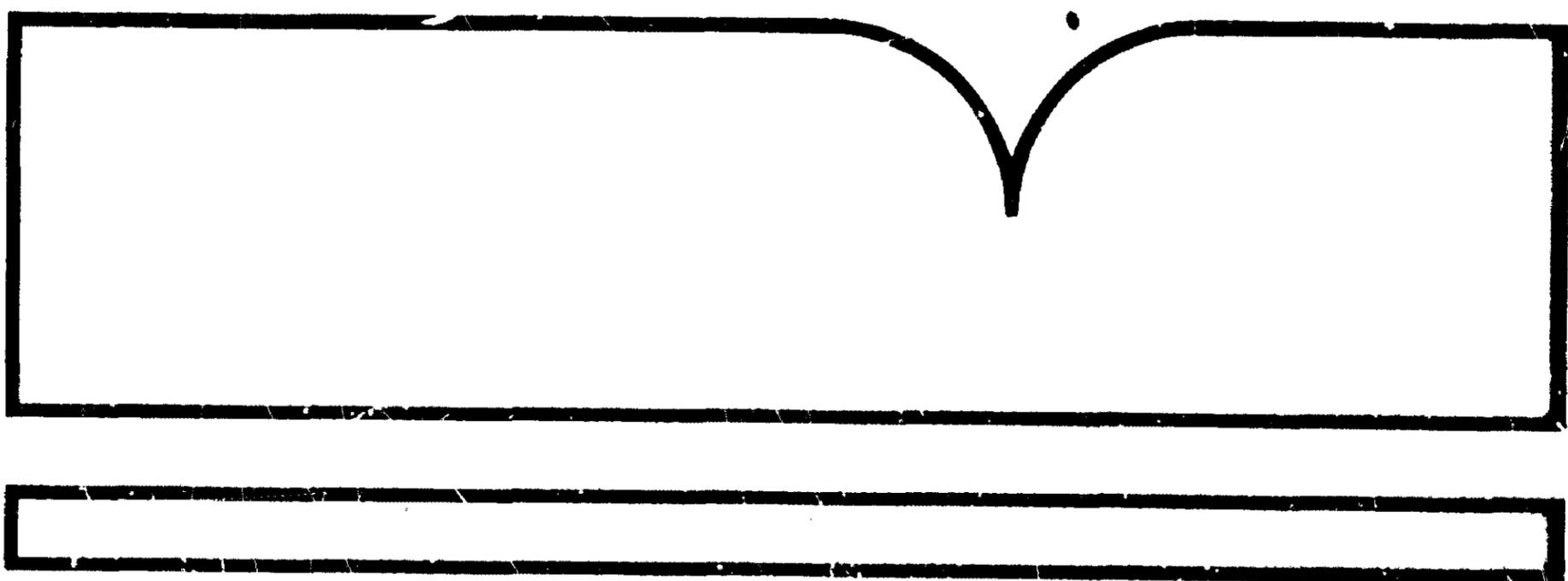


PB82-139379

Highway Accident Reports: Summary Format Issue
Number 2--October 1979-September 1980

(U.S.) National Transportation Safety Board
Washington, DC

20 Nov 81



U.S. Department of Commerce
National Technical Information Service

NTIS

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. NTSB-HAB-81-1		2. Government Accession No. PB82-139379		3. Recipient's Catalog No.	
4. Title and Subtitle Highway Accident Reports - Summary Format - Issue Number 2 -- 1980				5. Report Date November 20, 1981	
7. Author(s)				6. Performing Organization Code	
9. Performing Organization Name and Address National Transportation Safety Board Bureau of Accident Investigation 800 Independence Avenue, S. W. Washington, D. C. 20594				8. Performing Organization Report No.	
12. Sponsoring Agency Name and Address NATIONAL TRANSPORTATION SAFETY BOARD Washington, D. C. 20594				10. Work Unit No.	
				11. Contract or Grant No.	
15. Supplementary Notes The subject report was distributed to NTSB mailing lists: 8A, 8C and 16.				13. Type of Report and Period Covered 28 U. S. Highway accidents occurring during October 1979-September 1980	
				14. Sponsoring Agency Code	
16. Abstract The highway field activity for the second half of Fiscal 1980 included 28 highway accident investigations. This document contains summary reports and statements of probable cause of 24 of these reports and of 4 from the first half of FY 1980. The criteria for selection of accidents for investigation were accident severity (5 or more fatalities), technical problems with a national implication and public interest. The summary reports briefly state the facts and circumstances of each accident, a brief analysis of the facts and the probable cause developed through the analysis. These summary reports are for use in providing a Safety Board approved statement of probable cause in the public docket. As reported they have no statistical significance. For more detailed information concerning any individual report, the reader may review the complete reference file in the Public Inquiries Section, National Transportation Safety Board, 800 Independence Avenue, S. W., Washington, D. C. 20594.					
17. Key Words				18. Distribution Statement This document is available to the public through the National Technical Information Service, Springfield, Virginia 22161.	
19. Security Classification (of this report) UNCLASSIFIED		20. Security Classification (of this page) UNCLASSIFIED		21. No. of Pages 120	22. Price

FOREWORD

The reports included in this publication represent the findings of the National Transportation Safety Board's field level investigations of 28 highway accidents. These investigations were conducted pursuant to Section 304 (a)(1)(B) of the Independent Safety Board Act of 1974. Each report contains in narrative form the Board's factual findings and analysis leading to a probable cause.

The majority of accidents reported in this issue occurred in the second half of fiscal year 1980. Four additional highway accidents investigated by the Board during this period are not included herein, for they were still under investigation at the time of this printing. Those reports will be included in the next issue, which will cover the first half of fiscal year 1981.

Tables 1 and 2 on the following pages provide a breakdown of general causal and contributory factors, first in general as human, vehicular and environmental factors, and then, in specific terms in one category, human factors, for the preponderance of factors fell in that category. The reader should note that more factors than accidents are included in the tables, for most accidents have multiple causal or contributory factors. These breakdowns are for informational use only and have no statistical significance because of the small number of accidents reported herein. Table 3 provides a breakdown of general causal and contributory factors for Fiscal Year 1980, as published in Volumes 1 and 2.

As reports of the National Transportation Safety Board, the summary reports are subject to the limitation of 49 USC 1903(c):

"No part of any report or reports of the Board, relating to any accident or the investigation thereof, shall be admitted as evidence or used in any suit or action for damages growing out of any matter mentioned in such report or reports."

For those readers who wish more detailed information, the original factual reports are on file in the Washington, D.C., headquarters of the National Transportation Safety Board where they may be examined. These reports will be reproduced for a fee covering reproduction cost and postage. Orders for material also are subject to a user charge by the Board for special services, and such charge will be included in the bill.

Requests for copies of the factual reports should be forwarded to:

National Transportation Safety Board
Public Inquiries Section
Washington, D.C. 20594

TABLE OF CONTENTS

	Page
FOREWORD	ii
TABLE OF CONTENTS	iii
TABLES	
1. Causative and Contributing Factors	iv
2. Causative and Contributing Human Factors	vi
3. Causative and Contributing Factors - FY1980	ix
REPORTS OF ACCIDENTS BY DOCKET/ACCIDENT NUMBERS	
HY-221-79/MKC-80-F-H004	1
HY-223-79/LAX-80-F-H001	5
HY-224-79/NYC-80-F-H003	9
HY-234-80/ATL-80-F-H006	13
HY-246-80/NYC-80-F-H006	17
HY-247-80/ATL-80-F-H009	21
HY-248-80/ATL-80-F-H010	27
HY-250-80/ATL-80-F-H011	31
HY-251-80/MKC-80-F-H015	35
HY-252-80/ATL-80-F-H012	39
HY-253-80/NYC-80-F-H007	43
HY-257-80/MKC-80-F-H016	49
HY-260-80/MKC-80-F-H017	53
HY-263-80/NYC-80-F-H010	57
HY-265-80/LAX-80-F-H002	61
HY-270-80/LAX-80-F-H003	65
HY-272-80/DCA-80-F-H005	71
HY-273-80/ATL-80-F-H021	75
HY-274-80/ATL-80-F-H022	79
HY-275-80/LAX-80-F-H004	83
HY-276-80/LAX-80-F-H005	87
HY-277-80/ATL-80-F-H024	91
HY-278-80/MKC-80-F-H021	95
HY-280-80/ATL-80-F-H025	99
HY-283-80/LAX-80-F-H006	103
HY-285-80/LAX-80-F-H008	107
HY-288-80/LAX-80-F-H011	111
HY-289-80/LAX-80-F-H012	117

TABLE 1 - CAUSATIVE AND CONTRIBUTING FACTORS

	Cause			Contributing To Cause			To Severity		
	Human	Vehicle	Environment	Human	Vehicle	Environment	Human	Vehicle	Environment
<u>Side Collision</u>									
HY-221-79	X			X	X	X			
HY-250-80	X								
HY-257-80	2X			2X					
HY-260-80	X			X		X			
HY-263-80	X			X					
HY-265-80	X								X
HY-273-80	X					X			
HY-283-80	X			X			X	X	X
HY-289-80	X							2X	
<u>Head-on Collision</u>									
HY-247-80	X								2X
HY-248-80	X			2X					X
HY-252-80	X			X					
HY-272-80	X			X					
HY-274-80	X			X			X		
HY-277-80	X			X					
HY-278-80	X			2X					
HY-280-80	X					X	X		
<u>Collision with a Fixed Object</u>									
HY-223-79	X			2X					X
HY-234-80	X								
HY-246-80	X								
HY-253-80		X		X					
HY-285-80	X			X			X		X

NOTE: 2X indicates that the factor was mentioned twice.

TABLE 2 - CAUSATIVE AND CONTRIBUTING HUMAN FACTORS

	Cause	Contributing To Cause	To Severity
<u>Side Collision</u>			
HY-221-79	-failure to maintain directional control	-excessive speed	
HY-250-80	-failure to assure clear intersection before turning		
HY-257-80	-high speed -reckless driving	-alcohol impairment -driver fatigue	
HY-260-80	-failure to recognize insufficiency of sight distance for passing	-decision to pass vehicles traveling at speed limit	
HY-263-80	-failure to stop as required	-inattention to traffic	
HY-265-80	-failure to stop and yield right-of-way as required		
HY-273-80	-excessive speed		
HY-283-80	-failure to yield right-of-way	-inattention to driving task	-failure to use occupant restraints
HY-289-80	-failure to stop and yield right-of-way as required		
<u>Headon Collision</u>			
HY-247-80	-possible physical incapacitation		
HY-248-80	-failure to attend to driving task	-fatigue -alcohol impairment of judgment and driving ability	
HY-252-80	-vehicle passing maneuver in no passing zone	-alcohol impairment of efficiency and judgment	
HY-272-80	-wrong-way vehicle operation	-speed	
HY-274-80	-vehicle passing maneuver in no passing zone	-alcohol impairment of judgment and driving ability	-failure to use occupant restraints

TABLE 2 - CAUSATIVE AND CONTRIBUTING HUMAN FACTORS -2-

Contributing

	Cause	To Cause	To Severity
<u>Headon Collision - Cont'd</u>			
HY-277-80	-failure to maintain lateral lane position	-alcohol impairment of judgment and driving ability	
HY-278-80	-vehicle passing maneuver in no passing zone	-alcohol impairment of judgment and driving ability -decision to pass vehicles traveling near speed limit	-excessive speeds
HY-280-80	-vehicle operation in incorrect lane		
<u>Collision with a Fixed Object</u>			
HY-223-79	-failure to maintain vehicle on roadway	-alcohol impairment of judgment and driving ability -excessive speed for road conditions	
HY-234-80	-loss of vehicle control		
HY-246-80	-loss of directional control		
HY-253-80		-inadequate truck maintenance	
HY-285-80	-failure to maintain proper lane	-alcohol impairment of judgment and driving ability	-failure to wear occupant restraints
<u>Overturn</u>			
HY-224-79	-loss of directional control	-driver inattention	
HY-275-80	-sharp turning passing maneuver		
HY-276-80	-failure to reduce speed as required		

111

TABLE 2 - CAUSATIVE AND CONTRIBUTING HUMAN FACTORS -3-

	Contributing		
	Cause	To Cause	To Severity
<u>Rearend Collision</u>			
HY-251-80	-failure to perceive vehicle -failure to take appropriate avoidance action	-fatigue	
HY-270-80	-failure to react to standing vehicles -failure to stop short of standing vehicles	-driver fatigue	
HY-288-80	-speed too great for visibility conditions	-institutional policy of no signing -failure to assure clear distance behind	

TABLE 3 - CAUSATIVE AND CONTRIBUTING FACTORS - F Y 1980 *

	Cause			Contributing To Cause			To Severity		
	Human	Vehicle	Environ- ment	Human	Vehicle	Environ- ment	Human	Vehicle	Environ- ment
Side Collision	14			7	2	4	2	3	2
Headon Collision	16			12		2	5		3
Collision with a Fixed Object	6	1		5	1		1		2
Overturn	5	1		3					2
Rearend Collision	6			5					1
Highway Grade Crossing Collision	2			1		1			
TOTAL	49	2	0	33	3	7	8	3	10

* Summation of Vols. 1 and 2 - 1980
Covering 48 accidents

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : MKC-80-F-H004
Highway Docket Number : HY-221-79
Location : U.S. 31A south of Indiana State Route 46
Columbus, Indiana
Date : October 22, 1979
Time : 1831
Vehicle and Operator :
1. 1965 Mercury Comet
Operator: John T. Walker
Columbus, Indiana
2. 1976 Oldsmobile Cutlass
Operator: Edna J. Wendall
Columbus, Indiana
Injuries : 1 fatal
5 nonfatal
0 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the Mercury driver to maintain directional control due to his excessive speed for the wet weather conditions. Inadequate tire coefficient of friction, resulting from marginal tire tread depth, contributed to the occurrence of the accident.

INVESTIGATION

The Accident

On October 22, 1979, about 6:31 p.m., a 1965 Mercury Comet was traveling from the north to the south side of Columbus, Indiana on U.S. 31A at a calculated preimpact speed of 51 mph to 56 mph. About 600 feet south of the intersection of U.S. 31A and Indiana State Route 46, the rear end of the Mercury began to slide to the right, causing the front end of the car to cross into the northbound lanes. When the angle of the Mercury to the centerline of the road was about 90 degrees, a northbound 1976 Oldsmobile Cutlass struck the Mercury broadside. Impact speeds were calculated for both vehicles; the Mercury's was 24 mph and the Oldsmobile's, 18 mph, reduced from a preimpact speed of 30 mph.

The one passenger in the Mercury sustained fatal injuries. The driver of the Mercury and the four occupants of the Oldsmobile reported minor injuries.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>		<u>Passengers</u>		<u>Total</u>
	Mercury	Oldsmobile	Mercury	Oldsmobile	
Fatal	0	0	1	0	1
Nonfatal	1	1	0	3	5
None	0	0	0	0	0

Vehicle Information

The 1965 Mercury Comet was owned by the driver's father. It was equipped with a 302-cubic-inch V8 engine and automatic transmission. The Mercury was not equipped with occupant restraints. The right front tire had inadequate tread depth. All others were only marginally adequate, as indicated in the following table.

<u>Tire position</u>	<u>Tread depth (32's of an inch)</u>
left front	3-3-2-1
left rear	5-4-3-3
right front	1-0-1-1
right rear	6-5-3-3

The 1976 Oldsmobile Cutlass was owned by the driver. It was equipped with a V8 engine, automatic transmission and power front disc brakes. Though the Oldsmobile also was equipped with occupant restraints, shoulder straps in the front seat and lap belts in the rear, none was in use at the time of the accident.

Driver Information

The 16-year-old Mercury driver held a valid Indiana operator license with no restrictions which was issued him about two weeks before the accident.

The 44-year-old driver of the Oldsmobile held a valid Indiana operator license restricted to corrective lenses. A review of her driving record revealed no violations.

Highway Information

U.S. 31A is a north-south route through the Columbus, Indiana area. North of the accident area U.S. 31A is a four-lane highway. About 300 feet south of the intersection of U.S. 31A and State Route 46, the road begins to transition into two lanes on a seven-degree curve. White edgelines, solid yellow median lines and a dashed white centerline delineate the four-lane section. The two-lane section has solid white edgelines, a dashed yellow centerline and a solid yellow barrier line marking a no-passing zone for northbound traffic. The posted speed limit is 45 mph. The asphalt pavement from the intersection of State Route 46 and U.S. 31A to a point about 980 feet south was resurfaced in 1975. About 980 feet south of the intersection, a newer pavement surface began, this placed in the summer of 1979.

Tests

Sand patch tests were performed and surface friction measurements were made to assess the adequacy of the highway's drainage and texture. The first of two sand patch tests was on the older pavement, about 330 feet north of the impact area in the southbound lane's right wheel path. The texture depth indicated by this test was 0.00166 inch. The second test was conducted on the newer pavement, about 10 feet north of the impact area, also in the southbound lane's right wheel path. The texture depth indicated by this test was 0.00663 inch.

Surface friction measurements were made by the Indiana State Highway Commission Research and Training Center. The chosen test speed was 40 mph. Air temperature was 60 degrees, and the pavement temperature was 88 degrees. Several measurements were made at the following locations with the indicated results:

1. 360 feet north of the impact area in the southbound lane, right wheel path; result - average skid number (SN) = 24.2
2. 360 feet north of the impact area in the southbound lane, between wheel paths; result - average SN = 22.0
3. 360 feet north of the impact area in the southbound lane, right wheel path; result - average SN = 21.8
4. impact area in the northbound lane, left wheel path; result - average SN = 30.2
5. just south of the impact area and extending south for about .5 mile in the southbound lane, left wheel path; result - average SN = 35.9

Meteorological Information

At the time of the accident, heavy rain was falling in the area. Both drivers reported a steady rain which reduced visibility. The heaviest recorded rainfall was .43 inch between 4:00 p.m. and 5:00 p.m., and .25 inch from 5:00 p.m. to 6:00 p.m.

ANALYSIS

Using an equation from "Policy on Geometric Design of Rural Highways" published by the American Association of State Highway and Transportation Officials, the maximum safe speed in the curve where the Mercury went out of control was calculated to be 56.5 mph. Using the equations from a Federal Highway Administration report entitled, "Tentative Pavement and Geometric Design Criteria for Minimizing Hydroplaning," the minimum speed for hydroplaning was calculated to be 54 mph. Results of postaccident tests revealed friction quality, surface texture and drainage at the accident site were adequate for the safe operation of a vehicle at the posted speed limit of 45 mph, though the hydroplaning speed was slightly lower than the design speed for conditions existing at the time of the accident. Therefore, the Mercury driver, entering the curve at a calculated speed of 51 to 56 mph, not only was exceeding the posted speed limit, but also was dangerously close to the roadway's design limits. His inexperience with this vehicle and the vehicle's inadequate tire tread depth aggravated the situation and contributed to the driver's control problem.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the Mercury driver to maintain directional control due to his excessive speed, for the wet weather conditions. Inadequate tire coefficient of friction, resulting from marginal tire tread depth, contributed to the occurrence of the accident.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : LAX-80-B-H001
Highway Docket Number : HY-223-79
Location : Church Avenue near East Avenue
in Fresno, California
Date : November 17, 1979
Time : 0245
Vehicle and Operator :
1. 1972 Chevrolet Monte Carlo,
Operator: Calvin Laney
Fresno, California

Injuries : 5 fatal
0 nonfatal
0 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the Chevrolet driver, whose judgment and driving ability were impaired by alcohol, to maintain his vehicle on the roadway. Contributing to the cause of the accident was speed in excess of that safe for road conditions. Contributing to the severity of the accident was the intense fire fueled by natural gas escaping from a natural gas pipeline that was fractured in the accident.

INVESTIGATION

The Accident

On November 17, 1979, at 2:45 a.m., a 1972 Chevrolet Monte Carlo was westbound on Church Street in Fresno, California, at a speed estimated by witnesses to exceed 50 mph. Approaching the accident scene, the road curved slightly to the right, ascended about three feet to a railroad crossing and then straightened back toward the left as the street crossed the tracks. After crossing the railroad tracks, the Chevrolet ran off the right edge of the road, crossed a parking area and struck a building. Against the wall of the building were two natural gas meters which were displaced in the collision, resulting in a fractured natural gas supply line. The Chevrolet, resting over a natural gas jet was engulfed in flames when escaping gas vapors ignited.

Four of the five Chevrolet occupants died in the vehicle. A fifth escaped the burning vehicle but died 11 days later.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>	<u>Passengers</u>	<u>Total</u>
Fatal	1	4	5
Nonfatal	0	0	0
None	0	0	0

Vehicle Information

The two-door 1972 Chevrolet Monte Carlo was owned by Sylvester Melaneon, a neighbor of the driver who was not a passenger at the time of the accident. It was equipped with a V8 gasoline engine, power brakes and power steering and was reported to have been in good preaccident operating condition.

Primary collision damage was to the front of the Chevrolet. As the Chevrolet crashed into the building, the building's sheet metal wall folded around the sides of the car, preventing the two doors' opening. Fire, which could not be put out until 3 1/2 hours after the accident after the gas company excavated and shut off the supply line, consumed all flammables, soft metals and glass, except parts of the front tires, the grill and radiator. The gasoline tank was not ruptured or distorted.

Driver Information

The 31-year-old Chevrolet driver was unlicensed. California records showed he had been issued a Class 3 operator license in 1973, but there was no record to indicate it was renewed when it expired on the driver's birthdate in 1975. Postaccident toxicology testing revealed a blood alcohol content of 0.33 percent for the driver.

Highway Information

At the accident site, Church Avenue is a four-lane, blacktop roadway with 12-foot-wide travel lanes and a 12-foot-wide left turn storage lane for eastbound traffic. Lanes for traffic moving in the same direction are divided by dashed white lines. East- and

westbound lanes are delineated by a solid double yellow centerline. About 300 feet east of the crossing, advance white railroad crossing emblems were painted on both westbound lanes; a yellow- -black railroad advisory sign was posted to the right of the road about 270 feet east of the crossing to advise motorists of the four-track crossing ahead. At the time of the accident, the outermost westbound lane just east of the tracks was flooded from a long period of rainfall.

About 416 feet east of the point of impact, the roadway alignment curved slightly to the right such that the innermost westbound lane was on a tangent to the building struck by the Chevrolet. The roadway curved back to the left at the railroad tracks, which were elevated about three feet above street level. East Avenue intersects the north side of Church Street 75 feet west of the railroad tracks. Gouge marks in the curb at the northwest corner of the T-intersection of Church Street and East Avenue marked the point at which the Chevrolet ran off the road. The building struck stands in the northwest quadrant of the intersection. Tire tracks in the wet and muddy roadside headed straight to the building. No other marks attributable to the Chevrolet were identified on Church Street.

The posted speed limit through the area is 40 mph. It was dark at the time of the accident, and there was no artificial illumination at the scene.

Other Information

About one-half mile east of the accident site, according to a witness, the Chevrolet, traveling at a high rate of speed, passed another westbound vehicle which was stopped at a red traffic signal.

Toxicological results for the other Chevrolet occupants were negative.

ANALYSIS

Though the Chevrolet followed the route of the roadway as it veered right in approach to the railroad, it did not veer to the left again after crossing the railroad tracks. Instead, as evidenced by the straight line tire marks in the muddy off-road area, it continued on a tangent toward the roadside building. Because the tire tracks were partially covered by water, it could not be determined whether the wheels were rotating freely or being braked.

One factor that probably contributed to the Chevrolet driver's failure to keep his car on the roadway was the effect of alcohol on his judgment and driving ability. The National Highway Traffic Safety Administration's Highway Safety Program Standard No. 8, "Alcohol in Relation to Highway Safety," defines a driver as "intoxicated" or "under the influence of alcohol" when blood alcohol concentrations are 0.10 percent or higher by weight. 1/ According to "Chemical Tests and the Law." 2/

"... Regardless of normal reaction time, low concentrations of alcohol in the blood produce a definite lengthening of reaction time...."

1/ "Highway Safety Program Standard No. 8, Alcohol in Relation to Highway Safety, "U.S. Department of Transportation, National Highway Traffic Safety Administration, October 1, 1973.

2/ Donigan, R., "Chemical Tests and the Law," pgs. 286-287 and 294 as cited in National Transportation Safety Board Highway Accident Report, "Head-on Collision of Automobile and Pickup Truck, U.S. Route 64 near Perry, Oklahoma, February 23, 1980," NTSB-HAR-80-4.

"Early in alcohol influence (at blood alcohol concentrations of 0.04-0.08 percent) nerves which control coordinated activities of muscle groups become partially paralyzed. ... It is quite apparent that there is little question that ability to operate a motor vehicle safely is definitely impaired by the time the blood alcohol level reaches 0.10 percent.

Further evidences of his impaired judgment were his alleged failure to stop at the red traffic signal and his speed, which exceeded the posted speed limit and was too fast for a flooded roadway.

According to the County of Fresno-Office of Coroner, the four on-scene fatalities died from fire related injuries, leading to the possible conclusion that had they been able to escape from the vehicle, they may have been less seriously injured. The explosive, engulfing fire contributed to accident severity.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the Chevrolet driver whose judgment and driving ability were impaired by alcohol to maintain his vehicle on the roadway. Contributing to the cause of the accident was speed in excess of that safe for road conditions. Contributing to the severity of the accident was the intense fire fueled by natural gas escaping from a natural gas pipeline that was fractured in the accident.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : NYC-80-F-H003
Highway Docket Number : HY-224-79
Location : New York State Route 120 south of Whipoorwill
Crossing near North Castle, New York
Date : November 13, 1979
Time : 1431
Vehicle and Operator :
1. 1977 Dodge Tradesman 300 Maxivan schoolbus
Operator: Chappaqua Bus Co., Inc.,
Chappaqua, New York
Injuries : 0 fatal
0 nonfatal
7 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the loss of directional control of the schoolbus, resulting from failure to see debris in the roadway ahead before driving over it. Contributing to the cause was the driver's inattention to her driving duties.

INVESTIGATION

The Accident

About 2:30 p.m., on November 13, 1979, a 1977 Dodge Maxivan schoolbus occupied by a driver and six children, five to seven years old, was northbound on New York State Route 120 in North Castle, New York at a driver-estimated speed of 40 mph to 45 mph. The driver did not see a motor vehicle exhaust muffler lying on the roadway and ran over it. The bus swerved to the right, completely off the road; returned to the road headed toward the west shoulder; rotated clockwise about 230° after the driver corrected to the right; and overturned onto its left side off the east shoulder of the road, facing south. None of the occupants, all of whom were wearing seat belts, was injured.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>	<u>Passengers</u>	<u>Total</u>
Fatal	0	0	0
Nonfatal	0	0	0
None	1	6	7

Vehicle Information

The schoolbus was a 1977 Dodge Tradesman 300 Maxivan owned by Chappaqua Bus Company, Inc. of Chappaqua, New York. It was equipped with an eight-cylinder engine, a three-speed automatic transmission, power-assisted hydraulic brakes and power steering. All seats were equipped with seat belts.

When new, the van was converted by the Bus Conversion Corporation, Division of Spring Valley Dodge, Inc., of Spring Valley, New York for transporting school children. When placed in service, it was discovered that the upper and lower panes of glass in the second-from-front, left-side passenger window were broken. Both panes of glass were replaced with glass obtained from a local supplier whose invoice, dated July 11, 1978, indicated that two panes of safety glass had been purchased by Chappaqua Bus. A segment of glass from the bottom pane of the second-from-front, left-side passenger window, broken in this accident, bore a printed legend which read: "AS1 LAMINATED SAFETY GLASS," as did the unbroken upper pane. Examination of the broken segment revealed it was plate glass, however, rather than the "laminated safety glass" as labeled.

As a result of the overturn, there was some sheet metal deformation to the left side of the roof and the left rear corner of the bus body. The left half of the windshield was cracked and buckled outward at the upper left corner. The glass in the lower sash of the second-from-front, left-side passenger window was broken. None of the children nor the driver was injured by the broken glass. There was no deformation of interior equipment, including the seats.

Driver Information

The 40-year-old schoolbus driver held a valid New York chauffeur license with no restrictions, which authorized her to drive a schoolbus. Her driving record contained neither previous accidents nor traffic violation convictions. She had 20 years of driving experience, eight years of this as a schoolbus driver. Excluding the summer months,

she had been driving the bus involved in this accident since September 1978. A resident of Chappaqua, New York, she was familiar with the general area, as well as the specific route.

The schoolbus driver stated that she started driving about 7:15 a.m. on the day of the accident. She was en route from Armonk to Pleasantville on New York State Route 120 about 2:30 p.m., when the accident occurred.

In postaccident statements, she said she felt a bump and heard a loud noise as though she had hit something in the road. It startled her, she said, and the bus swerved to the right and off the road, traveled along the shoulder, then back onto the road. At this time the bus was out of control and headed for a utility pole. Her next recollection was of the bus coming to a stop on its left side, off the road and headed in the opposite direction. She said she had seen nothing on the road prior to feeling the bump. She recalled that she had attempted to brake at some point between the bump and overturning but did not know the specific site.

The schoolbus driver added that all of the children she transports are required to secure their seat belts immediately upon taking their seats. The driver indicated that the school regulation for the transportation of pupils states that passengers being transported in schoolbuses equipped with seat belts should wear them whenever the bus is in motion. Drivers, however, are not required to enforce the rule. They leave it up to the children on a voluntary basis. However, she does strictly enforce the regulation, and the bus does not move until all seat belts are fastened. She indicated that the children are very cooperative. All of the children had released their seat belts and gotten out of the bus through the rear doors before she extricated herself.

Highway Information

New York State Route 120, a two-lane, 22-foot-wide, asphalt-paved highway with 3.5-foot-wide paved shoulders, accomodates north- and southbound traffic through rolling rural terrain. East of the east-side shoulder, the ground slopes away from the roadway at a negligible grade for about 15 feet, then rises to a dilapidated stone wall about 25 feet east of the road. Approaching the accident site from the south, Route 120 is straight for 1,500 feet, with a seven percent ascending grade. The accident occurred on the transition from the seven percent grade to level road.

During the investigation, a damaged motor vehicle exhaust muffler was found on the west side of the roadway next to a guardrail, about 65 feet south of the point the schoolbus initially ran off the roadway. The muffler, which was not from the schoolbus, showed evidence of having been run over by a motor vehicle. There were no holes or bumps in the road surface through a half-mile approach to the accident scene.

The bus left yaw scuff marks on the roadway at about the point it reentered the road and began to rotate. Based on these marks, and the statement of an eyewitness who said the bus was moving slowly prior to overturn, the preoverturn speed was calculated between 30 mph and 38 mph.

ANALYSIS

The northbound schoolbus driver did not see an exhaust muffler lying on the road and ran over it. The resulting bumps and noise apparently startled her to such a degree that she lost directional control of the vehicle and ran off the right side of the road.

It would appear from the damage to the exhaust muffler chamber, flattened from both top and bottom with tire tread prints across both flattened areas, that the muffler had been lying transversely on the road when it was run over by a front wheel of the bus, then flipped over and the chamber again run over by a rear wheel.

It was not possible to determine from the tire marks made by the bus as it traveled through the grass, fallen leaves and bushes off the shoulder of the road whether there had been any significant brake application. The deformation of the sheet metal roof extension and left rear corner of the bus body is compatible with a slow-speed overturn. This is confirmed by the statement of the witness to the final few feet of travel and overturn of the bus.

The schoolbus occupants were uninjured because the driver insisted all wear the provided seat belts. Had she not enforced this rule or had the children been struck by shards of plate glass, serious injury could have resulted.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the loss of directional control of the schoolbus, resulting from failure to see debris in the roadway ahead before driving over it. Contributing to the cause was the driver's inattention to her driving duties.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : ATL-80-F-H006
Highway Docket Number : HY-234-80
**Location : Interstate 24 at milepost 139
near Monteagle, Tennessee**
Date : February 8, 1980
Time : 0220
Vehicle and Operator :
**1. 1977 White cab-over-engine truck tractor
towing a 1974 Trailmobile van-type semitrailer
Operator: Roger Dale Mansfield
Tallahassee, Florida**

Injuries : 3 fatal
0 nonfatal
0 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was loss of vehicle control by the unauthorized driver of the truck.

INVESTIGATION

The Accident

On February 8, 1980, about 2:20 a.m., an eastbound tractor-semitrailer transporting glass bottles was descending a 4.07-mile-long mountain grade on Interstate 24 near Monteagle, Tennessee at a witness-estimated speed of 40 mph to 50 mph. The witness stated that the top of the semitrailer was rocking from side to side as it passed his vehicle. About three miles downgrade, the driver of the tractor-semitrailer lost control of the vehicle just after traversing a six degree left curve. The tractor-semitrailer skidded about 160 feet to the east, partially overturned and skidded an additional 170 feet to the southeast, to a point where the front of the tractor struck a rock wall south of Interstate 24. With the front of the tractor in contact with the rock wall, the tractor-semitrailer skidded to a stop another 100 feet eastward.

The owner-driver of the truck picked up two hitchhikers at a truck stop in Nashville, Tennessee about midnight. One of the hitchhikers was driving the tractor-semitrailer at the time of the accident. All three tractor occupants were ejected and sustained fatal injuries.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>	<u>Passengers</u>	<u>Total</u>
Fatal	1	2	3
Nonfatal	0	0	0
None	0	0	0

Vehicle Information

The truck consisted of a 1977 International Road Commander cab-over-engine tractor and a 1974 Trailmobile tandem-axle, freight, van-type semitrailer. The tractor was equipped with a sleeper berth, a six-cylinder diesel engine, a 13-speed transmission and a standard air braking system. The driver and passenger seats were equipped with lap belts.

The tractor was owned by the truckdriver who was riding as a passenger at the time of the accident. The semitrailer was owned by Meat Dispatch, Inc. of Palmetto, Florida. The tractor was being operated under lease to Meat Dispatch, Inc.

Postaccident inspection of the tractor-semitrailer revealed no preexisting defect that would have caused the accident. Neither of the available lap belt restraints was used by the accident victims. Investigators found bottles of whiskey, rum and beer, marijuana and unidentified pills in the tractor.

Driver Information

The 29-year-old driver of the truck at the time of the accident was not the authorized driver 1/; he boarded the tractor as a hitchhiker in Nashville, Tennessee about two hours before the accident. 2/ He held a valid Florida chauffeur license with no restrictions,

1/ Title 49 CFR, Part 392.61 - The Federal Motor Carrier Safety Regulations require that no driver shall permit a motor vehicle to which he is assigned to be driven by any person not authorized to drive such vehicle by the motor carrier in control thereof.
2/ Title 49 CFR, Part 392.60 prohibits transportation of any person other than those specifically authorized by the carrier.

issued January 24, 1979. Previously he held a Missouri chauffeur license that was revoked on November 20, 1978; that license was due to expire on April 13, 1981. When applying for his Florida license, he falsely stated on his application that his Missouri license was valid.

Inquiry to the 50 states revealed that Missouri, Florida and California had records of traffic violations for this driver. No accident record was revealed. His driving record in those states revealed the following information:

Missouri

03/05/69 - Speed - Convicted
07/15/70 - License suspended
07/16/71 - Speed - Convicted
07/16/71 - Speed - Convicted
03/14/75 - Driving while license suspended - Convicted
04/10/75 - License revoked
05/27/77 - License revocation terminated
03/23/78 - License reinstatement
04/11/78 - No operators license - Convicted
07/24/78 - Speed - Convicted
11/12/78 - License suspended
11/20/78 - Issued order to pick up drivers license
02/21/80 - Status of drivers license - Revoked

California

10/09/79 - Exceeding posted speed
10/09/79 - Failure to appear in court on traffic charge

Florida

09/06/79 - Unlawful speed 65/55 - Conviction
09/06/79 - Unlawful speed 71/55 - Conviction

Highway Information

Interstate 24 is an east-west highway traversing Tennessee from the Kentucky state line to Chattanooga, Tennessee. The accident occurred about three miles east of Monteagle, Tennessee. This section of highway traverses mountain terrain for several miles. The highway consists of two bituminous-paved roadways cut from the side of the mountains. The winding roadways are divided by the mountain range and extend about five miles in each direction from the mountain peak at Monteagle to the flatlands below. Each roadway consists of three 12-foot-wide travel lanes. The left side of each roadway on the eastern slope is abutted by the rock wall mountainside; earthen shoulders of varying widths, guardrails or rock wall cuts parallel the right side. A solid white painted line on the far right side of the traffic lanes and a solid yellow line on the far left side delineate the outer edges of the traffic lanes; broken white painted lines separate the three traffic lanes. The posted speed limit is 55 mph.

The accident occurred on the eastern slope in the eastbound lanes, three miles down a 4.07-mile-long section of highway that descends a 5.6 percent grade from Monteagle. Two signs near the crest of the grade warn eastbound motorists: "STEEP DOWNGRADE - Trucks Use Lower Gear." One mile downgrade, a series of five signs begins, advising truckdrivers of a runaway truck ramp located three miles downgrade. At the time of the accident, the signs advised that the truck ramp was closed. The accident occurred 57 feet east of the 873-foot-long, six-degree left curve that passes the truck ramp entrance. The rock wall struck by the tractor-semitrailer parallels the south side of the roadway between the left curve at the truck ramp entrance and a right curve about 300 feet beyond.

Medical and Pathological Information

The three truck occupants died from impact injuries sustained in the accident. The two passengers died at the scene; the driver died 16 days later, never regaining consciousness. Toxicology tests on the three were negative for alcohol.

ANALYSIS

Meat Dispatch, Inc. operates as a motor common carrier in interstate commerce, and its operation thus is subject to the Federal Motor Carrier Safety Regulations (FMCSR). Since the driver-owned tractor was under lease to Meat Dispatch, the assigned driver violated the FMCSR by permitting passengers to ride in the vehicle and by permitting a person to drive the tractor who had not been authorized to drive the vehicle by Meat Dispatch.

The driver of the truck at the time of the accident had a lengthy history of disregard for traffic safety laws. His apparent willingness to operate a vehicle on which he was unauthorized was another indication of his irresponsibility.

Though the speed of the tractor-semitrailer as estimated by the witness was within the posted limit of 55 mph, it apparently was excessive for the driver's capabilities as evidenced by the observed rocking and swaying of the semitrailer.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was loss of vehicle control by the unauthorized driver of the truck.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : NYC-80-F-H006
Highway Docket Number : HY-246-80
Location : New Jersey Turnpike at milepost 107.6
near Newark, New Jersey
Date : April 9, 1980
Time : 0745
Vehicle and Operator :

1. 1978 Ford LN9000 truck tractor
towing a flatbed semitrailer
Operator: John V. Kevany
Woodside, New York
2. 1961 GMC bus
Operator: Domenico Bus Service, Inc.
Bayonne, New Jersey
3. 1973 Lincoln
Operator: Peter A. Guglielmi
Upper Saddle River, New Jersey

Injuries : 0 fatal
4 nonfatal
51 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the truckdriver's loss of directional control as he attempted a passing maneuver in rainy weather.

INVESTIGATION

The Accident

On April 9, 1980, about 7:45 a.m., a Ryder tractor-flatbed-semitrailer was northbound in the righthand lane of the New Jersey Turnpike, a six-lane highway with a concrete median barrier separating the north- and southbound lanes. Upon overtaking another northbound truck, the Ryder truckdriver pulled into the center lane to pass it on the left. The Ryder truckdriver lost control of the truck; it jackknifed and collided with the barrier. Upon impact, a section of concrete broke out of the barrier and struck the windshield of a southbound 1973 Lincoln, injuring its two occupants. Collision with the barrier separated the front axle and wheels from the Ryder tractor; the axle and wheels recrossed the northbound lanes and came to rest in a breakdown lane to the far right. The rest of the tractor-semitrailer came to rest blocking the center, right and breakdown lanes. As it attempted to avoid the truck, a northbound 1961 GMC commuter bus operated by Domenico Bus Service, Inc. ran into the right rear corner of the stopped semitrailer.

The driver and passenger in the Lincoln, the bus driver and the truckdriver sustained minor injuries. No bus passenger reported injury.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>			<u>Passengers</u>			<u>Total</u>
	Lincoln	Truck	Bus	Lincoln	Truck	Bus	
Fatal	0	0	0	0	0	0	0
Nonfatal	1	1	1	1	0	0	4
None	0	0	0	0	0	51*	51

* No exact passenger count was available, but the 51-passenger model was described as carrying a capacity load.

Vehicle Information

The tractor-flatbed-semitrailer was owned by Ryder Truck Rental, Inc. and leased to and operated by Federal Express of Long Island City, New York. The tractor was a two-axle 1978 Ford, model LN 9000, equipped with a Cummins diesel engine, Fuller transmission and air mechanical drum brakes. Postcrash inspection determined that the transmission was in the fifth position, providing a speed range of 45 mph to 64 mph. The semitrailer was a 26-foot-long, single axle 1971 Fruehoff flatbed equipped with air mechanical drum brakes. The gross vehicle weight of the tractor, semitrailer and cargo was about 36,000 pounds. The front of the tractor was severely deformed to the left; the trailer sustained minor damage only.

Postaccident vehicle inspection of the tractor-flatbed-semitrailer revealed no preexisting mechanical condition that could have contributed to the cause of the accident.

The 1961 GMC, model 5302, 51-passenger commuter bus was owned and operated by Domenico Bus Service, Inc., of Bayonne, New Jersey. It was transporting a capacity load at the time of the accident.

The 1973 Lincoln sedan was owned by the driver. Damage was limited to a broken windshield and minor sheet metal and paint damage.

Driver Information

The 26-year-old tractor-semitrailer driver held a valid Class 1 and 7 New York motor vehicle driver license with no restrictions. His driving record revealed no traffic violation or accident involvement during the past three years. His only experience as a truckdriver was his employment at Federal Express, for which he had worked since March 4, 1980. He had driven the route on which the accident occurred at least 25 times before the date of the accident.

The 34-year-old bus driver held a valid New York driver license. The 37-year-old Lincoln driver held a valid New Jersey driver license with no restrictions.

Highway Information

Through the accident area, the New Jersey Turnpike is an elevated, six-lane divided highway, with three 12-foot-wide, asphalt-paved travel lanes and a paved 12-foot-wide breakdown lane in either direction. The opposing lanes are separated by a 4-foot-wide median with an MB5-type concrete median barrier. The right side of the elevated roadway also is protected by an MB5-type concrete barrier. The alignment of the highway in the area of the accident is north-south, straight and on an approximate three percent ascending grade. It was raining at the time of the accident, and the roadway was wet. The posted legal speed limit is 55 mph.

The median barrier was designed in compliance with the guidelines established by the American Association of State Highway and Transportation Officials (AASHTO). Though most such barriers have been designed for automobiles weighing no more than 4,000 pounds, it has been demonstrated that MB5-type barriers can safely redirect a tractor-semitrailer weighing 48,800 pounds at a moderate impact speed of 35 mph to 45 mph and at an impact angle of 15 degrees to 19 degrees. ^{1/}

ANALYSIS

Damage to the front end of the tractor indicated it struck the median barrier at an angle of at least 110 degrees. The MB5 barrier was not designed to withstand such impact, particularly at an impact speed greater than that considered moderate under AASHTO guidelines, even though vehicle weight was more than 12,000 pounds less than the AASHTO maximum.

The reason the truckdriver lost vehicle control could not be determined. Postaccident vehicle inspection ruled out mechanical defect. Neither was the driver's relative lack of experience driving a tractor-semitrailer considered a positive contributory factor. The driver's physical capabilities apparently were not a factor, though no postaccident blood alcohol analysis was conducted. The skid resistance properties of the highway were not determined, so no positive relationship between wet roadway and loss of control could be established or refuted.

^{1/} American Association of State Highway and Transportation Officials, Guide for Selecting, Locating, and Designing Traffic Barriers, Appendix C, Table C-2, Page 226.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the truckdriver's loss of directional control as he attempted a passing maneuver in rainy weather.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : ATL-80-F-H009
Highway Docket Number : HY-247-80
Location : Interstate 40 at milepost 31
near Canton, North Carolina
Date : April 5, 1980
Time : 1300
Vehicle and Operator :

1. 1979 GMC cab-over-engine tractor
Operator: American Farm Lines
Oklahoma City, Oklahoma
2. 1978 Subaru A66L stationwagon
Operator: Charles J. Wilson
Spruce Pine, North Carolina

Injuries : 5 fatal
0 nonfatal
0 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the possible physical incapacitation of the truckdriver which caused him to lose control of the tractor. Contributing to the severity of the accident was the absence of a median barrier. Contributing to the severity of the injuries of the Subaru passenger seated in the right front seat of the vehicle was the postaccident fire.

INVESTIGATION

The Accident

About 1:00 p.m., on April 5, 1980, a 1979 GMC truck tractor was eastbound on four-lane Interstate 40 near Canton, North Carolina. A 1978 Subaru stationwagon with four occupants was westbound on Interstate 40, en route from the occupants' home in Spruce, North Carolina to the mountains in the western part of the state. As the two vehicles neared milepost 31 from opposing directions, the tractor crossed the 12-foot median and struck the Subaru head-on.

Postimpact fire destroyed both vehicles. All four Subaru occupants and the tractor's lone occupant died.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>		<u>Passengers</u>		<u>Total</u>
	Tractor	Subaru	Tractor	Subaru	
Fatal	1	1	0	3	5
Nonfatal	0	0	0	0	0
None	0	0	0	0	0

Vehicle Information

The 1979 GMC tandem-axle, cab-over-engine style tractor was operating under lease from Atlantic Coast Leasing Company, a subsidiary of Appalachian Freight Lines, to American Farm Lines. It was equipped with a six-cylinder diesel engine, a 10-speed Fuller Roadranger transmission and a standard air braking system.

Inspection and maintenance records from American Farm Lines indicated that the truck was placed in service new about January 1, 1980. Those records also indicated that both American Farm Lines and Appalachian Freight Lines had regularly inspected and performed minor repairs to the vehicle. An inspection of the vehicle by Appalachian Freight Lines before it departed Bean Station, Tennessee on the day of the accident revealed no mechanical defects. Postcrash inspection corroborated Appalachian Freight Lines' statement of preaccident roadworthiness.

The 1978 Subaru was a four-door, model A66L, stationwagon. It was equipped with two bench seats, a four-cylinder engine and automatic transmission. There was no indication that precrash mechanical condition of the stationwagon contributed to the accident.

According to a witness, the driver of an automobile following the tractor as it approached the accident site, the tractor was traveling "normal, with the flow of traffic." Just before reaching the accident site, the witness said, the tractor suddenly veered from the inside eastbound lane and entered the median. It rotated counterclockwise as it crossed the median and then moved through the westbound lane in a northeasterly direction, colliding with the Subaru in the outside westbound lane.

Following impact, the tractor continued moving northward and came to rest overturned about 40 feet north of the roadway. The impact forced the front of the Subaru to rotate clockwise and move northward with the truck. The Subaru came to rest upright facing north, with the rear truck frame penetrating its left windshield area.

According to a witness, the tractor engine continued to run after both vehicles came to rest. Onlookers saw fuel pumping from a broken fuel line on the tractor and running toward the rear of the tractor and the Subaru. Fire soon broke out in the engine of the tractor and engulfed both vehicles. Although belt-type restraints were available for all persons involved in the accident, fire damage precluded determining whether any were in used at the time of the collision.

Driver Information

The 53-year-old truckdriver held a valid North Carolina chauffeur license that was restricted to the wearing of corrective lenses. The license authorized him to drive the tractor he was driving at the time of the accident. His driving record in North Carolina revealed no traffic violations or accidents. He retired from the U.S. Navy in 1973 after about 27 years of military service. According to his wife, he drove heavy motor vehicles while in the Navy. Between 1976 and 1979, he was employed by a lumber company for whom he operated heavy equipment in the lumber yard. He also drove a tractor-semitrailer part time. On February 18, 1980, Atlantic Coast Leasing employed him as a truckdriver.

The 46-year-old Subaru driver held a valid North Carolina driver license with no restrictions. His driving record revealed no traffic violations or accidents.

Medical and Pathological Information

A blood alcohol test conducted for the driver of the Subaru revealed a blood alcohol level of 0.04 percent. Toxicological reports for the truckdriver were negative for barbituates, cocaine, opiates and blood ethanol.

When the truckdriver applied for his job with American Farm Lines, he was required to undergo a medical examination and meet certain minimum physical standards as required by Part 391 of the Federal Motor Carrier Safety Regulations (FMCSR). He was examined by a doctor in Wilmington, North Carolina on February 14, and 15, 1980 and again on February 18 prior to his approval for employment by American Farm Lines. The examining doctor never had met the driver until that time.

According to information the driver furnished the doctor during the examination, he had no past health history of fainting, ulcers or diabetes. Contrary to that information, however, medical records showed he had a past history of each of those medical problems. The doctor's examination on February 14, 1980 revealed that the driver had an elevated blood pressure that exceeded the suggested maximum blood pressure requirement of the FMCSR for an interstate truckdriver. The doctor refused to approve the man as an interstate truckdriver and gave him a medication, Regroton, to reduce his blood pressure. The prescription for the Regroton was dated February 14, 1980; it prescribed 30 tablets and instructed the driver to take 1 tablet immediately and each morning thereafter. The driver filled the prescription the same day at a drug store in Smithfield, North Carolina.

He returned to the Wilmington doctor a second time on February 15, 1980. On that visit, the doctor again found his blood pressure elevated and again refused to approve him as an interstate driver. The driver returned to the Wilmington doctor the third time on February 18, 1980, at which time his blood pressure was reduced to 150/90. The doctor signed a Medical Examiner's Certificate attesting that the driver was physically qualified to drive a motor vehicle in accordance with the requirement of Part 391.41(b) of the FMCSR. The driver was approved for employment by American Farm Lines and began driving a tractor-semitrailer unit under lease to that company.

On March 14, 1980, the truckdriver refilled the Regroton tablets. If he took the Regroton each day as instructed, he would have used the last of the 50-pill prescription on April 3, 1980, just two days before the accident. According to the 33rd edition of the Physicians' Desk Reference (PDR), Regroton tablets include 50 milligrams of chlorthalidone. The PDR advises that "Latent diabetes mellitus may become manifest during chlorthalidone administration."

Medical records revealed that the truckdriver received medical services from two physicians and one hospital in Smithfield, North Carolina and a U.S. Air Force Base at Goldsboro, North Carolina during a seven-year period prior to the accident. The records indicated he suffered from a variety of medical problems during that period; they included fainting spells, gastrointestinal ulcers, diabetes and obesity.

With the exception of the right front passenger in the Subaru, all involved died of multiple injuries, primarily in the chest and abdomen areas, according to reports of the Chief Medical Examiner of North Carolina. The right front Subaru passenger, though she too sustained severe impact injury, died of extensive burns.

Highway Information

Interstate Route 40 at the accident site consisted of two bituminous-paved highways divided by a 12-foot-wide, 4-inch-high, yellow-painted concrete median. The median had oval curbs at each outer edge. Each roadway consisted of two 12-foot-wide through lanes, with 10-foot-wide paved emergency lanes on the outside and 2-foot-wide emergency lanes abutting the curbed median. The traveled roadway was delineated from the emergency lanes by a solid white line on the right edge and a solid yellow line on the left; a broken white centerline separated the two lanes. The accident site was located on a level, tangent section of roadway; there were no sight restrictions.

At the time of the accident, the roadway was dry. The posted speed limit was 55 mph.

Postcrash inspection of the roadway revealed that the truck made 293 feet of tire impressions, the Subaru 33 feet, prior to collision. Two parallel dual tire braking marks from the truck began in the inside eastbound lane and continued east for 208 feet 6 inches. At that point, the tire impressions changed to yaw marks, arcing to the right and continuing 84 feet 6 inches across the median and the westbound lanes to the point of impact with the Subaru. Uninterrupted straight skidmarks from the Subaru extended 33 feet eastward in the outside westbound lane from the point of impact. Two deep pavement gouges near the solid white line that delineated the north edge of the westbound lanes from the emergency lane marked the initial point of impact. A burned grass area north of the pavement marked the location where both vehicles came to rest and burned.

ANALYSIS

Initial precrash marks on the pavement made by the tractor were dual tire marks, showing the full tread design of the tire and indicating that the wheels were still rotating but that hard braking was being applied by the driver. In view of the tractor's braking capability, the tires would have been skidding on the pavement had the brakes been automatically applied by the automatic emergency brake on the tractor. A witness who had been following the tractor for about five miles in his automobile stated that the tractor had been traveling routinely in the inside eastbound lane before it suddenly crossed the median without any prior movement. This suggests that the driver had experienced a sudden vehicle control problem.

The truckdriver's history of high blood pressure, diabetes and obesity made him susceptible to periodic fainting spells. Considering the lack of precrash tractor or roadway defects, in combination with the driver's medical history, it is assumed that the truckdriver suffered a sudden and unidentified physical incapacitation that caused him to suddenly apply the truck brakes, resulting in the loss of vehicle control. The loss of control permitted the truck to cross the median into the opposing lanes of traffic.

The North Carolina Department of Transportation has apportioned funds to install a New Jersey type median barrier along a section of Interstate 40 that includes the accident site. Presence of a barrier may have prevented the truck from crossing the roadway.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the possible physical incapacitation of the truckdriver which caused him to lose control of the tractor. Contributing to the severity of the accident was the absence of a median barrier. Contributing to the severity of the injuries of the Subaru passenger seated in the right front seat of the vehicle was the postaccident fire.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : ATL-80-F-H010
Highway Docket Number : HY-248-80
Location : Florida State Route 40 near Cone Road
near Ormond Beach, Florida
Date : April 19, 1980
Time : 2355
Vehicle and Operator :
1. 1975 Chevrolet Camaro
Operator: Brian Scott Riley
New Hudson, Michigan
2. 1972 Pontiac GTO
Operator: Roger Paul Babbitt
Brunswick, Georgia
Injuries : 6 fatal
1 nonfatal
0 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the Chevrolet driver's failure to attend to the driving task due to fatigue and alcohol impairment of judgment and driving ability. Contributing to the severity of injury to the surviving Chevrolet occupant was the postcollision outbreak of fire.

INVESTIGATION

The Accident

On April 19, 1980, about 11:55 p.m., a 1975 Chevrolet Camaro was eastbound on Florida State Route 40 near Ormond Beach, Florida. A 1972 Pontiac GTO was westbound on the same two-lane highway. After the Pontiac traversed a left curve and traveled about 150 feet over the connecting flat tangent, the eastbound Chevrolet crossed the centerline and struck the Pontiac left front to left front.

The Chevrolet caught fire and burned completely. Passersby pulled the Chevrolet passenger from the burning car. He survived. The Chevrolet driver and all occupants of the Pontiac died from impact injuries.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>		<u>Passengers</u>		<u>Total</u>
	<u>Pontiac</u>	<u>Chevrolet</u>	<u>Pontiac</u>	<u>Chevrolet</u>	
Fatal	1	1	4	0	6
Nonfatal	0	0	0	1	1
None	0	0	0	0	0

Vehicle Information

The 1975 Chevrolet Camaro was owned by the driver. It was equipped with an eight-cylinder engine, automatic transmission and power front disc and rear drum brakes. Neither of the available combination lap belt-shoulder strap occupant restraints was in use at the time of the accident. Crash and fire damage destroyed the Chevrolet to the extent it was impossible to determine the ignition source of the fire.

The 1972 Pontiac GTO was owned by the driver. It was equipped with an eight-cylinder engine, automatic transmission, power steering and power front disc and rear drum brakes. Seat belt occupant restraints were available for all Pontiac occupants, but none were in use. Impact damage totally destroyed the vehicle.

Driver Information

The 22-year-old driver of the Chevrolet held a valid Michigan operator license. After work the day before the accident he and a friend left South Lyon, Michigan, bound for Daytona Beach, Florida. They drove about 260 miles to Cincinnati, Ohio and stopped for the night. On the day of the accident, the Chevrolet owner's friend drove for about 12 hours. Around 8:00 p.m., the owner relieved him and drove until the accident occurred. In a 15-hour period they had traveled about 890 miles for a sustained average of about 59.33 mph.

The 19-year-old Pontiac driver held a valid Georgia operator license. The Pontiac occupants left Ormond Beach shortly before the accident.

Postmortem blood analyses for both drivers revealed a blood alcohol concentration (BAC) of 0.17 percent for the Chevrolet driver and 0.14 percent for the Pontiac driver.

Highway Information

Florida State Route 40 is a two-lane, east-west roadway which traverses generally flat terrain and moderate curves. The posted speed limit is 55 mph. Traffic lanes are 12 feet wide and are bordered by 15-foot grassy shoulders and 15-foot grassy embankments. In the accident area, the lanes are separated by a solid yellow centerline with a no-passing-zone marking for westbound traffic. Raised reflectorized delineators are spaced in pairs at intervals near the center of the roadway, and white lines delineate the pavement edges.

At the time of the accident the roadway surface was dry. It was dark, and there was no artificial illumination.

ANALYSIS

On the day of the accident, the driver of the Chevrolet had been traveling steadily for more than 15 hours when the accident occurred. He began the trip to Florida from Michigan the day before the accident, embarking immediately after working a full eight-hour day. Having traveled about 1,150 miles in less than 36 hours and at high speeds, the Chevrolet driver was undoubtedly fatigued at the time of the accident.

It is not known how often or for how long the vehicle stopped during this 15-hour period. It is known that it stopped at least once to change drivers. The fuel range of the Chevrolet is around 500 miles, so there had to be at least one other stop for fuel. It is reasonable to assume that during one or both of these stops the occupants took time to get something to eat. If the combined stops aggregated one hour, a very conservative estimate, the vehicle traveled about 890 miles in 14 hours at an average speed of about 63.57 mph. The severity of impact damage to both vehicles also attests to high speed impact. Sitting for 12 hours in the car would contribute to fatigue and a lack of alertness in subsequent sustained high-speed driving.

The Chevrolet driver's alertness was further affected by his BAC of 0.17 percent. The National Highway Traffic Safety Administration's Highway Safety Program Standard No. 8, "Alcohol in Relation to Highway Safety," defines a driver as "intoxicated" or "under the influence of alcohol" when blood alcohol concentrations are 0.10 percent or higher by weight. 1/ According to "Chemical Tests and the Law": 2/

. . . Regardless of normal reaction time, low concentrations of alcohol in the blood produce a definite lengthening of reaction time. . . .

Early in alcohol influence (at blood alcohol concentrations of 0.04-0.08 percent) nerves which control coordinated activities of muscle groups become partially paralyzed. . . . It is quite apparent that there is little question that ability to operate a motor vehicle safely is definitely impaired by the time the blood alcohol level reaches 0.10 percent.

Considering a BAC of 0.14 percent and the late hour raises the question of the alertness of the Pontiac driver. Assuming both vehicles to be traveling at or near

1/ "Highway Safety Program Standard No. 8, Alcohol in Relation to Highway Safety," U.S. Department of Transportation, National Highway Traffic Safety Administration, October 1, 1973.

2/ Donigan, R. "Chemical Tests and the Law," pp. 286-287 and 294 as cited in National Transportation Safety Board Highway Accident Report, "Head-on Collision of Automobile and Pickup Truck, U.S. Route 64 near Perry, Oklahoma, February 23, 1980," NTSB-HAR-80-4.

the posted speed limit, there was a closing speed of around 100 mph (147 feet per second). After the Pontiac rounded the left curve, it traveled about 150 feet of straight, level road before colliding with the Chevrolet. The terrain was flat and open, and it is entirely possible that an alert driver rounding the curve might have picked up the reflection of the Chevrolet headlights on the trees bordering the highway. Even then, the time frame would have been extended only to about two seconds, insufficient time for even a sober, alert driver to perceive, comprehend and take evasive action. Consequently, it is concluded that the alcohol impairment of the judgment and driving ability of the Pontiac driver was not a contributing factor in the cause of this accident.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the Chevrolet driver's failure to attend to the driving task due to fatigue and alcohol impairment of judgment and driving ability. Contributing to the severity of injury to the surviving Chevrolet occupant was the postcollision outbreak of fire.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : ATL-80-F-H011
Highway Docket Number : HY-250-80
Location : U.S. Highway 27 at Central Avenue
near Lake Wales, Florida
Date : May 4, 1980
Time : 2005
Vehicle and Operator :

1. 1976 Pontiac Grand Prix
Operator: Shui Cheong Cho
New York City, New York
2. 1970 International tractor
towing a flatbed semitrailer
Operator: Kenneth R. Harrison
Disputanta, Virginia

Injuries : 6 fatal
2 nonfatal
0 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the inexperienced Pontiac driver to assure that the intersection was clear of oncoming traffic before executing a left turn through the intersection.

INVESTIGATION

The Accident

On May 4, 1980, about 8:05 p.m., six occupants of a 1976 Pontiac Grand Prix were traveling south on four-lane, divided U.S. 27 from Disney World near Orlando, Florida, to their home in Lakes Wales, Florida. A 1980 International tractor with a flatbed-type semitrailer was northbound, en route from Immokalee, Florida to Columbia, South Carolina. The truck was occupied by its driver and one passenger.

As the two vehicles simultaneously approached intersecting Central Avenue, 0.1 mile west of Lake Wales, the traffic signals were green for U.S. 27 traffic. Witnesses stated that the Pontiac slowed and moved into the left-turn lane as it approached the intersection, while the opposing truck approached in the outside through lane at an estimated speed of 40 mph - 45 mph. The Pontiac moved into the intersection without stopping, appeared to hesitate momentarily before crossing the northbound lanes of U.S. 27 and then accelerated into the path of the oncoming truck. The truck struck the automobile broadside in the outside northbound lane of the highway. Witnesses stated that they heard the sound of the truck air brakes being applied, saw smoke from the truck's tires and heard its horn sound just before the crash. The truckdriver stated that the front seat Pontiac occupants looked straight ahead at all times, never noting the truck's presence.

After impact, the front of the tractor overrode the right side of the Pontiac, and the semitrailer separated from the tractor. The vehicles remained in contact as the Pontiac was forced sideways about 160 feet before it struck a guardrail off the east shoulder of the highway in the northeast quadrant of the intersection. The vehicles came to rest with the Pontiac on its left side atop the damaged guardrail and beneath the right front of the upright tractor; the semitrailer was upright with its front end resting on the rear of the tractor.

All six Pontiac occupants were crushed inside their vehicle and were dead at the scene. The two truck occupants sustained minor injuries.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>		<u>Passengers</u>		<u>Total</u>
	Pontiac	Truck	Pontiac	Truck	
Fatal	1	0	5	0	6
Nonfatal	0	1	0	1	2
None	0	0	0	0	0

Vehicle Information

The 1976 Pontiac Grand Prix two-door hardtop was owned by the brother of the driver. It was powered by a V8 engine and was equipped with an automatic transmission, power steering and power brakes. The two front bucket seats and the rear bench seat were equipped with lap belts. Postcrash inspection of the Pontiac did not reveal any mechanical defects that would have caused the accident.

The truck, which consisted of a 1970 International cab-over-engine tandem-axle tractor and a 40-foot-long flatbed trailer, was owned by Harrison Produce of Petersburg, Virginia. The tractor was equipped with brakes on the tandem axle, a diesel engine and 13-speed Fuller Roadranger transmission. The tractor-semitrailer unit was equipped with a standard air brake system, and the gross weight of the truck was about 74,640 pounds. Postcrash inspection of the truck did not reveal any mechanical defects that would have contributed to the accident.

Driver Information

The 31-year-old Pontiac driver held a valid Florida operator license with no restrictions. He was a Chinese immigrant who entered the United States about 1 1/2 years before the accident. Although he was a resident of New York City, he spent much of his time visiting his brother in Lake Wales. According to the brother, the driver drove through the involved intersection on many occasions.

Reportedly, the driver learned to drive in his native Hong Kong, where British vehicles equipped with steering wheels on the right side of the automobiles are prevalent and driving rules require that vehicles travel on the left side of a two-lane roadway. He reportedly drove "some" in New York City. New York had no record of having issued him a license. He was issued a restricted operator license by Florida on August 24, 1979. According to the 1978 edition of the Florida Drivers Handbook, restricted operator licenses are issued to persons who are at least 15 years of age and "to those persons 16 years or older who have passed the test for vision, road rules and road signs for the purpose of learning to drive." On one occasion, the driver failed the required written test but passed a second time and so was issued the restricted license. While holding the restricted license, he took the required driving test and failed. He took the driving test a second time and passed and was then issued a nonrestricted Florida operator license. This was on May 1, 1980, just three days before this accident. His driving record from Florida revealed no accident or traffic violation notations.

The 26-year-old truckdriver held a valid Virginia driver license with no restrictions. It authorized him to operate the tractor-semitrailer unit he was driving at the time of the accident. His driving record in Virginia revealed a 30-day suspension for reckless driving in 1976 and a speeding conviction in 1979.

Highway Information

U.S. 27 is a north-south highway which traverses central Florida from the Georgia state line to Miami. Central Avenue is a two-lane east-west street extending from downtown Lake Wales to its western suburb. At the time of the accident, U.S. 27 consisted of two bituminous paved roadways divided by a 60-foot-wide grass median that extended several miles in each direction from the Central Avenue intersection. At the intersection, the pavement of each roadway widened to four lanes in each direction. The inside lanes were marked for left turns, the outside lanes for right turns and the two center lanes for through traffic. The tangent section of roadway was level. At the time of the accident, roadway construction to add new left-turn lanes for both north- and southbound traffic was underway at the intersection. Fill dirt for the new lanes had been added to the median adjacent to the pavement of each roadway. Actual work on the construction project had stopped for the weekend.

Solid white lines separated the travel lanes from the outer pavement edge. White arrows painted on the pavement directed traffic in the turn lanes. North-south traffic at the intersection was controlled by single-faced traffic signals suspended above the through traffic lanes in each direction; similar traffic signals were suspended above Central Avenue to control the east-west traffic. The traffic signals were synchronized to show green for all north-south traffic while all east-west traffic was stopped; when east-west traffic was moving, all north-south traffic was stopped. The speed limit at the accident site was 45 mph.

Other Information

According to the Florida Department of Transportation, the accident history at the involved intersection prompted a traffic engineering study by that department. For a two-year period, there were 57 accidents in a 0.114 mile segment of U.S. 27 that included this intersection. Those accidents resulted in 54 injuries and no fatalities. Forty-seven of the accidents were at the traffic signals, and 17 involved vehicles turning left. The study revealed a need to upgrade the roadway and add more traffic signals to facilitate the safe movement of the increasing traffic, particularly the traffic turning from U.S. 27. The construction for the roadway improvements began on April 21, 1980 and was in progress at the time of the accident.

ANALYSIS

It could not be determined why the Pontiac driver failed to stop his vehicle and permit the opposing traffic to clear the intersection before he made a left turn. Available information revealed that the 31-year-old driver had little driving experience in the United States, where driving rules and conditions differ from those in his native Hong Kong. He had difficulty qualifying for a Florida driver license; he took both written and driving tests twice before Florida issued him a nonrestricted operator license. In view of the truckdriver's statement that the automobile driver never stopped while making the left turn, or even looked in the direction of the truck before the crash, it is probable that the Pontiac driver's lack of experience was a major factor in his driving through the intersection without yielding the right-of-way to the oncoming truck.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the inexperienced Pontiac driver to assure that the intersection was clear of oncoming traffic before executing a left turn through the intersection.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : MKC-80-F-H015
Highway Docket Number : HY-251-80
**Location : Texas State Highway 21 at Farm-to-Market Road 50
near Bryan, Texas**
Date : May 3, 1980
Time : 1215
Vehicle and Operator :

1. 1975 Mack truck
Operator: Western Co. of North America
Bryan, Texas
2. 1970 Dodge Polara
Operator: Ray Vega
Chriesman, Texas
3. 1978 Ford LTD
Operator: Walter Elfert
Houston, Texas

Injuries : 5 fatal
3 nonfatal
1 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the truckdriver's failure to perceive the vehicle stopped in the lane ahead and to take appropriate avoidance action. Contributing to the accident was driver fatigue. Contributing to the severity of the injuries of the Dodge passengers was the postcollision outbreak of fire.

INVESTIGATION

The Accident

On May 3, 1980, about 12:15 p.m., a 1970 Mack truck was eastbound on Texas State Highway 21 at an estimated speed of 50 mph - 55 mph, approaching another eastbound vehicle, a 1970 Dodge Polara. The Mack truck struck the rear of the Dodge which was stopped at the intersection of Texas State Highway 21 and Farm-to-Market Road 50, waiting for traffic to clear before turning left. Witnesses saw the left turn signal of the Dodge flashing.

At impact, the Dodge crossed into the westbound lane where it then was struck by a westbound 1978 Ford LTD. The Dodge burst into flames when struck by the truck and was destroyed by fire. The Ford also caught fire when it struck the Dodge, but this fire was quickly extinguished. The truck sustained relatively minor body damage.

Four Dodge passengers died from burn injuries. The Dodge driver sustained serious injuries and one passenger, minor injury, both due to impact. The Ford driver died; the only Ford passenger was seriously injured, each of these also as a result of vehicle impact. The truckdriver was uninjured.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>			<u>Passengers</u>			<u>Total</u>
	Truck	Dodge	Ford	Truck	Dodge	Ford	
Fatal	0	0	1	0	4	0	5
Nonfatal	0	1	0	0	1	1	3
None	1	0	0	0	0	0	1

Vehicle Information

The 1975 Mack truck was owned by the Western Company of North America located in Bryan, Texas. It was an oil field service vehicle equipped with tandem rear dual wheels with wedge-type power brakes on all axles. The brake lights illuminated when the brakes were applied. No mechanical defects were noted.

The 1970 Dodge Polara was owned by Roy Vega of Caldwell, Texas. It was equipped with a V8 engine and an automatic transmission. The truck impact crushed the rear of the Dodge to the "B" pillar ^{1/} and ruptured the fuel tank. Secondary impact with the Ford occurred at the right front corner and severely distorted and collapsed the front suspension and frame.

The 1978 Ford LTD was owned by the driver. It was equipped with a V8 engine and an automatic transmission. Damage occurred to the left front corner. The Dodge overrode the bumper of the Ford, crushing the hood and fender sheet metal and distorting and displacing engine components, the windshield, roof and instrument panel. The dashboard was shoved backward.

^{1/} The "B" pillar is the vertical post between the front and rear doors.

Driver Information

The 33-year-old Mack truckdriver held a valid Texas chauffeur license. For the three years preceding the accident, he had no history of traffic violations. On May 2, 1980, the day before the accident, the truckdriver went to bed about 9:00 p.m. He arose about 1:30 a.m. and left the terminal in Bryan, Texas for the oil field about 3:30 a.m. His return trip began about 10:30 a.m. He stopped en route to pick up a sandwich and soft drink about an hour prior to the accident.

Both the 33-year-old Dodge driver and the 49-year-old Ford driver held valid Texas operator licenses. Neither had a traffic violation record.

Highway Information

Texas State Highway 21 is an east-west, generally level road. The T-intersection with Farm-to-Market Road 50 is on a fill about 10 feet high. An 850-foot-long, two degree curve to the left begins about 400 feet west of the intersection. Traffic lanes are 12 feet wide with 8-foot-wide shoulders. The posted speed limit is 55 mph. There are no sight distance obstructions from either approach to the intersection.

Traffic control includes yellow dashed lane lines and guide signs, route markers and regulatory signs. Also, there are raised channellizing islands on Farm-to-Market Road 50 at the intersection. There were no tire marks on the highway to indicate preimpact braking or avoidance action.

Other Information

A witness following the Mack truck stated that it was traveling between 50 mph and 55 mph. Westbound witnesses stated that the Ford was traveling approximately 55 mph.

The witness following the Mack truck never saw any brake lights illuminate on the truck. The truckdriver, in his interview, never mentioned applying his brakes until after impact. He stated he tried to slow the truck by downshifting into a lower gear.

ANALYSIS

Based on the truckdriver's failure to brake or take evasive action, as evidenced by witness statements and the lack of preimpact physical evidence, it is probable that the truckdriver did not recognize that the Dodge was stopped ahead and signaling for a turn. A prime factor that may have accounted for this lack of recognition was driver fatigue, caused by his minimal rest the preceding night.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of this accident was the truckdriver's failure to perceive the vehicle stopped in the lane ahead and to take appropriate avoidance action. Contributing to the accident was driver fatigue. Contributing to the severity of the injuries of the Dodge passengers was the postcollision outbreak of fire.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : ATL-80-P-H012
Highway Docket Number : HY-252-80
Location : U.S. Route 29 near S-104
near Anderson, South Carolina
Date : May 16, 1980
Time : 1450
Vehicle and Operator :

1. 1973 Pontiac LeMans
Operator: Kelvin Clark Berry
Starr, South Carolina
2. 1969 Ford LTD
Operator: Marlan Sue Cobb
Hartwell, Georgia

Injuries : 5 fatal
7 nonfatal
0 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the operation of the northbound Pontiac in the southbound lane of a no-passing zone as a result of alcohol impairment of efficiency and judgment.

INVESTIGATION

The Accident

About 2:50 p.m., on May 16, 1980, a Pontiac LeMans northbound on U.S. Route 29 near Anderson, South Carolina crossed the centerline of the two-lane highway to pass a slow-moving northbound car and collided headon with a southbound Ford LTD in the southbound lane. Five Ford occupants were fatally injured. The Ford driver, five Ford passengers and the Pontiac driver were seriously injured.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>		<u>Passengers</u>		<u>Total</u>
	Pontiac	Ford	Pontiac	Ford	
Fatal	0	0	0	5	5
Nonfatal	1	1	0	5	7
None	0	0	0	0	0

Vehicle Information

The 1973 Pontiac LeMans two-door sedan was owned by its driver. The 1969 Ford LTD four-door sedan was owned by one of the passengers killed in the accident. Both vehicles sustained severest impact damage to the right front and side. The speedometer on the Pontiac was crushed with the needle stuck at 65 mph. No evidence indicated vehicle malfunction or defect as causal or contributory to the accident.

Combination lap belt-shoulder strap occupant restraints were available to both drivers, but neither was being used at the time of the collision. It was not determined whether any additional occupant restraints were installed in the Ford for passenger use.

Driver Information

The 13-year-old Pontiac driver held a valid South Carolina driver license with no restrictions. He was a local resident. About 7:00 a.m. on the day of the accident, the driver finished working an early morning shift in a factory. He then stopped at a nearby lake area to relax and drink beer with friends. Shortly before the accident occurred, he left the lake, en route to a pool parlor north of the accident site. An analysis of a blood sample from the Pontiac driver revealed a blood alcohol concentration of 0.175 percent by weight. The driver's record noted one previous accident which involved driving on the wrong side of the road in June 1979.

The 39-year-old Ford driver held a valid Georgia driver license with no restrictions. She and the 10 passengers were residents of nearby Hartwell, Georgia. The group had traveled to a hospital in Anderson, South Carolina to seek medical care for one of the passengers earlier in the day and was en route home at the time of the collision. Local authorities did not conduct a toxicological examination of the Ford driver.

Highway Information

U.S. Route 29 is a two-way, north-south route. Generally, the roadway is in good condition and traverses rolling terrain and moderate curves. The posted speed limit is 55 mph.

The two 11-foot-wide traffic lanes are separated by a solid yellow centerline for northbound traffic and an adjacent dashed yellow line for southbound traffic. This no-passing-zone marking begins 131 feet south of the point of impact and extends past the collision point more than 200 feet. The outer edges of the roadway are marked by white edgelines which are abutted nominally by two feet of paved asphalt and five feet of grass-covered shoulder.

Other Information

The driver of the northbound car the Pontiac tried to pass told investigators he saw in his rear-view mirror the Pontiac approach rapidly and begin to pass with no apparent hesitation or slowing. He estimated the Pontiac speed at 70 mph.

ANALYSIS

The combined evidence of the crushed speedometer's needle and the witness statement is sufficient to place the Pontiac's speed at least 10 mph above that designated as the maximum safe limit. Based on the driver's familiarity with the area, it also is possible to conclude he was aware, at least in general, of the various curves, depressions and no-passing zones, if not of their specific sites.

When tested, the Pontiac driver's blood alcohol level was 0.175 percent. The National Highway Traffic Safety Administration's Highway Safety Program Standard No. 8, "Alcohol in Relation to Highway Safety," defines a driver as "intoxicated" or "under the influence of alcohol" when blood alcohol concentrations are 0.10 percent or higher by weight. 1/ According to "Chemical Tests and the Law": 2/

"... Regardless of normal reaction time, low concentrations of alcohol in the blood produce a definite lengthening of reaction time...

"Early in alcohol influence (at blood alcohol concentrations of 0.04-0.08 percent) nerves which control coordinated activities of muscle groups become partially paralyzed. ...It is quite apparent that there is little question that ability to operate a motor vehicle safely is definitely impaired by the time the blood alcohol level reaches 0.10 percent."

The effect of the alcohol concentration on the Pontiac driver could explain his disregard for the posted speed and his ill-advised passing maneuver.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the operation of the northbound Pontiac in the southbound lane of a no-passing zone as a result of alcohol impairment of efficiency and judgment.

1/ "Highway Safety Program Standard No. 8, Alcohol in Relation to Highway Safety," U.S. Department of Transportation, National Highway Traffic Safety Administration, October 1, 1973.

2/ Donigan, R., "Chemical Tests and the Law," pgs. 286-287 and 294 as cited in National Transportation Safety Board Highway Accident Report, "Head-on Collision of Automobile and Pickup Truck, U.S. Route 64 near Perry, Oklahoma, February 23, 1980," NTSB-HAR-80-4.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : NYC-80-F-H007
Highway Docket Number : HY-253-80
Location : Liberty Avenue and Stanwix Street
in Pittsburgh, Pennsylvania
Date : April 28, 1980
Time : 1315
Vehicle and Operator :
1. 1973 Kenworth tractor
towing a 1975 Trailmobile refrigeration-box-semitrailer
Operator: L&M Transportation Co.
Middleboro, Massachusetts

Injuries : 5 fatal
6 nonfatal
0 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the loss of truck braking capability due to brakes that were out of adjustment because of a lack of adequate truck maintenance.

INVESTIGATION

The Accident

About 1:15 p.m., on April 28, 1980, a tractor-semitrailer loaded with 50,000 pounds of potatoes was eastbound on Interstate 279, en route from Massachusetts to Pittsburgh, Pennsylvania. The truck lost its braking capability after descending a steep 1-1/2-mile-long grade into downtown Pittsburgh, struck eight pedestrians and crashed into an office building.

Four pedestrians were killed. Three sustained minor injuries and one, serious injury. The seriously injured pedestrian gave birth to a stillborn child. The truckdriver and a passenger sustained minor injuries.

Injuries to Persons

<u>Injuries</u>	<u>Truck</u>	<u>Pedestrians</u>	<u>Other</u>	<u>Total</u>
Fatal	0	4	1*	5
Nonfatal	2	4	0	6
None	0	0	0	0

*Stillborn child of seriously injured pedestrian.

Vehicle Information

The tractor-semitrailer consisted of a 1973 Kenworth tractor and a 1975 Trailmobile refrigeration-box-semitrailer. Both the tractor and semitrailer were owned by L&M Transportation Company of Middleboro, Massachusetts.

The tractor was a three-axle, diesel-powered cab-over-engine model with a sleeper berth and a 13-speed standard transmission. The first axle was not equipped with brakes. The second and third axles were equipped with air mechanical "S" cam-type brakes; the second axle had type-30 single brake chambers, and the third axle had type-30 chambers that included spring brake chambers. The tractor was not equipped with any antilock brake hardware.

Postaccident examination of the tractor brakes revealed that the brake lining thickness was adequate. Push-rod travel, measured with cold brake drums, was 2 and 2-1/2 inches on the second axle, and 2-1/4 and 1-5/8 inches on the third axle. The validity of the 1-5/8-inch measurement was suspect because the drum was unseated as a result of the crash. The maximum available push-rod stroke was 2-1/2 inches. The manufacturer recommends that the brakes be adjusted when the stroke reaches 2 inches and that they be adjusted to as short a stroke as possible without having the brake drag.

All the tractor brake drums were heat checked; the right rear drum was found to be scored. Measurements of the 16-1/2-inch drums revealed that all except the right front drum were beyond the maximum .080-inch tolerance recommended by the National Wheel and Rim Association. The brake drum measurements were: right front, 16-1/2 +.075; left front, 16-1/2 + .220; right rear, 16-1/2 + .340; and left rear 16-1/2 + .375.

The semitrailer, a 45-foot-long, tandem-axle 1975 Trailmobile refrigerator box van was equipped with air mechanical "S" cam-type brakes with type-30 brake chambers that included spring brake chambers. The trailer was equipped with an antilock brake system which was not operational at the time of the crash.

An examination of the semitrailer revealed that although the brake linings were new, the braking system was severely out of adjustment. Push-rod travel was 2-1/4 inches at the right rear wheel and 2-1/2 inches at the other three wheels. The 16-1/2-inch brake drums were worn beyond the .08 recommended limit; all drums were heat-checked, and the right rear drum was severely scored.

There were no maintenance records available for the tractor or semitrailer.

The gross vehicle weight of the tractor, semitrailer and cargo was 82,000 pounds. This exceeded the Federal interstate maximum gross weight limit of 80,000 pounds and the maximum gross weight limits of each state the truck had to travel through to reach its destination.

Driver Information

The 27-year-old truckdriver held a valid Massachusetts truck driver license with no restrictions. His driving record revealed no previous accidents or traffic violations. The driver began working for L&M Transportation Company on April 23, 1980.

Highway Information

Interstate 279 (I-279), the highway on which the truck traveled into Pittsburgh, is an east-west interstate highway into downtown Pittsburgh. About three miles from the crash site, I-279 is a four-lane divided highway that descends toward Pittsburgh at a five percent grade. The grade is 1-1/2 miles long and is posted with numerous truck advisory and warning signs. Trucks descending the grade are restricted to traveling in the right lane, and the 55 mph speed limit is reduced to 35 mph for trucks weighing 21,000 pounds or more.

At the bottom of the hill, the highway curves right, merges with U.S. 19, levels and goes through the Port Pitt Tunnel, which is .7 mile long and has a one percent ascending grade. At the entrance to this nontoll tunnel, the 35 mph truck speed limit ends. Upon exiting the tunnel, I-279 continues across the Port Pitt Bridge which adjoins the tunnel, and at the end of the bridge, I-279 branches in three directions; north, south and east. The east leg is the Liberty Avenue exit ramp which begins about 1,500 feet from the tunnel. The exit ramp is about 700 feet long, descends at a five percent grade and levels where it meets Liberty Avenue.

A signal light controls the intersection at the end of the ramp. Liberty Avenue, which is aligned with the exit ramp, continues on a level and straight path for about 500 feet, then curves right at a radius of 403 feet as it approaches the intersection of Stanwix Street, which is 350 feet past the point of curvature.

Liberty Avenue runs east and west and Stanwix Street runs north and south. The area speed limit is 25 mph. At the time of the accident, there were no restrictions on truck traffic. East - and westbound Liberty Avenue traffic on the west leg of the intersection was separated by a 50-foot-wide, raised median that gradually tapered to 10 feet at Stanwix Street where it terminated. The mainly grass median was bordered by a 4-foot cobblestone walk and a 6-inch barrier curb; several trees were located in the grass section of the median.

Other Information

The driver picked up the load of potatoes in Maine on April 24, 1980, and drove 425 miles to his residence in Stoughton, Massachusetts, arriving there about 4:30 a.m. on April 25. He rested for a few hours and then drove the truck to an L&M Transportation Company terminal in nearby Middleboro, Massachusetts. When he arrived at the terminal, the driver told his employer that the brakes felt like they needed adjustment. When the driver returned to the terminal on April 27, he did not ask if the brakes had been adjusted because he assumed that they had been, and he departed for Pennsylvania.

The truck driver said that he lost his brakes on the Fort Pitt bridge when he applied them to avoid a car that cut across his path. When he realized he had no brakes, he pulled the spring emergency brakes and the trolley brakes, but nothing happened. He said he was going about 30 mph to 35 mph and tried to shift from fifth gear to fourth gear. He thought he had succeeded, but was unable to get it into any lower gear. He also said that he turned the engine off.

Using his CB radio, he asked a truck ahead to get in front of him so he could ram into it and stop, but other traffic prevented this maneuver. He tried to slow down by rubbing his tires against the curb of the raised median, but the truck mounted the median, crossed the intersection of Liberty Avenue and Stanwix Street and crashed into the pedestrians and office building.

ANALYSIS

Not only was it obvious that the truck owner did not comply with the driver's request to adjust the brakes, but the excessive trailer brake push-rod travel, coupled with full thickness brake linings, indicated that the brakes also were probably not adjusted when the linings were installed.

During the trip, the brake drums, when cool or at normal operating temperature, provided enough brake lining to brake drum contact to stop the truck when braked to a gradual halt. However, while descending the long, steep grade, the driver probably was braking to slow or maintain the truck's speed, and the heat generated by friction between the brake linings and brake drums caused the brake drums to expand. The expanded drums, combined with inadequate brake adjustments, soon left little or no stroke available to compensate for the drum expansion and, as a result, all effective braking was lost.

The truck was overloaded by 2,000 pounds, which further burdened the out-of-adjustment braking system. However, since the overload probably would have had no significant effect on a properly adjusted braking system, it was not considered to be a causal factor in this accident.

When the driver experienced the loss of braking capability, he activated the emergency brake system, but it had no effect on the truck's speed. The emergency spring brake system on this truck uses a powerful spring as an alternate method of applying the truck's brakes. However, it was ineffective because it activates the same brake chamber push-rod system that the service brake activates and is, therefore, dependent on the same brake adjustments. As a result, if the service brake fails because of inadequate brake adjustments, the emergency brake also will fail.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the loss of truck braking capability due to brakes that were out of adjustment because of a lack of adequate truck maintenance.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : **MKC-80-F-H016**
Highway Docket Number : **HY-257-80**
Location : **U.S. 180 near milepost 28
near Seminole, Texas**
Date : **June 1, 1980**
Time : **0245**
Vehicle and Operator :

1. **1977 Ford Thunderbird**
Operator: Paul Elam
Seminole, Texas
2. **1973 Plymouth Scamp**
Operator: Chester A. Young
Hobbs, New Mexico

Injuries : **6 fatal**
1 nonfatal
0 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was high speed and reckless driving by the Ford driver. Contributing to the cause were alcohol impairment and driver fatigue.

INVESTIGATION

The Accident

On June 1, 1980, about 2:45 a.m., a 1977 Ford Thunderbird was eastbound on two-lane U.S. 180. The driver was alone and en route to his home in Seminole, Texas. Earlier, he and several friends had driven to Lubbock, Texas, about 80 miles to the north of Seminole. About 3/4 mile from his home, the driver crossed into the westbound lane, began to return to the proper side of the road, but collided with the right side of a westbound 1973 Plymouth Scamp which was taking evasive action by turning into the eastbound lane.

The driver and sole occupant of the Ford sustained minor injury. All six Plymouth occupants died.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>		<u>Passengers</u>		<u>Total</u>
	Ford	Plymouth	Ford	Plymouth	
Fatal	0	1	0	5	6
Nonfatal	1	0	0	0	1
None	0	0	0	0	0

Vehicle Information

The 1977 two-door Ford Thunderbird was owned by the driver. It was equipped with a V8 engine, automatic transmission and speed control. The shoulder strap occupant restraint provided the driver was not being used at the time of the accident. Primary impact damage was to the front of the Ford. The depth of crush along the front of the Ford ranged from 36 inches to 59 inches, the maximum at the right front corner.

The 1973 two-door Plymouth Scamp was owned by Thyra L. Young, the left rear seat passenger. It was equipped with a V8 engine and automatic transmission. Impact was at the right front corner of the Plymouth. It also was equipped with four occupant restraints, two shoulder strap restraints for the front seat and two belt restraints for the rear seat. None was in use at the time of the accident. Crush damage to the right front and right front side ranged from 18 inches to 32 inches.

Driver Information

The 21-year-old Ford driver held a valid Texas commercial license with no restrictions. According to Texas driver records, since March 1976 he had five moving violations, four for speeding and one for running a stop sign. He also had been involved in one accident. Police officers administered a breathalyzer test to the Ford driver after the collision, revealing a blood alcohol content of 0.10 percent. He stated that all of a sudden he saw some headlights coming toward him and then they--the two vehicles--collided.

The 22-year-old Plymouth driver held a valid New Mexico commercial license. His driving record for 1978 and 1979 showed violations for the following: failure to obey a traffic sign; failure to stop after involvement in a property-damage-only accident; and speeding, twice. Blood analysis was negative for alcohol presence.

Highway Information

U.S. 180 is an east-west highway consisting of two 12-foot-wide lanes bordered on the outside by paved 7-foot-wide shoulders. It is level and straight for several miles in either direction of the accident site. The centerline is marked with a dashed yellow line. Skid and scuff marks indicated the pre- and postimpact paths of the two vehicles.

ANALYSIS

Based on the collision damage and physical evidence on the highway, the Ford's speed was calculated to be over 100 mph and the Plymouth's, about 55 mph.

The Ford driver's blood alcohol content of 0.10 percent, coupled with probable driver fatigue due to the late hour, probably caused high speed, reckless and inattentive driving. By his statement, the Ford driver was apparently so impaired that he was not even aware of operating in the wrong lane until it was too late to avoid impact.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was high speed and reckless driving by the Ford driver. Contributing to the cause were alcohol impairment and driver fatigue.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : MKC-80-F-H017
Highway Docket Number : HY-260-80
Location : U.S. 40 South Frontage Road near Yartmouth Point
near Clayton, Missouri
Date : June 6, 1980
Time : 2300
Vehicle and Operator :
1. 1969 Chevrolet Camaro
Operator: Jeffrey C. Smith
Manchester, Missouri
2. 1970 Volkswagen Beetle
Operator: Carol A. Hill
Pulton, Missouri
Injuries : 5 fatal
1 nonfatal
0 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the Chevrolet driver's failure to recognize the lack of sufficient sight distance to complete a passing maneuver. Contributing to the cause were the absence of "No Passing Zone" markings on the roadway and the Chevrolet driver's decision to pass vehicles traveling at the posted speed limit.

INVESTIGATION

The Accident

On June 6, 1980, about 11:00 p.m., a 1969 Chevrolet Camaro was eastbound on the south frontage road to U.S. 40, having entered the roadway from a driveway after waiting for two other eastbound vehicles to pass the driveway entrance. He overtook the two vehicles, which were traveling at driver-estimated speeds of 50 mph-55 mph, and passed one. He started to steer in between the two vehicles but, seeing no oncoming westbound vehicles, returned to the westbound lane to pass the second vehicle. When the Chevrolet's front end was about even with the passenger door of the second vehicle being passed, the Chevrolet driver saw a westbound 1970 Volkswagen Beetle approaching the south frontage road. He braked and steered to the left toward a clear grassy-covered area. The Volkswagen struck the right passenger door of the Chevrolet. The only Chevrolet passenger and all four Volkswagen occupants died. The Chevrolet driver sustained minor injuries.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>		<u>Passengers</u>		<u>Total</u>
	<u>Chevrolet</u>	<u>Volkswagen</u>	<u>Chevrolet</u>	<u>Volkswagen</u>	
Fatal	0	1	1	3	5
Nonfatal	1	0	0	0	1
None	0	0	0	0	0

Vehicle Information

The 1969 Chevrolet Camaro was owned by Judith S. Smith of St. Louis, Missouri, who was not a passenger at the time of the accident. A convertible model, it had a V8 engine and automatic transmission. Primary impact was to the right passenger door. It was crushed inward about 25 inches.

The 1970 Volkswagen Beetle was owned by the left rear passenger. The front end of the vehicle was crushed inward a minimum of 16 inches, a maximum of 27 inches. Neither vehicle was equipped with occupant restraints.

Driver Information

The 17-year-old Chevrolet driver held a valid Missouri operator license with no restrictions. His record indicated no traffic violations or previous accidents. After the accident, the driver wandered away from the accident scene. Police, therefore, performed no alcohol test.

The 39-year-old Volkswagen driver also held a valid Missouri operator license with no restrictions. She had no record of traffic violations or previous accidents. Postmortem laboratory tests were negative for alcohol presence.

Highway Information

U.S. 40 at this location is a four-lane, divided highway with a frontage road on either side. The accident occurred on the south side frontage road. 1/

This frontage road consists of two 10-foot-wide traffic lanes for two-way traffic. The gravel shoulder are about three feet wide. Traffic control consists of a dashed yellow centerline and a solid white edgeline on both edges. The posted speed limit is 55 mph.

Road alignment is straight over rolling terrain. The accident occurred at the crest of a hill with a 2.65 percent descending grade to the west and 3.02 percent descending grade to the east. The sight distance, as measured from plan and profile sheets provided by the Missouri Highway and Transportation Commission, beginning at a point 850 feet west of the impact area, is 900 feet. The sight distance is less than 900 feet until a point 190 feet west of the point of impact. The minimum sight distance in this area is about 410 feet.

The Missouri Highway and Transportation Commission pavement marking policy calls for "No Passing Zones" to be placed on all main line routes with an average daily traffic flow of 1,000 or more vehicles. Striping on local collector roads such as outer roadways and service roads is determined on an individual basis, taking into account such factors as type of traffic, speed of traffic, access points and terrain. The average daily traffic flow on the south frontage road near the accident site is 5,855. According to the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), the minimum passing sight distance for roadways like the frontage road is 900 feet. Section 3B-3 states, "Where centerlines are installed, no passing zones shall be established at vertical and horizontal curves --- where an engineering study indicates passing must be prohibited because of inadequate sight distances."

ANALYSIS

Based on available physical evidence, the impact speed of the Chevrolet was estimated to be about 21.5 mph and that of the Volkswagen, about 24 mph. Preimpact speed for the Chevrolet was estimated to be 58 mph to 60 mph. There was no indication that the Volkswagen changed its speed or direction prior to impact. Chevrolet speed estimates were supported by witnesses statements.

Using the speed estimate and witness statements, it is estimated that the Chevrolet began its second passing maneuver about 340 feet before the point of impact. At this position, the sight distance was about 440 feet, and the distance between the two vehicles, about 615 feet. At this point, the driver did not have the passing sight distance standard set forth in the MUTCD.

1/ Frontage road. A road contiguous to, and generally paralleling, an expressway, freeway, parkway, or through street. It is designed so as to intercept, collect, and distribute traffic desiring to cross, enter, or leave such a highway and to furnish access to property that otherwise would be isolated as a result of the controlled-access feature. It is sometimes called a service road. Traffic Engineering Theory and Practice by Louis J. Pignataro, p. 177.

However, the pavement was not marked as a "No Passing Zone." Therefore, the Chevrolet driver could not have known that he was in an unsafe passing situation. The fact that this area was not marked as a "No Passing Zone" is in direct opposition of the MUTCD standards.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the Chevrolet driver's failure to recognize the lack of sufficient sight distance to complete a passing maneuver. Contributing to the cause were the absence of "No Passing Zone" markings on the roadway and the Chevrolet driver's decision to pass vehicles traveling at the posted speed limit.

RECOMMENDATIONS

As a result of this accident, the National Transportation Safety Board made the following recommendations to the State of Missouri:

Enact legislation to establish a regulation prohibiting driving on the left side of the roadway within marked no-passing zones and insure that the regulation conforms with Section 11-307 of the Uniform Vehicle Code as published by the National Committee on Uniform Traffic Laws and Ordinances as required by Highway Safety Standard No. 6, Codes and Laws. (Class I, Urgent Action) (H-80-59)

Develop and implement a continuing program to bring all of the State's laws, particularly rules of the road, into substantial conformity with the Uniform Vehicle Code as published by the National Committee on Uniform Traffic Laws and Ordinances. (Class II, Priority Action) (H-80-60)

Revise the State's pavement marking policy, particularly the provisions for marking no-passing zones, to be consistent with the U.S. Department of Transportation's Manual on Uniform Traffic Control Devices for Streets and Highways. (Class I, Urgent Action) (H-80-61)

Re-mark all of the streets and highways within the State's jurisdiction so that the pavement markings, in particular the no-passing zone markings, comply with the U.S. Department of Transportation's Manual on Uniform Traffic Control Devices for Streets and Highways. (Class I, Urgent Action) (H-80-62)

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : NYC-80-F-H010
Highway Docket Number : HY-263-80
**Location : Virginia State Route 340 and Virginia State Route 50
near Winchester, Virginia**
Date : June 6, 1980
Time : 1430
Vehicle and Operator :

1. 1977 International tractor
towing a 1979 Trailmobile van-type semitrailer
Operator: World Leasing, Inc.
Wilmington, Delaware
2. 1971 Oldsmobile 442 convertible
Operator: Richard Rodriguez
Fairfax, Virginia

Injuries : 0 fatal
1 nonfatal
2 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the truckdriver's failure to stop before entering the intersection when he observed the amber traffic signal, even though the distance available and the law dictated such action. Contributing to the cause of the collision was the Oldsmobile driver's inattention to traffic as his vehicle approached and entered the intersection.

INVESTIGATION

The Accident

About 2:30 p.m., June 6, 1980, a tractor-semitrailer was northbound on Virginia State Route 340 near Winchester, Virginia. The truck, which was occupied by the driver and his wife, was approaching the intersection of Virginia State Route 50 as a 1971 Oldsmobile 442 convertible passenger car, eastbound on State Route 50, simultaneously approached the intersection from the truck's left. Both vehicles entered the intersection, which was signal light controlled, and collided in the southeast quadrant. The truck, which struck the right rear side of the convertible, came to rest at the northeast corner of the intersection, about 105 feet from the point of collision. After being struck, the convertible mounted the Route 50 median at the east side of the intersection, struck a steel pole with its left rear fender and came to rest on the median facing east.

A bystander who was at a gas station on the southwest corner of the intersection heard the crash, turned, and saw the two vehicles coming to rest. He said that he simultaneously saw that the signal light was red facing the northbound Route 340 traffic.

The driver of the Oldsmobile sustained minor injuries; the occupants of the truck, none.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>		<u>Passengers</u>		<u>Total</u>
	Oldsmobile	Truck	Oldsmobile	Truck	
Fatal	0	0	0	0	0
Nonfatal	1	0	0	0	1
None	0	1	0	1	2

Vehicle Information

The tractor-semitrailer consisted of a 1977 International tractor and a 1979 Trailmobile van-type semitrailer. It was owned by World Leasing, Inc. of Wilmington, Delaware. Damage to the truck was so slight, it continued its trip to New Jersey after the accident was recorded by the investigating police.

The 1971 Oldsmobile was owned by the driver. Primary damage was to the right rear of the vehicle where it was struck by the truck. The convertible top was dislodged and twisted, as was the trunk lid. The left rear of the vehicle also sustained impact damage when the rotating car struck a steel pole.

Driver Information

The 25-year-old truckdriver held a valid Ohio driver license with no restrictions. His driving record revealed one accident in 1977, and three traffic violation convictions, two for speed and one for assured clear distance.

The 48-year-old Oldsmobile driver held a valid Virginia driver license with no restrictions. His driving record revealed no prior accidents and no traffic violations.

Highway Information

The accident site at the junction of State Route 50 and State Route 340 is a slightly oblique, signal light controlled intersection in a rural section of Clarke County near Winchester, Virginia.

Although the speed limit on both Routes 50 and 340 is 55 mph, it is reduced to 40 mph in the vicinity of the intersection by signs posted on all four approaches. The altered speed limit signs are posted about 1,200 feet from the intersection and are preceded by "reduced speed ahead" signs and followed by "signal light ahead" symbol warning signs. Both intersecting roadways are four-lane, asphalt-paved divided highways.

At the intersection, 10 vertically arranged, three-lens, back-plated traffic control signals are suspended from overhead cables. Two signal faces control each direction of through traffic, and two signal faces control left turns from Route 50, one in each direction. The traffic signals are clearly visible on all approaches to the intersection.

The signal system is three-phase. The east-west (Route 50) phase has an initial interval of five seconds, a vehicle interval of five seconds and a 38-second maximum green with five seconds of amber clearance. The north-south (Route 340) phase has the same initial and vehicle interval time, with 32 seconds of maximum green time and five seconds of amber clearance.

There is a clearly delineated change in pavement color on northbound Route 340, 300 feet south of the Route 50 intersection. This was identified by the truckdriver as his location when the signal light turned amber.

The Virginia driving manual states that, "An amber light means caution and indicates a change is about to be made in the direction of the moving traffic. When the light is amber, traffic which has not already entered the intersection, including the crosswalks, must stop if it is not reasonably safe to continue. Traffic which has already entered the intersection should continue moving until the intersection has been cleared."

A groove gouge in the southeast quadrant marked the point of impact. Dual wheel skidmarks traced the path of the tractor-semitrailer.

Other Information

The truckdriver stated that he was slowing for the intersection when the light turned amber but then braked harder because the driver of the Oldsmobile did not seem to see him and continued into the intersection. He also stated to the police that he was going 45 mph and that the light turned amber when his truck was at the point where the pavement changes color.

The truckdriver's wife said that as they approached the intersection, the signal light turned amber. She saw the Oldsmobile approaching the intersection and it did not look like it was going to stop. She said her husband tried but could not stop in time to avoid the collision. She stated that the light was still amber when the truck reached the intersection.

The Oldsmobile driver stated that he was eastbound on Route 50 when he saw a red traffic light ahead and decelerated from about 45 mph. As he approached the intersection of Routes 50 and 340, a brown car drove onto Route 50 from a gas station into the left lane and, he said, as he approached the boundary of the gas station property, the light turned green. He said the brown car, which had stopped at the intersection, began accelerating, so he shifted his foot from the brake to the accelerator and drove past it. He said he did not perceive the truck before the crash.

ANALYSIS

Stated precollision paths and postcollision resting points of each vehicle, damage to the Oldsmobile and marks in the roadway indicated that the truck struck the Oldsmobile in the intersection of Route 50 and Route 340 at a point 25 feet north of the south edge of Route 50 and 58 feet east of the west edge of Route 340. At the point of collision, as marked by the gouge, the Oldsmobile was within a car length of completely clearing the 70-foot east-west width of the intersection, while the truck had traveled only 25 feet into the 117-foot north-south width of the intersection.

The truck came to rest about 105 feet from the point of collision. Based on this distance, the precrash speed of the truck was estimated to be at least 37 mph. The Oldsmobile's precrash speed was undetermined.

Since the drivers' statements were contradictory and the only independent witness to come forward did not see the traffic signal until after the crash, the precise time that the traffic signal turned red for the truckdriver could not be established. Virginia State Law, however, requires a driver whose vehicle has not already entered the intersection to stop at the intersection when an amber signal is displayed. Since the truckdriver indicated that he saw the amber signal when he was 300 feet from the intersection, it was his responsibility to stop before entering it, particularly since there was sufficient distance to do so. The Oldsmobile driver failed to see the approaching truck and, as a result, took no evasive action; his first perception of the truck was when he felt the crash.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the truckdriver's failure to stop before entering the intersection when he observed the amber traffic signal, even though the distance available and the law dictated such action. Contributing to the cause of the collision was the Oldsmobile driver's inattention to traffic as his vehicle approached and entered the intersection.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : LAX-80-F-H002
Highway Docket Number : HY-265-80
Location : Alta Mesa Road and California State Route 104
near Galt, California
Date : June 15, 1980
Time : 1715
Vehicle and Operator :
1. 1973 Oldsmobile Cutlass Colonnade
Operator: Joao Souza Borges
San Jose, California
2. 1964 Chevrolet S-30 one-ton pickup
Operator: Michael J. Crawford
Sacramento, California
Injuries : 5 fatal
0 nonfatal
0 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the Oldsmobile driver to stop before entering the stop sign controlled intersection and yield the right-of-way to cross traffic. Contributing to the severity of the accident was the postcollision outbreak of fire.

INVESTIGATION

The Accident

On June 15, 1980, about 5:15 p.m., a 1973 Oldsmobile Cutlass Colonnade was southbound on Alta Mesa Road near Galt, California at a calculated speed of 32 mph, when it failed to stop before entering an intersection which was controlled by a stop sign and collided with a 1964 Chevrolet pickup truck that was eastbound on California State Route 104 at a calculated speed of 52 mph. The vehicles came to rest with the Chevrolet inverted atop the Oldsmobile. Fire immediately engulfed both vehicles. The three Chevrolet occupants died in the fire. The two Oldsmobile occupants died from impact injuries.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>		<u>Passengers</u>		<u>Total</u>
	Chevrolet	Oldsmobile	Chevrolet	Oldsmobile	
Fatal	1	1	2	1	5
Nonfatal	0	0	0	0	0
None	0	0	0	0	0

Vehicle Information

The 1973 Oldsmobile Cutlass Colonnade was owned by the driver. It was equipped with a V8 engine and automatic transmission. Lap belt type occupant restraints were installed in the passenger compartment. Fire damage prevented the determination that they were in use. The Oldsmobile was severely crushed downward as a result of the Chevrolet's rolling over and landing atop its roof. Postcrash fire completely destroyed the interior and most of the exterior of the vehicle.

The 1964 Chevrolet model S-30 one-ton pickup was owned by Triangle, Inc., a Sacramento, California plumbing firm that employed the driver. This two-axle truck was equipped with a V8 engine, four-speed transmission and power assist hydraulic brakes. The truck was heavily laden with plumbing tools and supplies. No occupant restraints were available. The Chevrolet was severely damaged, with primary crush at the left front and along the top of the vehicle. Fire consumed the flammable materials in the cab and extensively burned the rest of the vehicle.

Driver Information

The 40-year-old Chevrolet driver held a valid California Class 3 license with no restrictions. His driving record revealed no violations or accidents. Postmortem toxicological examinations determined blood alcohol levels ranging from .05 percent to .07 percent for the truck occupants. The truck driver was the employer-assigned full-time driver of the Chevrolet pickup. His employment records indicated he had previously driven along State Route 104.

The 45-year-old Oldsmobile driver held a California Class 3 license with no restrictions which had expired the day before the accident. His driving record showed one accident in August 1977, as a result of which he was cited for "failure to stop/yield right-of-way at a posted sign." Accompanied by his father-in-law, the Oldsmobile driver left his home in San Jose and traveled over 100 miles to the home of a relative. They arrived

about 10:00 a.m. and, shortly before 5:00 p.m., departed for San Jose. They traveled about 15 miles before the collision. Although the driver was familiar with the general area, his familiarity with the accident-involved intersection was unknown.

Highway Information

At the accident site, State Route 104 is a straight two-lane highway running approximately east and west. Each lane is 12 feet wide, with smooth asphalt surfacing. At the accident intersection, there is one through-lane in each direction, with off-set left turn lanes delineated by solid white lines. The roadway is divided by a solid double line displayed in yellow Bolts dots and retro-markers. The roadway edges are marked with a solid white edgeline. This line continues through the intersection area as a broken white line. Other than directional arrows for left turning and through traffic, there are no traffic controls for either east- or westbound traffic. There are no sight distance obstructions to limit a driver's view.

Alta Mesa Road is a two-lane country road running north and south. The roadway is straight and nearly level, with 12-foot-wide, smooth asphalt lanes. The lanes are divided by solid double yellow lines. The road edge is bordered by six-foot dirt and grass shoulders. Alta Mesa Road is controlled by stop signs. There are a standard "Stop Ahead" sign and a "Stop Ahead" message printed on the roadway about 1,375 feet north of the intersection in the southbound lane. A similar control display exists for northbound traffic. There is no sight obstruction to the west at the intersection for a southbound motorist.

A 47-foot-long skidmark made by the right front wheel of the Chevrolet marked the braking action of the truck to the point of impact. The Oldsmobile left no preimpact marks on the pavement.

Other Information

The weather was clear, and the accident occurred about three hours before sunset. Neither vehicle was headed into the sun.

ANALYSIS

Using a normal perception-reaction time of 1.5 seconds, the Chevrolet's calculated speed of 52 mph, and the skidmark as evidence of the truckdriver's awareness of the impending collision, it is calculated that the truckdriver first perceived that the Oldsmobile was not going to stop at a point about 159 feet west of the point of impact. At this distance and with no apparent reaction to the approach of the Chevrolet by the Oldsmobile driver, the Chevrolet driver reduced his speed to a calculated 37 mph but was unable to avoid the collision.

After initial impact, the front of the Chevrolet remained entangled with the Oldsmobile and began pushing it broadside, southeast toward the road edge. As they approached the southeast road edge, the Chevrolet began to override the Oldsmobile. The Chevrolet driveshaft became disengaged, gouging the roadway, and contributed to the rollover motion of the truck. A 180° rotational movement about its longitudinal axis placed the truck upside down on top of the Oldsmobile at some point at or about the southeast road edge.

Fire immediately ensued. Fire damage suggested that the source of the fire was the carburetor of the truck. As the fire spread, it was fed by the auxiliary fuel tank on the truck.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the Oldsmobile driver to stop before entering the stop sign controlled intersection and yield the right-of-way to cross traffic. Contributing to the severity of the accident was the postcollision outbreak of fire.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : LAX-80-F-H003
Highway Docket Number : HY-270-80
Location : Interstate 84 at milepost 90
near Mountain Home, Idaho
Date : July 16, 1980
Time : 0925
Vehicle and Operator :

- | | |
|---|---|
| 1. 1977 Chevrolet Bonanza pickup
Operator: Eldon Merle Rund
Troutdale, Oregon | 4. 1976 Porsche 924
Operator: David C. Graham
Boise, Idaho |
| 2. 1970 MCI Challenger bus
Operator: Lakeshore Motor Coach Lines
Provo, Utah | 5. 1977 Chevrolet Nova
Operator: William O. Koenig
Pomona, California |
| 3. 1979 Buick Skylark
Operator: Wayne Buekendorf
Twin Falls, Idaho | 6. 1979 Ford Custom pickup
Operator: James E. Redfield, Jr.
Boise, Idaho |
| | 7. 1979 Mack tractor
towing 3 Comet Semitrailers
Operator: Garrett Freight Lines Inc.
Pocatello, Idaho |

Injuries : 4 fatal
28 nonfatal
22 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the Mack truckdriver to react to the standing queue of vehicles on the roadway and stop his vehicle short of the stopped vehicles. Contributing to the cause of the accident was driver fatigue.

INVESTIGATION

The Accident

A road resurfacing construction project on westbound Interstate 84 near Mountain Home, Idaho, required the closing of the left westbound lane the morning of July 16, 1980. Dust and gravel stirred up during construction work necessitated guiding traffic through the construction zone, several vehicles at a time. About 9:25 a.m., on July 16, a flagman stopped, in the following order, three cars, a charter bus and a pickup truck with camper shell. As the vehicles awaited the return of a pilot car to lead them through the area, a westbound 1979 Mack truck towing three trailers struck and overrode the rear of the pickup, forcing it into the rear of the bus and then toward the southwest, out of the traffic queue. The Mack truck then impacted the bus itself, initiating a chain-reaction rear-end collision involving all vehicles remaining in the traffic queue. Two of the cars veered to the southwest out of the queue. The Mack truck, bus and one car continued as a queue to the northwest, striking the flagman's unoccupied pickup on the north edge of the highway.

The Mack truckdriver and all three pickup occupants died in the collisions. Of the remaining 50 people involved, 28 sustained varying degrees of injury, and 22 were uninjured.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>	<u>Passengers</u>	<u>Total</u>
Fatal	2	4	4
Nonfatal	3	25	28
None	1	21	22

Vehicle Information

The 1979 Mack tractor was a cab-over-engine, two-axle model owned and operated by Garrett Freight Lines, Inc. of Pocatello, Idaho. Powered by a 350 Cummins engine and equipped with a Fuller 10-speed transmission, the tractor was towing three Comet semitrailers, two of which were refrigerated units. The driving compartment of the tractor was equipped with lap restraints, but usage could not be determined. The driver had installed a citizens band radio in the operating compartment. A Sangamo tachograph also was installed in the tractor to record driving times and speeds. Postaccident reading of the tachograph tape showed the Mack truck was being driven at speeds ranging between 50 mph and 55 mph right up to the time of collision.

Both the tractor and its nearest semitrailer were demolished in the accident. The extensiveness of the damage precluded thorough postaccident examination. To the limited extent determinable, there were no preexisting defects in the braking or steering mechanisms.

With the exception of the bus and empty pickup, all other vehicles were owned by their drivers. The following table identifies the vehicles involved in the collision, excepting the Mack truck described above, their owner and operator where the two are not the same and the extent of damage.

<u>Vehicle</u>	<u>Owner/Operator</u>	<u>Damage</u>
1977 Chevrolet Bonanza pickup w/camper shell	Eldon Merle Rund Troutdale, Oregon	Front and rear crush damage; totally destroyed
1970 MCI Challenger 47-passenger bus	Lakeshore Motor Coach Lines Provo, Utah Grant Michael Nielsen Orem, Utah	Primary crush damage to rear engine compartment
1979 Buick Skylark	Wayne Buekendorf Twin Falls, Idaho	Front and rear crush damage; minor fire in engine compartment
1976 Porsche 924	David C. Graham Boise, Idaho	Moderate crush damage to right front and rear
1977 Chevrolet Nova	William O. Koenig Pomona, California	Severe crush damage to front and rear; moderate damage to sides
1979 Ford Custom Pickup	James E. Redfield, Jr. Boise, Idaho	Moderate crush damage to right front.

Driver Information

The 56-year-old Mack truckdriver held a valid commercial license issued by the State of Utah. Employed as a professional truckdriver by Garrett Freight Lines for 22 years, he had been driving triple units for five years. His driving record indicated no accidents or violations in the three years preceding the accident. Garrett Company officials ranked him among the safest drivers in the firm.

A partially depleted prescription of an antibiotic, Keflex, was found in the truckdriver's personal effects. Drug usage was undetected in a postaccident drug abuse screen conducted on fluid samples from the Mack truckdriver, however, the major components of Keflex were not among those screened.

Before ending a two-day off-duty period, the Mack truckdriver, according to his wife, slept about six hours before reporting to work for this trip. He began the trip about 1:30 a.m. and made two stops before the collision, the latter about two hours before the accident. According to another driver with whom he had refreshments at that time, the Mack truckdriver was alert, in good spirits and seemingly good health. When the collision occurred, the driver was about 40 miles from his destination.

In 1975, the driver was licensed to operate a citizens band radio. Sometime before the collision he used it to talk with another Garrett driver, and, when found after the accident ejected from the truck, he held the CB microphone in his hand. Attempts to identify persons with whom he may have been conversing at the time of the accident proved unsuccessful.

The drivers or owners of the other vehicles involved in the accident played no causal or contributory roles in this accident.

Highway Information

Interstate 84 is the predominant east-west highway through Idaho. At the collision scene, it is a four-lane divided highway, with a 60-foot dirt and grass median. Traffic lanes are delineated by broken white lane lines. A solid yellow edgeline abuts the median and a solid white edgeline, the highway's outer edge. Roadway surface is concrete with asphalt shoulders at both road edges. The freeway is constructed at terrain level; over- and underpasses transect the roadway. An overpass immediately before the first point of impact funnels traffic westward into the town of Mountain Home, Idaho. Approaching the accident site from the east, Interstate 84 is straight and level for at least 1.5 miles, and there are no visibility obstructions. The posted speed limit is 55 mph.

At the accident site, Interstate 84 was being upgraded. A signing plan drawn up by the State of Idaho Transportation Department, Division of Highways, Traffic Section, provided for the closure of one lane of the two lanes provided for each direction of travel. This signing was installed in compliance with the Manual on Uniform Traffic Control Devices (MUTCD) for a freeway lane closure. The use of a pilot car and the potential for complete closure of the roadway, by means of a flagman, to await the pilot car's return to lead traffic through the dust at the construction site led to the addition of PREPARE TO STOP and FLAGMAN AHEAD signs. As traffic neared the construction zone, advance warning signs were posted as follows:

<u>Sign</u>	<u>Distance to "Flagman Ahead"</u>
Road Construction Ahead	7,393 feet
Merge Right	4,753 feet
Left Lane Closed 2,000 Ft.	3,169 feet
(lane closed pictorial sign with flags, flashing lights)	1,585 feet
Prepare to Stop	1,057 feet
Flagman Ahead	—

The signs were placed at this location two weeks before the collision. Driving logs for the Mack truckdriver indicate he had not traveled this route at any time during that two weeks.

Interviews with those involved in this collision indicate that the flagman was standing at the side of the roadway in front of the standing line of five vehicles, out of the line of sight of the truckdriver.

ANALYSIS

Evidence indicates that the driver of the triple unit did not react to the standing queue of vehicles. Visibility in the accident area was good, and the line of vehicles was visible far enough in advance to permit an attentive driver to safely stop his vehicle in time to avoid the collision. Yet the tachograph indicated a nearly constant speed approximating the speed limit up to the point of collision.

Autopsy and toxicology test results revealed no incapacitating factor affecting the driver's behavior. Since the specific medication discovered with the driver was not among those screened, no determination of its possible effects was available.

Conclusions of a U.S. Department of Transportation study ^{1/} indicate that "sleepy driver" fatigue, physiological state and performance are strongly affected by the time of day. In addition, the study indicates the probability of accident involvement significantly increases after about six hours of driving. The Mack truckdriver had been on duty almost eight hours at the time of the accident, most of which duty consisted of nighttime driving. He possibly was affected by this type of driver fatigue.

Several other factors may have contributed to the truckdriver's distraction. When the collision occurred, he was talking or preparing to talk with someone on his CB radio. His affinity for the CB radio was common knowledge among other Garrett drivers, and he was clutching the CB microphone when found after the accident. Another potentially distractive factor was his apparent close attention to vehicle speed, for, according to the tachograph chart, variation from the 55 mph posted maximum was almost nonexistent.

For unknown reasons the driver missed or failed to react to the roadside signs advising him to stop ahead. The consistency of his preimpact speed suggests that the lane closure signs made no impression on the driver in terms of reducing his speed in response to traffic conditions.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the Mack truckdriver to react to the standing queue of vehicles on the roadway and stop his vehicle short of the stopped vehicles. Contributing to the cause of the accident was driver fatigue.

^{1/} Robert R. Mackie and James C. Miller "Effects of Hours of Service, Regularity of Schedules, and Cargo Loading on Truck and Bus Driver Fatigue", U.S. Dept. of Trans., October, 1978, DOT-HS-803-799.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : DCA-80-F-H005
Highway Docket Number : HY-272-80
Location : Interstate 80
near Coalville, Utah
Date : July 20, 1980
Time : 1630
Vehicle and Operator :

1. 1975 Volkswagen Beetle
Operator: William Scott Parrish
Salt Lake City, Utah
2. 1979 Ford Lincoln Continental Mark V
Operator: Allen Mac West
Sour Lake, Texas

Injuries : 8 fatal
0 nonfatal
0 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the operation of the Volkswagen in the wrong way on a one-way highway. Contributing to the severity of the accident was the excessive speed of the Ford.

INVESTIGATION

The Accident

On July 20, 1980, about 4:30 p.m., a 1975 Volkswagen Beetle was westbound in the inner eastbound lane of Interstate 80 at an estimated speed of 55 mph. Interstate 80 is a four-lane divided highway with a 50-foot-wide grassy median separating eastbound, from westbound traffic. A 1979 Ford Lincoln Continental was eastbound in the inner eastbound lane traveling at an estimated 75 mph. The two vehicles converged and collided headon. All six occupants of the Volkswagen and both occupants of the Ford died in the collision.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>		<u>Passengers</u>		<u>Total</u>
	Volkswagen	Ford	Volkswagen	Ford	
Fatal	1	1	5	1	8
Nonfatal	0	0	0	0	0
None	0	0	0	0	0

Vehicle Information

The 1975 Volkswagen Beetle was owned by the driver's parents. It was equipped with a four-cylinder engine and standard transmission. Available occupant restraints were not in use at the time of the accident. Vehicle damage was severe. With the exception of the rear-mounted engine hood, all sheet metal components were distorted, dented, torn and scratched. At impact, the Ford shoved the Volkswagen 81 feet to the rear. Impact forces deformed the Volkswagen body 35 inches rearward. Among other things, investigators found several unopened cans of beer in the Volkswagen.

The 1979 Ford Lincoln Continental Mark V was owned by the driver. It was powered by a V8 engine and was equipped with power brakes and steering. Available occupant restraints were not in use. Primary impact damage was to the left front and left side of the vehicle. The left side was displaced rearward as far back as the rear fender well, a distance of 51 inches rearward, and the right side was crushed 71 inches to the rear.

Driver Information

The 18-year-old Volkswagen driver held a valid Utah driver license with no restrictions. He was a resident of nearby Salt Lake City, Utah and, according to acquaintances, had driven Interstate 80 between Salt Lake City and Coalville more than once. Postmortem blood alcohol tests revealed a blood alcohol level of 0.06 percent for the Volkswagen driver.

Earlier in the day, about 2:15 p.m., the Volkswagen with six teenaged occupants left Salt Lake City en route to the Echo Reservoir Cliff area, about 41 miles east of the city. Before leaving Salt Lake City, the Volkswagen occupants bought 1 1/2 cases of beer.

The 70-year-old Ford driver held a valid Texas driver license with no restrictions. He and his wife drove 400 miles to 500 miles on the day of the accident. Alcohol tests conducted for the Ford driver were negative.

Highway Information

In the accident area Interstate 80 is a four-lane divided highway on level terrain with a variable width median of 50 feet to 60 feet. Normally an east-west highway, east of Salt Lake City, near Coalville, the highway angles to the north for several miles. Eastbound traffic would travel north on this leg of Interstate 80; westbound traffic, south. However in this report, traffic flow is referred to as east- and westbound.

The point of impact, marked by gouges and scrapes, was in the inner eastbound lane, about 50 feet south of milepost 161.359 at which point was a sign, "EXIT 1 MILE." The Volkswagen left preimpact skidmarks on the roadway; the Ford, none. Pavement markings were clear, and the skid properties of the dry asphalt pavement appeared good.

Echo Dam and Reservoir was frequented by residents of Salt Lake City and surrounding counties for recreation purposes. People parked on the Interstate 80 right-of-way near the Coalville interchange and walked to the cliff area to the nearby reservoir, which was east of the highway. Besides the Coalville interchange, recreationists also had access to the reservoir area from a view area pull-off and from the Echo Reservoir and Interstate 84 interchanges north of Coalville. This reservoir area was 2.94 miles north of the point of impact. Unmarked, traversable crossovers connected the east- and westbound lanes. Access to both east- and westbound lanes was possible from any of these points. All of the interchanges were marked or signed in accordance with the Manual on Uniform Traffic Control Devices (MUTCD).

Other Information

A witness preceding the Ford had to swerve to avoid colliding with the Volkswagen. When he looked in his rearview mirror, the witness said, he saw no brake lights on the Volkswagen nor any attempt by its driver to pull onto the median in recognition of his being on the wrong side of the highway. Other witnesses said the Ford took no apparent evasion action before impact.

Investigators observed that the median vegetation appeared gold-colored when facing north at the time of day the accident occurred. They also had difficulty distinguishing the front from rear of a Volkswagen Beetle at a distance.

The traffic count in the accident area on the day of the accident for the hour in which it occurred was 580 vehicles, counting both east- and westbound flow.

ANALYSIS

No known witnesses observed the Volkswagen reenter Interstate 80, so its exact point of reentry could not be determined. Based on the occupants' known presence at the reservoir area and the fact that the Volkswagen had been parked on the Interstate 80 right-of-way, it is reasonable to assume the point of entry was somewhere along the Reservoir Cliff area.

If the Volkswagen reentered the interstate from the cliff area, travelling at 55 mph, it would take 3.2 minutes to drive the 2.94 miles to the point of impact. The 580 vehicle per hour average could not be definitively split between east- and westbound traffic. The Utah Highway Patrol indicated that most of the traffic that afternoon was westbound. The following table shows several percentage splits of the average hourly volume and the expected number of vehicles that may have passed the Volkswagen under those traffic conditions from the cliff area to the point of impact.

Percentage split of 580 vehicles/hour Eastbound - Westbound	Number of vehicles expected to pass in 3.2 minutes
50 - 50	16
40 - 60	12
20 - 80	6
10 - 90	3

This breakdown and the statement of the one known witness who swerved to avoid collision suggest that the driver had evidence that he was driving the wrong direction on Interstate 80. This is further supported by acquaintances' contentions that the Volkswagen driver was not unfamiliar with the area and roadway and by the presence at reentry point of MUTCD-approved signs warning wrong-way motorists.

Fatal injury to all Volkswagen occupants prevented possible determination of the driver's motivation for driving the wrong way on Interstate 80. His blood alcohol level of 0.06 percent may have had some adverse effect on his perception of right and wrong direction.

The color of the Volkswagen, considered with the observed hue of the median vegetation in the late afternoon, may have hampered the Ford driver's early perception of the oncoming Volkswagen. The similar appearance of the front and rear of the Beetle model likewise may have led the Ford driver to believe he was approaching a vehicle traveling in the same direction. At the estimated speed of 70 mph to 75 mph, the Ford driver reduced his available perception/reaction time. Driver fatigue also may have contributed to a delay in recognition of the problem, but this is uncorroborated. Lack of restrictions on the driver license indicate his vision was adequate. No concrete determination of the Ford driver's apparent failure to take evasive action was reached.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the operation of the Volkswagen in the wrong way on a one-way highway. Contributing to the severity of the accident was the excessive speed of the Ford.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : ATL-80-F-H021
Highway Docket Number : HY-273-80
Location : Interstate 75
near Jennings, Florida
Date : August 5, 1980
Time : 2000
Vehicle and Operator :

1. 1976 Chevrolet Monte Carlo
Operator: Horace Thrasher, Jr.
Miami, Florida
2. 1979 Cadillac Coupe de Ville
Operator: Johnnie Calvin Ried
Riviera Beach, Florida

Injuries : 6 fatal
0 nonfatal
0 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the excessive speed of the Chevrolet driver which prevented his maintaining vehicle control when it dropped onto the shoulder. Contributing to the accident was the excessive drop-off from the pavement to the shoulder.

INVESTIGATION

The Accident

On August 5, 1980, about 8:00 p.m., a northbound 1976 Chevrolet Monte Carlo was en route to Atlanta, Georgia along Interstate 75, a four-lane divided highway, traveling at times at a witness-estimated speed of 100 mph. A 1979 Cadillac Coupe de Ville also was traveling on Interstate 75, but southbound, en route to Riviera Beach, Florida. About 1.1 miles south of the Georgia State line, the Chevrolet driver ran off the left side of the road and then lost control of his vehicle as he tried to reenter the roadway. The Chevrolet crossed the median, became airborne and collided with the southbound Cadillac, its left side impacting the front of the Cadillac. The Chevrolet then rolled over the Cadillac in roof-to-roof contact, bounded onto the southbound shoulder and cartwheeled over an abutting guardrail. Both the two Chevrolet, and all four Cadillac occupants died from impact injuries.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>		<u>Passengers</u>		<u>Total</u>
	Chevrolet	Cadillac	Chevrolet	Cadillac	
Fatal	1	1	1	3	6
Nonfatal	0	0	0	0	0
None	0	0	0	0	0

Vehicle Information

The 1976 Chevrolet Monte Carlo was owned by the father of the driver who was a passenger at the time of the accident. The Chevrolet was powered by a V8 engine and was equipped with an automatic transmission, power steering and power brakes, front-disc and rear drum. Occupant restraints were available but unused by the Chevrolet occupants.

Though the postcrash damaged condition of the Chevrolet precluded a thorough inspection to determine the possibility of precrash mechanical defects, examination of those components that were intact revealed no defect that would have caused the accident.

The 1979 Cadillac Coup de Ville was owned by the driver. It was powered by a V8 engine and was equipped with an automatic transmission and power steering and brakes. Occupant restraints were available for all occupants, but none was used.

Postcrash examination of the severely damaged Cadillac revealed no mechanical defects that would have contributed to the accident.

Driver Information

The 28-year-old Chevrolet driver held a Florida chauffeur license that was restricted to wearing corrective lenses. It was in a suspended status at the time of the accident. Since September 1973, the Chevrolet driver's license had been suspended nine times as a result of various violations, including the following:

<u>Type of Violation</u>	<u>Number of Violations</u>
1. Operating without driver license/improper driver license	11
2. Failure to appear for traffic summons	4
3. Failure to obey traffic instruction sign/device	2
4. No inspection sticker	2
5. Failure to attend traffic school	2
6. Failure to pay traffic fine	2
7. Driving on wrong side of road	1
8. Improper turn	1
9. Driving while license cancelled/revoked/suspended	1
10. Violation of restriction	1
Total Violations	$\frac{1}{27}$

The 38-year-old Cadillac driver held a valid Florida operator license with no restrictions. His driving record revealed one speeding violation in 1975.

Highway Information

Interstate Route 75 is a north-south roadway across Florida from the Georgia State line to Tampa. The accident occurred in Florida near milepost 470.9, about 1.1 miles south of the Georgia State line.

This section of highway consisted of two bituminous paved roads divided by a 55-foot-wide grass-covered, V-shaped median. Each roadway consisted of two 12-foot-wide traffic lanes, with a paved 8-foot-wide outside shoulder and a paved 4-foot-wide inside shoulder. A solid white painted line on the outside and a solid yellow line on the inside of the traffic lanes delineated the traffic lanes from the shoulders; broken white painted lines separated the two traffic lanes. A short section of 37-inch-high guardrail abutted the right shoulders of both roadways at the accident site. In the vicinity of milepost 470.9, the roadway was level and tangent. The posted speed limit was 55 mph.

At the time of the accident, a 31.4-mile-long section of both north- and southbound Interstate 75, extending from the State line into both Georgia and Florida, was being resurfaced. The resurfacing project included the accident site. Initial resurfacing was completed at the time of the accident, but the inside shoulder of the northbound roadway had not been filled to elevate it to the level of the new pavement. The drop-off from the pavement to the shoulder measured between five and six inches. The American Association of State Highway and Transportation Officials (AASHTO) Committee's report

titled, Highway Design and Operational Practices Related to Highway Safety: Second edition, 1974, states that "Roadway shoulders should be constructed and maintained to be flush with the adjacent through-traffic lane and structurally adequate for all weather and traffic conditions." Four construction warning signs were in place on both shoulders of the northbound lanes beginning at milepost 462 and ending at milepost 496. No actual work on the construction project was ongoing at the time of the accident.

The Chevrolet's northwesterly path from the inside northbound lane, across the median and into the outside southbound lane was marked by tire impression marks and gouges. The right rear tire of the Cadillac left one straight, 39-foot-long skidmark to the point of impact.

Other Information

One northbound motorist stated that the Chevrolet had passed his vehicle at an estimated speed of about 100 mph about 11 miles south of the State line. Another northbound motorist said both Chevrolet occupants were drinking from beer cans when they passed him. It was estimated that the Chevrolet was traveling 90 mph when the driver lost vehicle control.

Blood samples were taken from each of the automobile drivers. Toxicology performed on the blood sample from the Cadillac driver was negative for alcohol. The container with the blood sample from the Chevrolet driver was accidentally broken en route to the laboratory, so no determination of a blood alcohol level could be made.

ANALYSIS

Based on witness statements, the Chevrolet driver was drinking an unknown beverage before the accident, and he was traveling at an excessively high rate of speed at the time of the accident. His driving record and actions--driving under a revoked license and at an excessively high rate of speed--reflected an attitude of disregard for the law.

The Chevrolet driver lost control of his vehicle when he attempted suddenly to steer his vehicle back to the pavement after dropping off the travel lane onto the lower shoulder. The loss of vehicle control probably could have been prevented if the driver had slowed his vehicle before attempting to return to the pavement; the excessive speed of the vehicle contributed to his inability to successfully maneuver his vehicle back onto the roadway.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the excessive speed of the Chevrolet driver which prevented his maintaining vehicle control when it dropped onto the shoulder. Contributing to the accident was the excessive drop-off from the pavement to the shoulder.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : ATL-80-F-H022
Highway Docket Number : HY-274-80
Location : Rural Paved Road 2224
near Zebulon, North Carolina
Date : August 17, 1980
Time : 1500
Vehicle and Operator :
1. 1974 Pontiac LeMans
Operator: Jacobo B. Gomez
Irving, Texas
2. 1973 Chevrolet Nova
Operator: Timothy W. Whitley
Middlesex, North Carolina
Injuries : 5 fatal
0 nonfatal
0 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the attempt of the Pontiac driver to perform a passing maneuver in a no-passing zone. Contributing to the cause was the driver's alcohol impairment of judgment and driving ability. Contributing to the severity of the accident was the failure of the occupants to use the available occupant restraints.

INVESTIGATION

The Accident

On August 17, 1980, about 3:00 p.m., a 1974 Pontiac LeMans was westbound on Rural Paved Road 2224 near Zebulon, North Carolina, at a police-estimated speed of 70 mph. A 1973 Chevrolet Nova was eastbound on the same roadway at a police-estimated 55 mph. As the Pontiac approached the crest of a hill, it pulled into the eastbound lane of the two-lane highway and accelerated to pass a vehicle ahead. At the crest of the hill, the Pontiac collided headon with the Chevrolet, forcing it 32.6 feet westward. The three Pontiac and two Chevrolet occupants died at the scene.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>		<u>Passengers</u>		<u>Total</u>
	Pontiac	Chevrolet	Pontiac	Chevrolet	
Fatal	1	1	2	1	5
Nonfatal	0	0	0	0	0
None	0	0	0	0	0

Vehicle Information

The 1974 Pontiac LeMans Sport Coupe was owned by Gloria Rodriguez of Plainview, Texas, who was not an occupant at the time of the accident. It was powered by a V8 engine and was equipped with an automatic transmission, power steering and power brakes. Each front bucket seat was equipped with a lap belt; the rear bench seat was equipped with three lap belts, all of which were stowed beneath the seat.

The 1973 Chevrolet Nova Super Sport was owned by the driver. It was equipped with an automatic transmission, power steering and power brakes. Each of the front bucket seats was equipped with a lap belt-shoulder strap occupant restraint.

Both vehicles sustained primary impact damage to their front ends, leaving the occupant compartments of each uncrushed. Interior components, like the steering wheel, dashboard and seat backs, were deformed in the accident. None of the occupant restraints in either vehicle was in use at the time of the accident.

Driver Information

The 35-year-old Pontiac driver was familiar with Road 2224. He did not hold a valid driver license at the time of the accident. A Texas operator license restricted to corrective lenses was issued to him in October 1974. This license was suspended for 12 months on April 14, 1975 upon the driver's conviction of driving while intoxicated. This suspension was extended for a 12-month period when the driver was convicted for driving while his license was suspended. Again in November 1979 the driver's license was suspended for driving while intoxicated, this time for 18 months. This suspension was in effect at the time of the accident.

Postaccident toxicological testing yielded a blood alcohol level of 0.14 percent for the Pontiac driver.

The 20-year-old Chevrolet driver held a valid North Carolina operator license with no restrictions. His driving record contained convictions for three moving violations, two for speeding and one for driving on the wrong side of the road.

Highway Information

Rural Paved Road 2224 is a two-lane, east-west highway traversing rolling hills through rural countryside. The 19.6-foot-wide bituminous-paved roadway is divided into single opposing lanes of travel by a broken painted centerline. A solid white painted line at each outer pavement edge delineates the pavement from the 10.5-foot-wide grassed shoulders. At the accident location, painted double yellow lines separate the traffic lanes and prohibit passing on the grade. The roadway is tangent for over 500 feet in each direction from the hill crest, thus restricting opposing motorists' views until they are near the top of the grade.

ANALYSIS

The Pontiac driver had a history of disregard for traffic safety laws which was again demonstrated in this accident by his excessive vehicle speed; disregard for the no-passing zone markings; and driving with a blood alcohol level of 0.14 percent and without a license.

The National Highway Traffic Safety Administration's Highway Safety Program Standard No. 8, "Alcohol in Relation to Highway Safety," defines a driver as "intoxicated" or "under the influence of alcohol" when blood alcohol concentrations are 0.10 percent or higher by weight. 1/ According to "Chemical Tests and the Law": 2/

"... Regardless of normal reaction time, low concentrations of alcohol in the blood produce a definite lengthening of reaction time. ...

"Early in alcohol influence (at blood alcohol concentrations of 0.04-0.08 percent) nerves which control coordinated activities of muscle groups become partially paralyzed. ...It is quite apparent that there is little question that ability to operate a motor vehicle safely is definitely impaired by the time the blood alcohol level reaches 0.10 percent."

Although passenger restraints were available to each vehicle occupant, none was in use. Deformation of the steering wheels, dashboards and seat backs indicated that the occupants were thrown about inside the vehicles. The severity of injuries would have been reduced if the occupants had been using the available restraints.

1/ "Highway Safety Program Standard No. 8, Alcohol in Relation to Highway Safety," U.S. Department of Transportation, National Highway Traffic Safety Administration, October 1, 1973.

2/ Donigan, R., "Chemical Tests and the Law," pgs. 286-287 and 294 as cited in National Transportation Safety Board Highway Accident Report, "Head-on Collision of Automobile and Pickup Truck, U.S. Route 64 near Perry, Oklahoma, February 23, 1980," NTSB-HAR-80-4.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the attempt of the Pontiac driver to perform a passing maneuver in a no-passing zone. Contributing to the cause was the driver's alcohol impairment of judgment and driving ability. Contributing to the severity of the accident was the failure of the occupants to use the available occupant restraints.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : LAX-80-F-H004
Highway Docket Number : HY-275-80
Location : Interstate 5 near Lacy Street railroad bridge
in Los Angeles, California
Date : August 11, 1980
Time : 1005
Vehicle and Operator :

1. 1980 Peterbilt tank truck
towing a 1972 Billings tank trailer
Operator: Fxxon Corporation
Carson, California
2. 1978 Dodge van truck
Operator: R. O. Cabo Distributing Company, Inc.
Los Angeles, California

Injuries : 0 fatal
1 nonfatal
2 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the sharp turning passing maneuver of the tank truck with trailer. Contributing to the severity of the accident was the fire resulting from fuel leakage.

INVESTIGATION

The Accident

On August 11, 1980, about 10:05 a.m., a combination tank truck towing a full tank trailer loaded with gasoline was northbound on Interstate 5, an eight-lane divided freeway through Los Angeles, California, at a witness-estimated speed of 65 mph. As the truck traveled through a left-hand curve, its driver steered to the right to pass a slower-moving Dodge van truck, which was traveling at a driver-estimated speed of 55 mph. As the tank truck changed lanes it began to skid to its right leaving about 120 feet of centrifugal skidmarks to the right side of the roadway, 30 feet in a roadside gutter and about another 107 feet after returning to the roadway. While the tank truckdriver tried to steer back onto the roadway, the combination vehicle began to weave and sideswiped the Dodge. The tank trailer overturned onto its right side, and the tank truck veered to the left, dragging the overturning trailer. The tank trailer continued to roll about its longitudinal axis, in a clockwise direction when viewed from the rear. A leak occurred, and the escaping gasoline fumes ignited. The vehicle combination came to rest under the Lacy Street railroad bridge, at which point the tank truck overturned onto its left side and became engulfed in flames. The Dodge came to rest at impact with the center divider.

Fire consumed both vehicles, their cargo, and severely damaged Interstate 5, related structures, the railroad bridge and a storm drain system.

Passersby assisted the slightly injured tank truckdriver from his vehicle. Both Dodge occupants escaped their vehicle unassisted and uninjured.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>		<u>Passengers</u>		<u>Total</u>
	Dodge	Tank Truck	Dodge	Tank Truck	
Fatal	0	0	0	0	0
Nonfatal	0	1	0	0	1
None	1	0	1	0	2

Vehicle Information

The combination vehicle consisted of a 1980 Peterbilt three-axle tank truck with aluminum cargo tank and a 1972 Billings two-axle tank trailer. The vehicle was owned and operated by the Exxon Corporation of Carson, California. The tank truck and trailer unit was fully loaded with 8,650 gallons of regular, unleaded and premium gasoline. Fire totally destroyed the vehicle.

The 1978 Dodge two-axle van truck was owned and operated by the R. O. Cabo Distributing Company, Inc. of Los Angeles, California. It was hauling canned and bottled beer to area merchants.

Driver Information

The 63-year-old tank truckdriver held a valid Class 1 license with no restrictions issued by the State of California; he also held a valid medical certificate. His driving record showed one previous traffic citation, for making an unsafe lane change in 1977.

The driver had no known physical or mental incapacity.

Employed by Exxon Corporation for about 34 years, he successfully completed the Exxon Corporation commercial truck training course 14 years ago. He was familiar with both the roadway at the accident site and the vehicle he was operating, as he had been driving that particular one for the past three months.

The 38-year-old Dodge driver held a valid Class 3 license with no restrictions issued by the State of California. His driving record indicated one citation for excessive speed in 1978.

Highway Information

Interstate 5, a north-south freeway, consists of seven marked traffic lanes, four northbound and three southbound. All lanes are of grooved concrete. Each is about 12 feet wide. Lanes are delineated by broken white lines. Opposing traffic is separated by a raised asphalt divider, with eight-inch concrete curbs. Both the median and outside travel lanes for north- and southbound traffic are bordered by concrete gutters, which are two to three feet wide. The posted speed limit on Interstate 5 is 55 mph.

Approaching the accident site in the northbound lanes, the roadway grade descends about 1.88 percent, levels off for a distance of about 700 feet and begins ascending. By the time it reaches the Lacy Street railroad bridge, the highway grade is 3.88 percent. Northbound traffic also traverses a 2,800-foot radius curve to the left as it approaches the railroad overpass.

ANALYSIS

There were no identifiable vehicle defects or malfunctions contributing to this collision. The Dodge, according to its driver, was proceeding at about the posted maximum speed limit. The tank driver, who should have been aware of the handling characteristics of his vehicle and maintained an appropriate speed, instead tried to move to the far right-hand lane, the slow lane, to pass. In doing so, he significantly reduced the radius of the 2,800-foot curve he was traversing to 625 feet, so as the trailer wheels entered the gutter and he tried to steer to the left to exit the gutter, he set up a "fishtail" motion in his unit. His unit then sideswiped the vehicle he was overtaking.

The gutter at the right-hand side of the highway contributed to control difficulties, to retaining the trailer and to its rollover. As the tanker truck dragged the overturned trailer across the freeway, it continued its clockwise rotation over its longitudinal axis. During either the dragging maneuver or the rollover, the tank was ruptured and the cargo began to escape, providing a source of ignition and a fuel for the ensuing fire and leaving a burn mark across the lanes of travel.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the sharp turning passing maneuver of the tank truck with trailer. Contributing to the severity of the accident was the fire resulting from fuel leakage.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : LAX-80-F-H005
Highway Docket Number : HY-276-80
Location : Transition road from U.S. 101 to California State Route 11
in Los Angeles, California
Date : August 13, 1980
Time : 0450
Vehicle and Operator :
1. 1979 GMC tractor
towing a 1974 Fruehauf cargo tank semitrailer
Operator: Vernon David Smith
Woodenville, Washington

Injuries : 0 fatal
2 nonfatal
0 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the truckdriver to reduce his vehicle speed as required by roadway design and recommended by the advance speed reduction warning signs.

INVESTIGATION

The Accident

On August 13, 1980, about 4:50 a.m., a tractor towing a cargo tank semitrailer loaded with 7,000 gallons of hot crude oil was southbound on the transition road from southbound U.S. 101 to southbound California State Route 11 at a driver estimated speed of 55 mph. As the vehicle entered the right-hand-curved transition road ramp, which had a posted reduced speed of 35 mph, it began to slide to its left, as evidenced by centrifugal skidmarks on the roadway, one 181 feet long and arcing to the southeast, the other 81 feet long and arcing southwest.

The tractor mounted a 32-inch-high concrete barrier on the left-hand side of the road. The barrier redirected the tractor to the roadway, and as it did so, the cargo tank semitrailer impacted the barrier and began to overturn. The left side of the cargo tank was creased and ruptured, spilling 2,000 gallons of hot oil onto the roadway.

The cargo tank semitrailer rolled over the concrete barrier, landing on its right side in a dirt gore area separating the southbound transition road from a northbound transition road. The tractor also overturned, sliding inverted along the concrete barrier and severely crushing the cab. The vehicle came to rest on its right side in the northbound transition lanes. Both the truckdriver and the single passenger, a relief driver, were injured.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>	<u>Passengers</u>	<u>Total</u>
Fatal	0	0	0
Nonfatal	1	1	2
None	0	0	0

Vehicle Information

The tractor was a 1979 GMC three-axle model owned by the passenger. It was equipped with a tachograph which indicated a preaccident speed of about 60 mph. The tractor was towing a 1974 Fruehauf two-axle cargo tank semitrailer with a capacity of 8,425 gallons. The cargo tank semitrailer was registered to Dennis and Linda Burtch of Bakersfield, California. The top of the tractor cab sustained primary damage, evidenced by inward crush as it rode inverted along the concrete barrier. Primary damage to the cargo tank semitrailer was a variable four- to six-inch crease extending the length of the tank.

Postaccident vehicle inspection revealed no defect or malfunction that may have contributed to the accident.

Driver Information

The 30-year-old driver held a valid license issued by the State of Washington which was restricted to the wearing of corrective lenses, a requirement with which he was complying at the time of the accident. He had been driving the type vehicle involved in the accident for about two months but had driven other trucks previously.

En route from Bakersfield to Wilmington, California with the second load of oil within 10 hours, the driver had been driving on this trip for about 4-1/2 hours at the time of the accident. He and the passenger, the co-driver and tractor owner, alternated the driving task. At the time of the accident, the driver and co-driver had been on duty driving for more than 10 hours. Neither driver had received any formal training on the handling characteristics of a cargo tank semitrailer.

Highway Information

This accident occurred on the transition road from southbound U.S. 101 to southbound California State Route 11. An elevated roadway, it lies in the congested downtown Los Angeles area. The roadway consists of two 12-foot-wide lanes delineated by broken white lane lines and white reflectorized raised dots. Roadway alignment is an 80 degree right-hand curve.

The right road edge is bordered by a two-foot-wide concrete drainage ditch, a five-foot asphalt shoulder and a three-foot-high metal guardrail. Beyond the guardrail is a shrubbery-covered slope to a city street below. The left road edge is defined by a 32-inch-high concrete shaped barrier which divides this transition road from a dirt and shrub gore area, on the far side of which is a northbound transition road. Two 35-mph yellow speed advisory signs are located in advance of the point of curvature. The signs and their locations are in compliance with the Manual on Uniform Traffic Control Devices. Lighting is accomplished by overhead cantilevered mercury vapor units.

ANALYSIS

The truckdriver's admitted speed, which approximates that indicated on the vehicle's tachograph readout, was about 20 mph more than the posted advisory speed of 35 mph. This speed, in conjunction with vehicle and load characteristics, resulted in the vehicle rollover.

When the tractor slid into the concrete barrier, it was redirected toward the roadway as intended by the barrier design. This sudden redirection to the right caused the 7,000 gallons of liquid in the tank to surge to the left, an action made possible by the tank's not being filled to its capacity. The surging forces of the liquid, in combination with the tank trailer's high center of gravity, which made it prone to rollover, initiated the tank trailer's roll over the barrier.

Signing was adequate to forewarn southbound motorists of the need for reduced speed, and the vapor lights provided good illumination for driving during darkness. In addition, this was the driver's second trip within a 10-hour period over this section of roadway. Therefore, although the driver had no formal tank truck driving instruction, this was no factor in his failure to control his vehicle speed.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the truckdriver to reduce his vehicle speed as required by roadway design and recommended by the advance speed reduction warning signs.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : ATL-80-F-H024
Highway Docket Number : HY-277-80
Location : Tennessee State Route 54
in Greenfield, Tennessee
Date : August 22, 1980
Time : 2200
Vehicle and Operator :

1. 1973 Oldsmobile Cutlass
Operator: Edward L. Sullivan
Greenfield, Tennessee
2. 1963 Chevrolet Bel Air
Operator: Georgia A. Childrey
Greenfield, Tennessee

Injuries : 6 fatal
2 nonfatal
0 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the Oldsmobile driver, whose judgment and driving ability were impaired by alcohol, to maintain his lateral lane position.

INVESTIGATION

The Accident

On August 22, 1980, about 10:00 p.m., an Oldsmobile southbound at an undetermined speed on Tennessee State Route 54 in Greenfield, Tennessee crossed the centerline of the two-way street and struck a northbound Chevrolet, the speed of which also was undetermined, head on in the northbound lane. The Oldsmobile rolled over several times and came to rest on its left side against a tree. An engine fire was quickly controlled. The Chevrolet rotated counterclockwise, its front end moving to the west, and came to rest along the east edge of the pavement, facing south.

The driver and two passengers in each car died in the crash. One passenger from each vehicle survived.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>		<u>Passengers</u>		<u>Total</u>
	Chevrolet	Oldsmobile	Chevrolet	Oldsmobile	
Fatal	1	1	2	2	6
Nonfatal	0	0	1	1	2
None	0	0	0	0	0

Vehicle Information

The 1973 Oldsmobile Cutlass was owned by its driver, as was the 1963 Chevrolet Bel Air. Postcrash inspection revealed extensive crush damage to the left fronts and sides of both vehicles. Police responding to the accident scene reported seatbelts were not being used by occupants of either vehicle. No evidence of vehicle malfunction or defect as causal or contributory factors was identified.

Driver Information

The 21-year-old driver of the Oldsmobile held a valid Tennessee driver license. A local resident, he had a history of traffic violations in the area. During the hours preceding the accident, the driver and his companions were seen drinking in various local bars. A postaccident blood alcohol analysis of a blood sample taken from the Oldsmobile driver revealed a blood alcohol content of 0.23 percent.

The 19-year-old driver of the Chevrolet held a valid Tennessee driver license. Like the Oldsmobile driver, she was an area resident. At the time of the accident she was driving one of her passengers home. The Chevrolet driver had a postaccident blood alcohol content of 0.02 percent.

Highway Information

Tennessee State Route 54, also known as Broad Street in the Greenfield area, is a two-lane, two-way road traversing generally rolling terrain and moderate curves. The speed limit is 30 mph.

The asphalt paved roadway consists of two 11-foot-wide traffic lanes delineated by white edgelines and a solid double yellow centerline. The 28-inch-wide shoulders, also asphalt paved, are bordered by concrete curbs.

Approaching the accident scene from the north, the highway passes from a rural into an urban area. The roadside is lined and lighted by luminaires. Southbound traffic traverses a six degree righthand curve on an ascending grade; the road crests and becomes tangent about 125 feet from the accident site. From the south, Broad Street is tangent over rolling terrain. About 675 feet from the point of impact, the roadway descends a moderate slope for about 600 feet and then, for 74 feet, rises to the collision site.

ANALYSIS

There were no eyewitnesses to the collision itself, however, there was sufficient physical evidence to place the point of impact in the northbound lane. Lack of tire marks on the roadway through the curve just north of the accident site indicates the Oldsmobile did not enter the opposing lane of travel by exceeding the critical speed of the curve, which was 95 mph. 1/

The National Highway Traffic Safety Administration's Highway Safety Program Standard No. 8, "Alcohol in Relation to Highway Safety," defines a driver as "intoxicated" or "under the influence of alcohol" when blood alcohol concentrations are 0.10 percent or higher by weight. 2/ According to "Chemical Tests and the Law": 3/

"... Regardless of normal reaction time, low concentrations of alcohol in the blood produce a definite lengthening of reaction time. ...

"Early in alcohol influence (at blood alcohol concentrations of 0.04-0.08 percent) nerves which control coordinated activities of muscle groups become partially paralyzed. ... It is quite apparent that there is little question that ability to operate a motor vehicle safely is definitely impaired by the time the blood alcohol reaches 0.10 percent."

The effect of alcohol impairment on the judgment and driving ability of the Oldsmobile driver could explain the southbound vehicle's presence in the northbound lane as it approached the point of impact.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the Oldsmobile driver, whose judgment and driving ability were impaired by alcohol, to maintain his lateral lane position.

1/ Baker, J. Stannard, Traffic Accident Investigation Manual, p. 219, Exhibit 9-11

2/ "Highway Safety Program Standard No. 8, Alcohol in Relation to Highway Safety," U.S. Department of Transportation, National Highway Traffic Safety Administration, October 1, 1973.

3/ Donigan, R., "Chemical Tests and the Law," pgs. 286-287 and 294 as cited in National Transportation Safety Board Highway Accident Report "Head-on Collision of Automobile and Pickup Truck, U.S. Route 64 near Perry, Oklahoma, February 23, 1980," NTSB-HAR-80-4.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : MKC-80-F-H021
Highway Docket Number : HY-278-80
Location : County Highway G near Hawk Road
near Beaver Dam, Wisconsin
Date : August 9, 1980
Time : 1915
Vehicle and Operator :
1. 1975 Chevrolet Malibu Classic
Operator: Kenneth E. Erdman
Randolph, Wisconsin
2. 1973 Pontiac Safari stationwagon
Operator: Stanley L. Reinock
Beaver Dam, Wisconsin
Injuries : 7 fatal
1 nonfatal
0 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the operation of the northbound Chevrolet in the southbound lane in a designated no-passing zone. Contributing to the accident were the Chevrolet driver's alcohol impaired judgment and driving ability and his decision to pass a vehicle traveling near the speed limit. Contributing to the severity of the accident were the excessive speeds of both the Chevrolet and Pontiac.

INVESTIGATION

The Accident

On August 9, 1980, about 7:15 p.m., a 1975 Chevrolet Malibu Classic was northbound on County Highway G near Beaver Dam, Wisconsin. It overtook a slower-moving northbound vehicle, which was traveling an estimated 50 mph. and steered into the southbound lane to pass. When the two vehicles were about parallel, the Chevrolet collided headon in the southbound lane with a southbound 1973 Pontiac Safari stationwagon.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>		<u>Passengers</u>		<u>Total</u>
	Pontiac	Chevrolet	Pontiac	Chevrolet	
Fatal	1	1	3	2	7
Nonfatal	0	0	1	0	1
None	0	0	0	0	0

Vehicle Information

The 1975 Chevrolet Malibu Classic was owned by the driver. It was equipped with a V8 engine and an automatic transmission. All three Chevrolet occupants were riding in the front seat. Shoulder strap occupant restraints were available for the driver and outside passenger seat positions. Neither was used.

The 1973 Pontiac Safari stationwagon was owned by the driver. It was equipped with a V8 engine. Shoulder strap restraints were installed in the front seat, and lap belts were installed for the outside rear passenger seat positions, but none was used.

Postaccident inspection of the destroyed vehicles revealed no identifiable preexisting mechanical problem that might have adversely affected vehicle control. A black light analysis of the Chevrolet speedometer indicated an impact speed of 61 mph.

Crush damage was severe for both vehicles along the front. For the Chevrolet, it ranged from a maximum of 126 inches at the left front to a minimum of 29 inches at the right front. Severest frontal crush on the Pontiac also was at the left front, 78 inches. At various other points along the front it measured between 40 inches and 65 inches.

Based on the crush damage, the Pontiac's preaccident speed was calculated to be 67 mph, and the Chevrolet's, 66 mph.

Driver Information

The 18-year-old Chevrolet driver held a valid Wisconsin chauffeur license restricted to the wearing of corrective lenses. The driver had accumulated 16 points against his license during the 24 months preceding the accident. At the time of the accident, the Wisconsin Division of Motor Vehicles was processing a letter to send the Chevrolet driver to inform him his license was suspended for exceeding the maximum allowable number of points, 12 points in 12 months, 18 points in 24 months or 24 points in 36 months.

The 49-year-old Pontiac driver held a valid Wisconsin operator license. His driving record showed three traffic violation convictions and two accidents in the three-year period preceding the accident. His license also had been revoked for seven months during that same time span.

State laboratory toxicology tests indicated a blood alcohol content (BAC) of 0.32 percent for the Chevrolet driver. An insufficient blood sample precluded toxicology tests on the Pontiac driver.

Highway Information

At the accident site, County Highway G is a two-lane road with 11-foot-wide asphalt lanes and five-foot-wide gravel shoulders. The highway is characterized by occasional moderate curves and rolling terrain.

A no-passing zone in the northbound direction begins 752 feet and ends about 230 feet south of the impact area. This no-passing zone is marked by a solid yellow centerline in the northbound lane adjacent to a dashed yellow centerline. No-passing zone markings were placed in conformance with the standards of the Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD). White edgeline striping marks the outer edges of the pavement. The posted speed limit is 55 mph.

The minimum passing sight distance at this location, as measured by the criteria in the MUTCD, is 1,500 feet. The MUTCD policy recommends marking a no-passing zone on a road designed for 55 mph when sight distance decreases to 900 feet. In contrast, the American Association of State Highway Officials (AASHTO) states that a passing sight distance of 1,500 feet is sufficient for a design speed of 40 mph; a design speed of 55 mph requires about 2,000 feet.

There were no pre- or postimpact skidmarks on the roadway.

● ANALYSIS

The policies of the MUTCD and AASHTO regarding minimum safe passing sight distance are at variance, with AASHTO recommending the greater distance. For the accident site, where the passing sight distance was a measured 1,500 feet, MUTCD policy does not recommend lane markings; AASHTO does and for a greater distance than they actually were placed. Since there was neither physical evidence nor witnesses to specify at what point the Chevrolet began its passing maneuver, whether in the passing or no-passing zone, the applicability of the lane markings could not be determined.

The National Highway Traffic Safety Administration's Highway Safety Program Standard No. 8, "Alcohol in Relation to Highway Safety," defines a driver as "intoxicated" or "under the influence of alcohol" when blood concentrations are 0.10 percent or higher by weight. 1/ According to "Chemical Tests and the Law": 2/

1/ "Highway Safety Program Standard No. 8, Alcohol in Relation to Highway Safety," U.S. Department of Transportation, National Highway Traffic Safety Administration, October 1, 1973.

2/ Donigan, R., "Chemical Tests and the Law," pgs. 286-287 and 294 as cited in National Transportation Safety Board Highway Accident Report "Head-on Collision of Automobile and Pickup Truck, U.S. Route 64 near Perry, Oklahoma, February 23, 1980," NTSB-HAR-80-4.

"... Regardless of normal reaction time, low concentrations of alcohol in the blood produce a definite lengthening of reaction time. ...

"Early in alcohol influence (at blood alcohol concentrations of 0.04-0.08 percent) nerves which control coordinated activities of muscle groups become partially paralyzed. ... It is quite apparent that there is little question that ability to operate a motor vehicle safely is definitely impaired by the time the blood alcohol reaches 0.10 percent."

With a BAC of 0.32 percent, the Chevrolet driver's judgment and driving ability undoubtedly were impaired and could explain his driving at an excessive rate of speed and his apparent unwillingness to reduce his speed and remain in the northbound lane, traveling behind the slower moving vehicle.

No reason could be found to explain the Pontiac driver's excessive speed or apparent lack of evasive action.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the operation of the northbound Chevrolet in the southbound lane in a designated no-passing zone. Contributing to the accident were the Chevrolet driver's alcohol impaired judgment and driving ability and his decision to pass a vehicle traveling near the speed limit. Contributing to the severity of the accident were the excessive speeds of both the Chevrolet and Pontiac.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : ATL-80-F-H025

Highway Docket Number : HY-280-80

**Location : County Road C485
near Brooksville, Florida**

Date : August 26, 1980

Time : 0705

Vehicle and Operator :

1. 1966 Plymouth Belvedere
Operator: John Orr Hubbard
Brooksville, Florida

3. 1970 Blue Bird schoolbus
Operator: Hernando County School System
Hernando County, Florida

2. 1979 Toyota RN 42 pickup
Operator: Kenneth D. Keylon, Jr.
Brooksville, Florida

Injuries : 3 fatal

1 nonfatal

3 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the operation of the westbound Plymouth in the eastbound lane where it collided headon with a schoolbus while racing the Toyota around a right curve at excessive rates of speed. Contributing to the cause of the accident was the limited sight distance of the curve when the vehicles first became visible to each driver.

INVESTIGATION

The Accident

On August 26, 1980, about 7:05 a.m., a 1966 Plymouth Belvedere was westbound on County Road C485 at a high rate of speed, pursued by a 1979 Toyota pickup. When the two vehicles approached a 13-degree righthand curve, about 1.5 miles east of Brooksville, Florida, the Plymouth crossed the centerline into the eastbound lane, and the Datsun moved ahead until the vehicles were traveling parallel. The two vehicles were traversing the curve side by side when they met an eastbound schoolbus. The Plymouth struck the bus headon; the Toyota ran onto an embankment on the north side of the road and stopped.

The Plymouth driver was seriously injured; his three passengers were killed. Neither the schoolbus driver, its only occupant, nor the two truck occupants, were injured.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>			<u>Passengers</u>			<u>Total</u>
	Plymouth	Toyota	Schoolbus	Plymouth	Toyota	Schoolbus	
Fatal	0	0	0	3	0	0	3
Nonfatal	1	0	0	0	0	0	1
None	0	1	1	0	1	0	3

Vehicle Information

The 1966 Plymouth Belvedere was owned by the driver's father. It was equipped with a six-cylinder engine, an automatic transmission and manual brakes and steering. The front and rear bench seats were equipped with lap belts, none of which was used. Postcrash inspection of the Plymouth revealed no precrash defect that would have caused the accident. The entire right front half of the car was destroyed by severe crushing. The rear passenger compartment, however, remained intact.

The 1979 Toyota model RN 42 pickup was owned by the driver. It did not collide with either the schoolbus or the Plymouth. It sustained minor damage as it ran off the roadway and struck a dirt embankment.

The schoolbus consisted of a 1970 2-axle International Loadstar 1700 chassis with a 66-passenger Blue Bird body. It was owned by the Hernando County School Board. The bus was equipped with a V8 engine, a five-speed transmission, power steering and a standard air brake system. A lap belt was anchored at the floor for the driver's seat; it was buckled around the protection bar behind the driver's seat. Postcrash inspection of the bus revealed no precrash defect that would have caused the accident. Primary damage was at the right front.

Driver Information

Both the Plymouth and Toyota drivers were 16 years old. Each held a valid Florida operator license with no restrictions which was issued the day after his 16th birthday. Both were area residents and students at Hernando County High School in Brooksville, Florida to which they were en route at the time of the accident. Neither driver's driving record in Florida contained any notations of traffic violations or accidents.

The 49-year-old schoolbus driver held a valid Florida chauffeur license with no restrictions. His driving record revealed one traffic violation and no accidents. He also held a School Bus Driver Certificate issued by the Florida Department of Education. A resident of Brooksville, he was employed as a regular schoolbus driver by the Hernando County School Board. He began driving schoolbuses in January 1980. At the time of the accident, he was traveling alone, en route to a rural area east of Brooksville to begin boarding students on his scheduled route.

Highway Information

County Road C485 is a two-lane, east-west, county-maintained highway that traverses rolling hills through a sparsely populated area. The highway consists of a 19-foot-wide bituminous paved roadway divided into single opposing lanes of travel by a painted broken centerline which is extinct in some locations. Grass-covered shoulders of varying widths abut the pavement.

The accident occurred on a level section of County Road C485 in a 15-degree, 624-foot-long curve. In addition to being pitted and creviced, the pavement surface is uneven because of asphalt patching. The irregular grass shoulders in the curve narrow to about six to eight feet. Tall shrubs and weeds parallel the shoulders, restricting motorists' views of opposing traffic. Signs in place on the westbound shoulder beginning about 3,000 feet east of the accident location advise motorists of the curve ahead, of narrow shoulders and of the 35 mph speed limit.

Postcrash inspection of the accident site revealed deep pavement gouges that marked the impact in the eastbound lane. Two parallel tire marks, the longest of which was 94 feet, marked the braking of the Plymouth. The roadway was dry. The schoolbus left no preimpact tire marks in the road surface.

Other Information

In postaccident statements, the Plymouth driver stated that the Toyota driver "wanted to pass, but I wouldn't let him" and that he was driving his vehicle at "80 mph, as fast as it would run." School children standing along the roadway said the Toyota was following the Plymouth as closely as 5 to 15 feet. The Toyota driver denied he was racing the Plymouth.

ANALYSIS

This accident occurred as a result of a high-speed race between two drivers. The several illegal driving maneuvers of the two drivers evidence their mutual disregard of highway safety and of the safety of those who were using the adjacent shoulders and property.

The Plymouth, driven on the wrong side of the road, was blocked from returning to the westbound lane when the truck moved up beside him in the limited visibility curve. Considering the narrow shoulders abutting the pavement and the limited visibility, the schoolbus driver had no advance warning and no escape route as the two opposing vehicles raced into his view side by side in the curve.

Although restraints were available to the fatally injured Plymouth passengers, none was in use. Since the Plymouth occupant compartment was crushed at the right front passenger seat, the passenger seated at that location probably would not have survived even if he had been using his seat belt. The rear occupant compartment, however, was not crushed. The injuries sustained by the rear seat passengers may have been reduced in severity had they used the restraints available to them.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the operation of the westbound Plymouth in the eastbound lane where it collided headon with a schoolbus while racing the Toyota around a right curve at excessive rates of speed. Contributing to the cause of the accident was the limited sight distance of the curve when the vehicles first became visible to each driver.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20584**

SUMMARY REPORT

Highway Accident Number : LAX-80-F-H006
Highway Docket Number : HY-283-80
Location : County Road CC and County Road 23
in Swink Colorado
Date : August 18, 1980
Time : 1745
Vehicle and Operator :

1. 1967 Chevrolet Custom Deluxe 30 truck
Operator: Charles George DeLong, Jr.
Fowler, Colorado
2. 1977 Buick Regal
Operator: Unknown
Owner: Ronald Casebolt
LaJunta, Colorado

Injuries : 6 fatal
0 nonfatal
0 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the southbound Chevrolet driver to yield the right-of-way to the eastbound Buick. Contributing to the cause was the Chevrolet driver's inattention to the driving task. Contributing to the severity of injury of the Chevrolet driver and the ejected Buick occupant was each one's failure to use the available occupant restraint; of both Chevrolet passengers, the lack of occupant restraints; and of the two Buick occupants who remained in the vehicle and the Chevrolet passenger ejected onto the Buick, the postcollision outbreak of fire.

INVESTIGATION

The Accident

On August 18, 1980, about 5:45 p.m., a Chevrolet Custom Deluxe 30 truck southbound on County Road 23 failed to yield the right-of-way to an eastbound Buick Regal and entered the intersection of County Road CC in rural Swink, Colorado, colliding right front to left front with the Buick. Both vehicles skidded off the roadway, over an irrigation ditch, into an open field. The Buick, which overturned, caught fire and burned completely.

One of the Buick, and all three of the Chevrolet occupants were ejected during the accident. Of these, the Buick, and one Chevrolet occupant died of severe fractures and crushing injuries. Another Chevrolet occupant was thrown onto the burning Buick and suffered fatal burn injury. The third Chevrolet occupant was thrown into an irrigation ditch and drowned. Both Buick occupants not ejected died from burns.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>		<u>Passengers</u>		<u>Total</u>
	<u>Chevrolet</u>	<u>Buick</u>	<u>Chevrolet</u>	<u>Buick</u>	
Fatal	1	1	2	2	6
Nonfatal	0	0	0	0	0
None	0	0	0	0	0

Vehicle Information

The 1967 Chevrolet Custom Deluxe 30 truck, a one-ton, two-axle flatbed with wooden side rails and dual rear wheels, was owned by the driver. It was powered by a V8 engine and equipped with a four-speed manual transmission, power steering and power-assisted brakes.

Primary impact damage was to the right front of the Chevrolet, with about two feet of penetration. The interior of the passenger compartment remained relatively intact, though the bench type seat was loose from its securements. Only one seat belt was found in the passenger compartment. It was on the driver's side beneath the seat, apparently unused for some time.

Postaccident inspection of the vehicle showed it to be in good mechanical condition. The service brake pedal was firm and well-adjusted, and the brake system appeared well-maintained.

The 1977 Buick Regal was owned by Brian Deter of La Junta, Colorado, an acquaintance of all three Buick occupants. It was powered by a V8 engine and equipped with an automatic transmission and power steering and brakes. Both front bucket and rear bench seats were equipped with seat belts, but none was used.

Primary impact damage was to the left front side of the Buick. Fire gutted the vehicle interior and destroyed the tires and some engine components. To the extent it could be determined, the Buick appeared to have been in good preaccident mechanical condition.

According to police estimates, both vehicles were traveling about 45 mph as they approached the accident site.

Driver Information

The 51-year-old Chevrolet driver held a valid operator license with no restrictions. His driving record indicated one violation, that in October 1978 for failing to have a license in his possession, and no accidents. He was well acquainted with the area and roadway, having worked in the local farming and sheep industry for several years. He also was familiar with the vehicle, driving it daily to transport produce. At the time of the accident, the Chevrolet driver and occupants were en route to a nearby relative's home after spending the day at the driver's produce stand.

Postaccident results of a toxicological examination conducted on a blood sample from the Chevrolet driver were negative for blood alcohol concentration.

The identity of the Buick driver was not conclusively determined. Of the three occupants, a 38-year-old male was ejected during the accident; a 19-year-old female was found in the front seat and a 20-year-old female, in the rear seat. According to the Buick owner, who was with the Buick occupants earlier in the afternoon, the 19-year-old female was the last known driver, but the Buick occupants made a subsequent stop at a bar and were not observed departing. The Buick owner further stated that the 38-year-old male did not like to drive others' vehicles.

The 38-year-old Buick occupant had a blood alcohol concentration of 0.206 percent. The nature of the injuries of the two female occupants precluded taking blood samples.

Highway Information

County Road CC is a level, east-west, two-lane blacktop road in good condition. The nine-foot-wide lanes, which are bounded by four- to six-foot dirt shoulders, are divided by a dashed yellow centerline which becomes a solid no-passing-zone marking for eastbound traffic about 300 feet west of the intersection with County Road 23.

County Road 23 is a level, north-south, two-lane blacktop roadway scattered with gravel. Its unmarked travel lanes are nominally nine feet wide, bordered by six-foot dirt shoulders. A yield sign for southbound motorists is posted 21 feet north of County Road CC, 18 feet west of County Road 23. A southbound motorist on County Road 23 has an unobstructed view of traffic approaching from the west on County Road CC. The posted speed limit for both roadways is 55 mph.

The tires of the Chevrolet truck left skidmarks on the pavement in the intersection. A single wheel skid associated with the right front tire began 1 foot 6 inches south of the north edge of County Road CC and extended southward 12 feet 3 inches. The left front tire also made a single wheel skidmark, beginning 6 feet 10 inches south of the north edge of County Road CC and continuing south 5 feet 5 inches. A dual wheel skid made by the truck's right rear wheels began 7 feet 3 inches south of the north edge of County Road CC and extended 3 feet southeast. No skidmarks were associated with the travel path of the Buick.

The average daily traffic count on County Road CC is 209 vehicles; on County Road 23, 63 vehicles. These numbers are based on a traffic count made by the local county in 1980.

ANALYSIS

According to police estimates, both vehicles approached the intersection well within the posted speed limit. The open field in the northwest quadrant of the intersection provided mutual visibility to the drivers of the Buick and Chevrolet. Yet neither apparently perceived the other almost until the moment of impact. Using the right front wheel skidmark as evidence that the Chevrolet driver ultimately did perceive the Buick and a perception-reaction time of 1.5 seconds, the Chevrolet, traveling at an estimated 66 feet per second, was a calculated 76.5 feet north of the yield sign when danger first was perceived. Given this distance and his speed, the Chevrolet driver was driving too fast to avoid the collision. Given the driver's familiarity with the roadway and specific intersection and lack of any evidence to indicate physical incapacitation, his lack of reaction can be attributed only to inattention.

Inability to identify positively the Buick driver precludes determining why he or she failed to perceive the fast-approaching Chevrolet or to take any identifiable evasive action.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the southbound Chevrolet driver to yield the right-of-way to the eastbound Buick. Contributing to the cause was the Chevrolet driver's inattention to the driving task. Contributing to the severity of injury of the Chevrolet driver and the ejected Buick occupant was each one's failure to use the available occupant restraint; of both Chevrolet passengers, the lack of occupant restraints; and of the two Buick occupants who remained in the vehicle and the Chevrolet passenger ejected onto the Buick, the postcollision outbreak of fire.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : LAX-80-F-HC08
Highway Docket Number : HY-285-80
Location : U.S. 101 near Santa Rosa Road
near Buellton, California
Date : August 23, 1980
Time : 0345
Vehicle and Operator :
1. 1976 Chrysler Cordoba
Operator: Epigmenio Madrid
Los Angeles, California

Injuries : 2 fatal
1 nonfatal
0 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the unlicensed driver, whose judgment and driving ability were impaired by alcohol, to keep his vehicle in the proper travel lane. Contributing to the severity of passenger injury were failure to wear available occupant restraints and the outbreak of fire.

INVESTIGATION

The Accident

On August 23, 1980, about 3:45 a.m., a 1976 Chrysler Cordoba was northbound on U.S. 101 near Buellton, California at a witness estimated speed of about 65 mph. As the Chrysler proceeded north through a slight curve to the left, it drifted off the paved traffic lane, across the east paved shoulder and dirt roadside, into a drainage ditch. After traveling 321 feet in the ditch, the Chrysler struck an oak tree.

Upon impact, the Chrysler rotated counterclockwise about the tree and came to rest east of the tree at a 90 degree angle to the road edge facing west.

The Chrysler began to burn; flames destroyed the vehicle. The driver and right front passenger died. The right rear passenger, who was sleeping intermittently, survived but was severely burned.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>	<u>Passengers</u>	<u>Total</u>
Fatal	1	1	2
Nonfatal	0	1	1
None	0	0	0

Vehicle Information

The 1976 Chrysler Cordoba was owned by the driver. Powered by a V8 engine, the car was equipped with an automatic transmission, power steering and power brakes. Frontal crush occurred across the entire width of the car, with maximum penetration on the driver's side. Investigators determined that the battery, which disintegrated against crushing metal as it was ejected from the car, may have provided an ignition source for gasoline and fumes from ruptured fuel lines. Fire gutted the interior of the Chrysler.

The passenger compartment was equipped with bucket seats in front and a bench seat in the rear. All rear seats were equipped with lap belts; front seats, with shoulder/lap combination belts. There was no indication that belts were in use at the time of impact.

Driver Information

The 23-year-old Chrysler driver was unlicensed and therefore had no driver license record. Postmortem blood alcohol testing disclosed a blood alcohol level of 0.17 percent.

According to the surviving passenger, the three Chrysler occupants were en route from Los Angeles to Fresno to seek work as farm laborers. They drank several beers before leaving Los Angeles at 1:30 a.m. Remnants of a six-pack of beer were found between the front bucket seats after the accident.

Highway Information

U.S. Route 101 is a level, north-south, four-lane blacktop divided highway consisting of two northbound and two southbound lanes in a rural area. Northbound lanes are 12 feet wide with an eight-foot paved shoulder. The lanes are divided by a dashed white line and raised white reflectorized dots. A solid white line delineates the roadway edge, and a solid yellow centerline with raised yellow reflectorized retro markers delineates the lanes from the dirt median. East of the northbound road edge is a drainage channel. The road curves gently to the left at a radius of 4,325 feet. An oak tree with a 12-foot-2-inch circumference is located 16 feet east of the paved road edge in the ditch. It is protected by a 169-foot-long metal W-beam guardrail installed adjacent to the shoulder and curving eastward south of the tree.

Visual inspection of the roadway revealed no identifiable skidmarks along the route traveled by the Chrysler prior to its leaving the paved portion of the road. Starting at the point of impact and extending south 321 feet along the drainage channel and up a slight incline to the paved roadway edge investigators found parallel tire tracks, but no evidence to indicate that braking occurred in the dirt area.

Gouges and scrapes in the packed dirt surface near the tree marked the point where the vehicle struck the tree and rotated counterclockwise. Striations on the tree matched damage to the left side of the Chrysler.

Survival Information

The driver sustained fatal injuries as a result of impact with the steering wheel and column which occurred as the car struck the tree, considerably reducing the driver's space.

The right front passenger, unprotected by restraints or padding, impacted the dash and subsequently was burned. Though the right front passenger area was not reduced in size to the degree that survival was precluded, his chances for survival were reduced by the added weight and force exerted upon him as the rear passenger was thrown forward into the right front passenger's seat back. This seat back and the right front passenger provided protection and padding for the surviving occupant.

ANALYSIS

The National Highway Traffic Safety Administration's Highway Safety Program Standard No. 8, "Alcohol in Relation to Highway Safety," defines a driver as "intoxicated" or "under the influence of alcohol" when blood alcohol concentrations are 0.10 percent or higher by weight. 1/ According to "Chemical Tests and the Law": 2/

1/ "Highway Safety Program Standard No. 8, Alcohol in Relation to Highway Safety," U.S. Department of Transportation, National Highway Traffic Safety Administration, October 1, 1973.

2/ Donigan, R., "Chemical Tests and the Law," pgs. 286-287 and 294 as cited in National Transportation Safety Board Highway Accident Report "Head-on Collision of Automobile and Pickup Truck, U.S. Route 64 near Perry, Oklahoma, February 23, 1980," NTSB-HAR-80-4.

"... Regardless of normal reaction time, low concentrations of alcohol in the blood produce a definite lengthening of reaction time. . . .

"Early in alcohol influence (at blood alcohol concentrations of 0.04-0.08 percent) nerves which control coordinated activities of muscle groups become partially paralyzed. . . . It is quite apparent that there is little question that ability to operate a motor vehicle safely is definitely impaired by the time the blood alcohol reaches 0.10 percent."

The Chrysler driver's blood alcohol level of 0.17 percent combined with the lateness of the hour to make him inattentive, as was the rear seat passenger. The likelihood that the Chrysler driver was inattentive, possibly even asleep, is supported by the lack of any physical evidence of any attempted evasive action during the 3-4 seconds after the car left the road and travelled along the drainage ditch before striking the tree.

The Chrysler drifted off the highway before it reached the guardrail protecting the tree, and drove behind the guardrail, so there was no barrier to redirect the vehicle.

All occupants were thrown forward and to the left on impact. As a result of failure to use available restraints and contact with vehicle interior features, two suffered fatal injuries and one, serious injury and burns. Because the driver's space was severely reduced, usage of an occupant restraint probably would not have affected his degree of injury. However, failure of the two passengers to use their available restraints probably contributed to the severity of their injuries.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the unlicensed driver, whose judgment and driving ability were impaired by alcohol, to keep his vehicle in the proper travel lane. Contributing to the severity of passenger injury were failure to wear available occupant restraints and the outbreak of fire.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : LAX-80-F-H011
Highway Docket Number : HY-288-80
Location : Arizona State Route 260 at milepost 335.5
near Show Low, Arizona
Date : September 24, 1980
Time : 0745
Vehicle and Operator :

1. 1973 Blue Bird schoolbus
Operator: Show Low School District # 10
Show Low, Arizona
2. 1977 Chevrolet Custom dump-bed truck
Operator: Leonardo Encinas
Show Low, Arizona

Injuries : 1 fatal
68 nonfatal
1 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the operation of the schoolbus at a speed too great for visibility conditions. Contributing to the cause of the accident were the lack of signing accompanying the maintenance work and the failure of the driver of the dump truck to assure a clear distance behind his vehicle before performing a U-turn in the eastbound traffic lane.

INVESTIGATION

The Accident

On September 24, 1990, about 7:45 a.m., a schoolbus traveling eastward on Arizona State Route 280 toward Show Low, Arizona, collided with the rear-end of a truck/sweeper combination enshrouded in a dense cloud of dust as it swept the roadway free of gravel in the eastbound lane. The truck/sweeper combination was in the process of making a U-turn at the time of the collision. Due to the dust cloud, the truckdriver was unable to see the sweeper operation, much less the traffic approaching from his rear. At impact fire erupted, destroying both bus and sweeper unit. All 67 pupils and the busdriver were injured, none fatally. The sweeper operator, who was standing on a wire mesh platform at the rear of the sweeper, was killed. The truckdriver was uninjured.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>		<u>Passengers</u>		<u>Total</u>
	Bus	Truck/Sweeper	Bus	Truck/Sweeper	
Fatal	0	0	0	1	1
Nonfatal	1	0	67	0	68
None	0	1	0	0	1

Vehicle Information

The 1973 Blue Bird 84-passenger schoolbus was owned and operated by Show Low School District #10 of Show Low, Arizona. Inside, fire gutted the bus. Fire also burned the exterior, the roof and the sides to the lower window frame. Most severe crush damage occurred on the front of the bus, particularly at the center of the grill, about 53 inches above ground level. All windows were broken and agape. The right front exit was jammed shut.

Though the driver's seat was fully burned, a seat belt still was identifiable. The busdriver said he was wearing it at the time of the accident.

No apparent defects were found in the steering or brake systems in postaccident inspection. The bus was equipped with an air brake system. All brake push-rod adjustments were within the manufacturer's recommended measurements, and the brake linings were within acceptable thickness and free of oil and dirt contamination.

A 1977 Chevrolet Custom dump-bed type two-axle truck was towing the sweeper. Owned and operated by the Arizona Department of Transportation, it had an amber beacon affixed to its roof, which, according to witnesses and corroborated by postaccident testing, was illuminated prior to impact. Major damage occurred on the rear, where the sweeper unit was attached to a heavy frame mounting. This was severely distorted inward. Postaccident inspection revealed no preexisting mechanical defect.

The sweeper unit uses a broom mechanism powered by a gasoline engine to sweep material from the pavement. A fuel cell with a capacity of about 7.5 gallons is mounted on the engine housing frame. To operate the broom mechanism, a sweeper operator manually operates a hydraulic pump to raise and lower the broom while standing on a metal platform at the rear of the sweeper. A slow-moving-vehicle triangular emblem is attached to the rear of the operator platform. The sweeper unit attaches to the towing vehicle with a goose-neck type attachment.

Bus impact totally crushed the sweeper unit, and fire burned it. The fuel cell was punctured and compressed. No preimpact defects could be found.

Driver Information

The 56-year-old schoolbus driver held a valid Class 4 operator license with no restrictions issued by the State of Arizona. An area resident, he had been employed by the school district for two years and traveled the same route twice daily. Before beginning employment as a schoolbus driver, he attended a 30-hour training course. His driving record listed one violation, that for an improper turn in 1976, and no previous accidents.

The driver of the schoolbus stated that he was traveling between 50 mph and 55 mph as he approached the accident site, although witnesses stated that he was traveling faster. He saw a dust cloud ahead but was unable to see through it because, he said, it was dense, and the morning sun was glaring. He further related that the sweeper unit never came into sight, but he did see the truck when he was about one bus length away. He said he saw no amber illuminated rotating beacon atop the truck.

The 26-year-old driver of the dump truck held a valid Class 2 operator license with no restrictions issued by the State of Arizona. Also an area resident, he had been employed by the Arizona Department of Transportation for one year, during which time he performed the same job function as that performed at the time of the accident. His driving record listed two speeding violations, one in 1978 and one in 1979 but no previous accidents.

The truckdriver said he never saw the bus, nor was he able to see the sweeper operator through the thick dust cloud. He was in the process of making a U-turn to reposition the sweeper unit for another pass across the roadway when he heard a loud roar and then felt the impact.

Highway Information

Arizona State Route 260 is a two-lane, east-west highway through a rural area which is predominantly mountainous and hilly. The posted speed limit is 55 mph. The accident occurred in the eastbound lane about five miles west of Show Low. The grade of the highway at the accident site is 0.93 percent descending, though the eastbound approach is a much steeper 4.1 percent. The impact area is clearly visible from a point 1,700 feet to the west. The road surface was asphalt with a skid trailer skid number of .65 as determined after the accident.

An Arizona Department of Transportation crew was resurfacing portions of State Route 260, including the accident site. As part of the process, gravel was spread over the roadway and allowed to stand for awhile to become embedded by passing traffic. Excess gravel was removed with a sweeper unit, with several passes across the width of the road necessary to remove all excess. This was the operation being performed at the time of the accident.

According to Arizona Department of Transportation personnel interviewed after the accident, the gravel removal operation was considered a moving operation, one not requiring signing as specified in Part VI of the Manual on Uniform Traffic Control Devices (MUTCD), which part prescribes appropriate traffic controls for highway construction and maintenance operations.

MUTCD Section 6B-4 Erection of Signs states, in part,

"...For maximum mobility on certain types of maintenance operations, a large sign may be effectively mounted on a vehicle stationed in advance of the work or moving along with it. This may be the working vehicle itself, as in the case of shoulder-mowing or pavement marking equipment, or a vehicle provided expressly for this purpose. These mobile sign displays may be mounted on a trailer, may be provided with self-contained electric power units for flashers and lights, or may be mounted on a regular maintenance vehicle. ..."

Section 6A-5 Fundamental Principles states, in part,

"...maintenance work should be planned and conducted with the safety of the motorist, pedestrian, and worker kept in mind at all times. ..."

Meteorological Information

At the time of the accident it was daylight; sunrise was at 6:20 a.m. The sky was clear, and the temperature, 65 degrees.

ANALYSIS

The busdriver related that he saw the dust cloud but did not think it contained a hazard and continued his 55-mph speed. At 55 mph, with the scene visible by the driver 1,700 feet before impact, 28 seconds would elapse before reaching the impact area. This would allow ample time and distance for a driver to reduce his speed and carefully evaluate the cloud ahead. The speed at which the driver entered the dust cloud demonstrated a complete disregard for the reduced visibility situation. Even though advance signing was not present, the driver had the responsibility to operate the schoolbus with due caution and sound judgment.

The sweeper was overridden, crushed and propelled forward 169 feet from impact. The truck's rear-end rotated in a counterclockwise direction evidenced by skids on the roadway, coming to rest 120 feet east of the point of impact. During this sequence of events, the bus' windshield became dislodged, and the fuel cell of the sweeper became compressed and punctured, producing a 3-inch-long, 3/4-inch-wide rupture in the fuel cell. This compression produced a hydraulic-type action, forcing the fuel through the ruptured tank into the atmosphere. This allowed the fuel to atomize and continue into the bus through the missing windshield. The exposed wires located in the left front damaged area of the bus possibly shorted out during impact, as evidenced by the beading effect on the wires. This condition, as well as metal-to-pavement and metal-to-metal contact, was a source of possible ignition. The bus and sweeper were totally destroyed by fire.

The driver of the dump truck also was negligent in performing a U-turn when his visibility was so limited that he could not see the sweeper operator, who was no more than 15 feet behind him.

Though the MUTCD indicates that marking the working vehicle itself may suffice in certain mobile maintenance operations, the intent of all signing is safety, of motorists and workers equally. The rotating amber light atop the dump truck and the slow-moving-vehicle emblem affixed to the sweeper operator platform were insufficient to warn approaching motorists because the dust cloud was dense enough to obscure the sweeper unit even from the dump truck driver's view.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the operation of the schoolbus at a speed too great for visibility conditions. Contributing to the cause of the accident were the lack of signing accompanying the maintenance work and the failure of the driver of the dump truck to assure a clear distance behind his vehicle before performing a U-turn in the eastbound traffic lane.

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594**

SUMMARY REPORT

Highway Accident Number : LAX-80-F-H012
Highway Docket Number : HY-289-80
Location : Irving Street and 4th Avenue
in San Francisco, California
Date : September 24, 1980
Time : 1550
Vehicle and Operator :
1. 1980 Pontiac Phoenix
Operator: Max Day
Hemelhemstead, England
2. 1979 Boeing Vertol Standard Light Rail Vehicle
Operator: San Francisco Municipal Railway
San Francisco, California

Injuries : 1 fatal
3 nonfatal
36 none

Probable Cause:

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the driver of the Pontiac to stop and yield the right-of-way to through traffic before entering a stop-sign-controlled intersection. Contributing to the severity of the accident were the size and configuration of the LRV.

INVESTIGATION

The Accident

On September 24, 1980, about 3:50 p.m., a San Francisco Municipal Railway Light Rail Vehicle (LRV) was operating eastward on its normal route and schedule along Irving Street at an estimated speed of 25 mph to 30 mph. As the LRV approached the 4th Avenue stop, the LRV operator saw nobody waiting to board or exit and so continued into the intersection. In the intersection, the LRV collided with the right side of a southbound 1980 Pontiac Phoenix that was traveling at a witness estimated speed of 10 mph to 15 mph. Witnesses stated that the Pontiac did not stop at a stop sign posted for southbound traffic before entering the intersection.

The right front passenger from the Pontiac died. The driver and two rear seat occupants were injured seriously. All 36 persons aboard the LRV escaped injury.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>		<u>Passengers</u>		<u>Total</u>
	Pontiac	LRV	Pontiac	LRV	
Fatal	0	0	1	0	1
Nonfatal	1	0	2	0	3
None	0	1	0	35	36

Vehicle Information

The 1980 Pontiac Phoenix was owned by Budget-Rent-A-Car of San Francisco, California and had been rented by the passenger in the right front seat. A four-door hatchback model, it was equipped with an automatic transmission and powered by a six-cylinder engine. The front bench seat was equipped with shoulder-type restraints; the rear, with lap belt-type occupant restraints. None of the restraints was used by the vehicle occupants at the time of collision.

The Pontiac was totally destroyed in the collision, sustaining principal crush damage of 32-inch penetration to the right side at the B-pillar. Occupant compartment space allocation was severely reduced on this side for both the front and rear passengers.

The 1979 Standard Light Rail Vehicle, a rail transit vehicle built by the Boeing Vertol Company, was owned and operated by the San Francisco Municipal Railway (MUNI). The vehicle body, which is 73 feet long, 8 feet 10-1/4 inches wide and stands 11 feet 4 inches above the rail, is predominantly orange on the lower half and white from the lower edge of the windows to the roof. Powered by two 600 volt DC traction motors, the LRV has a minimum emergency braking capability of 6 mph per second below a speed of 30 mph. Three of the vehicle's four braking systems automatically apply the brakes when the brake control lever is placed in the emergency position. Almost entirely surrounded by large windows, the operator compartment provides the operator unrestricted peripheral and forward visibility.

Most of the LRV damage was confined to the leading end of the car, particularly to the coupler's electric head and carrier frame. The nature of this type damage causes the electrical system to ground and automatically apply the brakes in an emergency mode with no operator intervention necessary.

Driver Information

The Pontiac driver was an English citizen, vacationing in the United States with his wife and in-laws. He held a valid driver license issued in Great Britain, but no U.S. or international license. The right front passenger rented the Pontiac about three days before the collision, with the stated intention of driving from the rental location in Los Angeles to San Francisco. Little is known of the occupants' precrash activities. There were maps of the area in the vehicle. Presumably, they were sightseeing.

The LRV operator was hired by the San Francisco Municipal Railway in February 1977 as a trolley car operator. He attended an intensive training program sponsored by Boeing Vertol on the operation of the LRV. In addition, MUNI requires and provides initial refresher training on a prescribed schedule.

The route along Irving Street was the LRV operator's normal route. At the time of the collision, he was inward bound on the last segment of his circuit. He was familiar with both the route and the vehicle.

Highway Information

Irving Street, an east-west, asphalt-paved, undivided street, is dissected by two tangent MUNI tracks which ascend a one percent grade. The roadway is 50 feet wide. Parking is allowed on both sides of the street but is prohibited within 20 feet of any corner. There are no traffic controls on Irving Street at the accident site for through traffic. MUNI bus stops are located on the southwest and northeast corners of the intersection of Irving Street and 4th Avenue.

An asphalt-paved residential street, north-south 4th Avenue is 40 feet wide and undelineated by lane, center- or edgeline. Cars may park on either side of the street except within 20 feet of Irving Street. According to witnesses, just before the accident a 20-foot bobtail truck was parked illegally on Irving Street in the northwest corner of the intersection. A stop sign is posted in the northwest quadrant for southbound traffic, 18 feet south of a painted solid white limit line. Multi-story residences are erected on all four corners of the intersection. The southbound approach to Irving Street is on a six percent ascending grade.

The speed limit along both streets is 25 mph. It is posted on Irving Street but not on 4th Avenue. LRVs, which operate on approximate two-minute intervals, are governed by the California Vehicle Code.

ANALYSIS

Based on closing speeds of 10 mph-15 mph for the Pontiac and 25 mph-30 mph for the LRV and visibility limitations, it is doubtful either driver recognized the impending danger in sufficient time to avoid the collision. The Pontiac driver's view of the approaching eastbound LRV was obstructed by parked cars, the road grade and surrounding buildings. As corroboration, postaccident visual observation of southbound traffic revealed all vehicles stopped, not at the stop line, but an additional 20 feet south, well into the intersection to enable the drivers to have a better view of east-west approaching traffic. The truck witnesses claimed was parked on Irving Street within 20 feet of the corner would have further obstructed the Pontiac driver's view of through traffic. The LRV driver, accustomed to this route, undoubtedly also was used to southbound cars edging into the intersection before stopping and thus did not react to the slow-moving Pontiac.

The lack of a positive "head" and "tail" on the LRV, coupled with the British custom of driving on the "opposite" side of the roadway, may have contributed to Pontiac driver confusion about which direction the LRV was operating and diverted his attention from the traffic control at the intersection.

Size differential between the LRV and Pontiac and the LRV design contributed to the severity of the accident. Weight differential alone exceeded 65,000 pounds. The location of the coupler and metal flange "bumpers" at either end of the car overrides the common frame height of passenger cars. Capable of slicing through sheet metal, they significantly penetrated the occupant compartment of the Pontiac.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the driver of the Pontiac to stop and yield the right-of-way to through traffic before entering a stop-sign-controlled intersection. Contributing to the severity of the accident were the size and configuration of the LRV.