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NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C. 20594

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

UNITED STATES GOVERNMENT

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16. Abstract About 12:45 a.m., on February 23, 1980, a two-door sedan westbound on U.S. Route 64, near Perry, Oklahoma, collided head-on with an eastbound pickup truck. The two-door sedan rebounded into the westbound lane, and the pickup truck was struck by a following eastbound four-door sedan. The two-door sedan burned, and its driver and all five occupants of the pickup truck were fatally injured. The two occupants of the four-door sedan escaped with minor injuries. The National Transportation Safety Board determines that the probable cause of this accident was that the driver, whose judgment and driving ability were impaired by alcohol, operated the westbound two-door sedan in the eastbound lane while negotiating a hill crest at an excessive rate of speed.					
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HIGHWAY ACCIDENT REPORT

Adopted: August 26, 1980

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U.S. ROUTE 64 NEAR PERRY, OKLAHOMA,
FEBRUARY 23, 1980**

SYNOPSIS

About 12:45 a.m., on February 23, 1980, a two-door sedan westbound on U.S. Route 64, near Perry, Oklahoma, collided head-on with an eastbound pickup truck. The two-door sedan rebounded into the westbound lane, and the pickup truck was struck by a following eastbound four-door sedan. The two-door sedan burned, and its driver and all five occupants of the pickup truck were fatally injured. The two occupants of the four-door sedan escaped with minor injuries.

The National Transportation Safety Board determines that the probable cause of this accident was that the driver, whose judgment and driving ability were impaired by alcohol, operated the westbound two-door sedan in the eastbound lane while negotiating a hill crest at an excessive rate of speed.

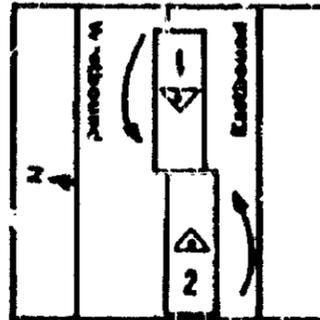
INVESTIGATION

The Accident

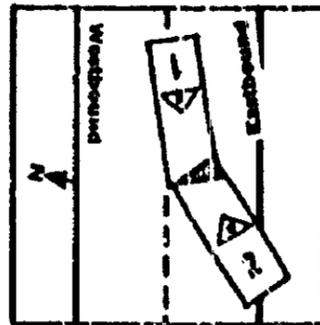
About 12:45 a.m., on February 23, 1980, a two-door sedan was westbound on two-lane U.S. Route 64 near Perry, Oklahoma. Traveling in the eastbound lane at an excessive rate of speed, the sedan crested a hill and collided head-on with an eastbound pickup truck. The sedan rebounded into the westbound lane and began to burn. The pickup truck was then struck by a following eastbound four-door sedan. (See figure 1.) Neither the pickup nor the four-door sedan were involved in the fire. Three of the five pickup truck occupants were ejected from the vehicle; all five suffered fatal injuries. The driver, the sole occupant of the two-door sedan, was killed. The two persons in the four-door sedan received minor injuries.

The driver of the four-door sedan stated that she was following the pickup at a distance of about 300 feet. She recalled nothing unusual about the preceding vehicle's preaccident operation. She said she did not observe oncoming headlamp glare from the two-door sedan or brakelight illumination from the pickup. She could not remember if she applied the brakes. Although she did not think she lost consciousness, her husband, who was sleeping, was knocked unconscious. After

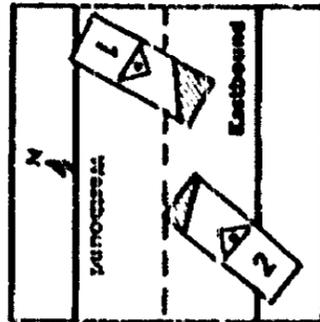
1. Initial impact positions and relative rotation of the two-door sedan and Pickup.



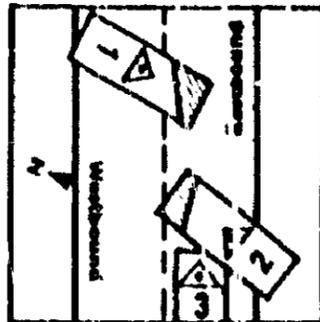
2. Maximum engagement of the two-door sedan and Pickup.



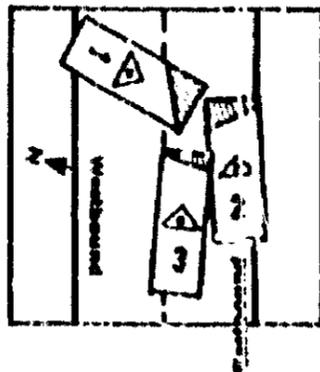
3. The distance of the two-door sedan and Pickup moved after first impact.



4. Initial impact of four-door sedan with Pickup.



5. Final rest positions of all three vehicles.



(Not to Scale)

Figure 1.--Diagram of collision kinematics of two-door sedan (1), pickup truck (2), four-door sedan (3).

arousing her husband, she tried to open the left front door but was unable to do so. She and her husband climbed over the front seatback and escaped through the left-rear door. Only then did she notice a small fire involving the two-door sedan. She said she helped her husband to a nearby farmhouse west of the accident site, and the resident of the farm called the Perry Police Department.

Weather at 12:58 a.m. was partly cloudy with surface visibility 4 miles with fog. However, the driver of the four-door sedan stated that she was not aware of any haze or fog as she approached the accident site. Average humidity between 11 p.m. February 22, and 1 a.m. February 23 was 84.3 percent.

Accident reconstruction indicates that the two-door sedan and pickup truck impacted about 26 feet west of the crest of the 400-foot hill. The vehicles hit head-on, with a 12- to 18-inch offset, when 80 percent of the westbound two-door sedan was in the eastbound lane and when all of the eastbound pickup truck was in the eastbound lane with its left side on the centerline of the road.

The positions of final rest and an approximate point of initial impact and secondary impact were determined using photographs taken by the Perry City Police Chief, physical evidence on the highway, and the vehicle damage. (See figure 2.)

Safety Board investigators were able to establish: (1) the direction of vehicle travel before impact; (2) the points of impact; (3) vehicle speeds at impact; (4) relative positions of the vehicles at impact; and (5) the principal directions of motion after impact.

After impact, the two-door sedan rotated counterclockwise about 66° while rebounding into the westbound lane and caught fire; all of the combustible materials burned. The initiating fuel source was probably gasoline draining from a broken tank-to-fuel pump line. The ignition source is unknown.

The pickup truck rotated about 45° counterclockwise while rebounding rearward in the eastbound lane and onto the shoulder. The eastbound four-door sedan collided with the left side of the pickup truck as it came to a momentary halt following its rebound from the first collision.

Injuries to Persons

<u>Injuries</u>	<u>Drivers</u>			<u>Passengers</u>			<u>Total</u>
	<u>Two-door sedan</u>	<u>Pickup</u>	<u>Four-door sedan</u>	<u>Two-door sedan</u>	<u>Pickup</u>	<u>Four-door sedan</u>	
Fatal	1	1	0	0	4	0	6
Serious	0	0	0	0	0	0	0
Minor/None	0	0	1	0	0	1	2
Total	1	1	1	0	4	1	8

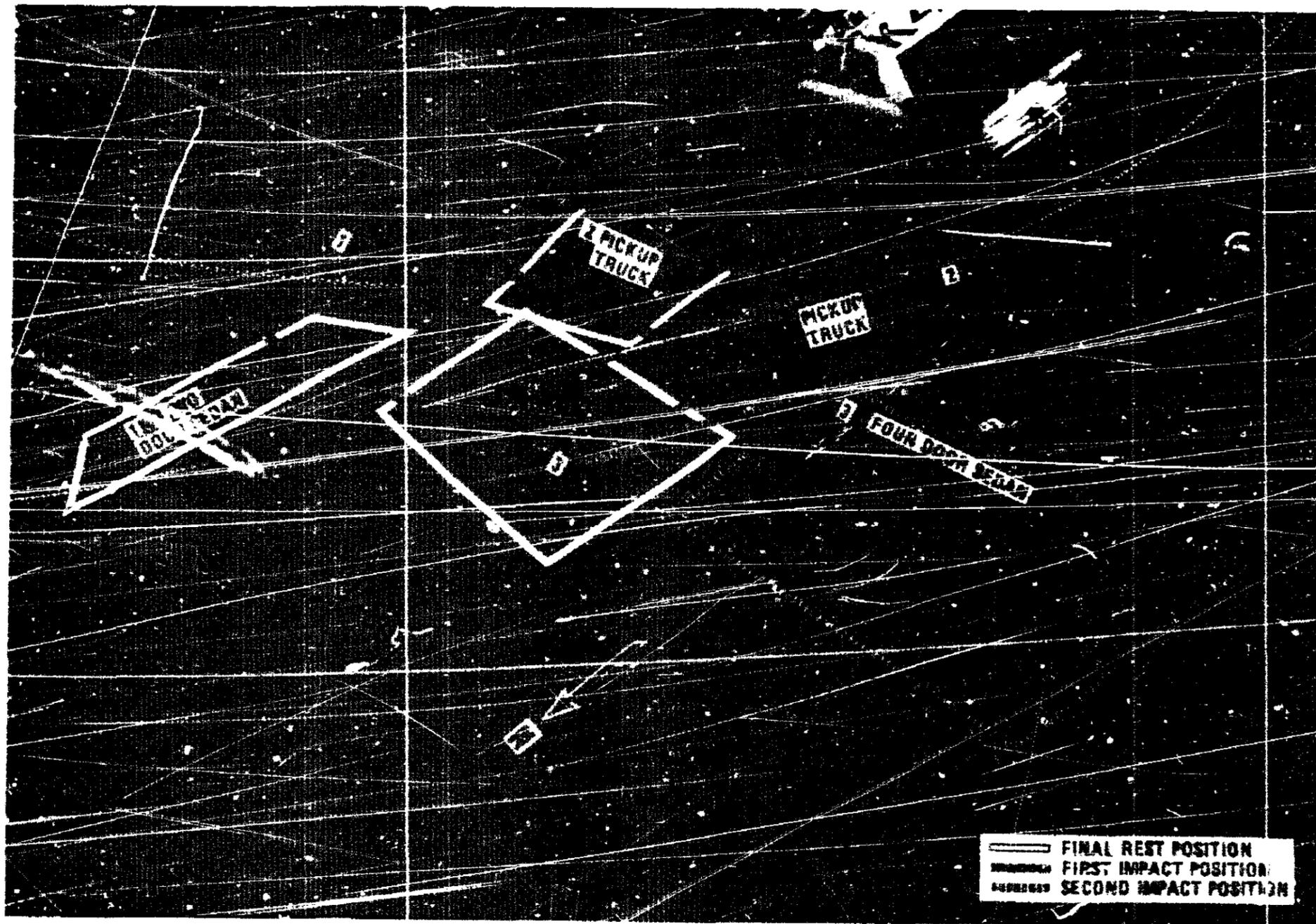


Figure 2.—Impact and final rest positions.

Vehicle Information

The gray two-door sedan, a 1979 Mercury Cougar, VIN 9H93F633029, was owned by the driver. It was powered by a 351-cubic-inch engine and had power steering and power brakes (front disc, rear drum) and an automatic transmission. The weight of the sedan and its driver was 4,462 pounds. A seatbelt shoulder harness restraint was available for the driver.

The blue pickup truck, a 1971 Chevrolet, C-10 pickup, VIN CE-141S631995, was owned by the driver. It was powered by a 350-cubic-inch engine and had a standard transmission and front and rear drum-type brakes. In the truck body were a diesel oil tank, a tool box, miscellaneous tools, and a washing machine; the total gross vehicle weight, including occupants, was 6,132 pounds. Three seatbelts were available in the truck.

The red four-door sedan, a 1977 Buick LaSabre, VIN 4P69R7X130693, was owned by the Indian Meridian Area Vocational Technical School. It was powered by a 231-cubic-inch engine and had power brakes (front disc, rear drum). The sedan, as loaded, and its passengers weighed 3,975 pounds. Seatbelt/shoulder harness restraints were available to the two persons in the front seat.

Vehicle Damage

A postcrash inspection of the three vehicles failed to disclose any mechanical defects that may have caused or contributed to the accident.

The front end components of the two-door sedan were deformed rearward. The most significant deformation was 85 inches on the left and 26 inches on the right front. (See figures 3 and 4.)

The entire front end of the pickup truck was badly damaged. All vehicle components, forward of the pickup truck body, were severely distorted rearward. The left and right fronts, respectively, were displaced 48 inches and 18 inches rearward of their normal positions. The top of the bumper was rotated rearward and downward. The left-side body skirting forward of the rear wheel was dented inward and bore red paint transfers. (See figures 5, 6, and 7.)

Collision damage was confined to the front of the four-door sedan, and the most significant damage occurred at the right front, above the bumper. Blue paint transfers were visible on the right front fender and the right center top surface of the bumper and the leading center surface of the engine hood and sheet metal cap. (See figures 8 and 9.)

Driver Information

The driver of the two-door sedan was 20 years old, weighed 120 pounds, and held a valid Oklahoma driver license with no restrictions. Her driving record listed one previous accident, on May 4, 1979.

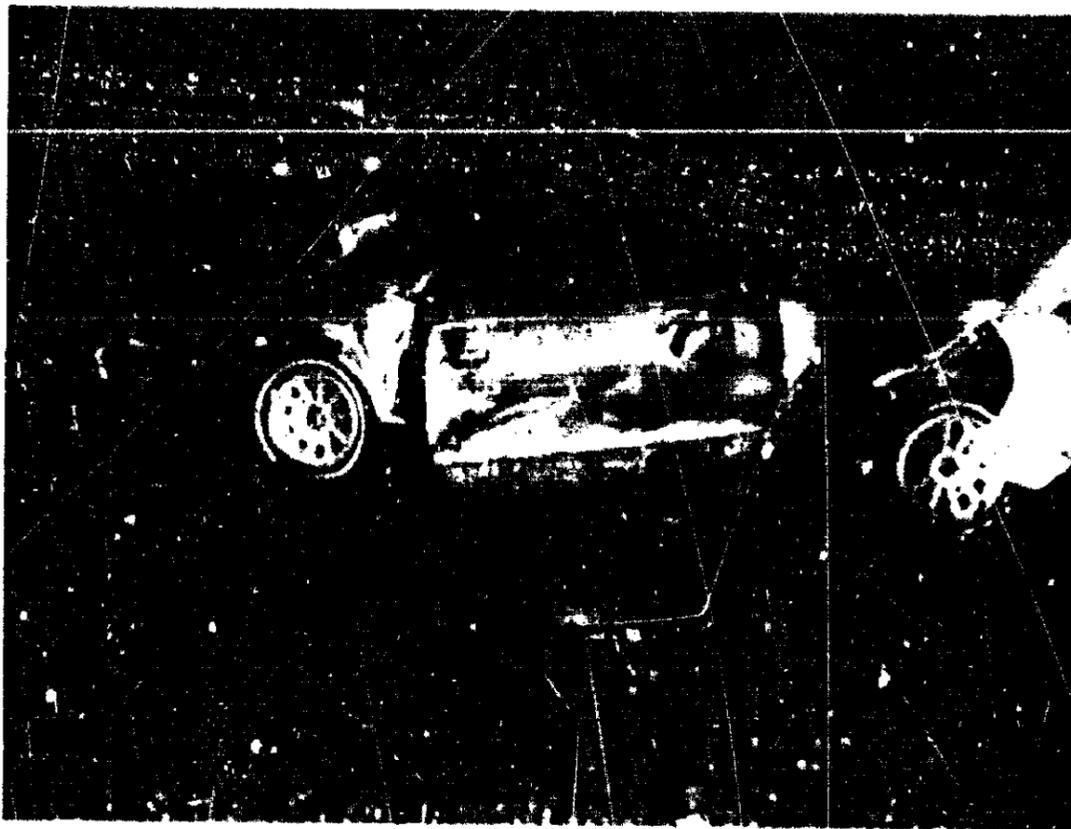


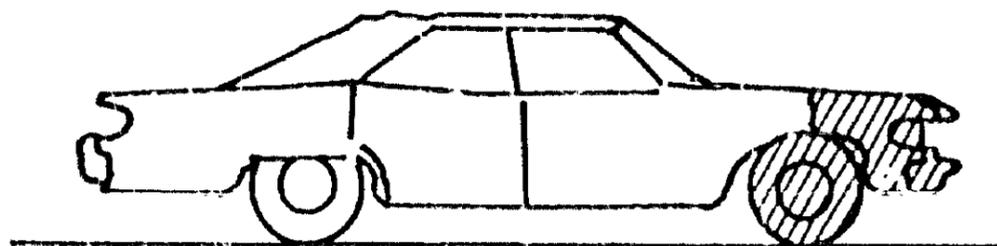
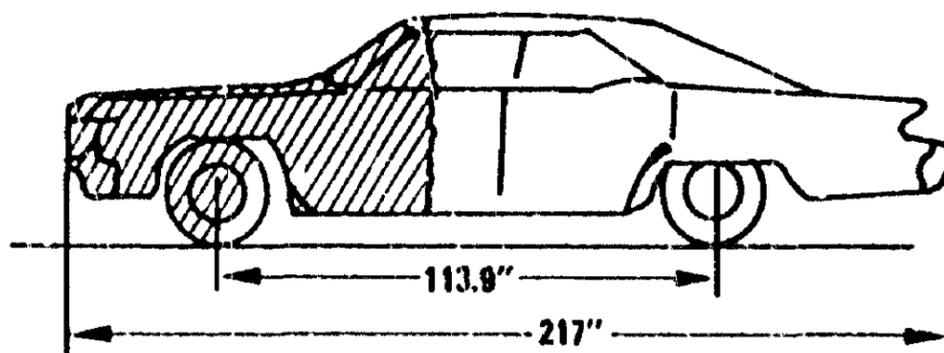
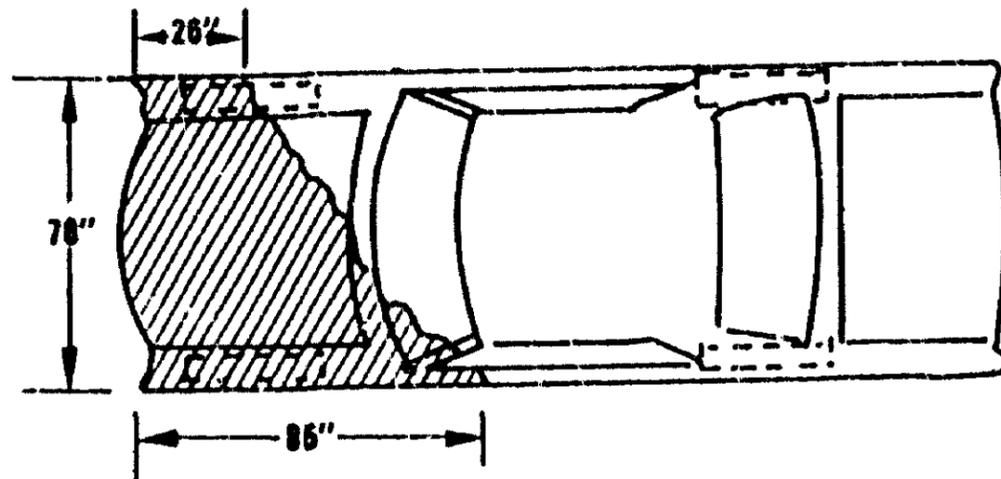
Figure 3.--Two-door sedan right side damage.

The driver had been employed on the night shift (midnight to 8 a.m.) at the Swan Rubber Company in Stillwater, Oklahoma, from July 1979 until February 4, 1980, when she changed to the day shift working from 8 a.m. to 4 p.m. According to friends, she found it difficult to adjust to the new hours and generally took an early evening nap for this reason. According to her father, she did not take a nap on the evening preceding the accident. She arrived home from work at about 4:45 p.m., and left shortly thereafter.

From about 6:30 p.m. until 11 p.m. on the evening preceding the accident the driver was at a local bar. About midnight she was observed leaving the tavern, alone, in her car. No person was found who could testify to her whereabouts from midnight until the accident.

The 34-year-old, 210-lb driver of the pickup truck was an area resident and held a valid Oklahoma driver license with no restrictions. He had no record of previous traffic violation convictions or accidents. He, his wife, and their three children had spent the evening at a friend's home in Perry; they arrived about 8 p.m. and left about 12:30 a.m. According to the driver's host, during the evening the driver drank about a "six-pack of beer." His host stated that he did not appear intoxicated when the family left and that all five occupants were riding in the front seat of the pickup truck when they left.

The 42-year-old, 140-lb driver of the four-door sedan held a valid Oklahoma driver license with no restrictions. There was no record of any previous traffic violation convictions on file with the Oklahoma Department of Public Safety. The driver and her husband were en route from Woodward, Oklahoma, to their home in



 **DEFORMATION DAMAGE**
(Dimensions in Inches)

Note: All vehicle components suffered fire damage except rear of trunk lid and right front fender.

Figure 4.--Two-door sedan damage diagram.

HOLE IN
HEADLAMP
PANEL

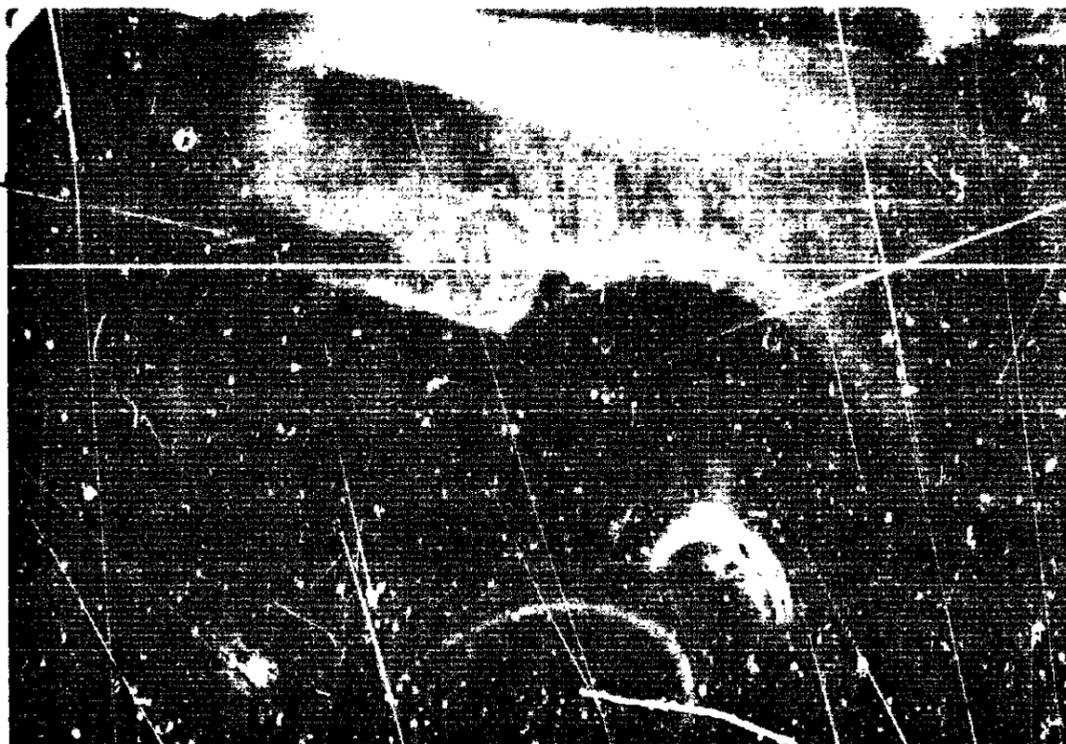


PT. OF MAX.
REARWARD
DISPLACEMENT
& HOLE IN
RADIATOR
CORE

RUBBER
TRANSFER

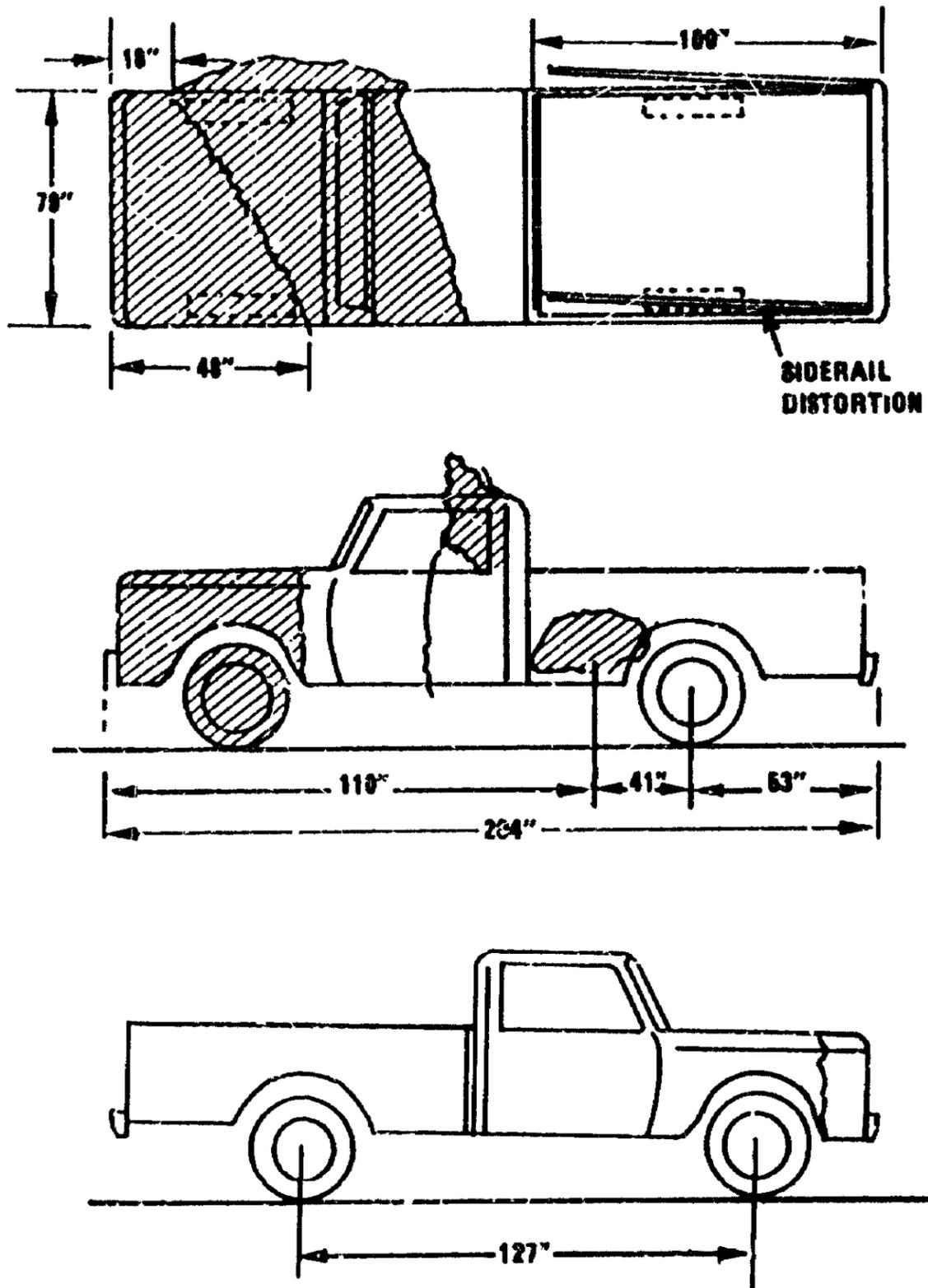
Figure 5.--Frontal view of damage to the pickup truck.

RED PAINT
TRANSFER
& TAR



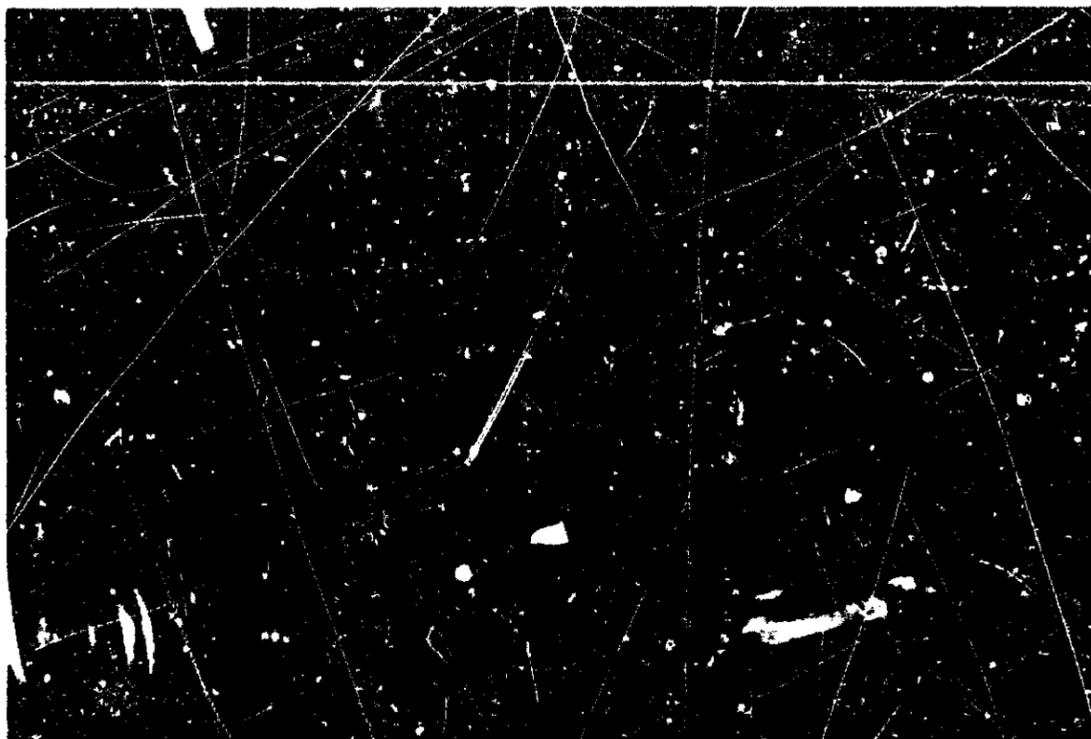
RUBBER
TRANSFER

Figure 6.--Left rear of pickup.



 **DEFORMATION DAMAGE**
(Dimensions in inches)

Figure 7.--Pickup truck damage diagram.



WITH BLUE
PAINT TRANSFER

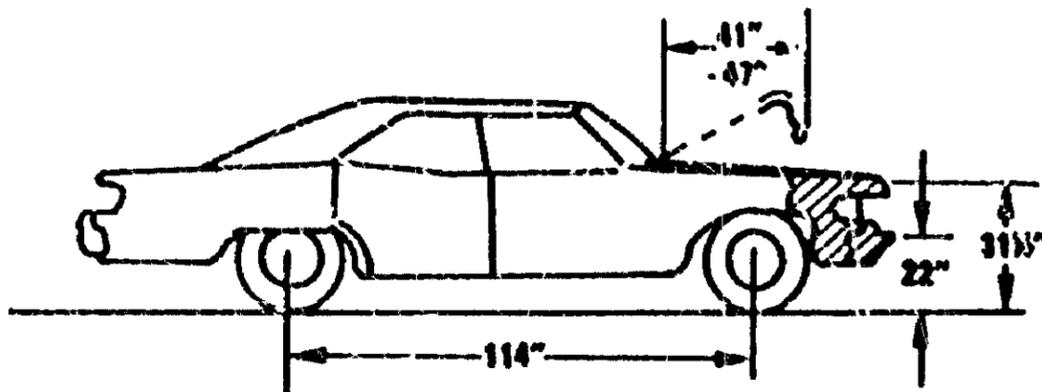
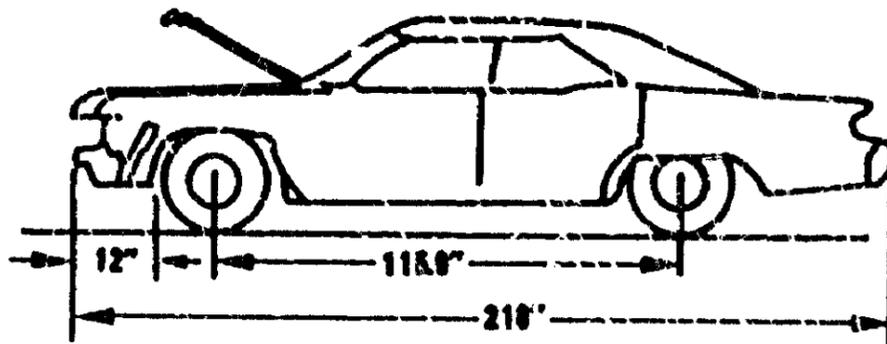
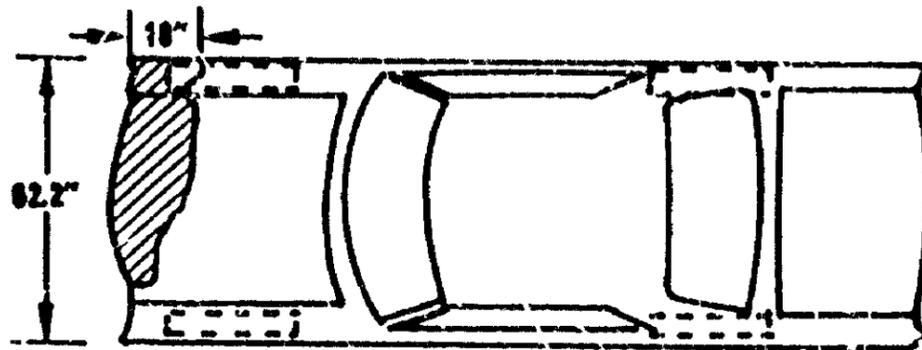
Figure 8.--View of the right side of the four-door sedan.

Stillwater, a distance of about 137 miles. They departed Woodward between 9 p.m. and 10 p.m. Her husband drove until they reached a point about 2 miles north of Perry where she started driving. She drove until the time of the accident, a distance of about 10 miles.

Highway Information

U.S. Route 64 in the area of the accident site was a two-lane, rural, unlighted highway with a straight horizontal and a rolling vertical alignment. A Federal-aid primary route functionally classified as a minor arterial between Interstate 35 and U.S. Route 177, it had an average daily traffic count of 2,500 vehicles. According to the Oklahoma Department of Transportation (OKDOT), the 11-mile section of the road from Perry to U.S. 177 had an accident rate of 80.4 accidents per 100 million vehicle miles, as compared to the Statewide rate of 121. Thus, the section was not a high-accident location. Of the 41 accidents which occurred over the past 5 years (1974 to 1979), 7 percent involved driving while intoxicated (DWI), 2.0 percent were wrong-side-of-road, head-on collisions. The 7-percent DWI accidents compares with the 1970 Statewide 7 percent of drivers and pedestrians known to have been drinking and involved in accidents. 1/

1/ Oklahoma Traffic Accident Facts—1979, Department of Public Safety.



 **DEFORMATION DAMAGE**
(Dimensions in Inches)

Figure 9.--Four-door sedan damage diagram.

The accident occurred on the crest of a hill in a 400-foot vertical curve. A vertical curve is the smooth transition provided for a vehicle to move through a change in grade on a highway. ^{2/} This smooth transition from one grade to another is called a "crest" if the point of intersection of the two grades is above the level of the roadway, and a "sag" if it is below the roadway. Any given hill will have at least three vertical curves and may have more depending on the number of grade changes. The design plans indicated that the eastbound grades for the hill were -4.71 percent and -3.54 percent. At the point of impact, the roadway was 24 feet wide, with 8-foot-wide sod shoulders. The pavement was marked in 1977 with a dashed yellow centerline and white edgelines. The point of impact was about 55 feet west of the end of a no-passing zone for westbound traffic and 28 feet west of the hillcrest.

The 3.7-mile section of U.S. 64 (1.8 miles west and 1.9 miles east of the accident site) includes 28 vertical curves, of which 13 are crest curves with design speeds of less than 55 mph. These 13 crest vertical curves had gradient differences ranging from 1.00 percent to 8.25 percent, and lengths ranging from 100 to 400 feet. The posted speed limit was 55 mph. Speed limit signs were posted 1.63 miles west and 3.68 miles east of the accident site, respectively, for eastbound and westbound traffic. According to the design standards of American Association of State Highway and Transportation Officials (AASHTO) Policy on Geometric Design of Rural Highways, 1965, the 400-foot hillcrest had a design speed of about 38 mph. A minimum length for this curve alignment at a speed of 55 mph would be 1,000 feet.

OKDOT design plans for this section of U.S. 64 were completed in 1927, and it is assumed that the road was constructed soon thereafter. In 1977, the pavement was overlaid with asphalt. The road surface was in a good condition and appeared to have a good skid resistance (an estimated coefficient of friction of 0.6). Post-accident examination revealed a number of longitudinal and lateral surface cracks in the roadway, but they were not deep enough to affect the serviceability of the surface. Aggregate edges were sharp, and there was no bleeding. The pavement markings in the daytime appeared to be a little faint; however, at night they had good reflective qualities and were distinct.

Medical and Pathological Information

Toxicological examinations were conducted by the Office of the Chief Medical Examiner of the State of Oklahoma. The blood alcohol level (BAL) for the driver of the two-door sedan was 0.21 percent by weight with a carbon monoxide level of 9 percent carboxyhemoglobin. The BAL for the pickup truck driver was 0.15 percent by weight. No autopsy was performed on the driver of the two-door sedan, and since her body was severely burned, no injury data were obtained. (See appendix B.)

^{2/} "Surveying," Bouchard and Moffit, 5th Edition, International Text Book Co.

Survival Aspects

The occupant space in the two-door sedan was not compromised enough to preclude survival. The steering wheel and upper dash panel exhibited evidence of occupant impact. Because of the severity of fire damage and an unsuccessful search for seatbelt hardware, it was not possible to determine if the occupant restraints were in use at the time of the crash.

The occupant space in the pickup truck from the middle of the seat to the left door was reduced sufficiently to preclude occupant survival. The seat area to the right of center was reduced sufficiently to have made survival questionable even if the occupants had not been ejected. Three seatbelts were available, but none was used.

The occupants of the four-door sedan were not wearing the available lapbelts and shoulder harnesses. They would have sustained only minor bruises from the restraints and no other injuries if they had been using the restraints. However, during the impact, they were injured when they struck the windshield and dash panel.

Tests and Research

About midnight on February 25, 3 days after the accident, the Safety Board investigative team, with the aid of an OKDOT Traffic Engineer, conducted tests for headlight glow, visibility, and sight-distance levels for vehicles approaching the hill crest at the accident site. Vehicles similar to those involved in the accident were used to insure proper eyeheight and vehicle headlamp positions. The tests were conducted with the headlamps at both high and low beams. It was noted that as each vehicle approached the crest of the hill, no headlamp glow could be seen until immediately before the direct light source came into view. When the vehicles were first visible to each driver, the vehicles were about 340 feet apart.

It was impossible to duplicate the environmental conditions at the time of the accident and at the time of the field tests. At the time of the test, the reported humidity was 65 percent and there was no discernible headlight glow visible to investigators. While the higher humidity at the time of the accident would not insure that there would have been headlight glow visible to either or both drivers, the atmospheric conditions would have been more conducive to producing visible headlight glow.

The four-door sedan driver indicated that the pickup truck was traveling approximately 50 mph. Calculations indicated the speed of the two-door sedan was about 85 mph. At the relative closing speed of 135 mph (199 feet per second), both drivers only had 1.7 seconds to see the other vehicle before the collision. (See figure 10.)

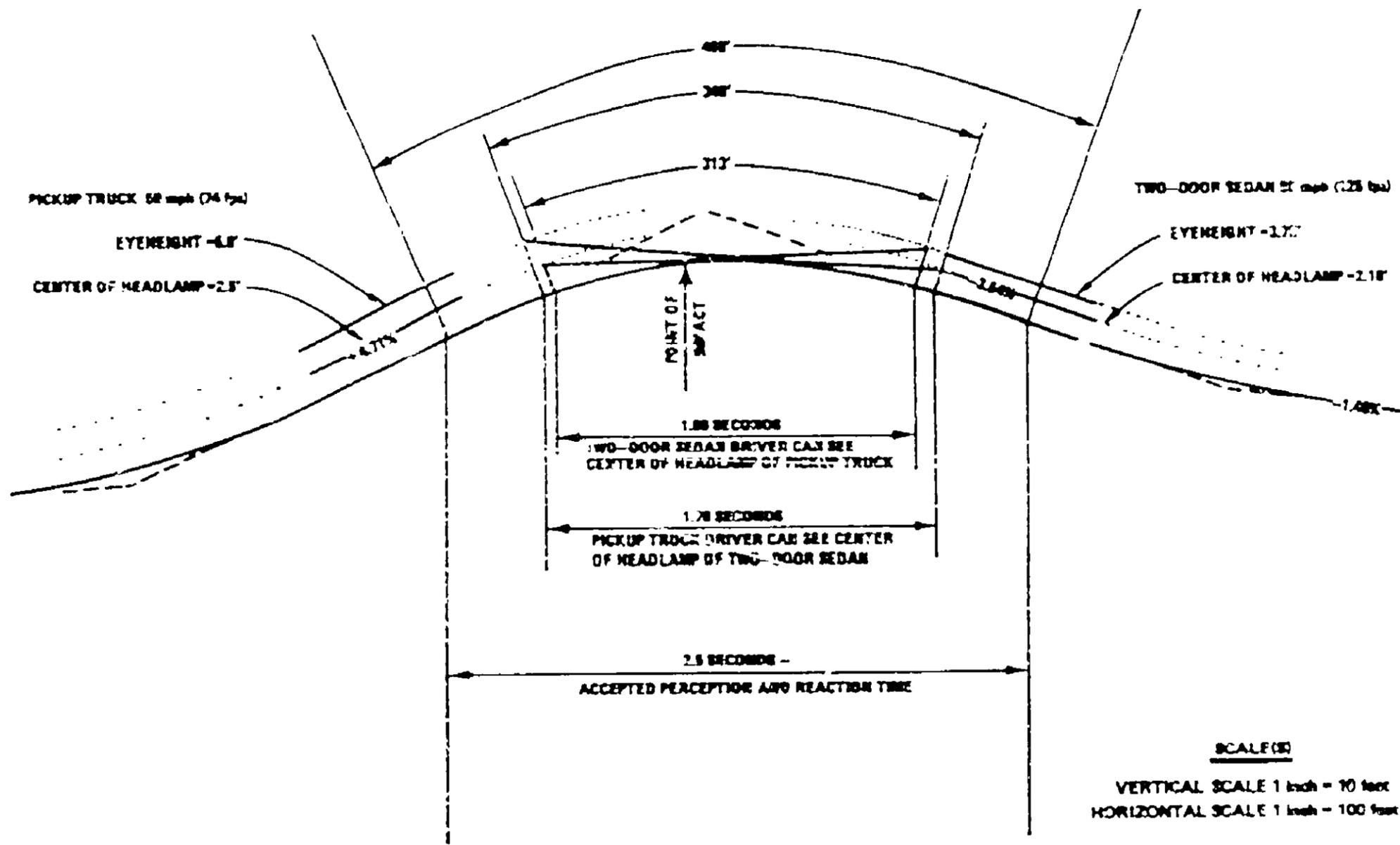


Figure 10.--Time and distance sight chart for two-door sedan and pickup truck.

Other Information

At the Safety Board's request, the OKDOT prepared a cost estimate for "flattening the accident curve." The following is an excerpt from the March 11, 1980, letter from the OKDOT Chief Traffic Engineer to the Board:

In order to get adequate sight distance of 1,000 feet or more, the roadway would have to be rebuilt from around Station 405+50 to Station 433+00, a distance of approximately 2,850 feet. The estimate to make this improvement at today's contract prices is \$843,000.

The sufficiency rating on this section of roadway is 68. I am enclosing excerpts from our 1978 Needs Study and Sufficiency Rating Report that explains the method of calculating the sufficiency rating. Our construction program is based on our needs study.

A great deal of Oklahoma is hilly to mountainous type of terrain. There are, therefore, many miles of highways in Oklahoma that were built years ago with hills and curves on them. These are being improved as fast as revenues will permit in accordance with priorities based on the degree of inadequacy.

As the letter from the OKDOT indicates, the section of U.S. 64 from Perry to U.S. 177 has a sufficiency rating of 68. According to OKDOT's sufficiency rating system, a rating of 0-69 is an "inadequate" road, 70-79 is "tolerable," and 80-100 is "adequate." When traffic volume and highway accidents are considered, the rating is 67. Thirty-nine percent of Oklahoma's rural roads are rated as "inadequate" by this system.

ANALYSIS

Highway Design

Because of the involvement of speed and alcohol in this accident, the degree of involvement of the design of the highway could not be determined. However, since the highway was designed assuming the use by vehicles of different handling qualities and higher driver eyeheight, roadway design, driver visibility distances, and operating speeds must be discussed.

Much of the State of Oklahoma consists of many miles of highway built to design standards in use before 1965. Although the posted speed limit was 55 mph, 64 percent of the hills, or 7 of the 13 near and including the accident site, had theoretical design speeds of less than 55 mph.

Using the accident site, which had a gradient difference of 8.25 percent, the highest of the group, as an example to support a design speed of 55 miles per hour, the no-passing, stopping sight-distance should have been 460 feet, which would require a vertical curve at least 1,000 feet long. The state has a systematic program for improving roads which are rated inadequate by its own rating system. Under this system, the accident hillcrest is in competition with 39 percent of Oklahoma's 11,714 miles of highway (not including Interstate highways) for these resources.

During the past 20 years, there have been numerous evaluations of the various parameters involved in calculating safe sight distances for passing and stopping on two-lane, rural roads. The variables considered in these calculations are driver eyeheight, vehicle speed, object height, the rate of change of grade on hill crests, coefficient of friction, and "perception, intellection, emotion, and volition" (PIBV). ^{3/} Evaluations conducted by the Federal Highway Administration (FHWA), the Transportation Research Board, and others address only the values assigned to these variables that are applicable at the time of the evaluation in order to determine safe sight distances. The variables in consideration in 1927, when this section of highway was designed, and in 1965, when the latest standards were published, do not take into account the low-profile, and lower eyeheight vehicles predominant on the highways today. As more low profile, small cars with reduced eyeheight are replacing older models, the problem of limited sight distance on hill crests will become more acute. The situation could cause more accidents similar to this one. One approach to this incompatible situation of low design speeds and higher posted speeds would be to warn drivers using the road of the possible hazard of limited sight distance. One procedure is the posting of warning signs accompanied by an advisory plate bearing the safe design speed. The Manual on Uniform Traffic Control Devices (MUTCD) provides a "Limited Sight Distance" (W14-4, ^{4/} sign and provides guidance for its use. The 30-inch by 30-inch diamond-shaped sign, with a supplemental Advisory Speed Sign (W13-1), is intended for use on hills where adequate safe stopping sight distance is not available. Authorized signs were listed in the MUTCD after a technical review by the National Advisory Committee on Uniform Traffic Control Devices and with the concurrence of the FHWA. There may or may not be an operational evaluation of the new sign(s) before they are included in the MUTCD. Provision for this sign was included in the 1978 edition of the MUTCD based on a 1976 request submitted by the AASHTO. This sign was not evaluated by the FHWA. Considering the nonspecific nature of its message and the large number of signs which would be required because of the varying design speeds in terrain such as this, the use of this combination sign would be of little worth.

Although it is impractical to flatten the hill crest as a result of this accident, the State should consider reducing the speed limit for this section of the road to the mean safe speed for the highway geometry until sufficient resources are available to correct the hazard.

^{3/} Perception, Intellection, emotion, and volition--the 2.5-second value is the minimum recommended by the American Association of State Highway and Transportation Officials for Calculating Safe Stopping distances.

^{4/} MUTCD, FHWA, 1978, p. 20-21.

The problem of incompatibility of operating speeds, current vehicle design eyesight, and limited sight distance exists on many roads designed to pre-1965 design standards, and is not unique to Oklahoma. The FHWA should continue its study and evaluation of limited sight distance situations and develop guidelines to assist the States in taking corrective action to make travel speeds and highway geometry compatible.

Alcohol Impairment

The National Highway Traffic Safety Administration's (NHTSA) 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 ^{5/} by weight. The Oklahoma State Traffic Code conforms with the Uniform Vehicle Code (UVC) Rules of the Road, Section 11-902 - Driving While Under the Influence of Alcohol. The code states:

- (a) A person shall not drive or be in actual physical control of any vehicle while:
 - (1) there is 0.10 percent or more by weight of alcohol in his blood.

The two-door sedan driver's BAL of 0.21 percent by weight indicates that at the time of the accident--about 45 minutes after she was last observed outside of the bar--she had the equivalent of 7 ounces of 100-proof alcohol or seven 12-ounce bottles of beer.

According to "Chemical Tests and the Law": ^{6/}

Among the first nerve activities to be numbed or depressed by concentrations of alcohol are those restraining or inhibitory functions which impel us to behave like civilized adult individuals. . . . Reactions to various stimuli are slowed very early in alcohol intoxication. . . . Regardless of the normal reaction time, low concentrations of alcohol in the blood produce a definite lengthening of reaction time. Thus 0.05 percent of alcohol in the blood may produce a doubling of the reaction time, while 0.10 percent alcohol in the blood could cause a quadrupling of the normal reaction time.

Along with the slowing of reaction time, special sense functions are impaired. Vision becomes blurred, especially at the edges of the visual field. . . .

^{5/} 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.

^{6/} Donigan, R., "Chemical Tests and the Law," pgs. 286-287 and 294.

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. The resulting incoordination is seen in uncertain steps of the individual, slurred or "thick" speech, and clumsy manipulative efforts to use the fingers. . . . 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 alcohol impairment on the judgment and driving ability of the two-door sedan driver could explain the vehicle's excessive speed and its being in the eastbound lane of traffic as the car topped the crest of the hill.

At the time of the accident, the pickup truck driver's BAL was 0.15 percent by weight. This would be equivalent to 8 ounces of 100-proof alcohol or eight 12-ounce bottles of 6-percent beer. Normally, the only beer available in Oklahoma is 3.2-percent beer. A six-pack of 3.2-percent beer consumed by a 210-pound person over a 4 1/2-hour period would produce a BAL of about 0.04 percent. Although his host reported that during his visit the pickup truck driver had consumed "about a six-pack" of beer, the Safety Board concludes that he had consumed more alcoholic beverages than that on the evening of the accident.

The alcohol-impaired judgment and driving ability of the pickup truck driver probably was not a contributing factor in this accident. Without warning, he was suddenly confronted with an oncoming vehicle 340 feet away in his lane of traffic at a closing speed of about 135 mph (199 feet per second). He had about 1.7 seconds to recognize the hazard, decide on an evasive action, and react. Based upon the PIEV time of 2.5 seconds, the pickup truck driver did not have time to take evasive action. By the time he could have recognized the danger, made a decision, and reacted, the collision had occurred. (See figure 10.)

Oklahoma's Alcohol Safety Program was developed as an NHTSA Alcohol Safety Action Project (ASAP). At that time it was a Statewide program but was concentrated primarily in three major cities--Oklahoma City, Tulsa, and Lawton. When the ASAP was no longer Federally funded (1977), the Statewide formal program terminated. The cities have maintained their programs but there is a lower level of effort in the rural areas and in the less populated communities.

In 1978 the Oklahoma Legislature passed Statute Title 47, Section 11-902.1, "Course for Drinking Drivers." This statute provided for the referral by the courts of offenders to DWI schools.

The Driver Improvement Bureau of the Oklahoma Department of Public Safety is authorized to certify all breath-test operators and all DWI schools. The highway aspects of the alcohol safety program are now performed by the Department of Public Safety. The Oklahoma State Highway Patrol trains all police officers in the State and alcohol countermeasures are a part of this training. There are about 20 certified, community funded and operated DWI schools throughout the State. These are operated by not-for-profit organizations.

Although the basic function of the State's alcohol safety program has been continued, with the loss of Federal funding and the discontinuance of the formal program, emphasis on the program has declined. For example, the DWI arrests have declined from a high of 6,884 arrests in 1977 (the last year of the formal program) to 6,517 in 1978 and 5,719 in 1979--a drop of 945 arrests in 2 years. During that same period of time, the number of drivers killed who were under the influence of alcohol (0.10 percent or more) increased from 175 in 1977 to 215 in 1979--a 21 percent increase. This reduction was explained by an official of the Department of Public Safety as the result of a loss of operating funds, a change in priorities, and limited resources. Fatal accidents (where a driver was killed and also had a BAL of 0.10 percent or higher) amounted to 38 percent of all fatal accidents in the State wherein the driver was killed (198 out of 522 in 1978). This is the largest single causative factor of fatal accidents in the State.

Based on the foregoing information, the Safety Board believes that the State of Oklahoma should seek the funds necessary to enable them to renew their emphasis on the Alcohol Safety Program, especially in the rural areas and less populated communities of the State.

Neither of the drivers killed in this accident had previous records for driving under the influence of alcohol or driving while intoxicated. In the absence of such arrests, they would not have been identified for rehabilitation under the NHTSA Alcohol Safety Action Program. 7/

The two drivers killed had consumed quantities of alcoholic beverages in the presence of persons who might have persuaded them not to drive. One of the owners of the bar had seen the driver of the two-door sedan in the bar for nearly 5 hours. Friends of the driver of the pickup truck were aware that he had consumed six cans of beer between 8 p.m. and 12:30 a.m.

In recent years, the Safety Board has investigated 7 major accidents resulting in 61 fatalities (see Table 1) where the drivers (with BAL ranging from 0.12 to 0.24) had been drinking in the presence of persons who might have persuaded them not to drive.

There are 21 States with laws similar to California's Dram Shop Law 8/ or other civil damage laws which have changed the common law rule that the proximate cause of injury to the consumer or a third person was the consumption and not the sale of liquor. Recent court decisions in California and Oregon 9/ have held that both public tavern keepers and private hosts can be held liable for actions of persons to whom they have sold or served alcohol. Oklahoma has no such law.

7/ Results of National Alcohol Safety Action Projects, U.S. DOT, NHTSA, DOT-HS-804-033, May 1979.

8/ Dram Shop Law--A rule which prohibits the furnishing of alcoholic beverages to an obviously intoxicated person. California Business and Professional Code, Section 25602.

9/ Weiner v. Gamma Phi Chapter of Alpha Tau Omega Fraternity, 258 Or. 632, 485 P.2d 13 (1971); Vesely v. Sager, Supreme Court of California, June 24, 1974 Sup., 95 Cal. Rptr. 623; et al.

The NHTSA has recently published a study on State alcohol laws relating to highway safety. ^{10/} This study is predominantly concerned with preliminary breath tests, blood alcohol concentration, driver screening, rehabilitation, legal age for consumption of alcoholic beverages, and sanctions. The Safety Board was not able to locate any study or research published on the relationship of highway safety and Dram Shop Laws. The Safety Board believes that the NHTSA should evaluate the effectiveness of existing Dram Shop Laws with a view toward the potential benefits of amending the Highway Safety Program Standard No. 8 as a guide for the States in reducing alcohol-involved highway accidents.

Table 1.--Accidents involving intoxicated drivers who drank in the presence of someone who could have discouraged them from driving.

<u>Accident</u>	<u>Report No.</u>	<u>Date of accident</u>	<u>BAL of driver(s)</u>	<u>Persons killed</u>
Bus/Automobile Collision Baker, California	SS-H-3	03-07-68	0.15	20
Grade Crossing Accident, Tracy, California	RHR-76-1	03-09-75	0.14	3
Grade Crossing Accident, Plant City, Florida	RHR-78-2	10-02-77	0.14	10
Bridge Accident, Alhambra, California	HAR-79-5	11-11-78	0.18	7
Pickup Truck Accident, Crofton, Maryland	HAR-79-6	04-23-79	0.135 (estimated)	10
Median Crossover Accident, New York, New York	HAR-79-8	06-08-79	0.12	4
Head-on Collision, Indiana, Pennsylvania	HAR-80-3	09-22-79	0.21 0.24	7
				<u>81</u>

^{10/} "Alcohol and Highway Safety Laws: A National Overview," U.S. DOT, NHTSA, DOT-HS-805-173, February 1979.

CONCLUSIONS

Findings

1. The preimpact speeds of the accident vehicles were estimated as follows: the two-door sedan, 85 mph; the pickup truck, 50 mph; and the four-door sedan, 50 mph.
2. The posted speed limit of 55 mph was excessive for the 38-mph highway design speed of the 3.7-mile portion of the highway near the accident scene.
3. In night visibility tests, conducted under lower humidity conditions and slower closing speeds than those involved in the accident, no headlight glow of approaching vehicles was visible to the investigators on the other side of the crest of the hill.
4. On the night of the accident, there was no haze or fog visible in the environment, and weather conditions did not contribute to this accident.
5. Examination of all three vehicles revealed no precrash mechanical discrepancy which could have contributed to the accident cause.
6. At impact the westbound two-door sedan was almost entirely in the eastbound lane and both the eastbound pickup truck and four-door sedan were eastbound in the eastbound lane.
7. When the vehicles were first visible to each driver, they were separated by about 340 feet. At a closing speed of 199 feet per second, neither driver had sufficient time in the 1.7 seconds available to perceive and react to avoid the collision.
8. The 1.7 seconds available was not sufficient to permit the driver of the pickup truck to perceive the hazard and take any evasive action.
9. Both the two-door sedan driver and the pickup truck driver were driving while under the influence of alcohol.
10. The alcohol-impaired condition of the pickup truck driver was neither causal nor contributory to this accident.
11. The Oklahoma Department of Transportation should seek the funds necessary to enable it to renew emphasis on the alcohol safety program, especially in the rural and less populated areas.
12. The NHTSA should evaluate State Dram Shop laws to determine their beneficial effects on the drinking/driving problem.

Probable Cause

The National Transportation Safety Board determines that the probable cause of this accident was that the driver, whose judgment and driving ability were impaired by alcohol, operated the westbound two-door sedan in the eastbound lane while negotiating a hill crest at an excessive rate of speed.

RECOMMENDATIONS

As a result of its investigation of this accident, the National Transportation Safety Board made the following recommendations:

--to the National Highway Traffic Safety Administration:

Evaluate the effectiveness of current Dram Shop type laws in reducing the number of highway accidents involving drivers under the influence of alcohol in States having such laws. If the above evaluations prove to be positive, then incorporate the concepts of these laws into the existing Highway Safety Program Standard No. 8, Alcohol in Relation to Highway Safety. (Class II, Priority Action) (H-80-47)

--to the Oklahoma Department of Transportation:

Study the series of curves on a 3.7-mile section of U.S. Route 64 including the accident site and reduce the posted speed limit to a speed that is compatible with the highway design speeds. (Class I, Urgent Action) (H-80-48)

Seek the funds necessary to enable a renewed emphasis on alcohol safety especially in the rural areas and the less populated communities of the State. (Class II, Priority Action) (H-80-49)

--to the Federal Highway Administration:

Evaluate the effectiveness of the "Limited Sight Distance" sign (W14-4-MUTCD) and report its findings to the Board. (Class II, Priority Action) (H-80-50)

If the Limited Sight Distance (W14-4-MUTCD) sign is found to be ineffective, then devise an effective method of warning motorists of the incompatibility of operating speeds, current vehicle design eyeheight, and limited sight distance situations that exist on roads designed to pre-1965 standards. (Class II, Priority Action) (H-80-51)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JAMES B. KING
Chairman

/s/ FRANCIS H. McADAMS
Member

/s/ PATRICIA A. GOLDMAN
Member

/s/ G. H. PATRICK BURSLEY
Member

ELWOOD T. DRIVER, Vice Chairman, did not participate.

August 26, 1980

APPENDIX A
INVESTIGATION

1. **Investigation**

The National Transportation Safety Board was notified of the accident at 8:30 a.m., on February 24, 1980. An investigative team from Washington, D.C. arrived in Perry, Oklahoma, at 11:30 p.m., February 24.

Investigative groups were formed for human factors/injury causation; highway/environment factors; and vehicle factors. Representatives of the Oklahoma Department of Transportation and the Federal Highway Administration participated in the investigation.

2. **Deposition/Hearing**

Depositions were not taken and a hearing was not held in connection with this investigation.

APPENDIX B
SEATED POSITION AND INJURIES IN THE VEHICLES INVOLVED

The seating positions, sex, age, weight, and cause of death/injury of the occupants of the vehicles are listed here. The causes of death are listed in detail in the coroner's report.

<u>Vehicle</u>	<u>Seated position</u>	<u>Sex</u>	<u>Age</u>	<u>Weight</u>	<u>Height</u>	<u>Cause of death</u>
Two-door sedan	Driver	F	23	120	5'2"	Severely burned; injury date unknown
Pickup Truck	Driver	M	34	210	6'1"	(A)
Pickup Truck	Front seat	M	14	165	5'8"	(B)
Pickup Truck	Front seat	M	12	155	4'10"	(C)
Pickup Truck	Front seat	F	42	185	5'8"	(D)
Pickup Truck	Front seat	F	6	80	4'7"	(E)
						<u>Cause of injury</u>
Four-door sedan	Driver	F	42	140	5'9"	(F)
	Front seat	M	42	205	6'1"	(G)

(A) Was pinned behind the steering wheel. Sustained a crushed chest, fractures of the right and left humerus, compound fracture of the left tibia and fibula, compound fracture of right ankle and drainage from the ears. (B) Was found 6 to 8 feet from rear of the pickup on the right side in line with the tailgate. Sustained a skull fracture, fractured mandible, laceration from back of skull to the front of the right ear, severe laceration of the right wrist, drainage from the ears. (C) Was pinned in the cab of the pickup just to the right of the driver. Sustained a severe laceration below the left eye down to the jaw, compound fracture of the left tibia and fibula, fracture of the right femur, and a severe laceration above the knee, avulsion of the right calf muscle, drainage from the ears. (D) Was found on the ground on the right side of the pickup just forward of the door. Sustained left tibia and fibula fractures, fractured mandible, drainage of the ears. (E) Was found under the right front pickup fender. Sustained compression-type injuries to chest. No visible fractures, drainage from ears. Severe chemical burns probably from fuel and battery. (F) Sustained bruises, muscle strains, and split lip which required three stitches. (G) Sustained bruises and a severe neck muscle strain and was briefly knocked unconscious.