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# MOTOR VEHICLE SAFETY 1990

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*A Report on Activities Under the  
National Traffic and Motor Vehicle Safety Act of 1966  
and the Motor Vehicle Information and Cost Savings Act of 1972  
as Amended.  
January 1, 1990 - December 31, 1990*



U.S. Department of Transportation

**National Highway Traffic Safety  
Administration**

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# TABLE OF CONTENTS

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|  | <b>page</b> |
|--|-------------|
| <b>Executive Summary: Looking Forward</b>  | <b>v</b>    |
| <b>Introduction: 1990 Activities</b>   | <b>1</b>    |
| <b>Statistical Summary</b>   | <b>2</b>    |
| Distribution of Traffic Fatalities for 1989 and 1990                                   | 2           |
| Summary of U.S. Motor Vehicle Activities and Fatalities                                | 3           |
| <b>Federal Motor Vehicle Safety Standards</b>  | <b>4</b>    |
| Crash Avoidance Safety Standards   | 4           |
| Crashworthiness Safety Standards   | 4           |
| <b>Observance of Federal Motor Vehicle Safety Standards</b>                            | <b>7</b>    |
| <b>Summary of Current Research Grants and Contracts</b>                                | <b>9</b>    |
| National Center for Statistics and Analysis  | 9           |
| Crashworthiness  | 10          |
| Crash Avoidance  | 12          |
| Vehicle Research and Test Center   | 14          |
| <b>Research Activities Completed and Technological Progress</b>                        | <b>17</b>   |
| Crashworthiness  | 17          |
| Crash Avoidance  | 17          |
| Vehicle Research and Test Center   | 18          |
| Evaluation of Technological Progress   | 20          |
| <b>Enforcement Actions, Judicial Decisions, Settlements,<br/>or Pending Litigation</b> | <b>21</b>   |
| Litigation Section   | 21          |
| <b>Consumer Activities</b>   | <b>23</b>   |
| <b>Title I: Bumper Standard</b>  | <b>25</b>   |
| <b>Glossary</b>  | <b>37</b>   |

---

## **TABLES**

---

|   |   |
|---|---|
| Distribution of Traffic Fatalities for 1989 and 1990                                | 2 |
| Summary of U.S. Motor Vehicle Activities and Fatalities—Calendar Years<br>1980–1990 | 3 |

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## **FIGURES**

---

|        |       |
|--------|-------|
| Charts | 27-36 |
|--------|-------|

---

## **APPENDICES**

---

|  |    |
|--|----|
| A Publications of the National Highway Traffic Safety<br>Administration                      | 39 |
| B Major Research Projects Performed for NHTSA Under<br>Contracts Which Utilize FY 1990 Funds | 41 |

# Executive Summary:

## *Looking Forward*

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Traffic-related deaths in 1990 *declined* to the lowest point in four years and the fatality rate fell to 2.1 deaths per 100 million miles traveled, down from 3.3 in 1980 and now at the lowest level in history. This was a 36-percent reduction in a decade. People walked away from collisions last year that would have killed or maimed them a decade ago. *American motorists are less at risk than ever before.*

The improvements in the fatality rate reflect increased use of safety belts, greater availability of air bags, improvements in vehicle crashworthiness, a growing awareness that traffic casualties are a major public health problem, and National progress against alcohol-impaired driving.

The Nation's highway safety problems are far from solved. Motor vehicles provide Americans with an extraordinary degree of mobility. Yet deaths on our streets and highways account for more than 90 percent of all transportation fatalities in the Nation—44,529\* in 1990. The economic costs of these fatalities, together with the injuries and property damage, amount to more \$74 billion each year. For people in the first four decades of their lives injuries resulting from motor vehicle crashes are the leading cause of death and lifelong impairment.

Since the basic legislation establishing the National Highway Traffic Safety Administration (NHTSA) was enacted in 1966, the agency's primary mission has been to improve highway safety: to reduce the deaths and economic losses resulting from motor vehicle crashes.

The NHTSA recently developed a three-year priority plan to improve motor vehicle and traffic safety. The plan will be an evolving guideline for the agency's safety activities.

The plan includes motor vehicle rulemaking for improving the crashworthiness of passenger cars, light trucks and vans; addressing vehicle rollover; and safety improvements in heavy trucks, school buses, and child safety seats.

It also calls for initiatives to promote State laws and programs to increase safety belt use, motorcycle helmet use, and to discourage drunk and drugged driving. The agency will continue comprehensive public information campaigns on belt use, anti-drunk driving, and discouraging speeding. These campaigns will be conducted in cooperation with private groups such as insurance companies, the sports industry, the Ad Council, and employers. The agency will provide technical assistance to States on safety belt use survey techniques, consistency and accuracy in police crash investigation and reporting, automation of the National Driver Register, drunk and drugged driving law enforcement, speed enforcement, emergency medical services, and pedestrian safety.

A number of research activities will be undertaken to foster new technologies and innovation and the results will be distributed to the highway safety community. These include improvements in our crash data collection and analysis, publication of a new research journal and a compendium of traffic safety training materials and opportunities, evaluations of major programs, and the conduct of our traditional Lifesavers and Experimental Safety Vehicle Conferences.

A key source of new ideas for these safety programs was the National Traffic Safety Summit, held in April 1990, which addressed a number of important highway safety issues involving the law

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\* Preliminary number.



enforcement community. Next year, the agency is planning a similar summit meeting with prosecutors and members of the judiciary.

Concurrent with the development of the NHTSA's priority safety plan, the Department formulated the National Transportation Policy that provides strategies for action to shape the movement of passengers and goods in the 1990s and beyond. In March 1990, the President and Secretary of Transportation Samuel K. Skinner presented the National Transportation Policy to the Nation. The Policy emphatically makes "safety ... the top priority for the Department of Transportation." Our "aim must be ... to cut the death rate and reduce the traffic death toll ... through the next decade."

The policy statement presents 169 guidelines and 65 legislative, regulatory, budget, or program initiatives that will be, or in some cases already are being, turned into actions to maintain and expand the Nation's transportation system.

The following is an overview of the NHTSA's priorities as they relate to the specific guidelines and initiatives of the National Transportation Policy:

**Encourage all States to enact laws requiring use of safety belts and motorcycle helmets, and to strengthen laws against drunk and drugged driving.**

Thirty-seven States and the District of Columbia have safety belt use laws. The NHTSA is encouraging the passage of laws in the remaining 13 States and upgrading existing belt use laws in order to reduce deaths and injuries.

Twenty-three States require all motorcyclists to wear a helmet. The agency plans to concentrate its efforts on increasing the number of States enacting motorcycle helmet use laws for riders of all ages. States and safety groups will be provided technical information on helmet effectiveness and societal costs of injuries, and assistance with the preparation of legislative testimony in support of motorcycle helmet use laws.

The NHTSA also will work with the States to strengthen laws against drunk and drugged driving; increase the number of States with prompt license suspension for drunk and drugged driving; increase the use of roadside checkpoints for drunk driving; and expand the Drug Evaluation and Classification Program, which enables trained police officers to detect drug use by drivers. The NHTSA also will promote driver license revocation for drug offenders.

**Conduct a coordinated National campaign to increase public awareness of traffic safety issues, promote improved driver training, achieve more effective driver licensing and driver records, build support for traffic safety laws, and change unsafe driving behavior.**

The NHTSA's popular crash dummies, Vince and Larry, have become National media symbols and effective "spokesdummies" for spreading the message about the importance of safety belt use. They also have been used to emphasize the need to use safety belts in cars with air bags.

Increased public awareness about safety belts and impaired driving will include the "70 Percent Plus" Honor Roll program recognizing States, communities, employers, and others that achieve 70-percent belt use; assisting employers to meet the pending Occupational Safety and Health Administration requirements for employee belt use on the job; participating in cooperative programs on safety belt use and impaired driving with the insurance industry; working with the Network of Employers for Traffic Safety (NETS) to put safety belt and anti-drunk driving programs in place in 400 corporations; and working with sports organizations through the Techniques for Effective Alcohol Management (TEAM) program to promote responsible alcohol-serving practices in sports and other public facilities.

**Target Federal financial support and technical assistance to promote more effective enforcement of laws and regulations governing speed limits, motor carrier safety, drunk and drugged driving, and use of safety belts, child safety seats, and motorcycle helmets.**

Law enforcement is an essential part of all highway safety programs to reduce crashes, fatalities and injuries. The first National Traffic Safety Summit was attended by approximately 150 law enforcement administrators from State, county, and municipal agencies. The Department published the proceedings of the meeting and plans to assist States in implementing many of the points that were made.

Traffic Safety Summit II, scheduled in 1991, will include prosecutors and representatives of the judicial community from across the country. It will focus on what judges and other prosecutors can do to promote traffic safety in their jurisdictions.

A National meeting, cosponsored by the American Coalition for Traffic Safety, Inc. (ACTS) and the NHTSA, is scheduled for January 1991 to discuss activities and programs which interested groups can implement to improve the level of occupant protection use, belt law enforcement programs, and outreach programs to educate and inform the public about occupant protection. The conference will be attended by representatives from numerous safety organizations, the police community, the insurance and media industries, and several foreign countries. The information presented at the conference will be summarized and distributed.

**Develop rules to require vehicle design improvements to increase occupant protection and improve vehicle crash avoidance capabilities, and continue efforts to keep unsafe vehicles off the roads through close monitoring and recalls of defective vehicles.**

The agency's major motor vehicle rulemakings over the next several years will include completing the Federal safety rulemaking on (1) improved side-impact protection for passenger cars, (2) light truck and van automatic crash protection (air bags or automatic belts), (3) side-impact testing, (4) center high-mounted stop lights, and (5) roof crush resistance for light trucks and vans; making regulatory decisions on rollover, pedestrian impact protection, interior head protection, and door retention components to reduce occupant ejections; and various safety improvements for heavy trucks, school buses, and child safety seats.

**Work with private industry and State and local governments to develop intelligent vehicle/highway systems (IVHS).**

The NHTSA, in cooperation with the Federal Highway Administration (FHWA), the Urban Mass Transportation Administration (UMTA), and other DOT agencies, will establish an agenda to develop improved understanding of human performance capabilities and to apply this and new technologies to improve the efficiency and safety of traffic in the United States. The NHTSA will focus principally on the safety impacts of intelligent vehicle/highway systems (IVHS) that use advanced electronics to improve safety and reduce congestion on the highways. In addition, the NHTSA and the FHWA are undertaking the development of an advanced driving simulator that will be used to evaluate vehicle-human performance and interaction.

**Improve reporting on accidents, data on exposure to risk, and information on trends and patterns to identify potential safety problems and causes.**

Most NHTSA safety programs use crash data to identify problems, develop countermeasures, and evaluate the effectiveness of safety programs. Efforts are underway to improve the utility of the NHTSA's databases, as well as the quality and utility of police-reported accident data. The utility of trauma information from hospital record systems is also being explored.

## Introduction: 1990 Activities

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Improving the safety of motor vehicle travel is one of the most critical public health issues facing the Nation today. The NHTSA's policy is to address highway safety through a balanced approach, concentrating on solutions involving both the vehicle and the driver. The National Traffic and Motor Vehicle Safety Act and the Motor Vehicle Information and Cost Savings Act provide for a coordinated National safety program to improve the safety of motor vehicles. The Highway Safety Act provides for a partnership of National, State, and local governments to improve driver and pedestrian safety. This report covers only activities under the National Traffic and Motor Vehicle Safety Act and the Motor Vehicle Information and Cost Savings Act.

Under the National Transportation Policy, the National Highway Traffic Safety Administration announced three principal goals:

- Raise the National highway safety consciousness with the goal of increasing safety belt usage to 70 percent by 1992;
- Decrease number and percent of alcohol- and drug-related highway accidents and fatalities by reducing the probability of crashes; and
- Decrease the highway fatality rate to 2.2 deaths per 100 million miles of travel by 1992 by reducing crash injuries and increasing crash survival rates. In 1990, the fatality rate decreased to 2.1, down 36 percent since 1980.

In 1990, the NHTSA designed programs to yield a reduction in fatalities, injuries, and

economic loss that result from motor vehicle accidents in the most effective and efficient manner. Resources were directed to those activities with the most realistic prospects of success and with the maximum safety gains per dollar invested. The 1990 fatality rate of 2.1 deaths per 100 million vehicle miles traveled is the lowest in U.S. history.

Under the phase-in requirements of Federal Motor Vehicle Safety Standard (FMVSS) No. 208 ("Occupant Protection"), all passenger cars built after September 1, 1989, were equipped with automatic crash protection (e.g., air bags and automatic safety belts). About 2,600,000 MY 1990 cars were equipped with air bags. By MY 1993, estimated production levels for vehicles equipped with air bags will reach four to five million annually. The agency continued to inform and educate the American people about the benefits of manual safety belts, air bags, and automatic safety belts.

Research and rulemaking efforts to improve motor vehicle safety technology emphasized crash avoidance and occupant protection. Crash avoidance priorities included lighting, mirror systems, brakes (particularly for light- and heavy-duty trucks), rollover stability, and international harmonization of safety regulations. Occupant crash protection efforts emphasized improved protection in side impacts, rollovers and other efforts to prevent ejections, and school buses. It also included efforts to prevent injuries to pedestrians when struck by motor vehicles.

The enforcement of Federal laws, standards, and regulations governing motor vehicles is one of the NHTSA's most important safety responsibilities. Emphasis continued to be placed on quickly and accurately identifying safety-related defects and non-compliances with safety standards, and to ensure they are corrected in the shortest possible time (there were 168 new safety defect investigations in 1990).

**Distribution of Traffic Fatalities for 1989 and 1990  
(Preliminary Estimates)**

| <b>Fatality Category</b>           | <b>1989</b> | <b>1990</b> | <b>Percent Change<br/>1989-1990</b> |
|------------------------------------|-------------|-------------|-------------------------------------|
| <b>Occupant Fatalities</b>         |             |             |                                     |
| Passenger Cars                     | 25,046      | 24,025      | -4                                  |
| Light Trucks/Vans/Utility Vehicles | 8,545       | 8,593       | +1                                  |
| Motorcycles                        | 3,143       | 3,238       | +3                                  |
| Medium/Heavy Trucks                | 857         | 704         | -18                                 |
| Buses                              | 50          | 32          | -36                                 |
| Other Vehicles *                   | 273         | 295         | +8                                  |
| Unknown                            | <u>151</u>  | <u>194</u>  | <u>-28</u>                          |
| Total Occupant Fatalities          | 38,065      | 37,081      | -3                                  |
| <b>Non-Occupant Fatalities</b>     |             |             |                                     |
| Pedestrians                        | 6,552       | 6,468       | -1                                  |
| Bicyclists                         | 831         | 856         | +3                                  |
| Other Non-Occupants                | <u>107</u>  | <u>124</u>  | <u>+16</u>                          |
| Total Non-Occupant Fatalities      | 7,490       | 7,448       | -1                                  |
| Total Fatalities                   | 45,555      | 44,529      | -2                                  |

\*"Other Vehicles" includes motor homes, snowmobiles, farm equipment (other than trucks), ATV's, construction equipment (other than trucks), go carts, forklifts, etc.



**Summary of U.S. Motor Vehicle Activities and Fatalities  
Calendar Years 1980–1990**

| <b>Year</b>     | <b>Licensed Drivers<br/>(millions)</b> | <b>Registered Motor Vehicles<br/>(millions)</b> | <b>Vehicle Miles Traveled<br/>(billions)</b> | <b>Traffic Fatalities *</b> | <b>Fatality Rate**</b> |
|-----------------|--|---|--|-----------------------------|------------------------|
| 1980            | 145.3                                  | 161.5   | 1,527  | 51,091                      | 3.3                    |
| 1981            | 147.1                                  | 164.1   | 1,553  | 49,301                      | 3.2                    |
| 1982            | 150.2                                  | 165.4   | 1,595  | 43,945                      | 2.8                    |
| 1983            | 154.4                                  | 169.3   | 1,653  | 42,589                      | 2.6                    |
| 1984            | 155.4                                  | 171.7   | 1,720  | 44,257                      | 2.6                    |
| 1985            | 156.9                                  | 177.1   | 1,774  | 43,825                      | 2.5                    |
| 1986            | 159.5                                  | 181.4   | 1,835  | 46,087                      | 2.5                    |
| 1987            | 161.8                                  | 183.9   | 1,921  | 46,390                      | 2.4                    |
| 1988            | 162.9                                  | 189.0   | 2,026  | 47,087                      | 2.3                    |
| 1989 (P)        | 165.6                                  | 191.7   | 2,107  | 45,555                      | 2.2                    |
| 1990 (P)        | 165.0                                  | 194.5   | 2,150  | 44,529                      | 2.1                    |
| <b>% Change</b> |  |   |  |                             |                        |
| 1980–1990       | 13.6                                   | 20.4  | 40.8   | -12.8                       | -36.4                  |
| <b>% Change</b> |  |   |  |                             |                        |
| 1989–1990       | -0.4                                   | 1.5   | -2.0   | -2.3                        | -4.5                   |

\* Based on 30-day definition.

\*\* Fatalities per 100 million vehicle miles.

(P) = Preliminary.

Source: Licensed Drivers, Registered Motor Vehicles, and Vehicle Miles Traveled—FHWA  
Fatalities—Fatal Accident Reporting System (FARS)—NHTSA

## Federal Motor Vehicle Safety Standards

The following list presents the Federal Motor Vehicle Safety Standards that were in effect in 1990.

### Crash Avoidance Safety Standards

- FMVSS No. 100:** Controls and Displays (vehicles manufactured before 9/1/89)
- FMVSS No. 101:** Controls and Displays (vehicles manufactured after 9/1/89)
- FMVSS No. 102:** Transmission Shift Lever Sequence, Starter Interlock, and Transmission Braking Effect
- FMVSS No. 103:** Windshield Defrosting and Defogging Systems
- FMVSS No. 104:** Windshield Wiping and Washing Systems
- FMVSS No. 105:** Hydraulic Brake Systems
- FMVSS No. 106:** Brake Hoses
- FMVSS No. 107:** Reflecting Surfaces
- FMVSS No. 108:** Lamps, Reflective Devices, and Associated Equipment
- FMVSS No. 109:** New Pneumatic Tires
- FMVSS No. 110:** Tire Selection and Rims
- FMVSS No. 111:** Rearview Mirrors
- FMVSS No. 112:** Headlamp Concealment Devices
- FMVSS No. 113:** Hood Latch System
- FMVSS No. 114:** Theft Protection
- FMVSS No. 115:** Vehicle Identification Number—Basic Requirements
- FMVSS No. 116:** Motor Vehicle Brake Fluids
- FMVSS No. 117:** Retreaded Pneumatic Tires
- FMVSS No. 118:** Power-Operated Window Systems
- FMVSS No. 119:** New Pneumatic Tires for Vehicles Other Than Passenger Cars
- FMVSS No. 120:** Tire Selection and Rims for Motor Vehicles Other Than Passenger Cars
- FMVSS No. 121:** Air Brake Systems
- FMVSS No. 122:** Motorcycle Brake Systems
- FMVSS No. 123:** Motorcycle Controls and Displays
- FMVSS No. 124:** Accelerator Control Systems
- FMVSS No. 125:** Warning Devices

- FMVSS No. 126:** Truck-camper Loading
- FMVSS No. 129:** New Non-Pneumatic Tires for Passenger Cars

### Crashworthiness Safety Standards

- FMVSS No. 201:** Occupant Protection in Interior Impact
- FMVSS No. 202:** Head Restraint
- FMVSS No. 203:** Impact Protection for the Driver From the Steering Control System
- FMVSS No. 204:** Steering Control Rearward Displacement
- FMVSS No. 205:** Glazing Materials
- FMVSS No. 206:** Door Locks and Door Retention Components
- FMVSS No. 207:** Seating Systems
- FMVSS No. 208:** Occupant Crash Protection
- FMVSS No. 209:** Seat Belt Assemblies
- FMVSS No. 210:** Seat Belt Assembly Anchorages
- FMVSS No. 211:** Wheel Nuts, Wheel Discs, and Hub Caps
- FMVSS No. 212:** Windshield Mounting
- FMVSS No. 213:** Child Restraint Systems
- FMVSS No. 214:** Side Door Strength
- FMVSS No. 216:** Roof Crush Resistance—Passenger Cars
- FMVSS No. 217:** Bus Window Retention and Release
- FMVSS No. 218:** Motorcycle Helmets
- FMVSS No. 219:** Windshield Zone Intrusion
- FMVSS No. 220:** School Bus Rollover Protection
- FMVSS No. 221:** School Bus Body Joint Strength
- FMVSS No. 222:** School Bus Passenger Seating and Crash Protection
- FMVSS No. 301:** Fuel Systems Integrity
- FMVSS No. 302:** Flammability of Interior Materials

**Side Impact Protection.** For many years, FMVSS No. 214, "Side Door Strength," has specified the requirement that the side doors of passenger cars sold in the U.S. meet a specific static strength. On October 24, 1990, the agency issued a final rule which amended FMVSS No. 214 to specify a dynamic side impact test for passenger cars. Under this rule, all passenger cars sold in the U.S. will have to provide thoracic and pelvic protection as deter-

mined by accelerations measured on the rib, lower spine, and pelvis of a side impact dummy used in side impact tests of passenger cars. The final rule adopts a three-year phase-in plan (10% , 25%, 40%, and 100%) or an alternative phase-in plan (0%, 100%, 100%, 100%) beginning on September 1, 1993.

**Light Truck Safety.** In late 1989 and in 1990, four Notices of Proposed Rulemaking were issued which would extend additional passenger car safety standards to light trucks: automatic crash protection (FMVSS No. 208), side door strength (FMVSS No. 214), roof crush resistance (FMVSS No. 216), and high-mounted stop lights (FMVSS No. 108). The FMVSS No. 208 rulemaking proposes to require automatic restraints such as air bags or automatic safety belts in all light trucks. The side door strength rulemaking would apply static testing requirements for light trucks similar to those currently used for passenger cars under FMVSS No. 214. The FMVSS No. 216 rulemaking would set minimum roof crush resistance requirements for light trucks to reduce the magnitude of roof crush in a rollover crash. The application of high-mounted stop lamps (FMVSS No. 108) to light trucks would produce significant reductions in rear-end crashes and related vehicle damage similar to its success in passenger cars.

**School Bus Safety.** A research project was completed on the state-of-the-art equipment to restrain a wheelchair and its occupant on school buses in the event of a collision or sudden stop. A research study was completed to evaluate the effectiveness of various mirror designs to provide school bus drivers with a view of the area in front of and alongside the school bus. Finally, a research study on the flammability characteristics of materials that are or could be used in school bus seats was completed. An NPRM was issued proposing the installation of stop-signal arms on all new school buses. These devices will reduce casualties associated with illegal passing of stopped school buses. The agency plans to issue a notice of proposed rulemaking on cross-view mirrors in the spring of 1991.

**Non-Pneumatic Spare Tires.** The agency issued a new safety standard (FMVSS No. 129), prescribing safety requirements for non-pneumatic spare tires. Some auto manufac-

turers are planning to introduce non-pneumatic spare tires in the near future. These tires have the advantage that they are smaller than the current "space saver" spare tire, and cannot go flat while in the trunk of a car.

**Rollover.** Research continued to investigate various methods of measuring the rollover stability of light-duty vehicles, and to relate test results to real-world accident statistics. The goal of this effort is to reduce the casualties associated with rollover crashes. At the end of the year, the agency reached a decision to pursue regulations in this area; a rulemaking notice is expected in mid-1991.

**Power-Operated Window Systems.** An NPRM was published proposing to amend FMVSS No. 118 to extend the requirements to power-operated roof panels, and to permit greater freedom of window and panel control without decreasing the level of safety of the current requirements. The proposal would allow closure provided that obstruction-sensing performance or continuous operator intervention was part of the control strategy, thus assuring safe closures. The standard now permits closure only in the following cases: (1) when the ignition key is in the "on," or "start," or "accessory" position, (2) by muscular force not assisted by a power source on the vehicle, (3) by an exterior key-locking system, or (4) in the interval between turning off the ignition and opening the front doors. The agency plans to make a decision on whether to issue a final rule in the spring of 1991.

**International Harmonization Activities (Lighting Systems).** Agreement at the technical level has been reached on harmonization of vertical location requirements of lighting systems between the United States, Japanese, and European standards. Work continues on harmonizing of horizontal location requirements. The Working Party on the Construction of Vehicles (WP-29) of the Economic Commission for Europe of the United Nations has agreed on maximum-intensity requirements for yellow rear-turn signal lamps that will permit equipping vehicles with lamps that simultaneously meet the standards of both the United States and Europe.

**International Harmonization Activities (Braking Systems).** Agreement in

principle on a wheel-lock sequence test has helped in formulating a proposal for a new international standard for passenger car brake systems. The agency plans to decide whether to issue an NPRM in the summer of 1991.

**Alternative Motor Fuels.** The Alternative Motor Fuels Act of 1988 requires the Department of Energy and other Federal agencies to conduct a number of studies and demonstration programs to encourage manufacturers and consumers to switch from vehicles powered by gasoline to those powered by more

environmentally safe fuels. In anticipation of increased use of alternative fuels, NHTSA has issued two Advance Notices of Proposed Rulemaking requesting comments on potential safety-related issues or specialized requirements for vehicles using compressed natural gas or liquefied petroleum gas (such as propane), and alcohol fuels (methanol or ethanol). NHTSA's goal is to address safety issues of alternative-fueled vehicles prior to their being introduced in large numbers, so as to assure their orderly, safe introduction.



## Observance of Federal Motor Vehicle Safety Standards

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The NHTSA is responsible for enforcing Federal motor vehicle safety laws, standards, and regulations. Actions taken in this area included:

- Safety defect/safety standards non-compliance recalls involving 6 million motor vehicles. There were 205 recall campaigns. Sixty-four campaigns involving 4.37 million vehicles were influenced by the NHTSA. There were 11.8 million items of motor vehicle equipment and more than 172,000 tires recalled.
- There were 168 new defect investigations and a total of 168 preliminary evaluations, engineering analyses, and formal cases were closed. One formal defect investigation was opened and three were still active at the end of the year.
- A total of 75 noncompliance investigations were opened, 39 investigations were completed and forwarded to the Office of Chief Counsel for consideration of legal action, and 76 investigations were closed.
- The NHTSA's Auto Safety Hotline received more than 433,000 calls and mailed over 154,000 publications. The publications consisted of 93,100 vehicle recall summaries, 16,700 tire reports, 11,000 questionnaires for reporting defects, 10,500 child seat recall summary reports, 6,100 New Car Assessment Program reports, and 16,600 of some 20 other safety pamphlets or reports.
- Ninety-three purchased and leased motor vehicles and 1,632 items of equipment were tested for compliance with the requirements of 30 Federal Motor Vehicle Safety Standards.
- Thirty-seven odometer fraud investigations were conducted in 18 States. Twenty-four cases involving large-scale odometer tampering were turned over to the U.S. Department of Justice for criminal prosecution. Seven cases were referred to State enforcement agencies and the results of 6 investigations were given to consumers to pursue private civil actions to recover damages. The NHTSA also supported eight Federal grand jury odometer fraud investigations which resulted in 19 criminal convictions. Prison sentences ranged from six months to two years and criminal fines totaled \$259,100.
- The number of nonconforming or "gray market" vehicles imported into the United States decreased from 1,628 in 1989 to 469 in 1990.
- Administrative enforcement actions under the National Traffic and Motor Vehicle Safety Act, Section 109, resulted in 27 civil penalties for a total of \$205,900.
- EPA reported to the NHTSA the corporate average fuel economy (CAFE) performance of 28 passenger car fleets and 18 light truck fleets (26 vehicle manufacturers) for MY 1989. When the CAFE of a manufacturer falls below the minimum required, the NHTSA sends the manufacturer either a letter allocating previous model years' credits or a penalty assessment letter. Penalties were collected from three manufacturers for MY 1988 and five for MY 1989 totaling \$7,113,255 and \$38,737,665 respectively (grand total of \$45,850,920).

## Summary of Current Research Grants and Contracts

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The following is a summary of all ongoing, current research grants and contracts conducted by the NHTSA:

### National Center for Statistics and Analysis

The NHTSA's National Center for Statistics and Analysis develops and operates a variety of data collection and analysis programs to support the agency's safety activities. Major databases operated by the Center include

- **The National Accident Sampling System—Crashworthiness Data System.** A Nationally representative sample of approximately 7,000 motor vehicle crashes is investigated annually by teams of trained investigators. Data from these investigations are used to support research and rulemaking, vehicle crashworthiness, and occupant protection.
- **The National Accident Sampling System—General Estimates System.** A Nationally representative sample of approximately 49,000 crashes. Information is extracted directly from police accident reports and used to make National estimates of the extent and characteristics of police-reported crashes.
- **The Fatal Accident Reporting System.** A census is taken of all police-reported crashes occurring on a public road in which at least one participant is injured fatally. Data are used to monitor trends in the frequencies and characteristics of fatal crashes.

Other sources of crash data utilized by the Center include

- Special investigations performed by trained investigators in which a small number of crashes of special interest are investigated in detail;
- Police-reported accident data provided by a number of States which are used to identify research requirements and evaluate highway safety issues not available from information contained in other databases.

Analysis of the Center's data included

- Estimates of the number of lives saved by safety belt laws, child restraints, motorcycle helmets, and minimum driving-age laws;
- The effects of the 65-mph speed limit on rural Interstate fatalities;
- The role of alcohol in fatal motor vehicle crashes;
- Trends in motorcycle crashes;
- Annual reports for the General Estimates System (GES), medium- and heavy-truck crashes, and the Fatal Accident Reporting System (FARS);
- Factors contributing to the rollover experience of light trucks and other vehicles;
- An analysis of the relationship between car size and safety;
- Monthly trends in fatal crashes;
- Monthly trends in alcohol-involved fatal crashes;
- Assessments of the effectiveness of air bags and automatic safety belts; and
- Analyses to support enforcement issues.

Other ongoing activities included

- Support for efforts to harmonize passenger car braking regulations by evaluating International proposals for test procedures and collecting performance data needed to establish performance requirements;

- Evaluation of five heavy-truck antilock brake systems (ABS) in various simulated crash avoidance maneuvers;
- Improving light-vehicle simulations to make them more “realistic” and accurate for studying stability and control problems; and
- Support of the Society of Automotive Engineers (SAE) activities to develop recommended practices for brake linings and pneumatic valves.

## Crashworthiness

### Vehicle Systems

- **Upper Interior Head Protection Program (VRTC-86-0030).** Head injuries from impacts with upper interior components (pillars, roof rails, and roof headers) account for an estimated 3,300 fatalities each year in passenger cars and light trucks. Research involves sled and component testing in the development and evaluation of head injury reduction concepts.
- **Light Trucks and Vans Side Structure and Aggressivity Related Measurements (DTRS-57-87-C-0046, TTD #6).** Data on light trucks and vans are collected for use in designing tests and computer models to assess their potential crashworthiness in side impact crashes.
- **Baseline Testing of Light Trucks and Vans (DTNH22-87-P-07168).** Side impact crash tests are being conducted on light trucks to evaluate the feasibility of extending the proposed dynamic side impact testing procedure to light trucks and vans.
- **Rollover Crash Testing of Light Trucks and Vans (DTNH22-90-X-07357).** Rollover tests were conducted on two vans and four pickup trucks, using the NHTSA rollover test device. The primary goal is to evaluate the crashworthiness of these vehicles during rollover, especially in respect to roof crush. The secondary goal is to develop analytical models to increase the understanding of the injury potential to occupants during rollover.
- **Side Impact Analysis (HS-976).** Computing simulations are used to determine the effect of the striking vehicle on the design of the struck vehicle in a side impact crash and possible countermeasures. Studies include models of the EuroSID and BioSID side impact dummies.
- **Door Latch Integrity Study (VRTC-87-0055).** Occupant ejection through side doors accounts for a significant number of severe injuries and fatalities. The initial assumption of this project was that increased door latch strength would lead to improved door integrity. Correlations between door latch strength and accident data were attempted with limited success. The study is continuing.
- **Passenger Head Protection Project (HS-76 [07] and HS-76 [19]).** Right front-seat passengers can receive serious head injuries from contacting the instrument panel even when wearing a safety belt. A laboratory test is planned to better understand the injury mechanisms, develop a test device to evaluate the safety performance of instrument panels, and evaluate injury mitigation concepts.
- **Frontal Crash Protection (DTRS57-87-C-00047).** Research was initiated and completed to determine, from fatal accident data, the appropriate crash test condition(s) for upgrading FMVSS No. 208 and New Car Assessment Program (NCAP) frontal barrier testing. Approximately one-half offsets were found to be the mean crash condition. An offset car-to-car program was then initiated to better quantify the performance of air-bag-restrained occupants in this configuration. Further research will be conducted to determine what standardized test can be used to evaluate

offset crash performance in terms of structure and restraints.

- **Lowering Vehicle Profile Feasibility Study (HS-176[32]).** Based on earlier agency analyses, a project to investigate the reduction of side impact injuries through reduction in the aggressiveness of the striking vehicle was initiated. Safety benefits for occupants of the struck vehicle from lowering and tapering the front profiles of passenger vehicles and light trucks are currently being investigated.

### Biomechanics

- **Chest Modeling (PPA-876[15]).** A program is underway to simulate the dynamic impact sequence of a human chest in a crash when restrained by either a torso belt or an air bag in frontal impacts or padded structures in side impacts.
- **Database Analysis (DTNH22-87-D-07098).** A program is underway to structure the biomechanical database to easily store and process the data from the new chest deflection measurement device.
- **Biomechanical Tests by the University of Heidelberg (DTNH22-89-D-07012), the University of Virginia (DTNH22-89-Z-17305), and the Medical College of Wisconsin (DTNH22-89-Z-07305).** Laboratory experiments are being conducted to study the response of the human chest to the forces sustained in a crash from the belt restraint system and deployment of the air bag.
- **Chest Deflection Measurement Validation (VRTC-80-0160).** A study is underway to have a laboratory do an independent check on the accuracy and durability of the prototype chest deflection measurement device.
- **Biomechanical Workshop (DTNH22-87-D-07098).** The Eighteenth International Workshop on Human Subjects for Biomechanical Research was held in Orlando, FL, on November 3, 1990.
- **Automobile Crash Trauma Study (DTNH22-88-C-07007).** This is a three-year study to examine the medical injury, treatment, rehabilitation, and costs of 150 severe road crashes and consider the vehicle, occupant performance, and road changes that might have prevented the injuries.
- **Mid-Atlantic Regional Trauma Registry. Data Linkage of Hospital, Police, Ambulance and Coroner's Reports (A Grant Study Requested by Congress) (DTNH22-88-Z-07386).** This is an effort to create a trauma registry in the following States: New Jersey, Pennsylvania, Delaware, Maryland, West Virginia, Virginia, and the District of Columbia. The project also plans to implement methods to computer link medical data from motor vehicle crashes with the police, ambulance, and coroner data.
- **Head Modeling (PPA-876(11)).** Experimental and clinical data suggest that strain is the fundamental cause of neural trauma resulting from head impact. A model of the brain is being developed that will help evaluate brain tissue strain under impact situations.
- **Shear Properties of Human Brain Tissue (DTNH22-89-Z-27305).** This project is investigating the essential properties of human brain tissues for use in modeling the tissue response to impact. The levels of stress and strain which cause damage to the tissue also will be investigated.
- **Maintenance of the Biomechanics Database (DTNH22-87-C-07181).** As other NHTSA programs produce biomechanical data for use in developing injury indices and crash dummy response specifications, these data are collected and organized in the Biomechanics Database. It currently



contains data on approximately 2,600 tests.

## Crash Avoidance

- **Heavy Truck Antilock Brakes (DTNH22-88-C-07027).** Work continued on a two-year, in-service field evaluation of 200 antilock-brake-equipped heavy truck tractors. Seventeen fleets, the seven major U.S. heavy truck manufacturers, and five suppliers of antilock brake systems are cooperating in this test involving vehicles based in six cities. As of October 1990, nearly 32 million miles of travel had been accumulated by the test tractors. This portion of the program will be completed by July 1991. Maintenance records, data from special on-board instrumentation systems, and feedback from drivers and mechanics will be used to judge the reliability, durability, and maintainability of the systems. No systematic problems have occurred, although all of the systems have required varying amounts of routine maintenance (adjustments, etc.). Fifty antilock-equipped trailers are in the process of being added to the program. All 50 will be in service by May 1991.
- **Speed Control Devices for Heavy Trucks (DTNH22-87-D-07101).** Work continued on a Congressionally mandated study that will assess the potential accident reduction effectiveness of devices that would limit the top speed of heavy trucks.
- **Heavy Truck Aggressivity Reduction (HS-14).** Work continued to determine if there are feasible truck front-end designs that would be more compatible and less aggressive to smaller vehicles when the two vehicle types are involved in collisions. The effort is focusing on identifying the crash conditions that could possibly be ameliorated, as well as the number of passenger vehicle occupant fatalities and injuries that could be prevented, if such modifications were made.
- **Performance Requirements for Large-Truck Conspicuity Enhancements (DTNH22-89-R-07524).** This study was initiated to identify and organize existing knowledge on the visibility of large trucks, carry out additional research where required, and recommend minimally acceptable large-truck conspicuity enhancement treatments and performance requirements for inclusion in FMVSS 108.
- **Development of Guidelines for Driver Information Displays (DTNH422-88-X-07485).** A joint project with the Federal Highway Administration to develop design and performance criteria for advanced communications, route guidance, and warning systems is ongoing.
- **Development of Headlight System Performance Criteria (DTNH22-87-C-07340).** Research continues on a study to identify and describe driver visibility needs for nighttime driving that headlight systems should help provide.
- **Development of a Headlight Safety Data Base (DTNH22-88-C-07071).** Research to develop and evaluate the photometric instrumentation needed to collect roadway illumination levels provided by headlight systems on the current vehicle fleet is ongoing.
- **Collision Avoidance/Vehicle Platooning Test and Evaluation (DTNH22-89Z-07409).** This project is nearing completion on the evaluation of Radar Control Systems Corporation's (RCS) collision warning device and collision avoidance/smart cruise control system. The test and evaluation is in progress.
- **Support for Transportation Research Board (TRB) Study of Advanced Vehicle and Highway Technology (DTNH22-89Z-07033).** A TRB study is underway that will assess advanced vehicle and highway technologies. Recommendations will

- be made about the appropriate staging of new systems and necessary research and development activities.
- **Assessment of Carbon Monoxide Sensing Devices (74-0599).** Research is nearing completion on the assessment of the suitability of a device developed by Carnegie Mellon Research Institute (CMRI) for the detection of carbon monoxide in highway vehicles. The assessment will provide information on the operating environment for the carbon monoxide device, performance characteristics of the CMRI device, and a projection of production costs.
  - **DOT-4-Type Referee Material Brake Fluid Evaluation (DTNH22-90-C-02067).** A study commenced to evaluate the proposed NHTSA DOT-4-type referee brake fluid for suitability in the NHTSA brake fluid compliance standard FMVSS 116. The DOT-4 referee brake fluid will be used in the various compliance tests within FMVSS 116 for testing several production DOT-4 brake fluids for compatibility. The NHTSA presently has no DOT-4 referee brake fluid for FMVSS 116 compliance tests.
  - **Contributions of Stability Factors and Roadside Features to Rollover (DTNH22-87-D-47174, Task Order #2).** A study is underway to examine the interaction of certain vehicle factors, such as center-of-gravity height and track width, with roadside features, in rollover accidents. This analysis is based on a detailed examination of NASS accident reports which contain roadway data, such as curvature, slope, and grade.
  - **Effects of Light Truck and Roadside Characteristics on Rollover (DTNH22-89-C-07005).** A research test program is underway to examine the extent to which light truck and roadside characteristics are contributing factors in rollover accidents. This project involves tests of instrumented vehicles of various types and sizes to determine vehicle dynamic behavior during rollover. The experimental data generated in this program also will be used to validate various computer models that have been developed to predict rollover.
  - **National Advanced Driving Simulator (NADS) Site Selection (DTNH22-90-X-07350).** The National Science Foundation (NSF) is conducting for NHTSA the competition among major transportation research universities in the U.S. to become the host site for the NADS. This competition will be performed in accordance with the well-established peer review procedures for NSF major research grants. The selection criteria developed by the NHTSA include cost sharing, engineering and scientific resources, operational plan, and long-term strategic plan. The finalists in this competition will be submitted to Secretary Skinner, who will announce the winning institution at the appropriate time.
  - **The National Advanced Driving Simulator (NADS) Requirements Studies (DTNH22-87-D-37174).** Two contract research studies are underway to conduct an independent assessment of the NADS functional requirements based on user needs. All potential major user groups, e.g., motor vehicle manufacturers, insurance companies, academic institutions, federal and State traffic and safety agencies, etc., will participate in interviews or focus group discussions to determine the applications they envision for the NADS. In addition, cost/capability tradeoff studies will also be performed for three different levels of simulator fidelity, i.e., low, medium, and high. A complementary study is being conducted by the Transportation Research Board's Committee A3B06 on Simulation and Measurement of Vehicle and Operator Performance within its membership. Both of these efforts will be

documented in reports which will be issued in the summer of 1991.

## Vehicle Research and Test Center (VRTC)

### Defects Programs

- **Safety Defects Determination (VRTC-70-0170...0192).** Engineering investigations and tests are being conducted on a variety of vehicles to determine whether safety defects exist in these vehicles and, if so, the nature of the safety risk.
- **Safety Defects Evaluation (VRTC-70-0170...0192).** Research is being performed into the safety implications of braking systems, rear axles, and various component failures.

### Crash Avoidance Research

- **Heavy Vehicle Brakes (VRTC-87-0052).** This continuing research program is aimed at improving the braking characteristics of heavy vehicles and reducing the stopping performance differential that exists between light vehicles and heavy trucks. Research is currently being conducted to develop objective vehicle test procedures and to quantify the benefits of ABS. Emphasis is being placed on combination vehicles, including those that consist of double and triple trailers. Research is also being conducted to evaluate an industry-developed rating scheme for heavy-vehicle brake linings and to develop equipment that can be utilized in the field by inspection personnel to objectively assess heavy-vehicle braking performance.

- **U.S. Army Five-Ton Truck ABS (VRTC-89-0137).** At the request of the U.S. Army Tank-Automotive Command (TACOM), VRTC is evaluating the performance benefits of ABS on the Advanced Technology Demonstrator five-ton truck. Two different ABS systems are being evaluated for durability and performance over a range of on- and off-road conditions.
- **Light-Vehicle ABS (VRTC-80-0165).** As part of an overall cost-benefits study being conducted by the NHTSA's Plans and Policy Office, VRTC is evaluating the performance of all light-vehicle ABS systems on the market.
- **Light-Vehicle Stability and Control (VRTC 87-0086).** This continuing research program is aimed at reducing light-vehicle (passenger car, light truck, and van) accidents caused by loss of stability and control and by rollover. Current emphasis is on evaluation of various static test methods for assessing rollover propensity and the development and use of computerized mathematical models to predict vehicle performance in accident avoidance situations.

### Crash Survival Research

- **Pedestrian Impact Protection Research (VRTC-86-0019).** Test procedures and criteria are being developed for simulating pedestrian head, chest, and leg impacts; and, improved design concepts are being developed for possible future rulemaking.

- **Upper Interior Head Protection Research (VRTC-89-0140).** Development and analysis is nearing completion on test procedures for simulating occupant head impacts against upper interior surfaces, and concepts are being developed to reduce injuries resulting from these impacts.
- **Rear-Seat Submarining Research (VRTC-87-0074).** Research continues to identify the rear seating geometry and safety belt designs which cause “submarining” (the tendency for the lap belt to ride over the pelvis and penetrate the soft abdomen in a frontal crash).
- **Accident Reconstruction Modeling (VRTC-87-0053).** “CRASH3” is a computer software program designed to reconstruct crashes when only part of the data is available. Improvements to the CRASH3 program continue. Crash tests are being conducted to improve model impacts to narrow objects.
- **Side Door Integrity Research (VRTC-80-0149).** Test procedures are being developed to determine the side door structure integrity relative to the possibility of a door opening during a crash, which could result in the ejection of the occupant.
- **Child Safety Research (VRTC-87-0074).** Evaluation of child safety seats to provide information for future rulemaking and consumer information.
- **Rollover/Roof Crush/Test Development (VRTC-81-0197).** Analysis of accident data is being conducted and

simple testing options being explored to simulate roof loading.

#### Applied Biomechanics

- **Measurement Technology (VRTC-88-0099).** Efforts continue on correlating multiple-point chest deflections measured on the Hybrid III dummy with the likelihood of injury from impact forces unevenly distributed on the chest.
- **Materials (VRTC-88-0084).** Work continues to develop fiber-reinforced composite materials with improved durability response and weight properties, to better simulate bone tissue in dummies.
- **Dummy Development (VRTC-89-0118 and VRTC-89-0119).** Development and evaluation continue on up-to-date anthropomorphic dummies representing a large male, small female, and a six-year-old child.
- **Dummy Component Development (VRTC-88-0108).** Development continues on a dummy neck with more human-like response in frontal, oblique, and lateral impact crashes.
- **Injury Criteria (VRTC-88-0107).** Development continues on head injury criteria for translational impacts from different directions and for rotational motions.
- **Side Impact Dummy Evaluation (VRTC-89-0138).** Research to compare the responses of the new BioSID and the modified EuroSID to those of the NHTSA SID continues, using sled testing.



## Research Activities Completed and Technological Progress

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The following is a summary of *completed* research activities and technological progress by the NHTSA.

### Crashworthiness

#### Vehicle Systems

- **Upper Interior Head Protection (VRTC-89-00140).** Developed a revised test procedure for simulating occupant head impacts against upper interior surfaces. Completed fleet characterization for 16 vehicles using the revised test procedure.
- **Frontal Crash Protection (DTRS57-87-C-0047).** Completed a review of fatal crashes involving restrained occupant cases, found in the National Accident Sampling Systems files, for defining possible test conditions for upgrading frontal protection beyond that provided by FMVSS No. 208.

#### Biomechanics

- **Trauma Assessment Technology (DTNH22-83-C-07005).** Efforts have been completed to develop a prototype of an improved chest structure for adoption into the Hybrid III test dummy that has improved anatomical realism and impact response to allow it to discern loading differences of air bags and safety belts in frontal crashes.
- **Chest Deflection Measurement (DTNH22-83-D-07098).** During the past two years, a chest deformation device was developed by the NHTSA (patent applied for) which measures the detailed geometric contour of the human chest in an automobile crash.

Seventeen devices have been manufactured and introduced into laboratory testing efforts studying the differences in performance of air bags and belts in frontal impacts.

- **Light-Vehicle Rollover Accident Data (DTNH22-87-Z-07480).** A rollover accident database has been developed to provide detailed information on the precrash events that lead to rollover crashes. These data were collected from reports of rollover crashes in Maryland during an 18-month time period. The data were sorted into files on the driver, vehicle, accident, postcrash movement, and tire characteristics. A supplementary database was created containing the corresponding single-vehicle crash experience from Maryland over the same time period. This database will permit exposure studies to be performed. Both databases are now available for public release.

### Crash Avoidance

- **Photometric and Electrical System Characteristics of Heavy Truck Trailers (DTNH22-87-D-07101).** A study was completed characterizing the photometric (stoplamp light intensity output) and electrical system (voltage and amperage) performance of typical truck trailers. A sample of approximately 561 trailers, taken at 4 sites around the country, indicated that the electrical integrity of many trailers is poor.
- **School Bus Mirrors (VRTC-80-0158).** Static tests were completed to evaluate various mirror systems to enable school bus drivers to see children crossing in front of the bus. The capabilities and potential usefulness of various mirrors and mirror systems were assessed and comparative evaluations of a number of existing designs were performed. Recommendations were developed as to how to best rate the performance of various systems.

- **Development of a Headlight System Performance Evaluation Tool (DTNH22-88-C-07011).** Research was completed to identify and calibrate computer models to predict headlight illumination levels required by drivers for object detection, and to compute glare responses of drivers to different headlight illumination levels.
- **Evaluation of the Conspicuity of Daytime Running Lights (DRL) (DTNH22-88-C-07016).** Research was completed to determine the relationship between ambient illumination, the detectability of vehicles equipped with DRL, and DRL intensity.
- **High-Lift Vehicles (DTNH22-88-C-07014).** Research was completed on the assessment of the braking, steering, and rollover stability of vehicles with a high center of gravity, called "high-lift" vehicles. In the tests performed, the modified high-lift vehicles were found to have degraded performance in most areas and a greater tendency to rollover.
- **The Relationship Between Vehicle Handling and Rollover (DTNH22-88-C-07384).** A combined experimental and analytical project was completed which investigated the relationship between handling qualities of light vehicles and their rollover frequency. The study included accident analysis, vehicle testing, and computer simulation designed to give insight into basic vehicle design variables that contribute to stability problems. The study found that vehicle stability could be compromised by several variables. In particular, it was found, for the vehicles and conditions studied, that a low track-width to center-of-gravity ratio is clearly related to the propensity for rollover, and the load transfer sensitivity defined by the low track-width to center-of-gravity ratio and wheel base to center-of-gravity ratios definitely relates to directional stability.
- **National Advanced Driving Simulator (NADS) (DTNH22-91-X-07072).** An experimental test program was conducted by the NHTSA at the NASA Ames Research Center to evaluate the conceptual design of the NADS motion platform. The NASA Vertical Motion (Flight) Simulator (VMS) was modified to emulate a sophisticated driving simulator. A group of 10 international experts on driving simulators performed as test subjects in evaluating the simulator's performance under two types of critical driving maneuvers; i.e., sudden stop to avoid a crash and a series of rapid lane changes. Each subject underwent a series of psychological and physiological tests prior to and after driving the simulator. The unanimous opinion of this group of experts was that the large excursion motion system planned for the NADS provides much more realistic motion cuing than does traditional synergistic motion base platforms.
- **1989 CARDfile Analyses (DTNH22-87-D-07101).** The Crash Avoidance Research Database (CARDfile) was used to complete analyses of the effect of vehicle color on crash involvement rates; the effect of antilock brake systems on crash involvement rates; the potential of front cornering lamps to reduce accidents involving nighttime turning maneuvers; and, the potential for crash reduction through the introduction of electronic driving performance aids and monitors.

## Vehicle Research and Test Center (VRTC)

### Defects Programs

The agency's Vehicle Research and Test Center participated in 30 safety defects investigations, 24 of which were completed at the end of the year.

### Crash Avoidance Research

The agency completed the following crash avoidance research:

- **Light-Vehicle ABS (VRTC 80-0165).** Eight different systems currently on the market have been evaluated and their performance characteristics have been quantified.
- **Heavy-Vehicle ABS (VRTC 87-0052).** The effects of adding ABS to double- and triple-trailer combinations have been determined. Also, the electrical power requirements of various trailer ABS configurations have been established.
- **Rollover (VRTC 86-0086).** A simple, reproducible, and repeatable tilt table test to evaluate rollover propensity has been developed and utilized to measure over 50 vehicles. A round-robin test with industry to evaluate procedures and equipment for measuring center-of-gravity height has been completed.

### Crash Survival Research

The following advances were accomplished in crash survival research:

- **Pedestrian Protection Test Procedure (VRTC-86-0019).** A standardized test procedure, suitable for rulemaking compliance, was developed and demonstrated for pedestrian head impacts against vehicle central hoods.
- **Measuring Device for Head Injury (VRTC-86-0030).** Test procedures and hardware were finalized. A sampling of current vehicles was selected and testing was performed on many of them.
- **Highway Accident Modeling (VRTC-87-0053).** Crush coefficients to represent current vehicle models in front, side, and rear collisions have been derived and published for use in computer modeling (simulations).

- **Ejection of Occupants (VRTC-86-0055).** Simulations of occupant impacts to the side door interior were conducted. It was found that none of the doors opened from these types of impacts.
- **Evaluation of VASCAR-Plus Speed Measurement Device (VRTC-70-0167).** Testing of the device with and without the operator/officer was performed. Statistical analysis of the accuracy of the device has been completed.

### Applied Biomechanics

The following were achieved in the area of applied biomechanics:

- **Fifth-Percentile Dummy Evaluation (VRTC-87-0076).** Preliminary evaluations were completed of the first 5th-percentile female and 95th-percentile male anthropomorphic dummies (patterned after the 50th-percentile male dummy) in collaboration with the Centers for Disease Control.
- **Rib Cage Improvements (VRTC-87-0060).** A new and more durable rib steel for the Side Impact Dummy (SID) was developed and evaluated.
- **Measurement Technology (VRTC-88-0099).** Capability to measure deflection at multiple points on the Hybrid III dummy chest was developed.
- **Injury Criteria (VRTC-86-0034).** An improved neck hyperextension injury criterion, based on angular displacement measurement, was developed and evaluated.
- **Side Impact Dummy Evaluation (VRTC-89-0138).** Research to compare the responses of the new BioSID and the modified EuroSID to those of the NHTSA SID was completed.
- **Newborn Dummy Development (VRTC-80-0168).** A newborn test dummy was developed, and evaluated



with two other existing dummies, for possible child restraint rulemaking use.

## **Evaluation of Technological Progress**

The NHTSA continually reviews existing and proposed Federal Motor Vehicle Safety Standards (FMVSS) and other regulations in light of current circumstances and motor vehicle safety requirements. The agency:

- Evaluated center high-mounted stop lamps for passenger cars. It was found that cars equipped with the lamps were 17 percent less likely to be struck in the rear while braking than cars without the lamps. When all cars

on the road have the lamps, there will be an estimated reduction of 80,000 injuries and \$910 million in property damage per year.

- Evaluated door locks and roof crush strength of passenger cars. It was found that the door latch improvements implemented during the 1960's save an estimated 400 lives per year, reducing the risk of occupant ejection in rollover crashes by 15 percent. In response to the requirements of FMVSS No. 216, "Roof Crush Resistance," automobile manufacturers placed a pillar (called a "B-pillar") behind the front doors of passenger cars. This shift from hardtops to pillared cars saved an estimated 110 lives per year.

## Enforcement Actions, Judicial Decisions, Settlements, or Pending Litigation

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### Litigation Section

The following is a list of the litigated cases in which the Office of the Chief Counsel participated in 1990. At the close of the year, several of these cases were still pending.

#### National Traffic and Motor Vehicle Safety Act

- *National Truck Equipment Association (NTEA) v. NHTSA*, 6th Cir. No. 89-3713. The court granted NTEA's petition for review challenging the NHTSA's denial of its petition for reconsideration of an extension of FMVSS No. 204 (Steering Column Rearward Displacement) to certain light trucks and vans. In a 2-to-1 decision, the court remanded the matter to the NHTSA "only...to the extent that it applies to vehicles completed by final-stage manufacturers that cannot pass through the certification of the initial manufacturer." At the close of the year, the NHTSA was preparing a petition for a rehearing *en banc* of the court's decision.
- *United States v. K-Mart Corp.*, D. Md. No. 85-3483. Government's motion for summary judgment is still pending in an action for civil penalties against the importer and seller of hazard warning and turn signal flashers that did not comply with FMVSS No. 108 (Lamps, Reflective Devices, and Associated Equipment).
- *United States v. Blue Skies Projects, Inc.*, M.D. Fla. No. 90-253-Civ-Orl-18 (consolidated with five other cases). Complaints were filed in the United States District Court for the Middle

District of Florida seeking injunctions and civil penalties against six commercial installers of motor vehicle window tint film that reduces the percentage of visible light transmitted by the windows below the 70 percent required by Federal Motor Vehicle Safety Standard No. 205 (Glazing Materials). The complaints allege violations of the provision of the National Traffic and Motor Vehicle Safety Act which prohibits the rendering inoperative of motor vehicle systems or equipment installed in compliance with a Federal motor vehicle safety standard. A consent judgment for an injunction and a civil penalty of \$40,000 was entered against one of the defendants, Allied Glass Tint. At the end of 1990, the remaining five cases were pending.

- *United States v. Superior Auto Sales*, W.D. N.Y. No. 90-0424-C. The United States filed a complaint seeking injunctive relief and civil penalties based on Superior Auto Sales' failure to comply with Standard No. 208's requirements for phase-in of automatic occupant protection systems in vehicles it imported between 1986 and 1989. The Government filed a motion for summary judgment in November 1990, and Superior filed a cross-motion for summary judgment in January 1991. At the end of 1990, the case was still pending.

#### Motor Vehicle Information and Cost Savings Act

- *Competitive Enterprise Institute v. NHTSA*, D.C. Cir. No. 86-1646 (consolidated with *Competitive Enterprise Institute v. NHTSA*, No. 89-1278). The court denied petitions for review that challenged the NHTSA's amendments of the passenger car CAFE standards for MY's 1987-1989 on safety grounds.
- *City of Los Angeles v. NHTSA*, D.C. Cir. No. 86-1649 (consolidated with *Center for Auto Safety v. NHTSA*, No. 86-1651; *State of California v. NHTSA*, No. 86-1652); *Natural Resources Defense Council v. NHTSA*,

- No. 89-2177; and *Center for Auto Safety v. NHTSA*, No. 89-1403). The court denied petitions for review that challenged the NHTSA's amendments of the passenger car CAFE standards for MY's 1987–1989 on environmental grounds.
- *General Motors v. NHTSA*, D.C. Cir. No. 88-1816 (consolidated with *Mercedes-Benz of North America, Inc. v. NHTSA*, No. 88-1831). The court denied petitions for review that challenged the NHTSA's denial of petitions for rulemaking that sought retroactive amendment of MY 1984–1985 passenger car CAFE standards.
  - *Competitive Enterprise Institute v. NHTSA*, D.C. Cir. No. 89-1422 (consolidated with *General Motors Corporation v. NHTSA*, No. 89-1432). These petitions for review challenge the NHTSA's notice terminating the rulemaking proceeding that had considered amending the MY 1990 passenger car CAFE standard. The case will be briefed and argued in early 1991.
  - *Mercedes-Benz of North America, Inc. v. NHTSA*, D.C. Cir. No. 89-1762. Mercedes-Benz appealed the NHTSA's decision in an administrative enforcement proceeding, which had affirmed an Initial Decision holding the company liable for \$5.5 million in civil penalties for failure to comply with the MY 1985 CAFE standard. The case will be briefed and argued in early 1991.
  - *Maserati Automobiles, Inc. v. NHTSA*, D.C. Cir. Nos. 90-1388 and 90-1389. Maserati filed petitions for review of the NHTSA's decisions denying its petitions for low-volume exemptions from passenger car CAFE standards for MY's 1982–1983, 1986–1987, and 1989–1991. After the agency agreed to compromise Maserati's civil penalty liability, Maserati voluntarily dismissed the petitions for review.
  - *Consumers Union v. Skinner*, D.D.C. Civ. No. 90-2369. Consumers Union filed a complaint seeking to compel the NHTSA to establish procedures under which automobile dealers must distribute information comparing differences in insurance costs for different model passenger cars, based upon differences in damage susceptibility and crashworthiness. The court approved a stay following a negotiated agreement between the parties, providing that the NHTSA and the CU will make a joint attempt to obtain information from insurers on the relationship between crashworthiness and insurance rates.

## Consumer Activities

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**Auto Safety Hotline.** The NHTSA's toll-free Auto Safety Hotline (800-424-9393 or 202-366-0123 within the Washington, D.C. area) is accessible in all 50 States, Puerto Rico, and the Virgin Islands. The TTY number for the deaf is 800-424-9153, or 202-366-7800 within the Washington, D.C. area. Calls are answered 24 hours a day, seven days a week, and a Spanish-speaking operator is available between 8:00 a.m. and 4:00 p.m. Eastern time, Monday through Friday. (For statistics, see "Observance of Federal Motor Vehicle Safety Standards.")

**New Car Assessment Program.** The NHTSA's New Car Assessment Program provides comparative data on frontal crash-worthiness of new vehicles. Crash results were released on 34 vehicles.

**Theft Prevention.** In July, the NHTSA issued the preliminary report to Congress on the effectiveness of the Motor Vehicle Theft Law Enforcement Act of 1984. Petitions for exemption from the requirements of the Theft Prevention Standard to mark selected parts of passenger cars were received for six car lines. Four were granted in whole and two were granted in part. Three petitions for modifications to existing exemptions were received and granted. A notice publishing the calendar year 1989 final theft rates for passenger motor vehicles was issued. An NPRM was issued listing those insurers and rental and leasing companies which must report to the NHTSA in

October 1990 on motor vehicle thefts. Fourteen high-theft determination letters either granting or denying high-theft status were issued.

**Fuel Economy.** A final rule was issued to establish a light-truck fuel economy standard for model year 1992. A combined standard of 20.2 mpg was set, with no optional separate standards for two-wheel and four-wheel fleets. A final rule was issued to set the minimum driving range standards for dual-energy and natural gas dual-energy passenger cars in order for their manufacturers to qualify for CAFE benefits for production of these cars. The minimum driving range for dual-energy passenger cars is 200 miles, and the minimum driving range for natural gas dual-energy passenger cars is 100 miles.

**Rear-Seat Lap/Shoulder Belt Retrofit Kits.** NHTSA officials met with insurance, manufacturing, dealer, and consumer interest groups to discuss actions to inform the public of kit availability. Consistent with these discussions, the NHTSA wrote to major automobile manufacturers and the National Automobile Dealers Association to encourage their continued active participation in making consumers aware of retrofit kit availability. The agency also issued a news release advising the public that auto manufacturers have rear-seat lap/shoulder belt kits for most older-model cars. The news release urged all occupants to buckle up whether the car in which they are riding has lap-only belts or lap/shoulder belts in the back seat.

**Consumer Information Brochures.** Two brochures were updated. The revised brochures were "Automatic Protection: Your Choice in 1991" and "Insurance Discounts."

## **Title I: Bumper Standard**

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Title I of the Motor Vehicle Information and Cost Savings Act charges the Agency to formulate a bumper standard that seeks to obtain the maximum feasible reduction of costs to the public and consumers.

The NHTSA has established requirements for the impact resistance of passenger car bumpers in low-speed front and rear collisions. The bumper standard was reduced from 5 mph

to 2.5 mph in 1982, based on extensive analysis of the costs and benefits of 5-mph bumpers, and on a comprehensive rulemaking record. The level was set by the agency to maximize net consumer benefits after taking into account the protection offered by bumpers, the higher costs to all consumers of obtaining that protection, and the frequency of low-speed crashes. Nevertheless, most automobile manufacturers are providing 5-mph bumpers on at least some of their vehicles in response to perceived consumer demand.

### NHTSA's MISSION

- ◆ Increase Usage of Safety Belts to 70 Percent by 1992
- ◆ Decrease Number and Percent of Alcohol- and Drug-Related Highway Accidents and Fatalities
- ◆ Decrease Highway Fatalities Rate to 2.2 Deaths per 100 Million Vehicle Miles by 1992

### ECONOMIC COSTS OF MOTOR VEHICLE CRASHES\*

|                                  |                |
|----------------------------------|----------------|
| Fatalities                       | \$16.5 Billion |
| Injuries                         | \$17.5         |
| Property Damage Only             | \$29.6         |
| <u>Other (Insurance Related)</u> | <u>\$10.6</u>  |
| Total                            | \$74.2 Billion |

\*Based on the latest NHTSA crash cost data (1986). Data include medical costs, lost earnings, property damage, and other economic costs. Not included are pain and suffering and value-of-life factors. These are encompassed by the \$1.5 million per fatality recommended by the Office of the Secretary of Transportation for use in cost-benefit analyses.

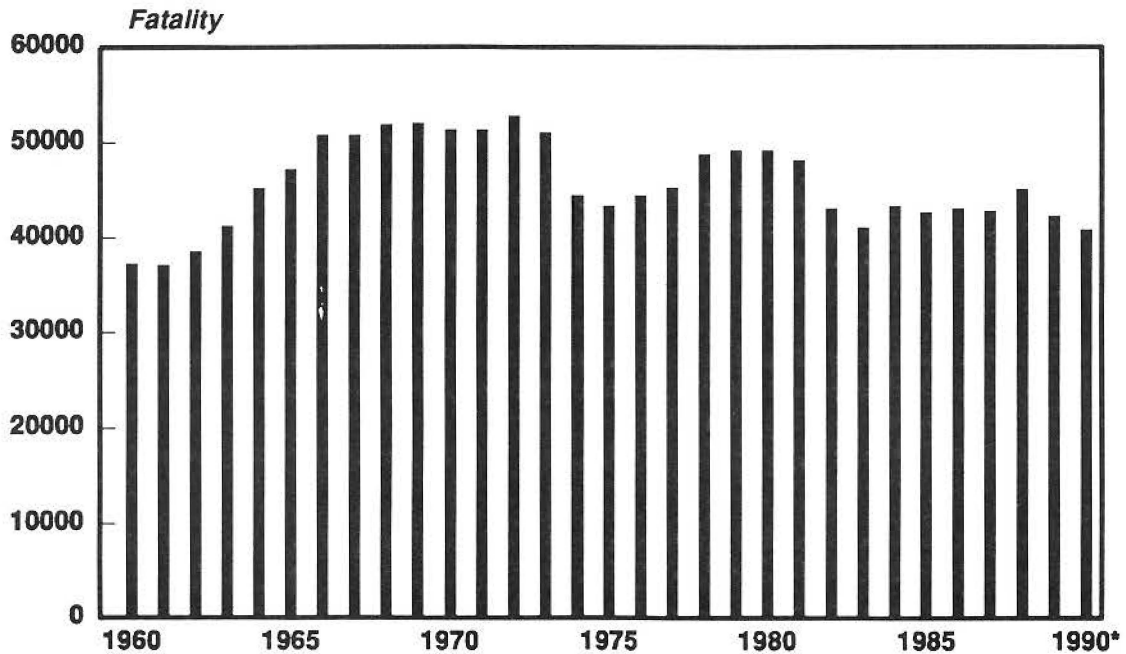


### FATALITIES IN 1990\*

| Occupants                    | Number        | Percent     |
|------------------------------|---------------|-------------|
| Passenger Cars               | 24,025        | 54%         |
| Light Trucks and Vans        | 8,593         | 19%         |
| Motorcycles                  | 3,238         | 7%          |
| Medium and Heavy Trucks      | 704           | 2%          |
| Other Vehicles (and Unknown) | 489           | 1%          |
| Buses                        | 32            | <1%         |
| <b>Non-Occupants</b>         |               |             |
| Pedestrians                  | 6,468         | 15%         |
| Others                       | 980           | 2%          |
| <b>Total</b>                 | <b>44,529</b> | <b>100%</b> |

\*Source: Fatal Accident Reporting System (FARS)

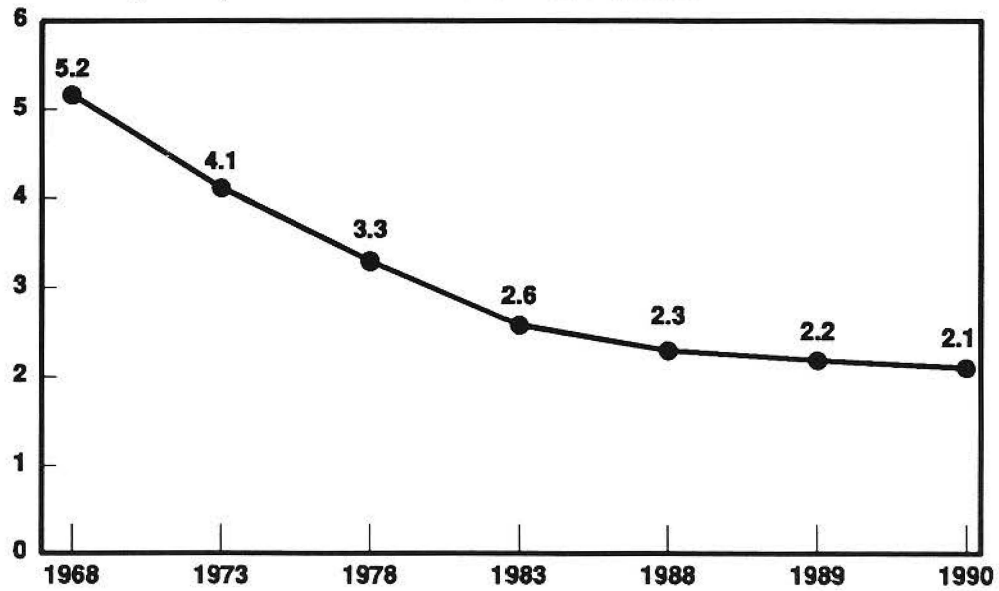
### TRAFFIC FATALITY TRENDS (1960–1990)



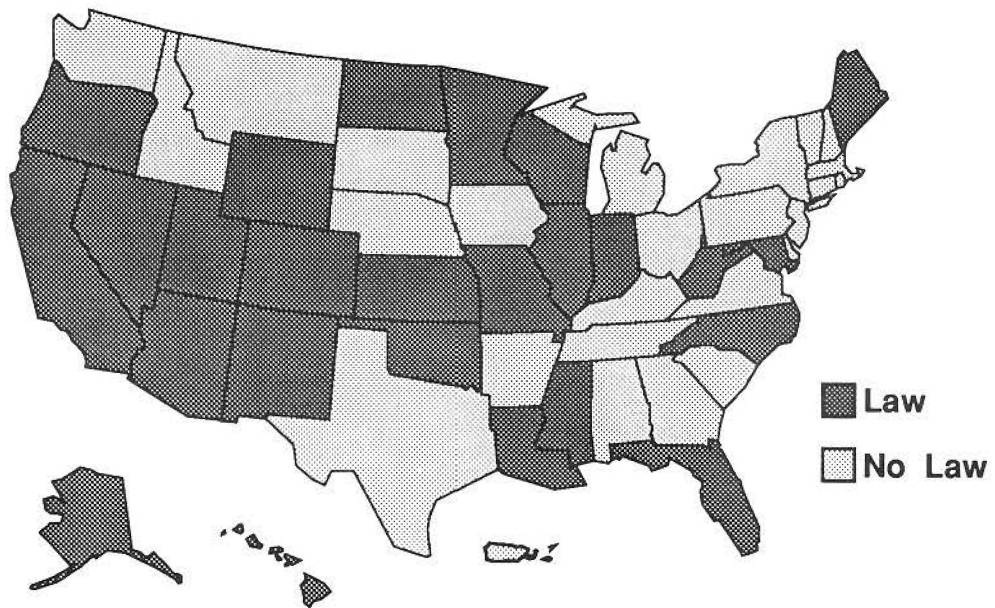
\*Preliminary estimate

### "THE NATION'S HIGHWAYS ARE SAFE ..."

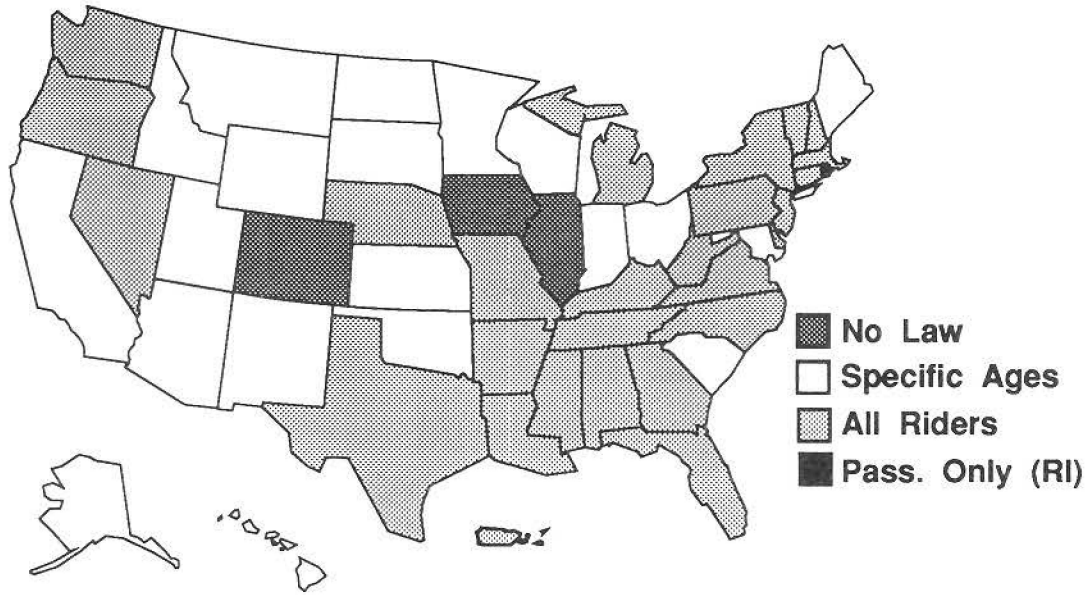
Fatality Rate per 100 Million Vehicle Miles Traveled



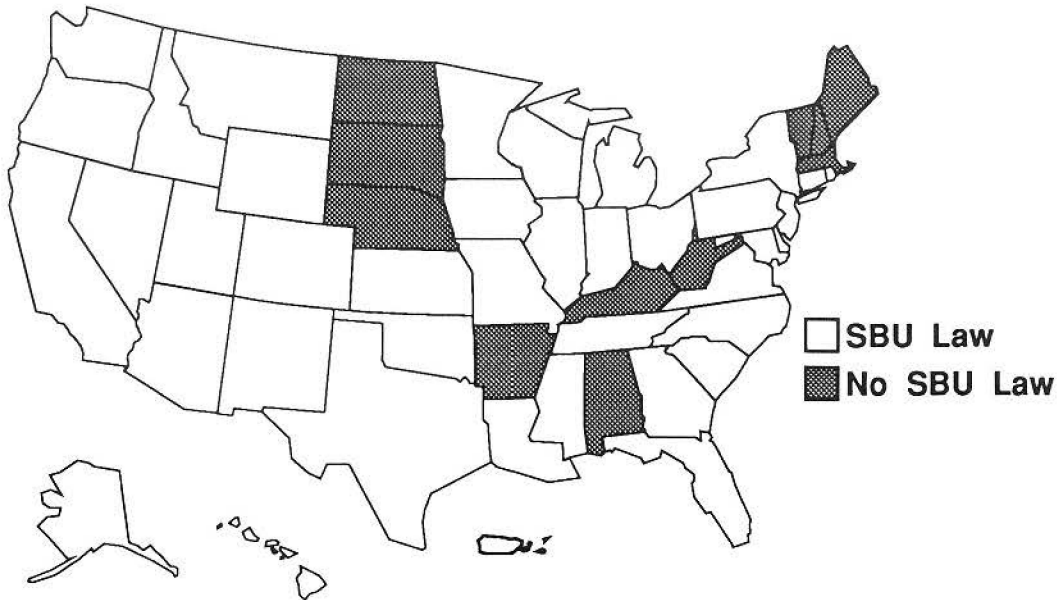
### STATES WITH ADMINISTRATIVE LICENSE REVOCATION LAWS (29 STATES + D.C. AS OF SEPTEMBER 1, 1990)



**STATES WITH MOTORCYCLE HELMET USE LAWS  
(AS OF SEPTEMBER 1, 1990)**



**STATES WITH SAFETY BELT USE LAWS  
(37 STATES + D.C. AS OF NOVEMBER 7, 1990)**



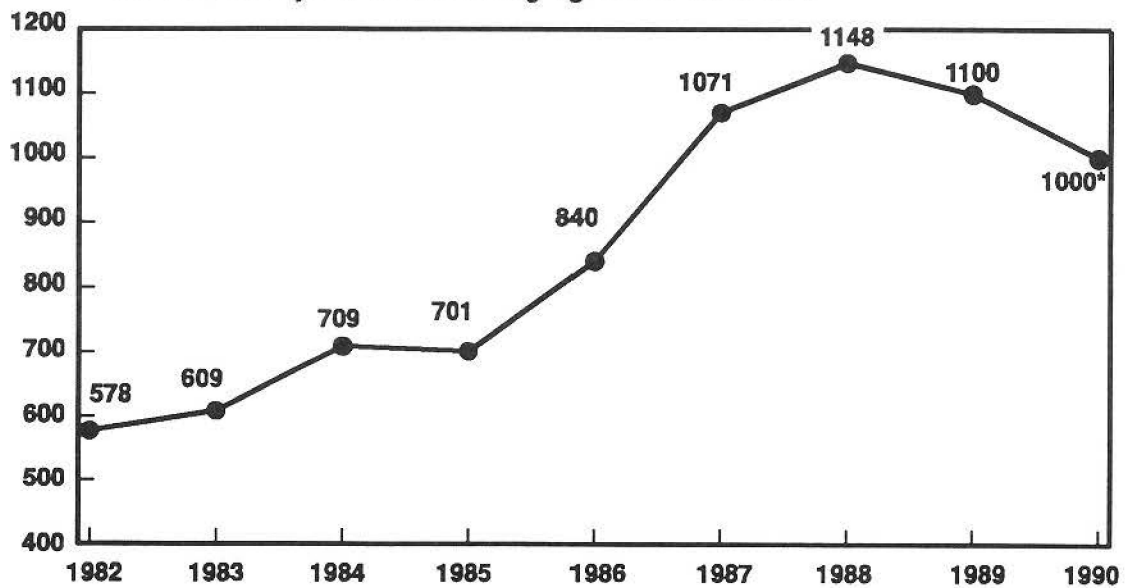
## ALCOHOL-RELATED ANNUAL LOSSES

- ◆ 23,000 Killed—Half of All Fatalities
- ◆ 500,000 Injured
- ◆ 40,000 Seriously Injured
- ◆ \$12 Billion Economic Costs\*

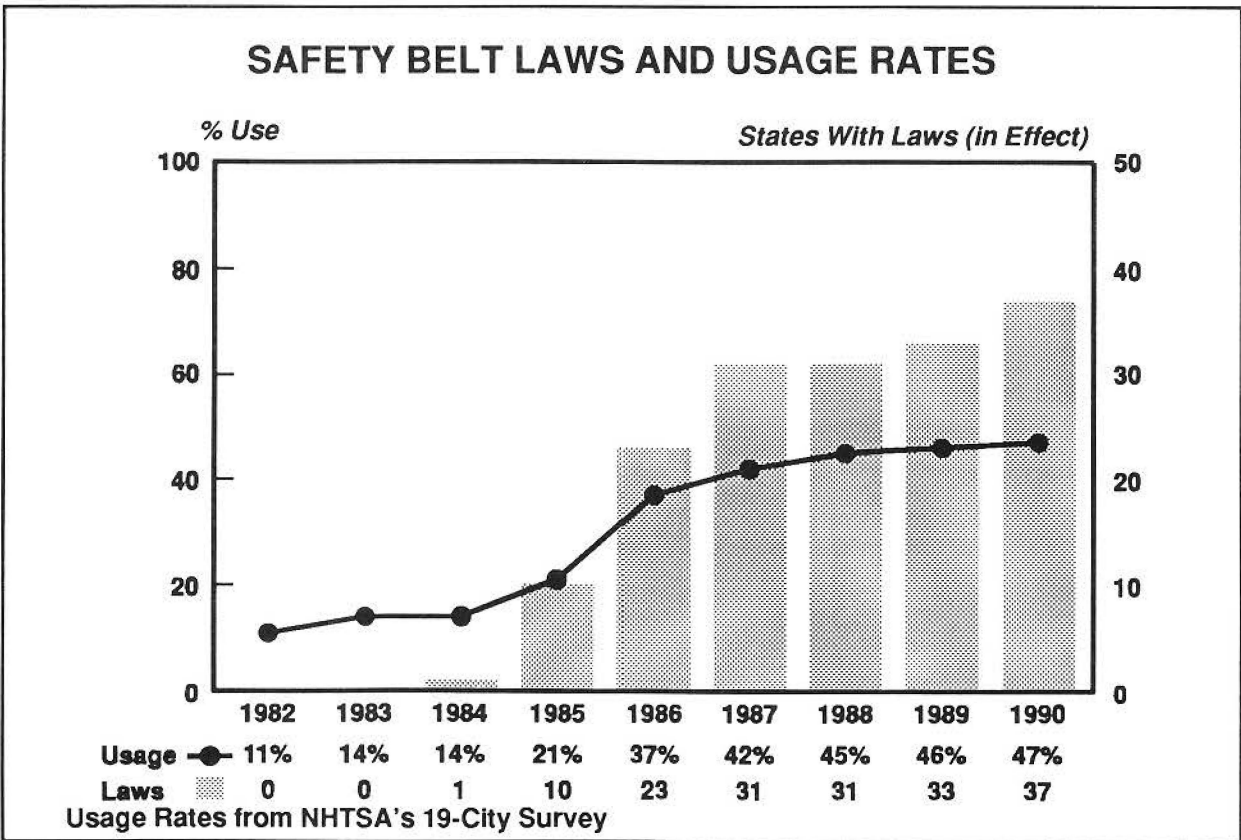
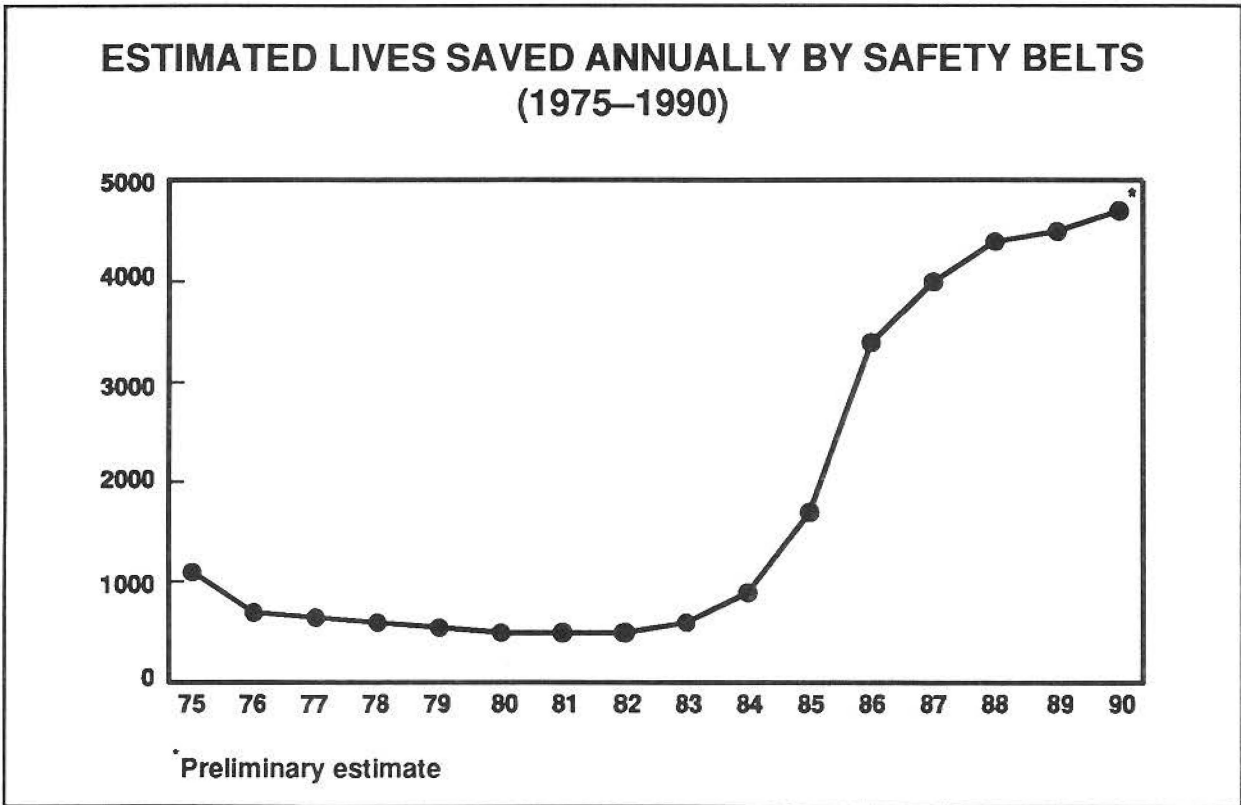
\*Based on the latest NHTSA crash cost data (1986).

## THE EFFECTIVENESS OF MINIMUM DRINKING AGE LAWS

*Lives Saved by Minimum Drinking Age Laws 1982–1990*



\*Preliminary estimate

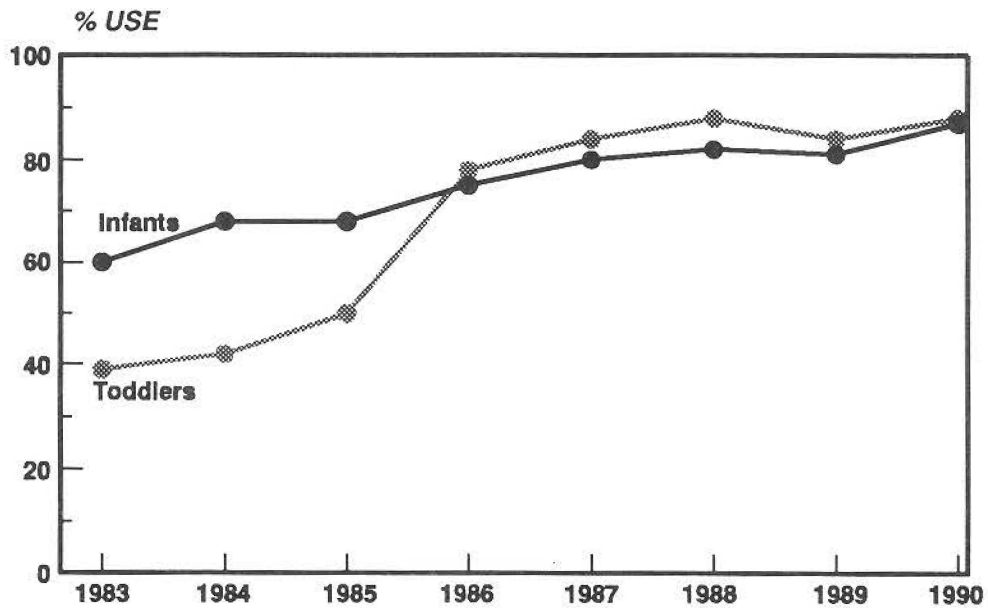




### 1990 STATE SAFETY BELT USAGE RATES

| Under 45%      |       | Between 46–55%       |       | Between 56–70% |       | Over 70% |       |
|----------------|-------|----------------------|-------|----------------|-------|----------|-------|
| Georgia        | 41.0% | Colorado             | 47.0% | California     | 67.8% | Hawaii   | 80.5% |
| Idaho          | 36.1% | District of Columbia | 47.8% | Connecticut    | 58.5% |          |       |
| Illinois       | 40.5% | Florida              | 55.2% | Iowa           | 59.0% |          |       |
| Louisiana      | 38.8% | Indiana              | 47.4% | Maryland       | 67.0% |          |       |
| Michigan       | 50.5% | Kansas               | 52.0% | Montana        | 63.6% |          |       |
| Minnesota      | 44.1% | Missouri             | 54.0% | New York       | 60.0% |          |       |
| Nevada         | 38.4% | New Mexico           | 58.7% | North Carolina | 62.0% |          |       |
| New Jersey     | 44.1% | Pennsylvania         | 49.5% | Puerto Rico    | 69.5% |          |       |
| Ohio           | 44.4% | Washington           | 55.4% | Texas          | 67.6% |          |       |
| Oklahoma       | 37.0% | Wisconsin            | 52.0% | Virginia       | 56.0% |          |       |
| South Carolina | 37.9% |                      |       |                |       |          |       |
| Tennessee      | 43.0% |                      |       |                |       |          |       |
| Utah           | 44.2% |                      |       |                |       |          |       |

### PERCENT OF CHILD SAFETY SEATS USED (1983-1990)\*



\*Based on 19-city survey

## PASSENGER CAR SIDE-IMPACT PROTECTION (AS OF DECEMBER 31, 1990)

### Problem

- ◆ 8,000 passenger car side-impact fatalities annually
- ◆ 24,000 serious injuries annually

### NHTSA Actions

- ◆ Final Rule Issued, October 24, 1990
  - Development of moving barrier to represent striking auto
  - Development of new test dummy
  - Development of new injury criterion (thoracic trauma index)
- ◆ Safety benefits
  - Up to 500 lives saved annually
  - Up to 2,600 serious injuries avoided annually

### Status

- ◆ Continue to refine/examine test dummies

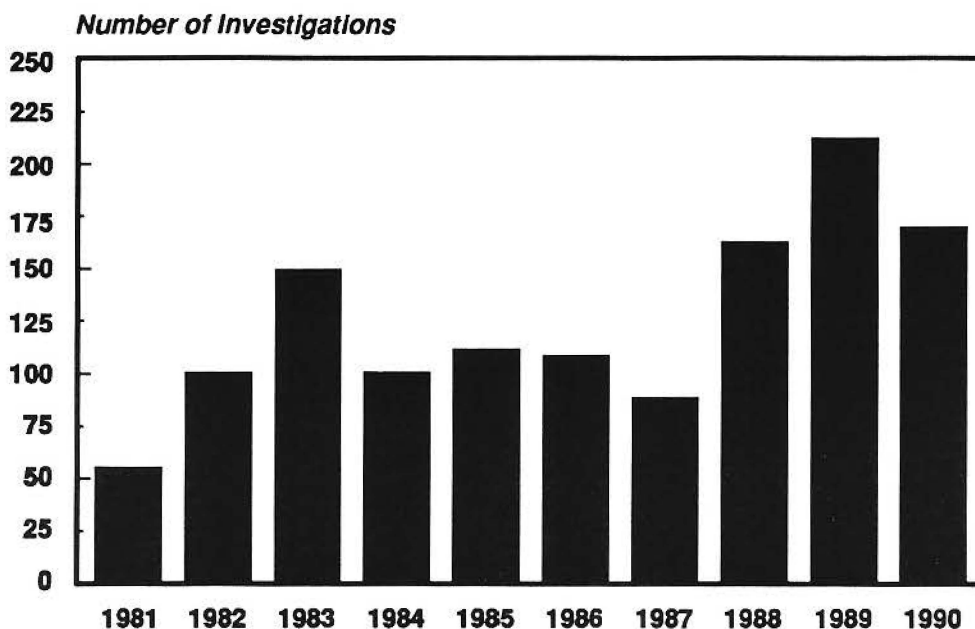
## LIGHT TRUCK SAFETY (AS OF DECEMBER 31, 1990)

|                               |                |
|-------------------------------|----------------|
| Head Restraints               |                |
| Completed, Effective Date     | September 1991 |
| Rear-Seat Shoulder Belts      |                |
| Completed, Effective Date     | September 1991 |
| Side-Impact Protection        |                |
| Decision on Final Rule        | Spring 1991    |
| Roof Crush Strength           |                |
| Decision on Final Rule        | Spring 1991    |
| Automatic Occupant Protection |                |
| Decision on Final Rule        | Spring 1991    |
| High-Mounted Stop Lamps       |                |
| Decision on Final Rule        | Spring 1991    |
| Rollover Protection           |                |
| Decision on ANPRM             | Summer 1991    |

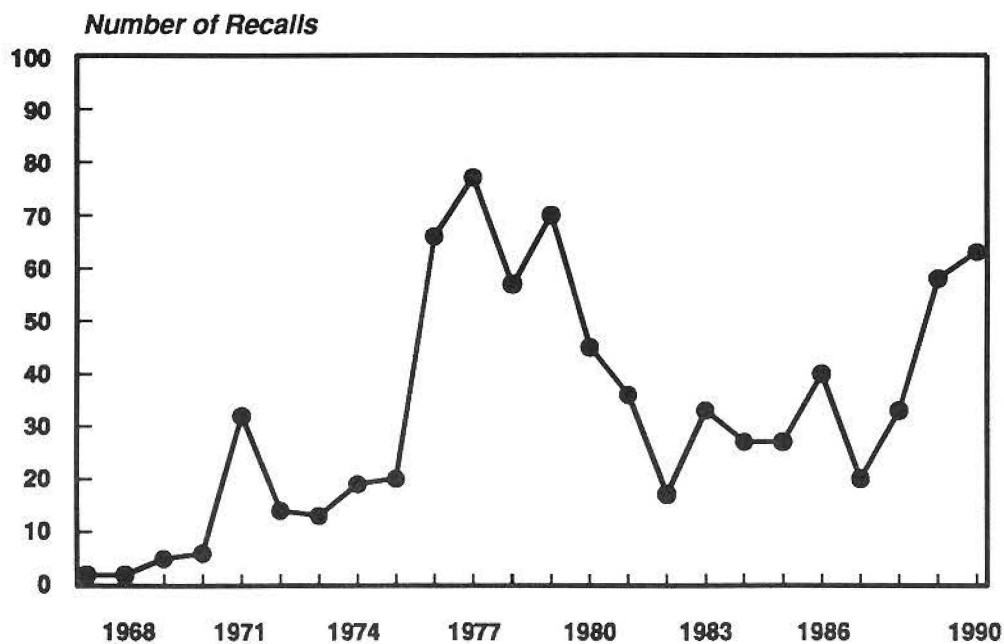
### SCHOOL BUS SAFETY (AS OF DECEMBER 31, 1990)

|                                    |                |
|------------------------------------|----------------|
| Mirror Systems                     |                |
| Decision on NPRM                   | Spring 1991    |
| Stop-Signal Arms                   |                |
| Decision on Final Rule             | Spring 1991    |
| Emergency Exits                    |                |
| Decision on NPRM                   | Winter 1990/91 |
| Interior Flammability              |                |
| Decision on NPRM                   | Winter 1990/91 |
| Fuel System Integrity              |                |
| ANPRM Published, Next Decision Due | Spring 1991    |
| Structural Integrity               |                |
| Decision on NPRM                   | Winter 1990/91 |
| Seat-Back Height                   |                |
| Decision                           | Winter 1990/91 |

### INVESTIGATIONS OPENED BY THE OFFICE OF DEFECTS INVESTIGATION (AS OF DECEMBER 31, 1990)



### VEHICLE RECALLS INFLUENCED BY ENFORCEMENT (AS OF DECEMBER 31, 1990)



### NHTSA RULEMAKINGS—NEW STARTS

| Year | Petition | NHTSA | Total |
|------|----------|-------|-------|
| 1982 | 34       | 2     | 36    |
| 1983 | 46       | 0     | 46    |
| 1984 | 36       | 1     | 37    |
| 1985 | 85       | 19*   | 104   |
| 1986 | 62       | 5     | 67    |
| 1987 | 71       | 8     | 79    |
| 1988 | 41       | 14    | 55    |
| 1989 | 70       | 14    | 84    |
| 1990 | 89       | 21    | 110   |

\*Initiation of Theft Program

## Glossary

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|                   |   |
|-------------------|---|
| <b>ABS</b>        | Antilock Brake System   |
| <b>ANPRM</b>      | Advance Notice of Proposed Rulemaking   |
| <b>ATD</b>        | Anthropomorphic Test Device. A human-like dummy used in crash tests to approximate human responses. The 50th percentile male dummy is currently in use for frontal impact tests. The Hybrid III dummy is an optional ATD for FMVSS No. 208 testing. For side impact testing, another ATD has been developed called SID (Side Impact Dummy). Currently under consideration are the NHTSA SID, the BioSID and the EuroSID. Other ATD's include the 5th-percentile female, 6-year-old child, 3-year-old child, 9-month infant, and 6-month infant. |
| <b>BioSID</b>     | An anthropomorphic test device developed by General Motors Corporation and First Technology Systems in cooperation with the Society of Automotive Engineers Mechanical Human Simulation Subcommittee of the Human Biomechanics and Simulations Standards Committee. (See "ATD.")  |
| <b>CFR</b>        | Code of Federal Regulations   |
| <b>CHMSL</b>      | Center High-Mounted Stop Lamps  |
| <b>CRASH3</b>     | A computer software program used in analyzing crashes. For various reasons, data collected at a crash site can be incomplete (e.g., one of the two vehicles has been towed away before the arrival of the accident investigation team). CRASH3 reconstructs crashes by taking available data and extrapolating the missing data.  |
| <b>EPA</b>        | Environmental Protection Agency   |
| <b>EuroSID</b>    | An anthropomorphic test device developed by the European Experimental Vehicle Committee. (See "ATD.")   |
| <b>FARS</b>       | Fatal Accident Reporting System   |
| <b>FY</b>         | Fiscal Year   |
| <b>FMVSS</b>      | Federal Motor Vehicle Safety Standard   |
| <b>GVWR</b>       | Gross Vehicle Weight Rating   |
| <b>Hybrid III</b> | See "ATD."  |
| <b>MPG</b>        | Miles Per Gallon  |
| <b>MPH</b>        | Miles Per Hour  |
| <b>MPV</b>        | Multipurpose Passenger Vehicle  |
| <b>MY</b>         | Model Year  |
| <b>NASS</b>       | National Accident-Sampling System   |
| <b>NCSS</b>       | National Crash for Severity Study   |



|                  |  |
|------------------|--|
| <b>NHTSA</b>     | National Highway Traffic Safety Administration |
| <b>NPRM</b>      | Notice of Proposed Rulemaking                  |
| <b>NHTSA SID</b> | See "ATD."                                     |
| <b>SAE</b>       | Society for Automotive Engineers               |
| <b>SID</b>       | See "ATD."                                     |
| <b>VRTC</b>      | Vehicle Research Test Center                   |
| <b>VIN</b>       | Vehicle Identification Number                  |

## **Appendix A**

### **Publications of the National Highway Traffic Safety Administration**

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The NHTSA'S Traffic Safety Programs distributed approximately 416,000 educational and technical materials to the public during 1990. The following is a representative sample of those materials.

#### **Title**

Highway Safety Program Advisories

State Legislative Fact Sheets

Car Safety for You and Your Baby

Protecting Yourself Automatically

Facts You Should Know About Airbags

National Awards Program Safety Belt Use

Prevent Pedestrian Accidents/Myths and Facts About Pedestrian Safety

Protect Your Child With a Child Safety Seat: One-Minute Safety Check Up

Shopping Guide for Child and Infant Safety Seats, 1991

Consumer Information: Transporting Your Child Safely

Consumer Information: Automatic Crash Protection: Your Choice in 1990

Safety Belt Use Required (sticker)

We Love You, Buckle Up (sticker)

Buckle Up America!—The Winning Combination (Vince and Larry stickers)

We Love You, Buckle Up (preschool kit)

How to Plan a Comprehensive Community Occupant Protection Program

Safer Than a Mother's Arms (poster)

Smash Hits (Vince and Larry poster)

Buckle Up America (Vince and Larry game)

Emergency Rescue Guidelines for Air-Bag-Equipped Cars

Vince and Larry Fun Coloring Book

Consumer Information: Safety Belts—Proper Use

The Winning Combination (VHS video tape)

Child Safety in Your Automobile

1990 Child Passenger Safety Awareness (CPSA) Idea Sampler: "Buckle Up for Love"  
"Buckle Up, America!" Idea Sampler  
"Buckle Up for Life Club" Membership Cards (Vince and Larry pledge cards)  
Idea Sampler: National Drunk and Drugged Driving Awareness Week  
Life of the Party Pack  
The Drunk Driver May Kill You  
Shifting Into Action: Youth and Highway Safety  
The Winning Combination (audiovisual, all formats)  
Community Traffic Safety Programs Case Studies of State Programs  
Community Traffic Safety Programs: A Consensus Statement  
Community Traffic Safety Programs: Case Studies of County and Small-City Programs  
Alcohol Prevention Curriculum for EMS Providers  
Development of Trauma Systems: A System and Community Guide  
Three Ways To Keep A Friend  
Friends Don't Let Friends Drive Drunk (poster)  
101 Drunk Driving Public Information Ideas  
Guide for Detecting Drunk Drivers At Night  
Join the Celebration: Project Graduation  
Questions Most Frequently Asked About Administrative Licensing Revocation  
Time-Out Testcards (TEAM)  
Every Drop Counts  
Together We Can Help Prevent Alcohol-Impaired Driving  
Prevent Bicycle Accidents  
Planning Community Pedestrian Safety Programs: An Agenda for Action  
Alcohol and Pedestrian Safety  
Bicycle Safety Alert for Parents, Teachers, Motorists  
Safe Street-Crossing for Kids: A Planning Guide and a Program That Works

**Appendix B**  
**Major Research Projects**  
**Performed for NHTSA Under**  
**Contracts Which Utilize FY 1990 Funds**

| Contract Number  | Contractor Project Title   | Dates Start-Completion | FY      |        |         |         |
|------------------|--|------------------------|---------|--------|---------|---------|
|                  |  |                        | FY87    | FY88   | FY89    | FY90    |
| ADMOAA           | Vehicle Research and Test Center<br>VRTC—Administrative Support          | 10/01/89-09/30/90      | 0       | 0      | 0       | 41408   |
| ADMOAB           | Vehicle Research and Test Center<br>VRTC—Administrative Support          | 10/01/89-09/30/90      | 0       | 0      | 0       | 104962  |
| ADMOAC           | Vehicle Research and Test Center<br>VRTC—Administrative Support          | 10/01/89-09/30/90      | 0       | 0      | 0       | 79974   |
| ADMOAD           | Vehicle Research and Test Center<br>VRTC—Administrative Support          | 10/01/89-09/30/90      | 0       | 0      | 0       | 238591  |
| DTNH22-83C-07005 | University of Michigan (UMTRI)<br>Dummy Research                         | 07/20/83-10/31/90      | 490137  | 51847  | 377000  | 159197  |
| DTNH22-86C-07366 | Engineering and Economics<br>Research, Inc.<br>Software Support          | 08/14/86-12/31/91      | 300000  | 354000 | 331000  | 420000  |
| DTNH22-86C-07422 | Automated Sciences Group, Inc.<br>NASS/GES General Control<br>Activities | 08/01/86-07/31/92      | 1424355 | 734203 | 1593257 | 2838413 |
| DTNH22-86X-07487 | Federal Highway Administration<br>Exposure Analysis                      | 09/15/86-07/31/91      | 0       | 0      | 80000   | 80000   |
| DTNH22-87C-07020 | National Capitol Systems, Inc.<br>PSU Sites                              | 06/30/87-03/31/91      | 1011560 | 552700 | 647656  | 347205  |
| DTNH22-87C-07026 | State of Connecticut<br>FARS State Contracts                             | 07/01/87-12/31/90      | 35350   | 109742 | 108288  | 112457  |
| DTNH22-87C-07031 | State of New Jersey<br>FARS State Contracts                              | 09/01/87-12/31/90      | 41539   | 43921  | 59237   | 44110   |
| DTNH22-87C-07032 | State of New York<br>FARS State Contracts                                | 05/21/87-12/31/90      | 90794   | 202272 | 130718  | 187196  |
| DTNH22-87C-07034 | State of Massachusetts<br>FARS State Contracts                           | 08/03/87-12/31/90      | 32196   | 92621  | 78802   | 50334   |
| DTNH22-87C-07041 | State of Alabama<br>FARS State Contracts                                 | 05/21/87-12/31/91      | 32305   | 23784  | 36867   | 44500   |
| DTNH22-87C-07042 | State of Florida<br>FARS State Contracts                                 | 09/04/87-12/31/90      | 77861   | 94222  | 79904   | 101500  |
| DTNH22-87C-07043 | State of Georgia<br>FARS State Contracts                                 | 05/21/87-12/31/90      | 30621   | 74373  | 77105   | 82043   |
| DTNH22-87C-07044 | State of Kentucky<br>FARS State Contracts                                | 05/21/87-12/31/90      | 38888   | 59524  | 51800   | 54500   |
| DTNH22-87C-07045 | State of Mississippi<br>FARS State Contracts                             | 09/04/87-12/31/90      | 16440   | 25492  | 35341   | 29500   |
| DTNH22-87C-07047 | State of South Carolina<br>FARS State Contracts                          | 05/21/87-12/31/90      | 21536   | 14760  | 33274   | 27500   |
| DTNH22-87C-07048 | State of Tennessee<br>FARS State Contracts                               | 05/21/87-12/31/90      | 55269   | 41675  | 71412   | 60059   |
| DTNH22-87C-7049  | State of Illinois<br>FARS State Contracts                                | 09/23/87-12/31/90      | 47181   | 58258  | 75072   | 82125   |

*Motor Vehicle Safety 1990*

| <b>Contract Number</b> | <b>Contractor Project Title</b>  | <b>Dates</b> |                   | <b>FY87</b> | <b>FY88</b> | <b>FY89</b> | <b>FY90</b> |
|------------------------|--|--------------|-------------------|-------------|-------------|-------------|-------------|
|                        |  | <b>Start</b> | <b>Completion</b> |             |             |             |             |
| DTNH22-87C-07050       | State of Indiana<br>FARS State Contracts   | 05/21/87     | 12/31/90          | 51802       | 30854       | 57499       | 27392       |
| DTNH22-87C-07051       | State of Michigan<br>FARS State Contracts  | 05/21/87     | 12/31/90          | 45466       | 95365       | 96476       | 63236       |
| DTNH22-87C-07052       | State of Minnesota<br>FARS State Contracts   | 09/04/87     | 12/31/91          | 26475       | 42796       | 48270       | 45656       |
| DTNH22-87C-07054       | State of Wisconsin<br>FARS State Contracts   | 09/28/87     | 12/31/90          | 27778       | 34890       | 42464       | 53500       |
| DTNH22-87C-07056       | State of Louisiana<br>FARS State Contracts   | 05/21/87     | 12/31/90          | 22067       | 38703       | 46482       | 28665       |
| DTNH22-87C-07057       | State of New Mexico<br>FARS State Contracts  | 07/31/87     | 12/31/90          | 12238       | 23186       | 24016       | 29500       |
| DTNH22-87C-07059       | State of Texas<br>FARS State Contracts   | 09/01/87     | 12/31/90          | 49960       | 74944       | 85110       | 45500       |
| DTNH22-87C-07062       | State of Missouri<br>FARS State Contracts  | 09/01/87     | 12/31/90          | 33105       | 61838       | 81608       | 68200       |
| DTNH22-87C-07063       | State of Nebraska<br>FARS State Contracts  | 09/01/87     | 12/31/90          | 17333       | 0           | 32869       | 34500       |
| DTNH22-87C-07064       | State of Colorado<br>FARS State Contracts  | 09/01/87     | 12/31/90          | 40650       | 55814       | 72559       | 30192       |
| DTNH22-87C-07065       | State of Montana<br>FARS State Contracts   | 09/01/87     | 12/31/90          | 30830       | 22321       | 36605       | 31250       |
| DTNH22-87C-07071       | State of California<br>FARS State Contracts  | 05/04/87     | 12/31/90          | 85126       | 237276      | 236541      | 315000      |
| DTNH22-87C-07072       | State of Hawaii<br>FARS State Contracts  | 05/21/87     | 12/31/90          | 13558       | 14761       | 19940       | 25500       |
| DTNH22-87C-07073       | State of Nevada<br>FARS State Contracts  | 05/01/87     | 12/31/90          | 29038       | 14422       | 36966       | 31500       |
| DTNH22-87C-07076       | State of Oregon<br>FARS State Contracts  | 06/30/87     | 12/31/90          | 16711       | 36506       | 42056       | 44200       |
| DTNH22-87C-07077       | State of Washington<br>FARS State Contracts  | 05/21/87     | 12/31/90          | 16821       | 24923       | 40822       | 31500       |
| DTNH22-87C-07101       | Allen Corporation of America<br>Crash Avoidance Database<br>Maintenance and Training | 03/23/90     | 03/08/90          | 0           | 0           | 0           | 30566       |
| DTNH22-87C-07181       | CHI Associates, Inc.<br>Trauma Research  | 09/04/87     | 10/31/90          | 85000       | 248747      | 296997      | 380928      |
| DTNH22-87C-07340       | The Last Resource, Inc.<br>Driver Factors  | 09/30/87     | 03/31/91          | 70000       | 134970      | 0           | 60349       |
| DTNH22-87C-17169       | National Capitol Systems, Inc.<br>Four In-Depth Teams                                | 09/30/87     | 09/30/90          | 16000       | 199000      | 80000       | 43748       |
| DTNH22-87C-27169       | Franklin Research Center<br>Four In-Depth Teams                                      | 09/30/87     | 09/30/92          | 15000       | 125000      | 40000       | 63750       |
| DTNH22-87C-47169       | Dynamic Science, Inc.<br>Four In-Depth Teams   | 09/30/87     | 09/30/90          | 15000       | 0           | 20000       | 40000       |
| DTNH22-87D-07098       | CHI Associates, Inc.<br>Technology and Applications<br>Projects                      | 09/30/87     | 06/29/90          | 39000       | 237013      | 159991      | 174302      |
| DTNH22-87D-07101       | Allen Corporation of America<br>Crash Avoidance Database<br>Maintenance and Training | 12/08/86     | 04/30/90          | 197789      | 119250      | 239253      | 63412       |

*Motor Vehicle Safety 1990*

| <b>Contract Number</b> | <b>Contractor Project Title</b>   | <b>Dates Start-Completion</b> |             |             |             |             |
|------------------------|---|-------------------------------|-------------|-------------|-------------|-------------|
|                        |   |                               | <b>FY87</b> | <b>FY88</b> | <b>FY89</b> | <b>FY90</b> |
| DTNH22-87D-07174       | Systems Technology, Inc.<br>Driving Simulation                                | 09/14/87-04/22/91             | 2500        | 32619       | 2500        | 186018      |
| DTNH22-87D-17174       | University of Michigan (UMTRI)<br>Analytical Support                          | 09/29/87-06/28/91             | 2500        | 2500        | 2500        | 372251      |
| DTNH22-87D-37174       | Dynamic Research, Inc.<br>Driving Simulation                                  | 09/16/87-05/27/91             | 2500        | 2500        | 55929       | 148913      |
| DTNH22-88A-05008       | The Advertising Council, Inc.<br>Special Projects—Research and<br>Development | 07/25/88-11/30/90             | 0           | 100000      | 0           | 250000      |
| DTNH22-88C-07007       | University of Maryland at<br>Baltimore Trauma Research                        | 09/30/88-09/29/91             | 0           | 150000      | 229745      | 95000       |
| DTNH22-88C-07010       | Opportunity Systems, Inc.<br>Technical Support for MAD                        | 03/01/88-02/28/91             | 0           | 79273       | 56120       | 65083       |
| DTNH22-88C-07015       | Dynamic Science, Inc.<br>D.C. Teams   | 09/30/88-09/30/91             | 0           | 150000      | 75000       | 100000      |
| DTNH22-88C-07018       | Franklin Research Center<br>NASS/GES General Control<br>Activities            | 05/13/88-05/31/91             | 0           | 240000      | 384279      | 350000      |
| DTNH22-88C-07019       | Franklin Research Center<br>NASS/GES General Control<br>Activities            | 05/14/88-05/31/91             | 0           | 240000      | 647473      | 64500       |
| DTNH22-88C-07020       | Indiana University<br>NASS/GES General Control<br>Activities                  | 05/14/88-05/31/91             | 0           | 270000      | 388531      | 360000      |
| DTNH22-88C-07022       | Kimley-Horn Research Institute<br>PSU Sites                                   | 09/30/88-03/31/92             | 0           | 23000       | 93312       | 142762      |
| DTNH22-88C-07027       | Southwest Research Institute<br>Analytical Support                            | 09/30/88-05/07/92             | 0           | 2421419     | 1098610     | 850000      |
| DTNH22-88C-07029       | Kimley-Horn Research Institute<br>PSU Sites                                   | 09/30/88-03/31/92             | 0           | 10000       | 50900       | 110862      |
| DTNH22-88C-07030       | United Management Systems, Inc.   | 09/30/88-09/29/91             | 0           | 30000       | 479413      | 208025      |
| DTNH22-88C-07031       | Management Engineers, Inc.<br>PSU Sites Site Support Activities               | 09/29/88-03/31/92             | 0           | 10000       | 109678      | 133418      |
| DTNH22-88C-07032       | Kimley-Horn Research Institute<br>PSU Sites                                   | 09/30/88-03/31/92             | 0           | 10000       | 115465      | 112142      |
| DTNH22-88C-07039       | Kimley-Horn Research Institute<br>PSU Sites                                   | 09/30/88-09/30/92             | 0           | 33000       | 23600       | 101500      |
| DTNH22-88C-07040       | Kimley-Horn Research Institute<br>PSU Sites                                   | 09/30/88-03/31/92             | 0           | 43000       | 33792       | 159334      |
| DTNH22-88C-07041       | Kimley-Horn Research Institute<br>PSU Sites                                   | 09/30/88-03/31/92             | 0           | 43000       | 141907      | 169319      |
| DTNH22-88C-07042       | National Capitol Systems, Inc.<br>PSU Sites                                   | 09/30/88-03/31/92             | 0           | 49000       | 97300       | 270839      |
| DTNH22-88C-07043       | Kimley-Horn Research Institute<br>PSU Sites                                   | 09/30/88-03/31/92             | 0           | 52000       | 96853       | 285331      |
| DTNH22-88C-07048       | National Capitol Systems, Inc.<br>NASS/GES General Control<br>Activities      | 12/18/87-03/31/92             | 0           | 198000      | 177300      | 202000      |
| DTNH22-88C-07050       | Kimley-Horn Research Institute<br>PSU Sites                                   | 09/30/88-03/31/92             | 0           | 51000       | 95714       | 240792      |
| DTNH22-88C-07051       | Kimley-Horn Research Institute<br>PSU Sites                                   | 09/30/88-03/31/92             | 0           | 30000       | 97900       | 203000      |



*Motor Vehicle Safety 1990*

| <b>Contract Number</b> | <b>Contractor Project Title</b>   | <b>Dates Start-Completion</b> | <b>FY87</b> | <b>FY88</b> | <b>FY89</b> | <b>FY90</b> |
|------------------------|---|-------------------------------|-------------|-------------|-------------|-------------|
| DTNH22-88C-07066       | National Institute for Safety Research<br>FARS Training                         | 09/30/88-11/30/91             | 0           | 34183       | 200000      | 200000      |
| DTNH22-88C-07069       | Franklin Research Center<br>Drugs—Nature and Magnitude of the Problem           | 09/30/88-09/30/91             | 0           | 970617      | 0           | 251725      |
| DTNH22-88C-07116       | Comsis Corporation<br>Technology and Applications Projects                      | 03/31/88-03/31/93             | 0           | 90786       | 94405       | 98167       |
| DTNH22-88C-07216       | The Last Resource, Inc.<br>Study Effects of Increased Speeds                    | 09/30/88-11/30/90             | 0           | 144582      | 3833        | 49674       |
| DTNH22-88C-07384       | Systems Technology, Inc.<br>Rollover Test Device Research                       | 09/30/88-07/31/90             | 0           | 230018      | 0           | 216054      |
| DTNH22-89C-03145       | J.C. Services, Inc.<br>Support Activities—Research and Development              | 12/01/88-12/31/90             | 0           | 0           | 45691       | 62910       |
| DTNH22-89C-07004       | National Academy of Sciences (TRB)<br>Special Projects—Research and Development | 08/01/89-09/30/91             | 0           | 0           | 75000       | 75000       |
| DTNH22-89C-07010       | Anacapa Sciences<br>Program-Focused Strategies                                  | 09/29/89-03/31/92             | 0           | 0           | 601072      | 100000      |
| DTNH22-89C-07013       | Development Assistance Corporation<br>PSU Sites                                 | 10/01/88-03/31/92             | 0           | 0           | 170000      | 353000      |
| DTNH22-89C-07014       | Kimley-Horn Research Institute<br>PSU Sites                                     | 04/01/89-03/31/92             | 0           | 0           | 63500       | 89887       |
| DTNH22-89C-07015       | Dynamic Science, Inc.<br>PSU Sites  | 04/01/89-03/31/92             | 0           | 0           | 144200      | 287045      |
| DTNH22-89C-07016       | KLD Associates, Inc.<br>PSU Sites   | 04/01/89-03/31/92             | 0           | 0           | 62500       | 136253      |
| DTNH22-89C-07017       | KLD Associates, Inc.<br>PSU Sites   | 04/01/89-03/31/92             | 0           | 0           | 104000      | 205958      |
| DTNH22-89C-07018       | KLD Associates, Inc.<br>PSU Sites   | 04/01/89-03/31/92             | 0           | 0           | 100833      | 194730      |
| DTNH22-89C-07019       | Management Engineers, Inc.<br>PSU Sites   | 04/01/89-03/31/92             | 0           | 0           | 77500       | 154600      |
| DTNH22-89C-07020       | Development Assistance Corporation<br>PSU Sites                                 | 04/01/89-03/31/92             | 0           | 0           | 200000      | 370000      |
| DTNH22-89C-07022       | KLD Associates, Inc.<br>PSU Sites   | 04/01/89-03/31/92             | 0           | 0           | 50000       | 102600      |
| DTNH22-89C-07023       | Kimley-Horn Research Institute<br>PSU Sites                                     | 04/01/89-03/31/92             | 0           | 0           | 120900      | 244391      |
| DTNH22-89C-07034       | Goodell-Grivas, Inc.<br>Occupant Protection Data                                | 12/23/88-03/23/91             | 0           | 0           | 416483      | 330143      |
| DTNH22-89C-07392       | National Public Services Research Inst.<br>Alcohol Avoidance Techniques—PI&E    | 09/15/89-12/14/90             | 0           | 0           | 78420       | 38316       |
| DTNH22-89C-07408       | L. Woerner, Inc., DBA HCR<br>Alcohol Deterrence Research                        | 09/26/89-05/03/91             | 0           | 0           | 100515      | 79415       |

*Motor Vehicle Safety 1990*

| Contract Number  | Contractor Project Title  | Dates    |            | FY87 | FY88 | FY89   | FY90   |
|------------------|---|----------|------------|------|------|--------|--------|
|                  |   | Start    | Completion |      |      |        |        |
| DTNH22-89C-07624 | Information Systems Services, Inc.<br>Support Activities—Research and Development | 09/30/89 | 07/31/91   | 0    | 0    | 95018  | 155928 |
| DTNH22-89D-07011 | The Washington Consulting Group<br>Occupant Protection Data                       | 09/29/89 | 09/30/92   | 0    | 0    | 5000   | 291037 |
| DTNH22-89D-07265 | Research and Evaluation Associates<br>Alcohol Deterrence Research                 | 09/11/89 | 09/10/91   | 0    | 0    | 2500   | 72500  |
| DTNH22-89G-07086 | 3COM Corporation<br>Support Activities—Research and Development                   | 10/20/89 | 12/31/89   | 0    | 0    | 0      | 32950  |
| DTNH22-89X-02034 | National Institute of Standards<br>Restraint Systems—Passive                      | 05/24/90 | 08/31/90   | 0    | 0    | 0      | 29000  |
| DTNH22-89X-07266 | Transportation Systems Center<br>NASS/GES General Control Activities              | 12/13/88 | 09/30/90   | 0    | 0    | 130000 | 150000 |
| DTNH22-89X-07287 | Federal Highway Administration<br>Other   | 03/16/89 | 07/02/90   | 0    | 0    | 125000 | 50000  |
| DTNH22-89X-07393 | U.S. Geological Survey<br>Timesharing Services                                    | 02/24/89 | 09/30/90   | 0    | 0    | 60000  | 80200  |
| DTNH22-89X-07512 | National Center for Health<br>Statistics<br>Occupant Protection Data              | 05/09/89 | 05/08/92   | 0    | 0    | 15000  | 40000  |
| DTNH22-89Z-07033 | National Academy of Sciences (TRB)<br>NASS/GES General Control Activities         | 03/30/89 | 06/30/91   | 0    | 0    | 50000  | 136250 |
| DTNH22-89Z-07305 | Medical College of Wisconsin<br>Trauma Research                                   | 09/28/89 | 09/30/91   | 0    | 0    | 91000  | 343030 |
| DTNH22-89Z-07573 | National Head Injury Foundation<br>Center for Injury Control and Trauma Research  | 08/04/89 | 08/03/91   | 0    | 0    | 94370  | 190746 |
| DTNH22-89Z-17305 | University of Virginia<br>Trauma Research   | 09/28/89 | 09/28/91   | 0    | 0    | 153778 | 403228 |
| DTNH22-90C-02067 | Case Consulting Labs, Inc.<br>Analytical Support                                  | 04/25/90 | 04/24/91   | 0    | 0    | 0      | 69000  |
| DTNH22-90C-07004 | Schulman, Ronca, & Bucuvalas, Inc.<br>Support                                     | 06/05/90 | 12/06/91   | 0    | 0    | 0      | 170045 |
| DTNH22-90C-07008 | Social Science Research Enterprises<br>Alcohol Avoidance Techniques—PI&E          | 09/28/90 | 02/28/92   | 0    | 0    | 0      | 41927  |
| DTNH22-90C-07011 | Walcoff and Associates, Inc.<br>Support   | 04/05/90 | 11/22/91   | 0    | 0    | 0      | 207175 |
| DTNH22-90C-07017 | University of Michigan (UMTRI)<br>NASS/GES General Control Activities             | 03/01/90 | 03/31/91   | 0    | 0    | 0      | 240975 |
| DTNH22-90C-07026 | AMR Technical Management<br>Services, Inc.<br>State Data Support                  | 04/23/90 | 04/22/92   | 0    | 0    | 0      | 60893  |
| DTNH22-90C-07031 | Comsis Corporation<br>FARS Quality Control  | 03/28/90 | 03/27/93   | 0    | 0    | 0      | 60000  |
| DTNH22-90C-07091 | Corporate-Tech Planning<br>Support Activities—Research and Development            | 02/09/90 | 09/30/90   | 0    | 0    | 0      | 49232  |

*Motor Vehicle Safety 1990*

| Contract Number  | Contractor Project Title   | Dates Start-Completion | Fiscal Year |      |      |        |
|------------------|--|------------------------|-------------|------|------|--------|
|                  |  |                        | FY87        | FY88 | FY89 | FY90   |
| DTNH22-90C-07104 | V.H. Patel Associates<br>Analytical Support  | 03/05/90-02/15/90      | 0           | 0    | 0    | 96266  |
| DTNH22-90C-07108 | United Management Systems, Inc.<br>PSU Sites                                       | 05/01/90-03/31/92      | 0           | 0    | 0    | 200390 |
| DTNH22-90C-07126 | Statcom, Inc.<br>Exposure Analysis   | 09/19/90- / /          | 0           | 0    | 0    | 133000 |
| DTNH22-90C-07199 | Information Systems and Services, Inc.<br>Technology and Applications Projects     | 08/20/90-09/29/91      | 0           | 0    | 0    | 244015 |
| DTNH22-90C-07223 | Dunlap and Associates<br>Elderly Pedestrian Projects                               | 08/14/90- / /          | 0           | 0    | 0    | 247605 |
| DTNH22-90C-07243 | University of North Carolina<br>Pedestrian Projects                                | 09/28/90-10/31/90      | 0           | 0    | 0    | 114609 |
| DTNH22-90C-07244 | Claritas Corporation<br>Group-Focused Strategies                                   | 09/04/90-09/03/91      | 0           | 0    | 0    | 55000  |
| DTNH22-90C-07285 | Hexcel Corporation<br>Side Protection  | 03/28/90-05/31/90      | 0           | 0    | 0    | 52500  |
| DTNH22-90C-07287 | Mid-Atlantic Research Institute<br>Alcohol Deterrence Research                     | 08/20/90-11/20/91      | 0           | 0    | 0    | 142512 |
| DTNH22-90C-07290 | Midwest Research Institute<br>Study Effects of Increased Speeds                    | 09/28/90-09/28/92      | 0           | 0    | 0    | 190000 |
| DTNH22-90D-07010 | CAE-Link Corporation<br>Crash Avoidance Database<br>Maintenance and Training       | 05/01/90-05/01/92      | 0           | 0    | 0    | 83360  |
| DTNH22-90D-07437 | Digital Equipment Corporation<br>Special Projects—Research and<br>Development      | 09/27/90-11/30/90      | 0           | 0    | 0    | 227974 |
| DTNH22-90G-07087 | 3COM Corporation<br>Support Activities—Research and<br>Development                 | 10/20/89-02/28/90      | 0           | 0    | 0    | 32794  |
| DTNH22-90G-07127 | Digital Equipment Corporation<br>ADP Activities                                    | 02/12/90-09/30/89      | 0           | 0    | 0    | 46756  |
| DTNH22-90G-07281 | Sorbus<br>Hardware Maintenance   | 03/19/90-09/30/91      | 0           | 0    | 0    | 49000  |
| DTNH22-90G-07319 | Advanced Computer Concepts<br>ADP Activities                                       | 04/16/90-05/11/90      | 0           | 0    | 0    | 46257  |
| DTNH22-90G-07341 | Advanced Computer Concepts<br>ADP Activities                                       | 05/17/90-09/30/90      | 0           | 0    | 0    | 49944  |
| DTNH22-90G-07499 | Advanced Computer Concepts<br>Crash Avoidance Database<br>Maintenance and Training | 09/26/90-09/30/90      | 0           | 0    | 0    | 45395  |
| DTNH22-90X-07014 | National Institutes of Health<br>Timesharing Services                              | 02/05/90-09/30/90      | 0           | 0    | 0    | 434036 |
| DTNH22-90X-07097 | Transportation Safety Institute<br>NASS Replacement Training                       | 01/23/90-09/30/94      | 0           | 0    | 0    | 197993 |
| DTNH22-90X-07131 | Transportation Systems Center<br>General Set-Aside Programs                        | 12/29/89-09/30/90      | 0           | 0    | 0    | 177203 |
| DTNH22-90X-07308 | Federal Highway Administration<br>Crash Avoidance Analysis                         | 05/02/90-09/30/92      | 0           | 0    | 0    | 50000  |
| DTNH22-90X-07350 | National Science Foundation<br>Driving Simulation                                  | 06/06/90-05/02/91      | 0           | 0    | 0    | 75000  |

*Motor Vehicle Safety 1990*

| Contract Number  | Contractor Project Title  | Dates Start-Completion | FY87   | FY88   | FY89   | FY90    |
|------------------|---|------------------------|--------|--------|--------|---------|
| DTNH22-90X-07357 | U.S. Air Force (AFMRL)<br>LTV Crash Testing   | 06/11/90-06/10/91      | 0      | 0      | 0      | 285000  |
| DTNH22-90X-07365 | Transportation Systems Center<br>Special Projects—Research and<br>Development                       | 06/18/90-09/30/90      | 0      | 0      | 0      | 110000  |
| DTNH22-90Z-05221 | International Assoc. of Chiefs of<br>Police<br>Crash Avoidance Database<br>Maintenance and Training | 06/08/90-05/08/91      | 0      | 0      | 0      | 25000   |
| DTNH22-90Z-07006 | University of Michigan<br>Analytical Support  | 12/04/89-12/04/90      | 0      | 0      | 0      | 65000   |
| DTNH22-90Z-07012 | San Diego Police Department<br>Programming Support—Systems<br>Operations Branch                     | 05/08/90-08/01/91      | 0      | 0      | 0      | 35451   |
| DTNH22-90Z-07018 | Intern'l Association of Chiefs of<br>Police<br>NASS/GES General Control<br>Activities               | 10/19/89-09/30/90      | 0      | 0      | 0      | 99710   |
| DTNH22-90Z-07032 | Thomas Jefferson University<br>Hospital<br>NASS/GES General Control<br>Activities                   | 10/13/89-10/15/90      | 0      | 0      | 0      | 2075000 |
| HS-034           | TSC, Cambridge, MA<br>Alcohol Deterrence Research   | 09/27/90-09/30/90      | 0      | 0      | 0      | 95000   |
| HS-08            | Transportation Systems Center<br>Software Support   | 07/29/86-09/30/90      | 603235 | 354000 | 450000 | 534000  |
| HS-11            | Transportation Systems Center<br>Timesharing Services   | 02/24/88-09/30/90      | 0      | 705000 | 686000 | 903000  |
| HS-14            | Transportation Systems Center<br>Analytical Support   | 01/02/90-09/30/90      | 0      | 0      | 0      | 100000  |
| HS-34            | Transportation Systems Center<br>Alcohol Deterrence Research  | 03/11/80-09/30/90      | 0      | 230000 | 0      | 100000  |
| HS-70(06)        | Transportation Systems Center<br>Technical Support for MAD  | 07/27/84-09/30/90      | 0      | 0      | 0      | 30000   |
| HS-76(30)        | Transportation Systems Center<br>Frontal Systems  | 01/02/90-09/30/90      | 0      | 0      | 0      | 140000  |
| HS-76(31)        | Transportation Systems Center<br>Side Protection  | 01/02/90-09/30/90      | 0      | 0      | 0      | 150000  |
| HS-76(32)        | Transportation Systems Center<br>Side Protection  | 01/02/90-09/30/90      | 0      | 0      | 0      | 50000   |
| HS-76(33)        | Transportation Systems Center<br>Side Protection  | 01/02/90-09/30/90      | 0      | 0      | 0      | 80000   |
| HS-76(34)        | Transportation Systems Center<br>Technology and Applications<br>Projects                            | 01/02/90-09/30/90      | 0      | 0      | 0      | 210000  |
| HS-76(35)        | Transportation Systems Center<br>Technology and Applications<br>Projects                            | 01/02/90-09/30/90      | 0      | 0      | 0      | 80000   |
| HS-76(36)        | Transportation Systems Center<br>Technology and Applications<br>Projects                            | 01/02/90-09/30/90      | 0      | 0      | 0      | 100000  |
| HS-76(37)        | Transportation Systems Center<br>Trauma Research  | 01/02/90-09/30/90      | 0      | 0      | 0      | 200000  |

*Motor Vehicle Safety 1990*

| Contract Number | Contractor Project Title   | Dates Start-Completion | FY     |        |        |        |
|-----------------|--|------------------------|--------|--------|--------|--------|
|                 |  |                        | FY87   | FY88   | FY89   | FY90   |
| HS-76(38)       | Transportation Systems Center Trauma Research                                  | 01/02/90-09/30/90      | 0      | 0      | 0      | 170000 |
| HS-76(39)       | Transportation Systems Center Technology and Applications Projects             | 05/21/90-09/30/90      | 0      | 0      | 0      | 200000 |
| HS-76(40)       | Transportation Systems Center Technology and Applications Projects             | 05/21/90-09/30/90      | 0      | 0      | 0      | 200000 |
| HS-78           | Transportation Systems Center Rollover Test Device Research                    | 06/23/88-09/30/90      | 0      | 200000 | 275000 | 100000 |
| HS-98           | Transportation Systems Center Support Services                                 | 12/31/82-09/30/90      | 0      | 188000 | 439000 | 755400 |
| LABOAA          | Vehicle Research and Test Center VRTC-Laboratory Support                       | 10/01/89-09/30/90      | 0      | 0      | 0      | 239606 |
| LABOAB          | Vehicle Research and Test Center VRTC-Laboratory Support                       | 10/01/89-09/30/90      | 0      | 0      | 0      | 109311 |
| LABOAC          | Vehicle Research and Test Center VRTC-Laboratory Support                       | 10/01/89-09/30/90      | 0      | 0      | 0      | 277335 |
| NRD-01-0-07081  | Associate Administrator for R&D Support Activities—Research and Development    | 10/20/89-09/30/90      | 0      | 0      | 0      | 29999  |
| NRD-01-0-07246  | General Services Division Research and Development—Printing Activities         | 02/01/90-09/30/90      | 0      | 0      | 0      | 60000  |
| NRD-01-0-07248  | General Services Division Research Development—Printing Activities             | 02/01/90-09/30/90      | 0      | 0      | 0      | 70000  |
| NRD-01-0-07251  | General Services Division Research and Development—Printing Activities         | 02/01/90-09/30/90      | 0      | 0      | 0      | 31600  |
| NRD-01-0-07252  | General Services Division Research and Development—Printing Activities         | 02/01/90-09/30/90      | 0      | 0      | 0      | 61400  |
| VRTC-80-0149    | Vehicle Research and Test Center Technology and Applications Projects          | 10/01/89-09/30/90      | 0      | 0      | 0      | 86421  |
| VRTC-80-0150    | Vehicle Research and Test Center Dummy Management Projects                     | 10/01/89-09/30/90      | 0      | 0      | 0      | 207392 |
| VRTC-80-0160    | Vehicle Research and Test Center Dummy Research                                | 01/24/90-09/30/90      | 0      | 0      | 0      | 74887  |
| VRTC-86-0019    | Vehicle Research and Test Center Pedestrian                                    | 12/31/85-09/30/90      | 236002 | 319614 | 348980 | 622934 |
| VRTC-87-0038    | Vehicle Research and Test Center Passenger Car Brakes                          | 10/01/86-09/30/90      | 174442 | 16909  | 188072 | 28645  |
| VRTC-87-0041    | Vehicle Research and Test Center Head Development Research                     | 10/01/86-09/30/90      | 99096  | 123013 | 121618 | 57530  |
| VRTC-87-0052    | Vehicle Research and Test Center Truck Brakes                                  | 10/01/86-09/30/90      | 290445 | 104767 | 325559 | 480728 |
| VRTC-87-0053    | Vehicle Research and Test Center Programming Support—Systems Operations Branch | 10/01/86-09/30/90      | 35730  | 96696  | 123893 | 208839 |
| VRTC-87-0074    | Vehicle Research and Test Center Child Safety Seat Initiatives                 | 10/01/87-09/30/89      | 0      | 95063  | 256885 | 162127 |

*Motor Vehicle Safety 1990*

| Contract Number | Contractor Project Title  | Dates Start-Completion | FY             |                 |                 |                 |
|-----------------|---|------------------------|----------------|-----------------|-----------------|-----------------|
|                 |   |                        | FY87           | FY88            | FY89            | FY90            |
| VRTC-87-0086    | Vehicle Research and Test Center Passenger Car Handling/Stability | 10/01/87-09/30/90      | 0              | 28112           | 242594          | 359736          |
| VRTC-88-0084    | Vehicle Research and Test Center Dummy Evolutionary Enhancement   | 10/01/87-09/30/90      | 0              | 64723           | 71768           | 154070          |
| VRTC-88-0107    | Vehicle Research and Test Center Head Injury Research             | 10/01/87-09/30/90      | 0              | 95000           | 75011           | 75022           |
| VRTC-88-0135    | Vehicle Research and Test Center Trauma Research                  | 10/01/89-09/30/90      | 0              | 0               | 0               | 104644          |
| VRTC-89-0108    | Vehicle Research and Test Center Dummy Neck Development           | 10/01/89-09/30/90      | 0              | 0               | 0               | 106482          |
| VRTC-89-0118    | Vehicle Research and Test Center Dummy Evolutionary Enhancement   | 10/01/88-09/30/90      | 0              | 0               | 0               | 99979           |
| VRTC-89-0120    | Vehicle Research and Test Center Head Injury Research             | 10/01/88-09/30/90      | 0              | 0               | 29702           | 49628           |
| VRTC-89-0126    | Vehicle Research and Test Center Dummy Evolutionary Enhancement   | 10/01/88-09/30/90      | 0              | 0               | 39573           | 40413           |
| VRTC-89-0137    | Vehicle Research and Test Center Truck Brakes                     | 06/21/89-09/30/90      | 0              | 0               | 65000           | 32750           |
| VRTC-89-0138    | Vehicle Research and Test Center Side Protection                  | 10/01/88-09/30/90      | 0              | 0               | 82398           | 475822          |
| VRTC-89-0140    | Vehicle Research and Test Center Side Protection                  | 10/01/89-09/30/90      | 0              | 0               | 0               | 199710          |
| <b>Totals</b>   |   |                        | <b>6149229</b> | <b>12587367</b> | <b>17608649</b> | <b>33034173</b> |



