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Report to Congress

The Effect of Increased Speed Limits in the Post-NMSL Era

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EXECUTIVE SUMMARY

The National Highway System (NHS) Designation Act (hereinafter referred to as "the NHS Act") of 1995 (Public Law [P. L.] 104-59) was signed into law on November 28, 1995. The NHS Act, among other things, established the National Highway System and eliminated the Federal mandate for the National Maximum Speed Limit (NMSL). In so doing, the NHS Act ended a period of more than 20 years of Federal involvement in the states' establishment of speed limits and ended the requirement for states' submission of speed compliance data to the Federal Highway Administration (FHWA). Section 347 of the NHS Act required the Secretary of Transportation to study the impact of states' actions to raise speed limits above 55/65 MPH and report to the Congress by September 30, 1997.

Key Findings

! Due to the current unavailability of full vehicle miles traveled (VMT) and other data, it is not known how increased travel on higher speed roads, shifts in travel, and other traffic safety factors, (e.g., changes in alcohol involvement, belt use) or various economic factors (e.g., fuel consumption, roadway maintenance, travel time) may have contributed to an estimated increase in Interstate fatalities and economic costs. Nevertheless, it is important to note that data currently available from the National Highway Traffic Safety Administration's (NHTSA) Fatality Analysis Reporting System (FARS) shows that states that increased speed limits in 1996 experienced approximately 350 more Interstate fatalities than would have been expected based on historical trends -- about 9 percent above expectations. Concurrently, the Interstate fatalities experienced in states that did not increase speed limits in 1996 was consistent with pre-1996 trends. <u>The estimated increase in Interstate fatalities found in this study, while smaller in magnitude compared to the estimated change in fatalities found in 1987 following the increase of speed limits on rural Interstates, does follow the historical pattern of increases in fatalities being associated with increases in posted speed limits.</u>

! An estimated increase in fatalities is typically associated with an increase in traffic crashes and associated injuries. The total economic cost of the estimated 350 additional fatalities and the associated injuries and crashes is more than $820 million in 1996 dollars. Although Section 347 of the NHS Act stated that the report should address the costs and benefits associated with the repeal of the NMSL, no attempt was made at this time to estimate potential benefits, as most States have not had increased limits in place for an extended period of time.

! In addition to the analysis of the FARS data on Interstate fatalities, ten states also provided information on the impact of increased speed limits in their respective states for inclusion in this report. A consistent pattern of crash increases was cited in only one of the 10 states (California). Each of the 10 states considered the findings preliminary or inconclusive due to the limited amount of data available for analysis. This is not particularly surprising, since each state had only its own data and experience to analyze, while it was possible for NHTSA and FHWA to pool states together, yielding more data for analysis.

In view of these findings, close monitoring of crash trends on roads with increased speed limits should continue and, if warranted, countermanding actions taken. Also, it will be important to continue to focus, at the national and state levels, on key program areas of traffic safety, e.g., increasing restraint use, enforcing traffic laws, informing and educating the public, implementing roadway and traffic safety improvements, and ameliorating the effects of alcohol-involved driving over the long term to compensate for possible increases in fatalities and injured persons that may be related to increased speed limits and increases in VMT and shifts in travel to roads with higher posted speed limits.

Report Summary

NHTSA and FHWA were delegated responsibility for conducting the study of the impact of increased speed limits. Section 347 of the NHS Act emphasized that the study should include the costs and benefits associated with increasing the speed limit at the state level. Thus, NHTSA and FHWA would need to incorporate information from individual states on their experience with increased limits and possible impacts on safety. NHTSA and FHWA began a process to solicit the states' input and request their comments on a proposed strategy to address the inherent complexities of determining the costs and benefits at the state and national levels, necessitating that an analysis of state-specific data be conducted. As part of this process the agencies published two Federal Register notices on the issue, the first of which invited comments and recommendations from state highway and traffic safety officials on a proposed study outline and methodology. The second notice presented a summary of comments from the states and others on the proposed study and presented a modified approach for conducting the study.

From the beginning, NHTSA and FHWA recognized that the extent to which it would be possible to address the impacts of increased speed limits, particularly at the state level, would depend in large degree on the states' submissions for inclusion in the study. Most of the 19 states commenting on the first of the two notices expressed concerns that: while the initial study methodology was reasonable, it was ambitious and would place an additional burden on the states; data would either not be available or was not being collected at the level of detail needed; and that meeting the deadline of September 30, 1997, would be difficult, "... *impossible* ..." or "... *unrealistic*."

To meet the NHS Act requirement and in light of the states' comments on the first notice, NHTSA and FHWA presented a modified approach for conducting the study in the second Federal Register notice using the limited amount of data available. As 1996 was the first year of experience with increased speed limits in the post-NMSL era, there were several analytical challenges to conducting this study. Certain types of data, e.g., travel (vehicle miles traveled or VMT) by roadway type, fuel consumption, medical costs, time, etc., were not available either at the state or national level, making it impossible at this time to address the entire range of costs and benefits typically associated with a study of this kind. In addition, some states have selectively increased speed limits on certain road types, e.g., selected urban Interstate or certain freeways or expressways, rather than systemwide, e.g., all Interstates. At the national level, NHTSA and FHWA could only begin to determine the contribution that increased speed limits would have on traffic fatalities using data from the Fatality Analysis Reporting System (FARS). Analyses were conducted on 3 groups of states: (1) those states that increased speed limits in late

1995 through early in the first quarter of 1996, (2) those that increased speed limits later in 1996, and (3) those that did not increase speed limits.

These analytical challenges aside, analysis of existing data has provided a preliminary assessment of the possible effects of increased speed limits. While total fatalities and injured persons changed very little at the national level in 1996 compared to 1995 (the increase in fatalities from 1995 to 1996 was 90), fatalities, fatal crashes, injured persons and injury crashes all increased at the national level on Interstate roads in 1996, while decreasing on all other roads. The pattern of change in Interstate fatalities was strongest for the group of eleven states that raised their speed limits late in 1995 or early in 1996 (Arizona, California, Delaware, Illinois, Massachusetts, Montana, Nevada, Oklahoma, Pennsylvania, Texas, and Wyoming) when contrasted with the group of states that did not raise limits in 1996. The group of 21 states that increased speed limits later in 1996 exhibited a pattern of increase that essentially paralleled the group of 11 "early change" states.

In the absence of detailed information regarding where and when speed limits were raised, it was possible to employ simple statistical models to analyze the fatality experience in these groups of states during 1996 compared to expectations based on historical trends. With a linear regression model[1] for each of the three groups of states using data for 1991-1996 which accounted for a time trend and an intervention for the post-NMSL time period, it was found that Interstate fatalities experienced a statistically significant increase in those states that raised their posted speed limits late in 1995 or early in 1996. The effect found in the group of states that increased speeds later in 1996 was numerically consistent with the "early change" states, but failed to reach statistical significance, while there was essentially no change in fatalities on Interstates for states that did not raise their speed limits during 1995-1996.

Based upon the analyses conducted in this study on the first year of experience with higher speed limits, it is estimated that Interstate fatalities in the states that increased speed limits experienced approximately 350 more fatalities than would have been expected based on historical trends, about 9 percent above expectations. Based on economic cost models used by the National Highway Traffic Safety Administration, the total economic cost of 350 additional fatalities and associated injuries and crashes is more than $820 million in 1996 dollars. Nonfatal injuries and non-injury crashes included in the total economic cost were estimated based on the relative frequency of these events to fatalities in speed-related crashes.[2] Due to the unavailability of detailed VMT and other data at this time, it is not known how increased travel on higher speed roads, shifts in travel, changes in average and top vehicle speeds and other traffic safety factors may have contributed to the estimated increase in Interstate fatalities. While Section 347 of the NHS Act stated that the report should address the costs and the benefits associated with the repeal of the NMSL, no attempt was made at this time to estimate potential benefits, as most

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[1] For more on linear regression analysis, see Draper, N. R. and Smith, H. *Applied Regression Analysis*, J. Wiley & Sons, Inc., 1966.

[2] Blincoe, L. J. *The Economic Cost of Motor Vehicle Crashes, 1994.* U. S. Department of Transportation, NHTSA, Washington, DC. DOT HS 808 425, July 1996.

states have not had increased limits in place for an extended period of time. A large portion of the potential benefits of increased speed limits would result from decreases in travel time, for example, data which is not easily obtainable, particularly on an individual state basis.

Studies of the impact of increased speed limits in individual states were obtained by NHTSA and FHWA from 10 states (California, Idaho, Iowa, Michigan, Missouri, Montana, Nebraska, New Mexico, Texas, and Virginia). These studies are summarized in this report. On a state-by-state basis, the possible impact of increased speed limits does not follow a consistent pattern. A consistent pattern of crash increases or decreases was cited in only one of the 10 states (California). In addition, each of the states considered the findings preliminary or inconclusive, again, due to the limited amount of data available for analysis.

NHTSA and FHWA plan to continue to study the impact of increased speed limits at the national and state levels, particularly after states have additional years of experience with the higher limits. Close monitoring of crash trends on roads with increased speed limits should continue and, if warranted, countermanding actions taken. Also, it will also be important to continue to focus on key program areas of traffic safety, e.g., increasing restraint use, enforcing traffic laws, informing and educating the public, implementing roadway and traffic safety improvements, and ameliorating the effects of alcohol-involved driving over the long term to compensate for possible increases in fatalities and injured persons that may be related to increased speed limits and increases in VMT and shifts in travel to roads with higher posted speed limits. The challenge will be to take these traffic safety initiatives into account in subsequent analyses of the effects of increased speed limits. In addition, while some evidence of increases in fatalities and fatal crashes was found at the national level, this study is based on only one year of data at higher speed limits, and warrants further examination as the national and individual states' experience with higher speed limits matures. Lastly, this study does not account for possible changes in the expected vehicle miles of travel patterns due to the unavailability of these exposure data at this time. Subsequent analysis of this issue will need to address these effects, where possible. NHTSA, FHWA, and the Centers for Disease Control have also contracted with the Transportation Research Board to examine the criteria used by states to establish speed limits and to recommend improvements to the current methodology. The group of experts assembled for this study come from a wide array of disciplines associated with highway traffic safety, e.g., engineering enforcement, and academia.

SECTION I -- BACKGROUND

Legislative History of Speed Limit Requirements

The National Highway System Designation Act (hereinafter referred to as "the NHS Act") of 1995 (Public Law [P. L.] 104-59) was signed into law on November 28, 1995. The NHS Act, among other things, established the National Highway System and eliminated the Federal mandate for the National Maximum Speed Limit (NMSL). In so doing, P. L. 104-59 ended a period of more than 20 years of Federal involvement in the states' establishment of speed limits and ended the requirement for states' submission of speed compliance data to the Federal Highway Administration (FHWA).

The NMSL, enacted during the Arab oil embargo of 1973 to conserve fuel, was initially set at 55 miles per hour (MPH). By March 1974, all States were in compliance with the NMSL. In addition to conserving fuel, the annual traffic fatality toll declined from 54,052 in 1973 to 45,196 in 1974, a drop of over 16 percent. As a result of the apparent safety benefit in the form of the reduction in traffic fatalities, the Congress passed P. L. 93-643, making the NMSL permanent. P. L. 93-643 also required every state to certify that the NMSL was being enforced.

In 1978, the Congress enacted the Surface Transportation Assistance Act (STAA), P. L. 95-599. The STAA required the states to submit data on the percentage of motor vehicles exceeding 55 MPH on public highways with a 55 MPH posted speed limit.

Following the enactment of the NMSL, numerous studies of the benefits and costs of the legislation were conducted. A joint National Highway Traffic Safety Administration (NHTSA) and FHWA task force, charged with determining the safety benefits of the NMSL, conducted one of these studies. The NHTSA/FHWA task force concluded that while the "*... determination of a precise, accurate estimate of lives saved by the NMSL ... is problematic, there were 20,000 to 30,000 lives saved by the NMSL during the period 1974-1978.*"[3]

The STAA of 1982 required that a study of the "*benefits, both human and economic*" of the NMSL, with "*particular attention to savings to the taxpayers ...*" be conducted by the National Academy of Sciences' Transportation Research Board (TRB). In 1984, TRB published its special report, *55: A Decade of Experience*.[4] The TRB study, conducted by a 19-member committee composed of experts from a wide range of disciplines needed to evaluate the costs and benefits of the NMSL, represents one of the most thorough and extensive examinations of this important safety issue. Although the TRB committee recognized the inherent difficulties associated with attempts to accurately estimate the safety, economic, and energy benefits of the

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[3] *The Life-Saving Benefits of the 55 MPH NMSL: Report of the NHTSA/FHWA Task Force*, U. S. Department of Transportation, DOT HS 805-559, October 1980.

[4] *55: A Decade of Experience*, TRB Special Report 204, National Research Council, Washington DC, 1984.

NMSL, the study concluded that "... *the slower speeds and more uniform pace of travel due to the 55 mph speed limit accounted for 3,000 to 5,000 fewer traffic fatalities in 1974.*"

Furthermore, by the 1984 publication date, the report found that,

> "*The 55 mph speed limit saves 2,000 to 4,000 lives per year, reduces highway fuel use slightly less than 2 percent (a savings of $2 billion in fuel costs at the then prevailing oil prices), and saves taxpayers about $65 million per year. But it also requires motorists to spend 1 billion additional hours driving each year, and the additional costs for enforcement are about $118 million per year. (Fines collected from speeders yield revenues that are roughly equal to these enforcement costs, so the net effect on government budgets is small.)*"

The TRB study also recognized several unresolved issues, including: the impact of noncompliance; the containment of higher speeds, if permitted, on a limited subset of roads; and whether the control of the speed limit is a state or Federal responsibility.

In 1987, the Surface Transportation and Uniform Relocation Assistance Act granted the states the authority to raise the speed limit, not to exceed 65 MPH, on portions of the rural Interstate system and some other "experimental" roads. Thirty-eight states raised speed limits to 65 MPH on rural Interstates in 1987, and two additional states adopted the 65 MPH speed limit on rural Interstates in 1988, bringing approximately 90 percent of the 34,000 rural Interstate mileage to 65 MPH. Congress asked for an evaluation of the effects of the 65 MPH speed limit on rural Interstate traffic fatalities for the period 1987 through 1989. NHTSA published the results of this evaluation in several reports to Congress, the last of which was published in 1992[5], estimating the 1990 fatality toll on rural Interstates in the 38 states with 65 MPH limits to be "*30 percent greater than might have been expected*" or an increase of about 500 fatalities.

Section 347 of the NHS Act, in addition to eliminating the NMSL, also required the Secretary of Transportation to study the impact of states' actions to raise speed limits above 55/65 MPH by September 30, 1997. Section 347 also identified various aspects of increased speed limits that the study should address, e.g., the costs to the states of deaths and injuries resulting from motor vehicle crashes; and the benefits to the states associated with the NMSL repeal, thus establishing the need to obtain specific information from the states' on the impact of increased speed limits on an individual state basis:

> "*Not later than September 30, 1997, the Secretary, in cooperation with any State which raises any speed limit in such State to a level above the level permitted under section 154 of title 23, United States Code, as such section was in effect on September 15, 1995, shall prepare and submit to Congress a study of-*
>
> *(1) the costs to such State of deaths and injuries resulting from motor vehicle crashes; and*

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[5] *Effects of the 65 MPH Speed Limit through 1990: A Report to Congress*, U. S. Department of Transportation, NHTSA, Washington, DC, May 1992.

(2) the benefits associated with the repeal of the national maximum speed limit."

NHTSA and the FHWA were delegated the responsibility for conducting the NHS Act study.

NHTSA and FHWA proposed a strategy for meeting the requirements of Section 347 of the NHS Act, intended to address the complexities of determining the costs and benefits of increased speed limits, while meeting the Congressional deadline of September 30, 1997. A major aspect of the strategy was an emphasis on cooperation between NHTSA, FHWA, and the states that increased their speed limits, as stated in the legislation, for preparation of the study. The states' participation in the NHS study process was considered to be a critical factor in determining the impact of increased speed limits in a particular state, necessitating that an analysis of state-specific data be conducted. In addition, the strategy initially proposed by NHTSA and FHWA was similar in approach to the extensive study conducted by TRB, in order to capitalize on the thorough work done by the TRB committee to examine costs and benefits resulting from decreasing the speed limit.

As the first step of the agencies' strategy, NHTSA and FHWA published a *Federal Register* (FR) notice on June 19, 1996, inviting comments, suggestions, and recommendations from state highway and traffic safety officials, highway safety organizations, researchers, and others on the agencies' proposed plan for conducting the NHS Act study. The proposed strategy, described in this notice, included a draft study outline, the minimum requirements for specific data from states that have raised their speed limits, and a proposed schedule for completing the NHS Act study in order to meet the September 30, 1997, deadline established by Section 347 of the Act. A total of 39 official comments to the docket were received from state agencies, private citizens, National Motorists Association (NMA) members, and others. Nineteen (19) states commented on the notice. Eighteen (18) of the 19 states that commented have increased limits since the NMSL was repealed or were planning to do so. Many of the comments from the states included concerns regarding the complexity and/or comprehensiveness of the agencies' proposed study outline, often in terms of the burden that would be placed upon the states. Many of the states also commented regarding the unavailability of data and the apparent difficulty in meeting the proposed schedule.

On November 27, 1996, NHTSA and FHWA published a second FR notice on the NHS Act study. This notice summarized comments from the states and others on the earlier notice and proposed an alternate strategy for meeting the legislative requirement, in view of the concerns noted by the states. Copies of the two *Federal Register* notices appear in Appendix B.

Analytical Challenge

Due to the concerns expressed by the states in the areas of study methodology, data availability, and scheduling, NHTSA and FHWA were faced with several major analytical challenges to conducting the NHS Act study. Several of the states specifically indicated that certain types of data, e.g., detailed travel by type of roadway, decreased travel time, increased fuel consumption, and increased or decreased medical costs, would not be available in time for inclusion in the report or was not presently being collected. Without this type of information from

the states, it will be difficult, if not impossible, for the agencies to address the entire range of costs and benefits due to increased speed limits in this study. The issue of data availability is further complicated in that many states selectively increased speed limits on certain road segments and/or roadway types, e.g., 4-lane roads, rather than systemwide, e.g., all Interstates. While the selective application of increased speed limits is indicative of the cautiousness on the part of many states in adopting higher limits, it further complicates the issue of data availability by necessitating the analysis of data by road segment.

At the national level, determining the impact of increased speed limits on traffic fatalities is limited to the latest available data from the Fatality Analysis Reporting System (FARS) for calendar 1996, focusing 3 groups of states: (1) the 11 states that increased speed limits in late 1995 or early in the first quarter of 1996, (2) the 21 states that increased speed limits later in 1996, and (3) the 18 states (and the District of Columbia) that did not increase speed limits in 1996. Finally, determining the impact of increased speed limits related to the amount of vehicle miles traveled and the distribution of vehicle speeds on affected roadways was not possible due to the unavailability of these data for calendar year 1996 at the time of the preparation of this report. With the repeal of the NMSL, states are no longer required to report data to FHWA on vehicle speeds by roadway type.

Status of States' Speed Limit Laws

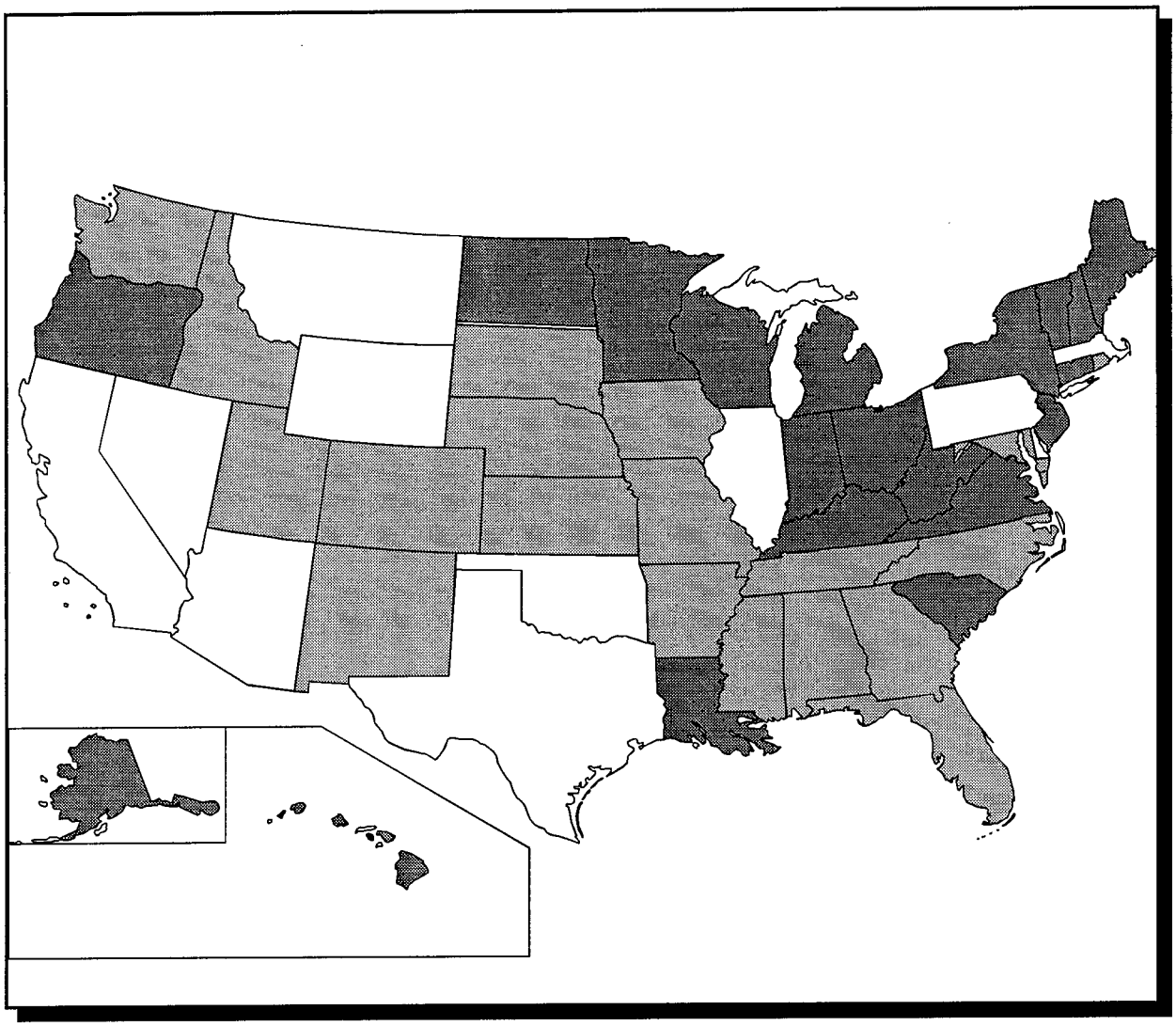
By the end of calendar year 1996, a total of 32 states had passed laws to raise speed limits on various types of roadways. Of the 32 states, 11 had increased speed limits at the end of 1995 after the passage of the NHS Act or early in the first quarter of 1996. Some states opted to increase speed limits on a systemwide basis, e.g., on all Interstate highways; while other states selectively increased limits on specific road segments and types, e.g., on all turnpike roadways. Exhibit 1 presents information on the states in 3 "groups", those which raised limits before or early in 1996, those which increased speed limits later in 1996, and those that did not raise limits during 1996. As of August 15, 1997, 3 additional states (Louisiana, Minnesota, North Dakota) had raised speed limits during 1997 and another state (Wisconsin) passed legislation authorizing the Commissioner to increase limits on selected roads. This brings the total number of states with increased speed limits to 35 as of August 15, 1997. Appendix A presents a detailed listing of the status of state speed limit legislation by affected roadways, date of law passage, and previous limit(s).

Exhibit 1
Timing of States' Speed Limit Changes in 1996

Timing of Speed Limit Change	No. Of States	States Included
Raised Limit in Late 1995 or Early in 1st Quarter of 1996	11	Arizona, California, Delaware, Illinois, Massachusetts, Montana, Nevada, Oklahoma, Pennsylvania, Texas, Wyoming
Raised Limit Later in 1996	21	Alabama, Arkansas, Colorado, Florida, Georgia, Idaho, Iowa, Kansas, Maryland, Michigan, Mississippi, Missouri, Nebraska, New Mexico, North Carolina, Ohio, Rhode Island, South Dakota, Tennessee, Utah, Washington
Maintained Previous Limit, i.e., No Changes in 1996	19	Alaska, Connecticut, DC, Hawaii, Indiana, Kentucky, Louisiana, Maine, Minnesota, New Hampshire, New Jersey, New York, North Dakota, Oregon, South Carolina, Vermont, Virginia, West Virginia, Wisconsin

Exhibit 2 is a map of the U.S. showing states in the above 3 groups. The lightest shaded states raised speed limits in late 1995 or early in first quarter of 1996. The darkest shaded states maintained the previous limit through 1996.

Exhibit 2
State Status of Speed Limit Changes



Early Change

Later Change

No Change

SECTION II -- ASSESSING THE IMPACT OF INCREASED SPEED LIMITS ON TRAFFIC CRASHES

The National Picture

In 1996, 37,351 fatal crashes occurred on the nation's roadways, accounting for 41,907 fatalities. An additional 3,511,000 persons were injured.[6] The following exhibit presents these national crash statistics in comparison to similar crash statistics for 1995.

Exhibit 3
Changes in U. S. Traffic Fatalities and Persons Injured
1996 vs. 1995

	1995	1996	% Change
Fatalities	41,817	41,907	--[1]
Fatal Crashes	37,241	37,351	--[1]
Injuries	3,386,000	3,511,000	+4%
Injury Crashes	2,167,000	2,256,000	+4%

1/ The percentage change is less than 0.5 percent.

Total fatalities and fatal crashes experienced essentially no change in 1996 compared to 1995, while the number of injured persons and injury crashes are estimated to have increased by 4 percent. Contrasting the changes in the distribution of fatalities, injuries, and fatal and injury crashes on Interstate and non-Interstate roadways shows a different picture, and may point to the possible impact of increased speed limits on the nation's highways. The following exhibits present data from FARS on fatalities and fatal crashes and from GES on persons injured and injury crashes on rural and urban Interstates and non-Interstates in 1996 compared to 1995.

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[6] Fatality and fatal crash data are from NHTSA's *Fatality Analysis Reporting System (FARS)*. FARS contains data on a census of fatal traffic crashes within the 50 states, the District of Columbia, and Puerto Rico (although Puerto Rico is not included in national totals). A crash must involve a motor vehicle traveling on a public roadway and must result in the death of an occupant of a vehicle or a nonmotorist within 30 days of the crash to be included in FARS. Injury data are from NHTSA's *General Estimates System (GES)*. GES data are obtained from a nationally representative probability sample selected from all police-reported crashes.

Exhibit 4
Changes in Fatalities and Fatal Crashes
on U. S. Interstates and Non-Interstates
1995 vs. 1996

Roadway Type	Fatalities		% Change	Fatal Crashes		% Change
	1995	1996		1995	1996	
Rural Interstates	2,658	2,920	+10%	2,210	2,438	+10%
Urban Interstates	2,177	2,311	+ 6%	1,919	2,045	+ 7%
All Interstates	4,835	5,231	+ 8%	4,129	4,483	+ 9%
Non-Interstates	36,699	36,174	- 1%	32,850	32,402	- 1%
Total	41,817	41,907	--[1]	37,241	37,351	--[1]

1/ The percentage change is less than 0.5 percent.

Exhibit 5
Changes in Persons Injured and Injury Crashes
on U. S. Interstates and Non-Interstates
1995 vs. 1996

Roadway Type	Persons Injured		% Change	Injury Crashes		% Change
	1995	1996		1995	1996	
All Interstates	200,000	230,000	+15%	126,000	143,000	+13%
Non-Interstates	3,186,000	3,281,000	+ 3%	2,041,000	2,113,000	+ 4%

Exhibit 6 summarizes the percentage changes nationally for Interstate vs. non-Interstate roadways.[7]

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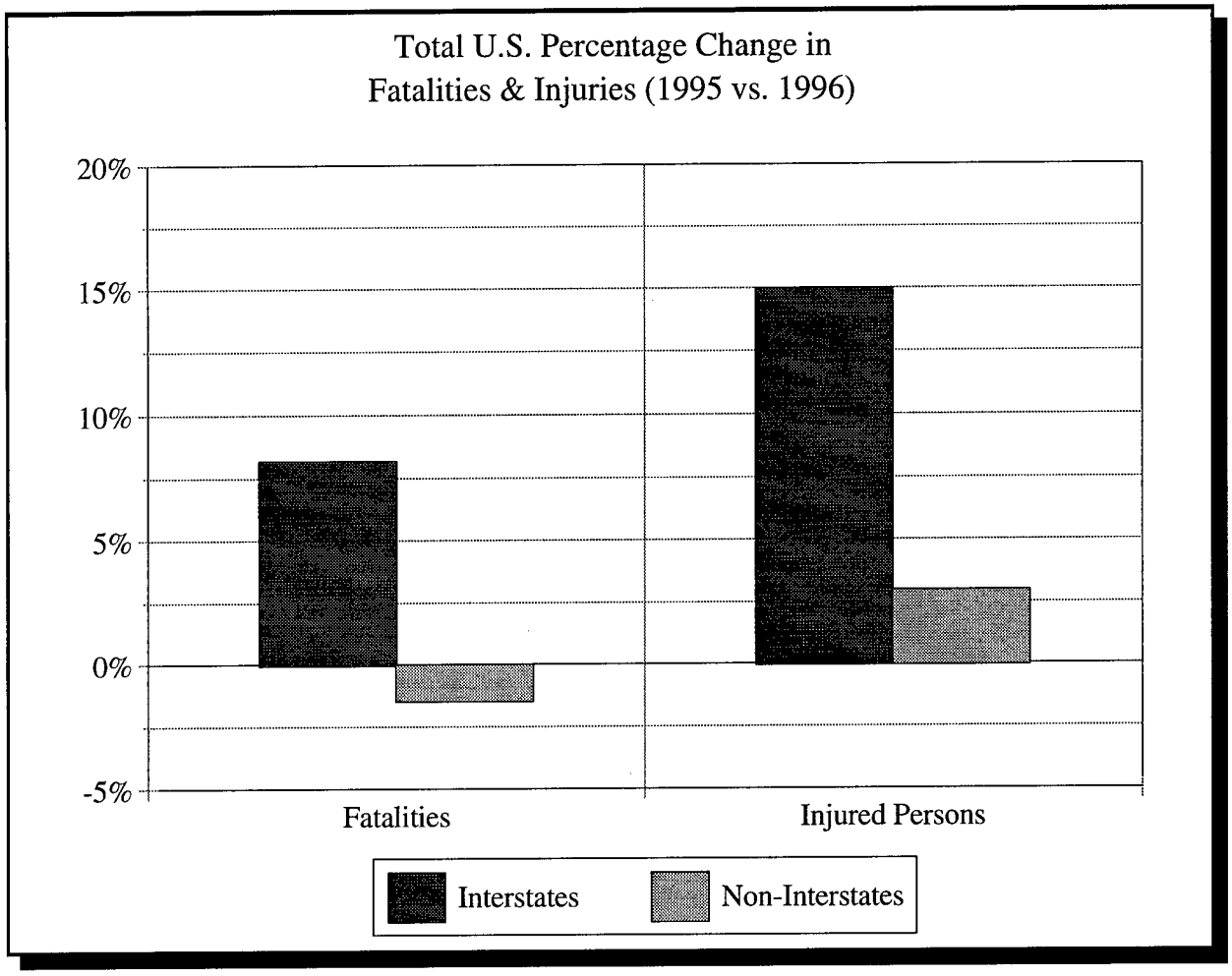
[7] As GES data are obtained from a nationally representative probability sample of all police-reported crashes, the GES statistics are estimates of persons injured and injury crashes and are subject to sampling and nonsampling errors. For more information, see *National Accident Sampling System GES Technical Note*, DOT HS 807-796.

Exhibit 6



As can be seen from the previous exhibits, while there has been about a 1 percent decrease in fatalities and fatal crashes on non-Interstate highways from 1995 to 1996, there has been an increase of approximately 10 percent in fatalities and fatal crashes on the nation's rural Interstates. Fatalities and fatal crashes on urban Interstates increased 6 percent and 7 percent, respectively. The number of injured persons increased 15 percent on Interstates in 1996, while increasing only 3 percent on all other roads. A similar pattern occurred for injury crashes.

The size of the increase in fatalities and fatal crashes on rural Interstates in 1996 is of particular interest, as these highways were set at 65 MPH in many states prior to the passage of the NHS Act. Following action in 38 states to raise speed limits on rural Interstates to 65 MPH in 1987 and adoption of the 65 MPH limit on rural Interstates by two additional states in 1988, NHTSA's evaluation[8] of the effects of the 65 MPH speed limit on rural Interstate traffic fatalities

[8] Effects of the 65 MPH Speed Limit through 1990: A URS Report to Congres Department of Transportation, NHTSA, Washington, DC, May 1992.

estimated the 1990 fatality toll on rural Interstates in the 38 states with 65 MPH limits to be 30 percent greater than might have been expected, i.e., an increase of about 500 fatalities. While the loss of 500 lives is extremely significant, such an increase in fatalities on rural Interstates would represent little more than a 1 percent increase in total fatalities. In 1996, the increase of almost 300 fatalities on rural Interstates represents a 10 percent increase in fatalities occurring on these roads compared to 1995. This translates into an increase of about 1 percent in total fatalities, compared to 1995. These increases are consistent with the estimated impact of the 65 MPH reported in NHTSA's 1992 report.[9]

In 1996, with more roadway miles posted at 65 MPH and above, the proportion of fatalities occurring on higher speed roads increased. The following exhibit presents data for fatalities and fatal crashes by posted speed limit in 1995 and 1996.

Exhibit 7
Changes in Fatalities and Fatal Crashes
by Posted Speed Limit
1995 vs. 1996

Posted Speed Limit	Fatalities		Fatal Crashes	
	1995	1996	1995	1996
Less than 55 MPH	18,798	18,360	17,369	16,963
55-60 MPH	19,403	16,669	16,769	14,522
65 MPH and Above*	2,839	5,768	2,371	4,838
No Speed Limit	75	175	70	153
Unknown	702	935	662	875
Total	41,817	41,907	37,241	37,351

** Note No roads were posted at speed limits above 65 MPH prior to December 1995.*

In 1995, fatalities and fatal crashes occurring on roads with speed limits of 65 MPH and greater represented approximately 7 percent of total fatalities, while in 1996, almost 14 percent of total fatalities and total fatal crashes occurred on roads posted at 65 MPH and above. Most of the shift in fatalities occurring on roads with higher speed limits appears to have come from roads previously posted at 55 MPH and now posted at 65 MPH, i.e., fatalities on roads posted 55-60 MPH declined 14 percent in 1996 compared to 1995 (16,669 vs. 19,403).

[9] *Ibid.*

The following exhibit presents data on injured persons and injury crashes by posted speed limits for 1995 and 1996.[10] In 1996, similar to the shift in total traffic fatalities occurring on roadways with higher posted speed limits, a greater number of injured persons and injury crashes occurred on roads posted at 65 MPH and above.

Exhibit 8
Changes in Injured Persons and Injury Crashes
by Posted Speed Limit
1995 vs. 1996

Posted Speed Limit	Injured Persons		% Change	Injury Crashes		% Change
	1995	1996		1995	1996	
Less than 55 MPH	2,635,000	2,722,000	+ 3%	1,697,000	1,768,000	+ 4%
55-60 MPH	699,000	649,000	- 7%	436,000	401,000	- 8%
65 MPH and Above*	51,000	138,000	+171%	32,000	85,000	+166%
No Limit	2,000	2,800	+40%	1,000	2,000	+50%

** Note No roads were posted at speed limits above 65 MPH prior to December 1995.*

Fatalities and persons injured in traffic crashes occurring on roads with higher speed limits have been commanding an increasing share of the total traffic crash toll for some time. A large part of this increase in 1996 is a direct result of increasing speed limits, resulting in a greater amount of exposure occurring at higher travel speeds. In 1990, 52.6 percent of all fatalities occurred on roads posted 55 MPH and greater, while the percentage of fatalities occurring on these roads increased to over 56 percent in 1996. At this time, the extent to which overall increases in the amount of travel affected these counts is not known. For example, if drivers prefer traveling at higher speed limits, alternate routes might be used, leading to greater than expected increases in motor vehicle travel on higher speed limit roads and less than expected changes on roads that maintained their previous limits.

Unfortunately, vehicle miles traveled (VMT) estimates are not tabulated according to posted speed limit (which would be an incredibly difficult, if not impossible task). To complicate matters, detailed information on exactly when and which roadway segments experienced increases in their posted speed limits is not now available. This makes it impossible at this time to identify a suitable "baseline" of roadways that experienced increased posted speed limits against which to

[10] Two statistical procedures, univariate and hot-deck imputation, are used in GES to complete values for unknown data. For more information, see *Imputation in the General Estimates System*, DOT HS 807-985.

compare the 1996 fatality outcome. Due to these difficulties, and the absence of travel data for such road segments, it is likely that analyses by posted speed limit (instead of roadway type) will never be capable of separating changes in exposure from changes in risk, and will require a relatively large analytical investment to correctly tabulate the baseline fatality experience so that a meaningful analysis can be conducted.

Therefore, the detailed analyses presented at the end of this section focus on contrasting the experience of Interstate highways with non-Interstate roadways, a well-defined categorization. VMT data for this categorization will be available later this year, to address the possible effects of changes in travel in subsequent analyses.

1995 vs. 1996 State Comparison

While the national fatality toll for 1996 changed very little compared to 1995 (refer to Exhibit 2), the change in the fatality toll for individual states ranged from as much as an increase of 18 percent (Texas) to a decrease of 17 percent (Vermont). Exhibit 9 contains data for fatalities by state for 1995 and 1996, with the percentage change.

Exhibit 9
Fatalities by State - 1995 vs. 1996

	Fatalities		1996 vs. 1995	
State	1995	1996	Chg	% Chg
Alabama	1114	1143	29	3%
Alaska	87	80	-7	-8%
Arizona	1035	993	-42	-4%
Arkansas	631	615	-16	-3%
California	4192	3989	-203	-5%
Colorado	645	617	-28	-4%
Connecticut	317	310	-7	-2%
Delaware	121	116	-5	-4%
District of Columbia	58	62	4	7%
Florida	2805	2753	-52	-2%
Georgia	1488	1574	86	6%
Hawaii	130	148	18	14%
Idaho	262	258	-4	-2%
Illinois	1586	1477	-109	-7%
Indiana	960	984	24	3%
Iowa	527	465	-62	-12%
Kansas	442	491	49	11%
Kentucky	849	841	-8	-1%
Louisiana	894	781	-113	-13%
Maine	187	169	-18	-10%
Maryland	671	608	-63	-9%
Massachusetts	444	417	-27	-6%
Michigan	1530	1505	-25	-2%
Minnesota	597	576	-21	-4%
Mississippi	868	811	-57	-7%
Missouri	1109	1149	40	4%
Montana	215	200	-15	-7%
Nebraska	254	293	39	15%
Nevada	313	348	35	11%
New Hampshire	118	134	16	14%
New Jersey	774	818	44	6%
New Mexico	485	481	-4	-1%
New York	1679	1564	-115	-7%
North Carolina	1448	1493	45	3%
North Dakota	74	85	11	15%

Exhibit 9 - Continued
Fatalities by State - 1995 vs. 1996

State	Fatalities 1995	Fatalities 1996	1996 vs. 1995 Chg	1996 vs. 1995 % Chg
Ohio	1360	1395	35	3%
Oklahoma	669	772	103	15%
Oregon	574	524	-50	-9%
Pennsylvania	1480	1469	-11	-1%
Rhode Island	69	69	0	0%
South Carolina	881	930	49	6%
South Dakota	158	175	17	11%
Tennessee	1259	1239	-20	-2%
Texas	3183	3741	558	18%
Utah	325	321	-4	-1%
Vermont	106	88	-18	-17%
Virginia	900	875	-25	-3%
Washington	653	712	59	9%
West Virginia	376	345	-31	-8%
Wisconsin	745	761	16	2%
Wyoming	170	143	-27	-16%

The first group of 11 states that increased speed limits and the characteristics of the increased limits are presented in Exhibit 10. In 1995, these states accounted for approximately 32 percent of the total national fatality toll, while representing 35 percent of the population, 34 percent of all licensed drivers and 33 percent of all vehicle miles traveled in 1995.[11]

Exhibit 11 presents the characteristics of the increased speed limits for the 21 states that raised limits later in 1996.

[11] *Traffic Safety Facts 1995: State Traffic Data Fact Sheet*, National Center for Statistics and Analysis, NHTSA, U. S. Department of Transportation.

Exhibit 10
States Which Raised Speed Limits Prior to or in 1st Quarter 1996

State	Speed Limit Change	Effective Date
Arizona	To 75 MPH on Rural Interstates	December 8, 1995
California	To 65 MPH on Freeways/Expressways; Later to 70 MPH for Rural Freeways	Increased to 65 MPH on December 10, 1995; Increased to 70 MPH on January 7, 1996
Delaware	To 65 MPH on Interstate 495 and one portion of US 1	January 26, 1996
Illinois	To 65 MPH for some Urban Interstates	November 29, 1995
Massachusetts	To 65 MPH on 13 Major Interstates & Highways	January 29, 1996
Montana	Unlimited during Day; To 65 MPH at Night	December 8, 1995
Nevada	To 75 MPH on Interstates; To 70 MPH on Other Primary	December 8, 1995
Oklahoma	To 70 MPH on Interstates & 4 Lanes; To 65 MPH all Other State Roads	December 1995
Pennsylvania	On Turnpike Roads to 75 MPH; Selected Roads to 65 MPH	December 1995
Texas	To 70 MPH on all Roads for Passenger Cars (65 MPH at Night); To 60 MPH on all Roads for Trucks (55 MPH at Night)	December 8, 1995
Wyoming	To 75 MPH Rural Interstate/To 70 MPH Urban Interstate/To 65 MPH on 4 & 2 Lane Roadways	January 24, 1996

In NHTSA's last report to Congress on the effects of the 65 MPH speed limit, the focus of the analysis was on rural Interstates in the 38 states that increased limits to 65 MPH.[12] For most states opting to increase speed limits following passage of the NHS Act, limits were typically set higher for rural Interstates than for other roads in the state, including urban Interstates. Exhibit 12 shows the revised maximum posted speed limits for rural and urban Interstates for the 11 states which raised speed limits immediately following passage of the NHS Act or early in the first quarter of 1996.

Exhibit 11

[12] See Footnote 4.

States Which Raised Speed Limits After Early 1st Quarter 1996

State	Speed Limit Change	Effective Date
Alabama	To 70 MPH on Interstates; To 65 MPH on other 4 Lanes; To 55 MPH on other Primary	May 9, 1996
Arkansas	To 70 MPH on Rural 4 Lane divided highways	July 17, 1996
Colorado	To 75 MPH on Highway; To 65 MPH for 4 Lanes;	May 28, 1996
Florida	To 70 MPH for some Interstate segments; To 65 MPH for some other 4 Lane segments	April 8, 1996 for Interstates; November 1996 for other 4 Lanes
Georgia	To 70 MPH on Interstates and look-alikes; To 65 MPH On Urban Interstates and some other divided	July 1, 1996
Idaho	To 75 MPH on Interstates; To 65 MPH on other primary	May 1, 1996
Iowa	To 65 MPH on selected 4 lane divided	May 16, 1996
Kansas	To 70 MPH on Interstates; To 65 MPH on other primary	March 22, 1996
Maryland	To 60 or 65 MPH on selected Urban Interstates	July 18, 1996
Michigan	To 70 MPH on Interstates	August 1996 study began; became permanent December 18, 1996
Mississippi	To 70 MPH on Interstates	March 12, 1996
Missouri	To 70 MPH on Interstates, and on any road with safety study	March 13, 1996
Nebraska	To 75 MPH on Interstates; To 60 MPH on 2 Lanes; To 65 MPH on 4 Lanes	April 15, 1996 signed, June 1, 1996 effective for Interstates; September 1, 1996 for other roads
New Mexico	To 75 MPH on Interstates; To 70 MPH on 4 Lanes with shoulders; To 65 MPH on 2 Lanes with shoulders; To 60 MPH on 2 Lanes without shoulders	May 13, 1996
North Carolina	To 70 MPH on Interstates and some controlled-access non-Interstate	August 1996 for Interstates; October 1, 1996 for non-Interstates
Ohio	To 65 MPH on Interstates; To 65 MPH on other roads after 360 days with review	February 29, 1996 effective; May 29, 1996 Implemented
Rhode Island	To 65 MPH on some Interstates	May 12, 1996
South Dakota	To 75 MPH on Interstates; To 65 MPH on major 2 Lanes	April 1, 1996 effective
Tennessee	To 65 MPH on some Urban Interstates; To 65 MPH on some 4 Lanes	April 22, 1996 for Urban Interstates; July 1, 1996 for 4 Lanes
Utah	To 75 MPH on Interstates	March 13, 1996
Washington	To 70 MPH on Interstates	March 11, 1996

Exhibit 12
Revised Maximum Speed Limits on Rural and Urban Interstates for States Which Raised Speed Limits in 1995 or Early in 1st Quarter 1996

State	Rural Interstate Speed Limit	Urban Interstate Speed Limit
Arizona	75 MPH	Remained at 55 MPH
California	70 MPH	65 MPH
Delaware	Remained at 65 MPH	65 MPH
Illinois	Remained at 65 MPH	65 MPH
Massachusetts	Remained at 65 MPH	65 MPH
Montana	Unlimited for Passenger Cars (Day)	65 MPH
Nevada	75 MPH	70 MPH
Oklahoma	70 MPH	60 MPH
Pennsylvania	Remained at 65 MPH	65 MPH
Texas	70 MPH for Passenger Cars (Day)	70 MPH for Passenger Cars (Day)
Wyoming	75 MPH	60 MPH

Total Interstate fatalities in FARS for 1996 for the 11 states, the group of 21 states that raised limits later in 1996 and the 19 states that made no change in limits during 1996 are compared to fatalities on total Interstates in 1995 and presented in the following exhibit.

Exhibit 13
Changes in Total Interstate Fatalities by Timing of States' Speed Limit Changes

Timing of States' Speed Limit Change	1995 Fatalities	1996 Fatalities	% Change
In 1995 or Early in 1996	1,874	2,038	+ 9%
Later in 1996	1,954	2,188	+12%
No Change in 1996	1,007	1,005	No Change

From Exhibit 13, total Interstate fatalities increased 9 percent for the 11 states as a group that increased speed limits early in 1996 (an actual increase of 164 fatalities) and increased 12 percent (an actual increase of 234 fatalities) for the 21 states that increased speed limits later in 1996. Total Interstate fatalities essentially did not change (an actual decrease of 2 fatalities) for the group of states that did not increase speed limits in 1996. As shown in Exhibit 14, fatalities on rural Interstates increased 5 percent for the 11 states that increased speed limits early in 1996 (an actual increase of 45 fatalities) and increased 20 percent (+218 fatalities) for the remaining 21 states that increased limits later in 1996. Fatalities on rural Interstates for states that did not increase speed limits in 1996 essentially did not change (-1 fatality) in 1996 compared to 1995. Exhibit 14 also presents similar data from 1996 FARS for changes in urban Interstate fatalities. For the 11 states whose limits changed early in 1996, fatalities on urban Interstates increased the greatest of the 3 groups of states, i.e., by 13 percent (+119 fatalities) in 1996 compared to 1995. The 21 states that raised limits later in 1996 experienced a 2 percent increase in fatalities (+16 fatalities) on urban Interstates, while those states that did not raise limits in 1996 had no change in fatalities (-1 fatality) on urban Interstates. Fatalities on non-Interstate roads decreased for all 3 groups of states in 1996. These data are shown in Exhibit 15.

Exhibit 14
Changes in Rural and Urban Interstate Fatalities by Timing of States' Speed Limit Changes

Timing of States' Speed Limit Change	1995 Fatalities	1996 Fatalities	% Change
Rural Interstates			
In 1995 or Early in 1996	956	1,001	+ 5%
Later in 1996	1,114	1,332	+20%
No Change in 1996	588	587	No Change
Urban Interstates			
In 1995 or Early in 1996	918	1,037	+13%
Later in 1996	840	856	+ 2%
No Change in 1996	419	418	No Change

Exhibit 15
Changes in Non-Interstate Fatalities by Timing of States' Speed Limit Changes

Timing of States' Speed Limit Change	1995 Fatalities	1996 Fatalities	% Change
In 1995 or Early in 1996	11,506	11,605	- 1%
Later in 1996	16,091	15,663	- 3%
No Change in 1996	9,102	8, 906	- 2%

While there were no apparent patterns of association between the states with increased limits in 1996 and changes in *total* fatalities (from Exhibit 9), there does appear to be an impact on fatalities occurring on Interstates associated with the higher speed limits. For both groups of states (32 states) that increased limits during 1996, fatalities on Interstates increased in 1996 compared to 1995, while Interstate fatalities essentially did not change for states that did not

increase speed limits in 1996. A pattern of association between the states with increased speed limits in 1996 and increases in total Interstate fatalities can also be seen in the following exhibit. Exhibit 16 presents changes in total Interstate fatalities for 1996 compared to 1995 for each of the states in the three groups, i.e., early change, later change, and no change in 1996. Exhibit 16 also presents changes in the proportion of Interstate fatalities, relative to total fatalities, for 1996 compared to 1995, for each state in the three groups. Increases from 1995 to 1996 are shown in bold in Exhibit 16.

Exhibit 16
Interstate/Non-Interstate Fatalities by State
by Timing of States' Speed Limit Changes-1995 vs. 1996

	Interstate			Non-Interstate			% of Fatalities on Interstate		
Early Change	**1995**	**1996**	**% Change**	**1995**	**1996**	**% Change**	**1995**	**1996**	**% Change**
Arizona	168	168	0.0%	846	808	-4.5%	16.6%	17.2%	**3.9%**
California	548	572	**4.4%**	3,644	3,417	-6.2%	13.1%	14.3%	**9.7%**
Delaware	10	13	**30.0%**	111	103	-7.2%	8.3%	11.2%	**35.6%**
Illinois	181	198	**9.4%**	1,405	1,279	-9.0%	11.4%	13.4%	**17.5%**
Massachusetts	51	68	**33.3%**	393	349	-11.2%	11.5%	16.3%	**42.0%**
Montana	39	46	**17.9%**	176	154	-12.5%	18.1%	23.0%	**26.8%**
Nevada	67	79	**17.9%**	246	269	9.4%	21.4%	22.7%	**6.1%**
Oklahoma	88	118	**34.1%**	581	654	12.6%	13.2%	15.3%	**16.2%**
Pennsylvania	129	120	-7.0%	1,351	1,349	-0.1%	8.7%	8.2%	-6.3%
Texas	539	619	**14.8%**	2,639	3,122	18.3%	17.0%	16.5%	-2.4%
Wyoming	54	37	-31.5%	114	101	-11.4%	32.1%	26.8%	-16.6%
Total	1,874	2,038	**8.8%**	11,506	11,605	0.9%	14.0%	14.9%	**6.7%**

	Interstate			Non-Interstate			% of Fatalities on Interstate		
Late Change	**1995**	**1996**	**% Change**	**1995**	**1996**	**% Change**	**1995**	**1996**	**% Change**
Alabama	98	122	**24.5%**	1,006	1,020	1.4%	8.9%	10.7%	**20.3%**
Arkansas	46	65	**41.3%**	585	550	-6.0%	7.3%	10.6%	**45.0%**
Colorado	136	110	-19.1%	509	507	-0.4%	21.1%	17.8%	-15.4%
Florida	257	278	**8.2%**	2,546	2,231	-12.4%	9.2%	11.1%	**20.8%**
Georgia	165	218	**32.1%**	1,319	1,341	1.7%	11.1%	14.0%	**25.8%**
Idaho	39	32	-17.9%	219	226	3.2%	15.1%	12.4%	-17.9%
Iowa	29	41	**41.4%**	495	424	-14.3%	5.5%	8.8%	**59.3%**
Kansas	45	39	-13.3%	397	452	13.9%	10.2%	7.9%	-22.0%
Maryland	55	54	-1.8%	596	513	-13.9%	8.4%	9.5%	**12.7%**
Michigan	140	129	-7.9%	1,383	1,370	-0.9%	9.2%	8.6%	-6.4%
Mississippi	85	100	**17.6%**	782	710	-9.2%	9.8%	12.3%	**25.9%**
Missouri	138	208	**50.7%**	969	939	-3.1%	12.5%	18.1%	**45.5%**
Nebraska	24	39	**62.5%**	230	254	10.4%	9.4%	13.3%	**40.9%**
New Mexico	117	121	**3.4%**	368	360	-2.2%	24.1%	25.2%	**4.3%**
North Carolina	112	118	**5.4%**	1,336	1,375	2.9%	7.7%	7.9%	**2.2%**
Ohio	127	129	**1.6%**	1,232	1,261	2.4%	9.3%	9.3%	-0.7%
Rhode Island	11	13	**18.2%**	58	56	-3.4%	15.9%	18.8%	**18.2%**
South Dakota	18	22	**22.2%**	140	153	9.3%	11.4%	12.6%	**10.3%**
Tennessee	149	155	**4.0%**	1,110	1,084	-2.3%	11.8%	12.5%	**5.7%**
Utah	96	105	**9.4%**	225	216	-4.0%	29.9%	32.7%	**9.4%**
Washington	67	90	**34.3%**	586	621	6.0%	10.3%	12.7%	**23.4%**
Total	1954	2188	**12.0%**	16091	15663	-2.7%	10.8%	12.3%	**13.2%**

Exhibit 16- Continued
Interstate/Non-Interstate Fatalities by State
by Timing of States' Speed Limit Changes-1995 vs. 1996

	Interstate			Non-Interstate			% of Fatalities on Interstate		
No Change	**1995**	**1996**	**% Change**	**1995**	**1996**	**% Change**	**1995**	**1996**	**% Change**
Alaska	31	22	-29.0%	54	55	1.9%	36.5%	28.6%	-21.7%
Connecticut	45	43	-4.4%	272	267	-1.8%	14.2%	13.9%	-2.3%
Dist of Columbia	5	1	-80.0%	53	61	15.1%	8.6%	1.6%	-81.3%
Hawaii	8	6	-25.0%	122	142	16.4%	6.2%	4.1%	-34.1%
Indiana	106	92	-13.2%	696	781	12.2%	13.2%	10.5%	-20.3%
Kentucky	88	91	**3.4%**	761	750	-1.4%	10.4%	10.8%	**4.4%**
Louisiana	93	88	-5.4%	801	687	-14.2%	10.4%	11.4%	**9.2%**
Maine	14	12	-14.3%	162	154	-4.9%	8.0%	7.2%	-9.1%
Minnesota	37	41	**10.8%**	560	535	-4.5%	6.2%	7.1%	**14.9%**
New Hampshire	20	16	-20.0%	91	114	25.3%	18.0%	12.3%	-31.7%
New Jersey	59	85	**44.1%**	712	730	2.5%	7.7%	10.4%	**36.3%**
New York	124	112	-9.7%	1,549	1,435	-7.4%	7.4%	7.2%	-2.3%
North Dakota	4	2	-50.0%	70	83	18.6%	5.4%	2.4%	-56.5%
Oregon	61	51	-16.4%	512	472	-7.8%	10.6%	9.8%	-8.4%
South Carolina	78	103	**32.1%**	803	825	2.7%	8.9%	11.1%	**25.4%**
Vermont	17	10	-41.2%	89	78	-12.4%	16.0%	11.4%	-29.1%
Virginia	132	120	-9.1%	767	749	-2.3%	14.7%	13.8%	-6.0%
West Virginia	56	69	**23.2%**	320	275	-14.1%	14.9%	20.1%	**34.7%**
Wisconsin	29	41	**41.4%**	708	713	0.7%	3.9%	5.4%	**38.2%**
Total	1,007	1,005	-0.2%	9,102	8,906	-2.2%	10.0%	10.1%	**1.8%**

As seen in Exhibit 16, Interstate fatalities increased for eight of the 11 states (about 73 percent of the states) in the early change group and increased for seventeen of the 21 states (about 80 percent of the states) in the later change group, while increased for only six of the 19 states whose limits did not change in 1996 (about 31 percent of the states). The difference between the proportion of states in the early change group with increases in Interstate fatalities, 73%, is statistically significant when compared to the proportion of states in the no change group, 31%, with increases in Interstate fatalities ($\chi^2 = 4.739$, 1 d.f., $p = 0.029$). Similarly, the difference between the proportion of states in the later change group, 80 percent, compared to the no change group, was also statistically significant ($\chi^2 = 9.950$, 1 d.f., $p = 0.002$).[13] In other words, both Interstate and non-Interstate fatalities for the no change states either remained steady or slightly declined in 1996 compared to 1995, while fatalities on Interstates increased for the majority of the early and later change states.

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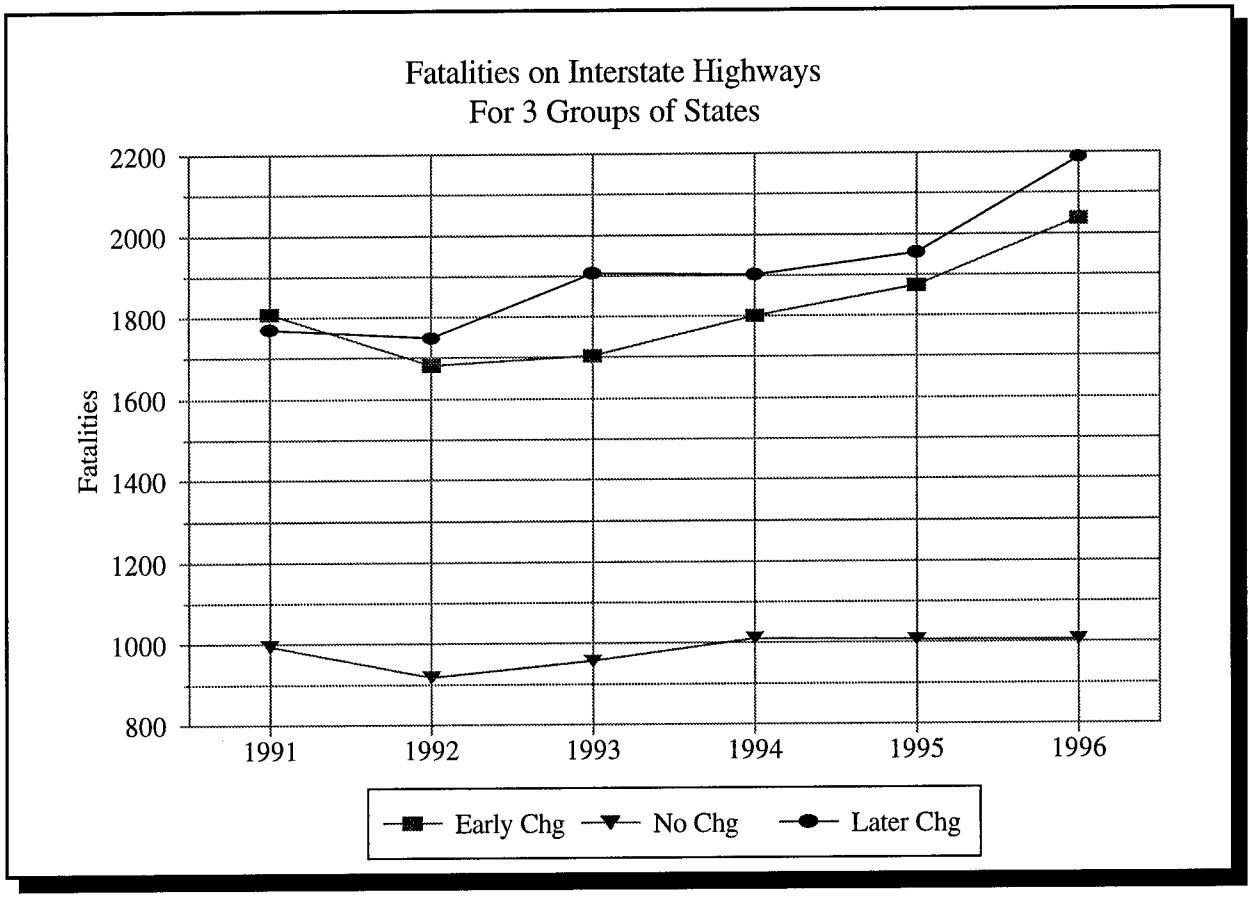
[13] See Fleiss, Joseph L. *Statistical Methods for Rates and Proportions*, Second Edition, John Wiley & Sons, Inc., 1981, for a discussion of tests for statistical significance for differences in proportions.

Statistical Modeling

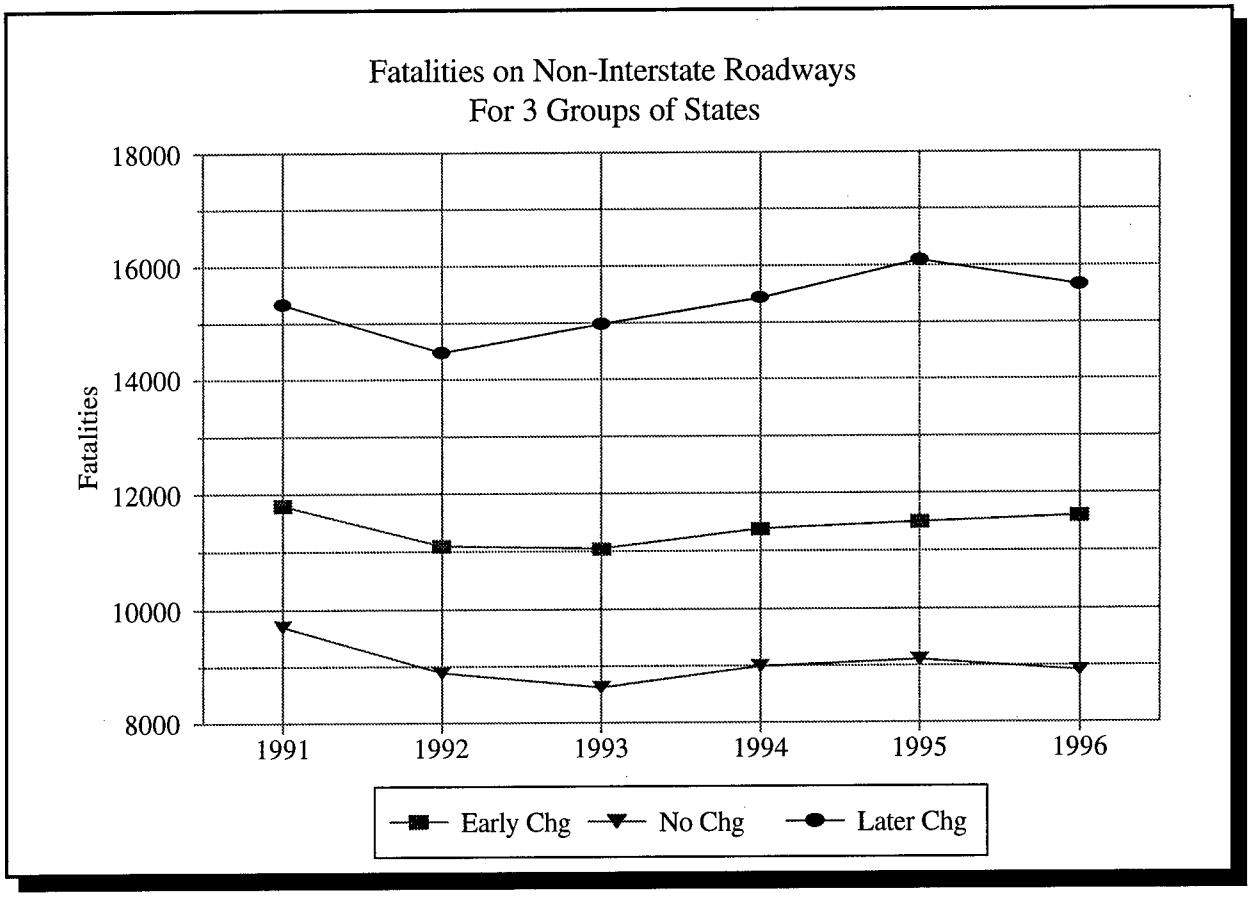
The previous discussion demonstrated increases in fatalities during 1996 compared to 1995 on Interstate highways in those states that increased posted speed limits beyond those permitted under the now defunct NMSL. However, as stated earlier in this report, there has been an increasing trend in the portion of the fatalities that occur on roads posted 55 MPH or greater. Thus, at least some increase in fatalities on the Interstates might be expected from one year to the next. A longer-term picture permits investigation of this trend, as well as additional insight into what happened in 1996. Exhibit 17 presents fatalities on Interstate highways for the 3 groups of states for 1991-1996, while Exhibit 18 is a similar graph for non-Interstate roadways.

Exhibit 17



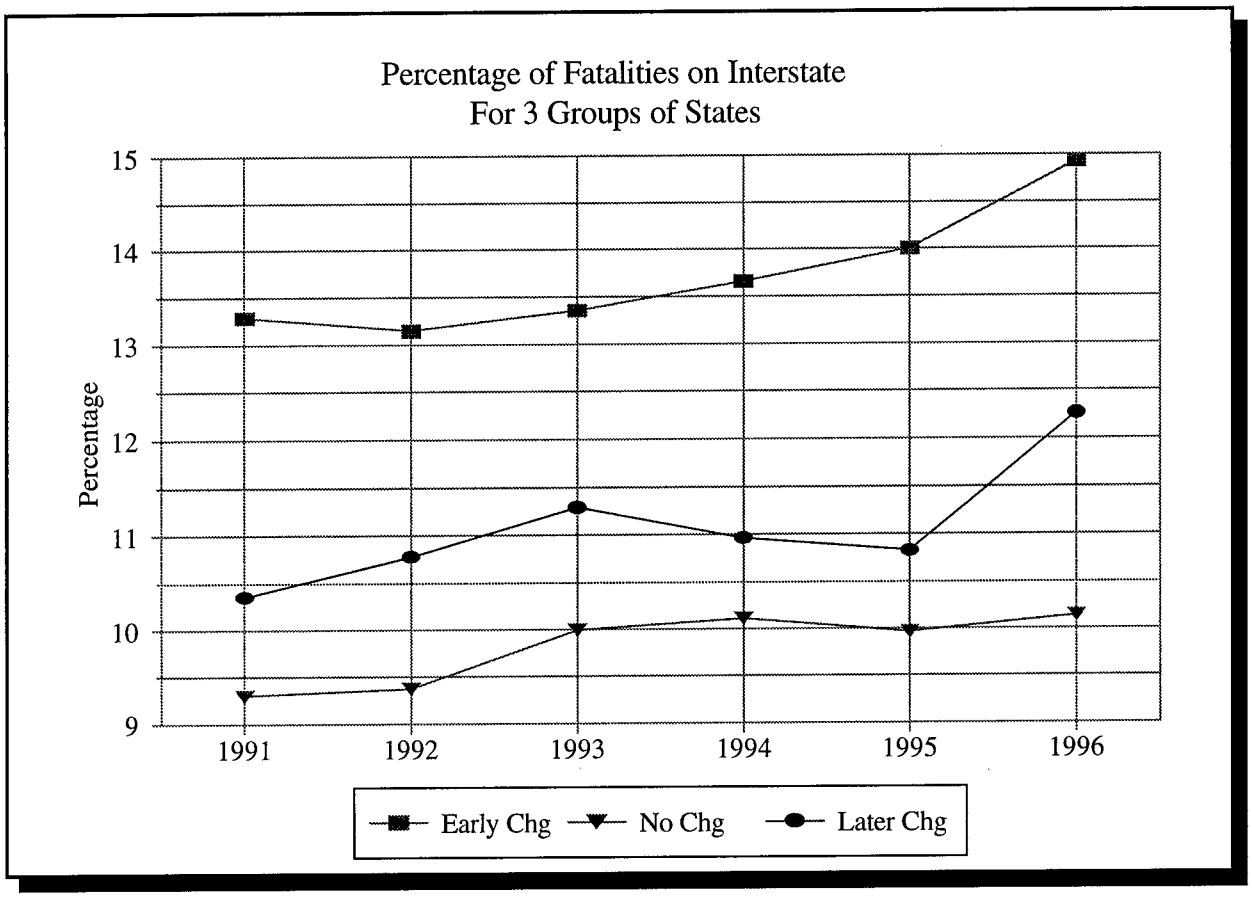
A quick review of this graph shows that fatalities on Interstate highways have been generally increasing over time for the two groups of states that changed speed limits, Both the "early change" and "later change" groups of states have experienced steady growth in Interstate fatalities since 1992, while the "no change" group of states experienced an almost steady 1,000 fatalities per year from 1991-1996.

Exhibit 18



An interesting aspect of this exhibit is the fairly parallel experience of the "early change" and "no change" groups of states during the 1991-1995 time frame, with declining fatalities during 1991-1993, and slight increases during 1993-1995. The two groups diverge in 1996, with the "early change" group continuing its upward trend while the "no change" states exhibited a decline in fatalities. In contrast to this, non-Interstate fatalities in the "later change" group of states grew steadily, and at a faster rate, between 1992-1995, and declined in 1996. A convenient and revealing way of combining the Interstate and non-Interstate patterns is to look at the percentage of total fatalities that occurred on Interstate highways, which appears in Exhibit 19.

Exhibit 19



The percentage of Interstate fatalities in the "early change" states has been increasing steadily since 1992, and experienced a relatively large increase between 1995 and 1996. This same relatively large increase in 1996 occurred in the "later change" states after several years of decline (1993-1995), paralleling the "early change" states. In contrast to this, the percentage of fatalities on Interstate highways in the "no change" states was relatively steady during 1993-1996, and showed a slight increase between 1995-1996.

Also noteworthy is the fact that the "early change" states as a group exhibit the greatest percentage of fatalities on Interstate highways, followed by the "later change" states, with the "no change" states exhibiting the lowest percentage of Interstate fatalities. However, the differences among the 3 groups are not particularly large, ranging from 3-5 percentage points over time.

To analytically investigate the changes in Interstate fatalities for the 3 groups of states, a linear regression[14] model was estimated for each of the 3 groups of states using 6 years of data (that is, 6 data points for each model). These models included 2 "dummy" variables representing the linear trend over time (with values of $x_1 = 1, 2, \ldots, 6$) and the 1996 intervention of increased

[14] See Footnote 1.

posted speed limits (with values of x_2 = 0, 0, 0, 0, 0, 1); i.e., the post-NMSL era. If these simple models of the percentage of fatalities on Interstate highways prove to be reasonably strong predictors of the percentage of Interstate fatalities in 1996, based upon the percentage from the five previous years, then the changes observed in 1996 may be given added perspective, especially if they can be compared to what one would have expected in the absence of speed limit changes (that is, predictions based on the statistical models). The following exhibit summarizes the results of the 3 regression models, one for each of the three groups of states, estimated in this analysis.

Exhibit 20
Linear Regression Modeling Results

	Early Change	Later Change	No Change
Trend	0.195	0.114	0.206
Standard Error	0.055	0.105	0.072
t-Test	3.541	1.081	2.875
Speed Limit Change	0.862	1.072	-0.227
Standard Error	0.252	0.483	0.329
t-Test	3.418	2.217	-0.690
R^2	0.96	0.84	0.78

Note: Statistically significant results appear as bold italics for t-Test results. The critical value for a 2-tailed test at the " = 0.05 level, 3 degrees of freedom is 3.182.

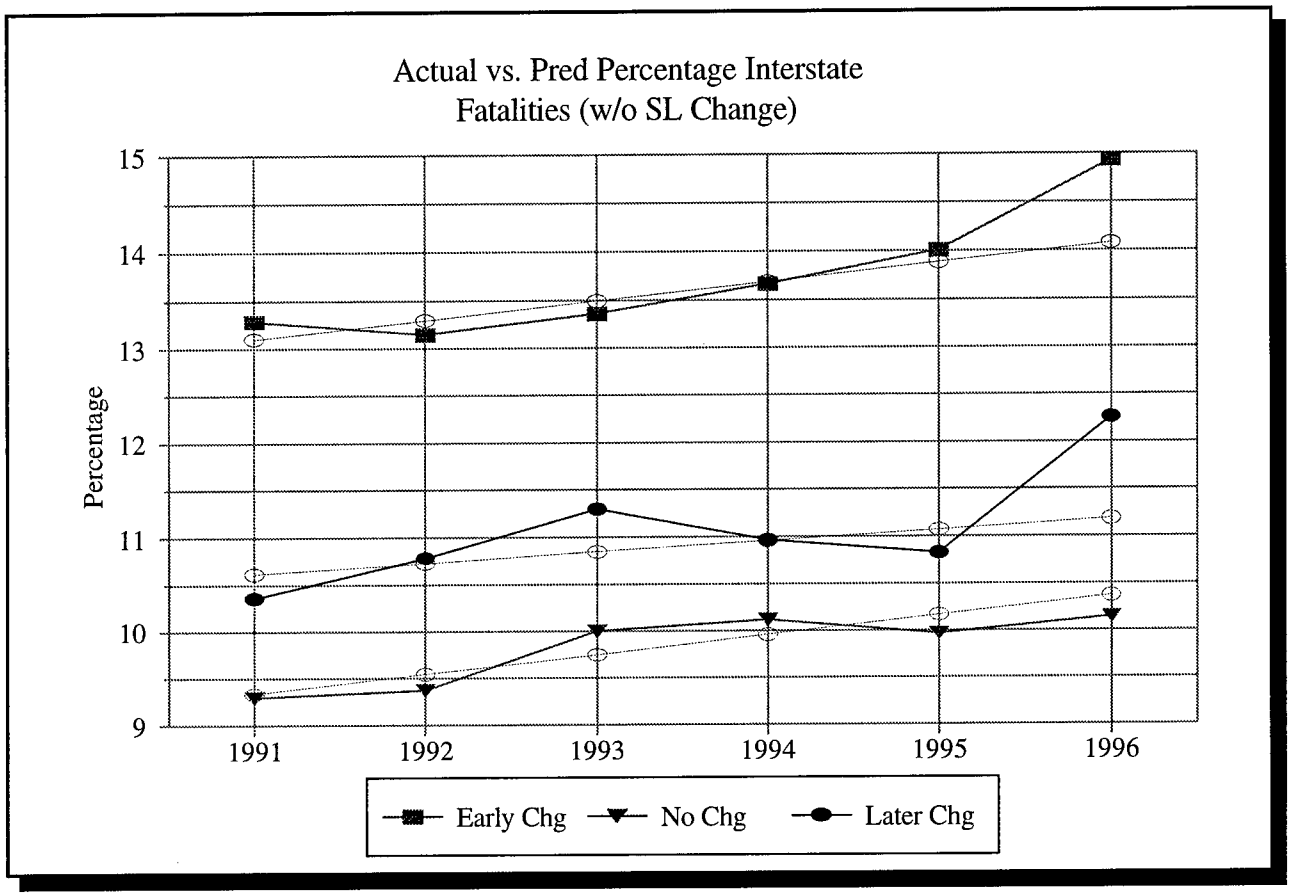
The analysis indicates that the "early change" group of states exhibited a statistically significant upward trend (0.195 percentage points per year) in the percentage of fatalities that occurred on Interstate highways. Even in light of this, the increase in 1996, estimated to be almost 1 percentage point (0.862) greater than expected, was also statistically significant. The statistical model for the "early change" states accounted for 96 percent (R^2 = 0.96) of the variation in the percentage of Interstate fatalities. The "later change" states as a group exhibited a lesser upward trend (not statistically significant) and the increase (1.072) in the percentage of Interstate fatalities, while larger in magnitude than that for the "early change" states, was not found to be statistically significant. The "no change" group of states also exhibited an upward trend that just failed to reach statistical significance, but more importantly, there was essentially no difference in the percentage of Interstate fatalities in 1996 compared with expectations. The results of these analyses were used to estimate the change in the number of Interstate fatalities in 1996 in states that increased their speed limits.

The first step in estimating the difference in fatalities experienced in 1996 involves comparing the actual vs. predicted number of fatalities on Interstate highways. This is in contrast to comparing the 1996 fatality experience to 1995, especially in light of the upward trend in several of the series. The actual percentages for the "early change", "later change", and "no change" groups of states are 15.0 percent, 12.3 percent, and 10.1 percent, respectively. The

predicted percentages are calculated by using the linear regression modeling results, without the variable representing the post-NMSL "effect", presented graphically in Exhibit 21.

Exhibit 21

Exhibit 21 presents the actual percentage of fatalities that occurred on the Interstates, compared with the predicted percentages had there been no change in posted speed limits during



1996 (of course, there was no change in the "no change" states). As can be seen, the predicted percentages for 1996 for the two groups of states that raised speed limits is greater than the actual 1995 percentage, so any calculations comparing actual vs. predicted will not only be more conservative than those based on comparing actual fatalities in 1996 vs. 1995, but also more meaningful.

The basic method of estimation involves answering the question: "If the predicted *percentage* of fatalities on Interstates had actually occurred, how many fatalities would have occurred?" and comparing this number to the actual fatality count. For example, the "early change" states experienced 14.9 percent of total fatalities on Interstates. Thus, if the 11,605 non-Interstate fatalities represented 85.1 percent of total fatalities (100-14.9 percent), then total fatalities were 13,643 (11,605 / 0.851; remembering that while the actual calculations were performed to many decimal places, the estimates presented herein have been rounded). In fact, total fatalities were 13,665, with the difference representing fatalities with unknown roadway types. The ratio of these two numbers provides an inflation factor to account for unknowns (here,

the ratio is 1.002). The appropriate ratios were used to account for unknown fatalities for each of the three groups of states.

Repeating this computation for the *predicted* percentage of fatalities (14.1 percent) and adjusting for fatalities with unknown roadway type yields a predicted 13,528 fatalities. The difference between the actual (13,665) and predicted (13,528) number of fatalities in this group of states yields 137, the number of additional fatalities that occurred compared to what would have been expected had the previously existing trend continued in 1996. Exhibit 22 presents the results of these calculations for the three groups of states.

Exhibit 22
Actual vs. Predicted Fatalities in 1996 and Percentage Change vs. Expectations

	Early Change	Later Change	No Change	Total
Actual Total Fatalities	13,665	18,167	10,075	41,907
Predicted Total Fatalities	13,528	17,948	10,101	41,576
Difference	137	219	- 26	331
"Actual" Interstate Fatalities	2,041	2,226	1,023	5,290
Predicted Interstate Fatalities	1,904	2,007	1,047	4,945
Percentage Difference	7.2%	10.9%	- 2.4%	7.0%
Difference for "Change" States	137	219		356
Predicted Interstate Fatalities	1,904	2,007		3,912
Percentage Difference	7.2%	10.9%		9.1%

Note: Totals may not add due to rounding. "Actual" Interstate Fatalities have been adjusted to account for unknowns.

The group of "early change" states that increased speed limits during 1996 experienced 7.2 percent more fatalities on Interstates than what would have been expected. The 10.9 percent increase for the "later change" states was not a statistically significant change in 1996, based on the statistical model. The 2.4 percent decrease for the "no change" states was not based on a statistically significant change in 1996, nor did any increase in posted speed limits actually occur. Thus, the "no change" group was not included in the estimate of effect associated with *increased* speed limits. These calculations appear in the bottom half of Exhibit 22. It is also worth comparing the percentage differences from the statistical modeling (7.2 percent for the early change group and 10.9 percent for the later change group) to the actual differences from Exhibit 13 (9 percent and 12 percent, respectively). As hypothesized earlier, the statistical models' accounting for the historical upward trend in the percentage of Interstate fatalities has resulted in more conservative and more meaningful estimates of change.

In conclusion, the group of states that increased speed limits in late 1995 and 1996 experienced approximately 350 more fatalities on Interstate highways in 1996, or about 9 percent greater than would have been expected had previous trends continued.

Several issues regarding the above analysis require discussion. The first of these involves the estimated 9 percent increase above expected Interstate fatalities. How should this estimate be interpreted? The current calculations use total Interstate fatalities for the analysis and estimating the change, both in absolute and percentage terms. However, if much less than 100 percent of the Interstate mileage was affected by increased speed limits, then the baseline number of fatalities, used in the denominator for computing the percentage change, would be too large, and the percentage change would be too small. There is ample reason to believe that this is the case, inasmuch as Exhibit 10 indicates, for example, that Arizona increased posted speed limits to 75 MPH on rural Interstates, while Illinois increased posted speed limits to 65 MPH for *some* urban Interstates. In this case, the cited estimates of the percentage change would be the lower bound, or the smallest percentage change, in the absence of an accurate accounting of how many fatalities occurred on roads where speed limits were raised. If, for example, only one-half of the Interstate fatalities occurred on roads where posted speed limits increased, then the 9 percent increase in fatalities would actually be 18 percent, when restricted to only those roads that experienced higher speed limits. At this time, the actual prevalence of increased speed limits in each state is not known. Thus, the interpretation should be that fatalities were ***at least*** 9 percent greater than expected.

The second issue that requires attention relates to where speed limits increased. A review of the states' speed limit changes shows that speed limits were increased on some non-Interstate roadways. For example, Massachusetts increased speed limits to 65 MPH on 13 major Interstates and highways, and Oklahoma went to 70 MPH on Interstates and 4-lane roads, and to 65 MPH on all other state roads. While it is uncertain to what degree this may affect the preceding analysis and conclusions, it is possible to speculate this.

The current analysis includes these affected non-Interstate roads in the comparison group, rather than the treatment (i.e., higher speed limit) group. If the impact observed on the Interstates translated to the same *percentage* increase on the non-Interstates, then the estimated *absolute* increase in fatalities would become greater, as the percentage increase would be applied to a greater base of affected fatalities. There is every reason to believe that the effect on non-Interstate roads would be at least as great as the percentage change observed on Interstates. The fatality rate per mile traveled on non-Interstate roads is greater than that for Interstates, indicating greater risk of fatality, which may be due, in part, to the more rigorous roadway design standards associated with the Interstate designation. NHTSA's report to Congress on the effect of raising speed limits to 65 MPH on the rural Interstates found a 30 percent greater fatality experience than what would have been expected, resulting from a 10 MPH increase on these roads.[15] With this recent repeal of the NMSL, several states increased speed limits to 65 MPH on some non-Interstate roads. In light of the current and previous analysis of raising speed limits, one would have to conclude that the current effect of raising speed limits is associated with ***at least*** 350

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[15] *Effects of the 65 MPH Speed Limit through 1990: A Report to Congress*, U. S. Department of Transportation, NHTSA, Washington, DC, May 1992.

additional fatalities.

Lastly, the current analysis does not account for changes in vehicle miles traveled on any of these roads, due to the current unavailability of these data (the data will, however, be available later this year). If the trend in miles traveled was affected by changing the posted speed limit, then this should be taken into account. As these data become available later this year and in the future, subsequent analyses of this issue may be able to address exposure changes.

A specific example of the *exposure* issue may explain why the change in fatalities in the early change states (an increase of 7.2 percent) is less than the change estimated in the later change states (10.9 percent increase). Everything else being equal, one would expect that states that increased speed limits earlier in the year would have experienced a greater percentage increase in fatalities than did those states that increased speed limits later in the year, since the higher speed limits were in force for a longer period of time. However, everything else is not equal, and the actual number of roadway miles covered by higher speed limits may be greater in the later change group of states. In other words, the "mile-months" of exposure, i.e., the product of the number of miles and the number of months where and when higher speed limits were in place in a given state, may be greater for the later change states than for the early change states. Thus, if a greater number of miles of roadway experienced higher speed limits in the later change group of states compared to the early change group, this could compensate for the shorter duration of time during which higher speed limits were in effect in the later change group and possibly yield the larger percent increase in fatalities for these states.

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SECTION III -- SYNOPSIS OF STUDIES BY INDIVIDUAL STATES

Overview

The 19 states commenting to the docket for the first FR notice on the NHS Act study consistently voiced concerns that the schedule necessitated by the date specified in Section 347 of the NHS Act was "ambitious" or "impossible." At least one of the 19 states suggested requesting a one year extension past the September 30, 1997, deadline to avoid creating a "second-rate report." Three of the 19 states commenting to the docket indicated that while plans existed to study the impact of increased speed limits in their respective states, results from these studies would not be available in time to submit to the agencies to be included as a part of this report.

Although increased speed limits have not been in place in most states for a time period that is adequate to permit a meaningful analysis of the impact in safety and other areas, several states have examined the impact on a limited basis. **Ten of these states, California, Idaho, Iowa, Michigan, Missouri, Montana, Nebraska, New Mexico, Texas, and Virginia, have examined the impact (or the potential impact) of increased speed limits in their respective states and forwarded copies of the findings to NHTSA and FHWA.** Of these 10 states, two, i.e., California and Montana, are among the group of states which raised speed limits late in 1995 or early in the first quarter of 1996. One state, Virginia, has not increased speed limits on a wide scale and studied the potential impact to provide a basis for future decision making. **The remainder of this section presents information abstracted from reports supplied by the states based upon data from the states' crash data files for each of the individual state studies followed by a summary of the findings from the 10 states.**

California

California passed legislation to increase the speed limit to 65 MPH on freeways on December 10, 1995. The speed limit for California's rural freeways was later increased to 70 MPH on January 7, 1996. California was among the first of several states which passed legislation to increase speed limits shortly after passage of the NHS Act.

In an informal study[16] of the effects of increased speed limits on California's freeways, data for fatal and injury crashes were examined for comparable time periods before vs. after the speed limit was changed. Following passage of legislation to increase the speed limit, crashes of all severities on California's freeways with the higher limits increased during the period January 1, 1996 through October 31, 1996, compared to the same 10-month period in 1995. Roughly 10 percent of California's freeway mileage (433 miles) remained posted at 55 MPH. The posted speed limit was increased from 55 MPH to 65 MPH on over two-thirds of the remaining freeway mileage in California. Almost 1,300 freeway miles were increased from 65 MPH to 70 MPH. The largest increase, more than 17 percent, was found for fatal freeway crashes during the period after speed limits were increased. The reported changes are summarized in Exhibit 23.

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[16] Informal study on *California Traffic Fatalities* (Provisional Data as of December 31, 1996.

Exhibit 23
Changes in California Freeway Crashes Before vs. After Speed Limit Increases

Crash Type	Before [1]	After [2]	% Change
Fatal	548	644	+17.5%
Injury	22,187	22,449	+1.2%
Property Damage	45,787	48,210	+5.3%
Total	68,522	71,303	+4.1%

Note 1: January 1, 1995 through October 31, 1995
Note 2: January 1, 1996 through October 31, 1996

Crashes of all severities increased by more than 4 percent on California freeways in the 10 months following the speed limit increase. The possible contribution of the increased speed limit to the increases may be seen when crashes occurring on freeways remaining at 55 MPH are compared to those occurring on freeways with an increased speed limit. The following exhibits present data for California freeways for fatal crashes, injury crashes, and for all crashes for the period before the speed limit increases compared to the period after the speed limit increases.

Fatal crashes on California freeways with a posted speed limit remaining at 55 MPH experienced a decrease of more than 8 percent while freeways with increases in the posted speed limit to 65 MPH and 70 MPH experienced increases of more than 22 percent and 12 percent, respectively. For California's injury crashes, crashes on freeways with the limit remaining at 55 MPH experienced almost no change (an increase of 0.7 percent), while changes on freeways where speed limits increased to 65 MPH and 70 MPH were more than 1 percent and more than 3 percent, respectively. While crashes of all severities increased for all groups of freeways, the percentage increase (more than 3 percent) was lowest for those freeways remaining at 55 MPH.

Exhibit 24
Changes in California Fatal Freeway Crashes
Before vs. After Speed Limit Increases

Freeway Speed Limit	Before [1]	After [2]	% Change
Remained at 55 MPH	62	57	-8.1%
Increased from 55 MPH to 65 MPH	330	403	+22.1%
Increased from 65 MPH to 70 MPH	165	185	+12.1%
All Freeways	557	645	+15.7%

Note 1: January 1, 1995 through October 31, 1995
Note 2: January 1, 1996 through October 31, 1996

Exhibit 25
Changes in California Injury Freeway Crashes
Before vs. After Speed Limit Increases

Freeway Speed Limit	Before [1]	After [2]	% Change
Remained at 55 MPH	4043	4072	+0.7%
Increased from 55 MPH to 65 MPH	16,861	17,094	+1.4%
Increased from 65 MPH to 70 MPH	1,929	1,993	+3.3%
All Freeways	22,187	22,449	+1.2%

Note 1: January 1, 1995 through October 31, 1995
Note 2: January 1, 1996 through October 31, 1996

California also measured the average 85th percentile speed on freeways where the speed limit was raised from 65 MPH to 70 MPH during the period November 1995 through January 1997. The increased speed limit of 70 MPH was in place for almost all of this period, with the exception of the month of November 1995. The average 85th percentile speed on these freeways increased slightly, from 71.6 MPH to 72.1 MPH.

Idaho

Speed limits on Idaho highways were increased to 75 MPH on Interstates and to 65 MPH on other primary roads effective May 1, 1996. Prior to May 1996, the maximum speed limit was 65 MPH on Interstates and state highways and 55 MPH for all other roads. While most legislation in Idaho typically has July 1 as an effective date, the effective date for the increased speed limit legislation was set at May 1. The earlier effective date limited the amount of time available to the Idaho Department of Transportation (Idaho DOT) for conducting engineering studies and implementing speed limit changes. Idaho DOT conducted a 6-month study[17] of the effect of the NMSL repeal in Idaho, focusing on changes in the number of speeding relating crashes. Idaho's study also examined average and 85th percentile speeds on affected roadways. The Idaho study compared the crash and travel speed experience for study roadways, i.e., those highways increased to 75 MPH (Interstates) or 65 MPH (all other roads) to control roadways, i.e., those roadways for which the posted speed limit was maintained at 65 MPH or less. The following exhibits present a comparison of the mileage, travel speed and crash experience for study vs. control roadways in 3 groups: urban Interstates, rural Interstates, and non-Interstate highways.

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[17] Laragan, Greg M., P. E. *Six Month Report Comparing May-October for 1991 - 1996*, Idaho DOT.

Exhibit 26
Changes on Idaho Urban Interstates
Before [1] vs. After [2] Speed Limit Increases

Measure	Study [3]	Control [4]
Average Speed	+ 3 MPH	- 3 MPH
85th Percentile Speed	+ 3 MPH	- 4 MPH
% Exceeding Posted Speed Limit	-31%	+1%
Total Crash Rate	+24%	+15%
Speeding-Related Crash Rate	+223%	+28%
Fatal Crash Rate	--[5]	No Change
Speeding-Related Fatal Crash Rate	--[5]	-50%

Note 1: May 1995 through October 1995
Note 2: May 1996 through October 1996
Note 3: 14.3 Miles
Note 4: 23.2 Miles
Note 5: Percentage Change Not Valid As Before Rate = 0.0

Exhibit 27
Changes on Idaho Rural Interstates
Before [1] vs. After [2] Speed Limit Increases

Measure	Study [3]	Control [4]
Average Speed	+ 3 MPH	+ 1 MPH
85th Percentile Speed	+ 3 MPH	+ 1 MPH
% Exceeding Posted Speed Limit	-36%	-2%
Total Crash Rate	+29%	-5%
Speeding-Related Crash Rate	-28%	No Change
Fatal Crash Rate	-42%	--[5]
Speeding-Related Fatal Crash Rate	-60%	--[5]

Note 1: May 1995 through October 1995
Note 2: May 1996 through October 1996
Note 3: 523.6 Miles
Note 4: 21.5 Miles
Note 5: Percentage Change Not Valid As After Rate = 0.0

Exhibit 28
Changes on Idaho Non-Interstates
Before [1] vs. After [2] Speed Limit Increases

Measure	Study [3]	Control [4]
Average Speed	+ 2 MPH	No Change
85th Percentile Speed	+ 2 MPH	No Change
% Exceeding Posted Speed Limit	-39%	No Change
Total Crash Rate	+13%	No Change
Speeding-Related Crash Rate	-30%	-5%
Fatal Crash Rate	+14%	+52%
Speeding-Related Fatal Crash Rate	-43%	+20%

Note 1: May 1995 through October 1995
Note 2: May 1996 through October 1996
Note 3: 14.3 Miles
Note 4: 23.2 Mile
Note 5: Percentage Change Not Valid As Before Rate = 0.0

Based upon the data in the above exhibits, Idaho's first 6 months of experience with increased speed limits indicates that:

- while average travel speeds and 85th percentile speeds increased 2 - 3 MPH on study roadways, they decreased or showed no change on control roadways;

- the number of vehicles exceeding the higher posted speed limits declined on study roadways while showing no change on control roadways; and

- while the total crash rate increased on all roads in the study group compared to decreases or no change in the rate for the control roadways, there was no consistent pattern of increases or decreases for the remaining 3 measures, the speeding-related crash rate, the fatal crash rate and the speeding-related fatal crash rate.

Idaho's study concluded that the data available in this 6-month comparison was not "... *adequate to make any conclusions regarding the impact of the increased speed limits.*" The study found that while crash rates are up on roadways where the speed limits were increased and vehicle speeds have increased slightly, fatal crash rates on the affected roadway have decreased. In this 6-month comparison, fatal crash rates on Idaho's rural Interstate highways decreased, where speeds have increased the greatest.

Iowa

Legislation was signed on May 16, 1996 giving Iowa's Department of Transportation (Iowa DOT) the authority to raise speed limits on selected 4-lane divided highways. Speed limits on rural and urban Interstate highways in Iowa were maintained in the legislation at 65 MPH and 55 MPH, respectively. Iowa DOT reviewed 322 miles for consideration of possible increases in the posted speed limit. By December 1996, the posted speed limit was increased to 65 MPH on 252 miles of the 322 miles, 78 percent of the highway mileage considered eligible for the speed limit increase in Iowa.

Iowa completed a review[18] of the impact of increased speed limits on its highways in February 1997. Iowa's review was conducted by the Safety Management System Task Force on Speed Limits, composed of representatives from Iowa's DOT, Departments of Public Health and Public Safety, local enforcement, and FHWA. The task force examined the crash and travel speed experience on 322 highway miles. The review also studied data on speeds and fatalities in 16 states adjacent to and surrounding Iowa. Upon completion of the review, speed limits were raised on 252 miles in Iowa. Most importantly, the Iowa study indicated that at least 3 more years of experience with increased speed limits was needed "... *to determine the real impact of this change ... on actual speeds, accidents, injuries, and fatalities.*"

Iowa's study focused on the impact of speed limit changes in Iowa and presented findings

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[18] *Report on Results of Speed Limit Changes After Repeal of National Maximum Speed Limit*, Iowa Safety Management System Task Force on Speed Limits, January 1997.

from a 3-part survey of other states. Regarding the impact of speed limit changes in Iowa, the task force found that:

- Operating speeds (the 85th percentile travel speed) increased an average of 6 MPH on 4-lane roads for which the speed limit was increased from 55 MPH to 65 MPH.

- Four fatalities occurred in 1996 on these 4-lane roads, compared to an average of 1.7 fatalities for the period 1993-1995.

- Travel speeds increased 1 - 5 MPH on roadways where the speed limits increased in the seven states surveyed by Iowa.

- Preliminary fatality data for the midwestern states indicate that for states with speed limit increases, fatalities increased 10 percent or more, while for states without speed limit increases, fatalities decreased approximately 4 percent or more.

Iowa's study examined the experience of eight midwestern states (Kansas, Illinois, Iowa, Missouri, Minnesota, Nebraska, South Dakota, and Wisconsin) in two groups, those that raised the speed limit beyond 65 MPH and those that did not raise the speed limit above 65 MPH. Fatalities for the 8-month period January to August 1995 were compared to the same period in 1996 for 8 midwestern states. For the midwestern states, those that did not raise the speed limit above 65 MPH all experienced decreases in traffic fatalities, while those that raised the speed limit above 65 MPH all experienced increases in traffic fatalities. Exhibit 29 presents the percentage change in fatalities for the two groups of midwestern states compared in the Iowa study.

Exhibit 29
Changes in Traffic Fatalities for Selected Midwestern States
Jan-Aug 1995 vs. Jan-Aug 1996

States that Did Not Raise the Speed Limit Above 65 MPH		States that Increased the Speed Limit Above 65 MPH	
State	**% Change**	**State**	**% Change**
Illinois	- 4.2%	Kansas	+10.2%
Iowa	-17.9%	Missouri	+13.3%
Minnesota	- 4.3%	Nebraska	+11.2%
Wisconsin	- 3.5%	South Dakota	+20.8%

Iowa also examined the change in traffic fatalities using the same comparison periods for selected states in other areas of the nation. The percentage change in fatalities for the comparison time periods are shown in the following exhibit for 11 states outside the Midwest.

Exhibit 30
Changes in Traffic Fatalities for Selected States Outside the Midwest
Jan-Aug 1995 vs. Jan-Aug 1996

States that Did Not Raise the Speed Limit Above 65 MPH		States that Increased the Speed Limit Above 65 MPH	
State	**% Change**	**State**	**% Change**
Indiana	+ 5.2%	Arizona	+ 3.1%
Massachusetts	- 8.2%	California	+ 5.9%
New York	- 18.0%	Florida	- 3.7%
Ohio	- 6.8%	Montana	- 4.4%
Pennsylvania	- 8.3%	Nevada	+ 5.1%
		Texas	+ 15.5%

For states outside the Midwest compared in the Iowa study, all but one of the 5 states (Indiana) that did not raise the speed limit above 65 MPH experienced decreases in traffic fatalities. Of the 6 states that did raise the limit above 65 MPH, all but 2 states (Florida and Montana) experienced increases in traffic fatalities. In addition, the Iowa study noted that

Montana significantly increased fines for speeding and Florida announced a tightening of speed enforcement.

Iowa concluded in its study that as limited data were available to the task force for the review, more time and information, i.e., at least 3 years, were needed to determine the " ... *full impact of these changes in actual speeds, crashes, injuries, and fatalities* ..."

Michigan

Michigan increased the speed limit to 70 MPH on approximately 500 highway miles, effective December 12, 1996. An additional 660 miles of non-Interstate freeway mileage were increased from 55 MPH to 65 MPH. All 2-lane state roads and approximately 120 miles of non-Interstate freeways remained at 55 MPH.

Michigan increased speed limits upon the completion of a study in December 1996 to determine the effects of the increase on safety and capacity. The study was conducted by Michigan State University on behalf of the Michigan Department of Transportation.[19]

The Michigan study focused on comparisons of the average travel speeds and the 85th percentile speeds on "test" sites vs. "control" sites. The test sites were segments of Michigan freeways where the speed limit was raised to 70 MPH for the study period. The control sites were similar segments on Michigan freeways. The study also examined changes in speeds on 5 non-freeway highway segments to determine if there was any spill-over effect in travel speeds as a result of proximity to the test segments. The Michigan study also examined the crash experience of the test and control segments. Some of the study conclusions are:

- While average and 85th percentile speeds increased slightly on test roadways, there was no indication that speeds increased on control roadways.
- No spill-over effect of increased speeds was found on the non-freeway segments in proximity to the test roadway segments.
- Congestion had little impact on recorded speeds during the before or after periods.
- During the 1-month period after speed limits were raised, traffic crashes increased by more than 16 percent on test road segments, i.e., those roadways where the speed limit was raised.

The Michigan study also concluded that the results of the safety impact analyses, i.e., comparisons of traffic crashes on test roadway segments, were "... *preliminary and inconclusive because of insufficient data.*"

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[19] Taylor, William C., and Maleck, Thomas L. *An Evaluation of the Michigan 70 MPH Speed Limit*, College of Engineering, Michigan Sate University, December 9, 1996.

Missouri

Effective March 13, 1996, speed limits could be raised to 70 MPH on any roadway in Missouri upon the completion of a safety study. Missouri conducted a review of the average speed and the 85th percentile speed on several roadway types. A comparison of traffic crashes for before vs. after the speed limit was increased was also made. The period March 14-September 30, 1995 was compared to the same period in 1996 to determine the change in traffic crashes.

Average speeds on Missouri's roads increased from more than 2 percent to approximately 8 percent, while the percentage change in the 85th percentile speeds varied from a decrease of more than 3 percent to an increase of almost 8 percent. The following exhibit presents the percentage change in average and 85th percentile speeds for 5 types of Missouri roads.

Exhibit 31
Changes in Average and 85th Percentile Speeds on Missouri Roads
1995 vs. 1996

Highway Type	% Change In	
	Average Speed	85th Percentile Speed
Rural Interstate	+ 4.6%	+ 1.5%
Urban Interstate	+ 7.9%	+ 5.5%
Urban Freeway	+ 2.9%	- 3.5%
Rural Divided	+ 7.9%	+ 7.7%
Rural Non-Divided	+ 2.3%	+ 1.6%

Missouri also compared traffic crashes and traffic fatalities on selected roadways. Crashes (including fatal crashes) increased on Interstates, but decreased on state lettered routes after the speed limit was raised.

Montana

Montana increased the speed limit on Interstate highways to a maximum of "reasonable and prudent" for passenger cars during the daylight hours, effective December 8, 1995. The maximum speed limit was limited to 65 MPH on Interstates and 55 MPH on all other roads for passenger cars during the nighttime hours. The maximum speed limit of 65 MPH at all times was established for trucks on Interstate highways.

Two Montana agencies, the Department of Transportation and the Highway Patrol, issued findings from a review of speed survey data, crash data and related information.[20] Based upon the review of speed survey data, Montana found that:

- The daytime 85th percentile speed on Interstate and primary roads increased approximately 5 MPH in 1996 compared to 1995, to about 78 MPH on the Interstates and to about 72 MPH on primary roads. The nighttime 85th percentile speeds remained unchanged, at about 70 MPH on Interstate roads and 67 MPH on primary roads.

- Since the return to "reasonable and prudent," there are greater variances in vehicle speeds, and speeds are less uniform, with more drivers traveling at higher speeds.

- Sixty percent of vehicles observed at speeds greater than 85 MPH were out-of-state vehicles. Seventy-five percent of vehicles traveling above 95 MPH were identified as out of state.

Montana also studied changes in its crash statistics for the first 3 quarters (9 months) of 1996, recognizing that crashes in this part of the nation can be greatly influenced by weather conditions. [Montana experienced severe weather conditions during the winter of 1996, i.e., January, February, and March 1996.] The Montana study also found that misunderstanding existed among the driving public regarding the difference between no set speed limit and Montana's "basic rule", i.e., reasonable and prudent. With these caveats, Montana examined changes in traffic crashes, fatalities, and injuries for the period 1992 - 1996. Daytime and nighttime crashes in Montana significantly increased during the January - March 1996 quarter. While Montana attributed the "... *significant increases* ..." in total crashes and in injury crashes to "... *icy, snowy, roadway conditions* ..." these increases appeared to continue beyond the first quarter of 1996.

The following exhibits present data for all crashes, fatal + injury crashes, injuries, and incapacitating injuries occurring on Montana's rural and urban roads for a 9-month comparison period before (January - September 1995) vs. after (January - September 1996) the increased speed limits were in place.

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[20] Montana DOT and Montana Highway Patrol, *State of Montana Data Reference Related Montana Speed Laws*, December 1996.

Exhibit 32
Changes in Safety Measures on Montana Rural Roadways
Before [1] vs. After [2] Speed Limit Increases

Safety Measure	Before [1]	After [2]	% Change
Total Crashes	6735	7925	+18%
Fatal + Injury Crashes	2846	2152	-24%
All Injuries	4322	4635	+ 7%
Incapacitating Injuries	1326	1261	- 5%

Note 1: January through September 1995
Note 2: January through September 1996

Exhibit 33
Changes in Safety Measures on Montana Urban Roadways
Before [1] vs. After [2] Speed Limit Increases

Safety Measure	Before [1]	After [2]	% Change
Total Crashes	7845	9008	+15%
Fatal + Injury Crashes	2273	2115	- 7%
All Injuries	3187	2997	- 6%
Incapacitating Injuries	472	289	-39%

Note 1: January through September 1995
Note 2: January through September 1996

Total crashes increased on Montana's rural and urban roadways after the speed limit was raised. While injuries increased on rural roadways, decreases occurred for fatal + injury crashes and incapacitating injuries, following the speed limit increase. On urban roadways, an increase occurred in total crashes, while decreases occurred for all other measures. One of the conclusions in the Montana report was that "... *no long term conclusions* ..." could be made as the impact of increased speed limits due to the limited amount of data available with a short time period.

Nebraska

Legislation to increase the posted speed limit to 75 MPH on Nebraska's Interstates became effective on June 1, 1996. The speed limit was raised to 60 MPH on 2-lane roads and to 65 MPH on 4-lane expressways, effective September 1, 1996. Fines for speeding were also substantially increased.

Nebraska conducted a study of the impact of the increased speed limits on traffic crashes, using the period June through December, 1990 - 1996.[21] The Nebraska study focused on changes in the number of crashes on rural Interstates. Rural Interstate highways "... *experienced the largest single increase, 19.6%* ...", in total crashes comparing June through December for the period 1990-1996. The Nebraska study also indicated that its State Patrol officers reported a " ... *marked increase in the extent of vehicle damage of the vehicles involved in crashes since the speed limit increases have occurred.*" The study concluded, however, that the brief review should not be considered conclusive and recommended that a more thorough evaluation be conducted.

New Mexico

New Mexico increased speed limits on its highways effective May 13, 1996. Speed limits were raised on almost all road categories: limits were raised to 75 MPH on Interstate highways; to 70 MPH on 4-lane roads with shoulders; to 65 MPH on 2-lane roads with shoulders; and to 60 MPH on 2-lane roads without shoulders.

The University of New Mexico conducted a study of the effect of higher speed limits on behalf of the New Mexico Highway and Transportation Department.[22] The study was conducted after the increased speed limits had been in place in New Mexico for 6 months. The purpose of the New Mexico study was threefold: "... *to provide a clear picture of the effects of higher speed limits, to provide information ... for enforcement and public information ..., and to contribute data* ..." to this study. The New Mexico study posed the following questions:

1. Did travel speeds increase after the speed limits changed, and, if so, by how much?

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[21] Nebraska Office of Highway Safety, *Nebraska--Comparative Crash Data, Pre and Post Speed Limit Increases*, May 7, 1997.

[22] Davis, James W., *The Effects of Higher Speed Limits in New Mexico,* Division of Government Research, University of New Mexico, March 1997.

2. Did the frequency of crashes increase on roadways where speeds increased?

3. Did the severity of crashes increase on roadways where speeds increased?

4. If crash frequency and/or severity increased, what other factors (e.g., type of vehicle, driver characteristics, weather, alcohol, occupant restraints) were involved?

The focus of New Mexico's study was Interstate roads posted at 75 MPH. Average and 85th percentile speeds on separate segments of rural Interstate roads increased during the 6-month period the higher limits were in place, as did the percentage of vehicles traveling over 80 MPH. The following exhibit from New Mexico's study presents changes in the average and 85th percentile speeds following the increase in speed limit.

Exhibit 34
Changes in Travel Speeds on New Mexico Rural Interstate Segments
Before[1] vs. After[2] Speed Limit Increase

Highway Segment	% Change In		
	Average Speed	85th Percentile Speed	% Over 80 MPH
Interstates I-25 and I-40	+ 3.5%	+ 2.9%	+ 93%
Interstate I-10	+ 7.9%	+ 5.5%	+ 11%

Note 1: April 1996
Note 2: June through August 1996

Crash data for the same segments of New Mexico's Interstate highways were also analyzed, using 14 weeks of data for approximately the same time periods in 1994, 1995, and 1996. The study compared the average weekly differences for the 1994 - 1996 time period and tested the differences for statistical significance. The New Mexico study concluded that the severity of crashes increased on Interstates 25 and 40, where speeds increased, as evidenced by increases in the number of fatalities and incapacitating injuries. The opposite occurred on Interstate 10, where speeds did not increase as much. However, the New Mexico study also found that when the January - April time period is used for comparison, crashes and injuries decreased in 1996, relative to the same periods in 1994 and 1995. The study concluded that the results should be considered preliminary and that there were not enough data available for a time period adequate for conducting a thorough evaluation.

Texas

Texas was one of the 11 states which raised its speed limits shortly following passage of the NHS Act. Effective December 8, 1995, the posted speed limits in Texas were eligible to be increased to 70 MPH for passenger cars and 60 MPH for trucks during daylight hours and to 65 MPH for passenger cars and 55 MPH for trucks during nighttime hours, on all roads.

The Texas Transportation Institute conducted a preliminary evaluation of the impact of the change in speed limits for the Texas Department of Transportation (TxDOT), using data for the first 9 months of experience with the higher limits.[23] The TTI study indicated that the evaluation was in its early stages as "... *changes in speed limits were phased-in* ..." through June 1996 and due to the lag between the occurrence of a motor vehicle crash and the recording of that crash in the state's data files. At the time of the TTI study, 47,400 of Texas' highway miles were set at 70 MPH, approximately 62 percent of the total state road mileage. More than 81 percent (2,700) of the state's 3,000 Interstate mileage was set at a maximum of 70 MPH.

The TTI study compared vehicle speed and crash data for January through September 1991-1996, focusing on changes on Interstate highways. On rural Interstates where the speed limit was increased to 70 MPH, the study found that the average speed, the 85th percentile speed, and the percentage of vehicles exceeding 70 MPH all increased. The average speed on Texas' rural Interstates increased from 64 MPH to 66 MPH, while the 85th percentile speed increased from 72.3 MPH to 74 MPH. The percentage of vehicles exceeding 70 MPH, the maximum limit, rose to 27.2 percent from 16.3 percent on rural Interstates. While speeds were much less than those found on the rural Interstates, substantial increases were found for these speed measures on urban Interstates where the speed limit was raised to 70 MPH. These comparisons are shown in the following exhibit.

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[23] Pezoldt, V. J., Brackett, R. Quinn, & Morris, Daniel E. *The Impact of the Change in Speed Limits on Texas Highways: A Nine-Month Evaluation*, February 19, 1997.

Exhibit 35
Changes in Travel Speeds on Texas Interstates
Before[1] vs. After[2] Speed Limit Increase

Highway Type	% Change In		
	Average Speed	85th Percentile Speed	% Over 70 MPH
Rural Interstate	+ 3.1%	+ 2.4%	+ 67%
Urban Interstate	+ 4.7%	+ 5.6%	+ 200%

Note 1: January - September 1995
Note 2: January - September 1996

The TTI study also compared changes in the average monthly number of serious crashes and the serious crash rate per 100 million vehicle miles traveled for the same time periods on rural and urban Interstates. These comparisons are shown in the following exhibit. The percentage increase in these safety measures for rural Interstates was considered not significant and possibly related to increases in travel or other factors. Significant increases in serious crashes and the serious crash rate were found for urban Interstates; however, the number of fatal crashes and the fatal crash rate did not change significantly following the speed limit increase. The TTI study concluded that while there was evidence suggesting that the increases in serious crashes and injuries on urban Interstates were associated with the higher speed limit, further monitoring and evaluation of crash and speed data was recommended.

Exhibit 36
Changes in Safety Measures on Texas Interstates
Before[1] vs. After[2] Speed Limit Increase

Highway Type	% Change In	
	Serious Crashes	Serious Crash Rate[3]
Rural Interstate	+ 8.2%	+ 5.2%
Urban Interstate	+ 44.7%	+ 38.5%

Note 1: January - September 1995
Note 2: January - September 1996
Note 3: Serious Crashes per 100 million vehicles miles traveled

Following the release of the TTI study, TxDOT was asked by the Governor's office to review the data to support the conclusion that the increased frequency and rate of serious crashes

on Texas' urban Interstates appeared to be associated with the higher speed limit.[24] Based upon its review, TxDOT concluded that there were inaccuracies in the speed data provided to TTI and also, that TTI may not have identified other factors affecting the data. The TxDOT review concluded that the actual difference between 1995 and 1996 in the crash data may not be statistically significant. TXDOT also recommended that a state speed database system be developed and implemented and that TTI consider weather and surface conditions in future analyses.

Virginia

While Virginia raised the posted speed limit to 65 MPH on only one roadway, the Dulles Greenway[25], the potential impact of speed limit increases has been studied by 2 state organizations. One study was conducted by a task force appointed to study Virginia Senate Joint Resolution 7 (VA SJR 7).[26] The VA SJR 7 study was conducted for "... *the purpose of recommending appropriate maximum highway speed limits for* ..." Virginia's highways. Virginia's Transportation Research Council (VTRC) also studied the changes in travel speed and crashes over the period 1985-1995 to provide reference material for decisions on whether to raise state speed limits.[27]

The VA SJR 7 study, indicating that "... *data regarding the impact of increased speed limits is ... limited*", reviewed literature on speed limits and the impact on safety. The SJR 7 study concluded that increasing speed limits in Virginia could "... *result in a reduction in speed variance ... in the short run*" and hypothesized that this reduction could be "... *expected to result in a decrease in ... crashes.*" Meanwhile, based upon past history and Virginia's experiences with changes in the speed limit, the study predicted that travel speeds would increase and that traffic fatalities and injuries would increase, as "... *crashes at higher speeds are more severe.*"

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[24] Texas Department of Transportation. *A Review of Urban Interstates Where the Speed Limit was Raised to 70 MPH.*

[25] The speed limit was increased to 65 MPH on the Dulles Greenway, a private, urban controlled access toll road.

[26] Commonwealth of Virginia. *A Report of the Special Task Force Studying Safe Minimum Highway Speed Limits* in Response to Senate Joint Resolution 7, December 1996.

[27] Virginia Transportation Research Council. *Virginia's Speed Limit Fact Sheet*, January 17, 1997.

The VTRC study reviewed crash data and average and 85th percentile speeds on Virginia's highways for the period 1985 - 1995. VTRC studied changes in speeds and crashes on rural Interstates, urban Interstates, limited access highways, and divided and undivided highways with at least 4 lanes. On rural Interstates, VTRC concluded that:

- The average speed and 85th percentile speed increased by more than 5 MPH. These speeds were slightly higher in the last four years, i.e., 1992 - 1995, than in the 3 years immediately following the speed limit increase, i.e., 1989 - 1991.

- Fatalities and fatal crashes experienced a sustained increase of about 50 percent during the time periods studied, i.e., 1985 - 1987, 1989 - 1991, 1992 - 1995. While fatalities and fatal crashes increased, the fatal crash and fatality rates, however, remained stable.

Earlier crash data (1969 - 1977) for Virginia's rural Interstates were also studied by VTRC, as the speed limit was increased and then decreased during this time period. VTRC found that fatalities increased more than 27 percent on rural Interstates in 1973, following the increase of the speed limit to 70 MPH. Fatalities, injuries, and fatal and injury crashes on rural Interstates all decreased during the period 1975 - 1997, following the establishment of the 55 MPH NMSL, which lowered the speed limit from 70 MPH.

For Virginia's urban Interstates, VTRC found that:

- The average and 85th percentile speed increased by 3 MPH, comparing the periods 1985 - 1987 to 1989 - 1991, about half the increase experienced on rural Interstates.

- Comparing the period 1969 - 1971 when the speed limit was 65 MPH to 1973, when the speed limit was raised to 70 MPH, fatal crashes and fatalities decreased, while injury crashes and injuries increased. After the speed limit was lowered to 55 MPH, fatalities, injuries and fatal and injury crashes all increased.

The VTRC study also examined data for Virginia's limited access highways and divided highways and again found inconsistent patterns of changes associated with increases and decreases in the posted speed limits.

Summary of Individual State Findings

The previous section illustrates the inherent difficulties in assessing the impact of increased speed limits on a state-by-state basis. Among the 10 states (California, Idaho, Iowa, Michigan, Missouri, Montana, Nebraska, New Mexico, Texas, and Virginia) whose study findings are presented in this report, while there appears to be some evidence of an association between the higher speed limits and increases in crashes, the impact of increased speed limits did not follow a consistent pattern across all states. Possible explanations for the inconsistency in findings are limited data, limited time periods with the increased limits in effect, increased law enforcement and fines, focus on public information and education, increase in the public's use of occupant restraints, decrease in alcohol involved driving, etc.

Of the 10 states whose studies are presented above, two, California and Montana, have

had higher speed limits in place for most of calendar year 1996. Following passage of legislation to increase the speed limit, crashes of all severities on California's freeways with the higher limits increased during the period January 1, 1996 through October 31, 1996, compared to the same 10-month period in 1995. In Montana, however, while total crashes increased on both rural and urban roads, decreases occurred in the most severe crashes, i.e., fatal + injury. The Montana report indicated that the lack of consistency in findings could be due to the limited data available as a result of the speed limit being in place for a short time period and due to adverse weather conditions in the state during the winter of 1995 - 1996.

Seven of the 10 states whose studies are presented above (Idaho, Iowa, Michigan, Missouri, Nebraska, New Mexico, and Texas) passed legislation to raise speed limits later in calendar year 1996, i.e., second quarter or later. In each of these studies, while increases in either crash rates and/or vehicle travel speeds were found, these increases were not consistent for all highways with the higher limits nor were they consistent for all safety measures, i.e., for fatal crashes, injury crashes, total crashes, etc. Each of these studies concluded that the findings should be considered preliminary, inconclusive, etc. due to the limited amount of time that the increased limits have been in place and, as a result, the unavailability of data to conduct a thorough assessment.

The last state summarized in the previous section, Virginia, conducted studies of the possible impact of increased speed limits to have as a basis for decision making on raising speed limits. The VTRC study examined data from various time periods, from pre-NMSL (1969-1973) to NMSL (1975 -1995). While the VTRC study found significant increases in fatalities, injuries and the associated crashes on some state highways, decreases were also found. Although the VTRC study did not draw conclusions, the study by a task force of Virginia's General Assembly concluded that while "... *increasing the speed limit would ... result in a reduction in speed variance ... in the short run*" travel speeds would increase and fatalities and injuries would increase in the long run.

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SECTION IV -- DISCUSSION/RECOMMENDATIONS

While there were several analytical challenges to conducting this study following the first year of the states' experience with the increased speed limits, there appears to be some indication of the nature of the impact of the higher limits on traffic safety. Certain types of data at the national and state levels were not available for use in this study, e.g., increases and/or shifts in VMT, decreased travel time, increased fuel consumption, increased or decreased medical costs, and VMT by roadway type. Without these data, it was not possible to address the benefits associated with repeal of the NMSL, as called for in Section 347 of the NHS Act, at this time. However, gross estimates of the potential impact, in terms of increases in fatalities and the associated economic cost at the national level in states that increased speed limits, were addressed in this study.

The prudent approach being taken by many of the states in adopting higher speed limits is noteworthy. Although several states moved fairly quickly to raise speed limits, i.e., raising limits in 1995 or in the first month of 1996 following passage of the NHS Act, most that did so also simultaneously conducted safety and/or engineering reviews. Many states have opted to selectively increase speed limits on certain road segments and/or roadway types, e.g., on certain urban Interstates, or on selected freeways and expressways, rather than systemwide or statewide. While the selective application of increased speed limits is indicative of the cautiousness on the part of many states in adopting higher limits, it further complicated the issue of data availability by necessitating the analysis of data by road segment over a limited time period. As a result, the analyses conducted in this study was limited to focusing on gross estimates of the potential effects of increased speed limits.

These analytical challenges aside, however, at the national level, the short-term impact of the states' adoption of increased speed limits can be characterized in two ways. First, while total fatalities and injured persons changed very little at the national level in 1996 compared to 1995 (i.e., an increase of 90 fatalities), fatalities and persons injured in traffic crashes occurring on roads with higher speed limits continue to account for an increasing share of the total traffic crash toll. Secondly, fatalities, fatal crashes, injured persons and injury crashes all increased at the national level on Interstate roads in 1996, while decreasing on all other roads. As Interstate highways are the nation's safest roads, the increasing fatality trend on these roads is of concern.

Studies of the impact of speed limit changes in the past provide insight into the resulting effect on traffic fatalities. Since the early 1970's, the nation has experienced both decreases and increases in posted speed limits, along with associated decreases and increases in traffic fatalities. The National Maximum Speed Limit (NMSL), enacted during the Arab oil embargo of 1973 to conserve fuel, was set at 55 miles per hour (MPH). In addition to conserving fuel, the annual traffic fatality toll declined from 54,052 in 1973 to 45,196 in 1974, a drop of over 16%.In 1987, the Surface Transportation and Uniform Relocation Assistance Act granted the states the authority to raise the speed limit, not to exceed 65 MPH, on portions of the rural Interstate system. Thirty-eight states raised speed limits on rural Interstates to 65 MPH in 1987, and two additional states adopted the 65 MPH speed limit on rural Interstates in 1988, bringing approximately 90 percent of the 34,000 rural Interstate mileage to 65 MPH. Congress asked for an evaluation of the effects of the 65 MPH speed limit on rural Interstate traffic fatalities for the period 1987 through 1989. NHTSA published the results of this evaluation in several reports to

Congress, the last of which was published in 1992[28], estimating the 1990 fatality toll on rural Interstates in the 38 states with 65 MPH limits to be "30 percent greater than might have been expected" or an increase of about 500 fatalities. The estimated increase in Interstate fatalities found in this study, while smaller in magnitude compared to the estimated changes found in 1974 and 1987, does follow the pattern of increases in fatalities being associated with increases in posted speed limits.

Based upon the analysis conducted in this study, it is estimated that Interstate fatalities in the 32 states that increased speed limits experienced approximately 350 more fatalities than would have been expected based on historical trends, about 9 percent above expectations. Based on economic cost models used by the National Highway Traffic Safety Administration, the total economic cost of 350 additional fatalities and associated injuries and crashes is more than $820 million in 1996 dollars. Nonfatal injuries and non-injury crashes included in the total economic cost were estimated based on the relative frequency of these events to fatalities in speed-related crashes.[29] Due to the unavailability of detailed VMT and other data at this time, it is not known how increased travel on higher speed roads, shifts in travel, changes in average and top vehicle speeds, and other traffic safety factors may have contributed to this estimated increase in Interstate fatalities.

At the state level, while there were no consistent patterns of association for those states that raised speed limits and total fatalities, the impact of increased speed limits in the short term was indicated by increases in fatalities on the Interstates. For the states that raised speed limits at any time during 1996, fatalities increased considerably on Interstate highways. Fatalities on Interstates did not change, however, for states that did not raise speed limits in 1996. On a state-by-state basis, the picture was not as clear. Of the 10 states whose studies were summarized in Section III, while there appears to be a clear association between the increased speed limits and increases in crashes of all severities in California, for example, a consistent pattern of crash increases or decreases was not found for the remaining states. Each of the state studies considered these findings preliminary or inconclusive due to the limited amount of data available for analysis.

NHTSA and FHWA plan to continue to study the impact of increased speed limits at the national and state levels, particularly after states have had several years of experience with the higher limits. In view of the findings, close monitoring of crash trends on roads with increased speed limits should continue and, if warranted, countermanding actions taken. Also, it will also be important to continue to focus on other key program areas of traffic safety, e.g., increasing restraint use, enforcing traffic laws, informing and educating the public, implementing roadway and traffic safety improvements, and ameliorating the effects of alcohol-involved driving over the long term to offset possible increases in fatalities and injured persons that may be related to increased speed limits and increases in VMT and shifts in travel to roads with higher posted speed

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[28] *Effects of the 65 MPH Speed Limit through 1990: A Report to Congress*, U. S. Department of Transportation, NHTSA, Washington, DC, May 1992.

[29] Blincoe, L. J. *The Economic Cost of Motor Vehicle Crashes, 1994.* U. S. Department of Transportation, NHTSA, Washington, DC. DOT HS 808 425, July 1996.

limits. The challenge will be to take these traffic safety initiatives into account in subsequent analyses of the effects of increased speed limits. In addition, while some evidence of increases in fatalities and fatal crashes was found at the national level, this study is based on only 1 year of data at higher speed limits, and warrants further examination as the national and individual states' experience with higher speed limits matures. Lastly, this study does not account for possible changes in the expected vehicle miles of travel patterns due to the unavailability of these exposure data at this time. Subsequent analysis of this issue will need to address these effects, where possible. NHTSA, FHWA, and the Centers for Disease Control have also contracted with the Transportation Research Board to examine the criteria used by states to establish speed limits and to recommend improvements to the current methodology. The group of experts assembled for this study come from a wide array of disciplines, e.g., engineering enforcement, and academia, associated with highway safety.

APPENDIX A -- DETAILED INFORMATION ON INDIVIDUAL STATE SPEED LIMIT LEGISLATION

The following exhibit presents the latest information available to NHTSA and FHWA as of August 15, 1997 regarding specific details on speed limit legislation in specific states. As such, the information presented in the exhibit may contain some inaccuracies in that legislative action taken in the states after this date is not reflected.

State	Pre NMSL Max (mph)	Exceeds Old NMSL Provisions	Cars		Trucks		August 15, 1997
			Interstate	Other Primary	Interstate	Other Primary	NOTES: *The following is provided for information purposes only. Every effort has been made to ensure that the information is accurate as of the above date. Some States may have made administrative or other changes that are not reflected here. Please contact the individual State for the latest information.*
Alabama	70	Y	70	55	70	55	Eff 5/9/96 - 70 mph on Interstates, 65 mph on other 4 lane highways
Alaska	70	N	65	55	65	55	
Arizona	75	Y	75/55*	55	75/55	55	Eff 12/8/95 - 75 rural Interstates; urban Interstates remain 55
Arkansas	75	Y	70	55	65	55	Eff 7/17/96 - AR Hwy.. Commission raised speed limit from 65 to 70 mph on rural four-lane divided highways (passenger vehicles only - trucks stay 65 mph). Restriction includes any truck that weighs more than 26,000 and requires a commercial driver's license to operate. Will not take effect for approximately one month to give the state time to post the new speed limit signs statewide.
California	70	Y	70	65	55	55	Freeways and expressways to 65 mph (12/10/95). Freeways and expressways to 65 mph and 70 mph (rural) (1/7/96). Other city, county and State roadways remain at 55 mph until 3/30/96, after which, based on engineering and traffic surveys they may go to 65 mph.
Colorado	70	Y	75	55	75	55	Eff 5/28/96 - Prima facie is 55 mph for 2 lane; 65 mph for 4 lane divided. Maximum can now be 75 mph for any highway. CO DOT engineering study will determine maximum limits for all road segments within one year.
Connecticut	60	N	55	55	55	55	
Delaware	60	Y	65	50	65	50	Raised I-495 and part of US 1 to 65 (1/26/96)
Dist. of Col.	60	N	55*	50	50	50	Only part of Woodrow Wilson bridge eligible. No changes considered at this time.
Florida	70	Y	70	55	65	55	Eff 4/8/96 - Only on part of Interstate 10 (Jacksonville to Pensacola); additional segments of I-75 and I-95 pending. Eff 11/96 Some non-Interstate 4 lane divided segments posted at 65 mph.
Georgia	70	Y	70	55	70	55	Eff 7/1/96 - 70 mph on Interstate and look-alike; 65 mph urban Interstates; 65 mph physically divided w/out controlled access. Based on engineering and traffic investigation studies.
Hawaii	70	N	55	55	55	55	
Idaho	70	Y	75	65	75	65	Eff 5/1/96 - 75 mph Interstates (cars and trucks); 65 mph other primary (cars and trucks)
Illinois	70	Y	65/55*	55	55	55	Gov action - some urban Interstates 65 mph (11/29/95) ; restricted unmarked county and township roads to 55 (1/25/96)
Indiana	70	N	65	55	60	55	Legislation to raise defeated in House (1/96)

State	Pre NMSL Max (mph)	Exceeds Old NMSL Provisions	Cars		Trucks		August 15, 1997
			Interstate	Other Primary	Interstate	Other Primary	NOTES: *The following is provided for information purposes only. Every effort has been made to ensure that the information is accurate as of the above date. Some States may have made administrative or other changes that are not reflected here. Please contact the individual State for the latest information.*
Iowa	75	Y	65	55	65	55	Gov signed legislation on 5/16/96 giving IOWA DOT authority to raise limits up to 65 mph on selected 4-lane divided. Rural and urban Interstates remain at 65 and 55 respectively. Only portions of US 20 have been increased.
Kansas	75	Y	70	65	70	65	Eff 3/22/96
Kentucky	70	N	65	55	65	55	No bills passed. Gov stated he would veto any bills to raise S/L.
Louisiana	70	N	70	65	70	65	Eff 8/15/97 - Interstate or controlled access highway 70 MPH; multi-lane divided highway with partial or no controlled access 65 MPH. LA DOT to develop criteria to determine which portions of a highway warrant a speed limit lower than the speed limits established by new law.
Maine	70	N	65	55	65	55	
Maryland	70	Y	65	55	65	55	Eff 7/18/96 - Gov approved speed limit increases on 85 additional miles of highway currently posted at 55 mph. Limits will be increased to 60 mph on 65 miles of highway and to 65 mph on 20 miles of highway. (total mileage posted above 55 mph will be 333 miles). Includes: Interstate 81 near the West Virginia and Pennsylvania state lines (to 65 mph), and Interstate 81 in the vicinity of Hagerstown (to 60 mph).
Massachusetts	65	Y	65	55	65	55	(1/29/96) Raised to 65 mph on 13 major Interstates and highways, 2 sections of Turnpike(1/29/96). (7/1/96) Massachusetts Turnpike, Interstate 90, between I-95/Route 128 and the New York State line had several sections raised from 55 mph to 65 mph (the entire turnpike is now 65 mph from I-95 to the New York State line on the turnpike).
Michigan	70	Y	65	55	65	55	Eff 12/18/96 70 mph permanent on about 500 miles of roads after safety study which began 8/96. Includes parts of I-94, I-69, I-96, I-75, US-131. Currently, most highways posted at 65 mph; 170 miles of urban highways at 55 mph; 500 mostly rural at 70 mph.
Minnesota	65	Y	70	70	65	95	Eff 7/1/97 - Increase 70 mph on approximately 650 miles of interstate freeway in Greater Minnesota (I-35, I-94 and I-90). Increase from 55 mph to 65 mph on approx. 660 miles of non-interstate freeway and expressways (4-lane divided highways). Approximately 120 miles of non-interstate freeway and expressways will remain at 55 mph. All two-lane state highways (approx.10,000 miles) will remain 55 mph.
Mississippi	70	Y	70	65	70	65	Eff 3/12/96
Missouri	70	Y	70/60	65	70/60	65	Eff 3/13/96 - State can raise any road to 70 mph with safety study.

State	Pre NMSL Max (mph)	Exceeds Old NMSL Provisions	Cars		Trucks		August 15, 1997
			Interstate	Other Primary	Interstate	Other Primary	NOTES: *The following is provided for information purposes only. Every effort has been made to ensure that the information is accurate as of the above date. Some States may have made administrative or other changes that are not reflected here. Please contact the individual State for the latest information.*
Montana	unlimited	Y	*	*	65*	60*	Eff 12/8/95 - No max posted limit "reasonable and prudent" (cars/day); 65 mph Interstate, 55 mph all other (cars/night); Trucks max 65 day/ night on Interstate; Triple truck comb. 55 mph (day/night) all roads.
Nebraska	75	Y	75	60	75	60	4/15/96 Gov signed - Eff 6/1/96 increase Interstates to 75 mph (urban 60 mph); Eff 9/1/96 - 2 lane roads 60 mph; 4 lane expressways 65 mph with some exceptions (unless Dept. Of Roads determines otherwise) Substantial increase in fines.
Nevada	unlimited	Y	75	70	75	55	75 and 70 (12/8/95)
New Hampshire	70	N	65	55	65	55	
New Jersey	70	N	55	50	55	50	
New Mexico	70	Y	75	60	75	60	Eff 5/13/96 - 75 mph on interstates; 70 mph on 4 lane with shoulders; 65 on 2 lanes with shoulders; 60 mph on 2 lane highways without shoulders.
New York	55	N	65	55	65	55	
North Carolina	70	Y	70	55	70	55	August, 1996 approximately 400 miles of Interstate to 70 MPH. Effective Oct. 1, 1996, 340 miles of non-Interstate controlled access to 70 MPH based on DOT studies.
North Dakota	75	Y	70	65	70	65	Eff 7/1/97 - Speed limits (subject to review by NDDOT) of 70 mph on Interstates (day and night); 65 mph on 2-lane (day) and multi-lane highways (day and night); and 55 mph on gravel roads (day and night) and two-lane highways (night)
Ohio	70	Y	65	55	55	55	Eff 2/29/96 Implement 5/29/96 - Buses to 65; maintains S/L for cars and trucks for 120 days; can automatically raise Interstate and freeways to 65 after 120 days if OH DOT, OH DPS and local municipality agree to geometry and traffic patterns. After 360 days raise or lower S/L to 65 for rural, divided, multi-lane hwys with same conditions as 120 day option
Oklahoma	70	Y	75/70*	65/55*	75/70*	55	*Gov raised to 70 on Interstates (60 for urban) and other 4 lane divided; 65 other state roads and hwys; 55 on state roads and other hwys night. Turnpike auth raised to 75 rural (min 50); 65 urban (min 40) (6/13/96)
Oregon	75	N	65	55	55	55	
Pennsylvania	65	Y	65	65	65	65	Parts of US 15, 22/232, 119, 220, 222, 422, PA 43 to 65 mph (7/13/95)
Rhode Island	60	Y	65	55	65	55	Eff 5/12/96 - Increase to 65 mph on approx 45 miles of Interstate highways.

State	Pre NMSL Max (mph)	Exceeds Old NMSL Provisions	Cars		Trucks		August 15, 1997
			Interstate	Other Primary	Interstate	Other Primary	NOTES: *The following is provided for information purposes only. Every effort has been made to ensure that the information is accurate as of the above date. Some States may have made administrative or other changes that are not reflected here. Please contact the individual State for the latest information.*
Puerto Rico	65	N	55	55	55	55	No change expected
South Carolina	70	N	65	55	65	55	Bill to raise Interstate to 70 passed House and in Senate.
South Dakota	75	Y	75	65	75	65	Eff 4/1/96 - 75 mph Interstates, 65 mph major 2 lane highways (40 counties will keep 55 mph, 11 to 65 mph, rest undecided (3/25/96)
Tennessee	75	Y	65	55	65	55	Eff 4/22/96 - Legislature approved raising some urban Interstates to 65 mph. (Memphis, Jackson, Knoxville, Chattanooga, Tri-Cities areas) Eff 07/01/96 - divided 4-lane limited access to 65 mph.
Texas	70	Y	70	70	65	60	Eff 12/8/95 - Cars - 70 day/65 night; 60 day/55 night for trucks - on all roads. (3/25/96) TX DOT studies indicate about 23,000 miles will be 70 mph (7/15/96) Texas Transportation Commission approved speed limits lower than the state maximum of 70 mph on about half of the State's 40,748 farm-to-market system.
Utah	70	Y	75	55	75	55	Gov signed bill 3/13/96 - Pending UT DOT posting signs
Vermont	65	N	65	50	65	50	
Virginia	70	Y	65	55	65	55	Dulles Greenway (private, urban, controlled access toll road) raised to 65. Other increases defeated (2/96)
Washington	70	Y	70	55	60	55	Eff 3/11/96
West Virginia	70	N	65	55	65	55	Legislation introduced to allow Commissioner to raise to 70 mph (2/96)
Wisconsin	70	N	65	55	65	55	Bill sent to Gov - increase to 65 on multilane roads after safety study.
Wyoming	75	Y	75	65	75	65	75 rural Interstates; 60 urban Interstates; 65 on 4 and 2 lane roads; some secondary and mountainous roads remain at 55. (being studied) 1/24/96

APPENDIX B -- *FEDERAL REGISTER* NOTICES

National Highway Traffic Safety Administration
Federal Highway Administration

[Docket No. 96-047-NO1]

Study of State Costs and Benefits Associated with Repeal of the National Maximum Speed Limit (NMSL)

AGENCY: National Highway Traffic Safety Administration (NHTSA) and Federal Highway Administration (FHWA), Department of Transportation (DOT).
ACTION: Notice and request for comments.

SUMMARY: This notice invites comments, suggestions and recommendations from State highway and traffic safety officials, highway safety organizations, researchers, and others with an interest in the potential relationship between increases in the speed limit and increases in motor vehicle fatalities and injuries. Specifically, in those States that have raised their speed limits beyond that permitted by the former NMSL, this notice solicits the participation and cooperation of the respective State highway safety officials in the preparation of the study of costs and benefits associated with the repeal of the NMSL, pursuant to Section 347 of the National Highway System Designation Act of 1995.

DATES: Comments are due no later than **August 5, 1996.**

ADDRESS: Written comments should refer to the docket number of this notice and should be submitted to: Docket Section, NHTSA, Room 5109, Nassif Building, 400 Seventh Street, SW, Washington, DC 20590. Docket hours are 9:30 am to 4:00 pm EST.

FOR FURTHER INFORMATION CONTACT: In NHTSA, Delmas Johnson, National Center for Statistics and Analysis, Telephone 202/366-5382, Fax 202/366-7078, Internet address is djohnson@nhtsa.dot.gov. In FHWA, Suzanne Stack, Office of Highway Safety, Telephone 202/366-2620, Fax 202/366-2249, Internet address is sjstack@intergate.dot.gov.

SUPPLEMENTARY INFORMATION: Speeding (exceeding the posted speed limit or driving too fast for conditions) is one of the most prevalent factors contributing to motor vehicle crashes, particularly fatal crashes. In calendar year 1994, speeding was a factor in 30 percent of all fatal crashes, and NHTSA estimates that 12,480 lives were lost in speed-related crashes. NHTSA estimates that an additional 23,000 persons sustained critical injuries, 60,000 sustained moderate injuries, and 500,000 sustained minor injuries, for a total of an estimated 583,000 persons injured in speed-related crashes in 1994. NHTSA estimates the 1994 costs of speed-related crashes to be more than $23 billion.[30]

The National Maximum Speed Limit (NMSL), enacted during the Arab oil embargo of 1973 to conserve fuel, was set at 55 miles per hour (MPH). By March 1974, all States were in compliance with the NMSL. In addition to conserving fuel, the annual traffic fatality toll declined from 54,052 in 1973 to 45,196 in 1974, a drop of over 16%. As a result of the enormous safety benefits in the form of the reduction in traffic fatalities, the Congress passed Public Law (P. L.) 93-643, making the NMSL permanent. P. L. 93-643 also required every State to certify that the NMSL was being enforced.

[30] *Traffic Safety Facts 1994: Speed*, U. S. Department of Transportation, NHTSA, National Center for Statistics and Analysis, 400 Seventh Street, S. W., Washington, DC 20590.

In 1978, the Congress enacted the Surface Transportation Assistance Act (STAA), P. L. 95-599. The STAA required the States to submit data on the percentage of motor vehicles exceeding 55 MPH on public highways with a 55 MPH posted speed limit.

Following the enactment of the NMSL, numerous studies of the benefits and costs of the legislation were conducted. A joint NHTSA/FHWA task force, charged with determining the safety benefits of the NMSL, conducted one of these studies. The NHTSA/FHWA task force concluded that while the "... determination of a precise, accurate estimate of lives saved by the NMSL ... is problematic, there were 20,000 to 30,000 lives saved by the NMSL during the period 1974 - 1978."[31]

The STAA of 1982 required that a study of the "benefits, both human and economic" of the NMSL, with "particular attention to savings to the taxpayers ..." be conducted by the National Academy of Sciences' Transportation Research Board (TRB). In 1984, TRB published its special report, *55: A Decade of Experience*.[32] The TRB study, conducted by a 19 member committee composed of experts from a wide range of disciplines needed to evaluate the costs and benefits of the NMSL, represents one of the most thorough and extensive examinations of this important safety issue. Although the TRB committee recognized the inherent difficulties associated with attempts to accurately estimate the safety, economic, and energy benefits of the NMSL, the study concluded that annually 3,000 to 5,000 fewer traffic fatalities, a savings of $2 billion in fuel costs, a savings of $65 million in taxpayer costs were the result of the NMSL, along with an increase of 1 billion hours in travel time. The TRB study also recognized several unresolved issues, including: the impact of noncompliance; the containment of higher speeds, if permitted, on a limited subset of roads; and whether the control of the speed limit is a state or federal responsibility.

In 1987, the Surface Transportation and Uniform Relocation Assistance Act granted the states the authority to raise the speed limit, not to exceed 65 MPH, on portions of the rural Interstate system. Thirty-eight states raised speed limits on rural Interstates to 65 MPH in 1987, and two additional states adopted the 65 MPH speed limit on rural Interstates in 1988, bringing approximately 90 percent of the 34,000 rural Interstate mileage to 65 MPH. Congress asked for an evaluation of the effects of the 65 MPH speed limit on rural Interstate traffic fatalities for the period 1987 through 1989. NHTSA published the results of this evaluation in several reports to Congress, the last of which was published in 1992[33], estimating the 1990 fatality toll on rural Interstates in the 38 states with 65 MPH limits to be "30 percent greater than might have been expected" or an increase of about 500 fatalities.

National Highway System (NHS)
Designation Act

The National Highway System Designation Act (hereinafter referred to as "the NHS Act") of 1995 (P. L. 104-59) was signed into law on November 28, 1995. The NHS Act, among other things, established the National Highway System and eliminated the Federal mandate for the NMSL. In addition, Section 347 of the NHS Act required the Secretary of Transportation to study the impact of states' actions to raise speed limits above 55/65 MPH:

> Not later than September 30, 1997, the Secretary, in cooperation with any State which raises any speed limit in such State to a level above the level permitted under section 154 of title 23, United States Code, as such section was in effect on September 15, 1995, shall prepare and submit to Congress a study of-

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[31] *The Life-Saving Benefits of the 55 MPH NMSL: Report of the NHTSA/FHWA Task Force*, U. S. Department of Transportation, DOT HS 805-559, October 1980.

[32] *55: A Decade of Experience*, TRB Special Report 204, National Research Council, Washington DC, 1984.

[33] *Effects of the 65 MPH Speed Limit through 1990: A Report to Congress*, U. S. Department of Transportation, NHTSA, Washington, DC, May 1992.

(1) the costs to such State of deaths and injuries resulting from motor vehicle crashes; and
(2) the benefits associated with the repeal of the national maximum speed limit.

Rep. James L. Oberstar, in remarks on his amendment which led to the requirement contained in P. L. 104-59, elaborated on the issues that the study (hereinafter referred to as the "NHS Act study") should address-

> To provide meaningful, useful information, the report should include information on the costs before the State changes its safety laws, and after. It would thus be my intent that the Secretary's report, due September 30, 1997, include information on the costs of motor vehicle crashes in the year before changes go into effect; and again a year later.
>
> The report should include, at a minimum, the costs of acute, rehabilitative and long-term medical care, sources of reimbursement and the extent to which these sources of reimbursement and the extent to which these sources cover actual costs, and the costs to all levels of government, to employers, and others.
>
> All States are not alike. Each State will want to know its own data, so that it can determine whether its problems are coming from alcohol-related or speed-related causes, from not wearing seatbelts and helmets, or other causes, and perhaps adjust its laws accordingly.
>
> The report should therefore also include additional factors such as whether excess speed or alcohol were involved in the accident, whether seat belts and motorcycle helmets were used by those involved in the crash, and any other factors the Secretary may wish to add or State to know.

NHTSA and FHWA (hereinafter referred to as "the agencies") propose a strategy for meeting the legislative requirements, as stated in Section 347 of the Act, in this notice. The proposed strategy is intended to address the complexities of determining the costs and benefits of increased speed limits, while meeting the Congressional deadline of September 30, 1997. A major aspect of the proposed strategy is an emphasis on cooperation between the agencies and the States that have increased their speed limits, as stated in the legislation, for preparation of the study. It is important that the States participate in the NHS study process, as determining the impact of increased speed limits in a particular State will necessitate that an analysis of state-specific data be conducted. In addition, the proposed strategy uses an approach similar to that used in the extensive study conducted by TRB, in order to capitalize on the thorough work done by the TRB committee to examine costs and benefits resulting from decreasing the speed limit.

Data Needs

The agencies have identified several major categories of data needed, as a minimum, to conduct the NHS Act study. These data are critical to studying, to a reasonable degree, the issues related to determining the costs and benefits of increasing speed limits. The following table presents the minimum data requirements for addressing key components of estimating the safety impact of increasing speed limits. It will be important to collect the data described in the following table for a minimum time period of one year before the speed limit change vs. one year after the speed limit change, if at all possible.

Minimum Data Requirements for Conducting NHS Act Study

Purpose	Data Description	Performing Organization
Background	Effective Dates of Change in Limits, Roadway Types, New Limit(s), Types of Vehicles Covered,.	States
Determining the Impact of Increased Speed Limits on Traffic Fatalities	Fatalities - Fatality Analysis Reporting System (FARS)	States -- state impacts NHTSA -- national impacts
Determining the Impact of Increased Speed Limits on Injuries	Injury Crashes and Injured Persons - by road, vehicle types, by speed limit, alcohol involvement, helmet use.	States
Determining the Impact of Increased Speed Limits on Crashes	Crashes of All Severities - by road, vehicle types, by speed limit, alcohol involvement, helmet use.	States
Estimating Benefits	Reduced Travel Time - Commercial & Public Transportation	States
Estimating Costs	Economic Cost of Crashes - Before vs. After Speed Limit Changes, Medical Costs of Crash-Involved Persons	States -- state impacts NHTSA -- national impacts
Determining Exposure	Vehicle Miles Traveled and Speed Distribution	States/FHWA

The agencies request comments from the States and other interested highway safety officials on the proposed data shown above. Specifically, the agencies request comments regarding data availability specific to relevant time periods, data accuracy, suggestions for additional data not mentioned above, and any problems inherent in collecting and/or reporting these data.

Proposed NHS Study Outline

The agencies propose the following outline for the NHS study content. The proposed outline presents a structure for addressing the entire range of issues identified in Section 347 of the Act. The outline is an adaptation of the structure of the TRB special report, *55: A Decade of Experience*. While the data described in the table shown in the previous section, Data Needs, represents the minimum data requirement for conducting the study, the following outline presents an approach for a thorough treatment of the entire range of issues associated with estimating costs and benefits of increased speed limits. The agencies recognize that data may not be available for all of these areas, but in the interest of completeness and to closely follow the TRB report's content, these areas are included. In some instances, collection of specific data may not be possible. However, estimates may be available from past relationships and/or research, or applying some type of multiplicative factors derived from other data sources.

Draft Outline for NHS Study

I. Introduction
   - A. Scope of the study / legislative language
   - B. Legislative history of NMSL and requirements
   - C. Summary of previous experiences
     - 1. Safety
     - 2. Economic

II. Effects on Travel and Vehicle Speeds
   - A. The highway system: mileage, travel and safety
   - B. Amount of travel affected
   - C. Speed and travel changes across highway systems
   - D. Adequacy of speed data for addressing issues

III. Impacts of Increased Speed Limits
   - A. Travel Time (Personal, work, etc.)
   - B. Required Monitoring & Compliance
   - C. Fuel Consumption
   - D. Highway Safety (Fatalities, Injuries, Property Damage, etc.)

IV. Economic Impacts of Increased Speed Limits
   - A. Value of the Effects on Travel Time
   - B. Required Monitoring & Compliance Certification Costs
   - C. Costs Associated with Fuel Consumption
   - D. Motor Vehicle Crash Costs (Medical Care, Lost Productivity, Property Damage, etc.

V. Summary and Conclusions

The material outlined above poses a number of challenges to assessing the impacts of raised speed limits. First and foremost is the collection of appropriate data to address the safety and economic impacts. The crash data collection should be straightforward, although the timing and availability of a sufficient amount of data to meet the report's current deadline may prove to be one of the biggest challenges. Another challenge will be in the area of analyzing the data to provide estimates of effect.

The TRB's report, *55: A Decade of Experience*, is essentially a review of the existing literature on these subjects, supplemented by what appears to be some new analysis at the national level, based on existing studies. The report contains hundreds of references of papers reviewed for consideration in their report. A copy of the

TRB report has been placed in the docket.[34] The report describes methods used to estimate various components such as taxpayer costs and benefits, energy savings, and travel time. In many cases, external information was used (such as the Nationwide Personal Transportation Study) to estimate, on a national level, the amount of travel accounted for by work-related trips, and their average trip length. In some instances, changes proportional to the changes in crashes, injuries and fatalities were assumed.

As stated earlier, one of the objectives of the current report is to study the effect of raised speed limits on, "... the costs of acute, rehabilitative and long-term medical care, sources of reimbursement and the extent to which these sources of reimbursement cover actual costs, and the costs to all levels of government, to employers, and others." This level of detail generally has been unavailable to the traffic safety community, with the possible exception of special, small-scale studies. However, NHTSA recently completed a project, *Crash Outcome Data Evaluation Study* (CODES), that consisted of grants to seven states. The CODES study employed methods whereby statewide data from police crash reports, emergency medical services, hospital emergency departments, hospital discharge files, claims and other sources were linked so that those people injured in motor vehicle crashes could be followed through the health care system. A copy of the Report to Congress (DOT-HS-808-347, February 1996) and the CODES Technical Report (DOT-HS-808-338, January 1996) have been placed in the docket. Based upon the CODES experience, NHTSA continues to encourage states to link these data as a resource for identifying and quantifying traffic safety problems within states, and for evaluating the health-care consequences of various traffic safety policy decisions. In the absence of such linked databases within the states, other approaches to estimating the economic effects on the health-care system will need to be employed.

Lastly, NHTSA's last Report to Congress on the *Effects of the 65 mph Speed Limit Through 1990* (DOT-HS-807-840, June 1992) has been placed in the docket. This report illustrates the type of analysis of crash data that can be performed for estimating the effect of speed limit changes. In this report, a time series regression model was used to estimate the data, using annual data from 1975 through 1986 as the baseline period, and 1987 through 1990 as the 65 mph period. Fatalities on rural interstate highways in the 38 states that increased their speed limits in 1987 were modeled as a function of fatalities on all other roads in these 38 states, and a dummy (0,1) variable representing the absence/presence of the 65 mph speed limit. This approach resulted in a model that fit the data well (i.e., 88 percent of the variation explained). In general, a longer time frame permits more stable estimates than simply comparing the year before vs. the year after, and thus, would be preferable for the current report.

Based on the above outline, the proposed NHS study would attempt to address a wide range of issues on the benefits and costs of the increased speed limits, using a compilation of State-specific data and national estimates. Chapter I - Introduction, would present an overview of the historical background on establishing speed limits, specifically the NMSL, and a brief summary of findings from study of the costs and benefits of the NMSL, similar to the material presented earlier in this notice in Supplementary Information. Chapter II - Effects on Travel and Vehicle Speeds, would rely heavily on information received from the States with increased speed limits, augmented by anecdotal information on the national impact. Chapter III - Impacts of Increased Speed Limits, would present a detailed assessment, using data collected and analyzed by individual States, on the estimated savings in reduced travel time and monitoring/compliance efforts and the estimated impact in terms of increases in motor vehicle crashes, fatalities, injuries, traffic congestion, and fuel consumption. As such, Chapter III encompasses a critical portion of the proposed study and will necessitate that the agencies rely upon the individual States for detailed assessments of the impact of increased speed limits on crashes, particularly injury and property damage crashes, traffic congestion, reduced air quality, and increased fuel consumption. It will be extremely important to receive State information on these key areas for compiling the NHS study, as the agencies will not have direct access to State specific data on these issues. Chapter IV - Economic Impacts of Increased Speed Limits - would present an examination of the actual costs saved in reduction in travel time and the costs incurred as a result of increases in the crash spectrum, fatalities, injuries, and property damage, in detail. As a

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[34] Interested parties may request a copy by contacting the TRB, National Research Council, 2101 Constitution Avenue, NW, Washington, DC 20418.

result, Chapter IV extends the analysis of the data presented in Chapter III by supplementing estimates of increases in motor vehicle crashes, with the economic cost of various components of crash costs. The agencies plan to rely heavily on the State analyses for compiling Chapter IV and intends to augment, as necessary, the State findings with economic cost estimates and a presentation of national estimates of economic costs, as well. Most importantly, the agencies will have to rely exclusively on State specific information for compiling one particular component of Chapter IV, Section D - Impact on public revenues. Chapter V - Summary and Conclusions - would present a summary of the State and National findings from previous chapters, along with observations regarding difficulties encountered by the States and the agencies in the analytical process and general conclusions.

Proposed Schedule

The agencies propose the following schedule for completing the NHS study in order to meet the deadline established by Section 347 of the Act.

Proposed Schedule for Conducting NHS Study

Date	Milestone
August 5, 1996	End 45-day comment period w/comments due to NHTSA/FHWA.
September 27, 1996	Publish final notice on NHS Act study methodology and summary of comments received.
October 1996 thru April 1997	Provide technical support to the States on an "as requested" basis for preparing State-specific studies of the costs/benefits of increased speed limits.
May 30, 1997	States' individual studies on costs/benefits of increased speed limits are due to NHTSA/FHWA.
June 30, 1997	NHTSA/FHWA complete draft NHS Act study report including consolidation of individual State studies.
July 1997	Draft NHS study circulated for review within DOT and to participating States.
August 1997	Final NHS study completed and reviewed/approved by DOT.
September 30, 1997	NHS study sent to Congress.

Issues Regarding Data Availability,
Proposed NHS Act Study Outline, and Schedule

The agencies recognize that the proposed NHS study outline, while comprehensive in addressing the various aspects of determining the benefits and costs of increased speed limits, may present difficulties, based on the timing of the schedule, particularly in terms of data availability. Data availability is a key concern for completing the proposed study at the Federal and State levels. For example, while NHTSA maintains data on traffic fatalities and fatal crashes for the nation in the Fatality Analysis Reporting System (FARS), FARS data for 1996 will be available for analysis in June 1997, three months from the legislative due date for the NHS Act study. Additionally, 1996 data on vehicle miles traveled, a critical measure of exposure needed for fatality and injury rate calculations, will be not available to FHWA until September 1997, at the same time the NHS Act study is due to Congress. As a result, the agencies solicit comments on these proposed requirements, and are particularly interested in answers to the following questions:

1. In the States with increased speed limits, are there data available in the State to address the specific areas outlined in the proposed NHS Act study, especially Chapter III - Impacts of Increased Speed Limits and Chapter IV - Economic Impacts of Increased Speed Limits? If so, to what extent?
2. Do plans currently exist within the State(s) to study the impact - safety and economic - of increased speed limits? If yes, does the State anticipate meeting the proposed schedule for forwarding results of the study to DOT? If there are no current plans to study the impact of increased speed limits, does the State intend to participate in the proposed study effort by contributing information regarding the changes in the State related to increased speed limits?
3. Is the proposed approach reasonable? Are there issues that should be studied that are not included in the proposed outline? Are there issues included in the proposed outline that should be omitted or revised?
4. Is the proposed schedule reasonable? If not, what can reasonably be accomplished within the proposed time frame? What is an alternative schedule that would be more reasonable?
5. Does the proposed schedule provide for a sufficient period of time to evaluate the effects of increased speed limits? For example, the study is tasked with comparing one year before vs. one year after the change in speed limits. States are asked to comment on the timing of their implemented or planned changes in the State speed limit as it relates to the NHS Act study objectives.

The agencies invite public comment on the above questions and other areas of this notice. Interested individuals, highway safety organizations, State highway officials, and others are encouraged to submit comments on these and any related issues. It is requested (but not required) that ten (10) copies of each comment be submitted. Written comments to the docket must be received on or before August 5, 1996. In order to expedite review of this notice and the submission of comments, copies of this notice are being sent simultaneously with issuance to members of the National Association of Governor's Highway Safety Representatives (NAGHSR) and the American Association of State Highway Safety and Traffic Officials (AASHTO). Comments should not exceed fifteen (15) pages in length. Necessary attachments may be appended to the submissions without regard to the fifteen page limit. This limitation is intended to encourage commenters to detail their primary concerns in a concise manner. All comments received before the close of business on the comment closing date listed above will be considered and will be available for examination in the docket room at the above address both before and after that date. To the extent possible, comments filed after the closing date will be considered. Those commenters wishing to be notified upon receipt of their comments by the Docket should include a self-addressed, stamped envelope with their comments. Upon receipt of the comments, the Docket supervisor will return the postcard by U.S. Mail.

Published June 19, 1996
Signed

Donald C. Bischoff,
Acting Executive Director, National Highway Traffic Safety Administration

Anthony R. Kane,
Executive Director, Federal Highway Administration
BILLING CODE 4910-59-P

National Highway Traffic Safety Administration
Federal Highway Administration

[Docket No. 96-047-NO2]

Study of State Costs and Benefits Associated with Repeal of the National Maximum Speed Limit (NMSL)

AGENCY: National Highway Traffic Safety Administration (NHTSA) and Federal Highway Administration (FHWA), Department of Transportation (DOT).
ACTION: Final notice announcing NHTSA/FHWA plan to conduct a study of State costs and benefits associated with the NMSL repeal, as required by Section 347 of the National Highway System (NHS) Designation Act (Pub. L. 104-59).

SUMMARY: This notice is being issued to announce NHTSA's and FHWA's plan to conduct the study (hereinafter referred to as the "NHS Act study") of the State costs and benefits associated with repeal of the National Maximum Speed Limit (NMSL), as required by the National Highway System (NHS) Designation Act (Pub. L. 104-59). NHTSA and FHWA (hereinafter referred to as "the agencies") published a notice in the **Federal Register** (61 FR 31212) on June 19, 1996, inviting comments, suggestions, and recommendations from State highway and traffic safety officials, highway safety organizations, researchers, and others on the agencies' proposed strategy for conducting the NHS Act study. The proposed strategy, as described in the initial notice, included a draft study outline, the minimum requirements for specific data from the States that have raised their speed limits, and a proposed schedule for completing the NHS Act study in order to meet the September 30, 1997, deadline established by Section 347 of the Act. This notice summarizes comments from the States and others on the proposed NHS Act Study and outlines the agencies' plan to meet the legislative requirement, in view of the concerns noted by the States.

FOR FURTHER INFORMATION CONTACT: In NHTSA, Delmas Johnson, National Center for Statistics and Analysis, Telephone 202/366-5382, Fax 202/366-7078, Internet address is djohnson@nhtsa.dot.gov. In FHWA, Suzanne Stack, Office of Highway Safety, Telephone 202/366-2620, Fax 202/366-2249, Internet address is sjstack@intergate.dot.gov.

SUPPLEMENTARY INFORMATION: The National Maximum Speed Limit (NMSL), enacted by the Congress during the Arab oil embargo of 1973 to conserve fuel, was initially set at 55 miles per hour (MPH). By March 1974, all States were in compliance with the NMSL. The Congress later passed legislation to make the NMSL permanent and to require the States to certify that the NMSL was being enforced. Congress also passed legislation requiring that a study of the benefits of the NMSL be undertaken. The National Academy of Sciences' Transportation Research Board (TRB) conducted this study and in 1984, published its special report, *55: A Decade of Experience*.[35] The TRB study, while one of the most thorough and extensive examinations of this important safety issue, recognized the inherent difficulties associated with attempts to accurately estimate the safety, economic, and energy benefits of the NMSL. Even with these difficulties, the TRB study concluded that many lives and taxpayer dollars were saved each year with the NMSL. The TRB study also recognized several unresolved issues, including whether the control of the speed limit is a state or Federal responsibility.

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[35] *55: A Decade of Experience*, TRB Special Report 204, National Research Council, Washington DC, 1984.

In 1987, Congress passed legislation granting the states the authority to raise the speed limit to no more than 65 MPH on the rural Interstate system and certain rural freeways. By 1988, forty states had raised limits on rural Interstates to 65 MPH, bringing approximately 90 percent of the 34,000 rural Interstate mileage to 65 MPH. In 1995, the National Highway System Designation Act (hereinafter referred to as "the NHS Act", Pub. L. 104-59) was passed, establishing the National Highway System and eliminating the Federal mandate for the NMSL. Section 347 of the NHS Act required the Secretary of Transportation to study the impact of actions to raise speed limits above 55/65 MPH, "in cooperation with any State which raises any speed limit in such State to a level above the level permitted under section 154 of title 23, United States Code...", due September 30, 1997.

The agencies proposed a strategy for meeting the study requirements, as stated in Section 347 of the Act, in the initial **Federal Register** (61 FR 31212) notice, published on June 19, 1996. The proposed strategy emphasized cooperation between the agencies and the States that have increased their speed limits, as stated in the legislation, for preparation of the study, along with a proposed schedule for completing the NHS Act study. The agencies recognized in the initial notice that the proposed NHS Act study outline, while comprehensive in addressing the costs and benefits of increased speed limits, posed difficulties based on the proposed schedule, particularly in terms of data availability. The initial notice requested comments on the reasonableness of the proposed draft study outline, the feasibility of the proposed schedule, and the availability of state specific data.

This notice summarizes the comments received addressing the issues raised in the initial notice and describes the agencies' plan to meet the legislative requirement in view of the concerns identified in the comments.

Summary of Comments

A total of 39 official comments to the docket were received from State agencies, private citizens, National Motorists Association (NMA) members, and others. Nineteen (19) States were represented in the official docket comments. Eighteen (18) of the 19 States commenting to the docket have increased limits since the NMSL was repealed or are planning to do so. Many of the comments from the States included concerns regarding the complexity and/or comprehensiveness of the agencies' proposed study outline, often in terms of the burden that would be placed upon the States. Many of the States commented regarding the unavailability of data and the apparent difficulty in meeting the proposed schedule. Comments from private citizens generally supported the repeal of the NMSL, with one exception. Several NMA members and officials commented, expressing views supporting the NMSL repeal and criticizing the proposed study outline. Comments were also received from the National Association of Governor's Highway Safety Representatives (NAGHSR), the Advocates for Highway and Auto Safety (AHAS), the American Trucking Association (ATA), and a consulting firm, JCW Consulting.

Cooperation and participation from the States with increased speed limits is critical to conducting the NHS Act study, as described in Section 347 of the Act. The States commenting to the docket recognized this critical issue and generally commented in three specific areas: Study Methodology, Data Availability, and Scheduling.

1. Study Methodology

While some of the States submitting comments to the docket indicated that the proposed approach was "...solid" or "...reasonable", most commented that the approach was too ambitious. The States also expressed concerns, however, that the approach was too broad, posed an additional burden, and would be difficult to accomplish due to the unavailability of data. NAGHSR commented that the proposed approach is reasonable "...only if all states' data were available.." AHAS commented that while the proposed approach was appropriate, "...reliance on state analyses and failure to consider other...issues" were important concerns.

2. Data Availability

The issue of data availability was addressed to some extent in all of the comments received from the States, along with some of the comments from private citizens and JCW Consulting. All of the States submitting

comments to the docket expressed concerns related to the unavailability of data to meet the proposed NHS Act study outline. Among the reasons cited for lack of available data were: specific data not presently collected by the states, e.g., speed monitoring, medical costs related to crash injuries; not possible to provide data in time to meet the proposed schedule; lack of resources; data currently collected inadequate for determining benefits and costs specifically related to increased speeds. Some States suggested that the agencies develop standards for estimating benefits and costs, particularly in the absence of specific state data collection efforts.

3. Scheduling

The States commenting to the docket consistently voiced the concern that the proposed schedule was ambitious, unreasonable, impossible, or unrealistic. One State suggested extending the proposed schedule one year past the September 30, 1997, deadline to avoid creating a "second-rate report." Three of the 18 States commenting to the docket indicated that plans existed to study the impact of increased speed limits in their respective State. However, all three States indicated that results from such studies would not be available in time to submit to the agencies for inclusion in the NHS Act Study. A concern regarding the before and after time frame of one year, as specified in Section 347 of the Act, was also expressed by several States and the ATA. ATA suggested that the agencies use a ten year baseline for conducting the study. Many of the States commented that one year of data after the increased limits became effective may not be adequate for analysis to determine impact. This issue is further complicated in that only nine States (Arizona, California, Illinois, Massachusetts, Montana, Nevada, Oklahoma, Pennsylvania, and Wyoming) may have had increased speed limits in place for at least nine months of calendar year 1996. This would mean, at best, that only one calendar year of data for the time frame after the increased speed limit was in place would be available for these nine States. States with increased speed limits becoming effective later in 1996, therefore, would not have one full year of final data to forward to the agencies prior to the report due date of September 30, 1997.

Analytical Challenges

Due to the concerns expressed by the States and others in the areas of study methodology, data availability, and scheduling, the agencies are faced with several major analytical challenges to conducting the NHS Act study. Several of the States specifically indicated that certain types of data, e.g., decreased travel time, increased fuel consumption, and increased or decreased medical costs, would not be available in time for inclusion in the report or was not presently being collected. Without this type of information from the States, it will be difficult for the agencies to address the entire range of benefits due to increased speed limits in the NHS Act study. The issue of data availability is further complicated in that many States are selectively increasing speed limits on certain road segments and/or roadway types, e.g., 4-lane roads, rather than systemwide, e.g., all Interstates. While the selective application of increased speed limits is indicative of the cautiousness on the part of many States in adopting higher limits, it further complicates the issue of data availability by necessitating the analysis of data by road segment. At the national level, determining the impact of increased speed limits on traffic fatalities will be limited to the latest available data from the Fatality Analysis Reporting System (FARS) for calendar 1996, focusing on the nine States that have had increased speed limits in place for most or all of 1996. Finally, determining the impact of increased speed limits related to the amount of vehicle miles traveled and the distribution of vehicle speeds on affected roadways will be limited at best to the preliminary information available to the agencies in the summer of 1997.

The agencies' final plan for conducting the NHS Act study, in view of the States' concerns and the analytical challenges discussed above, is described in the following section.

NHS Act Study Data

The initial **Federal Register** notice described several major categories of data the agencies needed, as a minimum, for addressing critical components of estimating the impacts of increasing speed limits. Based on the comments from the States and others in the area of data availability, the agencies plan to conduct the NHS Act

study using the data described in the following table. This table represents a subset of the minimum data requirements included in the initial **Federal Register** notice.

NHS Act Study Data & Outline

Purpose	Data Description	Performing Organization
Background	Effective Dates of Change in Limits, Roadway Types, New Limit(s), Types of Vehicles Covered	NHTSA/FHWA & States
Determining the Impact of Increased Speed Limits on Traffic Fatalities	Fatalities - 1996 Fatality Analysis Reporting System (FARS)	NHTSA -- national estimates & impact on limited number of States
Estimating Costs	Economic Cost of Crashes - Before vs. After Speed Limit Changes, Costs of Fatalities	NHTSA -- national estimates
Determining Exposure	Vehicle Miles Traveled and Speed Distribution	FHWA -- VMT: preliminary estimates, if available; Speed monitoring: from those States making voluntary submissions

As discussed in Analytical Challenges, the agencies' ability to address the impacts of increased speed limits on injury and other crashes and estimating benefits in the NHS Act study will depend on what the States are able to provide within the study schedule. The agencies plan to use a methodology similar to that used in NHTSA's last Report to Congress on the *Effects of the 65 mph Speed Limit Through 1990* (DOT-HS-807-840, June 1992). This report illustrates the type of analysis of crash data that can be performed for estimating the effect of speed limit changes. In this report, a time series regression model was used to estimate the data, using annual data from 1975 through 1986 as the baseline period, and 1987 through 1990 as the 65 mph period. Fatalities on rural interstate highways in the 38 states that increased their speed limits in 1987 were modeled as a function of fatalities on all other roads in these 38 states, and a dummy (0,1) variable representing the absence/presence of the 65 mph speed limit. This approach resulted in a model that fit the data well (i.e., 88 percent of the variation explained).
In general, a longer time frame permits more stable estimates than simply comparing the year before vs. the year after, and thus, would be preferable for the current report.

Schedule for Conducting the NHS Act Study

The agencies plan to conduct the NHS Act study within the following schedule in order to meet the deadline established by Section 347 of the Act.

Schedule for Conducting NHS Study

Date	Milestone
[insert date of publication in the Federal Register]	Publish final notice on NHS Act study plan and summary of comments received in response to initial notice.
April 1 - May 30, 1997	Informally canvas States on the availability of any State-specific studies on the impact of increased speed limits.
June 30, 1997	NHTSA/FHWA complete draft NHS Act study report including consolidation of individual State studies, as available.
July 1997	Draft NHS study circulated for review within DOT (and specific States, as appropriate).
August 1997	Final NHS study completed and reviewed/approved by DOT.
September 30, 1997	Final NHS study sent to Congress.

The NHS Act Study as outlined above will provide the agencies and Congress with a preliminary assessment of the impact of increased speed limits for a limited number of States. The agencies plan to continue informally to communicate with the States regarding the impact of increased speed limits, as more States have had the increased limits in effect for longer time periods.

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Signed

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