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EVALUATION OF 2004 TENNESSEE CRASH DATA REPORTED TO MCMIS CRASH FILE

PAUL E. GREEN
ANNE MATTESON

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Paul E. Green
Anne Matteson

The University of Michigan
Transportation Research Institute
Ann Arbor, MI 48109-2150
U.S.A.

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16. Abstract

This report is part of a series evaluating the data reported to the Motor Carrier Management Information System (MCMIS) Crash File undertaken by the Center for National Truck and Bus Statistics at the University of Michigan Transportation Research Institute. The earlier studies showed that reporting to the MCMIS Crash File was incomplete. This report examines the factors that are associated with reporting rates for the state of Tennessee.

MCMIS Crash File records were matched to the Tennessee Crash file to determine the nature and extent of underreporting. Overall, it appears that Tennessee is reporting 51.3 percent of crash involvements that should be reported to the MCMIS Crash file.

Reporting rates vary by crash severity and vehicle type. Overall, about 93.5 percent of fatal involvements are reported, compared with 54.8 percent of injury/transported involvements, and 47.4 percent of towed/disabled involvements. Crashes involving large trucks such as tractor-semitrailers or doubles combinations were more likely to be reported than crashes involving small, single-unit trucks or buses. The reporting rate for the Tennessee Highway Patrol is 57.0 percent, while the rate for city police is 49.9 percent and the rate for sheriff's offices is 37.8 percent.

Missing data rates are not negligible for more than a few variables in the MCMIS Crash file. Certain key variables such as vehicle configuration are more than 95 percent missing. Missing data rates are also elevated for sequence of events variables, number of vehicles in the crash, and driver license class. Hazardous materials variables display some inconsistencies between data in the MCMIS file and data recorded in the Tennessee file.

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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yard	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
	NOTE: volumes greater than 1000 L shall be shown in m^3			
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
		TEMPERATURE (exact degrees)		
^oF	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	^oC
		ILLUMINATION		
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	$candela/m^2$	cd/m^2
		FORCE and PRESSURE or STRESS		
lbf	poundforce	4.45	newtons	N
lbf/in^2	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
		VOLUME		
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	cubic meters	35.314	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
		TEMPERATURE (exact degrees)		
^oC	Celsius	1.8C+32	Fahrenheit	^oF
		ILLUMINATION		
lx	lux	0.0929	foot-candles	fc
cd/m^2	$candela/m^2$	0.2919	foot-Lamberts	fl
		FORCE and PRESSURE or STRESS		
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.
(Revised March 2003)

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Evaluation of 2004 Tennessee Crash Data Reported to the MCMIS Crash File

1. Introduction

The Motor Carrier Management Information System (MCMIS) Crash file has been developed by the Federal Motor Carrier Safety Administration (FMCSA) to serve as a census file of trucks and buses involved in traffic crashes meeting a specified selection criteria and crash severity threshold. FMCSA maintains the MCMIS file to support its mission to reduce crashes, injuries, and fatalities involving large trucks and buses. It is essential to assess the magnitude and characteristics of motor carrier crashes to design effective safety measures to prevent such crashes. The usefulness of the MCMIS Crash file depends upon individual states transmitting a standard set of data items on all trucks and buses involved in traffic crashes that meet a specific severity threshold.

The present report is part of a series of reports evaluating the completeness and accuracy of the data in the MCMIS Crash file. Previous reports on a number of states showed underreporting due in large part to problems in interpreting and applying the reporting criteria. The problems were more severe in large jurisdictions and police departments. Each state also had problems specific to the nature of its system. Some states also had overreporting of cases, often due to technical problems with duplicate records. The states are responsible for identifying and reporting qualifying crash involvements. Accordingly, improved completeness and accuracy must ultimately reside with the individual states.

In this report, we focus on MCMIS Crash file reporting by Tennessee (references 1 through 18 at the end of this report provide documentation for evaluations of other states). In recent years, Tennessee has reported from 1,020 to 3,420 involvements annually to the MCMIS Crash file. According to the 2002 Vehicle Inventory and Use Survey, Tennessee had 106,000 medium and heavy trucks registered in 2002. This ranks Tennessee 21st among the states and accounts for 2.0 percent of truck registrations nationwide [19]. In the years from 2000 to 2005 inclusive, Tennessee consistently ranks 16th in terms of state population each year [20], and in the five years from 1999 to 2003 had the 12th largest number of total truck fatal involvements [21].The method employed in this study to evaluate reporting to the MCMIS Crash file is similar to evaluations conducted in previous studies.

1. The complete police accident report file (PAR file hereafter) from Tennessee was obtained for the most recent year available, 2004. This file was processed to identify all cases that qualified for reporting to the MCMIS Crash file.

2. All cases in the Tennessee PAR file—those that qualified for reporting to the Crash file as well as those that did not—were matched to the cases actually reported to the MCMIS Crash file from Tennessee.

3. Cases that should have been reported, but were not, were compared with those that were reported to identify the sources of underreporting.

4. Cases that did not qualify but which were reported were examined to identify the extent and nature of overreporting.

Police accident report (PAR) data recorded in Tennessee's statewide files as of October 20, 2006 were used in this analysis. The 2004 PAR file contains the computerized records of 247,255 vehicles involved in 142,058 crashes that occurred in Tennessee.

2. Data Preparation

The Tennessee PAR file and MCMIS Crash file each required some preparation before the Tennessee records in the MCMIS Crash file could be matched to the Tennessee PAR file. In the case of the MCMIS Crash file, the only processing necessary was to extract records reported from Tennessee and to eliminate duplicate records. The Tennessee PAR file required more extensive work to create a comprehensive vehicle-level file from accident, vehicle, and occupant files. The following sections describe the methods used to prepare each file and some of the problems uncovered.

2.1 MCMIS Crash Data File

The 2004 MCMIS Crash file as of May 23, 2006 was used to identify records submitted from Tennessee. For calendar year 2004 there were 3,381 cases. An analysis file was constructed using all variables in the file. The file was then examined for duplicate records (those involvements where more than one record was submitted for the same vehicle in the same crash; i.e., the report number and sequence number were identical). Based on this criterion, two duplicate pairs were found. However, further examination suggests that these records are not duplicates. In the first case, since driver name and carrier name are different, it appears that both vehicles were in the same accident, but that identical sequence numbers were incorrectly assigned. In the second case, accident time, street name, driver name, and carrier name differed between the two records. This appears to be two different accidents in which report number may have been incorrectly recorded. Since these records do not seem to be duplicates, they were left in the MCMIS Crash file.

In addition, records were examined for identical values on other variables that would not be expected to be identical between two cases. Unfortunately, the variables driver date of birth, driver license number, VIN, and vehicle license number could not be used because of high percentages of missing data. Cases were analyzed using crash date, crash time, crash street, officer badge number, driver last name, and carrier name. This process identified 14 duplicate pairs and one triplicate, representing 31 cases. In ten pairs, all variables were the same except vehicle sequence number and MCMIS upload/change dates. It appears the vehicle record may

have been mistakenly entered a second time. In two pairs, all variables were the same except sequence number, and a couple of other variables. It is possible the records were mistakenly entered twice, possibly due to corrections. In two other pairs, all variables were the same, except sequence number. Finally, in the one triplicate, the three cases had different accident numbers while some of the other variables differed. The same driver was in three different crashes at the same time. Perhaps an update was intended. In all cases, the member of the pair with the most unrecorded variables, or the one that had the earliest MCMIS upload date was excluded. Thus, 16 cases were excluded (two in the case of the triplicate), resulting in 3,365 cases in the MCMIS file.

2.2 Tennessee Police Accident Report File

The 2004 Tennessee PAR data, dated October 20, 2006, was obtained from the state of Tennessee. The data were contained in a set of four text files representing accident, vehicle, person, and truck/bus records. The combined files contain records for 142,058 crashes involving 247,255 vehicles. Data for the PAR file are coded from the Tennessee Uniform Traffic Crash Report (SF-1203, Department of Safety) completed by police officers (Appendix B).

The PAR file was first examined for duplicate records. A search for records with identical case numbers and vehicle numbers found 328 such instances. The records appeared to be from the same accident, based on other variables. However, in all but 18 pairs, VIN, license plate number, and driver license number were different. This implies that these were two different vehicles in the same accident. Thus, except for the 18 pairs that seem to be duplicates, the others are not considered duplicates since vehicle number may have been assigned incorrectly.

In addition, inspection of case numbers verified that they were recorded in a consistent format, so there was no reason to suspect duplicate records based on similar, but not identical, case numbers (such as 07207733 and 072-7733, for example). However, cases were also examined to determine if there were any records that contained identical time, place and vehicle/driver variables, even though their case numbers were perhaps different. Two cases would not be expected to be identical on all variables. To investigate this possibility, records were examined for duplicate occurrences based on the variables accident date, time, county, reporting officer’s badge number, driver license number and VIN. A total of 220 cases were found (including the 18 pairs identified above and two triplicates), representing 109 unique occurrences of the examined variables.

Duplicate pairs (triplicates) were examined more closely for any patterns that might explain why they were occurring. Since not all variables among the duplicate pairs were identical, one member of the pair may have been intended only as an update. This correction process could have resulted in a duplicate record being mistakenly entered into the database.

The pairs identified above were considered to be duplicates and one (or more) member(s) of each pair was excluded. In many cases the date loaded variable was identical among both cases. Not knowing which record was the duplicate, one member of each pair was deleted. After deleting 111 cases, the PAR file contained 247,144 records.

3. Matching Process

The next step involved matching records from the Tennessee PAR file to corresponding records from the MCMIS file. After removing duplicates, there were 3,365 Tennessee records from the MCMIS file available for matching, and 247,144 records from the Tennessee PAR file. All records from the Tennessee PAR data file were used in the match, even those that were not reportable to the MCMIS Crash file. This allowed the identification of cases in the MCMIS Crash file that should not have been reported.

Matching records in the two files requires finding combinations of variables common to the two files that have a high probability of uniquely identifying accidents as well as specific vehicles within an accident. The case number variable, which is the identifier used to uniquely identify a crash in the Tennessee PAR data, and report number in the MCMIS Crash file, are obvious first choices. Indeed, there appeared to be a correspondence between the two numbers, and case number was never unrecorded in either file. The case number in the Tennessee PAR file is a ten-digit character value, while in the MCMIS Crash file report number is stored as a 12-character alphanumeric value, a combination of alphabetic characters and numbers. It appears that the report number in the MCMIS Crash file is constructed such that the first two columns contain the state abbreviation (TN, in this case), followed by ten digits. Since eight of these digits are consistent with the PAR case number, the last eight digits of the MCMIS report number and PAR case number were extracted, and these two variables were used in the match.

Other variables available for matching at the accident level included crash date, crash time (hour/minute), crash county and city code, and reporting officer's badge number. However, unrecorded rates in the MCMIS data were high for county and city code, 48% and 99%, respectively. These two variables were therefore not used in the match.

Variables in the MCMIS file that could distinguish one vehicle from another within the same accident include vehicle sequence number, vehicle license plate number, driver license number, VIN, driver date of birth, and driver last name. However, vehicle sequence number did not appear to correspond between the two files. The variables vehicle license plate number, driver license number, VIN, and driver date of birth were unrecorded in 97% to 99% of MCMIS cases, and thus could not be used for the match. Of the available variables, driver last name was the most reliable, as it was unrecorded 7.4% of the time in the PAR file, and in only 1.8% of MCMIS cases. In addition, owner zip code and owner city were used in the match.

Five separate matches were performed using the available variables. In each match step, records in either file with duplicate values on all the match variables were excluded, along with records that had missing values on the match variables. The first match included the variables case number, driver last name, and owner zip code. The second match step replaced owner zip code with owner city. The third match step matched on crash month, day, time (hhmm), reporting officer's badge number, and driver last name. After reviewing the remaining non-matched cases, the fourth match just used case number and the first two characters of driver last name. Each of the matched cases resulting from the fourth match attempt were examined in detail to ensure the match was valid. The remaining cases were hand-matched, based on all variables.

This process resulted in matching 3,290/3365 = 97.8 percent of the MCMIS records to the PAR file. Some of the 75 MCMIS cases that could not be matched may very well be reportable trucks/buses, but because driver name and other vehicle-specific variables were missing, it was not possible to match those cases to the PAR file. In some cases there was more than one truck in the accident, but since only one was submitted to MCMIS, it was not possible to determine which PAR case matched the submitted case. Table 1 shows the variables used in each match step along with the number of records matched. Matched records were verified using other variables common to the MCMIS and PAR files as a final check to ensure the match was valid.

Table 1 Steps in MCMIS/Tennessee PAR File Match, 2004

Match step	Matching variables	Cases matched
Match 1	case number, driver last name, owner zipcode	1,605
Match 2	case number, driver last name, owner city	382
Match 3	crash date, crash time, officer badge number, and driver last name	1,053
Match 4	case number, driver last name (2-characters)	130
Match 5	hand matches based on all variables	120
Total cases matched		3,290

Figure 1 shows the flow of cases in the matching process. Of the 3,290 matched cases, 189 are not reportable and 3,101 are reportable. The next section discusses the process of identifying cases that qualify for reporting to the MCMIS Crash file.

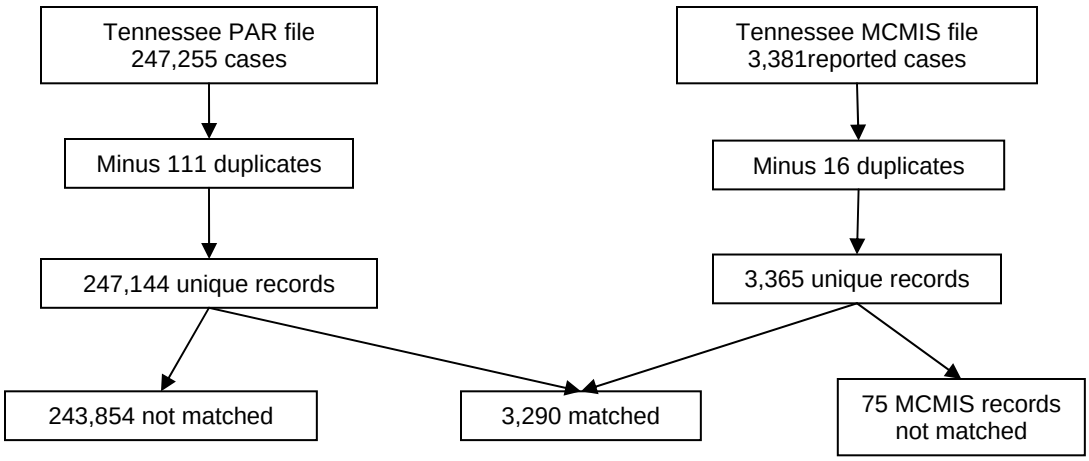


Figure 1 Case Flow in MCMIS/Tennessee Crash File Match

4. Identifying Reportable Cases

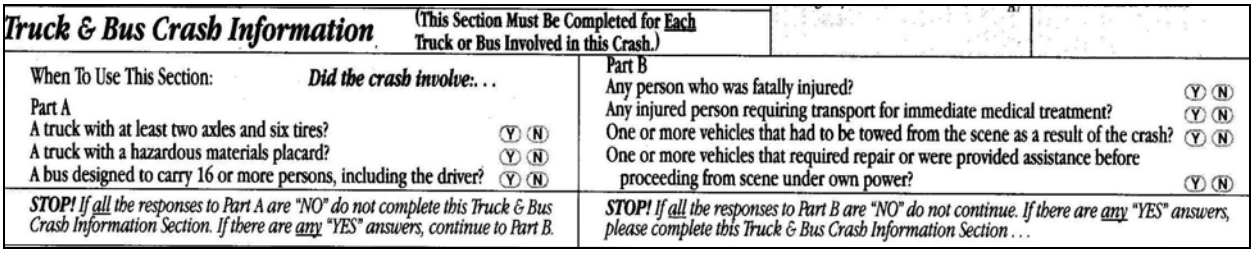
The next step in data preparation is to identify records in the Tennessee data that qualified for reporting to the MCMIS Crash file. Records are identified using the information available in the computerized crash files that were obtained from Tennessee. To identify reportable records, information is used that is completed by the officers for all vehicles. For example, in some states traffic crash reports contain certain data elements that are to be collected for the MCMIS file in a special section or supplemental form, with the instruction to the officer to complete that section if the vehicle and crash meets the MCMIS reporting criteria. However, the goal of this study is to identify all reportable cases, even those a reporting officer may have overlooked. For this reason, data that is completed for all cases are used. The goal of the selection process is to approximate as closely as possible the reporting threshold of the MCMIS file. The MCMIS criteria for a reportable crash involving a qualifying vehicle are shown in Table 2.

Table 2 Vehicle and Crash Severity Threshold for MCMIS Crash File

Vehicle	Truck with GVWR over 10,000 or GCWR over 10,000, or Bus with seating for at least nine, including the driver, or Vehicle displaying a hazardous materials placard.
Accident	Fatality, or Injury transported to a medical facility for immediate medical attention, or Vehicle towed due to disabling damage.

The process of identifying reportable records, as set out in Table 2 above, is fairly straightforward in the Tennessee PAR file, because Tennessee crash data includes most of the variables and levels needed to identify reportable cases. Tennessee, like many other states, uses a

supplemental Truck and Bus Crash Information form that officers must complete for each truck or bus involved in the crash (Appendix B). The main PAR form contains a bubble that should be checked to indicate whether the Truck/Bus Supplement was filled out. Instructions at the top of the supplemental form specify the criteria for filling out the form. Figure 2 shows the questions and bubbles that officers check on the supplemental form.



Truck & Bus Crash Information (This Section Must Be Completed for Each Truck or Bus Involved in this Crash.)

When To Use This Section: ***Did the crash involve:. . .***

Part A
- A truck with at least two axles and six tires? (Y) (N)
- A truck with a hazardous materials placard? (Y) (N)
- A bus designed to carry 16 or more persons, including the driver? (Y) (N)

STOP! *If all the responses to Part A are "NO" do not complete this Truck & Bus Crash Information Section. If there are any "YES" answers, continue to Part B.*

Part B
- Any person who was fatally injured? (Y) (N)
- Any injured person requiring transport for immediate medical treatment? (Y) (N)
- One or more vehicles that had to be towed from the scene as a result of the crash? (Y) (N)
- One or more vehicles that required repair or were provided assistance before proceeding from scene under own power? (Y) (N)

STOP! *If all the responses to Part B are "NO" do not continue. If there are any "YES" answers, please complete this Truck & Bus Crash Information Section . . .*

Figure 2 Supplemental Truck and Bus Crash Information on Tennessee Crash Report Form

The vehicle criteria approximate the MCMIS definition of a qualifying vehicle, although they are a bit out of date. Current criteria are stated in Table 2. Note that the question in Figure 2 specifies a truck with at least two axles and six tires, and makes no reference to GVWR, although the definition as shown in Figure 2 is most likely easier for officers to apply. In addition, the bus criterion is for 16 or more persons, but the current definition specifies 9 or more persons. The Tennessee definition of a hazardous materials placarded vehicle applies to a truck, whereas the MCMIS criterion applies to any vehicle displaying a hazardous materials placard. With respect to the crash severity criteria the fatal and 'injured and transported' thresholds match well in Part B of the form. The towed due to disabling damage criterion appears to be covered by two questions in Part B of Figure 2.

The supplemental Truck and Bus Crash Information form also includes variables pertaining to the MCMIS criteria, namely, combined GVWR, vehicle configuration, and hazmat placard. However, for purposes of this study, variables from the main PAR form, covering *all* vehicles are used to identify eligible vehicles (Appendix B).

The Tennessee computerized crash file contains a variable that is useful for identifying trucks and buses. The body code is a 57-level numeric variable containing standard vehicle configuration codes. The vehicle classification system used by Tennessee includes codes that generally correspond with the vehicle configuration variable in the MCMIS Crash file. Table 3 shows the relevant body style codes in the Tennessee PAR data.

Table 3 Relevant Vehicle Body Style Codes on Tennessee Accident File

Buses
School bus
Van-based school bus
Cross Country/Intercity bus
Transit bus (city bus)
Van-based transit bus
Other bus type
Unknown bus type
Heavy/Medium Truck (over 10,000 lbs GVWR)
Step van
Single-unit straight truck (10,001-26,000 lb GVWR)
Single-unit straight truck (26,000+ lb GVWR)
Single unit straight truck (GVWR unknown)
Truck tractor (cab only)
Truck tractor (with any number of trailing units)
Unknown medium/heavy truck type

The PAR file covering all vehicles does not contain a variable denoting whether the vehicle displayed a hazardous materials placard, so these vehicles were identified using the hazardous placard variable from the truck and bus supplemental form. This suggests that hazmat information would not be recorded for nontrucks, such as passenger vehicles. Yet, a cross-tabulation of the variables hazmat placard and body code shows that 10 nontrucks were recorded as hazmat placarded vehicles.

In total, there were 14,592 vehicles identified as trucks, buses, or vehicles with a hazardous materials placard in the Tennessee Par file (Table 4). About 90.1 percent of these vehicles are qualifying trucks, 9.8 percent are buses, and 10 are nontrucks with a hazmat placard, as described above. The 14,592 eligible vehicles represent 5.9 percent of all 247,144 vehicles in the Tennessee PAR file. For MCMIS evaluations of other states, this percentage has ranged from 2.6 percent to 6.1 percent.

Table 4 Vehicles Meeting MCMIS Vehicle Criteria, Tennessee PAR File, 2004

Vehicle Type	N	%
Trucks	13,152	90.1
Buses	1,430	9.8
Non-trucks with hazmat placard	10	0.1
Total	14,592	100.0

Having identified qualifying vehicles, the next step is to identify crashes of sufficient severity to qualify for reporting to the MCMIS Crash file. Qualifying crashes include either a fatality, an injury transported for immediate medical attention, or a vehicle towed from the scene due to disabling damage. Fatal crashes are readily identified using the crash type variable.

Whether a crash included an injured person transported for medical attention can also be determined. For each person involved in a motor vehicle crash, the PAR contains the severity of the injury (using the usual KABC0 scale), along with transport (yes/no) and the name of the facility. There was some inconsistency and ambiguity. For example, 132 incapacitating injuries were coded "Not transported," and in an additional 57 cases, the transport and facility name variables were left blank.

Accordingly, to identify crashes in which an injured person was transported for medical attention, all crashes in which a person was injured and the transport field was coded 'yes' were included. In addition, cases were included if the transport field was coded as '*' (unknown) or was missing, but the name of a valid medical facility was entered in the ambulance/hospital field. In some cases the ambulance/hospital field included entries such as 'refused', 'treated at scene', none', or 'no transport'. These were not considered valid entries, and thus these cases were not considered transported.

With respect to towed vehicles, the Tennessee PAR file has a towed variable and an extent of damage variable. If the vehicle was towed, the officer is instructed to enter the name of the garage or the location to which it was towed. The officer also records the extent of damage that the vehicle sustained: none, very minor, minor, moderate, severe, very severe, or unknown. Descriptions of the severe and very severe categories state explicitly that the vehicle is *not drivable*. Moderate damage is described as 'Vehicle quarterpanels are dented or creased. Broken or missing parts can either be replaced or repaired. Vehicle frame or unibody are not damaged. Includes engine compartment fires.'

All vehicles were included if damage extent was severe or very severe since the definition above states that the vehicle was not drivable. However, in the Tennessee PAR file, those with severe or very severe damage extent account for only 53 percent among all towed vehicles. Previous knowledge of these variables suggests that 53 percent is too low. For example, examination of the towed (manner of leaving scene) variable available in the 2005 General Estimates System (GES) data, indicates that nationally about 85 percent of towed vehicles are towed due to damage [22]. Based on these considerations, vehicles were also included if they were towed and damage extent was *moderate*. When these vehicles are included, approximately 92 percent of towed vehicles are represented.

Table 5 shows the numbers of qualifying vehicles that meet the threshold for a MCMIS reportable crash according to the MCMIS criteria. In total, it is estimated that 6,046 vehicles

were reportable to the MCMIS Crash file. Of these, 154 were involved in fatal crashes, 2,187 or 36.2 percent were involved in injury crashes where at least one person was transported for medical attention, and 3,705 or 61.3 percent were involved in crashes where at least one vehicle was towed due to disabling damage.

Table 5 Reportable Records in Tennessee Crash File, 2004

Crash type	Total	%
Fatal	154	2.6
Injury transported for treatment	2,187	36.2
Vehicle towed due to damage	3,705	61.3
Total	6,046	100.0

5. Factors Associated with Reporting

The procedure described in the previous section identified 6,046 vehicles involved in crashes as reportable to the MCMIS Crash file. The match process described in Section 3 determined that 3,365 unique cases were reported to the MCMIS Crash file, of which 3,290 could be matched to the Tennessee PAR data. Of the 3,290 cases that could be matched, 3,101 were determined to meet the MCMIS Crash file reporting criteria. Therefore, of the 6,046 reportable crashes in 2004, Tennessee reported 3,101, for an overall reporting rate of 51.3 percent. In this section, some of the factors that affect the chance that a qualifying crash would be submitted through the SafetyNet system and appear in the MCMIS Crash file are identified. The results are presented in four subsections: overreporting, case processing, reporting criteria, and reporting agency and area. Analysis of overreporting attempts to identify why cases were submitted that do not meet the MCMIS reporting criteria as defined by Table 2. Case processing deals with timing issues in reporting such as crash month and time lag between crash date and uploading date to the MCMIS Crash file. Reporting criteria includes factors such as vehicle type, crash severity, carrier type, and vehicle license plate state. Finally, reporting agency is associated with differences in reporting rates due to the agency, such as state police or local police, while area investigates reporting by location, such as the county where the crash occurred.

5.1 Overreporting

MCMIS evaluations tend to focus on underreporting because sources of underreporting tend to be more prevalent than overreporting. However, almost all states overreport cases to some degree. Overreporting results when cases are submitted to the MCMIS Crash file that do not meet the criteria for a reportable crash. Since 3,290 MCMIS cases could be matched to the Tennessee PAR data, and 3,101 were determined to meet the reporting criteria, the difference, or 189 cases, were not reportable, and should not have been reported. Table 6 shows a two-way classification of vehicle type and crash severity, and provides some explanation as to why these

vehicles should not have been reported to the MCMIS Crash file. Note that all 189 vehicles do not meet the crash severity threshold for a MCMIS reportable crash. In addition, 101 vehicles do not meet the vehicle criteria since they are not trucks, buses, or hazmat placarded vehicles. The 81 trucks and 7 buses are qualifying vehicles, but they were involved in crashes in which there were no fatalities, no persons were injured and transported for medical attention, and no vehicles were towed due to disabling damage.

Table 6 Distribution of Non-reportable Vehicles in MCMIS Crash File, Tennessee 2004

Vehicle type	Crash severity				
	Fatal	Transported injury	Towed/disabled	Other crash severity	Total
Truck	0	0	0	81	81
Bus	0	0	0	7	7
Other vehicle (not transporting hazmat)	0	0	0	101	101
Total	0	0	0	189	189

5.2 Case Processing

Delays in transmitting cases may partially account for the incompleteness of the MCMIS Crash file. The time lag in extracting and submitting reports to the MCMIS Crash file might explain some portion of the unreported cases. All reportable crash involvements for a calendar year are required to be transmitted to the MCMIS Crash file within 90 days of the date of the crash. The MCMIS file used in this evaluation was dated May 23, 2006, so all 2004 cases should have been reported by that date.

Table 7 shows reporting rates according to month of the crash. The numbers of reportable cases is fairly consistent, ranging between 400 and 600 a month. However, the smallest reporting rates are in some of the summer months. The smallest reporting rate of 25.0 percent occurs in August. In addition, the largest percentage of 13.5 percent of total unreported cases also occurs in August. The reporting rate in July is 37.5 percent, which is the second lowest rate. On the other hand, the reporting rates in November and December are consistent and the largest. During these months at the end of the year the reporting rates are 81.2 percent and 81.3 percent, respectively. Note that the percentages of total unreported cases during these two months are 3.3 percent and 3.6 percent, the smallest percentages shown in Table 7. For the remaining eight months the rates do not deviate markedly from the overall rate of 51.3 percent, and the percentages of total unreported cases range between 7.1 percent and 9.8 percent.

Table 7 Reporting Rate by Accident Month, Tennessee 2004

Crash month	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
January	518	45.6	282	9.6
February	432	51.9	208	7.1
March	454	47.4	239	8.1
April	533	46.0	288	9.8
May	497	50.5	246	8.4
June	462	44.8	255	8.7
July	445	37.5	278	9.4
August	532	25.0	399	13.5
September	517	46.0	279	9.5
October	573	53.2	268	9.1
November	510	81.2	96	3.3
December	573	81.3	107	3.6
Total	6,046	51.3	2,945	100.0

Figure 3 shows the average latency in case submission by month, where latency is the number of days between crash date and the date the case was uploaded to the MCMIS Crash file, minus the 90-day grace period. Therefore, a positive number for a month indicates the average number of days cases were submitted after the 90-day grace period. Negative numbers indicate that on average, cases were submitted within the 90-day grace period for a month. The plot shows a

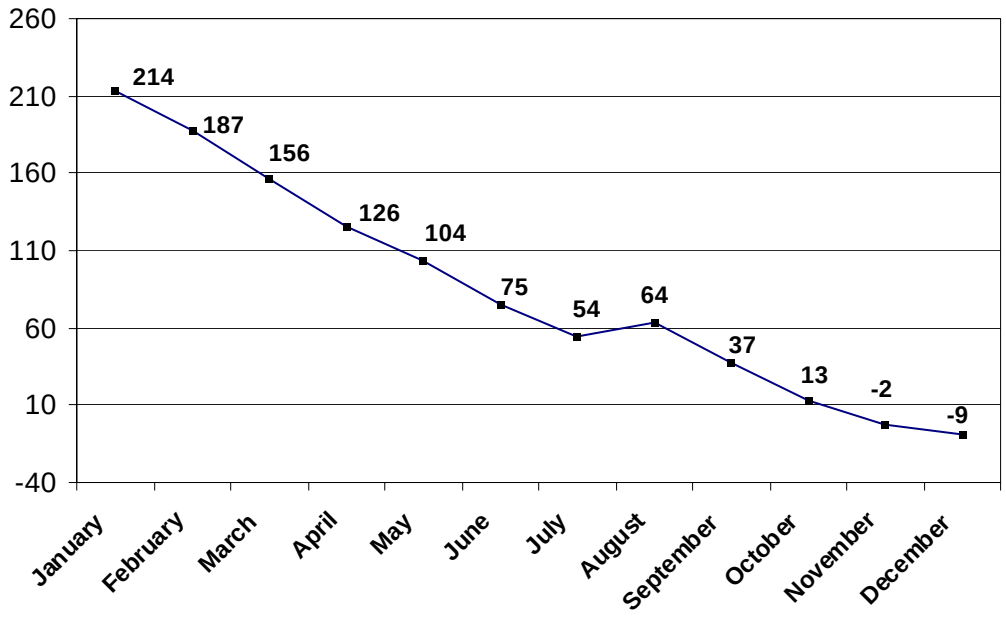


Figure 3 Average Latency (in Days, Minus 90) in Reporting to the MCMIS Crash File, Tennessee Reported Cases, 2004

clear downward trend beginning in January and ending in December. In January, cases were submitted on average 214 days, or approximately seven months after the grace period. November and December are the only months in which cases were submitted within the 90-day grace period, on average. In reference to Table 7, these are also the two months with the largest reporting rates.

5.3 Reporting Criteria

In this section, reporting is investigated according to variables in the Tennessee PAR file related to the reporting criteria for a MCMIS-reportable crash, as outlined in Table 2. Previous studies have consistently shown that trucks are more likely to be reported than buses and that fatal crashes are more likely to be reported than injury involvements. Since the criteria revolve around attributes associated with the vehicle type and crash severity, calculating reporting rates for these two variables is a logical starting point for assessing where improvements can be gained.

Table 8 shows reporting rates by vehicle type. The reporting rate for trucks is about 10 percent higher than it is for buses, and since there are so many more reportable trucks than buses, the reporting rate of 51.9 percent is very close to the overall rate of 51.3 percent. Additional evidence that trucks are the dominant vehicle type compared to buses in this MCMIS evaluation is shown by the large 91.8 percent of total unreported cases for trucks. Buses account for only 8.0 percent of the total unreported cases. Vehicles transporting hazardous materials represent a very small fraction of the unreported cases.

Table 8 Reporting Rate by Vehicle Type, Tennessee 2004

Vehicle type	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Truck	5,626	51.9	2,704	91.8
Bus	411	42.3	237	8.0
Transporting hazardous materials	9	55.6	4	0.1
Total	6,046	51.3	2,945	100.0

Although Table 8 shows that trucks are more likely to be reported than buses, previous MCMIS evaluations also suggest that certain trucks such as tractor semitrailers are more likely to be reported than single unit trucks. Table 9 shows reporting rates of vehicle type separated into distinct categories of truck and bus types. Excluding categories with only one or two reportable cases, truck tractors pulling one or more trailers have the highest rate of 61.5 percent. By far, with 3,449 reportable cases, this vehicle configuration accounts for the largest number of reportable cases. It also accounts for the largest percentage of unreported cases at 45.1 percent. Among single unit trucks, those with GVWR greater than 26,000 pounds have a reporting rate of 52.0 percent, which is close to the overall rate. Yet, single unit trucks with GVWR less than

26,000 pounds have a much lower rate of 28.9 percent. It appears that these lighter single unit qualifying trucks are not being as readily recognized as reportable. In addition, they account for 21.6 percent of total unreported cases, which after tractor combinations represents the second largest percentage shown in Table 9. The majority of buses are school buses and transit buses, and their reporting rates do not differ substantially, at 43.1 percent and 46.2 percent, respectively. Furthermore, buses account for a small percentage of total unreported cases.

Table 9 Reporting Rate by Detailed Vehicle Body Type, Tennessee 2004

Vehicle body type	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Sedan	3	33.3	2	0.1
Minivan	2	100.0	0	0.0
Standard pickup	1	0.0	1	0.0
Cab chasis-based	1	100.0	0	0.0
Step van	132	9.1	120	4.1
SUT, 10k-26k	896	28.9	637	21.6
SUT, >26k	575	52.0	276	9.4
SUT, unknown gvwr	189	30.7	131	4.4
Truck tractor (cab only)	239	55.6	106	3.6
Truck tractor (trailing units)	3,449	61.5	1,327	45.1
Unknown medium/heavy truck	146	26.7	107	3.6
School bus	255	43.1	145	4.9
Van-based school bus	15	40.0	9	0.3
Cross country/intercity bus	19	47.4	10	0.3
Transit bus	93	46.2	50	1.7
Van-based transit bus	15	13.3	13	0.4
Other bus type	13	30.8	9	0.3
Unknown bus type	1	0.0	1	0.0
Unknown body type	2	50.0	1	0.0
Total	6,046	51.3	2,945	100.0

Along with vehicle type, crash severity is another characteristic of a crash that needs to be considered when determining if a crash meets the threshold for reporting to the MCMIS Crash file. Previous MCMIS evaluations have shown that serious injury crashes tend to be reported at a higher rate than those involving less serious injury. Table 10 shows that reporting rates with respect to crash severity for Tennessee follow the usual trend. Reporting rates decline with crash severity. Fatal crash involvements are reported at a rate of 93.5 percent, but since these involvements represent a small percentage of all reportable cases, they have little influence on affecting the overall reporting rate. The reporting rate for injured and transported involvements is 54.8 percent, and the reporting rate for towed and disabled involvements that do not involve injury is 47.4 percent. Table 10 shows that 66.1 percent of total unreported cases are attributable to the towed and disabled category and 33.5 percent are attributable to the injured and

transported category. The overall reporting rate could increase significantly if reporting were to improve in these two categories.

Table 10 Reporting Rate by Crash Severity, Tennessee 2004

Crash severity	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Fatal	154	93.5	10	0.3
Injured/Transported	2,187	54.8	988	33.5
Towed/Disabled	3,705	47.4	1,947	66.1
Total	6,046	51.3	2,945	100.0

Table 11 shows reporting rates to the MCMIS Crash file by maximum injury severity in the crash according to the usual KABCOU scale. The fatal involvement results are identical to those shown in Table 10. Reporting rates decrease with crash severity. Although the reporting rate for A-involvements is greater than the rates for B-involvements and C-involvements, the differences are not that great. The reporting rate for property damage involvements is 47.9 percent which is very close to the 47.4 percent for towed and disabled involvements shown in Table 10. The percentages of total unreported cases increase as injury severity decreases. More than half of the unreported cases, 52.8 percent, are property damage involvements.

Table 11 Reporting Rate by Detailed Injury Severity, Tennessee 2004

Crash severity	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Fatal (K)	154	93.5	10	0.3
Disabling injury (A)	385	56.6	167	5.7
Evident injury (B)	978	53.4	456	15.5
Probable injury (C)	1,507	51.9	725	24.6
Property Damage (O)	2,984	47.9	1,556	52.8
Unknown (U)	38	18.4	31	1.1
Total	6,046	51.3	2,945	100.0

5.4 Reporting Agency and Area

Beyond the application of the reporting criteria, there can be differences related to where the crash occurs or the type of agency that covered the crash. More densely populated areas with a large number of traffic accidents may not report as completely as areas with a lower work load. The level and frequency of training or the intensity of supervision can also vary. If there are such differences, they may serve as a guide to focus resources in areas and at levels that will produce the greatest improvement. The next set of tables examines areas of the state to see if there are inconsistencies in reporting patterns.

In the 95 counties in Tennessee, the number of reportable cases ranges from 1 to 1,012. Therefore, some of the counties in Tennessee are much more densely populated than others and additionally, traffic density is also greater in certain counties compared to others. Table 12 shows the top fifteen counties in Tennessee, ordered in descending order by the number of reportable cases. It is not too surprising that the largest numbers of reportable cases are associated with counties containing the larger cities. For example, Memphis is located in Shelby County and Nashville is located in Davidson County. As shown in Table 12, these two counties rank first and second in terms of reportable cases. After considering these two counties, the numbers of reportable cases declines rapidly.

The reporting rate for the top fifteen counties is 50.2 percent, and for the remaining counties it is 53.4 percent, so there does not appear to be a large difference. Among the top fifteen counties, the largest rate is 64.6 in Greene County, and the smallest rate is 37.4 in Montgomery County, but these two counties account for small percentages of the total numbers of unreported cases. Shelby County and Davidson County account for 15.7 percent and 17.6 percent of the total unreported cases, respectively, but the reporting rates in these two counties, 54.4 percent and 46.6 percent, do not deviate greatly from the overall reporting rate of 51.3 percent. The top fifteen counties account for 66.5 percent, or about two-thirds of the total unreported cases.

Table 12 Reporting Rate by County of Crash, Tennessee 2004

County	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Shelby	1,012	54.4	461	15.7
Davidson	972	46.6	519	17.6
Knox	473	49.0	241	8.2
Hamilton	329	45.0	181	6.1
Rutherford	164	50.0	82	2.8
Madison	143	50.3	71	2.4
Sumner	106	62.3	40	1.4
Williamson	106	40.6	63	2.1
Sullivan	103	50.5	51	1.7
Wilson	96	59.4	39	1.3
Montgomery	91	37.4	57	1.9
Bradley	90	50.0	45	1.5
Cumberland	89	56.2	39	1.3
Greene	79	64.6	28	1.0
Roane	76	46.1	41	1.4
Top 15 Counties	3,929	50.2	1,958	66.5
All Other Counties	2,117	53.4	987	33.5

It is also possible that reporting rates could be related to the level of reporting agency. Here, agency type may be taken as an indicator of the focus and training of the department. Table 13

shows reporting rates by the various agencies in Tennessee. Cases are primarily handled by city or local police, the Tennessee Highway Patrol, or sheriff's offices. City police handle the most cases and are responsible for 62.1 percent of the unreported cases. Therefore, the reporting rate of 49.9 percent is similar to the overall reporting rate of 51.3 percent. The Tennessee Highway Patrol, which accounts for 28.2 percent of total unreported cases, has a 57.0 percent reporting rate, the highest among the three largest reporting agencies. Sheriff's offices, which account for

Table 13 Reporting Rate by Reporting Agency, Tennessee 2004

Reporting agency	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
TN Highway Patrol	1,929	57.0	830	28.2
City/metropolitan police	3,651	49.9	1,829	62.1
Sheriff's office	429	37.8	267	9.1
Commercial Vehicle Enforcement	7	71.4	2	0.1
College campus	1	0.0	1	0.0
Other	6	0.0	6	0.2
Unknown	23	56.5	10	0.3
Total	6,046	51.3	2,945	100.0

9.1 percent of unreported cases have the lowest reporting rate of 37.8 percent among the three major reporting agencies.

6. Data Quality of Reported Cases

In this section, we consider the quality of data reported to the MCMIS crash file. Two aspects of data quality are examined. The first is the amount of missing data. Missing data rates are important to the usefulness of a data file because records with missing data cannot contribute to an analysis. The second aspect of data quality considered here is the consistency of coding between records as they appear in the Tennessee Crash file and in the MCMIS Crash file. Inconsistencies can indicate errors in translating information recorded on the crash report to the values in the MCMIS Crash file.

Table 14 shows missing data rates for selected, important variables in the MCMIS Crash file. Missing data rates range from low, to moderate, to high, depending on the variable. Data are complete for variables such as report number, date of the crash, carrier state, injuries, interstate, towaway, and truck or bus. About half the data are missing for variables county, light, and number of vehicles. Data are missing in large percentages for a number of variables such as configuration, driver variables, event variables, vehicle license number, and road trafficway, as shown in Table 14. About half the data are missing on the hazmat placard variable.

Table 14 Missing Data Rates for Selected MCMIS Crash File Variables, Tennessee 2004

Variable	Percent unrecorded	Variable	Percent unrecorded
Report number	0.0	Fatal injuries	0.0
Accident year	0.0	Non-fatal Injuries	0.0
Accident month	0.0	Interstate	0.0
Accident day	0.0	Light	51.0
Accident hour	0.9	Event one	98.9
Accident minute	0.9	Event two	99.9
County	47.9	Event three	100.0
Body type	97.3	Event four	100.0
Configuration	96.2	Number of vehicles	47.8
GVWR class	99.8	Officer badge number	0.4
DOT number*	16.5	Road access	52.2
Carrier state	0.0	Road surface	50.7
Citation issued	1.8	Road trafficway	98.7
Driver condition	100.0	Towaway	0.0
Driver date of birth	97.4	Truck or bus	0.0
Driver license number	97.8	Vehicle license number	99.1
Driver license state	97.7	Vehicle license state	98.6
Driver license class	98.5	VIN	99.1
Driver license valid	1.8	Weather	50.8

* Counting cases where the carrier is coded interstate.

Hazardous materials variable	Percent unrecorded
Hazardous materials placard	50.8
Percentages of hazmat placarded vehicles only: *	
Hazardous cargo release	0.0
Hazardous materials class (1-digit)	0.0
Hazardous materials class (4-digit)	0.0
Hazardous materials name	0.0

* Only one placarded case.

Values of variables in the MCMIS Crash file can also be compared with the values of comparable variables in the Tennessee PAR file. The purpose of this comparison is to identify

any errors in translating variables from the values in the state crash file to the values required for SafetyNet. In earlier MCMIS evaluations, vehicle configuration is often compared between the two files. However, as shown in Table 14, vehicle configuration is missing for 96.2 percent of the data in the MCMIS Crash file. Therefore, other variables without missing data are considered.

Since the MCMIS Crash file has complete data on the truck/bus variable, it can be compared to the bodycode variable in the Tennessee PAR file. Table 15 shows the comparison between vehicle types. Only 14 buses in the Tennessee PAR file are classified as buses in the MCMIS file. Most of the buses are classified as trucks. For example, 106 school buses and 42 transit buses in the Tennessee file are classified as trucks in the MCMIS file. In addition, it can be seen that some vehicles classified as passenger cars including sedans and other light vehicles in the Tennessee Crash file are contained in the MCMIS Crash file that are classified as trucks. Most of these vehicles correspond to the non-reportable cases that are not trucks or buses and not transporting hazardous materials, as shown in Table 6. On the other hand, all medium and heavy trucks appear to agree between the two files.

Table 16 shows a comparison between recording the numbers of fatals in the crash in the two files. Agreement is generally good for this variable. In 95.3 percent of the 3,290 cases, both files show that there were no fatals in the crash. There is only disagreement in eleven of the cases. When there are two or more fatals in the crash, the files agree exactly.

Table 15 Comparison of Vehicle Type in MCMIS and Tennessee Crash Files, 2004

Vehicle Type		Cases	Prcnt
MCMIS Crash File	Tennessee PAR File		
Bus	School bus	8	57.1
	Intercity bus	2	14.3
	Transit bus	3	21.4
	Other bus	1	7.1
Bus total		14	100.0
Truck	Sedan	22	0.7
	Hatchback	1	0.0
	Auto-based pickup	1	0.0
	Auto unknown	6	0.2
	Compact utility	3	0.1
	Large utility	1	0.0
	Minivan	3	0.1
	Large van	1	0.0
	Step van	5	0.2
	Compact pickup	3	0.1
	Standard pickup	10	0.3
	Cab chasis-based	21	0.6
	Other light truck	4	0.1
	Step van	12	0.4
	SUT 10k-26k	269	8.2
	SUT >26k	304	9.3
	SUT unk gvwr	60	1.8
	Truck tractor (bob)	137	4.2
	Truck tractor/w trail units	2,180	66.5
	Unk med/hvy truck	41	1.3
	School bus	106	3.2
	Van-based school bus	6	0.2
	Intercity bus	8	0.2
	Transit bus	42	1.3
	Van-based transit bus	2	0.1
	Other bus type	3	0.1
	Construc equipment	3	0.1
	Other vehicle type	1	0.0
	Unk body type	21	0.6
Truck total		3,276	100.0
Total, all vehicles		3,290	

Table 16 Comparison of Fatals in Crash in MCMIS and Tennessee Crash Files, 2004

Number of Fatals in Crash		Cases	Prcnt
MCMIS Crash File	Tennessee PAR File		
0	Unknown	1	0.0
0	0	3,135	95.3
0	1	4	0.1
1	0	6	0.2
1	1	119	3.6
2	2	17	0.5
3	3	5	0.2
4	4	3	0.1
Total		3,290	100.0

7. Summary and Discussion

This report is an evaluation of reporting to the MCMIS Crash file by the state of Tennessee in 2004. Records were matched between the Tennessee PAR file and the MCMIS Crash file using variables common to both files with low percentages of missing data. After removing duplicate records from both files, 247,144 records remained for matching from the PAR file and 3,365 records remained for matching from the MCMIS file. In total, 3,290, or 97.8 percent of the MCMIS records were matched.

The next step in the evaluation process focused on identifying reportable cases using the Tennessee PAR file according to established vehicle and crash severity criteria. Overall, 14,592 vehicles were identified as qualifying trucks, buses, or non-trucks displaying a hazardous materials placard. Of these vehicles, 90.1 percent are trucks and 9.8 percent are buses. Hazmat placarded vehicles account for less than 0.1 percent of qualifying vehicles. It can be noted that space for recording information about hazmat placarded vehicles is provided in the Truck and Bus section of the Tennessee Traffic Crash Report, and not in the main section of the form. Yet, 10 non-trucks were identified as displaying hazmat placards.

After identifying qualifying vehicles, it is necessary to determine which of these vehicles meet the crash severity criteria for reporting to MCMIS. An injury variable following the standard KABCOU scale is coded in the Tennessee PAR file, so maximum injury severity in the crash could be derived and fatal involvements could be identified. In addition, it was necessary to determine if any injured person in the accident was transported for medical attention. To identify these cases, the transport variable was used along with an ambulance/hospital code. In summary, a person was considered injured and transported if injury was A, B, or C and the person was coded as transported, or a valid ambulance/hospital name was present.

Two variables were used in combination to identify vehicles that were towed and disabled. The Tennessee PAR file has a towed variable and an extent of damage variable. The Tennessee Uniform Traffic Crash Report Instruction Manual [23] documents that when extent of damage is severe or very severe, the vehicle is not drivable. Therefore, vehicles with extent of damage equal to severe or very severe were considered towed and disabled. However, the percentage of towed vehicles satisfying this condition was approximately 53 percent. Prior experience suggests that the percentage of towed vehicles that are towed due to damage is greater than 53 percent. In addition to vehicles with extent of damage equal to severe or very severe, a vehicle was also considered towed and disabled if it was towed and extent of damage was moderate.

Using the procedure described above resulted in identification of 6,046 vehicles involved in crashes that were reportable to the MCMIS Crash file. Of these, 154 were involved in fatal crashes, 2,187 were involved in injury crashes where at least one person was transported for medical attention, and 3,705 were involved in crashes where at least one vehicle was towed due to disabling damage. Of the 3,290 records that were matched between the Tennessee PAR file and the MCMIS Crash file, 3,101 were determined to meet the MCMIS Crash file reporting criteria. Therefore, the overall reporting rate in Tennessee in 2004 is estimated at 3,101/6,046 = 51.3 percent. The difference between 3,290 and 3,101 suggests that 189 cases were overreported to the MCMIS Crash file. According to this analysis, all 189 cases did not meet the crash severity threshold for reporting to MCMIS.

Since the overall reporting rate is estimated at 51.3 percent, specific variables were examined to identify sources of underreporting. Reporting rates were calculated and presented in three groups. The three groups are case processing, reporting criteria, and reporting agency and area. Case processing considers timing issues, reporting criteria deals with vehicle and crash severity issues, and agency and area are related to the reporting agency and the county of the crash.

Reporting rates tended to be lower than average for crashes occurring in July and August. The reporting rates in these months were 37.5 percent and 25.0 percent, respectively. The reporting rates at the end of the year were highest. In November the reporting rate was 81.2 percent and in December it was 81.3 percent. Beginning in January and ending in December, there was a clear downward trend in the lag time between crash date and the date crashes were uploaded to the MCMIS Crash file. Only in November and December were crashes uploaded within the 90-day grace period, on average. The longest average lag time was 214 days for crashes occurring in January, or about seven months after the 90-day grace period.

The reporting rate for trucks was 51.9 percent which is about 10 percent higher than for buses. Since trucks account for about 93 percent of all reportable cases, the rate for trucks is close to the overall rate of 51.3 percent. Tractor combinations, trucks pulling one or more trailers, had the highest reporting rate of 61.5 percent. The rate for single unit trucks with GVWR greater than 26,000 pounds was 52.0 percent, and the rate for single unit trucks with GVWR less than 26,000

pounds was 28.9 percent. After tractor combinations, single unit trucks with GVWR less than 26,000 pounds account for the most unreported cases, so improvement in reporting could be gained if these truck types were reported with greater frequency. School buses and transit buses accounted for the greatest percentages of reportable buses and differences in rates between the two were not great, 43.1 percent and 46.2 percent, respectively.

Previous MCMIS studies tend to suggest that serious injury crashes are more likely to be reported than those involving less injury severity, and results from this study follow the usual pattern. The reporting rate for fatal crashes was 93.5 percent, while the reporting rate for injured and transported cases was 54.8 percent, and the rate for towed and disabled cases was 47.4 percent. Since the towed and disabled category has the lowest reporting rate and the largest number of unreported cases, this is an area where possible improvement in reporting could be realized.

Reporting rates did not show great variability by county, except that among the top fifteen counties according to reportable cases, Greene County and Sumner County had the highest rates at 64.6 percent and 62.3 percent, respectively, while Montgomery County had the lowest rate at 37.4 percent. The top three counties in terms of reportable cases, Shelby, Davidson, and Knox, had reporting rates consistent with the overall rate. With respect to reporting agency, the Tennessee Highway Patrol had the highest reporting rate of 57.0 percent. The reporting rate for the city/metropolitan police was 49.9 percent and for sheriff's offices it was 37.8 percent.

Missing data are not negligible in the Tennessee MCMIS Crash file. Certain variables such as driver-related variables, vehicle configuration, body type, GVWR class, vehicle license number, vehicle license state, and VIN are missing values in excess of 95 percent of the cases. Other variables such as county, light condition, weather, and road access are missing values on approximately 50 percent of the cases. In previous MCMIS evaluations, one of the exercises has been to compare consistency of common variables in the Tennessee PAR file and the MCMIS Crash file. High percentages of missing values on the usual variables in the MCMIS Crash file made this exercise difficult.

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16 Blower, D., and Matteson, A., Evaluation of 2005 Louisiana Crash Data Reported to MCMIS Crash File. University of Michigan Transportation Research Institute, Ann Arbor, Michigan. December 2006. Sponsor: Federal Motor Carrier Safety Administration, U.S. D.O.T.

17 Blower, D., and Matteson, A., Evaluation of 2005 Nebraska Crash Data Reported to MCMIS Crash File. University of Michigan Transportation Research Institute, Ann Arbor, Michigan. February 2007. Sponsor: Federal Motor Carrier Safety Administration, U.S. D.O.T.

18 Blower, D., and Matteson, A., Evaluation of 2005 South Dakota Crash Data Reported to MCMIS Crash File. University of Michigan Transportation Research Institute, Ann Arbor, Michigan. March 2007. Sponsor: Federal Motor Carrier Safety Administration, U.S. D.O.T.

19 United States Census Bureau, 2002 Economic Census, Vehicle Inventory and Use Survey.

20 United States Census Bureau, Population Division, Estimates 2000-2005.

21 Trucks Involved in Fatal Accidents (TIFA) 1999-2003, Center for National Truck and Bus Statistics, The University of Michigan Transportation Research Institute.

22 National Automotive Sampling System (NASS) General Estimates System (GES) 2005, National Center for Statistics and Analysis, NHTSA.

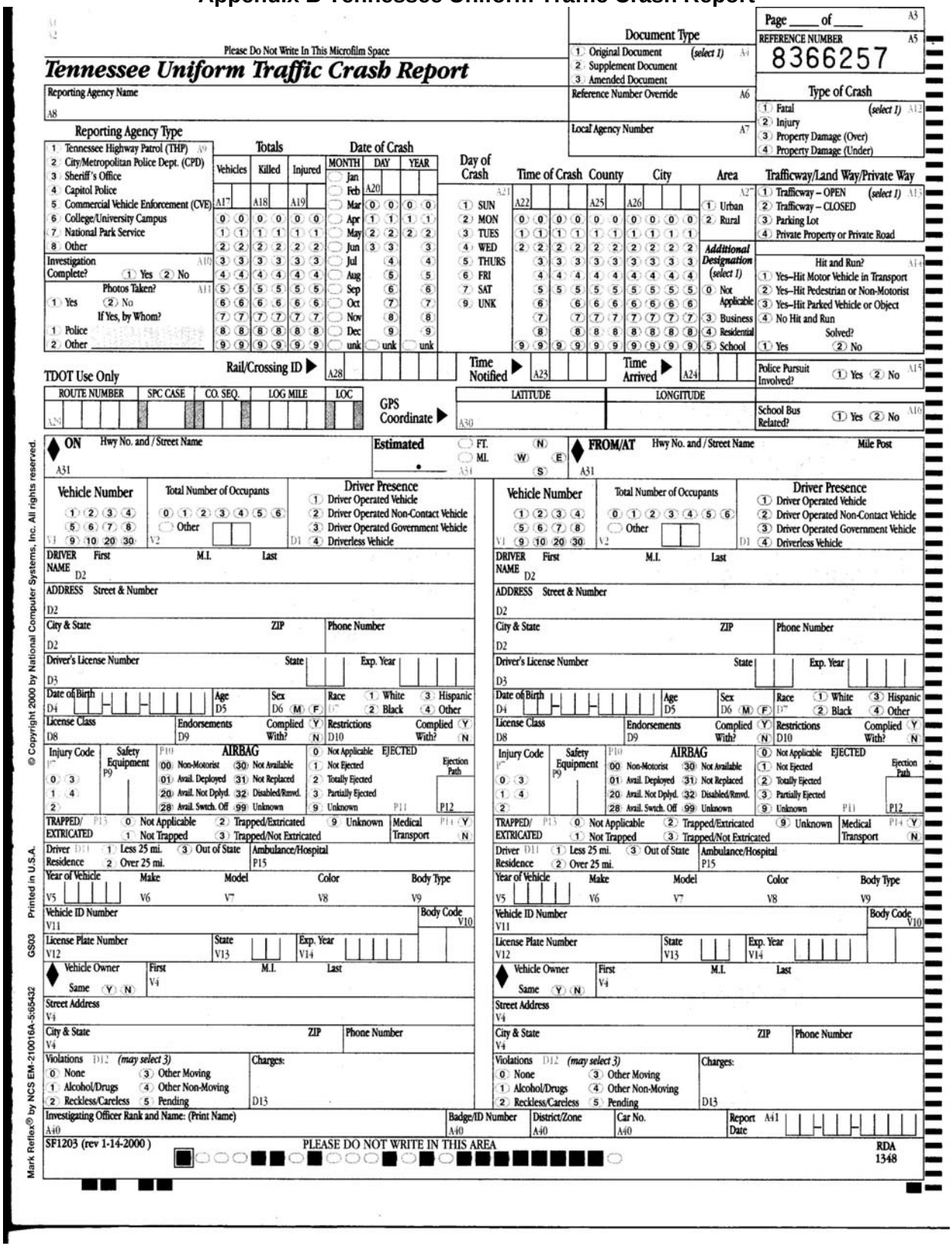
23 Tennessee Uniform Scannable Traffic Crash Report Instruction Manual, Department of Safety, State of Tennessee, 2001.

Appendix A: Variables from Tennessee PAR Data to Identify a MCMIS-Reportable Crash

MCMIS Reporting Criteria	Implementation in Tennessee PAR Data
Truck with GVWR over 10,000 or GCWR over 10,000	The bodycode variable in the Tennessee PAR file can be used to identify medium/heavy trucks with GVWR 10,000 lbs or greater bodycode = 40 – Step van 41 – SUT 10k-26k lbs 42 – SUT >26k gvwr 43 – SUT gvwr unknown 46 – Truck tractor (bobtail) 47 – Tractor/ trailing units 49 – Unknown medium/heavy truck
***or* Bus with seating for at least nine, including the driver**	The following codes were used to identify eligible buses: bodycode = 60 – School Bus 61 – Van-based school bus 62 – Cross country/intercity bus (eg. Greyhound) 63 – Transit bus (city bus) 64 – Van-based transit bus 68 – Other bus type 69 – Unknown bus type
***or* Vehicle displaying a hazardous materials placard**	These vehicles were identified using the hazardous placard variable from the truck and bus supplemental form. This suggests that hazmat information would not be recorded for nontrucks, such as passenger vehicles. Yet, a cross-tabulation of the variables hazmat placard and body code shows that 10 nontrucks were recorded as hazmat placarded vehicles
AND	
at least one fatality	The Tennessee occupant file contains an injury variable based on the usual KABCOU scale. A maximum injury severity variable was created to determine the maximum injury severity in the crash. A crash involving a fatality was determined from this created variable. Injury = 0 – None 1 – Possible 2 – Nonincapacitating 3 – Incapacitating 4 – Fatal 9 - Unknown

MCMIS Reporting Criteria	Implementation in Tennessee PAR Data
***or* at least one person injured and transported to a medical facility for immediate medical attention**	The maximum injury severity variable defined above was used to identify injury accidents. In addition, a medical transport variable identifies whether a person was transported for medical attention, and an ambulance/hospital variable records ambulance or medical facility name. Thus, this criteria was met by the following condition: Maximum injury severity =(A or B or C) and (transported =yes or a valid ambulance/hospital name recorded)
***or* at least one vehicle towed due to disabling damage**	Two variables were used in combination to identify vehicles satisfying this criterion: extent of damage and towed . Damage extent has levels 0=None, 1=Very minor, 2=Minor, 3=Moderate, 4=Severe, 5=Very severe, 6=Unknown. The towed flag has levels 1=Driven away, 2=Towed away, 8=Other, 9=Unknown. This criteria was met by the following condition: Damage extent=(4 or 5) or (Damage extent=3 and towed=2). According to the Tennessee Uniform Traffic Crash Report Instruction Manual [23], vehicles with damage extent equal to 4 or 5 are not drivable.

Appendix B Tennessee Uniform Traffic Crash Report



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Tennessee Uniform Traffic Crash Report

Page ____ of ____ (A3)

REFERENCE NUMBER (A5): 8366257

Document Type (A4): 1 Original Document (select 1) 2 Supplement Document 3 Amended Document

Reference Number Override (A6)

Local Agency Number (A7)

Type of Crash (A12): 1 Fatal (select 1) 2 Injury 3 Property Damage (Over) 4 Property Damage (Under)

Reporting Agency Name (A8)

Reporting Agency Type (A9): 1 Tennessee Highway Patrol (THP) 2 City/Metropolitan Police Dept. (CPD) 3 Sheriff's Office 4 Capitol Police 5 Commercial Vehicle Enforcement (CVE) 6 College/University Campus 7 National Park Service 8 Other

Investigation Complete? (A10) 1 Yes 2 No

Photos Taken? (A11) 1 Yes 2 No

If Yes, by Whom? 1 Police 2 Other

Totals	Vehicles (A17)	Killed (A18)	Injured (A19)
	0	0	0
	1	1	1
	2	2	2
	3	3	3
	4	4	4
	5	5	5
	6	6	6
	7	7	7
	8	8	8
	9	9	9

Date of Crash: MONTH (A20) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec unk; DAY; YEAR

Day of Crash (A21): 1 SUN 2 MON 3 TUES 4 WED 5 THURS 6 FRI 7 SAT 9 UNK

Time of Crash (A22)

County (A25)

City (A26)

Area (A27): 1 Urban 2 Rural

Additional Designation (select 1): 0 Not Applicable 3 Business 4 Residential 5 School

Trafficway/Land Way/Private Way (A13): 1 Trafficway – OPEN (select 1) 2 Trafficway – CLOSED 3 Parking Lot 4 Private Property or Private Road

Hit and Run? (A14): 1 Yes–Hit Motor Vehicle in Transport 2 Yes–Hit Pedestrian or Non-Motorist 3 Yes–Hit Parked Vehicle or Object 4 No Hit and Run

Solved? 1 Yes 2 No

TDOT Use Only

Rail/Crossing ID (A28)

Time Notified (A23)

Time Arrived (A24)

Police Pursuit Involved? (A15) 1 Yes 2 No

ROUTE NUMBER (A29)	SPC CASE	CO. SEQ.	LOG MILE	LOC

GPS Coordinate (A30)

LATITUDE	LONGITUDE

School Bus Related? (A16) 1 Yes 2 No

ON Hwy No. and / Street Name (A31)

Estimated (A31) FT. MI. N W E S

FROM/AT Hwy No. and / Street Name (A31) Mile Post

Vehicle Number (V1): 1 2 3 4 5 6 7 8 9 10 20 30

Total Number of Occupants (V2): 0 1 2 3 4 5 6 Other

Driver Presence (D1): 1 Driver Operated Vehicle 2 Driver Operated Non-Contact Vehicle 3 Driver Operated Government Vehicle 4 Driverless Vehicle

DRIVER NAME (D2): First M.I. Last

ADDRESS Street & Number (D2)

City & State (D2) ZIP Phone Number

Driver's License Number (D3) State Exp. Year

Date of Birth (D4) Age (D5) Sex (D6) M F Race (D7) 1 White 2 Black 3 Hispanic 4 Other

License Class (D8) Endorsements (D9) Complied With? Y N Restrictions (D10) Complied With? Y N

Injury Code (P7): 0 3 1 4 2

Safety Equipment (P9)

AIRBAG (P10): 00 Non-Motorist 01 Avail. Deployed 20 Avail. Not Dplyd. 28 Avail. Swtch. Off 30 Not Available 31 Not Replaced 32 Disabled/Rmvd. 99 Unknown

EJECTED (P11): 0 Not Applicable 1 Not Ejected 2 Totally Ejected 3 Partially Ejected 9 Unknown

Ejection Path (P12)

TRAPPED/EXTRICATED (P13): 0 Not Applicable 1 Not Trapped 2 Trapped/Extricated 3 Trapped/Not Extricated 9 Unknown

Medical Transport (P14) Y N

Driver Residence (D11): 1 Less 25 mi. 2 Over 25 mi. 3 Out of State

Ambulance/Hospital (P15)

Year of Vehicle (V5) Make (V6) Model (V7) Color (V8) Body Type (V9)

Vehicle ID Number (V11) Body Code (V10)

License Plate Number (V12) State (V13) Exp. Year (V14)

Vehicle Owner (V4) Same Y N First M.I. Last

Street Address (V4)

City & State (V4) ZIP Phone Number

Violations (D12) (may select 3): 0 None 1 Alcohol/Drugs 2 Reckless/Careless 3 Other Moving 4 Other Non-Moving 5 Pending

Charges: (D13)

Investigating Officer Rank and Name: (Print Name) (A40) Badge/ID Number (A40) District/Zone (A40) Car No. (A40) Report Date (A41)

SF1203 (rev 1-14-2000)

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RDA 1348

Vehicle Number (V1): 1 2 3 4 5 6 7 8 9 10 20 30

Total Number of Occupants (V2): 0 1 2 3 4 5 6 Other

Driver Presence (D1): 1 Driver Operated Vehicle 2 Driver Operated Non-Contact Vehicle 3 Driver Operated Government Vehicle 4 Driverless Vehicle

DRIVER NAME (D2): First M.I. Last

ADDRESS Street & Number (D2)

City & State (D2) ZIP Phone Number

Driver's License Number (D3) State Exp. Year

Date of Birth (D4) Age (D5) Sex (D6) M F Race (D7) 1 White 2 Black 3 Hispanic 4 Other

License Class (D8) Endorsements (D9) Complied With? Y N Restrictions (D10) Complied With? Y N

Injury Code (P7): 0 3 1 4 2

Safety Equipment (P9)

AIRBAG (P10): 00 Non-Motorist 01 Avail. Deployed 20 Avail. Not Dplyd. 28 Avail. Swtch. Off 30 Not Available 31 Not Replaced 32 Disabled/Rmvd. 99 Unknown

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Driver Residence (D11): 1 Less 25 mi. 2 Over 25 mi. 3 Out of State

Ambulance/Hospital (P15)

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Vehicle ID Number (V11) Body Code (V10)

License Plate Number (V12) State (V13) Exp. Year (V14)

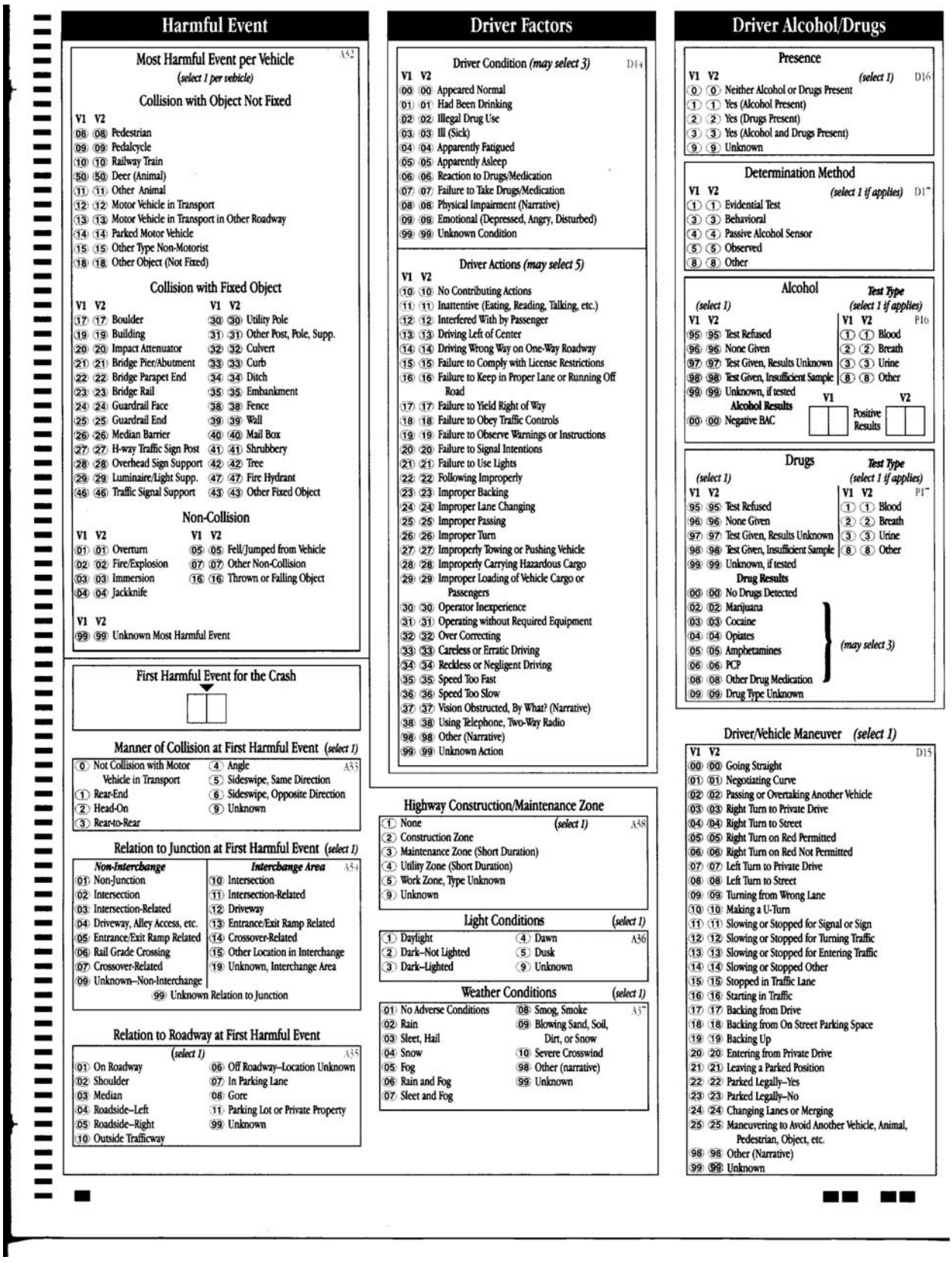
Vehicle Owner (V4) Same Y N First M.I. Last

Street Address (V4)

City & State (V4) ZIP Phone Number

Violations (D12) (may select 3): 0 None 1 Alcohol/Drugs 2 Reckless/Careless 3 Other Moving 4 Other Non-Moving 5 Pending

Charges: (D13)



Harmful Event

Most Harmful Event per Vehicle (A32)
(select 1 per vehicle)

Collision with Object Not Fixed

V1	V2	
08	08	Pedestrian
09	09	Pedalcycle
10	10	Railway Train
50	50	Deer (Animal)
11	11	Other Animal
12	12	Motor Vehicle in Transport
13	13	Motor Vehicle in Transport in Other Roadway
14	14	Parked Motor Vehicle
15	15	Other Type Non-Motorist
18	18	Other Object (Not Fixed)

Collision with Fixed Object

V1	V2		V1	V2	
17	17	Boulder	30	30	Utility Pole
19	19	Building	31	31	Other Post, Pole, Supp.
20	20	Impact Attenuator	32	32	Culvert
21	21	Bridge Pier/Abutment	33	33	Curb
22	22	Bridge Parapet End	34	34	Ditch
23	23	Bridge Rail	35	35	Embankment
24	24	Guardrail Face	38	38	Fence
25	25	Guardrail End	39	39	Wall
26	26	Median Barrier	40	40	Mail Box
27	27	H-way Traffic Sign Post	41	41	Shrubbery
28	28	Overhead Sign Support	42	42	Tree
29	29	Luminaire/Light Supp.	47	47	Fire Hydrant
46	46	Traffic Signal Support	43	43	Other Fixed Object

Non-Collision

V1	V2		V1	V2	
01	01	Overturn	05	05	Fell/Jumped from Vehicle
02	02	Fire/Explosion	07	07	Other Non-Collision
03	03	Immersion	16	16	Thrown or Falling Object
04	04	Jackknife			

V1	V2	
99	99	Unknown Most Harmful Event

First Harmful Event for the Crash

Manner of Collision at First Harmful Event (A33) *(select 1)*

0	Not Collision with Motor Vehicle in Transport	4	Angle
1	Rear-End	5	Sideswipe, Same Direction
2	Head-On	6	Sideswipe, Opposite Direction
3	Rear-to-Rear	9	Unknown

Relation to Junction at First Harmful Event (A34) *(select 1)*

Non-Interchange		*Interchange Area*	
01	Non-Junction	10	Intersection
02	Intersection	11	Intersection-Related
03	Intersection-Related	12	Driveway
04	Driveway, Alley Access, etc.	13	Entrance/Exit Ramp Related
05	Entrance/Exit Ramp Related	14	Crossover-Related
06	Rail Grade Crossing	15	Other Location in Interchange
07	Crossover-Related	19	Unknown, Interchange Area
09	Unknown–Non-Interchange		

99 Unknown Relation to Junction

Relation to Roadway at First Harmful Event (A35) *(select 1)*

01	On Roadway	06	Off Roadway–Location Unknown
02	Shoulder	07	In Parking Lane
03	Median	08	Gore
04	Roadside–Left	11	Parking Lot or Private Property
05	Roadside–Right	99	Unknown
10	Outside Trafficway		

Driver Factors

Driver Condition *(may select 3)* (D14)

V1	V2	
00	00	Appeared Normal
01	01	Had Been Drinking
02	02	Illegal Drug Use
03	03	Ill (Sick)
04	04	Apparently Fatigued
05	05	Apparently Asleep
06	06	Reaction to Drugs/Medication
07	07	Failure to Take Drugs/Medication
08	08	Physical Impairment (Narrative)
09	09	Emotional (Depressed, Angry, Disturbed)
99	99	Unknown Condition

Driver Actions *(may select 5)*

V1	V2	
10	10	No Contributing Actions
11	11	Inattentive (Eating, Reading, Talking, etc.)
12	12	Interfered With by Passenger
13	13	Driving Left of Center
14	14	Driving Wrong Way on One-Way Roadway
15	15	Failure to Comply with License Restrictions
16	16	Failure to Keep in Proper Lane or Running Off Road
17	17	Failure to Yield Right of Way
18	18	Failure to Obey Traffic Controls
19	19	Failure to Observe Warnings or Instructions
20	20	Failure to Signal Intentions
21	21	Failure to Use Lights
22	22	Following Improperly
23	23	Improper Backing
24	24	Improper Lane Changing
25	25	Improper Passing
26	26	Improper Turn
27	27	Improperly Towing or Pushing Vehicle
28	28	Improperly Carrying Hazardous Cargo
29	29	Improper Loading of Vehicle Cargo or Passengers
30	30	Operator Inexperience
31	31	Operating without Required Equipment
32	32	Over Correcting
33	33	Careless or Erratic Driving
34	34	Reckless or Negligent Driving
35	35	Speed Too Fast
36	36	Speed Too Slow
37	37	Vision Obstructed, By What? (Narrative)
38	38	Using Telephone, Two-Way Radio
98	98	Other (Narrative)
99	99	Unknown Action

Highway Construction/Maintenance Zone (A38) *(select 1)*

1	None
2	Construction Zone
3	Maintenance Zone (Short Duration)
4	Utility Zone (Short Duration)
5	Work Zone, Type Unknown
9	Unknown

Light Conditions (A36) *(select 1)*

1	Daylight	4	Dawn
2	Dark–Not Lighted	5	Dusk
3	Dark–Lighted	9	Unknown

Weather Conditions (A37) *(select 1)*

01	No Adverse Conditions	08	Smog, Smoke
02	Rain	09	Blowing Sand, Soil, Dirt, or Snow
03	Sleet, Hail	10	Severe Crosswind
04	Snow	98	Other (narrative)
05	Fog	99	Unknown
06	Rain and Fog		
07	Sleet and Fog		

Driver Alcohol/Drugs

Presence (D16) *(select 1)*

V1	V2	
0	0	Neither Alcohol or Drugs Present
1	1	Yes (Alcohol Present)
2	2	Yes (Drugs Present)
3	3	Yes (Alcohol and Drugs Present)
9	9	Unknown

Determination Method (D17) *(select 1 if applies)*

V1	V2	
1	1	Evidential Test
3	3	Behavioral
4	4	Passive Alcohol Sensor
5	5	Observed
8	8	Other

Alcohol *(select 1)* — *Test Type (select 1 if applies)* (P10)

V1	V2		V1	V2	
95	95	Test Refused	1	1	Blood
96	96	None Given	2	2	Breath
97	97	Test Given, Results Unknown	3	3	Urine
98	98	Test Given, Insufficient Sample	8	8	Other
99	99	Unknown, if tested			

Alcohol Results — V1 V2 — Positive Results

00	00	Negative BAC

Drugs *(select 1)* — *Test Type (select 1 if applies)* (P11)

V1	V2		V1	V2	
95	95	Test Refused	1	1	Blood
96	96	None Given	2	2	Breath
97	97	Test Given, Results Unknown	3	3	Urine
98	98	Test Given, Insufficient Sample	8	8	Other
99	99	Unknown, if tested			

Drug Results *(may select 3)*

00	00	No Drugs Detected
02	02	Marijuana
03	03	Cocaine
04	04	Opiates
05	05	Amphetamines
06	06	PCP
08	08	Other Drug Medication
09	09	Drug Type Unknown

Driver/Vehicle Maneuver *(select 1)* (D15)

V1	V2	
00	00	Going Straight
01	01	Negotiating Curve
02	02	Passing or Overtaking Another Vehicle
03	03	Right Turn to Private Drive
04	04	Right Turn to Street
05	05	Right Turn on Red Permitted
06	06	Right Turn on Red Not Permitted
07	07	Left Turn to Private Drive
08	08	Left Turn to Street
09	09	Turning from Wrong Lane
10	10	Making a U-Turn
11	11	Slowing or Stopped for Signal or Sign
12	12	Slowing or Stopped for Turning Traffic
13	13	Slowing or Stopped for Entering Traffic
14	14	Slowing or Stopped Other
15	15	Stopped in Traffic Lane
16	16	Starting in Traffic
17	17	Backing from Drive
18	18	Backing from On Street Parking Space
19	19	Backing Up
20	20	Entering from Private Drive
21	21	Leaving a Parked Position
22	22	Parked Legally–Yes
23	23	Parked Legally–No
24	24	Changing Lanes or Merging
25	25	Maneuvering to Avoid Another Vehicle, Animal, Pedestrian, Object, etc.
98	98	Other (Narrative)
99	99	Unknown

Page ____ of ____

Document Type
(2) Supplement Document
(3) Amended Document
A4

REFERENCE NUMBER
8366257

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Local Agency Number A7
Reference Number Override A6

Motorists (Passengers) and/or Non-Motorists

A
Vehicle Number P1 (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (20) (30)
Motorists (2)
Non-Motorists P2 (7) Other Cyclist (5) Pedestrian (8) Other Pedestrian (6) Bicyclist (9) Other Non-Motorist
NAME First M.I. Last P3
ADDRESS Same as ☐ Driver ☐ Owner Street & Number City & State ZIP
Date of Birth P4
Age P5 (1) Male Sex (2) Female P6
Injury Code (0) (3) (1) (4) (2) P7
SEAT Position P8
SAFETY Equipment P9
AIRBAG P10 (00) (30) (01) (31) (20) (32) (28) (99)
EJECTED P11 (0) Not Applicable (1) Not Ejected (2) Totally Ejected (3) Partially Ejected (9) Unknown
Ejection Path P12
TRAPPED/EXTRICATED (0) Not Applicable (1) Not Trapped P13 (2) Trapped/Extricated (3) Trapped/Not Extricated (9) Unknown
Medical Transport P14 (Y) (N)
Ambulance/Hospital P15
Alcohol P16
Drugs P17

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Medical Transport P14 (Y) (N)
Ambulance/Hospital P15
Alcohol P16
Drugs P17

Non-Motorist

Non-Motorist Number (A) (B) (C) (D) (E) (F) Non-Motorist Number (A) (B) (C) (D) (E) (F)

P18

Location At Intersection

N1 N2
01 01 In Crosswalk
02 02 On Roadway, Not in Crosswalk
03 03 On Roadway, Crosswalk Not Available
04 04 On Roadway, Crosswalk Availability Unknown
05 05 Not on Roadway
09 09 Unknown

Location Not At Intersection

N1 N2
10 10 In Crosswalk
11 11 On Roadway, Not in Crosswalk
12 12 On Roadway, Crosswalk Not Available
13 13 On Roadway, Crosswalk Availability Unknown
14 14 In Parking Lane
15 15 On Road Shoulder
16 16 Bike Path
17 17 Outside Trafficway
18 18 Other, Not on Roadway
19 19 Unknown

Vehicle Striking Non-Motorist
N1 Vehicle # (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (20) (30)

Vehicle Striking Non-Motorist
N2 Vehicle # (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (20) (30)

N1 N2 **Condition** *(may select 3)*
00 00 Appeared Normal
01 01 Had Been Drinking
02 02 Illegal Drug Use
03 03 Ill (Sick)
04 04 Reaction to Drugs/Medication
05 05 Failure to Take Drugs/Medication
06 06 Blind
07 07 Restricted to Wheelchair
08 08 Other Physical Impairment (Narrative)
09 09 Emotional (Depressed, Angry, Disturbed)
99 99 Unknown Condition

Actions (may select 4) P19

N1 N2
10 10 No Contributing Actions
20 20 Not Visible
21 21 Darting, Running or Stumbling into Road
22 22 Crossing with Signal
23 23 Crossing against Signal
24 24 Crossing, No Signal
25 25 Coming from Behind Parked Car
26 26 Standing in Safety Zone
27 27 Getting on or off Other Vehicle
28 28 Pushing or Working on Vehicle
29 29 Other Working in Roadway
30 30 Construction/Maintenance/Utility Worker
31 31 Playing in Roadway
32 32 Lying in Roadway
33 33 Walking in Roadway
34 34 Walking beside Roadway
41 41 Failure to Keep in Proper Lane or Running off Road
42 42 Failure to Yield Right of Way
43 43 Failure to Obey Traffic Controls
44 44 Failure to Observe Warnings or Instructions
45 45 Failure to Signal Intentions
46 46 Failure to Use Lights
47 47 Improper Loading of Vehicle Cargo or Passengers
48 48 Operator Inexperience
49 49 Operating without Required Equipment
50 50 Riding in Roadway Against Traffic
61 61 Vision Obstructed, By What? (Narrative)
99 99 Unknown Action

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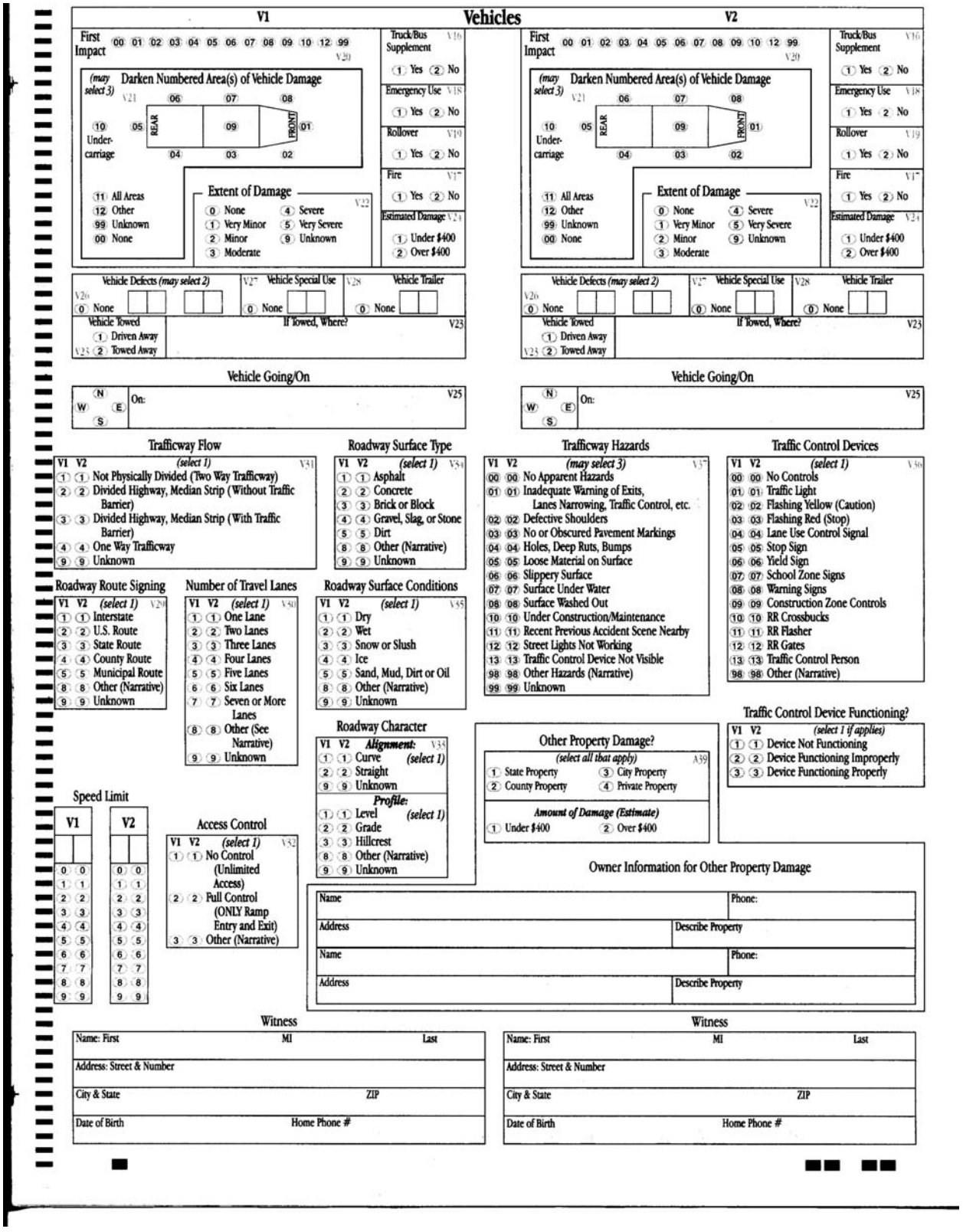


Vehicles

V1

First Impact (V20): 00 01 02 03 04 05 06 07 08 09 10 12 99

(may select 3) Darken Numbered Area(s) of Vehicle Damage (V21)

06 07 08 / 10 Under-carriage 05 REAR / 09 / FRONT 01 / 04 03 02

11 All Areas
12 Other
99 Unknown
00 None

Extent of Damage (V22)
0 None
1 Very Minor
2 Minor
3 Moderate
4 Severe
5 Very Severe
9 Unknown

Truck/Bus Supplement (V16): 1 Yes 2 No
Emergency Use (V18): 1 Yes 2 No
Rollover (V19): 1 Yes 2 No
Fire (V17): 1 Yes 2 No
Estimated Damage (V24): 1 Under $400 2 Over $400

Vehicle Defects (may select 2) (V26): 0 None
Vehicle Special Use (V27): 0 None
Vehicle Trailer (V28): 0 None
Vehicle Towed (V23): 1 Driven Away 2 Towed Away
If Towed, Where? (V23)

Vehicle Going/On (V25)
N W E S
On:

V2

First Impact (V20): 00 01 02 03 04 05 06 07 08 09 10 12 99

(may select 3) Darken Numbered Area(s) of Vehicle Damage (V21)

06 07 08 / 10 Under-carriage 05 REAR / 09 / FRONT 01 / 04 03 02

11 All Areas
12 Other
99 Unknown
00 None

Extent of Damage (V22)
0 None
1 Very Minor
2 Minor
3 Moderate
4 Severe
5 Very Severe
9 Unknown

Truck/Bus Supplement (V16): 1 Yes 2 No
Emergency Use (V18): 1 Yes 2 No
Rollover (V19): 1 Yes 2 No
Fire (V17): 1 Yes 2 No
Estimated Damage (V24): 1 Under $400 2 Over $400

Vehicle Defects (may select 2) (V26): 0 None
Vehicle Special Use (V27): 0 None
Vehicle Trailer (V28): 0 None
Vehicle Towed (V23): 1 Driven Away 2 Towed Away
If Towed, Where? (V23)

Vehicle Going/On (V25)
N W E S
On:

Trafficway Flow

V1 V2 (select 1) (V31)
1 1 Not Physically Divided (Two Way Trafficway)
2 2 Divided Highway, Median Strip (Without Traffic Barrier)
3 3 Divided Highway, Median Strip (With Traffic Barrier)
4 4 One Way Trafficway
9 9 Unknown

Roadway Surface Type

V1 V2 (select 1) (V34)
1 1 Asphalt
2 2 Concrete
3 3 Brick or Block
4 4 Gravel, Slag, or Stone
5 5 Dirt
8 8 Other (Narrative)
9 9 Unknown

Trafficway Hazards

V1 V2 (may select 3) (V37)
00 00 No Apparent Hazards
01 01 Inadequate Warning of Exits, Lanes Narrowing, Traffic Control, etc.
02 02 Defective Shoulders
03 03 No or Obscured Pavement Markings
04 04 Holes, Deep Ruts, Bumps
05 05 Loose Material on Surface
06 06 Slippery Surface
07 07 Surface Under Water
08 08 Surface Washed Out
10 10 Under Construction/Maintenance
11 11 Recent Previous Accident Scene Nearby
12 12 Street Lights Not Working
13 13 Traffic Control Device Not Visible
98 98 Other Hazards (Narrative)
99 99 Unknown

Traffic Control Devices

V1 V2 (select 1) (V36)
00 00 No Controls
01 01 Traffic Light
02 02 Flashing Yellow (Caution)
03 03 Flashing Red (Stop)
04 04 Lane Use Control Signal
05 05 Stop Sign
06 06 Yield Sign
07 07 School Zone Signs
08 08 Warning Signs
09 09 Construction Zone Controls
10 10 RR Crossbucks
11 11 RR Flasher
12 12 RR Gates
13 13 Traffic Control Person
98 98 Other (Narrative)

Roadway Route Signing

V1 V2 (select 1) (V29)
1 1 Interstate
2 2 U.S. Route
3 3 State Route
4 4 County Route
5 5 Municipal Route
8 8 Other (Narrative)
9 9 Unknown

Number of Travel Lanes

V1 V2 (select 1) (V30)
1 1 One Lane
2 2 Two Lanes
3 3 Three Lanes
4 4 Four Lanes
5 5 Five Lanes
6 6 Six Lanes
7 7 Seven or More Lanes
8 8 Other (See Narrative)
9 9 Unknown

Roadway Surface Conditions

V1 V2 (select 1) (V35)
1 1 Dry
2 2 Wet
3 3 Snow or Slush
4 4 Ice
5 5 Sand, Mud, Dirt or Oil
8 8 Other (Narrative)
9 9 Unknown

Roadway Character

V1 V2 Alignment: (select 1) (V33)
1 1 Curve
2 2 Straight
9 9 Unknown

Profile: (select 1)
1 1 Level
2 2 Grade
3 3 Hillcrest
8 8 Other (Narrative)
9 9 Unknown

Other Property Damage?

(select all that apply) (A39)
1 State Property
2 County Property
3 City Property
4 Private Property

Amount of Damage (Estimate)
1 Under $400
2 Over $400

Traffic Control Device Functioning?

V1 V2 (select 1 if applies)
1 1 Device Not Functioning
2 2 Device Functioning Improperly
3 3 Device Functioning Properly

Speed Limit

V1	V2
0 0	0 0
1 1	1 1
2 2	2 2
3 3	3 3
4 4	4 4
5 5	5 5
6 6	6 6
7 7	7 7
8 8	8 8
9 9	9 9

Access Control

V1 V2 (select 1) (V32)
1 1 No Control (Unlimited Access)
2 2 Full Control (ONLY Ramp Entry and Exit)
3 3 Other (Narrative)

Owner Information for Other Property Damage

Name	Phone:
Address	Describe Property
Name	Phone:
Address	Describe Property

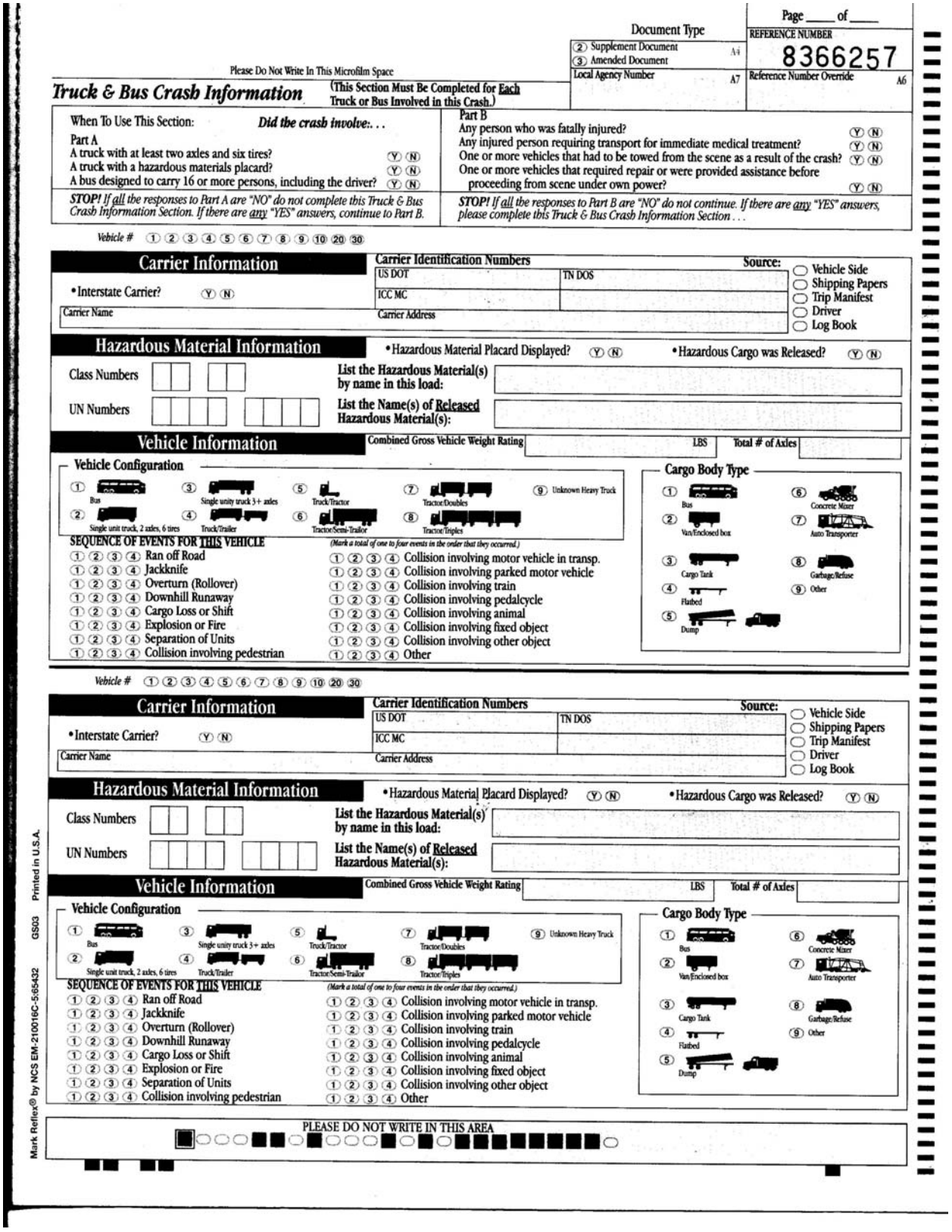
Witness

Name: First	MI	Last
Address: Street & Number		
City & State	ZIP	
Date of Birth	Home Phone #	

Witness

Name: First	MI	Last
Address: Street & Number		
City & State	ZIP	
Date of Birth	Home Phone #	

(Appendix B continued) Supplemental Truck and Bus Crash Information



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Truck & Bus Crash Information (This Section Must Be Completed for Each Truck or Bus Involved in this Crash.)

When To Use This Section: *Did the crash involve:. . .*

Part A
- A truck with at least two axles and six tires? (Y) (N)
- A truck with a hazardous materials placard? (Y) (N)
- A bus designed to carry 16 or more persons, including the driver? (Y) (N)

STOP! If all the responses to Part A are "NO" do not complete this Truck & Bus Crash Information Section. If there are any "YES" answers, continue to Part B.

Part B
- Any person who was fatally injured? (Y) (N)
- Any injured person requiring transport for immediate medical treatment? (Y) (N)
- One or more vehicles that had to be towed from the scene as a result of the crash? (Y) (N)
- One or more vehicles that required repair or were provided assistance before proceeding from scene under own power? (Y) (N)

STOP! If all the responses to Part B are "NO" do not continue. If there are any "YES" answers, please complete this Truck & Bus Crash Information Section . . .

Vehicle # (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (20) (30)

Carrier Information

Carrier Identification Numbers — Source: ◯ Vehicle Side ◯ Shipping Papers ◯ Trip Manifest ◯ Driver ◯ Log Book

- Interstate Carrier? (Y) (N)
- US DOT
- TN DOS
- ICC MC
- Carrier Name
- Carrier Address

Hazardous Material Information

- Hazardous Material Placard Displayed? (Y) (N)
- Hazardous Cargo was Released? (Y) (N)
- Class Numbers
- UN Numbers
- List the Hazardous Material(s) by name in this load:
- List the Name(s) of Released Hazardous Material(s):

Vehicle Information

Combined Gross Vehicle Weight Rating — LBS — Total # of Axles

Vehicle Configuration: (1) Bus (3) Single unity truck 3+ axles (5) Truck/Tractor (7) Tractor/Doubles (9) Unknown Heavy Truck (2) Single unit truck, 2 axles, 6 tires (4) Truck/Trailer (6) Tractor/Semi-Trailor (8) Tractor/Triples

Cargo Body Type: (1) Bus (6) Concrete Mixer (2) Van/Enclosed box (7) Auto Transporter (3) Cargo Tank (8) Garbage/Refuse (4) Flatbed (9) Other (5) Dump

SEQUENCE OF EVENTS FOR THIS VEHICLE (Mark a total of one to four events in the order that they occurred.)

(1) (2) (3) (4) Ran off Road	(1) (2) (3) (4) Collision involving motor vehicle in transp.
(1) (2) (3) (4) Jackknife	(1) (2) (3) (4) Collision involving parked motor vehicle
(1) (2) (3) (4) Overturn (Rollover)	(1) (2) (3) (4) Collision involving train
(1) (2) (3) (4) Downhill Runaway	(1) (2) (3) (4) Collision involving pedalcycle
(1) (2) (3) (4) Cargo Loss or Shift	(1) (2) (3) (4) Collision involving animal
(1) (2) (3) (4) Explosion or Fire	(1) (2) (3) (4) Collision involving fixed object
(1) (2) (3) (4) Separation of Units	(1) (2) (3) (4) Collision involving other object
(1) (2) (3) (4) Collision involving pedestrian	(1) (2) (3) (4) Other

Vehicle # (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (20) (30)

Carrier Information

Carrier Identification Numbers — Source: ◯ Vehicle Side ◯ Shipping Papers ◯ Trip Manifest ◯ Driver ◯ Log Book

- Interstate Carrier? (Y) (N)
- US DOT
- TN DOS
- ICC MC
- Carrier Name
- Carrier Address

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- Hazardous Material Placard Displayed? (Y) (N)
- Hazardous Cargo was Released? (Y) (N)
- Class Numbers
- UN Numbers
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- List the Name(s) of Released Hazardous Material(s):

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(1) (2) (3) (4) Ran off Road	(1) (2) (3) (4) Collision involving motor vehicle in transp.
(1) (2) (3) (4) Jackknife	(1) (2) (3) (4) Collision involving parked motor vehicle
(1) (2) (3) (4) Overturn (Rollover)	(1) (2) (3) (4) Collision involving train
(1) (2) (3) (4) Downhill Runaway	(1) (2) (3) (4) Collision involving pedalcycle
(1) (2) (3) (4) Cargo Loss or Shift	(1) (2) (3) (4) Collision involving animal
(1) (2) (3) (4) Explosion or Fire	(1) (2) (3) (4) Collision involving fixed object
(1) (2) (3) (4) Separation of Units	(1) (2) (3) (4) Collision involving other object
(1) (2) (3) (4) Collision involving pedestrian	(1) (2) (3) (4) Other

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