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EVALUATION OF 2008 MISSISSIPPI CRASH DATA REPORTED TO MCMIS CRASH FILE

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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 Mississippi.

MCMIS Crash File records were matched to the Mississippi crash file to determine the nature and extent of underreporting. Overall, it appears that for 2008 Mississippi reported 38.0 percent of crash involvements that qualified for reporting to the MCMIS Crash file. About 3.0 percent of the reported cases did not meet the reporting criteria.

Reporting rates were found to be related primarily to crash severity, the type of enforcement agency that covered the crash, and whether the reporting officer completed the Commercial Vehicle section of the Uniform Crash Report. Over 84 percent of fatal crashes were reported, compared with 36.4 percent of injury/transported crashes, and 35.8 percent of tow/disabled involvements. Reporting did not seem to vary significantly by truck size, but only 25 percent of "commercial" buses were reported, and less than 3 percent of school buses. Crashes covered by the State High Patrol were reported at the highest rate, though that was only 49.6 percent.

Missing data rates are low for most variables. Overall, the crash report is designed to support full reporting. Most of the information necessary to identify reportable cases is available in the crash file, so a substantial improvement in the reporting rate can be achieved.

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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.
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Evaluation of 2008 Mississippi Crash Data Reported to the MCMIS Crash File

1. Introduction

The Motor Carrier Management Information System (MCMIS) Crash file was 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 crash severity threshold. FMCSA maintains the MCMIS file to support its mission to reduce crashes, injuries, and fatalities involving large trucks and buses. Accurate and complete crash data are essential to assess the magnitude and characteristics of motor carrier crashes and 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 the crash file severity threshold.

The present report is part of a series of reports that evaluate the completeness and accuracy of the data in the MCMIS Crash file. Previous reports documented significant underreporting of cases, which appeared to be due in large part to problems in interpreting and applying the reporting criteria within the states. The problem of underreporting was typically more severe in large jurisdictions and police departments. Each state also had issues specific to the nature of its own system. Some states also over-reported cases, often due to technical problems with duplicate records. [See references 3 to 34.] Identifying the factors that prevent full and complete reporting at the state level is important, since the states are responsible for identifying and reporting qualifying crash involvements. Accordingly, improved completeness and accuracy ultimately depends upon the efficiency and effectiveness of individual state systems.

In this report, we focus on MCMIS Crash file reporting by Mississippi. In recent years, Mississippi has reported from 823 to 2103 involvements annually to the MCMIS Crash file. There has been no consistent trend, and the number reported has varied quite dramatically. Mississippi is the 31st largest state by population and in most years ranks 24th in terms of the number of annual truck and bus fatal involvements. The number of fatal truck and bus involvements in Mississippi has ranged from 82 in 2003 to 94 in 2006 and 74 in 2007.

Police accident report (PAR) data recorded in Mississippi's statewide files as of June, 2009, were used in this analysis. The 2008 PAR file contains the crash records for 131,871 vehicles.

The method employed in this study follows that of previous studies:

1. The complete police accident report file (PAR file hereafter) from Mississippi was obtained for the most recent year available, which was 2008. This file was processed to identify all cases that qualified for reporting to the MCMIS Crash file.

2. All cases in the Mississippi 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 Mississippi.

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.

2. Data Preparation

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

2.1 MCMIS Crash Data File

The 2008 MCMIS Crash file as of June 9, 2009, was used to identify records submitted from Mississippi. For calendar year 2008 there were 948 cases reported to the file from Mississippi. An analysis file was constructed of these records using all variables in the MCMIS file. The analysis file was then examined for duplicate records (more than one record submitted for the same vehicle in the same crash; i.e., the report number and sequence number were identical). The search yielded 360 records, amounting to 131 pairs, triplicates, etc. These records were individually examined, and only three cases appeared to be duplicate records, with identical driver and vehicle information. The other cases differed on accident date, driver, and vehicle variables, even though report numbers were identical.

In addition, records were examined for identical values on accident number, accident date/time, county, street, vehicle license number, and driver license number, even though their vehicle sequence numbers were different. The purpose is to identify cases with multiple records for the same vehicle and driver within a given accident. No such duplicates were found.

The duplicate instances identified in the first search were located in the PAR file. The member of the pair that also resided in the PAR file was kept, and the other one deleted. After the deletions, the resulting MCMIS file contains 945 unique records.

2.2 Mississippi Police Accident Report File

The Mississippi PAR data for 2008 (as of June 2009) was obtained from the state. The data were stored as multiple text files, representing Accident, Vehicle, Driver, and Occupant information. The files contain records for 74,275 traffic crashes involving 131,871 vehicles. Data for the PAR file are captured from the State of Mississippi Uniform Crash Report, as completed by police officers.

The PAR file was first examined for duplicate records (involvements where more than one record was submitted for the same vehicle in the same crash). In Mississippi, a specific crash is uniquely identified by a combination of the Agency Number and Crash Number variables. It

appears that Crash Number is the Case Number within a specific agency, generated by that agency. Since Crash Numbers were recorded in an inconsistent format, there was some reason to suspect duplicate records based on similar, but not identical, number formats. For example, some records contained alpha characters and dashes, and others did not. The file was examined for duplicate records based on identical agency number, case number, and vehicle number. Six duplicate pairs were found. Examination of these records determined that only one record in one pair had the same values for all vehicle and driver variables. It was excluded along with the other two records described below.

Just as in the preparation of the MCMIS Crash file, cases were examined to determine if there were any records that contained identical case number, time, place, and vehicle/driver variables, regardless of vehicle number. Records were examined for duplicate occurrences based on the fields for agency/crash number, accident date/time, crash county, city, driver license number, and insurance policy number. (VIN and vehicle license number were not on the file). Based on the above algorithm, two duplicate records (pairs) were found. Examination of the pairs revealed that a few variables differed among the pairs, but the driver information was identical. It appears a duplicate record may have been generated during the process of updating certain variables.

The member of the three pairs with the highest vehicle number was deleted. After deleting three records the resulting PAR file has 131,868 unique records.

3. Matching Process

The next step involved matching records from the Mississippi PAR file to corresponding records from the MCMIS file. There were 945 Mississippi records from the MCMIS file available for matching, and 131,868 records from the Mississippi PAR file. All records from the Mississippi PAR data file were used in the match, even those that did not meet the requirements for reporting to the MCMIS Crash file. This allows the identification of cases reported to the MCMIS Crash file that do not meet the reporting criteria.

The process of 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 and specific vehicles within the accidents. Agency Number/Crash Number, used to uniquely identify a crash in the Mississippi PAR data, and Report Number in the MCMIS Crash file, are obvious first choices. Agency Number combined with Crash Number in the Mississippi PAR file is a sixteen-digit character field, while in the MCMIS Crash file Report Number is stored as a 12-character alphanumeric value. The report number in the MCMIS Crash file is constructed as follows: The first two columns contain the state abbreviation (MS, in this case), followed by ten digits. It appears digits three through six correspond to PAR Agency Number, and thus were used in the match. A portion of the PAR Crash Number is often embedded in the MCMIS Report Number, but it does not follow a consistent format, and so it could not be used in the match.

Other data items typically used in matching at the crash level include Crash Date, Crash Time (stored in military time as hour/minute), Crash County, Crash City, Crash Street and Reporting Officer's Identification number. The PAR file had a variable pertaining to City, but it was unrecorded in 23.1 percent of records in the PAR file, and 64.0 percent of the time in the MCMIS file. Street Name was unrecorded in over 30 percent of PAR cases and in many cases did not appear to match Crash Street in the MCMIS file.

Variables in the MCMIS file that distinguish one vehicle from another within the same crash include vehicle license plate number, driver license number, vehicle identification number (VIN), driver date of birth, and driver last name. Only the driver variables were present in the PAR file. The driver variables were unrecorded six to ten percent of the time in the PAR data, but in less than one percent of MCMIS cases. The PAR data did include carrier-specific variables which proved useful in verifying matches made by other means.

The match was performed in five steps, using the available variables. At each step, records in either file with duplicate values on all the match variables were excluded, along with records that were missing values on the match variables. The first match included the variables agency number, crash date (month, day), crash time (hour, minute), county, street, officer badge number, driver license number, and driver date of birth. The second match step dropped agency, street, and driver date of birth, and matched on crash date, crash time, county, badge, and driver license number. After some experimentation, the third match step included crash date, crash hour, county, driver date of birth, and driver last name. The variables used in the final attempt at a computer-based match were crash date, crash time, county, and driver last name, but only one additional case was matched. An attempt was made to hand-match the remaining unmatched cases by reviewing all those crashes in the PAR file, and determining if any vehicle in the crash matched the MCMIS case. These hand-matches resulted in matching fifteen additional cases in the fifth match.

In total, this process resulted in matching 98.6 percent of the MCMIS records to the PAR file. Thirteen cases could not be matched. See Table 1 for the variables used in each match step and the number of records matched at each step.

Table 1 Steps in MCMIS/Mississippi PAR File Match, 2008

Step	Matching variables	Cases matched
Match 1	Agency number, crash date, crash time, county, street, officer badge number, driver license number, and driver date of birth	89
Match 2	Crash date, crash time, county, officer badge number, and driver license number	737
Match 3	Crash date, crash hour, county, driver date of birth, and last name	90
Match 4	Crash date, crash time, county, and driver last name	1
Match 5	Hand-matched using all available variables	15
Total cases matched		932

The matches made were verified using other variables common to the MCMIS and PAR file as a final check to ensure each match was valid. The above procedure resulted in 932 matches, representing 98.6 percent of the 945 non-duplicate records reported to MCMIS. Figure 1 shows the flow of cases from each file in the matching process.

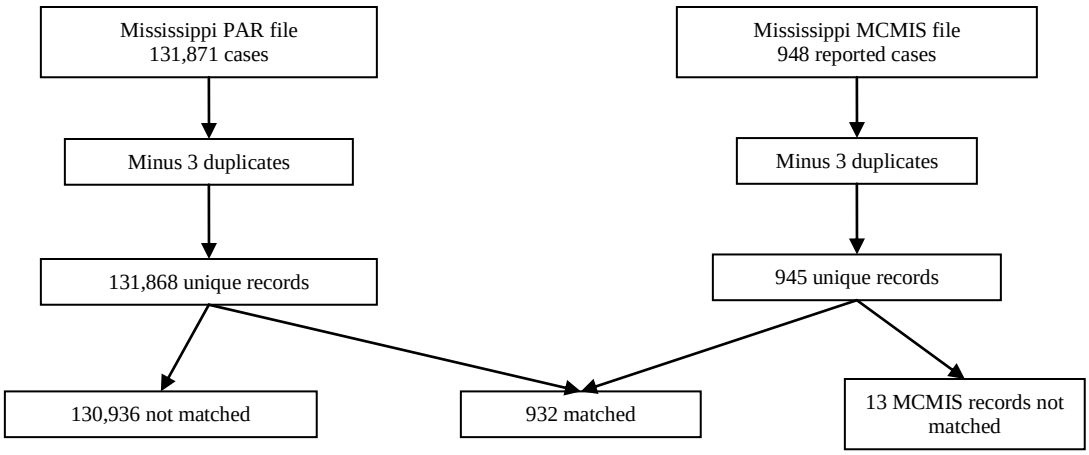

Figure 1 Case Flow in MCMIS/Mississippi Crash File Match

Of the 932 matched cases, 904 met the MCMIS reporting criteria (reportable) and 28 (3.0 percent) did not meet the MCMIS reporting criteria (not reportable). The method of identifying cases reportable to the MCMIS Crash file is discussed in the next section.

4. Identifying Reportable Cases

The next step in the evaluation of crash reporting is to identify records in the Mississippi data that qualified for reporting to the MCMIS Crash file. Records are selected as "reportable" using the information available in the computerized crash files that were sent by Mississippi. Records reportable to the MCMIS Crash file must meet the criteria specified by the FMCSA. The reporting criteria cover the type of vehicle and the severity of the crash. These criteria are discussed in more detail below, but the point here is that records transmitted to the MCMIS Crash file are selected from among all the records in the state's crash data. Records of every crash in the state are examined to see if they meet the MCMIS reporting criteria.

The method developed to identify reportable records is specifically designed to be independent of any prior selection within the state being evaluated. This approach is necessary to develop a comprehensive independent evaluation of the completeness of reporting. Accordingly, we use the information that is completed by the officers for all vehicles in the crashes. Some states place some of the data elements for the MCMIS Crash file in a special section, with instructions to the reporting officer to complete that information only for vehicles or crashes that meet the MCMIS selection criteria. In the case of Mississippi, a section of the crash form is designated as "Commercial Vehicle" and contains fields used to identify the carrier and information about any hazardous cargo. If the present evaluation of state reporting were limited to records identified by those data elements, it would obviously miss cases where the officer had neglected to complete the section. Accordingly, the method of identifying reportable cases used in this report is developed using the data recorded for all vehicles and all crashes, i.e., by using the variables with information about the type of vehicle and the severity of the crash. This approach provides the best opportunity to identify any cases that might have been overlooked.

The MCMIS criteria for a reportable crash involving a qualifying vehicle are shown in Table 2. Reportable records must meet both the vehicle type and crash severity criteria. The method used for the vehicle and crash severity criteria are each discussed in turn.

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 vehicles is fairly straightforward in the Mississippi PAR file. A Vehicle Configuration field in the crash file classifies vehicles among 21 distinct types. The vehicle configurations include several that match very well the vehicle types in the MCMIS Crash file. Mississippi's inclusion of vehicle diagrams in the instruction manual aids the reporting officer in determining the correct vehicle type. However, although the truck/tractor (bobtail) truck type was illustrated, it was not apparent how the officer was to record this particular vehicle type.

Vehicle Configuration was unrecorded for 3,131 (2.4 percent) cases in the PAR file. Table 3 shows the code levels of the Configuration variable that meet the vehicle criteria.

Table 3 Relevant Vehicle Configuration Codes in Mississippi PAR file

Trucks
3 – Single-Unit Truck (2)
4 – Single-Unit Truck (3+)
5 – Truck/Trailer
7 – Tractor/Semi Trailer
8 – Tractor (2)
9 – Tractor (3)
10 – Unknown Truck
Buses
13 **–** School Bus
14 – Commercial Bus

In addition to these vehicle types, any vehicle, regardless of size, displaying a hazardous materials placard, also meets the MCMIS vehicle type definition. Mississippi's crash form includes a Placard ID variable in the Commercial Vehicle section that can be used to identify vehicles displaying a hazardous materials placard.

In total, there were 5,476 vehicles identified as eligible trucks and buses in the Mississippi PAR data. Table 4 shows the distribution by vehicle type. About 91 percent of qualifying vehicles are trucks, while 9.0 percent are buses. There was one light vehicle transporting hazardous materials.

The 5,476 eligible vehicles represent 4.2 percent of the 131,868 vehicles in the PAR file. This proportion lies near the center of the range observed in other states evaluated, which is typically 2.6 to 6.1 percent.

Table 4 Vehicles Meeting MCMIS Vehicle Criteria, Mississippi PAR File, 2008

Vehicle type	N	%
Truck	4,984	91.0
Bus	491	9.0
Other, transporting hazmat	1	0.0
Total	5,476	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 those involving a fatality, an injured person transported for immediate medical attention, or a vehicle towed from the scene due to disabling damage. The Mississippi crash file has some, though not all, of the information necessary to identify in a straightforward way the crashes that meet the severity criteria.

The Mississippi Driver and Occupant files contain information on injured persons. There is a field for the officer to record the severity of the injury (using the KABCN scale). Injured occupants who were transported for care can also be identified using the Transport Type variable (EMS, Police, Private Vehicle); however this variable is not available for the majority of drivers because, while the variable is included in the Occupant file, it has not been included in the Driver file. Accordingly, to identify drivers transported for medical attention, it was necessary to rely on the Medical Facility variable, which identifies the medical facility to which the person was transported. Relying on the Medical Facility variable may result in missing some cases of drivers transported for attention, e.g., when it was known that the driver was transported but not the specific facility.

The Mississippi PAR data also includes some of the information needed to identify crashes in which a vehicle was towed from the scene. This is recorded directly on the Mississippi crash report, by means of a field in which the officer can indicate whether a vehicle was towed. However, the vehicle towed information just indicates whether a vehicle was towed, not whether the tow was due to disabling damage or for some other reason. That the tow was due to disabling damage was inferred from the Vehicle Damage field, which classifies damage severity as levels None, Light (<$500 to repair), and Heavy ($500+). Since heavy damage as it is defined here does not necessarily indicate the vehicle was not drivable, it is not possible to precisely determine “disabling” damage. However, there is no reasonable alternative, so all crashes in which at least one vehicle was coded as towed and also had heavy damage were considered as meeting the MCMIS criteria.

Using the damage scale variable in combination with the Towed flag resulted in a reasonable proportion of vehicles towed due to disabling damage. Analysis of the towed variable in the 2006 General Estimates System (GES) database shows that approximately 27 percent of vehicles are towed due to damage. Other MCMIS evaluations tend to support an estimate of about 27 to 31 percent. Based on the method used here, the percentage of vehicles towed due to damage in the

Mississippi PAR file is 28.5 percent, which aligns well with the proportion in other state files and with the national experience as captured in GES.

Implementing the eligible vehicle and crash severity filters identified a total of 2,378 reportable cases in the Mississippi crash data in 2008. There were 2,378 qualifying vehicles—either a truck, or bus—involved in a crash that included either a fatality, at least one person transported for immediate medical attention, or at least one vehicle towed due to disabling damage, based on the definitions explained above. As noted above, this number likely underestimates somewhat the true number of reportable records, primarily because information on whether a driver was transported is missing for almost all drivers and had to be inferred from the medical facility information.

Table 5 Reportable Records in Mississippi Crash File, 2008

	Crash severity			
MCMIS Vehicle type	Fatal	Injured/ transported	Tow/ disabled	Total
Truck	91	849	1,305	2,245
Bus	5	66	62	133
Hazmat placard	0	0	0	0
Total	96	915	1,367	2,378

As Figure 1 above shows, there were 948 records reported to the MCMIS Crash file by Mississippi in 2008, of which three were duplicates, leaving 945 unique records reported. Of these, 932 were matched to the Mississippi PAR file. Of the 932 matched records, 904 were identified as meeting the reporting criteria under the method described above, and 28 did not qualify for reporting.

5. Factors Associated with Reporting

The process described in section 4 identified 2,378 records in the 2008 Mississippi crash file as meeting the MCMIS Crash file reporting criteria. There were 948 records reported to the MCMIS Crash file for 2008, of which 945 were unique and 904 were determined to meet the MCMIS reporting criteria. Therefore, of the 2,378 reportable records, 904 were actually reported, for an overall reporting rate of 38.0 percent. This section provides a discussion of factors that apparently affected the successful identification and reporting of records to the MCMIS Crash file.

5.1 Overreporting

MCMIS evaluations tend to focus on underreporting because underreporting tends to be a larger problem than overreporting. However, some cases are reported that do not meet the MCMIS reporting criteria. Of the 932 MCMIS cases that could be matched to the Mississippi PAR data, 28 cases were not reportable, based on the definitions discussed in Section 4.

Table 6 shows a two-way classification of vehicle type and crash severity, and provides some explanation as to why these vehicles do not meet the reporting criteria. The majority of records did not meet the crash severity criteria. Of the 28 records, 22 were trucks in a crash that did not include a fatality, injury transported for treatment, or vehicle towed due to disabling damage.

(Please note, however, that the number of injured/transported cases may be under-identified because of the data problems discussed above.) The other six qualified for reporting by crash severity, but the vehicles were not a truck, bus, or light vehicle carrying hazmat.

Table 6 Distribution of Non-reportable Vehicles in Mississippi Crash File, 2008

	Crash severity				
Vehicle type	Fatal	Transported injury	Towed/disabled	Other crash severity	Total
Truck	0	0	0	22	22
Bus	0	0	0	0	0
Other vehicle (not transporting hazmat)	3	0	3	0	6
Total	3	0	3	22	28

5.2 Case Processing

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 2008 MCMIS Crash file as of June, 2009, approximately 180 days after the end of 2008, was used to identify records submitted from Mississippi, so all 2008 cases should have been reported by that date.

Table 7 shows reporting rates according to month of the crash. Reporting rates range from 17.7 percent in July to 65.7 percent in December. There is no consistent pattern of underreporting across the year, although note that similar rates are clustered. June and July have the lowest rates. January through April reporting rates are all about 32 percent. Rates in September through December fluctuate within the relatively narrow range of 60.6 to 65.7 percent. This seasonal pattern suggests seasonal factors are at work, but it does not appear that some sort of consistent lag in processing cases explains the overall reporting rate. The highest reporting rates are for the most recent months, and even those relative high rates amount to less than two-thirds of estimated reportable cases. So while it appears that some process over the course of the year causes reporting rates to vary, and that the process spans consecutive months, this process does not explain the overall low rate of reporting.

Table 7 Reporting Rate by Accident Month in Mississippi Crash File, 2008

Crash month	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
January	205	32.7	138	9.4
February	184	32.6	124	8.4
March	236	31.8	161	10.9
April	210	31.9	143	9.7
May	217	20.3	173	11.7
June	169	17.8	139	9.4
July	209	17.7	172	11.7
August	198	28.3	142	9.6

Crash month	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
September	208	62.0	79	5.4
October	206	61.7	79	5.4
November	170	60.6	67	4.5
December	166	65.7	57	3.9
Total	2,378	38.0	1,474	100.0

Figure 2 shows the cumulative percent of cases submitted by latency in days, i.e. the number of days between the crash date and the date the case was uploaded to the MCMIS Crash file. Crash reports are required to be submitted to the MCMIS Crash file within 90 days of the crash. Just over 73 percent of the records that were ultimately reported were submitted within 90 days of the crash. The median time between crash occurrence and record upload is about 37 days. Two-thirds are submitted within 68 days, and 90 percent were submitted within 153 days.

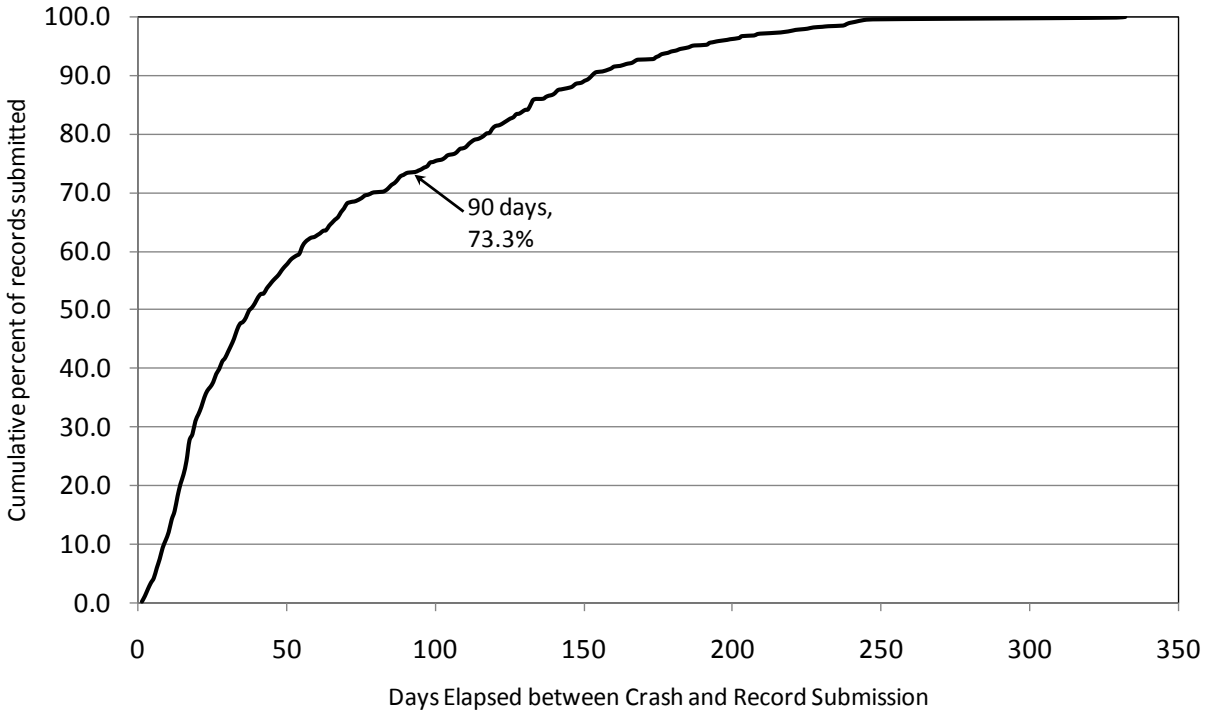

Figure 2 Cumulative Percent of Cases Submitted to MCMIS Crash File by Number of Days After Crash, Mississippi 2008

The first date on which crash records from 2008 were uploaded was January 17, 2008, when two records were uploaded. On average, uploads occurred every 5.5 days between then and March 24, 2009, when the last upload occurred. An average of 12.1 records were uploaded per upload, but many uploads consisted only of a few records. For example, 12 uploads consisted of one record, and another 37 had fewer than 10. At the other extreme, 66 records were uploaded on December 10, 2008, and 55 on January 15, 2009. Uploads of more than 20 records accounted for two-thirds of the records ultimately submitted.

5.3 Reporting Criteria

This section presents the results of examining reporting rates by the factors that are used to determine if a specific crash involvement is reportable. This analysis is intended to help identify characteristics of the vehicle or crash that are more likely to trigger the process that results in a reported case, and likewise vehicle types and crash types that are more likely to be overlooked.

Table 8 shows reporting rates, the number of unreported cases, and the proportion of unreported cases for each level of the MCMIS crash severity criteria. Traffic crashes that resulted in a fatality were reported at the highest rate, with 84.4 percent of such crash involvements reported. The two less-severe levels of crash severity were reported at substantially lower rates. Injury/transported involvements were reported at a 36.4 percent rate, while 35.8 percent of the towed involvements were reported. The difference in the reporting rates for injured/transported and towed/disabled is not significant statistically or practically. It appears that different processes are used for identifying fatal and nonfatal crash involvements. While there is room for improving the reporting of fatals, an improvement in the rates for the two nonfatal severities would produce the greatest increase in the overall reporting rate.

Table 8 Reporting Rate by MCMIS Crash Severity, Mississippi 2008

Crash severity	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Fatal	96	84.4	15	1.0
Injured/transported	915	36.4	582	39.5
Towed/disabled	1,367	35.8	877	59.5
Total	2,378	38.0	1,474	100.0

In Table 9, crash severity is measured by the most severe injury in the crash, ranked by the the KABCN scale used in the Mississippi crash data. In this scale, fatal injuries are classified as K, life-threatening injuries as A, moderate injuries as B, and complaint of pain (without visible injury) is coded C. Life-threatening (A) injuries are reported at a higher rate than less severe injuries. The difference is statistically significant. The rates for moderate injury, complaint of pain, and no injury are all about the same. It appears that fatal crashes receive the most scrutiny, followed by life threatening injuries, and other involvements all receive somewhat less attention.

Table 9 Reporting Rate by Most Serious Injury in the Crash, Mississippi 2008

Crash severity	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Fatal (K)	96	84.4	15	1.0
Life threatening (A)	60	46.7	32	2.2
Moderate (B)	399	39.6	241	16.4
Complaint of Pain (C)	649	33.4	432	29.3
No injury	1,171	35.9	751	50.9
Injury status not recorded	3	0.0	3	0.2
Total	2,378	38.0	1,474	100.0

The second component of the MCMIS Crash file criteria is the vehicle type. As described above, trucks, buses, and other vehicles transporting sufficient amounts of hazmat to require a placard all meet the reporting requirements. No light vehicles transporting hazmat were in a crash meeting the severity criteria, so only reporting rates for trucks and buses are considered here. Table 10 shows the rates for the different general types of vehicles. The reporting rate for trucks was 40.0 percent, close to the overall rate of 38.0 percent, which is expected since trucks account for 2,245 of the 2,378 total reportable vehicles. The reporting rate for buses is only 5.3 percent. It appears that reporting is almost exclusively focused on trucks, with only 7 buses reported out of 133 bus involvements that met the criteria.

Table 10 Reporting Rate by MCMIS Vehicle Class, Mississippi 2008

MCMIS Vehicle class	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Truck	2,245	40.0	1,348	91.5
Bus	133	5.3	126	8.5
Total	2,378	38.0	1,474	100.0

Table 11 provides more detail about the effect of vehicle configuration on reporting rates, showing rates by each level of the vehicle configuration variable. Reporting rates are somewhat higher for the biggest vehicles. Over 72 percent of tractor-triples involvements were reported, and almost 54 percent of tractor-semitrailers. But the rate of 2-axle SUT was close, at 51.8 percent. Note the very low rate for truck/trailers, with only four of 452 involvements reported. Both bus types represented are reported at significantly lower rates than trucks. Only a quarter of "commercial buses" are reported, and only 2.6 percent of school buses. School buses are almost entirely overlooked, suggesting that it is not recognized that they are reportable if they meet the passenger seating threshold for buses.

Table 11 Reporting Rate by Police-Reported Vehicle Configuration, Mississippi 2008

Vehicle Configuration	Reportable cases	Reporting rate	Unreported	% of total unreported
Single-Unit Truck (2 axles)	251	51.8	121	8.2
Single-Unit Truck (3+ axles)	68	44.1	38	2.6
Truck/Trailer	452	0.9	448	30.4
Tractor/Semitrailer	1303	53.7	603	40.9
Tractor (2 trailers)	42	47.6	22	1.5
Tractor (3 trailers)	18	72.2	5	0.3
Unknown Truck	111	0.0	111	7.5
School Bus	117	2.6	114	7.7
Commercial Bus	16	25.0	12	0.8
Total	2,378	38.0	1,474	100.0

Reporting rates, which are a measure of how reliably reportable records are recognized as meeting the MCMIS reporting criteria, vary by both the type of vehicle and by the severity of the crash. The effects seem to be additive, such that within a given vehicle type, lower severity crashes are reported at a lower level than more severe crashes. Calculating reporting rates by the

cross-classification of vehicle type and crash severity shows that the lowest reporting rates are for buses in injured/transported crashes, at 4.5 percent. (Table 12) Rates are higher for trucks at every crash severity, with the highest rate for trucks in fatal crashes, in which 84.6 percent (77 of 91) of crash involvements were reported.

Table 12 Reporting Rate by Crash Severity and Vehicle Type, Mississippi 2008

Crash Severity	Truck	Bus	Total
Fatal	84.6	80.0	84.4
Injured/transported	38.9	4.5	36.4
Towed/disabled	37.5	n/a	35.8
Total	40.0	5.3	38.0

5.4 License state and Commercial Vehicle Information

License state can be used as an imperfect surrogate for involvement in interstate commerce to test if vehicles clearly involved in interstate commerce are more likely to be reported to the MCMIS Crash file. There may be a tendency, whether deliberate or not, to more readily identify trucks and buses in interstate commerce as of interest to the national crash file, maintained by regulator of trucks and buses involved in interstate commerce. In Mississippi, records of crashes involving reportable vehicles with a non-Mississippi license plate were significantly more likely to be submitted to the MCMIS crash file than in-state vehicles. (Table 13) Over half of trucks or buses with out-of-state vehicle licenses were reported, compared to about one-third of in-state vehicles.

Table 13 Reporting Rate by Vehicle License State, Mississippi 2008

Vehicle license state	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
In-state	1,863	34.6	1,219	82.7
Out-of-state	507	51.3	247	16.8
Unrecorded	8	0.0	8	0.5
Total	2,378	38.0	1,474	100.0

The Mississippi Uniform Crash Report includes a Commercial Vehicle section in which is collected information identifying the carrier, including name, address, and identification number, as well as cargo body type, gross vehicle weight rating (GVWR), and data about hazardous materials in the cargo. There are no instructions on the Crash Report, but the *Instruction Manual* directs that the section be completed for any vehicle that meets the criteria specified. The criteria specified in the manual accurately captures the MCMIS vehicle type criteria, i.e., a vehicle with a GVWR over 10,000 pounds or a motor vehicle with seating for nine or more occupants, including the driver, or a vehicle displaying a hazmat placard.

Entering information into the CMV section clearly is associated with higher rates of reporting to the MCMIS Crash file, but it is not sufficient. Even cases that meet the reporting criteria that have all or nearly all the information are only reported about half the time. On the other hand,

cases in which none of the information is entered are almost completely unreported. Table 14 shows reporting rates by the number of items with data from the CMV section. In the data, the cases fell into basically two groups—either almost all of the CMV section was left blank or the section was virtually complete. Where the CMV section was left blank, only four of 674 reportable cases were actually submitted to the MCMIS Crash file. Where the form was complete or close to complete, about half of the reportable records are reported. Clearly, the CMV section data are important in the selection process in Mississippi, but they are not determinative.

Table 14 Reporting Rates by Number of Items Recorded in Commercial Vehicle Section Mississippi 2008

Items recorded	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
0	674	0.6	670	45.5
1	1	0.0	1	0.1
6	14	28.6	10	0.7
7	1,572	53.0	739	50.1
8	117	53.8	54	3.7
Total	2,378	38.0	1,474	100.0

5.5 Reporting Agency and County of Crash

In addition to the reporting criteria, there can be differences in reporting related to where the crash occurs or the type of agency that investigated 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. Such differences can help focus resources in areas that would produce the greatest improvement. This section examines reporting rates by location and agency.

Reporting rates vary significantly by the type of investigating agency (Table 15). There are three primary levels of investigating agencies identified in the Mississippi crash file: Highway Safety Patrol, county sheriff, and city police. Crashes covered by the Highway Patrol have the highest reporting rate at 49.6 percent. The Highway Patrol also cover about 46 percent of reportable crash involvements, so despite their relatively high rate, the underreporting of crash involvements covered by the Highway Patrol accounts for 37.4 percent of all the unreported crash involvements. The reporting rate for county sheriffs is 27.3 percent and for city police at 28.5 percent. It is likely the differences in training and enforcement duties account for the marked differences in reporting rates between the Highway Patrol on one hand and the city police and sheriffs on the other.

Table 15 Reporting Rate by Investigating Agency, Mississippi 2008

Investigating agency	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Highway patrol	1,094	49.6	551	37.4
City police	1,006	28.5	719	48.8
Sheriff	267	27.3	194	13.2
Other	11	9.1	10	0.7
Total	2,378	38.0	1,474	100.0

Reporting rates tend to be associated with the population size of the county, such that larger, more urbanized counties tend to report at a lower rate than less urbanized counties. But the size of the variation is not so large as to argue that population density is the primary factor explaining the low overall rate of reporting. Some small counties, with relatively few reportable cases (e.g., less than 30) have individual reporting rates that differ significantly from the overall rate, but overall the smallest 60 counties (those with fewer than 30 reportable cases) report 43.2 percent of records, while the top 10 report only 33.6 percent of records. (Table 16) The counties listed in Table 16 are all among the top 15 counties in Mississippi, in terms of population, and include seven out of the top nine. They include all the major urban population centers in Mississippi. These counties define the areas that would produce the most impact on overall reporting from Mississippi.

Table 16 Reporting Rate for Top Ten Counties by Number of Unreported Cases Mississippi 2008

County	Reportable cases	Reporting rate	Unreported cases	% of total
Hinds	183	29.5	129	8.8
De Soto	120	30.8	83	5.6
Harrison	110	27.3	80	5.4
Rankin	134	44.0	75	5.1
Jackson	109	37.6	68	4.6
Forrest	88	31.8	60	4.1
Lauderdale	83	37.3	52	3.5
Madison	67	37.3	42	2.8
Warren	57	28.1	41	2.8
Hancock	51	31.4	35	2.4
Subtotal of top 10	*1,002*	*33.6*	*665*	*45.1*
All other counties	1,376	41.2	809	54.9
Total	2,378	38.0	1,474	100.0

5.6 Fire Occurrence

The Mississippi crash file captures information about fires or explosions in the Sequence of Events fields. There were nine trucks and no buses involved in crashes where a fire occurred (Table 17). Almost 56 percent of these records were reported, substantially higher than the overall reporting rate of 38.0 percent. It is possible that very serious crashes, as indicated by the

occurrence of fire in the crash, receive a more thorough investigation and thus are more likely to be identified as reportable.

Table 17 Reporting Rates for Vehicles In Crashes Involving Fire, Mississippi 2008

Vehicle type	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Truck	9	55.6	4	100.0
Bus	0	n/a	0	0.0
Total	9	55.6	4	100.0

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 state crash file and in the MCMIS Crash file. Inconsistencies may indicate problems in translating information recorded on the crash report to the values in the MCMIS Crash file.

Table 18 shows missing data rates for selected, important variables in the MCMIS Crash file. Missing data rates are generally quite low, with a handful of exceptions. On most fundamental, structural variables, such as date, time, number of fatalities and number of injuries, missing data rates are either zero or extremely low.

Only road access and VIN have missing data rates are excessive. Mississippi has chosen not to collect VIN on the crash report. Possibly it is linked in from other files using the license plate number. In any case, it is missing for almost all records. Road access is also not captured on the uniform crash report which likely explains why it is missing in 96.0 percent of MCMIS records. The missing data rate for DOT number is calculated only for carriers coded as "Interstate," which therefore must have a DOT number, and only 3.6 percent of the records in MCMIS were found to be missing that information.

Table 18 Missing Data Rates for Selected MCMIS Crash File Variables, Mississippi, 2008

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	0.2
Accident hour	0.0	Event one	0.6
Accident minute	0.0	Event two	56.5
County	0.4	Event three	78.8
Body type	1.2	Event four	92.4
Configuration	0.5	Number of vehicles	0.0
GVWR class	5.4	Road access	96.0
DOT number *	3.6	Road surface	0.0
Carrier state	0.0	Road trafficway	5.1

Variable	Percent unrecorded	Variable	Percent unrecorded
Citation issued	0.4	Towaway	0.0
Driver date of birth	0.4	Truck or bus	0.0
Driver license number	0.7	Vehicle license number	0.3
Driver license state	0.7	Vehicle license state	0.3
Driver license class	0.6	VIN	99.7
Driver license valid	0.4	Weather	0.0

* Based on cases where the carrier is coded interstate.

Hazardous materials variable	Percent unrecorded
Hazardous materials placard	99.9
Percentages of hazmat placarded vehicles only:	
Hazardous cargo release	100.0
Hazardous materials class (1-digit)	0.0
Hazardous materials class (4-digit)	0.0
Hazardous materials name	0.0

The second section of the table shows missing data rates for the hazardous materials (hazmat) variables. Only one record showed a vehicle with a hazmat placard. That record had data for hazmat class, both the 1-digit and 4-digit codes, and hazmat name, but did not include information on whether the hazmat was released as a consequence of the crash.

There were, however, 25 additional records that had valid 4-digit hazmat class number (also known as the UN number), for which the hazmat placard indicator was left blank. It is most likely that these vehicles did in fact display a hazmat placard and that the hazmat placard indicator was left blank in error. This inconsistency can make the analysis of the hazmat data unpredictable, since it is common to begin an analysis by selecting records with a hazmat placard.

It is also useful to compare the values of variables in the MCMIS Crash file with the values of comparable variables in the Mississippi crash file, to detect instances of inconsistency between the two files, which may indicate a problem in preparing the data for upload. The comparison was done for all substantive variables, other than those that were used to match records in the two files. 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.

- Number of fatalities—one record in the Mississippi file recorded one fatal, but the matching record showed no fatalities in MCMIS. All other records were identical between on the two files.

- Vehicle configuration—10 cases inconsistent. There was no pattern to the differences. For example, one case coded SUT 3 axles in the Mississippi crash file was coded SUT 2-axles in the MCMIS data. However, it should be noted that Mississippi does not have a code level for tractor with no trailer (bobtail), so that configuration type is not captured in the data. It could not be determined how the bobtail configuration is captured in the Mississippi crash data.

- License state—Five records differed on license state between the Mississippi value and the value in the MCMIS Crash file. There was no consistent pattern.

- Cargo body—15 records differed on the type of cargo body; in addition, 10 records had a value for cargo body in the Mississippi data but were left blank in the MCMIS data, and another 10 records had a cargo body coded in the MCMIS data but cargo body was blank in the Mississippi crash data. Finally, 13 records were coded as no cargo body ("none") in the Mississippi data but cargo body was coded "other" in the MCMIS data.

- Road surface condition was perfectly consistent. Mississippi uses the same category levels as the MCMIS Crash file.

- Light condition—15 inconsistencies, mostly cases coded as dark/lighted or dark/unlighted in the Mississippi data that were coded as daylight in the MCMIS data.

- Weather—Mississippi permits coding up to two weather conditions, while the MCMIS Crash file includes only one. Cases coded cloudy in Mississippi were coded as "other" weather condition in the MCMIS data. There were also six cases coded "cloudy" in the Mississippi crash file that were coded as "no adverse condition," which seems more appropriate.

None of the inconsistencies listed above appeared to part of a pattern that would indicate a systematic problem with uploading the data or with preparing the data for upload. It appears more likely that the instances in which values in the Mississippi crash file did not match the values in the MCMIS file occurred on a case-by-case basis, such as when individual cases are manually prepared. Or they may have occurred when a correction was made in one file but not also in the other.

7. Summary and Discussion

This study evaluates reporting to the MCMIS Crash file by the state of Mississippi for crashes occurring during 2008. The primary goal of the evaluation is to determine if all of the records that *should* be reported to the MCMIS Crash file *are* reported, and, if not, to identify areas of underreporting that might suggest the reasons for the underreporting. A related goal is to identify cases that should *not* be reported, but which were reported.

To accomplish the goal involves two activities: First, a method is developed to identify cases that meet the MCMIS Crash file reporting criteria in the state's computerized crash file. This process uses the information in the state crash file itself to determine which records meet the vehicle type criteria and the threshold for the severity of the crash. The second activity is to match the records in the state file with those in the MCMIS Crash file. The matching process allows for the identification of three groups: 1) crashes that met the requirements and were reported; 2) crashes that met the requirements but were <u>not</u> reported; and 3) crashes that did not meet the requirements but <u>were</u> reported.

It is critical to develop an independent method of identifying reportable cases, separate from any identification by the reporting officer or other entity. An independent method allows the identification of any cases that may have been overlooked by the reporting officer or by the

process used in Mississippi to select cases for upload to the MCMIS Crash file. In the best outcome, an independent process will verify that the extraction is accurate and complete.

The computerized Mississippi crash record facilitates identifying reportable records, with some exceptions.

The vehicle types in the Vehicle Configuration variable specify vehicles that match the vehicle types in the MCMIS Crash file very well. The bus levels are somewhat oversimplified, identifying only school and "commercial" buses, but overall, if officers are correctly classifying vehicles, the Vehicle Configuration variable should be able to identify vehicles that meet the MCMIS reporting criteria unambiguously. Identifying light vehicles transporting placarded hazmat is more problematic. Since placard information is located in the commercial vehicle section of the Uniform Crash Report, the reporting officer would have to recognize that the vehicle meets the requirements for that section before he fills it in.

Similarly, crashes meeting the severity threshold can also be identified fairly cleanly using the coded data, though with one significant qualification. Whether an injured person was transported for treatment is captured in a variable that records the type of transport (EMS, police, or private vehicle) and secondarily the medical facility to which the person was transported. The Mississippi crash data are structured such that records for drivers are housed in a file separate from the file that contains records for all the other persons involved in the crash. The Transport Type variable is included in the file with records for Occupants, but that variable was unfortunately not included in the Driver file. The result is that for most vehicle occupants (which are drivers) it is necessary to rely on the variable that captures the medical facility. The only way we have of determining if an injured person was transported is if a medical facility code was entered. Thus, in our judgment, it is likely that some cases of injured/transported drivers are missed. This problem can be remedied very easily if the Transport Type variable is included in the Driver file, just as it is in the Occupant file.

A total of 2,378 crash involvements were identified that meet the MCMIS reporting criteria for vehicle type and crash severity. This includes 2,245 trucks and 133 buses. In terms of crash severity, there were 96 reportable fatal involvements, 915 injury/transported involvements, and 1,367 tow/damaged involvements. These estimates may be somewhat lower than the true number. Including the Transport Type variable in the Driver file may have resulted in a greater number of injury/transported cases.

Overall, a total of 948 records were submitted by Mississippi to the MCMIS Crash file for 2008. Three of these records were duplicate, and in the case of 28 it was determined that they did not meet the MCMIS reporting criteria, primarily because they did not meet the crash severity threshold. In addition, 13 of the cases could not be found in the Mississippi crash file. Therefore, of the 2,378 reportable records, 904 were actually reported, for an overall reporting rate of 38.0 percent. (If the 13 unmatched records actually were in the Mississippi crash file but just not found, their addition to the number of properly reported cases would increase the overall reporting rate by 0.6 percent to 38.6 percent.)

The severity of the crash seemed to have the largest impact on whether a reportable crash was reported. Over 84 percent of fatal involvements were reported, compared with only about 35 percent of nonfatal involvements. It is possible that fatal involvements are subjected to a higher

level of scrutiny and investigation, and so they are recognized as meeting the MCMIS requirements more readily. Fatal crashes may also be processed by a separate system. This actually seems the most likely explanation, since reporting rates move almost as a step function, with one rate for fatal involvements and lower rates, varying in a narrow range, for non-fatal involvements.

Reporting rates also varied by vehicle type, but the pattern of low reporting rates was a little different from that observed in other states. In most states, reporting seems to vary by vehicle size, such that large trucks (e.g., tractor-semitrailers) are reported at higher rates than small trucks (e.g., 2-axle SUTs), and trucks in general are reported at a higher rate than buses. In Mississippi, trucks were also reported at a higher rate, with 40.0 percent of reportable truck involvements submitted and only 5.3 percent of reportable bus involvements. (Only 2.6 percent of reportable school bus involvements were reported.) But in terms of truck size, there was only a weak relationship between truck size and reporting rates. The most notable factor in reporting related to truck configuration is that only 0.9 percent of truck/trailer combinations were reported. This configuration alone accounted for over 30 percent of unreported records.

Whether the reporting police office completed the CMV section of the Uniform Crash Report was strongly associated with the ultimate reporting of that crash to the MCMIS Crash file, but it did not fully determine the reporting. Only a bit over half of the reportable records for which the CMV section was completed were ever actually submitted to the MCMIS Crash file. About 47 percent of reportable cases which did have essentially complete CMV section data were not uploaded to the MCMIS file. On the other hand, only four of the 674 reportable records that did not have any information in the CMV section were reported to the MCMIS file. So the officer recognizing that a vehicle meets the MCMIS vehicle type requirements and completing the CMV section is a necessary but not sufficient condition of reporting.

The license state of the vehicle may influence reporting officers. Over half of trucks and buses licensed out of the state were reported, compared with only about 35 percent of those with Mississippi plates. The truck itself did not seem to have a major influence, as reported above, other than the fact that buses and especially truck/trailer combinations were frequently overlooked. The type of enforcement agency that covered the crash also had an effect, with cases covered by the State Highway Patrol correctly reported at a higher rate than either city police or county sheriffs. These differences may reflect training, experience, and enforcement duties. Members of the Highway Patrol may be more attuned to the CMV section because they complete it at a higher rate than either city police or county sheriffs, which in turn, produces a higher overall reporting rate.

In addition to problems in accurately identifying all reportable cases, there were some problems in the timeliness of reporting of those that were identified. Reportable crashes must be uploaded to the MCMIS Crash file within 90 days of occurrence, and about 73.3 percent of crashes are reported within that time frame. Reporting latency varied over the year, with particularly low rates in June and July, and higher rates toward the end of the year, with rates averaging over 60 percent from September through December.

With respect to the reported data itself, missing data rates for most fields reported to the MCMIS Crash file are quite low, with the exception of VIN, which is not collected on the Crash Report, and roadway access. There are a few records with differences in specific variables between what

appears in the state's crash data and the records as they exist in the MCMIS file. There are relatively few such cases and no systematic problems. One possible source of the discrepancies may be correcting a record in one system, but not making the same correction in the other. On balance, the data reported appears to be of good quality, reflecting a crash data-capture system—in terms of the fields collected on the crash report—that is well-designed.

In many ways, the data captured on the Mississippi crash data report could support more complete reporting if they were relied upon more directly. Most of the data needed to identify vehicles in crashes that meet the MCMIS Crash file thresholds appears in the coded data itself. There is the problem of the Transport Type variable not being included in the Driver file, but that could be fixed easily by carrying it along when creating the Driver file.

But beyond that, there is a problem in identifying cases for submission to the MCMIS Crash file. Half of the records that meet the vehicle and crash severity thresholds and that also have complete data in the CMV section are not being identified and submitted to the MCMIS file. There must be a selection process, possibly manual, which overlooks those cases that, from all evidence in the crash data, should be submitted to MCMIS. It is also true reporting officers are not completing the CMV section for almost half of the cases that they should. If officers completed that section when they should, the reporting rate would probably significantly improve. But there is still the problem of cases with complete data that meet the MCMIS reporting criteria simply not being identified for submission to the Crash file.

The Mississippi crash data is in many ways well-suited to support much higher rates of reporting. The vehicle type variable facilitates identifying vehicles that meet the criteria, (though it should be noted that capturing VIN would be a big help in identifying reportable vehicles that are misclassified by the reporting officer). Crashes that meet the criteria could be more accurately identified with a few improvements in the structure of the data. There is the problem that officers only complete the CMV section for a little over half the trucks and buses, but that in and of itself does not explain the low rate of reporting. Using the information already in the file, with a little restructuring as described above, could result in a substantial improvement to the current low rate of reporting.

8. References

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30 Matteson, A., and Blower, D., Evaluation of 2006 Maine Crash Data Reported to MCMIS Crash File. University of Michigan Transportation Research Institute, Ann Arbor, Michigan. June 2008. Sponsor: Federal Motor Carrier Safety Administration, U.S. D.O.T.

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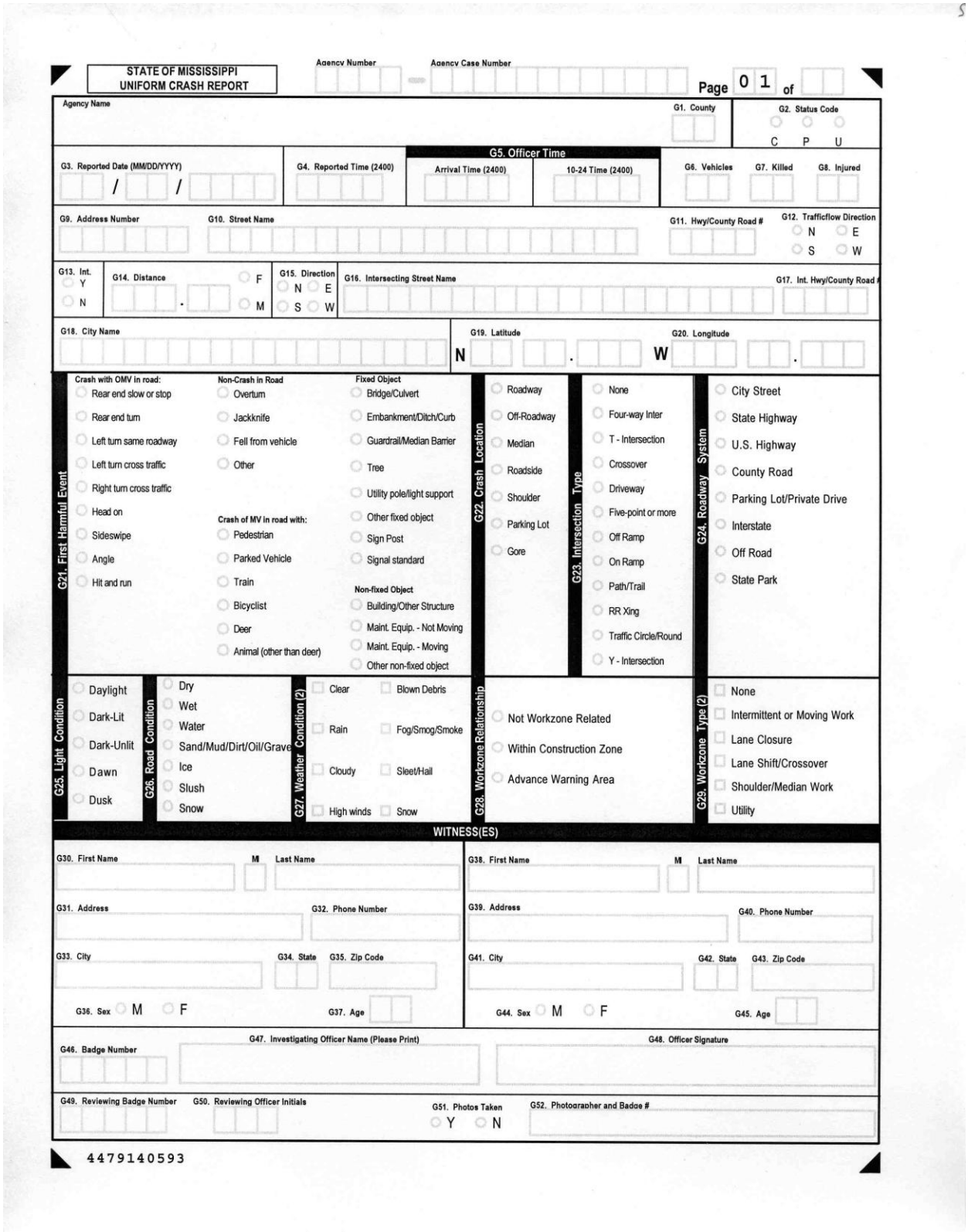
Appendix A Mississippi Traffic Accident Reports



STATE OF MISSISSIPPI
UNIFORM CRASH REPORT

Agency Number — Agency Case Number

Page 01 of

Agency Name

G1. County

G2. Status Code: C P U

G3. Reported Date (MM/DD/YYYY)

G4. Reported Time (2400)

G5. Officer Time: Arrival Time (2400) | 10-24 Time (2400)

G6. Vehicles | G7. Killed | G8. Injured

G9. Address Number | G10. Street Name | G11. Hwy/County Road # | G12. Trafficflow Direction: N E S W

G13. Int.: Y N

G14. Distance: F M

G15. Direction: N E S W

G16. Intersecting Street Name | G17. Int. Hwy/County Road #

G18. City Name

G19. Latitude: N

G20. Longitude: W

G21. First Harmful Event

Crash with OMV in road:
- Rear end slow or stop
- Rear end turn
- Left turn same roadway
- Left turn cross traffic
- Right turn cross traffic
- Head on
- Sideswipe
- Angle
- Hit and run

Non-Crash in Road:
- Overturn
- Jackknife
- Fell from vehicle
- Other

Crash of MV in road with:
- Pedestrian
- Parked Vehicle
- Train
- Bicyclist
- Deer
- Animal (other than deer)

Fixed Object:
- Bridge/Culvert
- Embankment/Ditch/Curb
- Guardrail/Median Barrier
- Tree
- Utility pole/light support
- Other fixed object
- Sign Post
- Signal standard

Non-fixed Object:
- Building/Other Structure
- Maint. Equip. - Not Moving
- Maint. Equip. - Moving
- Other non-fixed object

G22. Crash Location
- Roadway
- Off-Roadway
- Median
- Roadside
- Shoulder
- Parking Lot
- Gore

G23. Intersection Type
- None
- Four-way Inter
- T - Intersection
- Crossover
- Driveway
- Five-point or more
- Off Ramp
- On Ramp
- Path/Trail
- RR Xing
- Traffic Circle/Round
- Y - Intersection

G24. Roadway System
- City Street
- State Highway
- U.S. Highway
- County Road
- Parking Lot/Private Drive
- Interstate
- Off Road
- State Park

G25. Light Condition
- Daylight
- Dark-Lit
- Dark-Unlit
- Dawn
- Dusk

G26. Road Condition
- Dry
- Wet
- Water
- Sand/Mud/Dirt/Oil/Grave
- Ice
- Slush
- Snow

G27. Weather Condition (2)
- Clear
- Blown Debris
- Rain
- Fog/Smog/Smoke
- Cloudy
- Sleet/Hail
- High winds
- Snow

G28. Workzone Relationship
- Not Workzone Related
- Within Construction Zone
- Advance Warning Area

G29. Workzone Type (2)
- None
- Intermittent or Moving Work
- Lane Closure
- Lane Shift/Crossover
- Shoulder/Median Work
- Utility

WITNESS(ES)

G30. First Name | M | Last Name

G31. Address | G32. Phone Number

G33. City | G34. State | G35. Zip Code

G36. Sex M F | G37. Age

G38. First Name | M | Last Name

G39. Address | G40. Phone Number

G41. City | G42. State | G43. Zip Code

G44. Sex M F | G45. Age

G46. Badge Number

G47. Investigating Officer Name (Please Print)

G48. Officer Signature

G49. Reviewing Badge Number | G50. Reviewing Officer Initials

G51. Photos Taken: Y N

G52. Photographer and Badge #

4479140593

MUCR Diagram/Narrative

Agency Number _ Agency Case Number

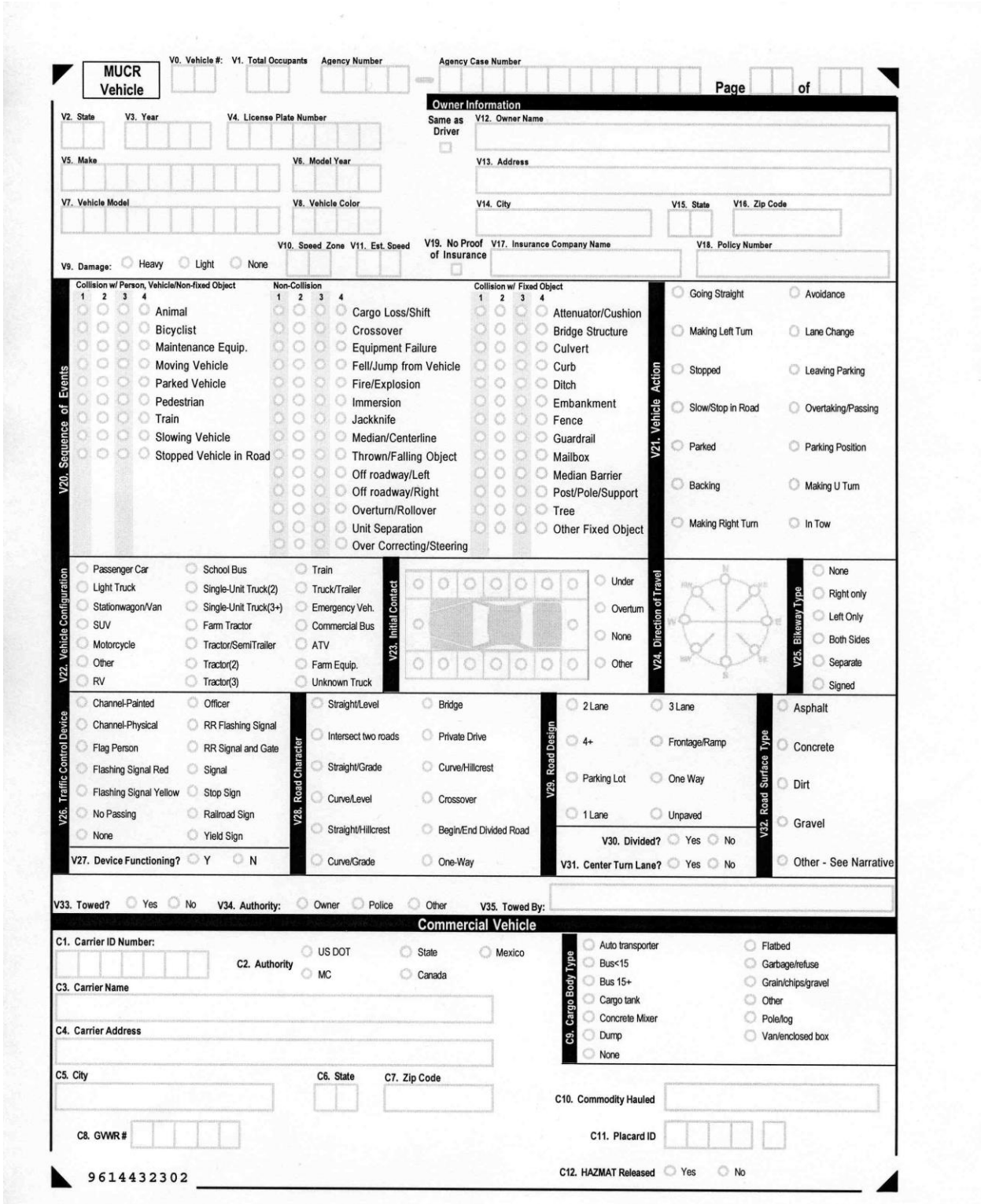
Page 0 2 of

N1. Collision Diagram

North Arrow

N2. Collision Narrative

1772140596



MUCR Vehicle

V0. Vehicle #: V1. Total Occupants Agency Number Agency Case Number Page of

Owner Information

V2. State V3. Year V4. License Plate Number Same as Driver V12. Owner Name

V5. Make V6. Model Year V13. Address

V7. Vehicle Model V8. Vehicle Color V14. City V15. State V16. Zip Code

V9. Damage: Heavy Light None V10. Speed Zone V11. Est. Speed V19. No Proof of Insurance V17. Insurance Company Name V18. Policy Number

V20. Sequence of Events

Collision w/ Person, Vehicle/Non-fixed Object	Non-Collision	Collision w/ Fixed Object
Animal	Cargo Loss/Shift	Attenuator/Cushion
Bicyclist	Crossover	Bridge Structure
Maintenance Equip.	Equipment Failure	Culvert
Moving Vehicle	Fell/Jump from Vehicle	Curb
Parked Vehicle	Fire/Explosion	Ditch
Pedestrian	Immersion	Embankment
Train	Jackknife	Fence
Slowing Vehicle	Median/Centerline	Guardrail
Stopped Vehicle in Road	Thrown/Falling Object	Mailbox
	Off roadway/Left	Median Barrier
	Off roadway/Right	Post/Pole/Support
	Overturn/Rollover	Tree
	Unit Separation	Other Fixed Object
	Over Correcting/Steering	

V21. Vehicle Action

Going Straight Avoidance
Making Left Turn Lane Change
Stopped Leaving Parking
Slow/Stop in Road Overtaking/Passing
Parked Parking Position
Backing Making U Turn
Making Right Turn In Tow

V22. Vehicle Configuration

Passenger Car School Bus Train
Light Truck Single-Unit Truck(2) Truck/Trailer
Stationwagon/Van Single-Unit Truck(3+) Emergency Veh.
SUV Farm Tractor Commercial Bus
Motorcycle Tractor/SemiTrailer ATV
Other Tractor(2) Farm Equip.
RV Tractor(3) Unknown Truck

V23. Initial Contact

Under Overturn None Other

V24. Direction of Travel

V25. Bikeway Type

None Right only Left Only Both Sides Separate Signed

V26. Traffic Control Device

Channel-Painted Officer
Channel-Physical RR Flashing Signal
Flag Person RR Signal and Gate
Flashing Signal Red Signal
Flashing Signal Yellow Stop Sign
No Passing Railroad Sign
None Yield Sign

V27. Device Functioning? Y N

V28. Road Character

Straight/Level Bridge
Intersect two roads Private Drive
Straight/Grade Curve/Hillcrest
Curve/Level Crossover
Straight/Hillcrest Begin/End Divided Road
Curve/Grade One-Way

V29. Road Design

2 Lane 3 Lane
4+ Frontage/Ramp
Parking Lot One Way
1 Lane Unpaved

V30. Divided? Yes No
V31. Center Turn Lane? Yes No

V32. Road Surface Type

Asphalt
Concrete
Dirt
Gravel
Other - See Narrative

V33. Towed? Yes No V34. Authority: Owner Police Other V35. Towed By:

Commercial Vehicle

C1. Carrier ID Number: C2. Authority US DOT State Mexico MC Canada

C3. Carrier Name

C4. Carrier Address

C5. City C6. State C7. Zip Code

C8. GVWR #

C9. Cargo Body Type

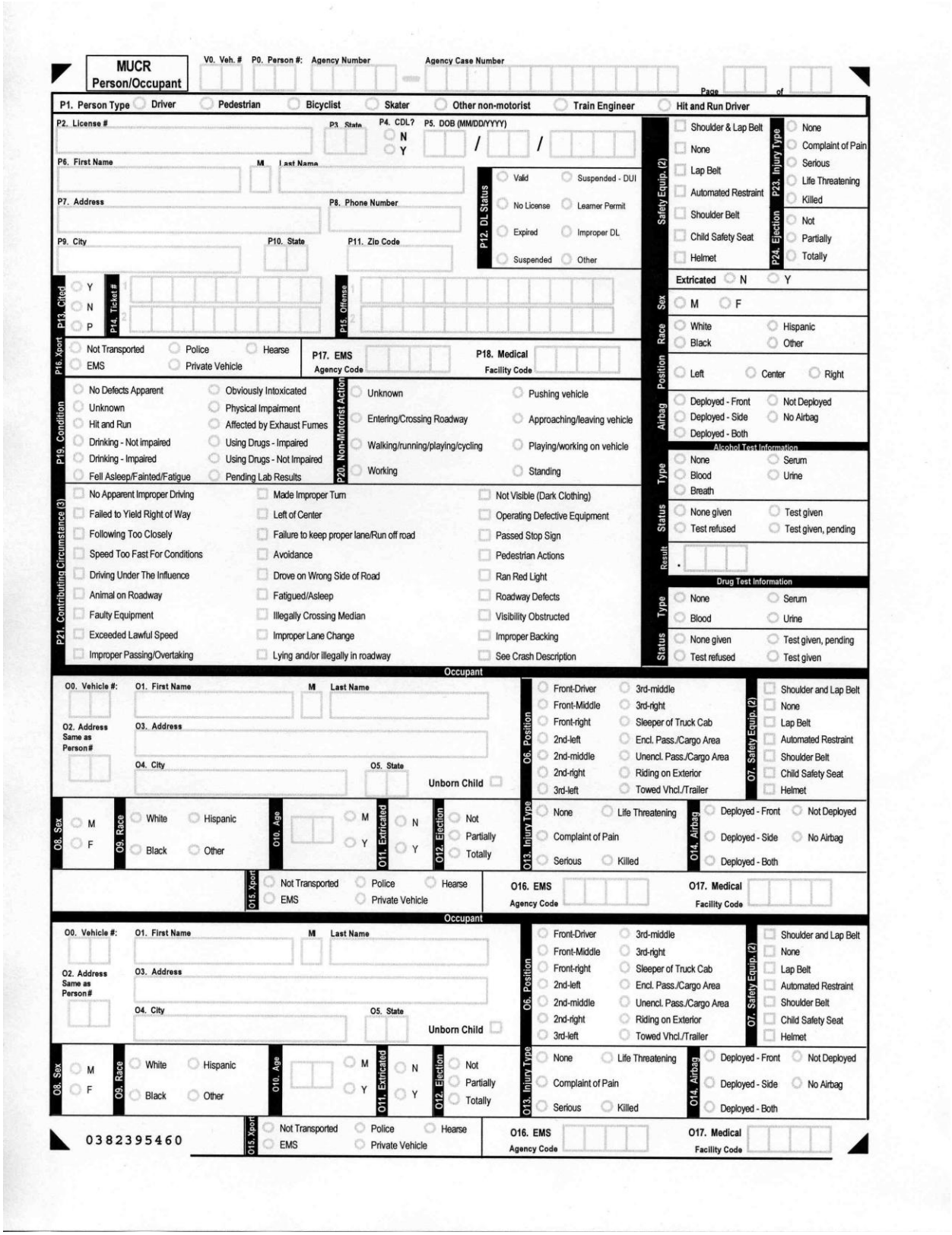
Auto transporter Flatbed
Bus<15 Garbage/refuse
Bus 15+ Grain/chips/gravel
Cargo tank Other
Concrete Mixer Pole/log
Dump Van/enclosed box
None

C10. Commodity Hauled

C11. Placard ID

C12. HAZMAT Released Yes No

9614432302



MUCR Person/Occupant

V0. Veh. # P0. Person #: Agency Number Agency Case Number Page of

P1. Person Type: Driver; Pedestrian; Bicyclist; Skater; Other non-motorist; Train Engineer; Hit and Run Driver

P2. License # P3. State P4. CDL? N Y P5. DOB (MM/DD/YYYY)

P6. First Name M Last Name

P7. Address P8. Phone Number

P9. City P10. State P11. Zip Code

P12. DL Status: Valid; Suspended - DUI; No License; Learner Permit; Expired; Improper DL; Suspended; Other

Safety Equip. (2): Shoulder & Lap Belt; None; Lap Belt; Automated Restraint; Shoulder Belt; Child Safety Seat; Helmet

P23. Injury Type: None; Complaint of Pain; Serious; Life Threatening; Killed

P24. Ejection: Not; Partially; Totally

P13. Cited: Y N P P14. Ticket # 1 2 P15. Offense 1 2

Extricated: N Y

Sex: M F

Race: White; Hispanic; Black; Other

Position: Left; Center; Right

Airbag: Deployed - Front; Not Deployed; Deployed - Side; No Airbag; Deployed - Both

P16. Xport: Not Transported; Police; Hearse; EMS; Private Vehicle

P17. EMS Agency Code P18. Medical Facility Code

P19. Condition: No Defects Apparent; Unknown; Hit and Run; Drinking - Not impaired; Drinking - Impaired; Fell Asleep/Fainted/Fatigue; Obviously Intoxicated; Physical Impairment; Affected by Exhaust Fumes; Using Drugs - Impaired; Using Drugs - Not Impaired; Pending Lab Results

P20. Non-Motorist Action: Unknown; Entering/Crossing Roadway; Walking/running/playing/cycling; Working; Pushing vehicle; Approaching/leaving vehicle; Playing/working on vehicle; Standing

Alcohol Test Information

Type: None; Blood; Breath; Serum; Urine

Status: None given; Test refused; Test given; Test given, pending

Result: .

Drug Test Information

Type: None; Blood; Urine; Serum

Status: None given; Test refused; Test given, pending; Test given

P21. Contributing Circumstance (3):

- No Apparent Improper Driving
- Failed to Yield Right of Way
- Following Too Closely
- Speed Too Fast For Conditions
- Driving Under The Influence
- Animal on Roadway
- Faulty Equipment
- Exceeded Lawful Speed
- Improper Passing/Overtaking
- Made Improper Turn
- Left of Center
- Failure to keep proper lane/Run off road
- Avoidance
- Drove on Wrong Side of Road
- Fatigued/Asleep
- Illegally Crossing Median
- Improper Lane Change
- Lying and/or Illegally in roadway
- Not Visible (Dark Clothing)
- Operating Defective Equipment
- Passed Stop Sign
- Pedestrian Actions
- Ran Red Light
- Roadway Defects
- Visibility Obstructed
- Improper Backing
- See Crash Description

Occupant

O0. Vehicle #: O1. First Name M Last Name

O2. Address Same as Person# O3. Address

O4. City O5. State Unborn Child

O6. Position: Front-Driver; Front-Middle; Front-right; 2nd-left; 2nd-middle; 2nd-right; 3rd-left; 3rd-middle; 3rd-right; Sleeper of Truck Cab; Encl. Pass./Cargo Area; Unencl. Pass./Cargo Area; Riding on Exterior; Towed Vhcl./Trailer

O7. Safety Equip. (2): Shoulder and Lap Belt; None; Lap Belt; Automated Restraint; Shoulder Belt; Child Safety Seat; Helmet

O8. Sex: M F

O9. Race: White; Hispanic; Black; Other

O10. Age M Y

O11. Extricated: N Y

O12. Ejection: Not; Partially; Totally

O13. Injury Type: None; Life Threatening; Complaint of Pain; Serious; Killed

O14. Airbag: Deployed - Front; Not Deployed; Deployed - Side; No Airbag; Deployed - Both

O15. Xport: Not Transported; Police; Hearse; EMS; Private Vehicle

O16. EMS Agency Code O17. Medical Facility Code

Occupant

O0. Vehicle #: O1. First Name M Last Name

O2. Address Same as Person# O3. Address

O4. City O5. State Unborn Child

O6. Position: Front-Driver; Front-Middle; Front-right; 2nd-left; 2nd-middle; 2nd-right; 3rd-left; 3rd-middle; 3rd-right; Sleeper of Truck Cab; Encl. Pass./Cargo Area; Unencl. Pass./Cargo Area; Riding on Exterior; Towed Vhcl./Trailer

O7. Safety Equip. (2): Shoulder and Lap Belt; None; Lap Belt; Automated Restraint; Shoulder Belt; Child Safety Seat; Helmet

O8. Sex: M F

O9. Race: White; Hispanic; Black; Other

O10. Age M Y

O11. Extricated: N Y

O12. Ejection: Not; Partially; Totally

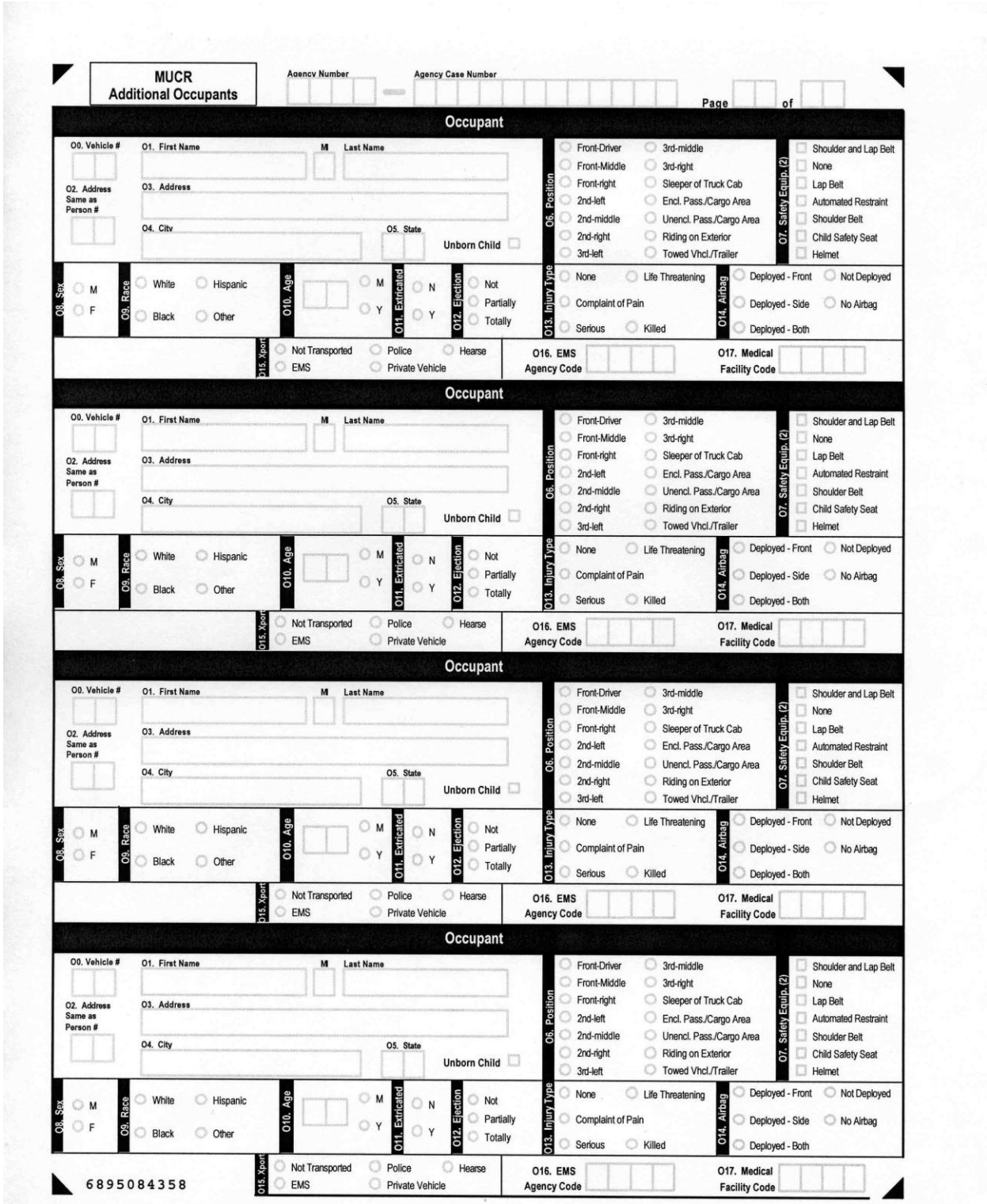
O13. Injury Type: None; Life Threatening; Complaint of Pain; Serious; Killed

O14. Airbag: Deployed - Front; Not Deployed; Deployed - Side; No Airbag; Deployed - Both

0382395460

O15. Xport: Not Transported; Police; Hearse; EMS; Private Vehicle

O16. EMS Agency Code O17. Medical Facility Code



MUCR
Additional Occupants

Agency Number — Agency Case Number — Page of

Occupant

O0. Vehicle # | O1. First Name | MI | Last Name

O2. Address Same as Person # | O3. Address

O4. City | O5. State | Unborn Child

O6. Position: Front-Driver; Front-Middle; Front-right; 2nd-left; 2nd-middle; 2nd-right; 3rd-left; 3rd-middle; 3rd-right; Sleeper of Truck Cab; Encl. Pass./Cargo Area; Unencl. Pass./Cargo Area; Riding on Exterior; Towed Vhcl./Trailer

O7. Safety Equip. (2): Shoulder and Lap Belt; None; Lap Belt; Automated Restraint; Shoulder Belt; Child Safety Seat; Helmet

O8. Sex: M; F

O9. Race: White; Hispanic; Black; Other

O10. Age | M; Y

O11. Extricated: N; Y

O12. Ejection: Not; Partially; Totally

O13. Injury Type: None; Life Threatening; Complaint of Pain; Serious; Killed

O14. Airbag: Deployed - Front; Not Deployed; Deployed - Side; No Airbag; Deployed - Both

O15. Xport: Not Transported; Police; Hearse; EMS; Private Vehicle

O16. EMS Agency Code | O17. Medical Facility Code

Occupant

O0. Vehicle # | O1. First Name | MI | Last Name

O2. Address Same as Person # | O3. Address

O4. City | O5. State | Unborn Child

O6. Position: Front-Driver; Front-Middle; Front-right; 2nd-left; 2nd-middle; 2nd-right; 3rd-left; 3rd-middle; 3rd-right; Sleeper of Truck Cab; Encl. Pass./Cargo Area; Unencl. Pass./Cargo Area; Riding on Exterior; Towed Vhcl./Trailer

O7. Safety Equip. (2): Shoulder and Lap Belt; None; Lap Belt; Automated Restraint; Shoulder Belt; Child Safety Seat; Helmet

O8. Sex: M; F

O9. Race: White; Hispanic; Black; Other

O10. Age | M; Y

O11. Extricated: N; Y

O12. Ejection: Not; Partially; Totally

O13. Injury Type: None; Life Threatening; Complaint of Pain; Serious; Killed

O14. Airbag: Deployed - Front; Not Deployed; Deployed - Side; No Airbag; Deployed - Both

O15. Xport: Not Transported; Police; Hearse; EMS; Private Vehicle

O16. EMS Agency Code | O17. Medical Facility Code

Occupant

O0. Vehicle # | O1. First Name | MI | Last Name

O2. Address Same as Person # | O3. Address

O4. City | O5. State | Unborn Child

O6. Position: Front-Driver; Front-Middle; Front-right; 2nd-left; 2nd-middle; 2nd-right; 3rd-left; 3rd-middle; 3rd-right; Sleeper of Truck Cab; Encl. Pass./Cargo Area; Unencl. Pass./Cargo Area; Riding on Exterior; Towed Vhcl./Trailer

O7. Safety Equip. (2): Shoulder and Lap Belt; None; Lap Belt; Automated Restraint; Shoulder Belt; Child Safety Seat; Helmet

O8. Sex: M; F

O9. Race: White; Hispanic; Black; Other

O10. Age | M; Y

O11. Extricated: N; Y

O12. Ejection: Not; Partially; Totally

O13. Injury Type: None; Life Threatening; Complaint of Pain; Serious; Killed

O14. Airbag: Deployed - Front; Not Deployed; Deployed - Side; No Airbag; Deployed - Both

O15. Xport: Not Transported; Police; Hearse; EMS; Private Vehicle

O16. EMS Agency Code | O17. Medical Facility Code

Occupant

O0. Vehicle # | O1. First Name | MI | Last Name

O2. Address Same as Person # | O3. Address

O4. City | O5. State | Unborn Child

O6. Position: Front-Driver; Front-Middle; Front-right; 2nd-left; 2nd-middle; 2nd-right; 3rd-left; 3rd-middle; 3rd-right; Sleeper of Truck Cab; Encl. Pass./Cargo Area; Unencl. Pass./Cargo Area; Riding on Exterior; Towed Vhcl./Trailer

O7. Safety Equip. (2): Shoulder and Lap Belt; None; Lap Belt; Automated Restraint; Shoulder Belt; Child Safety Seat; Helmet

O8. Sex: M; F

O9. Race: White; Hispanic; Black; Other

O10. Age | M; Y

O11. Extricated: N; Y

O12. Ejection: Not; Partially; Totally

O13. Injury Type: None; Life Threatening; Complaint of Pain; Serious; Killed

O14. Airbag: Deployed - Front; Not Deployed; Deployed - Side; No Airbag; Deployed - Both

O15. Xport: Not Transported; Police; Hearse; EMS; Private Vehicle

O16. EMS Agency Code | O17. Medical Facility Code

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