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EVALUATION OF 2007 MINNESOTA 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 Minnesota.

MCMIS Crash File records were matched to the Minnesota Crash file to determine the nature and extent of underreporting. Overall, it appears that Minnesota is reporting 79.9 percent of crash involvements that should be reported to the MCMIS Crash file. Reportable cases could be identified in the Minnesota data reasonably well using the coded data, with some qualification for the towed/disabled crash severity.

Reporting rates were related to crash severity, with fatal or injury/transported involvements most likely to be reported, and tow/disabled crashes less likely. Reporting rates also varied by the type of vehicle, with small buses (8-15 passenger) less likely to be reported than trucks or large buses; by state of registration, with in-state vehicles less likely to be reported than out-of-state; and by the type of investigation agency (state police, county, or city police).

Missing data rates are low for most variables reported to the crash file. Some inconsistencies between data reported to the MCMIS file and recorded in the Minnesota data were also noted.

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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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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 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. [See references 4 to 33.] 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 Minnesota. In recent years, Minnesota has reported from 2,300 to 3,300 involvements annually to the MCMIS Crash file. According to the 2002 Vehicle Inventory and Use Survey (the last available), Minnesota had over 127,000 trucks registered in 2002, ranking 15th among the states and accounting for 2.3 percent of all truck registrations [1]. Minnesota is the 21st largest state by population and generally ranks 26th in terms of the number of annual truck and bus fatal involvements.

The method employed in this study is similar to previous studies.

1. The complete police accident report file (PAR file hereafter) from Minnesota was obtained for the most recent year available, 2007. This file was processed to identify all cases that qualified for reporting to the MCMIS Crash file.

2. All cases in the Minnesota 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 Minnesota.

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 Minnesota's statewide files as of December, 2008 were used in this analysis. The 2007 PAR file contains the computerized records of 159,966 vehicles involved in 85,133 crashes that occurred in Minnesota.

2. Data Preparation

The Minnesota PAR file and MCMIS Crash file each required some preparation before the Minnesota records in the MCMIS Crash file could be matched to the Minnesota PAR file. In the case of the MCMIS Crash file, the only processing necessary was to extract records reported from Minnesota and to eliminate duplicate records. The Minnesota PAR file required more extensive work to create a comprehensive vehicle-level file from 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 2007 MCMIS Crash file as of August 27, 2008 was used to identify records submitted from Minnesota. There were 2,663 records for calendar year 2007. 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; e.g., the report number and sequence number were identical). One candidate duplicate pair (based on report number and sequence number) was identified, but upon further review they were determined to not to be genuine duplicates. The vehicles were in accidents on different days, in different cities, and vehicle and driver-specific data were not the same.

In addition, records were searched for cases with identical values on accident number, accident date/time, county, city, street, officer badge number, vehicle license number, and driver license number, even though their vehicle sequence numbers differed. One would not expect two records for the same vehicle and driver within a given accident. One pair of duplicate records was found. All but a few variables were identical for both records of the pair, including vehicle and driver variables, such as driver license number and vehicle identification number. This pair were considered to be true duplicates. The member of the pair with the most missing data was excluded. The resulting MCMIS file contains 2,662 unique records.

2.2 Minnesota Police Accident Report File

The Minnesota PAR data for 2007 (as of December, 2008) was obtained from the state of Minnesota. The data were stored as text files, representing Accident, Vehicle, and Person information. The combined files contain records for 85,133 crashes involving 159,966 vehicles. Data for the PAR file are coded from the Minnesota Motor Vehicle Accident Report Form (PS 32003-10) completed by police officers, or obtained via the Driver and Vehicle Service's (DVS) web-based data collection system.

The PAR file was first examined for duplicate records (those involvements where more than one record was submitted for the same vehicle in the same crash). An inspection of case numbers verified that they were recorded in a consistent format, so there was no reason to suspect duplicate records produced by variations in case number format (such as 070010261 and 07001-

261, for example). In addition, the file was examined for duplicate records based on identical case number and vehicle number. No such instances were found.

Cases were also examined to identify any records with identical values for case number, time, place, and vehicle/driver variables, regardless of vehicle number. Two cases would not be expected to be identical on all variables. To investigate this possibility, records were searched for duplicate occurrences based on the variables case number, accident date/time, crash county, city, vehicle identification number (VIN), vehicle license plate number, and vehicle owner's name. The search found 28 duplicate records. Detailed examination of the pairs showed that vehicle-specific variables sometimes differed, such as vehicle type, insurance company, and damage location. However, in all pairs the vehicle make, series type and model year were identical. Since the major vehicle variables were identical, these records were considered duplicates. It is likely that the duplicates were produced when a second record was entered during the process of updating certain variables. There are potentially additional duplicate cases that were not able to be verified due to a large number of "NULL" and missing values.

Since it was not possible to determine which record of a pair of duplicates was the correct one, one record of the pair was kept in the file, and the other one deleted. After deleting 28 records the resulting PAR file had 159,938 unique records.

3. Matching Process

The next step involved matching records from the Minnesota PAR file to corresponding records from the MCMIS file. There were 2,662 Minnesota records from the MCMIS file available for matching, and 159,938 records from the Minnesota PAR file. All records from the Minnesota 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 did not meet the MCMIS Crash file reporting criteria.

Matching records in the two files requires finding combinations of variables common to the two files that have a high probability of uniquely identifying traffic crashes and specific vehicles within the traffic crashes. Case Number, used to uniquely identify a crash in the Minnesota PAR data, and Report Number in the MCMIS Crash file, are obvious first choices. Case Number in the Minnesota PAR file is a nine-digit alphanumeric 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 (MN, in this case), followed by ten numeric digits. It appears the rightmost nine numeric digits correspond to PAR Case Number. These digits were then used in the match.

Other variables typically useful for 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. Crash City Code in the PAR file did not directly correspond with a similar variable in the MCMIS file. Crash City Name was unrecorded more than 99 percent of the time in the PAR data. Road Name/Number in the PAR file did not directly correspond with the MCMIS Crash Street variable, and was unrecorded in 41 percent of PAR cases. Reporting Officer's Badge Number was unrecorded in 42 percent of the records. Thus, these variables could not be used in the matching process, but were useful for verification purposes.

Variables in the MCMIS file that can be used (in combination) to uniquely identify a vehicle within a crash include vehicle license plate number, driver license number, vehicle identification number (VIN), and driver date of birth. All of these variables were present in the PAR file. License Plate Number was unrecorded approximately 3.8 percent of the time in the PAR data and was unknown in 0.2 percent of MCMIS cases. The other useful PAR variables—Driver License Number, VIN, and Driver Date of Birth—were unrecorded in 11.4, 22.8, and 10.7 percent of the records, respectively. The three corresponding variables in MCMIS all had low rates of missing data.

Four separate matches were performed 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 case number, crash date (month, day), crash time (hour, minute), county, vehicle license plate number, driver license number, and vehicle identification number (VIN). The second step matched on case number, crash date, crash time, county, and driver date of birth. After some experimentation, the third match step included case number, crash date, county, and vehicle license plate number. In the fourth match, crash minute and county were dropped, and records were matched on case number, crash date, hour, and driver license number. This process resulted in matching 96.6 percent of the MCMIS records to the PAR file. See Table 1 for the variables used in each match step along with the number of records matched at each step.

Table 1 Steps in MCMIS/Minnesota PAR File Match, 2007

Step	Matching variables	Cases matched
Match 1	Case number, crash date, crash time, county, vehicle license plate number, driver license number, and VIN	1,625
Match 2	Case number, crash date, crash time, county, and driver date of birth	795
Match 3	Case number, crash date, county, and vehicle license plate number	104
Match 4	Case number, crash date, crash hour, and driver license number	48
Total cases matched		2,572

Matched records were verified using other variables common to the MCMIS and PAR file as a final check to ensure the match was valid. The above procedure resulted in 2,572 matches, representing 96.6 percent of the 2,662 non-duplicate records reported to MCMIS. Figure 1 shows the flow of cases in the match. Ninety MCMIS records could not be matched with any record in the Minnesota PAR file. It is likely that missing data on variables used in the match account for this small number of non-matches.

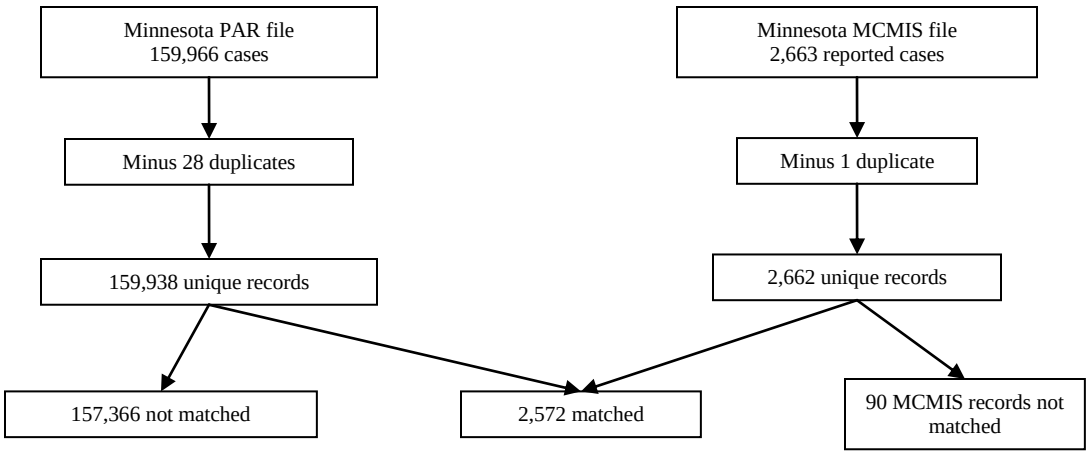

Figure 1 Case Flow in MCMIS/Minnesota Crash File Match

Of the 2,572 matched cases, 2,379 were identified as "reportable," meaning qualified for reporting to the MCMIS Crash file. The method of identifying cases as reportable to the MCMIS Crash file is discussed in the next section.

4. Identifying Reportable Cases

The next step in the process of evaluation crash reporting from Minnesota is to identify the records in the Minnesota PAR data that qualified for reporting to the MCMIS Crash file. Records are identified using the information available in the computerized crash files that were sent by Minnesota. To identify reportable records, we use the information that is completed by the officers for all vehicles. Since one purpose of this evaluation is to determine if all cases that *should* be reported *are* reported, we attempt to identify all vehicles that meet the reporting criteria. We do not rely on the reporting officer or the state's identification of cases that meet the criteria.

The data elements that capture much of the information required for the MCMIS Crash file are well-integrated into the crash report form. Some states use a supplementary form that is only filled out for vehicles and crashes that meet the MCMIS Crash file reporting criteria. In other states, the data are collected in a special area on the crash form, again with the data filled in only for vehicles and crashes that meet the MCMIS criteria. But the Minnesota form includes the variables that only apply to commercial vehicles as part of the main form, without any special instructions on the form. Thus, the variables are recorded for any CMV, without reference to the MCMIS reporting criteria.

The data collection training instructions on the Office of Public Safety website provides the following definition for commercial motor vehicles. [4]

A commercial motor vehicle (CMV) is defined as one that meets these criteria:

1. **Any vehicle or combination that has a gross vehicle weight rating (GVWR) greater than 10,000 pounds as indicated on the vehicle's driver-door panel. An example of a "combination" would be a pickup pulling a trailer.**

2. **Any vehicle with an actual gross vehicle weight over 10,000 pounds, this includes the vehicle and load. For instance, a pickup heavily loaded with cargo could actually weigh over 10,000 pounds.**

3. **A vehicle required to display a hazardous materials placard, for example, a van transporting hazardous medical supplies for a hospital.**

4. **A vehicle used for transporting more than 15 passengers, including the driver.**

5. **Any school or Head Start bus.**

6. **Ambulances, fire trucks, and other government owned trucks.**

Our goal is to evaluate the completeness of reporting of all vehicles in crashes that meet the MCMIS reporting criteria, even those that may have been overlooked. 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.

Minnesota's definition of a CMV cited above does not completely match the MCMIS vehicle criteria shown in Table 2. The instructions in the manual for the CMV variables overlook buses with seating for 15 or less passengers, unless it was a school bus or Head Start bus. For example, an officer might not record the CMV information (for example DOT number and carrier name) for an airport shuttle bus with seating for 9 to 14 passengers. In other respects, the definitions include the vehicles encompassed by the MCMIS reporting criteria, although they also include vehicles that are not covered, such as ambulances and fire trucks.

Using the data collected for *all* vehicles, the process of identifying reportable vehicles is fairly straightforward in the Minnesota PAR file. A Vehicle Type variable with 28 distinct codes was used to identify qualifying trucks and buses. Minnesota's Vehicle Type variable maps readily to the Configuration variable in MCMIS, making it easy to translate between the two systems. Table 3 shows the relevant code levels of the Vehicle Type variable that meet the vehicle criteria. (Note: the bus definition should be "8+ seats, plus the driver")

Table 3 Relevant Vehicle Body Codes in Minnesota PAR file

Code	Label
7	Bus (7 to 15 seats plus driver)
8	Bus (16+ seats plus driver)
31	2 axle, 6 tire Single Unit Truck
32	3 or more axle Single Unit Truck
33	Single Unit Truck w/trailer
34	Truck tractor with no trailer
35	Truck tractor with semitrailer
36	Truck tractor with double trailers
37	Truck tractor with triple trailers
38	Heavy truck of unknown type

In addition to these vehicle types, any vehicle, regardless of size, displaying a hazardous materials placard, also meets the MCMIS vehicle type definition. Minnesota's crash form includes a variable that indicates if a vehicle displayed a hazardous materials placard. This variable was used to identify vehicles meeting this criterion.

In total, there were 6,577 vehicles identified as trucks, buses, or vehicles transporting hazmat in the Minnesota PAR data. Table 4 shows the distribution by vehicle type. The great majority of qualifying vehicles are trucks, while 21.0 percent are buses. Only seven non-trucks transporting hazardous materials were identified. The 6,577 vehicles that meet the vehicle criteria of the MCMIS file represent 4.1 percent of all 159,938 vehicles in the PAR file. This result is consistent with other MCMIS evaluations in which the percentage of eligible vehicles has ranged from 2.6 to 6.1 percent.

Table 4 Vehicles Meeting MCMIS Vehicle Criteria, Minnesota PAR File, 2007

Vehicle type	N	%
Trucks	5,187	78.9
Buses	1,383	21.0
Transporting hazardous materials	7	0.1
Total	6,577	100.0

The next step is to identify crashes that meet the crash severity criteria 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 process of identifying reportable crashes is relatively straightforward in the Minnesota PAR file.

The Minnesota Person file contains the information needed to identify crashes involving an injury. The officer records the severity of the injury (using the usual KABCN scale). There are

also variables indicating if the injured person was transported to a medical facility, and the method of transport. An accident was considered to meet the criterion if it involved an A-, B-, or C-injured person who was transported to a medical facility. In addition, accidents were considered to involve a transported injury if there was an A-injury and it was unknown if the person was transported. It is highly likely that a person with such an incapacitating injury would be transported. The data show that only 3.5 percent of persons with A-injuries are coded as not transported. Only 19.0 percent of B-injuries are coded as not transported and , and 51.1 percent of C injuries are coded as not transported. Whether an injured person was transported was coded unknown, missing, or had some "wild" code for about 9 to 12 percent of the injured. Including all A-injured with unknown or "wild" codes on the transported variable seems reasonable, since the rate of transport is so high, but we did not make the same judgment for B- and C-injuries, since the rates of known transport were significantly lower. This decision rule probably understates the true rate of transport (since at least some of the B- and C-injured persons that were left unknown on transport probably were transported). But including them all as transported would similarly overstate the rate, so we adopted the rule of considering only A-injured with unknown transport as transported. The result probably understates the true number of cases that qualify.

The next challenge is to identify crashes in which a vehicle was towed due to disabling damage. The challenge is because not all towed vehicles are disabled, so it is not sufficient to simply identify towed vehicles. The Minnesota PAR data includes a variable that identifies if a vehicle was towed from the scene. Using another variable, the officer indicates the severity of damage to the vehicle in five levels: None, light, moderate, severe, and total. However, these damage levels are not further defined in the manual. That is, there is no instruction on how to apply the codes, so there is no guidance to determine if "moderate" damage is severe enough to require a tow. Thus, it is not possible to identify directly vehicles that were towed as a result of disabling damage.

It was therefore necessary to develop a decision rule. All cases in which vehicle damage was severe or total were considered towed/disabled. Vehicles coded with "severe" or "total" damage were considered to be disabled. In addition, cases where the vehicle was towed, and damage severity was moderate were considered as meeting the criterion. 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 30 percent [21, 23, 28, 29]. Based on the method used here, the percentage in the Minnesota PAR file is 32 percent, which is very close to the percentage observed in the GES data as well as evaluations of other states.

This decision rule is reasonable, but it is acknowledged that it is an approximation, albeit the best available given the information available.

Implementing the eligible vehicle and crash severity filters identified a total of 2,976 reportable cases in the Minnesota crash data in 2007. There were 2,976 vehicles—2,501 trucks, 471 buses, and four vehicles transporting hazmat—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 surrogate definitions explained above. Table 5 cross-classifies reportable records by vehicle type and crash severity.

Table 5 Reportable Records by Crash Type and Vehicle Type in Minnesota Crash File, 2007

Crash severity	Truck	Bus	Hazmat vehicle	Total	%
Fatal	86	12	0	98	3.3
Injured/transported accident	695	161	2	858	28.8
Tow/disabled accident	1,720	298	2	2020	67.9
Total	2,501	471	4	2,976	100.0

As Figure 1 above shows, there were 2,662 records reported to the MCMIS Crash file by Minnesota in 2007. Of these, 2,572 were matched to the Minnesota file, but 193 did not qualify for reporting, under the method developed to identify reportable cases.

5. Factors Associated with Reporting

The estimated overall reporting rate by Minnesota to the MCMIS Crash file in 2007 was 79.9 percent of reportable crashes. If all 193 of the cases that were reported but appear not to meet the reporting criteria actually are reportable, that would raise the reporting rate to 86.4 percent. In the next section, we provide more detail about why the 193 case were classified as not reportable. In the remaining sections, we discuss the factors that may explain why the cases not reported were overlooked.

Table 6 Reporting Rate to MCMIS Crash File by Minnesota, 2007

Crash severity	Reportable cases	Reported cases	Reporting rate
Fatal	98	84	85.7
Injured/transported	858	758	88.3
Towed/disabled	2020	1,537	76.1
Total	2,976	2,379	79.9

5.1 Overreporting

Overreporting results when cases are submitted to the MCMIS Crash file that do not meet the criteria for a reportable crash. Since 2,572 MCMIS cases could be matched to the Minnesota PAR data, and 2,379 were determined to meet the reporting criteria, the difference, or 193 cases, were not reportable, based on the definitions discussed in section 4.

Table 7 shows the cross-classification of vehicle type and crash severity for the 193 cases in the MCMIS Crash file identified as not reportable. The majority of vehicles are qualifying trucks or buses. Of the 193 reported, 141 are identified as trucks, and 10 are identified as buses. However, the crash they were involved in did not meet severity threshold for a MCMIS reportable crash according to the data provided in the Minnesota PAR file and the definitions established in this report. In addition, four vehicles were reported that meet neither the crash severity criteria nor the vehicle criteria since they are not trucks, buses, or hazmat placarded vehicles. Of the remaining 38 cases, 25 were pickup trucks, four were vans or minivans, and the remainder were

vehicle types other than trucks or buses. If these records actually did qualify for reporting to the MCMIS file, the vehicle information or the crash severity information in the PAR file is incorrect.

Table 7 Distribution of Non-reportable Vehicles in Minnesota Crash File, 2007

	Crash severity				
Vehicle type	Fatal	Transported injury	Towed/disabled	Other crash severity	Total
Truck	0	0	0	141	141
Bus	0	0	0	10	10
Other vehicle (not transporting hazmat)	3	16	19	4	42
Total	3	16	19	155	193

5.2 Case Processing

Delays in transmitting cases may account for some fraction of the rate of underreporting observed for Minnesota. The time lag in extracting and submitting reports to the MCMIS Crash file can be determined by comparing the crash date with the date the record was submitted to MCMIS. 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 Crash file as of August 27, 2008 was used to identify records submitted from Minnesota in 2007. That date is a full 240 days after the close of the 2007 crash year, so all 2007 cases should have been reported by that date.

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. Almost half of the cases (49.4 percent) were submitted within 40 days of the crash, and over two-thirds (67.3 percent) were reported within 60 days. Before the 90-day cut-off period, approximately 86.6 percent of Minnesota's cases had been reported. Cases continued to be submitted in small numbers well after all cases should have been reported, though the small numbers add up to about 13.4 percent of all records submitted. The largest time difference between the crash date and the date the record was submitted was 543 days. Twenty-four cases were submitted more than 180 days past the cut-off period. However, as time marches on, the number of cases submitted gets smaller and smaller, so it is unlikely that sheer delays in submitting cases account for much of the underreporting; i.e., it is unlikely that a significant number were submitted after the August date of the MCMIS Crash file used for this analysis.

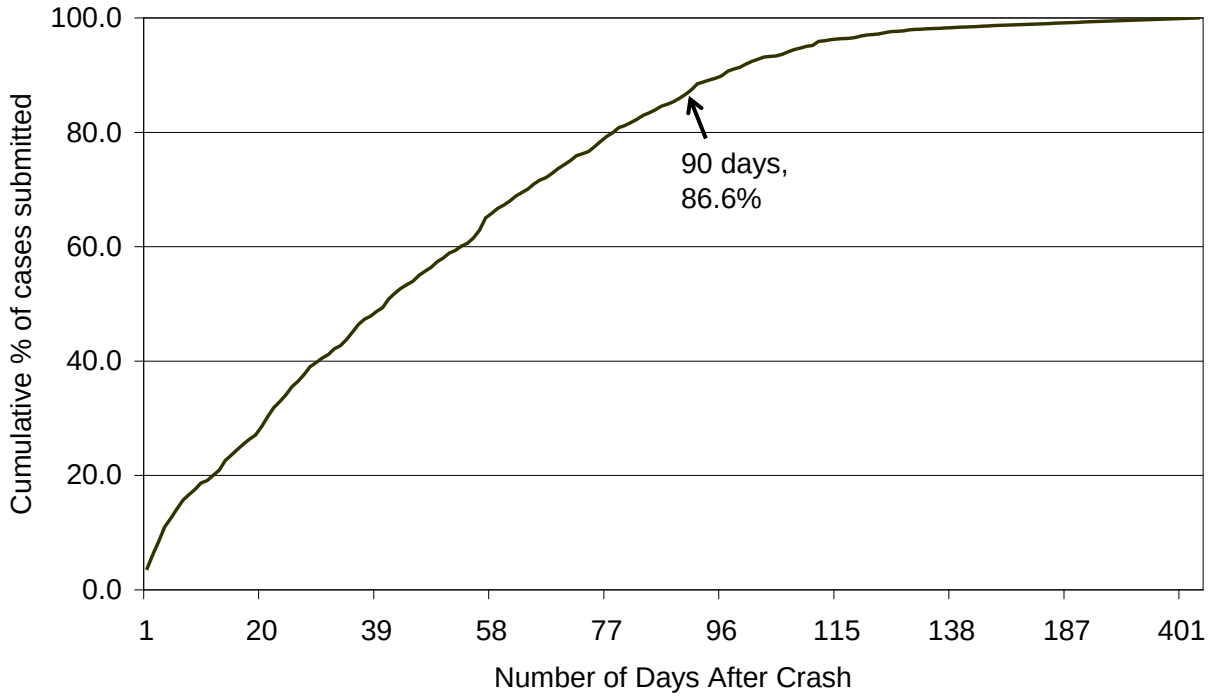

Figure 2 Percent of Cases Submitted to MCMIS Crash File by Number of Days After Crash, Minnesota 2007

Table 8 shows reporting rates according to month of the crash. The reporting rates by month are fairly consistent. The rates range from 75.7 percent in March to 84.8 percent in September. February and December represent the largest proportion of unreported cases, but there is no consistent pattern of underreporting across the months.

Table 8 Reporting Rate by Accident Month in Minnesota Crash File, 2006

Crash month	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
January	218	79.8	44	7.4
February	314	79.3	65	10.9
March	214	75.7	52	8.7
April	215	84.7	33	5.5
May	229	83.8	37	6.2
June	199	79.9	40	6.7
July	235	77.0	54	9.0
August	238	80.7	46	7.7

Crash month	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
September	263	84.8	40	6.7
October	252	77.4	57	9.5
November	203	78.8	43	7.2
December	371	83.6	61	10.2
Unknown	25	0.0	25	4.2
Total	2,976	79.9	597	100.0

5.3 Reporting Criteria

In this section we discuss factors that are associated with the observed reporting rate. The Minnesota crash form is organized such that the few specific data items that apply only to commercial vehicles are well-integrated into the crash reporting form. There is no special section that the officer must consciously apply the MCMIS Crash reporting criteria to determine whether to fill it out. Instead, there are just a few CMV-specific data items that the officer completes for CMVs. This design reduces one of the dependencies on the officer for full reporting. The burden of identifying cases for reporting to the MCMIS Crash file occurs at a later point.

It is clear that the extent to which the CMV-specific data items are completed is related to reporting, though filling in those items is far from a necessary condition. The CMV-specific fields on the PAR include carrier name, carrier DOT number, cargo body, hazmat placard, vehicle inspection number, whether the inspection was waived, and inspector badge number. Table 9 shows that reporting rates tracked to some extent how completely the CMV-specific fields were filled in. Over 90 percent of reportable records that had all the CMV fields completed were in fact reported, and 86.0 percent of reportable cases with at least some of the fields completed were reported. But reporting rates were relatively high even if none of the CMV fields were completed. Over 72 percent of reportable records with none of the CMV-specific data were nevertheless reported. Clearly, completing those fields contributes to higher reporting rates, but the they are far from critical.

Table 9 MCMIS Crash file reporting and CMV-specific PAR Fields, Minnesota 2007

CMV variables	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
All recorded	598	90.8	55	9.2
Some recorded	852	86.0	119	19.9
None recorded	1,526	72.3	423	70.9
Total	2,976	79.9	597	100.0

Table 10 shows reporting rates, the number of unreported cases, and the proportion of unreported cases for each level of the MCMIS crash severity criteria. The results suggest that less serious crashes are less likely to be identified as reportable to the MCMIS Crash file. Traffic crashes that

resulted in a fatality or transported injury were reported at the highest rates, 85.7 percent and 88.3 percent respectively. However, the less-severe towed/disabled crashes are reported at a significantly lower rate, 76.1 percent. That category accounts for 80.9 percent of unreported crashes, so a significant improvement in the identification and reporting of such crashes would result in a substantial improvement in the overall reporting rate. It is possible that more serious crashes, in terms of injuries and fatalities, receive more investigative attention and thus have more opportunity to be recognized as meeting the MCMIS reporting criteria.

Table 10 Reporting Rate by MCMIS Crash Severity, Minnesota 2007

Crash severity	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Fatal	98	85.7	14	2.3
Injured/transported	858	88.3	100	16.8
Towed/disabled	2,020	76.1	483	80.9
Total	2,976	79.9	597	100.0

In Table 11 crash severity is measured by the most severe injury in the crash, using the KABC0 scale. In this scale, injuries are classified as fatal, incapacitating, non-incapacitating, possible, and none. The reporting rates are about the same for all crashes in which someone was injured, regardless of the severity. The reporting rate for fatal involvements is not significantly different from those with only C injuries. On the other hand, the rate is significantly lower for crashes with no injuries, at only 73.6 percent. Differences between how injury and no-injury crashes are handled may account for this result.

Table 11 Reporting Rate by PAR Calculated Crash Severity, Minnesota 2007

Crash severity	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Fatal (K)	98	85.7	14	2.3
Incapacitating (A)	109	84.4	17	2.8
Non-incapacitating (B)	387	89.4	41	6.9
Possible (C)	752	87.5	94	15.7
No injury (O)	1,629	73.6	430	72.0
Unknown (U)	1	0.0	1	0.2
Total	2,976	79.9	597	100.0

Reporting also varied by the type of vehicle, and by the size of the vehicle. Table 12 provides detail about vehicle type from the PAR Vehicle Type variable. The code levels used for this field are similar to the classification system in the MCMIS Crash data. Generally speaking, larger vehicles were reported at a higher rate than smaller vehicles. Tractor-semitrailers were reported at the highest rate, 86.6 percent. Doubles, single-unit trucks (SUT) with trailers, and three-axle SUTs were all reported at rates over 80 percent. Two-axle SUTs and bobtail tractors were reported at a slightly lower rates. The differences between the rates for these vehicles and the

larger vehicles are not huge, but at least some are statistically significant, and it is noteworthy that the pattern is consistent. Buses are reported at much lower rates. For buses with seating for 16 or more passengers, 73.5 percent of reportable involvements were reported. But the rate is much lower for smaller buses: Only 17.5 percent of buses coded as with seating for 7 to 15 passengers plus the driver were reported. This may be attributable to the description in the *Instruction Manual* that mentions buses with seating for 15 or more, but not smaller buses. This instruction is also repeated in the online data collection training. [See 2, 3.]

Table 12 Reporting Rate by Police-Reported Vehicle Configuration, Minnesota 2007

Vehicle type	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Pickup (hazmat)	1	100.0	0	0.0
Van/minivan (hazmat)	2	0.0	2	0.3
Bus (7-15, + driver)	120	17.5	99	16.6
Bus (16+, + driver)	351	73.5	93	15.6
Farm equip (hazmat)	1	0.0	1	0.2
2-axle, 6-tire SUT	559	79.6	114	19.1
3+ axle SUT	287	84.7	44	7.4
SUT w/trailer	131	82.4	23	3.9
Truck tractor, no trailer	50	78.0	11	1.8
Tractor/semitrailer	1,325	86.6	178	29.8
Double	21	81.0	4	0.7
Triple	1	100.0	0	0.0
Unknown heavy truck	127	78.0	28	4.7
Total	2,976	79.9	597	100.0

Reporting rates are also associated with the license state of the vehicle. Vehicles with out-of-state licenses are significantly more likely to be reported than reportable cases of in-state registered vehicles. Table 13 shows that 86.8 percent of reportable vehicles registered out-of-state were actually reported, compared with 79.4 percent of in-state vehicles. This difference is statistically significant. Moreover, note than the reporting rate for vehicles where license state is unknown is only 54.9 percent. These results suggest that involvement in interstate commerce (demonstrated by the out-of-state plate) influences the identification of cases as reportable. Most of the unreported involvements (74.0 percent) were for in-state vehicles, so improving that rate would contribute to a substantial overall improvement.

Table 13 Reporting Rate by Vehicle License State, Minnesota 2007

Vehicle license state	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Minnesota	2,149	79.4	442	74.0
Other	683	86.8	90	15.1
Unrecorded	144	54.9	65	10.9
Total	2,976	79.9	597	100.0

5.4 Reporting Area and Agency

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. The Minnesota crash data include the county of crash. Counties with a large number of traffic accidents may not report as completely as those with a lower work load. The level and frequency of training or the focus of enforcement can also vary. Such differences can serve as a guide to direct resources to areas that would produce the greatest improvement. This section examines reporting rates by county and agency.

Table 14 shows the top ten counties displayed in descending order by the number of unreported cases. As a group their overall reporting rate is only slightly below the statewide average, but the ten counties account for 68.3 percent of unreported cases. Hennepin County has the lowest reporting rate at 73.3 percent and accounts for 31.7 percent of the unreported cases. Hennepin County includes Minneapolis, the most populous city in Minnesota.

Table 14 Reporting Rate by Crash County, Minnesota 2007

County	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Hennepin	708	73.3	189	31.7
Ramsey	351	74.6	89	14.9
Dakota	187	80.7	36	6.0
Anoka	119	83.2	20	3.4
Olmstead	90	81.1	17	2.8
St. Louis	77	84.4	12	2.0
Stearns	87	86.2	12	2.0
Washington	76	84.2	12	2.0
Wright	63	82.5	11	1.8
Goodhue	40	75.0	10	1.7
Ten County Total	1,798	77.3	408	68.3
All Counties Total	2,976	79.9	597	100.0

Reporting rates also vary by the type of investigating agency (Table 15). There are three primary levels of investigating agencies identified in the Minnesota crash file: state police, county sheriff, and city police. If reporting rates depended critically on the training and responsibilities of the reporting officer, one would expect that reporting rates would vary by the type of investigating agency. Rates in fact do vary between agency types. The reporting rate for crashes covered by city police was the lowest among the three types, at 70.4 percent. The reporting rate was highest for crashes covered by the state police, at 88.4 percent. The local police are responsible for 37% of the reportable cases, and account for over half of the unreported cases.

Table 15 Reporting Rate by Investigating Agency, Minnesota 2007

Reporting agency	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
State Patrol	1,443	88.4	167	28.0
County Sheriff	353	82.4	62	10.4
City Police	1,096	70.4	324	54.3
Other	58	69.0	18	3.0
Unrecorded	26	0.0	26	4.4
Total	2,976	79.9	597	100.0

5.5 Fire Occurrence

There is an Accident Type variable in the accident file that indicates if the crash involved a fire. Based on 2007 Minnesota data there were 36 trucks and no buses involved in crashes where a fire occurred (Table 16). Almost 78 percent of these trucks were reported; this rate is effectively indistinguishable from the overall rate, so it appears that fire occurrence does not affect reporting rates.

Table 16 Reporting Rates for Vehicles In Crashes Involving Fire, Minnesota 2007

Vehicle type	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Truck	36	77.8	8	100.0
Bus	0	-	-	-
Other	0	-	-	-
Total	36	77.8	8	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 Minnesota 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 17 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. DOT number is not recorded for 4.3 percent of interstate cases. Three of the four event variables are missing for a large percentage of cases, though this is not necessarily an indication of a problem since most crashes consist of a single impact. Some of the driver variables have higher than normal missing data rates, but only three to four percent, though Driver License Class is missing for 8.3 percent of cases. Among the other variables, only GVWR class (13.3 percent), Road Access (99.3 percent) and Road Trafficway (15.2 percent) have substantial amounts of missing data.

Table 17 Missing Data Rates for Selected MCMIS Crash File Variables, Minnesota 2007

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	0.3
Accident hour	0.0	Event one	0.7
Accident minute	0.0	Event two	78.1
County	<0.1	Event three	92.8
Body type	5.7	Event four	98.4
Configuration	<0.1	Number of vehicles	0.1
GVWR class	13.3	Road access	99.3
DOT number *	4.3	Road surface	0.2
Carrier state	0.0	Road trafficway	15.2
Citation issued	1.8	Towaway	0.0
Driver date of birth	3.2	Truck or bus	0.0
Driver license number	3.7	Vehicle license number	0.2
Driver license state	3.6	Vehicle license state	<0.1

Variable	Percent unrecorded	Variable	Percent unrecorded
Driver license class	8.3	VIN	0.5
Driver license valid	1.8	Weather	0.2

* Based on cases where the carrier is coded interstate.

Hazardous materials variable	Percent unrecorded
Hazardous materials placard	19.1
Percentages of hazmat placarded vehicles only:	
Hazardous cargo release	54.6
Hazardous materials class (1-digit)	59.1
Hazardous materials class (4-digit)	79.6
Hazardous materials name	0.0

The second section of the table shows missing data rates for the hazardous materials (hazmat) variables. Hazmat Placard was unrecorded in 19.1 percent of cases. Rates of missing data for the variables describing the hazardous material (where present) were higher. The percentages shown in the bottom section of the table include only the 44 cases in which it was coded that the vehicle displayed a hazmat placard. Hazardous materials name is always captured, but the other variables describing the 1-digit and 4-digit classes are missing in 59.1 percent and 79.6 percent of the cases. Hazmat cargo release is missing in almost 55 percent of the involvements of vehicles with a hazmat placard.

We also compared the values of variables in the MCMIS Crash file with the values of comparable variables in the Minnesota crash 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 in the MCMIS Crash file. The code levels for many variables in the Minnesota crash data are quite similar to those used in the MCMIS Crash file.

Table 18 shows the coding of vehicle configuration in the MCMIS Crash file and the record as it appears in the Minnesota Crash file. Code levels for the vehicle type variable in Minnesota are quite comparable to those in the MCMIS Crash file; in fact it appears that Minnesota adopted the MCMIS classification scheme. In the table, the cases are organized by the coding in the MCMIS file; the table shows the coding in the Minnesota crash file for each code level in the MCMIS file. Overall, the consistency is reasonably good, in that only about 2.7 percent of the cases are inconsistent between the two files. A relatively strict standard is used to judge consistency. For example, the five cases coded as a bus with seating for 16 or more in the Minnesota data but as a bus with seats for 9 to 15 in the MCMIS file, are considered to be inconsistent. But the five cases coded “heavy truck, unknown” but as a two-axle SUT (single unit truck) in the MCMIS data are not counted as inconsistent.

Table 18 Comparison of Vehicle Configuration in MCMIS and Minnesota Crash Files, 2007

Vehicle configuration		Cases	%
MCMIS Crash File	Minnesota Crash File		
Bus (seats 9-15,incl dr)	Bus (7-15,+dr)	18	0.7
	Bus (16+,+dr)	5	0.2
Bus (seats >15,incl dr)	Bus (7-15,+dr)	3	0.1
	Bus (16+,+dr)	263	10.2
SUT, 2-axle, 6-tire	Pickup	7	0.3
	Van/minivan	2	0.1
	2ax,6tire SUT	470	18.3
	3+axle SUT	2	0.1
	SUT w/trlr	1	0.0
	TrkTrac/semitrlr	3	0.1
	Hvy trk,unk	5	0.2
	Other	1	0.0
SUT, 3+ axles	Pickup	10	0.4
	Farm equip	2	0.1
	2ax,6tire SUT	3	0.1
	3+axle SUT	251	9.8
	SUT w/trlr	2	0.1
	TrkTrac/no trlr	10	0.4
	TrkTrac/semitrlr	4	0.2
	Hvy trk,unk	7	0.3
	Other	1	0.0
	Unknown	1	0.0
Truck trailer	Passenger Car	1	0.0
	Pickup	11	0.4
	Van/minivan	2	0.1
	SUT w/trlr	108	4.2
	TrkTrac/semitrlr	1	0.0
Truck tractor (bobtail)	TrkTrac/no trlr	29	1.1
Tractor/semitrailer	Passenger Car	1	0.0
	Pickup	1	0.0
	SUT w/trlr	1	0.0
	TrkTrac/no trlr	1	0.0
	TrkTrac/semitrlr	1,228	47.7
	TrkTrac/double	1	0.0
	Hvy trk,unk	1	0.0
Tractor/double	TrkTrac/semitrlr	1	0.0
	TrkTrac/double	20	0.8
Tractor/triple	TrkTrac/triple	1	0.0
Unk heavy truck>10,000	Hvy trk,unk	90	3.5
	Other	3	0.1
Total		2,572	100.0

Most of the cases counted as inconsistent come from two MCMIS vehicle types: SUT with 3 or more axles and the truck trailer. Ten SUTs with 3 or more axles were codes as pickups in the Minnesota crash file, and ten were coded as a truck-tractor with no trailer. Four were coded as

tractor-semitrailers, three as two-axle SUTs and two as farm equipment. Overall, the consistency between the two files is good, but somewhat surprising since the code levels used to classify vehicle type are almost identical between the two files.

There was a small number of cases coded inconsistently on some other variables. Only 0.3 percent of records had different values for light condition. For weather, there were no major inconsistencies. Minnesota includes a code level for "cloudy," while there is no comparable code in the MCMIS weather condition variable. In 98 cases, that was translated to the "other" category in the MCMIS file, while in 547 "cloudy" was coded as "no adverse condition" in the MCMIS file. There were no systematic difference between the two files for road surface: in only two records was the coding of road surface condition genuinely different.

Differences were more substantial for hazmat placard. Eight cases were coded with a hazmat placard in the Minnesota data but coded as "no" for hazmat placard in the MCMIS data. And for another eight Minnesota cases, hazmat placard is "yes" but unrecorded in the MCMIS data. With only 44 hazmat cases in the MCMIS data, these 16 discrepancies make a substantial difference for this important data element.

In terms of the count of fatalities, counts are generally identical. There were three cases with one fatality each in the Minnesota file that were coded as zero fatalities in the MCMIS file. And one case with two fatalities in the Minnesota file, but just one in the MCMIS Crash file. These differences might occur if an injured person died after the data was extracted for transmission to the MCMIS Crash file.

7. Summary and Discussion

This study evaluates reporting to the MCMIS Crash file by the state of Minnesota for crashes occurring during 2007. The complete Police Accident Report (PAR) file was obtained from Minnesota, with records for 159,966 vehicles involved in 85,133 crashes. The MCMIS Crash file had 2,663 records reported by Minnesota for crashes occurring in 2007. The goal of this 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.

To accomplish this goal involves two activities: First, a method is developed that identifies 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 were reported.

It is important to develop an independent method of identifying reportable cases, independent of any identification by the reporting officer or other body. An independent method allows us to identify any cases that may have been overlooked by the reporting officer or the body in Minnesota that extracts cases for upload to the MCMIS Crash file. Or, on the contrary, an independent process can verify if the extraction is accurate and complete.

The Minnesota crash file that was supplied includes most of the information about the vehicles and crash severity to identify reportable cases. The vehicle type field in the computerized record maps very well to the MCMIS system for classifying trucks and buses, so it is straightforward to identify vehicles that meet the vehicle type criteria. Applying the crash severity criteria was somewhat less precise, because the Minnesota data do not have quite all the information that is necessary. The injury criteria (fatality or an injury transported for treatment) are well-covered in the Minnesota crash data, but identifying crashes in which a vehicle was towed due to disabling damage was more ambiguous. Towed vehicles are identified, but not whether the tow was because the vehicle was disabled. A vehicle damage scale was used as a surrogate to determine whether the vehicle was disabled. Unfortunately, the damage scale is nowhere defined in the supporting documentation, so it was necessary to interpret the scale. However, the rule developed produced a number of cases in reasonable proportion to the other crash severities. Moreover, the proportion of towaways was similar to that in states where towed/disabled crashes could be identified directly.

A total of 2,976 crash involvements were identified in the Minnesota data as meeting the MCMIS reporting thresholds. These included 2,501 trucks, 471 buses, and four other vehicles that were transporting hazardous materials. There were 2,662 unique records in the MCMIS Crash file for 2007, of which 2,572 could be matched to the Minnesota crash file. Ninety of the records could not be matched, even after an extensive search, using crash date, location, and vehicle and driver identification information.

About 193 of the records reported to the MCMIS Crash file from Minnesota were not crashes that met the reporting criteria. Most of these cases did not meet the crash severity threshold, that is, the crash did not involve a fatality, an injury transported for treatment, or a vehicle towed due to disabling damage. The remainder were vehicles that were not trucks or buses. Most were pickup trucks, but some were light passenger vehicles such as minivans. None were coded as transporting hazmat. If these vehicles in reality met the reporting criteria, the information in the Minnesota crash file is incorrect. A more likely explanation is simply that they were extracted in error.

Excluding reported cases that did not meet the reporting criteria, the overall reporting rate from Minnesota for 2007 was determined to be 79.9 percent of reportable cases. Reporting rates were somewhat higher for crashes that involved injury. Almost 86 percent of fatal involvements were reported, and 88.3 percent of injury/transported involvements were reported (the difference is statistically non-significant). Towed/disabled reportable involvements were reported at a somewhat lower rate, 76.1 percent.

Several factors were identified that appear to contribute to underreporting. Reporting of some cases were considerably delayed. Over 13 percent of the cases were reported after the 90 day limit. One case was reported a full 543 days after the date the crash occurred. The MCMIS file used for this project was dated 240 days after the close of the crash year, and only a few cases were still trickling in as of that date, but the time period between the date of the crash and the date the crash is reported contributes to some of the underreporting.

Reporting rates primarily varied by the reporting criteria, by the agency reporting the crash, and by whether the vehicle was from out of state. These factors all have to do with whether the vehicle and crash are recognized as meeting the reporting thresholds. As mentioned above,

crashes involving a fatality or transported injury were reported at a higher rate than those where the severity was just towed/disabled. The difference appears to be injury/no injury, rather than related to the severity of the injury, since analysis showed that fatal or serious injuries (A-injuries) were not reported at a significantly higher rate than less-serious injuries (i.e., C-injuries).

Similarly, most trucks were reported at about the same rate—ranging from 86.6 percent for tractor-semitrailers to 79.6 percent for two-axle single-unit trucks—but buses were reported at a significantly lower rate. Over 73 percent of large buses (seating for 16 or more) were reported, but only 17.5 percent of the smaller buses, those classified as 7 to 15 passenger). The dramatic difference in reporting rates related to bus size may be attributable to special attention given to school buses and buses operated by Head Start. The crash report instructs the reporting officer to notify the state police of crashes involving a school or Head Start bus. And the *Instruction Manual* for the crash report includes school and Head Start buses in its definition of a CMV, but defines other buses as having seating for 15, plus the driver. Thus, smaller buses, those with seating for nine including the driver, may be overlooked.

Reporting rates also varied by whether the vehicle was from out of state and by the specific agency type that covered the crash. Out-of-state vehicles were reported 86.8 percent of the time, while in-state vehicles had a reporting rate of 79.4 percent. Reporting rates for the city police averaged 70.4 percent while the state police and county sheriffs each reported over 88.4 percent and 82.4 percent, respectively. This discrepancy may be due to heavier work loads for the local police, or to differences in training and enforcement responsibilities.

It is not possible to determine, from the information available, why reportable cases are missed. The approach Minnesota has taken to collecting the data is a good one and one that lends itself to a high reporting rate. Unlike some other states, most of the data that can be used to identify reportable cases is well-integrated into the crash form, so identifying reportable cases does not rely largely on the reporting officer recognizing a vehicle and crash that qualifies for reporting and then collecting the necessary information. Instead, reportable crashes can be identified fairly well just using the computerized data. There is the slight problem related to the difficulty in determining if a vehicle is towed *due to disabling damage*, but other than that, all the information is available from data collected on all vehicles. There is no special burden on the reporting officer to be aware of the special reporting requirements and to apply them.

Since the reporting officer is (apparently) not responsible for identifying reportable crashes, that must happen at a point in the process after the report is submitted. At that point, cases are more likely to be overlooked if they involve an in-state vehicle, a smaller bus, a less-severe crash, or were covered by a city police agency. But it should be noted that even fatal crashes, involving large, out-of-state trucks, are present in the Minnesota crash file and not extracted or uploaded. How that occurs is not known. It is should be pointed out that the overall reporting rate of 80 percent is quite respectable. However, one can further note that almost all the data required for identifying reportable crashes is available in the computerized record. With a few changes—correcting the way small buses are handled, defining vehicle damage to specify disabling damage, and using a computer algorithm to extract reportable crashes—it is likely that crash reporting to the MCMIS Crash file from Minnesota could be significantly improved.

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10 Green, P.E., and Blower, D., Evaluation of New Jersey Crash Data Reported to MCMIS Crash File. University of Michigan Transportation Research Institute, Ann Arbor, Michigan. February 2005. Sponsor: Federal Motor Carrier Safety Administration, U.S. D.O.T.

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

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

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

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

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17 Green, P.E., and Matteson, A., Evaluation of Maryland Crash Data Reported to MCMIS Crash File. University of Michigan Transportation Research Institute, Ann Arbor, Michigan. July 2006. Sponsor: Federal Motor Carrier Safety Administration, U.S. D.O.T.

18 Green, P.E., and Matteson, A., Evaluation of 2005 Ohio 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.

19 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.

20 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.

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

31 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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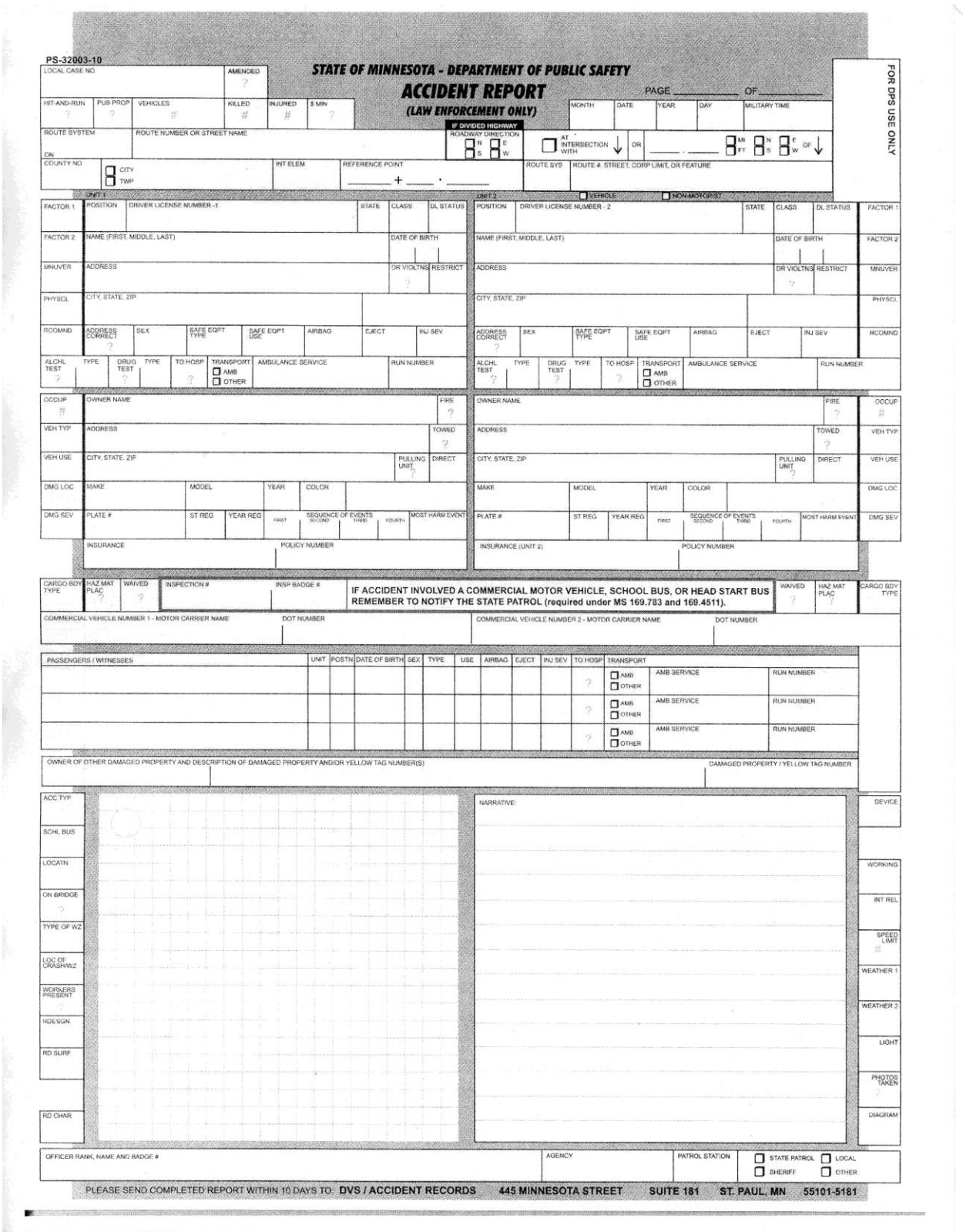
33 Blower, D.; and Matteson, A., Evaluation of 2007 Arkansas Crash Data Reported to MCMIS Crash File. University of Michigan Transportation Research Institute, Ann Arbor, Michigan. December 2008. Sponsor: Federal Motor Carrier Safety Administration, U.S. D.O.T.

Appendix A Minnesota Traffic Accident Reports



PS-32003-10

STATE OF MINNESOTA - DEPARTMENT OF PUBLIC SAFETY

ACCIDENT REPORT

(LAW ENFORCEMENT ONLY)

PAGE _____ OF _____

FOR DPS USE ONLY

LOCAL CASE NO. | AMENDED | HIT-AND-RUN | PUB PROP | VEHICLES | KILLED | INJURED | $ MIN | MONTH | DATE | YEAR | DAY | MILITARY TIME

ROUTE SYSTEM | ROUTE NUMBER OR STREET NAME | IF DIVIDED HIGHWAY ROADWAY DIRECTION N S E W | AT INTERSECTION WITH | OR | MI FT N S E W OF

ON | COUNTY NO | CITY TWP | INT ELEM | REFERENCE POINT | ROUTE SYS | ROUTE #, STREET, CORP LIMIT, OR FEATURE

UNIT 1 | VEHICLE | NON-MOTORIST | UNIT 2 | VEHICLE | NON-MOTORIST

FACTOR 1	POSITION	DRIVER LICENSE NUMBER -1	STATE	CLASS	DL STATUS	POSITION	DRIVER LICENSE NUMBER - 2	STATE	CLASS	DL STATUS	FACTOR 1
FACTOR 2	NAME (FIRST, MIDDLE, LAST)			DATE OF BIRTH		NAME (FIRST, MIDDLE, LAST)			DATE OF BIRTH		FACTOR 2
MNUVER	ADDRESS			DR VIOLTNS	RESTRICT	ADDRESS			DR VIOLTNS	RESTRICT	MNUVER
PHYSCL	CITY, STATE, ZIP					CITY, STATE, ZIP					PHYSCL
RCOMND	ADDRESS CORRECT	SEX	SAFE EQPT TYPE	SAFE EQPT USE	AIRBAG	EJECT	INJ SEV	ADDRESS CORRECT	SEX	SAFE EQPT TYPE	SAFE EQPT USE	AIRBAG	EJECT	INJ SEV	RCOMND
	ALCHL TEST	TYPE	DRUG TEST	TYPE	TO HOSP	TRANSPORT AMB OTHER	AMBULANCE SERVICE	RUN NUMBER	ALCHL TEST	TYPE	DRUG TEST	TYPE	TO HOSP	TRANSPORT AMB OTHER	AMBULANCE SERVICE	RUN NUMBER	
OCCUP	OWNER NAME			FIRE		OWNER NAME				FIRE		OCCUP
VEH TYP	ADDRESS			TOWED		ADDRESS				TOWED		VEH TYP
VEH USE	CITY, STATE, ZIP			PULLING UNIT	DIRECT	CITY, STATE, ZIP				PULLING UNIT	DIRECT	VEH USE
DMG LOC	MAKE	MODEL	YEAR	COLOR		MAKE	MODEL	YEAR	COLOR			DMG LOC
DMG SEV	PLATE #	ST REG	YEAR REG	SEQUENCE OF EVENTS FIRST SECOND THIRD FOURTH	MOST HARM EVENT	PLATE #	ST REG	YEAR REG	SEQUENCE OF EVENTS FIRST SECOND THIRD FOURTH	MOST HARM EVENT		DMG SEV
	INSURANCE	POLICY NUMBER				INSURANCE (UNIT 2)	POLICY NUMBER					

CARGO BDY TYPE | HAZ MAT PLAC | WAIVED | INSPECTION # | INSP BADGE # | IF ACCIDENT INVOLVED A COMMERCIAL MOTOR VEHICLE, SCHOOL BUS, OR HEAD START BUS REMEMBER TO NOTIFY THE STATE PATROL (required under MS 169.783 and 169.4511). | WAIVED | HAZ MAT PLAC | CARGO BDY TYPE

COMMERCIAL VEHICLE NUMBER 1 - MOTOR CARRIER NAME | DOT NUMBER | COMMERCIAL VEHICLE NUMBER 2 - MOTOR CARRIER NAME | DOT NUMBER

PASSENGERS / WITNESSES	UNIT	POSTN	DATE OF BIRTH	SEX	TYPE	USE	AIRBAG	EJECT	INJ SEV	TO HOSP	TRANSPORT AMB OTHER	AMB SERVICE	RUN NUMBER

OWNER OF OTHER DAMAGED PROPERTY AND DESCRIPTION OF DAMAGED PROPERTY AND/OR YELLOW TAG NUMBER(S) | DAMAGED PROPERTY / YELLOW TAG NUMBER

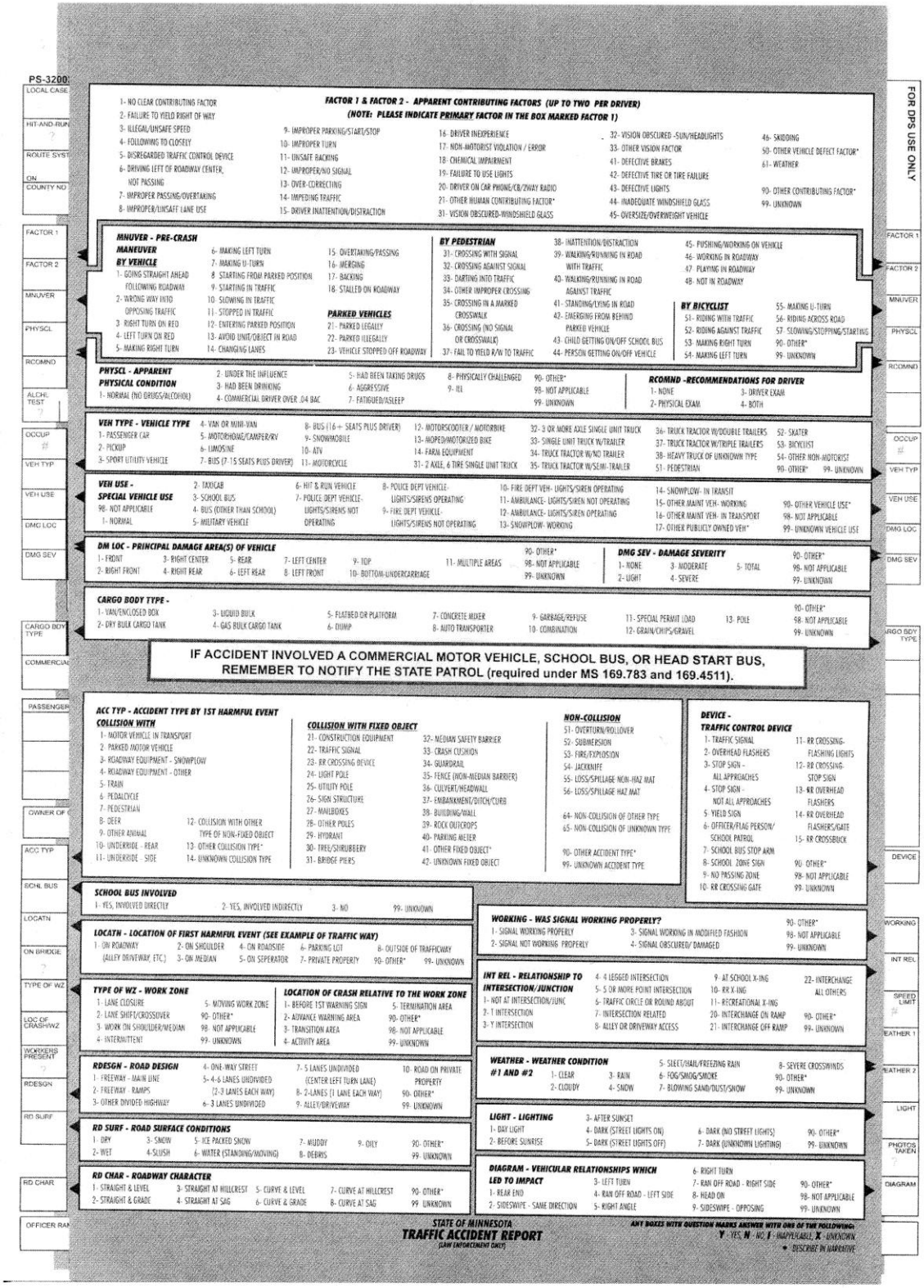
ACC TYP | SCHL BUS | LOCATN | ON BRIDGE | TYPE OF WZ | LOC OF CRASH/WZ | WORKERS PRESENT | RDDESGN | RD SURF | RD CHAR

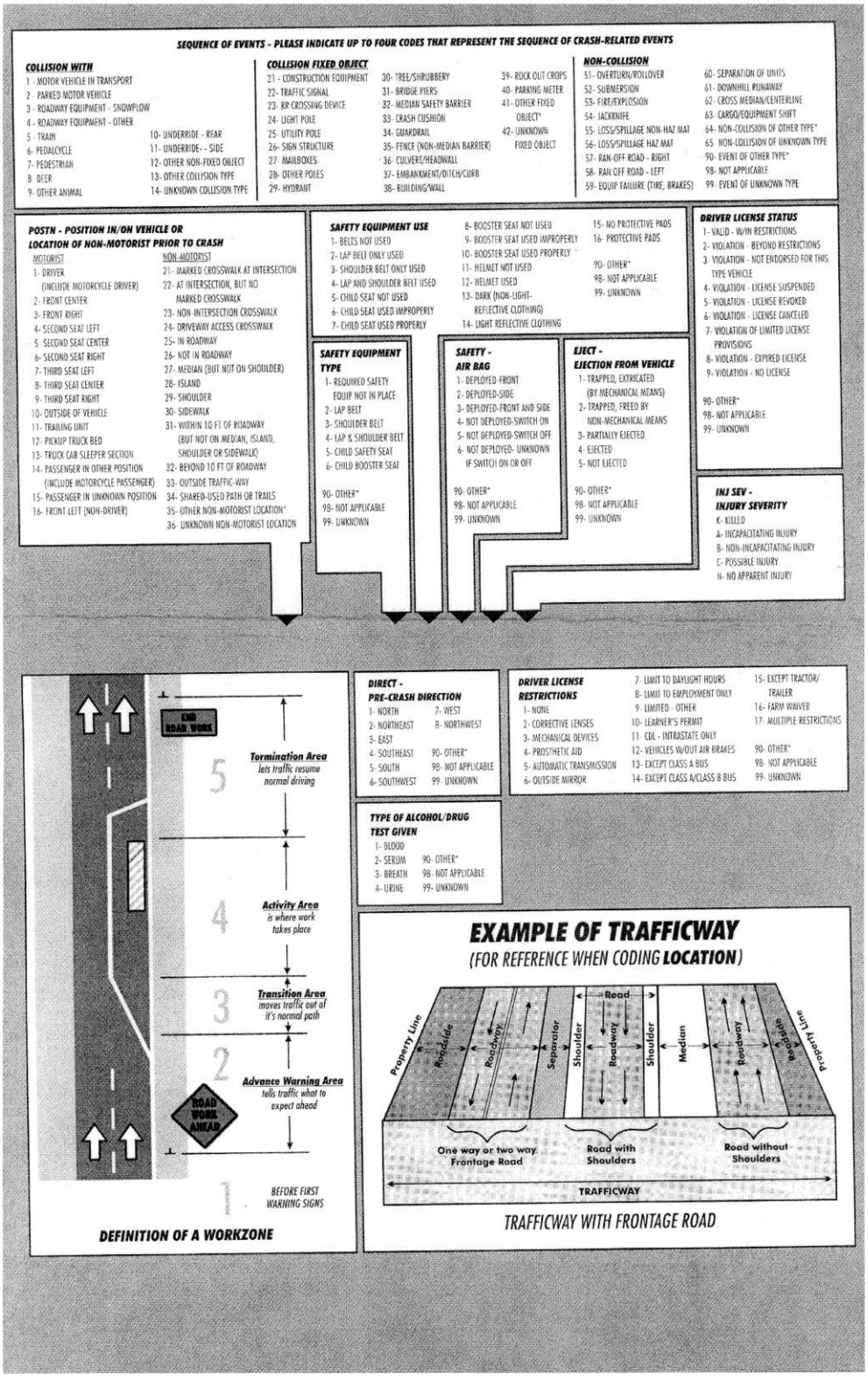
NARRATIVE:

DEVICE | WORKING | INT REL | SPEED LIMIT | WEATHER 1 | WEATHER 2 | LIGHT | PHOTOS TAKEN | DIAGRAM

OFFICER RANK, NAME AND BADGE # | AGENCY | PATROL STATION | STATE PATROL LOCAL SHERIFF OTHER

PLEASE SEND COMPLETED REPORT WITHIN 10 DAYS TO: DVS / ACCIDENT RECORDS 445 MINNESOTA STREET SUITE 181 ST. PAUL, MN 55101-5181


PS-3200
LOCAL CASE
HIT-AND-RUN
ROUTE SYST
ON
COUNTY NO
FACTOR 1
FACTOR 2
MNUVER
PHYSCL
RCOMND
ALCHL TEST
OCCUP #
VEH TYP
VEH USE
DMG LOC
DMG SEV
CARGO BDY TYPE
COMMERCIAL
PASSENGER
OWNER OF
ACC TYP
SCHL BUS
LOCATN
ON BRIDGE
TYPE OF WZ
LOC OF CRASH WZ
WORKERS PRESENT
RDESGN
RD SURF
RD CHAR
OFFICER RAN
FOR DPS USE ONLY
WORKING
INT REL
SPEED LIMIT #
WEATHER 1
WEATHER 2
LIGHT
PHOTOS TAKEN
DIAGRAM
1- NO CLEAR CONTRIBUTING FACTOR
2- FAILURE TO YIELD RIGHT OF WAY
3- ILLEGAL/UNSAFE SPEED
4- FOLLOWING TO CLOSELY
5- DISREGARDED TRAFFIC CONTROL DEVICE
6- DRIVING LEFT OF ROADWAY CENTER, NOT PASSING
7- IMPROPER PASSING/OVERTAKING
8- IMPROPER/UNSAFE LANE USE
FACTOR 1 & FACTOR 2 - APPARENT CONTRIBUTING FACTORS (UP TO TWO PER DRIVER)
(NOTE: PLEASE INDICATE PRIMARY FACTOR IN THE BOX MARKED FACTOR 1)
9- IMPROPER PARKING/START/STOP
10- IMPROPER TURN
11- UNSAFE BACKING
12- IMPROPER/NO SIGNAL
13- OVER-CORRECTING
14- IMPEDING TRAFFIC
15- DRIVER INATTENTION/DISTRACTION
16- DRIVER INEXPERIENCE
17- NON-MOTORIST VIOLATION / ERROR
18- CHEMICAL IMPAIRMENT
19- FAILURE TO USE LIGHTS
20- DRIVER ON CAR PHONE/CB/2WAY RADIO
21- OTHER HUMAN CONTRIBUTING FACTOR*
31- VISION OBSCURED-WINDSHIELD GLASS
32- VISION OBSCURED -SUN/HEADLIGHTS
33- OTHER VISION FACTOR
41- DEFECTIVE BRAKES
42- DEFECTIVE TIRE OR TIRE FAILURE
43- DEFECTIVE LIGHTS
44- INADEQUATE WINDSHIELD GLASS
45- OVERSIZE/OVERWEIGHT VEHICLE
46- SKIDDING
50- OTHER VEHICLE DEFECT FACTOR*
61- WEATHER
90- OTHER CONTRIBUTING FACTOR*
99- UNKNOWN
MNUVER - PRE-CRASH MANEUVER
BY VEHICLE
1- GOING STRAIGHT AHEAD
2- WRONG WAY INTO OPPOSING TRAFFIC
3- RIGHT TURN ON RED
4- LEFT TURN ON RED
5- MAKING RIGHT TURN
6- MAKING LEFT TURN
7- MAKING U-TURN
8- STARTING FROM PARKED POSITION
9- STARTING IN TRAFFIC
10- SLOWING IN TRAFFIC
11- STOPPED IN TRAFFIC
12- ENTERING PARKED POSITION
13- AVOID UNIT/OBJECT IN ROAD
14- CHANGING LANES
15- OVERTAKING/PASSING
16- MERGING
17- BACKING
18- STALLED ON ROADWAY
PARKED VEHICLES
21- PARKED LEGALLY
22- PARKED ILLEGALLY
23- VEHICLE STOPPED OFF ROADWAY
BY PEDESTRIAN
31- CROSSING WITH SIGNAL
32- CROSSING AGAINST SIGNAL
33- DARTING INTO TRAFFIC
34- OTHER IMPROPER CROSSING
35- CROSSING IN A MARKED CROSSWALK
36- CROSSING (NO SIGNAL OR CROSSWALK)
37- FAIL TO YIELD R/W TO TRAFFIC
38- INATTENTION/DISTRACTION
39- WALKING/RUNNING IN ROAD WITH TRAFFIC
40- WALKING/RUNNING IN ROAD AGAINST TRAFFIC
41- STANDING/LYING IN ROAD
42- EMERGING FROM BEHIND PARKED VEHICLE
43- CHILD GETTING ON/OFF SCHOOL BUS
44- PERSON GETTING ON/OFF VEHICLE
45- PUSHING/WORKING ON VEHICLE
46- WORKING IN ROADWAY
47- PLAYING IN ROADWAY
48- NOT IN ROADWAY
BY BICYCLIST
51- RIDING WITH TRAFFIC
52- RIDING AGAINST TRAFFIC
53- MAKING RIGHT TURN
54- MAKING LEFT TURN
55- MAKING U-TURN
56- RIDING ACROSS ROAD
57- SLOWING/STOPPING/STARTING
90- OTHER*
99- UNKNOWN
PHYSCL - APPARENT PHYSICAL CONDITION
1- NORMAL (NO DRUGS/ALCOHOL)
2- UNDER THE INFLUENCE
3- HAD BEEN DRINKING
4- COMMERCIAL DRIVER OVER .04 BAC
5- HAD BEEN TAKING DRUGS
6- AGGRESSIVE
7- FATIGUED/ASLEEP
8- PHYSICALLY CHALLENGED
9- ILL
90- OTHER*
98- NOT APPLICABLE
99- UNKNOWN
RCOMND -RECOMMENDATIONS FOR DRIVER
1- NONE
2- PHYSICAL EXAM
3- DRIVER EXAM
4- BOTH
VEH TYPE - VEHICLE TYPE
1- PASSENGER CAR
2- PICKUP
3- SPORT UTILITY VEHICLE
4- VAN OR MINI-VAN
5- MOTORHOME/CAMPER/RV
6- LIMOSINE
7- BUS (7-15 SEATS PLUS DRIVER)
8- BUS (16+ SEATS PLUS DRIVER)
9- SNOWMOBILE
10- ATV
11- MOTORCYCLE
12- MOTORSCOOTER / MOTORBIKE
13- MOPED/MOTORIZED BIKE
14- FARM EQUIPMENT
31- 2 AXLE, 6 TIRE SINGLE UNIT TRUCK
32- 3 OR MORE AXLE SINGLE UNIT TRUCK
33- SINGLE UNIT TRUCK W/TRAILER
34- TRUCK TRACTOR W/NO TRAILER
35- TRUCK TRACTOR W/SEMI-TRAILER
36- TRUCK TRACTOR W/DOUBLE TRAILERS
37- TRUCK TRACTOR W/TRIPLE TRAILERS
38- HEAVY TRUCK OF UNKNOWN TYPE
51- PEDESTRIAN
52- SKATER
53- BICYCLIST
54- OTHER NON-MOTORIST
90- OTHER*
99- UNKNOWN
VEH USE - SPECIAL VEHICLE USE
98- NOT APPLICABLE
1- NORMAL
2- TAXICAB
3- SCHOOL BUS
4- BUS (OTHER THAN SCHOOL)
5- MILITARY VEHICLE
6- HIT & RUN VEHICLE
7- POLICE DEPT VEHICLE- LIGHTS/SIRENS NOT OPERATING
8- POLICE DEPT VEHICLE- LIGHTS/SIRENS OPERATING
9- FIRE DEPT VEHICLE- LIGHTS/SIRENS NOT OPERATING
10- FIRE DEPT VEH- LIGHTS/SIREN OPERATING
11- AMBULANCE- LIGHTS/SIREN NOT OPERATING
12- AMBULANCE- LIGHTS/SIREN OPERATING
13- SNOWPLOW- WORKING
14- SNOWPLOW- IN TRANSIT
15- OTHER MAINT VEH- WORKING
16- OTHER MAINT VEH- IN TRANSPORT
17- OTHER PUBLICLY OWNED VEH*
90- OTHER VEHICLE USE*
98- NOT APPLICABLE
99- UNKNOWN VEHICLE USE
DM LOC - PRINCIPAL DAMAGE AREA(S) OF VEHICLE
1- FRONT
2- RIGHT FRONT
3- RIGHT CENTER
4- RIGHT REAR
5- REAR
6- LEFT REAR
7- LEFT CENTER
8- LEFT FRONT
9- TOP
10- BOTTOM-UNDERCARRIAGE
11- MULTIPLE AREAS
90- OTHER*
98- NOT APPLICABLE
99- UNKNOWN
DMG SEV - DAMAGE SEVERITY
1- NONE
2- LIGHT
3- MODERATE
4- SEVERE
5- TOTAL
90- OTHER*
98- NOT APPLICABLE
99- UNKNOWN
CARGO BODY TYPE -
1- VAN/ENCLOSED BOX
2- DRY BULK CARGO TANK
3- LIQUID BULK
4- GAS BULK CARGO TANK
5- FLATBED OR PLATFORM
6- DUMP
7- CONCRETE MIXER
8- AUTO TRANSPORTER
9- GARBAGE/REFUSE
10- COMBINATION
11- SPECIAL PERMIT LOAD
12- GRAIN/CHIPS/GRAVEL
13- POLE
90- OTHER*
98- NOT APPLICABLE
99- UNKNOWN
IF ACCIDENT INVOLVED A COMMERCIAL MOTOR VEHICLE, SCHOOL BUS, OR HEAD START BUS, REMEMBER TO NOTIFY THE STATE PATROL (required under MS 169.783 and 169.4511).
ACC TYP - ACCIDENT TYPE BY 1ST HARMFUL EVENT
COLLISION WITH
1- MOTOR VEHICLE IN TRANSPORT
2- PARKED MOTOR VEHICLE
3- ROADWAY EQUIPMENT - SNOWPLOW
4- ROADWAY EQUIPMENT - OTHER
5- TRAIN
6- PEDALCYCLE
7- PEDESTRIAN
8- DEER
9- OTHER ANIMAL
10- UNDERRIDE - REAR
11- UNDERRIDE - SIDE
12- COLLISION WITH OTHER TYPE OF NON-FIXED OBJECT
13- OTHER COLLISION TYPE*
14- UNKNOWN COLLISION TYPE
COLLISION WITH FIXED OBJECT
21- CONSTRUCTION EQUIPMENT
22- TRAFFIC SIGNAL
23- RR CROSSING DEVICE
24- LIGHT POLE
25- UTILITY POLE
26- SIGN STRUCTURE
27- MAILBOXES
28- OTHER POLES
29- HYDRANT
30- TREE/SHRUBBERY
31- BRIDGE PIERS
32- MEDIAN SAFETY BARRIER
33- CRASH CUSHION
34- GUARDRAIL
35- FENCE (NON-MEDIAN BARRIER)
36- CULVERT/HEADWALL
37- EMBANKMENT/DITCH/CURB
38- BUILDING/WALL
39- ROCK OUTCROPS
40- PARKING METER
41- OTHER FIXED OBJECT*
42- UNKNOWN FIXED OBJECT
NON-COLLISION
51- OVERTURN/ROLLOVER
52- SUBMERSION
53- FIRE/EXPLOSION
54- JACKKNIFE
55- LOSS/SPILLAGE NON-HAZ MAT
56- LOSS/SPILLAGE HAZ MAT
64- NON-COLLISION OF OTHER TYPE
65- NON-COLLISION OF UNKNOWN TYPE
90- OTHER ACCIDENT TYPE*
99- UNKNOWN ACCIDENT TYPE
DEVICE - TRAFFIC CONTROL DEVICE
1- TRAFFIC SIGNAL
2- OVERHEAD FLASHERS
3- STOP SIGN - ALL APPROACHES
4- STOP SIGN - NOT ALL APPROACHES
5- YIELD SIGN
6- OFFICER/FLAG PERSON/ SCHOOL PATROL
7- SCHOOL BUS STOP ARM
8- SCHOOL ZONE SIGN
9- NO PASSING ZONE
10- RR CROSSING GATE
11- RR CROSSING- FLASHING LIGHTS
12- RR CROSSING- STOP SIGN
13- RR OVERHEAD FLASHERS
14- RR OVERHEAD FLASHERS/GATE
15- RR CROSSBUCK
90- OTHER*
98- NOT APPLICABLE
99- UNKNOWN
SCHOOL BUS INVOLVED
1- YES, INVOLVED DIRECTLY
2- YES, INVOLVED INDIRECTLY
3- NO
99- UNKNOWN
LOCATN - LOCATION OF FIRST HARMFUL EVENT (SEE EXAMPLE OF TRAFFIC WAY)
1- ON ROADWAY (ALLEY DRIVEWAY, ETC.)
2- ON SHOULDER
3- ON MEDIAN
4- ON ROADSIDE
5- ON SEPERATOR
6- PARKING LOT
7- PRIVATE PROPERTY
8- OUTSIDE OF TRAFFICWAY
90- OTHER*
99- UNKNOWN
WORKING - WAS SIGNAL WORKING PROPERLY?
1- SIGNAL WORKING PROPERLY
2- SIGNAL NOT WORKING PROPERLY
3- SIGNAL WORKING IN MODIFIED FASHION
4- SIGNAL OBSCURED/ DAMAGED
90- OTHER*
98- NOT APPLICABLE
99- UNKNOWN
TYPE OF WZ - WORK ZONE
1- LANE CLOSURE
2- LANE SHIFT/CROSSOVER
3- WORK ON SHOULDER/MEDIAN
4- INTERMITTENT
5- MOVING WORK ZONE
90- OTHER*
98- NOT APPLICABLE
99- UNKNOWN
LOCATION OF CRASH RELATIVE TO THE WORK ZONE
1- BEFORE 1ST WARNING SIGN
2- ADVANCE WARNING AREA
3- TRANSITION AREA
4- ACTIVITY AREA
5- TERMINATION AREA
90- OTHER*
98- NOT APPLICABLE
99- UNKNOWN
INT REL - RELATIONSHIP TO INTERSECTION/JUNCTION
1- NOT AT INTERSECTION/JUNC
2- T INTERSECTION
3- Y INTERSECTION
4- 4 LEGGED INTERSECTION
5- 5 OR MORE POINT INTERSECTION
6- TRAFFIC CIRCLE OR ROUND ABOUT
7- INTERSECTION RELATED
8- ALLEY OR DRIVEWAY ACCESS
9- AT SCHOOL X-ING
10- RR X-ING
11- RECREATIONAL X-ING
20- INTERCHANGE ON RAMP
21- INTERCHANGE OFF RAMP
22- INTERCHANGE ALL OTHERS
90- OTHER*
99- UNKNOWN
RDESGN - ROAD DESIGN
1- FREEWAY - MAIN LINE
2- FREEWAY - RAMPS
3- OTHER DIVIDED HIGHWAY
4- ONE-WAY STREET
5- 4-6 LANES UNDIVIDED (2-3 LANES EACH WAY)
6- 3 LANES UNDIVIDED
7- 5 LANES UNDIVIDED (CENTER LEFT TURN LANE)
8- 2-LANES (1 LANE EACH WAY)
9- ALLEY/DRIVEWAY
10- ROAD ON PRIVATE PROPERTY
90- OTHER*
99- UNKNOWN
WEATHER - WEATHER CONDITION #1 AND #2
1- CLEAR
2- CLOUDY
3- RAIN
4- SNOW
5- SLEET/HAIL/FREEZING RAIN
6- FOG/SMOG/SMOKE
7- BLOWING SAND/DUST/SNOW
8- SEVERE CROSSWINDS
90- OTHER*
99- UNKNOWN
RD SURF - ROAD SURFACE CONDITIONS
1- DRY
2- WET
3- SNOW
4- SLUSH
5- ICE PACKED SNOW
6- WATER (STANDING/MOVING)
7- MUDDY
8- DEBRIS
9- OILY
90- OTHER*
99- UNKNOWN
LIGHT - LIGHTING
1- DAY LIGHT
2- BEFORE SUNRISE
3- AFTER SUNSET
4- DARK (STREET LIGHTS ON)
5- DARK (STREET LIGHTS OFF)
6- DARK (NO STREET LIGHTS)
7- DARK (UNKNOWN LIGHTING)
90- OTHER*
99- UNKNOWN
RD CHAR - ROADWAY CHARACTER
1- STRAIGHT & LEVEL
2- STRAIGHT & GRADE
3- STRAIGHT AT HILLCREST
4- STRAIGHT AT SAG
5- CURVE & LEVEL
6- CURVE & GRADE
7- CURVE AT HILLCREST
8- CURVE AT SAG
90- OTHER*
99- UNKNOWN
DIAGRAM - VEHICULAR RELATIONSHIPS WHICH LED TO IMPACT
1- REAR END
2- SIDESWIPE - SAME DIRECTION
3- LEFT TURN
4- RAN OFF ROAD - LEFT SIDE
5- RIGHT ANGLE
6- RIGHT TURN
7- RAN OFF ROAD - RIGHT SIDE
8- HEAD ON
9- SIDESWIPE - OPPOSING
90- OTHER*
98- NOT APPLICABLE
99- UNKNOWN
STATE OF MINNESOTA
TRAFFIC ACCIDENT REPORT
(LAW ENFORCEMENT ONLY)
ANY BOXES WITH QUESTION MARKS ANSWER WITH ONE OF THE FOLLOWING:
Y - YES, N - NO, I - INAPPLICABLE, X - UNKNOWN
* - DESCRIBE IN NARRATIVE


SEQUENCE OF EVENTS - PLEASE INDICATE UP TO FOUR CODES THAT REPRESENT THE SEQUENCE OF CRASH-RELATED EVENTS
COLLISION WITH
1 - MOTOR VEHICLE IN TRANSPORT
2 - PARKED MOTOR VEHICLE
3 - ROADWAY EQUIPMENT - SNOWPLOW
4 - ROADWAY EQUIPMENT - OTHER
5 - TRAIN
6- PEDALCYCLE
7- PEDESTRIAN
8- DEER
9- OTHER ANIMAL
10- UNDERRIDE - REAR
11- UNDERRIDE- - SIDE
12- OTHER NON-FIXED OBJECT
13- OTHER COLLISION TYPE
14- UNKNOWN COLLISION TYPE
COLLISION FIXED OBJECT
21 - CONSTRUCTION EQUIPMENT
22- TRAFFIC SIGNAL
23- RR CROSSING DEVICE
24- LIGHT POLE
25- UTILITY POLE
26- SIGN STRUCTURE
27- MAILBOXES
28- OTHER POLES
29- HYDRANT
30- TREE/SHRUBBERY
31- BRIDGE PIERS
32- MEDIAN SAFETY BARRIER
33- CRASH CUSHION
34- GUARDRAIL
35- FENCE (NON-MEDIAN BARRIER)
36- CULVERT/HEADWALL
37- EMBANKMENT/DITCH/CURB
38- BUILDING/WALL
39- ROCK OUT CROPS
40- PARKING METER
41- OTHER FIXED OBJECT*
42- UNKNOWN FIXED OBJECT
NON-COLLISION
51- OVERTURN/ROLLOVER
52- SUBMERSION
53- FIRE/EXPLOSION
54- JACKKNIFE
55- LOSS/SPILLAGE NON-HAZ MAT
56- LOSS/SPILLAGE HAZ MAT
57- RAN-OFF ROAD - RIGHT
58- RAN OFF ROAD - LEFT
59- EQUIP FAILURE (TIRE, BRAKES)
60- SEPARATION OF UNITS
61- DOWNHILL RUNAWAY
62- CROSS MEDIAN/CENTERLINE
63- CARGO/EQUIPMENT SHIFT
64- NON-COLLISION OF OTHER TYPE*
65- NON-COLLISION OF UNKNOWN TYPE
90- EVENT OF OTHER TYPE*
98- NOT APPLICABLE
99- EVENT OF UNKNOWN TYPE
POSTN - POSITION IN/ON VEHICLE OR LOCATION OF NON-MOTORIST PRIOR TO CRASH
MOTORIST
1- DRIVER (INCLUDE MOTORCYCLE DRIVER)
2- FRONT CENTER
3- FRONT RIGHT
4- SECOND SEAT LEFT
5- SECOND SEAT CENTER
6- SECOND SEAT RIGHT
7- THIRD SEAT LEFT
8- THIRD SEAT CENTER
9- THIRD SEAT RIGHT
10- OUTSIDE OF VEHICLE
11- TRAILING UNIT
12- PICKUP TRUCK BED
13- TRUCK CAB SLEEPER SECTION
14- PASSENGER IN OTHER POSITION (INCLUDE MOTORCYCLE PASSENGER)
15- PASSENGER IN UNKNOWN POSITION
16- FRONT LEFT (NON-DRIVER)
NON-MOTORIST
21- MARKED CROSSWALK AT INTERSECTION
22- AT INTERSECTION, BUT NO MARKED CROSSWALK
23- NON-INTERSECTION CROSSWALK
24- DRIVEWAY ACCESS CROSSWALK
25- IN ROADWAY
26- NOT IN ROADWAY
27- MEDIAN (BUT NOT ON SHOULDER)
28- ISLAND
29- SHOULDER
30- SIDEWALK
31- WITHIN 10 FT OF ROADWAY (BUT NOT ON MEDIAN, ISLAND, SHOULDER OR SIDEWALK)
32- BEYOND 10 FT OF ROADWAY
33- OUTSIDE TRAFFIC-WAY
34- SHARED-USED PATH OR TRAILS
35- OTHER NON-MOTORIST LOCATION*
36 UNKNOWN NON-MOTORIST LOCATION
SAFETY EQUIPMENT USE
1- BELTS NOT USED
2- LAP BELT ONLY USED
3- SHOULDER BELT ONLY USED
4- LAP AND SHOULDER BELT USED
5- CHILD SEAT NOT USED
6- CHILD SEAT USED IMPROPERLY
7- CHILD SEAT USED PROPERLY
8- BOOSTER SEAT NOT USED
9- BOOSTER SEAT USED IMPROPERLY
10- BOOSTER SEAT USED PROPERLY
11- HELMET NOT USED
12- HELMET USED
13- DARK (NON-LIGHT-REFLECTIVE CLOTHING)
14- LIGHT REFLECTIVE CLOTHING
15- NO PROTECTIVE PADS
16- PROTECTIVE PADS
90- OTHER*
98- NOT APPLICABLE
99- UNKNOWN
DRIVER LICENSE STATUS
1- VALID - W/IN RESTRICTIONS
2- VIOLATION - BEYOND RESTRICTIONS
3- VIOLATION - NOT ENDORSED FOR THIS TYPE VEHICLE
4- VIOLATION - LICENSE SUSPENDED
5- VIOLATION - LICENSE REVOKED
6- VIOLATION - LICENSE CANCELED
7- VIOLATION OF LIMITED LICENSE PROVISIONS
8- VIOLATION - EXPIRED LICENSE
9- VIOLATION - NO LICENSE
90- OTHER*
98- NOT APPLICABLE
99- UNKNOWN
SAFETY EQUIPMENT TYPE
1- REQUIRED SAFETY EQUIP NOT IN PLACE
2- LAP BELT
3- SHOULDER BELT
4- LAP & SHOULDER BELT
5- CHILD SAFETY SEAT
6- CHILD BOOSTER SEAT
90- OTHER*
98- NOT APPLICABLE
99- UNKNOWN
SAFETY - AIR BAG
1- DEPLOYED-FRONT
2- DEPLOYED-SIDE
3- DEPLOYED-FRONT AND SIDE
4- NOT DEPLOYED-SWITCH ON
5- NOT DEPLOYED-SWITCH OFF
6- NOT DEPLOYED- UNKNOWN IF SWITCH ON OR OFF
90- OTHER*
98- NOT APPLICABLE
99- UNKNOWN
EJECT - EJECTION FROM VEHICLE
1- TRAPPED, EXTRICATED (BY MECHANICAL MEANS)
2- TRAPPED, FREED BY NON-MECHANICAL MEANS
3- PARTIALLY EJECTED
4- EJECTED
5- NOT EJECTED
90- OTHER*
98- NOT APPLICABLE
99- UNKNOWN
INJ SEV - INJURY SEVERITY
K- KILLED
A- INCAPACITATING INJURY
B- NON-INCAPACITATING INJURY
C- POSSIBLE INJURY
N- NO APPARENT INJURY
END ROAD WORK
5
Termination Area
lets traffic resume normal driving
4
Activity Area
is where work takes place
3
Transition Area
moves traffic out of it's normal path
2
Advance Warning Area
tells traffic what to expect ahead
ROAD WORK AHEAD
1
BEFORE FIRST WARNING SIGNS
DEFINITION OF A WORKZONE
DIRECT - PRE-CRASH DIRECTION
1- NORTH
2- NORTHEAST
3- EAST
4- SOUTHEAST
5- SOUTH
6- SOUTHWEST
7- WEST
8- NORTHWEST
90- OTHER*
98- NOT APPLICABLE
99- UNKNOWN
DRIVER LICENSE RESTRICTIONS
1- NONE
2- CORRECTIVE LENSES
3- MECHANICAL DEVICES
4- PROSTHETIC AID
5- AUTOMATIC TRANSMISSION
6- OUTSIDE MIRROR
7- LIMIT TO DAYLIGHT HOURS
8- LIMIT TO EMPLOYMENT ONLY
9- LIMITED - OTHER
10- LEARNER'S PERMIT
11- CDL - INTRASTATE ONLY
12- VEHICLES W/OUT AIR BRAKES
13- EXCEPT CLASS A BUS
14- EXCEPT CLASS A/CLASS B BUS
15- EXCEPT TRACTOR/TRAILER
16- FARM WAIVER
17- MULTIPLE RESTRICTIONS
90- OTHER*
98- NOT APPLICABLE
99- UNKNOWN
TYPE OF ALCOHOL/DRUG TEST GIVEN
1- BLOOD
2- SERUM
3- BREATH
4- URINE
90- OTHER*
98- NOT APPLICABLE
99- UNKNOWN
EXAMPLE OF TRAFFICWAY
(FOR REFERENCE WHEN CODING LOCATION)
Property Line
Roadside
Roadway
Separator
Shoulder
Road
Roadway
Shoulder
Median
Roadway
Roadside
Property Line
One way or two way Frontage Road
Road with Shoulders
Road without Shoulders
TRAFFICWAY
TRAFFICWAY WITH FRONTAGE ROAD