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EVALUATION OF 2008 NORTH DAKOTA 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 North Dakota.

MCMIS Crash File records were matched to the North Dakota crash file to determine the nature and extent of underreporting. Overall, it appears that North Dakota is reporting 64.2 percent of crash involvements that should be reported to the MCMIS Crash file. There is also evidence that about 17 percent of the records reported do not meet the reporting standard.

Reporting rates were found to be related to crash severity, the configuration of the vehicle, and the type of enforcement agency that covered the crash. Over 93.3 percent of fatal crashes were reported, 81.8 percent of injury/transported crashes, and 57.5 percent of tow/disabled involvements. More than 72 percent of reportable involvements of truck-tractors were reported, but the reporting rate was 47.4 percent for 2-axle, 6-tire single-unit trucks. Only 30.8 percent of bus involvements were reported.

Missing data rates are low for most variables. Overall, the crash report is well-designed to support full reporting. 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.
(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 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 showed underreporting due in large part to problems in interpreting and applying the reporting criteria within the states. The problems were more severe in large jurisdictions and police departments. Each state also had issues specific to the nature of its own system. Some states also were overreporting some cases, often due to technical problems with duplicate records. [See references 3 to 34.] 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 North Dakota. In recent years, North Dakota has reported from 290 to 350 involvements annually to the MCMIS Crash file. According to the 2002 Vehicle Inventory and Use Survey (the last available), in 2002 North Dakota had over 58,000 trucks registered, ranking 33rd among the states and accounting for 1.1 percent of all truck registrations [1]. North Dakota is the 48th largest state by population and in most years ranks 45th in terms of the number of annual truck and bus fatal involvements.

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

1. The complete police accident report file (PAR file hereafter) from North Dakota 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 North Dakota 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 North Dakota.

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 North Dakota's statewide files as of June, 2009 were used in this analysis. The 2008 PAR file contains the crash records for 26,162 units (primarily vehicles).

2. Data Preparation

The North Dakota PAR file and MCMIS Crash file each required some preparation before the North Dakota records in the MCMIS Crash file could be matched to the North Dakota PAR file. In the case of the MCMIS Crash file, the only processing necessary was to extract records reported from North Dakota and to eliminate duplicate records. The North Dakota 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 2008 MCMIS Crash file as of June 9, 2009, was used to identify records submitted from North Dakota. For calendar year 2008 there were 340 cases reported to the file from North Dakota. An analysis file was constructed 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). No such duplicates were found.

In addition, records were examined for identical values on accident number, accident date/time, county, officer badge, 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. One such duplicate was found. All variables except vehicle sequence number were identical for both records of the pair, including vehicle and driver variables. It is possible that the record may have been mistakenly entered twice. The member of the pair with the highest sequence number was excluded. The resulting MCMIS file contains 339 unique records.

2.2 North Dakota Police Accident Report File

The North Dakota PAR data for 2008 (as of June 2009) was obtained from the state. The data were stored as multiple text files, representing Accident, Vehicle, and Person information. The file contained records for 16,407 traffic crashes involving 26,162 units. Data for the PAR file are coded from the Motor Vehicle Crash Report (SFN 2355, Rev. 12-2006) completed by police officers. The data as sent included records for 3,623 non-traffic crashes and non-reportable events. These are events that do not qualify as traffic accidents, but they are reported on the Crash Report form. Non-traffic accidents and non-reportable crashes were identified and excluded from the analysis file.

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). An inspection of case numbers

verified that they were recorded in a consistent format, so there was no reason to suspect duplicate records based on similar, but not identical, number formats (such as 154022 and 154-22, for example). In addition, the file was examined for duplicate records based on identical case number and vehicle number. No such instances were found.

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. Two crash records would not be expected to be identical on all variables. To investigate this possibility, records were examined for duplicate occurrences based on the fields for case number, accident date/time, crash county, vehicle license plate number, and driver license number. Based on the above algorithm, two duplicate records (pairs) were found. Examination of the pairs revealed that vehicle number differed between the pairs, but most other variables were identical. In all pairs vehicle make, model and model year were identical. Since the major vehicle and driver variables were identical, these records were considered duplicates. It appears a second record may have been mistakenly entered during the process of updating certain variables. Since it was not possible to tell which member was the correct one, the member with sequence number equal to one was kept, and the other one deleted. After deleting two records, and removing the records of non-traffic, non-reportable crashes identified earlier, the resulting PAR file has 26,160 unique records.

3. Matching Process

The next step involved matching records from the North Dakota PAR file to corresponding records from the MCMIS file. There were 339 North Dakota records from the MCMIS file available for matching, and 26,160 records from the North Dakota PAR file. All records from the North Dakota PAR data file were used in the match, even those that did not meet the requirements for reporting to the MCMIS Crash file. This allowed the identification of cases reported to the MCMIS Crash file that did not meet the 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 accidents and specific vehicles within the accidents. Crash Number, used to uniquely identify a crash in the North Dakota PAR data, and Report Number in the MCMIS Crash file, are obvious first choices. Crash Number in the North Dakota PAR file is a six-digit numeric 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 (ND, in this case), followed by ten digits. It appears the six rightmost digits correspond to PAR Crash Number. These digits were 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. Crash Highway Number was unrecorded in over 76 percent of PAR cases and Reporting Officer's Badge Number was not available in the PAR data. The PAR file had a numeric variable pertaining to City, but it was unrecorded in 32.0 percent of accident records in the PAR file, and was always unrecorded in the MCMIS file. Thus, these variables could not be used in the matching process, though some were useful in some cases to verify matches made by other means.

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. All of these variables were present in the PAR file, except for driver last name. License Plate Number was unrecorded approximately 4 percent of the time in the PAR data, but was complete in the MCMIS file. The driver-related variables were unrecorded in eight to nine percent of PAR cases. Both had low rates of missing data in the MCMIS file. VIN was unrecorded in 54.4 percent of PAR cases, in part because officers in North Dakota are instructed to record it only for out-of-state cases.

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 case number, crash date (month, day), crash time (hour, minute), county, vehicle license number, driver license number, and driver age. It was discovered that crash time in the MCMIS file was frequently incorrectly recorded, such that crash minute was given the same value as crash hour, even though they were different in the PAR file. For example, the time might be recorded as 10:23 in the PAR file, but 10:10 in the MCMIS file. Consequently, the second match step dropped minute as well as driver license number, and matched on case number, crash date, crash hour, county, vehicle license plate number, and age. After some experimentation, the third match step included case number, crash date, crash hour, and VIN. The variables used in the final attempt at a computer-based match were case number and VIN, but no additional cases were 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. In addition, all cases were searched for in the PAR file, based on license plate number alone. These hand-matches resulted in matching five additional cases in the fifth match.

In total, this process resulted in matching 94.7% percent of the MCMIS records to the PAR file. Eighteen 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/North Dakota PAR File Match, 2008

Step	Matching variables	Cases matched
Match 1	Case number, crash date, crash time, county, vehicle license plate number, driver license number, and driver age	135
Match 2	Case number, crash date, crash hour, county, vehicle license plate number, and driver age	179
Match 3	Case number, crash date, crash hour, and VIN	2
Match 4	Case number and VIN	0
Match 5	Hand-matched using all available variables	5
Total cases matched		321

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 321 matches, representing 94.7 percent of the 339 non-duplicate records reported to MCMIS.

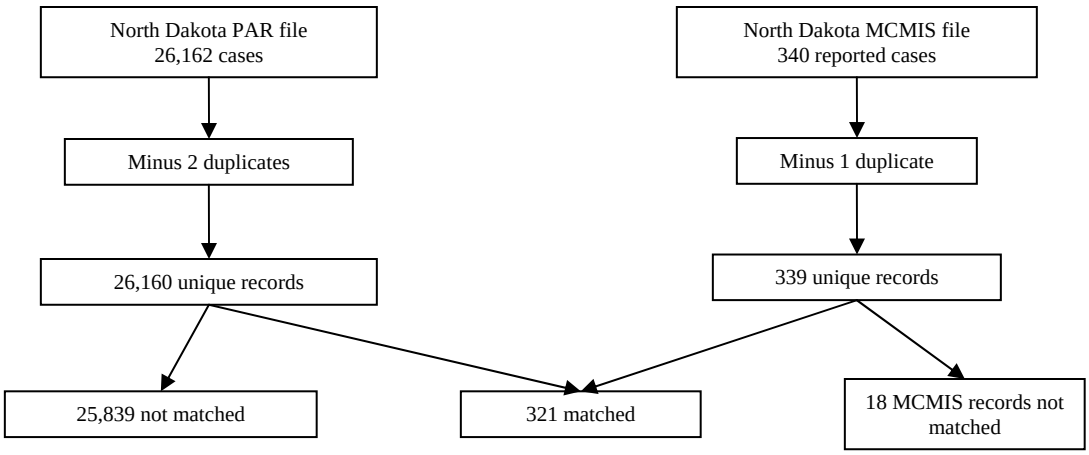

Figure 1 Case Flow in MCMIS/North Dakota Crash File Match

Note that 18 MCMIS records from North Dakota did not match a record in the North Dakota file prepared for matching. These cases were searched for among the 3,623 non-traffic and non-reportable incidents that were included in the original crash files supplied by North Dakota, as described above. The non-traffic/non-reportable incidents are all events that were reported on a SFN 2355, but which do not meet the definition of a traffic crash, typically because they occurred not on a public trafficway, but rather on private property or some other nonpublic location. Of the 18 unmatched MCMIS cases, 16 were found in the set of non-traffic crashes. Thus, they did not meet the North Dakota definition of a traffic accident, much less the MCMIS definition. The origin of the other two records could not be resolved.

Of the 321 matched cases, 280 met the MCMIS reporting criteria (reportable) and 41 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 North Dakota 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 North Dakota. Records that are 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 must be selected from among all the records in the state's crash data.

The method developed to identify reportable records is intended to be independent of any prior selection by 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 North Dakota, a section of the SFN 2355 is designated as "truck/bus/hazardous" 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 that had been missed by the state selection process. Accordingly, the method of identifying reportable cases used in this report is developed using the data recorded for all vehicles and 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 North Dakota PAR file. A Unit Configuration field in the crash file classifies vehicles among 24 distinct types. North Dakota's inclusion of vehicle diagrams on the crash form overlay aids the reporting officer in determining the correct vehicle type. Unit Configuration was recorded for all cases in the PAR file. The vehicle configurations include several that match very well the vehicle types in the MCMIS Crash file.

Some of the vehicle types in Unit Configuration are somewhat ambiguous as to whether they identify qualifying vehicles. These types include Pickup/van/utility, Roadway Maintenance Vehicle, or Other Publicly-owned Vehicle. Particularly where the Bodytype variable specifies a type commonly used on trucks, some of these vehicles may actually have GVWRs greater than 10,000 pounds. Decoding the VIN can show whether the vehicle meets the GVWR standard. An initial examination of 208 vehicles with VINs found 27 vehicles that met the GVWR standard. These vehicles were added to the set of MCMIS-qualifying vehicles, but because of this finding, it was determined to do a more systematic examination of vehicles that cannot be readily classified as either qualifying or not, but which are involved in crashes that meet the MCMIS severity threshold. There were 1,474 vehicles in MCMIS crashes with Unit Configuration of Pickup/van/utility, Roadway Maintenance Vehicle, or Other Publicly-owned Vehicle, the Bodytype is something other than Not Applicable, and VIN was recorded. A simple random sample of 200 of these cases were analyzed, and two cases (1 percent) were found to be eligible trucks. If one percent of the whole set of 1,474 vehicles are qualifying trucks, that would imply that an additional 15 cases could be reportable. Unfortunately, VIN is not recorded for 54.4 percent of vehicles, so it is not feasible to identify additional qualifying vehicles by decoding the VIN of ambiguous cases. But it should be noted that the number of qualifying vehicles identified using the available information likely underestimates slightly the true number of qualifying vehicles.

Table 3 shows the code levels of the Unit Configuration variable that meet the vehicle criteria.

Table 3 Relevant Unit Configuration Codes in North Dakota PAR file

Trucks
2 – Pickup/van/utility (where GVWR>10,000 lbs.)
17 – Roadway maintenance vehicle (where GVWR>10,000 lbs)
18 – Other publicly-owned vehicle (where GVWR>10,000 lbs)
20 – 2-axle, 6-tire Single Unit Truck/Step van
21 – 3 or more axle Single Unit Truck
22 – Single Unit Truck
23 – Truck Tractor
24 – Unknown Heavy Trucks
Buses
2 **-** Pickup/van/utility (identified as a bus)
3 – Bus (Seats for >= 16, including driver)
4 – School Bus

It should be noted that the Bus vehicle type does not conform to the MCMIS bus definition, which includes vehicles with seating for at least nine, including the driver, not for at least 16, as in the Unit Configuration variable. The instructions on the SFN 2355 for the Truck/Bus/Hazardous section specify that the section is to completed "for vehicles designed to transport 9 or more people counting the driver," along with the other qualifying vehicle types. There is an inconsistency between the instructions of the SNF 2355 and the code levels for buses in the Unit Configuration. The effect of this inconsistency cannot be determined, but it may reduce the number of small buses that are recognized as meeting the MCMIS vehicle standard.

In addition to these vehicle types, any vehicle, regardless of size, displaying a hazardous materials placard, also meets the MCMIS vehicle type definition. North Dakota's crash form includes five fields pertaining to whether a vehicle was transporting hazmat. However, the PAR file supplied by North Dakota did not include these variables from the Truck/Bus/Hazardous section of the crash report. Thus, vehicles displaying a hazardous materials placard cannot be identified. For most states, this criteria only results in a few additional non-truck cases, so exclusion of these cases is not likely to affect the overall reporting rate substantially.

In total, there were 889 vehicles identified as eligible trucks and buses in the North Dakota PAR data. Table 4 shows the distribution by vehicle type. Almost 90 percent of qualifying vehicles are trucks, while 10 percent are buses. The 889 eligible vehicles represent 3.4 percent of the 26,160 vehicles in the PAR file. This proportion lies within the range observed in other states evaluated, which is typically 2.6 to 6.1 percent.

Table 4 Vehicles Meeting MCMIS Vehicle Criteria, North Dakota PAR File, 2008

Vehicle type	N	%
Truck	797	89.7
Bus	92	10.3
Other, transporting hazmat	0	0.0
Total	889	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. As in the case of vehicles, the North Dakota crash file has the necessary information to identify in a straightforward way the crashes that meet the severity criteria.

The North Dakota Person file contains the necessary information on injured persons. There is one field for the officer to record both the severity of the injury (using the KABCN scale), as well as whether or not the injured person was transported to a medical facility. This information was used to identify crashes in which an injured person was transported for care.

The North Dakota PAR data also includes information needed to identify crashes in which a vehicle was towed from the scene due to vehicle damage. This is indicated directly on the North Dakota crash report, by means of a field in which the officer can indicate whether a vehicle was towed due to damage. However, it is not certain if such damage was "disabling." There is an additional field indicating the Extent of Vehicle Deformity, with code levels None, Minor, Moderate, Severe, and Unknown. Since it is not clear in the instructions accompanying the crash report how "Severe" is defined, it is not possible to precisely determine "disabling" damage. Thus, all crashes in which at least one vehicle was coded as towed due to damage were considered as meeting the MCMIS criteria.

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 North Dakota PAR file is 22.5 percent, somewhat lower than the proportion in other states.

Implementing the eligible vehicle and crash severity filters identified a total of 436 reportable cases in the North Dakota crash data in 2008. There were 436 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, because the nature of the variables on vehicle type make it difficult find reportable vehicles among those classified as pickups, buses with seating in the range of nine to 15, and light vehicles transporting hazmat.

Table 5 Reportable Records in North Dakota Crash File, 2008

	Crash severity			
MCMIS Vehicle type	Fatal	Injured/ transported	Tow/ disabled	Total
Truck	15	93	302	410
Bus	0	6	20	26
Hazmat placard	0	0	0	0
Total	15	99	322	436

As Figure 1 above shows, there were 340 records reported to the MCMIS Crash file by North Dakota in 2008, of which one was a duplicate record, leaving 339 unique records reported. Of these, 321 were matched to the North Dakota PAR file. Of the 321 matched records, 280 were identified as meeting the reporting criteria under the method described above, and 41 did not qualify for reporting.

5. Factors Associated with Reporting

The process described in section 4 identified 436 records in the 2008 North Dakota crash file as meeting the MCMIS Crash file reporting criteria. There were 340 records reported to the MCMIS Crash file for 2008, of which 339 were unique and 280 were determined to meet the MCMIS reporting criteria. Therefore, of the 436 reportable records, 280 were actually reported, for an overall reporting rate of 64.2 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 321 MCMIS cases that could be matched to the North Dakota PAR data, 41 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 vehicles are not qualifying trucks or buses. Of the 41 reported, fully 32 were not coded as a truck, a bus, or a vehicle transporting hazmat. Most of these vehicles appeared to be light-weight pickup trucks. The other nine qualified for reporting by vehicle type, but the crash in which they were involved did not involve a fatality, injury transported for treatment, or a vehicle towed due to damage.

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

	Crash severity				
Vehicle type	Fatal	Transported injury	Towed/disabled	Other crash severity	Total
Truck	0	0	0	7	7
Bus	0	0	0	2	2
Other vehicle (not transporting hazmat)	1	6	24	1	32
Total	1	6	24	10	41

In addition to this set of 41 cases, there were also an additional 16 records in MCMIS that were classified by North Dakota as non-traffic or non-reportable crashes, making at least 57 records that did not qualify out of the total of 339 unique records uploaded by North Dakota for 2008.

5.2 Case Processing

Delays in transmitting cases may partially account for the incompleteness of the MCMIS Crash file. A 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 North Dakota, 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 79.4 in October to 54.5 in May. Although December represents the largest proportion of unreported cases, there is no consistent pattern of underreporting across the year. Delays in reporting related to seasonal factors or a consistent lag in processing cases do not appear to contribute to the rate of reporting.

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

Crash month	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
January	22	68.2	7	4.5
February	42	61.9	16	10.3
March	31	61.3	12	7.7
April	30	56.7	13	8.3
May	33	54.5	15	9.6
June	20	55.0	9	5.8
July	26	69.2	8	5.1
August	36	69.4	11	7.1
September	43	67.4	14	9.0
October	34	79.4	7	4.5
November	62	67.7	20	12.8
December	57	57.9	24	15.4
Total	436	64.2	156	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. About 69 percent of the records were submitted within 90 days of the crash. The median time between crash occurrence and record upload is about 34 days. Two-thirds are submitted within 59 days, and 90 percent were submitted within 166 days.

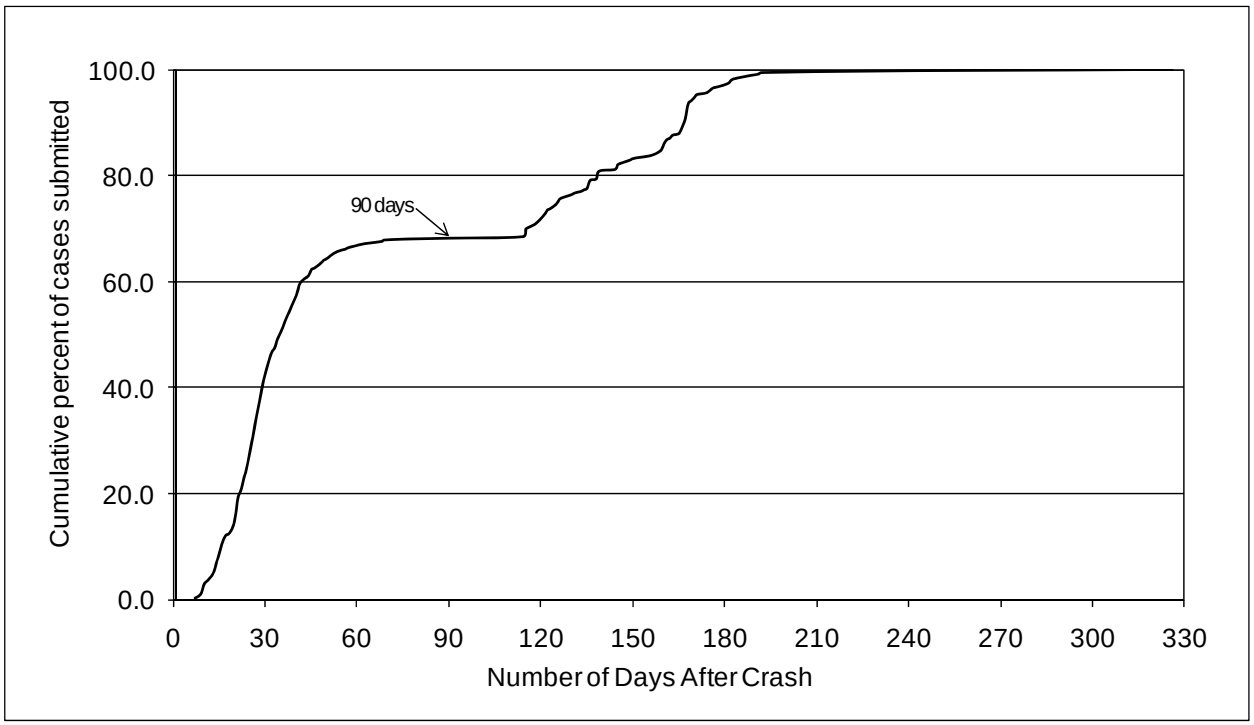

Figure 2 Cumulative Percent of Cases Submitted to MCMIS Crash File by Number of Days After Crash, North Dakota 2008

The first date on which crash records from 2008 were uploaded was January 29, 2008, when five records were uploaded. On average, uploads occurred every 19.6 days between then and April 23, 2009, when the last upload occurred. An average of 14.7 records were uploaded per upload, but many uploads consisted only of a few records. For example, four uploads consisted of one record, and another seven had fewer than 10. Approximately 31 percent of the records were uploaded on April 23, 2009, which is the final upload date found in the MCMIS Crash file records for 2008 in North Dakota.

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.

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 93.3 percent of such crash involvements reported. In fact, only one of the 15 fatal truck or bus involvements found in the North Dakota crash file were not reported. The two less-severe levels of crash severity were reported at lower rates. Injury/transported involvements were reported at a 81.8 percent rate, while 57.5 percent of the towed involvements were reported. The difference in the reporting rates for injured/transported and towed/disabled is statistically significant. Moreover, it is noteworthy that the reporting rates are lower for less serious crashes. That is, lower severity crashes are less likely to be recognized as meeting the requirements of the MCMIS Crash file.

Table 8 Reporting Rate by MCMIS Crash Severity, North Dakota 2008

Crash severity	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Fatal	15	93.3	1	0.6
Injured/transported	99	81.8	18	11.5
Towed/disabled	322	57.5	137	87.8
Total	436	64.2	156	100.0

More than 99 percent of the unreported involvements did not include a fatality. In fact, almost all of the unreported cases are towed/disabled cases, so a significant improvement in that area would contribute substantially to improving the overall reporting rate.

In Table 9 crash severity is measured by the most severe injury in the crash, using the KABCN scale. In this scale, fatal injuries are classified as K, incapacitating injuries as A, evident but not incapacitating injuries as B, and possible injuries are coded C. It is interesting to note that, within nonfatal injuries, there is no consistent pattern, though the frequencies are small, particularly for A injuries. There is a step change down in the reporting rate for crashes with no injuries (towed/disabled here). Despite the lack of a simple, linear pattern, the reporting rates suggest that there is a tendency to report more carefully, the more serious the crash. Fatal crashes probably receive the most scrutiny, resulting in a significantly higher reporting rate.

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

Crash severity	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Fatal (K)	15	93.3	1	0.6
Disabling (A)	14	71.4	4	2.6
Non-disabling (B)	75	90.7	7	4.5
Possible/claimed (C)	66	72.7	18	11.5
None	266	52.6	126	80.8
Total	436	64.2	156	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. Light vehicles transporting hazmat could not be identified, so only reporting rates for trucks and buses can be considered here. Table 10 shows the rates for the different general types of vehicles. The reporting rate for trucks was 66.3 percent, close to the overall rate of 64.2 percent, which is expected since trucks account for410 of the 436 total reportable vehicles. The reporting rate for buses is less than half, at 30.8 percent.

Table 10 Reporting Rate by MCMIS Vehicle Class, North Dakota 2008

MCMIS Vehicle class	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Truck	410	66.3	138	88.5
Bus	26	30.8	18	11.5
Total	436	64.2	156	100.0

Table 11 provides more detail about the effect of vehicle configuration on reporting rates, showing rates by each level of the unit configuration variable. The highest reporting rates are for the biggest vehicles. The rate for truck tractors, which includes tractor-semitrailer, doubles, and triples, is 72.4 percent. Large trucks are more reliably recognized as meeting the reporting requirements, while smaller trucks, which equally qualify, are overlooked more often. Two-axle, six tire SUTs and step vans are reported at only a 47.4 percent rate. Both bus types represented are reported at significantly lower rates than trucks. Buses coded as seating for 16 or more, including the driver, are reported at a 30.8 percent rate, while 33.3 percent of the reportable crash involvements of school buses are reported.

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

Unit Configuration	Reportable cases	Reporting rate	Unreported	% of total unreported
Pickup/van/utility (GVWR>10,000 lbs)	14	50.0	7	4.5
Bus (seats >16, incl. driver)	13	30.8	9	5.8
School bus	12	33.3	8	5.1
2 axle, 6 tire SUT/Step van	38	47.4	20	12.8
3+ axle SUT	88	61.4	34	21.8
SUT	8	75.0	2	1.3
Truck tractor	254	72.4	70	44.9
Other Publicly-owned vehicle	3	33.3	2	1.3
Unknown heavy truck	6	33.3	4	2.6
Total	436	64.2	156	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 towed/disabled crashes, at 25.0 percent. (Table 12) In injured/transported crashes the rate for buses is 50.0 percent. Rates are higher for trucks at every crash severity, with the highest rate for trucks in fatal crashes, in which 93.3 percent (14 of 15) of crash involvements were reported.

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

Crash Severity	Truck	Bus	Total
Fatal	93.3	n/a	93.3
Injured/transported	83.9	50.0	81.8
Towed/disabled	59.6	25.0	57.5
Total	66.3	30.8	64.2

5.4 License state

In other states, it has been possible to compare reporting rates for in-state vehicles and for those licensed out of state. This comparison uses license state as a surrogate (imperfect of course) for involvement in interstate commerce, to see if vehicles clearly involved in interstate commerce are more or less likely to be reported to the national crash file, maintained by regulator of trucks and buses involved in interstate commerce. However, license state was not included in the crash data supplied by North Dakota, so we were unable to make the comparison.

5.5 Reporting Agency and Area

In addition to the reporting criteria, reporting rates may reflect differences in where the crash occurs and the type of enforcement 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 or different enforcement priorities. The level and frequency of training or the intensity of supervision may also vary. Such differences can serve as a guide for directing resources to 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 13). There are three primary levels of investigating agencies identified in the North Dakota crash file: State police, county sheriff, and city police. Crashes covered by the State police have the highest reporting rate, at 79.2 percent. The State police also cover about 55 percent of reportable crash involvements, so despite their relatively high rate, the underreporting of crash involvements covered by state police accounts for about one third of all the unreported crash involvements. The reporting rate for county sheriffs is 53.0 percent and for city police at 35.9 percent. It is likely the differences in training and enforcement duties account for the marked differences in reporting rates among the agencies. It is interesting to note that each agency type is responsible for about a third of the unreported cases.

Table 13 Reporting Rate by Investigating Agency, North Dakota 2008

Investigating agency	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
State Patrol	240	79.2	50	32.1
County Sheriff	117	53.0	55	35.3
City Police	78	35.9	50	32.1
Other	1	0.0	1	0.6
Total	436	64.2	156	100.0

Table 14 shows the top five counties displayed in descending order by the number of unreported cases. As a group their overall reporting rate of 50.6 percent is below the statewide average of 64.2 percent, and they account for 53.8 percent of the unreported records. Most of the top counties contain or are near major cities in the state. Thus, they have higher populations and are traversed by the primary routes through North Dakota.

Table 14 Reporting Rate by Crash County, North Dakota 2008

County (major city)	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Cass (Fargo)	76	51.3	37	23.7
Grand Forks (Grand Forks)	21	33.3	14	9.0
Burleigh (Bismarck)	24	45.8	13	8.3
Mountrail	25	60.0	10	6.4
Williams (Williston)	24	58.3	10	6.4
Five County Total	170	50.6	84	53.8
All Counties Total	436	64.2	156	100.0

5.6 Fire Occurrence

The North Dakota crash file captures information about fires or explosions in the Most Harmful Event and Sequence of Events fields. There were 4 trucks and one bus involved in crashes where a fire occurred (Table 15). Almost 80 percent of these records were reported, substantially higher than the overall reporting rate of 64.2 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 15 Reporting Rates for Vehicles In Crashes Involving Fire, North Dakota 2008

Vehicle type	Reportable cases	Reporting rate	Unreported cases	% of total unreported cases
Truck	4	75.0	1	100.0
Bus	1	100.0	0	0.0
Total	5	77.8	1	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 can indicate problems in translating information recorded on the crash report to the values in the MCMIS Crash file.

Table 16 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. However, with respect to the time variables, it should be recalled that it was discovered that in many cases the minutes value actually just repeated the value for hours, rather than the correct minutes. There were many cases in which a time of 10:23 was stored as 10 hours and 10 minutes.

Variables with relatively high rates of missing data include body type, VIN, driver license class, and event one. VIN is only collected for out-of-state vehicles, which explains the high rate of missing data. The missing data rate for DOT number is calculated only for carriers coded as "Interstate," which therefore must have a DOT number, but 5.7 percent of the records in MCMIS were found to be missing that information.

Table 16 Missing Data Rates for Selected MCMIS Crash File Variables, North Dakota, 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	0.0
Accident hour	0.6	Event one	11.8
Accident minute	0.6	Event two	40.1
County	0.0	Event three	73.8
Body type	14.8	Event four	100.0
Configuration	3.0	Number of vehicles	0.0
GVWR class	0.0	Road access	0.0
DOT number *	5.7	Road surface	0.0
Carrier state	0.0	Road trafficway	0.0
Citation issued	2.1	Towaway	0.0
Driver date of birth	2.1	Truck or bus	0.0
Driver license number	2.4	Vehicle license number	0.0
Driver license state	2.4	Vehicle license state	0.0
Driver license class	68.7	VIN	32.4
Driver license valid	2.1	Weather	0.0

* Based on cases where the carrier is coded interstate.

Hazardous materials variable	Percent unrecorded
Hazardous materials placard	16.5
Percentages of hazmat placarded vehicles only:	
Hazardous cargo release	0.0
Hazardous materials class (1-digit)	28.6
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. Hazmat Placard was unrecorded in 16.5 percent of cases. The other missing data rates shown are limited to the 7 records where the vehicle displayed a hazmat placard, indicating it was carrying hazmat. There was no missing data for hazardous cargo release or hazmat 4-digit class. However, the hazmat class 1-digit code was missing in 28.6 percent of cases, and the hazmat name was missing in all cases.

It is also useful to compare the values of variables in the MCMIS Crash file with the values of comparable variables in the North Dakota crash file, to detect any instances of inconsistency, 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.

Overall, the result of the comparison showed that values in the North Dakota crash file for most variables were translated without alteration to the MCMIS Crash file. The values in the variables for light condition, weather, road surface condition, access control, and trafficway flow all were identical in all cases. In the first harmful event variable, there was one case coded as collision with a parked vehicle in MCMIS and coded as collision with a motor vehicle in transport in the North Dakota data. In the cargo body variables, the only "inconsistency" was 35 cases marked as "not applicable" in the North Dakota data but with specific cargo body codes in MCMIS.

The only truly significant difference relates to handling the Attachments variable in the North Dakota data. Unit Configuration captures the type of power unit and Attachments captures the number of trailers. The MCMIS vehicle configuration variable differentiates trucks with trailers from SUTs. Table 17 shows the coding of vehicle configuration in the MCMIS Crash file in the left most column and the coding of the linear combination of Unit Configuration and Attachments in the North Dakota Crash file. Comparisons that show inconsistencies are shaded. The primary problem is SUTs with trailers appearing in the MCMIS Crash file as simple SUTs, with no trailer. There were two records where the truck had no trailer in the North Dakota file, but was coded as a "truck trailer," but all of the other inconsistencies are trucks with trailers. By this measure, there were 31 records with inconsistent configurations. (There is no code level in North Dakota for a bus with seating for 9 to 15, so the two records that are apparently inconsistent are not counted here.)

Table 17 Comparison of Vehicle Configuration in MCMIS and North Dakota Crash Files, 2008

MCMIS Vehicle Configuration	North Dakota vehicle configuration		Cases	%
	Unit Configuration	Attachments		
Unrecorded	Emer. Veh.	None	1	0.3
	Farm Equip	None	2	0.6
	Oth. Pub-Owned Veh.	None	1	0.3
	SUT	Single Trailer	5	1.6
Bus (seats 9-15,incl dr)	Bus(seats>16,incl dr.)	None	2	0.6
	School Bus	None	4	1.2
Bus (seats >15,incl dr)	Bus (seats>16,incl dr.)	None	3	0.9
	School Bus	None	1	0.3
	Oth. Pub-Owned Veh.	None	1	0.3
SUT, 2-axle, 6-tire	Pickup/van/util.	None	7	2.2
	Pickup/van/util.	Single Trailer	5	1.6
	Rdway Maint. Veh.	None	1	0.3
	2ax,6t SUT/Stepvan	None	18	5.6
	2ax,6t SUT/Stepvan	Single Trailer	1	0.3
	3+ axle SUT	Single Trailer	1	0.3
	SUT	Single Trailer	1	0.3

MCMIS Vehicle Configuration	North Dakota vehicle configuration		Cases	%
	Unit Configuration	Attachments		
SUT, 3+ axles	Pickup/van/util.	None	1	0.3
	3+ axle SUT	None	34	10.6
	3+ axle SUT	Single Trailer	20	6.2
	3+ axle SUT	Double Trailer	1	0.3
Truck trailer	Pickup/van/util.	None	2	0.6
	Pickup/van/util.	Single Trailer	19	5.9
Truck tractor (bobtail)	Truck Tractor	None	4	1.2
Tractor/semitrailer	Truck Tractor	Single Trailer	169	52.6
Tractor/double	Truck Tractor	Double Trailer	14	4.4
Tractor/triple	Truck Tractor	Triple Trailer	1	0.3
Unk heavy truck>10,000	Unk. Heavy Truck	Single Trailer	2	0.6
Total			321	100.0

It was not possible to compare the coding of the hazmat variables because those data were not included with the North Dakota crash records.

7. Summary and Discussion

This study evaluates reporting to the MCMIS Crash file by the state of North Dakota 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 not reported; and 3) crashes that did not meet the requirements but were reported.

It is critical to develop an independent method of identifying reportable cases, separate from any identification by the reporting officer or other body. An independent method allows the identification of any cases that may have been overlooked by the reporting officer or by the process in North Dakota that extracts 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 North Dakota crash record facilitates identifying reportable records, with some exceptions. The vehicle types in the Unit Configuration variable specify vehicles that reasonably match the vehicle types in the MCMIS Crash file. Buses are somewhat problematic, because of the addition of buses with seating for 9 to 15 to the MCMIS file. In the North Dakota Unit Configuration variable, only two types of buses are specified: Buses with seating for 16 or more and School buses. But the instructions in the Truck/Bus/Hazardous area of the SFN 2355

include buses with seating for 9 or more, so such small buses could in theory be flagged. The code level for pickup/van/utility is used for some vehicles with GVWR over 10,000 pounds, which can only be identified by decoding the VIN, which unfortunately is not coded for in-state (North Dakota) licensed vehicles. However, both small buses and trucks coded as pickups that have a GVWR over 10,000 pounds are small in number. Decoding a sample of VINs that were available produced an estimate of an extra 15 pickups that met the GVWR threshold. So, the conclusion is that a reasonable identification of reportable vehicles can be made using the coded crash data, though the number identified is probably slightly less than the true number.

Similarly, crashes meeting the severity threshold can also be identified fairly cleanly, though with one qualification. The injury variable incorporates information about whether the injured party was transported to a medical facility, so it is straightforward to definitively determine if a crash met the injured/transported criteria in MCMIS. With respect to towed due to disabling damage, the North Dakota variable specifies whether a vehicle was towed due to damage, but not *disabling* damage. This is probably a minor quibble, though it is known from other states that there are cases where a vehicle was damaged and towed, but the damage was not disabling.

However, taken overall, the coded North Dakota crash data includes almost all the information needed to identify vehicles in crashes that qualify for reporting to the MCMIS Crash file. The nature and detail of information included in the crash report should facilitate high rates of reporting.

A total of 436 crash involvements were identified that meet the MCMIS reporting criteria for vehicle type and crash severity. This includes 410 trucks and 26 buses. In terms of crash severity, there were 15 reportable fatal involvements, 99 injury/transported involvements, and 322 tow/damaged involvements.

There were 340 records reported to the MCMIS Crash file for 2008, of which 339 were unique and 280 were determined to meet the MCMIS reporting criteria. Therefore, of the 436 reportable records, 280 were actually reported, for an overall reporting rate of 64.2 percent. Sixteen of the 18 records in MCMIS that could not be matched were determined to be classified in the North Dakota data as “non-traffic, non-reportable.” An additional 41 records reported did not appear to meet the MCMIS reporting criteria, either because they were not a qualifying vehicle (32 records) or because the crash did not meet the severity threshold (nine records). Thus, about 17 percent of the records reported did not meet the requirements for reporting.

Several factors were found to be associated with differences in reporting rates. Crashes that were more severe were reported at a higher rate than less severe crashes. Those involving a fatality were reported at a 93.3 percent rate, while injury/transported crashes and tow/disabled crashes were reported at 81.8 percent and 57.5 percent rates. Trucks are more likely to be reported than buses, and larger trucks were reported at a higher rate than small trucks. The reporting rate for truck tractors, which includes tractor-semitrailer, doubles, and triples, was 72.4 percent. Two-axle, six tire SUTs and step vans were reported at only a 47.4 percent rate. Crashes involving a fatality probably get more scrutiny so they have more chance to be recognized as a reportable case. And large trucks are also probably more easily recognized as meeting the vehicle type criteria than smaller trucks.

In addition to problems in accurately identifying all reportable cases, there were some problems in the timeliness of reporting. Reportable crashes must be uploaded to the MCMIS Crash file within 90 days of occurrence, and about 68 percent of crashes are reported within that time frame. About 31 percent of the records were uploaded on April 23, 2009, which is 113 days after the close of the crash year.

With respect to the reported data itself, missing data rates for most fields reported to the MCMIS Crash file are quite low, though there were some problems. Body type, VIN, driver license class, hazmat class (1 digit), and Event One all had higher rates of missing data than expected. 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 the discussion speculating on the reasons for underreporting, note the differences by reporting agency type.

In many ways, the data captured on the North Dakota crash data report supports more complete reporting than is accomplished. The estimated reporting rate is 64.2 percent, and the evaluation identified almost 17 percent of the records that were reported did not meet the MCMIS Crash file reporting criteria.

The process by which North Dakota selects records for upload to the MCMIS Crash file is not known by us. In some states with relatively low reporting rates, the process depends heavily on the reporting officer recognizing that the vehicle and crash meet the MCMIS criteria, but that is not entirely the case. The instructions for completing the Truck/Bus/Hazardous section on the SFN 2355 accurately describe the vehicle criteria for completing the section, but nowhere is the officer asked to determine if the crash meets the MCMIS criteria. Yet clearly the actions of the officer have some input, because reporting rates vary significantly by the type of agency. It may be that reports in which the officer completes the Truck/Bus/Hazardous section become candidates for upload, but there is a secondary process by which cases are reviewed and selected.

It is clear, though, that the process is overlooking a number of records that meet the reporting requirements. The Unit Configuration variable facilitates identifying the vehicles that meet the MCMIS criteria. The crash data also includes fields that make it relatively straightforward to identify crashes that meet the MCMIS severity threshold. Thus, the file itself contains, as coded data, the information necessary to identify and to extract the records that meet the MCMIS reporting criteria. The overall reporting rate could be significantly improved by using the information that is already in the file.

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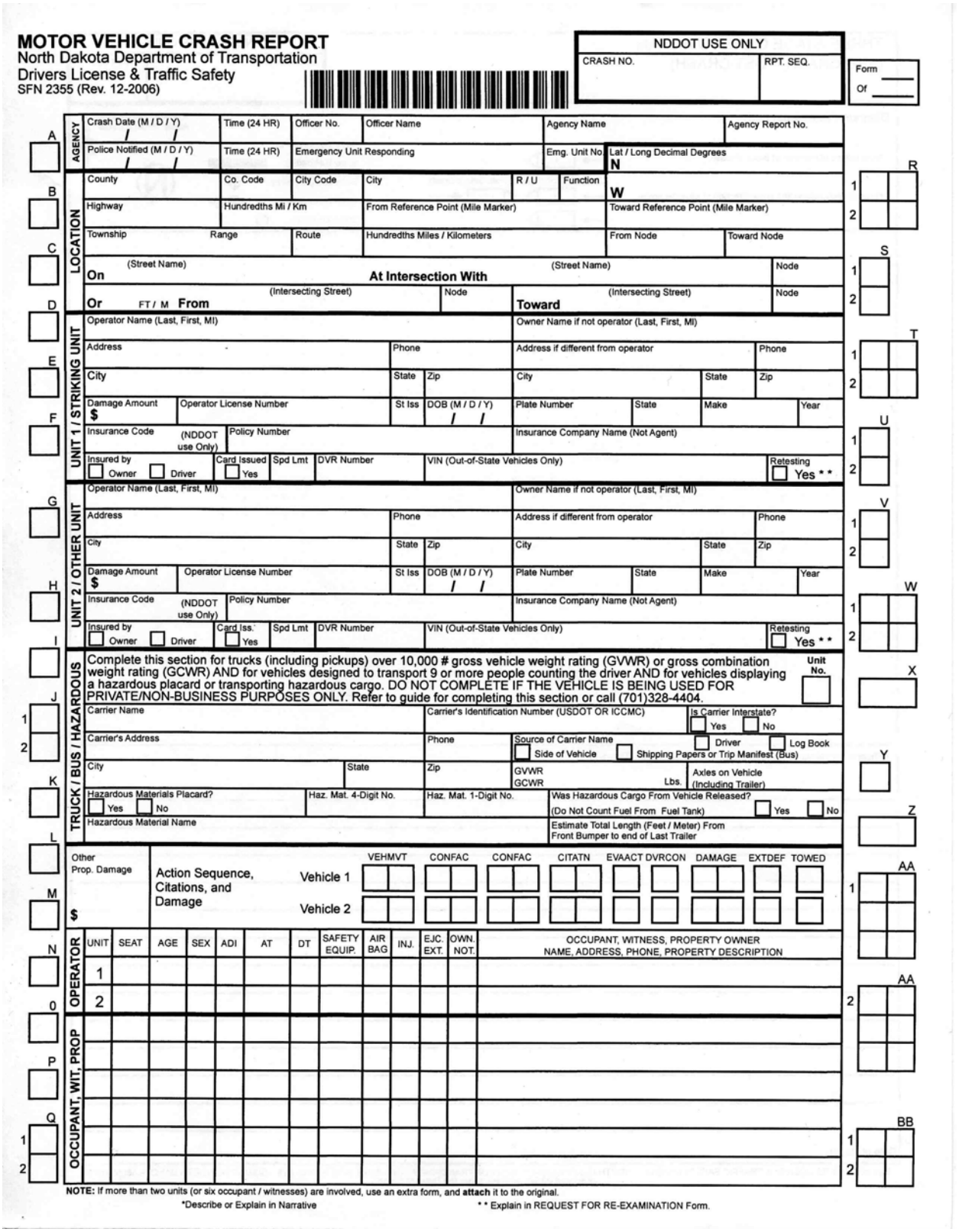
Appendix A North Dakota Traffic Accident Reports



MOTOR VEHICLE CRASH REPORT
North Dakota Department of Transportation
Drivers License & Traffic Safety
SFN 2355 (Rev. 12-2006)

NDDOT USE ONLY
CRASH NO. | RPT. SEQ.

Form ___ Of ___

AGENCY
Crash Date (M / D / Y) | Time (24 HR) | Officer No. | Officer Name | Agency Name | Agency Report No.
Police Notified (M / D / Y) | Time (24 HR) | Emergency Unit Responding | Emg. Unit No. | Lat / Long Decimal Degrees N

LOCATION
County | Co. Code | City Code | City | R / U | Function | W
Highway | Hundredths Mi / Km | From Reference Point (Mile Marker) | Toward Reference Point (Mile Marker)
Township | Range | Route | Hundredths Miles / Kilometers | From Node | Toward Node
On (Street Name) At Intersection With (Street Name) Node
Or FT / M From (Intersecting Street) Node | Toward (Intersecting Street) Node

UNIT 1 / STRIKING UNIT
Operator Name (Last, First, MI) | Owner Name if not operator (Last, First, MI)
Address | Phone | Address if different from operator | Phone
City | State | Zip | City | State | Zip
Damage Amount $ | Operator License Number | St Iss | DOB (M / D / Y) | Plate Number | State | Make | Year
Insurance Code (NDDOT use Only) | Policy Number | Insurance Company Name (Not Agent)
Insured by ☐ Owner ☐ Driver | Card Issued ☐ Yes | Spd Lmt | DVR Number | VIN (Out-of-State Vehicles Only) | Retesting ☐ Yes * *

UNIT 2 / OTHER UNIT
Operator Name (Last, First, MI) | Owner Name if not operator (Last, First, MI)
Address | Phone | Address if different from operator | Phone
City | State | Zip | City | State | Zip
Damage Amount $ | Operator License Number | St Iss | DOB (M / D / Y) | Plate Number | State | Make | Year
Insurance Code (NDDOT use Only) | Policy Number | Insurance Company Name (Not Agent)
Insured by ☐ Owner ☐ Driver | Card Iss. ☐ Yes | Spd Lmt | DVR Number | VIN (Out-of-State Vehicles Only) | Retesting ☐ Yes * *

TRUCK / BUS / HAZARDOUS
Complete this section for trucks (including pickups) over 10,000 # gross vehicle weight rating (GVWR) or gross combination weight rating (GCWR) AND for vehicles designed to transport 9 or more people counting the driver AND for vehicles displaying a hazardous placard or transporting hazardous cargo. DO NOT COMPLETE IF THE VEHICLE IS BEING USED FOR PRIVATE/NON-BUSINESS PURPOSES ONLY. Refer to guide for completing this section or call (701)328-4404. Unit No.
Carrier Name | Carrier's Identification Number (USDOT OR ICCMC) | Is Carrier Interstate? ☐ Yes ☐ No
Carrier's Address | Phone | Source of Carrier Name ☐ Side of Vehicle ☐ Driver ☐ Log Book ☐ Shipping Papers or Trip Manifest (Bus)
City | State | Zip | GVWR / GCWR Lbs. | Axles on Vehicle (Including Trailer)
Hazardous Materials Placard? ☐ Yes ☐ No | Haz. Mat. 4-Digit No. | Haz. Mat. 1-Digit No. | Was Hazardous Cargo From Vehicle Released? (Do Not Count Fuel From Fuel Tank) ☐ Yes ☐ No
Hazardous Material Name | Estimate Total Length (Feet / Meter) From Front Bumper to end of Last Trailer

Other Prop. Damage $ | Action Sequence, Citations, and Damage

	VEHMVT	CONFAC	CONFAC	CITATN	EVAACT	DVRCON	DAMAGE	EXTDEF	TOWED
Vehicle 1									
Vehicle 2									

OPERATOR

UNIT	SEAT	AGE	SEX	ADI	AT	DT	SAFETY EQUIP.	AIR BAG	INJ.	EJC. EXT.	OWN. NOT.	OCCUPANT, WITNESS, PROPERTY OWNER NAME, ADDRESS, PHONE, PROPERTY DESCRIPTION
1												
2												

OCCUPANT, WIT, PROP

NOTE: If more than two units (or six occupant / witnesses) are involved, use an extra form, and **attach** it to the original.
*Describe or Explain in Narrative
* * Explain in REQUEST FOR RE-EXAMINATION Form.

THREE-STAGE CRASH DIAGRAM
(PRE-CRASH, POST-CRASH)

NDDOT USE ONLY	
Crash Number	Report Seq.

Diagram What Happened:

Indicate North by Drawing Arrow Through Circle

Draw outline of roadway at place of crash.

Number each vehicle and show direction of travel by arrow.

Use Solid Line to Show Path Before Crash:

Show Pedestrian by: X

Show Railroad by:

Show Utility Poles by:

Show Motorcycle by:

Show Animal by:

Officer's Narrative: Observations and Asterisk Items. (Please Print)

Date of Report: Signature(s):

Mail to: DRIVERS LICENSE & TRAFFIC SAFETY DIVISION - NORTH DAKOTA DEPARTMENT OF TRANSPORTATION - 608 E BOULEVARD AVE - BISMARCK, NORTH DAKOTA 58505-0700
- Forward Within 10 Days From the Date of Crash -