



FARS/MCMIS Fatal Crash Record Matching Tool

A tool designed to help reconcile differences between the number of fatal crash records in the FARS and MCMIS databases.

Updated Results: **6/26/2009**

The **FARS/MCMIS Fatal Crash Record Matching Tool** is designed to help reconcile differences between the Fatality Analysis Reporting System (FARS) and Motor Carrier Management Information System (MCMIS) databases. A methodology was developed to "match" fatal large truck and bus crash records between the FARS and MCMIS databases. The methodology defines a "matched record" between the two databases as a crash that involved at least one fatality, involved a large truck or bus, and contains the same information in several key fields (e.g., county, date, time, VIN, DOT #, etc.). The methodology has more than 40 unique matching combinations that can produce a single match between FARS and MCMIS fatal crash records.

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What should I do with the matching results (the "matching tool")?

Review the results of the **Matching Tool** to determine if all reportable fatal crash records have been reported to MCMIS from your State database.

- Step 1: Review the Records Matched - One FARS crash record is matched to one MCMIS fatal crash record. Only large truck and bus vehicle types were included in this set of results.
- Step 2: Review the Records Potentially Matched - The records that were not definitely matched by the matching algorithm were evaluated as potential matches against non-truck and bus vehicle types in FARS (e.g., car, small truck) and MCMIS non-fatal crash records. Potentially matched record sets are identified in two lists: FARS truck and bus records potentially matched to MCMIS non-fatal crash records, and FARS non-truck and bus records potentially matched to MCMIS fatal crash records.
 - Determine why a fatal record(s) reported to FARS as a large truck or bus was reported to MCMIS as a non-fatal crash record.
 - Determine why a fatal record(s) reported to MCMIS as a large truck or bus was reported to FARS as non-truck or bus vehicle type (e.g., car, small truck).
 - If crash records were categorized incorrectly in MCMIS, update crash records accordingly and upload to MCMIS. If crash records were categorized incorrectly in FARS, contact your State's FARS analyst.
- Step 3: Review the Records Not Matched - The FARS and MCMIS fatal crash records that were evaluated by the matching algorithm but could not be potentially matched are identified in two separate lists: FARS Truck and Bus records, and MCMIS fatal crash records.
 - Review these record sets for missing data. A match requires several key fields to be the same in both the FARS and MCMIS records. Missing data or typographical errors can be identified and corrected, and then records can be re-uploaded to the appropriate data source to enable a definitive match.
 - Identify if there are fatal crash records in MCMIS that should have been categorized as non-fatal. This may be true for some States where their MCMIS fatal crash count is higher than the FARS fatal crash count.
 - A definitive match for all fatal records may not be possible because the definitions of large trucks and buses differ slightly.
- Step 4: **NEW** Add comments to each record (or pair of records) following the review of the matching results, describing actions to be taken or reasons why records may not match. Each State should only add comments to their State records. Comments will be displayed for as long as the record is evaluated.
 - Display the comment option by enabling the "Show Comments" selection above.
 - Click on the "Add Comment" / "Edit Comment" link at the end of each record to either add a new comment or edit an existing comment. Click on "Save Comment" when finished.

How is this Analysis Different from the State Safety Data Quality (SSDQ) evaluation?

- The SSDQ evaluation (color-coded map) currently provides a comparison of the total number of MCMIS and FARS fatal crash records. These crash records are evaluated and the results are shown in the fatal crash completeness measure. The SSDQ evaluation does not "match" records between FARS and MCMIS.
- The SSDQ fatal crash completeness measure only examines large trucks involved in fatal crashes. The **Matching Tool** examines large trucks and buses involved in fatal crashes. This broader analysis allows States to determine if both vehicle types involved in fatal crashes are being reported to FMCSA.
- The **Matching Tool** does not assign a rating - good, fair, or poor - to the matching results. The results of the Matching Tool are not used in the SSDQ methodology.

Is the Tool Expected to Match all Fatal Crash Records Between FARS and MCMIS?

- No, it's possible to have differences between the FARS and MCMIS databases. These databases may have different fatal crash counts due to variances in reportable vehicle configuration definitions.

How does the Matching Tool determine a "matched record set"?

The tool examines several variables from the FARS and MCMIS data sets. If the key variables in a record are the same or almost the same in some cases, then the tool returns a matched record set.

The tool has 54 unique matching combinations that can produce a matched record set. Each matching combination requires a few variables from each data source to match exactly to produce a matched record set. The following nine variables are examined from the FARS and MCMIS data sources to produce a matched record set: county, date, time, vehicle identification number (VIN), DOT number, MC/MX number, Truck or Bus indicator, driver age, and driver license state. These matching combinations are shown in Table 1, and the definitions of each variable are described in Table 2.

The matching combinations rely upon primary and secondary variable types. The primary variables - nine that are listed above - are evaluated as they were reported to the FARS and MCMIS. The secondary variables include the month and year data fields and sub-variables of the original variables. The DOT number and the VIN were created into sub-variables. For example, the VIN contains 12 alpha-numeric characters from the FARS data source and 17 alpha-numeric characters from the MCMIS data source. The sub-variable "VIN10" examines 10 of the original 12 alpha-numeric characters in the FARS and 17 characters from the MCMIS. The eight sub-variables created for this tool are described in Table 1. The tool can create a match without using all characters from the DOT and the VIN. Matching combinations 49, 50, 51, 52, 53, and 54 are applied only for TN, SC, and ND, because significant crash event data are missing (e.g., US DOT #, MC/MX #, VIN).

Table 1. Matching Combinations Used in the FARS/MCMIS Algorithm

Combination No.	Primary Variables							Secondary Variables											
	County	Date	Time	VIN	DOT	MC/MX #	TB	Driver Age	Driver License State	VIN10	VIN8	VIN7	VIN6	VIN5	VIN4	VIN3	DOT4	Month	Year
1	x	x	x	x	x														
2	x	x	x	x		x													
3	x	x	x	x				x											
4	x	x	x	x															
5		x	x	x	x														
6		x	x	x												x			
7		x	x	x		x													
8		x	x	x															
9	x		x	x	x												x	x	
10	x		x	x		x											x	x	
11	x		x	x													x	x	
12	x	x		x	x														
13	x	x		x		x													
14	x	x		x															
15	x	x	x		x								x						
16	x	x	x		x								x						
17	x	x	x		x						x								
18	x	x	x			x							x						
19	x	x	x						x										
20	x	x	x										x						
21	x	x	x										x						
22		x	x										x						
23	x	x	x								x								
24	x		x						x								x	x	
25	x	x	x										x						
26	x	x	x							x									
27	x	x	x										x						
28		x	x					x					x						
29	x	x	x		x			x	x										
30	x	x	x		x		x	x	x										
31	x	x	x			x		x	x										
32	x	x	x			x	x	x	x										
33	x	x			x			x					x						
34	x		x		x			x					x				x	x	
35	x		x		x			x			x						x	x	
36		x						x					x						
37		x	x					x	x				x						
38	x	x											x			x			
39	x	x	x						x										
40	x	x								x									
41	x	x							x										
42	x	x											x						
43	x	x											x						
44	x	x												x					
45	x	x													x				
46	x		x										x				x	x	
47	x	x											x						
48		x								x									
* 49	x	x	x		x														
* 50		x	x		x														
* 51			x		x												x	x	
* 52		x	x					x	x										
* 53		x	x						x										
* 54		x	x			x													

*Matching combinations are applied only for TN, SC, and ND, because significant crash event data are missing (e.g., US DOT #, MC/MX #, VIN).

Table 2. Descriptions of Primary and Secondary Variables used in the FARS/MCMIS Matching Methodology

Variable	Description
County	County code identifies the location of <i>where</i> the crash occurred.
Date	Accident date identifies the exact date in month/day/year of <i>when</i> the crash occurred.
Time	Accident time identifies the exact time in hour and minute of <i>when</i> the crash occurred.
VIN	Vehicle Identification Numbers consist of 17 alpha-numeric characters that identify the individual vehicle involved in the crash: FARS only provides up to 12 alpha-numeric characters and MCMIS provides up to 17 alpha-numeric characters. Therefore, the first 12 characters of the MCMIS 17-character VIN is matched with the FARS 12-character VIN. For example, a MCMIS 17-character VIN could be <u>1HTSCABM1TH200416</u> and a FARS 12-character VIN could be <u>1HTSCABM1TH2</u> .
DOT	US DOT Number. FARS provides 9-digit DOT and MCMIS provides 7-digit DOT. For example, FARS DOT is <u>103245860</u> and MCMIS DOT is <u>1032458</u> .
MC/MX #	Motor carrier numbers that are issued as carriers are registered.
TB	Truck or Bus indicator.
Driver Age	Age of Driver.
Driver License State	State that issued the driver's license.
VIN10	The sub-VIN with 10 alpha-numeric characters within the actual VIN. The last, first, or middle ten characters within the VIN are used. For example, (1) FARS VIN could be 1HTMHZPM2MH2 and MCMIS VIN could be 1NTMHZPM2MH295359; (2) FARS VIN could be 1FUPACXB0PL4 and MCMIS VIN could be FUPACXB0PL474360; or (3) FARS VIN could be 1GS9C421BV58 and MCMIS VIN could be 1GS9C421BV5582717. In the last example, the VIN could be matched by the first digit, but in some cases, there might be a typo in number "1" which is entered as a capitalized letter "I".
VIN8	The sub-VIN with <i>eight</i> alpha-numeric characters within the actual VIN. For example, (1) FARS VIN could be 1GS9C421BV58 and MCMIS could be 1GS9C4218V5582717; or (2) FARS VIN could be 1FUJBBCG14LN and MCMIS VIN could be 1FUTBBCG14LN21387.
VIN7	The sub-VIN with <i>seven</i> alpha-numeric characters within the actual VIN. For example, (1) FARS VIN could be 1XKWD69XX1R8 and MCMIS could be 1XKW69XX1R863875; or (2) FARS could be 1FUJA6CV76LU and MCMIS VIN could be 1FUYJA6CV76LU3131.
VIN6	The sub-VIN with <i>six</i> alpha-numeric characters within the actual VIN. For example, FARS VIN could be 1M2AA13Y4RWD and MCMIS VIN could be 1M214A1344RW03664.
VIN5	The sub-VIN with <i>five</i> alpha-numeric characters within the actual VIN. For example, (1) FARS VIN could be 1FUJBBG53PG and MCMIS VIN could be 1FUJBBG53PG99105; (2) FARS VIN could be 4V1WDBJH4SN6 and MCMIS VIN could be 4V1WDBJH4SN689529; or (3) FARS VIN could be 1FUJBBVGX5LU and MCMIS VIN could be 1FUJBBVGX5LU37716.
VIN4	The sub-VIN with <i>four</i> alpha-numeric characters within the actual VIN. For example, FARS VIN could be 1GBJ7H1CXJ5 and MCMIS VIN could be 1GBJ2H1CX4J522197.
VIN3	The sub-VIN with <i>three</i> alpha-numeric characters within the actual VIN. For example, FARS VIN could be 1FUYSSZB6XLA and MCMIS VIN could be 1FUY5SZB8XLA10131.

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