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AN IN-DEPTH STUDY OF TRUCK FIRE ACCIDENT DATA

(Including Appendices A-F)

James O'Day
Robin Ruthazer
Tom Gonzales

APRIL 1985

UMTRI The University of Michigan
Transportation Research Institute

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16. Abstract

Truck fires which occurred in connection with fatal traffic accidents in the U.S. during 1982 are examined in detail. Additional information has been derived from a Fatal Accident Reporting System (FARS) file covering the period 1975–1982.

Fires are associated with tractor-trailers involved in fatal accidents in more than 5% of the cases, compared with about 2.5% for passenger cars. Large straight trucks exhibit a fire incidence in fatal accidents on the order of 4%.

About half of the truck fires involve burning of the truck fuel, which follows from rupture or leakage associated with severe crashes. In the long-term data a correlation is observed between the incidence of truck fires and factors relating to ambient temperature.
Cause of fatal injury to truck occupants was attributed to the fire (smoke or burns) alone in 20 out of 214 burned vehicles. In another 53 cases, fire was reported as a contributing factor to an occupant fatality; in these latter cases it was generally not possible to determine from the available data whether the truck occupant would have died from traumatic injuries alone.

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The assistance of numerous UMTRI Systems Analysis staff in the collection and management of the data set is also gratefully acknowledged. In particular, the assistance of the MVMA Truck Study staff in the use of the UMTRI Truck File data, and the efforts of Wendy Barhydt and Charles Compton in the building and management of the data file, and Pam Harper and Dan Blower in the collection of the supplemental interview data, deserve special mention. Finally, the major contributors—the owners, operators and other trucking industry people, law enforcement, fire and emergency personnel, who provided interview and records information for this study—are gratefully acknowledged.

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SECTION 1

INTRODUCTION

This is the final report of an exploration of reported information about truck fires which occurred in U.S. fatal accidents during calendar year 1982. In addition to the study of 1982 crashes, certain statistics regarding the incidence of truck fires and fuel leakage have been developed from computerized files at both the national and state levels.

The purpose of this study has been to get a more definitive understanding of the frequency of truck fire in fatal traffic accidents, and of the causes and consequences of such fires. Such detail as ignition source, the type of material which burned, the frequency of fire-caused injuries, and accident configurations associated with such fires has been sought, and, in many cases, obtained.

The relatively high incidence of fire and fuel leakage in diesel-powered road tractors has been noted in several summary statistical publications.[1,2] While fatal accidents are relatively rare events, and fire in connection with fatal accidents even rarer, the quantity of data now available in eight years of FARS indicates that fires are associated with tractor trailers involved in fatal accidents in more than 5% of the cases, compared with about 2.5% for passenger cars. Over the eight-year period from 1975 through 1982 there were 29,678 combination vehicles reported in U.S. fatal accidents; of these 1,543 (or about 5%) sustained a fire.

Truck damage is often severe when a fire occurs on the truck. Whether because of this or because of the fire, the chance of fatality to an occupant of the truck is much greater given a fire. For the 1982 data, the average number of truck occupant fatalities for a truck *involved in* a fatal accident without a fire in the truck is 0.174. When the truck sustains a fire, this value is 0.634. There is little difference in these figures for straight trucks and for combination vehicles. Among truck occupants who are fatally injured, approximately one of every six is in a truck which sustained a fire.

Incidence of fires among large straight trucks has been less well documented, as many of the earlier studies concerned only combination (i.e., mostly tractor trailer) vehicles. In a review of data in the six-year (1975-1980) FARS file, large straight trucks exhibit a fire incidence in fatal accidents on the order of 4%—somewhat higher than that of passenger cars, but lower than that of tractor trailers. The number of large straight trucks involved in fatal accidents each year is smaller than the number of combination vehicles, but, because of their higher (than passenger car) fire incidence, cases involving straight trucks will be reviewed in this report as well.

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[1]O'Day, J.; Filkins, L.D.; and Kaplan, R.J. *Combination vehicles: Five year accident experience.* Final report no. UM-HSRI-80-51. Ann Arbor, The University of Michigan, Highway Safety Research Institute, July 1980.

[2]Bondy, N.; and Partyka, S. An analysis of fatalities in articulated trucks using automated accident data files. *Accident Data Analysis of Vehicle Crashworthiness: Ten Papers,* pp. 161-208. NHTSA technical report DOT-HS-805-833. Washington, D.C., National Highway Traffic Safety Administration, April 1981.

Fuel Leakage in Crashes

Michigan is one of the few states (perhaps the only one) which routinely notes fuel leakage on the standard accident report form. Each reporting officer is asked to record (for each crash-involved vehicle) whether or not fuel leaked, or whether there was a fire.

Table 1 derives from an analysis of the 1982 Michigan accident data.[3] Passenger cars are coded with fuel leakage in accidents less than 1% of the time, and with fires about 0.3% of the time. Tractor-trailers, however, are coded with fuel leakage (no fire) in 6.5% of their accident involvements, with another 0.7% having a fire (often accompanied by fuel leakage). The numbers in the cells are the numbers of such accidents in calendar year 1982—i.e., there were 326 tractor-trailers with fuel leakage (but no fire) in Michigan in that year. There were 36 crash fires of tractor trailers, and (not shown on the table) four of these were in fatal accidents. The overrepresentation of tractor trailers in fires and fuel leakage (relative to cars) is statistically very significant.

The computerized data in Michigan do not provide any detail about the extent of spillage. Discussions with officers in the state suggest that this report is not made unless there is some fuel on the roadway. It seems clear, however, that large trucks have a much higher leakage rate than do passenger cars.

TABLE 1

Fire and Fuel Leakage by Vehicle Type, Michigan, 1982

Vehicle Type	Fuel Leak (No Fire)	Fire	No leak or fire	TOTAL
Passenger Car	3017	877	376336	380230
Row %	0.8	0.3	99.0	100.0
Straight Truck	831	152	67474	68457
Row %	1.2	0.3	98.6	100.0
Tractor-Trailer	326	36	4641	5003
Row %	6.5	0.7	92.8	100.0

The Population Considered for this Study

While the starting point to define the population for this study was the 1982 FARS record of large truck fatal fires, the additional data obtained during this program led to the dropping of a small number of cases which were in conflict with the FARS codes for vehicle type or fire. In the interviews conducted for development of the UMTRI truck file, one new truck fire case (not so reported in FARS) was discovered. This case has been added to the

[3]Michigan 1982 Accident Data file as described in *Codebook 82-10.*

present data set. The resulting population is believed to be the census of trucks and combination vehicles with a gross vehicle weight of more than 10,000 lbs. which had fires on or in those vehicles in fatal crashes during 1982. Table 2 displays this population by engine type (diesel-powered or not) and by whether or not there were fatal injuries incurred by occupants of the truck.

TABLE 2

Vehicle Types and Truck Occupant Fatalities
Trucks with Fires: FARS 1982

Condition	Diesel-Powered Truck/Tractor	Non-Diesel-Powered Truck/Tractor	Both
One or More Fatality to Truck Occupants			
No. of Vehicles	93	30	123
No. of Fatalities	105	33	138
No Fatality to Truck Occupants			
No. of Vehicles	68	23	91
TOTAL			
No. of Vehicles	161	53	214
No. of Fatalities	105	33	138

Report Organization and Purpose

The purpose of this study has been to get a more complete understanding of the causes and consequences of crash-related fires involving large trucks, with an ultimate goal of identifying ways to reduce the incidence or severity of such fires. Data sources used are more completely described in Section 2 of this report, but include both state and federal accident files in addition to the newly generated interview information.

Section 2 of this report presents a discussion of the various data sources employed in this study. Section 3 concerns the methodology of the study. The principal results are presented in Section 4. And Section 5 presents conclusions and recommendations.

Appendices A through G contain supporting material.

SECTION 2

DATA SOURCES

Accident Data

Data for this study have come from many sources. The National Highway Traffic Safety Administration's Fatal Accident Reporting System (FARS) provides a census of fatal accidents in the U.S., and this is the starting point for most of the work done in the present study. Analyses of the FARS[4,5,6] data covering the period 1975 through 1982 provide some general statistics regarding truck fires, but the FARS data alone lack detail important to the present study. The 1982 FARS data were subset to identify fires involving large trucks, and these have been supplemented by the BMCS data (for those cases which were reported there) and by new data acquired by interview of owners, operators, police officers, firemen, and towing agencies. New data elements acquired by reading copies of the original police accident reports, from interviews with the various persons who were at the scene and others, were entered in the form shown in Appendix E. This form was subsequently used in conjunction with FARS to generate the accident computer file.

As a result of cross-checking the interview and BMCS data against FARS data, some discrepancies were discovered. Of an original 228 cases identified in FARS as large (i.e., >10,000 lb. GVW) trucks with fires, 14 cases were subsequently determined either to not be trucks or to have had no fire on the truck. These cases have been deleted from the working file, but would still appear in a simple listing of FARS cases. In a previous study of 1980 data, a small number of truck fires were identified (in the UMTRI followup) which were not so noted in the FARS data. The UMTRI 1982 file[7] is not quite complete at the time of this writing, but one additional case has been discovered and included in this analysis. The deleted cases are described briefly in Appendix C.

As may be seen in the univariate distributions of the combined file (see Appendix G), there are still a number of variables for which data are incomplete. For the most part, such factual information as driver age, sex, make and model of truck, etc. is rather complete and dependable. Information on engine make came partly from interpretation of VIN's and partly from interviews with owners/drivers, and is not quite complete. Some

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[4]FARS 1975–1980 Version Jul1282, reformatted into the UMTRI ADAAS data system.

[5]FARS 1981 Version Jul1282, reformatted into the UMTRI ADAAS data system.

[6]FARS 1982 Version Jun2283, reformatted into the UMTRI ADAAS data system.

[7]The MVMA-supported Truck Project at UMTRI merges the information from the BMCS MCS-50-T form, and conducts interviews to collect the MCS-50-T data elements when no BMCS accident report is matched with the FARS report. Thus the UMTRI truck project produces a data file called *Truck Involvement in Fatal Accidents* (TIFA) with both the FARS and BMCS data elements for all trucks with gross vehicle weight ratings greater than 10,000 lbs. involved in fatal accidents in the U.S. The fire file contains many of these same variables, but was developed separately. Some ratios have been computed from a comparison between these two files.

information in the combined file is based on opinions furnished by persons interviewed. Determination that the cause of fatal injury was fire alone might be based on a report from an observer who saw the deceased alive in the fire, or on an autopsy. Such designations should be considered reasonable but not always conclusive.

The process of acquiring the data sometimes required written requests to respondents. As of the time of writing this report, some replies are still trickling in. Among other things, this may make a few of the tabular presentations in this report slightly inconsistent. It is our intent to continue to update the file in the future as new information becomes available. An example of such a change might be a change of engine make from "unknown" to some particular value.

Fuel Temperature and Flash Point Data

Data regarding diesel fuel flash point were provided by the U.S. Motor Vehicle Manufacturers Association, which has sponsored periodic surveys and chemical analysis of various properties of diesel fuel taken from tanks in service stations. In particular, these data have been used to characterize the flash point distributions of fuel in the supply system in various parts of the U.S.

Fuel temperature has been measured in truck fuel tanks in connection with California truck inspection lanes. The state of California has established a number of facilities for weighing and inspecting heavy trucks traveling in the state. Typically those trucks selected for mechanical inspection are detained for 20 minutes or more, and we were able to measure the temperature of fuel in the tanks of a sample of trucks stopped for inspection. This activity resulted in a file of data including vehicle make, engine make, and fuel temperature. In the last of three days of such measurement, small samples of fuel were drawn from the truck tanks for subsequent flash point analysis.

Exposure Data

The R.L. Polk truck registration files held by the Transportation Systems Center provided some information on the numbers of trucks in the U.S. population as of July 1, 1982 (the year of the accident data analyzed), and of the distribution of engine makes by truck manufacturer. Most of the engine make detail was derived from VIN number decoding, and this is rather incomplete for older vehicles. The more recent years' data are used in this study to pursue a hypothesis relating to engine make.

Computerized Data Files

New data files which are available as a result of this study include:

(1) Combined FARS/BMCS/Fire Interview data file, consisting of 214 cases. A codebook describing the full data set as well as the diesel and non-diesel subsets is attached as Appendix G.

(2) Truck fuel temperature survey data, currently maintained in a MIDAS file on the University of Michigan computer. The codebook and a set of one-way distributions for selected variables in this file are attached as Appendix A.

SECTION 3

METHODOLOGY

Accident File Construction and Analysis Methods

The principal analyses in this study were performed with data from a set of carefully reviewed case histories of large truck fires in fatal accidents during calendar year 1982. The cases were initially identified by their presence in the Fatal Accident Reporting System (FARS) files for that year, and they were then supplemented by information from other sources which have been described in the previous section of this report.

The truck accident data were placed in a single truck-centered file, i.e., with one entry for each truck which sustained a fire. This file contains four major sub-sections—three from FARS (the accident, vehicle, and driver-occupant) and one resulting from the case reviews accomplished during this study. A codebook for this file (Appendix G) contains three one-way tabulations of the data: the first for all cases, the second for diesel-powered trucks, and the third for all other (mostly gasoline-powered) trucks.

The 1982 truck accident data file is currently maintained as an OSIRIS file, although it may be transformed easily into a form suitable for use in most statistical analysis packages.

Backing up the computer file is a set of folders containing documents used in the file development. These include copies of the original police report of the accident, a copy of the BMCS report where available, a copy of the interviewer's record of telephone and mail contacts and a coding sheet from which the "fire" portion of the computer file has been prepared. Sample copies of these forms are attached as Appendix E. This hard copy file will be retained at the University of Michigan, but will be made available for further study as needed.

Analysis methods included tabulation of all and parts of the data in a variety of ways. Two-way tables of variables of interest have been prepared for diesel-powered tractors and for other types of trucks. Comparisons of mean values of interval variables (e.g., fuel tanks size, temperature) have been made over a variety of control variables.

Many of the variables used in the accident data file are transcribed directly from the FARS, and the definitions associated with these may be found in FARS documentation. Variables numbered from 800 onward in the file have generally been created from the interview data. Appendix B provides brief descriptions of the coding conventions adopted for these variables.

Of particular interest is a set of variables describing the sequence of events associated with each accident. Most computer files describing such events are limited to coding the "most severe" or "first-occurring" event. In this file Variables 857 through 866 code the 1st, 2nd...5th harmful event (in order of occurrence), and the "other vehicle" associated with each of these (where applicable); Variables 915 through 919 describe the "manner of collision" for these same harmful events. Variable 867 gives the number of the event which was considered to be the most harmful.

This detail is not easily displayed in two-way table form, but can be listed for specific subsets of cases, and scanned for patterns.

Fuel Survey File Construction and Analysis Methods

The fuel survey raw data were described in Section 2 of this report. In building the final file of data for analysis, certain derived variables were created, specifically to permit display of the temperature differential between two fuel tanks, identification of the side of the warmer tank, differences between ambient and fuel temperatures, etc.

All of these data were placed in a MIDAS file on the UM computer for further analysis, although these data also would be easily transformed for analysis using other statistical packages. Observed fuel tank temperature distributions and means may be computed and displayed with respect to engine make, vehicle manufacturer, etc. One-way distributions for categorical variables in this file are shown in Appendix A.

The flash point data, derived from testing the fuel samples collected in the third day of observation in California, was based on only 30 samples and has been handled entirely by hand. It will also be discussed in Section 4.

SECTION 4

RESULTS

In this section some descriptive statistics of the 1982 truck fatal accident fires are presented. The results of the California fuel temperature and flash point measurements are discussed. Analyses based on both the accident data and the fuel survey are then presented.

As an initial step in this study, the FARS data covering the period 1975–1982 were reviewed regarding the incidence of truck fires. The results of this work were published in a paper given at the 1984 American Association for Automotive Medicine meeting, and that paper is reproduced as Appendix D of this report. Briefly, the information presented in that paper supported a finding of an earlier report[8] that the incidence of truck fires was correlated with factors relating to higher ambient temperatures. Figure 1 shows the proportion of fatal-accident-involved tractor-trailers which were reported with fires over the eight-year period, aggregated over each month, with a strong peaking in the summer period.

As shown in Appendix D, this same proportion is highest in the southwest part of the U.S., also supporting the idea of a relationship with ambient temperature. Much of the analysis presented here seeks to further illuminate this relationship.

Some Characteristics of the Trucks and the Accidents in this Data Set

The dictionary/codebook of the accident file in Appendix G displays the one-way distributions for most variables, and further presents these in two subsets—diesel-powered vehicles and non-diesel powered vehicles. Only a few of the variables will be reviewed here, and the reader is referred to the Appendix for further detail.

A number of characteristics of the trucks involved in these accidents are shown in Table 3. Variable numbers in the following text and in Table 3 refer to variables in Appendix G.

An attempt was made to determine the principal material which burned in each fire (V880), the source of ignition, whether or not there was fuel spillage (V877, V878), and the extent of the spillage (V874, V875) defined as "rupture" or "leak." In 104 cases the first major material burned was either gasoline or diesel fuel (i.e., not the cargo), and in another 34 cases this factor was undetermined. In thirty cases the first material burned was a liquid cargo, and in 41 cases the truck or trailer cab or body burned first. Fuel was reported spilled at impact in 66 cases (54 diesel, 12 other), but this factor was undetermined for an additional 85 cases. Fuel was reported spilled at rest in 124 cases (61 of which also reported fuel spilled at impact). In 89 cases the fuel spillage was described as resulting from a "rupture," in 39 cases "leakage." In 86 cases the initial fire

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[8]O'Day, J. Fires and fatalities in tractor-semitrailer accidents. *The UMTRI Research Review*, 14:2, September–October 1983. Ann Arbor: University of Michigan Transportation Research Institute.

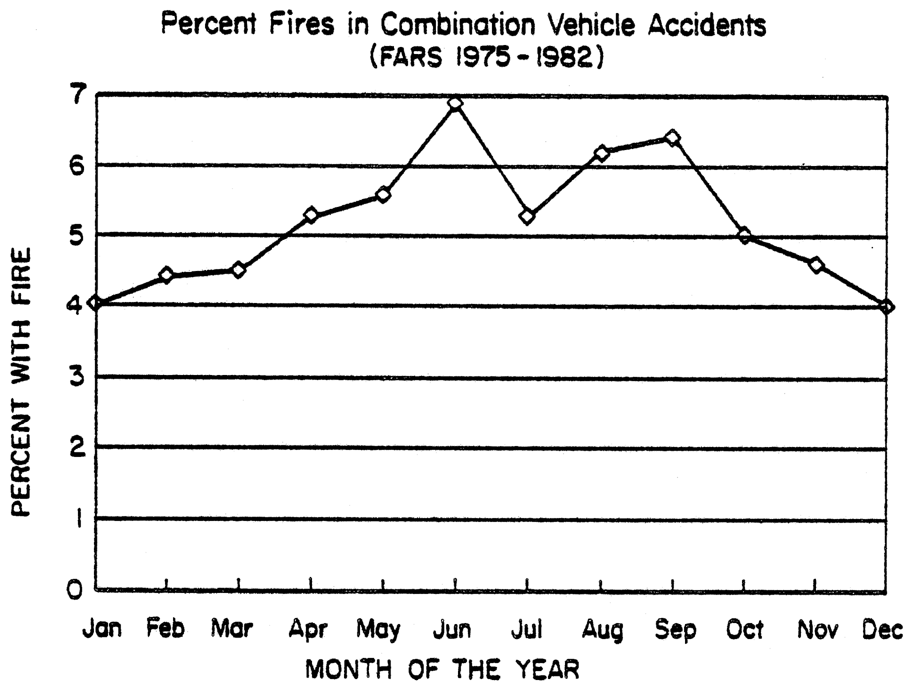


FIGURE 1. Percent trucks with fire by month of year.

TABLE 3

Some Characteristics of Diesel and Non-Diesel
Trucks Involved in Fatal Fires
1982

Characteristic	Diesel Powered	Non-Diesel Powered	TOTAL
TOTAL	161	53	214
Cab Style (V810)			
Conventional	68	50	118
Cabover	90	2	92
Unknown	3	1	4
Cargo Body Style (V811,V815)			
Van	69	12	81
Tanker	46	10	56
Flatbed	16	6	22
Dump	7	13	20
Tractor only	2	0	2
Other/Unknown	21	12	33
Cargo Hazard (V840)			
Hazardous	37	11	48
Not Hazardous	92	30	122
No Cargo or N/A	32	12	44
Cargo Type (V839)			
Empty	32	12	44
General Freight	34	4	38
Gasoline	20	4	24
Diesel Fuel	3	0	3
Flam. Liquids	9	5	14
Flam. Gases	1	1	2
Farm/Food Products	21	6	27
Other/Unknown	41	21	62
Road Class (V17)			
Interstate	52	7	59
Other U.S.	45	16	61
Other State Route	53	18	71
Other	11	12	23
Rollover Direction (V853)			
Right	26	8	34
Left	25	5	30
End	2	1	3
Unknown Dir.	9	2	11
No Rollover	99	37	136

was described as an "explosion," i.e., a very rapid burning which occurred quickly after the crash.

In about two-thirds of the cases in which fuel spilled (80 of 124 at rest, and 42 of 66 at impact) fatal injury was sustained by an occupant of the truck. Cause of death was assigned on the basis of interview/accident report/medical report results into one of six categories (V902-V906)— (1) fire only, (2) fire plus traumatic injury, (3) fire plus traumatic injury associated with ejection, (4) traumatic injury alone, (5) injury associated with ejection, and (6) unknown. When fuel was reported spilled at impact, 23 of 42 fatalities were at least partially associated with fire (i.e., codes 1, 2, or 3). When fuel was reported spilled at rest, 43 of 84 fatalities were at least partially associated with fire.

The sequence of events in these accidents was sometimes complex. For example, in one case there was a pedestrian struck (without fatal injury) followed by a collision between the truck and another vehicle, and then a rollover. In another a tractor-trailer sideswiped a passenger car, caught fire, jackknifed, and then sideswiped another passenger car. Appendix F presents, as an example, a listing of selected variable values for those cases coded as fatalities resulting solely from fire.

While the complete sequence of events may be traced out in the computer file, the more significant sequences are shown in Figure 2 for four groups of trucks—diesels (mostly but not entirely combination vehicles) with and without occupant fatalities, and non-diesels (mostly straight trucks) for the same two categories. As would be expected, the cases without fatality to occupants of the truck are mostly collisions with passenger cars. When fatal injuries are sustained by truck occupants, the collisions are usually with large objects—other trucks, tractor trailers, railroad trains, and/or rollovers of the truck. Nineteen of the 93 diesel trucks/tractors with occupant fatalities struck or were struck by tractor-trailers.

For more than 150 cases estimates of the high and low ambient temperatures of the day have been entered into the computer file. These estimates were taken from records at the nearest weather station for that day. Mean ambient temperature was used as a dependent variable in a one-way analysis of variance across many independent variables. In most cases the results were not significant, including whether the driver was fatally injured, whether the fuel system ruptured, whether the cab was conventional or cabover, etc. The mean ambient high-of-the-day when diesel truck fuel was the first material burned was 70 degrees F. compared with 52 degrees F when liquid cargo was the first material burned (this being statistically significant at the 0.01 level). The mean high-of-the-day temperature was 80 degrees F for Caterpillar engines, 69 degrees F for Cummins engines, and 63 degrees F for Detroit Diesel engines. However, the number of cases of Caterpillars (for which temperature was determined) was only 8, and this relationship was not statistically significant.

Fuel Temperature Surveys

Truck fuel temperatures were sampled on three separate occasions at California truck inspection stations. The first of these occasions was at the Banning scales (east of Los Angeles) in southern California on May 11, 1984. The two others were both at the Cordelia scales (west of Sacramento), first on May 14, 1984, and then on September 7, 1984. In each case approximately thirty trucks were observed, generally with a temperature measurement of the liquid in each fuel tank.

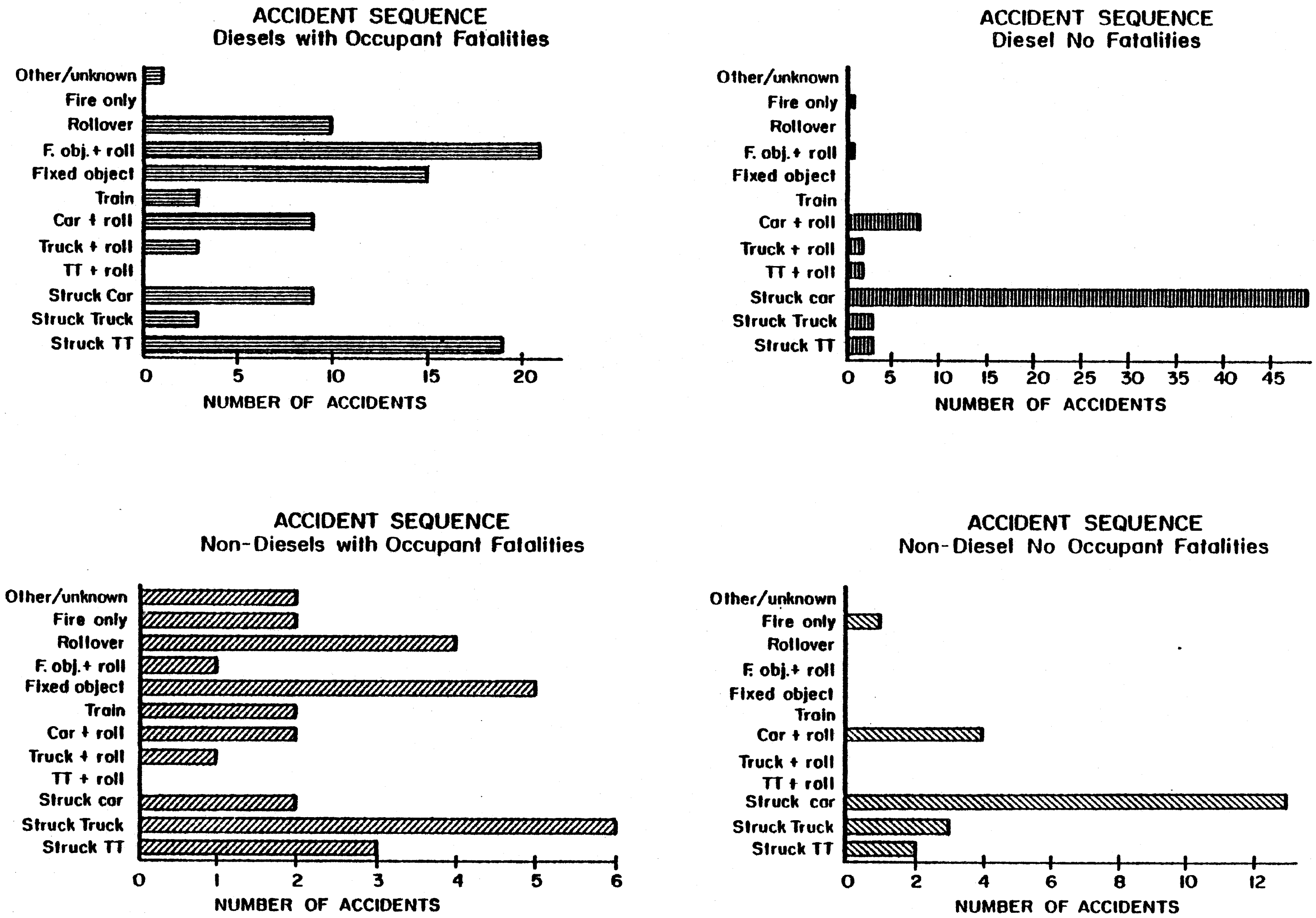


Figure 2. Crash sequences for several truck groups.

On the last occasion three temperatures were usually recorded: that in the left tank, that in the right tank, and the ambient temperature. The thermometer was a digital readout thermocouple instrument which displayed in Celsius degrees (with no decimal point). When a third or fourth tank was present (these were rare) temperatures for these were also recorded.

Also on the third occasion the ambient temperature was recorded before measuring fuel temperature for each truck. Finally, a 2-ounce fuel sample was acquired from nearly every truck during the September measurements. These fuel samples were returned to the University of Michigan for later testing on a Pensky-Martens flash point tester.

On the first two occasions ambient temperature was not recorded. However, a value for ambient temperature was imputed for each case by creating a smooth variation based on the lower of the two tank temperatures and the time of day.

The days of the Banning measurements and the second Cordelia measurements were quite warm, the ambient temperature rising to about 100 degrees F by late afternoon. The first Cordelia operation had a lower maximum ambient temperature.

Temperature Analysis

In most cases one fuel tank (of two) contained fuel at a substantially higher temperature than did the other. A typical case is shown in Figure 3 (a copy of a field form). The left side tank in this case exhibited a temperature of 53 degrees Celsius (about 127 degrees Fahrenheit), the right side 28 degrees—a difference of 25 Celsius (or 45 Fahrenheit) degrees. In this particular case the temperature of the fuel in the cooler tank was substantially below ambient, and the warm tank was only 21 degrees Celsius above ambient.

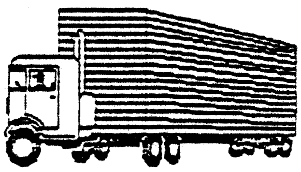
Several new variables were created in the data file. These included the actual difference between the left and right tank, the absolute value of that difference, and the maximum tank temperature (variables 24, 25, and 26, respectively). Figure 4 shows the distribution of temperatures of the warmer tank for these measurements. It is superimposed on the MVMA winter survey distribution (see Figure 5). Both curves represent percentage distributions. Although the means of the two distributions are rather different, a substantial proportion of the truck tank temperatures lie in the range of flash points as determined from the MVMA survey. This suggests that there may be trucks in crashes (with fuel tank rupture) with the fuel temperature being higher than the flash point. In this condition, an ignition source such as a friction spark or an electricl spark could ignite the fuel easily.

Data from the third day of observation served mainly to confirm the findings of the earlier survey. Typically one tank had a substantially higher temperature than the other. While there were reversals, trucks with a Detroit Diesel engine had the warmer tank split about evenly between left and right, while trucks equipped with a Cummins engine had the left tank warmer. Trucks equipped with Caterpillar engines showed relatively low temperatures and little difference in temperature between tanks on opposite sides. Fuel temperatures tended to rise with ambient temperature, but there there was considerable scatter of fuel temperature at a given ambient temperature.

Only four engine makes were observed: 12 Caterpillars, 47 Cummins, 23 Detroit Diesels, and 1 Mack (with 3 others undetermined). Engine make was determined by asking the driver in most cases.

Truck Fuel Temperatures

Cordelia, Cal.



Case No. [illegible]

Truck Make Kenworth

Cab Type Cabover

Engine Make Cummins

Time 1330

Ambient Temperature 32°

Notes

	Left Side	Right Side
Tank Size	100	100
Tank Material	Alum.	Alum.
% Filled	75%	75%
Temperature	53° C	28° C
Tank Shape	Round	Round

Extra Tank ?

Tank Size

Tank Material

% Filled

Temperature

Tank Shape

Comment

FIGURE 3. Fuel survey form.

Mean ambient temperature as well as the mean temperature of the fuel in each tank is displayed by engine make in Table 4. The last column shows the absolute difference in Celsius degrees between the two tanks; other values in the table are averages for the indicated group. The Mack entries, of course, are based on a single observation, and they were not included in the computation of the F-ratio statistic.

TABLE 4

Several Mean Temperatures (in Degrees Celsius)
by Diesel Engine Make

Engine Make	Ambient Temp	Right Tank Temp	Left Tank Temp	Warmer Tank Temp	Absolute LR Diff.
Caterpillar . .	28.9	29.9	31.9	33.3	4.2
Cummins . . .	29.9	32.2	42.2	43.8	13.9
Detroit Diesel	30.0	38.9	39.7	47.0	15.8
Mack	35.0	38.0	51.0	51.0	13.0
F-Ratio Signif.	0.7055	0.0392	0.0170	0.0008	0.0001

Similar tabulations by vehicle manufacturer show no significant difference for any of the temperature variables.

Flash Point Determinations

The Motor Vehicle Manufacturers Association (MVMA) sponsors a winter and summer analysis of samples of diesel fuel taken from service station tanks all over the U.S. Although a number of properties of the fuel are determined (e.g., pour point, cloud point, cetane number, etc.), the flash point is of most interest to the present investigation. In the 1982 surveys conducted for MVMA, the measured flash points varied widely over a range from less than 80 degrees F to nearly 200 degrees F. Distributions of the winter and summer samples are shown in Figure 5. The mean flash point temperature for the winter sample was 136 degrees, and for the summer 148 degrees. In the winter survey, more than half of the cases exhibited a flash point below 150 degrees F.

In our California observations fuel samples were collected from the warmer of two tanks (on trucks with two tanks) and were subsequently analyzed to determine flash point using an ASTM Pensky-Martens Tester. In this test a small amount of fuel (2 cc) is placed in an electrically heated metal dish. Temperature of the fuel in the dish is read continuously by a mercury thermometer. The fuel chamber is covered by a loose-fitting cap which has a small sliding port with a butane-fed flame above it. Periodically, as the temperature of the sample rises, the investigator opens the sliding port, and the flame is

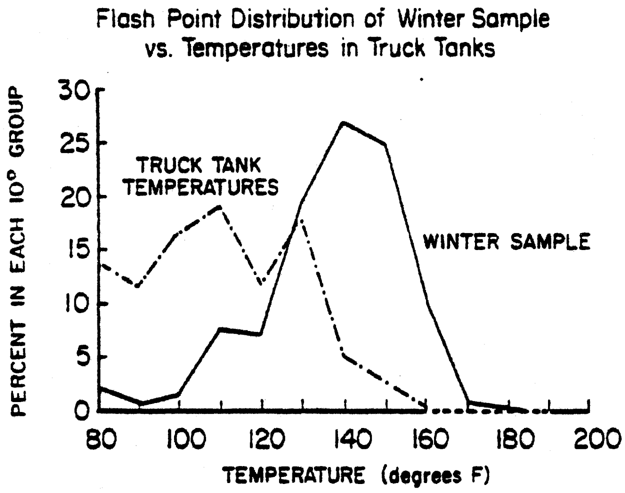


FIGURE 4. Winter survey and truck tank fuel temperatures.

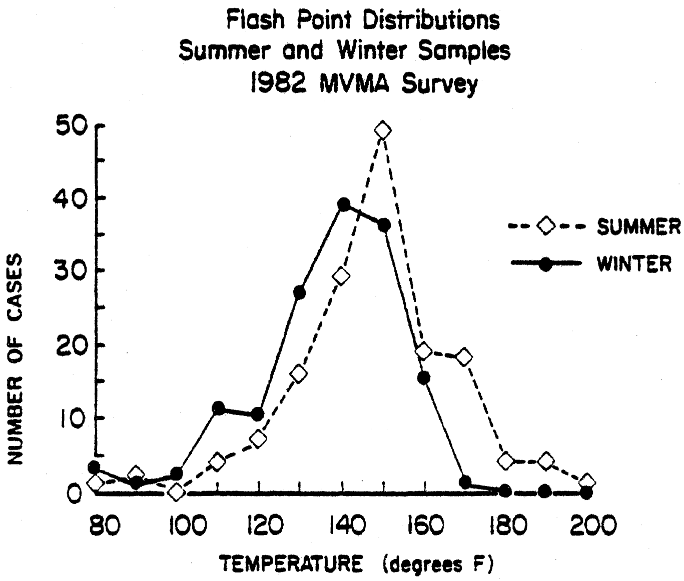


FIGURE 5. Winter/summer flash point distributions.

dipped down toward the fuel. This is attempted about every two or three degrees of temperature rise until the sample begins to burn: this establishes the flash point of the material.

It had been expected that the distribution might look much like the summer curve taken from the MVMA statistics. However, of the thirty fuel samples analyzed, only two had a flash point lower than 150 degrees—the remaining 28 were higher than this. (The two lower values were 148 and 138 degrees F). This was clearly not like either the winter or summer MVMA sample.

The most likely explanation of this difference is as follows: the lower values observed in the MVMA study suggest considerable contamination of the diesel fuel with gasoline or other more volatile material. Yet such contamination was evidently not present in these vehicles as seen in a rural California environment. There were some cities in the MVMA sample which had consistently high flash point readings, but the one California site had six (of six) winter samples with flash points lower than 150 degrees F, and 4 of 6 summer samples.

Diesel fuel in large trucks is usually recirculated, being drawn from a saddle tank, routed to the injector pump, and a portion of the fuel then returning to the tank from which it originated. In this process the fuel temperature rises—partly from its use to cool the injectors, partly from radiant heat on the lines from hot engine components, and sometimes from in-line heaters which are intended to prevent waxing in the wintertime. It was hypothesized that the high flash points observed in samples of fuel drawn from trucks in operation might have resulted from the fuel heating driving out the more volatile components of the fuel. In order to test this hypothesis, a sample of fuel with a measured flash point of 167 degrees F was contaminated by adding 5% gasoline. The resulting mixture was placed in the Pensky-Martens tester, and initially flashed at a temperature of 90 degrees after heating to that value over a period of 40 minutes. However, as the fuel was further heated, the flash point rose. Figure 6 shows the progression with time, with the open square indicating the point at which flashing ceased. After heating for a little more than than two hours, the flash point was nearing the original unadulterated value. We conclude that the heating of the fuel in the truck system has a sort of built-in protective feature, since it is capable of taking contaminated fuel and dispersing the more volatile contaminants in a matter of hours. Two full 100 gallon tanks would typically power a tractor for 15 hours or more; we observed that the fuel in trucks which had been refueled only an hour earlier had reached a reasonably stable high temperature, so that it seems likely that the low flash point of contaminated fuel would not last very long. It would be of interest, however, to determine (for those trucks that experienced sudden fuel fires), how long they had traveled since refueling. If the MVMA samples truly represent the distribution of fuel flash points in the supply system, we should expect nearly half the trucks in operation to have flash points below 150 degrees F for a short time after refueling. In this survey we were not able to determine time since refueling for the accident vehicles, but this would be a potentially useful piece of information for in-depth accident investigations.

This set of observations, of course, has been limited to a small number of sites in California, and these same results may not obtain universally. We would recommend some further study of this phenomenon.

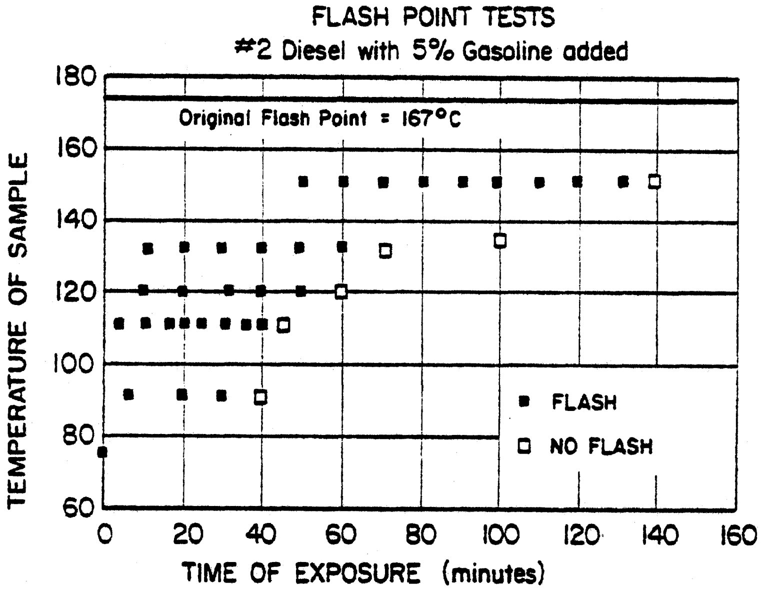


FIGURE 6. Flash points of contaminated fuel.

Fire Incidence by Engine Manufacturer

The distribution of diesel engines in the extant truck population is of particular interest because of the observed low fuel tank temperatures associated with the Caterpillar engines in the California inspection data. In combination with the earlier observations that ambient high temperature appears to be highly correlated with truck fire incidence, we might hypothesize that Caterpillar engines should be underrepresented in the truck-fire population. Alternatively, in the light of the boiling-off process described above, it is possible that Caterpillar engines retain the low flash point fuel, and are more susceptible to fire. The purpose of this section is to pursue these hypotheses.

In the most recent years (1981-1982) the VIN's provided by nearly all truck manufacturers permit identification of the diesel engine manufacturer. In earlier years, however, this information is incomplete. It can be identified rather completely for Chevrolet and GMC trucks for the past ten years or more, but not for Paccar, Ford, Freightliner, or others. Within these limits, some VIN-derived truck engine identification is available from the R.L. Polk Medium/Heavy Truck Population Profile based on state registration data as of July 1, 1982.

If the Caterpillar share of the truck engine market had been constant for many years, it would be appropriate to use the more recent (1981-82) data to represent earlier truck model years. This is not the case, however. Caterpillar has enjoyed an increasing percentage of the truck engine business in recent years, at least as represented by the GM and Chevrolet data. Caterpillar furnished 21.5% of the engines for GMC diesel trucks in 1982, 20% in 1981, 13.9% in 1980, 6.6% in 1979, dropping off to 5.3%, 4.0%, and 3.2% in 1978, 1977, and 1976. Chevrolet heavy trucks exhibit a similar, though slightly higher, pattern.

Ford diesel heavy trucks were equipped with Caterpillar engines 48.7 of the time for 1981 models, 49.6 for 1980. Earlier Ford VIN's are not decodable for engine make. In 1981 other major manufacturers used relatively high proportions of Caterpillar engines—Kenworth (31.5), Peterbilt (28.2), and Freightliner (16.0). Apparently International Harvester has used Caterpillar engines relatively infrequently (essentially none reported from VIN decoding), as has Mack (with only 0.34 in 1981). A number of other truck makes (including Oshkosh, FWD, Brockway, Western Star, Autocar) are tabulated in the Polk data, but their numbers are small and should not affect the conclusions presented here. As of 1982 Volvo, Mercedes, and some otherwise identified truck manufacturers represented only about 5 of the Polk registration total for trucks.

For 1981, the only year with adequate engine identification, Caterpillar furnished 17,929 of 120,368 diesel truck engines as reported in the Polk data. This is 14.9% of the total for that year. The GM and Chevrolet records indicate that the 1980 percentages are about two-thirds of that in 1981, but that 1982 was slightly above the 1980 figure. An industry-wide estimate of about 10% Caterpillar engines for 1980 seems reasonable but not very certain. One piece of field evidence comes from our recent California inspection station work, where we observed 13 Caterpillars out of 83 trucks for which engine make was identified (15.6), but this may be high for a national figure, partly because it is several years later (1984 vs. the 1982 accident data), and partly because the location was on the west coast, where several manufacturers seem to have high usage of Caterpillar engines. It is also a very small sample.

Restricting the analysis to 1979-1982 diesel-powered trucks and tractors, Caterpillar engines account for 7 of 75 vehicles in the accident file—slightly less than 10%. If the actual proportion of Caterpillars in the 1979-82 truck population is on the order of

15%, then Caterpillars would appear to be somewhat underrepresented in the fire accident population. However, the numbers are not large enough to provide much statistical confidence. Given these values, there are about four chances out of five that Caterpillars are underrepresented, but one in five that they are not.

A number of other comparisons could be made—e.g., restricting the analysis only to tractors, assuming a slightly larger percentage of Caterpillar engines in the operating population—but the small numbers of specific engine types in fires would continue to lead to results of low statistical significance. There seems to be a slight underrepresentation of Caterpillar engines in the crash/fire population, which is consistent with the hypothesis that the lower temperature rise of these engines leads to a reduced chance of fire. Perhaps data from 1983 accidents, along with the more complete engine exposure information from better VIN decoding in recent years, would confirm or deny this observation.

SECTION 5

CONCLUSIONS AND RECOMMENDATIONS

The intent of this study has been to generate a more complete understanding of the circumstances and causes of fires involving large trucks. The major data collection and analysis has been restricted to fatal accidents. The NHTSA Fatal Accident Reporting System provides a national census of cases, permitting national planning to result. Fatal tractor-trailer fire accidents had been observed in a previous study to be associated with approximately one out of six truck occupant fatalities in the U.S., making this group appropriate for further study and understanding.

Straight truck fatal fire cases have been included in the present study, and there has been a mixture of both gasoline and diesel-powered vehicles.

Although the results of this study seem to provide a better understanding of many characteristics of truck fatal fires, they do not provide enough information to suggest specific countermeasures with any great confidence. In short, the problem seems to be quite complex, and, while there may be countermeasures which will reduce the incidence of such fires, they are not yet clear.

Of the 214 large trucks in fatal crashes which sustained a fire, 104 of them—nearly 50%—had the truck fuel (77 diesel, 27 gasoline) as the major material which burned. We were not able to determine the major material burned in 34 additional cases, and it is possible that some of these could also have involved the truck fuel supply.

Those crashes which led to fatality of the truck occupants were generally severe, and in many cases involved both substantial crush to the truck cab as well as rupture or leakage of the fuel tank or tanks. For 20 truck occupants (of the 214 trucks with fire) the cause of death was attributed to fire alone. For 1982 this constitutes a minimum number of lives which might be saved by preventing all of these fires. An additional 53 truck occupants were judged to have died because of a combination of fire and traumatic injuries. The present data are inadequate to determine the relative contribution of fire and trauma to these cases. Reduction in the occurrence or the extent of fire in such cases could be expected to lead to a better chance of survival for truck operators.

Conclusions

1. The 1982 analyses confirm earlier studies in finding that about 15% of truck occupant fatalities occur in connection with crash fires, and that large trucks in police-reported (mostly non-fatal) crashes leak fuel in about 6% of the cases.

2. Correlation of the incidence of truck crash fires with temperature-related factors (summer and the U.S. southwest) was supported by analysis of additional years of data in this study.

3. The MVMA sample of diesel fuel in the supply system (i.e., in service station tanks) indicated that about half of the fuel exhibited a flash point below 150 degrees F.

4. In observations made at California truck inspection stations during this study it was observed that the temperature of fuel in the warmer tank in many trucks on the road

was above 100 degrees F; occasional trucks were seen with fuel temperatures in the 140 to 150 degree range. Thus many trucks were operating with fuel tank temperatures at or above the flash point of the fuel in the supply system.

5. However, a measurement of the flash point of fuel samples taken from trucks at California inspection stations indicates that essentially all of these samples have flash points above the temperature of the fuel in the tank. Although our samples were limited to a single area, it appears that the warming of the fuel by the truck fuel-handling system boils off the more volatile components of the supply fuel, leading to a safer (i.e., a higher) flash point.

6. An experiment done with contaminated fuel during this project indicates that heating of the contaminated fuel for several hours will raise the flash point to near the value of uncontaminated fuel.

7. During the California fuel temperature measurement program it was observed that the fuel tanks on trucks equipped with Caterpillar engines had a relatively low temperature rise—evidently because of a different arrangement on those engines for fuel handling.

8. Caterpillar-engine-equipped trucks exhibited a lower fire incidence rate (per vehicle in the population) than did trucks equipped with engines of other manufacture. The number of cases in the data, however, is so small that this finding is not of great statistical significance.

9. However, Caterpillar engines still appear in crash fires, and in fires involving diesel fuel spillage. There may be other important factors which lead to fires but which are not yet well understood. These could include sources of ignition, tank strength, accident type, and others.

Recommendations

1. Analysis of the data sets generated in this study have been rather limited because of the short time between the completion of the collection and the writing of this report. The data are well described by the documents included here, and further analysis by interested parties should be of value.

2. The one-year accident data set prepared in this study could be considerably strengthened by collecting similar data for 1983. In particular, the more recent the data the better the ability to decode VIN numbers, and the more useful the comparison with exposure (Polk registration) data will be.

3. The followup of accidents more than two years after their occurrence was reasonably successful. Firemen and police officers, in particular, seemed to have good recollection of details of these major fires. However, there is much volatile information which could not be recovered. Few photographs were available, and essentially all of the vehicles had been destroyed and disposed. If the NHTSA GO teams could be allocated to do immediate followups on major truck fires (using an augmented CPIR-B form for data collection) important information on ignition sources, detailed fuel system failures, roadside interaction, etc., may be obtainable. Information at this level of detail would be important to the definition of specific countermeasures.

4. Some observations have been offered here about differences in performance among fuel systems in trucks. It would be useful to compile details of fuel handling methods in different trucks/engines, and perhaps to trace and record fuel temperatures and flow rates.

5. Our measurements of fuel temperature in operating trucks has been limited to a couple of sites in California in the summertime. There was much variation in the flash point distribution of fuel in the supply system by city or region of the country, and a more national sample of fuel temperatures/flash points from operating trucks should be informative. Perhaps this could be done in conjunction with the BMCS inspection operations, or with state-operated inspections operated under federal sponsorship.

6. It would be nice to end a research report with the conclusion that all questions had been answered, and that there was no need for further research. We conclude, however, that the findings reported here are not yet sufficient for such actions as rulemaking, or perhaps even for modest design changes. They do provide a basis, however, for further data collection, laboratory experimentation, or analysis which may lead to such change. Suggested further research include in-depth accident investigation to determine ignition sources or methods of tank protection, determination of relationships between fuel temperature and ignition—particularly in connection with the mechanisms of tank rupture, and collection of data similar to that presented here covering a later year.

APPENDICES

APPENDIX A

Fuel Temperature Measurement Codebook

On three separate days data were acquired at California truck inspection stations in conjunction with the normal state equipment safety check. Some information about the make and model of the truck, the engine, etc., was determined by observation or interview of the driver; fuel tank size, fuel temperature, etc., were determined by observation or measurement. The resulting data were entered into computer form, and a working file is available for analysis. This appendix provides a brief description of the variables in that computer file. The first listing indicates the names of the 26 variables (the last three of which are derived from preceding variables). In this listing the value under "N" indicates the number of cases for which information was determined (i.e., non-missing cases). The second listing shows one-way distributions for categorical variables only.

DESCRIPTIVE MEASURES

Variable	N	Description of this Variable
1.SITE	86	Coded 1, 2, or 3 for the observation site/day
2.CASE.NO	86	Coded sequentially within site/day
3.TIME	86	4-digit military time of observation
4.T.MAKE	84	A unique code for the truck/tractor manufacturer
5.AMBTEMP	86	Est. or meas. ambient temperature at time of obs.
6.ENG.MAKE	83	Unique code for engine manufacturer
7.ENG.MOD	79	Alphanumeric description of engine model
8.TANK	86	Fuel tank configuration (see below)
9.RT.SIZE	84	Main right tank size in gallons
10.RT.SHAPE	83	Unique code for right tank shape
11.RT.MAT	83	Code for right fuel tank material
12.RT.TEMP	82	Right fuel tank temperature (Celsius)
13.RT.FULL	81	Code for proportion full for right tank
14.LT.SIZE	84	Main left tank size in gallons
15.LT.SHAPE	82	Unique code for left tank shape 9
16.LT.MAT	81	Code for left fuel tank material
17.LT.TEMP	82	Left fuel tank temperature (Celsius)
18.LT.FULL	84	Code for proportion full for left tank
19.TT.SIZE	3	Third tank size in gallons
20.TT.SHAPE	2	Unique code for third tank shape
21.TT.MAT	2	Code for third tank material
22.TT.TEMP	3	Temperature of third fuel tank (Celsius)
23.TT.FULL	3	Code for proportion full, third tank
24.RTMINLT	78	Right tank temp. minus left tank temp. (Celsius)
25.ABSDIFF	78	Absolute value of Variable 25
26.MAXTEMP	86	Maximum tank temperature for each vehicle

1.SITE	BANNG	CORD	CORD2
N= 86	23	31	32
MARG	26.7	36.0	37.2

4.T.MAKE	MISS	FORD	GMC	FL	IH	KW	PTBLT	WHITE	MACK
N= 84	2	6	5	19	11	22	10	8	3
MARG	7.1	6.0	22.6	13.1	26.2	11.9	9.5	3.6	

6.ENG.MAKE	MISS	CATRPL	CUM	DD	MACK
N= 83	3	12	47	23	1
MARG		14.5	56.6	27.7	1.2

8.TANK	R.ONLY	L.ONLY	L.AN.R	THREE	TWO.R
N= 86	1	6	75	3	1
MARG	1.2	7.0	87.2	3.5	1.2

10.RT.SHAPE	MISS	ROUND	SQUARE	NOTANK
N= 83	3	76	4	3
MARG		91.6	4.8	3.6

11.RT.MAT	MISS	ALUM	STEEL	NOTANK
N= 83	3	77	3	3
MARG		92.8	3.6	3.6

15.LT.SHAPE	MISS	ROUND	SQUARE	NOTANK
N= 82	4	74	4	4
MARG		90.2	4.9	4.9

16.LT.MAT	MISS	ALUM	STEEL	NOTANK
N= 81	5	73	4	4
MARG		90.1	4.9	4.9

20.TT.SHAPE	MISS	ROUND
N= 2	84	2
MARG		100.0

21.TT.MAT	MISS	ALUM
N= 2	84	2
MARG		100.0

23.TT.FULL	MISS	X.5	X.333	FULL
N= 3	83	1	1	1
MARG		33.3	33.3	33.3

APPENDIX B

Fire Supplement Variables and Definitions

Fire Supplement Variables 800 to 929 are further described here using definitional notes and reference sources. Many are self-explanatory and listed but not further defined. Others use definitions and coding schemes identical to or consistent with those used by FARS 1982, the MVMA Truck Study, or BMCS; these are so indicated. Some fire supplement variables, in fact,duplicate information available from these other sources. This is necessary, in part, to accomplish the matching and combining of case data from the several sources.

Since the Fire Supplement data derived from an examination of additional (i.e., interview) information, some inconsistencies arose between them and the original (FARS/ BMCS) data for the same variable. In such cases, the Fire Supplement Variables were coded with consideration of the type of data, the source of the data, and the certainty of the interview respondents. For example, owner or driver information on vehicles (e.g., length, weight, size of fuel tanks) was usually considered more valid than estimates offered by a police officer; but accident specifics (e.g.,descriptions of impacts, tank rupture, fire-related death) reported by the investigating officers were considered more valid than those given by a company spokespersons who was not present at the accident scene.

Generally there is no notation of the source in the computerized files, but the paper files from which these data were created contain extensive notes of our interviewers, and often provide the rationale for such decisions in the event of inconsistencies.

Variable Definitions and Notes

V800: BMCS ID Number (MVMA Truck Study)

V803: VIN (Vehicle Identification Number) first ten digits

V804: Fuel Type – Mixed fuel types (e.g., gasoline and propane) are coded "4. Other"

V805: Engine Make – All vehicles coded Gasoline, LPG, or Other Fuel Types (for V804) are coded "0. Manufacturers." Category 8 is unknown make but diesel, while 9 is unknown fuel type and engine make.

V806: Engine Model – ten characters alpha numeric

V807: Vehicle Make

V808: Vehicle Model – ten characters alpha numeric

V809: Model Year

V810: Cab Style

V811: Power Unit Body Style (MVMA Truck Study)

V812: Power Unit Axles (MVMA Truck Study)

V813: Type of First Trailer (MVMA Truck Study)

V814: 1st Trailer – axles (MVMA Truck Study)

V815: 1st Trailer Body Type (MVMA Truck Study)

V816: Type of Second Trailer (MVMA Truck Study)

V817: 2nd Trailer – axles (MVMA Truck Study)

V818: 2nd Trailer Body Type

V819: Veh Combination Code. Category 04 includes straight truck with towaway or piggyback.

V820: Total Weight (MVMA Truck Study) – vehicle plus cargo

V821: 1st Cargo Weight – The weight in pounds of the cargo in the first cargo body area. Includes a straight truck body and the first trailer pulled by a tractor. Codes for "N/A," "Some Cargo–Unknown Weight," "Full Cargo–Unknown Weight" are also provided.

V822: 2nd Cargo Weight – Same scheme as V821 for cargo in second cargo body

V823: TOTAL Cargo Weight – same scheme as V821 for total cargo weight in all cargo bodies

V824: Empty Combination Weight

V825: Power Unit Weight (MVMA Truck Study)

V826: First Trailer Weight – empty weight

V827: Second Trailer Weight – empty weight

V828: Total Vehicle Length – overall length (MVMA Truck Study)

V829: Power Unit Length (MVMA Truck Study)

V830: 1st Trailer Length (MVMA Truck Study)

V831: 2nd Trailer Length (MVMA Truck Study)

V832: Truck Width – Width of widest part of truck, trailer, or cargo (MVMA Truck Study) in inches

V833: Fuel Tank Configuration – Refers to tank set up on power unit. "0. Other configuration" would include those where fuel tank is mounted on the trailer but part of the power unit fuel system.

V834: Right Fuel Tank Size – gallons

V835: Left Fuel Tank Size – gallons

V836: Auxiliary Left Fuel Tank Size – gallons.

V837: Auxiliary Right Fuel Tank Size – gallons

V838: Fuel on Board – Estimated percentage of full, remaining at time of accident

V839: Cargo Type – Some cargo types found in MVMA Truck Study and BMCS and not listed here are grouped into "13. Other."

V840: Hazardous Cargo – Generally same as FARS and MVMA Truck Study, but includes cargoes indicated on police reports as hazardous (by that state's classification scheme).

V841: Cargo Spillage (same as MVMA Truck Study, except N/A no cargo)

V842: Type of Carrier (same as MVMA Truck Study/BMCS). "Inter." abbreviates interstate, "Intra." abbreviates intrastate.

V843: Type of Trip (MVMA Truck Study)

V844: Temp: High of Day – Farenheit plus 100, high temperature reported for that day.

V845: Temp: Low of Day – Farenheit plus 100, low temperature reported for that day.

V846: Temp at Time of Accident – Farenheit plus 100, atmospheric temperature at the time of the accident.

V849: Ramp Status

V850: Initial Impact Point – Point of first damaging impact. Includes impacts in non-collision events. Different scheme than FARS.

V851: Principle Impact Point – Point of *most* damaging impact to vehicle, either collision or non-collision. May differ from FARS.

V852: Rollover-Cause – Causal event immediately preceding and resulting in rollover action. Unknown cause of rollover is coded "6.", Unknown whether there was a rollover is coded as "9."

V853: Rollover-Direction

V854: Rollover Amount – Number of quarter turns up to 6, seven or more quarter turns coded "7.", Unknown amount is "8.", Unknown whether there was a rollover is coded as "9.".

V855: Jackknife – "1." is coded where the jackknife is the first harmful event. "2." is for subsequent event jackknifes. This is congruent with FARS in the aggregate, but the categories are different.

V856: Estimated Travel Speed – Taken from police reports or interview statements from officers.

V857: 1st Harmful Event – Combination coding different from FARS. Differentiates where sample vehicle is the striking vehicle versus the struck vehicle and when the sample vehicle or other vehicle is slow moving (≤35 mph) or stopped on or off the roadway.

V858: 1st Other Veh Config – In the first harmful event, the configuration of the other vehicle involved, or N/A for non-collision.

V859: 2nd Harmful Event (same as V857 for second event)

V860: 2nd Other Vehicle Configuration (same as V858 for second event)

V861: 3rd Harmful Event (same as V857 for third event)

V862: 3rd Other Vehicle Configuration (same as V858 for third event)

V863: 4th Harmful Event (same as V857 for fourth event)

V864: 4th Other Vehicle Configuration (same as V858 for fourth event)

V865: 5th Harmful Event (same as V857 for fifth event)

V866: 5th Other Vehicle Configuration (same as V858 for fifth event)

V867: Most Harmful Event – May be different from FARS. The most damaging event with reference to the sample vehicle. In choosing between two events, the question is asked whether either would have been sufficient to totally damage the vehicle. The first such event would be the most harmful. "9." Unknown" includes cases in which this is not ascertainable.

V868: Mechanical Defects – Same as FARS plus cases in which the reporting officer indicated that a mechanical defect or equipment failure was a contributing factor in the accident.

V869: Seatbelt Usage-Driver

V870: Seatbelt Usage-Passenger

V871: Explosion, Sample Vehicle – "Explosion" is used in a descriptive sense indicating a very sudden or rapid burning after the crash. To be coded "1. Witnessed", a respondent must have been at the scene and witnessed the explosion and detailed such in verbal or written statement (police report or signed witness statement). "2. Reported" means someone reported an explosion to the respondent. "3. None" means no explosion witnessed, reported, or evidenced at scene. Explosion is *not* limited to sample vehicle.

V873: Slow/Stopped/Parked Vehicle – Slow moving has arbitrarily been set at ≤35 mph but may be considered in relation to a much faster moving vehicle. For example, a vehicle moving 40 mph hit by another moving 85-90 mph would be considered a slow moving vehicle.

V874/5: Fuel System Failure: Rupture/Leakage – Rupture is distinguished from leakage by the severity of damage to the tanks. Rupture is coded when damage is extensive and fuel is spilled immediately and rapidly following the harmful event. This would include a large puncture or tear during collision with fuel spilled at point of impact and point of rest, but also includes explosion of intact tanks from fire at POR. Leakage is coded where little or no spillage occurs at POI, but some spillage is evident at POR. Category 27 is coded where there is evidence or report of rupture or leakage but the location cannot be determined.

V876: Fuel System Fail: Cause – The major cause of rupture or leakage coded in V874 or V875, either as specified in police report, interview, or BMCS report.

V877/8: Fuel Spillage: Impact/Rest – Determined from police report, interview, or BMCS. (Refers to sample vehicle only)

V879: Ignition Source – Refers to fire on the sample vehicle. A judgment by the investigating officer or fire department personnel who witnessed accident scene or examined evidence and witness statements. "1. Sparks Collision" includes collision with other vehicle, fixed object. or friction spark from contact with road surface. "2. Fire-Other Vehicle" means fire began in other vehicle, spread to this vehicle. "3. Other Spark" indicates battery or other electrical spark originating on vehicle. "4. Other" – Some examples are muffler, supercharger, and power lines falling onto vehicle.

V880: First Material Burned – Refers to sample vehicle, a judgment as in case of V879 above. Category 7. Other includes things like brakes catching fire.

V881: Entrapment – Coded only for those cases where the victim was physically pinned by wreckage and required extrication. Does not include cases where victim was not pinned, but unable to escape from the fire.

V882: Ejection – Partially or totally ejected from the vehicle, indicated on police report or reported by someone at accident scene.

V883: No. Occupants in Vehicle – Sample vehicle only. Three or more occupants coded as 3.

V884: No. Uninjured in Vehicle – According to FARS and police reports, confirmed in interview where questionable.

V885: No. Injured in Vehicle – Sample vehicle non-fatal injured.

V886: Driver Injury – KABC level of injury to driver. FARS and police report used.

V887: No. Passengers Killed – Three or more coded as 3

V888: No. Passengers Injured – Sample vehicle non-fatal injured

V889: No. Uninjured in Other Vehicle – Uninjured not in sample vehicle or associated with sample vehicle. Includes pedestrians.

V890–892: A/B/C-Injured in Other Vehicle – A/B/C-level-injured persons.

V893: Unknown Injuries, Other – Injury status unknown. Same persons as V889.

V894: K-Injured Other Vehicle

V895: Total Accident Fatals – Note: Duplication occurs when more than one sample vehicle occurs in same accident.

V896: Total Accident Injuries

V897: Years Driver Employed – From BMCS report, the number of years the driver had been employed *as a driver* for that company. N/A where no BMCS reports is available. Category "00" for non-employee driver.

V898: Driver Age

V899: Hours Driving (From BMCS and MVMA Truck Study). The number of hours actually driven since last 8-hour break.

V902: No. K due to F-samp – Sample vehicle occupant fatalities for which the cause of death is primarily due to fire. In a small number of cases, victim received minor collision injuries which were not believed to have contributed to the death. In the majority of cases, this is a conclusion by the investigating officer from evidence at scene and witness statements. In some cases autopsy and/or coroner reports were available.

V903: No. K due to F+T-Samp – Coded where both collision trauma and fire injuries may have contributed to death. A judgment as in V902.

V904: No. K due to F+E-Samp – Similar to V903, except that the traumatic injuries may have been caused by complete or partial ejection. Trauma includes partial or total ejection.

V905: No. K due to T-Samp – Cause of death primarily due to collision trauma. Fire-related injuries were minor or occurred after fatal collision injuries.

V906: No. K due to Trauma and Ejection – Same as V905 except includes partial or total ejection

V907–911: Use the corresponding definitions for fatalities not in the sample vehicle or associated with the sample vehicle. Category 8 is N/A, for cases where there is no other vehicle or persons involved *or* no deaths not in the sample vehicle. Seven or more deaths are coded as 7.

V912: Fire-Injured Sam-Veh – For the sample vehicle, the number of non-fatal injured with fire-related injuries

V913: Fire-Injured Not Sample Vehicle – All other non-fatal injured with fire-related injury. "8. N/A" when only sample vehicle involved in accident.

V915–919: Manner of Collision First thru Fifth Harmful Event – For each separate harmful event, the manner of collision between the sample vehicle and other vehicle. Events such as overturn, fire, and collision with fixed object are coded 0. Not a collision with a vehicle in transport Category 4. Direct to Side, includes estimated angles from 45 degrees to 135 degrees. Beyond these are coded Sideswipe same or opposite direction. Some judgment is involved here since police report diagrams are used to estimate. Category 8 is N/A cases where no second-fifth event occurred.

920–924: Opinions – These are expressly asked as opinion or best judgment questions. Each is contingent on a set of circumstances being present. Thus it is possible that the answer is "Unknown" because the circumstances are uncertain or they are not ascertainable because the respondents "Do not know."

V920/921: Circumstances – Truck fuel system failure *and* fire-related injury/death in any vehicle.

If fuel had not spilled/leaked, would there still have been a fire? Identifies where fire started unrelated to fuel system failure on sample vehicle: Cargo fires and fires in other vehicles.

Same Circumstances. Would there still have been injury/death from fire? Identifies cases where fuel system failure contributed to fire and was the difference in whether fire injury or death occurred. Where V920 is answered "No," V921 must be "No."

V922: No Seatbelts Used – Collision *and* fire injury. Would the use of seatbelts have reduced collision injury and allowed victim to escape fire injury?

Identifies cases where seatbelts would have reduced injuries from collision and thereby enabled escape from fire.

V923: Same as V922 except for fatality

V924: Entrapment, Fire Injury/Fatality – Had victim not been trapped could he/she have escaped fire injury/death

V925–927: Vehicle Actions for cases of collision with other vehicles only. The category which best describes the action the vehicle is performing or the status of the vehicle at the time of impact. Adopted from BMCS with the following working definitional notes:

04. Rear-End: Refers to the rear-ending vehicle not the rear-ended.

09. Means in its own lane, no maneuvers. Includes travel on a curved road.
12. Standing or proceeding through an intersection, but physically in the intersection at impact.
16. Not as a part of 13. Passing.

V925 is used for the sample vehicle.
V926 is used for the first other vehicle the sample vehicle impacts.
V927 is used for the second other vehicle the sample vehicle impacts or the second impact with same vehicle.

V928: Month of Accident

V929: Day of Month of Accident

APPENDIX C

Non-Sample Cases

The selection of case vehicles for inclusion in the Study of Truck Fires began with the 1982 MVMA Truck Study dataset. This dataset, itself a subset of the 1982 Fatal Accident Reporting System (FARS) filtered to include only medium and heavy trucks with a gross vehicle weight rating (GVWR) over 10,000lbs, was then filtered on FARS variable 134, FIRE OCCURRENCE. A total of 228 cases passed this two-stage process and became the initial set of cases. For each of these cases, all available information from FARS and MVMA Truck Study case folders was gathered, including copies of police and Bureau of Motor Carrier Safety (BMCS) reports, MVMA Truck Study interviews, and interviewer logs. This information was analyzed and coded for each case and then supplemented with the Study of Truck Fires interview.

During the analysis of this records data and subsequent interviews, an additional 14 cases were identified as non-sample. In four cases, the vehicle was less than the required GVWR.[9] In ten others, there was police or BMCS report, MVMA Truck Study, and/or Study of Truck Fires interview indication that there was no fire in the vehicle.[10] These 14 cases were dropped leaving the final dataset of 214 cases.

The fourteen non-sample vehicle cases and the reason for their exclusion are outlined below:

A. GVWR <10,000lbs

21/0238/02 1982 Chevrolet. FARS indicates from VIN that this is a C or K-series standard pickup with GVWR 6,001 – 10,000 lbs. Police report describes it as a "1 ton" truck.

22/0021/02 1980 Chevrolet. FARS indicates from VIN that this is a C-30 standard pickup with GVWR of 6,001–10,000 lbs. Police report says "C-10".

37/0566/01 1979 GMC. FARS indicates from VIN that this vehicle was less than 10,000 lbs. GVWR. Police report indicates a passenger vehicle. MVMA Truck Study ruled non-sample.

48/1449/02 1982 GMC FARS indicates from VIN a C or K-series standard pickup with 6,001–10,000lbs

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[9]For the 1982 MVMA Truck Study as a whole, 159 of 4,877 vehicles were ultimately found to be inappropriate (generally because they did not meet the GVWR requirement) and they were deleted from the UMTRI file.

[10]This is slightly over 4% passing the filter and later determined as not involving a fire in the vehicle.

B. No Fire In Vehicle

06/2944/02 1969 Ford straight truck. No fire mentioned in a 15-page police report. Fuel spilled, but did not burn. MVMA Truck Study interview with owner indicates "No fire in any vehicle."

18/0039/03 1979 Mack tractor-trailer. Police report code marked "No" to fire, narrative does not mention fire. Reporting officer in interview said no fire in this vehicle.

19/0168/03 1971 Kenworth tractor-trailer. Police report code marked "None" for fire, narrative does not mention any fire. Interviews with owner and reporting officer indicate "no fire."

19/0190/01 1979 GMC tractor-trailer. Police report code marked "None" for fire, narrative mentions no fire. BMCS report code and narrative do not indicate fire.

24/0233/02 1977 Mack tractor-trailer. Police report and BMCS report do not indicate fire. Interview with reporting officer indicated "No fire."

27/0198/01 1970 IHC straight truck. Police report mentions no fire. Owner in interview said fuel spillage, but no fire.

29/0579/01 1982 Ford tractor-trailer. Police report says fire in other vehicle (motorcycle) lodged under trailer. Reporting officer in interview said yes, but no fire in tractor-trailer and no fire damage to trailer.

30/0119/01 1974 Ford straight truck. Police report mentions no fire. Owner in interview said no fire.

47/0173/01 1976 GMC Stepvan. Neither police report nor BMCS form indicate a fire.

56/0102/01 1979 White tractor-trailer. Neither police police report nor BMCS form indicate a fire. Inter-view with safety director who investigated accident indicated "No fire."

APPENDIX D

Road Tractor Fires: An Epidemiological Study

Reprint of a paper presented at
1984 American Association for Automotive Medicine Conference

By
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Introduction

The relatively high incidence of fire and fuel leakage in diesel-powered road tractors has been reported. A 1980 Factbook states that truck accidents involving fatalities (based on 1975-79 FARS data) were accompanied by fire in about 5% of the cases, compared with about 2.5% for all vehicles.[11,12] While fatal accidents are relatively rare events, and fire in fatal accidents is even more rare, the present availability of eight years of FARS data for the U.S. allows further study of this phenomenon from an epidemiological point of view.

A previous paper reported that truck fires (given a fatal truck involvement) were more likely to occur during the summer months and in the southwestern regions of the U.S. In the present paper a larger data set is used to reexamine each of these relationships and also to study interactions of these two factors with the presence of truck fires.

The Data Source

NHTSA's Fatal Accident Reporting system designated a code for vehicle fire when it was first compiled in 1975. Although the interest at that time was primarily in passenger car fires, the same coding (fire or no fire) was used for all vehicles involved in fatal accidents. The percentage of heavy trucks with fires reported in FARS has remained relatively constant since 1975, and this is taken as evidence that the reporting has been consistent and relatively complete.

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[11] O'Day, J.; Filkins, L.D.; and Kaplan, R.J. *Combination vehicles: Five-year accident experience.* Final Report no. UM-HSRI-80-51. Ann Arbor, The University of Michigan, Highway Safety Research Institute, July 1980.

[12] Bondy, N.; and Partyka, S. An analysis of fatalities in articulated trucks using automated accident data files. *Accident Data Analysis of Vehicle Crashworthiness: Ten Papers*, pp. 161-208. NHTSA technical report DOT-HS-805-833. Washington, D.C., National Highway Traffic Safety Administration, April 1981.

Vehicle type coding has varied from year to year, but combination vehicles (most of which are tractor-trailers or doubles) are separately identified in each year's data. There were some reporting inconsistencies with truck identification in 1975 and 1976 which led to underreporting the number of such vehicles involved in fatal accidents in those years. With the current availability of eight years of data, the error introduced by the deficiencies of the early years should be minimal. In this report we consider combination vehicles only. The vast majority of these are diesel-powered tractors with a semi-trailer, or with a semi-trailer and a second trailer.

Other variables used in the present analysis are month of the year and the state in which the accident occurred. The FARS data are nearly 100% complete for both of these variables, and are presumed to be accurate.

Fire Rate by Month and Season

When aggregating data over the entire U.S. there are enough cases to observe fire frequency by month of the year. Table 1 shows the distribution of combination vehicle involvements in fatal accidents by month of the year, and the proportion of those involvements accompanied by fire. This table is based on the eight-year FARS record (1975–82). The general pattern of a low fire rate in the winter and a higher rate in the summer seems consistent with an increase of fire occurrence associated with higher ambient temperatures. The drop in July is statistically quite significant, but we know of no explanation for it.

TABLE 1

Combination Vehicle Fatal Accident Involvements
and Fires by Month of the Year
Source: FARS 1975–82

Month	Vehicles in Accidents	Percent with Fire
January	2249	4.0
February	2144	4.4
March	2331	4.5
April	2169	5.3
May	2394	5.6
June	2467	6.9
July	2493	5.3
August	2808	6.2
September	2607	6.4
October	2826	5.0
November	2625	4.6
December	2565	4.0

Fire Rate by State/Region

The average fire rate (truck fires per truck fatal involvement) is 5.2% over the eight-year period. The variation of this statistic by state or region of the country had been reported earlier[13] for the six-year period (1975-80). Figure 1 shows as shaded those states with 7% or more of their fatal truck involvements accompanied by fire. The strong association of this statistic with the southwest part of the U.S. can be observed.

TABLE 2

Combination Vehicles in Fatal Accidents
and the Percentage with Fire
Source: FARS 1975-1982

Region Number	Vehicles in Accidents	Percent with Fire	States in Region
1	2064	4.0	CT,ME,MA NH,NJ,NY,RI,VT
3	2597	3.5	DE,DC,MD PA,VA,WV
4	6451	3.8	AL,FL,GA KY,MS,NC,SC,TN
5	5542	4.4	IL,IN,MI MN,OH,WI
6	5638	6.7	AR,LA,NM OK,TX
7	2104	7.0	IA,KS,MO,NE
8	1479	6.7	CO,MT,ND,SD,UT,WY
9	2771	7.7	AZ,CA,HI,NV
10	1032	4.0	AK,ID,OR,WA
TOTAL	29678	5.2	

[13] O'Day, J. Fires and fatalities in tractor-semitrailer accidents. *The UMTRI Research Review*, 14:2, September-October 1983. Ann Arbor, University of Michigan Transportation Research Institute.

The state with the largest number of fatal truck accidents was Texas with 3124, 6.9% of which occurred with fire. California had the second largest number, with 2122 accidents and a fire rate of 7.5%. The highest fire rates in fatal truck accidents were 9.3% (of 421 cases) in Colorado, 9.1% (of 798 cases) in Oklahoma, and 8.7% (of 483 cases) in Arizona.

The Interaction between State and Season

With a total of more than 1500 fire cases (and 29,000 combination vehicles involved in fatal accidents) we explore the data to determine whether region of the country and season of the year are independent with respect to fire occurrence. High ambient temperatures are one property of the summer months; similarly, they are a property of the southwest region of the U.S. If these two factors are independent, (i.e., if the frequency of fires in the southwest (or elsewhere) is higher in the summer than in the winter) our belief that higher ambient temperature is a fire-causative factor is supported.

A three-way contingency table was prepared to display the relationship between the incidence of truck fire, the season of the year, and the DOT region within the U.S. . This table was then analyzed using the BMDP program 4-F. The results of the analysis showed that the best model to predict the individual cell frequencies should include all main effect terms and all two-way interactions. Although both season and region are individually related to fire occurrence, the strength of the effect of one (e.g., season) depends on the level of the other (i.e., region).

This same relationship may be presented graphically, and two further map displays are presented as Figures 2 and 3. Figures 2 and 3 show those states with more than 7% of their truck fatal accidents accompanied by fire during the winter and summer quarters, respectively. Note that only six states in the winter fall in this category, compared to seventeen states in the summer.

The results of the contingency table analysis and the maps support the same conclusion—that both region and season are associated with fire occurrence in fatal truck accidents. While there may be many other factors, one factor common to summer and the southwest is temperature (perhaps of the fuel, the road surface, the air). It may well be related to the likelihood of crash fires. While there may be little in the statistical data presented to prove this, the results do suggest that a further study of temperature would be in order.

The relationship between season (winter, spring, summer, fall) and fire was tested with a X^2 statistic. For each Department of Transportation Region the results are shown in Table 3. Four regions show relatively little interaction (3: Middle Atlantic States; 7: Iowa, Kansas, Missouri, and Nebraska; 8:Rocky Mountain States; and 10: Alaska, Idaho, Oregon, and Washington). All other regions show a significant relationship at the 5% level or better.

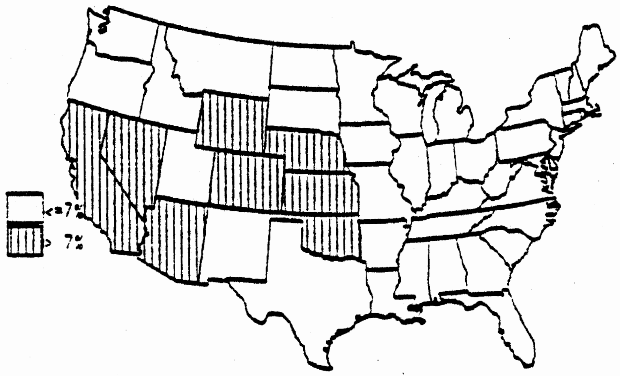

Figure 1. States having more than 7% incidence of fire-related fatal truck accidents--all seasons.

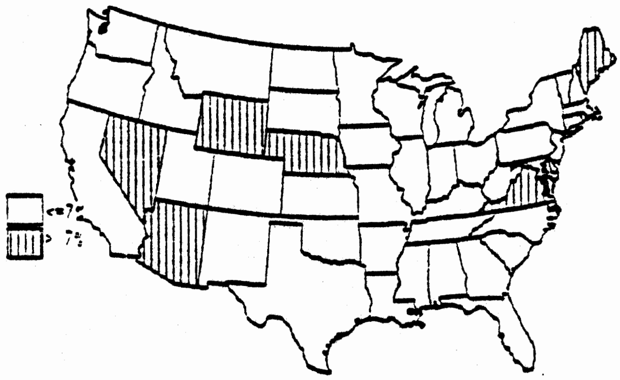

Figure 2. States having more than 7% incidence of fire-related fatal truck accidents--winter quarter.

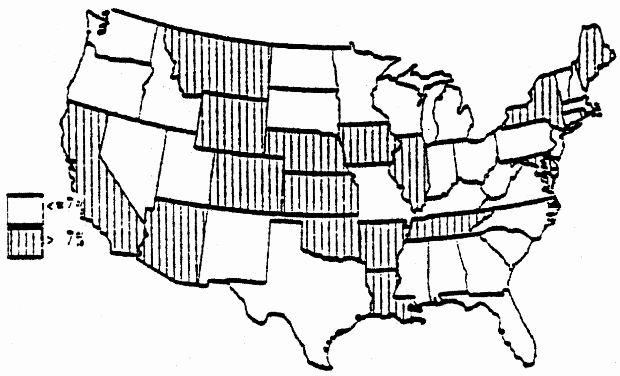

Figure 3. States having more than 7% incidence of fire-related fatal truck accidents--summer quarter.

TABLE 3

Pearson Chi Square Significance Level
Fire/No Fire by Season for each DOT Region

DOT Region	Significance Level
1	.0091
3	.3005
4	.0234
5	.0290
6	.0441
7	.5975
8	.0876
9	.0222
10	.4120
ALL REGIONS	0.0000

Conclusions

1. Fire incidence in combination vehicles involved in fatal accidents is higher than for passenger cars.

2. This incidence is strongly related to season.

3. This incidence is strongly related to geography.

4. These two factors (season and geography) interact to produce rather high rates in the southwest in the summertime.

5. This additive effect is taken as further evidence that the underlying factor responsible for the higher incidence of fire is temperature.

Final Comment

FARS now provides a very large set of data. It is possible to search for patterns among events that are quite rare, although the assumption that the events are stable with time is necessary. The total number of fatal accidents reported in eight years of FARS is nearly 400,000, the number of large trucks involved in fatal accidents is 29,678, and the number of combination vehicle fires about 1500.

This analysis is only a part of a larger study, and is presented here mainly to show the interaction of season and region. There may be other variables which also are associated with the incidence of fire, and, of course, some of these may also interact with the present variables. Nevertheless, it seems reasonable to suggest that there is some relationship between temperature and the incidence of truck fires. causation study.

APPENDIX E

Data Forms Used in This Study

TRUCK FIRE STUDY

09/27/84

1. FARS State ______ Code __ __ (1 2)   2. FARS Case No. __ __ __ __ (3 4 5 6)   3. FARS Veh. No. __ __ (7 8)

4. BMCS ID No. __ __ __ __ __ (12 13 14 15 16)   5. Accident Date __ __ / __ __ / 8 2 (257 258 259 260)

VEHICLE AND CARGO

6. VIN *(1st 10 digits)*

__ __ __ __ __ __ __ __ __ __ (17 18 19 20 21 22 23 24 25 26)

7. Truck Make

Autocar	[ ] 00
Chevrolet	[ ] 01
Diamond Reo	[ ] 02
Dodge	[ ] 03
Ford	[ ] 04
Freightliner	[ ] 05
GMC	[ ] 06
IHC	[ ] 07
Kenworth	[ ] 08
Mack	[ ] 09
Peterbilt	[ ] 10
Western Star	[ ] 11
White*	[ ] 12
Other ________ *(specify)*	[ ] 13 (39-40)

**Ask Autocar, Frtliner, Wstrn Star.*

8. Truck Model *(number/name)*

__ __ __ __ __ __ __ __ __ __ (41 42 43 44 45 46 47 48 49 50)

9. Model Year 19 __ __ (51 52)

10. Cab Style Conventional [ ] 1
COE/Cab Fwrd [ ] 2 (53)

11. Fuel Type

Diesel	[ ] 1
Gasoline	[ ] 2
LPG(propane)	[ ] 3
Other ________	[ ] 4 (27)

12. Engine Make

Mfr's gasoline	[ ] 0
Allis-Chalmers	[ ] 1
Caterpillar	[ ] 2
Cummins	[ ] 3
Detroit Diesel	[ ] 4
IHC	[ ] 5
Mack	[ ] 6
White	[ ] 7
Other Diesel	[ ] 8
Unknown	[ ] 9 (28)

13. Engine Model

__ __ __ __ __ __ __ __ __ __ (29 30 31 32 33 34 35 36 37 38)

14. Fuel Tanks

Right [ ] Left [ ] Aux.R. [ ] L. [ ]

Size ___ (130-132) ___ (133-135) ___ (136-138) ___ (139-141)

15. % Fuel Remaining ___ (142-144)

CONFIGURATION

	POWER UNIT		FIRST TRAILER		SECOND TRAILER	
16. TYPE	Tractor	[ ] 0	Semi	[ ] 1	Semi	[ ] 1
			Full	[ ] 2	Full	[ ] 2
			Other	[ ] 3	Other	[ ] 3
			None	[ ] 8 (56)	None	[ ] 8 (60)
17. BODY	St. Trk:					
	Van	[ ] 1	Van	[ ] 01	Van	[ ] 01
	Flatbed	[ ] 2	Flatbed	[ ] 02	Flatbed	[ ] 02
	Tanker	[ ] 3	Tank	[ ] 03	Tank	[ ] 03
	Refuse	[ ] 5	Auto Cr.	[ ] 04	Auto Cr.	[ ] 04
	Dump	[ ] 6	Dump	[ ] 06	Dump	[ ] 06
	Other	[ ] 7 (54)	Other	[ ] 08 (58-59)	Other	[ ] 08 (62-63)
	________ *(specify)*		________ *(specify)*		________ *(specify)*	
18. NO. OF AXLES			One	[ ] 1	One	[ ] 1
	Two	[ ] 2	Two	[ ] 2	Two	[ ] 2
	Three	[ ] 3	Three	[ ] 3	Three	[ ] 3
	Four	[ ] 4	Four	[ ] 4	Four	[ ] 4
	Five	[ ] 5 (55)	________	[ ] (57)	________	[ ] (61)

19. What was the Total Weight of the truck and cargo? __ __ __ __ __ __ lbs. (66 67 68 69 70 71)

20. What was the Cargo Weight?

ST. TRK __ __ __ __ __ __ lbs.
(% Full: __ __ __)

1ST TLR. __ __ __ __ __ __ lbs.
(% Full: __ __ __)

2ND TLR. __ __ __ __ __ __ lbs.
(% Full __ __ __)

TOT. CARGO __ __ __ __ __ __ lbs. (84 85 86 87 88 89)

21. What were the Empty Weights of the units?

TRAC/ST. TRK __ __ __ __ __ __ lbs. (96 97 98 99 100 101)

1ST TLR. __ __ __ __ __ __ lbs. (102 103 104 105 106 107)

2ND TLR. __ __ __ __ __ __ lbs. (108 109 110 111 112 113)

COMB. WT. __ __ __ __ __ __ lbs. (90 91 92 93 94 95)

22. What was the Total Length of the truck and any trailers? __ __ __ ft. (114 115 116)

What were the Lengths of each unit?

TRAC/ST. TRK __ __ __ ft. (117 118 119)

1ST TRLR __ __ __ ft. (120 121 122)

2ND TRLR __ __ __ ft. (123 124 125)

Cargo Body Length of ST. TRK __ __ __ ft.

23. What was the width of truck or cargo in inches? __ __ __ ins. (126 127 128)

24. Cargo ______________________
(specify and code below)

	ST. TRK	1ST TRLR.	2ND TRLR.	CODE
Empty	[ ]	[ ]	[ ]	[ ]01
General Freight	[ ]	[ ]	[ ]	[ ]02
Metal (coils, sheets, rods)	[ ]	[ ]	[ ]	[ ]03
Gasoline	[ ]	[ ]	[ ]	[ ]04
Diesel	[ ]	[ ]	[ ]	[ ]05
Flammable Gases in bulk	[ ]	[ ]	[ ]	[ ]06
Non-flammable Gases in bulk	[ ]	[ ]	[ ]	[ ]07
Solid in bulk (non-pkgd)	[ ]	[ ]	[ ]	[ ]08
Non-flammable Liquid in bulk	[ ]	[ ]	[ ]	[ ]09
Flammable Liquid in bulk	[ ]	[ ]	[ ]	[ ]10
Processed Food (refrigerated)	[ ]	[ ]	[ ]	[ ]11
Farm Products (inc. animals)	[ ]	[ ]	[ ]	[ ]12
Other ______________	[ ]	[ ]	[ ]	[ ]13
Unknown	[ ]	[ ]	[ ]	[ ]99
				145-146

25. Hazardous Cargo

Yes [ ]1
No [ ]2
147

26. Cargo Spillage

Yes [ ]1
No [ ]2
148

27. Type of Carrier *(Truck Study/BMCS)*

Interstate/private	[ ]1
Interstate/authorized	[ ]2
Interstate/exempt	[ ]3
Intrastate/private	[ ]4
Intrastate/hire	[ ]5
Government	[ ]6
Rental	[ ]7
Other	[ ]8
Unknown	[ ]9
	149

28. Type of Trip *(Truck Study/BMCS)*

Over-The-Road (BMCS)	[ ]1
Local pick-up and delivery	[ ]2
Under 200 miles (one way)	[ ]3
Over 200 miles "	[ ]4
Over-The-Road (Survey)	[ ]5
Unknown	[ ]9
	150

____ Harmful Event (Sample Vehicle)

[ ] COLLISION WITH MOTOR VEHICLE	[ ] NOT COLLISION WITH MV

Other Vehicle Configuration

Straight truck	[ ]01
Straight/Trailer	[ ]02
Tractor(bobtail)	[ ]03
Tractor/Semi-Trailer	[ ]04
Tractor/Double	[ ]05
Other Truck	[ ]06
Unknown Truck	[ ]07
Car/Pickup	[ ]08
Train	[ ]09
Other	[ ]10
Unknown	[ ]99

Slow/Stopped/Parked Vehicle

None [ ]

	Sample Veh.	Other
Slow-moving	[ ]	[ ]
Stopped ON Roadway	[ ]	[ ]
Stopped/Parked Off Roadway	[ ]	[ ]

Sample Vehicle Role *(collision w/veh only)*

Struck	[ ]
Striking	[ ]
Unknown	[ ]

Manner of Collision

Rear-End	[ ]1
Head-On	[ ]2
Rear-to-Rear	[ ]3
Direct to Side or Angle	[ ]4
Side-Swipe Same Direction	[ ]5
Side-Swipe Opposite Direction	[ ]6
Other	[ ]7
Unknown	[ ]9

244-245

Fire/Explosion	Primary	[ ]
	Subseq.	[ ]
Jacknife	Primary	[ ]1
	Subseq.	[ ]2

166

Overturn	Primary	[ ]
	Subseq.	[ ]

Due to:

Ran-Off-Road	[ ]1
Avoidance	[ ]2
Ramp	[ ]
Coll. w/veh in trans.	[ ]3
Coll. w/fixed object	[ ]4

166

Direction of OT:

Right	[ ]1
Left	[ ]2
End	[ ]3
Unknown	[ ]4

166

No. of Quarter-Turns ____ 167

Collision with:

Fixed Object [ ]

____
(specify)

Ped./Cyclist/Animal [ ]

Other Non-Collision [ ]

____
(specify)

Sample Vehicle Damage Area

Front	[ ]01	Left Side	[ ]07
Right Front	[ ]02	Left Front	[ ]08
Right Side	[ ]03	Top	[ ]09
Right Rear	[ ]04	Undercarriage	[ ]10
Rear	[ ]05	Total	[ ]
Left Rear	[ ]06	Unknown	[ ]99
	161-164		161-164

(All items reference Sample Vehicle except Explosion and Temps.)

30. Most Harmful Event

- First [ ]1
- Second [ ]2
- Third [ ]3
- Fourth [ ]4
- Fifth [ ]5
- Don't Know [ ]9

181

31. Fuel System Failure

- None [ ]
- Tank Rupture [ ] Right Left Aux. Unk.
- Fuel Leakage [ ] Right Left Aux. Unk.

Unknown System Failure or Not [ ]

32. Fuel System Failure: Cause

- N/A No system Failure [ ]8
- Fire/explosion [ ]1
- Overturn [ ]2
- Collision w/moving vehicle [ ]3
- Collision w/fixed object [ ]4
- Coll. w/slow/stopped/parked veh [ ]5
- Other Non-collision [ ]6
- Unknown [ ]9

202

33. Fuel Spillage

N/A No system failure [ ]

Point of Impact Yes No Unk.

Point of Rest Yes No Unk.

34. Explosion

- Witnessed by Respondent [ ]1
- Reported [ ]2
- None [ ]3
- Unknown [ ]9

196

35. First Major Material Burned

- Diesel Fuel [ ]1
- Gasoline Fuel [ ]2
- Liquid Cargo [ ]3
- Dry Cargo [ ]4
- Tractor or Truck Cab [ ]5
- Trailer or Cargo Body [ ]6
- Other ________________ [ ]7
- Unknown [ ]9

206

36. Ignition Source

- Sparks-Collision [ ]1
- Fire other vehicle [ ]2
- Other Spark [ ]3
- Other ________________ [ ]4
- Unknown [ ]9

205

37. Seat Belt Usage - Driver

- Yes - used belt [ ]1
- No - installed belt not used [ ]2
- No - no belt installed [ ]5
- N/A - Driver not in seat [ ]8
- Unknown [ ]9

194

38. Seat belt Usage - Passenger(s)

- All [ ]1
- Some [ ]2
- None [ ]3
- N/A: No passenger or not in seat [ ]8
- Unknown [ ]9

195

	39. Entrapment	40. Ejection
1. Driver	[ ]1	[ ]1
2. Authorized Passenger	[ ]2	[ ]2
3. Unauthd. Passenger	[ ]3	[ ]3
4. 1 and 2 above	[ ]4	[ ]4
5. 2 and 3 above	[ ]5	[ ]5
6. 1 and 3 above	[ ]6	[ ]6
7. 1, 2, and 3 above	[ ]7	[ ]7
8. None	[ ]8	[ ]8
9. Unknown	[ ]9	[ ]9
	207	208

41. Estimated Travel Speed ___ ___ mph (169 170)

42. High/Low Temps ___ ___ ___ / ___ ___ ___ (151 152 153 154 155 156)

43. Ramps "On Ramp"[ ]1 "Off Ramp"[ ]2 N/A[ ]8

44. Contributing Factors

- None [ ] ________________
- Driver Action [ ] ________________
- Mechanical [ ] ________________
- Other [ ] ________________

INJURY AND DEATH

Sample Vehicle

			Fire Related
Uninjured	___		
C-Injured	___	________ (Specify)	___
B-Injured	___	________ (Specify)	___
A-Injured	___	________ (Specify)	___
K-Injured	___	________ (Specify)	___
Unk. Injured	___		

Other Vehicles and Pedestrians

			Fire Related
Uninjured	___		
C-Injured	___	________ (Specify)	___
B-Injured	___	________ (Specify)	___
A-Injured	___	________ (Specify)	___
K-Injured	___	________ (Specify)	___
Unk. Injured	___		

No. of Deaths Due to	Sample Vehicle	Other Vehicle
Fire	___	___
Fire or Trauma	___	___
Fire and Ejection	___	___
Trauma in Vehicle	___	___
Trauma and Ejection	___	___

50. Hours Driving ___ ___   51. Years Driver Employed ___ ___   52. Driver Age (*FARS*) ___ ___

OPINIONS/CONCLUSIONS (Based on respondent experience and observation of accident)

*** Truck fuel system failure and any fire-related injury/fatality, any vehicle ***

NO	UNKNOWN	YES
Code Q53/54 N/A Skip to next section	Code Q53/54 UNK Skip to next section	Go to Q53/54

Q53. If fuel had not spilled/leaked, would there still have been a fire?

Yes   No   Don't Know   Explain: ____________________

OPINIONS (cont'd)

Q54. Would there still have been injury/death from the fire? Yes No Don't Know
Explain: ______________________________
____

*** Seat belts were not used - Collision and fire injuries (sample vehicle)***

NO	UNKNOWN	YES
Code Q55 N/A Skip to Q56	Code Q55 UNK Skip to Q56	Go to Q55

Q55. Would the use of seat belts have reduced collision injury and allowed the victim to escape injury from the fire? Yes No Don"t Know
Explain: ______________________________
____

*** Seat belts were not used - fire-related death (sample vehicle) ***

NO	UNKNOWN	YES
Code Q56 N/A Skip to next section	Code Q56 UNK Skip to next section	Go to Q56

Q56. Would the use of seat belts have reduced collision injuries and allowed victim to escape death from the fire? Yes No Don't Know
Explain: ______________________________
____

*** Entrapment - fire-related injury/death (sample vehicle)***

NO	UNKNOWN	YES
Code Q57 N/A Skip to Q58/59	Code Q57 UNK Skip to Q58/59	Go to Q57

Q57. Had the victim not been trapped, could he/she have escaped injury/death from the fire? Yes No Don't Know
Explain: ______________________________
____

Q58. Are there supplemental reports, photos, etc. available? How do we get them?
____
____

Q59. What fire and emergency units responded to accident scene?
____
____

MVMA HEAVY TRUCK PROGRAM
1982 FARS SUPPLEMENT DATA ELEMENTS

ACCIDENT IDENTIFICATION *(FILL OUT PRIOR TO INTERVIEW)*

1. FARS State of Crash ______________________ Code __ __ (1, 2)

2. FARS Case No. __ __ __ __ (3, 4, 5, 6)

3. FARS Vehicle No. __ __ (7, 8)

4. Date __ __/__ __/__ __ (Month / Day / Year)

NOTE: Put all information/calculations on this form.

START HERE:

5. Owner Name ______________________________

6. Owner's Business Type ______________________________

VEHICLE USE

7. Operating Authority at the Time of the Accident

Was this a daily rental truck? Yes [ ]7
Was this truck govt. owned? (city/county/state/federal) Yes [ ]6
→ SKIP TO QUESTION 8

Do any of your trucks ever carry goods interstate (across state lines)?

[ ]1 YES → Were you operating
- PRIVATE [ ]1 (Carry own goods) → [ ]1
- FOR HIRE [ ]2 (Carry other people's goods) →
  - ICC Authorized (Common, Contract) [ ]2
  - Exempt [ ]3
  - → Was the owner also the driver? YES [ ]1 NO [ ]2

[ ]2 NO → Were you operating
- PRIVATE [ ]1 (Carry own goods) → [ ]4
- FOR HIRE [ ]2 (Carry other people's goods) → [ ]5 (11) → Was the owner also the driver? YES [ ]1 NO [ ]2

[ ]9 (9) UNKNOWN →
- PRIVATE [ ]1
- FOR HIRE [ ]2 (10) → Was the owner also the driver? YES [ ]1 NO [ ]2 (12)

8. Type of Trip

Local *(within a 50 mile radius of base)* [ ]2

Over-the-Road
- Less than 200 miles one-way intended trip distance [ ]3
- Greater than 200 miles one-way intended trip distance [ ]4
- Unknown over-the-road trip distance [ ]5 (13)

POWER UNIT

9. Power Unit Make

Autocar	[ ]	01
Brockway	[ ]	02
Chevrolet	[ ]	03
Diamond Reo	[ ]	04
Dodge	[ ]	05
Ford	[ ]	06
Freightliner	[ ]	07
GMC	[ ]	08
Hendrick	[ ]	09
Intl. Harvester	[ ]	10
Kenworth	[ ]	11
Mack	[ ]	12
Marmon	[ ]	13
Mercedes	[ ]	16
Peterbilt	[ ]	14
Volvo	[ ]	17
Western Star	[ ]	18
White*	[ ]	15
Other ________ *(Specify)*	[ ] 14-15	97

***If response is WHITE, ask whether it is Autocar, Frtliner, Wstrn Star.**

10. Power Unit Model ____________
(Name or No.)

11. Power Unit Model Year: 19 __ __ (16, 17)
(from registration)

12. Power Unit Cab Style

Conventional	[ ]1
Cab-Over-Engine/Cab Forward	[ ]2 (18)

13. Fuel

Gas	[ ]1
Diesel	[ ]2
Other ________ *(Specify)*	[ ]4 (19)

VEHICLE CONFIGURATION

		POWER UNIT		FIRST TRAILER		SECOND TRAILER		THIRD TRAILER	
14.	TYPE:	Tractor	[ ]8	Semi	[ ]1				
		St. Trk.	[ ]1 (20)	Full	[ ]2	Full	[ ]2	Full	[ ]2
				Other	[ ]3	Other	[ ]3	Other	[ ]3
				None	[ ]4 (23)	None	[ ]4 (26)	None	[ ]4 (29)
15.	BODY STYLE:	Tractor	[ ]0						
		Van	[ ]1	Van	[ ]1	Van	[ ]1	Van	[ ]1
		Flatbed	[ ]2	Flatbed	[ ]2	Flatbed	[ ]2	Flatbed	[ ]2
		Tanker	[ ]3	Tank	[ ]3	Tank	[ ]3	Tank	[ ]3
		Dump	[ ]6	Auto C.	[ ]4	Auto C.	[ ]4	Auto C.	[ ]4
		Refuse	[ ]7	Dump	[ ]6	Dump	[ ]6	Dump	[ ]6
		Other	[ ]8 (21)	Other	[ ]9 (24)	Other	[ ]9 (27)	Other	[ ]9 (30)
		________ *(Specify)*		________ *(Specify)*		________ *(Specify)*		________ *(Specify)*	
16.	NO. OF AXLES:			One	[ ]1	One	[ ]	One	[ ]1
		Two	[ ]2	Two	[ ]2	Two	[ ]2	Two	[ ]2
		Three	[ ]3	Three	[ ]3	Three	[ ]3	Three	[ ]3
		Four +	[ ]4 (22)	Four +	[ ]4 (25)	Four +	[ ]4 (28)	Four +	[ ]4 (31)

LENGTH AND WEIGHT

17. What was the TOTAL WEIGHT of the truck and any cargo at the time of the accident? ___ ___ ___ ___ ___ ___ Lbs.
32 33 34 35 36 37

18. What was the CARGO WEIGHT?

ST. TRK. ___ ___ ___ ___ ___ ___ Lbs.
38 39 40 41 42 43
(% Full: ___ ___)

1ST TRLR. ___ ___ ___ ___ ___ ___ Lbs
44 45 46 47 48 49
(% Full: ___ ___)

2ND TRLR. ___ ___ ___ ___ ___ ___ Lbs.
50 51 52 53 54 55
(% Full: ___ ___)

3RD TRLR. ___ ___ ___ ___ ___ ___ Lbs.
56 57 58 59 60 61
(% Full: ___ ___)

19. What are the EMPTY WEIGHTS of the units?

TRAC/ST TRK. ___ ___ ___ ___ ___ ___ Lbs.
62 63 64 65 66 67

1ST TRLR. ___ ___ ___ ___ ___ ___ Lbs.
68 69 70 71 72 73

2ND TRLR. ___ ___ ___ ___ ___ ___ Lbs. [1]
74 75 76 77 78 79 80
Dup Col 1-4

3RD TRLR. ___ ___ ___ ___ ___ ___ Lbs.
9 10 11 12 13 14

(OR Empty Combination Weight: ___ ___ ___ ___ ___ ___ *Lbs.)*
15 16 17 18 19 20

20. What was the TOTAL LENGTH of the truck and any trailers at the time of the accident? ___ ___ ___ Ft.
21 22 23

21. What were the LENGTHS of each unit?→*(OR Cargo Body Length for Straight Truck)* ___ ___ ___

TRAC/ST TRK. ___ ___ ___ Ft.
24 25 26

1ST TRLR. ___ ___ ___ Ft.
27 28 29

2ND TRLR. ___ ___ ___ Ft.
30 31 32

3RD TRLR. ___ ___ ___ Ft.
33 34 35

22. What was the WIDTH of the truck or cargo at the time of the accident? ___ ___ Ft.

23. Cargo ______________________
(Specify and code below)

	ST. TRUCK	1ST TRAILER	2ND TRAILER	3RD TRAILER
Empty	[ ]12	[ ]12	[ ]12	[ ]12
General freight (LTL)	[ ]01	[ ]01	[ ]01	[ ]01
Household goods, uncrated furniture/fixtures	[ ]02	[ ]02	[ ]02	[ ]02
Metal (coils, sheets, rods)	[ ]03	[ ]03	[ ]03	[ ]03
Heavy machinery/large objects	[ ]04	[ ]04	[ ]04	[ ]04
Motor vehicles	[ ]05	[ ]05	[ ]05	[ ]05
Driveaway/Towaway/Piggyback	[ ]06	[ ]06	[ ]06	[ ]06
Gases in bulk (LPG, Propane)	[ ]07	[ ]07	[ ]07	[ ]07
Solids in bulk (not packaged)	[ ]08	[ ]08	[ ]08	[ ]08
Liquids in bulk (milk, gasoline)	[ ]09	[ ]09	[ ]09	[ ]09
Explosives	[ ]10	[ ]10	[ ]10	[ ]10
Logs, Poles, Lumber	[ ]11	[ ]11	[ ]11	[ ]11
Refrigerated foods	[ ]13	[ ]13	[ ]13	[ ]13
Mobile home	[ ]14	[ ]14	[ ]14	[ ]14
Farm products (including animals)	[ ]15	[ ]15	[ ]15	[ ]15
Other	[ ]16	[ ]16	[ ]16	[ ]16
	38-39	41-42	44-45	47-48

24. Hazardous Cargo				
Yes	[ ] 1	[ ] 1	[ ] 1	[ ] 1
No	[ ] 2	[ ] 2	[ ] 2	[ ] 2
	40	43	46	49

25. Were any of the following the primary accident event?

Ran-off-road	[ ] 0
Jackknife	[ ] 1
Overturn	[ ] 2
Separation of units	[ ] 3
Fire	[ ] 4
Loss or spillage of cargo	[ ] 5
Cargo shift	[ ] 6
None	[ ] 8
	50

26. Did any of the following result from the accident (not the primary event)?

Spillage of non-hazardous cargo	[ ] 4
Spillage of hazardous cargo	[ ] 2
Fire (in any vehicle)	[ ] 3
Explosion	[ ] 5
None	[ ] 1
	51

27. At the time of the accident how many hours had the driver been driving? __ __ Hrs. (52 53)

*** END OF INTERVIEW ***

Thank you for your cooperation.

28. Driver Age *(from FARS)* __ __ Years (54 55)

REMAINDER TO BE COMPLETED BY EDITOR.

29. Interview Status

Complete	[ ] 1
Refusal	[ ] 2
Partial	[ ] 3
Unable to contact	[ ] 4
	56

30. Source

Police Report	[ ] 1
Interview	[ ] 2
BMCS	[ ] 4
Mail	[ ] 5
	57

DERIVED INFORMATION *(Insert question numbers.)*

__ __ (58 59)	__ __ (68 69)
__ __ (60 61)	__ __ (70 71)
__ __ (62 63)	__ __ (72 73)
__ __ (64 65)	__ __ (74 75)
__ __ (66 67)	__ __ (76 77)

[2] (80)

v001	CASE STATE	_ _
v002	CASE NUMBER	_ _ _ _
v104	VEH NUMBER	_ _
v799	FILLER	_ _ _
v800	BMCS ID	_ _ _ _ _
v803	VIN	_ _ _ _ _ _ _ _ _ _ _
v804	FUEL TYPE	_
v805	ENGINE MAKE	_
v806	ENGINE MODEL	_ _ _ _ _ _ _ _ _ _
v807	VEH MAKE	_ _
v808	VEH MODEL	_ _ _ _ _ _ _ _ _ _
v809	MODEL YEAR	_ _
v810	CAB STYLE	_
v811	POWER UNIT STYLE	_
v812	POWER UNIT AXLES	_
V813	TLR1 TYPE	_
v814	TLR1 AXLES	_
v815	TLR1.BODY	_ _
v816	TLR2 TYPE	_
v817	TLR2 AXLES	_
v818	TLR2 BODY	_ _
v819	VEH COMB.	_ _
v820	TOTAL WT	_ _ _ _ _ _
v821	1st CARGO WT	_ _ _ _ _ _
v822	2nd CARGO WT	_ _ _ _ _ _
v823	TOT CARGO WT	_ _ _ _ _ _
v824	EMPTY COMB	_ _ _ _ _ _
v825	P. UNIT WT	_ _ _ _ _ _
v826	1st TLR WT	_ _ _ _ _ _
v827	2nd TLR WT	_ _ _ _ _ _
v828	TOT VEH LENGTH	_ _ _
v829	P. UNIT LENGTH	_ _ _
v830	1st TLR LENGTH	_ _ _
v831	2nd TLR LENGTH	_ _ _
v832	WIDTH INCHES	_ _ _
v833	FUEL TANK CONFIG	_
v834	R TANK SIZE	_ _ _
v835	L TANK SIZE	_ _ _

v836	L AUX TANK SIZE	_ _ _
v837	R AUX TANK SIZE	_ _ _
v838	FUEL ON BOARD %	_ _ _
v839	CARGO TYPE	_ _
v840	HAZARD CARGO	_
v841	CARGO SPILLAGE	_
v842	CARRIER TYPE	_
v843	TRIP TYPE	_
v844	TEMP:HIGH	_ _ _
v845	TEMP:LOW	_ _ _
v846	ACTUAL TEMP	_ _ _
v847	RAMP STATUS	_
v850	1st IMPACT PNT	_ _
v851	P IMPACT PNT	_ _
v852	ROLLOVER CAUSE	_
v853	ROLLOVER DIR	_
v854	ROLLOVER AMT	_
v855	JACKNIFE	_
v856	EST TRAVEL SPD	_ _
v857	1st HARM EVENT	_ _
v858	1st CONFIG	_ _
v859	2nd HARM EVENT	_ _
v860	2nd CONFIG	_ _
v861	3rd HARM EVENT	_ _
v862	3rd CONFIG	_ _
v863	4th HARM EVENT	_ _
v864	4th CONFIG	_ _
v865	5th HARM EVENT	_ _
v866	5th CONFIG	_ _
v867	MOST HRM EVENT	_
v868	MECH DEFECT	_ _
v869	SEAT BELT DRIVER	_
v870	SEAT BELT PASSGR	_
v871	EXPLOSION	_
v873	PRKD/STOP/SLOW	_
v874	FSF:RUPTURE	_ _
v875	FSF:LEAKAGE	_ _
v876	FSF:CAUSE	_
v877	FUEL SPILL:IMPCT	_

v878	FUEL SPILL:REST	___
v879	IGNITION SOURCE	___
v880	1st MATER BURNED	___
v881	ENTRAPMENT	___
v882	EJECTION	___
v883	NO. OCCUP IN VEH	___
v884	NO. UNINJD IN VEH	___ 210
v885	NO, INJD IN VEH	___
v886	DRIVER INJURY	___
v887	NO. PASS KILLED	___
v888	NO. PASS INJD	___
v889	UNINJD OTH VEH	___
v890	A-INJD OTH VEH	___
v891	B-INJD OTH VEH	___
v892	C-INJD OTH VEH	___
v893	UNK INJD OTH VEH	___
v894	K-INJD OTH VEH	___ 220
v895	TOT ACC FATALS	___
v896	TOT ACC INJD	___
v897	YRS DRIVER EMPLYD	___ ___
v898	DRIVER AGE (YARS)	___ ___
v899	HRS DRIVING	___ ___
v902	F:S	___
v903	F+T:S	___ 230
v904	F+E:S	___
v905	T:S	___
v906	T+E:S	___
v907	F:O	___
v908	F+T:O	___
v909	F+E:O	___
v910	T:O	___
v911	T+E:O	___
v912	FIRE INJD:S	___
v913	FIRE INJD:O	___ 240
v915	COLL EVENT 1	___
v916	COLL EVENT 2	___
v917	COLL EVENT 3	___
v918	COLL EVENT 4	___
v919	COLL EVENT 5	___
v920	Q:F W/O FUEL SPILL	___
v921	Q:INJ/K W/O FUEL F	___
v922	Q:BELT, NO F INJ	___
v923	Q:BELT, NO F K	___
v924	Q:NO TRAP, NO F INJ/K	___ 250
v925	V1 ACTION: COLL	___ ___
v926	V2 ACTION: COLL	___ ___
v927	V3 AcTION: COLL	___ ___
v928	ACC MONTH	___ ___
v929	ACC DATE	___ ___ 260

INTERVIEW LOG SHEET

FARS STATE ______________ FARS CASE NO. ______________

FARS VEHICLE NO. ______________

Date	Time	Company	Person	Position	Phone	Initial

Date	COMMENTS *(NOTE HERE IF PERSON YOU SPEAK TO SAYS TO CALL SOMEONE ELSE.)*

APPENDIX F

Data Set List of Fire-Only Fatalities

This appendix contains the computer output for a data set list of selected variables for those cases involving truck occupants who were believed to have succumbed to fire-only injuries. The predominance of liquid cargo fires in this subset can be noted. A larger set (41 persons) of cases (not presented here) covers truck occupants who died from fire/and or traumatic injuries. This appendix is given primarily as an example of the data retrieval method.

Program: LIST (Data Set List)
Date: DEC 8, 1984 at 13:52:46

Data Key: COMB2

Filter:
INCLUDE V154=1-3 AND V804=1 AND V902=1-3

Listing of Filter Variables Requested:

Num	Name	T	FW	Loc	ID	MR	MD 1	MD 2
154	NO OF K-INJURED IN VEH	C	2	169	0	1		
804	FUEL TYPE	C	1	288	0	1	9	
902	NO. K DUE TO F - SAMP	C	1	490	0	1	9	

Title:
DIESEL TRUCKS WITH A FATALITY IN THE TRUCK

Options Specified:
LABEL
NARROW
CASE
WIDTH = 70
VARIABLE = 1,2,104,805-813,815,840-843,850,852-853,855,857,858,915,
859,860,916,861,862,917,863,864,918,865,866,919,869-871,
873-882,867,880,887,902-906

.Listing of Program Variables Requested:

Num	Name	T	FW	Loc	ID	MR	MD 1	MD 2
1	CASE STATE	C	2	1	0	1		
2	CASE NUMBER	C	4	3	0	1		
104	VEHICLE NUMBER	C	2	92	0	1	0	
805	ENGINE MAKE	C	1	289	0	1	9	
806	ENGINE MODEL	A	10	290	0	1		
807	VEHICLE MAKE	C	2	300	0	1	99	
808	VEHICLE MODEL	A	10	302	0	1		
809	MODEL YEAR	C	2	312	0	1	99	
810	CAB STYLE	C	1	314	0	1	9	
811	POWER UNIT BODY STYLE	C	1	315	0	1	9	
812	POWER UNIT – AXLES	C	1	316	0	1	9	
813	TYPE OF FIRST TRAILER	C	1	317	0	1	9	
815	1ST TRAILER BODY TYPE	C	2	319	0	1	99	98
840	HAZARDOUS CARGO	C	1	408	0	1	9	
841	CARGO SPILLAGE	C	1	409	0	1	9	
842	TYPE OF CARRIER	C	1	410	0	1	9	
843	TYPE OF TRIP	C	1	411	0	1	9	
850	INITIAL IMPACT POINT	C	2	422	0	1	99	
852	ROLLOVER-CAUSE	C	1	426	0	1	9	
853	ROLLOVER-DIRECTION	C	1	427	0	1	9	
855	JACKNIFE	C	1	429	0	1	9	
857	1ST HARMFUL EVENT	C	2	432	0	1	99	
858	1ST OTHER VEH. CONFIG	C	2	434	0	1	99	
915	MANNER OF COLLISION/1ST	C	1	502	0	1	9	
859	2ND HARMFUL EVENT	C	2	436	0	1	99	
860	2ND OTHER VEH. CONFIG	C	2	438	0	1	99	
916	MANNER OF COLLISION/2ND	C	1	503	0	1	9	
861	3RD HARMFUL EVENT	C	2	440	0	1	99	
862	3RD OTHER VEH. CONFIG	C	2	442	0	1	99	
917	MANNER OF COLLISION/3RD	C	1	504	0	1	9	
863	4TH HARMFUL EVENT	C	2	444	0	1	99	
864	4TH OTHER VEH. CONFIG	C	2	446	0	1	99	
918	MANNER OF COLLISION/4TH	C	1	505	0	1	9	
865	5TH HARMFUL EVENT	C	2	448	0	1	99	
866	5TH OTHER VEH. CONFIG	C	2	450	0	1	99	
919	MANNER OF COLLISION/5TH	C	1	506	0	1	9	
869	SEATBELT USAGE-DRIVER	C	1	455	0	1	9	4
870	SEATBELT USAGE-PASNGRS	C	1	456	0	1	9	
871	EXPLOSION	C	1	457	0	1	9	
873	SLOW/STOPPED/PARKED/VEH	C	1	458	0	1	9	
874	FUEL SYST FAIL:RUPTURE	C	2	459	0	1	99	
875	FUEL SYST FAIL:LEAK	C	2	461	0	1	99	
876	FUEL SYST FAIL:CAUSE	C	1	463	0	1	9	
877	FUEL SPILLAGE: IMPACT	C	1	464	0	1	9	
878	FUEL SPILLAGE: REST	C	1	465	0	1	9	
879	IGNITION SOURCE	C	1	466	0	1	9	
880	1st MATERIAL BURNED	C	1	467	0	1	9	
881	ENTRAPMENT	C	1	468	0	1	9	
882	EJECTION	C	1	469	0	1	9	
867	MOST HARMFUL EVENT	C	1	452	0	1	9	
880	1st MATERIAL BURNED	C	1	467	0	1	9	
887	NO. PASSENGERS KILLED	C	1	474	0	1	9	

902	NO. K DUE TO F − SAMP	C	1	490	0	1	9
903	NO. K DUE TO F+T − SAMP	C	1	491	0	1	9
904	NO. K DUE TO F+E − SAMP	C	1	492	0	1	9
905	NO. K DUE TO T − SAMP	C	1	493	0	1	9
906	NO. K DUE TO T+E − SAMP	C	1	494	0	1	9

Data Set List – CASE mode
Date: DEC 8, 1984 at 13:52:58
DIESEL TRUCKS WITH A FATALITY IN THE TRUCK

CASE No. 1

V1:CASE STATE	= Alabama
V2:CASE NUMBER	= 435
V104:VEHICLE NUMBER	= Veh. #1
V805:ENGINE MAKE	= Cummins
V806:ENGINE MODEL	= 350-999999
V807:VEHICLE MAKE	= Freightliner
V808:VEHICLE MODEL	= FLC12064T-
V809:MODEL YEAR	= 82
V810:CAB STYLE	= Conventional
V811:POWER UNIT BODY STYLE	= Tractor: N/A
V812:POWER UNIT - AXLES	= 3
V813:TYPE OF FIRST TRAILER	= Semi-trailer
V815:1ST TRAILER BODY TYPE	= Other
V840:HAZARDOUS CARGO	= Yes
V841:CARGO SPILLAGE	= Yes
V842:TYPE OF CARRIER	= Intra/private
V843:TYPE OF TRIP	= Local pick-up and delivery
V850:INITIAL IMPACT POINT	= Left
V852:ROLLOVER-CAUSE	= N/A:No rollover
V853:ROLLOVER-DIRECTION	= N/A:No rollover
V855:JACKNIFE	= No
V857:1ST HARMFUL EVENT	= b:Col.w/ Fixed object
V858:1ST OTHER VEH. CONFIG	= N/A:No other vehicle
V915:MANNER OF COLLISION/1ST	= Not a collision
V859:2ND HARMFUL EVENT	= Fire/Explosion
V860:2ND OTHER VEH. CONFIG	= N/A:No other vehicle
V916:MANNER OF COLLISION/2ND	= Not a collision
V861:3RD HARMFUL EVENT	= No Event
V862:3RD OTHER VEH. CONFIG	= N/A:No 3rd harmful event
V917:MANNER OF COLLISION/3RD	= N/A: No 3rd event
V863:4TH HARMFUL EVENT	= No Event
V864:4TH OTHER VEH. CONFIG	= N/A:No 4th harmful event
V918:MANNER OF COLLISION/4TH	= N/A: No 4th event
V865:5TH HARMFUL EVENT	= No Event
V866:5TH OTHER VEH. CONFIG	= N/A:No 5th harmful event
V919:MANNER OF COLLISION/5TH	= N/A: No 5th event
V869:SEATBELT USAGE-DRIVER	= N/A:Driver not in seat
V870:SEATBELT USAGE-PASNGRS	= N/A:No passenger
V871:EXPLOSION	= Reported
V873:SLOW/STOPPED/PARKED/VEH	= None
V874:FUEL SYST FAIL:RUPTURE	= None
V875:FUEL SYST FAIL:LEAK	= None
V876:FUEL SYST FAIL:CAUSE	= N/A:No system fa
V877:FUEL SPILLAGE: IMPACT	= No
V878:FUEL SPILLAGE: REST	= No
V879:IGNITION SOURCE	= Unknown
V880: 1st MATERIAL BURNED	= Other
V881:ENTRAPMENT	= None
V882:EJECTION	= None
V867:MOST HARMFUL EVENT	= 2nd event
V887:NO. PASSENGERS KILLED	= N/A: No passengers
V902:NO. K DUE TO F - SAMP	= 1

CASE No. 2

V1:CASE STATE	=	Arkansas
V2:CASE NUMBER	=	227
V104:VEHICLE NUMBER	=	Veh. #1
V805:ENGINE MAKE	=	Other Diesel
V806:ENGINE MODEL	=	9999999999
V807:VEHICLE MAKE	=	IH
V808:VEHICLE MODEL	=	F-2575-SS9
V809:MODEL YEAR	=	79
V810:CAB STYLE	=	Conventional
V811:POWER UNIT BODY STYLE	=	Tractor: N/A
V812:POWER UNIT - AXLES	=	3
V813:TYPE OF FIRST TRAILER	=	Semi-trailer
V815:1ST TRAILER BODY TYPE	=	Tank
V840:HAZARDOUS CARGO	=	Yes
V841:CARGO SPILLAGE	=	Yes
V842:TYPE OF CARRIER	=	Inter/private
V843:TYPE OF TRIP	=	Under 200
V850:INITIAL IMPACT POINT	=	Rear Left
V852:ROLLOVER-CAUSE	=	Coll. w/fixed ob
V853:ROLLOVER-DIRECTION	=	Left
V855:JACKNIFE	=	No
V857:1ST HARMFUL EVENT	=	b:Col.w/ Fixed object
V858:1ST OTHER VEH. CONFIG	=	N/A:No other vehicle
V915:MANNER OF COLLISION/1ST	=	Not a collision
V859:2ND HARMFUL EVENT	=	Overturn
V860:2ND OTHER VEH. CONFIG	=	N/A:No other vehicle
V916:MANNER OF COLLISION/2ND	=	Not a collision
V861:3RD HARMFUL EVENT	=	Fire/Explosion
V862:3RD OTHER VEH. CONFIG	=	N/A:No other vehicle
V917:MANNER OF COLLISION/3RD	=	Not a collision
V863:4TH HARMFUL EVENT	=	No Event
V864:4TH OTHER VEH. CONFIG	=	N/A:No 4th harmful event
V918:MANNER OF COLLISION/4TH	=	N/A: No 4th event
V865:5TH HARMFUL EVENT	=	No Event
V866:5TH OTHER VEH. CONFIG	=	N/A:No 5th harmful event
V919:MANNER OF COLLISION/5TH	=	N/A: No 5th event
V869:SEATBELT USAGE-DRIVER	=	No - installed b
V870:SEATBELT USAGE-PASNGRS	=	N/A:No passenger
V871:EXPLOSION	=	Unknown
V873:SLOW/STOPPED/PARKED/VEH	=	None
V874:FUEL SYST FAIL:RUPTURE	=	L,R
V875:FUEL SYST FAIL:LEAK	=	None
V876:FUEL SYST FAIL:CAUSE	=	Fire/Explosion
V877:FUEL SPILLAGE: IMPACT	=	Unknown
V878:FUEL SPILLAGE: REST	=	Yes
V879:IGNITION SOURCE	=	Unknown
V880: 1st MATERIAL BURNED	=	Liquid Cargo
V881:ENTRAPMENT	=	None
V882:EJECTION	=	None
V867:MOST HARMFUL EVENT	=	1st event
V887:NO. PASSENGERS KILLED	=	N/A: No passengers
V902:NO. K DUE TO F - SAMP	=	1

CASE No. 3

V1:CASE STATE	=	California
V2:CASE NUMBER	=	1556
V104:VEHICLE NUMBER	=	Veh. #5
V805:ENGINE MAKE	=	Cummins
V806:ENGINE MODEL	=	350-999999
V807:VEHICLE MAKE	=	Kenworth
V808:VEHICLE MODEL	=	9999999999
V809:MODEL YEAR	=	76
V810:CAB STYLE	=	COE/Cab Forward
V811:POWER UNIT BODY STYLE	=	Tractor: N/A
V812:POWER UNIT - AXLES	=	3
V813:TYPE OF FIRST TRAILER	=	Semi-trailer
V815:1ST TRAILER BODY TYPE	=	Van
V840:HAZARDOUS CARGO	=	No
V841:CARGO SPILLAGE	=	No
V842:TYPE OF CARRIER	=	Intra/private
V843:TYPE OF TRIP	=	Under 200
V850:INITIAL IMPACT POINT	=	No Impact
V852:ROLLOVER-CAUSE	=	N/A:No rollover
V853:ROLLOVER-DIRECTION	=	N/A:No rollover
V855:JACKNIFE	=	No
V857:1ST HARMFUL EVENT	=	Fire/Explosion
V858:1ST OTHER VEH. CONFIG	=	N/A:No other vehicle
V915:MANNER OF COLLISION/1ST	=	Not a collision
V859:2ND HARMFUL EVENT	=	No Event
V860:2ND OTHER VEH. CONFIG	=	N/A:No 2nd harmful event
V916:MANNER OF COLLISION/2ND	=	N/A:No second ev
V861:3RD HARMFUL EVENT	=	No Event
V862:3RD OTHER VEH. CONFIG	=	N/A:No 3rd harmful event
V917:MANNER OF COLLISION/3RD	=	N/A: No 3rd event
V863:4TH HARMFUL EVENT	=	No Event
V864:4TH OTHER VEH. CONFIG	=	N/A:No 4th harmful event
V918:MANNER OF COLLISION/4TH	=	N/A: No 4th event
V865:5TH HARMFUL EVENT	=	No Event
V866:5TH OTHER VEH. CONFIG	=	N/A:No 5th harmful event
V919:MANNER OF COLLISION/5TH	=	N/A: No 5th event
V869:SEATBELT USAGE-DRIVER	=	Unknown:installe
V870:SEATBELT USAGE-PASNGRS	=	Unknown
V871:EXPLOSION	=	Reported
V873:SLOW/STOPPED/PARKED/VEH	=	None
V874:FUEL SYST FAIL:RUPTURE	=	None
V875:FUEL SYST FAIL:LEAK	=	None
V876:FUEL SYST FAIL:CAUSE	=	N/A:No system fa
V877:FUEL SPILLAGE: IMPACT	=	No
V878:FUEL SPILLAGE: REST	=	No
V879:IGNITION SOURCE	=	Fire-oth vehicle
V880: 1st MATERIAL BURNED	=	Tractor or truck
V881:ENTRAPMENT	=	1+2
V882:EJECTION	=	None
V867:MOST HARMFUL EVENT	=	1st event
V887:NO. PASSENGERS KILLED	=	1
V902:NO. K DUE TO F - SAMP	=	2

CASE No. 4

V1:CASE STATE	=	Colorado
V2:CASE NUMBER	=	420
V104:VEHICLE NUMBER	=	Veh. #1
V805:ENGINE MAKE	=	Cummins
V806:ENGINE MODEL	=	NT-9999999
V807:VEHICLE MAKE	=	Kenworth
V808:VEHICLE MODEL	=	W900-99999
V809:MODEL YEAR	=	82
V810:CAB STYLE	=	Conventional
V811:POWER UNIT BODY STYLE	=	Tractor: N/A
V812:POWER UNIT - AXLES	=	3
V813:TYPE OF FIRST TRAILER	=	Semi-trailer
V815:1ST TRAILER BODY TYPE	=	Tank
V840:HAZARDOUS CARGO	=	Yes
V841:CARGO SPILLAGE	=	Yes
V842:TYPE OF CARRIER	=	Inter/private
V843:TYPE OF TRIP	=	Over 200
V850:INITIAL IMPACT POINT	=	Left
V852:ROLLOVER-CAUSE	=	Ran-off-road
V853:ROLLOVER-DIRECTION	=	Left
V855:JACKNIFE	=	No
V857:1ST HARMFUL EVENT	=	Overturn
V858:1ST OTHER VEH. CONFIG	=	N/A:No other vehicle
V915:MANNER OF COLLISION/1ST	=	Not a collision
V859:2ND HARMFUL EVENT	=	Fire/Explosion
V860:2ND OTHER VEH. CONFIG	=	N/A:No other vehicle
V916:MANNER OF COLLISION/2ND	=	Not a collision
V861:3RD HARMFUL EVENT	=	No Event
V862:3RD OTHER VEH. CONFIG	=	N/A:No 3rd harmful event
V917:MANNER OF COLLISION/3RD	=	Not a collision
V863:4TH HARMFUL EVENT	=	No Event
V864:4TH OTHER VEH. CONFIG	=	N/A:No 4th harmful event
V918:MANNER OF COLLISION/4TH	=	N/A: No 4th event
V865:5TH HARMFUL EVENT	=	No Event
V866:5TH OTHER VEH. CONFIG	=	N/A:No 5th harmful event
V919:MANNER OF COLLISION/5TH	=	N/A: No 5th event
V869:SEATBELT USAGE-DRIVER	=	Yes - used belt
V870:SEATBELT USAGE-PASNGRS	=	N/A:No passenger
V871:EXPLOSION	=	Witnessed
V873:SLOW/STOPPED/PARKED/VEH	=	None
V874:FUEL SYST FAIL:RUPTURE	=	L,R
V875:FUEL SYST FAIL:LEAK	=	None
V876:FUEL SYST FAIL:CAUSE	=	Fire/Explosion
V877:FUEL SPILLAGE: IMPACT	=	No
V878:FUEL SPILLAGE: REST	=	Yes
V879:IGNITION SOURCE	=	Sparks/collision
V880: 1st MATERIAL BURNED	=	Liquid Cargo
V881:ENTRAPMENT	=	None
V882:EJECTION	=	None
V867:MOST HARMFUL EVENT	=	1st event
V887:NO. PASSENGERS KILLED	=	N/A: No passengers
V902:NO. K DUE TO F - SAMP	=	1

CASE No. 5

V1:CASE STATE	=	Florida
V2:CASE NUMBER	=	782
V104:VEHICLE NUMBER	=	Veh. #2
V805:ENGINE MAKE	=	Mack
V806:ENGINE MODEL	=	ENDT676-99
V807:VEHICLE MAKE	=	Mack
V808:VEHICLE MODEL	=	R686ST-999
V809:MODEL YEAR	=	80
V810:CAB STYLE	=	Conventional
V811:POWER UNIT BODY STYLE	=	Tractor: N/A
V812:POWER UNIT - AXLES	=	3
V813:TYPE OF FIRST TRAILER	=	Semi-trailer
V815:1ST TRAILER BODY TYPE	=	Tank
V840:HAZARDOUS CARGO	=	Yes
V841:CARGO SPILLAGE	=	Yes
V842:TYPE OF CARRIER	=	Inter/private
V843:TYPE OF TRIP	=	Over-the-road (
V850:INITIAL IMPACT POINT	=	Front Right
V852:ROLLOVER-CAUSE	=	Coll. w/fixed ob
V853:ROLLOVER-DIRECTION	=	Left
V855:JACKNIFE	=	No
V857:1ST HARMFUL EVENT	=	b:Col.w/ slow mo
V858:1ST OTHER VEH. CONFIG	=	Straight
V915:MANNER OF COLLISION/1ST	=	Direct-to-side
V859:2ND HARMFUL EVENT	=	b:Col.w/ Fixed object
V860:2ND OTHER VEH. CONFIG	=	N/A:No other vehicle
V916:MANNER OF COLLISION/2ND	=	Not a collision
V861:3RD HARMFUL EVENT	=	Overturn
V862:3RD OTHER VEH. CONFIG	=	N/A:No other vehicle
V917:MANNER OF COLLISION/3RD	=	Not a collision
V863:4TH HARMFUL EVENT	=	Fire/Explosion
V864:4TH OTHER VEH. CONFIG	=	N/A:No other vehicle
V918:MANNER OF COLLISION/4TH	=	Not a collision
V865:5TH HARMFUL EVENT	=	No Event
V866:5TH OTHER VEH. CONFIG	=	N/A:No 5th harmful event
V919:MANNER OF COLLISION/5TH	=	N/A: No 5th event
V869:SEATBELT USAGE-DRIVER	=	No - no belt ins
V870:SEATBELT USAGE-PASNGRS	=	N/A:No passenger
V871:EXPLOSION	=	Reported
V873:SLOW/STOPPED/PARKED/VEH	=	Other vehicle
V874:FUEL SYST FAIL:RUPTURE	=	None
V875:FUEL SYST FAIL:LEAK	=	None
V876:FUEL SYST FAIL:CAUSE	=	N/A:No system fa
V877:FUEL SPILLAGE: IMPACT	=	No
V878:FUEL SPILLAGE: REST	=	Yes
V879:IGNITION SOURCE	=	Other spark
V880: 1st MATERIAL BURNED	=	Liquid Cargo
V881:ENTRAPMENT	=	Driver
V882:EJECTION	=	None
V867:MOST HARMFUL EVENT	=	4th event
V887:NO. PASSENGERS KILLED	=	N/A: No passengers
V902:NO. K DUE TO F - SAMP	=	1

CASE No. 6

V1:CASE STATE	= Maine
V2:CASE NUMBER	= 190
V104:VEHICLE NUMBER	= Veh. #2
V805:ENGINE MAKE	= Cummins
V806:ENGINE MODEL	= FORMULA230
V807:VEHICLE MAKE	= IH
V808:VEHICLE MODEL	= S-2575-999
V809:MODEL YEAR	= 78
V810:CAB STYLE	= Conventional
V811:POWER UNIT BODY STYLE	= Tractor: N/A
V812:POWER UNIT - AXLES	= 3
V813:TYPE OF FIRST TRAILER	= Semi-trailer
V815:1ST TRAILER BODY TYPE	= Tank
V840:HAZARDOUS CARGO	= Yes
V841:CARGO SPILLAGE	= Yes
V842:TYPE OF CARRIER	= Inter/authorized
V843:TYPE OF TRIP	= Over 200
V850:INITIAL IMPACT POINT	= Front Left
V852:ROLLOVER-CAUSE	= N/A:No rollover
V853:ROLLOVER-DIRECTION	= N/A:No rollover
V855:JACKNIFE	= No
V857:1ST HARMFUL EVENT	= f:Col.w/motor ve
V858:1ST OTHER VEH. CONFIG	= Car/Pickup
V915:MANNER OF COLLISION/1ST	= Sideswipe - oppo
V859:2ND HARMFUL EVENT	= f:Col.w/motor ve
V860:2ND OTHER VEH. CONFIG	= Car/Pickup
V916:MANNER OF COLLISION/2ND	= Sideswipe - oppo
V861:3RD HARMFUL EVENT	= Fire/Explosion
V862:3RD OTHER VEH. CONFIG	= N/A:No other vehicle
V917:MANNER OF COLLISION/3RD	= Not a collision
V863:4TH HARMFUL EVENT	= No Event
V864:4TH OTHER VEH. CONFIG	= N/A:No 4th harmful event
V918:MANNER OF COLLISION/4TH	= N/A: No 4th event
V865:5TH HARMFUL EVENT	= No Event
V866:5TH OTHER VEH. CONFIG	= N/A:No 5th harmful event
V919:MANNER OF COLLISION/5TH	= N/A: No 5th event
V869:SEATBELT USAGE-DRIVER	= Unknown:installe
V870:SEATBELT USAGE-PASNGRS	= N/A:No passenger
V871:EXPLOSION	= Witnessed
V873:SLOW/STOPPED/PARKED/VEH	= None
V874:FUEL SYST FAIL:RUPTURE	= None
V875:FUEL SYST FAIL:LEAK	= Some leak, unkno
V876:FUEL SYST FAIL:CAUSE	= Fire/Explosion
V877:FUEL SPILLAGE: IMPACT	= No
V878:FUEL SPILLAGE: REST	= Yes
V879:IGNITION SOURCE	= Unknown
V880: 1st MATERIAL BURNED	= Liquid Cargo
V881:ENTRAPMENT	= Driver
V882:EJECTION	= None
V867:MOST HARMFUL EVENT	= 3rd event
V887:NO. PASSENGERS KILLED	= N/A: No passengers
V902:NO. K DUE TO F - SAMP	= 1

CASE No. 7

V1:CASE STATE	=	Mississippi
V2:CASE NUMBER	=	432
V104:VEHICLE NUMBER	=	Veh. #2
V805:ENGINE MAKE	=	Detroit Diesel
V806:ENGINE MODEL	=	6-71-99999
V807:VEHICLE MAKE	=	GMC
V808:VEHICLE MODEL	=	ASTRO-95-9
V809:MODEL YEAR	=	78
V810:CAB STYLE	=	COE/Cab Forward
V811:POWER UNIT BODY STYLE	=	Tractor: N/A
V812:POWER UNIT - AXLES	=	2
V813:TYPE OF FIRST TRAILER	=	Semi-trailer
V815:1ST TRAILER BODY TYPE	=	Van
V840:HAZARDOUS CARGO	=	No
V841:CARGO SPILLAGE	=	Unknown
V842:TYPE OF CARRIER	=	Inter/private
V843:TYPE OF TRIP	=	Over-the-road (
V850:INITIAL IMPACT POINT	=	Right
V852:ROLLOVER-CAUSE	=	Coll. w/mov vehi
V853:ROLLOVER-DIRECTION	=	Right
V855:JACKNIFE	=	No
V857:1ST HARMFUL EVENT	=	f:Col.w/motor ve
V858:1ST OTHER VEH. CONFIG	=	Car/Pickup
V915:MANNER OF COLLISION/1ST	=	Direct-to-side
V859:2ND HARMFUL EVENT	=	Fire/Explosion
V860:2ND OTHER VEH. CONFIG	=	N/A:No other vehicle
V916:MANNER OF COLLISION/2ND	=	Not a collision
V861:3RD HARMFUL EVENT	=	Overturn
V862:3RD OTHER VEH. CONFIG	=	N/A:No other vehicle
V917:MANNER OF COLLISION/3RD	=	Not a collision
V863:4TH HARMFUL EVENT	=	Other
V864:4TH OTHER VEH. CONFIG	=	N/A:No other vehicle
V918:MANNER OF COLLISION/4TH	=	Not a collision
V865:5TH HARMFUL EVENT	=	No Event
V866:5TH OTHER VEH. CONFIG	=	N/A:No 5th harmful event
V919:MANNER OF COLLISION/5TH	=	N/A: No 5th event
V869:SEATBELT USAGE-DRIVER	=	No - installed b
V870:SEATBELT USAGE-PASNGRS	=	N/A:No passenger
V871:EXPLOSION	=	None
V873:SLOW/STOPPED/PARKED/VEH	=	None
V874:FUEL SYST FAIL:RUPTURE	=	Right
V875:FUEL SYST FAIL:LEAK	=	None
V876:FUEL SYST FAIL:CAUSE	=	Coll. w/moving m
V877:FUEL SPILLAGE: IMPACT	=	Yes
V878:FUEL SPILLAGE: REST	=	Yes
V879:IGNITION SOURCE	=	Sparks/collision
V880: 1st MATERIAL BURNED	=	Diesel fuel
V881:ENTRAPMENT	=	None
V882:EJECTION	=	Driver
V867:MOST HARMFUL EVENT	=	1st event
V887:NO. PASSENGERS KILLED	=	N/A: No passengers
V902:NO. K DUE TO F - SAMP	=	1

CASE No. 8

V1:CASE STATE	=	Missouri
V2:CASE NUMBER	=	222
V104:VEHICLE NUMBER	=	Veh. #3
V805:ENGINE MAKE	=	Cummins
V806:ENGINE MODEL	=	9999999999
V807:VEHICLE MAKE	=	White
V808:VEHICLE MODEL	=	ROAD-BOSS9
V809:MODEL YEAR	=	76
V810:CAB STYLE	=	Conventional
V811:POWER UNIT BODY STYLE	=	Tractor: N/A
V812:POWER UNIT – AXLES	=	3
V813:TYPE OF FIRST TRAILER	=	Semi-trailer
V815:1ST TRAILER BODY TYPE	=	Tank
V840:HAZARDOUS CARGO	=	Yes
V841:CARGO SPILLAGE	=	Yes
V842:TYPE OF CARRIER	=	Inter/private
V843:TYPE OF TRIP	=	Over-the-road (
V850:INITIAL IMPACT POINT	=	Rear Left
V852:ROLLOVER-CAUSE	=	Ran-off-road
V853:ROLLOVER-DIRECTION	=	Unk. Direction
V855:JACKNIFE	=	No
V857:1ST HARMFUL EVENT	=	b:Col.w/ moving
V858:1ST OTHER VEH. CONFIG	=	Car/Pickup
V915:MANNER OF COLLISION/1ST	=	Sideswipe – oppo
V859:2ND HARMFUL EVENT	=	Fire/Explosion
V860:2ND OTHER VEH. CONFIG	=	N/A:No other vehicle
V916:MANNER OF COLLISION/2ND	=	Not a collision
V861:3RD HARMFUL EVENT	=	b:Col.w/ Fixed object
V862:3RD OTHER VEH. CONFIG	=	N/A:No other vehicle
V917:MANNER OF COLLISION/3RD	=	Not a collision
V863:4TH HARMFUL EVENT	=	Overturn
V864:4TH OTHER VEH. CONFIG	=	N/A:No other vehicle
V918:MANNER OF COLLISION/4TH	=	Not a collision
V865:5TH HARMFUL EVENT	=	No Event
V866:5TH OTHER VEH. CONFIG	=	N/A:No 5th harmful event
V919:MANNER OF COLLISION/5TH	=	N/A: No 5th event
V869:SEATBELT USAGE-DRIVER	=	Unknown:installe
V870:SEATBELT USAGE-PASNGRS	=	N/A:No passenger
V871:EXPLOSION	=	Reported
V873:SLOW/STOPPED/PARKED/VEH	=	None
V874:FUEL SYST FAIL:RUPTURE	=	Unknown
V875:FUEL SYST FAIL:LEAK	=	Unknown
V876:FUEL SYST FAIL:CAUSE	=	Unknown
V877:FUEL SPILLAGE: IMPACT	=	Unknown
V878:FUEL SPILLAGE: REST	=	Unknown
V879:IGNITION SOURCE	=	Sparks/collision
V880: 1st MATERIAL BURNED	=	Liquid Cargo
V881:ENTRAPMENT	=	None
V882:EJECTION	=	None
V867:MOST HARMFUL EVENT	=	2nd event
V887:NO. PASSENGERS KILLED	=	N/A: No passengers
V902:NO. K DUE TO F – SAMP	=	1

CASE No. 9

V1:CASE STATE	=	Nebraska
V2:CASE NUMBER	=	101
V104:VEHICLE NUMBER	=	Veh. #2
V805:ENGINE MAKE	=	Caterpillar
V806:ENGINE MODEL	=	3406-99999
V807:VEHICLE MAKE	=	Peterbilt
V808:VEHICLE MODEL	=	9999999999
V809:MODEL YEAR	=	80
V810:CAB STYLE	=	COE/Cab Forward
V811:POWER UNIT BODY STYLE	=	Tractor: N/A
V812:POWER UNIT - AXLES	=	3
V813:TYPE OF FIRST TRAILER	=	Semi-trailer
V815:1ST TRAILER BODY TYPE	=	Tank
V840:HAZARDOUS CARGO	=	N/A No cargo
V841:CARGO SPILLAGE	=	N/A No cargo
V842:TYPE OF CARRIER	=	Inter/private
V843:TYPE OF TRIP	=	Under 200
V850:INITIAL IMPACT POINT	=	Front
V852:ROLLOVER-CAUSE	=	N/A:No rollover
V853:ROLLOVER-DIRECTION	=	N/A:No rollover
V855:JACKNIFE	=	Yes:subsequent e
V857:1ST HARMFUL EVENT	=	b:Col.w/ moving
V858:1ST OTHER VEH. CONFIG	=	Car/Pickup
V915:MANNER OF COLLISION/1ST	=	Direct-to-side
V859:2ND HARMFUL EVENT	=	Jacknife
V860:2ND OTHER VEH. CONFIG	=	N/A:No other vehicle
V916:MANNER OF COLLISION/2ND	=	Not a collision
V861:3RD HARMFUL EVENT	=	Fire/Explosion
V862:3RD OTHER VEH. CONFIG	=	N/A:No other vehicle
V917:MANNER OF COLLISION/3RD	=	Not a collision
V863:4TH HARMFUL EVENT	=	No Event
V864:4TH OTHER VEH. CONFIG	=	N/A:No 4th harmful event
V918:MANNER OF COLLISION/4TH	=	N/A: No 4th event
V865:5TH HARMFUL EVENT	=	No Event
V866:5TH OTHER VEH. CONFIG	=	N/A:No 5th harmful event
V919:MANNER OF COLLISION/5TH	=	N/A: No 5th event
V869:SEATBELT USAGE-DRIVER	=	No - installed b
V870:SEATBELT USAGE-PASNGRS	=	N/A:No passenger
V871:EXPLOSION	=	Witnessed
V873:SLOW/STOPPED/PARKED/VEH	=	None
V874:FUEL SYST FAIL:RUPTURE	=	L,R
V875:FUEL SYST FAIL:LEAK	=	None
V876:FUEL SYST FAIL:CAUSE	=	Fire/Explosion
V877:FUEL SPILLAGE: IMPACT	=	No
V878:FUEL SPILLAGE: REST	=	Yes
V879:IGNITION SOURCE	=	Fire-oth vehicle
V880: 1st MATERIAL BURNED	=	Tractor or truck
V881:ENTRAPMENT	=	None
V882:EJECTION	=	None
V867:MOST HARMFUL EVENT	=	1st event
V887:NO. PASSENGERS KILLED	=	N/A: No passengers
V902:NO. K DUE TO F - SAMP	=	1

CASE No. 10

V1:CASE STATE	=	North Carolina
V2:CASE NUMBER	=	133
V104:VEHICLE NUMBER	=	Veh. #2
V805:ENGINE MAKE	=	Detroit Diesel
V806:ENGINE MODEL	=	6V-9999999
V807:VEHICLE MAKE	=	GMC
V808:VEHICLE MODEL	=	J95-999999
V809:MODEL YEAR	=	79
V810:CAB STYLE	=	Conventional
V811:POWER UNIT BODY STYLE	=	Tractor: N/A
V812:POWER UNIT - AXLES	=	3
V813:TYPE OF FIRST TRAILER	=	Semi-trailer
V815:1ST TRAILER BODY TYPE	=	Tank
V840:HAZARDOUS CARGO	=	Yes
V841:CARGO SPILLAGE	=	Yes
V842:TYPE OF CARRIER	=	Intra/private
V843:TYPE OF TRIP	=	Under 200
V850:INITIAL IMPACT POINT	=	Front
V852:ROLLOVER-CAUSE	=	Coll. w/mov vehi
V853:ROLLOVER-DIRECTION	=	Right
V855:JACKNIFE	=	No
V857:1ST HARMFUL EVENT	=	b:Col.w/ moving
V858:1ST OTHER VEH. CONFIG	=	Car/Pickup
V915:MANNER OF COLLISION/1ST	=	Sideswipe - same
V859:2ND HARMFUL EVENT	=	Overturn
V860:2ND OTHER VEH. CONFIG	=	N/A:No other vehicle
V916:MANNER OF COLLISION/2ND	=	Not a collision
V861:3RD HARMFUL EVENT	=	Fire/Explosion
V862:3RD OTHER VEH. CONFIG	=	N/A:No other vehicle
V917:MANNER OF COLLISION/3RD	=	Not a collision
V863:4TH HARMFUL EVENT	=	No Event
V864:4TH OTHER VEH. CONFIG	=	N/A:No 4th harmful event
V918:MANNER OF COLLISION/4TH	=	N/A: No 4th event
V865:5TH HARMFUL EVENT	=	No Event
V866:5TH OTHER VEH. CONFIG	=	N/A:No 5th harmful event
V919:MANNER OF COLLISION/5TH	=	N/A: No 5th event
V869:SEATBELT USAGE-DRIVER	=	No - installed b
V870:SEATBELT USAGE-PASNGRS	=	N/A:No passenger
V871:EXPLOSION	=	Reported
V873:SLOW/STOPPED/PARKED/VEH	=	None
V874:FUEL SYST FAIL:RUPTURE	=	None
V875:FUEL SYST FAIL:LEAK	=	None
V876:FUEL SYST FAIL:CAUSE	=	N/A:No system fa
V877:FUEL SPILLAGE: IMPACT	=	No
V878:FUEL SPILLAGE: REST	=	No
V879:IGNITION SOURCE	=	Other spark
V880: 1st MATERIAL BURNED	=	Liquid Cargo
V881:ENTRAPMENT	=	None
V882:EJECTION	=	None
V867:MOST HARMFUL EVENT	=	2nd event
V887:NO. PASSENGERS KILLED	=	N/A: No passengers
V902:NO. K DUE TO F - SAMP	=	1

CASE No. 11

V1:CASE STATE	=	North Carolina
V2:CASE NUMBER	=	217
V104:VEHICLE NUMBER	=	Veh. #1
V805:ENGINE MAKE	=	Cummins
V806:ENGINE MODEL	=	300-999999
V807:VEHICLE MAKE	=	IH
V808:VEHICLE MODEL	=	C0F9670-99
V809:MODEL YEAR	=	82
V810:CAB STYLE	=	COE/Cab Forward
V811:POWER UNIT BODY STYLE	=	Tractor: N/A
V812:POWER UNIT - AXLES	=	3
V813:TYPE OF FIRST TRAILER	=	Semi-trailer
V815:1ST TRAILER BODY TYPE	=	Van
V840:HAZARDOUS CARGO	=	No
V841:CARGO SPILLAGE	=	Unknown
V842:TYPE OF CARRIER	=	Inter/private
V843:TYPE OF TRIP	=	Over-the-road
V850:INITIAL IMPACT POINT	=	Front
V852:ROLLOVER-CAUSE	=	N/A:No rollover
V853:ROLLOVER-DIRECTION	=	N/A:No rollover
V855:JACKNIFE	=	Yes:subsequent e
V857:1ST HARMFUL EVENT	=	b:Col.w/ Pedestr
V858:1ST OTHER VEH. CONFIG	=	N/A:No other vehicle
V915:MANNER OF COLLISION/1ST	=	Not a collision
V859:2ND HARMFUL EVENT	=	b:Col.w/ Fixed object
V860:2ND OTHER VEH. CONFIG	=	N/A:No other vehicle
V916:MANNER OF COLLISION/2ND	=	Not a collision
V861:3RD HARMFUL EVENT	=	Jacknife
V862:3RD OTHER VEH. CONFIG	=	N/A:No other vehicle
V917:MANNER OF COLLISION/3RD	=	Not a collision
V863:4TH HARMFUL EVENT	=	Fire/Explosion
V864:4TH OTHER VEH. CONFIG	=	N/A:No other vehicle
V918:MANNER OF COLLISION/4TH	=	Not a collision
V865:5TH HARMFUL EVENT	=	No Event
V866:5TH OTHER VEH. CONFIG	=	N/A:No 5th harmful event
V919:MANNER OF COLLISION/5TH	=	N/A: No 5th event
V869:SEATBELT USAGE-DRIVER	=	No - installed b
V870:SEATBELT USAGE-PASNGRS	=	None
V871:EXPLOSION	=	Reported
V873:SLOW/STOPPED/PARKED/VEH	=	None
V874:FUEL SYST FAIL:RUPTURE	=	Right
V875:FUEL SYST FAIL:LEAK	=	None
V876:FUEL SYST FAIL:CAUSE	=	Coll. w/fixed ob
V877:FUEL SPILLAGE: IMPACT	=	Yes
V878:FUEL SPILLAGE: REST	=	No
V879:IGNITION SOURCE	=	Other
V880: 1st MATERIAL BURNED	=	Tractor or truck
V881:ENTRAPMENT	=	Passenger (Autho
V882:EJECTION	=	None
V867:MOST HARMFUL EVENT	=	2nd event
V887:NO. PASSENGERS KILLED	=	2
V902:NO. K DUE TO F - SAMP	=	3+

CASE No. 12

V1:CASE STATE	=	Oklahoma
V2:CASE NUMBER	=	238
V104:VEHICLE NUMBER	=	Veh. #1
V805:ENGINE MAKE	=	Mack
V806:ENGINE MODEL	=	ENDT676-99
V807:VEHICLE MAKE	=	Mack
V808:VEHICLE MODEL	=	RWS700LST9
V809:MODEL YEAR	=	79
V810:CAB STYLE	=	Conventional
V811:POWER UNIT BODY STYLE	=	Tractor: N/A
V812:POWER UNIT - AXLES	=	3
V813:TYPE OF FIRST TRAILER	=	Semi-trailer
V815:1ST TRAILER BODY TYPE	=	Tank
V840:HAZARDOUS CARGO	=	Yes
V841:CARGO SPILLAGE	=	Yes
V842:TYPE OF CARRIER	=	Intra/hire
V843:TYPE OF TRIP	=	Over-the-road (
V850:INITIAL IMPACT POINT	=	Right
V852:ROLLOVER-CAUSE	=	Ran-off-road
V853:ROLLOVER-DIRECTION	=	Right
V855:JACKNIFE	=	No
V857:1ST HARMFUL EVENT	=	Overturn
V858:1ST OTHER VEH. CONFIG	=	N/A:No other vehicle
V915:MANNER OF COLLISION/1ST	=	Not a collision
V859:2ND HARMFUL EVENT	=	Fire/Explosion
V860:2ND OTHER VEH. CONFIG	=	N/A:No other vehicle
V916:MANNER OF COLLISION/2ND	=	Not a collision
V861:3RD HARMFUL EVENT	=	No Event
V862:3RD OTHER VEH. CONFIG	=	N/A:No 3rd harmful event
V917:MANNER OF COLLISION/3RD	=	N/A: No 3rd event
V863:4TH HARMFUL EVENT	=	No Event
V864:4TH OTHER VEH. CONFIG	=	N/A:No 4th harmful event
V918:MANNER OF COLLISION/4TH	=	N/A: No 4th event
V865:5TH HARMFUL EVENT	=	No Event
V866:5TH OTHER VEH. CONFIG	=	N/A:No 5th harmful event
V919:MANNER OF COLLISION/5TH	=	N/A: No 5th event
V869:SEATBELT USAGE-DRIVER	=	No - installed b
V870:SEATBELT USAGE-PASNGRS	=	N/A:No passenger
V871:EXPLOSION	=	None
V873:SLOW/STOPPED/PARKED/VEH	=	None
V874:FUEL SYST FAIL:RUPTURE	=	L,R
V875:FUEL SYST FAIL:LEAK	=	None
V876:FUEL SYST FAIL:CAUSE	=	Fire/Explosion
V877:FUEL SPILLAGE: IMPACT	=	No
V878:FUEL SPILLAGE: REST	=	Yes
V879:IGNITION SOURCE	=	Unknown
V880: 1st MATERIAL BURNED	=	Liquid Cargo
V881:ENTRAPMENT	=	None
V882:EJECTION	=	None
V867:MOST HARMFUL EVENT	=	1st event
V887:NO. PASSENGERS KILLED	=	N/A: No passengers
V902:NO. K DUE TO F - SAMP	=	1

CASE No. 13

V1:CASE STATE	=	Texas
V2:CASE NUMBER	=	2258
V104:VEHICLE NUMBER	=	Veh. #1
V805:ENGINE MAKE	=	Other Diesel
V806:ENGINE MODEL	=	9999999999
V807:VEHICLE MAKE	=	IH
V808:VEHICLE MODEL	=	F4370TRANS
V809:MODEL YEAR	=	81
V810:CAB STYLE	=	Conventional
V811:POWER UNIT BODY STYLE	=	Tractor: N/A
V812:POWER UNIT - AXLES	=	3
V813:TYPE OF FIRST TRAILER	=	Semi-trailer
V815:1ST TRAILER BODY TYPE	=	Tank
V840:HAZARDOUS CARGO	=	N/A No cargo
V841:CARGO SPILLAGE	=	N/A No cargo
V842:TYPE OF CARRIER	=	Intra/hire
V843:TYPE OF TRIP	=	Local pick-up and delivery
V850:INITIAL IMPACT POINT	=	Left
V852:ROLLOVER-CAUSE	=	N/A:No rollover
V853:ROLLOVER-DIRECTION	=	N/A:No rollover
V855:JACKNIFE	=	Yes:primary event
V857:1ST HARMFUL EVENT	=	Jacknife
V858:1ST OTHER VEH. CONFIG	=	N/A:No other vehicle
V915:MANNER OF COLLISION/1ST	=	Not a collision
V859:2ND HARMFUL EVENT	=	f:Col.w/motor ve
V860:2ND OTHER VEH. CONFIG	=	Car/Pickup
V916:MANNER OF COLLISION/2ND	=	Direct-to-side
V861:3RD HARMFUL EVENT	=	Fire/Explosion
V862:3RD OTHER VEH. CONFIG	=	N/A:No other vehicle
V917:MANNER OF COLLISION/3RD	=	Not a collision
V863:4TH HARMFUL EVENT	=	No Event
V864:4TH OTHER VEH. CONFIG	=	N/A:No 4th harmful event
V918:MANNER OF COLLISION/4TH	=	N/A: No 4th event
V865:5TH HARMFUL EVENT	=	No Event
V866:5TH OTHER VEH. CONFIG	=	N/A:No 5th harmful event
V919:MANNER OF COLLISION/5TH	=	N/A: No 5th event
V869:SEATBELT USAGE-DRIVER	=	No - installed b
V870:SEATBELT USAGE-PASNGRS	=	N/A:No passenger
V871:EXPLOSION	=	Reported
V873:SLOW/STOPPED/PARKED/VEH	=	None
V874:FUEL SYST FAIL:RUPTURE	=	Right
V875:FUEL SYST FAIL:LEAK	=	None
V876:FUEL SYST FAIL:CAUSE	=	Coll. w/moving m
V877:FUEL SPILLAGE: IMPACT	=	Yes
V878:FUEL SPILLAGE: REST	=	Yes
V879:IGNITION SOURCE	=	Fire-oth vehicle
V880: 1st MATERIAL BURNED	=	Diesel fuel
V881:ENTRAPMENT	=	Unknown
V882:EJECTION	=	None
V867:MOST HARMFUL EVENT	=	3rd event
V887:NO. PASSENGERS KILLED	=	N/A: No passengers
V902:NO. K DUE TO F - SAMP	=	1

CASE No. 14

V1:CASE STATE	=	Texas
V2:CASE NUMBER	=	3108
V104:VEHICLE NUMBER	=	Veh. #2
V805:ENGINE MAKE	=	Other Diesel
V806:ENGINE MODEL	=	9999999999
V807:VEHICLE MAKE	=	IH
V808:VEHICLE MODEL	=	F4370-9999
V809:MODEL YEAR	=	81
V810:CAB STYLE	=	Conventional
V811:POWER UNIT BODY STYLE	=	Tractor: N/A
V812:POWER UNIT - AXLES	=	3
V813:TYPE OF FIRST TRAILER	=	Semi-trailer
V815:1ST TRAILER BODY TYPE	=	Tank
V840:HAZARDOUS CARGO	=	N/A No cargo
V841:CARGO SPILLAGE	=	N/A No cargo
V842:TYPE OF CARRIER	=	Intra/private
V843:TYPE OF TRIP	=	Local pick-up and delivery
V850:INITIAL IMPACT POINT	=	Front
V852:ROLLOVER-CAUSE	=	N/A:No rollover
V853:ROLLOVER-DIRECTION	=	N/A:No rollover
V855:JACKNIFE	=	No
V857:1ST HARMFUL EVENT	=	a:Col.w/ on road
V858:1ST OTHER VEH. CONFIG	=	Tractor/semi
V915:MANNER OF COLLISION/1ST	=	Direct-to-side
V859:2ND HARMFUL EVENT	=	Fire/Explosion
V860:2ND OTHER VEH. CONFIG	=	N/A:No other vehicle
V916:MANNER OF COLLISION/2ND	=	Not a collision
V861:3RD HARMFUL EVENT	=	No Event
V862:3RD OTHER VEH. CONFIG	=	N/A:No 3rd harmful event
V917:MANNER OF COLLISION/3RD	=	N/A: No 3rd event
V863:4TH HARMFUL EVENT	=	No Event
V864:4TH OTHER VEH. CONFIG	=	N/A:No 4th harmful event
V918:MANNER OF COLLISION/4TH	=	N/A: No 4th event
V865:5TH HARMFUL EVENT	=	No Event
V866:5TH OTHER VEH. CONFIG	=	N/A:No 5th harmful event
V919:MANNER OF COLLISION/5TH	=	N/A: No 5th event
V869:SEATBELT USAGE-DRIVER	=	No - installed b
V870:SEATBELT USAGE-PASNGRS	=	N/A:No passenger
V871:EXPLOSION	=	Reported
V873:SLOW/STOPPED/PARKED/VEH	=	None
V874:FUEL SYST FAIL:RUPTURE	=	None
V875:FUEL SYST FAIL:LEAK	=	None
V876:FUEL SYST FAIL:CAUSE	=	N/A:No system fa
V877:FUEL SPILLAGE: IMPACT	=	No
V878:FUEL SPILLAGE: REST	=	No
V879:IGNITION SOURCE	=	Sparks/collision
V880: 1st MATERIAL BURNED	=	Liquid Cargo
V881:ENTRAPMENT	=	None
V882:EJECTION	=	None
V867:MOST HARMFUL EVENT	=	2nd event
V887:NO. PASSENGERS KILLED	=	N/A: No passengers
V902:NO. K DUE TO F - SAMP	=	1

APPENDIX G

Dictionary/Codebook for the Accident File

Codebook is bound separately