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PROJECT MEMORANDUM

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PROJECTED 1981 EXPOSURE ESTIMATES USING
ITERATIVE PROPORTIONAL FITTING

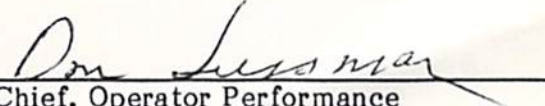
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Chief, Operator Performance
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Summary

1981 VMT estimates categorized by eight driver, vehicle, and environmental variables are produced. These 1981 estimates are produced using analytical methods developed in a previous report. The estimates are based on 1977 NPTS data (the latest year for which VMT data fully categorized by the eight variables is available) and 1981 highway traffic and registration data categorized by just a few variables. A discussion of the validity of the estimates is given.

Data on exposure to highway traffic accidents classified by several variables, is important for accident analysis. The National Personal Transportation Survey (NPTS) provides data to estimate this multivariate exposure for the year 1977. A previous report, Development of Multivariate Fatal Accident Involvement Rates for 1977 (Reference 1), gave estimates of exposure, developed from the 1977 NPTS data, classified simultaneously by eight driver, vehicle and environmental variables into 576 categories. The variables and levels are listed in Table 1. The estimates were smoothed using log-linear models (see Reference 2) to make them more accurate. Fatal accident involvement rates were calculated for 1977 using the smoothed VMT estimates from NPTS and smoothed fatal accident involvement estimates from 1977 FARS.

It is desirable to have VMT and fatal involvement rate estimates available for other years, especially for more recent years. The purpose of this report is to develop estimates of VMT which are classified into the 576 categories available from the 1977 NPTS data for a more recent year than 1977. A procedure which could be used to estimate the VMT classified like the 1977 data is iterative proportional fitting or IPF (See Reference 2). To use IPF, partially classified VMT data (marginal data) for the year (1981) is needed. 1981 was chosen since it was the latest year for which all marginal data was available. In addition, a "core" matrix is needed which is completely classified data from a slightly different context. In this case, the 1977 fully classified VMT matrix developed from NPTS will be used.

Table 1
Dimensions and Levels
of Multivariate Exposure Data

<u>Dimensions</u>	<u>Levels</u>
Driver Age	LE-25 26-55 GE-56
Driver Sex	Male Female
Vehicle Age	LE 5 GE 6
Vehicle Weight	LE 3000 lbs. GT 3000 lbs.
Number of Occupants	1 GE 2
Time of Day	Late Night Rush Hour Other
Land Use	Urban Rural
Season	Summer Winter

IPF provides estimates of fully classified VMT which are consistent with the partially classified VMT² data used to update the 1977 VMT matrix. The more completely classified the input data, the more confidently the results can be interpreted. Similarly, the closer the "core" matrix is to the desired data, the more confidently the updated can be interpreted. The 1977 VMT matrix is the best possible.

Margin Data

Three types of marginal (i.e., incompletely classified) data were available:

1. The driver age sex distribution estimated by driver registration data available from References 3 and 4, Federal Highway publications.
2. The vehicle age size distribution estimated by vehicle registration data available from R. L. Polk and Company data.
3. The urban/rural, winter/summer distribution of VMT estimated by Federal Highway and available in Reference 5.

Since the given 1981 driver age/sex distribution was based on driver registration data and not VMT data, it was used to estimate the 1981 age/sex VMT distribution as follows: 1) The 1977 age/sex VMT distribution was found by calculating the age/sex margin of the full 1977 VMT matrix (by summing over all other variables): 2) The 1977 VMT age/sex margin was scaled to 1981 age/sex margin by multiplying each cell by the ratio of 1981 to 1977 driver registrations for that cell. The distribution of VMT by age and sex of the driver in 1981 is thus determined by assuming that drivers in each group did the same amount of driving (relative to each other group) in 1981 as in 1977. A similar scaling procedure was used to develop an estimate of the distribution of 1981 VMT by car age and size based on the assumption that cars in a given age/size group were driven (relative to other age/size groups) the same amount in 1981 as in 1977.

The given 1981 season, urban/rural, margin was already VMT. Nevertheless, the ratio of this margin in 1981 to that in 1977 was used to scale the corresponding NPTS margin in the same manner as in the case of the other two margins.*

*The decision to use the 1981 margin directly or to use the ratio of the 1981 and 1977 margins to scale the corresponding 1977 NPTS margin is somewhat arbitrary, but it is suggested that the latter procedure, the one used, is more consistent.

The 1977 and 1981 data on numbers of licensed drivers by age/sex, number of cars registered by weight and VMT by season and land use distributions are given in Tables 2, 3, and 4. These data were used in the process described above to develop margins. However, the three margins had different VMT totals and had to be scaled to a common total VMT. The total VMT to scale them to was obtained by multiplying the total VMT in the 1977 VMT matrix by the ratio of Federal Highway estimated total passenger car VMT for 1981 to that for 1977.

The Core Data

The 1977 VMT matrix which was used as the core in the IPF calculation is given in Table 5. The 1977 VMT core matrix is the smoothed matrix in which the cell estimates are based on the more parsimonious log-linear model of Reference 1.

Table 2
Licensed Drivers (in thousands) by Age and Sex for 1977 and 1981
(Source: References 3 and 4)

1977		
Sex		
<u>Age</u>	<u>Male</u>	<u>Female</u>
LE25	18286.8	15822.8
26-55	39684.6	35388.2
GE-56	16495.6	12443.0

1981		
Sex		
<u>Age</u>	<u>Male</u>	<u>Female</u>
LE25	18119.8	15994.0
26-55	42214.2	38671.0
GE-56	17554.0	14523.0

Table 3
VMT Season and Land Use (Summer = April - September, Winter = other)
for 1977 and 1981
(Source: Reference 5)

	1977	
	<u>Summer</u>	<u>Winter</u>
Urban	344015.08	322096.33
Rural	260100.3	215055.47
	1981	
	<u>Summer</u>	<u>Winter</u>
Urban	348691.46	326844.17
Rural	243275.42	213336.19

Table 4
Registered Vehicles (in thousands) by Size and Age for 1977 and 1981
(Source: R. L. Polk and Company Data)

1977		
WEIGHT		
<u>Age</u>	LE3000 lbs.	GT3000 lbs.
LE5years	17684.368	35906.622
GE5years	12572.839	33565.161

1981		
WEIGHT		
<u>Age</u>	LE3000 lbs.	GT3000 lbs.
LE5years	23480.432	27219.846
GE5years	18290.902	36475.252

Results

Table 6 presents the fully classified 1981 VMT estimates developed from the margins and core described above. It is very difficult to obtain an assessment of the accuracy of the VMT estimates in Table 6 (standard errors for each cell in Table 5 are given in Reference 2). The difficulty results from the assumptions that go into the estimate:

1. The distribution of the relative amount of driving per driver and per vehicle by age and sex of driver and age and weight of vehicle is the same in 1981 as in 1977.
2. The higher order interactions in VMT hold constant between 1977 and 1981. The need for this assumption is derived in Reference 3. Higher order interactions are the interdependancies among cells which are not represented in the margin data.

It is very difficult to estimate the degree to which these assumptions hold. Nevertheless, some bounds on the lack of accuracy of these VMT estimates are possible. To this end fatal involvement rates were constructed using the 1977 VMT matrix in Table 5 as the denominator and the smoothed 1977 FARS fatal involvements (developed in Reference 1) as the numerator. Likewise, 1981 fatal involvement rates were calculated using 1981 FARS fatal involvements (smoothed by the same log-linear model as the 1977 FARS) and 1981 VMT from Table 6. Since the overall average rates were different and since different numbers of fatality records were dropped because of missing information, the 1977 rates were multiplied by a constant factor (1.16) so that the aggregate rate for 1977 equalled the aggregate rate for 1981. Thus, any differences between the two tables are distributional and not due to differences in overall rates. These two matrices of rates are given in Tables 7 and 8 for 1977 and 1981, respectively.

There is clearly a great deal of similarity between the rates in the two tables, but there is also substantial disagreement in some cells.

Before analyzing further the discrepancies between the two tables, we should first discuss why the tables should be similar and what are the causes for differences between the tables.

First, it is suggested that accident rates (in given categories) may be expected to be more constant over time than numbers of accidents (in the same given categories) or the total VMT (in the given categories). Therefore, a certain agreement is expected between the two tables. By this argument they should have approximately equal entries.

Obviously, however, it is not to be expected that the rates should be exactly equal. The reasons for differences can be divided into three main categories:

1. The assumption that fatal involvement rates in each category remain constant is clearly false. There are shifts in the underlying processes leading to the accidents that produce fundamental shifts in the accident rates.
2. These data, like any, are "noisy". The fact that the accidents in any category are often rather small whole numbers which are subject to statistical fluctuations gives rise to differences in rates from one year to another.
3. The process of calculating the 1981 VMT from the 1977 VMT and the marginal data involved assumptions and the degree to which these assumptions do not hold gives rise to a lack of agreement between the two rates.

Table 9 gives an idea of the magnitude of the discrepancies between Tables 7 and 8. In each cell in Table 9 is the difference between the logarithms of the corresponding cells in Tables 7 and 8 (or the logarithm of the ratio of the corresponding entries in Tables 7 and 8). In other words, tabulated in Table 9 is $\log_e (R_{81}) - \log_e (R_{77})$ where R_{81} = smoothed fatal involvements/smoothed VMT for each cell for the 1981 table (Table 8) while R_{77} is similarly defined as the corresponding entry in Table 7. Note that a small entry of .01 in Table 9 corresponds roughly to a 1.0 percent difference between Tables 7 and 8. Thus, if .05 is the entry in Table 9, then the entry in Table 8 is approximately 5 percent larger than the entry in Table 7.

To the extent that the entries in Table 9 are small it may be concluded safely that both:*

1. The fatal involvement rates have not changed much from 1977 to 1981; and
2. The procedure for using IPF to estimate exposure for 1981 is valid.

Unfortunately, many of the entries in Table 9 are rather large in absolute value. A comprehensive analysis of Table 9 is not justified; unambiguous conclusions are not possible since discrepancies are due to a combination of two causes. Nevertheless, there is one obvious pattern in this table which may be noted and some attempt may be made to explain it. The columns representing older lighter cars seem to have a preponderance of negative signs even though the table is overall fairly well balanced with respect to positive and negative entries.** The preponderance of negative signs in these columns suggests that the 1977 estimated fatality rates were larger than the 1981 estimated rates for these categories. There are two possible explanations:

1. The fatal involvement rates of older lighter cars decreased relative to other fatal involvement rates; or
2. The relative amount of driving (VMT) per car for older lighter cars was less in 1981 than in 1977. (Reasoning: 1981 estimated rates are too low -- suggesting estimated VMT is too high -- suggesting estimated VMT per registered car too high -- suggesting VMT per car went down, while we assumed it held the same.

That the fatal involvement rates for older lighter cars went down from 1977 to 1981 seems quite possible; reasons why the relative amount of driving per car for older, lighter cars decreased seem somewhat harder to find. Either or both reasons for this pattern in Table 9 may hold, however.

*Of course, this would happen only if the noise is small too. The noise will be small for some cells, namely those with large numbers of accidents and hence small relative error.

**In particular, car weight and car age have rather large effects on the quantities. That these two variables have the largest effect on the entries in Table 9 is substantiated by log-linear models fit to the ratio of the fatality rates.

CONCLUSIONS

This exercise investigates the feasibility of developing multivariate exposure data for 1981 using 1977 multivariate exposure data and 1981 marginal data on registered drivers, vehicles, and highway travel by land use (urban/rural). Although the 1981 estimates were obtained, it was not possible to show they were accurate by the limited method employed here. This could simply be due to changes in fatal accident rates from 1977 to 1981. When the 1982 NPTS data is ready, the accuracy of the 1981 estimates can be checked more conclusively. Alternatively, 1982 marginal data can be used to obtain 1982 estimates of multivariate exposure and these compared to the exposure estimates derived directly from the 1982 NPTS data. Only when the 1982 NPTS data is available can the accuracy of the method used here be conclusively tested.

REFERENCES

1. Development of Multivariate Fatal Accident Involvement Rates for 1977 by P. Mengert, R. Bair, R. DiGregorio, P. Hoxie, and R. Mumford (March 1984).
2. Analytic Methods of Multivariate Highway Safety Exposure Data Estimation by P. Mengert and E. Roberts, DOT-HS-806-494 and Transportation Systems Center Report No. DOT-TSC-NHTSA-83-5 (January 1984).
3. Highway Statistics 1977, U.S. Department of Transportation, Federal Highway Administration.
4. Highway Statistics 1981, U.S. Department of Transportation, Federal Highway Administration.
5. Traffic Volume Trends, U.S. Department of Transportation, Federal Highway Administration.

TABLE 5 SMOOTHED ESTIMATES OF VEHICLE MILES TRAVELED (APIS, 1977)
(BILLIONS)

SEASON: SUMMER

OCCUPANTS	TIME	SEX	AGE	URBAN						RURAL																			
				LAND USE:			5 YRS OF LESS			5 YRS OR LESS			5 YRS OR LESS			OVER 5 YRS													
				VEHICLE AGE:	VEHICLE WEIGHT:	VEHICLE WEIGHT:	I	I	I	I	I	I	I	I	I	I	I	I	I	I									
ONE	OTHER	MALE	LE 25	1.78806	2.03631	1.74624	2.07214	0.75358	0.84755	0.87114	1.15331	26-55	3.45758	8.75094	3.18540	6.82341	1.37911	4.01655	1.10669	3.16863	GE 56	0.52488	1.99762	0.70397	2.08759	0.21966	1.31772	0.24703	1.34971
		FEMALE	LE 25	2.16303	1.73511	1.69469	1.18720	1.04974	0.86247	0.84114	0.70545	26-55	2.25046	5.39749	2.37307	4.03739	0.80483	2.72269	0.63870	1.79169	GE 56	0.49098	1.57239	0.53781	1.12482	0.36521	1.06670	0.28983	0.64620
	RUSH	MALE	LE 25	1.53861	2.22796	1.50262	2.26716	0.57085	0.81635	0.65990	1.14938	26-55	4.36352	9.10960	4.02040	7.10307	1.53580	3.68916	1.23242	2.92872	GE 56	0.47123	1.54250	0.63202	1.61197	0.14122	0.72864	0.15882	0.74633
		FEMALE	LE 25	1.54937	1.58029	1.21390	1.08127	0.66194	0.69151	0.53040	0.56562	26-55	2.36441	4.67718	2.49323	3.45859	0.74608	2.08186	0.59208	1.36988	GE 56	0.36693	1.01070	0.40193	0.72301	0.19545	0.49100	0.15511	0.23744
	LATE	MALE	LE 25	0.63470	0.92046	0.61985	0.93665	0.21630	0.30980	0.25005	0.43618	26-55	0.88910	2.23072	0.81911	1.73937	0.33076	0.95495	0.26543	0.75811	GE 56	0.10258	0.34983	0.13758	0.36559	0.02060	0.11076	0.02317	0.11345
		FEMALE	LE 25	0.42173	0.43080	0.33042	0.29476	0.16550	0.17316	0.13261	0.14163	26-55	0.31786	0.75574	0.33518	0.56530	0.10603	0.35559	0.08414	0.23358	GE 56	0.05271	0.15125	0.05773	0.10820	0.01882	0.04925	0.01493	0.02963
MORE THAN 1	OTHER	MALE	LE 25	1.83996	2.16928	1.45884	2.50996	1.64103	1.91075	0.95866	1.90403	26-55	4.08038	10.69129	2.50953	7.75423	3.22721	9.73033	1.86697	7.86290	GE 56	0.95519	3.76346	0.58792	2.52783	0.91253	5.66727	0.41253	3.26800
		FEMALE	LE 25	1.45806	1.21084	1.19942	1.21828	1.18102	1.00453	0.61847	0.75208	26-55	2.18788	5.43239	1.61003	3.97161	1.22364	4.28574	0.73965	3.00840	GE 56	0.24387	0.80855	0.23313	0.70695	0.32660	0.98756	0.19813	0.64049
	RUSH	MALE	LE 25	0.48506	0.72714	0.38458	0.84133	0.38084	0.56384	0.22248	0.56185	26-55	1.57777	3.40967	0.57037	2.48574	1.10103	2.73803	0.64378	2.21818	GE 56	0.26272	0.89030	0.16171	0.59800	0.17974	0.96007	0.08125	0.55362
		FEMALE	LE 25	0.49046	0.51788	0.40345	0.52106	0.34973	0.37823	0.28314	0.28317	26-55	1.07946	2.21061	0.79436	1.61617	0.53268	1.53878	0.32199	1.08016	GE 56	0.08559	0.24406	0.08182	0.21339	0.08208	0.21347	0.04579	0.13844
	LATE	MALE	LE 25	0.41361	0.62099	0.32794	0.71851	0.29830	0.44230	0.17426	0.44075	26-55	0.66449	1.72594	0.40868	1.25826	0.49017	1.46508	0.28661	1.16851	GE 56	0.11822	0.41739	0.07277	0.26035	0.05421	0.30167	0.02451	0.17395
		FEMALE	LE 25	0.22174	0.23449	0.18240	0.23593	0.14524	0.15731	0.07606	0.11777	26-55	0.24104	0.59328	0.17738	0.43375	0.12573	0.43655	0.07600	0.30644	GE 56	0.02042	0.06067	0.01952	0.05304	0.01313	0.03556	0.00796	0.02306

TABLE 5 (CONTINUED). SMOOTHED ESTIMATES OF VEHICLE MILES TRAVELED (MPTS, 1977)
(BILLIONS)

SEASON: WINTER

OCCUPANTS	TIME	SEX	AGE	LAND USE:			URBAN			RURAL		
				VEHICLE AGE:	5 YRS OR LESS	OVER 5 YRS	5 YRS OR LESS	OVER 5 YRS	5 YRS OR LESS	OVER 5 YRS		
ONE	OTHER	MALE	LE 25	2.14317	2.13212	1.74982	1.81365	0.87368	0.85839	0.84436	1.01038	
			26-55	3.82019	8.44618	2.94233	5.50582	1.67253	4.25521	1.12206	2.82414	
			GE 56	0.66235	2.20206	0.74267	1.92387	0.22198	1.16328	0.20871	0.95612	
	RUSH	FEMALE	LE 25	1.97294	1.88158	1.29227	1.07630	0.92615	0.90467	0.62042	0.61663	
			26-55	2.16389	6.17024	1.90761	3.65857	0.84944	3.41667	0.56356	1.87953	
			GE 56	0.37928	1.44410	0.34733	0.86364	0.22593	0.78455	0.14990	0.35734	
	LATE	MALE	LE 25	1.84418	2.33279	1.50570	1.98456	0.66183	0.82679	0.63962	0.97319	
			26-55	4.82158	8.79235	3.71361	5.73147	1.86255	3.90836	1.24954	2.55394	
			GE 56	0.59465	1.70037	0.66676	1.46556	0.14271	0.64324	0.13418	0.55081	
OTHER	FEMALE	LE 25	1.41321	1.71370	0.92565	0.98027	0.58401	0.72535	0.39122	0.46601		
		26-55	2.27345	5.34680	2.00420	3.34363	0.78743	2.61230	0.52242	1.42705		
		GE 56	0.28345	0.92824	0.25957	0.55513	0.12091	0.36112	0.08022	0.16289		
MORE THAN 1	MALE	LE 25	0.76075	0.96377	0.62112	0.81990	0.25078	0.31376	0.24236	0.36932		
		26-55	0.98235	2.15304	0.75661	1.40350	0.40114	1.01170	0.26911	0.67145		
		GE 56	0.12945	0.38564	0.14515	0.33692	0.02082	0.09778	0.01958	0.06373		
OTHER	FEMALE	LE 25	0.38467	0.46717	0.25196	0.26723	0.14602	0.18163	0.09782	0.12420		
		26-55	0.30564	0.86394	0.26944	0.54026	0.11190	0.44619	0.07424	0.24545		
		GE 56	0.04072	0.13891	0.03729	0.08307	0.01164	0.03622	0.00772	0.01834		
RUSH	MALE	LE 25	1.81387	1.86813	1.20232	1.80706	1.56483	1.59165	0.76424	1.32596		
		26-55	3.70797	8.48709	1.90653	5.17269	3.21902	8.47848	1.57354	5.74238		
		GE 56	0.99137	3.41214	0.51013	1.91603	0.75847	4.11467	0.28665	1.98372		
LATE	FEMALE	LE 25	1.09383	1.07995	0.75224	0.90841	0.65700	0.86663	0.37520	0.54244		
		26-55	1.73025	5.10768	1.06447	3.12186	1.06219	4.42304	0.53678	2.55565		
		GE 56	0.15494	0.61076	0.12383	0.44644	0.16618	0.59740	0.08428	0.32391		
OTHER	MALE	LE 25	0.47818	0.62619	0.31696	0.60572	0.36316	0.46967	0.17736	0.35177		
		26-55	1.43376	2.70671	0.73720	1.64968	1.09823	2.38577	0.53684	1.61586		
		GE 56	0.27268	0.80719	0.14031	0.45327	0.14939	0.69708	0.05646	0.33605		
RUSH	FEMALE	LE 25	0.36794	0.46190	0.25304	0.30853	0.25378	0.32630	0.11110	0.20424		
		26-55	0.85367	2.07848	0.52519	1.27039	0.46240	1.58808	0.23367	0.93196		
		GE 56	0.05438	0.18436	0.04346	0.13476	0.04176	0.12913	0.02118	0.07002		
LATE	MALE	LE 25	0.40775	0.53478	0.27028	0.51729	0.28445	0.36844	0.13892	0.30694		
		26-55	0.60384	1.37010	0.31048	0.83505	0.48893	1.27659	0.23900	0.86462		
		GE 56	0.12270	0.37843	0.06314	0.21250	0.04506	0.21903	0.01703	0.10559		
OTHER	FEMALE	LE 25	0.16635	0.20914	0.11440	0.17592	0.10539	0.13572	0.04614	0.06454		
		26-55	0.19062	0.55782	0.11727	0.34095	0.10914	0.45054	0.05516	0.26440		
		GE 56	0.01297	0.04582	0.01037	0.03350	0.00668	0.02151	0.00339	0.01166		

Table 6
Estimated 1981 VMT (Billions)

SEASON: SUMMER	OCCUPANTS	TIME	SEX	VEHICLE WEIGHT: AGE	LAND USE:			URBAN			RURAL					
					VEHICLE AGE:			5 YRS OR LESS			5 YRS OR LESS			OVER 5 YRS		
					I	I	I	I	I	I	I	I	I	I	I	I
ONE	OTHER	MALE	IF 25	1.954	1.408	2.242	1.845	0.747	0.679	0.857	0.890					
			26-55	4.407	5.889	4.459	6.804	1.762	2.841	1.782	3.282					
			OE 56	0.827	1.752	1.001	2.423	0.316	0.845	0.383	1.169					
		FEMALE	LE 25	2.205	1.032	2.292	1.225	0.867	0.512	0.902	0.608					
			26-55	3.413	4.048	3.127	4.237	1.342	2.008	1.230	2.102					
			OE 56	0.817	1.100	0.897	1.378	0.321	0.546	0.353	0.684					
	RUSH	MALE	IF 25	1.950	1.405	2.238	1.842	0.630	0.572	0.722	0.750					
			26-55	5.184	6.677	5.243	7.656	1.674	2.698	1.692	3.117					
			OE 56	0.619	1.312	0.750	1.815	0.200	0.534	0.242	0.739					
		FEMALE	LE 25	1.821	0.857	1.893	1.012	0.604	0.357	0.628	0.424					
			26-55	3.178	3.769	2.912	3.945	1.055	1.578	0.967	1.652					
			OE 56	0.507	0.682	0.556	0.855	0.168	0.285	0.195	0.358					
	LATE	MALE	IF 25	0.789	0.569	0.906	0.745	0.249	0.224	0.286	0.297					
			26-55	1.232	1.575	1.246	1.819	0.389	0.627	0.393	0.724					
			OE 56	0.122	0.240	0.148	0.359	0.039	0.103	0.047	0.143					
		FEMALE	LE 25	0.486	0.227	0.505	0.270	0.158	0.093	0.164	0.111					
			26-55	0.498	0.590	0.456	0.618	0.162	0.242	0.148	0.253					
			OE 56	0.066	0.089	0.072	0.111	0.021	0.036	0.024	0.046					
	MORE THAN ONE	MALE	IF 25	1.903	1.438	1.640	2.029	1.457	1.388	1.271	1.960					
			26-55	5.349	7.170	3.731	8.089	4.094	6.923	2.856	7.811					
			OE 56	1.491	3.313	0.891	3.201	1.141	3.199	0.682	3.091					
		FEMALE	LE 25	1.626	0.798	1.286	1.020	0.989	0.617	0.782	0.783					
			26-55	3.298	4.102	2.084	4.193	2.006	3.147	1.268	3.217					
			OE 56	0.536	0.757	0.290	0.643	0.326	0.581	0.177	0.508					
	RUSH	MALE	IF 25	0.579	0.438	0.504	0.418	0.374	0.357	0.327	0.504					
			26-55	1.836	2.441	1.281	2.777	1.187	2.006	0.828	2.264					
			OE 56	0.341	0.757	0.204	0.732	0.220	0.617	0.132	0.594					
		FEMALE	LE 25	0.629	0.309	0.497	0.395	0.323	0.200	0.255	0.256					
			26-55	1.439	1.790	0.909	1.830	0.739	1.159	0.467	1.185					
			OE 56	0.156	0.220	0.084	0.193	0.080	0.142	0.043	0.125					
	LATE	MALE	LE 25	0.488	0.369	0.426	0.521	0.308	0.294	0.269	0.415					
			26-55	0.908	1.218	0.634	1.374	0.574	0.970	0.400	1.095					
			OE 56	0.140	0.312	0.084	0.301	0.089	0.248	0.053	0.240					
		FEMALE	LE 25	0.281	0.138	0.222	0.176	0.141	0.087	0.112	0.112					
			26-55	0.377	0.469	0.238	0.480	0.189	0.297	0.170	0.304					
			OE 56	0.034	0.048	0.018	0.042	0.017	0.030	0.009	0.027					

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Table 6
Estimated 1981 VMT (Billions)
(continued)

OCCUPANTS	TIME	SEX	ARE	LAND USE:											
				URBAN						RURAL					
				5 YRS OR LESS			OVER 5 YRS			5 YRS OR LESS			OVER 5 YRS		
				VEHICLE AGE:	VEHICLE WEIGHT:	ARE	VEHICLE AGE:	VEHICLE WEIGHT:	ARE	VEHICLE AGE:	VEHICLE WEIGHT:	ARE	VEHICLE AGE:	VEHICLE WEIGHT:	ARE
ONE	OTHER	MALE	LE 25	2.276	1.423	2.185	1.540	0.922	0.727	0.885	0.797	0.885	0.797		
			26-55	5.367	5.953	4.540	5.753	2.174	3.041	1.839	2.939	1.839	2.939		
			GE 56	0.963	1.771	0.975	2.049	0.390	0.905	0.395	1.047	0.395	1.047		
		FEMALE	LE 25	2.049	1.155	1.782	1.148	0.853	0.607	0.742	0.603	0.742	0.603		
			26-55	3.172	4.532	2.431	3.968	1.321	2.381	1.013	2.085	1.013	2.085		
			GE 56	0.760	1.231	0.697	1.291	0.316	0.647	0.290	0.678	0.290	0.678		
	RUSH	MALE	LE 25	2.272	1.420	2.181	1.557	0.777	0.613	0.745	0.672	0.745	0.672		
			26-55	6.040	6.699	5.109	6.474	2.065	2.889	1.747	2.792	1.747	2.792		
			GE 56	0.721	1.327	0.731	1.535	0.247	0.572	0.250	0.642	0.250	0.642		
		FEMALE	LE 25	1.692	0.954	1.472	0.948	0.595	0.423	0.517	0.420	0.517	0.420		
			26-55	2.953	4.219	2.264	3.695	1.038	1.871	0.796	1.639	0.796	1.639		
			GE 56	0.471	0.763	0.432	0.800	0.166	0.339	0.152	0.355	0.152	0.355		
	LATE	MALE	LE 25	0.920	0.570	0.883	0.630	0.307	0.242	0.295	0.266	0.295	0.266		
			26-55	1.435	1.592	1.214	1.538	0.480	0.671	0.404	0.649	0.404	0.649		
			GE 56	0.143	0.262	0.145	0.304	0.048	0.111	0.048	0.128	0.048	0.128		
		FEMALE	LE 25	0.452	0.255	0.393	0.253	0.155	0.110	0.135	0.110	0.135	0.110		
			26-55	0.463	0.661	0.355	0.579	0.159	0.287	0.122	0.251	0.122	0.251		
			GE 56	0.061	0.100	0.056	0.104	0.021	0.043	0.019	0.045	0.019	0.045		
	MORE THAN ONE	MALE	LE 25	1.636	1.204	1.341	1.422	1.489	1.231	1.087	1.454	1.087	1.454		
			26-55	5.162	6.005	3.012	5.668	4.184	6.142	2.442	5.794	2.442	5.794		
			GE 56	1.439	2.775	0.719	2.243	1.167	2.838	0.583	2.294	0.583	2.294		
		FEMALE	LE 25	1.252	0.740	0.828	0.792	0.804	0.601	0.533	0.643	0.533	0.643		
			26-55	2.539	3.805	1.343	3.254	1.636	3.091	0.865	2.444	0.865	2.444		
			GE 56	0.413	0.702	0.187	0.514	0.266	0.570	0.120	0.418	0.120	0.418		
	RUSH	MALE	LE 25	0.559	0.367	0.408	0.433	0.383	0.317	0.279	0.374	0.279	0.374		
			26-55	1.772	2.062	1.034	1.946	1.213	1.780	0.708	1.680	0.708	1.680		
			GE 56	0.329	0.634	0.164	0.513	0.225	0.548	0.112	0.443	0.112	0.443		
		FEMALE	LE 25	0.484	0.286	0.320	0.306	0.263	0.196	0.174	0.210	0.174	0.210		
			26-55	1.108	1.660	0.586	1.420	0.602	1.139	0.318	0.974	0.318	0.974		
			GE 56	0.120	0.204	0.054	0.149	0.065	0.140	0.030	0.102	0.030	0.102		
	LATE	MALE	LE 25	0.471	0.309	0.344	0.365	0.315	0.261	0.230	0.308	0.230	0.308		
			26-55	0.877	1.020	0.512	0.942	0.587	0.861	0.342	0.812	0.342	0.812		
			GE 56	0.135	0.261	0.088	0.211	0.091	0.220	0.045	0.178	0.045	0.178		
		FEMALE	LE 25	0.216	0.128	0.143	0.137	0.115	0.086	0.076	0.092	0.076	0.092		
			26-55	0.290	0.435	0.154	0.372	0.154	0.292	0.082	0.250	0.082	0.250		
			GE 56	0.026	0.045	0.012	0.033	0.014	0.030	0.006	0.022	0.006	0.022		

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Table 7
 Fatal Involvement Rates (Fatal Involvements
 Per Billion VMT) for 1977 Based on 1977 FARS and NPTS (Smoothed)

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OCCUPANTS	TIME	SEX	AGE	VEHICLE WEIGHT	LAWY USE			UKRAIN			KUKAL		
					VEHICLE WGT			VEHICLE WGT			VEHICLE WGT		
					1	2	3	1	2	3	1	2	3
OTHER	11-25	MALE	11-25	44,903	43,030	76,669	112,198	113,165	138,919	192,646			
			26-55	23,405	23,413	33,757	55,435	51,809	63,825	72,954			
			OVER 56	37,504	33,061	53,521	103,842	93,155	145,208	116,115			
	FEMALE	11-25	18,063	23,907	20,607	33,499	36,306	52,105	75,169				
		26-55	16,120	16,937	20,797	39,649	33,026	37,481	38,196				
		OVER 56	24,431	31,479	39,307	59,725	80,634	94,148	85,725				
	RUSH	MALE	11-25	19,146	19,785	32,632	56,496	54,728	69,931	91,464			
			26-55	8,896	7,830	9,212	13,523	21,439	28,011	30,188			
			OVER 56	21,251	22,674	30,066	58,595	65,634	91,780	69,199			
	FEMALE	11-25	11,806	14,349	13,126	22,507	30,128	37,697	50,325				
		26-55	9,803	9,706	9,839	11,918	26,897	21,111	25,427				
		OVER 56	16,183	19,640	22,911	24,792	38,342	36,125	69,367				
LATE	MALE	11-25	130,291	171,342	161,313	292,373	493,011	507,205	842,670				
		26-55	84,384	102,909	87,866	131,101	238,717	240,793	274,749	324,988			
		OVER 56	76,090	89,112	107,665	112,382	241,684	224,367	337,962	279,685			
FEMALE	11-25	80,906	89,609	92,299	140,253	242,079	267,705	323,100					
	26-55	74,464	63,472	74,734	80,393	210,090	146,438	198,602	169,366				
	OVER 56	63,288	68,240	89,398	86,116	234,622	200,553	279,733	213,164				
OTHER	MALE	11-25	31,441	30,143	50,398	69,032	80,887	77,792	150,569	140,621			
		26-55	12,260	13,776	17,698	17,185	24,512	21,836	39,113	30,109			
		OVER 56	16,038	17,304	36,815	25,008	36,000	30,793	81,676	43,985			
FEMALE	11-25	24,913	31,441	35,120	43,041	77,666	77,705	93,189	90,539				
	26-55	13,393	13,418	20,328	17,772	34,568	27,455	49,907	34,252				
	OVER 56	21,760	26,981	63,500	49,118	74,478	72,542	101,385	111,228				
RUSH	MALE	11-25	28,310	32,383	32,782	58,607	81,330	73,750	131,394	133,315			
		26-55	8,314	9,020	12,290	11,252	19,008	15,966	30,331	22,015			
		OVER 56	21,028	21,393	40,269	30,917	52,708	42,510	119,384	60,722			
FEMALE	11-25	22,173	26,367	31,357	36,096	77,189	72,769	92,617	84,788				
	26-55	10,071	9,307	13,436	12,392	29,026	21,723	41,906	27,101				
	OVER 56	23,579	27,297	60,181	49,694	89,300	81,957	117,483	125,664				
LATE	MALE	11-25	330,123	288,890	428,884	522,885	522,666	520,183	972,937	940,310			
		26-55	62,095	72,207	89,640	90,075	109,609	101,045	174,890	139,326			
		OVER 56	46,074	51,445	105,763	74,349	91,307	80,823	207,159	115,448			
FEMALE	11-25	151,430	139,924	213,476	218,931	416,786	380,740	500,086	406,583				
	26-55	57,020	47,829	87,445	63,300	130,002	86,404	187,689	107,792				
	OVER 56	55,033	56,381	139,137	103,006	164,787	139,310	401,322	202,934				

Table 7
Fatal Involvement Rates (Fatal Involvements
Per Billion VMT) for 1977 Based on 1977 FARS and NPTS (Smoothed)
(continued)

OCCUPANTS	TIME	SEX	AGE	UNION					MILITARY				
				3 YRS OR LESS		OVER 3 YRS		OVER 3 YRS		OVER 3 YRS		OVER 3 YRS	
				VEHICLE	WEIGHT	VEHICLE	WEIGHT	VEHICLE	WEIGHT	VEHICLE	WEIGHT	VEHICLE	WEIGHT
ONE	OTHER	MALE	LE 25	33,418	40,995	46,507	93,748	88,277	102,604	122,705	196,088		
			26-55	20,076	27,263	23,468	38,992	48,309	52,010	62,420	82,218		
			GE 56	36,424	47,497	57,853	67,246	85,767	88,663	134,641	124,069		
		FEMALE	LE 25	12,663	21,604	25,183	38,041	48,637	42,354	53,007	63,478		
			26-55	16,376	14,328	18,677	19,979	39,781	27,306	42,218	37,714		
			GE 56	27,337	29,229	43,432	41,409	75,109	63,688	100,542	75,994		
MORE THAN ONE	RUSH	MALE	LE 25	15,577	21,527	21,671	41,189	54,155	59,349	75,276	114,423		
			26-55	8,153	10,440	9,531	14,931	25,830	26,220	33,375	41,430		
			GE 56	21,306	26,195	33,839	37,086	66,045	64,375	103,679	90,082		
		FEMALE	LE 25	14,660	15,177	18,776	26,725	47,729	39,172	52,029	58,709		
			26-55	11,800	9,697	13,295	13,368	37,581	24,789	39,564	31,337		
			GE 56	21,188	21,354	33,675	30,223	76,668	61,206	102,629	73,092		
OTHER	LATE	MALE	LE 25	113,165	171,695	157,489	328,522	320,737	395,401	456,944	755,655		
			26-55	69,234	97,297	80,932	139,133	183,709	204,115	236,723	372,671		
			GE 56	67,915	91,647	107,871	129,734	175,864	188,134	276,080	263,264		
		FEMALE	LE 25	81,225	74,679	104,028	131,499	220,896	161,004	240,792	341,303		
			26-55	70,619	51,542	79,566	71,049	186,371	107,836	197,787	140,015		
			GE 56	65,287	58,435	103,764	82,787	177,333	140,020	264,156	167,076		
RUSH	OTHER	MALE	LE 25	33,073	46,235	69,198	93,940	70,827	78,495	148,012	159,294		
			26-55	12,182	15,774	19,743	22,091	23,765	24,396	42,371	37,764		
			GE 56	17,335	21,353	44,671	34,969	53,091	32,618	84,283	52,305		
		FEMALE	LE 25	30,182	31,619	47,767	48,594	78,326	65,051	105,306	85,091		
			26-55	15,377	12,747	26,374	18,923	38,599	25,448	62,561	35,642		
			GE 56	27,337	27,881	88,743	56,981	78,888	63,750	115,577	109,735		
LATE	OTHER	MALE	LE 25	30,740	40,520	64,318	82,337	86,762	90,664	181,313	183,988		
			26-55	8,733	10,662	14,152	14,931	22,432	21,732	40,219	33,640		
			GE 56	23,461	27,305	69,460	44,626	59,026	54,860	110,342	87,971		
		FEMALE	LE 25	31,442	31,037	49,760	47,700	107,338	84,156	144,875	110,081		
			26-55	13,490	10,571	23,213	15,719	44,774	27,815	72,569	38,957		
			GE 56	34,307	33,017	111,530	67,978	130,600	99,497	357,075	171,266		
OTHER	LATE	MALE	LE 25	22,442	32,104	465,411	655,833	403,199	467,432	842,592	938,411		
			26-55	5,699	7,978	91,888	106,402	93,620	99,465	167,706	123,952		
			GE 56	45,763	58,883	117,931	95,534	73,941	75,433	188,332	120,946		
		FEMALE	LE 25	169,193	148,325	267,767	227,954	371,636	258,203	500,600	337,851		
			26-55	60,212	41,904	103,610	63,309	128,347	70,811	208,025	99,176		
			GE 56	63,182	53,923	205,101	110,204	154,243	104,359	421,699	179,635		

Table 8
 Fatal Involvement Rates (Fatal Involvements
 Per Billion VMT) Based on Estimated 1981 VMT and 1981 FARS (Smoothed)

OCCUPANTS	TYPE	SEX	AGE	LARGE VEH:						MEDIUM						SMALL					
				VEHICLE WEIGHT:		5 TRS OR LESS		OVER 5 TRS		VEHICLE WEIGHT:		5 TRS OR LESS		OVER 5 TRS		VEHICLE WEIGHT:		5 TRS OR LESS		OVER 5 TRS	
				LIGHT	HEAVY	LIGHT	HEAVY	HEAVY	HEAVY	HEAVY	HEAVY	HEAVY	HEAVY	HEAVY	HEAVY	HEAVY	HEAVY	HEAVY	HEAVY	HEAVY	HEAVY
DRIVER	MALE	18-24	21.081	45.740	57.511	90.358	89.678	117.616	103.379	197.413											
		25-34	21.228	22.899	20.161	31.790	38.377	49.879	50.499	63.107											
		35-56	49.020	40.571	40.259	39.639	137.401	107.973	109.396	106.887											
	FEMALE	18-24	19.157	39.540	18.327	43.130	34.744	66.469	45.414	83.850											
		25-34	17.610	10.079	13.109	19.786	43.732	35.093	28.846	34.507											
		35-56	27.122	41.165	27.147	41.836	77.895	93.727	59.541	89.166											
PASSENGER	MALE	11-24	11.770	17.512	15.587	34.500	45.202	55.519	52.108	93.466											
		25-34	7.913	8.018	7.518	11.131	26.093	21.602	23.283	27.330											
		35-56	22.548	20.981	18.515	21.943	71.700	57.688	62.197	57.105											
	FEMALE	11-24	11.741	16.357	11.355	24.057	41.499	45.833	34.426	57.818											
		25-34	10.554	9.856	7.904	10.786	32.416	23.999	21.382	23.132											
		35-56	17.127	23.645	13.985	24.030	60.837	66.587	46.503	63.347											
TOTAL	MALE	11-24	179.509	204.957	168.213	404.811	476.453	577.760	549.242	1037.858											
		25-34	100.585	108.104	95.572	130.193	326.793	279.199	282.931	353.230											
		35-56	103.030	101.973	84.602	104.215	342.907	268.574	272.244	265.860											
	FEMALE	11-24	91.027	127.980	88.036	180.719	308.192	343.508	255.666	433.333											
		25-34	87.600	82.634	65.668	90.437	257.985	197.749	170.165	185.784											
		35-56	47.466	68.920	40.391	70.043	168.520	185.917	128.657	176.872											
TOTAL	MALE	11-24	25.749	38.893	30.172	81.592	62.635	74.988	108.301	139.281											
		25-34	12.390	12.744	16.175	17.171	26.664	21.743	21.723	26.697											
		35-56	20.477	19.543	24.631	20.453	44.974	33.679	32.399	34.494											
	FEMALE	11-24	20.802	30.379	29.261	45.896	60.769	69.776	72.717	90.421											
		25-34	13.414	13.132	14.742	14.895	33.774	26.311	32.689	26.183											
		35-56	23.195	33.569	37.292	47.338	67.541	77.490	101.401	102.769											
TOTAL	MALE	11-24	33.009	52.738	44.989	68.553	68.249	76.761	118.026	142.574											
		25-34	9.959	9.655	13.002	12.985	26.049	19.951	30.991	24.498											
		35-56	25.221	23.378	30.337	23.662	67.322	47.354	78.437	48.500											
	FEMALE	11-24	16.512	21.935	23.226	35.138	58.142	61.230	70.151	79.346											
		25-34	10.203	9.086	11.213	10.305	31.222	22.041	30.219	22.018											
		35-56	23.009	30.396	37.031	42.834	81.710	85.275	122.673	112.344											
TOTAL	MALE	11-24	311.381	318.975	411.872	667.529	440.774	527.235	762.166	979.572											
		25-34	75.209	77.285	98.186	104.135	138.758	113.039	165.080	138.799											
		35-56	71.352	67.337	85.826	71.701	134.345	100.511	156.326	102.943											
	FEMALE	11-24	149.631	200.396	210.477	303.056	371.646	394.981	448.407	511.842											
		25-34	70.896	63.710	77.913	77.263	153.025	109.017	148.110	108.902											
		35-56	58.005	77.061	93.033	108.646	144.798	152.500	217.391	201.263											

Table 8
 Fatal Involvement Rates (Fatal Involvements
 Per Billion VMT) Based on Estimated 1981 VMT and 1981 FARS (Smoothed)
 (continued)

SEASON	WINTER	LUMP USE	URBAN			RURAL				
			5 YRS OR LESS	OVER 5 YRS	OVER 5 YRS	5 YRS OR LESS	OVER 5 YRS	OVER 5 YRS		
OCCUPANTS	TYPE	SEX	VEHICLE WEIGHT		VEHICLE WEIGHT		VEHICLE WEIGHT			
			LIGHT	HEAVY	LIGHT	HEAVY	LIGHT	HEAVY		
NONE	OTHER	FE 25	25.145	45.700	37.201	108.813	65.455	94.721	70.265	199.295
		26 25	20.635	25.651	23.530	47.742	47.276	46.884	49.439	71.194
		0E 50	46.984	53.638	46.307	65.794	106.108	96.031	101.292	114.098
NONE	MUSH	FE 25	20.132	25.095	23.370	45.162	48.229	48.610	48.022	73.601
		26 25	20.662	17.609	18.573	23.131	43.056	29.087	34.087	33.653
		0E 50	31.372	37.326	30.747	48.214	72.266	72.480	66.576	82.762
NONE	LATE	FE 25	11.994	20.365	10.691	48.722	37.364	50.788	51.678	106.857
		26 25	9.003	10.512	10.267	17.517	24.842	22.995	25.815	34.918
		0E 50	25.290	27.117	24.926	33.266	68.352	58.106	65.251	67.038
NONE	OTHER	FE 25	13.986	16.175	16.236	28.552	40.097	36.762	39.925	55.661
		26 25	14.036	10.881	13.617	14.293	35.003	21.511	27.711	24.886
		0E 50	22.455	23.735	23.008	31.391	62.139	56.475	57.028	64.486
NONE	MUSH	FE 25	109.132	199.060	170.164	471.099	308.065	446.544	427.355	939.541
		26 25	94.400	117.310	107.715	195.477	356.747	233.085	246.019	353.943
		0E 50	95.376	109.008	94.191	133.715	234.640	212.155	233.997	252.071
NONE	LATE	FE 25	92.108	116.228	115.605	205.169	259.345	239.954	228.230	363.317
		26 25	107.100	83.788	96.276	110.063	242.609	150.468	192.072	174.075
		0E 50	59.566	68.892	58.500	84.036	149.776	137.327	137.414	156.809
NONE	OTHER	FE 25	25.460	44.314	39.542	111.309	51.909	71.626	107.745	159.679
		26 25	13.677	16.211	21.432	26.218	24.699	23.209	35.269	34.205
		0E 50	22.285	24.258	22.174	30.787	59.419	34.017	55.124	41.817
NONE	MUSH	FE 25	24.026	30.096	41.915	54.574	60.298	57.949	87.321	90.133
		26 25	17.874	14.524	23.576	19.774	37.762	24.327	43.868	29.168
		0E 50	30.469	36.604	38.653	61.941	71.433	68.051	128.759	107.798
NONE	LATE	FE 25	26.720	43.685	62.491	109.730	64.065	83.035	132.978	185.112
		26 25	12.868	14.326	20.163	23.169	27.326	24.119	39.071	35.546
		0E 50	35.125	32.047	46.381	41.687	66.824	54.166	93.449	66.586
NONE	OTHER	FE 25	22.337	24.631	37.712	44.665	63.798	55.772	92.390	86.746
		26 25	15.410	11.391	20.327	13.508	38.206	22.436	44.477	26.900
		0E 50	39.379	37.568	66.180	63.573	94.808	82.134	170.846	130.105
NONE	MUSH	FE 25	202.317	351.813	473.156	883.694	324.423	447.278	673.455	997.130
		26 25	88.588	95.170	125.933	153.913	114.157	107.167	163.010	157.942
		0E 50	79.167	81.745	108.323	103.746	104.387	70.165	146.251	110.839
NONE	LATE	FE 25	185.207	206.884	313.874	375.150	355.157	313.537	514.327	487.342
		26 25	90.343	73.360	129.720	99.873	163.423	96.645	109.882	115.877
		0E 50	79.323	87.478	152.697	140.030	136.318	127.922	263.656	202.632

Table 9
Differences in Logarithms of Fatal Involvement Rates
(log (FIR₈₁) - log (FIR₇₇)) From Tables 7 and 8

SEASON:	SUPPORT	OCCUPANTS	TIME	SEX	AGE	URBAN						RURAL								
						VEHICLE MILEAGE:			OVER 5 YRS			5 YRS OR LESS			OVER 5 YRS			5 YRS OR LESS		
						LIGHT	HEAVY	OTHER	LIGHT	HEAVY	OTHER	LIGHT	HEAVY	OTHER	LIGHT	HEAVY	OTHER	LIGHT	HEAVY	OTHER
ONE	OTHER	MALE	LE 25	0.002	0.017	0.156	0.164	0.274	-0.005	-0.295	0.074	0.074	0.074	0.074	0.074	0.074	0.074			
			26-35	0.038	-0.146	-0.149	-0.060	0.021	-0.038	-0.234	-0.145	-0.145	-0.145	-0.145	-0.145	-0.145	-0.145			
			GE 56	0.760	0.135	-0.276	-0.075	0.291	0.148	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083			
		FEMALE	LE 25	0.059	0.205	-0.106	0.190	0.070	0.166	0.157	0.109	0.109	0.109	0.109	0.109	0.109	0.109			
			26-35	0.088	0.065	-0.204	-0.050	0.098	0.075	-0.107	-0.107	-0.107	-0.107	-0.107	-0.107	-0.107	-0.107			
			GE 56	0.105	0.268	-0.446	0.057	-0.014	0.150	0.039	0.039	0.039	0.039	0.039	0.039	0.039	0.039			
	RUSH	MALE	LE 25	0.405	0.089	-0.258	0.028	0.223	-0.008	-0.294	0.072	0.072	0.072	0.072	0.072	0.072	0.072			
			26-35	0.111	-0.204	-0.118	0.100	0.100	-0.185	-0.099	-0.099	-0.099	-0.099	-0.099	-0.099	-0.099	-0.099			
			GE 56	0.079	0.070	0.485	0.288	0.175	0.030	-0.309	-0.309	-0.309	-0.309	-0.309	-0.309	-0.309	-0.309			
		FEMALE	LE 25	0.070	0.131	-0.145	0.067	0.085	0.195	-0.073	0.139	0.139	0.139	0.139	0.139	0.139	0.139			
			26-35	0.074	0.015	-0.219	-0.100	0.187	0.173	-0.054	-0.054	-0.054	-0.054	-0.054	-0.054	-0.054	-0.054			
			GE 56	0.057	0.185	-0.594	-0.031	0.045	0.170	0.403	0.403	0.403	0.403	0.403	0.403	0.403	0.403			
TAIL	MALE	LE 25	0.006	0.170	0.041	0.355	0.005	0.189	0.278	0.278	0.278	0.278	0.278	0.278	0.278	0.278				
		26-35	0.174	0.050	0.082	0.136	0.314	0.190	0.029	0.013	0.013	0.013	0.013	0.013	0.013	0.013				
		GE 56	0.303	0.135	-0.241	0.075	0.348	0.180	-0.216	-0.216	-0.216	-0.216	-0.216	-0.216	-0.216	-0.216				
	FEMALE	LE 25	0.118	0.356	-0.047	0.292	0.111	0.350	0.046	0.293	0.293	0.293	0.293	0.293	0.293	0.293				
		26-35	0.163	0.233	-0.129	0.118	0.275	0.275	-0.155	-0.155	-0.155	-0.155	-0.155	-0.155	-0.155	-0.155				
		GE 56	-0.246	0.010	-0.797	0.207	0.332	0.076	-0.777	-0.777	-0.777	-0.777	-0.777	-0.777	-0.777	-0.777				
MORE THAN ONE	OTHER	LE 25	0.200	0.019	0.155	0.165	0.256	0.037	-0.330	-0.330	-0.330	-0.330	-0.330	-0.330	-0.330	-0.330				
		26-35	0.011	-0.078	-0.090	-0.001	0.084	0.004	-0.209	-0.209	-0.209	-0.209	-0.209	-0.209	-0.209	-0.209				
		GE 56	0.244	0.111	-0.402	0.201	0.273	0.090	-0.444	-0.444	-0.444	-0.444	-0.444	-0.444	-0.444	-0.444				
	FEMALE	LE 25	0.080	-0.034	-0.103	0.064	-0.254	-0.108	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001				
		26-35	0.002	0.022	-0.331	-0.177	-0.033	-0.046	-0.423	-0.423	-0.423	-0.423	-0.423	-0.423	-0.423	-0.423				
		GE 56	0.055	0.218	-0.535	-0.037	0.098	0.066	-0.582	-0.582	-0.582	-0.582	-0.582	-0.582	-0.582					
RUSH	MALE	LE 25	0.004	0.012	0.159	0.157	0.175	0.040	0.249	0.067	0.067	0.067	0.067	0.067	0.067	0.067				
		26-35	0.157	0.065	-0.056	0.142	0.315	0.273	0.273	0.273	0.273	0.273	0.273	0.273	0.273	0.273				
		GE 56	0.187	0.045	-0.364	-0.267	0.245	0.108	-0.422	-0.422	-0.422	-0.422	-0.422	-0.422	-0.422	-0.422				
	FEMALE	LE 25	0.025	0.184	-0.297	0.085	-0.203	-0.173	0.278	0.278	0.278	0.278	0.278	0.278	0.278	0.278				
		26-35	0.013	0.045	-0.320	-0.200	0.073	0.015	-0.357	-0.357	-0.357	-0.357	-0.357	-0.357	-0.357	-0.357				
		GE 56	0.021	0.108	-0.610	-0.148	0.019	0.040	-0.573	-0.573	-0.573	-0.573	-0.573	-0.573	-0.573	-0.573				
TAIL	MALE	LE 25	0.005	0.099	-0.040	0.284	0.171	0.013	0.244	0.041	0.041	0.041	0.041	0.041	0.041	0.041				
		26-35	0.192	0.068	0.091	0.145	0.236	0.112	-0.058	-0.058	-0.058	-0.058	-0.058	-0.058	-0.058	-0.058				
		GE 56	0.437	0.269	-0.209	-0.043	0.386	0.218	-0.280	-0.280	-0.280	-0.280	-0.280	-0.280	-0.280	-0.280				
	FEMALE	LE 25	0.012	0.227	-0.014	0.325	-0.115	0.174	-0.109	0.230	0.230	0.230	0.230	0.230	0.230	0.230				
		26-35	0.217	0.287	-0.115	0.135	0.163	0.232	-0.232	-0.232	-0.232	-0.232	-0.232	-0.232	-0.232	-0.232				
		GE 56	0.053	0.309	-0.537	0.053	-0.127	0.063	-0.613	-0.613	-0.613	-0.613	-0.613	-0.613	-0.613	-0.613				

Table 9
 Differences in Logarithms of Fatal Involvement Rates
 (log (FIR₈₁) - log (FIR₇₇)) From Tables 7 and 8
 (continued)

OCCUPATION	TIME	SEX	ROADWAY						KURHAL										
			VEHICLE USE:			OVER 5 YRS:			5 YRS OR LESS:			OVER 5 YRS:			5 YRS OR LESS:				
			VEHICLE	WEIGHT	WHEEL	HEAVY	LIGHT	HEAVY	LIGHT	HEAVY	LIGHT	HEAVY	LIGHT	HEAVY	LIGHT	HEAVY	LIGHT	HEAVY	
ONE	OTHER	MALE	11 25		0.204	0.065	0.171	0.149	0.299	0.080	0.304	0.016							
			26 55		0.027	0.061	0.003	0.092	-0.015	-0.104	-0.233	-0.144							
			01 56		0.255	0.122	0.223	0.077	0.213	0.080	-0.205	-0.084							
	FEMALE	11 25		0.024	0.170	0.075	0.177	0.000	0.138	0.099	0.148								
		26 55		0.270	0.197	0.006	0.149	0.079	0.026	-0.214	-0.059								
		01 56		0.130	0.302	-0.343	0.192	0.034	0.129	-0.412	-0.085								
RUSH	MALE	11 25		0.261	0.046	0.148	0.169	0.371	-0.156	0.376	-0.060								
		26 55		0.099	0.007	0.074	0.160	-0.039	-0.131	-0.237	-0.171								
		01 56		0.171	0.035	0.306	0.109	0.034	0.102	0.463	-0.266								
	FEMALE	11 25		0.047	0.064	-0.145	0.056	-0.174	0.069	-0.053									
		26 55		0.174	0.115	-0.052	0.067	-0.063	-0.121	-0.356	-0.237								
		01 56		0.038	0.107	-0.425	0.037	-0.210	-0.081	-0.500	-0.125								
LATE	MALE	11 25		0.036	0.140	0.077	0.362	0.062	0.122	0.067	0.210								
		26 55		0.311	0.107	0.206	0.340	0.256	0.133	0.039	0.093								
		01 56		0.342	0.173	-0.136	0.030	0.280	0.120	-0.209	-0.043								
	FEMALE	11 25		0.094	0.442	0.106	0.495	0.160	0.399	0.070	0.409								
		26 55		0.416	0.406	0.191	0.438	0.264	0.333	-0.079	0.210								
		01 56		-0.092	0.165	-0.575	0.015	-0.376	-0.019	-0.614	-0.063								
MORE THAN ONE	OTHER	MALE	11 25		0.262	-0.042	0.170	0.311	-0.092	0.318	0.002								
			26 55		0.116	0.027	0.082	0.171	0.039	-0.050	-0.188	-0.099							
			01 56		0.251	0.110	-0.320	0.127	0.175	0.042	0.423	-0.224							
	FEMALE	11 25		-0.195	-0.049	0.131	0.116	0.262	-0.116	0.109	0.058								
		26 55		0.154	0.131	0.112	0.042	-0.022	-0.045	0.300	0.200								
		01 56		0.108	0.272	-0.414	0.083	-0.098	0.065	-0.513	-0.018								
RUSH	MALE	11 25		0.140	0.075	0.029	0.047	0.303	0.088	0.310	0.006								
		26 55		0.300	0.295	0.354	0.439	0.196	0.104	-0.030	0.055								
		01 56		0.314	0.177	0.265	0.068	0.124	-0.013	-0.476	-0.279								
	FEMALE	11 25		0.342	0.231	0.277	0.066	0.222	-0.411	0.338									
		26 55		0.133	0.075	0.133	0.014	-0.157	0.215	-0.490	-0.370								
		01 56		0.001	0.129	0.522	0.060	0.320	-0.192	-0.737	-0.275								
LATE	MALE	11 25		0.095	0.019	0.017	0.301	0.217	-0.033	0.224	0.061								
		26 55		0.499	0.225	0.315	0.369	0.190	0.075	-0.026	0.087								
		01 56		0.496	0.320	-0.003	0.087	0.347	0.179	-0.233	0.087								
	FEMALE	11 25		0.093	0.333	0.159	0.490	0.045	0.037	0.166	0.166								
		26 55		0.491	0.360	0.225	0.477	0.242	0.311	-0.091	0.156								
		01 56		0.270	0.484	0.295	0.295	0.053	0.204	0.037	0.120								