

**Ozone Science and Air
Modeling Research
Project Area H-8B:
Modeling and MOBILE6 –
Development of Local Mileage
Accumulation Rates**

FINAL REPORT

Prepared for:

The Houston Advanced Research Center

Prepared by:

Eastern Research Group, Inc.

August 29, 2003

ERG No.: 3381.00.002.001

OZONE SCIENCE AND AIR MODELING RESEARCH

**PROJECT AREA H-8B: MODELING AND MOBILE6 –
DEVELOPMENT OF LOCAL MILEAGE ACCUMULATION RATES**

FINAL REPORT

Prepared for:

The Houston Advanced Research Center
TERC
4800 Research Forest Drive
The Woodlands, TX 77381

Prepared by:

Eastern Research Group, Inc.
5608 Parkcrest Drive, Suite 100
Austin, TX 78731

August 29, 2003

INTRODUCTION

The objective of this analysis was to create Houston area specific mileage accumulation rates (MARs) for use in MOBILE6 models. The area specific MARs can replace the MOBILE6 defaults and improve the accuracy of the model. The MARs are based on historical odometer readings from the Texas Inspection and Maintenance Vehicle Inspection Database (VID) for Harris County. Although data is not available for the remaining seven counties, Harris County vehicles are responsible for roughly three quarters of all Vehicle Miles Traveled (VMT) in the region. Therefore, development of mileage accumulation rates for Harris County alone will provide an important adjustment to the total on-road inventory.

All of the odometer data in the VID was hand entered by inspectors and, as such, are subject to significant error. The majority of the analysis for creating the MARs focused on removing, or accounting for, these errors as best as possible. This document discusses the data processing steps used to create the MARs and presents the Houston area specific MARs that were produced.

...

Advanced Data Preparation

...

As the vehicle age increases, the five different scenarios begin to spread out greatly. This shows that the results for the older vehicles are very dependent on the data clean up scenario that is used to correct the typos and rollovers. Part of this dependence stems from the reduced number of records present for the older vehicles (Figure 8). As the number of observations drops substantially, the process used to handle the typos and rollovers becomes increasingly important and greatly affects the final results. The older vehicles are also more likely to have 5 digit odometers and higher mileage, making them much more dependent on the methodology used to correct for rollovers.

...

Final Creation of MARs

The final creation of the MARs for the Houston area incorporated both the modified rollover analysis as well as the averaging of the positive and negative typos. Figures 9 through 13 present the final MARs that were developed for this project. Each plot shows the calculated MARs with error bars as well as the MOBILE6 defaults. The error bars show the 95% confidence interval about the mean. Figure 13 shows the number of mileage accumulation observations used for each MAR calculated. As seen before, the number of observations greatly decreases as the age of the vehicles increase. This is also reflected in the increase in the size of the error bars and the oscillations of the averages for the calculated MARs as age increases. These error bars show only the error that is present in the scenario used to create this set of MARs. They do not show the uncertainty

that arises from the choice of the scenario as Figure 6 illustrates. Inclusion of this error would make only a small difference for the younger vehicles but greatly increase the error bars for the older vehicles.

After analyzing Figures 9 through 14, it becomes apparent that the calculated MARs match the MOBILE6 defaults quite well. This matching serves as independent verification of our methodology. On the whole there does seem to be a small but systematic increase in MARs across vehicle types, typically between years three and ten, relative to MOBILE6 defaults. However, on the whole older vehicle MARs are not significantly different than the MOBILE6 defaults. This is shown by the MOBILE6 defaults being encompassed by the error bars for half of the older age vehicles. Given the 95% confidence intervals and the scenario-to-scenario uncertainty, there is insufficient evidence to support that LDV MARs for Harris County are significantly different than the MOBILE6 defaults for essentially all vehicles over 11 years old. A similar pattern exists for other vehicle types, although decreases in sample sizes, especially for the LDT3 and LDT4 categories, yield erratic calculated trends.

In addition, the relative uncertainty associated with the first two years of MAR data is relatively high, especially for the truck categories, due to unusually low sample sizes for these years. (Also, the first two years of calculated MARs for the LDT1, 3, and 4 categories also show an anomalous peak at year 3, adding to our suspicion about their credibility.) The low sample sizes are an artifact of the I/M program itself, which does not require vehicle testing for a full two years after new vehicle purchase. In fact, one would expect no data for this time period at all, if all vehicles received their first I/M test at the correct time. For these reasons we believe the first two years of calculated MAR data should be replaced. A conservative solution would be to set year one and two values equal to year three levels.

Given these observations, we propose to use the Harris County calculated MARs for the first 11 years of vehicle age, with year one and two levels set to equal year 3, and MOBILE6 defaults for the remainder of the vehicle age. We believe that this captures the majority of the area specific driving patterns as possible with the existing dataset.

Table 2 shows the final recommended vehicle MARs for use with MOBILE6.

Table 2. MOBILE6 Default & Calculated Houston-Specific MARs

Age	LDV		LDT1		LDT2		LDT3		LDT4	
	Calculated	MOBILE6	Calculated	MOBILE6	Calculated	MOBILE6	Calculated	MOBILE6	Calculated	MOBILE6
1	15,264	14,910	16,293	19,496	18,130	19,496	16,081	21,331	17,766	21,331
2	14,665	14,174	16,706	18,384	16,158	18,384	18,143	19,865	18,679	19,865
3	14,569	13,475	19,135	17,308	15,804	17,308	17,349	18,500	17,177	18,500
4	14,676	12,810	17,952	16,267	16,293	16,267	17,576	17,228	16,996	17,228
5	14,529	12,178	16,243	15,260	16,075	15,260	17,202	16,044	16,979	16,044
6	14,049	11,577	15,304	14,289	15,229	14,289	16,346	14,942	16,328	14,942
7	13,012	11,006	14,025	13,352	14,477	13,352	15,690	13,915	15,853	13,915
8	12,004	10,463	12,781	12,451	12,992	12,451	14,359	12,959	14,458	12,959
9	11,035	9,947	11,434	11,584	11,486	11,584	13,486	12,068	13,162	12,068
10	10,132	9,456	10,135	10,752	10,416	10,752	12,254	11,239	13,814	11,239
11	8,993	8,989	9,616	9,955	9,591	9,955	9,702	10,466	12,939	10,466
12	8,719	8,546	8,464	9,194	9,332	9,194	9,501	9,747	9,631	9,747
13	7,983	8,124	8,632	8,467	7,872	8,467	7,019	9,077	11,987	9,077
14	7,516	7,723	8,277	7,775	8,104	7,775	7,626	8,453	8,579	8,453
15	7,029	7,342	7,625	7,118	7,687	7,118	6,635	7,872	5,051	7,872
16	7,211	6,980	7,318	6,496	6,459	6,496	7,933	7,331	6,836	7,331
17	5,998	6,636	6,762	5,909	7,514	5,909	7,172	6,827	6,679	6,827
18	5,923	6,308	7,123	5,356	5,672	5,356	9,446	6,358	3,783	6,358
19	6,294	5,997	6,348	4,839	7,598	4,839	9,917	5,921	4,815	5,921
20	6,134	5,701	8,479	4,357	7,316	4,357	10,341	5,514	10,824	5,514
21	4,621	5,420	6,336	3,909	8,620	3,909	6,523	5,135	17,273	5,135
22	5,664	5,152	6,939	3,497	8,280	3,497	9,587	4,782	N/A	4,782
23	4,875	4,898	8,542	3,120	12,098	3,120	6,549	4,454	10,806	4,454
24	5,703	4,656	6,534	2,777	4,176	2,777	5,833	4,148	12,090	4,148
25	4,600	4,427	12,757	2,470	5,204	2,470	5,740	3,863	20,184	3,863
26	5,557	4,208	-1,644	2,197	5,082	2,197	930	3,597	-147	3,597
27	3,669	4,001	-4,367	1,959	4,569	1,959	6,508	3,350	6,558	3,350
28	8,339	3,803	-1,760	1,756	2,016	1,756	6,218	3,120	-150	3,120
29	3,235	3,616	-6,546	1,589	509	1,589	4,809	2,905	16,364	2,905
30	7,478	3,437	1,148	1,456	7,522	1,456	N/A	2,706	3,269	2,706