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MEMORANDUM

Date: September 22, 2004
To: Mr. Steven P. Douglas
From: M. Laurentius Marais
Subject: California AB 1493 proposed regulations

William E. Wecker Associates, Inc., was asked by the Alliance of Automobile Manufacturers to provide an approximate projection of the effects of the California Air Resources Board's proposed regulations pursuant to California AB 1493 ("proposed regulations") on the numbers of fatalities and serious injuries occurring in crashes on California highways. We were asked to assume for this purpose that the proposed regulations would be in full effect in 2016, and that their effects on the composition of the passenger vehicle fleet and on vehicle-miles traveled ("VMT") in California in 2009-2030 would conform to projections provided to us by NERA, Inc., and by Sierra Research, Inc. Our assignment was to use these inputs to estimate the differences in future California highway fatalities and serious injuries between this "regulation" scenario and a parallel, "baseline" scenario without the proposed regulations.

For our analysis we have relied on the following:

- Kahane, C. J., "Vehicle Weight, Fatality Risk and Crash Compatibility of Model Year 1991-99 Passenger Cars and Light Trucks," NHTSA Technical Report No. DOT HS 809 662, October 2003, ("Kahane Report"; Appendix 1);
- Estimates and projections for model years 2003 and 2016 of average curb weights by vehicle category assuming the baseline scenario (provided by Sierra Research, Inc.; Appendix 2);
- Projections for model year 2016 of average curb weights by vehicle category assuming the regulation scenario (provided by Sierra Research, Inc.; Appendix 2);
- Estimates and projections for calendar years 2003-2030 by model year and vehicle category of the vehicle population and VMT assuming the baseline scenario (provided by NERA, Inc.; Appendix 3);
- Estimates and projections for calendar years 2003-2030 by model year and vehicle category of the vehicle population and VMT assuming the regulation scenario (provided by NERA, Inc. and Sierra Research, Inc.; Appendix 4);

- California Statewide Integrated Traffic Records System (SWITRS) 2001 Annual Report (Appendix 5);
- Federal motor vehicle accident data;
- Hellman, K. H., and Heavenrich, R. M., "Light-Duty Automotive Technology and Fuel Economy Trends: 1975 Through 2003," United States Environmental Protection Agency Technical Report No. EPA420-R-03-006, April 2003, ("EPA Report"; Appendix 6).

Methods

For purposes of our analysis we divided the California fleet of cars and light-duty trucks into four categories: passenger cars having curb weight less than 2,950 pounds (category "PC1"); passenger cars having curb weight greater than or equal to 2,950 pounds (category "PC2"); light-duty trucks having test weight (equal to curb weight + 300 pounds) less than or equal to 3,750 pounds (category "LDT1"); and light-duty trucks having test weight greater than 3,750 pounds but gross vehicle weight rating ("GVWR") less than 8,500 pounds (category "LDT2+").

Our methods for estimating predicted numbers of fatalities and serious injuries in 2020 and 2030 with and without the proposed regulations were as follows:

1. Using information for vehicle categories similar to ours from Tables 1 and 2 of the Kahane Report Executive Summary, and 1996-2002 FARS data for fatal accidents in California, we applied the methods described in section 5.7 of the Kahane Report to calculate a baseline distribution of fatalities for California alone. From this distribution, and using the methods described in the Kahane report, we calculated a prorated "full year projection" of California highway fatalities based on FARS data for 2002, since the 2003 FARS data were not yet available to us. [Tables 1a and 3a at columns [1]-[3]]
2. Given the estimated VMT provided to us by NERA, we calculated rates of fatalities per billion VMT by vehicle category. [Tables 1a and 3a at columns [4]-[5]] (NERA projections for passenger cars did not distinguish between our categories PC1 and PC2. For purposes of the projections reported here we approximated the proportions of PC1 and PC2 car sales in each model year from 1975 to 2003 using data from Appendix H of the EPA Report. For model years 2004 and later we used the 2003 sales proportions and for model years 1974 and earlier we used the 1975 sales proportions.)
3. Assuming, for the moment, that the rates of fatalities per billion VMT would remain unchanged through 2030, we calculated the numbers of fatalities given the estimated VMT in 2020 and 2030 under both the baseline and the regulation scenarios. [Tables 1a and 3a at columns [6]-[9]]

4. We adjusted the estimated proportional effects of 100-pound weight reductions on overall fatalities shown in Tables 1 and 2 of the Kahane Report Executive Summary to reflect the changed mix of vehicle types and crash modes under our baseline and regulation scenarios. [Tables 1b, 1c, 3b, and 3c, and Tables 2 and 4 at column [4]]
5. Using average curb weights by vehicle category provided to us by Sierra Research for model years 2003 and 2016, and based on consultation with Sierra, we interpolated and extrapolated the average curb weights in these vehicle categories for other model years as follows. For model years before 2003 we used weight data from Appendix G of the EPA Report for cars and from Table 2, p. 8 for light trucks to calculate a weight index by model year for each vehicle category (with index values for 2003 equal to 1.00). We then multiplied the model year 2003 weights from Sierra by these index values to estimate average weights by model year in each vehicle category. For model years 2003-2030 under the baseline scenario we assumed for each vehicle category that average weights would rise in equal, annual percentage increments from 2003 to 2009, and would then remain constant from 2009 through 2030 at the levels projected by Sierra for 2016. Under the regulation scenario we assumed that average curb weights would be the same as under the baseline scenario through model year 2009, that weights would then decline in equal, annual percentage increments through 2016 to the levels projected by Sierra for 2016, and that weights would remain constant from 2016 through 2030 at the levels projected by Sierra for 2016.
6. Using NERA projections of the composition by model year of the vehicle population in 2003, 2020, and 2030, we used these interpolated and extrapolated average curb weights to estimate the average curb weights of the vehicle populations of 2003, 2020 and 2030. [Tables 2 and 4 at columns [1] and [2]]
7. Using the adjusted estimates of the effects of weight changes, our estimated changes in average vehicle weights, and our prorated "full year projection" of fatalities for California in 2002, we calculated estimates of the effects of weight changes on numbers of fatalities under the regulation scenario, as in the Kahane Report Executive Summary. [Tables 2 and 4 at columns [5]-[7]]
8. According to the most recent SWITRS report, 3,926 vehicle occupants were killed and 13,007 suffered "severe wounds" in California in 2001. We used the implied ratio of severe wounds to fatalities (i.e., $3.3 = 13,007/3,926$) to estimate the numbers of serious injuries in 2020 and 2030, given our estimates of the numbers of fatalities for 2020 and 2030. [Tables 2 and 4 at column [8]]

Results

Given the inputs provided to us for the baseline scenario, we estimate that approximately 4,480 fatalities and 14,841 severe injuries would occur in traffic accidents on California

highways in 2020, and 5,094 fatalities and 16,876 severe injuries in 2030. [Tables 2 and 4 at columns [7] and [8]].

Given the inputs provided to us for the regulation scenario, we estimate that approximately 4,737 fatalities and 15,694 severe injuries would occur in traffic accidents on California highways in 2020, and 5,623 fatalities and 18,631 severe injuries in 2030. [Tables 2 and 4 at columns [7] and [8]].

These totals reflect estimated increases of 258 fatalities and 853 severe injuries in 2020 under the proposed regulations compared to the baseline scenario, and 530 fatalities and 1,755 severe injuries in 2030.

Table 1a

Estimated Effects of VMT Changes on California Crash Fatalities in 2020

Vehicle Category	[1]		[2]		[3] = [2] x 3,649		[4]	[5] = [3] / [4]		[6]	[7] = [5] x [6]		[8]		[9] = [5] x [8]		
	Fatalities ¹		Percent		Full Year Projection ³		2003 VMT ⁴ (billions)	Fatalities per billion VMT	Baseline Scenario		Regulation Scenario		Projected 2020		Estimated		
	Actual ²	Distribution	Percent	Projection ³	Projection ³	(billions)	Fatalities per billion VMT	Projected 2020 VMT ⁵ (billions)	Fatalities	Projected 2020 VMT ⁵ (billions)	Fatalities	Projected 2020 VMT ⁵ (billions)	Fatalities	Projected 2020 VMT ⁵ (billions)	Fatalities	Projected 2020 VMT ⁵ (billions)	Fatalities
PC1	1,362	32.6%	1,189	74.3	16.0	77.0	1,233	78.7	1,260	1,260	1,260	1,260	1,260	1,260	1,260	1,260	1,260
PC2	881	21.1%	769	94.3	8.2	143.9	1,174	146.7	1,197	1,197	1,197	1,197	1,197	1,197	1,197	1,197	1,197
LDT1	343	8.2%	300	44.5	6.7	62.7	423	64.2	433	433	433	433	433	433	433	433	433
LDT2+	1,593	38.1%	1,391	68.7	20.3	88.8	1,799	90.3	1,828	1,828	1,828	1,828	1,828	1,828	1,828	1,828	1,828
All	4,178	100.0%	3,649	281.8	372.5	4,628	379.9	4,717	4,717	4,717	4,717	4,717	4,717	4,717	4,717	4,717	4,717

Note 1: Crash fatalities are prorated among crash-involved case vehicles as in Kahane Report, section 5.7, to avoid double counting.

Note 2: California crash fatalities involving model-year 1996-1999 vehicles, from FARS 1996-2002.

Note 3: California crash fatalities with known crash mode and involving at least one car or light truck, FARS 2002.

Note 4: VMT (vehicle miles traveled) for California vehicle population in 2003, estimated by NERA, Inc.

Note 5: VMT for California vehicle population in 2030, projected by NERA, Inc. and Sierra Research, Inc.

Note 6: 1996-2002 FARS (Fatality Analysis Reporting System) data are available from National Highway Traffic Safety Administration, DTS-44, DOT/Volpe National Transportation Systems Center, Kendall Square, Cambridge, MA 02142.

Table 1b

**Kahane "Fatality Increase Per 100-Pound Weight Reduction"
Adjusted for Changed Mix of Vehicle Types and Crash Modes
Baseline Scenario**

Case Vehicle Category	Crash Mode	Kahane Baseline Fatalities	Calendar Year 2000				Calendar Year 2020				[6] = (1) x ((4)/(2)) x ((5)/(3))	[7]	[8] = (6) x (7)	[9] = (8) / (6)
			[3]		[4]		[5]		[6]					
			Case Vehicles	Other Vehicles	Case Vehicles	Other Vehicles	Case Vehicles	Other Vehicles	Case Vehicles	Other Vehicles				
PC1	Principal rollover	995	78		77		986		50	5.08%	50			
	Fixed object	3,357	78		77	3,326		107	3.22%	107				
	Ped/bike/motorcycle	1,741	78		77	1,725		60	3.48%	60				
	Heavy truck	1,148	78		77	1,137		68	5.96%	68				
	Car < 2,950	934	78	78	77	917		45	4.96%	45				
	Car 2,950+	1,342	78	82	77	1,44		58	2.48%	58				
Light truck	4,091	78	108	77	5,201		321	5.63%	321					
All		13,608				16,128		709	4.40%	709				
PC2	Principal rollover	715	82		144		1,255		59	4.70%	59			
	Fixed object	2,822	82		144	4,955		83	1.67%	83				
	Ped/bike/motorcycle	1,349	82		144	2,369		-15	-0.62%	-15				
	Heavy truck	822	82		144	1,443		30	2.06%	30				
	Car < 2,950	1,342	82	78	77	2,335		37	1.59%	37				
	Car 2,950+	677	82	82	144	2,087		66	3.18%	66				
Light truck	3,157	82	108	144	7,797		204	2.62%	204					
All		10,884				22,242		465	2.09%	465				
LDT1	Principal rollover	1,319	42		63		1,978		62	3.15%	62			
	Fixed object	1,687	42		63	2,529		102	4.02%	102				
	Ped/bike/motorcycle	1,148	42		63	1,721		21	1.24%	21				
	Heavy truck	584	42		63	876		52	5.91%	52				
	Car	2,062	42	160	63	4,277		48	1.13%	48				
	Light truck < 3,870	247	42	42	63	555		39	6.98%	39				
Light truck 3,870+	1,010	42	66	63	2,041		71	3.49%	71					
All		8,057				13,976		395	2.83%	395				
LOT2+	Principal rollover	2,183	66		89		2,942		75	2.56%	75			
	Fixed object	2,639	66		89	3,556		109	3.06%	109				
	Ped/bike/motorcycle	2,043	66		89	2,753		4	0.13%	4				
	Heavy truck	860	66		89	1,159		7	0.62%	7				
	Car	5,186	66	160	89	9,668		-66	-0.68%	-66				
	Light truck < 3,870	1,010	66	42	89	2,041		-31	-1.50%	-31				
Light truck 3,870+	784	66	66	89	1,424		-43	-3.00%	-43					
All		14,705				23,542		56	0.24%	56				

Sources: See Kahane Report at pages ix and xi for columns (1) and (2). Estimates and projections for columns (2)-(5) provided by NERA, Inc.

Table 1c

**Kahane "Fatality Increase Per 100-Pound Weight Reduction"
Adjusted for Changed Mix of Vehicle Types and Crash Modes
Regulation Scenario**

Case Vehicle Category	Crash Mode	[1] Kahane Baseline Fatalities	[2] VMT (billions)				[5] Calendar Year 2020	[6] = [1] x ([4]/[2]) x ([3]/[5])	[7]	[8] = [6] x [7]	[9] = [8] / [6]
			Calendar Year 2000		Calendar Year 2020						
			Case Vehicles	Other Vehicles	Case Vehicles	Other Vehicles					
PC1	Principal rollover	995	78	79	79	1,008	5.08%	51	Overall	4.40%	
	Fixed object	3,357	78	79	3,399	3.22%	109	Net Change in Annual Fatalities	Effect of 100-Pound Reduction		
	Ped/bike/motorcycle	1,741	78	79	1,763	3.48%	61				
	Heavy truck	1,148	78	79	1,162	5.96%	69				
	Car < 2,950	934	78	79	958	4.96%	48				
Car 2,950+	1,342	78	79	1,47	2,433	2.48%	60				
Light truck	4,091	78	79	154	5,939	5.63%	334				
All		13,608			16,662		733				
PC2	Principal rollover	715	82	147	1,280	4.70%	60	4.70%	2.09%		
	Fixed object	2,822	82	147	5,053	1.67%	84	1.67%			
	Ped/bike/motorcycle	1,349	82	147	2,416	-0.62%	-15	-0.62%			
	Heavy truck	822	82	147	1,472	2.06%	30	2.06%			
	Car < 2,950	1,342	82	147	2,433	1.59%	39	1.59%			
Car 2,950+	677	82	147	2,171	3.18%	69	3.18%				
Light truck	3,157	82	147	8,104	2.62%	212	2.62%				
All		10,884			22,929		480				
LDT1	Principal rollover	1,319	42	64	2,024	3.15%	64	3.15%	2.82%		
	Fixed object	1,687	42	64	2,588	4.02%	104	4.02%			
	Ped/bike/motorcycle	1,148	42	64	1,761	1.24%	22	1.24%			
	Heavy truck	584	42	64	896	5.91%	53	5.91%			
	Car	2,052	42	64	4,466	1.13%	50	1.13%			
Light truck < 3,870	247	42	64	581	6.98%	41	6.98%				
Light truck 3,870+	1,010	42	64	2,122	3.49%	74	3.49%				
All		8,057			14,439		408				
LDT2+	Principal rollover	2,183	66	90	2,990	2.56%	77	2.56%	0.22%		
	Fixed object	2,639	66	90	3,615	3.06%	111	3.06%			
	Ped/bike/motorcycle	2,043	66	90	2,798	0.13%	4	0.13%			
	Heavy truck	860	66	90	1,178	0.62%	7	0.62%			
	Car	5,186	66	90	10,029	-0.68%	-68	-0.68%			
Light truck < 3,870	1,010	66	90	2,122	-1.50%	-32	-1.50%				
Light truck 3,870+	784	66	90	1,471	-3.00%	-44	-3.00%				
All		14,705			24,203		54				

Sources: See Kahane Report at pages ix and xi for columns [1] and [7]. Estimates and projections for columns [2]-[5] provided by NERA, Inc. and Sierra Research, Inc.

Table 2
Estimated Combined Effects of VMT and Vehicle Weight Changes
on California Crash Fatalities in 2020

Vehicle Category	[1]	[2]	[3] = [2] - [1]	[4]	[5] = -[3] x [4]/100	[6]	[7] = [6] + [5] x [6]	[8] = [7] x 3.3
	Average Curb Weight	2003 Fleet	2020 Fleet	Change	Estimated Percent Increase in Fatalities per 100-Pound Reduction	Estimated Percent Change in Fatalities	Estimated 2020 Fatalities Accounting for Changes In...	Estimated Severe Injuries in 2020 Accounting for Changes in VMT and Vehicle Weights
Baseline Scenario								
PC1	2,620	2,792	172	4.40%	-7.56%	1,233	1,140	3,775
PC2	3,388	3,423	35	2.09%	-0.74%	1,174	1,165	3,860
LDT1	2,818	3,094	276	2.83%	-7.82%	423	390	1,292
LDT2+	3,961	4,274	312	0.24%	-0.74%	1,799	1,785	5,914
All						4,628	4,480	14,841
Regulation Scenario								
PC1	2,620	2,625	5	4.40%	-0.23%	1,260	1,257	4,164
PC2	3,388	3,207	-181	2.09%	3.78%	1,197	1,242	4,115
LDT1	2,818	2,965	147	2.82%	-4.16%	433	415	1,374
LDT2+	3,961	4,077	116	0.22%	-0.26%	1,828	1,823	6,041
All						4,717	4,737	15,694
Regulation Scenario Increase over Baseline							258	853

Note 1: Average curb weights based on estimates from Sierra Research, Inc.
 Note 2: Column [4] from Tables 1b and 1c.
 Note 3: Column [6] from Table 1a.
 Note 4: In column [8], 3.3 (= 13,007 / 3,926) = ratio of Severe Injuries to Fatalities from California Statewide Integrated Traffic Records System (SWITRS) Annual Report for 2001.

Table 3a

Estimated Effects of VMT Changes on California Crash Fatalities in 2030

Vehicle Category	[1] Fatalities ¹		[2]	[3] = [2] x 3,649	[4]	[5] = [3] / [4]	[6]	[7] = [5] x [6]		[8]		[9] = [5] x [8]
	Actual ²	Distribution	Percent	Full Year Projection ³	2003 VMT ⁴ (billions)	Fatalities per billion VMT	Projected 2030 VMT ⁵ (billions)	Baseline Scenario Projected 2030	Estimated Fatalities	Regulation Scenario Projected 2030	Estimated Fatalities	Fatalities
PC1	1,362		32.6%	1,189	74.3	16.0	84.3	84.3	1,349	87.0	1,392	1,392
PC2	881		21.1%	769	94.3	8.2	162.0	162.0	1,321	167.0	1,362	1,362
LDT1	343		8.2%	300	44.5	6.7	75.1	75.1	506	78.7	530	530
LDT2+	1,593		38.1%	1,391	68.7	20.3	104.4	104.4	2,115	108.0	2,188	2,188
All	4,178		100.0%	3,649	281.8		425.8	425.8	5,291	440.7	5,472	5,472

Note 1: Crash fatalities are prorated among crash-involved case vehicles as in Kahane Report, section 5.7, to avoid double counting.

Note 2: California crash fatalities involving model-year 1996-1999 vehicles, from FARS 1996-2002.

Note 3: California crash fatalities with known crash mode and involving at least one car or light truck, FARS 2002.

Note 4: VMT (vehicle miles traveled) for California vehicle population in 2003, estimated by NERA, Inc.

Note 5: VMT for California vehicle population in 2030, projected by NERA, Inc. and Sierra Research, Inc.

Note 6: 1996-2002 FARS (Fatality Analysis Reporting System) data are available from National Highway Traffic Safety Administration, DTS-44, DOT/Volpe National Transportation Systems Center, Kendall Square, Cambridge, MA 02142.

Table 3b

**Kahane "Fatality Increase Per 100-Pound Weight Reduction"
Adjusted for Changed Mix of Vehicle Types and Crash Modes**

Baseline Scenario

Case Vehicle Category	Crash Mode	Kahane Baseline Fatalities	VMT (billions)				[6] = [1] x [4] / [3] x [5] / [3]	[7]	[8] = [6] x [7]	[9] = [8] / [6]
			Calendar Year 2000		Calendar Year 2030					
			Case Vehicles	Other Vehicles	Case Vehicles	Other Vehicles				
PC1	Principal rollover	995	78	84	84	1,079	5.08%	55	Overall Effect of 100-Pound Reduction	
	Fixed object	3,357	78	84	84	3,641	3.22%	117		
	Ped/bike/motorcycle	1,741	78	84	84	1,888	3.48%	66		
	Heavy truck	1,148	78	84	84	1,245	5.96%	74		
	Car < 2,950	934	78	84	84	1,099	4.96%	54		
	Car 2,950+	1,342	78	84	162	2,877	2.48%	71		
	Light truck	4,091	78	84	180	7,393	5.63%	416		
	All	13,608				19,222		854		4.44%
PC2	Principal rollover	715	82	162	162	1,413	4.70%	66		Overall Effect of 100-Pound Reduction
	Fixed object	2,822	82	162	162	5,578	1.67%	93		
	Ped/bike/motorcycle	1,349	82	162	162	2,666	-0.62%	-17		
	Heavy truck	822	82	162	162	1,625	2.06%	33		
	Car < 2,950	1,342	82	162	84	2,877	1.59%	46		
	Car 2,950+	677	82	162	162	2,645	3.18%	84		
	Light truck	3,157	82	162	180	10,398	2.62%	272		
	All	10,884				27,201		579	2.13%	
LDT1	Principal rollover	1,319	42	75	75	2,368	3.15%	75	Overall Effect of 100-Pound Reduction	
	Fixed object	1,687	42	75	75	3,029	4.02%	122		
	Ped/bike/motorcycle	1,148	42	75	75	2,061	1.24%	26		
	Heavy truck	584	42	75	75	1,048	5.91%	62		
	Car	2,062	42	75	246	5,709	1.13%	65		
	Light truck < 3,870	247	42	75	75	796	6.98%	56		
	Light truck 3,870+	1,010	42	75	104	2,873	3.49%	100		
	All	8,057				17,884		504		2.82%
LDT2+	Principal rollover	2,183	66	104	104	3,459	2.56%	89	Overall Effect of 100-Pound Reduction	
	Fixed object	2,639	66	104	104	4,182	3.06%	128		
	Ped/bike/motorcycle	2,043	66	104	104	3,237	0.13%	4		
	Heavy truck	860	66	104	104	1,363	0.62%	8		
	Car	5,186	66	104	246	12,673	-0.68%	-86		
	Light truck < 3,870	1,010	66	104	75	2,873	-1.50%	-43		
	Light truck 3,870+	784	66	104	104	1,969	-3.00%	-59		
	All	14,705				29,755		41	0.14%	

Sources: See Kahane Report at pages ix and xi for columns [1] and [7]. Estimates and projections for columns [2]-[5] provided by NERA, Inc.

Kahane "Fatality Increase Per 100-Pound Weight Reduction" Adjusted for Changed Mix of Vehicle Types and Crash Modes

Regulation Scenario

Case Vehicle Category	Crash Mode	[1] Kahane Baseline Fatalities	[2] VMT (billions)				[5] Estimated 2030 Fatalities	[7] Effect of 100-Pound Reduction	[8] Net Change in Annual Fatalities	[9] Overall Effect of 100-Pound Reduction
			Calendar Year 2000		Calendar Year 2030					
			Case Vehicles	Other Vehicles	Case Vehicles	Other Vehicles				
PC1	Principal rollover	995	78	87	1,113	5.08%	57	902	4.45%	
	Fixed object	3,357	78	87	3,756	3.22%	121			
	Ped/bike/motorcycle	1,741	78	87	1,948	3.48%	68			
	Heavy truck	1,148	78	87	1,285	5.96%	77			
	Car < 2,950	934	78	87	1,169	4.96%	58			
Car 2,950+	1,342	78	87	3,060	2.48%	76				
Light truck	4,091	78	108	7,934	5.63%	447				
All		13,608			20,265					
PC2	Principal rollover	715	82	167	1,457	4.70%	68	612	2.14%	
	Fixed object	2,822	82	167	5,750	1.67%	96			
	Ped/bike/motorcycle	1,349	82	167	2,749	-0.62%	-17			
	Heavy truck	822	82	167	1,675	2.06%	35			
	Car < 2,950	1,342	82	167	3,060	1.59%	49			
Car 2,950+	677	82	167	2,811	3.18%	89				
Light truck	3,157	82	108	11,148	2.62%	292				
All		10,884			28,649					
LDT1	Principal rollover	1,319	42	79	2,481	3.15%	78	537	2.82%	
	Fixed object	1,687	42	79	3,173	4.02%	128			
	Ped/bike/motorcycle	1,148	42	79	2,159	1.24%	27			
	Heavy truck	584	42	79	1,098	5.91%	65			
	Car	2,062	42	79	6,167	1.13%	70			
Light truck < 3,870	247	42	79	874	6.98%	61				
Light truck 3,870+	1,010	42	66	3,114	3.49%	109				
All		8,057			19,065					
LDT2+	Principal rollover	2,183	66	108	3,579	2.56%	92	35	0.11%	
	Fixed object	2,639	66	108	4,326	3.06%	132			
	Ped/bike/motorcycle	2,043	66	108	3,349	0.13%	4			
	Heavy truck	860	66	108	1,410	0.62%	9			
	Car	5,186	66	108	13,521	-0.68%	-92			
Light truck < 3,870	1,010	66	108	3,114	-1.50%	-47				
Light truck 3,870+	784	66	108	2,107	-3.00%	-63				
All		14,705			31,406					

Sources: See Kahane Report at pages ix and xi for columns [1] and [7]. Estimates and projections for columns [2]-[5] provided by NERA, Inc. and Sierra Research, Inc.

Table 4

Estimated Combined Effects of VMT and Vehicle Weight Changes on California Crash Fatalities in 2030

Vehicle Category	[1] [2]		[3] = [2] - [1]	[4]	[5] = -[3] x (4)/100	[6]	[7] = [6] + [5] x [6]	[8] = [7] x 3.3	
	Average Curb Weight	2003 Fleet	2030 Fleet	Estimated Percent Increase in Fatalities per 100-Pound Reduction	Estimated Percent Change in Fatalities	Estimated 2030 Fatalities Accounting for Changes In...	Estimated 2030 Fatalities Accounting for Changes in VMT and Vehicle Weights	Estimated Severe Injuries In 2030 Accounting for Changes in VMT and Vehicle Weights	
Baseline Scenario									
PC1	2,620	2,828	208	4.44%	-9.25%	1,349	1,224	4,057	
PC2	3,388	3,440	52	2.13%	-1.11%	1,321	1,306	4,328	
LDT1	2,818	3,149	331	2.82%	-9.33%	506	459	1,521	
LDT2+	3,961	4,340	378	0.14%	-0.52%	2,115	2,104	6,970	
All						5,291	5,094	16,876	
Regulation Scenario									
PC1	2,620	2,512	-108	4.45%	4.82%	1,392	1,459	4,834	
PC2	3,388	3,049	-339	2.14%	7.24%	1,362	1,460	4,838	
LDT1	2,818	2,913	96	2.82%	-2.69%	530	516	1,710	
LDT2+	3,961	3,975	14	0.11%	-0.02%	2,188	2,188	7,248	
All						5,472	5,623	18,631	
Regulation Scenario Increase over Baseline							<u>530</u>	<u>1,755</u>	

Note 1: Average curb weights based on estimates from Sierra Research, Inc.

Note 2: Column [4] from Tables 3b and 3c.

Note 3: Column [6] from Table 3a.

Note 4: In column [8], 3.3 (= 13,007 / 3,926) = ratio of Severe Injuries to Fatalities from California Statewide Integrated Traffic Records System (SWITRS) Annual Report for 2001.

Appendix 2

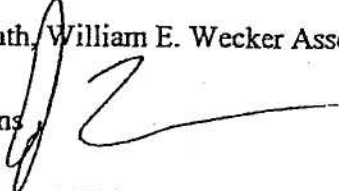
Estimates and Projections of Average Curb Weights by Vehicle Category
Provided by Sierra Research, Inc

September 21, 2004



1801 J Street
Sacramento, CA 95814
(916) 444-6666
Fax: (916) 444-8373

Memo to: Angela McGrath, William E. Wecker Associates

From: James M. Lyons 

Subject: Impact of Proposed CARB Regulations on Vehicle Weight

Using the methodology, data and results of the analysis I performed and documented in Attachment C-1 of Appendix C to the Comments of the Alliance of Automobile Manufacturers Association, I have computed estimates of the changes in average vehicle weight that will result from the proposed CARB regulations. More specifically, per your request, I have computed the average change in vehicle weight expected to occur between the 2003 and 2016 model years in the absence of the CARB regulations as well as the change in average vehicle weight relative to the 2003 model year that is expected for the 2016 model year with the regulations in place. Again, per your request, these calculations have been performed for four vehicle categories: (1) passenger cars with curb weights of less than 2,950 pounds (PC1); (2) passenger cars with curb weights equal to or greater than 2,950 pounds (PC2); (3) light-duty trucks with test weights of 3,750 pounds or less (referred to as LDT1s) and (4) light-duty trucks with test weights of more than 3,750 pounds but with gross vehicle weight ratings of less than 8,500 pounds (referred to as LDT2s and LDT3s). The results of my calculations are presented in Table 1 below.

Category	MY2003	MY2016 No Reg	MY2016 With Reg
PC1	2753	2843	2435
PC2	3338	3448	2953
LDT1	3117	3173	2864
LDT2	4298	4376	3879

Appendix 3

Estimates and Projections for Calendar years 2003–2030 by Model Year and Vehicle
Category of the Vehicle Population and VMT Assuming the Baseline Scenario
Provided by NERA, Inc.

Month Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030					
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Appendix 4

Estimates and Projections for Calendar Years 2003–2030 by Model Year and Vehicle
Category of the Vehicle Population and VMT Assuming the Regulation Scenario
Provided by NERA, Inc. and Sierra Research, Inc.

Month Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
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2019																						
2020																						

Appendix 5

SWITRS 2001 Annual Report



Safety, Service, & Security

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- [SWITRS 1999 Report](#)
- [SWITRS 1998 Report](#)
- [SWITRS 1997 Report](#)
- [Fatalities 0 - 4 Years](#)

2001 SWITRS Annual Report

2001 Annual Report of Fatal and Injury Motor Vehicle Traffic Collisions

State of California
Gray Davis, Governor

Business, Transportation and Housing Agency
Maria Contreras-Sweet, Secretary

Department of California Highway Patrol
D. O. Helmick, Commissioner

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The following documents have been converted to Adobe Acrobat 5.0 "tagged PDF" format. A free software "plug-in" is required to use them, which can be obtained at <http://www.adobe.com/prodindex/acrobat/readstep.html>.

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- [CHP Commissioner D.O. Helmick](#)

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2001 California Quick Collision Facts

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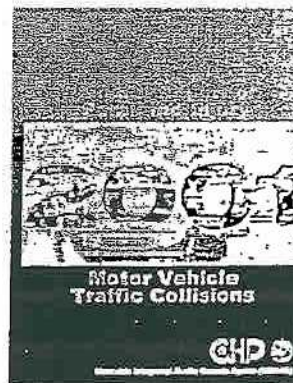
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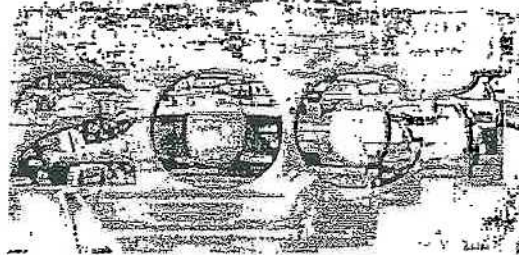
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TABLE 4C PERSONS KILLED AND INJURED BY EXTENT OF INJURY BY TYPE OF COLLISION - 2001

TYPE OF COLLISION	EXTENT OF INJURY					
	TOTAL KILLED AND INJURED	TOTAL KILLED	TOTAL INJURED	Severe Wound	Other Visible Injuries	Complaint of Pain
Head-on	19,341	447	18,894	1,320	6,067	11,507
Sidewipe	20,138	139	19,999	632	5,562	13,805
Rear end	98,709	249	98,460	1,211	14,351	82,898
Broadside	92,952	672	92,280	2,572	23,321	66,387
Hit object	38,957	1,199	37,758	3,405	19,061	15,292
Overturned	9,180	312	8,868	979	5,289	2,600
Auto/pedestrian	14,415	675	13,740	1,875	6,295	5,570
Other	16,141	233	15,908	1,013	8,052	6,843
TOTAL	309,833	3,926	305,907	13,007	87,998	204,902

TABLE 4D PERSONS KILLED AND INJURED BY EXTENT OF INJURY BY TYPE OF VEHICLE - 2001

TYPE OF VEHICLE	EXTENT OF INJURY					
	TOTAL KILLED AND INJURED	TOTAL KILLED	TOTAL INJURED	Severe Wound	Other Visible Injuries	Complaint of Pain
Passenger car	228,464	2,233	226,231	7,045	57,207	161,979
Passenger car with trailer	481	3	478	13	137	328
Motorcycle/scooter	8,652	295	8,357	1,430	4,622	2,305
Moped	48	-	48	4	29	15
Bicycle	11,528	116	11,412	744	6,341	4,327
Pickup or panel truck	36,994	466	36,528	1,477	10,796	24,255
Pickup or panel truck w/trailer	1,315	4	1,311	40	368	903
Truck or truck tractor	1,144	19	1,125	51	395	679
Truck or truck tractor w/trailer(s)	1,143	39	1,104	65	461	578
School bus	778	4	774	4	133	637
Other bus	1,645	-	1,645	19	225	1,401
Emergency vehicle	1,521	3	1,518	44	375	1,099
Highway construction equipment	18	-	18	3	-	15
Other	16,098	744	15,354	2,067	6,906	6,381
Not stated	4	-	4	1	3	-
TOTAL	309,833	3,926	305,907	13,007	87,998	204,902

TABLE 4E PEDESTRIANS KILLED AND INJURED BY AGE BY ACTION - 2001

PEDESTRIAN ACTION	TOTAL	PEDESTRIAN AGE								
		0- 4	5- 14	15- 24	25- 34	35- 44	45- 54	55- 64	65 and over	Not Stated
Crossing in crosswalk - at intersection	5,807	112	1,091	1,055	717	817	735	464	762	54
Crossing in crosswalk - not at intersection	346	10	73	73	33	38	43	37	37	2
Crossing - not in crosswalk In roadway - includes shoulder	5,046	447	1,682	731	459	504	480	278	408	57
Not in roadway	2,851	146	422	560	542	489	338	163	163	28
Approaching/leaving school bus	1,166	61	173	223	167	183	134	85	126	14
Not stated	15	2	4	2	-	3	1	1	2	-
	35	4	6	7	6	6	1	3	1	1
TOTAL	15,266	782	3,451	2,651	1,924	2,040	1,732	1,031	1,499	156

Appendix 6

EPA Report