

APPENDIX A

U.S. Passenger Car and Light Truck Results Reported Separately

Appendix A

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A.1 Air Quality

A.1.1 Direct and Indirect Impacts, Analysis A1

Table A.1.1-1-A1. Nationwide Criteria Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	5,766,718	5,774,231	5,782,013	5,772,595
Cars Upstream	29,139	28,597	27,902	27,860
Cars Subtotal	5,795,856	5,802,829	5,809,915	5,800,455
Trucks Tailpipe	9,140,246	9,152,510	9,152,179	9,142,700
Trucks Upstream	36,540	35,442	35,386	34,443
Trucks Subtotal	9,176,786	9,187,952	9,187,566	9,177,144
Totals	14,972,642	14,990,780	14,997,481	14,977,598
Nitrogen oxides (NO_x)				
Cars Tailpipe	247,603	247,870	248,272	249,684
Cars Upstream	94,020	91,605	89,540	87,649
Cars Subtotal	341,623	339,475	337,813	337,333
Trucks Tailpipe	793,616	794,086	794,072	796,709
Trucks Upstream	120,279	116,668	116,486	111,904
Trucks Subtotal	913,894	910,754	910,558	908,612
Totals	1,255,518	1,250,229	1,248,370	1,245,945
Particulate matter (PM_{2.5})				
Cars Tailpipe	11,729	11,747	11,765	11,730
Cars Upstream	10,465	10,168	9,945	9,653
Cars Subtotal	22,194	21,915	21,710	21,383
Trucks Tailpipe	18,458	18,495	18,495	18,452
Trucks Upstream	13,429	13,025	13,004	12,427
Trucks Subtotal	31,886	31,520	31,499	30,879
Totals	54,080	53,435	53,210	52,262
Sulfur dioxide (SO₂)				
Cars Tailpipe	8,285	8,037	7,861	7,566
Cars Upstream	54,664	53,705	52,386	52,445
Cars Subtotal	62,949	61,741	60,247	60,011
Trucks Tailpipe	10,631	10,311	10,295	9,771
Trucks Upstream	68,212	66,160	66,056	64,424
Trucks Subtotal	78,843	76,471	76,351	74,195
Totals	141,793	138,212	136,598	134,206

Table A.1.1-1-A1. Nationwide Criteria Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	257,936	258,083	258,241	258,238
Cars Upstream	144,295	139,958	136,872	131,405
Cars Subtotal	402,231	398,041	395,112	389,643
Trucks Tailpipe	701,958	702,167	702,153	702,390
Trucks Upstream	185,684	180,093	179,810	170,123
Trucks Subtotal	887,642	882,260	881,963	872,513
Totals	1,289,873	1,280,301	1,277,075	1,262,155

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.1-2-A1. Nationwide Criteria Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	6,462,513	6,480,053	6,497,440	6,306,907
Cars Upstream	31,997	31,016	29,900	39,598
Cars Subtotal	6,494,510	6,511,068	6,527,340	6,346,505
Trucks Tailpipe	8,478,726	8,508,607	8,514,081	8,427,432
Trucks Upstream	35,269	32,961	32,327	32,646
Trucks Subtotal	8,513,995	8,541,568	8,546,408	8,460,078
Totals	15,008,505	15,052,636	15,073,748	14,806,582
Nitrogen oxides (NO_x)				
Cars Tailpipe	247,083	247,716	248,654	250,505
Cars Upstream	102,779	97,361	93,140	100,744
Cars Subtotal	349,862	345,078	341,794	351,249
Trucks Tailpipe	605,631	606,799	606,993	615,507
Trucks Upstream	116,112	108,523	106,276	101,254
Trucks Subtotal	721,743	715,322	713,270	716,760
Totals	1,071,605	1,060,400	1,055,063	1,068,010
Particulate matter (PM_{2.5})				
Cars Tailpipe	13,560	13,600	13,635	13,103
Cars Upstream	11,422	10,721	10,223	10,018
Cars Subtotal	24,982	24,321	23,858	23,121
Trucks Tailpipe	19,280	19,370	19,387	19,041
Trucks Upstream	12,961	12,112	11,854	11,021
Trucks Subtotal	32,241	31,482	31,242	30,062
Totals	57,223	55,803	55,100	53,182
Sulfur dioxide (SO₂)				
Cars Tailpipe	9,037	8,436	8,023	7,261
Cars Upstream	60,069	58,414	56,370	76,504
Cars Subtotal	69,106	66,851	64,393	83,764
Trucks Tailpipe	10,260	9,587	9,379	8,460
Trucks Upstream	65,828	61,515	60,346	61,459
Trucks Subtotal	76,088	71,102	69,725	69,919
Totals	145,194	137,953	134,118	153,683

Table A.1.1-2-A1. Nationwide Criteria Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	247,439	247,807	248,175	245,253
Cars Upstream	157,387	146,944	139,692	125,109
Cars Subtotal	404,826	394,751	387,867	370,362
Trucks Tailpipe	553,539	554,101	554,169	553,941
Trucks Upstream	179,251	167,504	163,875	145,932
Trucks Subtotal	732,789	721,605	718,043	699,873
Totals	1,137,616	1,116,356	1,105,911	1,070,235

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.1-3-A1. Nationwide Criteria Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	9,064,999	9,132,189	9,129,601	7,709,857
Cars Upstream	42,363	40,425	41,522	88,680
Cars Subtotal	9,107,361	9,172,613	9,171,123	7,798,537
Trucks Tailpipe	8,898,855	9,010,521	9,044,250	8,549,463
Trucks Upstream	39,317	33,848	31,745	38,642
Trucks Subtotal	8,938,172	9,044,369	9,075,995	8,588,105
Totals	18,045,533	18,216,982	18,247,119	16,386,643
Nitrogen oxides (NO_x)				
Cars Tailpipe	324,927	327,426	328,360	308,402
Cars Upstream	135,247	121,345	114,850	160,833
Cars Subtotal	460,173	448,771	443,211	469,235
Trucks Tailpipe	374,104	378,701	380,092	401,910
Trucks Upstream	129,413	111,434	102,832	101,477
Trucks Subtotal	503,516	490,135	482,924	503,386
Totals	963,690	938,906	926,135	972,621
Particulate matter (PM_{2.5})				
Cars Tailpipe	21,420	21,574	21,561	17,870
Cars Upstream	15,004	13,125	11,964	12,404
Cars Subtotal	36,424	34,699	33,525	30,273
Trucks Tailpipe	26,541	26,874	26,974	24,808
Trucks Upstream	14,450	12,439	11,407	10,201
Trucks Subtotal	40,991	39,312	38,381	35,009
Totals	77,415	74,012	71,905	65,282
Sulfur dioxide (SO₂)				
Cars Tailpipe	11,862	10,219	9,087	6,920
Cars Upstream	79,620	76,617	79,503	176,703
Cars Subtotal	91,482	86,836	88,590	183,622
Trucks Tailpipe	11,444	9,848	8,998	7,173
Trucks Upstream	73,399	63,177	59,394	74,334
Trucks Subtotal	84,843	73,025	68,391	81,506
Totals	176,325	159,861	156,981	265,128

Table A.1.1-3-A1. Nationwide Criteria Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	243,496	245,234	245,112	204,262
Cars Upstream	206,519	177,972	158,197	116,717
Cars Subtotal	450,015	423,206	403,309	320,979
Trucks Tailpipe	260,223	263,006	263,830	249,331
Trucks Upstream	199,900	172,072	157,225	119,866
Trucks Subtotal	460,122	435,077	421,056	369,196
Totals	910,137	858,283	824,364	690,176

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.1-4-A1. Nationwide Criteria Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	12,214,991	12,375,628	12,398,916	10,341,282
Cars Upstream	56,724	54,409	56,580	124,221
Cars Subtotal	12,271,715	12,430,038	12,455,496	10,465,503
Trucks Tailpipe	11,843,734	12,075,123	12,160,233	11,392,964
Trucks Upstream	52,113	44,597	41,658	52,523
Trucks Subtotal	11,895,848	12,119,720	12,201,891	11,445,488
Totals	24,167,562	24,549,758	24,657,387	21,910,991
Nitrogen oxides (NO_x)				
Cars Tailpipe	438,107	443,996	446,224	416,234
Cars Upstream	181,062	162,897	155,003	221,795
Cars Subtotal	619,169	606,893	601,227	638,029
Trucks Tailpipe	487,574	497,087	500,587	534,072
Trucks Upstream	171,516	146,809	134,540	134,460
Trucks Subtotal	659,090	643,896	635,127	668,532
Totals	1,278,260	1,250,789	1,236,354	1,306,561
Particulate matter (PM_{2.5})				
Cars Tailpipe	28,986	29,364	29,395	23,788
Cars Upstream	20,086	17,600	16,071	16,835
Cars Subtotal	49,072	46,963	45,466	40,623
Trucks Tailpipe	35,848	36,547	36,805	33,253
Trucks Upstream	19,154	16,390	14,910	13,332
Trucks Subtotal	55,001	52,937	51,715	46,586
Totals	104,073	99,900	97,181	87,209
Sulfur dioxide (SO₂)				
Cars Tailpipe	15,880	13,695	12,169	9,199
Cars Upstream	106,615	103,159	108,460	247,811
Cars Subtotal	122,495	116,854	120,630	257,010
Trucks Tailpipe	15,171	12,978	11,755	9,225
Trucks Upstream	97,298	83,248	77,982	101,341
Trucks Subtotal	112,469	96,226	89,737	110,566
Totals	234,963	213,080	210,367	367,576

Table A.1.1-4-A1. Nationwide Criteria Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	329,522	333,782	334,168	272,100
Cars Upstream	276,455	238,494	211,877	154,956
Cars Subtotal	605,977	572,275	546,044	427,056
Trucks Tailpipe	313,788	319,842	322,056	295,926
Trucks Upstream	264,977	226,732	205,374	153,231
Trucks Subtotal	578,765	546,574	527,431	449,156
Totals	1,184,742	1,118,849	1,073,475	876,212

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.1-5-A1. Nationwide Toxic Air Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	2,033	2,035	2,038	2,046
Cars Upstream	32	31	30	29
Cars Subtotal	2,064	2,066	2,068	2,075
Trucks Tailpipe	4,627	4,630	4,629	4,646
Trucks Upstream	40	39	39	37
Trucks Subtotal	4,667	4,669	4,669	4,683
Totals	6,731	6,734	6,737	6,758
Acrolein				
Cars Tailpipe	91	91	91	93
Cars Upstream	4	4	4	4
Cars Subtotal	95	95	95	97
Trucks Tailpipe	216	216	216	219
Trucks Upstream	6	5	5	5
Trucks Subtotal	221	221	221	224
Totals	316	316	317	321
Benzene				
Cars Tailpipe	7,811	7,816	7,820	7,808
Cars Upstream	640	621	607	583
Cars Subtotal	8,451	8,437	8,427	8,391
Trucks Tailpipe	21,981	21,988	21,987	21,975
Trucks Upstream	820	795	794	752
Trucks Subtotal	22,800	22,783	22,781	22,727
Totals	31,252	31,219	31,208	31,117
1,3-Butadiene				
Cars Tailpipe	978	979	980	980
Cars Upstream	7	7	7	6
Cars Subtotal	985	986	987	987
Trucks Tailpipe	2,506	2,507	2,507	2,509
Trucks Upstream	9	9	9	8
Trucks Subtotal	2,515	2,516	2,515	2,517
Totals	3,500	3,501	3,502	3,503

Table A.1.1-5-A1. Nationwide Toxic Air Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	28	29	33	86
Cars Upstream	3,891	3,774	3,693	3,565
Cars Subtotal	3,919	3,803	3,726	3,651
Trucks Tailpipe	76	76	76	175
Trucks Upstream	4,988	4,837	4,830	4,601
Trucks Subtotal	5,063	4,913	4,906	4,776
Totals	8,982	8,716	8,631	8,427
Formaldehyde				
Cars Tailpipe	2,049	2,051	2,056	2,092
Cars Upstream	237	230	225	218
Cars Subtotal	2,286	2,281	2,281	2,309
Trucks Tailpipe	4,915	4,918	4,918	4,980
Trucks Upstream	304	295	294	281
Trucks Subtotal	5,219	5,213	5,212	5,261
Totals	7,505	7,494	7,493	7,570

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.1-6-A1. Nationwide Toxic Air Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	2,297	2,303	2,310	2,306
Cars Upstream	34	32	31	28
Cars Subtotal	2,332	2,335	2,341	2,334
Trucks Tailpipe	3,888	3,896	3,897	3,949
Trucks Upstream	39	36	36	33
Trucks Subtotal	3,927	3,933	3,933	3,982
Totals	6,259	6,268	6,274	6,316
Acrolein				
Cars Tailpipe	102	102	102	109
Cars Upstream	5	4	4	4
Cars Subtotal	106	106	107	113
Trucks Tailpipe	177	177	177	188
Trucks Upstream	5	5	5	5
Trucks Subtotal	182	182	182	193
Totals	289	289	289	305
Benzene				
Cars Tailpipe	7,223	7,235	7,245	7,086
Cars Upstream	698	652	620	555
Cars Subtotal	7,921	7,887	7,864	7,641
Trucks Tailpipe	16,549	16,568	16,570	16,479
Trucks Upstream	791	739	723	646
Trucks Subtotal	17,340	17,307	17,293	17,124
Totals	25,262	25,194	25,157	24,765
1,3-Butadiene				
Cars Tailpipe	1,006	1,008	1,010	995
Cars Upstream	8	7	7	6
Cars Subtotal	1,014	1,015	1,017	1,001
Trucks Tailpipe	1,976	1,979	1,979	1,980
Trucks Upstream	9	8	8	7
Trucks Subtotal	1,984	1,987	1,987	1,987
Totals	2,998	3,002	3,004	2,988

Table A.1.1-6-A1. Nationwide Toxic Air Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	13	14	26	278
Cars Upstream	4,243	3,961	3,770	3,464
Cars Subtotal	4,255	3,975	3,795	3,741
Trucks Tailpipe	51	52	52	474
Trucks Upstream	4,812	4,497	4,399	4,031
Trucks Subtotal	4,864	4,548	4,451	4,505
Totals	9,119	8,523	8,246	8,246
Formaldehyde				
Cars Tailpipe	2,255	2,261	2,275	2,414
Cars Upstream	258	241	230	212
Cars Subtotal	2,514	2,503	2,505	2,626
Trucks Tailpipe	4,006	4,014	4,015	4,259
Trucks Upstream	293	274	268	247
Trucks Subtotal	4,299	4,288	4,283	4,506
Totals	6,813	6,790	6,787	7,133

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.1-7-A1. Nationwide Toxic Air Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	3,388	3,413	3,419	3,084
Cars Upstream	45	39	35	28
Cars Subtotal	3,433	3,452	3,454	3,112
Trucks Tailpipe	3,265	3,303	3,315	3,417
Trucks Upstream	43	37	34	29
Trucks Subtotal	3,308	3,341	3,349	3,447
Totals	6,741	6,793	6,803	6,559
Acrolein				
Cars Tailpipe	150	151	153	173
Cars Upstream	6	5	5	4
Cars Subtotal	156	157	158	177
Trucks Tailpipe	147	149	150	199
Trucks Upstream	6	5	5	4
Trucks Subtotal	153	154	154	203
Totals	310	311	312	379
Benzene				
Cars Tailpipe	7,925	7,980	7,965	6,301
Cars Upstream	917	790	702	517
Cars Subtotal	8,841	8,770	8,667	6,818
Trucks Tailpipe	8,133	8,223	8,250	7,355
Trucks Upstream	882	759	694	535
Trucks Subtotal	9,015	8,982	8,944	7,890
Totals	17,856	17,752	17,610	14,708
1,3-Butadiene				
Cars Tailpipe	1,351	1,360	1,360	1,143
Cars Upstream	10	9	8	6
Cars Subtotal	1,360	1,369	1,367	1,149
Trucks Tailpipe	1,326	1,342	1,346	1,280
Trucks Upstream	10	8	8	6
Trucks Subtotal	1,336	1,350	1,354	1,286
Totals	2,696	2,719	2,721	2,436

Table A.1.1-7-A1. Nationwide Toxic Air Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	7	12	53	1,298
Cars Upstream	5,570	4,799	4,273	3,419
Cars Subtotal	5,577	4,811	4,326	4,717
Trucks Tailpipe	37	38	38	1,992
Trucks Upstream	5,367	4,619	4,220	3,546
Trucks Subtotal	5,404	4,656	4,258	5,538
Totals	10,982	9,467	8,584	10,256
Formaldehyde				
Cars Tailpipe	3,281	3,308	3,340	3,803
Cars Upstream	339	292	260	213
Cars Subtotal	3,621	3,601	3,601	4,016
Trucks Tailpipe	3,203	3,241	3,252	4,357
Trucks Upstream	327	281	257	221
Trucks Subtotal	3,530	3,522	3,509	4,578
Totals	7,151	7,123	7,110	8,594

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.1-8-A1. Nationwide Toxic Air Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	4,581	4,641	4,658	4,147
Cars Upstream	60	52	46	38
Cars Subtotal	4,641	4,694	4,705	4,184
Trucks Tailpipe	4,320	4,403	4,434	4,586
Trucks Upstream	58	49	45	38
Trucks Subtotal	4,378	4,453	4,479	4,624
Totals	9,019	9,146	9,183	8,808
Acrolein				
Cars Tailpipe	203	206	208	237
Cars Upstream	8	7	6	5
Cars Subtotal	212	213	215	242
Trucks Tailpipe	195	199	200	280
Trucks Upstream	8	7	6	5
Trucks Subtotal	203	205	206	285
Totals	414	419	421	527
Benzene				
Cars Tailpipe	10,720	10,857	10,854	8,355
Cars Upstream	1,227	1,058	940	686
Cars Subtotal	11,947	11,915	11,794	9,040
Trucks Tailpipe	10,145	10,341	10,413	8,881
Trucks Upstream	1,170	1,001	906	685
Trucks Subtotal	11,315	11,342	11,319	9,566
Totals	23,262	23,257	23,113	18,607
1,3-Butadiene				
Cars Tailpipe	1,826	1,850	1,853	1,526
Cars Upstream	13	11	10	8
Cars Subtotal	1,840	1,862	1,863	1,534
Trucks Tailpipe	1,726	1,759	1,771	1,653
Trucks Upstream	13	11	10	8
Trucks Subtotal	1,738	1,770	1,781	1,662
Totals	3,578	3,632	3,644	3,196

Table A.1.1-8-A1. Nationwide Toxic Air Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	10	16	76	1,929
Cars Upstream	7,456	6,432	5,723	4,556
Cars Subtotal	7,466	6,448	5,798	6,485
Trucks Tailpipe	48	49	50	3,220
Trucks Upstream	7,116	6,087	5,514	4,591
Trucks Subtotal	7,164	6,136	5,564	7,811
Totals	14,631	12,584	11,362	14,296
Formaldehyde				
Cars Tailpipe	4,439	4,501	4,554	5,209
Cars Upstream	454	392	349	284
Cars Subtotal	4,893	4,893	4,903	5,493
Trucks Tailpipe	4,230	4,312	4,342	6,142
Trucks Upstream	434	371	336	286
Trucks Subtotal	4,664	4,683	4,678	6,428
Totals	9,557	9,575	9,581	11,921

a. Emissions changes have been rounded to the nearest whole number.

A.1.2 Direct and Indirect Impacts, Analysis A2

Table A.1.2-1-A2. Nationwide Criteria Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	5,771,727	5,780,908	5,789,473	5,784,490
Cars Upstream	28,421	27,675	26,989	26,975
Cars Subtotal	5,800,147	5,808,583	5,816,462	5,811,465
Trucks Tailpipe	8,822,228	8,834,496	8,833,233	8,817,672
Trucks Upstream	35,003	33,869	33,837	33,026
Trucks Subtotal	8,857,231	8,868,365	8,867,070	8,850,698
Totals	14,657,379	14,676,948	14,683,532	14,662,164
Nitrogen oxides (NO_x)				
Cars Tailpipe	248,750	249,056	249,344	249,866
Cars Upstream	93,402	90,930	88,671	86,725
Cars Subtotal	342,151	339,986	338,014	336,591
Trucks Tailpipe	780,886	781,526	781,546	784,926
Trucks Upstream	115,939	112,133	112,053	108,550
Trucks Subtotal	896,826	893,659	893,599	893,476
Totals	1,238,977	1,233,646	1,231,613	1,230,067
Particulate matter (PM_{2.5})				
Cars Tailpipe	11,737	11,760	11,780	11,761
Cars Upstream	10,449	10,171	9,919	9,618
Cars Subtotal	22,187	21,931	21,699	21,379
Trucks Tailpipe	17,545	17,582	17,578	17,513
Trucks Upstream	12,831	12,417	12,404	11,981
Trucks Subtotal	30,376	29,999	29,983	29,494
Totals	52,563	51,930	51,682	50,873
Sulfur dioxide (SO₂)				
Cars Tailpipe	8,274	8,053	7,853	7,565
Cars Upstream	53,135	51,741	50,461	50,593
Cars Subtotal	61,409	59,794	58,314	58,158
Trucks Tailpipe	10,066	9,744	9,730	9,330
Trucks Upstream	64,960	62,880	62,808	61,386
Trucks Subtotal	75,026	72,624	72,539	70,716
Totals	136,435	132,418	130,853	128,875

Table A.1.2-1-A2. Nationwide Criteria Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	257,958	258,131	258,294	258,278
Cars Upstream	143,987	140,149	136,656	131,507
Cars Subtotal	401,946	398,280	394,950	389,784
Trucks Tailpipe	694,424	694,656	694,635	694,877
Trucks Upstream	177,141	171,345	171,144	163,315
Trucks Subtotal	871,565	866,001	865,780	858,192
Totals	1,273,510	1,264,281	1,260,729	1,247,976

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.2-2-A2. Nationwide Criteria Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	6,422,162	6,446,606	6,467,670	6,329,873
Cars Upstream	30,721	29,080	27,576	34,489
Cars Subtotal	6,452,884	6,475,686	6,495,246	6,364,362
Trucks Tailpipe	8,133,899	8,161,911	8,163,099	8,078,265
Trucks Upstream	33,884	31,658	30,980	31,189
Trucks Subtotal	8,167,782	8,193,569	8,194,079	8,109,454
Totals	14,620,666	14,669,255	14,689,325	14,473,816
Nitrogen oxides (NO_x)				
Cars Tailpipe	247,274	248,100	248,902	250,099
Cars Upstream	100,998	95,191	90,167	94,530
Cars Subtotal	348,272	343,291	339,069	344,630
Trucks Tailpipe	591,853	593,260	594,063	603,089
Trucks Upstream	112,508	105,070	102,783	98,802
Trucks Subtotal	704,361	698,330	696,847	701,891
Totals	1,052,633	1,041,621	1,035,916	1,046,520
Particulate matter (PM_{2.5})				
Cars Tailpipe	13,438	13,494	13,541	13,161
Cars Upstream	11,293	10,625	10,061	9,755
Cars Subtotal	24,732	24,119	23,602	22,916
Trucks Tailpipe	18,280	18,361	18,362	18,008
Trucks Upstream	12,409	11,595	11,338	10,691
Trucks Subtotal	30,689	29,956	29,700	28,698
Totals	55,420	54,075	53,302	51,615
Sulfur dioxide (SO₂)				
Cars Tailpipe	8,938	8,400	7,950	7,266
Cars Upstream	57,417	54,380	51,579	66,025
Cars Subtotal	66,354	62,780	59,529	73,291
Trucks Tailpipe	9,702	9,068	8,853	8,103
Trucks Upstream	62,735	58,639	57,381	58,199
Trucks Subtotal	72,437	67,707	66,234	66,302
Totals	138,791	130,487	125,763	139,593

Table A.1.2-2-A2. Nationwide Criteria Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	246,650	247,145	247,587	245,522
Cars Upstream	155,612	146,258	138,384	125,605
Cars Subtotal	402,261	393,403	385,971	371,126
Trucks Tailpipe	544,428	544,982	545,069	544,762
Trucks Upstream	171,311	159,960	156,051	140,715
Trucks Subtotal	715,739	704,942	701,120	685,477
Totals	1,118,000	1,098,346	1,087,091	1,056,603

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.2-3-A2. Nationwide Criteria Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	8,320,521	8,412,999	8,483,433	7,393,179
Cars Upstream	37,293	33,628	30,203	66,671
Cars Subtotal	8,357,813	8,446,627	8,513,636	7,459,850
Trucks Tailpipe	8,213,541	8,310,508	8,339,611	7,956,737
Trucks Upstream	36,338	31,491	29,135	32,479
Trucks Subtotal	8,249,878	8,341,999	8,368,747	7,989,216
Totals	16,607,692	16,788,625	16,882,382	15,449,066
Nitrogen oxides (NO_x)				
Cars Tailpipe	300,722	304,044	307,831	293,978
Cars Upstream	122,629	108,255	96,234	129,703
Cars Subtotal	423,351	412,299	404,065	423,681
Trucks Tailpipe	347,386	352,057	356,030	380,127
Trucks Upstream	121,015	104,864	96,758	92,137
Trucks Subtotal	468,402	456,921	452,788	472,264
Totals	891,752	869,220	856,853	895,945
Particulate matter (PM_{2.5})				
Cars Tailpipe	19,725	19,939	20,085	17,233
Cars Upstream	13,706	11,998	10,623	10,657
Cars Subtotal	33,431	31,937	30,708	27,890
Trucks Tailpipe	24,460	24,737	24,776	22,965
Trucks Upstream	13,292	11,518	10,610	9,439
Trucks Subtotal	37,752	36,255	35,386	32,404
Totals	71,183	68,192	66,094	60,294
Sulfur dioxide (SO₂)				
Cars Tailpipe	10,845	9,445	8,325	6,388
Cars Upstream	69,681	63,021	56,690	132,065
Cars Subtotal	80,526	72,466	65,015	138,453
Trucks Tailpipe	10,350	8,963	8,216	6,625
Trucks Upstream	67,087	58,143	53,810	61,500
Trucks Subtotal	77,437	67,106	62,026	68,125
Totals	157,963	139,572	127,041	206,578

Table A.1.2-3-A2. Nationwide Criteria Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	224,936	227,368	229,084	197,489
Cars Upstream	188,893	164,559	144,774	108,190
Cars Subtotal	413,829	391,927	373,858	305,679
Trucks Tailpipe	243,254	245,640	246,174	234,217
Trucks Upstream	183,476	158,785	145,144	111,529
Trucks Subtotal	426,730	404,425	391,318	345,746
Totals	840,559	796,352	765,176	651,425

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.2-4-A2. Nationwide Criteria Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	10,435,263	10,611,359	10,744,122	9,251,323
Cars Upstream	46,693	42,237	37,980	87,583
Cars Subtotal	10,481,956	10,653,596	10,782,102	9,338,906
Trucks Tailpipe	10,261,469	10,451,227	10,523,477	9,983,791
Trucks Upstream	45,272	39,018	35,863	40,836
Trucks Subtotal	10,306,740	10,490,245	10,559,339	10,024,627
Totals	20,788,696	21,143,842	21,341,441	19,363,533
Nitrogen oxides (NO_x)				
Cars Tailpipe	377,128	383,473	390,104	370,739
Cars Upstream	153,536	135,753	120,695	167,031
Cars Subtotal	530,664	519,226	510,799	537,770
Trucks Tailpipe	424,228	432,963	439,942	475,442
Trucks Upstream	150,794	129,962	119,076	113,736
Trucks Subtotal	575,023	562,924	559,017	589,178
Totals	1,105,687	1,082,150	1,069,816	1,126,948
Particulate matter (PM_{2.5})				
Cars Tailpipe	24,772	25,190	25,473	21,352
Cars Upstream	17,161	15,036	13,309	13,483
Cars Subtotal	41,933	40,226	38,782	34,835
Trucks Tailpipe	31,060	31,616	31,758	29,020
Trucks Upstream	16,559	14,270	13,049	11,546
Trucks Subtotal	47,618	45,887	44,807	40,566
Totals	89,551	86,112	83,589	75,401
Sulfur dioxide (SO₂)				
Cars Tailpipe	13,578	11,832	10,421	7,916
Cars Upstream	87,245	79,173	71,315	173,772
Cars Subtotal	100,823	91,005	81,737	181,688
Trucks Tailpipe	12,891	11,100	10,095	7,995
Trucks Upstream	83,567	72,025	66,223	77,521
Trucks Subtotal	96,457	83,125	76,318	85,516
Totals	197,280	174,130	158,054	267,204

Table A.1.2-4-A2. Nationwide Criteria Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	282,324	287,047	290,325	244,644
Cars Upstream	236,507	206,164	181,201	133,795
Cars Subtotal	518,831	493,211	471,527	378,439
Trucks Tailpipe	273,351	278,258	279,780	260,038
Trucks Upstream	228,562	196,701	178,340	133,716
Trucks Subtotal	501,913	474,959	458,120	393,754
Totals	1,020,744	968,170	929,646	772,193

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.2-5-A2. Nationwide Toxic Air Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	2,040	2,043	2,045	2,048
Cars Upstream	32	31	30	29
Cars Subtotal	2,072	2,073	2,075	2,077
Trucks Tailpipe	4,523	4,527	4,527	4,548
Trucks Upstream	38	37	37	36
Trucks Subtotal	4,561	4,564	4,564	4,584
Totals	6,633	6,638	6,639	6,661
Acrolein				
Cars Tailpipe	92	93	93	93
Cars Upstream	4	4	4	4
Cars Subtotal	97	97	97	97
Trucks Tailpipe	212	212	212	216
Trucks Upstream	5	5	5	5
Trucks Subtotal	217	217	217	221
Totals	314	314	314	318
Benzene				
Cars Tailpipe	7,801	7,806	7,812	7,806
Cars Upstream	638	621	605	583
Cars Subtotal	8,439	8,427	8,417	8,389
Trucks Tailpipe	21,728	21,734	21,733	21,714
Trucks Upstream	772	748	747	714
Trucks Subtotal	22,500	22,482	22,480	22,428
Totals	30,939	30,909	30,897	30,817
1,3-Butadiene				
Cars Tailpipe	979	980	981	981
Cars Upstream	7	7	7	6
Trucks Tailpipe	986	987	987	987
Trucks Upstream	2,463	2,465	2,465	2,467
Cars and Trucks Tailpipe	8	8	8	8
Cars and Trucks Upstream	2,472	2,473	2,473	2,474
Totals	3,458	3,459	3,460	3,462

Table A.1.2-5-A2. Nationwide Toxic Air Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	76	76	76	97
Cars Upstream	3,892	3,788	3,694	3,564
Cars Subtotal	3,968	3,864	3,771	3,661
Trucks Tailpipe	99	105	107	239
Trucks Upstream	4,711	4,562	4,556	4,393
Trucks Subtotal	4,810	4,667	4,663	4,632
Totals	8,778	8,531	8,433	8,294
Formaldehyde				
Cars Tailpipe	2,082	2,084	2,087	2,101
Cars Upstream	237	231	225	217
Cars Subtotal	2,319	2,315	2,312	2,318
Trucks Tailpipe	4,828	4,835	4,836	4,917
Trucks Upstream	287	278	278	268
Trucks Subtotal	5,115	5,113	5,113	5,186
Totals	7,435	7,428	7,425	7,504

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.2-6-A2. Nationwide Toxic Air Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	2,296	2,303	2,310	2,306
Cars Upstream	34	32	30	28
Cars Subtotal	2,330	2,335	2,340	2,334
Trucks Tailpipe	3,766	3,776	3,781	3,835
Trucks Upstream	37	34	34	32
Trucks Subtotal	3,803	3,810	3,814	3,867
Totals	6,133	6,146	6,155	6,201
Acrolein				
Cars Tailpipe	103	104	104	108
Cars Upstream	5	4	4	4
Cars Subtotal	108	108	108	112
Trucks Tailpipe	172	173	174	185
Trucks Upstream	5	5	5	4
Trucks Subtotal	177	178	178	190
Totals	285	286	286	302
Benzene				
Cars Tailpipe	7,181	7,197	7,211	7,100
Cars Upstream	689	647	613	556
Cars Subtotal	7,870	7,845	7,824	7,656
Trucks Tailpipe	16,246	16,261	16,259	16,159
Trucks Upstream	743	695	678	613
Trucks Subtotal	16,989	16,956	16,937	16,773
Totals	24,859	24,801	24,761	24,429
1,3-Butadiene				
Cars Tailpipe	1,002	1,005	1,007	996
Cars Upstream	7	7	7	6
Trucks Tailpipe	1,010	1,012	1,014	1,002
Trucks Upstream	1,925	1,929	1,929	1,929
Cars and Trucks Tailpipe	8	8	7	7
Cars and Trucks Upstream	1,933	1,936	1,937	1,936
Totals	2,943	2,948	2,951	2,939

Table A.1.2-6-A2. Nationwide Toxic Air Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	74	74	77	253
Cars Upstream	4,203	3,950	3,740	3,454
Cars Subtotal	4,277	4,024	3,817	3,707
Trucks Tailpipe	84	96	122	573
Trucks Upstream	4,534	4,241	4,145	3,863
Trucks Subtotal	4,618	4,337	4,267	4,436
Totals	8,895	8,361	8,084	8,143
Formaldehyde				
Cars Tailpipe	2,291	2,298	2,306	2,401
Cars Upstream	256	241	228	212
Cars Subtotal	2,548	2,539	2,534	2,613
Trucks Tailpipe	3,904	3,919	3,936	4,196
Trucks Upstream	276	259	253	237
Trucks Subtotal	4,181	4,178	4,189	4,433
Totals	6,729	6,717	6,723	7,046

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.2-7-A2. Nationwide Toxic Air Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	3,142	3,176	3,209	2,960
Cars Upstream	41	36	32	26
Cars Subtotal	3,183	3,212	3,241	2,986
Trucks Tailpipe	3,038	3,076	3,104	3,229
Trucks Upstream	39	34	31	27
Trucks Subtotal	3,077	3,110	3,135	3,256
Totals	6,260	6,322	6,376	6,242
Acrolein				
Cars Tailpipe	142	143	146	164
Cars Upstream	6	5	4	4
Cars Subtotal	148	148	151	167
Trucks Tailpipe	139	141	145	193
Trucks Upstream	5	5	4	4
Trucks Subtotal	144	146	149	197
Totals	291	294	300	364
Benzene				
Cars Tailpipe	7,293	7,372	7,415	6,114
Cars Upstream	836	728	641	478
Cars Subtotal	8,129	8,100	8,056	6,592
Trucks Tailpipe	7,568	7,639	7,628	6,837
Trucks Upstream	791	685	626	487
Trucks Subtotal	8,359	8,324	8,255	7,324
Totals	16,488	16,424	16,310	13,916
1,3-Butadiene				
Cars Tailpipe	1,247	1,261	1,271	1,103
Cars Upstream	9	8	7	6
Trucks Tailpipe	1,256	1,269	1,278	1,109
Trucks Upstream	1,233	1,246	1,250	1,197
Cars and Trucks Tailpipe	9	7	7	6
Cars and Trucks Upstream	1,241	1,254	1,257	1,203
Totals	2,498	2,522	2,535	2,312

Table A.1.2-7-A2. Nationwide Toxic Air Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	94	94	144	1,159
Cars Upstream	5,099	4,441	3,923	3,136
Cars Subtotal	5,193	4,535	4,067	4,296
Trucks Tailpipe	94	127	255	2,116
Trucks Upstream	4,830	4,186	3,850	3,285
Trucks Subtotal	4,924	4,312	4,106	5,401
Totals	10,116	8,848	8,172	9,696
Formaldehyde				
Cars Tailpipe	3,099	3,132	3,196	3,598
Cars Upstream	311	271	239	195
Cars Subtotal	3,410	3,403	3,436	3,792
Trucks Tailpipe	3,013	3,067	3,161	4,241
Trucks Upstream	294	255	235	205
Trucks Subtotal	3,308	3,323	3,396	4,446
Totals	6,718	6,726	6,831	8,239

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.2-8-A2. Nationwide Toxic Air Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	3,942	4,008	4,069	3,710
Cars Upstream	52	45	40	32
Cars Subtotal	3,994	4,053	4,109	3,743
Trucks Tailpipe	3,772	3,847	3,899	4,085
Trucks Upstream	49	42	38	33
Trucks Subtotal	3,820	3,889	3,938	4,118
Totals	7,814	7,942	8,047	7,861
Acrolein				
Cars Tailpipe	178	181	186	210
Cars Upstream	7	6	5	4
Cars Subtotal	185	187	191	214
Trucks Tailpipe	172	177	183	257
Trucks Upstream	7	6	5	5
Trucks Subtotal	179	182	189	261
Totals	364	369	380	476
Benzene				
Cars Tailpipe	9,153	9,306	9,392	7,530
Cars Upstream	1,046	912	802	592
Cars Subtotal	10,200	10,218	10,194	8,122
Trucks Tailpipe	8,816	8,965	8,972	7,721
Trucks Upstream	986	848	769	585
Trucks Subtotal	9,802	9,813	9,741	8,306
Totals	20,001	20,031	19,935	16,428
1,3-Butadiene				
Cars Tailpipe	1,565	1,591	1,610	1,370
Cars Upstream	11	10	9	7
Trucks Tailpipe	1,576	1,601	1,619	1,377
Trucks Upstream	1,503	1,530	1,540	1,455
Cars and Trucks Tailpipe	11	9	8	7
Cars and Trucks Upstream	1,513	1,539	1,549	1,462
Totals	3,090	3,140	3,167	2,840

Table A.1.2-8-A2. Nationwide Toxic Air Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis A2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	116	118	198	1,653
Cars Upstream	6,384	5,563	4,912	3,898
Cars Subtotal	6,500	5,681	5,110	5,551
Trucks Tailpipe	121	167	364	3,191
Trucks Upstream	6,015	5,183	4,733	3,993
Trucks Subtotal	6,135	5,350	5,096	7,184
Totals	12,636	11,031	10,206	12,735
Formaldehyde				
Cars Tailpipe	3,888	3,953	4,061	4,617
Cars Upstream	389	339	300	242
Cars Subtotal	4,277	4,292	4,361	4,860
Trucks Tailpipe	3,736	3,833	3,988	5,644
Trucks Upstream	367	316	289	250
Trucks Subtotal	4,103	4,150	4,277	5,894
Totals	8,380	8,442	8,638	10,754

a. Emissions changes have been rounded to the nearest whole number.

A.1.3 Direct and Indirect Impacts, Analysis B1

Table A.1.3-1-B1. Nationwide Criteria Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	5,776,010	5,780,759	5,786,604	5,756,553
Cars Upstream	28,596	28,265	27,737	28,809
Cars Subtotal	5,804,606	5,809,024	5,814,341	5,785,362
Trucks Tailpipe	9,151,112	9,158,043	9,159,326	9,157,282
Trucks Upstream	35,704	35,108	34,944	33,787
Trucks Subtotal	9,186,816	9,193,151	9,194,271	9,191,069
Totals	14,991,422	15,002,175	15,008,611	14,976,431
Nitrogen oxides (NO_x)				
Cars Tailpipe	247,928	248,086	248,403	250,785
Cars Upstream	92,236	90,867	89,027	88,539
Cars Subtotal	340,164	338,953	337,430	339,323
Trucks Tailpipe	794,055	794,322	794,385	796,735
Trucks Upstream	117,551	115,587	115,050	110,586
Trucks Subtotal	911,606	909,910	909,435	907,320
Totals	1,251,770	1,248,863	1,246,865	1,246,644
Particulate matter (PM_{2.5})				
Cars Tailpipe	11,750	11,761	11,775	11,680
Cars Upstream	10,265	10,100	9,889	9,653
Cars Subtotal	22,015	21,861	21,664	21,333
Trucks Tailpipe	18,490	18,511	18,515	18,498
Trucks Upstream	13,120	12,901	12,841	12,311
Trucks Subtotal	31,610	31,412	31,356	30,810
Totals	53,624	53,273	53,020	52,143
Sulfur dioxide (SO₂)				
Cars Tailpipe	8,126	7,990	7,818	7,502
Cars Upstream	53,649	53,054	52,074	54,402
Cars Subtotal	61,775	61,044	59,892	61,905
Trucks Tailpipe	10,384	10,211	10,163	9,698
Trucks Upstream	66,637	65,526	65,220	63,116
Trucks Subtotal	77,021	75,737	75,382	72,814
Totals	138,796	136,780	135,274	134,718

Table A.1.3-1-B1. Nationwide Criteria Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	258,174	258,263	258,384	258,087
Cars Upstream	141,520	139,143	136,120	130,071
Cars Subtotal	399,694	397,407	394,504	388,158
Trucks Tailpipe	702,192	702,313	702,333	702,616
Trucks Upstream	181,418	178,383	177,542	168,963
Trucks Subtotal	883,610	880,696	879,875	871,579
Totals	1,283,304	1,278,103	1,274,379	1,259,736

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.3-2-B1. Nationwide Criteria Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	6,476,965	6,489,716	6,497,847	6,305,334
Cars Upstream	31,192	30,556	30,199	39,364
Cars Subtotal	6,508,157	6,520,272	6,528,046	6,344,698
Trucks Tailpipe	8,498,682	8,514,620	8,521,751	8,442,926
Trucks Upstream	33,871	32,655	31,921	32,347
Trucks Subtotal	8,532,553	8,547,275	8,553,672	8,475,273
Totals	15,040,710	15,067,547	15,081,718	14,819,971
Nitrogen oxides (NO_x)				
Cars Tailpipe	247,590	248,018	248,599	253,323
Cars Upstream	100,131	96,615	93,287	100,409
Cars Subtotal	347,722	344,634	341,886	353,732
Trucks Tailpipe	606,429	607,056	607,395	615,312
Trucks Upstream	111,544	107,540	104,994	100,562
Trucks Subtotal	717,973	714,596	712,390	715,874
Totals	1,065,695	1,059,230	1,054,276	1,069,606
Particulate matter (PM_{2.5})				
Cars Tailpipe	13,592	13,621	13,635	13,086
Cars Upstream	11,125	10,670	10,204	9,993
Cars Subtotal	24,717	24,292	23,839	23,079
Trucks Tailpipe	19,339	19,387	19,408	19,092
Trucks Upstream	12,445	11,999	11,711	10,946
Trucks Subtotal	31,784	31,385	31,119	30,038
Totals	56,501	55,677	54,958	53,117
Sulfur dioxide (SO₂)				
Cars Tailpipe	8,800	8,411	7,994	7,225
Cars Upstream	58,561	57,491	56,999	76,024
Cars Subtotal	67,360	65,902	64,992	83,249
Trucks Tailpipe	9,848	9,495	9,264	8,408
Trucks Upstream	63,201	60,934	59,577	60,851
Trucks Subtotal	73,049	70,428	68,841	69,259
Totals	140,410	136,331	133,834	152,508

Table A.1.3-2-B1. Nationwide Criteria Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	247,821	248,079	248,270	245,115
Cars Upstream	153,265	146,508	139,202	124,207
Cars Subtotal	401,087	394,587	387,472	369,322
Trucks Tailpipe	553,967	554,274	554,395	554,228
Trucks Upstream	172,126	165,940	161,878	145,264
Trucks Subtotal	726,092	720,214	716,273	699,492
Totals	1,127,179	1,114,801	1,103,745	1,068,814

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.3-3-B1. Nationwide Criteria Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	9,138,133	9,161,977	9,071,258	7,921,323
Cars Upstream	38,590	38,261	44,066	79,816
Cars Subtotal	9,176,723	9,200,238	9,115,324	8,001,139
Trucks Tailpipe	9,008,278	9,050,674	9,081,904	8,544,258
Trucks Upstream	33,257	31,393	29,369	37,527
Trucks Subtotal	9,041,535	9,082,067	9,111,273	8,581,785
Totals	18,218,258	18,282,305	18,226,597	16,582,924
Nitrogen oxides (NO_x)				
Cars Tailpipe	327,488	328,373	326,032	322,562
Cars Upstream	123,068	117,351	115,796	149,715
Cars Subtotal	450,556	445,724	441,828	472,277
Trucks Tailpipe	378,544	380,313	381,863	399,900
Trucks Upstream	109,515	103,379	95,309	96,543
Trucks Subtotal	488,059	483,692	477,172	496,443
Totals	938,616	929,416	918,999	968,720
Particulate matter (PM_{2.5})				
Cars Tailpipe	21,587	21,645	21,435	18,231
Cars Upstream	13,646	12,810	11,754	11,917
Cars Subtotal	35,233	34,454	33,190	30,148
Trucks Tailpipe	26,868	26,994	27,082	24,829
Trucks Upstream	12,221	11,536	10,583	9,579
Trucks Subtotal	39,088	38,529	37,665	34,407
Totals	74,321	72,984	70,854	64,556
Sulfur dioxide (SO₂)				
Cars Tailpipe	10,785	10,031	8,780	6,863
Cars Upstream	72,538	72,310	84,876	158,613
Cars Subtotal	83,323	82,341	93,656	165,476
Trucks Tailpipe	9,673	9,130	8,350	6,686
Trucks Upstream	62,061	58,582	54,939	72,304
Trucks Subtotal	71,734	67,713	63,289	78,991
Totals	155,057	150,054	156,945	244,467

Table A.1.3-3-B1. Nationwide Criteria Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	245,256	245,989	243,638	208,664
Cars Upstream	187,776	174,674	152,984	115,357
Cars Subtotal	433,032	420,663	396,623	324,022
Trucks Tailpipe	262,742	263,879	264,649	249,360
Trucks Upstream	169,064	159,580	145,836	112,280
Trucks Subtotal	431,807	423,460	410,485	361,640
Totals	864,839	844,123	807,107	685,662

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.3-4-B1. Nationwide Criteria Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	12,549,589	12,506,611	12,368,055	10,707,831
Cars Upstream	45,410	47,738	56,083	106,387
Cars Subtotal	12,594,998	12,554,348	12,424,138	10,814,218
Trucks Tailpipe	12,310,892	12,325,577	12,376,539	11,490,893
Trucks Upstream	35,305	35,021	33,081	44,118
Trucks Subtotal	12,346,197	12,360,599	12,409,620	11,535,011
Totals	24,941,196	24,914,947	24,833,759	22,349,229
Nitrogen oxides (NO_x)				
Cars Tailpipe	449,987	448,467	444,748	438,806
Cars Upstream	144,784	146,835	147,789	196,611
Cars Subtotal	594,771	595,302	592,537	635,417
Trucks Tailpipe	506,699	507,304	509,831	536,233
Trucks Upstream	116,248	115,313	107,034	110,072
Trucks Subtotal	622,946	622,617	616,865	646,305
Totals	1,217,717	1,217,919	1,209,402	1,281,723
Particulate matter (PM_{2.5})				
Cars Tailpipe	29,764	29,670	29,323	24,499
Cars Upstream	16,053	16,047	15,025	15,430
Cars Subtotal	45,817	45,716	44,348	39,929
Trucks Tailpipe	37,249	37,297	37,445	33,581
Trucks Upstream	12,974	12,869	11,874	10,734
Trucks Subtotal	50,223	50,167	49,319	44,315
Totals	96,039	95,883	93,667	84,244
Sulfur dioxide (SO₂)				
Cars Tailpipe	12,687	12,575	11,234	8,731
Cars Upstream	85,360	90,185	107,990	211,661
Cars Subtotal	98,047	102,759	119,224	220,392
Trucks Tailpipe	10,270	10,188	9,365	7,350
Trucks Upstream	65,889	65,359	61,918	85,300
Trucks Subtotal	76,159	75,547	71,284	92,651
Totals	174,206	178,306	190,507	313,042

Table A.1.3-4-B1. Nationwide Criteria Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	338,115	337,053	333,264	280,502
Cars Upstream	220,887	218,970	195,727	146,552
Cars Subtotal	559,002	556,023	528,991	427,054
Trucks Tailpipe	325,377	325,889	327,302	298,375
Trucks Upstream	179,487	178,041	163,529	122,699
Trucks Subtotal	504,864	503,930	490,831	421,074
Totals	1,063,866	1,059,953	1,019,822	848,128

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.3-5-B1. Nationwide Toxic Air Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	2,036	2,037	2,040	2,051
Cars Upstream	31	30	30	29
Cars Subtotal	2,067	2,068	2,069	2,080
Trucks Tailpipe	4,630	4,631	4,632	4,646
Trucks Upstream	39	39	39	37
Trucks Subtotal	4,669	4,670	4,670	4,683
Totals	6,736	6,738	6,740	6,763
Acrolein				
Cars Tailpipe	91	91	91	94
Cars Upstream	4	4	4	4
Cars Subtotal	95	95	95	98
Trucks Tailpipe	216	216	216	218
Trucks Upstream	5	5	5	5
Trucks Subtotal	221	221	221	223
Totals	317	317	317	322
Benzene				
Cars Tailpipe	7,819	7,822	7,825	7,791
Cars Upstream	628	617	604	577
Cars Subtotal	8,447	8,439	8,429	8,368
Trucks Tailpipe	21,988	21,993	21,993	21,986
Trucks Upstream	800	787	783	746
Trucks Subtotal	22,789	22,780	22,776	22,732
Totals	31,236	31,219	31,205	31,100
1,3-Butadiene				
Cars Tailpipe	979	980	981	979
Cars Upstream	7	7	7	6
Cars Subtotal	986	987	987	986
Trucks Tailpipe	2,507	2,508	2,508	2,510
Trucks Upstream	9	9	8	8
Trucks Subtotal	2,516	2,516	2,516	2,518
Totals	3,502	3,503	3,503	3,504

Table A.1.3-5-B1. Nationwide Toxic Air Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	28	28	32	136
Cars Upstream	3,816	3,752	3,672	3,544
Cars Subtotal	3,844	3,780	3,704	3,680
Trucks Tailpipe	76	76	76	156
Trucks Upstream	4,871	4,790	4,767	4,564
Trucks Subtotal	4,947	4,866	4,844	4,720
Totals	8,791	8,646	8,548	8,400
Formaldehyde				
Cars Tailpipe	2,052	2,053	2,057	2,125
Cars Upstream	232	229	224	216
Cars Subtotal	2,284	2,281	2,281	2,342
Trucks Tailpipe	4,918	4,920	4,921	4,972
Trucks Upstream	297	292	290	278
Trucks Subtotal	5,215	5,212	5,211	5,250
Totals	7,499	7,493	7,492	7,592

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.3-6-B1. Nationwide Toxic Air Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	2,302	2,306	2,310	2,321
Cars Upstream	33	32	30	28
Cars Subtotal	2,336	2,338	2,341	2,349
Trucks Tailpipe	3,894	3,898	3,901	3,949
Trucks Upstream	37	36	35	33
Trucks Subtotal	3,931	3,935	3,936	3,981
Totals	6,267	6,273	6,277	6,331
Acrolein				
Cars Tailpipe	102	102	102	112
Cars Upstream	5	4	4	4
Cars Subtotal	106	106	107	116
Trucks Tailpipe	177	177	178	188
Trucks Upstream	5	5	5	4
Trucks Subtotal	182	182	182	192
Totals	289	289	289	308
Benzene				
Cars Tailpipe	7,235	7,244	7,248	7,055
Cars Upstream	680	650	617	551
Cars Subtotal	7,915	7,894	7,865	7,606
Trucks Tailpipe	16,563	16,574	16,577	16,494
Trucks Upstream	759	732	714	642
Trucks Subtotal	17,322	17,305	17,291	17,136
Totals	25,238	25,199	25,156	24,742
1,3-Butadiene				
Cars Tailpipe	1,008	1,010	1,011	994
Cars Upstream	7	7	7	6
Cars Subtotal	1,015	1,017	1,017	1,001
Trucks Tailpipe	1,978	1,980	1,980	1,981
Trucks Upstream	8	8	8	7
Trucks Subtotal	1,986	1,988	1,988	1,988
Totals	3,002	3,004	3,006	2,989

Table A.1.3-6-B1. Nationwide Toxic Air Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	13	13	23	376
Cars Upstream	4,131	3,949	3,755	3,456
Cars Subtotal	4,144	3,962	3,778	3,832
Trucks Tailpipe	52	52	54	441
Trucks Upstream	4,619	4,453	4,345	4,001
Trucks Subtotal	4,670	4,504	4,400	4,442
Totals	8,814	8,466	8,177	8,274
Formaldehyde				
Cars Tailpipe	2,260	2,264	2,274	2,489
Cars Upstream	252	241	229	212
Cars Subtotal	2,512	2,504	2,502	2,701
Trucks Tailpipe	4,012	4,016	4,019	4,246
Trucks Upstream	281	271	265	245
Trucks Subtotal	4,293	4,287	4,284	4,491
Totals	6,805	6,791	6,786	7,192

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.3-7-B1. Nationwide Toxic Air Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	3,413	3,423	3,397	3,199
Cars Upstream	41	38	33	28
Cars Subtotal	3,454	3,461	3,430	3,227
Trucks Tailpipe	3,300	3,316	3,328	3,404
Trucks Upstream	37	35	32	27
Trucks Subtotal	3,337	3,351	3,360	3,431
Totals	6,791	6,812	6,790	6,658
Acrolein				
Cars Tailpipe	151	152	152	186
Cars Upstream	6	5	5	4
Cars Subtotal	157	157	156	189
Trucks Tailpipe	149	150	150	196
Trucks Upstream	5	5	4	4
Trucks Subtotal	154	154	155	200
Totals	311	311	311	389
Benzene				
Cars Tailpipe	7,983	8,006	7,920	6,373
Cars Upstream	833	775	678	512
Cars Subtotal	8,816	8,781	8,598	6,885
Trucks Tailpipe	8,215	8,252	8,274	7,374
Trucks Upstream	746	704	644	499
Trucks Subtotal	8,961	8,956	8,918	7,873
Totals	17,776	17,737	17,515	14,758
1,3-Butadiene				
Cars Tailpipe	1,360	1,364	1,352	1,170
Cars Upstream	9	8	7	6
Cars Subtotal	1,369	1,373	1,359	1,176
Trucks Tailpipe	1,340	1,347	1,351	1,279
Trucks Upstream	8	8	7	6
Trucks Subtotal	1,349	1,354	1,358	1,285
Totals	2,718	2,727	2,717	2,462

Table A.1.3-7-B1. Nationwide Toxic Air Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	7	7	43	1,576
Cars Upstream	5,064	4,710	4,127	3,399
Cars Subtotal	5,071	4,718	4,170	4,975
Trucks Tailpipe	37	38	50	1,907
Trucks Upstream	4,536	4,281	3,918	3,294
Trucks Subtotal	4,573	4,319	3,968	5,202
Totals	9,645	9,037	8,138	10,176
Formaldehyde				
Cars Tailpipe	3,305	3,315	3,312	4,087
Cars Upstream	308	287	251	212
Cars Subtotal	3,614	3,602	3,564	4,298
Trucks Tailpipe	3,237	3,253	3,271	4,300
Trucks Upstream	276	261	239	205
Trucks Subtotal	3,514	3,513	3,510	4,505
Totals	7,127	7,115	7,073	8,803

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.3-8-B1. Nationwide Toxic Air Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	4,702	4,687	4,643	4,339
Cars Upstream	48	48	43	36
Cars Subtotal	4,750	4,734	4,686	4,375
Trucks Tailpipe	4,481	4,488	4,510	4,605
Trucks Upstream	39	39	36	30
Trucks Subtotal	4,520	4,527	4,546	4,635
Totals	9,270	9,261	9,232	9,010
Acrolein				
Cars Tailpipe	209	208	207	256
Cars Upstream	7	7	6	5
Cars Subtotal	215	214	213	261
Trucks Tailpipe	202	202	204	278
Trucks Upstream	5	5	5	4
Trucks Subtotal	207	208	209	282
Totals	423	422	422	543
Benzene				
Cars Tailpipe	11,000	10,965	10,829	8,525
Cars Upstream	980	972	867	650
Cars Subtotal	11,981	11,937	11,696	9,174
Trucks Tailpipe	10,522	10,538	10,580	8,981
Trucks Upstream	792	785	722	546
Trucks Subtotal	11,314	11,324	11,302	9,528
Totals	23,295	23,261	22,998	18,702
1,3-Butadiene				
Cars Tailpipe	1,874	1,868	1,848	1,576
Cars Upstream	11	11	9	8
Cars Subtotal	1,885	1,879	1,857	1,584
Trucks Tailpipe	1,790	1,793	1,801	1,666
Trucks Upstream	9	9	8	7
Trucks Subtotal	1,799	1,801	1,808	1,673
Totals	3,684	3,680	3,666	3,257

Table A.1.3-8-B1. Nationwide Toxic Air Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	10	10	61	2,329
Cars Upstream	5,957	5,905	5,281	4,334
Cars Subtotal	5,967	5,915	5,342	6,662
Trucks Tailpipe	50	50	70	3,128
Trucks Upstream	4,816	4,777	4,395	3,647
Trucks Subtotal	4,866	4,828	4,465	6,775
Totals	10,834	10,743	9,807	13,438
Formaldehyde				
Cars Tailpipe	4,555	4,541	4,531	5,644
Cars Upstream	363	360	322	270
Cars Subtotal	4,918	4,900	4,852	5,914
Trucks Tailpipe	4,387	4,394	4,426	6,112
Trucks Upstream	293	291	268	227
Trucks Subtotal	4,681	4,685	4,694	6,339
Totals	9,599	9,585	9,547	12,253

a. Emissions changes have been rounded to the nearest whole number.

A.1.4 Direct and Indirect Impacts, Analysis B2

Table A.1.4-1-B2. Nationwide Criteria Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	5,778,781	5,784,343	5,791,444	5,781,879
Cars Upstream	27,985	27,525	26,908	27,500
Cars Subtotal	5,806,766	5,811,868	5,818,352	5,809,379
Trucks Tailpipe	8,830,514	8,837,263	8,832,984	8,819,654
Trucks Upstream	34,331	33,749	33,629	32,577
Trucks Subtotal	8,864,846	8,871,012	8,866,613	8,852,232
Totals	14,671,612	14,682,880	14,684,965	14,661,610
Nitrogen oxides (NO_x)				
Cars Tailpipe	248,996	249,181	249,419	250,068
Cars Upstream	91,975	90,437	88,399	87,300
Cars Subtotal	340,971	339,618	337,819	337,368
Trucks Tailpipe	781,213	781,473	782,102	785,720
Trucks Upstream	113,726	111,770	111,379	107,673
Trucks Subtotal	894,939	893,243	893,481	893,393
Totals	1,235,910	1,232,862	1,231,300	1,230,761
Particulate matter (PM_{2.5})				
Cars Tailpipe	11,753	11,767	11,784	11,753
Cars Upstream	10,289	10,116	9,890	9,634
Cars Subtotal	22,042	21,883	21,674	21,387
Trucks Tailpipe	17,570	17,591	17,575	17,517
Trucks Upstream	12,584	12,372	12,326	11,904
Trucks Subtotal	30,155	29,963	29,901	29,421
Totals	52,196	51,846	51,575	50,807
Sulfur dioxide (SO₂)				
Cars Tailpipe	8,146	8,010	7,831	7,552
Cars Upstream	52,318	51,462	50,314	51,670
Cars Subtotal	60,464	59,472	58,144	59,222
Trucks Tailpipe	9,871	9,707	9,660	9,268
Trucks Upstream	63,706	62,639	62,413	60,492
Trucks Subtotal	73,576	72,346	72,073	69,760
Totals	134,040	131,818	130,217	128,983

Table A.1.4-1-B2. Nationwide Criteria Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	258,114	258,218	258,349	258,272
Cars Upstream	141,772	139,386	136,244	131,239
Cars Subtotal	399,886	397,604	394,593	389,510
Trucks Tailpipe	694,578	694,695	694,715	695,007
Trucks Upstream	173,731	170,806	169,846	162,115
Trucks Subtotal	868,309	865,501	864,560	857,122
Totals	1,268,195	1,263,104	1,259,153	1,246,633

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.4-2-B2. Nationwide Criteria Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	6,433,874	6,450,178	6,468,970	6,320,456
Cars Upstream	30,045	28,934	27,654	35,362
Cars Subtotal	6,463,919	6,479,112	6,496,624	6,355,817
Trucks Tailpipe	8,151,357	8,166,543	8,160,927	8,092,013
Trucks Upstream	32,602	31,462	30,814	30,236
Trucks Subtotal	8,183,959	8,198,005	8,191,741	8,122,249
Totals	14,647,878	14,677,117	14,688,365	14,478,066
Nitrogen oxides (NO_x)				
Cars Tailpipe	247,687	248,234	248,870	251,666
Cars Upstream	98,780	94,704	89,990	95,502
Cars Subtotal	346,467	342,939	338,859	347,168
Trucks Tailpipe	592,546	593,148	594,866	604,107
Trucks Upstream	108,269	104,454	102,111	97,375
Trucks Subtotal	700,815	697,602	696,977	701,482
Totals	1,047,282	1,040,540	1,035,836	1,048,650
Particulate matter (PM_{2.5})				
Cars Tailpipe	13,465	13,502	13,544	13,130
Cars Upstream	11,044	10,572	10,025	9,778
Cars Subtotal	24,509	24,074	23,569	22,908
Trucks Tailpipe	18,332	18,378	18,345	18,039
Trucks Upstream	11,939	11,522	11,256	10,601
Trucks Subtotal	30,271	29,900	29,601	28,640
Totals	54,780	53,974	53,170	51,548
Sulfur dioxide (SO₂)				
Cars Tailpipe	8,740	8,358	7,916	7,223
Cars Upstream	56,150	54,111	51,767	67,810
Cars Subtotal	64,890	62,470	59,683	75,034
Trucks Tailpipe	9,333	9,011	8,776	8,061
Trucks Upstream	60,352	58,257	57,081	56,270
Trucks Subtotal	69,685	67,268	65,857	64,330
Totals	134,575	129,738	125,539	139,364

Table A.1.4-2-B2. Nationwide Criteria Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	246,926	247,251	247,627	245,488
Cars Upstream	152,175	145,523	137,778	124,584
Cars Subtotal	399,101	392,774	385,405	370,072
Trucks Tailpipe	544,772	545,066	545,091	544,942
Trucks Upstream	164,841	159,089	154,582	139,955
Trucks Subtotal	709,613	704,155	699,673	684,897
Totals	1,108,714	1,096,929	1,085,078	1,054,969

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.4-3-B2. Nationwide Criteria Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	8,385,633	8,430,467	8,470,749	7,333,012
Cars Upstream	34,042	32,690	31,608	65,847
Cars Subtotal	8,419,676	8,463,157	8,502,357	7,398,859
Trucks Tailpipe	8,317,001	8,353,083	8,346,570	8,030,049
Trucks Upstream	30,669	29,137	27,649	28,948
Trucks Subtotal	8,347,669	8,382,220	8,374,218	8,058,998
Totals	16,767,345	16,845,376	16,876,575	15,457,857
Nitrogen oxides (NO_x)				
Cars Tailpipe	303,021	304,658	306,130	307,377
Cars Upstream	111,945	105,183	95,725	128,049
Cars Subtotal	414,966	409,841	401,855	435,425
Trucks Tailpipe	351,607	353,121	358,147	383,021
Trucks Upstream	102,168	97,056	90,359	84,776
Trucks Subtotal	453,776	450,177	448,506	467,798
Totals	868,742	860,018	850,361	903,223
Particulate matter (PM_{2.5})				
Cars Tailpipe	19,873	19,978	20,076	16,868
Cars Upstream	12,511	11,661	10,359	10,476
Cars Subtotal	32,384	31,640	30,434	27,344
Trucks Tailpipe	24,768	24,875	24,764	23,181
Trucks Upstream	11,217	10,657	9,851	8,821
Trucks Subtotal	35,985	35,532	34,615	32,001
Totals	68,369	67,172	65,049	59,346
Sulfur dioxide (SO₂)				
Cars Tailpipe	9,898	9,183	8,038	6,099
Cars Upstream	63,605	61,281	59,766	130,389
Cars Subtotal	73,503	70,464	67,804	136,488
Trucks Tailpipe	8,733	8,297	7,591	6,272
Trucks Upstream	56,604	53,781	51,211	54,590
Trucks Subtotal	65,336	62,078	58,801	60,863
Totals	138,839	132,542	126,605	197,351

Table A.1.4-3-B2. Nationwide Criteria Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	226,503	227,778	228,882	194,008
Cars Upstream	172,420	159,943	139,962	101,293
Cars Subtotal	398,922	387,721	368,844	295,301
Trucks Tailpipe	245,639	246,621	246,099	235,930
Trucks Upstream	154,898	147,135	133,897	105,717
Trucks Subtotal	400,537	393,757	379,997	341,646
Totals	799,459	781,478	748,841	636,948

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.4-4-B2. Nationwide Criteria Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	10,722,325	10,712,930	10,778,420	9,199,377
Cars Upstream	37,449	38,489	38,291	82,541
Cars Subtotal	10,759,773	10,751,419	10,816,711	9,281,918
Trucks Tailpipe	10,674,302	10,684,507	10,672,682	10,201,414
Trucks Upstream	30,588	30,396	29,346	31,178
Trucks Subtotal	10,704,890	10,714,903	10,702,028	10,232,592
Totals	21,464,663	21,466,323	21,518,739	19,514,509
Nitrogen oxides (NO_x)				
Cars Tailpipe	387,399	387,075	389,489	391,451
Cars Upstream	123,146	123,776	115,090	157,501
Cars Subtotal	510,545	510,851	504,579	548,951
Trucks Tailpipe	441,208	441,628	448,676	484,651
Trucks Upstream	101,921	101,280	95,569	89,668
Trucks Subtotal	543,129	542,908	544,245	574,320
Totals	1,053,674	1,053,758	1,048,823	1,123,271
Particulate matter (PM_{2.5})				
Cars Tailpipe	25,439	25,425	25,581	20,849
Cars Upstream	13,763	13,719	12,415	12,666
Cars Subtotal	39,202	39,143	37,997	33,515
Trucks Tailpipe	32,298	32,332	32,154	29,671
Trucks Upstream	11,187	11,116	10,401	9,253
Trucks Subtotal	43,484	43,448	42,555	38,924
Totals	82,687	82,592	80,551	72,439
Sulfur dioxide (SO₂)				
Cars Tailpipe	10,889	10,802	9,617	7,203
Cars Upstream	69,970	72,156	72,478	163,697
Cars Subtotal	80,858	82,958	82,095	170,900
Trucks Tailpipe	8,707	8,652	8,000	6,498
Trucks Upstream	56,443	56,090	54,377	58,954
Trucks Subtotal	65,150	64,742	62,377	65,452
Totals	146,008	147,699	144,471	236,352

Table A.1.4-4-B2. Nationwide Criteria Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	289,714	289,562	291,424	239,735
Cars Upstream	189,676	188,155	167,463	119,117
Cars Subtotal	479,390	477,717	458,887	358,851
Trucks Tailpipe	283,653	284,014	283,118	265,530
Trucks Upstream	154,480	153,507	141,095	108,789
Trucks Subtotal	438,133	437,520	424,213	374,320
Totals	917,523	915,237	883,100	733,171

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.4-5-B2. Nationwide Toxic Air Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	2,042	2,044	2,046	2,049
Cars Upstream	31	31	30	29
Cars Subtotal	2,073	2,074	2,076	2,078
Trucks Tailpipe	4,526	4,527	4,531	4,553
Trucks Upstream	37	37	37	36
Trucks Subtotal	4,563	4,564	4,568	4,589
Totals	6,636	6,639	6,643	6,667
Acrolein				
Cars Tailpipe	93	93	93	94
Cars Upstream	4	4	4	4
Cars Subtotal	97	97	97	97
Trucks Tailpipe	212	212	213	217
Trucks Upstream	5	5	5	5
Trucks Subtotal	217	217	218	221
Totals	314	314	315	319
Benzene				
Cars Tailpipe	7,806	7,809	7,814	7,804
Cars Upstream	628	617	604	581
Cars Subtotal	8,434	8,427	8,417	8,386
Trucks Tailpipe	21,733	21,737	21,732	21,714
Trucks Upstream	757	745	741	708
Trucks Subtotal	22,490	22,482	22,473	22,423
Totals	30,924	30,908	30,890	30,808
1,3-Butadiene				
Cars Tailpipe	980	980	981	981
Cars Upstream	7	7	7	6
Trucks Tailpipe	986	987	988	987
Trucks Upstream	2,464	2,465	2,465	2,468
Cars and Trucks Tailpipe	8	8	8	8
Cars and Trucks Upstream	2,473	2,473	2,473	2,475
Totals	3,459	3,460	3,461	3,462

Table A.1.4-5-B2. Nationwide Toxic Air Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	76	76	76	106
Cars Upstream	3,832	3,768	3,684	3,560
Cars Subtotal	3,908	3,844	3,760	3,665
Trucks Tailpipe	99	99	126	262
Trucks Upstream	4,619	4,543	4,525	4,368
Trucks Subtotal	4,718	4,642	4,651	4,630
Totals	8,626	8,486	8,411	8,296
Formaldehyde				
Cars Tailpipe	2,084	2,086	2,088	2,106
Cars Upstream	234	230	225	217
Cars Subtotal	2,318	2,315	2,312	2,324
Trucks Tailpipe	4,830	4,832	4,848	4,933
Trucks Upstream	282	277	276	267
Trucks Subtotal	5,112	5,109	5,124	5,200
Totals	7,430	7,424	7,436	7,524

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.4-6-B2. Nationwide Toxic Air Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	2,300	2,305	2,310	2,314
Cars Upstream	33	32	30	28
Cars Subtotal	2,333	2,336	2,340	2,342
Trucks Tailpipe	3,771	3,776	3,786	3,841
Trucks Upstream	35	34	33	31
Trucks Subtotal	3,807	3,810	3,819	3,873
Totals	6,140	6,146	6,159	6,215
Acrolein				
Cars Tailpipe	103	104	104	110
Cars Upstream	5	4	4	4
Cars Subtotal	108	108	108	114
Trucks Tailpipe	173	173	175	186
Trucks Upstream	5	5	5	4
Trucks Subtotal	177	177	179	191
Totals	285	285	287	304
Benzene				
Cars Tailpipe	7,190	7,201	7,213	7,085
Cars Upstream	674	644	610	552
Cars Subtotal	7,864	7,845	7,823	7,637
Trucks Tailpipe	16,257	16,267	16,253	16,160
Trucks Upstream	715	690	671	610
Trucks Subtotal	16,972	16,957	16,924	16,770
Totals	24,835	24,802	24,748	24,407
1,3-Butadiene				
Cars Tailpipe	1,004	1,005	1,008	996
Cars Upstream	7	7	7	6
Trucks Tailpipe	1,011	1,012	1,014	1,003
Trucks Upstream	1,927	1,929	1,929	1,931
Cars and Trucks Tailpipe	8	8	7	7
Cars and Trucks Upstream	1,935	1,936	1,937	1,938
Totals	2,946	2,949	2,951	2,940

Table A.1.4-6-B2. Nationwide Toxic Air Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	74	74	74	311
Cars Upstream	4,110	3,931	3,724	3,444
Cars Subtotal	4,184	4,005	3,798	3,755
Trucks Tailpipe	84	84	158	600
Trucks Upstream	4,361	4,211	4,112	3,844
Trucks Subtotal	4,445	4,296	4,271	4,443
Totals	8,629	8,301	8,068	8,199
Formaldehyde				
Cars Tailpipe	2,295	2,300	2,305	2,442
Cars Upstream	251	240	227	211
Cars Subtotal	2,546	2,540	2,532	2,653
Trucks Tailpipe	3,909	3,913	3,957	4,215
Trucks Upstream	266	257	251	236
Trucks Subtotal	4,175	4,170	4,208	4,451
Totals	6,721	6,710	6,740	7,104

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.4-7-B2. Nationwide Toxic Air Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	3,164	3,182	3,197	3,029
Cars Upstream	38	35	31	26
Cars Subtotal	3,202	3,217	3,228	3,054
Trucks Tailpipe	3,072	3,085	3,117	3,253
Trucks Upstream	33	31	29	26
Trucks Subtotal	3,105	3,117	3,146	3,279
Totals	6,307	6,333	6,374	6,333
Acrolein				
Cars Tailpipe	143	144	144	184
Cars Upstream	5	5	4	4
Cars Subtotal	148	148	149	188
Trucks Tailpipe	140	141	148	194
Trucks Upstream	5	4	4	4
Trucks Subtotal	145	145	152	198
Totals	293	293	300	385
Benzene				
Cars Tailpipe	7,345	7,386	7,421	5,836
Cars Upstream	763	708	619	449
Cars Subtotal	8,107	8,094	8,041	6,285
Trucks Tailpipe	7,646	7,678	7,607	6,893
Trucks Upstream	668	634	578	463
Trucks Subtotal	8,313	8,312	8,185	7,355
Totals	16,421	16,405	16,226	13,640
1,3-Butadiene				
Cars Tailpipe	1,256	1,263	1,269	1,089
Cars Upstream	8	8	7	6
Trucks Tailpipe	1,264	1,271	1,276	1,095
Trucks Upstream	1,246	1,252	1,251	1,207
Cars and Trucks Tailpipe	7	7	6	6
Cars and Trucks Upstream	1,253	1,258	1,257	1,213
Totals	2,518	2,529	2,533	2,307

Table A.1.4-7-B2. Nationwide Toxic Air Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	94	95	95	1,775
Cars Upstream	4,654	4,318	3,782	3,064
Cars Subtotal	4,748	4,413	3,878	4,839
Trucks Tailpipe	95	96	345	2,116
Trucks Upstream	4,073	3,871	3,564	3,103
Trucks Subtotal	4,169	3,966	3,909	5,219
Totals	8,917	8,379	7,787	10,058
Formaldehyde				
Cars Tailpipe	3,121	3,138	3,154	4,055
Cars Upstream	284	263	231	192
Cars Subtotal	3,405	3,401	3,384	4,247
Trucks Tailpipe	3,047	3,060	3,220	4,264
Trucks Upstream	248	236	218	194
Trucks Subtotal	3,295	3,296	3,438	4,458
Totals	6,699	6,697	6,822	8,705

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.4-8-B2. Nationwide Toxic Air Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	4,046	4,044	4,070	3,824
Cars Upstream	42	41	37	30
Cars Subtotal	4,088	4,085	4,106	3,855
Trucks Tailpipe	3,916	3,920	3,967	4,163
Trucks Upstream	33	33	31	27
Trucks Subtotal	3,948	3,953	3,998	4,190
Totals	8,036	8,038	8,104	8,045
Acrolein				
Cars Tailpipe	183	183	184	241
Cars Upstream	6	6	5	4
Cars Subtotal	188	188	189	245
Trucks Tailpipe	179	179	189	260
Trucks Upstream	5	4	4	4
Trucks Subtotal	183	183	194	264
Totals	371	372	382	509
Benzene				
Cars Tailpipe	9,394	9,389	9,449	7,122
Cars Upstream	839	832	741	528
Cars Subtotal	10,233	10,221	10,190	7,650
Trucks Tailpipe	9,150	9,162	9,053	7,897
Trucks Upstream	666	661	609	477
Trucks Subtotal	9,816	9,823	9,662	8,374
Totals	20,049	20,044	19,852	16,024
1,3-Butadiene				
Cars Tailpipe	1,606	1,605	1,616	1,352
Cars Upstream	9	9	8	7
Trucks Tailpipe	1,615	1,614	1,624	1,359
Trucks Upstream	1,560	1,562	1,560	1,485
Cars and Trucks Tailpipe	7	7	7	6
Cars and Trucks Upstream	1,567	1,569	1,567	1,491
Totals	3,182	3,183	3,190	2,850

Table A.1.4-8-B2. Nationwide Toxic Air Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis B2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	119	119	120	2,614
Cars Upstream	5,120	5,079	4,525	3,640
Cars Subtotal	5,239	5,198	4,645	6,253
Trucks Tailpipe	125	126	493	3,203
Trucks Upstream	4,061	4,035	3,758	3,238
Trucks Subtotal	4,186	4,161	4,251	6,440
Totals	9,425	9,359	8,896	12,694
Formaldehyde				
Cars Tailpipe	3,990	3,988	4,014	5,324
Cars Upstream	312	310	276	228
Cars Subtotal	4,303	4,298	4,290	5,552
Trucks Tailpipe	3,878	3,883	4,121	5,725
Trucks Upstream	248	246	230	203
Trucks Subtotal	4,126	4,129	4,350	5,928
Totals	8,428	8,427	8,640	11,480

a. Emissions changes have been rounded to the nearest whole number.

A.1.5 Cumulative Impacts, Analysis C1

Table A.1.5-1-C1. Nationwide Criteria Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	5,766,718	5,780,759	5,786,604	5,756,553
Cars Upstream	29,139	28,265	27,737	28,809
Cars Subtotal	5,795,856	5,809,024	5,814,341	5,785,362
Trucks Tailpipe	9,140,246	9,158,043	9,159,326	9,157,282
Trucks Upstream	36,540	35,108	34,944	33,787
Trucks Subtotal	9,176,786	9,193,151	9,194,271	9,191,069
Totals	14,972,642	15,002,175	15,008,611	14,976,431
Nitrogen oxides (NO_x)				
Cars Tailpipe	247,603	248,086	248,403	250,785
Cars Upstream	94,020	90,867	89,027	88,539
Cars Subtotal	341,623	338,953	337,430	339,323
Trucks Tailpipe	793,616	794,322	794,385	796,735
Trucks Upstream	120,279	115,587	115,050	110,586
Trucks Subtotal	913,894	909,910	909,435	907,320
Totals	1,255,518	1,248,863	1,246,865	1,246,644
Particulate matter (PM_{2.5})				
Cars Tailpipe	11,729	11,761	11,775	11,680
Cars Upstream	10,465	10,100	9,889	9,653
Cars Subtotal	22,194	21,861	21,664	21,333
Trucks Tailpipe	18,458	18,511	18,515	18,498
Trucks Upstream	13,429	12,901	12,841	12,311
Trucks Subtotal	31,886	31,412	31,356	30,810
Totals	54,080	53,273	53,020	52,143
Sulfur dioxide (SO₂)				
Cars Tailpipe	8,285	7,990	7,818	7,502
Cars Upstream	54,664	53,054	52,074	54,402
Cars Subtotal	62,949	61,044	59,892	61,905
Trucks Tailpipe	10,631	10,211	10,163	9,698
Trucks Upstream	68,212	65,526	65,220	63,116
Trucks Subtotal	78,843	75,737	75,382	72,814
Totals	141,793	136,780	135,274	134,718

Table A.1.5-1-C1. Nationwide Criteria Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	257,936	258,263	258,384	258,087
Cars Upstream	144,295	139,143	136,120	130,071
Cars Subtotal	402,231	397,407	394,504	388,158
Trucks Tailpipe	701,958	702,313	702,333	702,616
Trucks Upstream	185,684	178,383	177,542	168,963
Trucks Subtotal	887,642	880,696	879,875	871,579
Totals	1,289,873	1,278,103	1,274,379	1,259,736

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.5-2-C1. Nationwide Criteria Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	6,462,513	6,489,716	6,497,847	6,305,334
Cars Upstream	31,997	30,556	30,199	39,364
Cars Subtotal	6,494,510	6,520,272	6,528,046	6,344,698
Trucks Tailpipe	8,478,726	8,514,620	8,521,751	8,442,926
Trucks Upstream	35,269	32,655	31,921	32,347
Trucks Subtotal	8,513,995	8,547,275	8,553,672	8,475,273
Totals	15,008,505	15,067,547	15,081,718	14,819,971
Nitrogen oxides (NO_x)				
Cars Tailpipe	247,083	248,018	248,599	253,323
Cars Upstream	102,779	96,615	93,287	100,409
Cars Subtotal	349,862	344,634	341,886	353,732
Trucks Tailpipe	605,631	607,056	607,395	615,312
Trucks Upstream	116,112	107,540	104,994	100,562
Trucks Subtotal	721,743	714,596	712,390	715,874
Totals	1,071,605	1,059,230	1,054,276	1,069,606
Particulate matter (PM_{2.5})				
Cars Tailpipe	13,560	13,621	13,635	13,086
Cars Upstream	11,422	10,670	10,204	9,993
Cars Subtotal	24,982	24,292	23,839	23,079
Trucks Tailpipe	19,280	19,387	19,408	19,092
Trucks Upstream	12,961	11,999	11,711	10,946
Trucks Subtotal	32,241	31,385	31,119	30,038
Totals	57,223	55,677	54,958	53,117
Sulfur dioxide (SO₂)				
Cars Tailpipe	9,037	8,411	7,994	7,225
Cars Upstream	60,069	57,491	56,999	76,024
Cars Subtotal	69,106	65,902	64,992	83,249
Trucks Tailpipe	10,260	9,495	9,264	8,408
Trucks Upstream	65,828	60,934	59,577	60,851
Trucks Subtotal	76,088	70,428	68,841	69,259
Totals	145,194	136,331	133,834	152,508

Table A.1.5-2-C1. Nationwide Criteria Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	247,439	248,079	248,270	245,115
Cars Upstream	157,387	146,508	139,202	124,207
Cars Subtotal	404,826	394,587	387,472	369,322
Trucks Tailpipe	553,539	554,274	554,395	554,228
Trucks Upstream	179,251	165,940	161,878	145,264
Trucks Subtotal	732,789	720,214	716,273	699,492
Totals	1,137,616	1,114,801	1,103,745	1,068,814

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.5-3-C1. Nationwide Criteria Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	9,064,999	9,161,977	9,071,258	7,921,323
Cars Upstream	42,363	38,261	44,066	79,816
Cars Subtotal	9,107,361	9,200,238	9,115,324	8,001,139
Trucks Tailpipe	8,898,855	9,050,674	9,081,904	8,544,258
Trucks Upstream	39,317	31,393	29,369	37,527
Trucks Subtotal	8,938,172	9,082,067	9,111,273	8,581,785
Totals	18,045,533	18,282,305	18,226,597	16,582,924
Nitrogen oxides (NO_x)				
Cars Tailpipe	324,927	328,373	326,032	322,562
Cars Upstream	135,247	117,351	115,796	149,715
Cars Subtotal	460,173	445,724	441,828	472,277
Trucks Tailpipe	374,104	380,313	381,863	399,900
Trucks Upstream	129,413	103,379	95,309	96,543
Trucks Subtotal	503,516	483,692	477,172	496,443
Totals	963,690	929,416	918,999	968,720
Particulate matter (PM_{2.5})				
Cars Tailpipe	21,420	21,645	21,435	18,231
Cars Upstream	15,004	12,810	11,754	11,917
Cars Subtotal	36,424	34,454	33,190	30,148
Trucks Tailpipe	26,541	26,994	27,082	24,829
Trucks Upstream	14,450	11,536	10,583	9,579
Trucks Subtotal	40,991	38,529	37,665	34,407
Totals	77,415	72,984	70,854	64,556
Sulfur dioxide (SO₂)				
Cars Tailpipe	11,862	10,031	8,780	6,863
Cars Upstream	79,620	72,310	84,876	158,613
Cars Subtotal	91,482	82,341	93,656	165,476
Trucks Tailpipe	11,444	9,130	8,350	6,686
Trucks Upstream	73,399	58,582	54,939	72,304
Trucks Subtotal	84,843	67,713	63,289	78,991
Totals	176,325	150,054	156,945	244,467

Table A.1.5-3-C1. Nationwide Criteria Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	243,496	245,989	243,638	208,664
Cars Upstream	206,519	174,674	152,984	115,357
Cars Subtotal	450,015	420,663	396,623	324,022
Trucks Tailpipe	260,223	263,879	264,649	249,360
Trucks Upstream	199,900	159,580	145,836	112,280
Trucks Subtotal	460,122	423,460	410,485	361,640
Totals	910,137	844,123	807,107	685,662

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.5-4-C1. Nationwide Criteria Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	12,214,991	12,506,611	12,368,055	10,707,831
Cars Upstream	56,724	47,738	56,083	106,387
Cars Subtotal	12,271,715	12,554,348	12,424,138	10,814,218
Trucks Tailpipe	11,843,734	12,325,577	12,376,539	11,490,893
Trucks Upstream	52,113	35,021	33,081	44,118
Trucks Subtotal	11,895,848	12,360,599	12,409,620	11,535,011
Totals	24,167,562	24,914,947	24,833,759	22,349,229
Nitrogen oxides (NO_x)				
Cars Tailpipe	438,107	448,467	444,748	438,806
Cars Upstream	181,062	146,835	147,789	196,611
Cars Subtotal	619,169	595,302	592,537	635,417
Trucks Tailpipe	487,574	507,304	509,831	536,233
Trucks Upstream	171,516	115,313	107,034	110,072
Trucks Subtotal	659,090	622,617	616,865	646,305
Totals	1,278,260	1,217,919	1,209,402	1,281,723
Particulate matter (PM_{2.5})				
Cars Tailpipe	28,986	29,670	29,323	24,499
Cars Upstream	20,086	16,047	15,025	15,430
Cars Subtotal	49,072	45,716	44,348	39,929
Trucks Tailpipe	35,848	37,297	37,445	33,581
Trucks Upstream	19,154	12,869	11,874	10,734
Trucks Subtotal	55,001	50,167	49,319	44,315
Totals	104,073	95,883	93,667	84,244
Sulfur dioxide (SO₂)				
Cars Tailpipe	15,880	12,575	11,234	8,731
Cars Upstream	106,615	90,185	107,990	211,661
Cars Subtotal	122,495	102,759	119,224	220,392
Trucks Tailpipe	15,171	10,188	9,365	7,350
Trucks Upstream	97,298	65,359	61,918	85,300
Trucks Subtotal	112,469	75,547	71,284	92,651
Totals	234,963	178,306	190,507	313,042

Table A.1.5-4-C1. Nationwide Criteria Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	329,522	337,053	333,264	280,502
Cars Upstream	276,455	218,970	195,727	146,552
Cars Subtotal	605,977	556,023	528,991	427,054
Trucks Tailpipe	313,788	325,889	327,302	298,375
Trucks Upstream	264,977	178,041	163,529	122,699
Trucks Subtotal	578,765	503,930	490,831	421,074
Totals	1,184,742	1,059,953	1,019,822	848,128

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.5-5-C1. Nationwide Toxic Air Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	2,033	2,037	2,040	2,051
Cars Upstream	32	30	30	29
Cars Subtotal	2,064	2,068	2,069	2,080
Trucks Tailpipe	4,627	4,631	4,632	4,646
Trucks Upstream	40	39	39	37
Trucks Subtotal	4,667	4,670	4,670	4,683
Totals	6,731	6,738	6,740	6,763
Acrolein				
Cars Tailpipe	91	91	91	94
Cars Upstream	4	4	4	4
Cars Subtotal	95	95	95	98
Trucks Tailpipe	216	216	216	218
Trucks Upstream	6	5	5	5
Trucks Subtotal	221	221	221	223
Totals	316	317	317	322
Benzene				
Cars Tailpipe	7,811	7,822	7,825	7,791
Cars Upstream	640	617	604	577
Cars Subtotal	8,451	8,439	8,429	8,368
Trucks Tailpipe	21,981	21,993	21,993	21,986
Trucks Upstream	820	787	783	746
Trucks Subtotal	22,800	22,780	22,776	22,732
Totals	31,252	31,219	31,205	31,100
1,3-Butadiene				
Cars Tailpipe	978	980	981	979
Cars Upstream	7	7	7	6
Cars Subtotal	985	987	987	986
Trucks Tailpipe	2,506	2,508	2,508	2,510
Trucks Upstream	9	9	8	8
Trucks Subtotal	2,515	2,516	2,516	2,518
Totals	3,500	3,503	3,503	3,504

Table A.1.5-5-C1. Nationwide Toxic Air Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	28	28	32	136
Cars Upstream	3,891	3,752	3,672	3,544
Cars Subtotal	3,919	3,780	3,704	3,680
Trucks Tailpipe	76	76	76	156
Trucks Upstream	4,988	4,790	4,767	4,564
Trucks Subtotal	5,063	4,866	4,844	4,720
Totals	8,982	8,646	8,548	8,400
Formaldehyde				
Cars Tailpipe	2,049	2,053	2,057	2,125
Cars Upstream	237	229	224	216
Cars Subtotal	2,286	2,281	2,281	2,342
Trucks Tailpipe	4,915	4,920	4,921	4,972
Trucks Upstream	304	292	290	278
Trucks Subtotal	5,219	5,212	5,211	5,250
Totals	7,505	7,493	7,492	7,592

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.5-6-C1. Nationwide Toxic Air Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	2,297	2,306	2,310	2,321
Cars Upstream	34	32	30	28
Cars Subtotal	2,332	2,338	2,341	2,349
Trucks Tailpipe	3,888	3,898	3,901	3,949
Trucks Upstream	39	36	35	33
Trucks Subtotal	3,927	3,935	3,936	3,981
Totals	6,259	6,273	6,277	6,331
Acrolein				
Cars Tailpipe	102	102	102	112
Cars Upstream	5	4	4	4
Cars Subtotal	106	106	107	116
Trucks Tailpipe	177	177	178	188
Trucks Upstream	5	5	5	4
Trucks Subtotal	182	182	182	192
Totals	289	289	289	308
Benzene				
Cars Tailpipe	7,223	7,244	7,248	7,055
Cars Upstream	698	650	617	551
Cars Subtotal	7,921	7,894	7,865	7,606
Trucks Tailpipe	16,549	16,574	16,577	16,494
Trucks Upstream	791	732	714	642
Trucks Subtotal	17,340	17,305	17,291	17,136
Totals	25,262	25,199	25,156	24,742
1,3-Butadiene				
Cars Tailpipe	1,006	1,010	1,011	994
Cars Upstream	8	7	7	6
Cars Subtotal	1,014	1,017	1,017	1,001
Trucks Tailpipe	1,976	1,980	1,980	1,981
Trucks Upstream	9	8	8	7
Trucks Subtotal	1,984	1,988	1,988	1,988
Totals	2,998	3,004	3,006	2,989

Table A.1.5-6-C1. Nationwide Toxic Air Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	13	13	23	376
Cars Upstream	4,243	3,949	3,755	3,456
Cars Subtotal	4,255	3,962	3,778	3,832
Trucks Tailpipe	51	52	54	441
Trucks Upstream	4,812	4,453	4,345	4,001
Trucks Subtotal	4,864	4,504	4,400	4,442
Totals	9,119	8,466	8,177	8,274
Formaldehyde				
Cars Tailpipe	2,255	2,264	2,274	2,489
Cars Upstream	258	241	229	212
Cars Subtotal	2,514	2,504	2,502	2,701
Trucks Tailpipe	4,006	4,016	4,019	4,246
Trucks Upstream	293	271	265	245
Trucks Subtotal	4,299	4,287	4,284	4,491
Totals	6,813	6,791	6,786	7,192

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.5-7-C1. Nationwide Toxic Air Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	3,388	3,423	3,397	3,199
Cars Upstream	45	38	33	28
Cars Subtotal	3,433	3,461	3,430	3,227
Trucks Tailpipe	3,265	3,316	3,328	3,404
Trucks Upstream	43	35	32	27
Trucks Subtotal	3,308	3,351	3,360	3,431
Totals	6,741	6,812	6,790	6,658
Acrolein				
Cars Tailpipe	150	152	152	186
Cars Upstream	6	5	5	4
Cars Subtotal	156	157	156	189
Trucks Tailpipe	147	150	150	196
Trucks Upstream	6	5	4	4
Trucks Subtotal	153	154	155	200
Totals	310	311	311	389
Benzene				
Cars Tailpipe	7,925	8,006	7,920	6,373
Cars Upstream	917	775	678	512
Cars Subtotal	8,841	8,781	8,598	6,885
Trucks Tailpipe	8,133	8,252	8,274	7,374
Trucks Upstream	882	704	644	499
Trucks Subtotal	9,015	8,956	8,918	7,873
Totals	17,856	17,737	17,515	14,758
1,3-Butadiene				
Cars Tailpipe	1,351	1,364	1,352	1,170
Cars Upstream	10	8	7	6
Cars Subtotal	1,360	1,373	1,359	1,176
Trucks Tailpipe	1,326	1,347	1,351	1,279
Trucks Upstream	10	8	7	6
Trucks Subtotal	1,336	1,354	1,358	1,285
Totals	2,696	2,727	2,717	2,462

Table A.1.5-7-C1. Nationwide Toxic Air Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	7	7	43	1,576
Cars Upstream	5,570	4,710	4,127	3,399
Cars Subtotal	5,577	4,718	4,170	4,975
Trucks Tailpipe	37	38	50	1,907
Trucks Upstream	5,367	4,281	3,918	3,294
Trucks Subtotal	5,404	4,319	3,968	5,202
Totals	10,982	9,037	8,138	10,176
Formaldehyde				
Cars Tailpipe	3,281	3,315	3,312	4,087
Cars Upstream	339	287	251	212
Cars Subtotal	3,621	3,602	3,564	4,298
Trucks Tailpipe	3,203	3,253	3,271	4,300
Trucks Upstream	327	261	239	205
Trucks Subtotal	3,530	3,513	3,510	4,505
Totals	7,151	7,115	7,073	8,803

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.5-8-C1. Nationwide Toxic Air Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C1^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	4,581	4,687	4,643	4,339
Cars Upstream	60	48	43	36
Cars Subtotal	4,641	4,734	4,686	4,375
Trucks Tailpipe	4,320	4,488	4,510	4,605
Trucks Upstream	58	39	36	30
Trucks Subtotal	4,378	4,527	4,546	4,635
Totals	9,019	9,261	9,232	9,010
Acrolein				
Cars Tailpipe	203	208	207	256
Cars Upstream	8	7	6	5
Cars Subtotal	212	214	213	261
Trucks Tailpipe	195	202	204	278
Trucks Upstream	8	5	5	4
Trucks Subtotal	203	208	209	282
Totals	414	422	422	543
Benzene				
Cars Tailpipe	10,720	10,965	10,829	8,525
Cars Upstream	1,227	972	867	650
Cars Subtotal	11,947	11,937	11,696	9,174
Trucks Tailpipe	10,145	10,538	10,580	8,981
Trucks Upstream	1,170	785	722	546
Trucks Subtotal	11,315	11,324	11,302	9,528
Totals	23,262	23,261	22,998	18,702
1,3-Butadiene				
Cars Tailpipe	1,826	1,868	1,848	1,576
Cars Upstream	13	11	9	8
Cars Subtotal	1,840	1,879	1,857	1,584
Trucks Tailpipe	1,726	1,793	1,801	1,666
Trucks Upstream	13	9	8	7
Trucks Subtotal	1,738	1,801	1,808	1,673
Totals	3,578	3,680	3,666	3,257

Table A.1.5-8-C1. Nationwide Toxic Air Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C1^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	10	10	61	2,329
Cars Upstream	7,456	5,905	5,281	4,334
Cars Subtotal	7,466	5,915	5,342	6,662
Trucks Tailpipe	48	50	70	3,128
Trucks Upstream	7,116	4,777	4,395	3,647
Trucks Subtotal	7,164	4,828	4,465	6,775
Totals	14,631	10,743	9,807	13,438
Formaldehyde				
Cars Tailpipe	4,439	4,541	4,531	5,644
Cars Upstream	454	360	322	270
Cars Subtotal	4,893	4,900	4,852	5,914
Trucks Tailpipe	4,230	4,394	4,426	6,112
Trucks Upstream	434	291	268	227
Trucks Subtotal	4,664	4,685	4,694	6,339
Totals	9,557	9,585	9,547	12,253

a. Emissions changes have been rounded to the nearest whole number.

A.1.6 Cumulative Impacts, Analysis C2

Table A.1.6-1-C2. Nationwide Criteria Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	5,778,781	5,780,908	5,789,473	5,784,490
Cars Upstream	27,985	27,675	26,989	26,975
Cars Subtotal	5,806,766	5,808,583	5,816,462	5,811,465
Trucks Tailpipe	8,830,514	8,834,496	8,833,233	8,817,672
Trucks Upstream	34,331	33,869	33,837	33,026
Trucks Subtotal	8,864,846	8,868,365	8,867,070	8,850,698
Totals	14,671,612	14,676,948	14,683,532	14,662,164
Nitrogen oxides (NO_x)				
Cars Tailpipe	248,996	249,056	249,344	249,866
Cars Upstream	91,975	90,930	88,671	86,725
Cars Subtotal	340,971	339,986	338,014	336,591
Trucks Tailpipe	781,213	781,526	781,546	784,926
Trucks Upstream	113,726	112,133	112,053	108,550
Trucks Subtotal	894,939	893,659	893,599	893,476
Totals	1,235,910	1,233,646	1,231,613	1,230,067
Particulate matter (PM_{2.5})				
Cars Tailpipe	11,753	11,760	11,780	11,761
Cars Upstream	10,289	10,171	9,919	9,618
Cars Subtotal	22,042	21,931	21,699	21,379
Trucks Tailpipe	17,570	17,582	17,578	17,513
Trucks Upstream	12,584	12,417	12,404	11,981
Trucks Subtotal	30,155	29,999	29,983	29,494
Totals	52,196	51,930	51,682	50,873
Sulfur dioxide (SO₂)				
Cars Tailpipe	8,146	8,053	7,853	7,565
Cars Upstream	52,318	51,741	50,461	50,593
Cars Subtotal	60,464	59,794	58,314	58,158
Trucks Tailpipe	9,871	9,744	9,730	9,330
Trucks Upstream	63,706	62,880	62,808	61,386
Trucks Subtotal	73,576	72,624	72,539	70,716
Totals	134,040	132,418	130,853	128,875

Table A.1.6-1-C2. Nationwide Criteria Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	258,114	258,131	258,294	258,278
Cars Upstream	141,772	140,149	136,656	131,507
Cars Subtotal	399,886	398,280	394,950	389,784
Trucks Tailpipe	694,578	694,656	694,635	694,877
Trucks Upstream	173,731	171,345	171,144	163,315
Trucks Subtotal	868,309	866,001	865,780	858,192
Totals	1,268,195	1,264,281	1,260,729	1,247,976

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.6-2-C2. Nationwide Criteria Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	6,433,874	6,446,606	6,467,670	6,329,873
Cars Upstream	30,045	29,080	27,576	34,489
Cars Subtotal	6,463,919	6,475,686	6,495,246	6,364,362
Trucks Tailpipe	8,151,357	8,161,911	8,163,099	8,078,265
Trucks Upstream	32,602	31,658	30,980	31,189
Trucks Subtotal	8,183,959	8,193,569	8,194,079	8,109,454
Totals	14,647,878	14,669,255	14,689,325	14,473,816
Nitrogen oxides (NO_x)				
Cars Tailpipe	247,687	248,100	248,902	250,099
Cars Upstream	98,780	95,191	90,167	94,530
Cars Subtotal	346,467	343,291	339,069	344,630
Trucks Tailpipe	592,546	593,260	594,063	603,089
Trucks Upstream	108,269	105,070	102,783	98,802
Trucks Subtotal	700,815	698,330	696,847	701,891
Totals	1,047,282	1,041,621	1,035,916	1,046,520
Particulate matter (PM_{2.5})				
Cars Tailpipe	13,465	13,494	13,541	13,161
Cars Upstream	11,044	10,625	10,061	9,755
Cars Subtotal	24,509	24,119	23,602	22,916
Trucks Tailpipe	18,332	18,361	18,362	18,008
Trucks Upstream	11,939	11,595	11,338	10,691
Trucks Subtotal	30,271	29,956	29,700	28,698
Totals	54,780	54,075	53,302	51,615
Sulfur dioxide (SO₂)				
Cars Tailpipe	8,740	8,400	7,950	7,266
Cars Upstream	56,150	54,380	51,579	66,025
Cars Subtotal	64,890	62,780	59,529	73,291
Trucks Tailpipe	9,333	9,068	8,853	8,103
Trucks Upstream	60,352	58,639	57,381	58,199
Trucks Subtotal	69,685	67,707	66,234	66,302
Totals	134,575	130,487	125,763	139,593

Table A.1.6-2-C2. Nationwide Criteria Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	246,926	247,145	247,587	245,522
Cars Upstream	152,175	146,258	138,384	125,605
Cars Subtotal	399,101	393,403	385,971	371,126
Trucks Tailpipe	544,772	544,982	545,069	544,762
Trucks Upstream	164,841	159,960	156,051	140,715
Trucks Subtotal	709,613	704,942	701,120	685,477
Totals	1,108,714	1,098,346	1,087,091	1,056,603

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.6-3-C2. Nationwide Criteria Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	8,385,633	8,412,999	8,483,433	7,393,179
Cars Upstream	34,042	33,628	30,203	66,671
Cars Subtotal	8,419,676	8,446,627	8,513,636	7,459,850
Trucks Tailpipe	8,317,001	8,310,508	8,339,611	7,956,737
Trucks Upstream	30,669	31,491	29,135	32,479
Trucks Subtotal	8,347,669	8,341,999	8,368,747	7,989,216
Totals	16,767,345	16,788,625	16,882,382	15,449,066
Nitrogen oxides (NO_x)				
Cars Tailpipe	303,021	304,044	307,831	293,978
Cars Upstream	111,945	108,255	96,234	129,703
Cars Subtotal	414,966	412,299	404,065	423,681
Trucks Tailpipe	351,607	352,057	356,030	380,127
Trucks Upstream	102,168	104,864	96,758	92,137
Trucks Subtotal	453,776	456,921	452,788	472,264
Totals	868,742	869,220	856,853	895,945
Particulate matter (PM_{2.5})				
Cars Tailpipe	19,873	19,939	20,085	17,233
Cars Upstream	12,511	11,998	10,623	10,657
Cars Subtotal	32,384	31,937	30,708	27,890
Trucks Tailpipe	24,768	24,737	24,776	22,965
Trucks Upstream	11,217	11,518	10,610	9,439
Trucks Subtotal	35,985	36,255	35,386	32,404
Totals	68,369	68,192	66,094	60,294
Sulfur dioxide (SO₂)				
Cars Tailpipe	9,898	9,445	8,325	6,388
Cars Upstream	63,605	63,021	56,690	132,065
Cars Subtotal	73,503	72,466	65,015	138,453
Trucks Tailpipe	8,733	8,963	8,216	6,625
Trucks Upstream	56,604	58,143	53,810	61,500
Trucks Subtotal	65,336	67,106	62,026	68,125
Totals	138,839	139,572	127,041	206,578

Table A.1.6-3-C2. Nationwide Criteria Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	226,503	227,368	229,084	197,489
Cars Upstream	172,420	164,559	144,774	108,190
Cars Subtotal	398,922	391,927	373,858	305,679
Trucks Tailpipe	245,639	245,640	246,174	234,217
Trucks Upstream	154,898	158,785	145,144	111,529
Trucks Subtotal	400,537	404,425	391,318	345,746
Totals	799,459	796,352	765,176	651,425

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.6-4-C2. Nationwide Criteria Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Carbon monoxide (CO)				
Cars Tailpipe	10,722,325	10,611,359	10,744,122	9,251,323
Cars Upstream	37,449	42,237	37,980	87,583
Cars Subtotal	10,759,773	10,653,596	10,782,102	9,338,906
Trucks Tailpipe	10,674,302	10,451,227	10,523,477	9,983,791
Trucks Upstream	30,588	39,018	35,863	40,836
Trucks Subtotal	10,704,890	10,490,245	10,559,339	10,024,627
Totals	21,464,663	21,143,842	21,341,441	19,363,533
Nitrogen oxides (NO_x)				
Cars Tailpipe	387,399	383,473	390,104	370,739
Cars Upstream	123,146	135,753	120,695	167,031
Cars Subtotal	510,545	519,226	510,799	537,770
Trucks Tailpipe	441,208	432,963	439,942	475,442
Trucks Upstream	101,921	129,962	119,076	113,736
Trucks Subtotal	543,129	562,924	559,017	589,178
Totals	1,053,674	1,082,150	1,069,816	1,126,948
Particulate matter (PM_{2.5})				
Cars Tailpipe	25,439	25,190	25,473	21,352
Cars Upstream	13,763	15,036	13,309	13,483
Cars Subtotal	39,202	40,226	38,782	34,835
Trucks Tailpipe	32,298	31,616	31,758	29,020
Trucks Upstream	11,187	14,270	13,049	11,546
Trucks Subtotal	43,484	45,887	44,807	40,566
Totals	82,687	86,112	83,589	75,401
Sulfur dioxide (SO₂)				
Cars Tailpipe	10,889	11,832	10,421	7,916
Cars Upstream	69,970	79,173	71,315	173,772
Cars Subtotal	80,858	91,005	81,737	181,688
Trucks Tailpipe	8,707	11,100	10,095	7,995
Trucks Upstream	56,443	72,025	66,223	77,521
Trucks Subtotal	65,150	83,125	76,318	85,516
Totals	146,008	174,130	158,054	267,204

Table A.1.6-4-C2. Nationwide Criteria Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Volatile organic compounds (VOCs)				
Cars Tailpipe	289,714	287,047	290,325	244,644
Cars Upstream	189,676	206,164	181,201	133,795
Cars Subtotal	479,390	493,211	471,527	378,439
Trucks Tailpipe	283,653	278,258	279,780	260,038
Trucks Upstream	154,480	196,701	178,340	133,716
Trucks Subtotal	438,133	474,959	458,120	393,754
Totals	917,523	968,170	929,646	772,193

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.6-5-C2. Nationwide Toxic Air Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	2,042	2,043	2,045	2,048
Cars Upstream	31	31	30	29
Cars Subtotal	2,073	2,073	2,075	2,077
Trucks Tailpipe	4,526	4,527	4,527	4,548
Trucks Upstream	37	37	37	36
Trucks Subtotal	4,563	4,564	4,564	4,584
Totals	6,636	6,638	6,639	6,661
Acrolein				
Cars Tailpipe	93	93	93	93
Cars Upstream	4	4	4	4
Cars Subtotal	97	97	97	97
Trucks Tailpipe	212	212	212	216
Trucks Upstream	5	5	5	5
Trucks Subtotal	217	217	217	221
Totals	314	314	314	318
Benzene				
Cars Tailpipe	7,806	7,806	7,812	7,806
Cars Upstream	628	621	605	583
Cars Subtotal	8,434	8,427	8,417	8,389
Trucks Tailpipe	21,733	21,734	21,733	21,714
Trucks Upstream	757	748	747	714
Trucks Subtotal	22,490	22,482	22,480	22,428
Totals	30,924	30,909	30,897	30,817
1,3-Butadiene				
Cars Tailpipe	980	980	981	981
Cars Upstream	7	7	7	6
Cars Subtotal	986	987	987	987
Trucks Tailpipe	2,464	2,465	2,465	2,467
Trucks Upstream	8	8	8	8
Trucks Subtotal	2,473	2,473	2,473	2,474
Totals	3,459	3,459	3,460	3,462

Table A.1.6-5-C2. Nationwide Toxic Air Pollutant Emissions in 2021 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	76	76	76	97
Cars Upstream	3,832	3,788	3,694	3,564
Cars Subtotal	3,908	3,864	3,771	3,661
Trucks Tailpipe	99	105	107	239
Trucks Upstream	4,619	4,562	4,556	4,393
Trucks Subtotal	4,718	4,667	4,663	4,632
Totals	8,626	8,531	8,433	8,294
Formaldehyde				
Cars Tailpipe	2,084	2,084	2,087	2,101
Cars Upstream	234	231	225	217
Cars Subtotal	2,318	2,315	2,312	2,318
Trucks Tailpipe	4,830	4,835	4,836	4,917
Trucks Upstream	282	278	278	268
Trucks Subtotal	5,112	5,113	5,113	5,186
Totals	7,430	7,428	7,425	7,504

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.6-6-C2. Nationwide Toxic Air Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	2,300	2,303	2,310	2,306
Cars Upstream	33	32	30	28
Cars Subtotal	2,333	2,335	2,340	2,334
Trucks Tailpipe	3,771	3,776	3,781	3,835
Trucks Upstream	35	34	34	32
Trucks Subtotal	3,807	3,810	3,814	3,867
Totals	6,140	6,146	6,155	6,201
Acrolein				
Cars Tailpipe	103	104	104	108
Cars Upstream	5	4	4	4
Cars Subtotal	108	108	108	112
Trucks Tailpipe	173	173	174	185
Trucks Upstream	5	5	5	4
Trucks Subtotal	177	178	178	190
Totals	285	286	286	302
Benzene				
Cars Tailpipe	7,190	7,197	7,211	7,100
Cars Upstream	674	647	613	556
Cars Subtotal	7,864	7,845	7,824	7,656
Trucks Tailpipe	16,257	16,261	16,259	16,159
Trucks Upstream	715	695	678	613
Trucks Subtotal	16,972	16,956	16,937	16,773
Totals	24,835	24,801	24,761	24,429
1,3-Butadiene				
Cars Tailpipe	1,004	1,005	1,007	996
Cars Upstream	7	7	7	6
Cars Subtotal	1,011	1,012	1,014	1,002
Trucks Tailpipe	1,927	1,929	1,929	1,929
Trucks Upstream	8	8	7	7
Trucks Subtotal	1,935	1,936	1,937	1,936
Totals	2,946	2,948	2,951	2,939

Table A.1.6-6-C2. Nationwide Toxic Air Pollutant Emissions in 2025 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	74	74	77	253
Cars Upstream	4,110	3,950	3,740	3,454
Cars Subtotal	4,184	4,024	3,817	3,707
Trucks Tailpipe	84	96	122	573
Trucks Upstream	4,361	4,241	4,145	3,863
Trucks Subtotal	4,445	4,337	4,267	4,436
Totals	8,629	8,361	8,084	8,143
Formaldehyde				
Cars Tailpipe	2,295	2,298	2,306	2,401
Cars Upstream	251	241	228	212
Cars Subtotal	2,546	2,539	2,534	2,613
Trucks Tailpipe	3,909	3,919	3,936	4,196
Trucks Upstream	266	259	253	237
Trucks Subtotal	4,175	4,178	4,189	4,433
Totals	6,721	6,717	6,723	7,046

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.6-7-C2. Nationwide Toxic Air Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	3,164	3,176	3,209	2,960
Cars Upstream	38	36	32	26
Cars Subtotal	3,202	3,212	3,241	2,986
Trucks Tailpipe	3,072	3,076	3,104	3,229
Trucks Upstream	33	34	31	27
Trucks Subtotal	3,105	3,110	3,135	3,256
Totals	6,307	6,322	6,376	6,242
Acrolein				
Cars Tailpipe	143	143	146	164
Cars Upstream	5	5	4	4
Cars Subtotal	148	148	151	167
Trucks Tailpipe	140	141	145	193
Trucks Upstream	5	5	4	4
Trucks Subtotal	145	146	149	197
Totals	293	294	300	364
Benzene				
Cars Tailpipe	7,345	7,372	7,415	6,114
Cars Upstream	763	728	641	478
Cars Subtotal	8,107	8,100	8,056	6,592
Trucks Tailpipe	7,646	7,639	7,628	6,837
Trucks Upstream	668	685	626	487
Trucks Subtotal	8,313	8,324	8,255	7,324
Totals	16,421	16,424	16,310	13,916
1,3-Butadiene				
Cars Tailpipe	1,256	1,261	1,271	1,103
Cars Upstream	8	8	7	6
Cars Subtotal	1,264	1,269	1,278	1,109
Trucks Tailpipe	1,246	1,246	1,250	1,197
Trucks Upstream	7	7	7	6
Trucks Subtotal	1,253	1,254	1,257	1,203
Totals	2,518	2,522	2,535	2,312

Table A.1.6-7-C2. Nationwide Toxic Air Pollutant Emissions in 2040 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	94	94	144	1,159
Cars Upstream	4,654	4,441	3,923	3,136
Cars Subtotal	4,748	4,535	4,067	4,296
Trucks Tailpipe	95	127	255	2,116
Trucks Upstream	4,073	4,186	3,850	3,285
Trucks Subtotal	4,169	4,312	4,106	5,401
Totals	8,917	8,848	8,172	9,696
Formaldehyde				
Cars Tailpipe	3,121	3,132	3,196	3,598
Cars Upstream	284	271	239	195
Cars Subtotal	3,405	3,403	3,436	3,792
Trucks Tailpipe	3,047	3,067	3,161	4,241
Trucks Upstream	248	255	235	205
Trucks Subtotal	3,295	3,323	3,396	4,446
Totals	6,699	6,726	6,831	8,239

a. Emissions changes have been rounded to the nearest whole number.

Table A.1.6-8-C2. Nationwide Toxic Air Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C2^a

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Acetaldehyde				
Cars Tailpipe	4,046	4,008	4,069	3,710
Cars Upstream	42	45	40	32
Cars Subtotal	4,088	4,053	4,109	3,743
Trucks Tailpipe	3,916	3,847	3,899	4,085
Trucks Upstream	33	42	38	33
Trucks Subtotal	3,948	3,889	3,938	4,118
Totals	8,036	7,942	8,047	7,861
Acrolein				
Cars Tailpipe	183	181	186	210
Cars Upstream	6	6	5	4
Cars Subtotal	188	187	191	214
Trucks Tailpipe	179	177	183	257
Trucks Upstream	5	6	5	5
Trucks Subtotal	183	182	189	261
Totals	371	369	380	476
Benzene				
Cars Tailpipe	9,394	9,306	9,392	7,530
Cars Upstream	839	912	802	592
Cars Subtotal	10,233	10,218	10,194	8,122
Trucks Tailpipe	9,150	8,965	8,972	7,721
Trucks Upstream	666	848	769	585
Trucks Subtotal	9,816	9,813	9,741	8,306
Totals	20,049	20,031	19,935	16,428
1,3-Butadiene				
Cars Tailpipe	1,606	1,591	1,610	1,370
Cars Upstream	9	10	9	7
Cars Subtotal	1,615	1,601	1,619	1,377
Trucks Tailpipe	1,560	1,530	1,540	1,455
Trucks Upstream	7	9	8	7
Trucks Subtotal	1,567	1,539	1,549	1,462
Totals	3,182	3,140	3,167	2,840

Table A.1.6-8-C2. Nationwide Toxic Air Pollutant Emissions in 2060 from U.S. Passenger Cars and Light Trucks (tons/year), by Vehicle Emissions Type and by Alternative, Analysis C2^a (continued)

Pollutant and Source	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	2%/yr Cars and Trucks	Preferred	7%/yr Cars and Trucks
Diesel particulate matter (DPM)				
Cars Tailpipe	119	118	198	1,653
Cars Upstream	5,120	5,563	4,912	3,898
Cars Subtotal	5,239	5,681	5,110	5,551
Trucks Tailpipe	125	167	364	3,191
Trucks Upstream	4,061	5,183	4,733	3,993
Trucks Subtotal	4,186	5,350	5,096	7,184
Totals	9,425	11,031	10,206	12,735
Formaldehyde				
Cars Tailpipe	3,990	3,953	4,061	4,617
Cars Upstream	312	339	300	242
Cars Subtotal	4,303	4,292	4,361	4,860
Trucks Tailpipe	3,878	3,833	3,988	5,644
Trucks Upstream	248	316	289	250
Trucks Subtotal	4,126	4,150	4,277	5,894
Totals	8,428	8,442	8,638	10,754

a. Emissions changes have been rounded to the nearest whole number.

A.2 Climate Change

A.2.1 Direct and Indirect Impacts, Analysis A1

Table A.2.1-1-A1. CO₂ Emissions and Emission Reductions (MMTCO₂) from Cars from 2017 through 2100 by Alternative, Analysis A1^a

Alternative	Total Emissions	Emission Reductions Compared to No Action Alternative	Percent Emission Reductions Compared to No Action Emissions
Alternative 1 - No Action	78,100	0	
Alternative 2 - 2%/year	68,500	9,600	12%
Alternative 3 - Preferred	62,200	15,900	20%
Alternative 4 - 7%/year	57,500	20,600	26%

a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions do not reflect the exact differences between the values.

Table A.2.1-2-A1. CO₂ Emissions and Emission Reductions (MMTCO₂) from Trucks from 2017 through 2100 by Alternative, Analysis A1^a

Alternative	Total Emissions	Emission Reductions Compared to No Action Alternative	Percent Emission Reductions Compared to No Action Emissions
Alternative 1 - No Action	77,300	0	
Alternative 2 - 2%/year	67,200	10,100	13%
Alternative 3 - Preferred	61,900	15,400	20%
Alternative 4 - 7%/year	54,800	22,400	29%

a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions do not reflect the exact differences between the values.

Table A.2.1-3-A1. Emissions of Greenhouse Gases (MMTCO₂e per year) from Cars by Alternative, Analysis A1

GHG and Year	Alternative 1 No Action	Alternative 2 2%/Year	Alternative 3 Preferred	Alternative 4 7%/Year
Carbon dioxide (CO₂)				
2020	574	562	553	539
2040	820	711	640	587
2060	1,098	953	858	790
2080	1,090	947	852	785
2100	1,014	880	792	730
Methane (CH₄)				
2020	2.07	2.03	2.00	1.96
2040	3.08	2.74	2.52	2.52
2060	4.12	3.68	3.39	3.42

Table A.2.1-3-A1. Emissions of Greenhouse Gases (MMTCO₂e per year) from Cars by Alternative, Analysis A1 (continued)

GHG and Year	Alternative 1 No Action	Alternative 2 2%/Year	Alternative 3 Preferred	Alternative 4 7%/Year
Methane (CH₄) (continued)				
2080	4.09	3.65	3.36	3.40
2100	3.81	3.40	3.13	3.16
Nitrous oxide (N₂O)				
2020	2.80	2.80	2.80	2.80
2040	3.34	3.34	3.33	2.91
2060	4.48	4.51	4.51	3.92
2080	4.45	4.48	4.48	3.90
2100	4.14	4.16	4.17	3.62

a. MMTCO₂e = million metric tons carbon dioxide equivalent.

Table A.2.1-4-A1. Emissions of Greenhouse Gases (MMTCO₂e per year) from Trucks by Alternative, Analysis A1

GHG and Year	Alternative 1 No Action	Alternative 2 2%/Year	Alternative 3 Preferred	Alternative 4 7%/Year
Carbon dioxide (CO₂)				
2020	755	738	740	712
2040	795	684	626	550
2060	1,054	902	818	716
2080	1,046	895	813	711
2100	973	833	756	661
Methane (CH₄)				
2020	2.84	2.79	2.79	2.72
2040	3.28	2.96	2.79	2.96
2060	4.38	3.94	3.69	4.07
2080	4.35	3.91	3.67	4.04
2100	4.04	3.64	3.41	3.76
Nitrous oxide (N₂O)				
2020	4.29	4.29	4.29	4.28
2040	4.18	4.19	4.19	3.66
2060	5.60	5.65	5.66	4.86
2080	5.56	5.61	5.62	4.83
2100	5.17	5.22	5.23	4.49

a. MMTCO₂e = million metric tons carbon dioxide equivalent.

Table A.2.1-5-A1. CO₂ Concentrations, Global Mean Surface Temperature Increase, and Sea-level Rise Using MAGICC (GCAMReference) from Cars by Alternative, Analysis A1^{a,b}

Totals by Alternative	CO ₂ Concentration (ppm)			Global Mean Surface Temperature Increase (°C) ^c			Sea-level Rise (cm) ^c		
	2040	2060	2100	2040	2060	2100	2040	2060	2100
Alternative 1 - No Action	478.8	563.7	784.9	1.191	1.833	3.064	11.21	18.79	37.40
Alternative 2 - 2%/year	478.7	563.4	784.0	1.190	1.831	3.061	11.21	18.79	37.37
Alternative 3 - Preferred	478.6	563.1	783.3	1.190	1.830	3.059	11.21	18.78	37.35
Alternative 4 - 7%/year	478.5	562.9	782.9	1.189	1.829	3.056	11.20	18.77	37.33
Reductions under Alternative Vehicle Standards									
Alternative 2 - 2%/year	0.1	0.4	0.9	0.001	0.002	0.003	0.00	0.00	0.03
Alternative 3 - Preferred	0.2	0.6	1.5	0.001	0.002	0.005	0.00	0.01	0.05
Alternative 4 - 7%/year	0.3	0.8	2.0	0.002	0.004	0.008	0.01	0.02	0.07

- a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions might not reflect the exact difference of the values in all cases.
- b. The effects on climate change indicators shown in this table incorporate emission reductions that occur before 2017 due to early compliance with the rulemaking.
- c. The values for global mean surface temperature and sea-level rise relate to the year 1990.

Table A.2.1-6-A1. CO₂ Concentrations, Global Mean Surface Temperature Increase, and Sea-level Rise Using MAGICC (GCAMReference) from Trucks by Alternative, Analysis A1^{a,b}

Totals by Alternative	CO ₂ Concentration (ppm)			Global Mean Surface Temperature Increase (°C) ^c			Sea-level Rise (cm) ^c		
	2040	2060	2100	2040	2060	2100	2040	2060	2100
Alternative 1 - No Action	478.8	563.7	784.9	1.191	1.833	3.064	11.21	18.79	37.40
Alternative 2 - 2%/year	478.6	563.3	783.9	1.190	1.831	3.061	11.21	18.79	37.37
Alternative 3 - Preferred	478.6	563.1	783.4	1.190	1.831	3.059	11.21	18.78	37.35
Alternative 4 - 7%/year	478.5	562.8	782.7	1.189	1.829	3.056	11.20	18.77	37.33
Reductions under Alternative Vehicle Standards									
Alternative 2 - 2%/year	0.2	0.4	1.0	0.001	0.002	0.003	0.00	0.00	0.03
Alternative 3 - Preferred	0.2	0.6	1.5	0.001	0.002	0.005	0.00	0.01	0.05
Alternative 4 - 7%/year	0.3	0.9	2.2	0.001	0.004	0.008	0.01	0.02	0.07

- a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions might not reflect the exact difference of the values in all cases.
- b. The effects on climate change indicators shown in this table incorporate emission reductions that occur before 2017 due to early compliance with the rulemaking.
- c. The values for global mean surface temperature and sea-level rise relate to the year 1990.

A.2.2 Direct and Indirect Impacts, Analysis A2

Table A.2.2-1-A2. CO₂ Emissions and Emission Reductions (MMTCO₂) from Cars from 2017 through 2100 by Alternative, Analysis A2^a

Alternative	Total Emissions	Emission Reductions Compared to No Action Alternative	Percent Emission Reductions Compared to No Action Emissions
Alternative 1 - No Action	69,400	0	
Alternative 2 - 2%/year	61,300	8,100	12%
Alternative 3 - Preferred	54,800	14,500	21%
Alternative 4 - 7%/year	49,700	19,600	28%

a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions do not reflect the exact differences between the values.

Table A.2.2-2-A2. CO₂ Emissions and Emission Reductions (MMTCO₂) from Trucks from 2017 through 2100 by Alternative, Analysis A2^a

Alternative	Total Emissions	Emission Reductions Compared to No Action Alternative	Percent Emission Reductions Compared to No Action Emissions
Alternative 1 - No Action	69,400	0	
Alternative 2 - 2%/year	60,800	8,600	12%
Alternative 3 - Preferred	56,400	13,000	19%
Alternative 4 - 7%/year	50,200	19,200	28%

a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions do not reflect the exact differences between the values.

Table A.2.2-3-A2. Emissions of Greenhouse Gases (MMTCO₂e per year) from Cars by Alternative, Analysis A2

GHG and Year	Alternative 1 No Action	Alternative 2 2%/Year	Alternative 3 Preferred	Alternative 4 7%/Year
Carbon dioxide (CO₂)				
2020	575	564	554	539
2040	754	658	582	523
2060	944	825	729	656
2080	937	819	724	651
2100	872	762	674	605
Methane (CH₄)				
2020	2.08	2.05	2.02	1.97
2040	2.84	2.56	2.35	2.30
2060	3.56	3.21	2.95	2.93
2080	3.54	3.18	2.93	2.91
2100	3.29	2.96	2.73	2.71

Table A.2.2-3-A2. Emissions of Greenhouse Gases (MMTCO₂e per year) from Cars by Alternative, Analysis A2 (continued)

GHG and Year	Alternative 1 No Action	Alternative 2 2%/Year	Alternative 3 Preferred	Alternative 4 7%/Year
Nitrous oxide (N₂O)				
2020	2.80	2.80	2.79	2.79
2040	3.02	3.02	3.01	2.68
2060	3.78	3.81	3.81	3.37
2080	3.75	3.78	3.78	3.34
2100	3.49	3.51	3.51	3.11

a. MMTCO₂e = million metric tons carbon dioxide equivalent.

Table A.2.2-4-A2. Emissions of Greenhouse Gases (MMTCO₂e per year) from Trucks by Alternative, Analysis A2

GHG and Year	Alternative 1 No Action	Alternative 2 2%/Year	Alternative 3 Preferred	Alternative 4 7%/Year
Carbon dioxide (CO₂)				
2020	725	707	709	689
2040	739	640	590	521
2060	920	793	726	637
2080	914	788	721	632
2100	850	733	671	588
Methane (CH₄)				
2020	2.69	2.64	2.64	2.60
2040	2.99	2.72	2.61	2.82
2060	3.74	3.40	3.26	3.65
2080	3.72	3.38	3.24	3.62
2100	3.46	3.14	3.01	3.37
Nitrous oxide (N₂O)				
2020	4.14	4.14	4.14	4.11
2040	3.81	3.82	3.79	3.31
2060	4.81	4.84	4.82	4.14
2080	4.77	4.80	4.78	4.11
2100	4.44	4.47	4.45	3.82

a. MMTCO₂e = million metric tons carbon dioxide equivalent.

Table A.2.2-5-A2. CO₂ Concentrations, Global Mean Surface Temperature Increase, and Sea-level Rise Using MAGICC (GCAMReference) from Cars by Alternative, Analysis A2^{a,b}

Totals by Alternative	CO ₂ Concentration (ppm)			Global Mean Surface Temperature Increase (°C) ^c			Sea-level Rise (cm) ^c		
	2040	2060	2100	2040	2060	2100	2040	2060	2100
Alternative 1 - No Action	478.8	563.7	784.9	1.191	1.833	3.064	11.21	18.79	37.40
Alternative 2 - 2%/year	478.7	563.4	784.1	1.190	1.832	3.061	11.21	18.79	37.37
Alternative 3 - Preferred	478.6	563.1	783.5	1.190	1.831	3.059	11.21	18.78	37.35
Alternative 4 - 7%/year	478.6	563.1	783.5	1.190	1.831	3.059	11.21	18.78	37.35
Reductions under Alternative Vehicle Standards									
Alternative 2 - 2%/year	0.1	0.3	0.8	0.001	0.001	0.003	0.00	0.00	0.03
Alternative 3 - Preferred	0.2	0.6	1.4	0.001	0.002	0.005	0.00	0.01	0.05
Alternative 4 - 7%/year	0.2	0.6	1.4	0.001	0.002	0.005	0.00	0.01	0.05

- a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions might not reflect the exact difference of the values in all cases.
- b. The effects on climate change indicators shown in this table incorporate emission reductions that occur before 2017 due to early compliance with the rulemaking.
- c. The values for global mean surface temperature and sea-level rise relate to the year 1990.

Table A.2.2-6-A2. CO₂ Concentrations, Global Mean Surface Temperature Increase, and Sea-level Rise Using MAGICC (GCAMReference) from Trucks by Alternative, Analysis A2^{a,b}

Totals by Alternative	CO ₂ Concentration (ppm)			Global Mean Surface Temperature Increase (°C) ^c			Sea-level Rise (cm) ^c		
	2040	2060	2100	2040	2060	2100	2040	2060	2100
Alternative 1 - No Action	478.8	563.7	784.9	1.191	1.833	3.064	11.21	18.79	37.40
Alternative 2 - 2%/year	478.7	563.4	784.0	1.190	1.831	3.061	11.21	18.79	37.37
Alternative 3 - Preferred	478.6	563.2	783.6	1.190	1.831	3.060	11.21	18.78	37.36
Alternative 4 - 7%/year	478.5	563.0	783.0	1.190	1.830	3.058	11.20	18.78	37.34
Reductions under Alternative Vehicle Standards									
Alternative 2 - 2%/year	0.1	0.4	0.8	0.001	0.001	0.003	0.00	0.00	0.03
Alternative 3 - Preferred	0.2	0.5	1.2	0.001	0.002	0.004	0.00	0.01	0.04
Alternative 4 - 7%/year	0.3	0.8	1.8	0.001	0.003	0.006	0.01	0.01	0.06

- a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions might not reflect the exact difference of the values in all cases.
- b. The effects on climate change indicators shown in this table incorporate emission reductions that occur before 2017 due to early compliance with the rulemaking.
- c. The values for global mean surface temperature and sea-level rise relate to the year 1990.

A.2.3 Direct and Indirect Impacts, Analysis B1

Table A.2.3-1-B1. CO₂ Emissions and Emission Reductions (MMTCO₂) from Cars from 2017 through 2100 by Alternative, Analysis B1^a

Alternative	Total Emissions	Emission Reductions Compared to No Action Alternative	Percent Emission Reductions Compared to No Action Emissions
Alternative 1 - No Action	65,900	0	
Alternative 2 - 2%/year	64,400	1,500	2%
Alternative 3 - Preferred	58,800	7,000	11%
Alternative 4 - 7%/year	54,900	11,000	17%

a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions do not reflect the exact differences between the values.

Table A.2.3-2-B1. CO₂ Emissions and Emission Reductions (MMTCO₂) from Trucks from 2017 through 2100 by Alternative, Analysis B1^a

Alternative	Total Emissions	Emission Reductions Compared to No Action Alternative	Percent Emission Reductions Compared to No Action Emissions
Alternative 1 - No Action	58,200	0	
Alternative 2 - 2%/year	56,900	1,300	2%
Alternative 3 - Preferred	52,900	5,300	9%
Alternative 4 - 7%/year	47,200	11,000	19%

a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions do not reflect the exact differences between the values.

Table A.2.3-3-B1. Emissions of Greenhouse Gases (MMTCO₂e per year) from Cars by Alternative, Analysis B1^a

GHG and Year	Alternative 1 No Action	Alternative 2 2%/Year	Alternative 3 Preferred	Alternative 4 7%/Year
Carbon dioxide (CO₂)				
2020	564	557	549	537
2040	746	696	622	575
2060	877	873	796	739
2080	871	867	790	734
2100	810	806	735	683
Methane (CH₄)				
2020	2.04	2.02	1.99	1.97
2040	2.86	2.70	2.45	2.60
2060	3.47	3.45	3.18	3.46
2080	3.45	3.42	3.16	3.43
2100	3.21	3.18	2.94	3.19

Table A.2.3-3-B1. Emissions of Greenhouse Gases (MMTCO₂e per year) from Cars by Alternative, Analysis B1 (continued)

GHG and Year	Alternative 1 No Action	Alternative 2 2%/Year	Alternative 3 Preferred	Alternative 4 7%/Year
Nitrous oxide (N₂O)				
2020	2.80	2.80	2.80	2.78
2040	3.34	3.34	3.33	2.89
2060	4.52	4.51	4.50	3.88
2080	4.48	4.48	4.47	3.85
2100	4.17	4.17	4.16	3.58

a. MMTCO₂e = million metric tons carbon dioxide equivalent.

Table A.2.3-4-B1. Emissions of Greenhouse Gases (MMTCO₂e per year) from Trucks by Alternative, Analysis B1^a

GHG and Year	Alternative 1 No Action	Alternative 2 2%/Year	Alternative 3 Preferred	Alternative 4 7%/Year
Carbon dioxide (CO₂)				
2020	741	731	730	706
2040	673	635	581	514
2060	714	708	652	573
2080	709	703	647	569
2100	659	654	602	529
Methane (CH₄)				
2020	2.79	2.77	2.76	2.70
2040	2.92	2.81	2.66	2.82
2060	3.39	3.38	3.22	3.61
2080	3.37	3.35	3.19	3.59
2100	3.13	3.12	2.97	3.34
Nitrous oxide (N₂O)				
2020	4.29	4.29	4.29	4.28
2040	4.19	4.19	4.19	3.66
2060	5.70	5.70	5.70	4.87
2080	5.66	5.66	5.66	4.83
2100	5.26	5.26	5.27	4.50

a. MMTCO₂e = million metric tons carbon dioxide equivalent.

Table A.2.3-5-B1. CO₂ Concentrations, Global Mean Surface Temperature Increase, and Sea-level Rise Using MAGICC (GCAMReference) from Cars by Alternative, Analysis B1^{a,b}

Totals by Alternative	CO ₂ Concentration (ppm)			Global Mean Surface Temperature Increase (°C) ^c			Sea-level Rise (cm) ^c		
	2040	2060	2100	2040	2060	2100	2040	2060	2100
Alternative 1 - No Action	478.8	563.7	784.9	1.191	1.833	3.064	11.21	18.79	37.40
Alternative 2 - 2%/year	478.7	563.6	784.7	1.191	1.832	3.064	11.21	18.79	37.39
Alternative 3 - Preferred	478.6	563.4	784.2	1.190	1.831	3.062	11.21	18.78	37.37
Alternative 4 - 7%/year	478.5	563.2	783.8	1.190	1.830	3.060	11.20	18.78	37.35
Reductions under Alternative Vehicle Standards									
Alternative 2 - 2%/year	0.1	0.1	0.1	0.000	0.000	0.001	0.00	0.00	0.01
Alternative 3 - Preferred	0.2	0.4	0.7	0.001	0.002	0.002	0.00	0.01	0.03
Alternative 4 - 7%/year	0.3	0.5	1.0	0.001	0.003	0.005	0.01	0.01	0.05

- a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions might not reflect the exact difference of the values in all cases.
- b. The effects on climate change indicators shown in this table incorporate emission reductions that occur before 2017 due to early compliance with the rulemaking.
- c. The values for global mean surface temperature and sea-level rise relate to the year 1990.

Table A.2.3-6-B1. CO₂ Concentrations, Global Mean Surface Temperature Increase, and Sea-level Rise Using MAGICC (GCAMReference) from Trucks by Alternative, Analysis B1^{a,b}

Totals by Alternative	CO ₂ Concentration (ppm)			Global Mean Surface Temperature Increase (°C) ^c			Sea-level Rise (cm) ^c		
	2040	2060	2100	2040	2060	2100	2040	2060	2100
Alternative 1 - No Action	478.8	563.7	784.9	1.191	1.833	3.064	11.21	18.79	37.40
Alternative 2 - 2%/year	478.7	563.6	784.8	1.191	1.832	3.064	11.21	18.79	37.39
Alternative 3 - Preferred	478.7	563.5	784.4	1.190	1.832	3.062	11.21	18.79	37.38
Alternative 4 - 7%/year	478.5	563.2	783.8	1.190	1.831	3.060	11.21	18.78	37.36
Reductions under Alternative Vehicle Standards									
Alternative 2 - 2%/year	0.1	0.1	0.1	0.000	0.000	0.001	0.00	0.00	0.01
Alternative 3 - Preferred	0.1	0.3	0.5	0.001	0.001	0.002	0.00	0.00	0.02
Alternative 4 - 7%/year	0.2	0.5	1.0	0.001	0.002	0.004	0.00	0.01	0.04

- a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions might not reflect the exact difference of the values in all cases.
- b. The effects on climate change indicators shown in this table incorporate emission reductions that occur before 2017 due to early compliance with the rulemaking.
- c. The values for global mean surface temperature and sea-level rise relate to the year 1990.

A.2.4 Direct and Indirect Impacts, Analysis B2

Table A.2.4-1-B2. CO₂ Emissions and Emission Reductions (MMTCO₂) from Cars from 2017 through 2100 by Alternative, Analysis B2^a

Alternative	Total Emissions	Emission Reductions Compared to No Action Alternative	Percent Emission Reductions Compared to No Action Emissions
Alternative 1 - No Action	58,900	0	
Alternative 2 - 2%/year	57,500	1,500	3%
Alternative 3 - Preferred	51,800	7,200	12%
Alternative 4 - 7%/year	48,000	11,000	19%

a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions do not reflect the exact differences between the values.

Table A.2.4-2-B2. CO₂ Emissions and Emission Reductions (MMTCO₂) from Trucks from 2017 through 2100 by Alternative, Analysis B2^a

Alternative	Total Emissions	Emission Reductions Compared to No Action Alternative	Percent Emission Reductions Compared to No Action Emissions
Alternative 1 - No Action	52,500	0	
Alternative 2 - 2%/year	51,400	1,100	2%
Alternative 3 - Preferred	48,400	4,100	8%
Alternative 4 - 7%/year	43,600	8,900	17%

a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions do not reflect the exact differences between the values.

Table A.2.4-3-B2. Emissions of Greenhouse Gases (MMTCO₂e per year) from Cars by Alternative, Analysis B2^a

GHG and Year	Alternative 1 No Action	Alternative 2 2%/Year	Alternative 3 Preferred	Alternative 4 7%/Year
Carbon dioxide (CO₂)				
2020	567	561	552	539
2040	688	640	563	517
2060	757	752	674	621
2080	752	747	670	616
2100	699	695	623	573
Methane (CH₄)				
2020	2.06	2.04	2.01	1.97
2040	2.65	2.50	2.27	2.48
2060	3.01	3.00	2.75	3.13
2080	2.99	2.98	2.74	3.11
2100	2.78	2.77	2.54	2.89

Table A.2.4-3-B2. Emissions of Greenhouse Gases (MMTCO₂e per year) from Cars by Alternative, Analysis B2 (continued)

GHG and Year	Alternative 1 No Action	Alternative 2 2%/Year	Alternative 3 Preferred	Alternative 4 7%/Year
Nitrous oxide (N₂O)				
2020	2.80	2.80	2.79	2.79
2040	3.02	3.02	3.02	2.55
2060	3.81	3.82	3.83	3.17
2080	3.79	3.79	3.80	3.14
2100	3.52	3.52	3.54	2.92

a. MMTCO₂e = million metric tons carbon dioxide equivalent.

Table A.2.4-4-B2. Emissions of Greenhouse Gases (MMTCO₂e per year) from Trucks by Alternative, Analysis B2^a

GHG and Year	Alternative 1 No Action	Alternative 2 2%/Year	Alternative 3 Preferred	Alternative 4 7%/Year
Carbon dioxide (CO₂)				
2020	714	705	704	686
2040	624	592	547	489
2060	622	618	578	512
2080	618	614	574	509
2100	574	571	533	473
Methane (CH₄)				
2020	2.66	2.63	2.63	2.60
2040	2.66	2.57	2.50	2.74
2060	2.91	2.90	2.87	3.31
2080	2.89	2.88	2.85	3.29
2100	2.69	2.68	2.65	3.06
Nitrous oxide (N₂O)				
2020	4.14	4.14	4.13	4.11
2040	3.83	3.83	3.77	3.33
2060	4.89	4.90	4.82	4.18
2080	4.86	4.86	4.79	4.15
2100	4.52	4.52	4.45	3.86

a. MMTCO₂e = million metric tons carbon dioxide equivalent.

Table A.2.4-5-B2. CO₂ Concentrations, Global Mean Surface Temperature Increase, and Sea-level Rise Using MAGICC (GCAMReference) from Cars by Alternative, Analysis B2^{a,b}

Totals by Alternative	CO ₂ Concentration (ppm)			Global Mean Surface Temperature Increase (°C) ^c			Sea-level Rise (cm) ^c		
	2040	2060	2100	2040	2060	2100	2040	2060	2100
Alternative 1 - No Action	478.8	563.7	784.9	1.191	1.833	3.064	11.21	18.79	37.40
Alternative 2 - 2%/year	478.7	563.6	784.7	1.191	1.832	3.064	11.21	18.79	37.39
Alternative 3 - Preferred	478.6	563.4	784.2	1.190	1.831	3.062	11.21	18.78	37.37
Alternative 4 - 7%/year	478.5	563.2	783.8	1.190	1.830	3.060	11.20	18.78	37.36
Reductions under Alternative Vehicle Standards									
Alternative 2 - 2%/year	0.1	0.1	0.1	0.000	0.000	0.001	0.00	0.00	0.01
Alternative 3 - Preferred	0.2	0.4	0.7	0.001	0.002	0.002	0.00	0.01	0.03
Alternative 4 - 7%/year	0.3	0.5	1.0	0.001	0.003	0.004	0.01	0.01	0.04

- a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions might not reflect the exact difference of the values in all cases.
- b. The effects on climate change indicators shown in this table incorporate emission reductions that occur before 2017 due to early compliance with the rulemaking.
- c. The values for global mean surface temperature and sea-level rise relate to the year 1990.

Table A.2.4-6-B2. CO₂ Concentrations, Global Mean Surface Temperature Increase, and Sea-level Rise Using MAGICC (GCAMReference) from Trucks by Alternative, Analysis B2^{a,b}

Totals by Alternative	CO ₂ Concentration (ppm)			Global Mean Surface Temperature Increase (°C) ^c			Sea-level Rise (cm) ^c		
	2040	2060	2100	2040	2060	2100	2040	2060	2100
Alternative 1 - No Action	478.8	563.7	784.9	1.191	1.833	3.064	11.21	18.79	37.40
Alternative 2 - 2%/year	478.7	563.7	784.8	1.191	1.833	3.064	11.21	18.79	37.39
Alternative 3 - Preferred	478.7	563.5	784.5	1.190	1.832	3.063	11.21	18.79	37.38
Alternative 4 - 7%/year	478.6	563.3	784.0	1.190	1.831	3.061	11.21	18.78	37.37
Reductions under Alternative Vehicle Standards									
Alternative 2 - 2%/year	0.1	0.1	0.1	0.000	0.000	0.000	0.00	0.00	0.01
Alternative 3 - Preferred	0.1	0.2	0.4	0.000	0.001	0.001	0.00	0.00	0.02
Alternative 4 - 7%/year	0.2	0.4	0.8	0.001	0.002	0.003	0.00	0.01	0.03

- a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions might not reflect the exact difference of the values in all cases.
- b. The effects on climate change indicators shown in this table incorporate emission reductions that occur before 2017 due to early compliance with the rulemaking.
- c. The values for global mean surface temperature and sea-level rise relate to the year 1990.

A.2.5 Cumulative Impacts C1

Table A.2.5-1-C1. CO₂ Emissions and Emission Reductions (MMTCO₂) from Cars from 2017 through 2100 by Alternative, Cumulative Impacts C1^a

Alternative	Total Emissions	Emission Reductions Compared to No Action Alternative	Percent Emission Reductions Compared to No Action Emissions
Alternative 1 - No Action	78,100	0	
Alternative 2 - 2%/year	64,400	13,700	18%
Alternative 3 - Preferred	58,800	19,300	25%
Alternative 4 - 7%/year	54,900	23,300	30%

a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions do not reflect the exact differences between the values.

Table A.2.5-2-C1. CO₂ Emissions and Emission Reductions (MMTCO₂) from Trucks from 2017 through 2100 by Alternative, Cumulative Impacts C1^a

Alternative	Total Emissions	Emission Reductions Compared to No Action Alternative	Percent Emission Reductions Compared to No Action Emissions
Alternative 1 - No Action	77,300	0	
Alternative 2 - 2%/year	56,900	20,300	26%
Alternative 3 - Preferred	52,900	24,300	31%
Alternative 4 - 7%/year	47,200	30,000	39%

a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions do not reflect the exact differences between the values.

Table A.2.5-3-C1. Emissions of Greenhouse Gases (MMTCO₂e per year) from Cars by Alternative, Cumulative Impacts C1^a

GHG and Year	Alternative 1 No Action	Alternative 2 2%/Year	Alternative 3 Preferred	Alternative 4 7%/Year
Carbon dioxide (CO₂)				
2020	574	557	549	537
2040	820	696	622	575
2060	1,098	873	796	739
2080	1,090	867	790	734
2100	1,014	806	735	683
Methane (CH₄)				
2020	2.07	2.02	1.99	1.97
2040	3.08	2.70	2.45	2.60
2060	4.12	3.45	3.18	3.46
2080	4.09	3.42	3.16	3.43
2100	3.81	3.18	2.94	3.19

Table A.2.5-3-C1. Emissions of Greenhouse Gases (MMTCO₂e per year) from Cars by Alternative, Cumulative Impacts C1^a (continued)

GHG and Year	Alternative 1 No Action	Alternative 2 2%/Year	Alternative 3 Preferred	Alternative 4 7%/Year
Nitrous oxide (N₂O)				
2020	2.80	2.80	2.80	2.78
2040	3.34	3.34	3.33	2.89
2060	4.48	4.51	4.50	3.88
2080	4.45	4.48	4.47	3.85
2100	4.14	4.17	4.16	3.58

a. MMTCO₂e = million metric tons carbon dioxide equivalent.

Table A.2.5-4-C1. Emissions of Greenhouse Gases (MMTCO₂e per year) from Trucks by Alternative, Cumulative Impacts C1^a

GHG and Year	Alternative 1 No Action	Alternative 2 2%/Year	Alternative 3 Preferred	Alternative 4 7%/Year
Carbon dioxide (CO₂)				
2020	755	731	730	706
2040	795	635	581	514
2060	1,054	708	652	573
2080	1,046	703	647	569
2100	973	654	602	529
Methane (CH₄)				
2020	2.84	2.77	2.76	2.70
2040	3.28	2.81	2.66	2.82
2060	4.38	3.38	3.22	3.61
2080	4.35	3.35	3.19	3.59
2100	4.04	3.12	2.97	3.34
Nitrous oxide (N₂O)				
2020	4.29	4.29	4.29	4.28
2040	4.18	4.19	4.19	3.66
2060	5.60	5.70	5.70	4.87
2080	5.56	5.66	5.66	4.83
2100	5.17	5.26	5.27	4.50

a. MMTCO₂e = million metric tons carbon dioxide equivalent.

Table A.2.5-5-C1. CO₂ Concentrations, Global Mean Surface Temperature Increase, and Sea-level Rise Using MAGICC (GCAM6.0) from Cars by Alternative, Cumulative Impacts C1^{a,b}

Totals by Alternative	CO ₂ Concentration (ppm)			Global Mean Surface Temperature Increase (°C) ^c			Sea-level Rise (cm) ^c		
	2040	2060	2100	2040	2060	2100	2040	2060	2100
Alternative 1 - No Action	471.7	543.4	677.8	1.114	1.666	2.564	10.84	17.73	33.42
Alternative 2 - 2%/year	471.6	542.9	676.5	1.113	1.664	2.559	10.84	17.72	33.38
Alternative 3 - Preferred	471.5	542.7	676.0	1.113	1.663	2.556	10.84	17.72	33.36
Alternative 4 - 7%/year	471.4	542.5	675.7	1.112	1.662	2.554	10.83	17.71	33.34
Reductions under Alternative Vehicle Standards									
Alternative 2 - 2%/year	0.2	0.5	1.3	0.001	0.002	0.005	0.00	0.01	0.04
Alternative 3 - Preferred	0.3	0.7	1.8	0.001	0.003	0.007	0.00	0.01	0.06
Alternative 4 - 7%/year	0.3	0.9	2.1	0.001	0.004	0.009	0.01	0.02	0.08

- a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions might not reflect the exact difference of the values in all cases.
- b. The effects on climate change indicators shown in this table incorporate emission reductions that occur before 2017 due to early compliance with the rulemaking.
- c. The values for global mean surface temperature and sea-level rise relate to the year 1990.

Table A.2.5-6-C1. CO₂ Concentrations, Global Mean Surface Temperature Increase, and Sea-level Rise Using MAGICC (GCAM6.0) from Trucks by Alternative, Cumulative Impacts C1^{a,b}

Totals by Alternative	CO ₂ Concentration (ppm)			Global Mean Surface Temperature Increase (°C) ^c			Sea-level Rise (cm) ^c		
	2040	2060	2100	2040	2060	2100	2040	2060	2100
Alternative 1 - No Action	471.7	543.4	677.8	1.114	1.666	2.564	10.84	17.73	33.42
Alternative 2 - 2%/year	471.5	542.7	675.9	1.113	1.663	2.556	10.84	17.72	33.36
Alternative 3 - Preferred	471.5	542.5	675.6	1.113	1.662	2.555	10.84	17.71	33.35
Alternative 4 - 7%/year	471.4	542.3	675.0	1.112	1.661	2.553	10.83	17.71	33.33
Reductions under Alternative Vehicle Standards									
Alternative 2 - 2%/year	0.2	0.7	1.9	0.001	0.003	0.007	0.00	0.01	0.06
Alternative 3 - Preferred	0.3	0.8	2.3	0.001	0.003	0.009	0.00	0.02	0.07
Alternative 4 - 7%/year	0.4	1.1	2.8	0.001	0.004	0.011	0.01	0.02	0.09

- a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions might not reflect the exact difference of the values in all cases.
- b. The effects on climate change indicators shown in this table incorporate emission reductions that occur before 2017 due to early compliance with the rulemaking.
- c. The values for global mean surface temperature and sea-level rise relate to the year 1990.

A.2.6 Cumulative Impacts C2

Table A.2.6-1-C2. CO₂ Emissions and Emission Reductions (MMTCO₂) from Cars from 2017 through 2100 by Alternative, Cumulative Impacts C2^a

Alternative	Total Emissions	Emission Reductions Compared to No Action Alternative	Percent Emission Reductions Compared to No Action Emissions
Alternative 1 - No Action	69,400	0	
Alternative 2 - 2%/year	57,500	11,900	17%
Alternative 3 - Preferred	51,800	17,600	25%
Alternative 4 - 7%/year	48,000	21,400	31%

a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions do not reflect the exact differences between the values.

Table A.2.6-2-C2. CO₂ Emissions and Emission Reductions (MMTCO₂) from Trucks from 2017 through 2100 by Alternative, Cumulative Impacts C2^a

Alternative	Total Emissions	Emission Reductions Compared to No Action Alternative	Percent Emission Reductions Compared to No Action Emissions
Alternative 1 - No Action	69,400	0	
Alternative 2 - 2%/year	51,400	18,000	26%
Alternative 3 - Preferred	48,400	21,000	30%
Alternative 4 - 7%/year	43,600	25,800	37%

a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions do not reflect the exact differences between the values.

Table A.2.6-3-C2. Emissions of Greenhouse Gases (MMTCO₂e per year) from Cars by Alternative, Cumulative Impacts C2^a

GHG and Year	Alternative 1 No Action	Alternative 2 2%/Year	Alternative 3 Preferred	Alternative 4 7%/Year
Carbon dioxide (CO₂)				
2020	575	561	552	539
2040	754	640	563	517
2060	944	752	674	621
2080	937	747	670	616
2100	872	695	623	573
Methane (CH₄)				
2020	2.08	2.04	2.01	1.97
2040	2.84	2.50	2.27	2.48
2060	3.56	3.00	2.75	3.13
2080	3.54	2.98	2.74	3.11
2100	3.29	2.77	2.54	2.89

Table A.2.6-3-C2. Emissions of Greenhouse Gases (MMTCO₂e per year) from Cars by Alternative, Cumulative Impacts C2^a (continued)

GHG and Year	Alternative 1 No Action	Alternative 2 2%/Year	Alternative 3 Preferred	Alternative 4 7%/Year
Nitrous oxide (N₂O)				
2020	2.80	2.80	2.79	2.79
2040	3.02	3.02	3.02	2.55
2060	3.78	3.82	3.83	3.17
2080	3.75	3.79	3.80	3.14
2100	3.49	3.52	3.54	2.92

a. MMTCO₂e = million metric tons carbon dioxide equivalent.

Table A.2.6-4-C2. Emissions of Greenhouse Gases (MMTCO₂e per year) from Trucks by Alternative, Cumulative Impacts C2^a

GHG and Year	Alternative 1 No Action	Alternative 2 2%/Year	Alternative 3 Preferred	Alternative 4 7%/Year
Carbon dioxide (CO₂)				
2020	725	705	704	686
2040	739	592	547	489
2060	920	618	578	512
2080	914	614	574	509
2100	850	571	533	473
Methane (CH₄)				
2020	2.69	2.63	2.63	2.60
2040	2.99	2.57	2.50	2.74
2060	3.74	2.90	2.87	3.31
2080	3.72	2.88	2.85	3.29
2100	3.46	2.68	2.65	3.06
Nitrous oxide (N₂O)				
2020	4.14	4.14	4.13	4.11
2040	3.81	3.83	3.77	3.33
2060	4.81	4.90	4.82	4.18
2080	4.77	4.86	4.79	4.15
2100	4.44	4.52	4.45	3.86

a. MMTCO₂e = million metric tons carbon dioxide equivalent.

Table A.2.6-5-C2. CO₂ Concentrations, Global Mean Surface Temperature Increase, and Sea-level Rise Using MAGICC (GCAM6.0) from Cars by Alternative, Cumulative Impacts C₂^{a,b}

Totals by Alternative	CO ₂ Concentration (ppm)			Global Mean Surface Temperature Increase (°C) ^c			Sea-level Rise (cm) ^c		
	2040	2060	2100	2040	2060	2100	2040	2060	2100
Alternative 1 - No Action	461.5	506.9	521.9	1.057	1.494	1.831	10.54	16.70	27.77
Alternative 2 - 2%/year	461.2	505.8	519.3	1.056	1.490	1.819	10.53	16.67	27.66
Alternative 3 - Preferred	461.1	505.5	518.6	1.055	1.488	1.815	10.53	16.66	27.63
Alternative 4 - 7%/year	460.9	505.1	517.9	1.054	1.486	1.811	10.52	16.65	27.59
Reductions under Alternative Vehicle Standards									
Alternative 2 - 2%/year	0.3	1.0	2.5	0.001	0.004	0.013	0.01	0.03	0.11
Alternative 3 - Preferred	0.5	1.4	3.3	0.002	0.006	0.016	0.01	0.04	0.14
Alternative 4 - 7%/year	0.6	1.8	4.0	0.003	0.008	0.021	0.02	0.05	0.18

- a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions might not reflect the exact difference of the values in all cases.
- b. The effects on climate change indicators shown in this table incorporate emission reductions that occur before 2017 due to early compliance with the rulemaking.
- c. The values for global mean surface temperature and sea-level rise relate to the year 1990.

Table A.2.6-6-C2. CO₂ Concentrations, Global Mean Surface Temperature Increase, and Sea-level Rise Using MAGICC (GCAM6.0) from Trucks by Alternative, Cumulative Impacts C₂^{a,b}

Totals by Alternative	CO ₂ Concentration (ppm)			Global Mean Surface Temperature Increase (°C) ^c			Sea-level Rise (cm) ^c		
	2040	2060	2100	2040	2060	2100	2040	2060	2100
Alternative 1 - No Action	471.7	543.4	677.8	1.114	1.666	2.564	10.84	17.73	33.42
Alternative 2 - 2%/year	471.5	542.8	676.1	1.113	1.663	2.557	10.84	17.72	33.37
Alternative 3 - Preferred	471.5	542.6	675.9	1.113	1.663	2.556	10.84	17.72	33.36
Alternative 4 - 7%/year	471.4	542.4	675.4	1.113	1.662	2.554	10.84	17.71	33.34
Reductions under Alternative Vehicle Standards									
Alternative 2 - 2%/year	0.2	0.6	1.7	0.001	0.002	0.006	0.00	0.01	0.05
Alternative 3 - Preferred	0.2	0.7	1.9	0.001	0.003	0.007	0.00	0.01	0.06
Alternative 4 - 7%/year	0.3	0.9	2.4	0.001	0.004	0.009	0.00	0.02	0.08

- a. The numbers in this table have been rounded for presentation purposes. As a result, the reductions might not reflect the exact difference of the values in all cases.
- b. The effects on climate change indicators shown in this table incorporate emission reductions that occur before 2017 due to early compliance with the rulemaking.
- c. The values for global mean surface temperature and sea-level rise relate to the year 1990.