

Attachment 5. Inputs and results, emissions/vol. crude vs. crude quality and fuels

PADD	Year	<i>EI</i>	density	sulfur	cap.	prod.	<i>EI</i> pred. 95% confidence			Fuel mix	Emit pred. 95%	
		(GJ/m ³)	(kg/m ³)	(kg/m ³)	ut. (%)	ratio	Lower	Central	Upper	(kg/GJ)	Lower	Central
1	1999	3.451	858.20	8.24	90.9	3.668	2.877	3.241	3.604	81.53	235	264
1	2000	3.430	860.18	8.00	91.7	3.489	2.987	3.349	3.711	80.34	240	269
1	2001	3.518	866.34	7.71	87.2	3.479	3.198	3.559	3.919	81.85	262	291
1	2002	3.426	865.71	7.45	88.9	3.605	3.152	3.511	3.870	81.08	256	285
1	2003	3.364	863.44	7.43	92.7	3.321	3.133	3.493	3.853	81.51	255	285
1	2004	3.416	865.44	7.79	90.4	3.397	3.209	3.568	3.927	81.46	261	291
1	2005	3.404	863.38	7.17	93.1	3.756	3.048	3.410	3.772	81.23	248	277
1	2006	3.440	864.12	7.17	86.7	3.522	3.054	3.417	3.780	80.40	246	275
1	2007	3.499	864.33	7.26	85.6	3.443	3.067	3.433	3.800	82.28	252	282
1	2008	3.551	863.65	7.08	80.8	3.400	2.972	3.352	3.733	83.26	247	279
2	1999	3.368	858.25	10.64	93.3	4.077	2.984	3.347	3.711	78.11	233	261
2	2000	3.361	860.03	11.35	94.2	4.132	3.104	3.468	3.832	77.56	241	269
2	2001	3.396	861.33	11.37	93.9	4.313	3.126	3.495	3.863	77.46	242	271
2	2002	3.393	861.02	11.28	90.0	4.345	3.068	3.432	3.796	77.90	239	267
2	2003	3.298	862.80	11.65	91.6	4.281	3.195	3.558	3.922	78.00	249	278
2	2004	3.376	865.65	11.86	93.6	4.167	3.369	3.733	4.098	77.25	260	288
2	2005	3.496	865.65	11.95	92.9	4.207	3.362	3.725	4.089	77.27	260	288
2	2006	3.738	865.44	11.60	92.4	3.907	3.380	3.738	4.095	75.84	256	283
2	2007	3.800	864.07	11.84	90.1	4.161	3.270	3.629	3.989	75.55	247	274
2	2008	3.858	862.59	11.73	88.4	4.333	3.154	3.515	3.875	74.97	236	263
3	1999	4.546	869.00	12.86	94.7	3.120	3.759	4.117	4.476	71.61	269	295
3	2000	4.563	870.29	12.97	93.9	3.120	3.813	4.172	4.531	71.87	274	300
3	2001	4.348	874.43	14.34	94.8	3.128	4.086	4.444	4.803	72.43	296	322
3	2002	4.434	876.70	14.47	91.5	3.251	4.140	4.499	4.859	72.71	301	327
3	2003	4.381	874.48	14.43	93.6	3.160	4.076	4.435	4.794	72.81	297	323
3	2004	4.204	877.79	14.40	94.1	3.228	4.213	4.572	4.930	73.43	309	336
3	2005	4.205	878.01	14.40	88.3	3.316	4.149	4.511	4.873	73.24	304	330
3	2006	4.367	875.67	14.36	88.7	3.176	4.067	4.433	4.798	74.15	302	329
3	2007	4.226	876.98	14.47	88.7	3.205	4.127	4.491	4.856	74.93	309	337
3	2008	4.361	878.66	14.94	83.6	3.229	4.165	4.540	4.915	74.48	310	338
5	1999	4.908	894.61	11.09	87.1	2.952	4.713	5.082	5.451	70.27	331	357
5	2000	5.189	895.85	10.84	87.5	3.160	4.725	5.092	5.460	69.09	326	352
5	2001	5.039	893.76	10.99	89.1	3.231	4.648	5.014	5.380	69.38	322	348
5	2002	4.881	889.99	10.86	90.0	3.460	4.450	4.814	5.178	69.15	308	333
5	2003	4.885	889.10	10.94	91.3	3.487	4.422	4.788	5.153	69.40	307	332
5	2004	4.861	888.87	11.20	90.4	3.551	4.410	4.775	5.140	69.89	308	334
5	2005	4.774	888.99	11.38	91.7	3.700	4.409	4.780	5.151	69.88	308	334
5	2006	4.862	887.65	10.92	90.5	3.615	4.331	4.695	5.060	69.32	300	325
5	2007	5.091	885.54	11.07	87.6	3.551	4.235	4.594	4.953	69.12	293	318
5	2008	4.939	890.16	12.11	88.1	3.803	4.456	4.824	5.191	68.39	305	330

Predictions for California refineries in 2020

Calif.	2004	--	899.23	11.46	93.0	3.633	4.881	5.256	5.632	70.82	346	372
Calif.	2005	--	900.56	11.82	95.0	3.801	4.937	5.329	5.721	71.06	351	379
Calif.	2006	--	899.56	11.73	91.5	3.845	4.861	5.239	5.616	72.65	353	381
Calif.	2007	--	899.84	11.89	88.3	3.814	4.866	5.234	5.603	71.43	348	374
Calif.	2008	--	902.00	12.85	91.0	4.087	4.980	5.370	5.759	71.02	354	381
Calif.	2009	--	901.38	11.70	82.9	4.045	4.837	5.200	5.564	70.54	341	367
Emit reduction case			883.14	8.24	91.8	3.836	3.953	4.313	4.674	71.40	282	308
Emit increase case			948.39	22.59	91.8	3.836	7.511	8.037	8.563	71.40	536	574

EI: refinery energy intensity as measured by fuel energy consumed/vo. crude refined.

Cap. ut.: operable refinery capacity utilization as defined by U.S. EIA.

Prod. ratio: the ratio by volume of gasolines, distillate, kerosenes and naphtha to other refiner

Fuel mix emission intensity measured from reported data as detailed in Table 2-1.

Emit reduction case: 70/30 PADD 1 2004–2008/CA 2004–2008 crude feed; other inputs = 200

Emit increase case: 70/30 USGS heavy oil/CA 2004–2008 crude feed; other inputs = 2004–08

USGS heavy oil average quality from ref. 28; other data from Table 2-1: Attachment Crude–1.

% conf.	Obs. CO ₂
Upper (kg/m ³)	

294	281
298	276
321	288
314	278
314	274
320	278
306	277
304	277
313	288
311	296
290	263
297	261
299	263
296	264
306	257
317	261
316	270
311	284
301	287
291	289
321	326
326	328
348	315
353	322
349	319
362	309
357	308
356	324
364	317
366	325
383	345
377	358
373	350
358	338
358	339
359	340
360	334
351	337
342	352
355	338

399	354
407	358
408	384
400	401
409	383
392	397
334	--
611	--

y products.

04–08 CA avg.

CA avg.