

## Calculation of 2015 Crude Average Carbon Intensity Value

Posting: Section 95489(c)(3) of the Low Carbon Fuel Standard (LCFS) Regulation<sup>1</sup> states that each year the Executive Officer will post the Annual Crude Average carbon intensity calculation at the ARB-LCFS website for public comment. Written comments shall be accepted for 15 calendar days following the date on which the analysis was posted.<sup>2</sup> Only comments related to potential factual or methodological errors in the posted Annual Crude Average carbon intensity value may be considered. The Executive Officer shall evaluate the comments received and, if the Executive Officer deems it necessary, may request in writing additional information or clarification from the commenters. Commenters shall have 10 days to respond to these requests. The Executive Officer shall post the final Annual Crude Average carbon intensity value at the ARB-LCFS website within 15 days of completion of the comment period, if no comments are received. If comments are received, the Executive Officer shall post the final Annual Crude Average carbon intensity value within 30 days of completion of the comment period or within 25 days of the latest request by the Executive Officer for additional information or clarification from a commenter, whichever is later.

Calculation of 2013, 2014 and 2015 Annual Crude Average Carbon Intensity Values: In table 1, California crude volumes and Annual Crude Average carbon intensity values for 2013, 2014 and 2015 are shown. In tables 2, 3 and 4, breakdowns of the sources of crude oil supplied to California refineries during 2013, 2014, and 2015 as well as the carbon intensity values assigned to these crude sources are displayed. All crude oil produced in and offshore of California during the time period of 2013 to 2015 was assumed to be refined in California.<sup>3</sup> The volume contributions for California produced crudes are based on oil production data obtained from the California Department of Conservation.<sup>4</sup> The volume contributions for California federal offshore crudes are based on oil production data obtained from the Bureau of Safety and Environmental Enforcement.<sup>5</sup> The volume contributions of imported crudes are based on oil supply data submitted by refineries as part of annual LCFS reporting. The annual crude average carbon intensity values are a volume-weighted average of the carbon intensities for the crudes supplied in a given year.

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<sup>1</sup> The LCFS regulation is found at California Code of Regulations (CCR), title 17, sections 95480-95497. Subsequent section references are to CCR title 17.

<sup>2</sup> No comments were received.

<sup>3</sup> The total volume of California state and federal offshore crude supplied to California refineries as reported to ARB was 653 million barrels, which closely matches the total volume reported by oil producers to California Department of Conservation and Bureau of Safety and Environmental Enforcement of 651 million barrels.

<sup>4</sup> California Department of Conservation, Online Production and Injection Query and Database, <http://opi.consrv.ca.gov/opi/opi.dll>, (accessed May 29, 2014, April 17, 2015, and May 19, 2016).

<sup>5</sup> Bureau of Safety and Environmental Enforcement website [http://www.data.bsee.gov/homepg/data\\_center/production/PacificFreeProd.asp](http://www.data.bsee.gov/homepg/data_center/production/PacificFreeProd.asp) (accessed May 2014, April 2015 and April 21, 2016).

**Table 1: Crude Volumes and Annual Crude Average Carbon Intensity Values**

Year	2013	2014	2015
CI (gCO <sub>2</sub> e/MJ)	11.37	11.19	12.06
Volume (bbl)	588,254,470	612,332,497	605,749,048

Calculation of California Baseline Crude Average Carbon Intensity:

$CI_{BaselineCrudeAve}$  is the California Baseline Crude Average carbon intensity value, in gCO<sub>2</sub>e/MJ, attributed to the production and transport of the crude oil supplied as petroleum feedstock to California refineries during the baseline calendar year, 2010, and is calculated by the following formula for the 2015 compliance period:

$$CI_{BaselineCrudeAve} = \frac{[11.39 \times 588,254,470 + 11.39 \times 612,332,497 + 11.98 \times 605,749,048]}{[588,254,470 + 612,332,497 + 605,749,048]}$$

$$CI_{BaselineCrudeAve} = 11.59$$

Calculation of Three-Year California Crude Average Carbon Intensity:

$CI_{2015CrudeAve}$  is the Three-year California Crude Average carbon intensity value, in gCO<sub>2</sub>e/MJ, attributed to the production and transport of the crude oil supplied as petroleum feedstock to California refineries during the most recent three calendar years (2013, 2014 and 2015), and is calculated by the following formula:

$$CI_{2015CrudeAve} = \frac{[11.37 \times 588,254,470 + 11.19 \times 612,332,497 + 12.06 \times 605,749,048]}{[588,254,470 + 612,332,497 + 605,749,048]}$$

$$CI_{2015CrudeAve} = 11.54$$

Summary: The Three-year California Crude Average carbon intensity of 11.54 gCO<sub>2</sub>e/MJ is less than the California Baseline Crude Average carbon intensity value of 11.59 gCO<sub>2</sub>e/MJ. Therefore, no incremental deficits for CARBOB or diesel will be added to each affected regulated party's compliance obligation for the annual compliance period of 2017.

**Table 2: 2013 Refinery Crude Supply**

<b>Country/State</b>	<b>Crude Name</b>	<b>CI (g/MJ)</b>	<b>2013 Volume (bbl)</b>
	2013 Volume Weighted Average CI	11.37	588,254,470
Algeria	Saharan	11.39	74,260
Angola	Dalia	7.86	2,593,109
	Girassol	10.43	1,583,834
	Greater Plutonio	8.82	2,607,434
	Kissanje	11.39	519,752
	Nemba	11.39	579,161
	Pazflor	11.39	4,019,245
Australia	Enfield	11.39	527,084
Brazil	Albacora Leste	7.35	772,526
	Frade	6.62	430,048
	Jubarte	11.39	168,020
	Lula	11.39	1,920,416
	Marlim	6.75	1,878,263
	Ostra	5.71	930,198
	Roncador	11.39	215
	Roncador Heavy	11.39	1,271,000
	Sapinhoa	11.39	1,032,516
Canada	Access Western Blend	11.39	228,810
	Albian Muskeg River Heavy	11.39	124,000
	Albian Heavy Synthetic	21.02	3,258,978
	Borealis	11.39	386,249
	Bow River	11.39	270,383
	Cardium	11.39	16,611
	Cold Lake	18.74	6,772,240
	Fosterton	11.39	1,060,536
	Halkirk	11.39	35,728
	Koch Alberta	7.61	86,900
	Light Sweet	11.39	37,148
	Peace River Sour	11.39	92,915
	Pembina	11.39	201,500
	Suncor Synthetic (all grades)	24.49	4,898,699
Chad	Doba	11.39	719,359
Colombia	Castilla	6.45	11,754,560
	Cusiana	11.39	69,690
	Magdalena	11.39	3,642,933
	Rubiales	11.39	382,242

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	South Blend	11.39	1,595,908
	Vasconia	6.63	7,762,498
Ecuador	Napo	7.45	22,693,813
	Oriente	9.34	44,719,127
Equatorial Guinea	Ceiba	11.39	3,357,194
	Zafiro	11.39	1,035,612
Iraq	Basra Light	12.08	53,485,785
Kuwait	Kuwait	11.39	4,566,220
Mauritania	Chinquetti	11.39	625,062
Neutral Zone	Eocene	5.59	291,620
Nigeria	Antan	11.39	544,019
Oman	Oman	12.30	270,490
Peru	Loreto	5.82	3,685,332
Russia	ESPO	12.09	5,808,606
Saudi Arabia	Arab Extra Light	6.86	19,670,435
	Arab Light	6.75	52,436,845
	Arab Medium	11.39	13,953,374
	Arab Heavy	11.39	813,300
Venezuela	Bachaquero	11.39	266,800
	Boscan	12.53	155,000
	Hamaca DCO	11.39	322,400
	Laguna	11.39	283,440
	Zuata (all grades)	23.50	480,740
US Alaska	ANS	12.81	72,965,982
US Colorado	Niobrara	11.39	642,988
US New Mexico	Four Corners	11.39	454,065
US North Dakota	Bakken	11.39	3,147,501
US Texas	West Texas Intermediate	11.39	279,600
US Utah	Covenant	11.39	519,556
	Utah Sweet	11.39	71,645
US Wyoming	Wyoming	11.39	115,078
US California*	Aliso Canyon	1.97	250,249
	Ant Hill	26.37	51,053
	Antelope Hills	2.69	133,377
	Antelope Hills, North	13.16	242,962
	Arroyo Grande	27.81	366,738
	Asphalto	7.92	250,847
	Bandini	7.75	6,733
	Bardsdale	5.24	114,429
	Barham Ranch	2.74	78,498
	Beer Nose	2.18	35,139

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	Belgian Anticline	3.62	42,247
	Bellevue	8.27	20,398
	Bellevue, West	8.63	10,026
	Belmont, Offshore	3.19	701,620
	Belridge, North	5.00	2,513,108
	Belridge, South	14.49	23,527,707
	Beverly Hills	3.33	745,772
	Big Mountain	3.15	28,171
	Blackwells Corner	11.05	9,527
	Brea-Olinda	2.97	1,111,985
	Buena Vista	13.61	1,233,874
	Burrel	16.44	11,871
	Cabrillo	2.84	12,791
	Canal	4.04	28,684
	Canfield Ranch	3.58	114,807
	Caneros Creek	2.96	20,545
	Cascade	2.20	144,353
	Casmalia	11.61	202,648
	Castaic Hills	2.79	9,372
	Cat Canyon	5.09	1,438,877
	Cheviot Hills	3.06	41,971
	Chico-Martinez	3.83	195,601
	Cienaga Canyon	3.89	28,348
	Coalinga	25.36	5,523,804
	Coles Levee, N	3.47	155,665
	Coles Levee, S	4.27	74,596
	Comanche	10.75	31,331
	Coyote, East	5.59	229,482
	Cuyama, South	11.86	212,571
	Cymric	19.91	14,459,179
	Deer Creek	18.29	48,556
	Del Valle	4.30	55,332
	Devils Den	3.63	18,934
	Edison	9.03	786,006
	El Segundo	2.98	30,083
	Elk Hills	5.36	12,418,438
	Elwood, S., Offshore	4.18	1,734,916
	Fruitvale	10.24	431,701
	Greeley	8.14	112,119
	Hasley Canyon	2.07	37,433
	Helm	3.35	56,025

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	Holser	3.01	18,242
	Honor Rancho	2.69	64,973
	Huntington Beach	7.80	2,143,415
	Hyperion	1.65	10,848
	Inglewood	8.74	2,731,733
	Jacalitos	2.22	124,723
	Jasmin	17.54	123,904
	Kern Front	25.06	3,447,417
	Kern River	9.55	25,738,315
	Kettleman Middle Dome	3.53	47,090
	Kettleman North Dome	4.70	31,844
	Landslide	10.49	33,929
	Las Cienegas	4.46	337,733
	Livermore	2.17	12,088
	Lompoc	31.05	364,509
	Long Beach	5.12	1,389,178
	Long Beach Airport	3.73	11,329
	Los Angeles Downtown	4.11	23,697
	Los Angeles, East	8.28	22,814
	Lost Hills	11.40	10,762,890
	Lost Hills, Northwest	4.35	25,649
	Lynch Canyon	7.73	160,485
	Mahala	3.57	12,021
	McCool Ranch	1.71	11,388
	McDonald Anticline	4.92	54,787
	McKittrick	15.47	2,513,368
	Midway-Sunset	21.18	28,794,725
	Montalvo, West	2.63	658,941
	Montebello	10.29	572,863
	Monument Junction	3.81	120,059
	Mount Poso	20.57	1,114,063
	Mountain View	4.42	103,790
	Newhall-Potrero	2.83	119,417
	Newport, West	4.33	88,486
	Oak Canyon	3.81	16,255
	Oak Park	2.13	17,005
	Oakridge	2.57	117,458
	Oat Mountain	1.90	86,998
	Ojai	3.27	265,080
	Olive	1.93	73,195
	Orcutt	12.52	1,432,214

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	Oxnard	16.89	102,030
	Paloma	3.42	22,861
	Placerita	31.66	942,420
	Playa Del Rey	6.04	33,674
	Pleito	4.01	586,827
	Poso Creek	28.41	2,793,324
	Pyramid Hills	2.92	62,093
	Railroad Gap	6.56	133,231
	Raisin City	7.64	114,381
	Ramona	3.37	46,219
	Richfield	3.63	320,586
	Rincon	2.93	310,729
	Rio Bravo	4.85	353,540
	Rio Viejo	2.50	73,224
	Riverdale	2.99	68,063
	Rose	2.10	463,643
	Rosecrans	5.18	152,981
	Rosecrans, South	3.11	8,592
	Rosedale	6.60	14,719
	Rosedale Ranch	8.84	170,325
	Round Mountain	28.73	4,175,910
	Russell Ranch	6.56	62,098
	Salt Lake	2.82	51,699
	Salt Lake, South	3.68	31,833
	San Ardo	28.82	7,229,422
	San Miguelito	4.44	470,557
	San Vicente	2.31	271,235
	Sansinena	2.54	173,094
	Santa Clara Avenue	3.31	60,971
	Santa Fe Springs	11.34	937,016
	Santa Maria Valley	6.48	229,038
	Santa Susana	3.14	17,820
	Sargent	4.77	35,510
	Saticoy	3.26	36,633
	Sawtelle	2.83	174,433
	Seal Beach	4.07	443,272
	Semitropic	3.39	38,312
	Sespe	2.91	388,345
	Shafter, North	2.54	940,893
	Shiells Canyon	3.24	88,990
	South Mountain	3.10	670,182

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	Stockdale	1.71	117,873
	Tapia	6.42	43,455
	Tapo Canyon, South	2.87	8,306
	Tejon	7.96	488,252
	Tejon Hills	5.74	15,359
	Tejon, North	4.72	44,017
	Temescal	3.10	66,503
	Ten Section	6.22	94,873
	Timber Canyon	3.30	38,081
	Torrance	4.45	387,747
	Torrey Canyon	2.88	123,261
	Union Avenue	1.79	13,455
	Ventura	4.35	5,135,029
	Wayside Canyon	2.93	54,060
	West Mountain	2.89	14,743
	Wheeler Ridge	3.34	68,613
	White Wolf	1.64	9,821
	Whittier	2.51	72,634
	Wilmington	6.36	13,858,052
	Yowlumne	11.22	230,670
	Zaca	10.45	215,552
US Federal OCS	Beta	1.74	1,511,235
	Carpinteria	2.62	372,631
	Dos Cuadras	3.83	988,268
	Hondo	4.27	5,120,464
	Hueneme	4.33	107,563
	Pescado	3.45	2,322,478
	Point Arguello	8.68	1,206,958
	Point Pedernales	6.00	1,395,406
	Sacate	2.33	3,558,681
	Santa Clara	2.41	379,709
	Socketeye	5.82	983,983



**Table 3: 2014 Refinery Crude Supply**

<b>Country/State</b>	<b>Crude Name</b>	<b>CI (g/MJ)</b>	<b>2014 Volume (bbl)</b>
	2014 Volume Weighted Average CI	11.19	612,332,497
Angola	Clov	11.39	1,955,065
	Pazflor	11.39	11,305,783
Brazil	Albacora Leste	7.35	554,900
	Lula	11.39	114,572
	Sapinhoa	11.39	6,063,680
Canada	Access Western Blend	11.39	4,074,970
	Albian Heavy Synthetic	21.02	746,514
	Albian Vacuum Blend	11.39	124,685
	Canadian Heavy	11.39	51,871
	Cold Lake	18.74	5,334,932
	Fosterton	11.39	609,584
	High Prairie Bitumen	11.39	92,820
	Kearl Lake	11.39	546,566
	Koch Alberta	7.61	87,459
	Light Sweet	11.39	162,424
	McKay Heavy	11.39	549,285
	Mixed Sweet	7.75	371,558
	Peace River Sour	11.39	33,421
	Premium Albian Synthetic	11.39	672,100
	Seal Bitumen	11.39	17,980
	Suncor Synthetic (all grades)	24.49	710,900
	Surmont	11.39	918,406
	Western Canadian Select	11.39	9,390
Colombia	Castilla	6.45	12,729,107
	Magdalena	11.39	5,804,028
	South Blend	11.39	3,021,157
	Vasconia	6.63	9,858,634
Ecuador	Napo	7.45	17,364,711
	Oriente	9.34	36,382,389
Equatorial Guinea	Ceiba	11.39	1,474,959
Iraq	Basra Light	12.08	70,562,909
Mexico	Isthmus	11.39	4,318,914
Neutral Zone	Eocene	5.59	535,800
Peru	Loreto	5.82	2,729,775
	Mayna	7.14	415,167
Russia	ESPO	12.09	752,695

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	Sokol	11.39	2,025,198
Saudi Arabia	Arab Extra Light	6.86	30,663,255
	Arab Light	6.75	73,768,778
	Arab Medium	11.39	2,037,200
Venezuela	Boscan	12.53	1,036,380
	Hamaca	11.39	653,984
	Hamaca DCO	11.39	919,900
US Alaska	ANS	12.81	70,438,234
US Colorado	Niobrara	11.39	880,842
US Louisiana	GCA	11.39	162,695
US New Mexico	Four Corners	11.39	1,129,938
	New Mexico Sweet	11.39	85,329
US North Dakota	Bakken	11.39	3,089,846
US Utah	Covenant	11.39	259,064
	Utah Sweet	11.39	913,318
	Utah Black Wax	11.39	220,976
US Wyoming	Wyoming	11.39	618,489
US California*	Aliso Canyon	1.97	207,560
	Ant Hill	26.37	48,791
	Antelope Hills	2.69	121,034
	Antelope Hills, North	13.16	316,664
	Arroyo Grande	27.81	422,592
	Asphalto	7.92	229,677
	Bandini	7.75	5,875
	Bardsdale	5.24	170,049
	Barham Ranch	2.74	83,030
	Beer Nose	2.18	13,206
	Belgian Anticline	3.62	38,754
	Bellevue	8.27	27,654
	Bellevue, West	8.63	10,295
	Belmont, Offshore	3.19	670,435
	Belridge, North	5.00	2,372,083
	Belridge, South	14.49	23,578,653
	Beverly Hills	3.33	685,013
	Big Mountain	3.15	28,992
	Blackwells Corner	11.05	11,618
	Brea-Olinda	2.97	1,074,529
	Buena Vista	13.61	1,170,187
	Burrel	16.44	14,858
	Cabrillo	2.84	24,378
	Canal	4.04	27,497

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	Canfield Ranch	3.58	105,820
	Caneros Creek	2.96	20,001
	Cascade	2.20	132,485
	Casmalia	11.61	200,271
	Castaic Hills	2.79	6,264
	Cat Canyon	5.09	1,579,569
	Cheviot Hills	3.06	46,751
	Chico-Martinez	3.83	168,064
	Cienaga Canyon	3.89	25,550
	Coalinga	25.36	6,105,373
	Coles Levee, N	3.47	207,319
	Coles Levee, S	4.27	72,539
	Comanche	10.75	28,858
	Coyote, East	5.59	243,727
	Cuyama, South	11.86	208,230
	Cymric	19.91	15,685,203
	Deer Creek	18.29	46,115
	Del Valle	4.30	55,590
	Devils Den	3.63	17,519
	Edison	9.03	833,919
	El Segundo	2.98	26,397
	Elk Hills	5.36	11,811,836
	Elwood, S., Offshore	4.18	1,366,871
	Fruitvale	10.24	451,811
	Greeley	8.14	113,322
	Hasley Canyon	2.07	30,034
	Helm	3.35	63,708
	Holser	3.01	18,383
	Honor Rancho	2.69	50,500
	Huntington Beach	7.80	2,314,022
	Hyperion	1.65	9,839
	Inglewood	8.74	2,664,143
	Jacalitos	2.22	124,479
	Jasmin	17.54	125,925
	Kern Front	25.06	4,619,561
	Kern River	9.55	25,264,002
	Kettleman Middle Dome	3.53	63,295
	Kettleman North Dome	4.70	75,584
	Landslide	10.49	32,727
	Las Cienegas	4.46	295,786
	Livermore	2.17	12,538

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Lompoc	31.05	342,134
Long Beach	5.12	1,402,368
Long Beach Airport	3.73	11,527
Los Angeles Downtown	4.11	14,374
Los Angeles, East	8.28	28,091
Lost Hills	11.40	11,219,489
Lost Hills, Northwest	4.35	24,919
Lynch Canyon	7.73	291,504
Mahala	3.57	10,886
McCool Ranch	1.71	21,835
McDonald Anticline	4.92	63,620
McKittrick	15.47	3,131,900
Midway-Sunset	21.18	29,287,992
Montalvo, West	2.63	572,639
Montebello	10.29	513,055
Monument Junction	3.81	109,107
Mount Poso	20.57	1,258,638
Mountain View	4.42	100,261
Newhall-Potrero	2.83	113,963
Newport, West	4.33	87,783
Oak Canyon	3.81	23,370
Oak Park	2.13	17,116
Oakridge	2.57	147,570
Oat Mountain	1.90	83,680
Ojai	3.27	264,077
Olive	1.93	85,627
Orcutt	12.52	1,369,801
Oxnard	16.89	336,359
Paloma	3.42	19,238
Placerita	31.66	896,067
Playa Del Rey	6.04	52,031
Pleito	4.01	982,619
Poso Creek	28.41	3,606,689
Pyramid Hills	2.92	55,326
Railroad Gap	6.56	98,623
Raisin City	7.64	126,411
Ramona	3.37	42,709
Richfield	3.63	312,338
Rincon	2.93	292,997
Rio Bravo	4.85	343,180
Rio Viejo	2.50	52,281

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	Riverdale	2.99	64,401
	Rose	2.10	605,610
	Rosecrans	5.18	154,072
	Rosecrans, South	3.11	9,583
	Rosedale	6.60	10,095
	Rosedale Ranch	8.84	154,135
	Round Mountain	28.73	4,225,365
	Russell Ranch	6.56	58,546
	Salt Lake	2.82	57,511
	Salt Lake, South	3.68	29,412
	San Ardo	28.82	7,682,477
	San Miguelito	4.44	451,169
	San Vicente	2.31	266,409
	Sansinena	2.54	160,505
	Santa Clara Avenue	3.31	53,044
	Santa Fe Springs	11.34	1,058,837
	Santa Maria Valley	6.48	229,496
	Santa Susana	3.14	15,871
	Sargent	4.77	32,284
	Saticoy	3.26	39,774
	Sawtelle	2.83	186,785
	Seal Beach	4.07	450,916
	Semitropic	3.39	40,063
	Sespe	2.91	477,032
	Shafter, North	2.54	787,194
	Shiells Canyon	3.24	81,063
	South Mountain	3.10	741,363
	Stockdale	1.71	124,938
	Tapia	6.42	26,369
	Tapo Canyon, South	2.87	9,283
	Tejon	7.96	460,092
	Tejon Hills	5.74	13,800
	Tejon, North	4.72	38,037
	Temescal	3.10	72,793
	Ten Section	6.22	91,380
	Timber Canyon	3.30	31,586
	Torrance	4.45	367,184
	Torrey Canyon	2.88	118,353
	Union Avenue	1.79	9,713
	Ventura	4.35	5,089,921
	Wayside Canyon	2.93	24,046

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	West Mountain	2.89	9,239
	Wheeler Ridge	3.34	74,985
	White Wolf	1.64	11,879
	Whittier	2.51	95,020
	Wilmington	6.36	14,240,290
	Yowlumne	11.22	176,201
	Zaca	10.45	245,055
US Federal OCS	Beta	1.74	1,732,242
	Carpinteria	2.62	355,317
	Dos Cuadras	3.83	933,465
	Hondo	4.27	5,180,905
	Hueneme	4.33	96,849
	Pescado	3.45	2,667,240
	Point Arguello	8.68	1,306,278
	Point Pedernales	6.00	1,722,801
	Sacate	2.33	2,945,500
	Santa Clara	2.41	633,594
	Sockeye	5.82	851,044

**Table 4: 2015 Refinery Crude Supply**

<b>Country/State</b>	<b>Crude Name</b>	<b>CI (g/MJ)</b>	<b>2015 Volume (bbl)</b>
	2015 Volume Weighted Average CI	12.06	605,749,048
Angola	Clov	8.25	4,204,843
	Girassol	10.33	1,118,099
	Greater Plutonio	9.78	1,774,496
	Hungo	9.10	1,486,409
	Pazflor	8.91	3,119,864
	Sangos	11.98	3,051,709
Australia	Pyrenees	5.99	454,412
	Vincent	5.05	652,505
Belize	Belize Light	11.98	360,417
Brazil	Bijupira Salema	8.08	433,868
	Iracema (Cernambi)	11.98	5,078,582
	Lula	9.94	2,931,225
	Ostra	6.54	337,723
	Peregrino	11.98	302,079
	Sapinhua	8.53	5,694,501
	Tubarao Azul	11.98	26,098
	Tubarao Martelo	11.98	104,143
Canada	Access Western Blend	16.31	247,794
	Albian Heavy Synthetic (all grades)	19.90	1,463,238
	Boundary Lake	8.27	102,760
	Burnaby Blend	11.98	154,030
	Canadian Conventional Heavy	9.27	269,969
	Cold Lake	18.40	3,605,136
	Kearl Lake	12.05	308,662
	Mixed Sweet	8.27	1,707,626
	Shell Synthetic (all grades)	21.39	199,994
	Suncor Synthetic (all grades)	23.71	2,286,703
	Surmont Heavy Blend	18.26	792,787
	Wabasca	6.79	269,509
	Western Canadian Select	18.43	29,942
Colombia	Castilla	9.61	4,374,828
	Magdalena	21.01	3,066,144
	South Blend	9.22	3,669,732
	Vasconia	9.33	30,722,134

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Ecuador	Napo	9.56	23,122,264
	Oriente	10.90	39,409,691
Equatorial Guinea	Ceiba	10.88	1,713,733
Iraq	Basra Light	13.08	17,149,050
Kuwait	Kuwait	10.31	26,477,992
Mexico	Isthmus	10.16	359,910
Peru	Loreto	8.23	687,938
	Pirana	11.98	249,579
Russia	ESPO	13.70	3,264,866
	Sokol	10.51	536,721
Saudi Arabia	Arab Extra Light	9.35	27,322,040
	Arab Light	9.15	81,249,853
	Arab Medium	8.66	5,423,168
Venezuela	Boscan	10.76	1,602,120
	Hamaca DCO	7.63	692,490
US Alaska	ANS	12.93	75,321,220
US Colorado	Niobrara	8.03	1,330,366
US Gulf of Mexico	Mars	11.98	304,100
US Louisiana	GCA	11.98	93,626
US New Mexico	Four Corners	9.37	1,263,943
	New Mexico Sweet	9.37	236,315
US North Dakota	Bakken	10.18	862,859
US Texas	Eagle Ford Shale	12.03	134,093
US Utah	Utah Sweet	5.99	351,327
	Utah Black Wax	5.09	169,700
US Wyoming	Wyoming Sweet	24.11	70,744
US California*	Aliso Canyon	4.16	194,618
	Ant Hill	22.04	42,769
	Antelope Hills	6.56	111,775
	Antelope Hills, North	19.14	336,624
	Arroyo Grande	29.33	498,091
	Asphalto	8.00	225,255
	Bandini	6.78	5,910
	Bardsdale	3.63	268,388
	Barham Ranch	2.64	77,361
	Beer Nose	2.50	3,706
	Belgian Anticline	3.56	35,974



	Bellevue	7.52	31,508
	Bellevue, West	4.55	9,164
	Belmont, Offshore	4.15	621,834
	Belridge, North	4.77	2,329,514
	Belridge, South	14.84	22,901,920
	Beverly Hills	4.49	670,634
	Big Mountain	2.58	25,188
	Blackwells Corner	5.03	11,797
	Brea-Olinda	3.17	1,071,791
	Buena Vista	7.45	1,186,195
	Burrel	25.23	14,840
	Cabrillo	2.49	22,714
	Canal	4.17	23,829
	Canfield Ranch	3.99	90,987
	Carneros Creek	3.40	19,447
	Cascade	2.12	159,831
	Casmalia	9.35	198,338
	Castaic Hills	2.52	5,812
	Cat Canyon	4.08	1,289,170
	Cheviot Hills	3.39	31,173
	Chico-Martinez	15.81	199,064
	Cienaga Canyon	4.08	23,212
	Coalinga	27.85	6,780,338
	Coles Levee, N	4.56	210,258
	Coles Levee, S	2.70	71,286
	Comanche	7.88	22,968
	Coyote, East	6.15	239,183
	Cuyama, South	14.43	192,364
	Cymric	19.23	16,544,912
	Deer Creek	9.96	38,926
	Del Valle	4.73	43,930
	Devils Den	5.88	13,338
	Edison	15.55	747,779
	El Segundo	3.77	25,318
	Elk Hills	6.30	11,231,816
	Elwood, S., Offshore	3.57	497,254
	Fruitvale	3.87	460,887
	Greeley	9.60	108,477

	Hasley Canyon	2.15	26,148
	Helm	3.93	47,364
	Holser	3.04	20,135
	Honor Rancho	4.09	70,309
	Huntington Beach	5.11	2,472,233
	Hyperion	2.05	10,369
	Inglewood	9.52	2,376,814
	Jacalitos	2.40	113,835
	Jasmin	12.77	112,176
	Kern Front	25.10	5,005,420
	Kern River	9.63	25,684,157
	Kettleman Middle Dome	3.70	87,981
	Kettleman North Dome	5.14	171,640
	Landslide	12.17	31,189
	Las Cienegas	4.63	279,585
	Livermore	2.56	9,687
	Lompoc	19.65	345,984
	Long Beach	6.84	1,639,756
	Long Beach Airport	4.02	10,101
	Los Angeles Downtown	5.71	42,492
	Los Angeles, East	10.02	12,161
	Lost Hills	10.26	11,209,502
	Lost Hills, Northwest	3.91	16,358
	Lynch Canyon	12.00	268,814
	Mahala	2.70	7,298
	McCool Ranch	3.32	27,873
	McDonald Anticline	4.30	60,061
	McKittrick	24.64	3,334,461
	Midway-Sunset	25.05	28,163,266
	Montalvo, West	2.28	399,469
	Montebello	14.96	507,852
	Monument Junction	3.62	96,716
	Mount Poso	11.17	1,303,617
	Mountain View	3.71	95,609
	Newhall-Potrero	2.85	107,690
	Newport, West	4.38	85,699
	Oak Canyon	3.50	22,522
	Oak Park	2.48	13,925

	Oakridge	2.39	113,970
	Oat Mountain	2.59	74,677
	Ojai	2.75	238,334
	Olive	1.98	68,485
	Orcutt	12.71	1,140,191
	Oxnard	9.16	326,774
	Paloma	3.51	17,106
	Placerita	31.20	879,526
	Playa Del Rey	4.58	46,480
	Pleito	2.60	1,249,956
	Poso Creek	28.15	4,137,105
	Pyramid Hills	3.34	55,893
	Railroad Gap	5.05	83,256
	Raisin City	8.72	112,082
	Ramona	3.41	41,606
	Richfield	4.40	296,903
	Rincon	3.93	270,538
	Rio Bravo	5.75	329,409
	Rio Viejo	2.87	42,527
	Riverdale	3.74	54,922
	Rose	2.70	399,905
	Rosecrans	5.52	147,910
	Rosecrans, South	3.11	9,467
	Rosedale	6.49	17,171
	Rosedale Ranch	8.00	149,044
	Round Mountain	25.99	3,610,219
	Russell Ranch	7.56	48,831
	Salt Lake	2.67	46,379
	Salt Lake, South	3.84	16,683
	San Ardo	27.26	7,795,661
	San Miguelito	5.65	422,815
	San Vicente	2.47	226,885
	Sansinena	2.56	139,140
	Santa Clara Avenue	3.49	44,356
	Santa Fe Springs	10.50	939,517
	Santa Maria Valley	5.15	203,347
	Santa Susana	2.93	13,936
	Sargent	3.98	26,784

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	Saticoy	3.33	34,119
	Sawtelle	3.18	187,851
	Seal Beach	5.08	420,447
	Semitropic	3.48	35,096
	Sespe	2.79	404,945
	Shafter, North	3.01	598,178
	Shiells Canyon	3.38	72,929
	South Mountain	3.31	641,600
	Stockdale	2.13	127,532
	Tapia	7.55	18,789
	Tapo Canyon, South	2.92	9,800
	Tejon	6.49	365,138
	Tejon Hills	6.47	12,846
	Tejon, North	3.14	34,268
	Temescal	2.75	69,640
	Ten Section	6.60	79,708
	Timber Canyon	2.99	27,589
	Torrance	4.49	364,790
	Torrey Canyon	2.73	124,284
	Union Avenue	3.57	5,288
	Ventura	4.61	4,746,716
	Wayside Canyon	1.67	27,229
	West Mountain	2.84	9,579
	Wheeler Ridge	4.28	102,447
	White Wolf	1.88	11,658
	Whittier	2.42	96,315
	Wilmington	7.02	13,660,268
	Yowlumne	10.62	101,829
	Zaca	8.16	232,480
US Federal OCS	Beta	1.71	2,036,833
	Carpinteria	2.85	355,145
	Dos Cuadras	4.00	908,709
	Hondo	5.54	1,959,967
	Hueneme	3.04	115,165
	Pescado	5.72	994,848
	Point Arguello	14.23	569,983
	Point Pedernales	9.38	1,890,073
	Sacate	3.59	935,703

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	Santa Clara	2.47	823,404
	Sockeye	8.35	638,669

\*All California fields that produced at least 10,000 bbls during, 2013, 2014, or 2015