

Draft Calculation of 2016 Crude Average Carbon Intensity Value

Posting: Section 95489(c)(3) of the Low Carbon Fuel Standard (LCFS) Regulation¹ 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. 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 2014, 2015 and 2016 Annual Crude Average Carbon Intensity Values: In table 1, California crude volumes and Annual Crude Average carbon intensity values for 2014, 2015 and 2016 are shown. In tables 2, 3 and 4, breakdowns of the sources of crude oil supplied to California refineries during 2014, 2015 and 2016 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 2014 to 2016 was assumed to be refined in California.² The volume contributions for California produced crudes are based on oil production data obtained from the California Department of Conservation.³ The volume contributions for California federal offshore crudes are based on oil production data obtained from the Bureau of Safety and Environmental Enforcement.⁴ 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.

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

² The total volume of California state and federal offshore crude supplied to California refineries as reported to ARB was 630 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 626 million barrels.

³ California Department of Conservation, Online Production and Injection Query and Database, <http://opi.consrv.ca.gov/opi/opi.dll> (accessed April 17, 2015, May 19, 2016 and May 10, 2017).

⁴ Bureau of Safety and Environmental Enforcement website <https://www.data.bsee.gov/Main/PacificProduction.aspx> (accessed April 17, 2015, April 21, 2016 and May 11, 2017).

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

Year	2014	2015	2016
CI (gCO ₂ e/MJ)	11.19	12.06	12.14
Volume (bbl)	612,332,497	605,749,048	582,101,235

Calculation of California Baseline Crude Average Carbon Intensity:

$CI_{BaselineCrudeAve}$ is the California Baseline Crude Average carbon intensity value, in gCO₂e/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 2016 compliance period:

$$CI_{BaselineCrudeAve} = \frac{[11.39 \times 612,332,497 + 11.98 \times 605,749,048 + 11.98 \times 582,101,235]}{[612,332,497 + 605,749,048 + 582,101,235]}$$

$$CI_{BaselineCrudeAve} = 11.78$$

Calculation of Three-Year California Crude Average Carbon Intensity:

$CI_{2016CrudeAve}$ is the Three-year California Crude Average carbon intensity value, in gCO₂e/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 (2014, 2015 and 2016), and is calculated by the following formula:

$$CI_{2016CrudeAve} = \frac{[11.19 \times 612,332,497 + 12.06 \times 605,749,048 + 12.14 \times 582,101,235]}{[612,332,497 + 605,749,048 + 582,101,235]}$$

$$CI_{2015CrudeAve} = 11.79$$

Summary: The Three-year California Crude Average carbon intensity of 11.79 gCO₂e/MJ is less than the California Baseline Crude Average carbon intensity of 11.78 gCO₂e/MJ plus 0.10 gCO₂e/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 2018.

Table 2: 2014 Refinery Crude Supply

Country/State	Crude Name	CI (g/MJ)	2014 Volume (bbl)
	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
	Sapinhua	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 3: 2015 Refinery Crude Supply

Country/State	Crude Name	CI (g/MJ)	2015 Volume (bbl)
	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

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	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

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	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

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	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

Table 4: 2016 Refinery Crude Supply

Country/State	Crude Name	CI (g/MJ)	2015 Volume (bbl)
	2016 Volume Weighted Average CI	12.14	582,101,235
Angola	Clov	8.25	15,190
	Dalia	9.78	1,474,555
	Girassol	10.33	957,592
	Greater Plutonio	9.78	2,091,565
	Hungo	9.10	420,075
	Pazflor	8.91	5,330,519
	Sangos	11.98	735,882
Argentina	Escalante	9.30	805,623
Australia	Pyrenees	5.99	75,454
	Vincent	5.05	657,236
Belize	Belize Light	11.98	147,660
Brazil	Iracema (Cernambi)	11.98	5,930,893
	Lula	9.94	941,247
	Papa Terra	11.98	305,180
	Sapinhua	8.53	1,939,517
	Tubarao Azul	11.98	63,760
	Tubarao Martelo	11.98	710,667
Canada	Access Western Blend	16.31	167,231
	Albian Heavy Synthetic (all grades)	19.90	1,382,106
	Burnaby Blend	11.98	342,430
	Canadian Conventional Heavy	9.27	8,028
	Christina Dilbit Blend	13.34	71,874
	Christina Synbit	17.43	61,151
	Cold Lake	18.40	3,205,705
	Kearl Lake	12.05	1,235,972
	Koch Alberta	8.27	63,119
	Mixed Sweet	8.27	320,359
	Peace River Sour	8.27	63,807
	Suncor Synthetic (all grades)	23.71	557,872
	Surmont Heavy Blend	18.26	895,151
Colombia	Acordionero	11.98	622,982
	Castilla	9.61	4,047,210
	Magdalena	21.01	3,658,417
	Puerto Bahia	11.98	50,732

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	South Blend	9.22	2,517,964
	Vasconia	9.33	32,668,178
Ecuador	Napo	9.56	30,282,738
	Oriente	10.90	43,489,670
Equatorial Guinea	Ceiba	10.88	2,194
	Zafiro	21.56	596,645
Ghana	Ten Blend	11.98	78,119
Iraq	Basra Light	13.08	13,028,012
	Basra Heavy	11.98	926,750
Kuwait	Kuwait	10.31	26,980,599
Mexico	Isthmus	10.16	699,917
Nigeria	Antan	33.44	556,452
Oman	Oman	12.35	10,979,852
Peru	Loreto	8.23	228,059
	Pirana	11.98	435,001
Russia	ESPO	13.70	2,920,405
	Sokol	10.51	228,115
Saudi Arabia	Arab Extra Light	9.35	25,886,753
	Arab Light	9.15	68,991,575
	Arab Medium	8.66	12,313,808
UAE	Upper Zakum	8.97	995,767
Venezuela	Boscan	10.76	17,570
	Hamaca DCO	7.63	576,941
	Zuata (all grades)	23.51	538,266
US Alaska	ANS	12.93	73,604,859
US Colorado	Niobrara	8.03	166,664
US New Mexico	Four Corners	9.37	836,544
US North Dakota	Bakken	10.18	169,116
US Utah	Utah Sweet	5.99	14,331
US California*	Aliso Canyon	4.16	117,447
	Ant Hill	22.04	38,810
	Antelope Hills	6.56	94,342
	Antelope Hills, North	19.14	289,014
	Arroyo Grande	29.33	572,247
	Asphalto	8.00	193,898
	Bandini	6.78	5,917
	Bardsdale	3.63	195,993

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	Barham Ranch	2.64	93,236
	Beer Nose	2.50	7,033
	Belgian Anticline	3.56	30,739
	Bellevue	7.52	23,644
	Bellevue, West	4.55	8,439
	Belmont, Offshore	4.15	561,214
	Belridge, North	4.77	2,100,802
	Belridge, South	14.84	22,537,553
	Beverly Hills	4.49	552,472
	Big Mountain	2.58	20,805
	Blackwells Corner	5.03	11,285
	Brea-Olinda	3.17	1,032,422
	Buena Vista	7.45	1,167,228
	Burrel	25.23	11,051
	Cabrillo	2.49	18,699
	Canal	4.17	16,593
	Canfield Ranch	3.99	76,102
	Carneros Creek	3.40	19,365
	Cascade	2.12	131,662
	Casmalia	9.35	129,666
	Castaic Hills	2.52	6,384
	Cat Canyon	4.08	1,185,719
	Cheviot Hills	3.39	40,514
	Chico-Martinez	15.81	68,133
	Cienaga Canyon	4.08	16,950
	Coalinga	27.85	6,395,643
	Coles Levee, N	4.56	194,790
	Coles Levee, S	2.70	64,197
	Comanche	7.88	16,793
	Coyote, East	6.15	235,254
	Cuyama, South	14.43	168,558
	Cymric	19.23	16,944,262
	Deer Creek	9.96	32,255
	Del Valle	4.73	30,320
	Devils Den	5.88	10,680
	Edison	15.55	561,860
	El Segundo	3.77	22,416
	Elk Hills	6.30	10,053,472

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	Elwood, S., Offshore	3.57	0
	Fruitvale	3.87	398,412
	Greeley	9.60	112,640
	Hasley Canyon	2.15	23,663
	Helm	3.93	72,749
	Holser	3.04	15,478
	Honor Rancho	4.09	45,742
	Huntington Beach	5.11	2,255,128
	Hyperion	2.05	10,393
	Inglewood	9.52	2,087,420
	Jacalitos	2.40	96,228
	Jasmin	12.77	102,376
	Kern Front	25.10	4,562,279
	Kern River	9.63	24,279,701
	Kettleman Middle Dome	3.70	50,285
	Kettleman North Dome	5.14	107,613
	Landslide	12.17	28,126
	Las Cienegas	4.63	226,800
	Livermore	2.56	9,543
	Lompoc	19.65	278,844
	Long Beach	6.84	1,449,873
	Long Beach Airport	4.02	9,349
	Los Angeles Downtown	5.71	41,186
	Los Angeles, East	10.02	6,161
	Lost Hills	10.26	10,258,312
	Lost Hills, Northwest	3.91	9,872
	Lynch Canyon	12.00	253,521
	Mahala	2.70	7,343
	McCool Ranch	3.32	9,599
	McDonald Anticline	4.30	51,973
	McKittrick	24.64	3,377,085
	Midway-Sunset	25.05	24,683,165
	Montalvo, West	2.28	325,193
	Montebello	14.96	412,054
	Monument Junction	3.62	90,606
	Mount Poso	11.17	1,308,326
	Mountain View	3.71	75,434
	Newhall-Potrero	2.85	86,830

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	Newport, West	4.38	78,895
	Oak Canyon	3.50	17,241
	Oak Park	2.48	13,575
	Oakridge	2.39	105,395
	Oat Mountain	2.59	69,853
	Ojai	2.75	198,628
	Olive	1.98	178,824
	Orcutt	12.71	890,961
	Oxnard	9.16	426,749
	Paloma	3.51	14,134
	Placerita	31.20	607,757
	Playa Del Rey	4.58	41,011
	Pleito	2.60	876,063
	Poso Creek	28.15	4,202,196
	Pyramid Hills	3.34	45,223
	Railroad Gap	5.05	95,243
	Raisin City	8.72	142,831
	Ramona	3.41	36,210
	Richfield	4.40	265,445
	Rincon	3.93	221,383
	Rio Bravo	5.75	271,503
	Rio Viejo	2.87	47,037
	Riverdale	3.74	47,419
	Rose	2.70	282,185
	Rosecrans	5.52	129,620
	Rosecrans, South	3.11	8,718
	Rosedale	6.49	12,202
	Rosedale Ranch	8.00	115,929
	Round Mountain	25.99	2,574,219
	Russell Ranch	7.56	45,729
	Salt Lake	2.67	48,016
	Salt Lake, South	3.84	13,147
	San Ardo	27.26	7,925,192
	San Miguelito	5.65	367,385
	San Vicente	2.47	217,116
	Sansinena	2.56	131,923
	Santa Clara Avenue	3.49	29,098
	Santa Fe Springs	10.50	877,266

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	Santa Maria Valley	5.15	131,612
	Santa Susana	2.93	8,342
	Sargent	3.98	24,557
	Saticoy	3.33	29,695
	Sawtelle	3.18	172,525
	Seal Beach	5.08	386,176
	Semitropic	3.48	28,829
	Sespe	2.79	372,585
	Shafter, North	3.01	555,299
	Shiells Canyon	3.38	61,966
	South Mountain	3.31	542,001
	Stockdale	2.13	116,181
	Tapia	7.55	15,616
	Tapo Canyon, South	2.92	6,464
	Tejon	6.49	276,201
	Tejon Hills	6.47	9,994
	Tejon, North	3.14	33,072
	Temescal	2.75	69,405
	Ten Section	6.60	67,512
	Timber Canyon	2.99	25,068
	Torrance	4.49	332,852
	Torrey Canyon	2.73	112,770
	Union Avenue	3.57	565
	Ventura	4.61	4,505,876
	Wayside Canyon	1.67	10,478
	West Mountain	2.84	9,572
	Wheeler Ridge	4.28	69,873
	White Wolf	1.88	11,611
	Whittier	2.42	65,846
	Wilmington	7.02	12,551,717
	Yowlumne	10.62	63,751
	Zaca	8.16	210,226
US Federal OCS	Beta	1.71	1,923,383
	Carpinteria	2.85	324,308
	Dos Cuadras	4.00	897,918
	Hondo	5.54	0
	Hueneme	3.04	104,855
	Pescado	5.72	0

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	Point Arguello	14.23	0
	Point Pedernales	9.38	1,471,041
	Sacate	3.59	0
	Santa Clara	2.47	739,499
	Sockeye	8.35	677,866

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