

# CRUDE OIL ASSAY REPORT

## "CAMBAY CRUDE OIL"

**CRUDE OIL ASSAY REPORT NUMBER:**

FCA/1497/18

**DATE OF ISSUE:**

05-12-2018



## Table of Contents

Whole Crude Characteristics .....	Page 1
Whole Crude Composition .....	Page 2
TBP Distillation data .....	Page 3
TBP Distillation Graph .....	Page 4
Yield Distribution (Fractions) .....	Page 5
Yield distribution Chart (%Mass) .....	Page 6
Yield distribution Chart (%Vol.) .....	Page 7

---

## Job Reference Information

Date: 05/12/2018

Crude Oil Assay Report No: FCA/1497/18

**FOR THE ATTENTION OF** : Anupriya Srivastava

**SAMPLE DETAILS** : Crude Oil

**SOURCE** : India

**DESCRIPTION** : "CAMBAY CRUDE OIL"

**CONTAINERS** : 3 X 25 Litre IATA CANS

**SEALS** : No Seal

Reported by: Anoop Renganath  
Shift Leader

Approved by: John T Abraham  
Laboratory Manager

**LABORATORY REPORT NO. FCA/1497/18**

**"CAMBAY CRUDE OIL "**

**SUMMARY & COMMENTS**

**General:**

The Crude Oil sample labeled as "CAMBAY CRUDE Oil" was received on 22nd October 2018. The sample was in 3 x 25 Litre IATA Cans.

**Appearance & Initial Examination:**

The sample was observed to be semi liquid at room temperature. The H<sub>2</sub>S content on the vapor phase from the original containers were measured and noted to be <5 ppm. A representative portion of the sample was taken and tested for API and Water content. API was found to be 43.8 and Water Content 0.025% Vol.

**Distillation:**

The distillation of the sample was carried out in two major steps as per ASTM D 2892 (15 Theoretical plate column) & ASTM D 5236 (Vacuum potstill) methods. The yield pattern of each fraction collected is tabulated in percentage weight and percentage volume and in graphical form.

---

INTERTEK FUJAIRAH FZC  
WARE HOUSE 201 & 203  
FUJARIAH FREE ZONE PHASE II  
Tel : + 971 9 2228124  
Fax: + 971 9 2228125

**Client:** VEDANTA LIMITED

**Client Contact:** ANUPRIYA SRIVASTAVA

**Intertek Reference:** FCA/1497/18

**Date Received:** 22/10/2018

**Date Completed:** 04/12/2018

**Subject:** Assay Project

---

**LABORATORY REPORT NO. - FCA/1497/18**

**WHOLE CRUDE**

Sample Descriptions / Label : "CAMBAY CRUDE OIL"

TEST	METHOD	UNIT	RESULT
Appearance	Visual		
Density @ 15° C	ASTM D 4052	kg/L	0.8067
Specific Gravity @ 60/60° F	Conv.		0.8071
API Gravity @ 60° F	Calc.	° API	43.8
Density @ 60° F	Conv.	kg/L	0.8063
Pour Point	ASTM D 97	°C	+15
Flash Point	ASTM D 93	° C	<5
BS & Water	ASTM D 4007	% Vol.	0.025
Wax Content	UOP 46	% Wt.	<5
Ash Content	ASTM D 482	% Wt.	0.008
Asphaltenes	IP 143	%Wt	<0.50
Salt Content	ASTM D 3230	PTB	0.70
Vapour Pressure	ASTMD 323	psi	# <sup>1</sup>
Kinematic Viscosity @ 60°C	ASTM D 445	cSt	2.107
Kinematic Viscosity @ 100°C	ASTM D 445	cSt	1.227
Kinematic Viscosity @ 135°C	ASTM D 445	cSt	0.9365
Sulphur Content	D 4294	%Wt	0.0347
Hydrogen Sulphide	UOP163	ppm wt	<1
Mercaptan Sulphur	UOP163	ppm wt	<1
Total Nitrogen	ASTM D 4629 / D 5762	ppm wt	261
Basic Nitrogen	UOP 269	ppm Wt	94
Total Acid Number	ASTM D 664	mgKOH/g	0.30
UOP K Factor	UOP 375	calc.	12.2939
Carbon Residue	ASTM D 189	% Wt.	0.31
<b>Full compositional metals</b>			
Nickel	IP 501	ppm Wt	2
Vanadium			<1
Iron			<2
Aluminium			<5
Tin			<1
Sodium			4
Manganese			<1
Zinc			<1
Molybdenum			<1
Lead			<1
Calcium			6
Magnesium			<1
Chromium			<1
Copper			<1
Mercury			<1
Wax Appearance Temperature			Cross Polarization Microscopy
Wax Disappearance Temperature	°C	30.0	
<b>SARA Analysis</b>			
Saturates	ASTM D2007	%Wt	67.8
Aromatics		%Wt	20.4
Asphaltenes		%Wt	0.8
Polar (Resin)		%Wt	6.9

Note : (# <sup>1</sup>) Not possible due to the nature of sample

# Lab Report No. FCA/1497/18

## WHOLE CRUDE OIL COMPOSITION

Sample Label : "CAMBAY CRUDE OIL"

Component	Mole %	Weight %	Density g/cc (g/cc @ 60°F)	MW (g/mole)
Nitrogen		0.00	0.806	28.01
Carbon Dioxide		0.00	0.8164	44.01
Hydrogen Sulfide		0.00	0.7981	34.08
Methane		0.00	0.2997	16.04
Ethane		0.00	0.3558	30.07
Propane	0.65	0.16	0.5065	44.10
iso-Butane	1.08	0.35	0.5623	58.12
n-Butane	1.81	0.58	0.5834	58.12
Neo-pentane	0.00	0.00	0.5968	72.15
iso-Pentane	1.93	0.77	0.6238	72.15
n-Pentane	2.70	1.08	0.6305	72.15
Hexanes	5.74	2.73	0.6631	86.18
Methyl Cyclo Pentane	1.25	0.58	0.7533	84.16
Benzene	0.25	0.11	0.8820	78.11
Cyclohexane	3.05	1.42	0.7827	84.16
Heptanes	5.61	3.11	0.6875	100.20
Methyl Cyclo Hexane	4.84	2.62	0.7740	98.19
Toluene	0.56	0.29	0.8734	92.14
Octanes	6.66	4.20	0.7063	114.23
Ethyl Benzene	0.17	0.10	0.8735	106.17
Meta+Para Xylene	0.89	0.52	0.8671	106.17
Ortho Xylene	0.27	0.16	0.8840	106.17
Nonanes	5.48	3.88	0.7212	128.26
Iso-Propyl benzene	0.03	0.02	0.8797	120.19
n-Propyl benzene	0.09	0.06	0.8797	120.19
1,2,4-Trimethylbenzene	0.28	0.18	0.8797	120.19
Decanes	6.16	4.84	0.7335	142.28
Undecanes	5.46	4.44	0.7890	147.00
Dodecanes	4.87	4.33	0.8000	161.00
Tridecanes	4.37	4.22	0.8110	175.00
Tetradecanes	4.95	5.20	0.8220	190.00
Pentadecanes	4.14	4.72	0.8320	206.00
Hexadecanes	2.37	2.91	0.8390	222.00
Heptadecanes	2.76	3.62	0.8470	237.00
Octadecanes	2.42	3.35	0.8520	251.00
Nonadecanes	1.84	2.67	0.8570	263.00
Eicosanes	1.56	2.38	0.8620	275.00
Heneicosanes	1.41	2.27	0.8670	291.00
Docosanes	1.56	2.62	0.8720	305.00
Tricosanes	1.16	2.04	0.8770	318.00
Tetracosanes	1.26	2.31	0.8810	331.00
Pentacosanes	1.25	2.38	0.8850	345.00
Hexacosanes	0.97	1.92	0.8890	359.00
Heptacosanes	1.03	2.12	0.8930	374.00
Octacosanes	0.87	1.87	0.8960	388.00
Nonacosanes	0.68	1.50	0.8990	402.00
Triacontanes	0.65	1.49	0.9020	416.00
Hentriacontanes	0.47	1.12	0.9060	430.00
Dotriacontanes	0.37	0.92	0.9090	444.00
Tritriacontanes	0.29	0.74	0.9120	458.00
Tetraatriacontanes	0.21	0.55	0.9140	472.00
Pentatriacontanes	0.22	0.58	0.9170	486.00
Hexatriacontanes plus	3.36	9.94	0.9499	534.79
Totals	100.00	100.00		
Residue Totals	Mole %	Weight %	Density g/cc (g/cc @ 60°F)	MW (g/mole)
Pentanes plus	96.46	98.91	0.815	182
Heptanes plus	81.54	92.22	0.813	198
Undecanes plus	50.52	72.24	0.816	243
Eicosanes plus	17.33	36.77	0.848	384
Hexatriacontanes plus	3.36	9.94	0.950	535
Average Molecular Weight of sample (g/mole)			180.95	
Density of Sample @ 60°F (kg/L)				0.8235

**Note:** GPSA, Katz & Firoozabadi data are used for mole weight and density.

**LABORATORY REPORT NO. - FCA/1497/18**  
**TRUE BOILING POINT DISTILLATION DATA**  
**(ASTM D 2892 & ASTM D 5236)**

Sample Descriptions / Label : "CAMBAY CRUDE OIL"

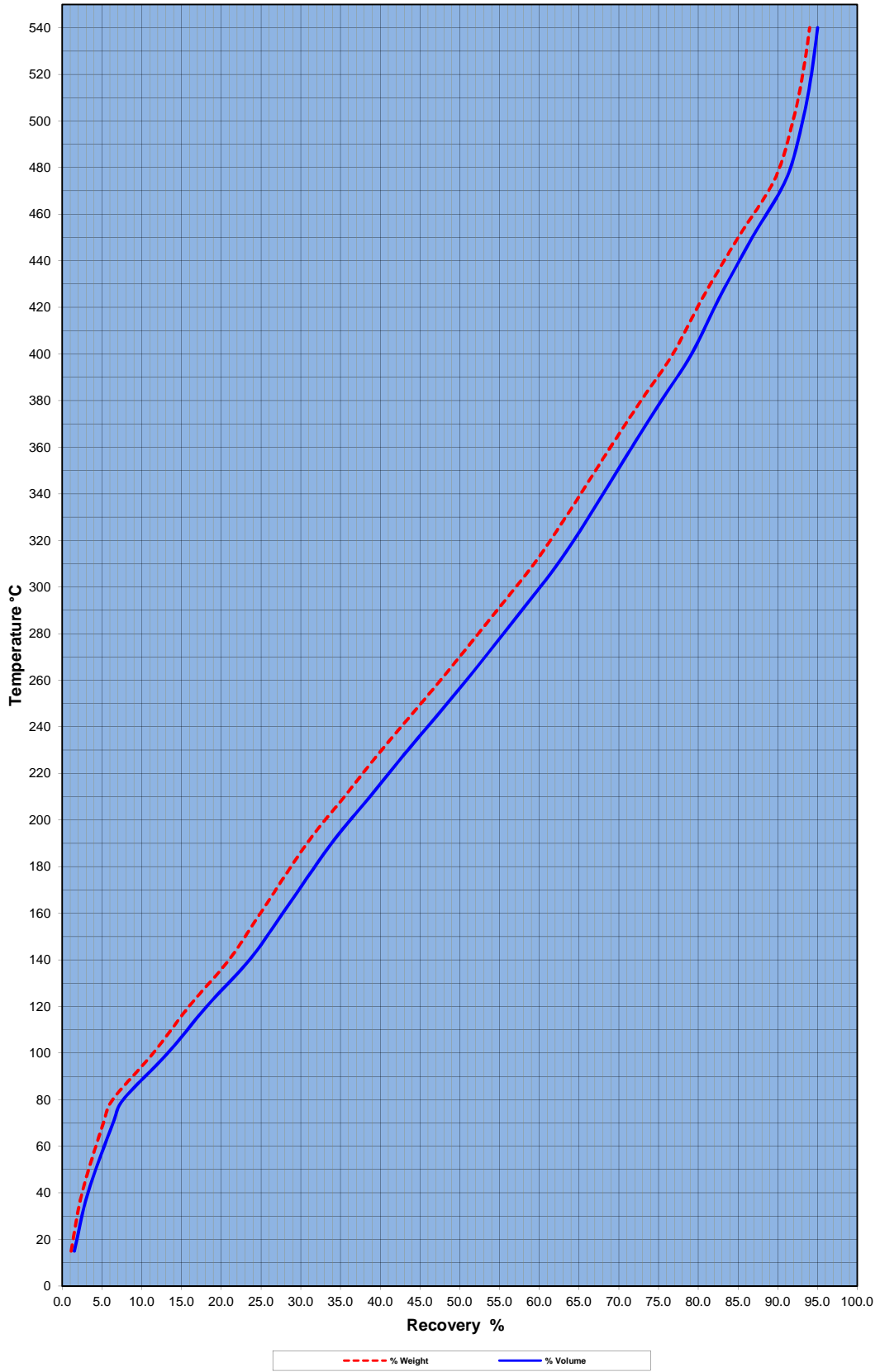
Sl. No.	Vapour Temperature °C	Density@15°C kg/l	% mass	Cumulative % mass	% Volume	Cumulative % Volume
1	LPG	0.5785	1.11	1.11	1.51	1.51
2	15.0 - 40.0	0.6401	1.38	2.49	1.71	3.22
3	40.0 - 70.0	0.6776	2.68	5.17	3.17	6.39
4	70.0 - 80.0	0.7246	1.16	6.33	1.27	7.66
5	80.0 - 100.0	0.7323	5.12	11.45	5.62	13.28
6	100.0 - 120.0	0.7406	4.49	15.94	4.87	18.15
7	120.0 - 140.0	0.7482	5.03	20.97	5.41	23.56
8	140.0 - 160.0	0.7593	3.95	24.92	4.17	27.73
9	160.0 - 190.0	0.7696	5.86	30.78	6.14	33.87
10	190.0 - 210.0	0.7847	4.70	35.48	4.83	38.70
11	210.0 - 230.0	0.7930	4.68	40.16	4.76	43.46
12	230.0 - 260.0	0.8109	7.42	47.58	7.38	50.84
13	260.0 - 290.0	0.8235	7.11	54.69	6.96	57.80
14	290.0 - 310.0	0.8269	4.66	59.35	4.55	62.35
15	310.0 - 330.0	0.8289	3.98	63.33	3.87	66.22
16	330.0 - 360.0	0.8343	5.62	68.95	5.43	71.65
17	360.0 - 380.0	0.8383	3.86	72.81	3.71	75.36
18	380.0 - 400.0	0.8454	3.99	76.80	3.80	79.16
19	400.0 - 425.0	0.8640	3.89	80.69	3.63	82.79
20	425.0 - 450.0	0.8694	4.33	85.02	4.01	86.80
21	450.0 - 475.0	0.8729	4.60	89.62	4.25	91.05
22	475.0 - 500.0	0.8860	2.29	91.91	2.08	93.13
23	500.0 - 520.0	0.9023	1.23	93.14	1.10	94.23
24	520.0 - 540.0	0.9142	0.88	94.02	0.78	95.01
25	540.0 + Residue	0.9728	5.98	100.00	4.99	100.00



# LABORATORY REPORT NO. FCA/1497/18

## TRUE BOILING POINT DISTILLATION CURVE (ASTM D 2892 & ASTM D 5236)

"CAMBAY CRUDE OIL"



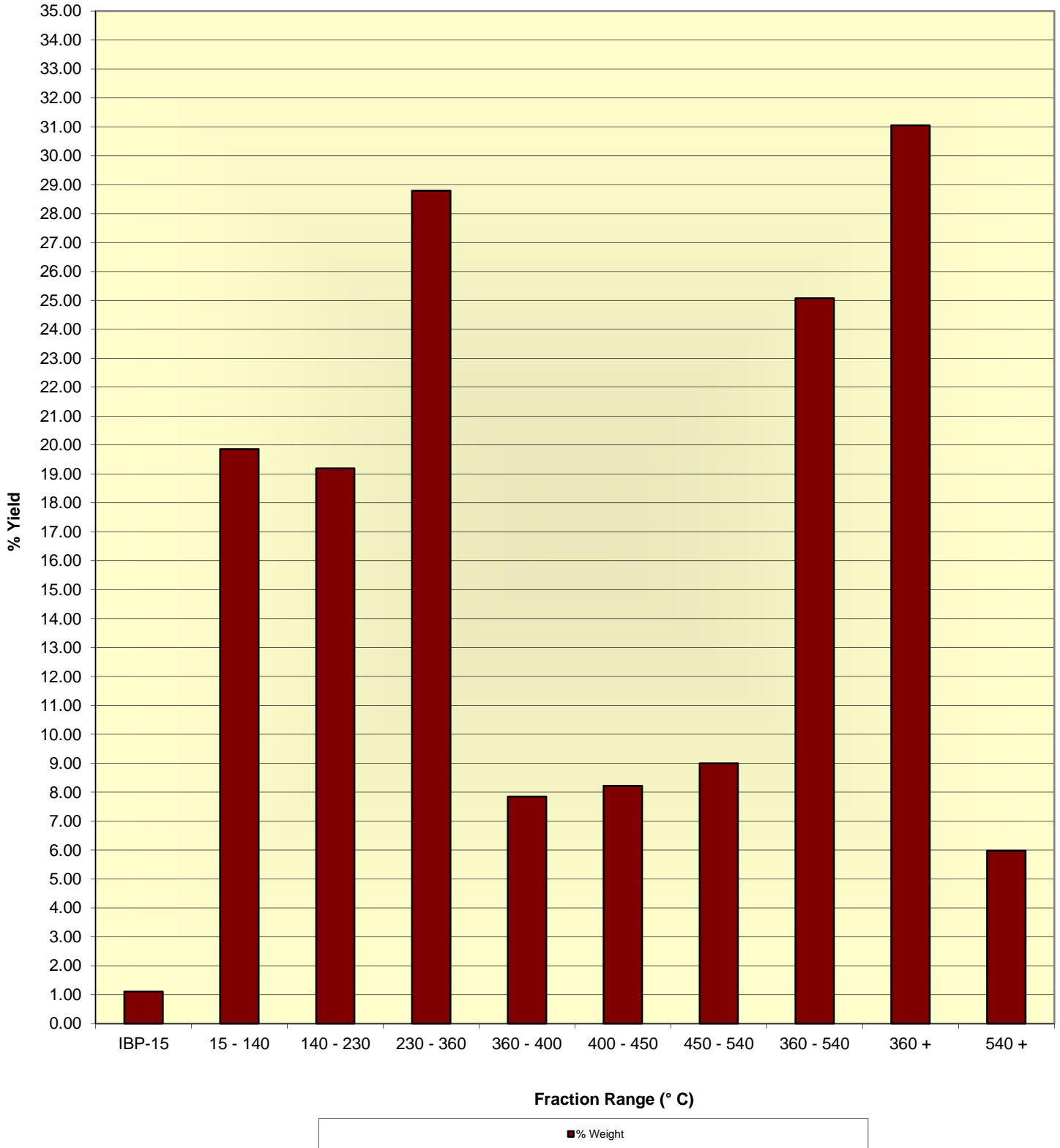
**LABORATORY REPORT NO. - FCA/1497/18**

**SUMMARY OF PRODUCT / RESIDUE CUT POINTS AND YIELDS**

**Sample Descriptions / Label :** "CAMBAY CRUDE OIL"

	Cut Points	Yield %	
		"CAMBAY CRUDE OIL"	
		(° C)	Weight %
LPG	Up to C4	1.11	1.51
Naphtha	C5 - 140	19.86	22.05
Kerosene	140 - 230	19.19	19.90
Distillate	230 - 360	28.79	28.19
Light VGO	360 - 400	7.85	7.51
	400 - 450	8.22	7.64
Heavy VGO	450 - 540	9.00	8.21
Total VGO	360 - 540	25.07	23.36
Residue	360 +	31.05	28.35
	540 +	5.98	4.99

## Yield Distribution-Graph (% Mass) "CAMBAY CRUDE OIL"



## Yield Distribution-Graph (% Volume) "CAMBAY CRUDE OIL"

