

Banda Aceh, 21 Februari 2024

No. : 079/PGE.GMR/410/2-24/E

Lampiran : 2 (dua) dokumen

Perihal : **Tanggapan atas Permintaan Data PT Pema Global Energi (PGE)**

Kepada Yth.

Bpk. Edwar Salim

Direktur Pengembangan Usaha

PT Pembangunan Aceh (PEMA)

di -

Tempat

Dengan hormat,

Merujuk pada surat Bapak nomor 87/PEMA/I/2024 tanggal 30 Januari 2024 perihal Permintaan Data yang akan digunakan untuk tahap inspeksi dan *re-engineering* Tangki Kondensat F-610, maka bersama ini dapat kami sampaikan sebagai berikut:

1. Lampiran 1 (terlampir) adalah data Proyeksi Minyak Kondensat 10 Tahun kedepan
2. Lampiran 2 (terlampir) adalah Komposisi Minyak Kondensat hasil analisis laboratorium terakreditasi, dan data tekanan dan *temperature upstream* dan *Downstream*.

Kami berharap dapat terus saling berkoordinasi untuk pelaksanaan kegiatan ini..

Demikian dapat kami sampaikan atas perhatian dan kerjasamanya kami ucapkan terima kasih.

Hormat kami,

PT Pema Global Energi



Eppy Gustiawani

General Manager

Proyeksi Minyak Kondensat PGE 10 Tahun kedepan

Year	Produksi Minyak Kondensat Lapangan Arun & SLS (BCPD)
2024	865,55
2025	1010,10
2026	912,30
2027	824,00
2028	744,20
2029	672,18
2030	607,15
2031	548,43
2032	495,40
2033	447,51
2034	404,27

LAMPIRAN 2

Komposisi Minyak Kondensat hasil analisis laboratorium terakreditasi, dan data tekanan dan *temperature upstream* dan *downstream*

- A. Komposisi Minyak Kondensat: Laporan Hasil Analisis Laboratorium Terakreditasi (terlampir)
- B. Data Tekanan dan Temperature
 - i. Pressure; upstream 14-28 psig dan downstream 65-73 psig
 - ii. Temperature; upstream & downstream 84-88 deg Fahrenheit

Research Report No. LRP - 023/2023

**46.4 °API ARUN CONDENSATE
PT PEMA GLOBAL ENERGI**

**LABORATORY EVALUATION OF CRUDE OIL
Medium Analysis**

**Process Laboratories
Research and Development Center
for Oil and Gas Technology**

**BALAI BESAR PENGUJIAN MINYAK DAN GAS BUMI
LEMIGAS
J A K A R T A**

August 2023

P r e f a c e

Referring to Mandatory Letter No. SRT-0054/SKKMF2000/2023/S1 dated April 14, 2023 from SKK MIGAS, a sample of **ARUN CONDENSATE** of **PT PEMA GLOBAL ENERGI** has been analyzed for Medium Crude Oil Evaluation.

The analysis was performed in the Process Laboratories of Research and Development Center for Oil and Gas Technology LEMIGAS and based on a sample quantity taken 2 cans of 20 liters.

Jakarta, August 25, 2023

Process Technology Laboratories,



Muh Kurniawan, Ph. D
Engineer In Charge

C O N T E N T

	Page
Preface	1
Summary	3
Table 1 - Main Properties of Principle Products	4
I. General Characteristics Of Crude Oil	5
Table 2 - General Characteristics of Crude Oil	6
Table 3 - Gas Chromatographic Analysis of Light-End	7
II. Hempel Distillation	8
Table 4 - Hempel Distillation	9
Figure 1 - Hempel Distillation Diagram	10
III. True Boiling Point Distillation - Wide Cuts	11
Table 5 - True Boiling Point Distillation - Wide Cuts Material Balance of Wide Cuts	13
Table 6 - Analytical Data of Gasoline	14
Table 7 - Gas Chromatographic Analysis of Gasolines	15
Table 8 - Analytical Data of Naphtha	16
Table 9 - Analytical Data of Kerosenes	17
Table 10 - Analytical Data of Residues	18
Figure 2 - ASTM Distillation Diagrams	19
IV. Test Methods Applied	20 - 23

S u m m a r y

A crude oil assay has been run on a sample of:
46.4 °API ARUN CONDENSATE, PT PEMALU GLOBAL ENERGI.

The results are summarized as follow:

- API Gravity	[]	: 46.4
- Specific Gravity at 60/60°F	[]	: 0.7955
- Pour Point	[°C]	: Below -36
- Sulfur Content	[%wt]	: 0.005
- Asphaltene Content	[%wt]	: Nil
- Wax Content	[%wt]	: 0.00

46.4 °API ARUN CONDENSATE could not be classified base on U.S. Bureau of Mines Classification, due to unavailability of key fraction I and II. But this condensate which has UOP K factor = 11.6 can be categorized as Naphthenic base.

The Gasoline fractions are "low" in yield and have "relatively low" Octane Number.

The Naphtha fraction is "high" in yield and has "medium" Aromatic Content.

The Kerosene fractions are "high" in yield and have "medium" Smoke Point.

The properties of the principal products are given in Table 1.

Notes:

- Yield of Gasoline, Naphtha, Kerosene, and Gasoil fractions:
 "low" (< 10 %vol), "medium" (10-20 %vol), "high" (> 20 %vol)
- Gasoline fraction RON: "low" (< 65), "relatively low" (65-75), "medium" (> 75)
- Naphtha fraction Aromatic Content: "low" (< 10 %vol), "medium" (10-30 %vol), "high" (> 30 %vol)
- Kerosene fraction Smoke Point: "low" (< 15 mm), "medium" (15-20 mm), "high" (> 20 mm)
- Gasoil fraction Cetane Index: "low" (< 40), "medium" (40-45), "high" (> 45)

Table 1

46.4 °API ARUN CONDENSATE
PT PEMA GLOBAL ENERGI
Main Properties of Principle Products

Distillation Products	Yield on Crude [%vol]	Main Properties		
Crude Oil	100.0	Gravity	[°API]	46.4
		Pour Point	[°C]	Below -36
		Sulfur Content	[%wt]	0.005
Condensate < C5	0.0	[]	[]	
Gasoline:				
C5 - 100	3.7	Research Octane Number	[]	71.4
Naphtha:				
100 - 180	51.4	n-Paraffins	[%vol]	19.94
		i-Paraffins	[%vol]	33.25
		Olefin	[%vol]	0.00
		Naphthenes	[%vol]	23.07
		Aromatics	[%vol]	23.74
Kerosenes:				
180 - 250	38.8	Smoke Point	[mm]	19
150 - 300	63.7	Smoke Point	[mm]	19
250 - 300	4.1			
Residue:				
Rsd > EP (300 °C)	2.0	Pour Point	[°C]	Minus 9
		Kinematic Viscosity at 210 °F	[cSt]	--
		Sulfur Content	[%wt]	0.063

Sample ID: EB#0296

I. GENERAL CHARACTERISTICS OF CRUDE OIL

Table 2
46.4 °API ARUN CONDENSATE
PT PEMA GLOBAL ENERGI
General Characteristics of Crude Oil

Specific Gravity 60/60 °F	[]	0.7955
API Gravity at 60 °F	[]	46.4
Kinematic Viscosity at 100 °F	[cSt]	1.019
Kinematic Viscosity at 122 °F	[cSt]	0.920
Kinematic Viscosity at 140 °F	[cSt]	0.859
Pour Point	[°C]	Below -36
Flash Point "ABEL"	[°C]	4
Reid Vapor Pressure at 100 °F	[psi]	1.8
Water Content	[%vol]	0.50
Water & Sediment	[%vol]	0.00
Salt Content as NaCl	[%wt]	0.0002
Salt Content as NaCl	[lb/1000 bbl]	1
Total Acid Number	[mg KOH/g]	0.058
Strong Acid Number	[mg KOH/g]	Nil
Total Base Number	[mg KOH/g]	0.021
Gross Heat of Combustion	MJ/kg	45.912
Sulfur Content	[%wt]	0.005
Asphaltene Content	[%wt]	Nil
Wax Content	[%wt]	0.00
Congealing Point of Petroleum Wax (*)	[°C]	--
Conradson Carbon Residue	[%wt]	0.000
Ash Content	[%wt]	0.000
Hydrogen Sulfide	[mg/kg]	Nil
Mercaptane	[mg/kg]	< 3
Total Nitrogen	[%wt]	0.002
Characterization Factor, K _{UOP}	[]	11.6
Metal Content: - Vanadium	[mg/kg]	Nil
- Nickel	[mg/kg]	Nil

(*) The sample is not sufficient for this analysis

Table 3

46.4 °API ARUN CONDENSATE
PT PEMA GLOBAL ENERGI
Gas Chromatographic Analysis of Light-End

No.	C o m p o n e n t	Yield on Crude	
		[%wt]	[%mol]
1.	Methane	0.00	0.00
2.	Ethane	0.00	0.00
3.	Propane	0.24	0.76
4.	Isobutane	0.94	2.24
5.	Normal Butane	1.59	3.81
6.	Isopentane	3.03	5.84
7.	Normal Pentane	2.20	4.24

II. HEMPEL DISTILLATION

Table 4

46.4 °API ARUN CONDENSATE
PT PEMA GLOBAL ENERGI
Hempel Distillation

1. At atmospheric pressure

Fraction	Cutting Temperature (°C)	Yield on Crude		Specific Gravity 60/60 °F	Yield on Crude		Refractive Index n ^D ₂₀
		non-cum. (%wt)	cumulative (%wt)		non-cum. (%vol)	cumulative (%vol)	
	Gas+Loss	0.2	0.2	--	0.2	0.2	--
1.	IBP - 75	1.1	1.2	0.684	1.3	1.5	1.3891
2.	75 - 100	5.7	7.0	0.728	6.2	7.7	1.4094
3.	100 - 125	11.5	18.5	0.756	12.1	19.8	1.4237
4.	125 - 150	16.8	35.3	0.777	17.2	37.0	1.4350
5.	150 - 175	17.6	52.9	0.795	17.6	54.6	1.4433
6.	175 - 200	16.5	69.5	0.808	16.2	70.8	1.4497
7.	200 - 225	22.3	91.8	0.824	21.5	92.3	1.4582
	Residue > 225	8.2	100.0	0.840	7.7	100.0	1.4727

2. At absolute pressure of 40 mmHg

3. Crude Oil Classification: - Key Fraction I (atm. frac. 250-275 °C) = Not found
- Key Fraction II (vac. frac. 275-300 °C) = Not found

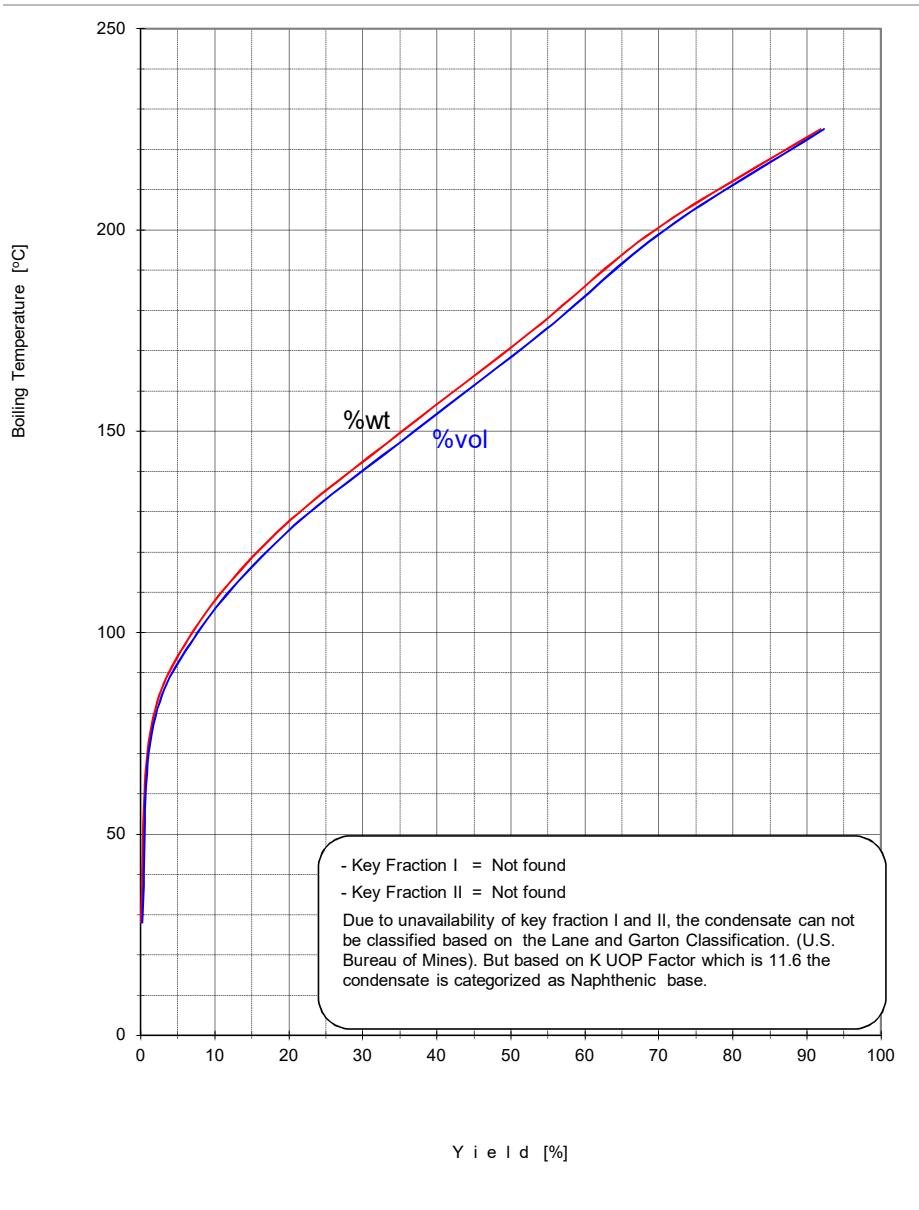
Key Fraction I (Vac. frac. 273-300 °C) Not found
Due to unavailability of key fraction I and II, the condensate can not be classified based on the Lane and Garton Classification. (U.S. Bureau of Mines). But based on K UOP Factor which is 11.6 the condensate is categorized as Naphthenic base.

4. Cutting temperature conversion (°C) :

At 40 mmHg :					
At atmospheric pressure :					

Figure 1

46.4 °API ARUN CONDENSATE
PT PEMA GLOBAL ENERGI
Hempel Distillation



III. TRUE BOILING POINT DISTILLATION - WIDE CUTS

True Boiling Point Distillation - Wide Cuts

Several products such as Gasoline, Naphtha, and Kerosenes were obtained from batch distillation of the Crude Oil sample, and some other fractions were made by blending of the wide-cut fractions obtained from the distillation.

Wide-cut True Boiling Point Distillation was carried out on 20 liters crude oil sample in the following manner:

In an Oldershaw column with 30 effective trays, 100 cm column height, and 32 mm diameter:

- The fractions up to 180 °C were prepared by distillation under atmospheric pressure with a reflux ratio of 10/1.
- The fractions up to 300 °C were prepared by distillation under an absolute pressure of 40 mm mercury with a reflux ratio of 5/1.

Maxwell and Bonel's temperature-pressure conversion chart was used in the distillation. Specific Gravity of distillates were determined at 60 °F.

The volume yields were calculated from these values.

Material Balance of products is tabulated in Table 5.

Table 5

46.4 °API ARUN CONDENSATE
PT PEMA GLOBAL ENERGI
True Boiling Point Distillation - Wide Cuts
Material Balance of Wide Cuts

Cutting Temperature [°C]	Specific Gravity 60/60°F	Yield on Crude [%wt]	Position on Crude [%wt]	Yield on Crude [%vol]	Position on Crude [%vol]
Condensate < C5	0.0000	0.0	0.0 - 0.0	0.0	0.0 - 0.0
<hr/>					
Gasoline:					
C5 - 100	0.7094	3.3	0.0 - 3.3	3.7	0.0 - 3.7
<hr/>					
Naphtha:					
100 - 180	0.7783	50.2	3.3 - 53.5	51.4	3.7 - 55.1
<hr/>					
Kerosenes:					
180 - 250	0.8185	39.9	53.5 - 93.4	38.8	55.1 - 93.9
150 - 300	0.8118	64.9	32.9 - 97.8	63.7	34.3 - 98.0
<hr/>					
250 - 300	0.8491	4.4	93.4 - 97.8	4.1	93.9 - 98.0
<hr/>					
Residue:					
Rsd > 300 °C	0.8691	2.2	97.8 - 100.0	2.0	98.0 - 100.0
<hr/>					

Table 6

**46.4 °API ARUN CONDENSATE
PT PEMA GLOBAL ENERGI
Analytical Data of Gasoline**

Cutting Temperature	[°C]	C5 - 100
Yield on Crude Oil	[%wt]	3.3
Yield on Crude Oil	[%vol]	3.7
Position on Crude Oil	[%wt]	0.0 - 3.3
Position on Crude Oil	[%vol]	0.0 - 3.7
<hr/>		
Specific Gravity 60/60°F	[]	0.7094
API Gravity at 60 °F	[°API]	68.0
Refractive Index n_D^{20}	[]	1.3966
Reid Vapor Pressure	[psi]	8.2
Total Sulfur	[%wt]	0.003
Hydrogen Sulfide	[mg/kg]	Nil
Mercaptane Sulfur	[mg/kg]	< 3
Doctor Test	[]	Negative
Aromatic Content	[%vol]	8.95
<hr/>		
Copper Strip Corrosion:		
- 3 hours at 50 °C	[ASTM No.]	1b
- 2 hours at 100 °C	[ASTM No.]	1b
Research Octane Number F1 clear (*)	[]	71.4
Characterization, K _{UOP}	[]	12.2
<hr/>		
ASTM Distillation:		
IBP	[°C]	35.0
5 %vol	[°C]	55.0
10 %vol	[°C]	61.5
20 %vol	[°C]	66.0
30 %vol	[°C]	70.0
40 %vol	[°C]	74.0
50 %vol	[°C]	78.0
60 %vol	[°C]	82.5
70 %vol	[°C]	87.0
80 %vol	[°C]	92.5
90 %vol	[°C]	99.5
95 %vol	[°C]	105.0
FBP	[°C]	113.0
Distillate	[vol %]	100.0
Residue	[vol %]	0.0
Loss	[vol %]	0.0

(*) This value was calculated from gas chromatographic analysis.

Table 7

**46.4 °API ARUN CONDENSATE
PT PEMA GLOBAL ENERGI
Gas Chromatographic Analysis of Gasolines**

No.	Component	Boiling Point [°C]	Specific Gravity	%wt in Gasoline C5 - 100°C
1	Propane	-42.04	0.5005	0.02
2	Isobutane	-11.72	0.5572	0.33
3	n-Butane	-0.50	0.5788	1.27
4	2,2-Dimethylpropane	9.50	0.5910	0.03
5	Isopentane	27.84	0.6196	6.68
6	n-Pentane	36.06	0.6262	7.30
7	2,2-Dimethylbutane	49.73	0.6491	1.74
8	Cyclopentane	49.25	0.7454	3.72
9	2,3-Dimethylbutane	57.98	0.6616	0.00
10	2-Methylpentane	60.26	0.6531	9.22
11	3-Methylpentane	63.27	0.6643	6.08
12	n-Hexane	68.73	0.6594	9.99
13	2,2-Dimethylpentane	79.19	0.6738	0.70
14	Methylcyclopentane	71.80	0.7486	8.08
15	2,4-Dimethylpentane	80.49	0.6727	0.75
16	2,2,3-Trimethylbutane	80.88	0.6901	0.20
17	Benzene	80.09	0.8789	5.25
18	3,3-Dimethylpentane	86.06	0.6932	0.43
19	Cyclohexane	80.72	0.7785	4.59
20	2-Methylhexane	90.05	0.6786	3.86
21	2,3-Dimethylpentane	89.78	0.6951	1.16
22	1,1-Dimethylcyclopentane	87.48	0.7545	1.07
23	3-Methylhexane	91.85	0.6871	3.98
24	1 cis,3-Dimethylcyclopentane	90.77	0.7448	1.76
25	1 trans,3-Dimethylcyclopentane	91.72	0.7488	1.75
26	3-Ethylpentane	93.47	0.6981	0.24
27	1 trans,2-Dimethylcyclopentane	91.87	0.7514	0.00
28	2,2,4-Trimethylpentane	99.24	0.6919	2.66
29	n-Heptane	98.42	0.6837	6.03
30	Methylcyclohexane	100.93	0.7694	0.00
31	2,2-Dimethylhexane	106.84	0.6953	0.78
32	Ethylcyclopentane	103.47	0.7664	0.88
33	2,5-Dimethylhexane	109.11	0.6935	0.00
34	2,4-Dimethylhexane	109.43	0.7003	0.64
35	1 cis,2 trans,4-Trimethylcyclopentane	116.74	0.7634	0.43
36	3,3-Dimethylhexane	111.97	0.7100	0.15
37	1 trans,2 cis,3-Trimethylcyclopentane	110.41	0.7704	0.78
38	2,3,4-Trimethylpentane	113.47	0.7190	0.03
39	Toluene	110.63	0.8670	7.41
Total:				100.00

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Table 8

46.4 °API ARUN CONDENSATE
PT PEMA GLOBAL ENERGI
Analytical Data of Naphtha

Cutting Temperature	[°C]	100 - 180
Yield on Crude Oil	[%wt]	50.2
Yield on Crude Oil	[%vol]	51.4
Position on Crude Oil	[%wt]	3.3 - 53.5
Position on Crude Oil	[%vol]	3.7 - 55.1
Specific Gravity 60/60°F	[]	0.7783
API Gravity at 60 °F	[°API]	50.3
Refractive Index n_D^{20}	[]	1.4348
Total Sulfur	[%wt]	0.008
PIONA Analysis:		
- n-Paraffins	[%vol]	19.94
- i-Paraffins	[%vol]	33.25
- Olefin	[%vol]	0.00
- Naphthenes	[%vol]	23.07
- Aromatics	[%vol]	23.74
Flash Point "ABEL"	[°C]	4
Basic Nitrogen	[%wt]	0.0001
Total Acid Number	[mg KOH/g]	0.053
Aniline Point	[°C]	40.1
Characterization, K_{UOP}	[]	11.6
ASTM Distillation:		
IBP	[°C]	104.0
5 %vol	[°C]	114.0
10 %vol	[°C]	119.0
20 %vol	[°C]	124.0
30 %vol	[°C]	129.0
40 %vol	[°C]	134.0
50 %vol	[°C]	139.0
60 %vol	[°C]	145.0
70 %vol	[°C]	150.5
80 %vol	[°C]	157.0
90 %vol	[°C]	166.0
95 %vol	[°C]	174.0
FBP	[°C]	182.0
Distillate	[vol %]	98.5
Residue	[vol %]	1.5
Loss	[vol %]	0.0

Table 9

46.4 °API ARUN CONDENSATE
PT PEMA GLOBAL ENERGI
Analytical Data of Kerosenes

Cutting Temperature	[°C]	180 - 250	150 - 300
Yield on Crude Oil	[%wt]	39.9	64.9
Yield on Crude Oil	[%vol]	38.8	63.7
Position on Crude Oil	[%wt]	53.5 - 93.4	32.9 - 97.8
Position on Crude Oil	[%vol]	55.1 - 93.9	34.3 - 98.0
Specific Gravity 60/60°F	[]	0.8185	0.8118
API Gravity at 60 °F	[°API]	41.4	42.8
Refractive Index n_D^{20}	[]	1.4564	1.4534
Freezing Point	[°C]	Minus 51.0	Minus 54.0
Smoke Point	[mm]	19	19
Flash Point "ABEL"	[°C] (*)	67.5	52.0
Total Sulfur	[%wt]	0.011	0.011
Aromatic Content	[%vol]	20.20	21.20
Aniline Point	[°C]	56.2	51.3
Total Acid Number	[mg KOH/g]	0.057	0.069
Copper Strip Corrosion: - 2 hours at 100 °C	[ASTM No.]	3a	3b
Kinematic Viscosity at 100 °F	[cSt]	1.514	1.277
Kinematic Viscosity at 122 °F	[cSt]	1.281	1.087
Kinematic Viscosity at 140 °F	[cSt]	1.139	0.974
Gross Heat of Combustion	[MJ/kg]	45.771	45.693
Characterization, K_{UOP}	[]	11.6	11.6
ASTM Distillation:			
IBP	[°C]	170.0	151.5
5 %vol	[°C]	184.0	164.0
10 %vol	[°C]	189.0	169.0
20 %vol	[°C]	192.0	173.0
30 %vol	[°C]	195.5	179.0
40 %vol	[°C]	198.5	184.5
50 %vol	[°C]	203.0	191.0
60 %vol	[°C]	207.0	198.5
70 %vol	[°C]	212.0	207.0
80 %vol	[°C]	217.5	217.5
90 %vol	[°C]	225.0	230.0
95 %vol	[°C]	232.0	240.0
FBP	[°C]	240.0	250.5
Distillate	[vol %]	100.0	98.5
Residue	[vol %]	0.0	1.5
Loss	[vol %]	0.0	0.0

(*) Flash Point of Kerosene 180 - 250°C is measured by using PMCC (Pensky-Martens Close-Cup) Tester.

Table 10

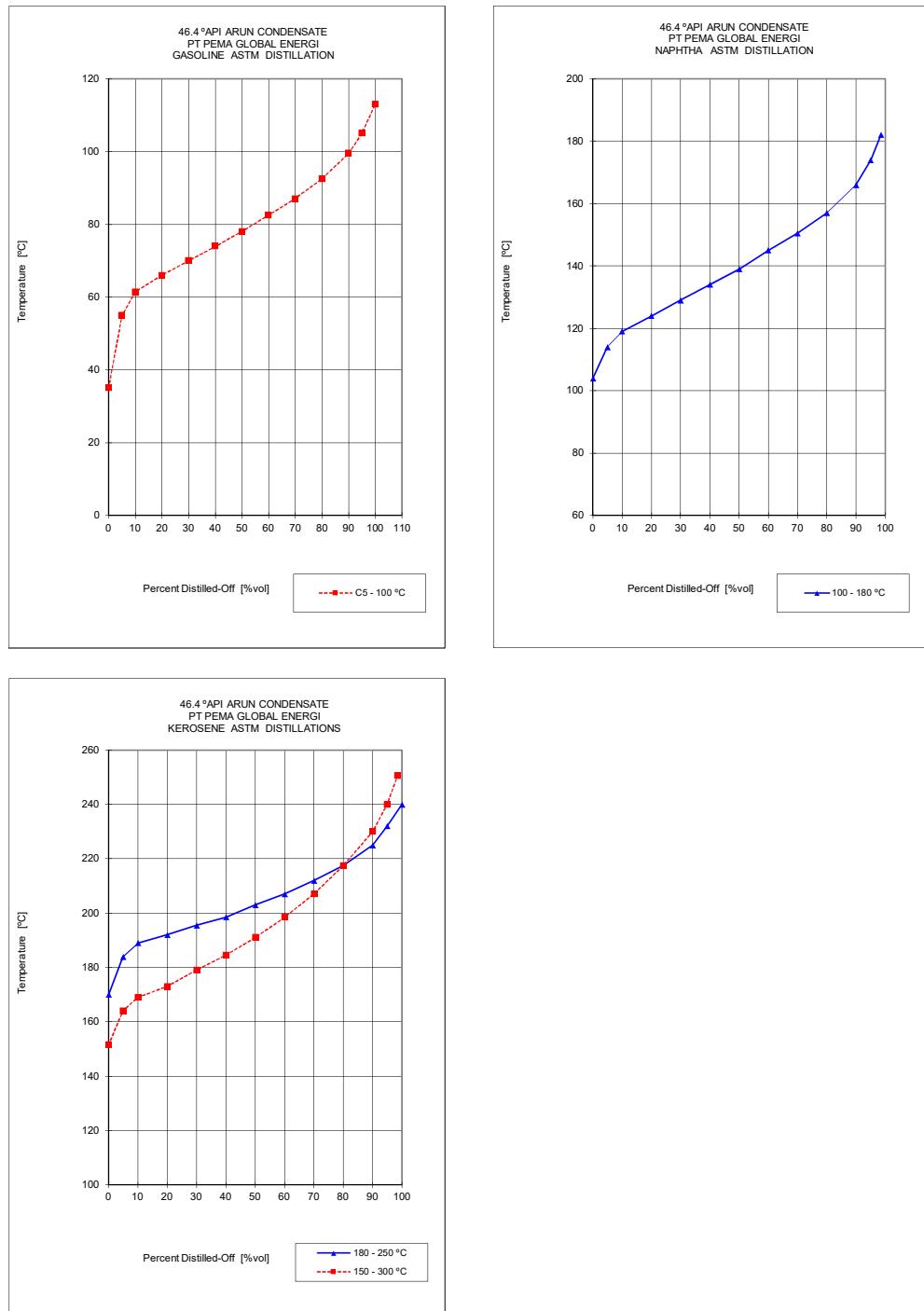
46.4 °API ARUN CONDENSATE
PT PEMA GLOBAL ENERGI
Analytical Data of Residues

Cutting Temperature	[°C]	Rsd > 300 °C
Yield on Crude Oil	[%wt]	2.2
Yield on Crude Oil	[%vol]	2.0
Position on Crude Oil	[%wt]	97.8 - 100.0
Position on Crude Oil	[%vol]	98.0 - 100.0
<hr/>		
Specific Gravity 60/60°F	[]	0.8691
API Gravity at 60 °F	[°API]	31.3
Kinematic Viscosity at 140 °F	[cSt]	(*) --
Kinematic Viscosity at 180 °F	[cSt]	(*) --
Kinematic Viscosity at 210 °F	[cSt]	(*) --
Total Sulfur	[%wt]	0.063
Pour Point	[°C]	Minus 9
<hr/>		
Metal Content:		
- Vanadium	[mg/kg]	0.21
- Nickel	[mg/kg]	Nil

(*) The sample is not sufficient for this analysis

Figure 2

**ASTM Distillation Diagrams
of Gasoline, Naphtha and Kerosenes**



IV. TEST METHODS APPLIED

IV. Test Methods Applied

D e t e r m i n a t i o n s	M e t h o d s
<hr/>	
4.1. Crude Oil	
Specific Gravity	ASTM D 1298
Kinematic Viscosity	ASTM D 445
Pour Point	ASTM D 5853
Flash Point "ABEL"	IP 170
Reid Vapor Pressure at 100 °F	ASTM D 323
Water Content	ASTM D 4006
Water & Sediment	ASTM D 4007
Salt Content as NaCl	ASTM D 3230
Total Acid Number	ASTM D 664
Strong Acid Number	ASTM D 664
Total Base Number	ASTM D 2896
Sulfur Content	ASTM D 4294
Hydrogen Sulfide	UOP 163
Mercaptans	UOP 163
Asphaltenes	IP 143
Wax Content	Alcohol - Ether
Congealing Point of Petroleum Wax	ASTM D 938
Conradson Carbon Residue	ASTM D 189
Ash Content	ASTM D 482
Light End of Crude Oil	Gas Chromatography
UOP Characterization Factor	UOP 375
Metal Contents	AAS
Total Nitrogen	ASTM D 3228
<hr/>	
4.2. Gasoline	
Specific Gravity	ASTM D 4052
Refractive Index n_D^{20}	Refractometer
Reid Vapor Pressure	ASTM D 323
Total Sulfur	ASTM D 4294
Hydrogen Sulfide	UOP 163
Mercaptan Sulfur	UOP 163
Doctor Test	IP 30
Copper Strip Corrosion	ASTM D 130
Octane Number	ASTM D 2699
UOP Characterization Factor	UOP 375
ASTM Distillation	ASTM D 86

IV. Test Methods Applied (continued)

D e t e r m i n a t i o n s	M e t h o d s
4.3. Naphtha	
Specific Gravity	ASTM D 4052
Refractive Index n_D^{20}	Refractometer
Total Sulfur	ASTM D 4294
PNA Analysis	PIONA GC
n-Paraffins	Gas Chromatography
Flash Point "ABEL"	IP 170
Basic Nitrogen	ASTM D 269
Total Acid Number	ASTM D 974
Anilin Point	ASTM D 611
UOP Characterization Factor	UOP 375
ASTM Distillation	ASTM D 86
4.4. Kerosene	
Specific Gravity	ASTM D 4052
Refractive Index n_D^{20}	Refractometer
Freezing Point	ASTM D 2386
Smoke Point	IP 57/55
Flash Point "ABEL"	IP 170
Total Sulfur	ASTM D 4294
Aromatic Content	ASTM D 1319
Acidity	ASTM D 974
Copper Strip Corrosion	ASTM D 130
Anilin Point	ASTM D 611
Gross Heat of Combustion	ASTM D 240
Strong Acid Number	ASTM D 644
UOP Characterization Factor	UOP 375
ASTM Distillation	ASTM D 86

IV. Test Methods Applied (continued)

D e t e r m i n a t i o n s	M e t h o d s
<hr/>	
4.5. Residue	
Specific Gravity	IP 190
Pour Point	ASTM D 97
Kinematic Viscosity	ASTM D 445
Total Sulfur	ASTM D 4294
Metal Content	ASTM D 5863

Report No. 07600/ANBPAP
Date: November 3, 2022



Issuing Office:
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REPORT OF ANALYSIS

The sample was taken by PT. Sucofindo Staff with the following identification:

CLIENT : PEMA GLOBAL ENERGY, PT
Aceh Production Operatons Point A Nibong,
Aceh Utara, Indonesia 24385

TYPE OF SAMPLE : CONDENSATE

DATE RECEIVED : October 3, 2022

DATE OF ANALYSIS : October 3, 2022 to October 26, 2022

TESTED FOR : Water Content, Hydrogen Sulfide, Hydrocarbon
Composition C1-C40, Total Ammonia, Calcium,
Magnesium and Biological Oxygen Demand

DESCRIPTION OF SAMPLE : Form : Liquid
1 (One) sample

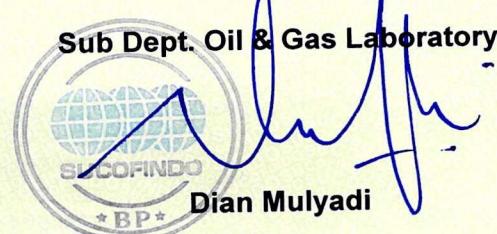
SAMPLE IDENTIFICATION : D418 TO G436 CLUSTER IV

YOUR REFERENCE : CALL OF NO : 07/FAC-ENG-VI/22

The Attachment available is an integral part of this certificate.

This test result (s) related to the sample (s) submitted only and the report / certificate cannot be reproduced in any way, except in full context and with the prior approval in writing from Sucofindo Laboratory.
This Certificate/report is issued under our General Terms and Conditions, copy of which is available upon request or may be accessed at www.sucofindo.co.id

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Page 1 of 2

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REPORT OF ANALYSIS

Oil Layer

Parameters	Units	Results	Methods
- Water Content	ppm	112	ASTM D6304-20
- Hydrogen Sulfide (H ₂ S)	mg/kg	0	UOP 163
- Hydrocarbon Composition C1-C40	-	Attached	ASTM D6729-14

Note:

The sample consists of two layers, oil & water. Analysis was carried out on the oil layer.
Free water content= 60 %vol.

Sampling Date : October 3, 2022
Sampling Location : D418 to G436 Cluster IV

Water Layer

Parameters	Units	Results	Methods [*]
- Total Ammonia	mg/L	49.4	4500 NH ₃ -F
- Calcium	mg/L	0.73	3120 B. 3030 E
- Magnesium	mg/L	0.14	3120 B. 3030 E
- BOD 5 days 20 °C	mg/L	40.4	5210 B

^{*} Standard Method, 23rd Edition 2017, APHA-AWWA-WEF

Note:

The sample consists of two layers, oil & water. Analysis was carried out on the water layer.

Sampling Date : October 3, 2022
Sampling Location : D418 to G436 Cluster IV



2064332

Attachment
To Report No. 07600/ANBPAP
Date: November 3, 2022



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Page 2 of 2

REPORT OF ANALYSIS

Parameters	Results		Methods
	% wt	% mol	
Hydrocarbon Compositions C1-C40 :			
Methane. C1	0.0006	0.0054	ASTM D6729-14
Ethane. C2	0.0025	0.0121	ASTM D6729-14
Propane. C3	0.0165	0.0534	ASTM D6729-14
i-butane. i-C4	0.0297	0.0731	ASTM D6729-14
n- butane. n-C4	0.0675	0.1661	ASTM D6729-14
i- pentane. i-C5	0.1787	0.3543	ASTM D6729-14
n- pentane. n-C5	0.1596	0.3164	ASTM D6729-14
Hexane. n-C6	1.4285	2.3709	ASTM D6729-14
Heptane. C7	6.1486	8.7762	ASTM D6729-14
Octane. C8	15.1535	18.9729	ASTM D6729-14
Nonane. C9	11.6898	13.0353	ASTM D6729-14
Decane. C10	20.0813	20.1850	ASTM D6729-14
Undecane. C11	12.3587	11.3077	ASTM D6729-14
Dodecane. C12	10.6909	8.9761	ASTM D6729-14
Tridecane. C13	7.7853	6.0393	ASTM D6729-14
Tetradecane. C14	5.4349	3.9179	ASTM D6729-14
Pentadecane. C15	3.9228	2.6411	ASTM D6729-14
Hexadecane. C16	1.5867	1.0021	ASTM D6729-14
Heptadecane. C17	1.4332	0.8524	ASTM D6729-14
Octadecane. C18	0.7195	0.4043	ASTM D6729-14
Nonadecane. C19	0.3634	0.1935	ASTM D6729-14
Icosane. C20	0.3113	0.1576	ASTM D6729-14
Henicosane. C21	0.1846	0.0890	ASTM D6729-14
Docosane. C22	0.0413	0.0190	ASTM D6729-14
Tricosane. C23	0.0275	0.0121	ASTM D6729-14
Tetracosane. C24	0.0331	0.0140	ASTM D6729-14
Pentacosane. C25	0.0175	0.0071	ASTM D6729-14
Hexacosane. C26	0.0194	0.0076	ASTM D6729-14
Heptacosane. C27	0.0082	0.0031	ASTM D6729-14
Octacosane. C28	0.0087	0.0032	ASTM D6729-14
Nonacosane. C29	0.0296	0.0104	ASTM D6729-14
Triacontane. C30	0.0216	0.0073	ASTM D6729-14
Hentriacontane. C31	0.0083	0.0027	ASTM D6729-14
Dotriacontane. C32	0.0367	0.0116	ASTM D6729-14
Tritriacontane. C33	0.0000	0.0000	ASTM D6729-14
Tetratriacontane. C34	0.0000	0.0000	ASTM D6729-14
Pentatriacontane. C35	0.0000	0.0000	ASTM D6729-14
Hexatriacontane. C36	0.0000	0.0000	ASTM D6729-14
Heptatriacontane. C37	0.0000	0.0000	ASTM D6729-14
Octatriacontane. C38	0.0000	0.0000	ASTM D6729-14
Nonatriacontane. C39	0.0000	0.0000	ASTM D6729-14
Tetracontane. C40	0.0000	0.0000	ASTM D6729-14
Total:	100.0000	100.0000	



2064333

