

**LABORATORY REPORT NO. MUM/1617/24****CRUDE OIL - DETAILED ASSAY ALL CUTS OVERVIEW****Sample Name : ASV 2nd Offtake M-field Crude of KG-DWN 98/2 block ,Collected from: Autosampler ,Collected on: 02.04.2024**

Tests		Units	Whole Crude	Fractions						
Initial BP	Methods			Light Ends	C4	C5	140	250	370	550+
Final BP		°C		-	140	250	370	370+	550	550+
Yield	ASTM D 2892 & D5236	%Wt		0.61	11.42	14.73	22.76	50.48	36.46	14.02
		%Vol.		0.95	13.16	15.66	22.94	47.29	35.19	12.10
Density @ 15° C	ASTM D5002/D4052	kg/L	0.8519	0.5671	0.7404	0.8014	0.8446	0.9096	0.8827	0.9901
Specific Gravity @ 60/60° F	Conversion		0.8523		0.7406	0.8018	0.845	0.9101	0.8832	0.9907
API Gravity @ 60° F	Calculated	° API	34.5		59.6	45.0	36.0	24.0	28.7	11.3
Composition	GC	%Wt		See Page 8						
Aromatics										
Mono	IP 391	%mass				10.8	12.3			
Di		%mass				1.0	4.8			
Tri		%mass				<0.1	<0.1			
Poly		%mass				1.0	4.9			
Asphaltene	IP 143	%Wt	<0.50					<0.50		0.70
Basic Nitrogen	UOP269	ppm wt				1	24	680		1600
Benzene	ASTM D5580	%Wt			0.22					
Carbon Residue- Micro	ASTM D4530	%Wt	1.60				<0.10	3.2	0.11	11.6
Organic Chloride	ASTM D4929B	ppm wt			<1					
Composition - Light HC	IP 601	%wt & %Vol.	See Page 14							
Paraffins	ASTM D6730	Vol %			45.212					
Olefins		Vol %			0.783					
Naphthene		Vol %			46.877					
Aromatics		Vol %			7.098					
Flash Point (PMCC)	ASTM D93/D 170	°C	<- 5			46.5	>110			
Freezing Point	ASTM D2386	°C				-51				
Hydrogen Sulphide (Liquid Phase)	UOP163	ppm wt			<1					
Kinematic Viscosity @ 20°C		#								
Kinematic Viscosity @ 40°C	ASTM D445	cSt	8.610				4.325			
Kinematic Viscosity @ 50°C		cSt	5.760				3.733			
Kinematic Viscosity @ 70°C		cSt						32.30	12.63	#
Kinematic Viscosity @ 100°C		cSt						13.69	6.720	257.10
Kinematic Viscosity @ 135°C		cSt								61.50
Mercaptan Sulphur	UOP163	ppm wt			<3					
Metals										
Copper	ICPOES	ppm wt	<1					<1	<1	<1
Iron	ICPOES	ppm wt	6					12	<1	44
Nickel	ICPOES	ppm wt	4					8	<1	30
Zinc	ICPOES	ppm wt	<1					<1	<1	1
Vanadium	ICPOES	ppm wt	<1					<1	<1	1
Motor Octane Number	ASTM D2700	Rating			67					
Pour Point	ASTM D97	°C	21				6	51	51	78
Cold Filter Plugging Point	IP 309	°C				<- 28				
Cloud Point	ASTM D2500	°C					7			
Aniline Point	ASTM D611	°C				61.5	81.0	99.8		
Aniline Point & API Product	Calculation					6431				
Saybolt	ASTM D156					+23				
Doctor Test	IP 30				Negative					
Copper Strip Corrosion	ASTM D130				1a	1a				
Cetane Index	ASTM D976	Rating				41.1	54.2			
Diesel Index	IP 21	-				64.3	64.1			
Reid Vapour Pressure @37.8°C	ASTM D5191/D323	psi	4.5		3.84					
Research Octane Number	ASTM D2699	Rating			69					
Salt Content	ASTM D3230	lb/1000bbls	3.5							
Smoke Point	ASTM D1322	mm				26				
Total Acid Number	ASTM D664	mg KOH/g	0.25				0.20			
Total Nitrogen	ASTM D4629/D5762/D3228	ppm wt	680			3.2	57	1300	450	3500
Total Sulphur	ASTM D4294/D5453	%Wt	0.0508		0.0041	0.0150	0.0440	0.0757	0.0461	0.155
Water Content	ASTM D4006/D6304	% Vol	0.05							
Water Content	ASTM D6304	ppm					95			
Water & Sediments	ASTM D4007	% Vol	0.20							
Sediment by Extraction	ASTM D473	%Wt					<0.01			
Wax Appearance Temperature	DSC	°C	43.0							
Wax Disappearance Temperature	DSC	°C	53.0							
Wax Content	UOP46*	%Wt	23.1				10.5	42.0	41.5	
Distillation	ASTM D86 / D1160	°C			See Below	See Below	See Below	See Below	See Below	
Initial Boiling Point		°C			44.1	149.9	262.6	361.0	376.00	
5% recovered		°C			68.8	166.1	273.8	399.0	397.00	
10% recovered		°C			75.1	169.3	276.8	408.0	402.00	
20% recovered		°C			82.6	174.6	280.3	418.0	413.00	
30% recovered		°C			91.5	180.1	284.2	432.0	421.00	
40% recovered		°C			97.5	186.7	288.7	445.0	430.00	
50% recovered		°C			101.7	193.5	294.7	455.0	440.00	
60% recovered		°C			106.2	201.4	301.9	473.0	449.00	
70% recovered		°C			111.1	209.7	310.0	499.0	458.00	
80% recovered		°C			116.7	218.1	320.0		472.00	
90% recovered		°C			124.9	227.1	332.2		492.00	
95% recovered		°C			121.3	233.0	339.5		536.00	
FBP/AET @ 400 °C Kettle Temp.		°C			140.3	238.7	341.9	547.0	98.70	
Recovery		Vol %			98.3	98.4	98.4	79.4		
Residue		Vol %			1.0	0.8	1.2			
Loss		Vol %			0.7	0.8	0.2			

Note : (#) Not possible due to the nature of sample (*)Withdrawn method



LABORATORY REPORT NO. MUM/1617/24

WHOLE CRUDE PROPERTIES

Sample Descriptions / Label :

Sample Name : ASV 2nd Offtake M-field Crude of KG-DWN 98/2 block ,Collected from: Autosampler ,Collected on: 02.04.2024

Tests	Methods	Units	Results
Density @ 15° C	ASTM D5002	kg/L	0.8519
Specific Gravity @ 60/60° F	Conversion		0.8523
API Gravity @ 60° F	Calculated	° API	34.5
Asphaltene	IP 143	% Wt	<0.50
Carbon Residue- Micro	ASTM D4530	% Wt	1.60
Composition (Upto C9)	IP 601	% Wt & %Vol.	See Page 14
Flash Point	IP 170	° C	<-5
Kinematic Viscosity @ 20° C	ASTM D445	cSt	#
Kinematic Viscosity @ 40° C			8.610
Kinematic Viscosity @ 50° C			5.760
Metals			
Copper	ICPOES	ppm wt	<1
Iron	ICPOES	ppm wt	6
Nickel	ICPOES	ppm wt	4
Zinc	ICPOES	ppm wt	<1
Vanadium	ICPOES	ppm wt	<1
Pour Point	ASTM D97	° C	21
Reid Vapour Pressure @ 100° F	ASTM D323	psi	4.50
Salt Content	ASTM D3230	PTB	3.5
Total Acid Number	ASTM D664	mg KOH/g	0.25
Total Nitrogen	ASTM D5762	ppm wt	680
Total Sulphur	ASTM D4294	% Wt	0.0508
Water Content	ASTM D4006	% Vol	0.05
Water & Sediments	ASTM D4007	% Vol	0.20
Wax Appearance Temperature	DSC	°C	43.0
Wax Disappearance Temperature	DSC	°C	53.0
Wax Content	UOP 46*	% Wt	23.1

Note : (#) Not possible due the nature of the sample



LABORATORY REPORT NO. MUM/1617/24
TRUE BOILING POINT DISTILLATION DATA
(ASTM D 2892 & ASTM D 5236)

Sample Descriptions / Label :

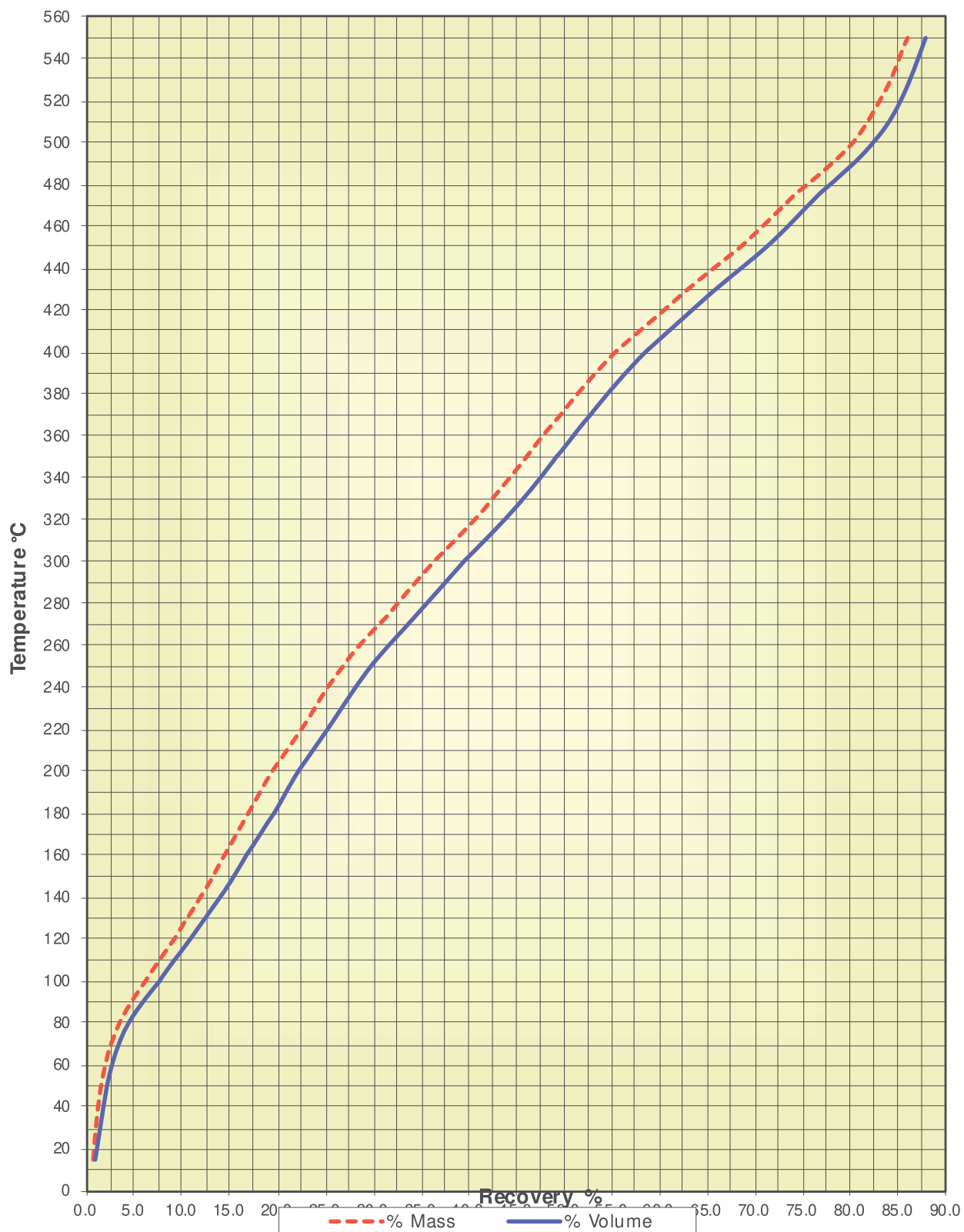
Sample Name : ASV 2nd Offtake M-field Crude of KG-DWN 98/2 block ,Collected from:
Autosampler ,Collected on: 02.04.2024

Sl. No.	Method	Vapour Temperature °C	% Mass	Cumulative % Mass	% Volume	Cumulative % Volume
1	ASTM D2892	Gas	0.61	0.61	0.95	0.95
2		15 - 50	0.92	1.53	1.22	2.17
3		50 - 75	1.37	2.90	1.67	3.84
4		75 - 100	3.24	6.14	3.70	7.54
5		100 - 120	3.03	9.17	3.39	10.93
6		120 - 140	2.86	12.03	3.18	14.11
7		140 - 160	2.52	14.55	2.77	16.88
8		160 - 180	2.53	17.08	2.74	19.62
9		180 - 200	2.49	19.57	2.66	22.28
10		200 - 225	3.61	23.18	3.79	26.07
11		225 - 250	3.58	26.76	3.70	29.77
12		250 - 275	4.81	31.57	4.89	34.66
13		275 - 300	4.83	36.40	4.89	39.55
14		300 - 325	5.19	41.59	5.22	44.77
15		325 - 350	4.49	46.08	4.50	49.27
16		350 - 370	3.44	49.52	3.44	52.71
17	ASTM D5236	370 - 400	5.97	55.49	5.91	58.62
18		400 - 425	6.23	61.72	6.13	64.75
19		425 - 450	6.66	68.38	6.45	71.20
20		450 - 475	5.97	74.35	5.70	76.90
21		475 - 500	5.92	80.27	5.64	82.54
22		500 - 525	3.43	83.70	3.24	85.78
23		525 - 550	2.28	85.98	2.12	87.90
24		550 + Residue	14.02	100.00	12.10	100.00



Sample Name : ASV 2nd Offtake M-field Crude of KG-DWN 98/2 block ,

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





LABORATORY REPORT NO. MUM/1617/24

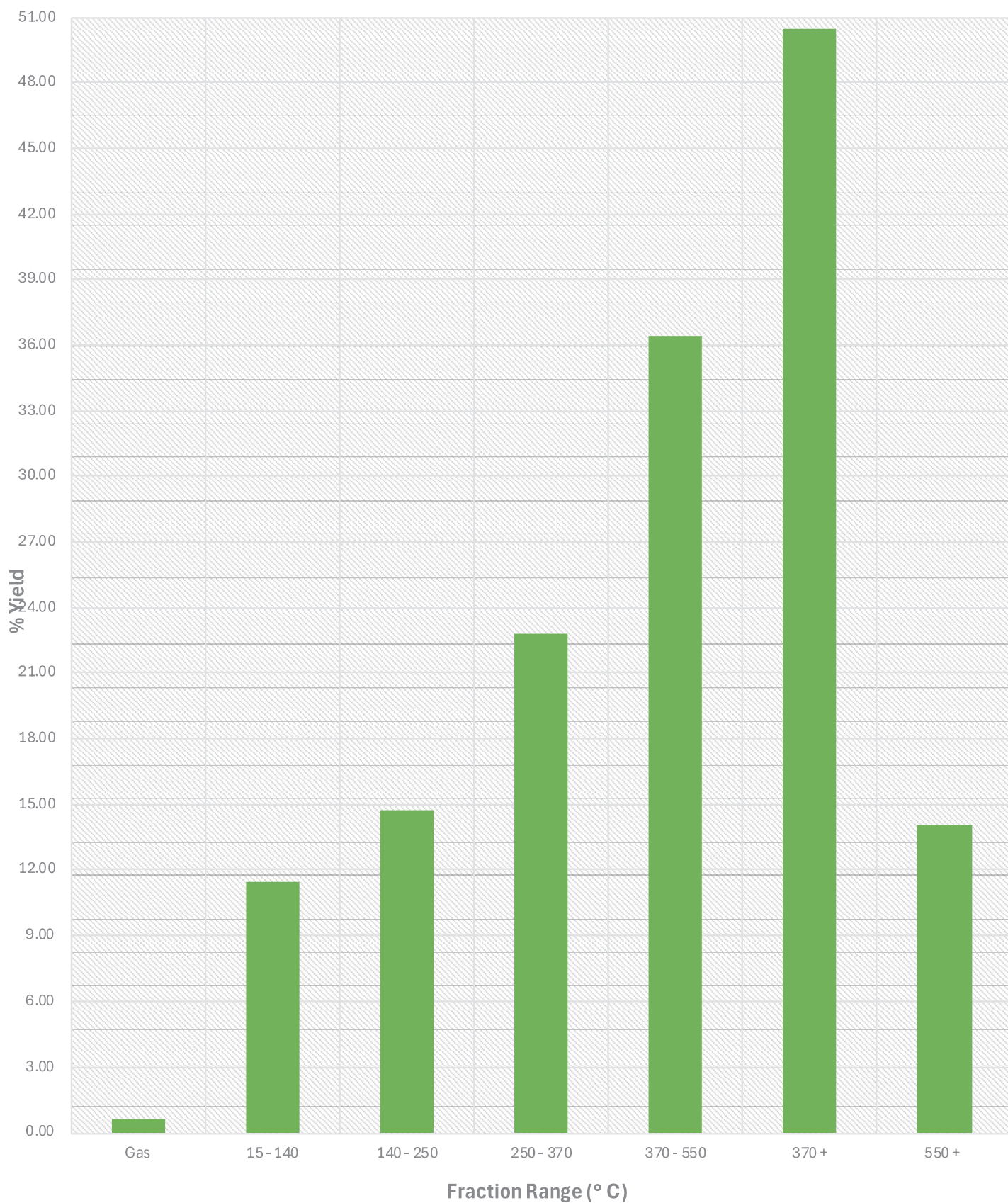
SUMMARY OF PRODUCT / RESIDUE CUT POINTS AND YIELDS

Sample Descriptions: Sample Name : ASV 2nd Offtake M-field Crude of KG-DWN 98/2 block
,Collected from: Autosampler ,Collected on: 02.04.2024

Products	Cut Points	Yield	
	(° C)	% Mass	Volume %
Gas	Below 15	0.61	0.95
Naphtha	15 - 140	11.42	13.16
Kerosene	140 - 250	14.73	15.66
Gas Oil	250 - 370	22.76	22.94
Vacuum Gas Oil	370 - 550	36.46	35.19
Residues	370 +	50.48	47.29
	550 +	14.02	12.10

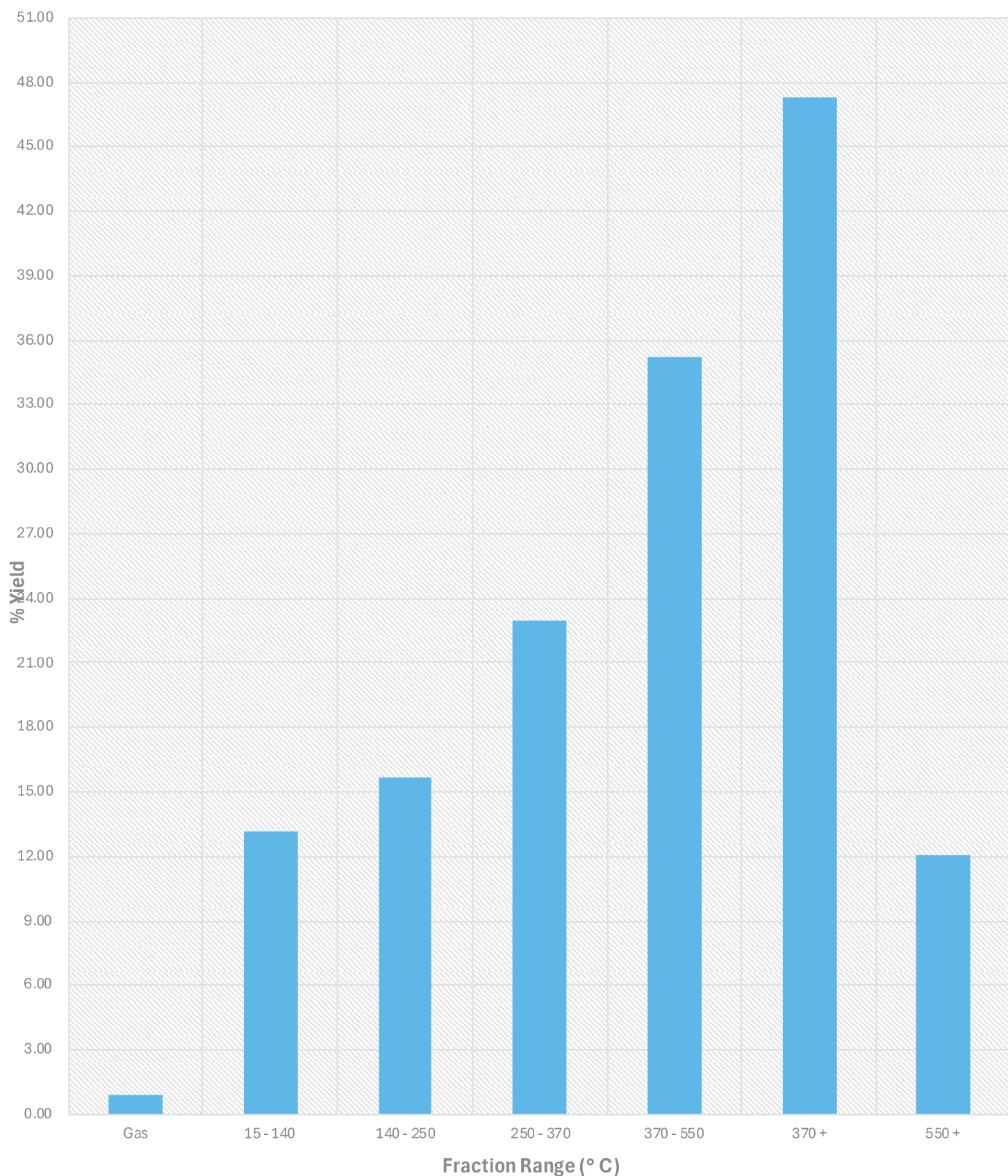


Yield Distribution-Graph (% Mass)
"Crude Oil Sample Received On 30th April 2024"





Yield Distribution-Graph (% Volume)
"Crude Oil Sample Received On 30th April 2024"





LABORATORY REPORT NO. MUM/1617/24

SUMMARY OF LIGHT END COMPOSITION

Sample Descriptions : Sample Name : ASV 2nd Offtake M-field Crude of KG-DWN 98/2 block ,Collected from: Autosampler ,Collected on: 02.04.2024

Tests	Methods	Units	Results
Yield	ASTM D 2892	% Wt.	0.61
Yield		% Vol.	0.95
Density @ 15°C	GC / Calculated	kg/L	0.5671
Methane	GC	% Wt.	<0.010
Ethane			0.524
Propane			35.042
i-butane			24.093
n-Butane			35.262
i-pentane			3.919
n-Pentane			1.159



LABORATORY REPORT NO. MUM/1617/24

Sample Descriptions:

Sample Name : ASV 2nd Offtake M-field Crude of KG-DWN 98/2 block
Collected from: Autosampler ,Collected on: 02.04.2024

Tests	Methods	Units	Naphtha Cut
			Results
Initial BP		°C	15
Final BP		°C	140
Yield	ASTM D2892	% Wt.	11.42
		% Vol.	13.16
Density @ 15°C	ASTM D4052	kg/L	0.7404
Specific Gravity @ 60/60° F	Conversion		0.7406
API Gravity @ 60° F	Calculated	° API	59.6
Benzene	ASTM D5580	% Wt.	0.22
Paraffins	ASTM D6730	% Vol.	45.212
Olefins		% Vol.	0.783
Naphthene		% Vol.	46.877
Aromatics		% Vol.	7.098
Hydrogen Sulphide (Liquid Phase)	UOP163	ppm wt	<1
Mercaptan Sulphur	UOP 163	ppm wt	<3
Organic Chloride	ASTM D4929B	ppm wt	<1
Motor Octane Number	ASTM D2700	Rating	67
Doctor Test	IP 30		Negative
Copper Strip Corrosion	ASTM D130		1a
Reid Vapour Pressure @ 100° F	ASTM D5191	psi	3.84
Research Octane Number	ASTM D2699	Rating	69
Sulphur	ASTM D5453	% Wt.	0.0041
Distillation			
Initial Boiling Point	ASTM D86	°C	44.1
5% recovered		°C	68.8
10% recovered		°C	75.1
20% recovered		°C	82.6
30% recovered		°C	91.5
40% recovered		°C	97.5
50% recovered		°C	101.7
60% recovered		°C	106.2
70% recovered		°C	111.1
80% recovered		°C	116.7
90% recovered		°C	124.9
95% recovered		°C	121.3
Final Boiling Point		°C	140.3
Recovery		Vol %	98.3
Residue		Vol %	1.00
Loss		Vol %	0.70



LABORATORY REPORT NO. MUM/1617/24

Sample Descriptions:

Sample Name : ASV 2nd Offtake M-field Crude of KG-DWN 98/2
block ,Collected from: Autosampler ,Collected on: 02.04.2024

Tests	Methods	Units	Gas Oil Cut
			Results
Initial BP		°C	250
Final BP		°C	370
Yield	ASTM D2892/D5236	% Wt.	22.76
Yield		% Vol.	22.94
Density @ 15° C	ASTM D4052	kg/L	0.8446
Specific Gravity @ 60/60° F	Conversion		0.8450
API Gravity @ 60° F	Calculated	° API	36.0
Aromatics			
Mono	IP 391	% Wt.	12.3
Di		% Wt.	4.8
Tri		% Wt.	<0.1
Poly		% Wt.	4.9
Carbon Residue- Micro	ASTM D4530	% Wt	<0.10
Basic Nitrogen	UOP 269	ppm wt	24
Flash Point (PMCC)	ASTM D93	°C	>110
Kinematic Viscosity @ 40°C	ASTM D445	cSt	4.325
Kinematic Viscosity @ 50°C	ASTM D445	cSt	3.733
Pour Point	ASTM D97	°C	6
Cloud Point	ASTM D2500	°C	7
Aniline Point	ASTM D611	°C	81.0
Cetane Index	ASTM D976	Rating	54.2
Diesel Index	IP 21	-	64.1
Total Acid Number	ASTM D664	mg KOH/g	0.20
Total Nitrogen	ASTM D5762	ppm wt	57
Total Sulphur	ASTM D4294	% Wt	0.0440
Water Content	ASTM D6304	ppm	95
Sediment by Extraction	ASTM D473	% Wt	<0.01
Wax Content	UOP 46*	% Wt	10.5
Distillation			
Initial Boiling Point	ASTM D86	°C	262.6
5% recovered		°C	273.8
10% recovered		°C	276.8
20% recovered		°C	280.3
30% recovered		°C	284.2
40% recovered		°C	288.7
50% recovered		°C	294.7
60% recovered		°C	301.9
70% recovered		°C	310.0
80% recovered		°C	320.0
90% recovered		°C	332.2
95% recovered		°C	339.5
Final Boiling Point		°C	341.9
Recovery		Vol %	98.4
Residue		Vol %	1.2
Loss		Vol %	0.2

Note: (*) Withdrawn method



LABORATORY REPORT NO. MUM/1617/24

Sample Descriptions:

Sample Name : ASV 2nd Offtake M-field Crude of KG-DWN 98/2
block ,Collected from: Autosampler ,Collected on: 02.04.2024

Tests	Methods	Units	VGO Cut
			Results
Initial BP		°C	370
Final BP		°C	550
Yield	ASTM D2892/D5236	% Wt.	36.46
Yield		% Vol.	35.19
Density @ 15° C	ASTM D4052	kg/L	0.8827
Specific Gravity @ 60/60° F	Conversion		0.8832
API Gravity @ 60° F	Calculated	° API	28.7
Carbon Residue- Micro	ASTM D4530	% Wt	0.11
Kinematic Viscosity @ 70°C	ASTM D445	cSt	12.63
Kinematic Viscosity @ 100°C	ASTM D445	cSt	6.720
Metals			
Copper	ICPOES	ppm wt	<1
Iron	ICPOES	ppm wt	<1
Nickel	ICPOES	ppm wt	<1
Zinc	ICPOES	ppm wt	<1
Vanadium	ICPOES	ppm wt	<1
Pour Point	ASTM D97	°C	51
Total Nitrogen	ASTM D5762	ppm wt	450
Total Sulphur	ASTM D4294	% Wt	0.0461
Wax Content	UOP 46*	% Wt.	41.5
Distillation			
Initial Boiling Point	ASTM D1160	°C	376
5% recovered		°C	397
10% recovered		°C	402
20% recovered		°C	413
30% recovered		°C	421
40% recovered		°C	430
50% recovered		°C	440
60% recovered		°C	449
70% recovered		°C	458
80% recovered		°C	472
90% recovered		°C	492
95% recovered		°C	518
AET @ 400 °C Kettle Temperature		°C	536
Recovery @ 400°C Kettle Temp.		Vol %	98.7

Note: (*) Withdrawn method



LABORATORY REPORT NO. MUM/1617/24

Sample Descriptions:

Sample Name : ASV 2nd Offtake M-field Crude of KG-DWN 98/2 block
,Collected from: Autosampler ,Collected on: 02.04.2024

Tests	Methods	Units	Residue Cut	
			Results	
Initial BP		°C	370 + Residue	550 + Residue
Final BP		°C		
Yield	ASTM D2892/D5236	% Wt.	50.48	14.02
Yield		% Vol.	47.29	12.10
Density @ 15° C	IP 365	kg/L	0.9096	0.9901
Specific Gravity @ 60/60° F	Conversion		0.9101	0.9907
API Gravity @ 60° F	Calculated	° API	24.0	11.3
Asphaltene	IP 143	% Wt.	<0.50	0.70
Carbon Residue- Micro	ASTM D4530	% Wt.	3.2	11.6
Kinematic Viscosity @ 70°C	ASTM D445	cSt	32.30	#
Kinematic Viscosity @ 100°C			13.69	257.1
Kinematic Viscosity @ 135°C				61.50
Metals				
Copper	ICPOES	ppm wt	<1	<1
Iron			12	44
Nickel			8	30
Zinc			<1	1
Vanadium			<1	1
Pour Point	ASTM D97	°C	51	78
Aniline Point	ASTM D611	°C	99.8	
Total Sulphur	ASTM D4294	% Wt.	0.0757	0.155
Basic Nitrogen	UOP 269	ppm wt	680	1600
Total Nitrogen	ASTM D5762	ppm wt	1300	3500
Wax Content	UOP 46*	% Wt.	42.0	
Initial boiling point	ASTM D1160	°C	361	
AET @ 5% Recovery		°C	399	
AET @ 10% Recovery		°C	408	
AET @ 20% Recovery		°C	418	
AET @ 30% Recovery		°C	432	
AET @ 40% Recovery		°C	445	
AET @ 50% Recovery		°C	455	
AET @ 60% Recovery		°C	473	
AET @ 70% Recovery		°C	499	
AET @ 400 °C Kettle Temperature		°C	547	
Recovery @ 400°C Kettle Temp.		Vol %	79.4	

Note: (*) Withdrawn method



LABORATORY REPORT NO. MUM/1617/24

Sample Descriptions / Label :

Sample Name : ASV 2nd Offtake M-field Crude of KG-DWN 98/2 block
, Collected from: Autosampler , Collected on: 02.04.2024

COMPOSITION UP TO C9

Component	Mass %	Volume %	Component	Mass %	Volume %
propane	0.0578	0.1154	1,1-methylethylcyclopentane	0.1447	0.1853
i-butane	0.0963	0.1727	unknown	0.0122	0.0175
n-butane	0.3029	0.5233	1c,2c,3-trimethylcyclopentane	0.2534	0.3251
i-pentane	0.4023	0.6493	n-octane	0.4761	0.6778
n-pentane	0.4533	0.7238	1c,4-dimethylcyclohexane	0.0271	0.0346
cyclopentane	0.1169	0.1568	unknown	0.1125	0.1607
2,3-dimethylbutane	0.0635	0.0959	2,4,4-trimethylhexane	0.0242	0.0327
2-methylpentane	0.3309	0.5066	unknown	0.0134	0.0191
3-methylpentane	0.2027	0.3051	unknown	0.0212	0.0302
n-hexane	0.4555	0.6907	2,2-dimethylheptane	0.0166	0.0234
methylcyclopentane	0.5944	0.7940	N4	0.0668	0.0857
2,4-dimethylpentane	0.0254	0.0377	ethylcyclohexane	0.0421	0.0537
benzene	0.0323	0.0367	2,4-dimethylheptane	0.4529	0.6332
cyclohexane	0.9343	1.2001	4,4-dimethylheptane	0.1467	0.2051
2-methylhexane	0.1486	0.2190	2,5-dimethylheptane	0.0296	0.0413
2,3-dimethylpentane	0.0815	0.1172	3,3-dimethylheptane	0.0264	0.0364
1,1-dimethylcyclopentane	0.0527	0.0698	3,5-dimethylheptane	0.0240	0.0332
3-methylhexane	0.1638	0.2383	2,6-dimethylheptane	0.0316	0.0446
1c,3-dimethylcyclopentane	0.1648	0.2212	1,1,3-trimethylcyclohexane	0.0219	0.0278
1t,3-dimethylcyclopentane	0.1602	0.2139	N10	0.0202	0.0259
3-ethylpentane	0.0200	0.0287	ethylbenzene	0.1638	0.1889
1t,2-dimethylcyclopentane	0.2728	0.3630	1c,2t,4t-trimethylcyclohexane	0.0876	0.1124
n-heptane	0.4820	0.7050	1,3-dimethylbenzene	0.1578	0.1826
unknown	0.0402	0.0574	1,4-dimethylbenzene	0.1650	0.1916
methylcyclohexane	1.5057	1.9570	I7	0.0622	0.0852
2,2-dimethylhexane	0.0741	0.1066	unknown	0.0142	0.0203
ethylcyclopentane	0.1396	0.1822	4-methyloctane	0.0323	0.0448
unknown	0.0273	0.0389	I4	0.0714	0.0978
1c,2t,4-trimethylcyclopentane	0.1049	0.1374	1c,2t,3-trimethylcyclohexane	0.0198	0.0261
1t,2c,3-trimethylcyclopentane	0.1343	0.1743	3-ethylheptane	0.0171	0.0236
toluene	0.5556	0.6409	3-methyloctane	0.0738	0.1024
2,3-dimethylhexane	0.0258	0.0363	unknown	0.0236	0.0338
2-methyl-3-ethylpentane	0.0597	0.0838	unknown	0.0131	0.0187
2-methylheptane	0.2292	0.3284	unknown	0.0122	0.0174
4-methylheptane	0.0385	0.0546	unknown	0.0181	0.0259
unknown	0.0161	0.0230	1,2-dimethylbenzene	0.0710	0.0806
3-methylheptane	0.0794	0.1125	unknown	0.0146	0.0208
1t,4-dimethylcyclohexane	0.0159	0.0209	I6	0.0597	0.0817
1c,2t,3-trimethylcyclopentane	0.4233	0.5494	N18	0.1423	0.1824
unknown	0.0288	0.0411	I8	0.0845	0.1157
1,1-dimethylcyclohexane	0.1384	0.1772	N21	0.0127	0.0163
3c-ethylmethylcyclopentane	0.0431	0.0562	N22	0.0174	0.0223
3t-ethylmethylcyclopentane	0.0615	0.0801	unknown	0.0141	0.0201
2t-ethylmethylcyclopentane	0.0563	0.0733	n-nonane	0.4699	0.6548

