

NNPC-FES
FIELD: KOLMANI RIVER
WELL: KOLMANI RIVER-4

13th October, 2021

Attention: **AISHA, Musa**

Dear Sir,

VALIDATION STUDY REPORT ON KOLMANI RIVER-4 BOTTOM HOLE SAMPLES
[REPORT No.: PVT – 034 / 09 / 2021]

Sample Reception

The report contains laboratory results from reservoir fluid validation study conducted on Kolmani River-4 bottom hole samples. The samples in chamber number MPSR B2_3767, B6_4888, B3_4829, B4_4830, B1_3729, B5_4887, B1_4275 and B2_4825 were received in our Laboratory on 23RD September, 2021.

Sample Quality Check

The samples were validated through opening pressure checks, saturation pressure determination (relative to the reservoir pressure) and oil base mud contamination level. Results of the validation test are shown on page 4 of the report.

Validation Study

A subset of each of the restored and homogenized bottom-hole gas samples was introduced into a high pressure and high temperature PVT cells. The samples were heated to their differing reservoir temperatures and stabilized at a pressure of 7515 psia for chambers MPSR B6_4888, B3_4829, B4_4830, B1_3729, B5_4887, B1_4275 and B2_4825 while chamber MPSR B2_3767 was stabilized at a pressure of 7015 psia. The saturation pressures for all samples were determined at their respective reservoir temperatures as shown in page 4 of this report.

In order to determine the OBM contamination level on each the sample, a subset of homogenized sample in the cell was flashed to atmospheric conditions (ambient pressure and temperature of the laboratory). The flashed liquid (residual oil or condensate from the reservoir fluid), mud filtrate were analyzed by gas chromatographic technique to obtain their molecular compositions. OBM contamination level was then determined by subtraction method using a PVT software.

Note:

- An in-depth compositional fingerprint analysis (semi-log plot of weight percentage against molecular weight) of the residual stock liquid from all samples and mud filtrate shows a similar trend between the mud filtrate and stock oil in all samples. This is contradictory to the conventional Niger Delta stock tank oil fingerprint comparison with a mud filtrate as shown in page 14.



MMATA, Bella (Ph.D)
Senior Manager
PVT Laboratory and Environmental Services
+234(0)8037800046



LASER

Petroleum Phase Behaviour (PVT) Laboratory



NNPC-FES
FIELD: KOLMANI RIVER
WELL: KOLMANI RIVER-4

Table of Contents

| Item No. | Item Description | Page |
|----------|---|--------|
| 1. | Summary of Validity Check | 3 |
| 2. | Mud Filtrate Composition | 4 |
| 3. | Reservoir Fluid Composition | 5 - 12 |
| 4. | Fingerprint Comparison of Mud Filtrate and Stock Tank Oil | 13 |
| 5. | Nomenclature | 14 |



LASER

Petroleum Phase Behaviour (PVT) Laboratory



NNPC-FES
FIELD: KOLMANI RIVER
WELL: KOLMANI RIVER-4

Summary of Validity Check on Kolmani River 4 Bottom Hole Samples

| S/No | Cylinder No. | Depth | Formation | | Shut-in Pressure | Lab. Opening Pressure | Sample Nature | Saturation Pressure | Oil Base Mud (OBM) Contamination Level |
|------|--------------|---------|-----------|----------|------------------|-----------------------|---------------|---------------------|--|
| | | | Temp. | Pressure | | | | | |
| | MPSR | [ft] | [oF] | [psia] | [psia] | [psia @ oF] | | [psia] | * Mud Filtrate |
| | | | | | | | | | [wt. %] |
| 1 | B2_3767 | 6929.51 | 237.8 | 3067.4 | 8793.3 | 4134.7 @ 79.3 | BHS Gas | 6347.7 | 0.0 |
| 2 | B6_4888 | 6933.01 | 237.7 | 3068.0 | 9664.9 | 5146.7 @ 79.5 | BHS Gas | 6481.7 | 22.0 |
| 3 | B3_4829 | 6982.96 | 237.6 | 3071.4 | 8758.5 | 4268.7 @ 79.5 | BHS Gas | 5853.7 | 0.0 |
| 4 | B4_4830 | 6982.96 | 238.3 | 3071.4 | 7650.4 | 4034.7 @ 79.5 | BHS Gas | 5149.7 | 25.6 |
| 5 | B1_3729 | 6991.03 | 239.5 | 3071.8 | 6360.5 | 2372.7 @ 79.5 | BHS Oil | 2814.7 | 0.0 |
| 6 | B5_4887 | 6991.03 | 239.8 | 3071.8 | 6135.3 | 2556.7 @ 79.7 | BHS Oil | 3107.3 | 0.0 |
| 7 | B1_4275 | 7067.38 | 233.2 | 3089.2 | 7151.1 | 1038.7 @ 79.7 | BHS Oil | 873.7 | 0.0 |
| 8 | B2_4825 | 7067.38 | 234.5 | 3089.2 | 8813.4 | 1564.7 @ 79.7 | BHS Oil | 1114.7 | 33.5 |

* Mud Filtrate was used for OBM calculations

NNPC-FES
FIELD: KOLMANI RIVER
WELL: KOLMANI RIVER-4

| MUD FILTRATE COMPOSITION | | |
|--------------------------|----------------|---------------|
| No | Component | Mud Filtrate |
| | | [mol. %] |
| 1 | N2 | 0.00 |
| 2 | CO2 | 0.00 |
| 3 | C1 | 0.00 |
| 4 | C2 | 0.00 |
| 5 | C3 | 0.00 |
| 6 | iC4 | 0.01 |
| 7 | nC4 | 0.03 |
| 8 | iC5 | 0.07 |
| 9 | nC5 | 0.07 |
| 10 | C6 | 0.70 |
| 11 | C7 | 0.59 |
| 12 | C8 | 0.62 |
| 13 | C9 | 0.66 |
| 14 | C10 | 1.49 |
| 15 | C11 | 3.10 |
| 16 | C12 | 6.51 |
| 17 | C13 | 11.68 |
| 18 | C14 | 17.54 |
| 19 | C15 | 17.86 |
| 20 | C16 | 10.95 |
| 21 | C17 | 6.21 |
| 22 | C18 | 5.40 |
| 23 | C19 | 3.93 |
| 24 | C20 | 3.12 |
| 25 | C21 | 2.56 |
| 26 | C22 | 1.95 |
| 27 | C23 | 1.36 |
| 28 | C24 | 0.94 |
| 29 | C25 | 0.61 |
| 30 | C26 | 0.53 |
| 31 | C27 | 0.41 |
| 32 | C28 | 0.44 |
| 33 | C29 | 0.22 |
| 34 | C30+ | 0.44 |
| | Total | 100.00 |
| | MW [g/mol] | 213.47 |
| | Gravity | 0.8439 |
| | MW C7+ [g/mol] | 214.64 |
| | Mol % C7+ | 99.12 |
| | Gravity C7+ | 0.8447 |



NNPC-FES
FIELD: KOLMANI RIVER
WELL: KOLMANI RIVER-4

| MPSR B2_3767 RESERVOIR FLUID COMPOSITION | | | | |
|--|-----------------------|----------------|----------------|-----------------|
| No | Component | Flashed Gas | Flashed Liquid | Reservoir Fluid |
| | | [mol %] | [mol %] | [mol %] |
| 1 | N2 | 3.43 | 0.00 | 3.33 |
| 2 | CO2 | 1.00 | 0.00 | 0.97 |
| 3 | C1 | 88.59 | 0.00 | 85.94 |
| 4 | C2 | 3.19 | 0.05 | 3.10 |
| 5 | C3 | 1.92 | 0.16 | 1.87 |
| 6 | i-C4 | 0.47 | 0.11 | 0.46 |
| 7 | n-C4 | 0.66 | 0.21 | 0.65 |
| 8 | i-C5 | 0.31 | 0.30 | 0.31 |
| 9 | n-C5 | 0.21 | 0.27 | 0.21 |
| 10 | C6 | 0.11 | 0.99 | 0.14 |
| 11 | C7 | 0.07 | 2.16 | 0.13 |
| 12 | C8 | 0.03 | 3.20 | 0.12 |
| 13 | C9 | 0.01 | 2.48 | 0.08 |
| 14 | C10 | 0.00 | 3.28 | 0.10 |
| 15 | C11 | 0.00 | 4.70 | 0.14 |
| 16 | C12 | 0.00 | 7.84 | 0.23 |
| 17 | C13 | 0.00 | 12.60 | 0.38 |
| 18 | C14 | 0.00 | 17.36 | 0.52 |
| 19 | C15 | 0.00 | 15.64 | 0.47 |
| 20 | C16 | 0.00 | 9.17 | 0.27 |
| 21 | C17 | 0.00 | 4.84 | 0.14 |
| 22 | C18 | 0.00 | 3.99 | 0.12 |
| 23 | C19 | 0.00 | 2.77 | 0.08 |
| 24 | C20 | 0.00 | 2.13 | 0.06 |
| 25 | C21 | 0.00 | 1.69 | 0.05 |
| 26 | C22 | 0.00 | 1.25 | 0.04 |
| 27 | C23 | 0.00 | 0.84 | 0.03 |
| 28 | C24 | 0.00 | 0.53 | 0.02 |
| 29 | C25 | 0.00 | 0.36 | 0.01 |
| 30 | C26 | 0.00 | 0.31 | 0.01 |
| 31 | C27 | 0.00 | 0.28 | 0.01 |
| 32 | C28 | 0.00 | 0.26 | 0.01 |
| 33 | C29 | 0.00 | 0.16 | 0.00 |
| 34 | C30+ | 0.00 | 0.07 | 0.00 |
| | Total | 100.00 | 100.00 | 100.00 |
| | Sample: | | | |
| | MW [g/mol] | 19.11 | 194.59 | 23.92 |
| | Gravity [air = 1] | 0.660[air = 1] | 0.8318[g/cm3] | ----- |
| | MW C7+ [g/mol] | 104.11 | 197.20 | 193.83 |
| | Gravity C7+ | 0.750 | 0.8316[g/cm3] | ----- |
| | Mol % C7+ | 0.19 | 97.91 | 3.04 |
| | Flash GOR [SCF/STB] | ----- | ----- | 17797.75 |
| | Flash CGR [STB/MMSCF] | | | 56.19 |

NNPC-FES
FIELD: KOLMANI RIVER
WELL: KOLMANI RIVER-4

| MPSR B6_4888 RESERVOIR FLUID COMPOSITION | | | | |
|--|-----------------------|----------------|----------------|-----------------|
| No | Component | Flashed Gas | Flashed Liquid | Reservoir Fluid |
| | | [mol %] | [mol %] | [mol %] |
| 1 | N2 | 3.59 | 0.00 | 3.32 |
| 2 | CO2 | 2.57 | 0.00 | 2.38 |
| 3 | C1 | 85.59 | 0.00 | 79.20 |
| 4 | C2 | 3.44 | 0.09 | 3.19 |
| 5 | C3 | 2.29 | 0.32 | 2.14 |
| 6 | i-C4 | 0.60 | 0.25 | 0.57 |
| 7 | n-C4 | 0.88 | 0.58 | 0.86 |
| 8 | i-C5 | 0.43 | 0.91 | 0.47 |
| 9 | n-C5 | 0.29 | 0.84 | 0.33 |
| 10 | C6 | 0.16 | 3.00 | 0.37 |
| 11 | C7 | 0.09 | 5.72 | 0.51 |
| 12 | C8 | 0.04 | 6.71 | 0.54 |
| 13 | C9 | 0.02 | 3.27 | 0.26 |
| 14 | C10 | 0.01 | 3.28 | 0.25 |
| 15 | C11 | 0.00 | 3.63 | 0.27 |
| 16 | C12 | 0.00 | 5.47 | 0.41 |
| 17 | C13 | 0.00 | 9.65 | 0.72 |
| 18 | C14 | 0.00 | 13.89 | 1.04 |
| 19 | C15 | 0.00 | 13.80 | 1.03 |
| 20 | C16 | 0.00 | 8.42 | 0.63 |
| 21 | C17 | 0.00 | 4.95 | 0.37 |
| 22 | C18 | 0.00 | 3.85 | 0.29 |
| 23 | C19 | 0.00 | 2.99 | 0.22 |
| 24 | C20 | 0.00 | 2.38 | 0.18 |
| 25 | C21 | 0.00 | 1.93 | 0.14 |
| 26 | C22 | 0.00 | 1.35 | 0.10 |
| 27 | C23 | 0.00 | 0.95 | 0.07 |
| 28 | C24 | 0.00 | 0.57 | 0.04 |
| 29 | C25 | 0.00 | 0.34 | 0.03 |
| 30 | C26 | 0.00 | 0.26 | 0.02 |
| 31 | C27 | 0.00 | 0.19 | 0.01 |
| 32 | C28 | 0.00 | 0.17 | 0.01 |
| 33 | C29 | 0.00 | 0.14 | 0.01 |
| 34 | C30+ | 0.00 | 0.10 | 0.01 |
| | Total | 100.00 | 100.00 | 100.00 |
| | Sample: | | | |
| | MW [g/mol] | 19.59 | 184.76 | 31.92 |
| | Gravity [air = 1] | 0.676[air = 1] | 0.7815[g/cm3] | ----- |
| | MW C7+ [g/mol] | 104.25 | 191.82 | 190.01 |
| | Gravity C7+ | 0.75 | 0.8321[g/cm3] | ----- |
| | Mol % C7+ | 0.16 | 94.01 | 7.16 |
| | Flash GOR [SCF/STB] | ----- | ----- | 6977.34 |
| | Flash CGR [STB/MMSCF] | | | 143.32 |

NNPC-FES
FIELD: KOLMANI RIVER
WELL: KOLMANI RIVER-4

MPSR B3_4829 RESERVOIR FLUID COMPOSITION

| No | Component | Flashed Gas | Flashed Liquid | Reservoir Fluid |
|----|-----------------------|----------------|----------------|-----------------|
| | | [mol %] | [mol %] | [mol %] |
| 1 | N2 | 3.33 | 0.00 | 3.28 |
| 2 | CO2 | 1.68 | 0.00 | 1.65 |
| 3 | C1 | 87.33 | 0.00 | 85.96 |
| 4 | C2 | 3.27 | 0.07 | 3.22 |
| 5 | C3 | 2.05 | 0.20 | 2.02 |
| 6 | i-C4 | 0.53 | 0.16 | 0.52 |
| 7 | n-C4 | 0.78 | 0.35 | 0.77 |
| 8 | i-C5 | 0.41 | 0.60 | 0.41 |
| 9 | n-C5 | 0.29 | 0.54 | 0.29 |
| 10 | C6 | 0.17 | 2.27 | 0.20 |
| 11 | C7 | 0.09 | 5.52 | 0.18 |
| 12 | C8 | 0.04 | 8.79 | 0.18 |
| 13 | C9 | 0.02 | 6.28 | 0.12 |
| 14 | C10 | 0.01 | 6.02 | 0.10 |
| 15 | C11 | 0.00 | 5.69 | 0.09 |
| 16 | C12 | 0.00 | 6.89 | 0.11 |
| 17 | C13 | 0.00 | 10.38 | 0.16 |
| 18 | C14 | 0.00 | 13.21 | 0.21 |
| 19 | C15 | 0.00 | 12.00 | 0.19 |
| 20 | C16 | 0.00 | 6.77 | 0.11 |
| 21 | C17 | 0.00 | 3.71 | 0.06 |
| 22 | C18 | 0.00 | 2.83 | 0.04 |
| 23 | C19 | 0.00 | 2.09 | 0.03 |
| 24 | C20 | 0.00 | 1.71 | 0.03 |
| 25 | C21 | 0.00 | 1.23 | 0.02 |
| 26 | C22 | 0.00 | 0.88 | 0.01 |
| 27 | C23 | 0.00 | 0.60 | 0.01 |
| 28 | C24 | 0.00 | 0.36 | 0.01 |
| 29 | C25 | 0.00 | 0.24 | 0.00 |
| 30 | C26 | 0.00 | 0.17 | 0.00 |
| 31 | C27 | 0.00 | 0.16 | 0.00 |
| 32 | C28 | 0.00 | 0.14 | 0.00 |
| 33 | C29 | 0.00 | 0.08 | 0.00 |
| 34 | C30+ | 0.00 | 0.06 | 0.00 |
| | Total | 100.00 | 100.00 | 100.00 |
| | Sample: | | | |
| | MW [g/mol] | 19.15 | 174.48 | 21.58 |
| | Gravity [air = 1] | 0.661[air = 1] | 0.7815[g/cm3] | ----- |
| | MW C7+ [g/mol] | 104.25 | 178.84 | 171.75 |
| | Gravity C7+ | 0.75 | 0.8231[g/cm3] | ----- |
| | Mol % C7+ | 0.16 | 95.81 | 1.66 |
| | Flash GOR [SCF/STB] | ----- | ----- | 37452.74 |
| | Flash CGR [STB/MMSCF] | | | 26.70 |

NNPC-FES
FIELD: KOLMANI RIVER
WELL: KOLMANI RIVER-4

| MPSR B4_4830 RESERVOIR FLUID COMPOSITION | | | | |
|--|-----------------------|----------------|----------------|-----------------|
| No | Component | Flashed Gas | Flashed Liquid | Reservoir Fluid |
| | | [mol %] | [mol %] | [mol %] |
| 1 | N2 | 3.25 | 0.00 | 3.22 |
| 2 | CO2 | 1.57 | 0.00 | 1.55 |
| 3 | C1 | 87.57 | 0.00 | 86.68 |
| 4 | C2 | 3.26 | 0.03 | 3.23 |
| 5 | C3 | 2.02 | 0.15 | 2.00 |
| 6 | i-C4 | 0.52 | 0.13 | 0.52 |
| 7 | n-C4 | 0.76 | 0.29 | 0.76 |
| 8 | i-C5 | 0.40 | 0.48 | 0.40 |
| 9 | n-C5 | 0.28 | 0.45 | 0.28 |
| 10 | C6 | 0.18 | 2.09 | 0.20 |
| 11 | C7 | 0.10 | 5.59 | 0.16 |
| 12 | C8 | 0.06 | 9.83 | 0.16 |
| 13 | C9 | 0.02 | 7.70 | 0.10 |
| 14 | C10 | 0.01 | 2.10 | 0.03 |
| 15 | C11 | 0.00 | 6.70 | 0.07 |
| 16 | C12 | 0.00 | 6.17 | 0.06 |
| 17 | C13 | 0.00 | 6.89 | 0.07 |
| 18 | C14 | 0.00 | 9.67 | 0.10 |
| 19 | C15 | 0.00 | 12.07 | 0.12 |
| 20 | C16 | 0.00 | 10.98 | 0.11 |
| 21 | C17 | 0.00 | 6.10 | 0.06 |
| 22 | C18 | 0.00 | 3.31 | 0.03 |
| 23 | C19 | 0.00 | 2.51 | 0.03 |
| 24 | C20 | 0.00 | 1.60 | 0.02 |
| 25 | C21 | 0.00 | 1.40 | 0.01 |
| 26 | C22 | 0.00 | 1.09 | 0.01 |
| 27 | C23 | 0.00 | 0.84 | 0.01 |
| 28 | C24 | 0.00 | 0.63 | 0.01 |
| 29 | C25 | 0.00 | 0.39 | 0.00 |
| 30 | C26 | 0.00 | 0.24 | 0.00 |
| 31 | C27 | 0.00 | 0.20 | 0.00 |
| 32 | C28 | 0.00 | 0.15 | 0.00 |
| 33 | C29 | 0.00 | 0.11 | 0.00 |
| 34 | C30+ | 0.00 | 0.11 | 0.00 |
| | Total | 100.00 | 100.00 | 100.00 |
| | Sample: | | | |
| | MW [g/mol] | 19.11 | 180.64 | 20.74 |
| | Gravity [air = 1] | 0.660[air = 1] | 0.8237[g/cm3] | ----- |
| | MW C7+ [g/mol] | 104.11 | 184.59 | 171.62 |
| | Gravity C7+ | 0.75 | 0.8275[g/cm3] | ----- |
| | Mol % C7+ | 0.19 | 96.37 | 1.17 |
| | Flash GOR [SCF/STB] | ----- | ----- | 59149.58 |
| | Flash CGR [STB/MMSCF] | | | 16.91 |

NNPC-FES
FIELD: KOLMANI RIVER
WELL: KOLMANI RIVER-4

MPSR B1_3729 RESERVOIR FLUID COMPOSITION

| No | Component | Flashed Gas | Flashed Liquid | Reservoir Fluid |
|----|-----------------------|----------------|----------------|-----------------|
| | | [mol %] | [mol %] | [mol %] |
| 1 | N2 | 3.70 | 0.00 | 1.82 |
| 2 | CO2 | 0.50 | 0.00 | 0.25 |
| 3 | C1 | 88.14 | 0.00 | 43.31 |
| 4 | C2 | 3.61 | 0.09 | 1.82 |
| 5 | C3 | 2.07 | 0.21 | 1.12 |
| 6 | i-C4 | 0.50 | 0.12 | 0.31 |
| 7 | n-C4 | 0.67 | 0.26 | 0.46 |
| 8 | i-C5 | 0.32 | 0.27 | 0.29 |
| 9 | n-C5 | 0.22 | 0.21 | 0.21 |
| 10 | C6 | 0.12 | 0.53 | 0.33 |
| 11 | C7 | 0.08 | 0.79 | 0.44 |
| 12 | C8 | 0.04 | 0.91 | 0.48 |
| 13 | C9 | 0.02 | 0.88 | 0.46 |
| 14 | C10 | 0.01 | 1.87 | 0.96 |
| 15 | C11 | 0.00 | 3.59 | 1.83 |
| 16 | C12 | 0.00 | 6.66 | 3.39 |
| 17 | C13 | 0.00 | 12.32 | 6.27 |
| 18 | C14 | 0.00 | 17.91 | 9.11 |
| 19 | C15 | 0.00 | 17.32 | 8.81 |
| 20 | C16 | 0.00 | 10.58 | 5.38 |
| 21 | C17 | 0.00 | 6.12 | 3.11 |
| 22 | C18 | 0.00 | 5.06 | 2.57 |
| 23 | C19 | 0.00 | 3.39 | 1.72 |
| 24 | C20 | 0.00 | 3.07 | 1.56 |
| 25 | C21 | 0.00 | 2.30 | 1.17 |
| 26 | C22 | 0.00 | 1.70 | 0.86 |
| 27 | C23 | 0.00 | 1.25 | 0.64 |
| 28 | C24 | 0.00 | 0.78 | 0.40 |
| 29 | C25 | 0.00 | 0.50 | 0.25 |
| 30 | C26 | 0.00 | 0.39 | 0.20 |
| 31 | C27 | 0.00 | 0.30 | 0.15 |
| 32 | C28 | 0.00 | 0.27 | 0.14 |
| 33 | C29 | 0.00 | 0.20 | 0.10 |
| 34 | C30+ | 0.00 | 0.15 | 0.08 |
| | Total | 100.00 | 100.00 | 100.00 |
| | Sample: | | | |
| | MW [g/mol] | 18.72 | 206.95 | 114.48 |
| | Gravity [air = 1] | 0.646[air = 1] | 0.8210[g/cm3] | ----- |
| | MW C7+ [g/mol] | 104.80 | 209.40 | 209.25 |
| | Gravity C7+ | 0.751 | 0.8410[g/cm3] | ----- |
| | Mol % C7+ | 0.15 | 98.29 | 50.08 |
| | Flash GOR [SCF/STB] | ----- | ----- | 509.72 |
| | Flash CGR [STB/MMSCF] | | | 1961.86 |

NNPC-FES
FIELD: KOLMANI RIVER
WELL: KOLMANI RIVER-4

MPSR B5_4887 RESERVOIR FLUID COMPOSITION

| No | Component | Flashed Gas | Flashed Liquid | Reservoir Fluid |
|----|-----------------------|----------------|----------------|-----------------|
| | | [mol %] | [mol %] | [mol %] |
| 1 | N2 | 3.09 | 0.00 | 1.73 |
| 2 | CO2 | 1.21 | 0.00 | 0.68 |
| 3 | C1 | 86.87 | 0.00 | 48.76 |
| 4 | C2 | 4.07 | 0.09 | 2.32 |
| 5 | C3 | 2.48 | 0.21 | 1.48 |
| 6 | i-C4 | 0.61 | 0.13 | 0.40 |
| 7 | n-C4 | 0.84 | 0.24 | 0.58 |
| 8 | i-C5 | 0.36 | 0.33 | 0.35 |
| 9 | n-C5 | 0.23 | 0.27 | 0.25 |
| 10 | C6 | 0.12 | 0.72 | 0.38 |
| 11 | C7 | 0.06 | 1.11 | 0.52 |
| 12 | C8 | 0.03 | 1.25 | 0.57 |
| 13 | C9 | 0.02 | 1.03 | 0.46 |
| 14 | C10 | 0.01 | 1.55 | 0.69 |
| 15 | C11 | 0.00 | 3.55 | 1.56 |
| 16 | C12 | 0.00 | 6.88 | 3.02 |
| 17 | C13 | 0.00 | 12.33 | 5.41 |
| 18 | C14 | 0.00 | 18.11 | 7.94 |
| 19 | C15 | 0.00 | 17.54 | 7.69 |
| 20 | C16 | 0.00 | 10.75 | 4.72 |
| 21 | C17 | 0.00 | 6.03 | 2.65 |
| 22 | C18 | 0.00 | 4.65 | 2.04 |
| 23 | C19 | 0.00 | 3.63 | 1.59 |
| 24 | C20 | 0.00 | 2.91 | 1.28 |
| 25 | C21 | 0.00 | 2.42 | 1.06 |
| 26 | C22 | 0.00 | 1.62 | 0.71 |
| 27 | C23 | 0.00 | 1.06 | 0.46 |
| 28 | C24 | 0.00 | 0.63 | 0.28 |
| 29 | C25 | 0.00 | 0.43 | 0.19 |
| 30 | C26 | 0.00 | 0.32 | 0.14 |
| 31 | C27 | 0.00 | 0.09 | 0.04 |
| 32 | C28 | 0.00 | 0.05 | 0.02 |
| 33 | C29 | 0.00 | 0.04 | 0.02 |
| 34 | C30+ | 0.00 | 0.03 | 0.01 |
| | Total | 100.00 | 100.00 | 100.00 |
| | Sample: | | | |
| | MW [g/mol] | 19.15 | 203.60 | 100.06 |
| | Gravity [air = 1] | 0.661[air = 1] | 0.8150[g/cm3] | ----- |
| | MW C7+ [g/mol] | 106.80 | 206.32 | 206.17 |
| | Gravity C7+ | 0.753 | 0.8390[g/cm3] | ----- |
| | Mol % C7+ | 0.12 | 98.01 | 43.06 |
| | Flash GOR [SCF/STB] | ----- | ----- | 681.41 |
| | Flash CGR [STB/MMSCF] | | | 1467.54 |

NNPC-FES
FIELD: KOLMANI RIVER
WELL: KOLMANI RIVER-4

MPSR B1_4275 RESERVOIR FLUID COMPOSITION

| No | Component | Flashed Gas | Flashed Liquid | Reservoir Fluid |
|----|-----------------------|----------------|----------------|-----------------|
| | | [mol %] | [mol %] | [mol %] |
| 1 | N2 | 5.25 | 0.00 | 1.05 |
| 2 | CO2 | 1.90 | 0.00 | 0.38 |
| 3 | C1 | 84.92 | 0.00 | 17.01 |
| 4 | C2 | 4.10 | 0.08 | 0.89 |
| 5 | C3 | 2.26 | 0.19 | 0.60 |
| 6 | i-C4 | 0.47 | 0.10 | 0.17 |
| 7 | n-C4 | 0.61 | 0.21 | 0.29 |
| 8 | i-C5 | 0.22 | 0.19 | 0.20 |
| 9 | n-C5 | 0.13 | 0.14 | 0.14 |
| 10 | C6 | 0.07 | 0.33 | 0.28 |
| 11 | C7 | 0.04 | 0.54 | 0.44 |
| 12 | C8 | 0.02 | 0.70 | 0.56 |
| 13 | C9 | 0.01 | 0.81 | 0.65 |
| 14 | C10 | 0.00 | 2.07 | 1.66 |
| 15 | C11 | 0.00 | 3.86 | 3.09 |
| 16 | C12 | 0.00 | 6.77 | 5.41 |
| 17 | C13 | 0.00 | 12.50 | 10.00 |
| 18 | C14 | 0.00 | 18.09 | 14.47 |
| 19 | C15 | 0.00 | 17.30 | 13.83 |
| 20 | C16 | 0.00 | 10.50 | 8.40 |
| 21 | C17 | 0.00 | 6.13 | 4.90 |
| 22 | C18 | 0.00 | 4.78 | 3.82 |
| 23 | C19 | 0.00 | 3.70 | 2.96 |
| 24 | C20 | 0.00 | 2.98 | 2.38 |
| 25 | C21 | 0.00 | 2.43 | 1.94 |
| 26 | C22 | 0.00 | 1.70 | 1.36 |
| 27 | C23 | 0.00 | 1.23 | 0.98 |
| 28 | C24 | 0.00 | 0.91 | 0.73 |
| 29 | C25 | 0.00 | 0.45 | 0.36 |
| 30 | C26 | 0.00 | 0.38 | 0.30 |
| 31 | C27 | 0.00 | 0.31 | 0.25 |
| 32 | C28 | 0.00 | 0.25 | 0.20 |
| 33 | C29 | 0.00 | 0.21 | 0.17 |
| 34 | C30+ | 0.00 | 0.16 | 0.13 |
| | Total | 100.00 | 100.00 | 100.00 |
| | Sample: | | | |
| | MW [g/mol] | 19.17 | 207.89 | 170.09 |
| | Gravity [air = 1] | 0.662[air = 1] | 0.8172[g/cm3] | ----- |
| | MW C7+ [g/mol] | 102.71 | 209.69 | 209.67 |
| | Gravity C7+ | 0.748 | 0.8412[g/cm3] | ----- |
| | Mol % C7+ | 0.07 | 98.76 | 78.99 |
| | Flash GOR [SCF/STB] | ----- | ----- | 130.96 |
| | Flash CGR [STB/MMSCF] | | | 7635.76 |



LASER

Petroleum Phase Behaviour (PVT) Laboratory



NNPC-FES
FIELD: KOLMANI RIVER
WELL: KOLMANI RIVER-4

| MPSR B2_4825 RESERVOIR FLUID COMPOSITION | | | | |
|--|-----------------------|----------------|----------------|-----------------|
| No | Component | Flashed Gas | Flashed Liquid | Reservoir Fluid |
| | | [mol %] | [mol %] | [mol %] |
| 1 | N2 | 10.75 | 0.00 | 2.08 |
| 2 | CO2 | 1.12 | 0.00 | 0.22 |
| 3 | C1 | 80.05 | 0.00 | 15.47 |
| 4 | C2 | 3.98 | 0.09 | 0.84 |
| 5 | C3 | 2.39 | 0.21 | 0.63 |
| 6 | i-C4 | 0.52 | 0.12 | 0.20 |
| 7 | n-C4 | 0.67 | 0.23 | 0.32 |
| 8 | i-C5 | 0.23 | 0.23 | 0.23 |
| 9 | n-C5 | 0.14 | 0.17 | 0.16 |
| 10 | C6 | 0.08 | 0.48 | 0.40 |
| 11 | C7 | 0.04 | 0.73 | 0.60 |
| 12 | C8 | 0.02 | 0.89 | 0.72 |
| 13 | C9 | 0.01 | 0.96 | 0.78 |
| 14 | C10 | 0.00 | 1.81 | 1.46 |
| 15 | C11 | 0.00 | 3.24 | 2.61 |
| 16 | C12 | 0.00 | 6.70 | 5.41 |
| 17 | C13 | 0.00 | 12.48 | 10.07 |
| 18 | C14 | 0.00 | 17.69 | 14.27 |
| 19 | C15 | 0.00 | 17.24 | 13.91 |
| 20 | C16 | 0.00 | 10.45 | 8.43 |
| 21 | C17 | 0.00 | 6.14 | 4.95 |
| 22 | C18 | 0.00 | 5.07 | 4.09 |
| 23 | C19 | 0.00 | 3.38 | 2.73 |
| 24 | C20 | 0.00 | 2.97 | 2.40 |
| 25 | C21 | 0.00 | 2.25 | 1.82 |
| 26 | C22 | 0.00 | 1.75 | 1.41 |
| 27 | C23 | 0.00 | 1.33 | 1.07 |
| 28 | C24 | 0.00 | 0.99 | 0.80 |
| 29 | C25 | 0.00 | 0.53 | 0.43 |
| 30 | C26 | 0.00 | 0.45 | 0.36 |
| 31 | C27 | 0.00 | 0.39 | 0.31 |
| 32 | C28 | 0.00 | 0.33 | 0.27 |
| 33 | C29 | 0.00 | 0.31 | 0.25 |
| 34 | C30+ | 0.00 | 0.39 | 0.31 |
| | Total | 100.00 | 100.00 | 100.00 |
| | Sample: | | | |
| | MW [g/mol] | 19.69 | 209.56 | 172.87 |
| | Gravity [air = 1] | 0.680[air = 1] | 0.8167[g/cm3] | ----- |
| | MW C7+ [g/mol] | 102.71 | 211.78 | 211.76 |
| | Gravity C7+ | 0.748 | 0.8430[g/cm3] | ----- |
| | Mol % C7+ | 0.07 | 98.47 | 79.46 |
| | Flash GOR [SCF/STB] | ----- | ----- | 124.15 |
| | Flash CGR [STB/MMSCF] | | | 8054.70 |

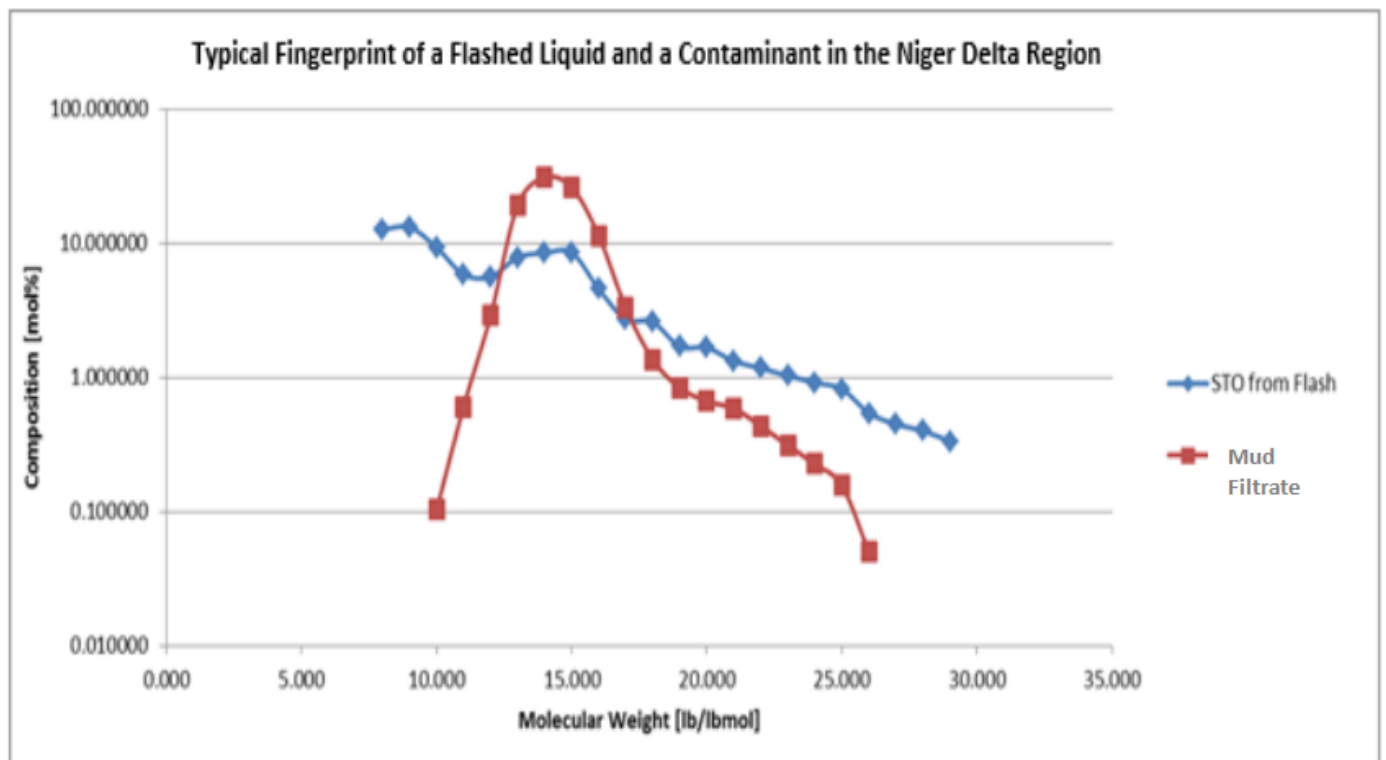
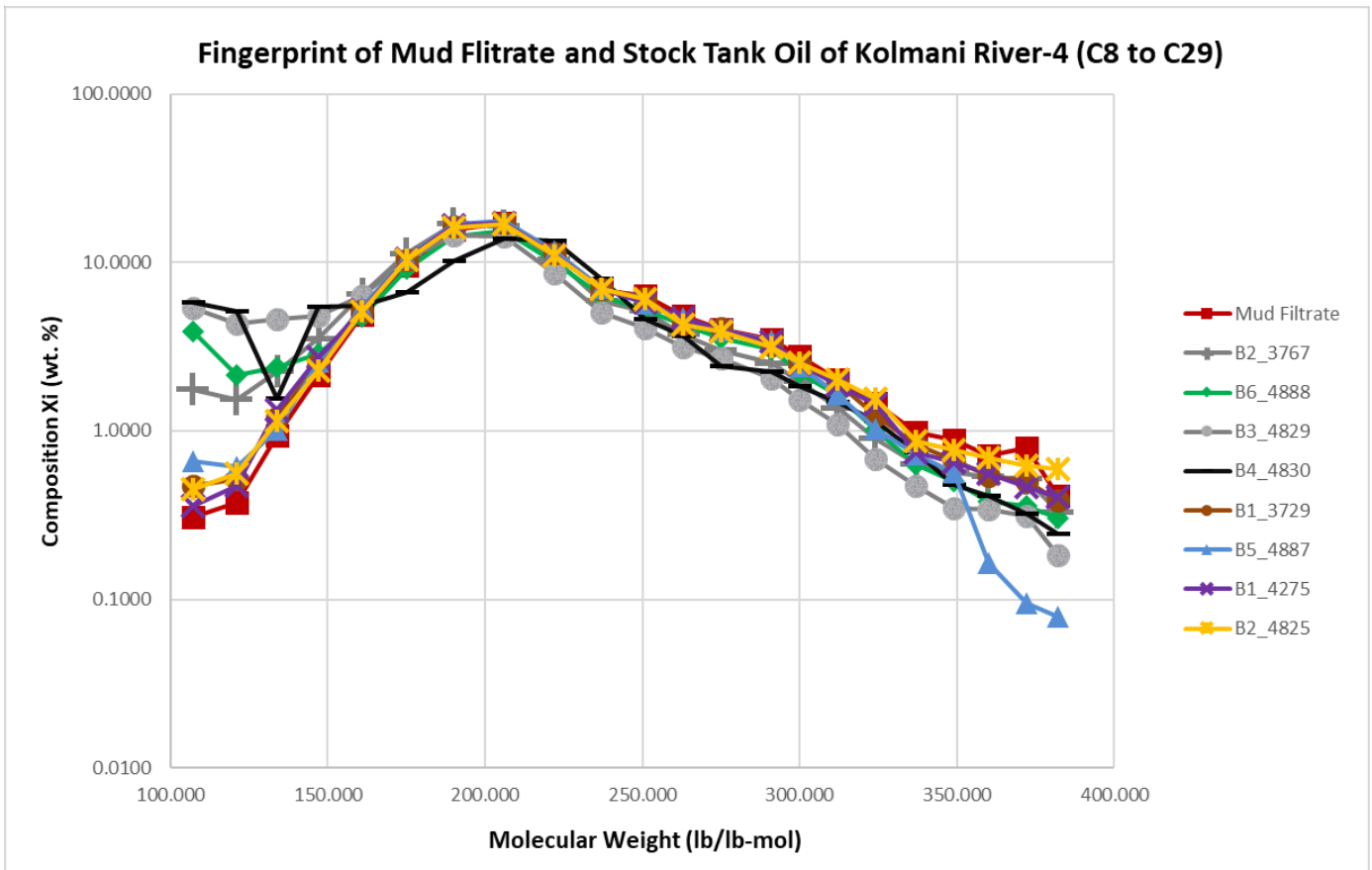


LASER

Petroleum Phase Behaviour (PVT) Laboratory



NNPC-FES
FIELD: KOLMANI RIVER
WELL: KOLMANI RIVER-4



NNPC-FES
FIELD: KOLMANI RIVER
WELL: KOLMANI RIVER-4

Nomenclature

Symbols

| | |
|----|------------------|
| °F | Degree Farenheit |
| % | Percent |

Abbreviations

| | |
|------|---------------------------------|
| BHS | Bottom Hole Sample |
| MD | Measured Depth |
| N/A | Not Available |
| OBM | Oil Based Mud |
| PSIA | Pounds per Square Inch Absolute |
| PVT | Pressure Volume Temperature |
| STO | Stock Tank Oil |
| Wt. | Weight |



LASER

Petroleum Phase Behaviour (PVT) Laboratory

