

AGAR WATERCUT FIELD EVALUATION TEST – Otumara and North Bank Flow Stations

Executive Summary:

As a requirement for use of Agar water cut meters for BS&W measurement in line with regulations, a joint field test was conducted for the Agar watercut meter at Otumara FS and North bank FS in the presence of Department of Petroleum Resources (DPR), The Shell Petroleum Development Company of Nigeria Ltd (SPDC) and PE Energy Ltd (PEEL) representing Agar Corporation in Nigeria.

The visit which was held from 4th to 5th December involved field test of Agar watercut meter installed on the 10" delivery line at Otumara FS with laboratory analysis of samples at Otumara FS laboratory on 4th December 2018 and field test Agar water cut meter installed on the 8" delivery line at North bank FS on 4th December 2018, while laboratory analysis of samples was conducted at the Forcados Oil Terminal(FOT) laboratory on 5th December 2018.

Three samples were collected from each meter and the samples were taken to the laboratories for Dean and Stack (D & S) analysis.

1.0 The Facility setup

The Agar water cut meter installation at Otumara FS and North Bank FS comprised of inline static mixers upstream the water cut meters. At Otumara, the installation is upstream the metering skid, while that at North bank is downstream the metering skid.



Fig 1.0 Otumara FS Installation



Fig 1.1 North Bank FS Installation

2.0 TEST DESCRIPTION

The test was conducted in line with the OEM recommendation for field sampling as contained in the attached document "MANUAL PIPELINE SAMPLING PROCEDURE".

Test Description

1. Conduct safety briefing/tool box talk
2. Assess work area
3. Assemble sample collection materials
 - a. Bucket for flushing
 - b. 3 number of 4 liter cans for sample collection.
 - c. 3 Beakers/measuring cylinders
 - d. Separation cylinders
 - e. Test tubes and manual centrifuge
 - f. IS laptop with OWMwin software and accessories.
4. Set-up manual sampling analysis unit
5. Connect the Laptop to Agar meter and login to OWMwin
6. Flush sampling
7. Start line save and collection of samples simultaneously
8. Record sample start time and end time
9. Complete sample analysis with field set-up
10. Record and compare result with meter readings

Repeat steps 4 to 10 for the other samples

3.0 Test Result

Results are summarised below:

FACILITY :	Otumara FS		
TEST DATE:	4 th December 2018		
LOCATION OF WATERCUT METER:	Metering Skid area		
METER SERIAL NO/YEAR OF MFG:	130036.18/2013		
METER MANUFACTURE:	AGAR Corporation		
PHYSICAL DESCRIPTION OF STATE OF METER:	Meter was in good condition		
WAS METER POWERED ON: YES/NO	Yes		
DESCRIPTION OF SAMPLE COLLECTION POINT:	Sampling point is on the line		
NUMBER OF SAMPLES COLLECTED:	3		
	SAMPLE 1	SAMPLE 2	SAMPLE 3
START TIME	12:01	12:07	12:11
STOP TIME	12:02	12:08	12:11
AVERAGE WCM READING (OWNwin)	66.30	66.09	65.70
DEAN & STARK(LAB ANALYSIS)	64.96	65.50	65.07

Table 3.1: Summary of results for Otumara FS

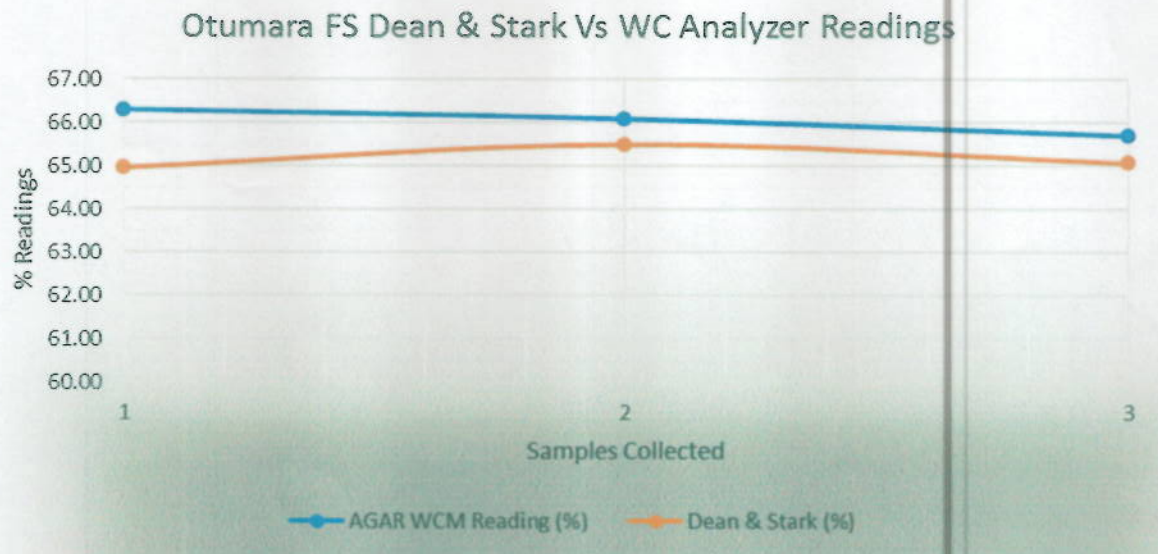


Fig 3.2: Dean & Stark v WC analyser readings for Otumara FS

Ogboke, O. *[Signature]* Enyike A. *[Signature]* Uboke, S. *[Signature]* Douglas, O. *[Signature]*

FACILITY:	North Bank FS		
TEST DATE:	5 th December 2018		
LOCATION OF WATERCUT METER:	Metering Skid area		
METER SERIAL NO/YEAR OF MFG:	130036.4/2013		
METER MANUFACTURE:	AGAR Corporation		
PHYSICAL DESCRIPTION OF STATE OF METER:	Meter was in good condition		
WAS METER POWERED ON: YES/NO	Yes		
DESCRIPTION OF SAMPLE COLLECTION POINT:	Sampling point is on the line		
NUMBER OF SAMPLES COLLECTED:	3		
	SAMPLE 1	SAMPLE 2	SAMPLE 3
START TIME	17:43	17:47	17:50
STOP TIME	17:44	17:47	17:50
AVERAGE WCM READING (OWNwin)	18:29	15:44	15:83
DEAN & STACK(LAB ANALYSIS)	18:50	15:80	14:50

Table 3.3: Summary of results for Otumara FS

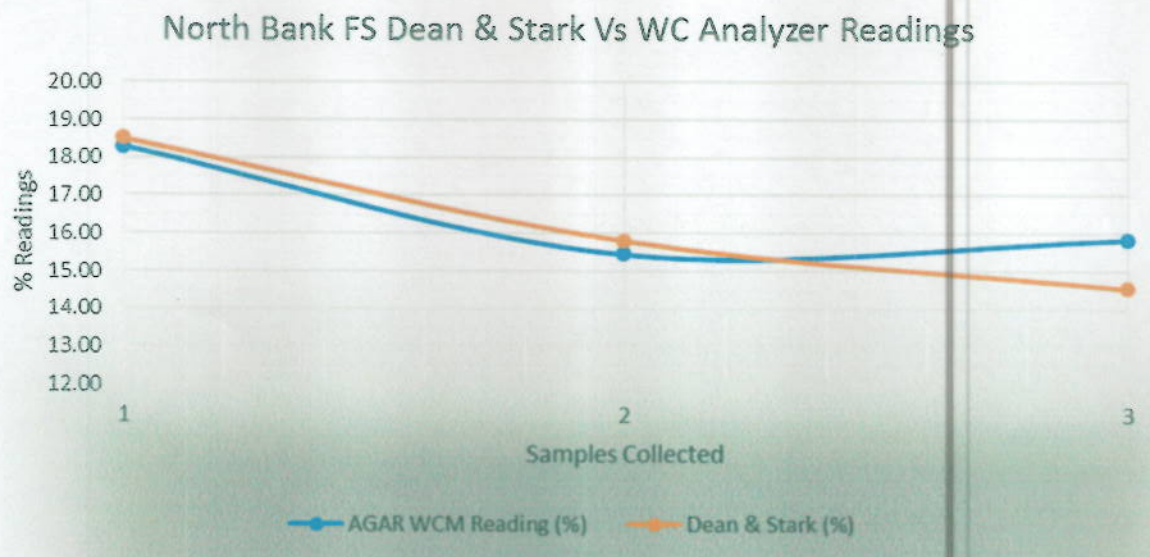


Fig 3.4: Dean & Stark v Water analyser reading for North bank FS

4.0 Summary:

Comparison of data as shown in Fig. 3.2 and 3.4 shows that the deviation between D & S and water cut readings is less than $\pm 2\%$. This is clearly represented in the deviation plot below.

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 U. S. K. S.
 Douglas, O.
 Ogborbe O.

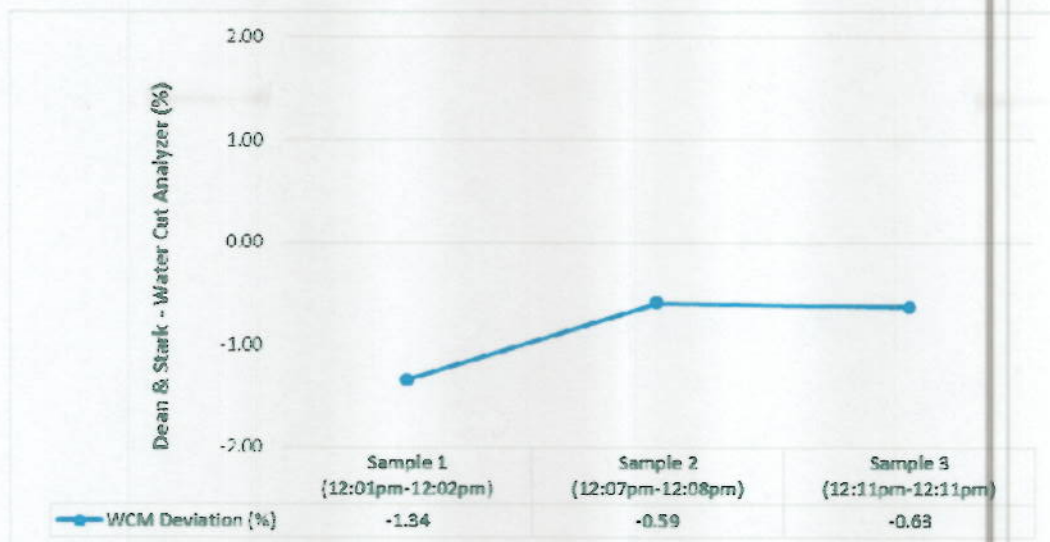


Fig 4.1: Deviation Plot for Otumara FS

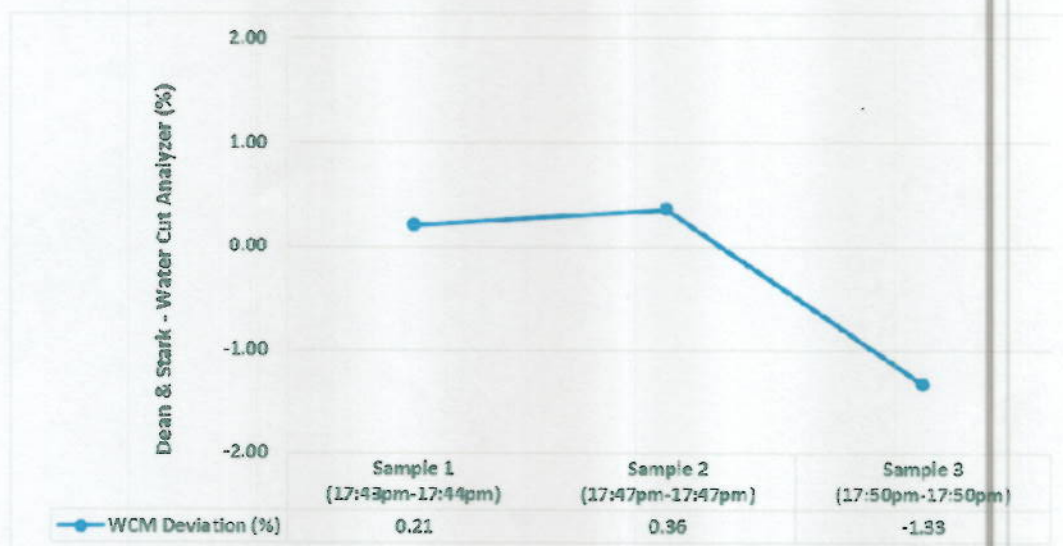


Fig 4.2: Deviation Plot for North bank FS

Ogboke O.
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Rhyshike A


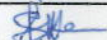

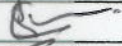

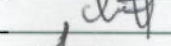

Ugoka, S
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Douglas O.
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5.0 List of Participants/Sign-off

S/N	NAME	COMPANY	SIGNATURE	DATE
1	Tele Moses	DPR		06th DEC, 2018
2	IkemefunaMba	DPR		06th Dec, 2018
3	Odima Douglas	SPDC		06/12/18
4	Samson Uzoka	SPDC		06/12/2018
5	Damiete Thomas	PEEL		06/12/18
6	OnyekaOgbobe	SPDC		06/12/18
7	Anthony Enyadike	SPDC		06/12/2018

APPENDIX:



Pipeline Sampling
Ver0.pdf

1.0: Agar Pipeline Sampling Procedure



North Bank Flow
Station Water Cut Me

2.0: North Bank FS Sample Analysis result

3.0: Otumara FS Sample Analysis result



OTUMARA_130036.1
8_4.12.18_v2.xlsx

4.0: Otumara WCM readings download



NORTH BANK WCM
Reading_4.12.18.xlsx

5.0: Northbank WCM readings download