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An Integrated Approach to Well Development and Delivery for Niger Delta Marginal Fields Operators

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Abstract— this paper is aimed at bridging the operational gap in some of the marginal fields caused by lack of investors to provide funds for the hiring of competent Engineers for complete surveillance of the oil and gas assets. Also to assist marginal field operators on how to keep and manage data in order to identify challenges in individual wells for possible maintenance and repairs, A program was developed using Microsoft Visual Basic 2010 Version to aid Engineers for an effective well maintenance, production technology inputs, formation damage and pressure depletion analysis. Production well data from fourteen (14) reservoirs marginal field (appendix 1) were used to test and validate the program. The production input data were, number of completion zones, reservoir oil rates, water rates, gas rates, liquid gross rates, manual sand count, flowing tubing head pressure and choke sizes. The output result variables were reliable and included, Gas-Oil-Ratio (GOR), Basic Sediments and Water (BSW), Gas superficial velocities, liquid superficial velocities, mixture superficial velocities, erosional velocities and water oil ratio (WOR). Through these results, theoretical and diagnostic plots were established to aid the surveillance Engineers identify the challenges and proffer solutions to problematic matured Wells in case of water coning, water channeling and sand upsurge. Therefore the software would serve as a tool for analysis to assist marginal field operators to manage their wells professionally, efficiently and in decision making, particularly in prediction of production volumes in the life of the asset during the phase of production decline.

Index Terms— Marginal fields, reservoir rates, water rates, gas rates, liquid rates, BS&W,well surveillance .

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1 INTRODUCTION

A Marginal field is one that can be developed with marginal profits regardless of the actual size of the oil and gas field. It requires special field development planning strategies to have an acceptable return on investment, ROI [1]. According to the Department of Petroleum Resources (DPR 2019), there are over two hundred Marginal Oil Fields in Niger Delta, estimated to contain over 2.3 billion barrels of Stock Tank Oil Initially in Place (STOIIP). With considerable amount of oil retained in the ground even after being subjected to many years of primary recovery methods, it therefore becomes imperative that special equipment and technology be employed to achieve maximum recovery in the remote marginal fields case. In 2003, twenty seven (27) marginal fields were awarded by the government to sole and joint venture operators, only nine have been developed and are producing currently while the rest are still planning production or seemingly dormant. DPR recent index showed a total of 31 new Marginal Fields (16 onshore and 15 offshore) to be awarded to qualifying operators [2]. Reasons for non-development of these fields are largely linked to huge costs associated with conventional development methods as well as their remoteness.

Surveillance has been used in the oil industry since the early days but mostly reactive in nature. But, as producing wells decline in production, measurements are made to understand the cause and appropriate remedial measures through surveillance. Most projects are required to have proactive surveillance not only to monitor the health and safety of the systems but also to ensure active Production and Reservoir management decision making. This has been possible because of improved correlation of direct and indirect measurements with uncertain parameters of interest. The issues of lack of real time monitoring, insufficient data, poor management of data and the lack of motivation to acquire data at appropriate times have been a major challenge for Marginal field operators particularly during re-entry and post re-entry operations. For example, a proper surveillance system would actively limit problems associated with Sand Production, Excessive Water Production, High GOR and using wrong Choke sizes.

The need for a computer based program as a tool to simplify or demystify surveillance in the oil and gas marginal field operations has also being a major challenge. Talash in [4] contends that the desire to understand chemical recovery process applications led to a significant increase in surveillance activities. Discussions relating not only to data gathering but also to documentation, automated systems, data integration, and other process elements started to appear [7, 8, 9]. The decision to measure a certain parameter at a given point in the system at a given time is invariably linked to its value. The value can be looked at as a quantification of benefit over cost [10, 11, 12]. According to Kikani in [13], the essential part of any project especially a supplemental recovery project, like the marginal field operation should have a well-designed and well-executed surveillance plan. This plan should be tailored to meet the specific needs of each individual project or field be-

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cause each project or field has different characteristics requiring different degrees of evaluation and observation.

2 The Well Surveillance Manager (WSM) Overview and platform

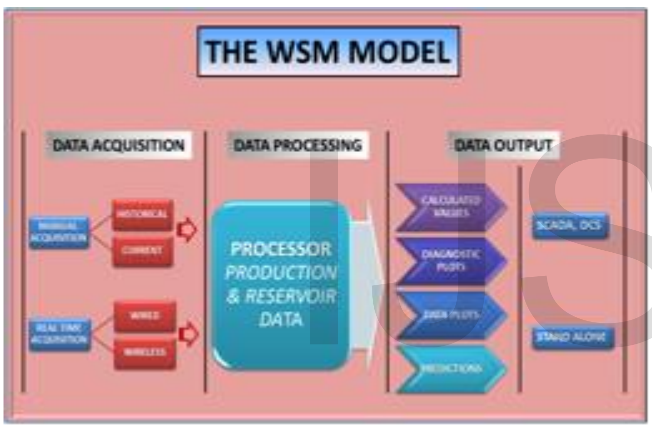
In developing the model, a computer programming language called Microsoft visual basic 2010 version was used to build a user friendly program called the WSM as shown in the flow chart interface Figure 1. The fundamental tasks done by the software were;

a. To validate and check the quality of the marginal field production data.

b. Deduce possible challenges that the wells faced from the production history data plots.

c. Identify well production problems, like water coning, sand problems and others.

d. Calculate other variables like erosional velocities, superficial velocities of gas, liquid and mixture, water – oil – ratio, water – oil – ratio derivative, gas – oil – ratio and BSW.



2.1 Basic equations for Calculated Variables in the WSM

Detailed submission guidelines can be found on the author resources Web pages. Author resource guidelines are specific to each journal, so please be sure to refer to the correct journal when seeking information. All authors are responsible for understanding these guidelines before submitting their manuscript. For further information on both submission guidelines, authors are strongly encouraged to refer to http://www.ijser.org.

The equations used for the calculated variables that were processed in the Well Surveillance Manager program automatically are.

$$BSW = \frac{Water\ Rate\,(B/D)}{Gross\ Liquid\ (B/D)} \quad (1)$$

Or when measured in a test tube

$$BSW = \frac{Water\,Vol.(B/D)}{Gross\,Vol.(B/D)} \quad (2)$$

Where BSW is the Basic Sediment and Water

$$GOR = \frac{Gas\,Rate\,(mmscf/D)}{Net\,Oil\ (B/D)} \quad (3)$$

Where GOR is the Gas-Oil ratio

$$U_s = \frac{Q}{A} \quad (4)$$

Where us is the superficial velocity of a given phase, m/s; Q is the volume flow rate of the phase, m3/s and A is the cross sectional area, m2

$$U_s = \phi U \quad (5)$$

Where Φ is porosity, dimensionless and u is the advection velocity, m/s.

$$V = \frac{C}{\sqrt{\rho}} \quad (6)$$

Where V is the maximum recommended velocity, ft/s; ρ is the gas/liquid density at the flow temperature and pressure, lb ft−3; C is an empirical constant. Equation 6 is only valid for horizontal flow with shear stress as the limiting factor.

2.2 Auto Outlier Correction Method

Bulky data such as production data surveyed for so many years were liable to many errors. Also, the many years of survey, sampling equipment like gauges and other equipment can be faulty or inconsistent. Therefore the responsibility of a Surveillance Engineer is to correct the data so that plots can be representative. This program automatically did the correction on the basis of the concept of the straight line equation, (y = mx + C)

3 Results and Discussion

Production data from fourteen (14) reservoirs were used to test the capability of the WSM software. The components of the input data are the following; Completion zone), Reservoir data, Field and well name , Date of test, Oil Rate (B/D), Gas Rate (mmscf/D), Water Rate (B/D), THP (Psi), Choke (/"64), Sand (PPTB), BSW (%), GOR (Scf/B), Liquid Rate (B/D). Figure 2 below shows the uploaded data on the WSM software.

Production Data Table | Production Data Chart

Reservoir	Field	Date	Oil Rate	Gas Rate	Water Rate	THP	Choke	Sand
M1100X	AFIE001L	7/31/1968 12:00...	8.39	4.03	0	0	0	0
M1100X	AFIE001L	11/30/1970 12:0...	452.27	881.47	0	1480	16	0
M1100X	AFIE001L	8/31/1973 12:00...	70.94	301.97	0	2000	12	2.5
M1100X	AFIE001L	9/30/1973 12:00...	141.37	744.77	0	2116.667	12	3.7
M1100X	AFIE001L	10/31/1975 12:0...	25.9	233.45	0	2250	12	2
M1100X	AFIE001L	11/30/1975 12:0...	0.1	0.9	0	2250	12	1
M1100X	AFIE001L	7/31/1977 12:00...	29.58	28.26	0.61	2270	12	0
M1100X	AFIE001L	8/31/1977 12:00...	441.29	337.48	201.32	836.667	14	7.2
M1100X	AFIE001L	9/30/1977 12:00...	710.73	603.07	334.47	513.333	24	9.4
M1100X	AFIE001L	10/31/1977 12:0...	622.52	500.23	468.65	315	30	8.8
M1100X	AFIE001L	11/30/1977 12:0...	413.9	301.33	505.87	130	32	5.4
M1100X	AFIE001L	12/31/1977 12:0...	350.58	337.16	428.48	140	26	0
M1100X	AFIE001L	1/31/1978 12:00...	356.13	345.1	435.26	180	32	0
M1100X	AFIE001L	2/28/1978 12:00...	496.71	224.71	533.36	193.333	32	5.8
M1100X	AFIE001L	3/31/1978 12:00...	337.94	192.13	762.94	190	32	19.5
M1100X	AFIE001L	4/30/1978 12:00...	393.5	222.8	881.33	188.333	32	1.3
M1100X	AFIE001L	5/31/1978 12:00...	450.52	177.03	766.81	180	32	0.5
M1100X	AFIE001L	6/30/1978 12:00...	344.8	252.1	886.63	175	32	0.6
M1100X	AFIE001L	7/31/1978 12:00...	304.68	212.97	783.45	175	32	4.8
M1100X	AFIE001L	8/31/1978 12:00...	430.74	198.58	874.55	185	32	0

Fig. 1 well input data on Well Surveillance Manager Program

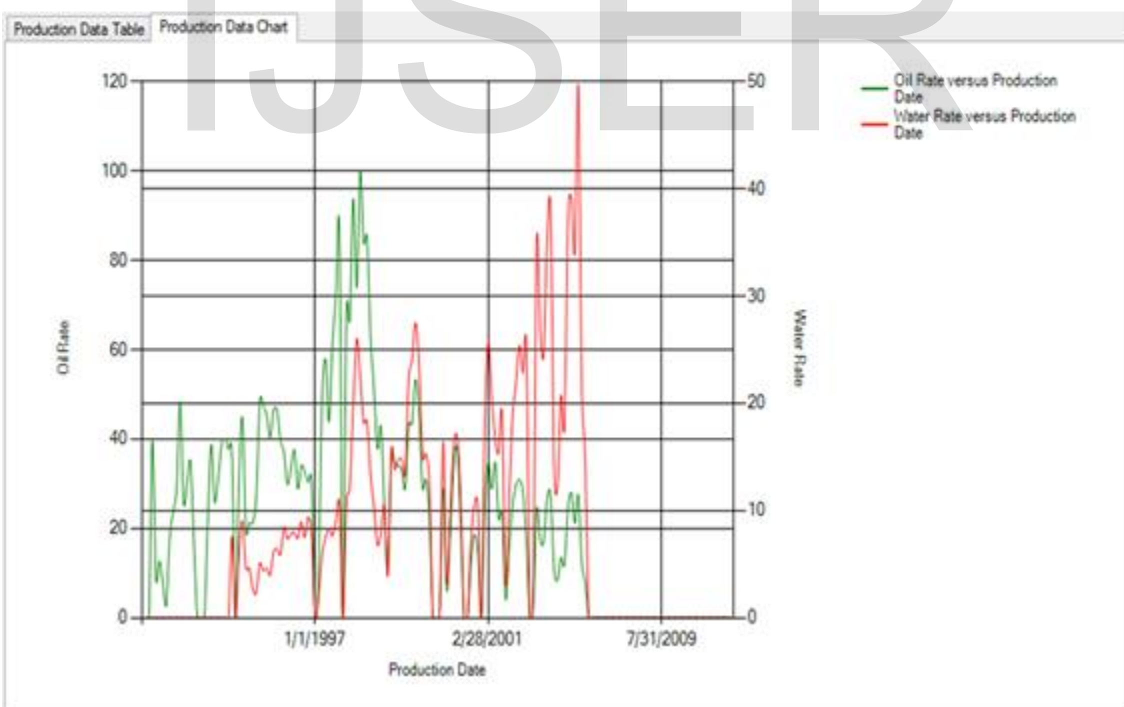


Fig. 2 Plot of Oil rate and Water rate versus Production Data

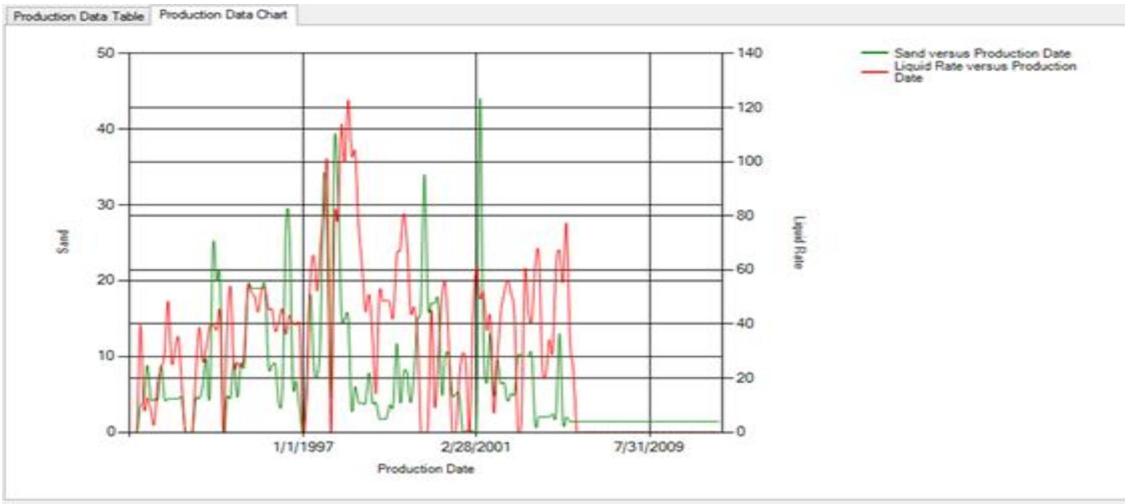


Fig. 3 Plot of Sand and Liquid Rate versus Production Data

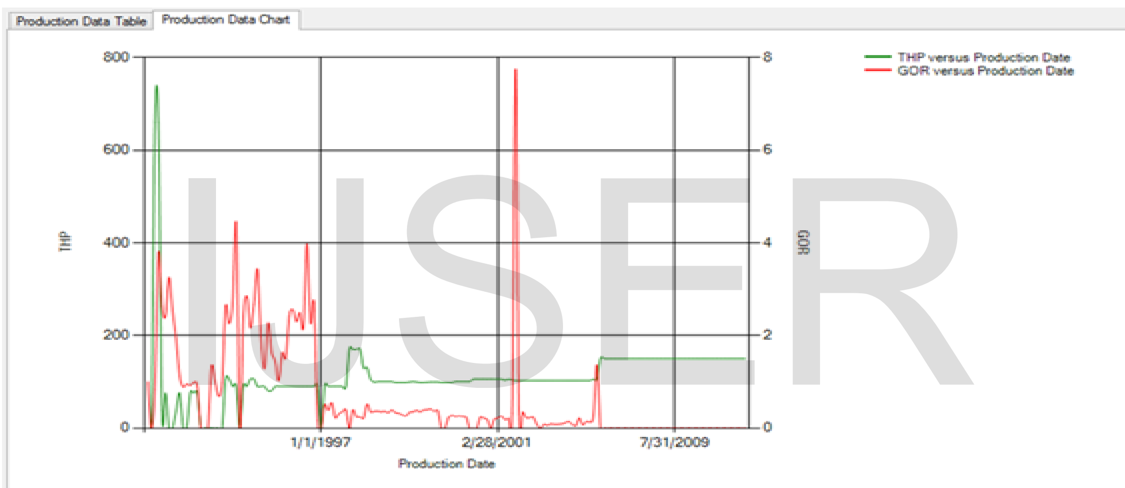


Fig. 4 Plot of THP and GOR versus Production data

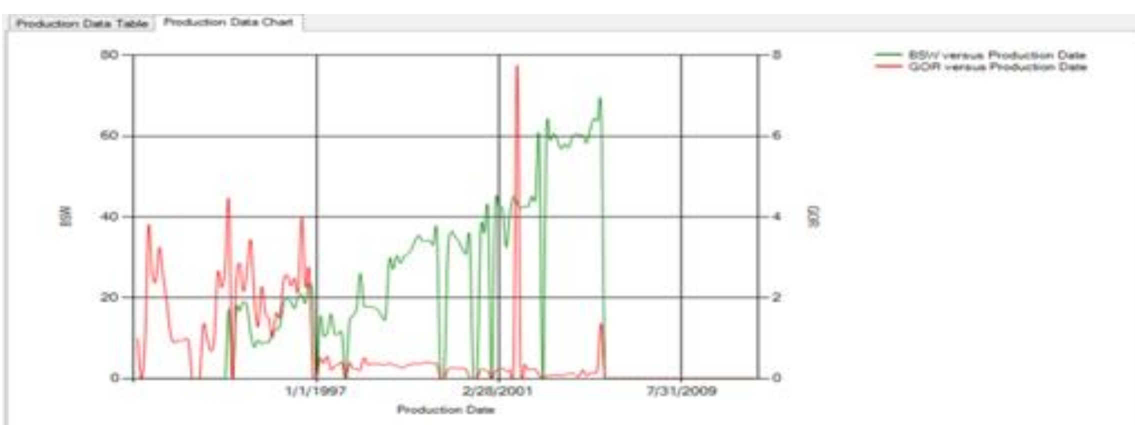
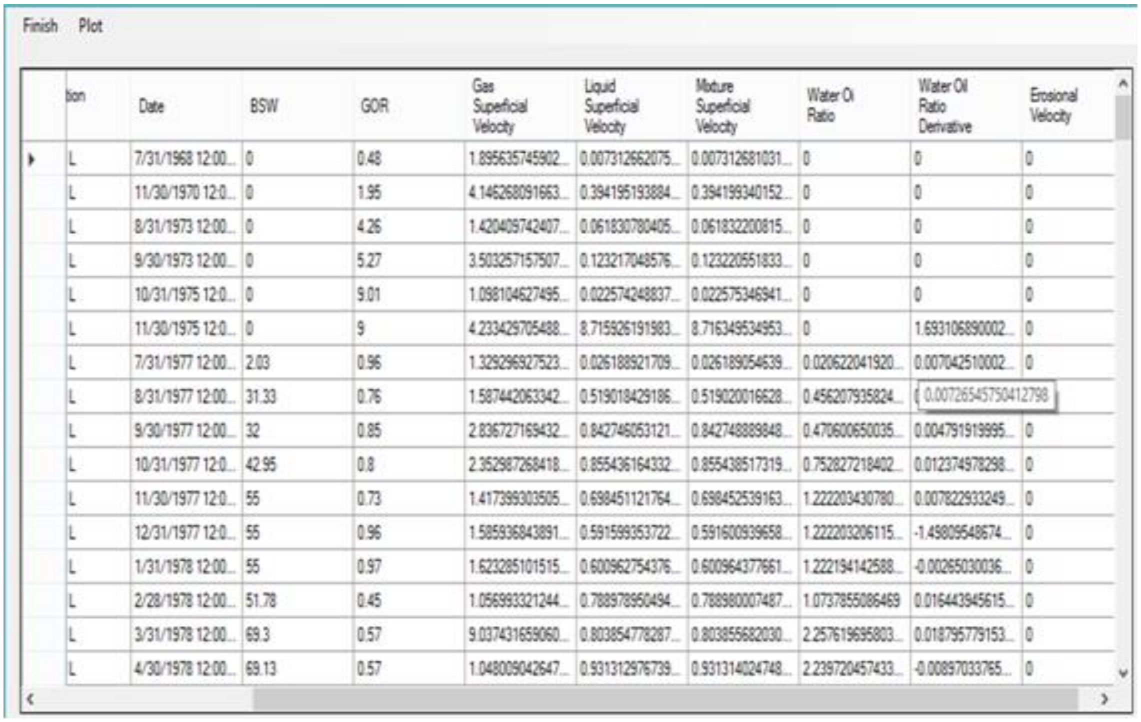


Fig. 5 Plot of BSW and GOR versus Production data



Finish Plot

tion	Date	BSW	GOR	Gas Superficial Velocity	Liquid Superficial Velocity	Mixture Superficial Velocity	Water Oi Ratio	Water Oil Ratio Derivative	Erosional Velocity
L	7/31/1968 12:00...	0	0.48	1.895635745902...	0.007312662075...	0.007312681031...	0	0	0
L	11/30/1970 12:0...	0	1.95	4.146268091663...	0.394195193884...	0.394199340152...	0	0	0
L	8/31/1973 12:00...	0	4.26	1.420409742407...	0.061830780405...	0.061832200815...	0	0	0
L	9/30/1973 12:00...	0	5.27	3.503257157507...	0.123217048576...	0.123220551833...	0	0	0
L	10/31/1975 12:0...	0	9.01	1.098104627495...	0.022574248837...	0.022575346941...	0	0	0
L	11/30/1975 12:0...	0	9	4.233429705488...	8.715926191983...	8.716349534953...	0	1.693106890002...	0
L	7/31/1977 12:00...	2.03	0.96	1.329296927523...	0.026188921709...	0.026189054639...	0.020622041920...	0.007042510002...	0
L	8/31/1977 12:00...	31.33	0.76	1.587442063342...	0.519018429186...	0.519020016628...	0.456207935824...	(0.00726545750412798	
L	9/30/1977 12:00...	32	0.85	2.836727169432...	0.842746053121...	0.842748889848...	0.470600650035...	0.004791919995...	0
L	10/31/1977 12:0...	42.95	0.8	2.352987268418...	0.855436164332...	0.855438517319...	0.752827218402...	0.012374978298...	0
L	11/30/1977 12:0...	55	0.73	1.417399303505...	0.698451121764...	0.698452539163...	1.222203430780...	0.007822933249...	0
L	12/31/1977 12:0...	55	0.96	1.585936843891...	0.591599353722...	0.591600939658...	1.222203206115...	-1.49809548674...	0
L	1/31/1978 12:00...	55	0.97	1.623285101515...	0.600962754376...	0.600964377661...	1.222194142588...	-0.00265030036...	0
L	2/28/1978 12:00...	51.78	0.45	1.056993321244...	0.788978950494...	0.788980007487...	1.0737855086469	0.016443945615...	0
L	3/31/1978 12:00...	69.3	0.57	9.037431659060...	0.803854778287...	0.803855682030...	2.257619695803...	0.018795779153...	0
L	4/30/1978 12:00...	69.13	0.57	1.048009042647...	0.931312976739...	0.931314024748...	2.239720457433...	-0.00897033765...	0

Fig 6 Results of calculated variables from the WSM

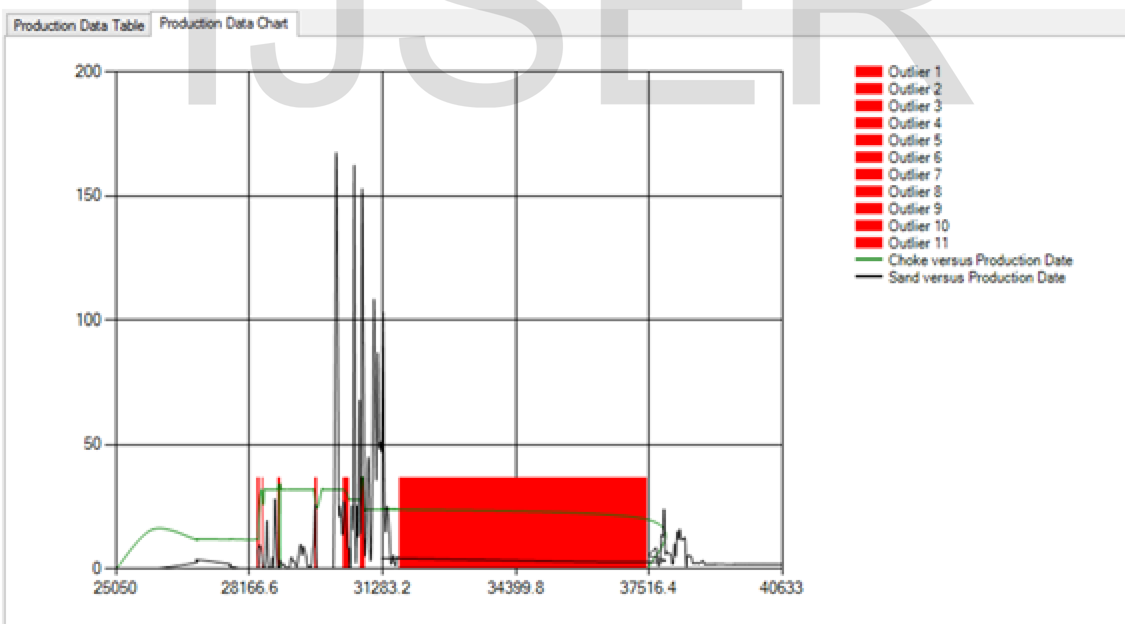


Fig. 7 Outlier correction of the production data from the WSM

Production Data Table | Production Data Chart

l Rate	Gas Rate	Water Rate	THP	Choke	Sand	BSW	GOR	Liquid Rate
9	4.03	0	0	0	0	0	0.48	8.39
2.27	881.47	0	1480	16	0	0	1.95	452.27
94	301.97	0	2000	12	2.5	0	4.26	70.94
1.37	744.77	0	2116.667	12	3.7	0	5.27	141.37
9	233.45	0	2250	12	2	0	9.01	25.9
	0.9	0	2250	12	1	0	9	0.1
58	28.26	0.61	2270	12	0	2.03	0.96	30.19
1.29	337.48	201.32	836.667	14	7.2	31.33	0.76	642.61
0.73	603.07	334.47	513.333	24	9.4	32	0.85	1045.2
2.52	500.23	468.65	315	30	8.8	42.95	0.8	1091.17
3.9	301.33	505.87	130	32	5.4	55	0.73	919.77
0.58	337.16	428.48	140	26	0	55	0.96	779.06
6.13	345.1	435.26	180	32	0	55	0.97	791.39
6.71	224.71	533.36	193.333	32	5.8	51.78	0.45	1030.07
7.94	192.13	762.94	190	32	19.5	69.3	0.57	1100.88
3.5	222.8	881.33	188.333	32	1.3	69.13	0.57	1274.83
0.52	177.03	766.81	180	32	0.5	62.99	0.39	1217.33
4.8	252.1	886.63	175	32	0.6	72	0.73	1231.43
4.68	212.97	783.45	175	32	4.8	72	0.7	1088.13
0.74	198.58	874.55	185	32	0	67	0.46	1305.29

Fig. 8 Results of checked erosional velocity from the WSM

Figure 1 shows the well data when uploaded on WSM. Figure 2 shows how oil rate and water rate fluctuated over time for the case study reservoirs. Figure 3 shows how sand and liquid rate fluctuated over time for the case study reservoirs. Figure 4 shows how Tubing Head Pressure and Gas Oil Ration fluctuated over time for the case study reservoirs. Figure 5 shows how the Basic Sediment & Water and Gas Oil Ratio fluctuate over time for the case study reservoirs. Figure 6 displays the results of some calculated variables that were useful in this research.

4 Conclusion

From this study, the following were concluded:

1. A proactive surveillance management tool was possible and developed purposely to assist marginal field operators in order to effectively manage their wells and reservoirs in a more professional and efficient manner.
2. Diagnostic plots were obtained and used to understand the behavior and trend of individual wells as well as identify the problems or challenges a well faces during its production life.

References

[1] Nwaozuzu, C., Marginal oil fields development: Status, constraints, prospects & way forward, Available at: http://sweetcrudereports.com/2013/12/05/marginal-oil-fields development-status-constraints-prospects-way-forward/2013 (Accessed 25 August 2014).

[2] Kulasingam, R., Marginal fields in Nigeria: recent developments, available at: http://www.dentons.com/en/insights/alerts/2014/may/20/nigeria-2013marginal-fields-licensing-round (Accessed 8 August 2014), 2014.

[3] Kunkel, G.C. and Bagley, J.W. Jr., "Control Water flooding, means Queen Reservoir," Presented at the SPE Annual Meeting, Denver, 3-6 October, 1965, SPE-1211-MS.

[4] Talash, A.W., "An Overview of Waterflood Surveillance Monitoring," Journal of Petroleum Technology, 1988, 40(12), 1539-1543, SPE-18740-PA. http://dx.doi.org/10.2118/22344-PA.

[5] Bucaram, S.M. and Sullivan, J.H., "A Data Gathering and Processing System To Optimize Producing Operations," Journal of Petroleum Technology, 1972, 24 (2), 185-192, SPE- 3468-PA. http://dx.doi.org/10.2118/3468-PA.

[6] Moore, J.B., "Oilfield Surveillance With Personal Computers," Journal of Petroleum Technology, 1986, 38(6), 665-668, SPE-13632-PA. http://dx.doi.org/10.2118/13632-PA.

[7] Thakur, G.C., "Waterflood Surveillance Techniques- A Reservoir Management Approach," Journal of Petroleum Technology, 1991, 43(10), 1180-1188, SPE- 23471-PA. http://dx.doi.org/10.2118/23471-PA.

[8] Terrado, R.M., Yudono, S., and Thakur, G.C., "Waterflood Surveillance and Monitoring: Putting Principles Into Practice," Presented at the SPE Annual Technical Conference and Exhibition, San Antonio, Texas, USA, 24-27 September, 2006, SPE-102200-MS. http://dx.doi.org/10.2118/102200-MS.

[9] Grose, T.D., "Surveillance- Maintaining the Field From Cradle to Grave, Presented at the Offshore Europe," 4-7 September, Aberdeen, Scotland, U.K, 2007, SPE 108498 MS.
http://dx.doi.org/10.2118/108498-MS

[10] Sengul, M. and Beckkousha, M.A., "Applied Production Optimization: I-Field," Presented at the SPE Annual Technical Conference and Exhibition, San Antonio, Texas, USA, 29 September – 2 October, 2002, SPE-77608-MS.
http://dx.doi.org/10.2118/77608-MS.

[11] Holstein, E.D. and Berger, A.R., "Measuring the Quality of a Reservoir Management Program," Journal of Petroleum Technology, 1997, 49(1), 52-56. SPE-35200-MS. http://dx.doi.org/10.2118/35200-MS.

[12] Raghuraman, B., Couet, B. and Savundararaj, P., Valuation of Technology and Information for Reservoir Risk Management, SPE Res Eval & Eng, 2003, 6(5), 307-316, SPE-86568-PA. http://dx.doi.org/10.2118/86568-PA.

[13] Kikani, J., Reservoir Surveillance, Presented as a Society of Petroleum Engineers distinguished lecture, 2013.

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APPENDIX I

Samples of Actual Field Production Data from a marginal field in the Niger Delta

Completion	Reservoir	Field	Oil Rate (B/D)	Gas Rate (mmscf/D)	Water Rate (B/D)	THP (Psi)	Choke (/"64)	Sand (PPTB)	BSW (%)	GOR (Scf/B)	Liquid Rate (B/D)
AFIE001L	M1100X	AFAVOUR	8.39	4.03	0	0	0	0	0	0.48	
AFIE001L	M1100X	AFAVOUR	452.27	881.47	0	1480	16	0	0	1.95	
AFIE001L	M1100X	AFAVOUR	70.94	301.97	0	2000	12	2.5	0	4.26	
AFIE001L	M1100X	AFAVOUR	141.37	744.77	0	2116.667	12	3.7	0	5.27	
AFIE001L	M1100X	AFAVOUR	25.9	233.45	0	2250	12	2	0	9.01	
AFIE001L	M1100X	AFAVOUR	0.1	0.9	0	2250	12	1	0	9	
AFIE001L	M1100X	AFAVOUR	29.58	28.26	0.61	2270	12	0	2.03	0.96	
AFIE001L	M1100X	AFAVOUR	441.29	337.48	201.32	836.667	14	7.2	31.33	0.76	
AFIE001L	M1100X	AFAVOUR	710.73	603.07	334.47	513.333	24	9.4	32	0.85	
AFIE001L	M1100X	AFAVOUR	622.52	500.23	468.65	315	30	8.8	42.95	0.8	
AFIE001L	M1100X	AFAVOUR	413.9	301.33	505.87	130	32	5.4	55	0.73	
AFIE001L	M1100X	AFAVOUR	350.58	337.16	428.48	140	26	0	55	0.96	
AFIE001L	M1100X	AFAVOUR	356.13	345.1	435.26	180	32	0	55	0.97	
AFIE001L	M1100X	AFAVOUR	496.71	224.71	533.36	193.333	32	5.8	51.78	0.45	
AFIE001L	M1100X	AFAVOUR	337.94	192.13	762.94	190	32	19.5	69.3	0.57	
AFIE001L	M1100X	AFAVOUR	393.5	222.8	881.33	188.333	32	1.3	69.13	0.57	
AFIE001L	M1100X	AFAVOUR	450.52	177.03	766.81	180	32	0.5	62.99	0.39	
AFIE001L	M1100X	AFAVOUR	344.8	252.1	886.63	175	32	0.6	72	0.73	
AFIE001L	M1100X	AFAVOUR	304.68	212.97	783.45	175	32	4.8	72	0.7	
AFIE001L	M1100X	AFAVOUR	430.74	198.58	874.55	185	32	0	67	0.46	
AFIE001L	M1100X	AFAVOUR	469.6	201.8	953.43	191.667	32	28	67	0.43	
AFIE001L	M1100X	AFAVOUR	210.74	81.77	427.87	200	32	14.6	67	0.39	
AFIE001L	M1100X	AFAVOUR	311.83	361.27	851.87	188.333	32	1.8	73.2	1.16	
AFIE001L	M1100X	AFAVOUR	288	355.39	819.68	185	32	0.6	74	1.23	
AFIE001L	M1100X	AFAVOUR									
AFIE001L	M1100X	AFAVOUR	216.29	170.48	615.61	195	32	3.5	74	0.79	
AFIE001L	M1100X	AFAVOUR	324.79	156.96	1000.07	215	32	2.1	75.49	0.48	
AFIE001L	M1100X	AFAVOUR	68.87	34.71	218.1	205	32	1.5	76	0.5	
AFIE001L	M1100X	AFAVOUR	205.83	93.67	651.8	190	32	2	76	0.46	
AFIE001L	M1100X	AFAVOUR	78.55	35.74	248.74	190	32	1	76	0.46	
AFIE001L	M1100X	AFAVOUR	233.45	1624.19	1139.77	375.5	32	0.5	83	6.96	
AFIE001L	M1100X	AFAVOUR	226.73	366.7	1049.03	250	32	3.6	82.23	1.62	
AFIE001L	M1100X	AFAVOUR	242.58	379.32	1062.03	250	32	4.8	81.41	1.56	
AFIE001L	M1100X	AFAVOUR	222.53	365.8	977.97	250	32	2.9	81.46	1.64	
AFIE001L	M1100X	AFAVOUR	226.68	363.29	966.35	250	32	3.2	81	1.6	
AFIE001L	M1100X	AFAVOUR	227.81	281.1	971.16	250	32	1.4	81	1.23	
AFIE001L	M1100X	AFAVOUR	220.34	429.79	939.38	260	32	1.1	81	1.95	
AFIE001L	M1100X	AFAVOUR	235.77	409.65	959.97	270	32	4.7	80.28	1.74	
AFIE001L	M1100X	AFAVOUR	272.73	394.77	913.07	265	32	8.5	77	1.45	
AFIE001L	M1100X	AFAVOUR	282.71	408.68	946.45	261.667	32	9.8	77	1.45	
AFIE001L	M1100X	AFAVOUR	290.13	409.87	971.33	260	32	5.6	77	1.41	
AFIE001L	M1100X	AFAVOUR	290.77	412.39	973.45	255	32	9	77	1.42	
AFIE001L	M1100X	AFAVOUR	282.16	415.52	944.61	257.5	32	7.4	77	1.47	
AFIE001L	M1100X	AFAVOUR	187.43	289.77	568.8	261.667	32	5.1	75.21	1.55	

Completion	Reservoir	Field	Oil Rate (B/D)	Gas Rate (mmscf/D)	Water Rate (B/D)	THP (Psi)	Choke (/"64)	Sand (PPTB)	BSW (%)	GOR (Scf/B)	Liquid Rate (B/D)
AFIE001S	J2000X	AFAVOUR	10.12	15.93	0.45	145	80	7.7	4.26	1.57	
AFIE001S	J2000X	AFAVOUR	12.95	20.4	0.58	145	80	7.7	4.26	1.57	
AFIE001S	J2000X	AFAVOUR	13.78	20.46	0.66	132.5	80	13.3	4.56	1.49	
AFIE001S	J2000X	AFAVOUR									
AFIE001S	J2000X	AFAVOUR	13.72	18.25	0.75	127.5	80	10	5.19	1.33	
AFIE001S	J2000X	AFAVOUR	9.93	19.03	0.59	132.5	80	8.8	5.64	1.92	
AFIE001S	J2000X	AFAVOUR	13.27	19.27	0.79	115	80	8.8	5.64	1.45	
AFIE001S	J2000X	AFAVOUR	12.29	17.81	0.73	100	80	4.4	5.64	1.45	
AFIE001S	J2000X	AFAVOUR	10.32	14.15	0.75	110	80	8.8	6.74	1.37	
AFIE001S	J2000X	AFAVOUR	15.45	20.04	1.27	120	80	8.8	7.57	1.3	
AFIE001S	J2000X	AFAVOUR	12.86	19.29	1.05	120	80	8.8	7.57	1.5	
AFIE001S	J2000X	AFAVOUR	7.61	12.4	0.62	120	80	4.8	7.57	1.63	
AFIE001S	J2000X	AFAVOUR	4.86	8.16	0.4	120	80	0.4	7.57	1.68	
AFIE001S	J2000X	AFAVOUR	3.66	6.15	0.3	120	80	0.4	7.58	1.68	
AFIE001S	J2000X	AFAVOUR	8	17.83	0.65	93.333	80	10.3	7.57	2.23	
AFIE001S	J2000X	AFAVOUR	9.88	13.28	0.81	80	80	9.4	7.57	1.34	
AFIE001S	J2000X	AFAVOUR	10.2	12.95	0.84	90	80	3.5	7.57	1.27	
AFIE001S	J2000X	AFAVOUR	9.38	17.38	0.77	100	80	4.3	7.58	1.85	
AFIE001S	J2000X	AFAVOUR	10.71	19.62	0.88	100	80	4	7.58	1.83	
AFIE001S	J2000X	AFAVOUR	8.28	12.92	0.68	100	80	2	7.57	1.56	
AFIE001S	J2000X	AFAVOUR	3.89	6.28	0.32	100	80	0.5	7.58	1.62	
AFIE001S	J2000X	AFAVOUR	8.1	17.29	0.76	100	80	2.6	8.59	2.14	
AFIE001S	J2000X	AFAVOUR	7.28	15.78	0.73	100	80	25.1	9.09	2.17	
AFIE001S	J2000X	AFAVOUR	5.66	12.74	0.57	100	80	24.8	9.09	2.25	
AFIE001S	J2000X	AFAVOUR	6.58	18.06	0.66	100	80	1.8	9.09	2.74	
AFIE001S	J2000X	AFAVOUR	3.52	9.66	0.35	100	80	1.8	9.1	2.74	
AFIE001S	J2000X	AFAVOUR	6.34	17.47	0.66	100	80	3.4	9.45	2.76	
AFIE001S	J2000X	AFAVOUR	7.68	18.39	0.87	120	80	3.3	10.14	2.39	
AFIE001S	J2000X	AFAVOUR	4.31	9.11	0.49	140	80	1.7	10.14	2.12	
AFIE001S	J2000X	AFAVOUR	8.96	24.29	1.01	140	80	4.3	10.14	2.71	
AFIE001S	J2000X	AFAVOUR	2	9.32	0.23	140	80	2.6	10.14	4.67	
AFIE001S	J2000X	AFAVOUR	4.88	22.82	0.55	140	80	2.6	10.14	4.67	
AFIE001S	J2000X	AFAVOUR	3.24	11.05	0.37	140	80	3.4	10.13	3.41	
AFIE001S	J2000X	AFAVOUR	5.93	14.79	0.67	120	80	3.9	10.13	2.49	
AFIE001S	J2000X	AFAVOUR									
AFIE001S	J2000X	AFAVOUR	7.66	18.3	0.86	100	80	3.1	10.14	2.39	
AFIE001S	J2000X	AFAVOUR	5.38	12.86	0.61	100	80	3.1	10.14	2.39	
AFIE001S	J2000X	AFAVOUR	6.3	15.05	0.71	100	80	3.1	10.14	2.39	
AFIE001S	J2000X	AFAVOUR	12.17	29.08	1.37	100	80	3.1	10.14	2.39	
AFIE001S	J2000X	AFAVOUR	7.51	25.17	0.85	100	80	4.7	10.14	3.35	
AFIE001S	J2000X	AFAVOUR	4.82	17.35	0.54	100	80	1.6	10.14	3.6	
AFIE001S	J2000X	AFAVOUR									
AFIE001S	J2000X	AFAVOUR	7.42	23.89	0.8	100	80	3.6	9.71	3.22	