Source Rocks and Petroleum Systems of Equatorial Guinea

Volume IV

Petroleum Systems Analysis

Final Version October 2015

RPS Energy

Source Rocks and Petroleum Systems of Equatorial Guinea

Volume IV Petroleum Systems Analysis

Final Version October 2015

DISCLAIMER

The opinions and interpretations presented in this report represent our best technical interpretation of the data made available to us. However, due to the uncertainty inherent in the estimation of all sub-surface parameters, we cannot and do not guarantee the accuracy or correctness of any interpretation and we shall not, except in the case of gross or wilful negligence on our part, be liable or responsible for any loss, cost damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees.

Except for the provision of professional services on a fee basis, RPS Energy does not have a commercial arrangement with any other person or company involved in the interests that are the subject of this report.

COPYRIGHT

© RPS Energy

The material presented in this report is confidential. This report has been prepared by RPS Energy and shall not be distributed or made available to any other company or person without the knowledge and written consent of RPS Energy.

DOCUMENT REVISION RECORD

Document Description	Date	Issued by	Checked by	Accepted by Client	Comment
Version 1 – Draft	Aug 2010	AP	GT		
Version 2 – Draft	Jan 2011	AP	GT		
Version 3 – Final	Jan 2012	AP	GT		
Version 4 – FINAL	Mar 2012	AP	GT		
Version 5 – FINAL	Oct 2015	AP	GT		



Table of Contents

1.	INTR	ODUC	ΓΙΟΝ						1
2.	METH	HODOL	OGY						2
3.								PETROLEUM	
4.	DESC	CRIPTIC	ON / WO	RKING	S OF PET	ROLE	UM SYSTEM	S	6
	4.1	SR2 -	Associa	ted Petr	oleum Sys	stem (I	PS2)		6
		4.1.1	Introdu	ction					6
		4.1.2	Develo	oment a	nd Distribu	ition o	f SR2		6
		4.1.3	The Pe	troleum	System Li	nk			8
		4.1.4	SR2 Ma	aturity a	nd Genera	tion			10
		4.1.5	Second	ary Mig	ration from	SR2	and Subsequ	ent Entrapment	14
		4.1.6	PS2 Pe	troleum	System A	nalysi	S		15
	4.2	SR3 -	Associa	ted Petr	oleum Sys	stem (I	PS3)		19
		4.2.1	Introdu	ction					19
		4.2.2	Develo	oment a	nd Distribu	ition o	f SR3		19
		4.2.3	The Pe	troleum	System Li	nk			21
		4.2.4	SR3 Ma	aturity a	nd Genera	tion			23
		4.2.5	Second	ary Mig	ration and	Subse	equent Entrap	ment	26
		4.2.6	PS3 Pe	troleum	System A	nalysi	S		26
	4.3	SR4 -	Associa	ted Petr	oleum Sys	stem (I	PS4)		30
		4.3.1	Introdu	ction					30
		4.3.2	Develo	oment a	nd Distribu	ition o	f SR4		30
		4.3.3	The Pe	troleum	System Li	nk			30
		4.3.4	SR4 Ma	aturity a	nd Genera	tion			32
		4.3.5	Second	ary Mig	ration and	Subse	equent Entrap	ment	35
		4.3.6	PS4 Pe	troleum	System A	nalysi	S		35
	4.4	SR5 -	Associa	ted Petr	oleum Sys	stem (I	PS5)		41
		4.4.1	Introdu	ction					41
		4.4.2	Develo	oment a	nd Distribu	ıtion o	f SR5		41
		4.4.3	The Pe	troleum	System Li	nk			41
		4.4.4	SR5 Ma	aturity a	nd Genera	tion			43
		4.4.5	Second	ary Mig	ration and	Subse	equent Entrap	ment	45
		4.4.6	PS5 Pe	troleum	System A	nalysi	S		46

i

5 .	PET	PETROLEUM SYSTEMS SUMMARY AND PLAYS				
	5.1	Distal Niger Delta	52			
	5.2	Douala Basin	54			
	5.3	Rio Muni Basin	56			
6.	REF	ERENCES	58			

List of Figures

Figure 1:	Molecular and Isotopic Parameters of Source Rocks	5
Figure 2:	Comparison of SR1 and SR2 Geochemical Characteristics	6
Figure 3:	SR2 Tectonostratigraphic Context	7
Figure 4:	Comparison of SR2 with Family A Oils	9
Figure 5:	Comparison of SR1 with Family A Oils	10
Figure 6:	Maturity Parameters of Family A Oils	11
Figure 7:	Maturity Evolution of SR2	13
Figure 8:	2D Modelling along Line 7 showing Oil Accumulated Volume R at the Present Day	
Figure 9:	PS2 Petroleum System Maps	16
Figure 10:	PS2 Petroleum System Event Charts	17
Figure 11:	PS2 Graphical Summary	19
Figure 12:	SR3 Tectonostratigraphic Context	20
Figure 13:	Comparison of SR3 with Family B Oils	22
Figure 14:	Maturity Parameters of Family B Oils	23
Figure 15:	Maturity Evolution of SR3 (Top)	25
Figure 16:	2D Modelling along Line 7 showing Gas Accumulated Volume R at the Present Day	
Figure 17:	PS3 Petroleum Systems Maps	27
Figure 18:	PS3 Petroleum System Event Charts	28
Figure 19:	Comparison of SR4 with Family C Oils	31
Figure 20:	Comparison of SR4 with Family D Oils	32
Figure 21:	Maturity Parameters of Family C and D Oils	33
Figure 22:	Maturity Evolution of SR4	34
Figure 23:	2D Modelling along Line 3 showing Oil Accumulated Volume R at the Present Day	
Figure 24:	PS4 Petroleum System Maps	36
Figure 25:	PS4 Petroleum System Event Charts	37
Figure 26:	PS4 Graphical Summary	39
Figure 27:	Douala Basin SR3/SR4/SR5 Petroleum Systems	40
Figure 28:	Comparison of SR5 with Family D Oils	42
Figure 29:	Maturity Parameters of Family D Oils	43
Figure 30:	Maturity Evolution of SR5	44

Figure 31:	2D Modelling along Line 3 showing Gas (upper) and Oil (lower) Present Day Saturations based only on Tertiary Source Rocks	
	(SR4 & SR5)	45
Figure 32:	PS5 Petroleum System Maps	47
Figure 33:	PS5 Petroleum System Event Charts	48
Figure 34:	Petroleum Systems Summary / Stratigraphy	50
Figure 35:	Petroleum Systems Summary Map	51
Figure 36:	Distal Niger Delta – Petroleum Systems / Stratigraphy	52
Figure 37:	Distal Niger Delta – Play / Trap Combinations	53
Figure 38:	Douala Basin – Petroleum Systems / Stratigraphy	54
Figure 39:	Douala Niger Delta – Play / Trap Combinations	55
Figure 40:	Rio Muni Basin – Petroleum Systems / Stratigraphy	56
Figure 41:	Rio Muni Niger Delta – Play / Trap Combinations	57

List of Tables

Table 1:	Kitchen Evolution	for the Four Source F	Rock Intervals	50
Table I.			1001 II ILCI VAIS	