

Near bit Ejector Unit, NBEU Advantages

1. Bit's saving tool, lifetime is increased
2. Less tripping time for bit's replacement
3. ROP increase, less drilling time
4. Anti-balling tool
5. Ease to handle
6. No maintenance required

Near-bit ejector unit (NBEU)
for bit's and wellbore drilling optimization.

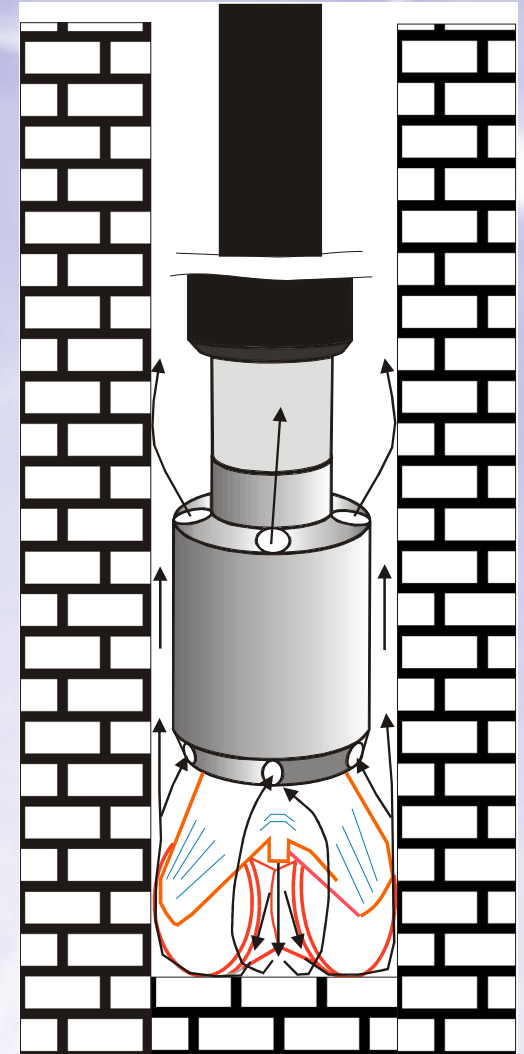
Advantages

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NBEU: Principle of operation

- I. NBEU is installed above a bit and run into the hole as a part of BHA.
- II. The drilling mud is fed. The drilling mud through the drilling string and NBEU moves in a downward direction to the bit.
- III. On passing through the NBEU a small part of the drilling mud changes its movement's direction from downward to upward. This part of mud creates an underpressure zone. Receiving suction effect (in bit's zone – mud with high pressure, above – the underpressure) makes rock destroying ability of bit more effective. The cuttings are milled and chipped easier from the rock.
- IV. In addition the cuttings are carried out faster from the bit's zone. No re-milling of cuttings. Bit is worn-out less and works longer.



Features

- Can be used in any BHA with any bit – tricone , PDC
- Available for any bit's size
- Could be manufactured for any standard by Customer's request
- No impact to another tools of BHA



Presented @ 2011 SPE conference

2011 SPE/DGS Annual Technical Symposium and Exhibition, Al-Khobar, Saudi Arabia

SPE 149113. Methods of drilling rate increase, near bit ejector application



Field (wells) Application

1. Oman – PDO
2. Libya - AGOCO Co
3. Russia – Gasprom Burenie, Tatneft, Eurasia Perm Drilling Co., Podsemburgas, etc
4. UAE – ADCO (on last stage of trial's approval)



Application of NBEU

Country	Well no.	Drilling interval	Bit's type	Received benefits	Saved bit's quantity
Oman	Yib-516	12¼"	<i>PDC</i>	ROP increase - 31,2%. 1day saved	Bit is in good condition and suitable for further use
Libya	L81-65	8½"	<i>Tri-cone</i>	ROP increase - 71,5%. 2 days saved	1
Libya	HH100-65	8½"	<i>Tri-cone</i>	2 drilling days saved	3

NBEU application

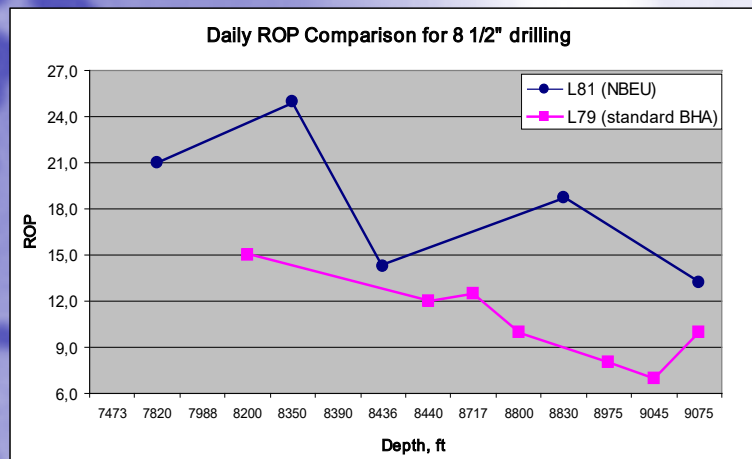
Motor + 12¼" PDC bit

No.	Company's name	Quantity of wells	ROP, ft/hr		ROP progress on NBEU application, %
			basic	with NBEU	
1	Chernogorskoe joint venture, Russia	6	72	96,6	34.2%
2	Naryanmarneftegaz Ltd, Russia	2	40,3	55,4	37.5%
3	Gazprom Burenie Ltd, Russia	1	61	82,7	35.5%

Comparison of NBEU drilling result in Libya

Well; L81 (with NBEU's application) Well L79: (without NBEU's application)

Depth (ft)		Bit type		Footage (ft)		Hrs		ROP		ROP progress on NBEU application, %
L-79	L-81	L-79	L-81	L-79	L-81	L-79	L-81	L-79	L-81	
7988-8200	7473-7820	GTX-G3 135	GT-20 517	212	347	14	16	15	21,0	43,2
8200-8440	7820-8350	GTX-G3 135	GT-20 517	240	530	21	21	12	25,0	120,6
8440-8717	8350-8390	GTX-G3 135	GT-20 517	277	40	22	3	12,5	13,3	6,7
8717-8800	8390-8436	CX47MRS 537	GT-20 517	83	46	8	6	10	14,3	43,0
8800-8975	8436-8830	CX47MRS 537	GT-20 517	175	394	21,5	21	8	18,7	133,8
8975-9045	8830-9075	GT-20 517	GT-20 517	70	245	10	18,5	7	13,2	89,2
9045-9075		GT-20 517		30		3		10		
Total:				1087	1602	99,5	85,5	10,9	18,7	71,5



Application in Oman

Well no. YIB-512 (standard BHA **without NBEU**). PDC bit

Bit	Ser. no.	Depth in, ft	Depth out, ft	Footage, ft	Drill, hrs	ROP	IADC Dull grade
DSR619S-I4	222418	4682	8228	3546	94.25	37.6	2-2-HC-A-X-I-WT-TD

Well no. YIB-516 (**with NBEU application**). PDC bit

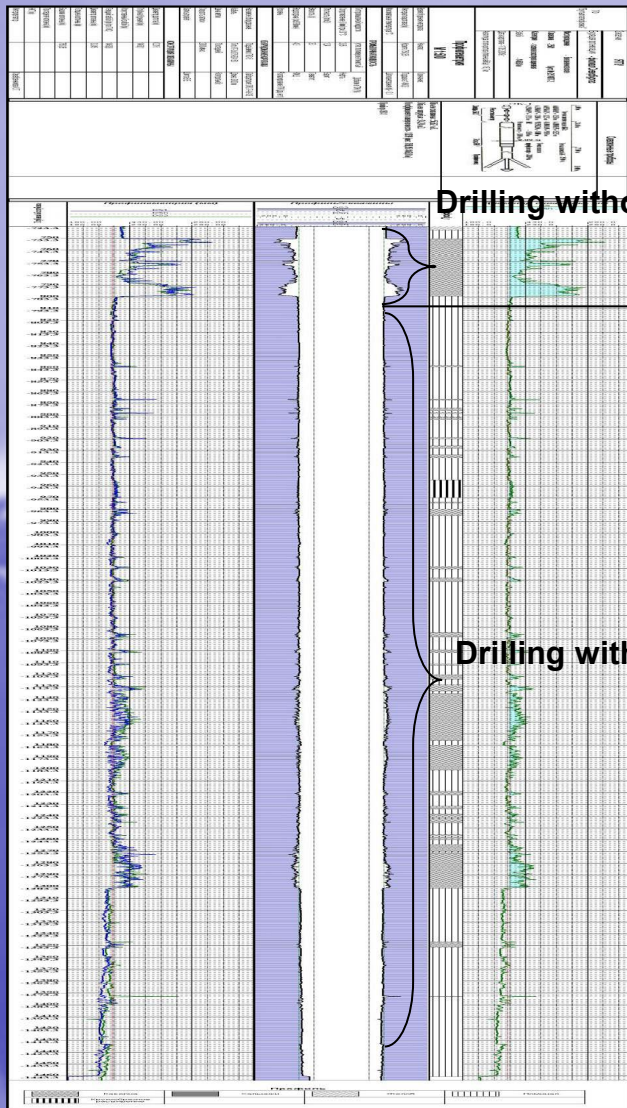
Bit	Ser. no.	Depth in, ft	Depth out, ft	Footage, ft	Drill, hrs	ROP	IADC Dull grade
DSR619S-I4	227434	5623	8310	2687	54	49.8	0-0-WT-G-X-I-WT-TD

Conclusion: ROP was increased up to 31.2 %

Bit is suitable for further use (as a new) Cumulative drilling time was decreased

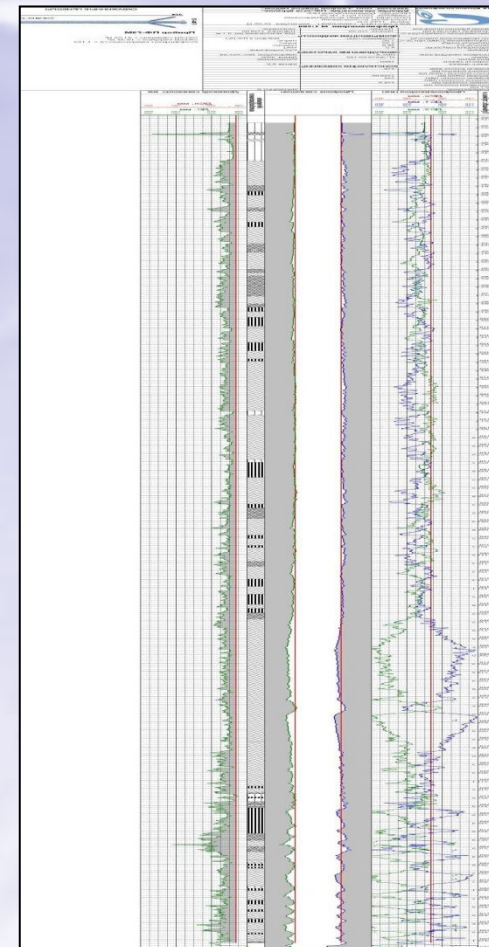
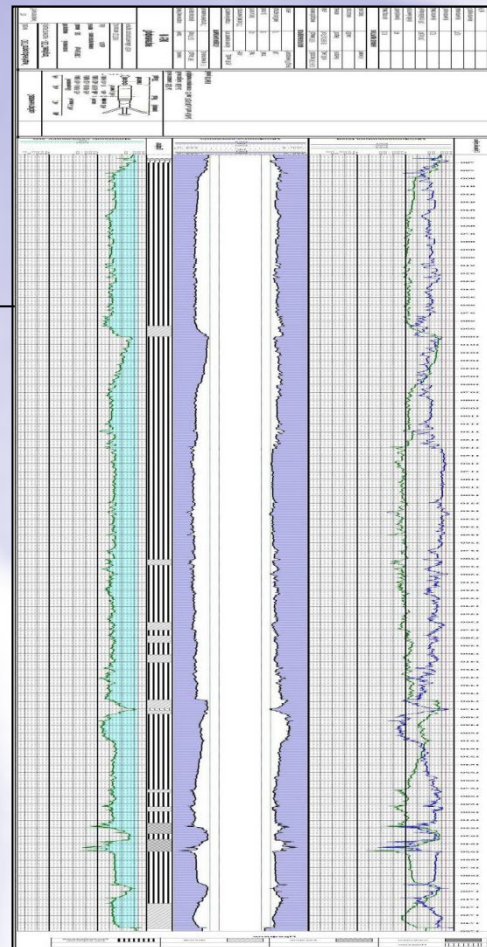
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Caliper logs – drilling with and without NBEU



Drilling without NBEU

Drilling with NBEU



Drilling without NBEU (on the left) and with NBEU (on the right). The jobs were performed on two wells located on same well cluster

Job reports



Al Harm for Engineering, Consultancy and Logistic Services
Down hole tools Division

Analysis of Near Bit Ejector Unit's application
on 8 ½" drilling on the well No.L81-65, Sarir Field
AGOCO, Libya

January, 2010



Analysis of Near Bit Ejector Unit's application
on 12 ¼" drilling on the well No.YIB-516 (Well ID 13734),
YIBAL KHUFF FIELD
Petroleum Development Oman

May, 2011



Al Harm for Engineering, Consultancy and Logistic Services
Down hole tools Division

Analysis of Near Bit Ejector Unit's application
on 8 ½" drilling on the well No.HH100-65, MESSLA FIELD
AGOCO, Libya

May, 2010

Conclusions

As a result of near bit ejector unit's application while drilling the following results were provided:

- I. Rate of penetration is increased
- II. Bit's cost/ft saving result.
- III. Drilling time is reduced.
- IV. Wellbore quality is improved. i.e. No washouts apparent.