COST OPTIMIZATION IN DIRECTIONAL DRILLING VIA SELECT THE SUITABLE AKO, SIZE AND SUITABLE PLACE FOR STABILIZERS

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Abstract. One of the process for reducing the cost is reducing the time of drilling.in Directional Drilling is reduce the slide volume and select the appropriate number for AKO on down hole motors is suitable for different dog legs This is in addition to reducing costs, especially in offshore platforms will be correlated take predetermined path and finally, in addition to increasing the speed creates a clean and well maintained angular displacement to be added. We can reach quickly a suitable motor angular rotation of the slide. Since in rotation, increases ROP, we reach our goals faster. On the other hand, by choosing appropriate parameters for drilling and stabilizing the rotation, We maintain our angle without slide. in this article is tried, by selecting angle of the downhole motor suited to the dogleg and choosing Suitable stabilizers and the distance to it due to the size and depth of the wells in the number of reservoirs of the south western Iran is according with the characteristics of Gachsaran, Asmari, Sarvak layers suitable for directional drilling with short radius , medium and long term.

Keywords: Directional Drilling, Downhole Motor, AKO, Slide, Rotation, Stabilizer

1-INTRODUCTION

In this paper, data from several wells in south western Iran reservoirs were analyzed by Land Mark program. In directional drilling , an important part is the choosing the appropriate number for AKO[1] at the beginning of directional drilling that In this way we can achieve our lost dogleg in the desired direction and in desire way, do the drilling process, don't get in up and down track. After selecting an appropriate number AKO, we start the process build up angle and to end of the curve , it will continue to slide. Then we enter in hold section, in this section we can chose a suitable BHA[2] with maximum ROP[3], we keep angle without using slide, we reach bottom hole(2-S3). In this mood, we Can achieved aim a in less time and at lower cost and higher quality(4-2S).

In the south western iran's Reservoirs, formations are high pressure or low pressure, that divided three low-pressure areas: Aghajary , Mishan and seventh floors of Gachsaran and The next formaions area that are high pressure of total Gachsaran that range from one to six that included rocks are made of gypsum and Anhydrite that building Pressure in this area is more than from other areas and Most drilling problems are angle of more than 30, dogleg more than 3.5 and stuck pipe in place(5-S2,3). also, One of the best ways for this area is rotation drilling. The third area is from Asmari , Gurpi, Ilam and Sarvak formations that Consists of thick layers of horizontal limestone and Marley shale, sandstone and shale oil. Thus we have no problem in this area can get up to 16 doglegs(1-S2).

Since the directional drilling process is costly, if we can choose a suitable AKO and suitable Stabilizer in rotation mood, we can reduce time and cost of drilling, in particular costs is high in Offshore platforms(7-s113ta116).

1-Adjustable Kick of Point
2-Bottom Hole Assembly
3-Rate of Penetration

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2- STUDY E, I, SC OF PIPES IN DOGLEG

1. Young's Modulus for a Variety of Materials

Material	Used In	E(lb/In2)
Alloy steel	DP, DC	30×106
Aluminum	DP, DC	10.5×106
Monel	NMDC	26×106
Stainless Steel	NMDC	28×106
Tungsten Carbide	Bit Insert	87×106
Tungsten	Drill Collars	51.5×106

I= π (OD4 – ID4) ÷ 64

Stiffness Coefficient = E × I

DP							
OD	ID	THREAD	E	I	SC	SAG	lb/FT
5"	4.276"	4 ½ IF	30×106	14.2692	428.076×106	0.000315	19.5
3 ½"	2.764"	3 ½ IF	30×106	4.5012	135.036×106	0.000682	13.3
2 7/8"	1.5"	2 3/8 Pack	30×106	3.1052	93.1561×106	0.000773	10.4

HWDP							
OD	ID	THREAD	E	I	SC	SAG	lb/FT
5"	3"	4 ½ IF	30×106	26.7035	801.105×106	0.000423	49
3 ½"	2 1/16"	3 ½ IF	30×106	6.4779	194.337×106	0.000926	26

DC							
OD	ID	THREAD	E	I	SC	SAG	lb/FT
11"	3"	8 5/8" H90	30×10^6	714.7123	21441.369×106	0.0000965	299
9 5/4"	3"	7 5/8"H90	30×10^6	439.6207	13188.621×106	0.000121	230
8 ½"	3"	6 5/8"H90	30×10^6	252.2631	7567.893×106	0.000155	169
8 ½"	2 13/16"	6 5/8"H90	30×10^6	253.1678	7695.034×106	0.000154	169
6 ½"	2 ½"	4 ½"IF	30×10^6	85.7066	2571.198×106	0.000248	92
4 ¾"	2 3/4"	3 ½"IF	30×10^6	22.1814	665.442×106	0.000437	42

2-1 Drilling pipes SC

SC pipes are expressing flexible pipes that reduced the rate of I that Thereby reducing the pipes SC and finally increased flexibility in pipes. Increasing the flexibility of the pipes in similar hole size are increase the amount of doglegs, Thereby reducing the size of the wells in the same doglegs, should reduce the amount AKO, Then we examine this amount(6-S427,428S).
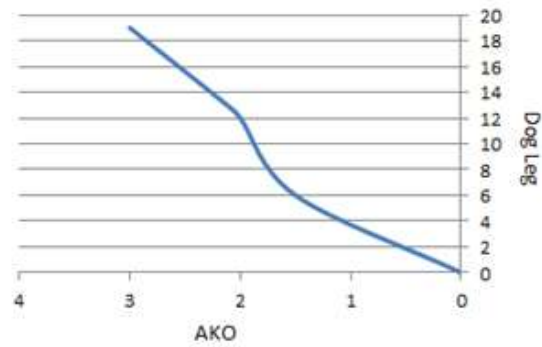
2-2 Study similar AKO in different hole sizes

2.Choose suitable motor size	
Motor Size	Hole Size
11 ¼"	17 ½", 26"
9 ½"	12 ½", 17 ½"
6 ½", 6 ¾"	8 3/8", 8 ½"
4 ¾"	6 1/6", 5 7/8"
3 1/8"	4 1/8"

| 3. Table for increase the hole size according to increase dogleg			
AKO	Hole 12 ¼"	Hole 8 ½"	Hole 6 ½"
0	0	0	0
0.5	1	1.5	2.5
1	2.5	3	4
1.5	4	6	8.5
1.83	6	10	13
2	8.5	12	15

Motor 6 3/4
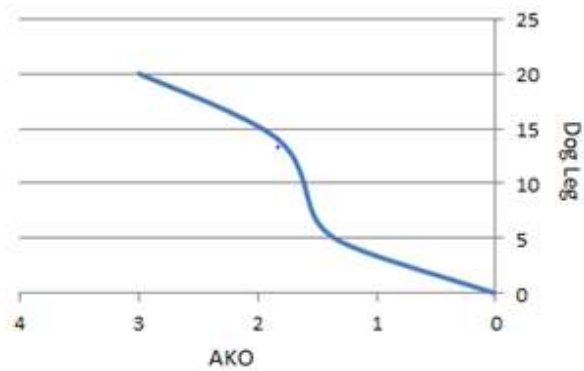
Motor 4 3/4
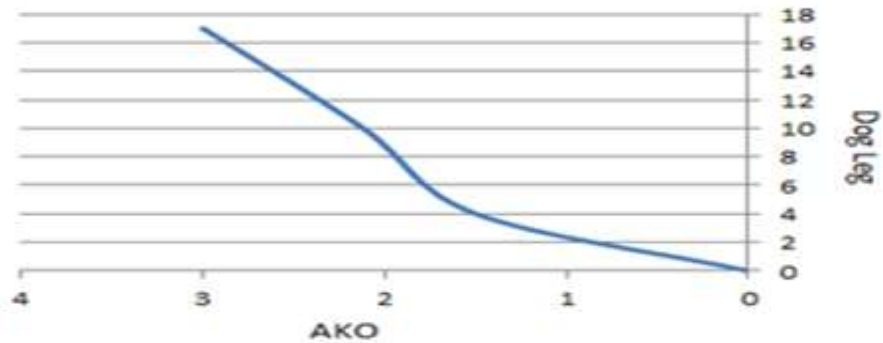
Motor 8

According to the above tables, if we want to go from 12 to 8 for hole size to keep same dogleg, must reduce 23% of the AKO and if we wanted to go hole size, from 8 to 6, we have to reduce 16 % of the AKO until can produce dogleg and we can select a row as the base of the AKO for different doglegs choose all hole sizes. On the other hand, with increasing AKO ,in rotation will become larger hole. this cause that Tangency point is closer to bit and the amount of BUR[1] increased, On the other hand, with increasing depth due to their high levels of pressure, layer is more rigid and increases the angle.

2-3 Study Tangency point in rotation mood

The point where the front of the pipe on the weight exerted by the pipes is separated from wall, is said Tangency point. If the weight doings higher, this point is closer to bit and by closer to this point, the angle is greater .on the other hand , Enlarge the hole , with the same weight can make a greater angle(6-S430).
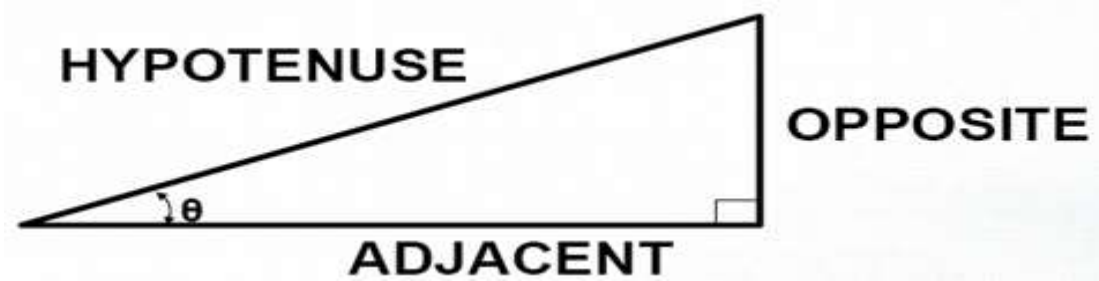
1-Build Up Rate

If we assume that the triangle above is the front of the motor, Opp amount you can get the same amount is well dilated, According dilated well as the amount increases with increasing AKO. As result, increase angle. we can do drilling with UBD[1] then do directional drilling at an angle of light(7-s99).
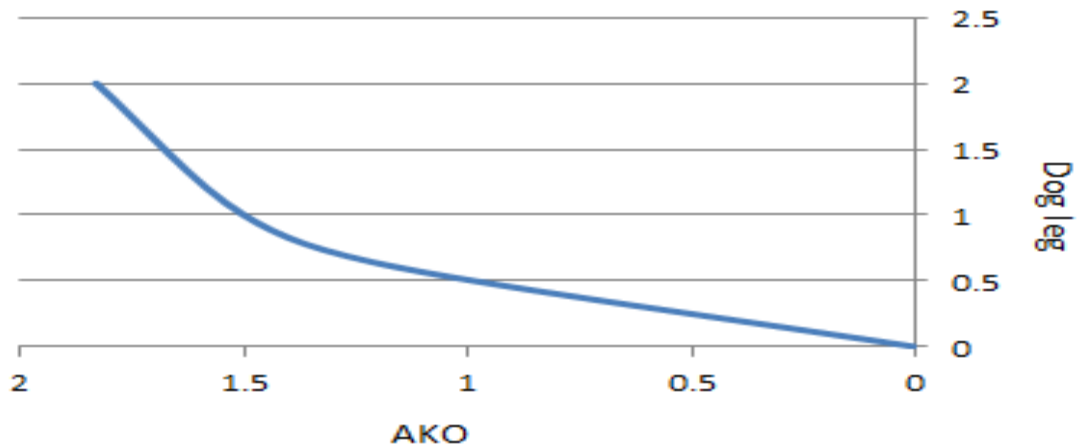
Study suitable hole size with increase AKO and increase Dogleg in rotation Process

3- SIZE AND PLACE OF STABILIZERS IN BHA IN KEEP SECTION MOOD

3-1 Size of second STB than of first STB[1]

Usually in keep section in the South Western Reservoirs is used two or one STB. More than 2 STB it causes a adding torque which prevents further drilling . STB Size in keep section mood is very important, If a process which was to keep section, STB latter is larger than the first one will be Drop, if the STB former is smaller than first cause to Build. In conclusion choose a suitable size for STB is very important, for remain in keep section mood with Rotation without the slide. In line with the overall ROP increases that reduce the time and cost of drilling(8-s28,29).

3-2 The distance from second STB to first

The distance from each other STB can determines Build or Drop in drill stem, two STBs are in the bit stem with a suitable distance apart, keep track of wells. The former makes the latter is by far the STB Build (Of course, if too far, causing a drop angle wells) and close down too much cause we Build. The distance to the depth and area of the hole size and the size of the motor is changed(6-S437).

4. Keep Section BHA In Ahwaz						
Hole Size	Motor Size	Zone	Depth	STB on Motor	STB on BHA	Distance Between two STB (M)
4 1/8"	3 ½"	Ahwaz	4000-4500	N	N	/
61/8"	4 ¾"	Ahwaz	3500-4500	5 7/8"	98%	6-7
8 ½"	6 ½"	Ahwaz	3000-3500	8 1/8"	102%	7-9

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[1]1-Under Balance Drilling

2-Stabilizer

5.Keep Section BHA In Aghajari(AJ)

Hole Size	Motor Size	Zone	Depth	STB on Motor	STB on BHA	Distance Between two STB (M)
12 ½"	8"	AJ	1500-2100	12 ¼"	96%	8-10
8 ½"	6 ¾"	AJ	2000-2500	8 ¼"	101%	7-9
12 ½"	8"	AJ	1800-2700	12 ¼"	102%	8-10

6. Keep section BHA In Parse

Hole Size	Motor Size	Zone	Depth	STB on Motor	STB on BHA	Distance Between two STB (M)
12 1/4"	8"	PR	1500-2100	12 1/16"	95%	8-10
8 ½"	6 ¾"	PR	1500-2100	8 ¼"	98%	7-9
8 ½"	6 ¾"	PR	2100-2500	N	8 1/8"	N
12 1/4"	8"	PR	1800-2500	12 1/16"	102%	8-10

Notice: With hardening and increasing depth, must be more the latter STB than the former. 12 Hole DC in the presence of BHA property makes Pendulum. That need to be much larger than the second STB as weight will drop tube angle well. But only on the size of the hole in the top is very important point that needs to be considered is that BHA and drill pipe diameter due to the difference in the probability of occurrence of a key seat is high. So to avoid this phenomenon, especially in Marley formations or to reduce the amount of open hole Or the minimum and maximum RPM and ROP was destined to make this stop(9-s14).

CONCLUSION

- The table above is expressed in reservoirs instead of the right size can be determined for a second STB.
- According to the SC Pipe Hole 12 to 8 vote to go to the previous state of our dogs in our hands, must reduce 23 % of low AKO and tilt the Hole 8 to 6 to 16 % of our AKO.
- To increase the amount of pressure on the larger classes and their strength in depth is greater, This would tend to increase the angle wells at depths greater.
- You can reduce the amount of open hole and reduce RPM (level) and increased drilling speed inhibit the formation of Marley Key seat phenomenon
- We can increase drilling speed with reduce the slide volume and increase Rotation volume. Reduce the time and cost, This can be done by selecting the suitable AKO for motor.
- In general, using graphs and tables above have been obtained from the reservoirs of the South West of Iran , we can find an optimal directional drilling that cause to reduce time and cost.

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