BLACK & TAN 27 FEDERAL COM 305H

String: **SURFACE**

Hole Size:	17.5						
Top Setting Depth (MD):	0	Top Setting Depth (TVD):	0	Btm setting depth (MD):	1700	Btm setting depth (TVD):	1700
Size:	13-3/8"	Grade:	J-55	Weight (lbs/ft):	54.5	Joint (Butt,FJ, LTC,STC, SLH, N/A, Other):	Buttress

Condition (New/Used): New Standard (API/Non-API): API

Tapered String (Y/N)?: N
If yes, need spec attachment

Safety Factors

Collapse Design Safety Factor: 2.15 Burst Design Safety Factor: 1.82

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Body Tensile Design Safety Factor: 3.79

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Joint Tensile Design Safety Factor: 4.04

String: **INTERMEDIATE**

Hole Size:	12.25						
Top Setting Depth (MD):	0	Top Setting Depth (TVD):	0	Btm setting depth (MD):	900	Btm setting depth (TVD):	900
Size:	9-5/8"	Grade:	J-55	Weight (lbs/ft):	40	Joint (Butt,FJ, LTC,STC, SLH, N/A, Other):	Buttress

Condition (New/Used): New Standard (API/Non-API): API

Tapered String (Y/N)?: N
If yes, need spec attachment

Safety Factors

Collapse Design Safety Factor: 5.37 Burst Design Safety Factor: 1.7

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Body Tensile Design Safety Factor: 1.96

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Joint Tensile Design Safety Factor: 2.24

Top Setting Depth (MD):	900	Top Setting Depth (TVD):	900	Btm setting depth (MD):	5780	Btm setting depth (TVD):	5780
Size:	9-5/8"	Grade:	J-55	Weight (lbs/ft):	40	Joint (Butt,FJ, LTC,STC, SLH, N/A, Other):	LTC

Condition (New/Used): New Standard (API/Non-API): API

Tapered String (Y/N)?: N
If yes, need spec attachment

Safety Factors

Collapse Design Safety Factor: 1.54 Burst Design Safety Factor: 1.87

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Body Tensile Design Safety Factor: 2.15

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Joint Tensile Design Safety Factor: 1.8

String: **PRODUCTION**

Hole Size:	8.75						
Top Setting Depth (MD):	0	Top Setting Depth (TVD):	0	Btm setting depth (MD):	15723.83	Btm setting depth (TVD):	11039
Size:	5-1/2"	Grade:	P-110	Weight (lbs/ft):	17	Joint (Butt,FJ, LTC,STC, SLH, N/A, Other):	Buttress

Condition (New/Used): New Standard (API/Non-API): API

Safety Factors

Collapse Design Safety Factor: 1.35 Burst Design Safety Factor: 1.28

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Body Tensile Design Safety Factor: 2.03

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Joint Tensile Design Safety Factor: 2.12

Tapered String (Y/N)?: N
If yes, need spec attachment

BLACK & TAN 27 FEDERAL COM 305H

CEMENT: SURFACE

Stage Tool Depth: N/A

Lead:

Top MD of Segment:	0	Btm MD of Segment:	1285.47
Cmt Type:	C	Cmt Additives:	4% Bentonite + 1% CaCl2
Quantity (sks):	650		
Yield (cu/ft/sk):	1.73	Volume (cu/ft):	1124.5
Density (lbs/gal):	13.5	Percent OH Excess:	25%

Tail:

Top MD of Segment:	1285.47	Btm MD of Segment:	1700
Cmt Type:	C	Cmt Additives:	1% CaCl2
Quantity (sks):	300		
Yield (cu/ft/sk):	1.33	Volume (cu/ft):	399
Density (lbs/gal):	14.8	Percent OH Excess:	25%

CEMENT: INTERMEDIATE

Single Stage

Lead:

Top MD of Segment:	0	Btm MD of Segment:	5144.38
Cmt Type:	C	Cmt Additives:	5% NaCl + 6% Bentonite + 2 lb/sk Kolseal + 0.125 lb/sk Celloflake + 0.4% Retarder
Quantity (sks):	1043		
Yield (cu/ft/sk):	1.885	Volume (cu/ft):	1966.06
Density (lbs/gal):	12.9	Percent OH Excess:	25%

Tail:

Top MD of Segment:	5144.38	Btm MD of Segment:	5780
Cmt Type:	C	Cmt Additives:	0.2% Retarder
Quantity (sks):	200		
Yield (cu/ft/sk):	1.34	Volume (cu/ft):	268
Density (lbs/gal):	14.8	Percent OH Excess:	25%

2 Stage Cement Job

* DV tool depth(s) will be adjusted based on hole conditions and cement volumes will be adjusted proportionally. DV tool will be set a minimum of 50 feet below previous casing and a minimum of 200 feet above current shoe. Lab reports with the 500 psi compressive strength time for the cement will be onsite for

*If lost circulation is encountered, Apache may 2-stage Interm csg. A DVT may be used in the 9-5/8" csg & ECP may be placed below DVT.

1st Stage

Lead:

Top MD of Segment:	3500	Btm MD of Segment:	5144.38
Cmt Type:	C	Cmt Additives:	5% NaCl + 6% Bentonite + 2 lb/sk Kolseal + 0.125 lb/sk Celloflake + 0.4% Retarder
Quantity (sks):	345		
Yield (cu/ft/sk):	1.885	Volume (cu/ft):	650.33
Density (lbs/gal):	12.9	Percent OH Excess:	25%

Tail:

Top MD of Segment:	5144.38	Btm MD of Segment:	5780
Cmt Type:	C	Cmt Additives:	0.3% Retarder
Quantity (sks):	200		
Yield (cu/ft/sk):	1.34	Volume (cu/ft):	268
Density (lbs/gal):	14.8	Percent OH Excess:	25%

Stage Tool / ECP Depth: ± 3500'

2nd Stage

Lead:

Top MD of Segment: 0 | Btm MD of Segment: 2815.44

Cmt Type: C | Cmt Additives: 5% NaCl + 6% Bentonite

Quantity (sks): 565
Yield (cu/ft/sk): 1.868 Volume (cu/ft): 1055.42
Density (lbs/gal): 12.9 Percent OH Excess: 25%

Tail:

Top MD of Segment: 2815.44 | Btm MD of Segment: 3500

Cmt Type: C | Cmt Additives: 0.3% Retarder

Quantity (sks): 200
Yield (cu/ft/sk): 1.34 Volume (cu/ft): 268
Density (lbs/gal): 14.8 Percent OH Excess: 25%

CEMENT: PRODUCTION

Single Stage

Lead:

Top MD of Segment: 3000 | Btm MD of Segment: 10566.45

Cmt Type: H | Cmt Additives: 10% gel + 5% Salt

Quantity (sks): 938
Yield (cu/ft/sk): 2.32 Volume (cu/ft): 2176.16
Density (lbs/gal): 11.9 Percent OH Excess: 20%

Tail:

Top MD of Segment: 10566.45 | Btm MD of Segment: 15723.83

Cmt Type: TXI Lite Cmt Additives: 0.3% Fluid Loss + 0.2% Retarder

Quantity (sks):	1092		
Yield (cu/ft/sk):	1.44	Volume (cu/ft):	1572.48
Density (lbs/gal):	12.8	Percent OH Excess:	20%

2 Stage Cement Job

* DV tool depth(s) will be adjusted based on hole conditions and cement volumes will be adjusted proportionally. DV tool will be set a minimum of 50 feet below previous casing and a minimum of 200 feet above current shoe. Lab reports with the 500 psi compressive strength time for the cement will be onsite for review.

*If lost circulation is encountered, Apache may 2-stage Interm csg. A DVT may be used in the 7" csg & ECP may be placed below DVT.

1st Stage

Lead:

Top MD of Segment: 5830 Btm MD of Segment: 10566.45

Cmt Type: H Cmt Additives: 10% gel + 5% Salt

Quantity (sks):	619		
Yield (cu/ft/sk):	2.32	Volume (cu/ft):	1436.08
Density (lbs/gal):	11.9	Percent OH Excess:	20%

Tail:

Top MD of Segment: 10566.45 Btm MD of Segment: 15723.83

Cmt Type: TXI Lite Cmt Additives: 0.3% Fluid Loss + 0.2% Retarder

Quantity (sks):	1092		
Yield (cu/ft/sk):	1.44	Volume (cu/ft):	1572.48
Density (lbs/gal):	12.8	Percent OH Excess:	20%

Stage Tool / ECP Depth: ± 5830'

2nd Stage

Lead:

Top MD of Segment:	3000		Btm MD of Segment:	4810.33	
Cmt Type:	H		Cmt Additives:	10% gel + 5% Salt	
Quantity (sks):	204				
Yield (cu/ft/sk):	2.32	Volume (cu/ft):		473.28	
Density (lbs/gal):	11.9	Percent OH Excess:		20%	

Tail:

Top MD of Segment:	4810.33		Btm MD of Segment:	5830	
Cmt Type:	C		Cmt Additives:	0.3% Retarder	
Quantity (sks):	200				
Yield (cu/ft/sk):	1.34	Volume (cu/ft):		268	
Density (lbs/gal):	14.8	Percent OH Excess:		20%	