

Deltascope APT

Introductory Presentation



What does the Deltascopes APT do?

The Deltascopes APT allows the workstring to rotate and reciprocate with the annular closed at full working pressure with zero wear to the annular.

How does the Deltascopie APT allow the workstring to rotate and reciprocate with the annular at full working pressure?

The annular is closed on the Deltascopie's Isolation Sleeve and the Deltascopie's Inner Mandrel can rotate and reciprocate friction free through the isolation sleeve's dynamic sealing technology.

Isolation Sleeve and Inner Mandrel

Inner Mandrel

Isolation Sleeve



What length can the workstring be rotated and reciprocated with the Deltascop APT?

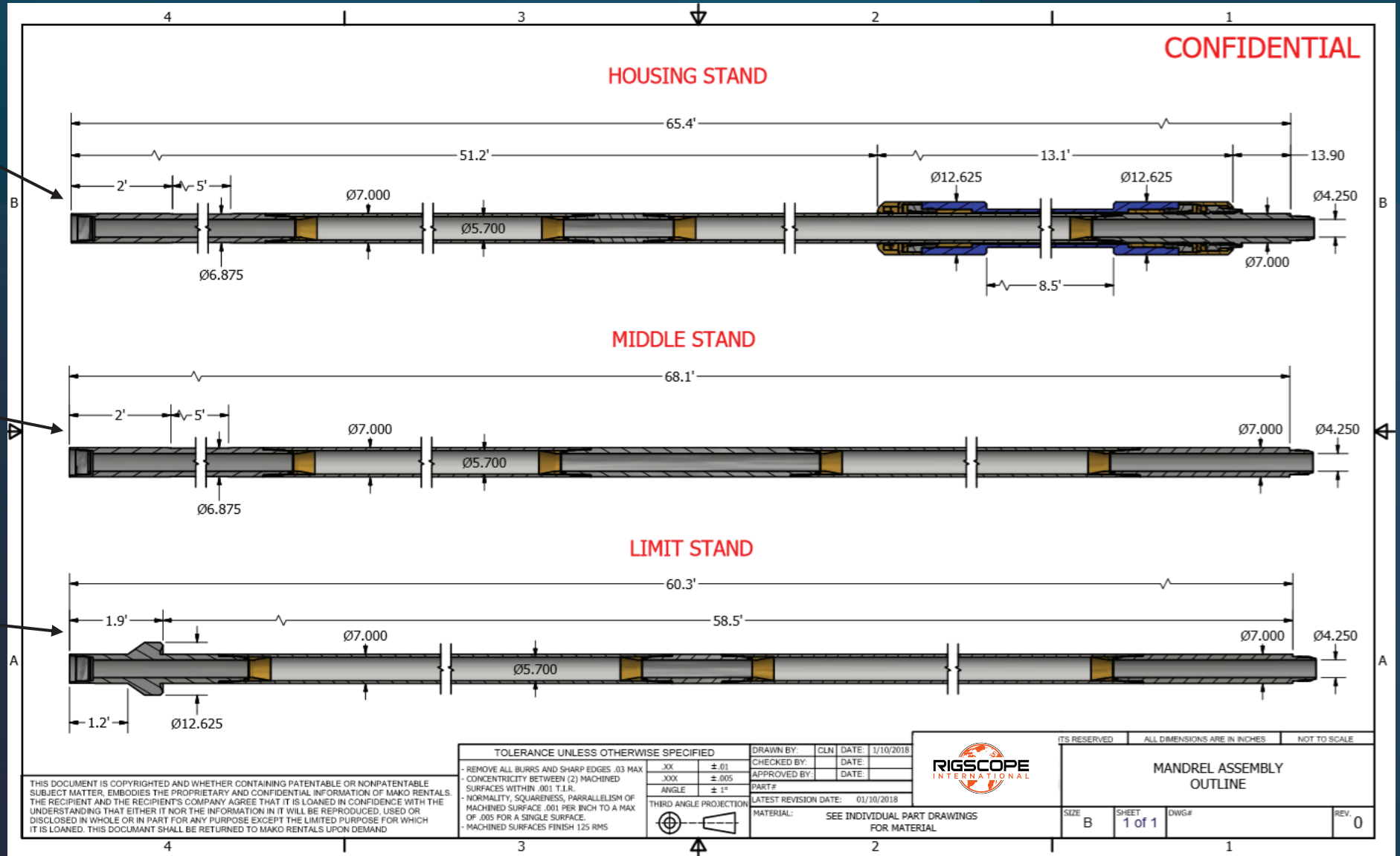
- The workstring can be rotated and reciprocated the length of inner mandrel ran in the hole.
- If 1000' of stroke is needed, 1000' of inner mandrel is run above the isolation sleeve.



Isolation Sleeve Assembly

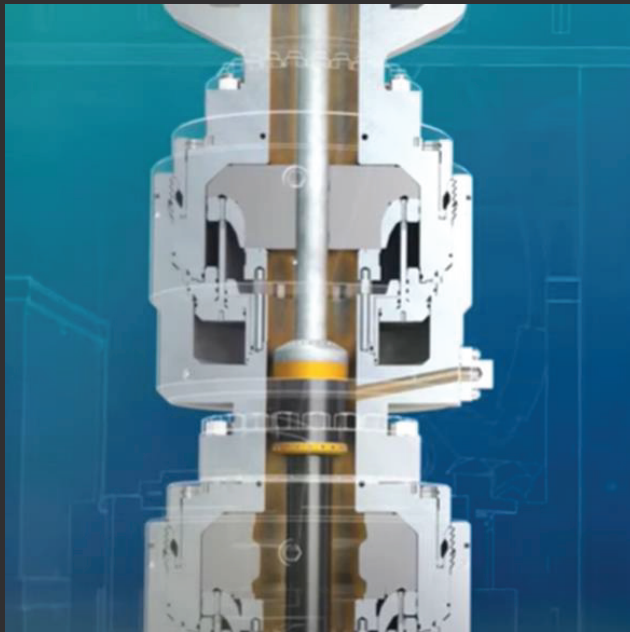
Inner Mandrel Assembly

No Go Assembly

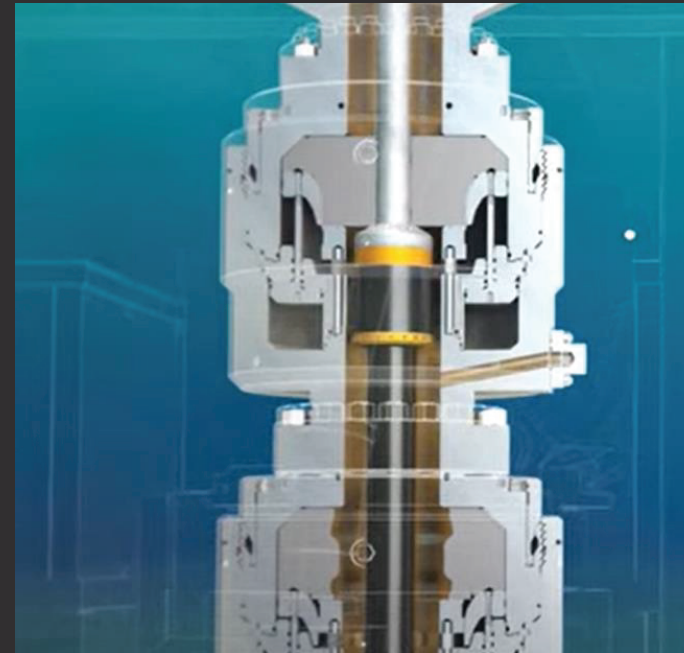


How is the Deltascopie located in the annular?

Step 1. The annular is soft closed above the isolation sleeve.



Step 2. The top of the isolation sleeve is bumped on the annular.



How is the Deltascop located in the annular? Continued...

Step 3. The annular is opened and the isolation sleeve is centered across the annular. The annular is soft closed and the bottom of the isolation sleeve is bumped on the annular.



What keeps the isolation sleeve in position while running in the hole?

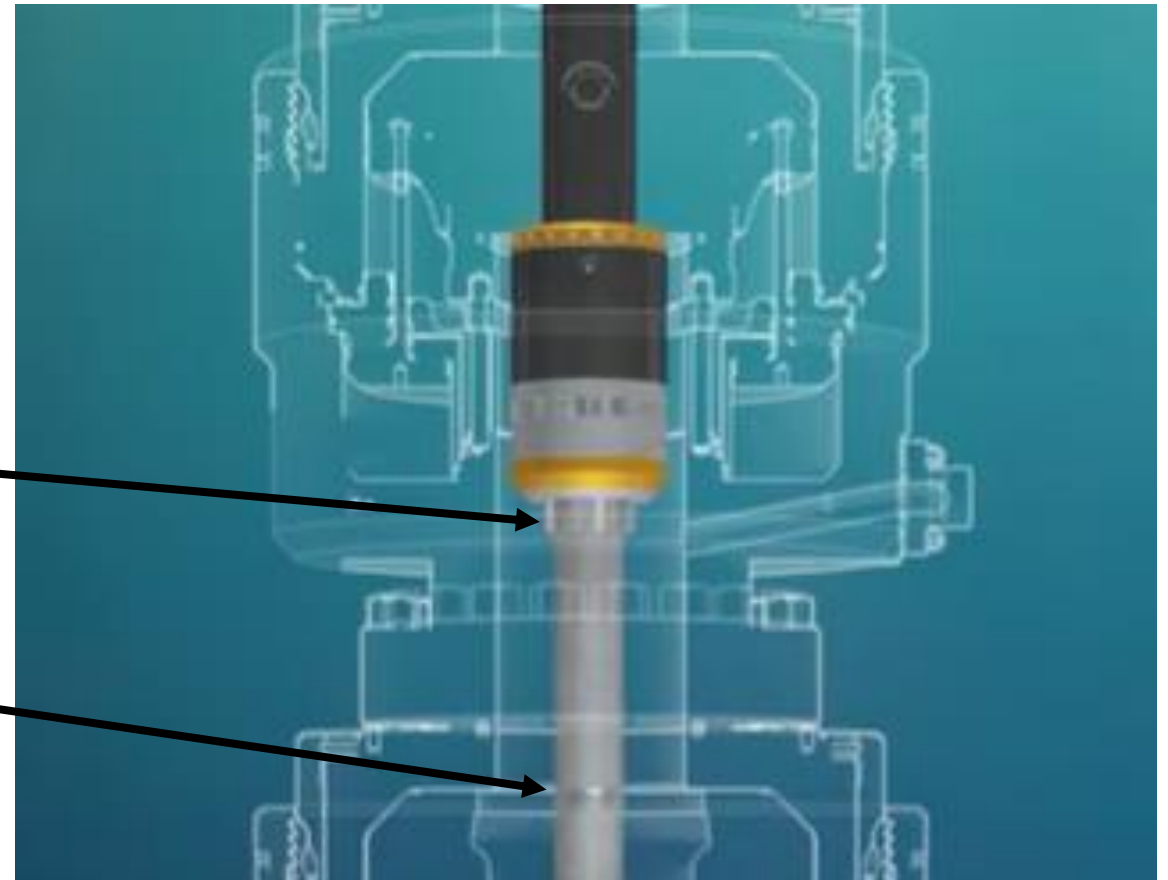
The Deltascope APT uses a collet style unlatch and relatch design.

- ✓ The Deltascope APT can be unlatched and latched as many times as needed.

Deltascope Figure shown unlatched

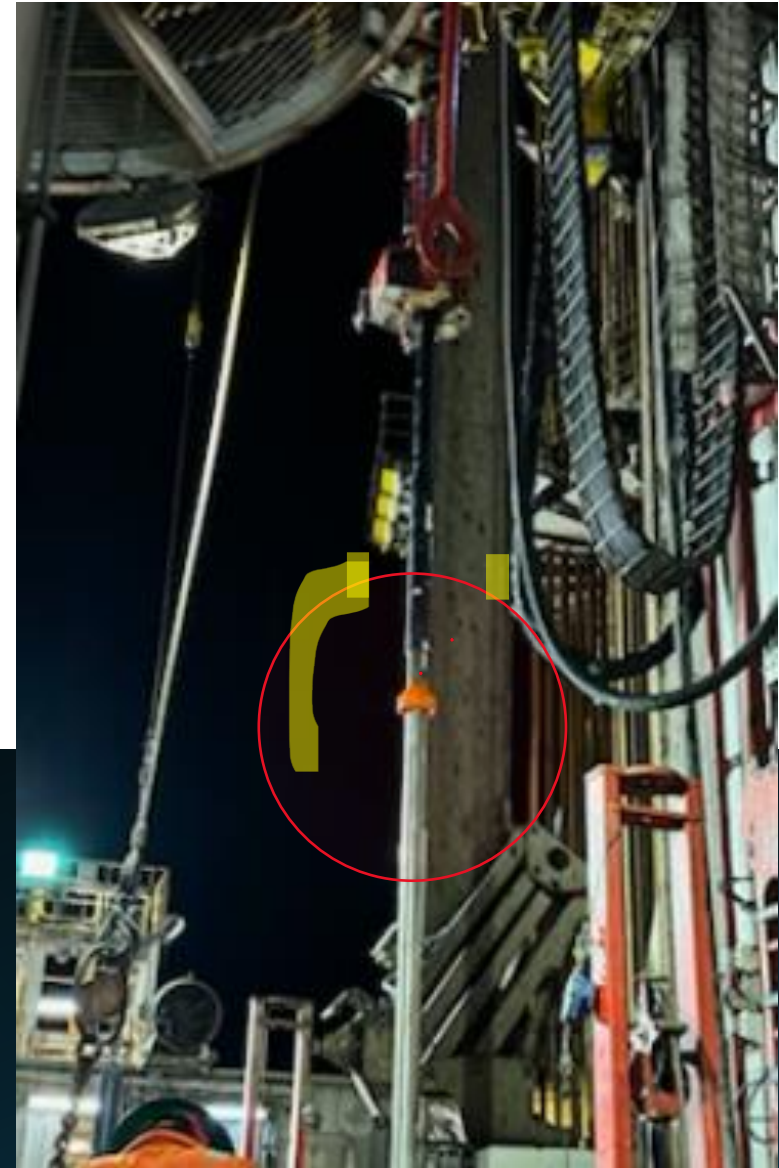
Collet Fingers

Collet Bevel



What prevents the drill pipe from entering the isolation sleeve?

The top of the inner mandrel has a no go called the limiter sub.





How is the Deltascopes APT torqued up?


- For +/- 56' of stroke or less the iron roughneck is used.
- More than 56' of stroke non marking aluminum inserts are used by a tubing service provider.

What pressure is the Deltascopes APT rated to?

10,000psi
External
Differential

15,000psi
Internal



A close-up, slightly blurred photograph of a tachometer scale. The scale is black with white and red markings. A white needle is visible, pointing towards the right. The number '60' is prominently displayed in red on the scale. The unit 'rpm' is visible at the bottom left of the scale. The background is dark and out of focus.

The
Deltascope
APT can
rotate at
speeds up to
120 RPM



6.25" & 7"
Models Available

• 7" OD

12.625" OD

9.180" OD

What does pick up,
slack off weights,
and rotational
torque look like on a
typical job?

Before Closing Annular

Pick Up Weight = 273K

Slack Off Weight = 267K

Rotational Torque = 3K ft/lbs

Annular @ Full Working Pressure

Pick Up Weight = 271K

Slack Off Weight = 263K

Rotational Torque = 3K ft/lbs

How does the Deltascope compare to the annular closed on the drill pipe or slick joint?

Deltascope located in annular @ 1500psi closing pressure

- ✓ Pick up/slack off & rotate with 10,000psi backside pressure with no added frictional drag (7000psi highest on actual job)
- ✓ Zero Tool Joints
- ✓ Zero Annular Wear
- ✓ Weight Transfers below annular for precise WOB or Tool Position
- ✓ Rotational torque remains the same as annular open
- ✓ Travel 1000s of feet with the annular at full working pressure
- ✓ Easily see tool indications such as snap in and out
- ✓ Weight indicator reads smooth, steady and in real-time

Drill Pipe or Slick Joint located in annular

- Can not work the pipe at full working pressure
- Any backside pressure greatly increase the friction or overpull needed to move workstring
- Tool Joints every 33' to 44'
- **Damages annular**
- Cannot rotate the workstring
- **The annular masks the weight transfer to the BHA**
- Weight indicator very difficult to distinguish indications or friction due to weight indicator jumping from one extreme to the other
- Sometimes a leak path is needed to lubricate annular to move pipe

Applications

- Anytime the annular is closed and pipe movement is required.
- Fracking
- Perforating
- Two Stage Displacements
- Pressurized Surface Cement Plugs
- Drilling into Unknown Environment
- Milling
- MPD



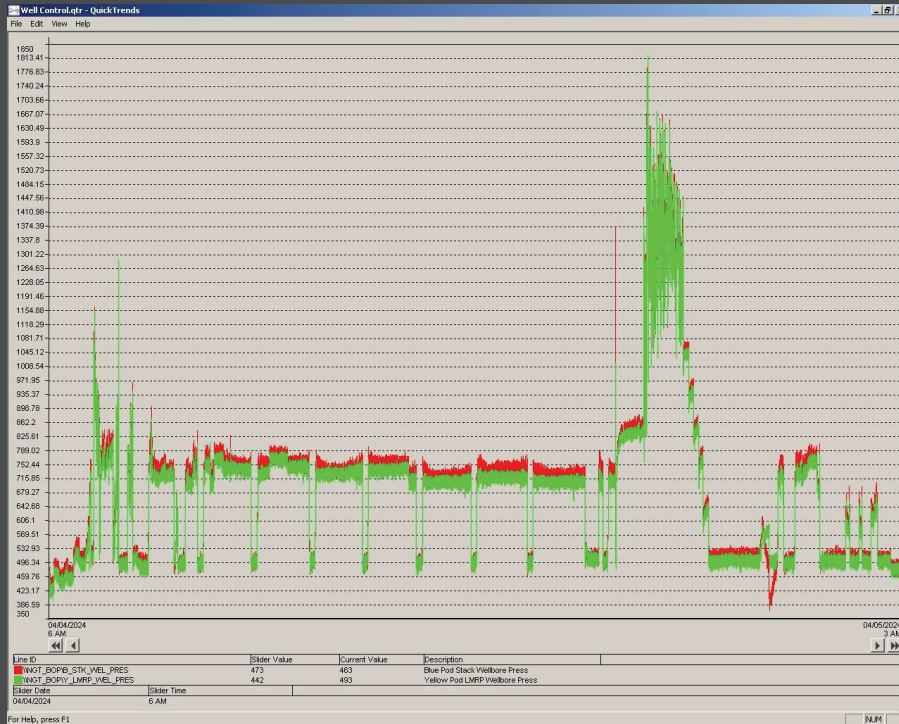
Advantages of milling or drilling barriers with the Deltascope APT

- ✓ Complete the entire operation with well control.
- ✓ Reduced risk of shavings and debris from entering the ram cavities above dead head fluid column
- ✓ WOB and ROP can easily be set and monitored with extreme accuracy even with the annular at full working pressure
- ✓ The annular is already closed for barriers near the BOP with little to no reaction time to keep hydrocarbons out the riser
- ✓ Rotate the workstring 120 RPM



Gas Bubble Encountered During Barrier Removal

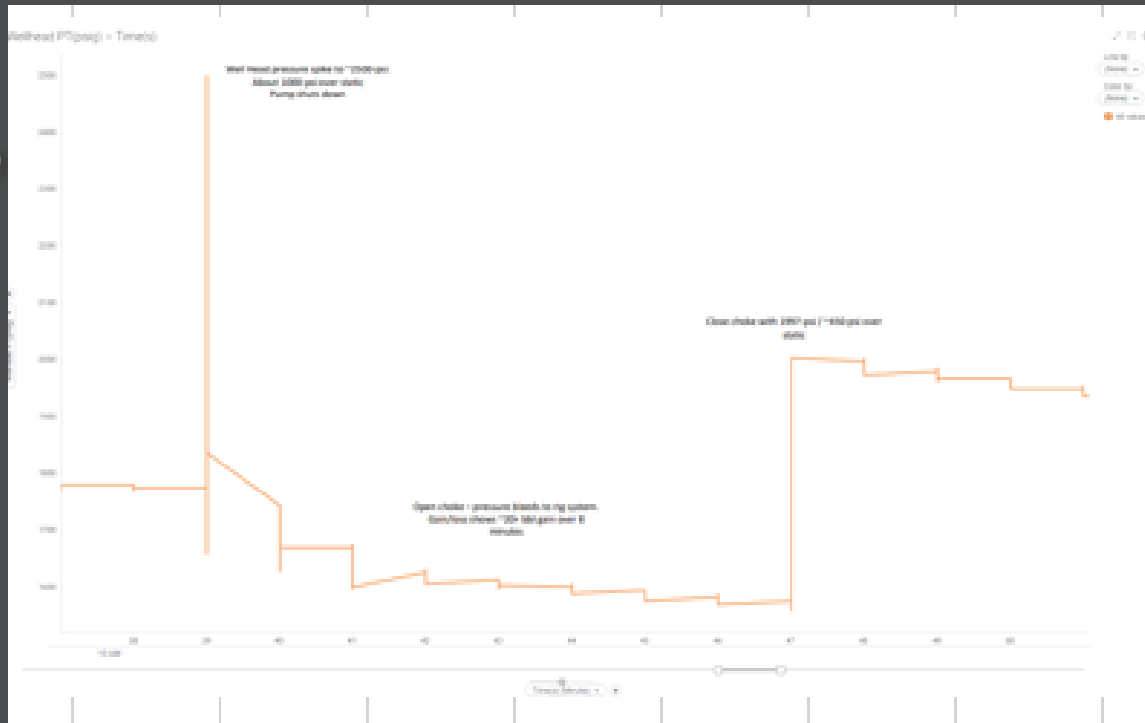
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	<p align="center">Surface Cement Plug Drill Out with Gas Bubble Below Date 4/4/2024</p>															
	<p align="center">Well Information</p> <table border="1"> <tr><td>Fluid Type</td><td>WBM</td></tr> <tr><td>Fluid Weight</td><td>16.6 PPG</td></tr> <tr><td>Casing 1</td><td>9 5/8 P-110 53.5 lb/ft</td></tr> <tr><td>Casing 2</td><td>13 5/8 Q-125 88.2 lb/ft</td></tr> <tr><td>Location</td><td>GB 127</td></tr> <tr><td>Water Depth</td><td>622'</td></tr> <tr><td>Surface Cement Plug</td><td>2000'-2200'</td></tr> <tr><td>Rig Type</td><td>Drill Ship</td></tr> </table>	Fluid Type	WBM	Fluid Weight	16.6 PPG	Casing 1	9 5/8 P-110 53.5 lb/ft	Casing 2	13 5/8 Q-125 88.2 lb/ft	Location	GB 127	Water Depth	622'	Surface Cement Plug	2000'-2200'	Rig Type
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Surface Cement Plug	2000'-2200'															
Rig Type	Drill Ship															
<p align="center">Reasons for Deploying the Deltascope APT</p> <p>Although hydrocarbons were not expected under the surface cement plug, the Deltascope APT was deployed due to the lack of reaction time to close the annular in the event of a gas bubble below the surface cement plug.</p>																
<p align="center">POA</p> <p>The Deltascope Isolation Sleeve was located in the upper annular where it remained for the entire drill out. The upper annular was closed to full working pressure of 1500psi. Approximately 450' of Deltascope mandrel was used to drill the surface cement plug. Once the top of cement was tagged @ 1982' drilling started. @ a depth of 2204' the bit broke through the plug and the pump pressure spiked from 750psi to 1850psi and the drill pipe began to rattle violently in the rotary. The choke was closed in 5 seconds. The wellbore pressure continued to climb indicating a gas bubble had been encountered. With the gas bubble 100% contained, all critical personnel were notified, a plan was rehearsed on the rig floor to regain control of the well. The plan was then executed and well control was successfully regained. Since the choke was closed off immediately and the annular was already closed, the rig experienced zero gain in any tanks. The gas was circulated out through the gas busters and separators while holding back pressure on the choke. In less than three hours from closing the choke, the rig was back to normal operations.</p>																
<p align="center">Key Take Aways from the Job</p> <p>Rig personnel impressed pick up and slack off weights along with torque of the BHA matched the annular open vs annular closed to full working pressure.</p> <p>With the close proximity of the surface plug, there was zero gain in any tank.</p> <p>The choke line showed no signs of plugging utilizing a PDC bit and circulating bottoms up every 30'</p> <p>Operations continued as planned in less than 3 hrs. after gas bubble detected. Ensuring the well was stable and flat line test took up more time than regaining control of the well.</p>																

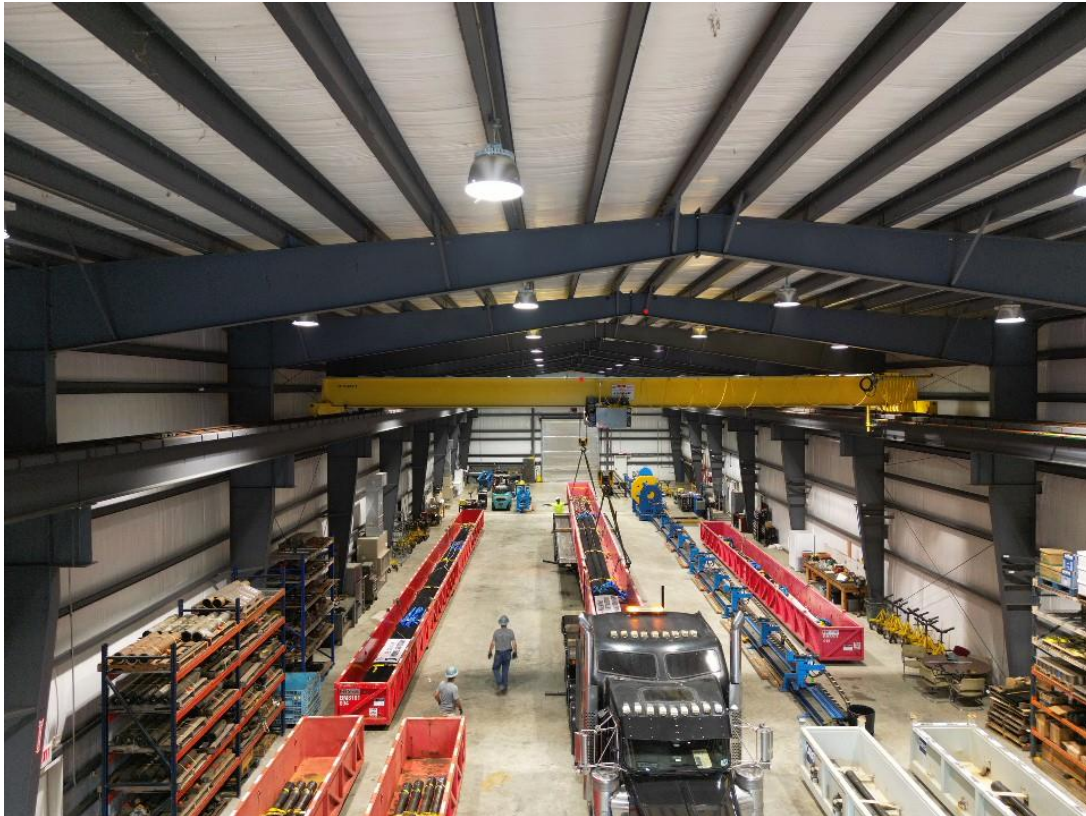
Pressure Encountered During Packer Mill Out

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Surface Barrier Drill Out with Pressure Below Date 8/24/23	
Well Information	
Fluid Type	SBM
Fluid Weight	15.3 PPG SBW
Casing	13 5/8 Q-125 88.2 lb/ft
Location	MC 726
Water Depth	4602
Packer	5308
Rig Type	Drill Ship
Reasons for Deploying the Deltascope APT	
Known Factors	
<ul style="list-style-type: none"> No cement behind the 13 5/8" casing Hole in the 13 5/8 casing patch just below mudline Packer set 16 years ago only good for several months Methane ice plug protruding out of wellhead Well began to flow on last well entry 	
Unknown Factors	
<ul style="list-style-type: none"> Leak path Pressure below methane ice plug and Packer Methane ice plug in backside casing patch 	
Description	
<p>After locating the Deltascope in the UA, the tool was stroked down to begin washing the methane hydrate plug (5184'). The gas busters on top the derrick could be heard making a loud popping sound as the gas was separated out. Heated mud was used to circulate and remove any ice build up behind the casing patch. @ 5307' the packer was encountered and drilled out rotating @ 80 RPM. Once the seals of the packer were drilled out a 2000psi spike in pressure was encountered. The workstring immediately rose up 20' due to the compensator trying to maintain WOB. 115,000lbs was pushing up on the bit. With the pressure 100% contained, a plan was derived and executed to regain control of the well. The Deltascope held 100% of the pressure and all influx from entering the riser. The rig gained back a total of 20 barrels of wellbore fluid while bleeding down the pressure and circulating out any wellbore influx.</p>	
Key Take Aways from the Job	
<p>The Deltascope APT was used to wash Methane ice plug for 153' with zero gas entering the riser.</p>	
<p>With the close proximity of the surface plugs to the wellhead, there was zero gain in any tank while holding pressure</p>	
<p>Rig was moving forward in less than 3 hours.</p>	
<p>A separate run was made to free stuck plug</p>	

Advantages of deploying the Deltascope APT during frac operations.



Counter thermal contraction by adding weight to the service tool with confidence.



Easily snap in and out with the service tool and get a good indication on the weight indicator.



Find tool positions with pressurized annulus



Quickly find the location of stuck BHA without the friction of the annular



Stroke in the hole to close circulation sleeve with a pressurized annulus

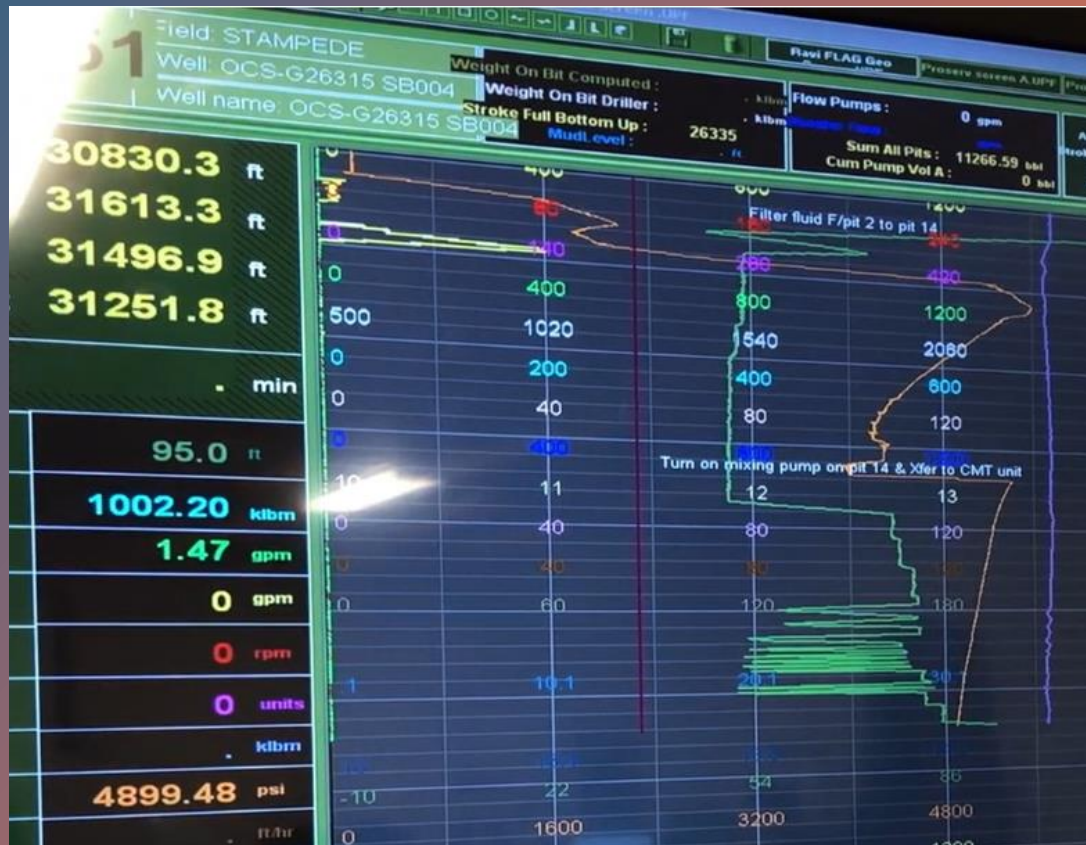


Increase chances of a successful stack hop with no additional wear to the annular

Highlighted Accomplishments (Frac)

- Shifted tool from reverse to frac position with pressurized annulus due to formation being charged after the Mini-frac.
- Picked up to reverse with 7,000 psi on annulus
- Stroked in hole 256' and closed MSV sleeve with 900psi on annulus
- Telemetry data over the course of 8 wells consistently proved the weight being applied at surface was being applied to the service tool downhole.

Highlighted Accomplishments (Frac)



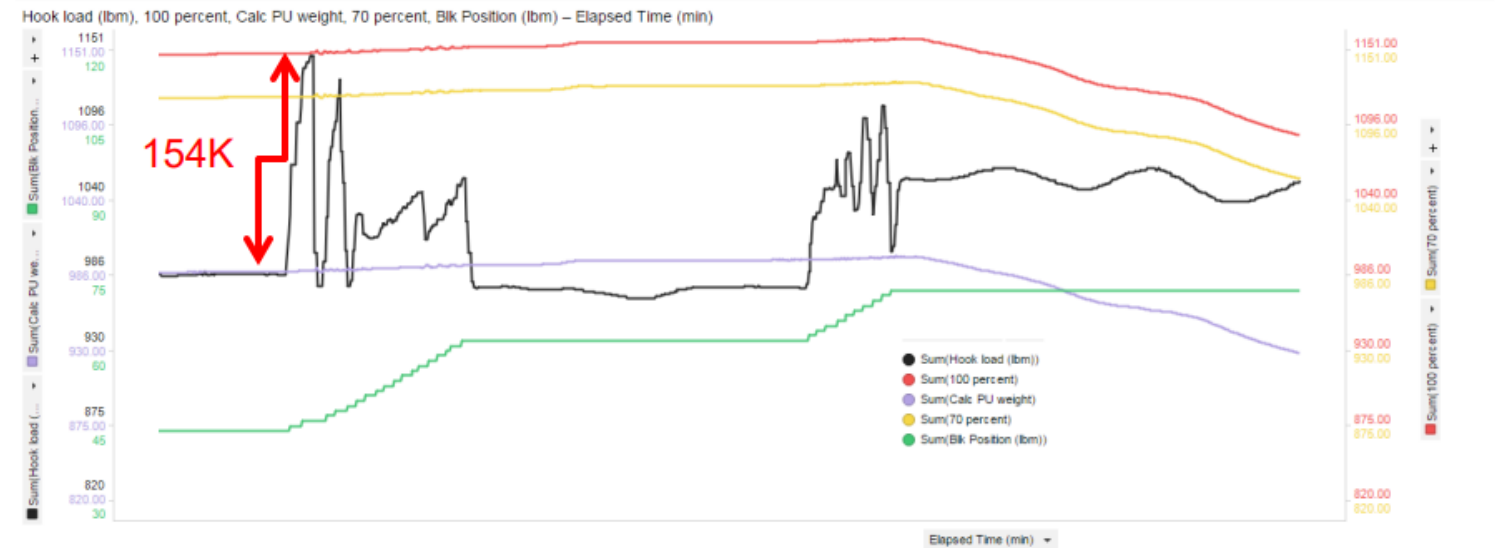
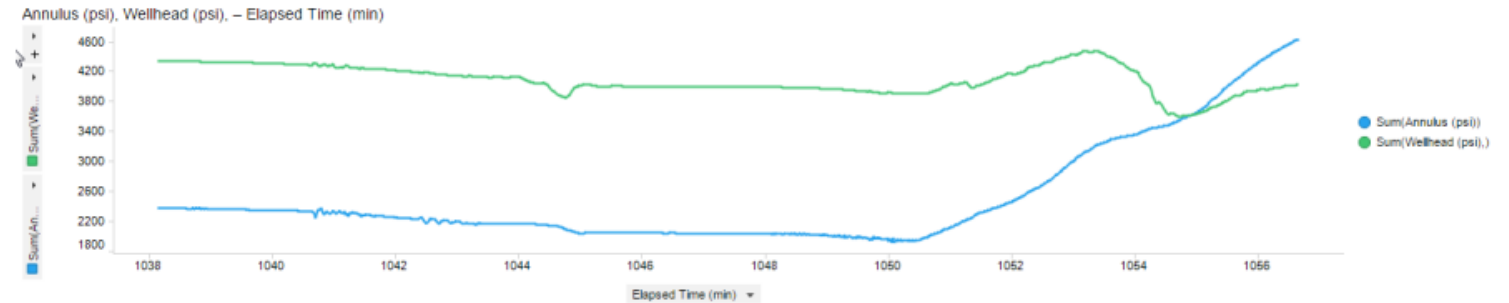
Ability to apply simulated frac pressure and find tool position and verify indications before frac job

Frac service tool provider witnessed their mandrel seals engage on the BHA

Eliminated all NPT related to ABOP drag effects in the field (8 multizone frac jobs)

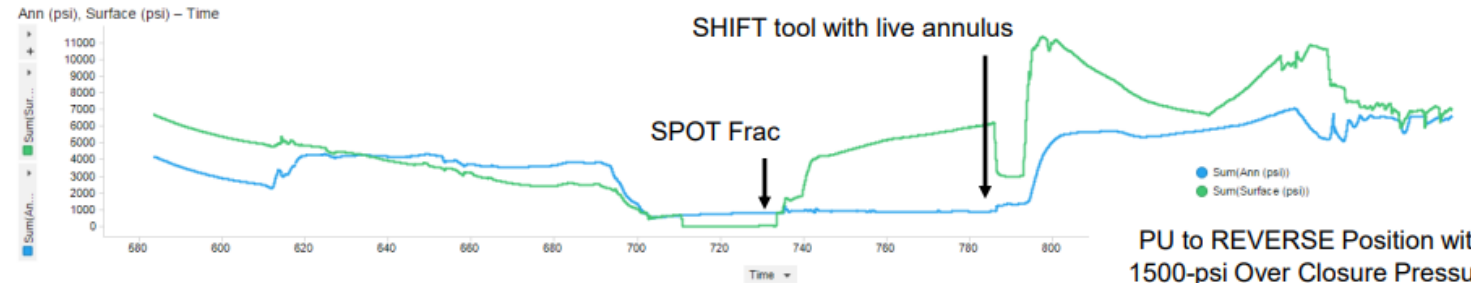
Service tool became stuck and was able to quickly be freed with max overpull

Annular drag can make working under a closed BOP near impossible.



Even with 6,800 psi, tool position can easily be achieved when the Deltascopie APT is deployed.

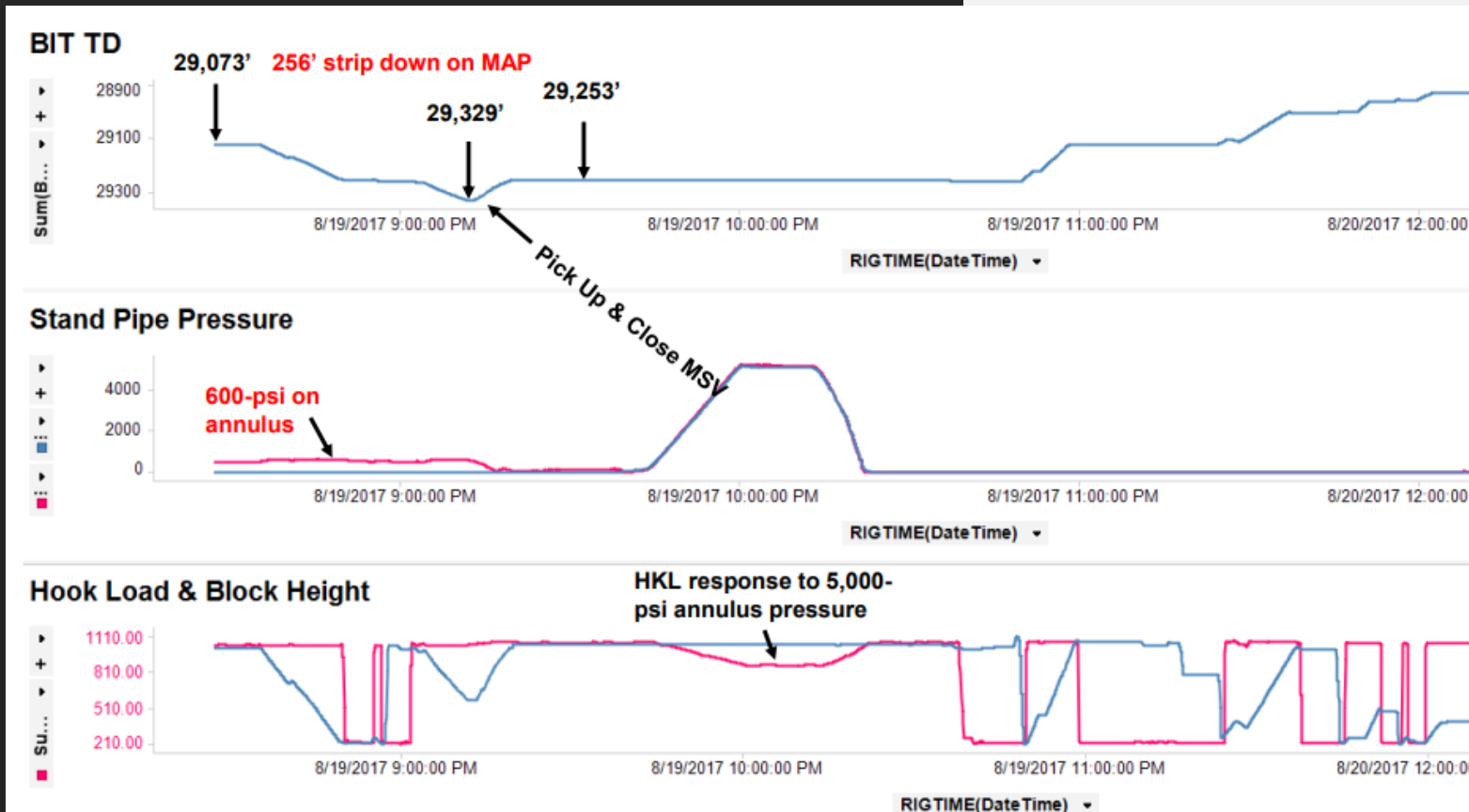
Annulus will not bleed down. Spot FRAC with live Annulus and shift tool



Stroked in the Hole and Closed the Isolation Sleeve

- With no tool joints to hinder the operation, the Deltascop was easily stroked in the hole 256' with 600psi on the annulus.

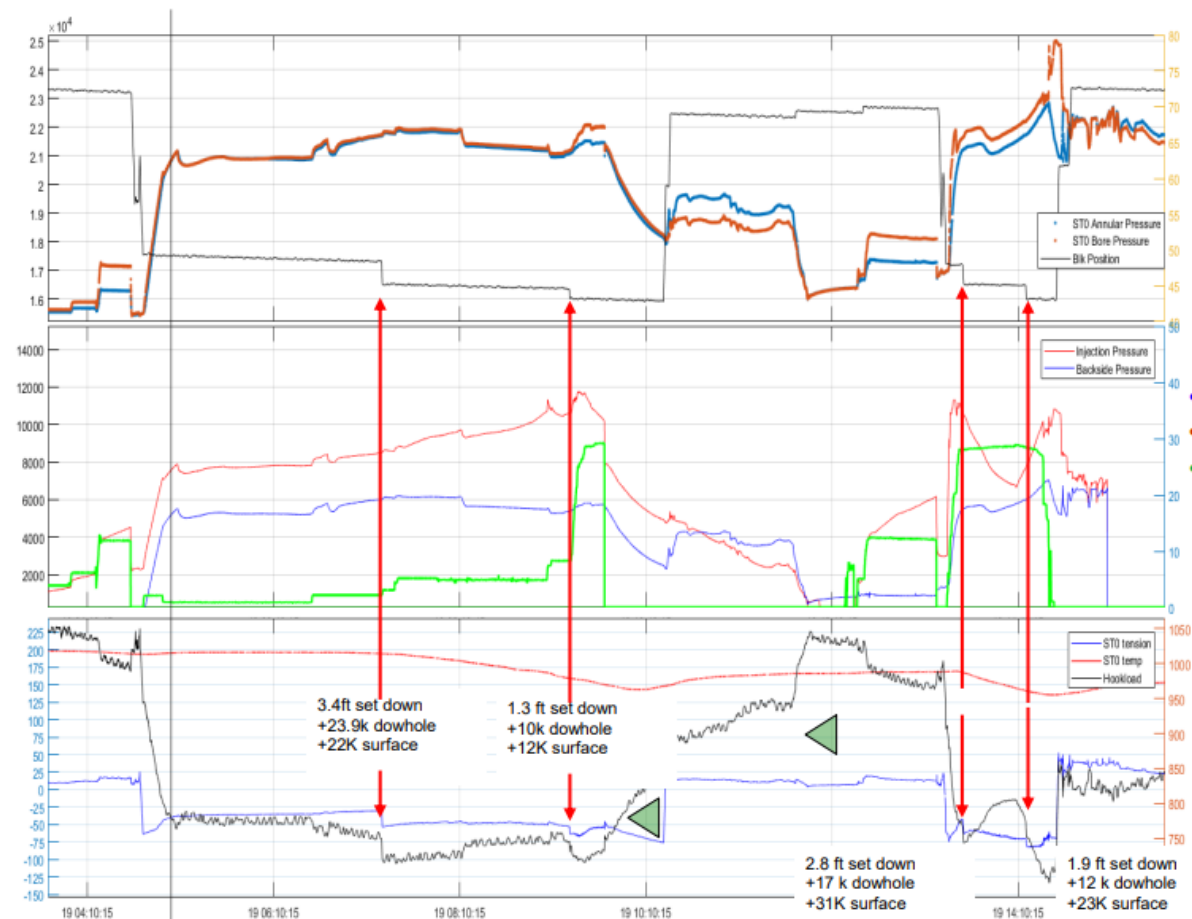
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8 Well Study

Telemetry Data Retrieved and Compared Post Job

- ✓ The weight set down at surface was recorded by the telemetry tool downhole proving the weight is being transferred below a closed ABOP.



- Ann BHP PSI
- Tbg BHP PSI
- BLK POS

- Ann Surface PSI
- Tbg Surface PSI
- RATE

- ST0 Tension
- ST0 Temp
- HKL

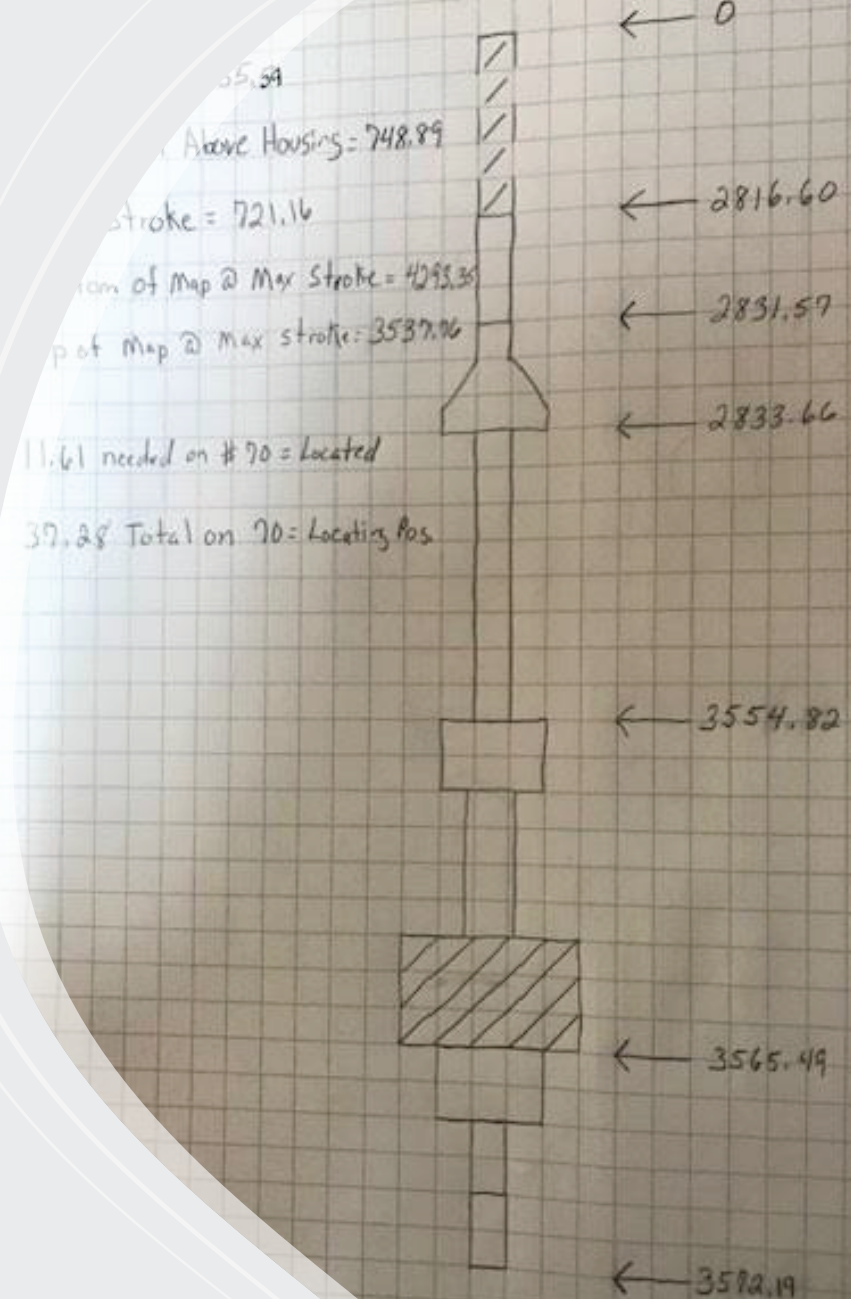
Two Stage Displacement Benefits

(Mud to Completion Fluid)

Ability to rotate and reciprocate while displacing the riser separately from the wellbore.

Chemical trains become more effective because they do not have time to get strung out.

Larger wellbore debris is removed with turbulent flow through the choke/kill instead of settling out in the riser.

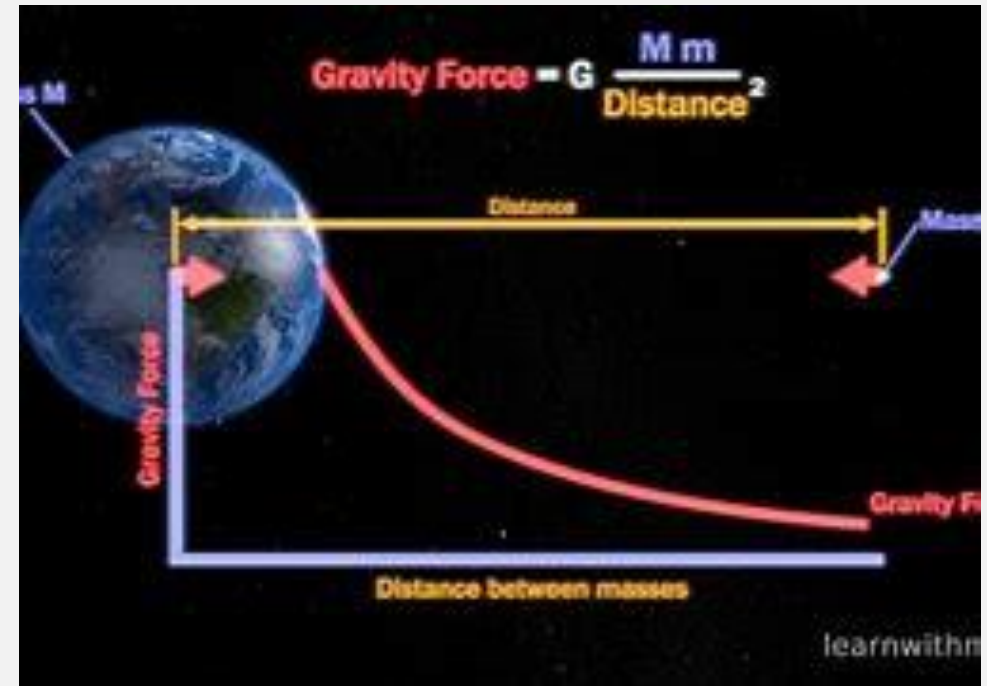


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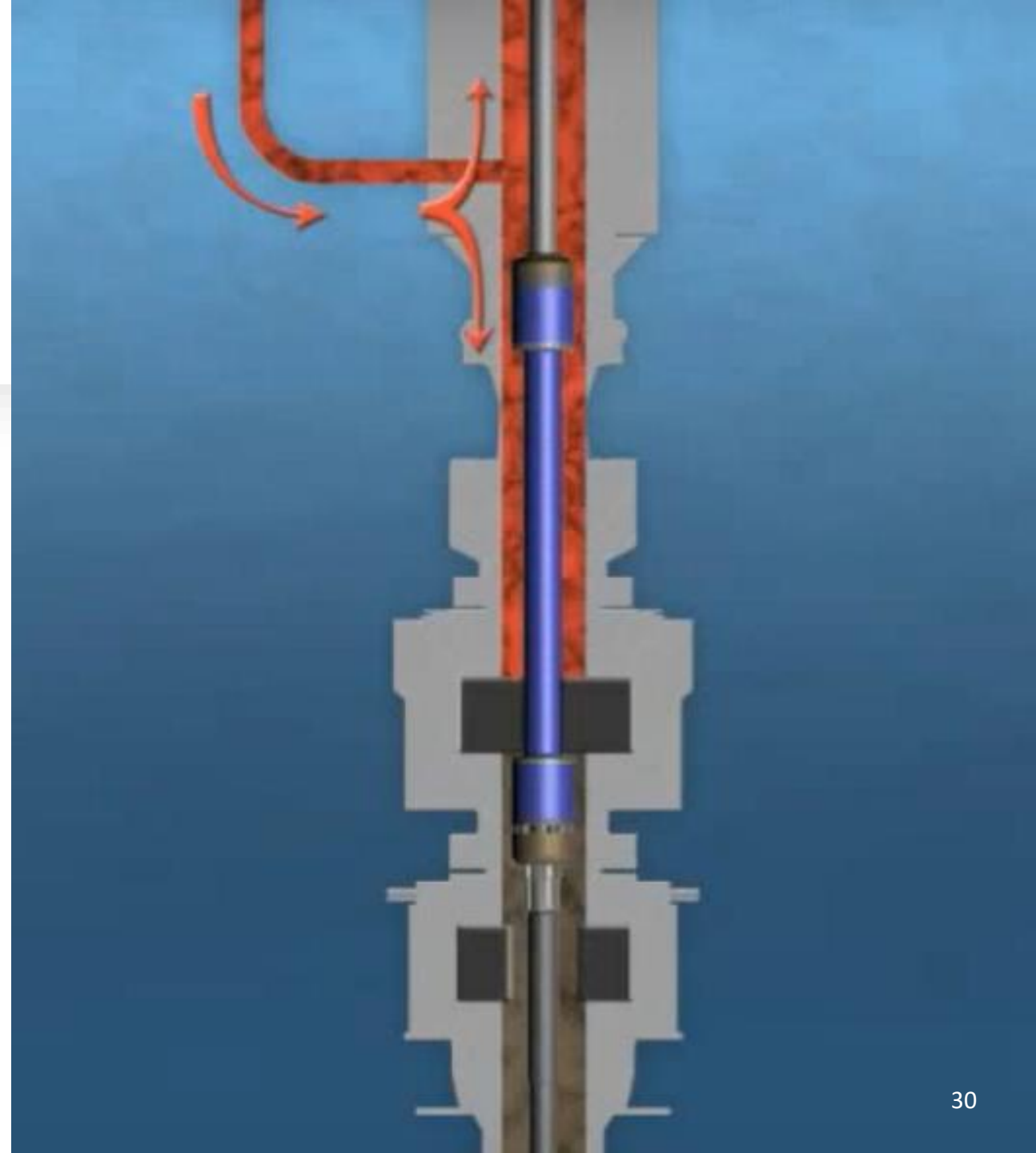
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The unchallenged ability to rotate and reciprocate while reverse circulating.



Two Stage Displacement Procedure

1. Locate Deltascopes in the annular
2. Displace riser to completion fluid.
3. Displace the wellbore while rotating and reciprocating in reverse circulation.
4. Short Trip
5. Jet Stack
6. Locate Deltascopes in the annular
7. Reverse circulate 1.5 times wellbore volume while rotating and reciprocating.
8. Open annular.
9. Circulate the long way at least one bottoms up and until NTUs are acceptable.



Deltascopes Job History



RIGSCOPE INTERNATIONAL		Deltascopes APT Job History									
Location	Stroke	RPM	BPM	PSI Test	Max PS	Time Use	WD	Rig Name	Application		
SIT	65'	70	10	1100	900	8hrs	0'	Frank's Rig	SIT (Successful)		
M/C 778	65'	70	15	4500	3200	23hrs	6040'	PDQ (TLP)	Displacement/Wash Fill/Qualify Tool (Successful) 12.6 CaBr2		
G/B 293	24'	56	15	2000	1200	10hrs	2200'	Ocean Victory (Floater)	Displacement (Successful) 14.9 SBM to 13.3 CaBr2		
W/D 45	74'	0	2	3500	2400	6hrs	49'	EnSCO 99 (Jack Up)	Frac/Qualify Tool for Deepwater (Successful) 9.8 CaCl2		
G/C 490	24'	56	13.5	4500	2500	15hrs	3845'	Ocean Victory (Floater)	Displacement/Wash Fill (Successful) 14.2 SBM to 12.3 CaBr2		
G/C 238	42'	55	20	2000	1500	47hrs	2357'	Ocean Victory (Floater)	Rotate & reciprocate while cleaning pits/Neg. Test/Displacement (Successful) 14.2 CaBr2/ZnBr2		
G/C 158	46'	35	4	2000	1350	6hrs	2985'	H&P 202 (TLP)	Displacement (Successful) 12.2 CaBr2		
G/C 158	46'	35	3.5	2000	1500	5hrs	2985'	H&P 202 (TLP)	Displacement (Successful) 12.2 CaBr2		
G/C 158	46'	20	4	2000	1400	8Hrs	2985'	H&P 202 (TLP)	Displacement (Successful) 12.2 CaBr2		
M/C 935	46'	40	14	2000	1600	7Hrs	3797'	Noble Driller (Semi)	Displacement (Successful)		
E/B 602	46'	45	15	2000	2500	12Hrs	3681'	EnSCO 8500 (Semi)	Displacement (Successful) 11.2 SBM to 9 CaCl2		
G/C 248	46'	20	8	2000	1950	14Hrs	3427'	Noble Driller (Semi)	Displacement (Successful) 14.2 SBM to 14.2 CaBr2		
G/C 116	46'	35	14	2000	1150	17Hrs	2046'	Jim Thompson (Semi)	Displacement (Successful) 13.5 CaBr2		
G/C 727	46'	20	20	2000	1200	11hrs	4487'	Discovery Spirit (Drill Ship)	Displacement (Successful) 15 WBM to 14.8 ZnBr3 ZnBr2		
MB 861	46'	100	10	0	700	3.5	52'	Spartan 202 (Jack Up)	Drill out cement and CIBP (Successful) 15.5 OBM		
G/B 260	46'	20	3.5	2000	1900	9hrs	1600'	Super Sundowner 16	Reverse Displacement (Surface Stack) (Successful) 15.9 WBM to 15.6 ZnBr2		
G/B 341	46'	20	26	2000	1650	13Hrs	2013'	Noble Driller (Semi)	Displacement (Successful) 13.7 SBM to 11.7 CaBr2		
G/B 427	78'	0	10	7000		42Hrs	2719'	Jim Thompson (Semi)	High Rate Water Pack (Successful) 12.8 CaBr2		
G/B 427	89'	0	22	7000		54Hrs	2720'	Jim Thompson (Semi)	Frac Pack (Successful) 12.6 CaBr2 130,000 lbs.		
G/C 512	800'	0	0	7500	7200	32hrs	3580'	Black Lion (Drill Ship)	Multi Zone Frac Simulated function test with applied pressure (Successful) 10.9 CaBr2 (While Waiting on Storm)		
G/C 512	800'	0	20	7500	7500	78Hrs	3580'	Black Lion (Drill Ship)	Multi Zone Frac (Successful) 10.9 CaBr2 500,000 lbs.		
G/C 512	800'	0	20	7500	7500	82Hrs	3535'	Black Rhino (Drill Ship)	Multi Zone Frac (Successful) 10.7 CaBr2 500,000 lbs.		
G/C 512	250'	0	20	7500	7500	42Hrs	3544'	Black Rhino (Drill Ship)	Single Zone Frac (Successful) 10.6 CaBr2 250,000 lbs		
G/C 512	800'	0	20	8000	8000	67Hrs	3544'	Black Rhino (Drill Ship)	Multi Zone Frac (Successful) 10.6 CaBr2 500,000 lbs.		
G/C 512	250'	0	20	8000	7700	24Hrs	3634'	Black Rhino (Drill Ship)	Packer Pull/Clean Fill (Successful) 10.8 CaBr2 500,000 lbs.		
G/C 512	800'	0	20	8000	7500	70Hrs	3634'	Black Rhino (Drill Ship)	Multi Zone Frac (Successful) 10.8 CaBr2 500,000 lbs.		
G/C 512	800'	0	20	8000	7600	12Hrs	3634'	Black Rhino (Drill Ship)	Isolation Run (Successful) 10.8 CaBr2 500,000 lbs.		
G/C 512	800'	0	25	8500	7500	90Hrs	3634'	Black Lion (Drill Ship)	Multi Zone Frac (Successful) 10.9 CaBr2 500,000 lbs.		
G/C 512	800'	0	25	8500	7500	84Hrs	3634'	Black Lion (Drill Ship)	Multi Zone Frac (Successful) 10.7 CaBr2 500,000 lbs.		
M/C 726	56'	5	0	2500	1000	1Hrs	4602'	Deepwater Asgard (Drill Ship)	Pull Stuck Test Plug. (Successful) 15ppg OBM		
M/C 726	1200'	80	25	6000	4600	72Hrs	4602'	Deepwater Asgard (Drill Ship)	Wash Methane Hydrate Plug/Drill Packer (Successful) 15ppg OBM		
G/B 84	300'	80	8	1500	800	10hrs	630'	Noble Globetrotter 1 (Drill Ship)	Surface Cement Plug Drill Out (Successful) 15ppg WBM		
G/B 127	440'	100	8	2000	1850	13hrs	627'	Noble Globetrotter 1 (Drill Ship)	Surface Cement Plug Drill Out (Successful) 15ppg WBM		
G/B 172	440'	120	8	2000	750	10hrs	919'	Noble Globetrotter 1 (Drill Ship)	Surface Cement Plug Drill Out (Successful) 16.2ppg WBM		
G/B 128	440'	80	8	2000	800	10hrs	718'	Noble Globetrotter 1 (Drill Ship)	Surface Cement Plug Drill Out (Successful) 16.2ppg WBM		



Frequently Asked Questions

1 How much pressure is the Deltascope good for?

The internal working pressure of the mandrel (workstring) is 15,000 psi and the Isolation Sleeve (Backside) is 10,000 psi differential.

2 What is the maximum surface plug length the Deltascope can drill?

The Deltascope can drill out any length cement plug. Simply add more mandrel stands to the system to cover the plug's length.

3 How fast can the workstring be rotated?

The workstring can be rotated up to 120RPM.

4 Can the Deltascope APT work in the top or the bottom annular?

Yes, the Deltascope works in any annular but we recommend the top so that the bottom can be used as a contingency plan.

5 Will the annular crush the isolation sleeve if too much closing pressure is applied?

No, the isolation sleeve is designed to with stand maximum closing pressure.

6 Does the rotational torque of the workstring increase after the annular is closed?

No, the torque remains the same.

7 Does the hook load change any after the annular is closed?

The hook load changes 2,000lbs both ways due to the fact the annular is now holding the weight of the isolation sleeve. See examples. [Annular Open P/U # 410K S/O 380K](#) [Annular Closed P/U # 408K S/O 378K](#)

8 Is the Deltascope shearable?

Yes, the mandrels of the Deltascope system are shearable in many common BOPs.

9 Do the bearings have any internal moving parts?

No, the bearings do not have any moving parts.

10 What is the max torque of the Deltascope APT?

The max torques of the Deltascope APT is limited to the CTM-57 connection. 57,900 ft/lbs



Deltascope APT Performance Sheet

Rigscope International, LLC
317 Old Hwy 659
Schriever, La. 70395
Operations@Rigscopeint.com

Mandrel Body			Mandrel Connection CTM-57			Isolation Sleeve Body	
	New Machined	Minimum OD Allowance					
OD (in):	7.000	6.990	Tool Joint OD (in):	7.000	Sealing Area OD (in):	9.18	
Wall Thickness (in):	0.625	0.620	Tool Joint ID (in):	4.250	Wall Thickness (in):	0.745	
Nominal ID (in):	5.750	5.750	Drift (in):	4.125	ID (in):	7.69	
Calculated Plain End Wt. (lbs-ft):	42.533	41.219	Tool Joint SMYS (ksi):	135	Burst Capacity (psi):	20,792	
Tensile Strength (lbs):	1,564,700	1,550,924	Tool Joint Length (ft):	2.58	Collapse Capacity (psi):	17,953	
Torsional Strength (ft-lbs):	220,500		Thread Compound (FF):	1.000	Stop OD (in):	12.625	
			Elevator Shoulder Capacity:	N/A	Top Stop Length (ft):	2.17	
			Maximum MUT (ft-lbs):	57,900	Sealing Area Length (ft):	8.5	
100 % RBW (87.5% API) Burst Capacity (psi):	19,530		Tension @ Shoulder Separation @ MAX MUT (lbs):	666,500	Bottom Stop (ft):	2.39	
Burst Capacity (psi):	22,321	22,174	Tension @ Connection Yield @ MAX MUT (lbs):	1,115,530	Overall Length (ft):	13.06	
Collapse Capacity (psi):	20,328	20,150	Minimum MUT (ft-lbs):	48,300	Material:	4145	
Cross Sectional Area Pipe Body (in ²):	12.517		Tension @ Shoulder Separation @ MIN MUT (lbs):	1,309,474	Minimum Yield (ksi):	120	
Cross Sectional Area OD (in ²):	38.485		Tension @ Connection Yield @ MIN MUT (lbs):	1,350,609	Isolation Sleeve Total Wt. (lbs):	2758	
Cross Sectional Area ID (in ²):	25.967		Tool Joint Torsional Strength (ft/lbs):	96,561	Displacement (bbls):	1	
Sectional Modulus (in ³):	18.343		Tool Joint Tensile Strength (lbs):	1,350,609			
Polar Section Modulus (in ³):	36.686		Internal Pressure Rating (psi):	20,000			
Material (Type):	4145		External Pressure Rating (psi):	10,000			
Material SMYS (psi):	125,000						
Deltascope APT Ratings						Mandrel Stand Data	
Mandrel Internal Working Pressure	15,000 psi		RPM	120	Stand Length (ft):	62.89	
Isolation Sleeve Working Pressure	10,000 psi Differential		FPM Located	80	Adjusted Weight (lbs-ft):	53.53	
Unlatch Weight Down	20K lbs		Annular Closing Pressure	3000	Fluid Displacement (bbls-ft):	0.01946	
					Fluid Capacity (bbls-ft):	0.02789	