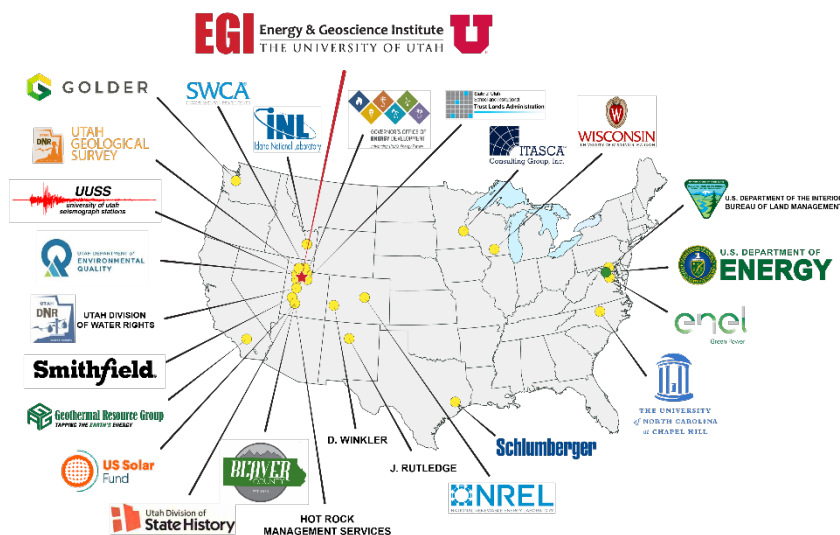


End of Well Report

Utah Forge Seismic Monitoring Well 78B-32 Milford, Utah



Prepared by:
Geothermal Resource Group, Inc.
for
University of Utah (UofU)



End of Well Report Utah FORGE Seismic Monitoring Well 78B-32	Ref. GRG-10230	
	Ver. Final	Page 2 of 68
	Issued: 1 December 2021	

Prepared by	Ernesto Rivas
	Sr. Drilling Engineer
	Sami Atalay
	Sr. Drilling Engineer
Reviewed by	Mary Mann
	Sr. Geoscientist
	W. M. Rickard
	President
Approved by	Joseph Moore
	Project Manager

All rights reserved. No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of the publisher, except in the case of brief quotations embodied in critical reviews and certain other noncommercial uses permitted by copyright law.





End of Well Report		Ref. GRG-10230	
Utah FORGE		Ver. Final	Page 3 of 68
Seismic Monitoring Well 78B-32		Issued: 1 December 2021	

Contents

1. SUMMARY.....	8
2. ABBREVIATIONS AND ACRONYMS.....	8
3. INTRODUCTION.....	13
4. WELL INFORMATION.....	14
4.1. Well Location.....	14
4.2. Planned Wellbore Construction and Well Plan	16
4.3. Wellbore As-Constructed	18
4.4. Drilling Summary.....	20
4.5. Days vs Depth	20
5. DIRECTIONAL PROGRAM.....	21
6. DRILLING ACTIVITY BY WELL SECTION.....	26
6.1. Mob, Site Prep, Conductor.....	26
6.2. 22 in. Hole to 416 ft. and 16 in. Casing.....	28
6.2.1. Drilling Objectives	28
6.2.2. Summary	28
6.2.3. 22 in. Surface Equipment	28
6.2.4. 17-1/2 in. Bit, Hydraulics and BHA	28
6.2.5. 22 in. Drilling Fluids	29
6.2.6. 16 in. Casing and Cementing.....	30
6.3. 14-3/4 in. Hole to 3,009 ft. and 11-3/4 in. Casing.....	32
6.3.1. 14-3/4 in. Hole Objectives.....	32
6.3.2. 14-3/4 in. Summary.....	32
6.3.3. 14-3/4 in. Surface Equipment.....	33
6.3.4. 14-3/4 in. Bit, Hydraulics Program and BHA	34
6.3.5. 14-3/4 in. Drilling Fluids.....	38
6.3.6. 11-3/4 in. Casing and Cementing	39
6.4. 10-5/8 in. Hole to 8,500 ft. and 7 in. Casing	40
6.4.1. 10-5/8 in. Hole Objectives.....	40
6.4.2. 10-5/8 in. Summary.....	41
6.4.3. 10-5/8 in. Surface Equipment.....	41
6.4.4. 10-5/8 in. Bits, Hydraulics Program and BHA.....	42
6.4.5. 10-5/8 in. Drilling Fluids.....	58
6.4.6. 7 in. Casing and Cementing.....	59
6.5. 5-3/4 in. Hole to 9,500 ft.	61
6.5.1. 5-3/4 in. Hole Objectives.....	61
6.5.2. 5-3/4 in. Section Summary	61





End of Well Report		Ref. GRG-10230	
Utah FORGE		Ver. Final	Page 4 of 68
Seismic Monitoring Well 78B-32		Issued: 1 December 2021	

6.5.3.	5-3/4 in. Surface Equipment.....	61
6.5.4.	5-3/4 in. Bits, Hydraulics Program and BHA.....	63
7.	<i>CORING</i>	65
8.	<i>DATA COLLECTION</i>	66
8.1.	Geophysical Logging.....	66
9.	<i>APPENDICES in Accompanying file</i>	





End of Well Report		Ref. GRG-10230	
Utah FORGE		Ver. Final	Page 5 of 68
Seismic Monitoring Well 78B-32		Issued: 1 December 2021	

Figures

Figure 1: Utah FORGE project site location.....	14
Figure 2: Aerial view of surface locations of Utah FORGE wells. The primary purpose of well 78B-32 is to provide a site where R&D tools and technologies for EGS development can be tested. At other times, the well will be used for seismic monitoring.....	15
Figure 3: Planned well construction for 78B-32.....	17
Figure 4: 78-B32 well schematic, as built.	19
Figure 5: Planned vs actual drilling days plot for well 78B-32. Planned line is red and actual drilling days is blue.	21
Figure 6: Final Directional survey plot.	25
Figure 7: Drilling of conductor.	26
Figure 8: Conductor hole as drilled.	26
Figure 9: Conductor setting.	27
Figure 10: Conductor setting -cont.	27
Figure 11: Conductor and mouse - as constructed.....	27
Figure 12: Lateral view, conductor and mouse hole.....	27
Figure 13: 16 in. surface casing cement pressure chart.	32
Figure 14 : BOPE 21-1/4" for drilling 14-3/4" hole.	33
Figure 15 : 11-3/4" Intermediate casing cement pressure chart.....	40
Figure 16: 13-5/8" BOPE Stack for drilling 10-5/8" hole.	41
Figure 17: 7 in. Production casing cement pressure chart (primary job).....	60
Figure 18: xLOT pump chart at 8,555 ft.....	62
Figure 19: 7-1/16" BOPE stack for drilling 5-3/4" hole.....	63





End of Well Report Utah FORGE Seismic Monitoring Well 78B-32	Ref. GRG-10230	
	Ver. Final	Page 6 of 68
	Issued: 1 December 2021	

Tables

Table 1: Abbreviations and Acronyms	8
Table 2: Table of units and their symbols used during drilling of 78B-32.....	11
Table 3: 78-32 Well Information.	15
Table 4: 78B-32-hole sections, as constructed.	18
Table 5: Survey data for 78B-32.....	21
Table 6: Basic drilling parameters for 22 in. section.	28
Table 7: BHA # 1 used with bit #1.	29
Table 8: Fluid Parameters Planned for 17-1/2 in. Section.....	29
Table 9: Average fluid properties for 22 in. section.	30
Table 10: Cement report for 16 in. casing.	31
Table 11: 14-3/4 in. Bit parameters.	34
Table 12: BHAs used to drill 14-3/4 in. hole section.	34
Table 13: BHA #2 used with bit #2.	35
Table 14: BHA # 3 used with bit # 3.	36
Table 15: BHA # 4 used with bit # 4.	37
Table 16: Planned fluids parameters for 14-3/4 in. hole section.	38
Table 17: Average fluid properties for 14-3/4 in. section.....	38
Table 18: Cement job report for 11-3/4 in. casing.....	39
Table 19: Bits used in drilling 10-5/8" hole section.	42
Table 20: 10-5/8 in. BHA used with bit # 5.....	43
Table 21: 10-5/8 in. BHA # 6 used with bit # 6.....	44
Table 22: 10-5/8 in. BHA #7 used with bit # 7.....	46
Table 23: 10-5/8 in. BHA # 8 used with bit # 8.....	47
Table 24: 10-5/8 in. BHA # 9 used with bit #9.....	48
Table 25: 10-5/8 in. BHA # 10 used with bit #9.....	49
Table 26: 10-5/8 in. BHA # 11 used with bit # 10.....	50
Table 27: 10-5/8 in. BHA # 12 used with bit # 11.....	51
Table 28: 10-5/8 in. BHA # 13 used with bit # 12.....	52
Table 29: 10-5/8 in. BHA # 14 used with bit # 13.....	53





End of Well Report Utah FORGE Seismic Monitoring Well 78B-32	Ref. GRG-10230	
	Ver. Final	Page 7 of 68
	Issued: 1 December 2021	

Table 30: 10-5/8 in. BHA # 15 used with bit # 14.....	54
Table 31: 8-3/4 in. Coring BHA #16 used with bit #15.....	55
Table 32: 8-3/4 in. Coring BHA # 17 used with bit # 15.....	56
Table 33: 10-5/8 in. BHA # 18 used with bit # 14.....	56
Table 34: 10-5/8 in. BHA # 19 used with bit # 12.....	57
Table 35: 10-5/8 in. BHA # 20 used with bit # 12.....	57
Table 36: Fluid parameters planned for 10-5/8 in.	58
Table 37: Average fluid properties for 10-5/8 in. section.....	59
Table 38: Primary cement job report for 7” casing.....	60
Table 39: Bits used to drill the 5-3/4 in. hole section.	64
Table 40: 5-3/4 in. BHA #21 to clean-out cement inside the 7 in. casing.	64
Table 41: 5-3/4 in. BHA # 21 used with bit # 17.....	65
Table 42: Open hole geophysical logs for 78B-32.	66



1. SUMMARY

Department of Energy FORGE initiative Phase 3B Well 78B-32 was vertically drilled to a depth of 9,500 ft. to be used as a closed monitoring well. Well 78B-32 encountered the top of the granite at about 2,700 ft. Improved PDC technology and bit design, better understanding and use of MSE in real time and ongoing limiter redesign were the major factors in the tremendous increase in ROP. This well took less than 45% of the on-bottom drilling time, required in the previous two wells, to reach 9,000 ft. The ROP was effectively doubled when compared to the two previous wells.

The well was cased with 7 in. casing to a depth of 8,508 ft. and completed barefoot to 9,500 ft. A suite of geophysical logs, pressure and temperature surveys, and image logs were run to obtain data. 21.5 ft. of 8-3/4 in. core was cut between 6,700 and 6,740 ft. (two coring runs performed) and 32.4 ft. of 8-3/4 in. cored cut at 8,500 and 8,540 ft. (two coring runs performed), respectively. The drilling and testing of 78B-32 well were completed at planned depth.

2. ABBREVIATIONS AND ACRONYMS

The abbreviations and acronyms in Table 1 are used throughout the document, many of them are commonly used in the drilling industry and may appear without explanation in the text. The reader is urged to refer to this table to become familiar with the terms as they are employed within the report. Table 2 contains the units of measure that were used during drilling and the abbreviations or symbols may occur through this report.

Important Note: All depths in this program are measured depths from the rotary Kelly bushing (RKB) level of 30.40 ft. above ground level, unless stated otherwise

Table 1: Abbreviations and Acronyms

Abbreviation or Acronyms	Description
ACP	annulus casing packer
AD	Alternative (special) drift
AFE	authorization for expenditure
API	American Petroleum Institute
ASL	above sea level
BGL	below ground level
BHA	bottom-hole assembly



Abbreviation or Acronyms	Description
BHST	bottom hole static temperature
BOP	blowout preventer
BOPE	blowout prevention equipment
BTC	buttress threaded and coupled
CO ₂	carbon dioxide
DC	drill collar
DP	drill pipe
DSV	drilling supervisor
EOWR	end-of-well report
EMW	equivalent mud weight
FC	float collar
FG	fracture gradient
FIT	formation integrity test
FOSV	full opening safety valve
FS	float shoe
GL	ground level
GRG	Geothermal Resource Group, Inc.
H ₂ S	Hydrogen sulfide
HSE	health, safety, and environmental
HWDP	heavy weight drill pipe
IADC	International Association of Drilling Contractors
ID	inner diameter
JSA	job safety analysis
jt	Joint (casing, drill pipe)
Ksi	Kilopounds per Square Inch
KPI	key performance indicators
LCM	lost circulation material



Abbreviation or Acronyms	Description
LGS	low gravity solids
LOT	leak off test
LSR	Life-saving rules
LSND	low solids non-dispersed (drilling mud)
M/U	make up
MD	measured depth
MI/RU	move in and rig up
MSDS	material safety data sheet
MW	mud weight
N/U	nipple up
N/D	nipple down
NMDC	non-magnetic drill collar
NPT	national pipe thread
OD	outer diameter
P/U	pick up
PDC	polycrystalline diamond compact (bit)
PLC	partial loss of circulation
POH	pull out of hole
PoH	probability of hazard occurrence
PPB	pounds per barrel
PPF	pounds per foot
PPG	pounds per gallon
P/T or PT	pressure and temperature
PTS	pressure, temperature, and spinner logging / survey
PVT	pit volume totalizer
RD/MO	rig down and move off
ROP	Rate of Penetration



Abbreviation or Acronyms	Description
RMG	rig manager
sFIT	step-rate formation integrity test
TD	Total Depth or Termination Depth of hole or section
UofU	University of Utah
xLOT	extended leak off test

Table 2: Table of units and their symbols used during drilling of 78B-32.

Unit Category	Description	Symbol
Cost	Currency – daily cost and AFE amounts	\$
Size/Diameter-1	Small diameter – bit nozzle diameter	1/32 in
Size/Diameter-2	Larger diameter – bit diameter, pipe OD	in or (")
Dog Leg	Dog leg severity (DLS)	°/100
Drilling Rate	Rate of penetration -- feet per hour	fph
FlowRate-1	Moderate flow rate – pump flow	gpm
FlowRate-2	Large flow rates – gas flow rate	scfm
FlowRate-3	Large flow rate - cement, mud/water loss	bpm
Fluid Density	Fluid density – mud weight/density	ppg
Gas	Gas concentrations – trip and connection gas	units
Length-1	Moderate length – depth	ft or (')
Length-2	Long lengths – visibility	mile
Pressure	Pressure – pump pressure	psi
Resistivity	Resistivity – geophysical survey	ohm.m
Temperature	Temperature – mud temperature	°F
Torque	Torque	ft-lb
Viscosity-1	Viscosity – funnel viscosity	sec /qt
Viscosity-2	Viscosity – plastic viscosity	cp





End of Well Report		Ref. GRG-10230	
Utah FORGE		Ver. Final	Page 12 of 68
Seismic Monitoring Well 78B-32		Issued: 1 December 2021	

Unit Category	Description	Symbol
Volume-1	Small to moderate volume	gal
Volume-2	Large volume – mud/water/cement volume	bbl
Weight	Weight – WOB, hook load	lb
Weight per Length	Weight per unit of length - tubular	ppf
Yield Point	Yield point	lb /100 sqft



3. INTRODUCTION

Well 78B-32, drilled vertically and completed to a depth of 9,500 ft in a location that is advantageous for monitoring in relation to the final determined bottom hole location of the deep scientific well 16A-32, drilled in 2020. Well 78B-32 is the 6th well drilled in the Milford area Utah Frontier Observatory for Research in Geothermal Energy (FORGE) Enhanced Geothermal System (EGS) site (Utah FORGE). The project is administered by the U.S. Department of Energy and managed by the University of Utah (UofU).

Specific objectives of 78B-32 were to:

- Complete a closed monitoring well to 9,500 ft., with fiber optic seismic cable to 8,500 ft. cemented behind casing
- Use of Mechanical Specific Energy (MSE) calculation to evaluate PDC bits performance in hard rock

The first objective was partially achieved as the Silixa fiber optic seismic cable was run to 8,508 ft, but it is confirmed via continuity test that cable failed from 3,933 ft. to 8508 ft.

The second objective was successfully completed: better understanding and use of MSE in real time and ongoing limiter redesign workflow were the major factors in the tremendous increase in ROP. This well took less than 45% of the on-bottom drilling time, required in the previous two wells, to reach 9,000 ft.

The health and safety of all personal, and maintaining a clean, non-hazardous work environment (HSE), were the top priority during drilling and testing operations.

The safety and environmental standards of the U of U were implemented, achieving the following goals:

- No LTIs (lost time injuries or incidents)
- No environmental hazards and minimum environmental impact
- No major or catastrophic service quality incident

On location, the project HSE plan was implemented, including:

- The COVID-19 guidelines were implemented and followed. No cases were detected while drilling the well
- Daily safety meetings were held prior to each shift, addressing the importance of proper and safety conscious crew behavior
- Operation specific safety meetings with all personnel involved to identify safety risks and relevant precautions prior to specific tasks such as casing running, cementing, and logging
- Clear identification of muster areas at the location and clear lines communication for all personnel
- Safety drills were performed on a periodic basis



All detailed information including reports from service providers, daily drilling reports, BHAs, casing and cementing reports, mud log, geologic reports, drilling fluids reports, and other relevant documentation of operations are included as appendices in attached file.

4. WELL INFORMATION

4.1. Well Location

Well 78B-32 is located at the Utah Frontier Observatory for Research in Geothermal Energy (FORGE). The well site is just west of the Mineral Mountains and is 217 mi. (350 km.) south of Salt Lake City and 10 mi. (16 km) north-northeast of Milford (Figure 1). The Opal Mound Fault separates the convective thermal regime in Roosevelt Hot Springs geothermal system to the east from the conductive thermal regime surrounding Utah FORGE to the west. Figure 2 shows an aerial view of the surface locations for the Utah FORGE wells drilled and planned. Table 3 contains the basic planned well information for well 78B-32. All depth measurements in this report are referred to the rotary Kelly Bushing (RKB), unless otherwise noted.

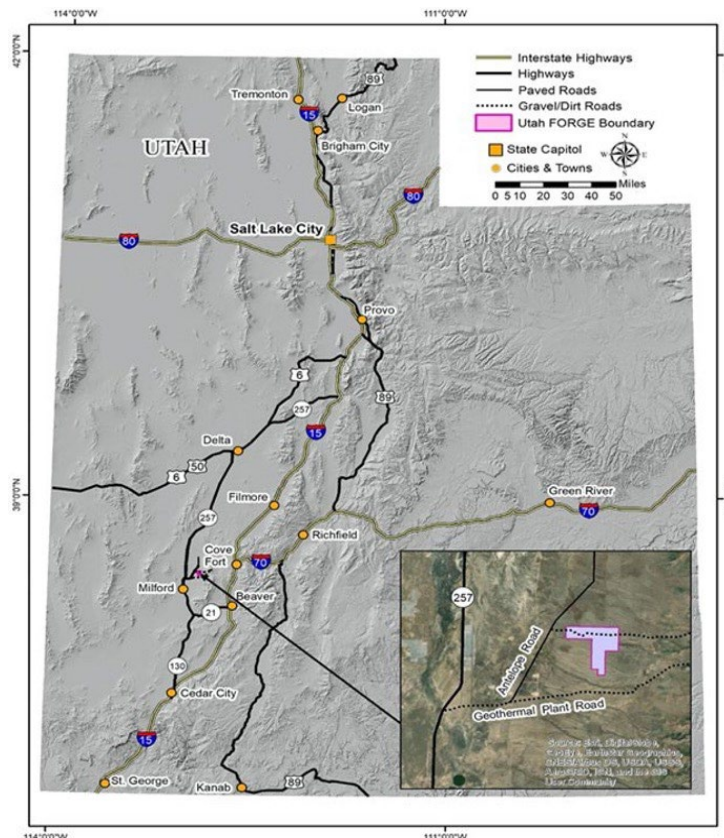


Figure 1: Utah FORGE project site location.



Figure 2: Aerial view of surface locations of Utah FORGE wells. The primary purpose of well 78B-32 is to provide a site where R&D tools and technologies for EGS development can be tested. At other times, the well will be used for seismic monitoring.

Table 3: 78-32 Well Information.

Country/Area:	USA / Milford, UT
Field:	FORGE UTAH
Operator:	University of Utah (UofU)
Drilling Project Manager	Geothermal Resource Group (GRG)
Drilling Contractor (PM):	Frontier
Drilling Rig:	Rig-16
Well Name:	78B-32

Well Type:	Mid-size, vertical, deep monitoring and testing well, well of opportunity
Well Location:	Utah FORGE, 78-32 Pad Northing. : 4262991 Easting : 335868 Latitude : 38.50017088966857 Longitude : -112.8822210971944
Coordinate Reference System:	NAD83, UTM Zone 12
Rotary Table Height:	30.40 ft. from ground level
Ground Level (GL):	5,536 ft. ASL
Rotary Table Elevation	5,566.4 ft. ASL
Planned Depth:	9,500 ft. (within 4° inclination from vertical at TD)
Actual Depth:	9,500 ft. (3.91° inclination at 9,500 ft)

4.2. Planned Wellbore Construction and Well Plan

Well 78B-32 was planned as a mid-size, vertical, EGS monitoring and testing well to a total depth of 9,500 ft. (Figure 3). A 24 in. conductor casing was to be set at 100 ft., a 22 in. surface hole with cemented 16 in. casing was planned to 400 ft., the intermediate 14-3/4 in. hole with cemented 11-3/4 in. casing was planned to 3,300 ft., 10-5/8 in. hole to 8,500 ft. with cemented 7 in. casing then open hole completion to total depth.

Time to drill was estimated based on drilling performance of wells 16A-32 and 56-32. The days versus depth plots were calculated prior to drilling and is shown in Figure 5. The estimated time was 30 days for drilling and testing. Drilling was completed within 33 days to TD of 9,500 ft and rig was released in 35 days (this includes NPT time due to the Silixa cable failure and tools failure such as mud motors).

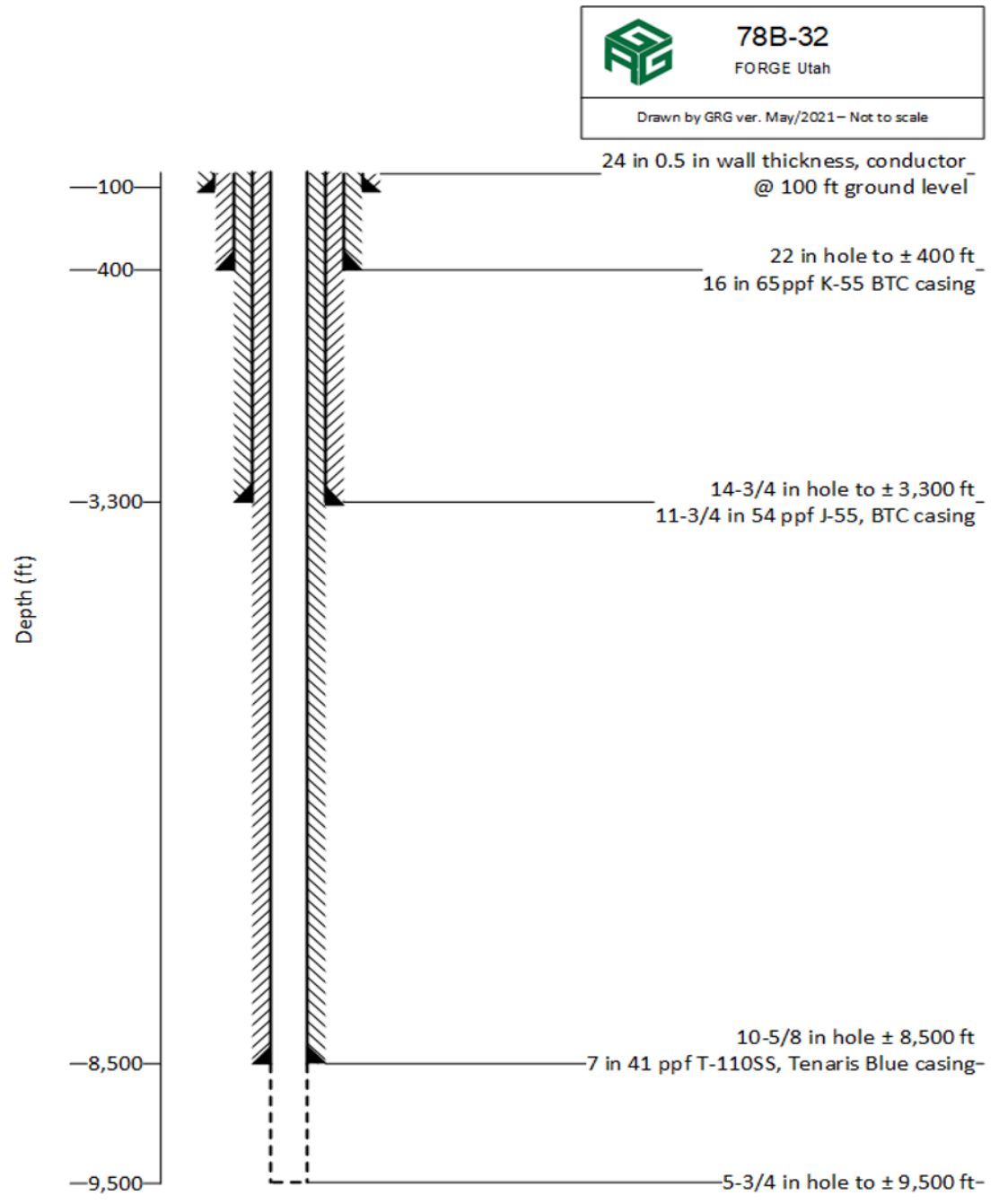


Figure 3: Planned well construction for 78B-32.

4.3. Wellbore As-Constructed

Table 4 shows the casing specifications and depths for actual construction of the 78B-32 wellbore.

Table 4: 78B-32-hole sections, as constructed.

Section	Hole Size (in.)	Casing Size (in.)	Specifications	Nominal ID / Drift ID/ Coupling OD (in.)	Actual Depth (ft.)	Remarks
Conductor	n/a	24	0.5 in. WT, Butt Welded	23.000 n/a n/a	128.5	Preset
Surface	22	16	65 ppf, K-55, BTC	15.250 15.062 17.000	416	Cemented well control string. Set in 100% alluvium
Intermediate	14-3/4	11-3/4	54 ppf, K-55, BTC	10.880 10.720 12.750	2,990	Cemented intermediate string. Set in 100% granite
Production	10-5/8	7	41 ppf, T-110 SS, Tenaris Blue	5.820 5.695 7.656	8,509	Cemented production string. Set in 100% granodiorite

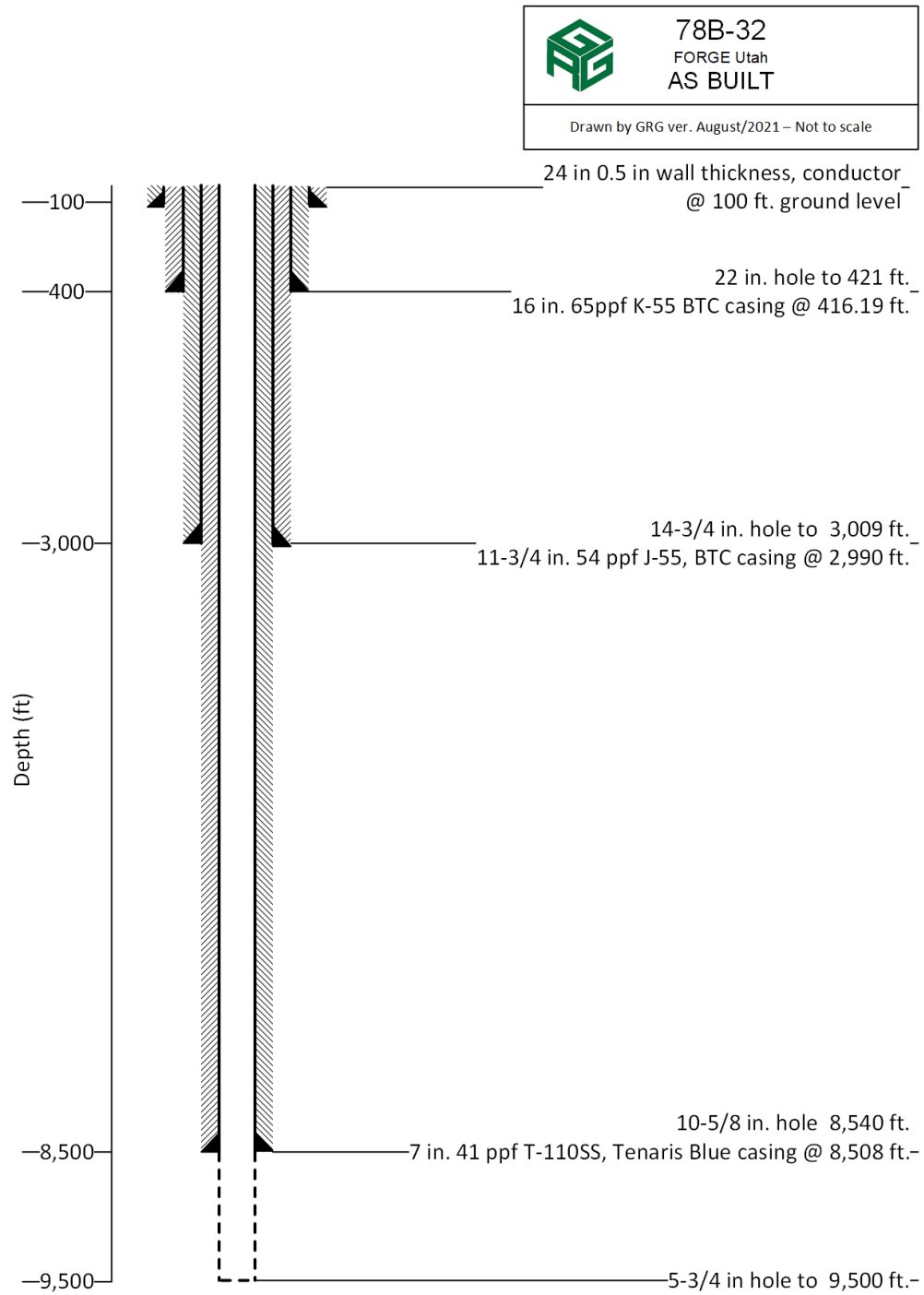


Figure 4: 78-B32 well schematic, as built.

4.4. Drilling Summary

Prior to rig mobilization, the well pad was constructed including setting of the cellar and drilling of mouse and rat holes. Additionally, the 24 in. conductor pipe was cemented with the casing shoe at 100 ft. ground level on 8 June 2021. Drilling commenced on 28 June 2021. The 22 in. hole was drilled to 421 ft. and 16 in. casing was cemented to 416 ft., on the same day. Drilling of the 14-3/4 in. hole commenced on 30 June and continued to 1 July, when the casing point of 3,009 ft. was reached. The 11-3/4 in. casing was set and cemented at 2,990 ft. measured depth next day. Drilling of the 10-5/8 in. hole commenced on 4 July, and total depth of 8,500 ft. was reached on 16 July. Two 8-3/4 in. coring runs between 6,700 ft. and 6,740 ft. were performed and 21.5 feet of core was recovered, followed by additional two runs between 8,500 ft. and 8,540 ft with 32.4 feet recovered.

On 19 July, sonic scanner and formation borehole imager logs were conducted at 8,520 ft. Later, a Triple Combo was run to section TD on same day and maximum BHT was recorded as 354 F°. On 20 July, Schlumberger UBI log was conducted then the 10-5/8 in. hole section was deepened to 8,545 ft.

The 7 in. casing was to run to 6,753 ft when a loss of communication on the Silixa cable, run on the outside of the casing was observed, so it was decided to pull out the casing. While pulling the 7 in. casing, it was observed that the fiber optic cable has broken from 3,017 ft. to 1,212 ft. After finishing pulling it out, it was determined that there was still 3,686 ft. of usable cable. A decision was made to wait on delivery of additional 5,000 ft new fiber optic cable. While waiting on additional cable, tripped in hole 7 in. casing to 3,722 ft. installing available fiber optic cable and performed frequent continuity tests. Once received additional length on site, spliced on new fiber-optic cable at 3,722 ft. then continued to run in the 7 in. casing run to 8,508 ft., finished on 24 July and final continuity test on fiber-optic cables were conducted at TD. Test results indicated that fiber-optic cable failed from 3,933 ft. to 8,508 ft.

Cementing of the 7 in. casing was completed on 25 July 2021 and cement top fell to 95 ft. from the rig floor. Waited on cement and top fill with neat cement. Once waited on cement and worked on wellhead, a 5-3/4 in. TCI bit was run to 8,364 ft. then cement, floating equipment and 10 ft. of new formation were drilled to 8,555 ft. Performed xLOT on 28 July then pulled out of hole and picked up directional BHA. The 5-3/4 in. hole section was drilled to 9,500 ft. and drilling was completed on 29 July.

The rig was released on 31 July 2021 at 23:59 hours.

4.5. Days vs Depth

Well 78B-32 was drilled to a total depth of 9,500 ft. in less time than anticipated (Figure 5). The expected rate of penetration (ROP) was based on the PDC performance of the two previous wells. Improvements in the use of MSE allowed for this well to be drilled 60% faster than anticipated. Several types of PDC bits were tested within the granitic section, which led to improved performance.



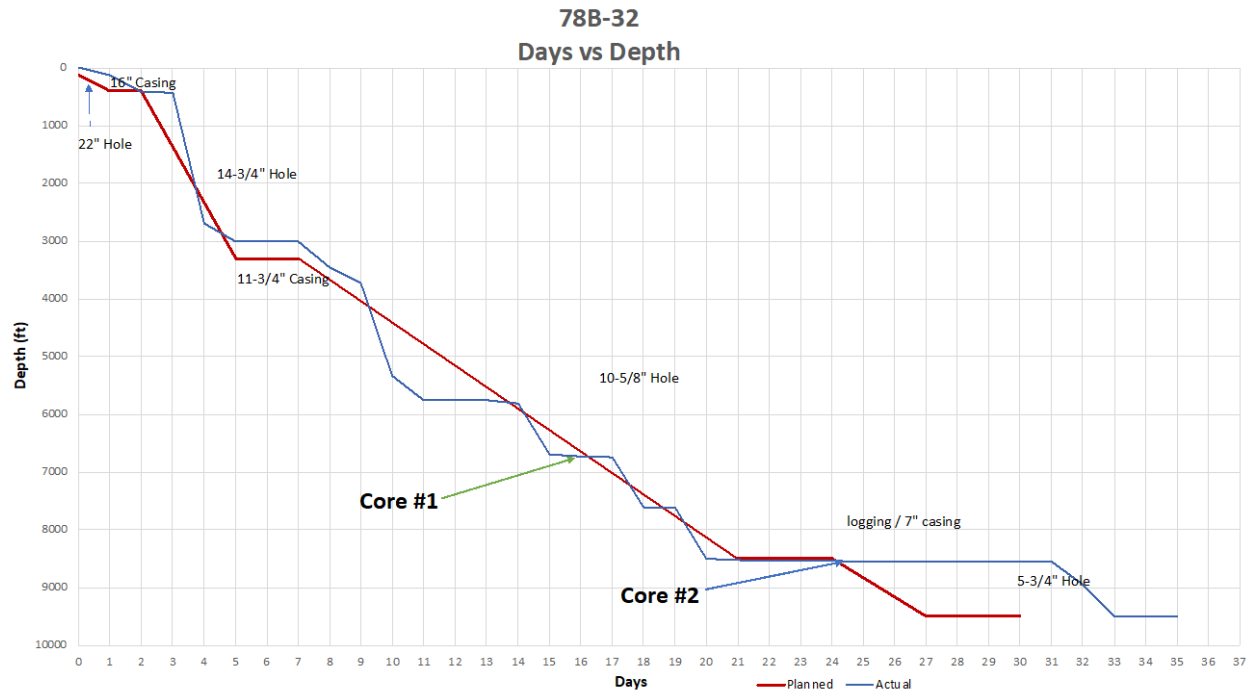


Figure 5: Planned vs actual drilling days plot for well 78B-32. Planned line is red and actual drilling days is blue.

5. DIRECTIONAL PROGRAM

Well 78B-32 was designed as a vertical well. Directional MWD surveys were taken frequently along the wellbore with correctional sliding drilling performed as needed to maintain verticality. Close monitoring was possible, as the well was completely drilled with mud motor and MWD. The survey results from surface to TD are shown in Table 5. The final Total Measured Depth is 9,500 ft. and True Vertical Depth is 9,497.3 ft., as calculated by the directional drilling services provider. The final plot is shown in Figure 6.

Table 5: Survey data for 78B-32.

Survey Type	Measured Depth	Inc (deg)	Azimuth (deg)	TVD (ft)	Coordinates		Closure (ft)	Vertical Section (ft)	Dogleg Severity
					N-S (ft)	E-W (ft)			
**TieIn	0,0	0,00	359.98	0,0	0,0	0,0	0,0	0,0	0,000
MWD	241,0	0,69	358.29	241,0	1,5	-0,0	1,5	1,5	0,286
MWD	337,0	1,04	359.49	337,0	2,9	-0,1	2,9	2,9	0,365





End of Well Report			Ref. GRG-10230	
Utah FORGE			Ver. Final	Page 22 of 68
Seismic Monitoring Well 78B-32			Issued: 1 December 2021	

MWD	545,0	0,17	93.92	545,0	4,8	0,2	4,8	4,8	0,513
MWD	731,0	0,07	271.76	731,0	4,8	0,4	4,8	4,8	0,129
MWD	822,0	0,12	37.38	822,0	4,8	0,4	4,8	4,8	0,187
MWD	914,0	0,15	342.6	914,0	5,0	0,4	5,0	5,0	0,138
MWD	1.005,0	0,47	187.27	1.005,0	4,8	0,3	4,8	4,8	0,670
MWD	1.101,0	0,19	350.91	1.101,0	4,5	0,3	4,5	4,5	0,682
MWD	1.195,0	0,07	294.81	1.195,0	4,7	0,2	4,7	4,7	0,172
MWD	1.291,0	0,19	82.64	1.291,0	4,8	0,3	4,8	4,8	0,263
MWD	1.386,0	0,12	297.71	1.386,0	4,8	0,3	4,8	4,8	0,312
MWD	1.480,0	0,24	141.52	1.480,0	4,7	0,4	4,7	4,7	0,376
MWD	1.576,0	0,17	48.65	1.576,0	4,6	0,6	4,7	4,6	0,314
MWD	1.670,0	0,10	216.87	1.670,0	4,7	0,7	4,7	4,7	0,286
MWD	1.765,0	0,14	231.05	1.765,0	4,5	0,5	4,6	4,5	0,052
MWD	1.861,0	0,18	123.07	1.861,0	4,4	0,6	4,4	4,4	0,271
MWD	1.955,0	0,10	292.13	1.955,0	4,3	0,6	4,4	4,3	0,297
MWD	2.050,0	0,26	216.12	2.050,0	4,2	0,4	4,2	4,2	0,268
MWD	2.145,0	0,15	323.76	2.145,0	4,1	0,2	4,1	4,1	0,355
MWD	2.240,0	0,12	115.81	2.240,0	4,2	0,2	4,2	4,2	0,276
MWD	2.335,0	0,18	98.85	2.335,0	4,1	0,5	4,1	4,1	0,078
MWD	2.431,0	0,11	21.4	2.431,0	4,2	0,6	4,2	4,2	0,197
MWD	2.526,0	0,08	179.69	2.526,0	4,2	0,7	4,2	4,2	0,197
MWD	2.620,0	0,10	52.94	2.620,0	4,2	0,7	4,2	4,2	0,171
MWD	2.715,0	0,12	192.1	2.715,0	4,1	0,8	4,2	4,1	0,217
MWD	2.810,0	0,13	85.79	2.810,0	4,0	0,9	4,1	4,0	0,211
MWD	2.905,0	0,14	127.62	2.905,0	4,0	1,1	4,1	4,0	0,102
MWD	2.981,0	0,09	327.33	2.981,0	4,0	1,1	4,1	4,0	0,298
MWD	3.101,0	0,15	39.36	3.101,0	4,2	1,2	4,3	4,2	0,124
MWD	3.196,0	0,18	42.83	3.196,0	4,4	1,3	4,6	4,4	0,033
MWD	3.289,0	0,08	311.16	3.289,0	4,5	1,4	4,7	4,5	0,214
MWD	3.384,0	0,76	228.36	3.384,0	4,1	0,9	4,2	4,1	0,794
MWD	3.480,0	2,55	231.96	3.479,9	2,4	-1,3	2,7	2,4	1,867
MWD	3.575,0	3,93	223.19	3.574,8	-1,3	-5,2	5,3	-1,3	1,539
MWD	3.642,0	3,93	218.32	3.641,6	-4,7	-8,2	9,4	-4,7	0,498
MWD	3.737,0	1,10	218.9	3.736,5	-8,0	-10,8	13,4	-8,0	2,979
MWD	3.832,0	1,11	93.69	3.831,5	-8,8	-10,4	13,6	-8,8	2,065
MWD	3.927,0	1,83	89.39	3.926,5	-8,8	-8,0	11,9	-8,8	0,766



MWD	4.022,0	3,01	85.27	4.021,4	-8,6	-4,0	9,5	-8,6	1,255
MWD	4.117,0	1,92	159.41	4.116,3	-9,9	-0,9	9,9	-9,9	3,259
MWD	4.181,0	1,19	199.7	4.180,3	-11,5	-0,8	11,5	-11,5	1,987
MWD	4.213,0	0,99	220.09	4.212,3	-12,0	-1,1	12,1	-12,0	1,354
MWD	4.308,0	0,86	209.26	4.307,3	-13,3	-1,9	13,4	-13,3	0,229
MWD	4.403,0	0,40	258.72	4.402,3	-14,0	-2,6	14,2	-14,0	0,708
MWD	4.498,0	0,66	264.54	4.497,3	-14,1	-3,5	14,5	-14,1	0,279
MWD	4.593,0	1,33	319.25	4.592,2	-13,3	-4,8	14,1	-13,3	1,148
MWD	4.688,0	1,75	318.56	4.687,2	-11,4	-6,4	13,1	-11,4	0,443
MWD	4.783,0	1,48	0.52	4.782,2	-9,1	-7,4	11,7	-9,1	1,246
MWD	4.879,0	1,68	339.26	4.878,1	-6,5	-7,9	10,2	-6,5	0,641
MWD	4.974,0	1,65	322.94	4.973,1	-4,1	-9,2	10,1	-4,1	0,498
MWD	5.069,0	0,45	52.1	5.068,1	-2,8	-9,7	10,1	-2,8	1,794
MWD	5.164,0	0,21	25.93	5.163,1	-2,4	-9,3	9,7	-2,4	0,292
MWD	5.259,0	0,57	255.65	5.258,1	-2,4	-9,7	10,0	-2,4	0,762
MWD	5.354,0	1,12	247.76	5.353,1	-2,8	-11,0	11,4	-2,8	0,590
MWD	5.499,0	1,46	260.8	5.498,0	-3,7	-14,2	14,7	-3,7	0,308
MWD	5.545,0	2,01	268.39	5.544,0	-3,8	-15,6	16,0	-3,8	1,293
MWD	5.640,0	1,97	247.92	5.639,0	-4,5	-18,7	19,3	-4,5	0,745
MWD	5.736,0	1,56	198.04	5.734,9	-6,3	-20,7	21,6	-6,3	1,598
MWD	5.832,0	1,57	189.05	5.830,9	-8,9	-21,3	23,1	-8,9	0,256
MWD	5.927,0	1,77	197.93	5.925,8	-11,5	-21,9	24,8	-11,5	0,344
MWD	6.022,0	1,47	189.12	6.020,8	-14,1	-22,6	26,7	-14,1	0,410
MWD	6.117,0	1,10	155.48	6.115,8	-16,2	-22,4	27,6	-16,2	0,867
MWD	6.307,0	1,06	132.51	6.305,7	-19,0	-20,4	27,9	-19,0	0,227
MWD	6.402,0	1,07	123.66	6.400,7	-20,1	-19,0	27,6	-20,1	0,173
MWD	6.497,0	0,71	100.21	6.495,7	-20,7	-17,6	27,2	-20,7	0,532
MWD	6.592,0	0,88	33.24	6.590,7	-20,2	-16,7	26,2	-20,2	0,935
MWD	6.635,0	0,77	56.73	6.633,7	-19,8	-16,2	25,6	-19,8	0,820
MWD	6.675,0	1,18	44.22	6.673,7	-19,3	-15,7	24,9	-19,3	1,149
MWD	6.770,0	1,25	25.97	6.768,7	-17,7	-14,6	22,9	-17,7	0,412
MWD	6.865,0	1,46	26.18	6.863,7	-15,7	-13,6	20,8	-15,7	0,221
MWD	6.960,0	1,09	38.77	6.958,6	-13,9	-12,5	18,7	-13,9	0,486
MWD	7.056,0	1,57	205.96	7.054,6	-14,3	-12,5	19,0	-14,3	2,754
MWD	7.151,0	1,92	193.85	7.149,6	-17,1	-13,5	21,7	-17,1	0,533
MWD	7.246,0	1,38	197.6	7.244,5	-19,7	-14,2	24,3	-19,7	0,579





End of Well Report		Ref. GRG-10230	
Utah FORGE		Ver. Final	Page 24 of 68
Seismic Monitoring Well 78B-32		Issued: 1 December 2021	

MWD	7.341,0	0,83	203.94	7.339,5	-21,4	-14,8	26,0	-21,4	0,592
MWD	7.436,0	0,89	200.92	7.434,5	-22,7	-15,4	27,4	-22,7	0,079
MWD	7.531,0	0,95	208.89	7.529,5	-24,1	-16,0	28,9	-24,1	0,149
MWD	7.639,0	0,74	209.63	7.637,5	-25,5	-16,8	30,5	-25,5	0,195
MWD	7.830,0	1,62	212.6	7.828,4	-28,9	-18,8	34,5	-28,9	0,462
MWD	7.925,0	1,87	235.65	7.923,4	-30,9	-20,9	37,2	-30,9	0,778
MWD	8.020,0	1,85	235.65	8.018,4	-32,6	-23,4	40,1	-32,6	0,021
MWD	8.116,0	1,52	279.59	8.114,3	-33,3	-25,9	42,2	-33,3	1,351
MWD	8.211,0	1,76	291.62	8.209,3	-32,5	-28,5	43,3	-32,5	0,440
MWD	8.306,0	1,49	275.63	8.304,2	-31,9	-31,1	44,5	-31,9	0,553
MWD	8.402,0	0,87	250.94	8.400,2	-32,0	-33,0	46,0	-32,0	0,821
MWD	8.428,0	1,39	249.84	8.426,2	-32,1	-33,5	46,4	-32,1	2,002
MWD	8.558,0	2,78	264.46	8.556,1	-33,0	-38,1	50,4	-33,0	1,136
MWD	8.653,0	2,31	307.21	8.651,0	-32,1	-42,0	52,8	-32,1	2,006
MWD	8.743,0	0,99	21.37	8.741,0	-30,2	-43,1	52,7	-30,2	2,501
MWD	8.843,0	0,92	283.71	8.841,0	-29,2	-43,6	52,5	-29,2	1,438
MWD	8.938,0	2,76	282.65	8.935,9	-28,6	-46,6	54,6	-28,6	1,937
MWD	9.033,0	1,05	250.44	9.030,9	-28,3	-49,6	57,1	-28,3	2,056
MWD	9.127,0	2,40	258.85	9.124,8	-29,0	-52,4	59,9	-29,0	1,457
MWD	9.222,0	1,31	284.52	9.219,8	-29,1	-55,4	62,6	-29,1	1,416
MWD	9.317,0	3,73	270.04	9.314,7	-28,9	-59,5	66,1	-28,9	2,614
MWD	9.412,0	3,96	250.99	9.409,5	-29,9	-65,7	72,2	-29,9	1,360
MWD	9.444,0	3,91	235.47	9.441,4	-30,9	-67,6	74,4	-30,9	3,322
MWD	9.497,5	3,91	235.47	9.494,7	-33,0	-70,6	78,0	-33,0	0,000
MWD	9.500,0	3,91	235.47	9.497,3	-33,1	-70,8	78,1	-33,1	0,000



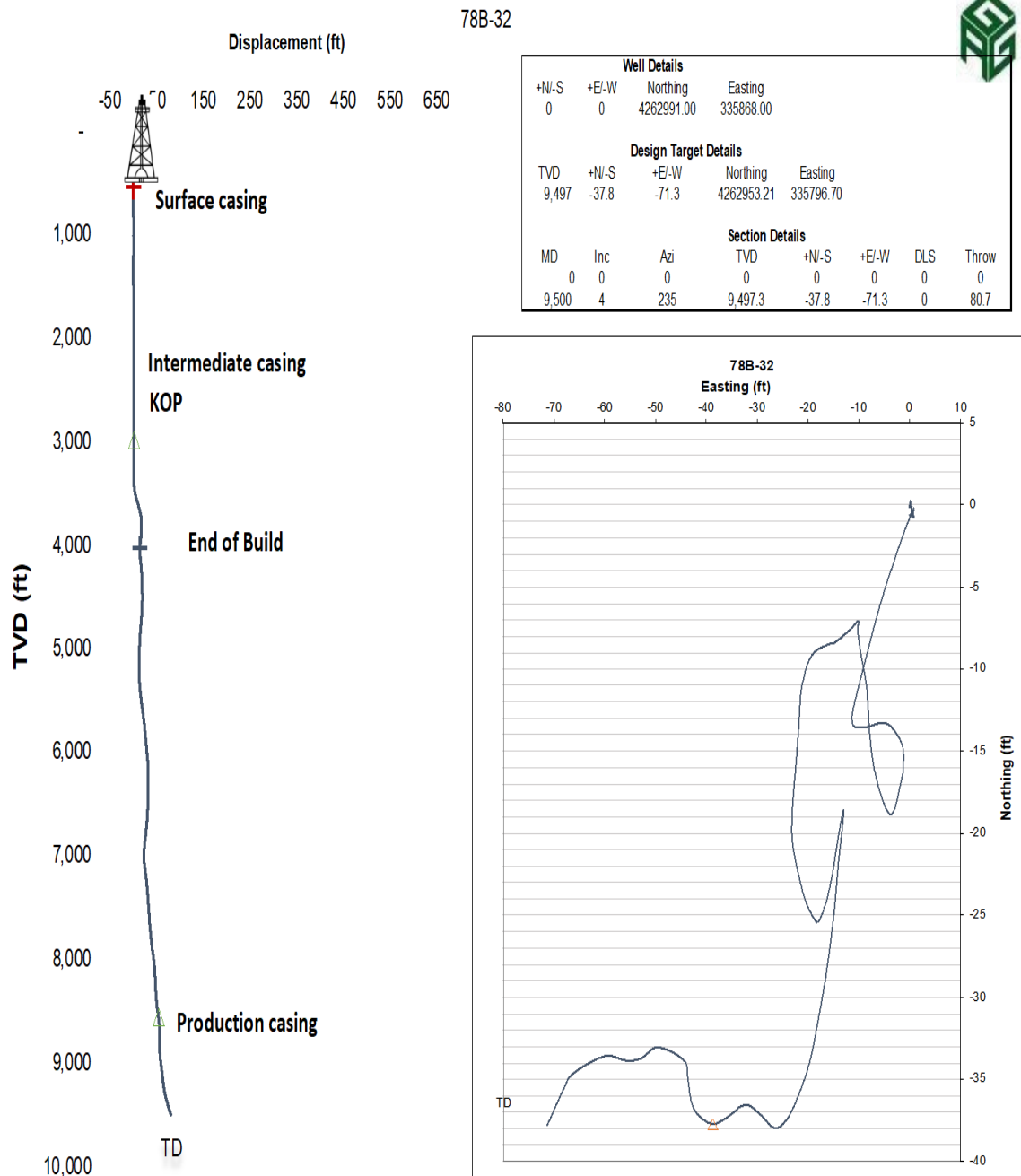


Figure 6: Final Directional survey plot.

6. DRILLING ACTIVITY BY WELL SECTION

6.1. Mob, Site Prep, Conductor

Following is the report including pictures: Move all equipment to the 78B-32 site on June 8, 2021. While trying to confirm delivery of 16 yards of ready mix. NOTE: The cement delivery was set up for 8 days now and while traveling down last night the local ready-mix company called Wyoming and cancelled all delivery schedules. Found a supplier in Delta and confirmed 2 deliveries. Drill 36 in. hole from surface to 100 ft. All material was alluvium (decomposed granite). Experienced no hole cave or sluff.



Figure 7: Drilling of conductor.



Figure 8: Conductor hole as drilled.

Check hole for fill / clean out to 100 ft. and welded 3 joints of 24 in. 1/2 in. wall thickness, 125.5 ppf conductor casing. Set on bottom, pulled rig forward and centered and leveled conductor (102 ft. total).



Figure 9: Conductor setting.



Figure 10: Conductor setting -cont.



Figure 11: Conductor and mouse - as constructed.



Figure 12: Lateral view, conductor and mouse hole.

6.2. 22 in. Hole to 416 ft. and 16 in. Casing

6.2.1. Drilling Objectives

Drilling objectives for the 22 in. hole section were:

- Drill 22 in. section from 24 in. conductor shoe at 128.5 ft. (ground level) to the 16 in. casing shoe depth at 416 ft. in a single bit run
- Case-off shallow unconsolidated formations, gas zones, and loss zones, if encountered
- Drill to sufficient casing depth to install the BOPE
- Maintain verticality and stabilize wellbore hazards

6.2.2. Summary

Drilling of the 22 in. hole began on 28 June from the bottom of the 24 in. conductor casing at 128.5 ft. Drilling to the casing point at 421 ft. was accomplished the same day without incident. The 16 in. 65 ppf, K-55, BTC casing was run to 416 ft. No circulation losses were found in this section and the wellbore inclination was approximately 1° at TD of section.

6.2.3. 22 in. Surface Equipment

The 22 in. section was drilled without a flowline welded to the conductor. Fluids returns were taken at the cellar and pumped back into the shakers.

6.2.4. 17-1/2 in. Bit, Hydraulics and BHA

A new 22 in. milled-tooth bit was used to drill the 22 in. section from 128.5 ft. to 421 ft. The bit parameters and basic drilling parameters shown in Table 6 were used. Bit selection was based on drilling performance of the previous wells (58-32, 16A-32 and 56-32). The bottom hole assembly consisted of the bit, bit sub, cross-over sub, MWD, cross-over sub, non-magnetic drill collar, float sub, cross-over sub and 8 joints heavy weight drill pipe for a total length of 314 ft.(Table 7).

Table 6: Basic drilling parameters for 22 in. section.

Bit #/Run	Hole made (ft)	Bit Size (in.)	IADC Code	Ave. WOB (klbs)	Ave. RPM	Jet Size (32nd)	Ave. flow rate (gpm)	Ave. ROP (fph)
1/1	292.5	22	117	15	90	28-28-28	800	83.7



Table 7: BHA # 1 used with bit #1.

BHA No: 1		Wellbore: Original Wellbore										
BHA Length (ft):	314.30											
	Weights in Air	Buoyed Weight	Mud Wt of (lbs/gal): 8.90									
BHA Wt:	21,473	18,552										
Drillstring Wt:	21,473	18,552										
Wt Above Jars:												
Wt Below Jars:												
	In	Out										
Depth (ft):	128	421										
Date/Time:	27-Jun-21 11:30	28-Jun-21 06:30										
Inclination:												
Azimuth:	0	0										
Average RPM:	90	Drilling Hrs.:	3.5									
Build Rate:		Walk Rate:										
WOB - Avg (lbs):	3	WOB - Max (lbs):	30									
Comments: 22" Surface section BHA												
BHA Component Details												
Item	No. Jnts	Length	OD	ID	Weight	Grade	Top Connection	P/B	Fishing Length	OD	Blade OD	Comment
BIT	1	2.00	22.000				7.625REG	Pin				S/No: RH7510
BS	1	4.44	9.625	3.000	223.3	S-135	6.625REG	Box	2.28	8.000		S/No: DR42979
XO	1	2.24	8.125	3.125	150.2	S-135	5.5IF	Box				S/No: DR31132
MWD	1	30.11	8.125	4.250	128.0	S-135	5.5IF	Box				XBOLT MP MWD (D&I ONLY S/No: D80H158D
XO	1	2.72	8.063	3.500	140.8	S-135	6.625REG	Box				S/No: DR26834
MONEL	1	28.45	8.375	3.500	154.5	S-135	6.625REG	Box				S/No: DR34100
FLOAT	1	2.34	8.000	2.750	150.7	S-135	6.625REG	Box				S/No: DR28684
OTHER	1	2.95	8.063	2.750	153.4	S-135	6.625REG	Box				S/No: DR44846
XO	1	4.05	8.000	2.750	150.7	S-135	4.5IF	Box	6.75	2.000		S/No: DR44284
HWDP	1	235.00	5.000	3.000	42.7	S-135	4.5IF	Box				S/No: RIGS
Total:		314.30										

6.2.5. 22 in. Drilling Fluids

Planned basic drilling parameters and the design of the mud system for the 22 in. drilling sections are shown in Table 8 and the average parameters used are shown in Table 9. The spud mud was designed as a pre-hydrated gel mud blended with 3% (4 ppb) fine micronized cellulose. The accepted mud program included the maintenance of 3% micronized cellulose.

Table 8: Fluid Parameters Planned for 17-1/2 in. Section

Hole Size	22 in.
Casing Size	16 in.
Mud Type	Lime/Gel/Water System
Mud Weight (ppg)	8.6 – 9.2



Viscosity (sec)	50-60+
Filtrate (ML)	< 20
Total Mud Volume	400 bbls (300 bbls surface volume)
Directional Program	NA – Vertical Hole
Formations	Surface Alluvium
Interval BHT	< 100°F
Planned section mud program: Drill the 22 in. hole with flocculated clay-based mud system; add Gel and Lime/Soda Ash/Caustic Soda as needed to maintain adequate viscosity for good hole cleaning (PV alap, YP 25+). Use Bentonite/Sawdust/Polyvis (PHPA) to sweep and stabilize the hole as needed; thin mud with Desco CF/water. If encountered, control lost circulation with conventional LCM pills. Run and cement 16” casing.	

Table 9: Average fluid properties for 22 in. section.

Fluid Parameters (spud)	Unit	Min	Max	Ave
Mud Weight	ppg	8.9	8.9	8.9
pH		9	9	9
API Fluid Loss (Filtrate)	cc/30 sec.	12.2	12.2	12.2
Plastic Viscosity	cP	19	19	19
Yield Point	lb/100ft ²	22	22	22

6.2.6. 16 in. Casing and Cementing

The 16 in. 65 ppf. K-55 casing was set at 416 ft., and cemented with centralizers at 337 ft., 253 ft., 169 ft., 85 ft., 40 ft., and 20 ft. The cement report is shown in (Table 10). Good cement returns held at surface and after 5.5 hours waiting on cement (WOC), the 13-5/8 in. 3,000 psi x 5,000 psi wellhead (w/ 2 ea. 2-1/16 in. x 5,000 psi side outlets) was installed and tested.





End of Well Report		Ref. GRG-10230	
Utah FORGE		Ver. Final	Page 31 of 68
Seismic Monitoring Well 78B-32		Issued: 1 December 2021	

Table 10: Cement report for 16 in. casing.

Cement Job Information						
Start Date/Time:	28-Jun-21 13:00	Wellbore:	Original Wellbore			
Job Type:	PRIMARY	String OD (ins):	16.000			
Well Section:	SURF	String Type:	FULL			
Cementing Co:	Resource	Cementing Engineer:				
Primary Job Detail						
	Volume (bbls)	Pump Time	Rate (bbls/min)	Pressure (psi)		
Conditioning Data:						
Cement Data:	146.0	30	5.0	260		
Displacement Data:	6.0	3	3.0	120		
Calc. Displacement Vol:	6.0					
<input type="checkbox"/> Reciprocate Pipe?	<input checked="" type="checkbox"/> Batch Mix?	<input type="checkbox"/> Bump Plug?	Bump Pressure:			
Returns to Surface:	FULL	<input checked="" type="checkbox"/> Cement at Surface?	Volume (bbls):	10.0		
Calc Top of Cement (ft):	0	Excess (%):	50.00%	Avg. Hole Size (ins): 22.000		
Slurry Information						
Type	Density	Yield	Sacks	Volume	Rate	Additives
LEAD	13.88			146.0	5.0	Thermalite-A with 2% cacl
Post Job Information						
Liner Top Test (lbs/gal):				Job Success?		No
Actual Top of Cmt (ft):				0	CBL Bond Quality:	
Misc. Comments:		Pressure test to 1500 psi, Pump 20 bbl fresh water, pump 50 bbls of sepiolite, pump 5 bbl of fresh water, pump 13 bbl od sodium silicate, pump 5 bbls fresh water, Mix and pump 146 bbl of 13.88 RC Theremelite w/ 2% CC, displace w/ 6 bbls fresh water, check floats CIP @ 16:00				



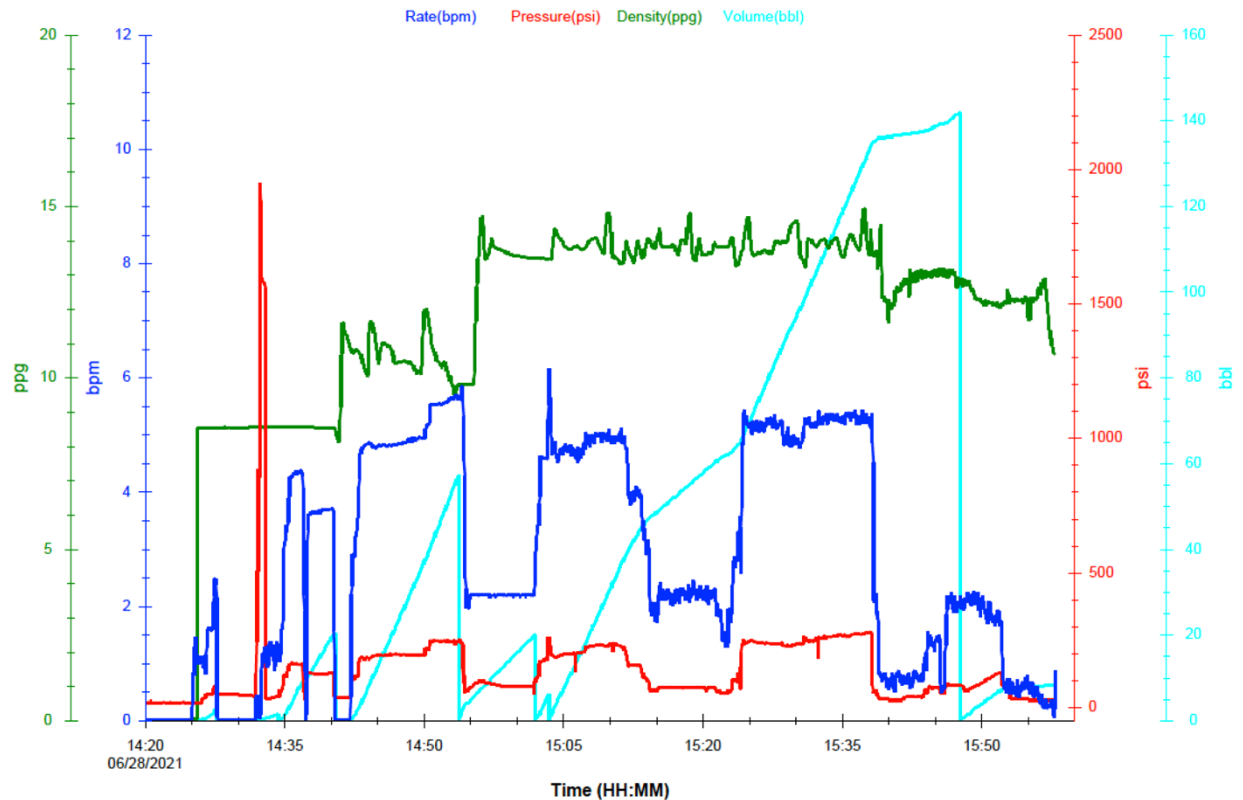


Figure 13: 16 in. surface casing cement pressure chart.

6.3. 14-3/4 in. Hole to 3,009 ft. and 11-3/4 in. Casing

6.3.1. 14-3/4 in. Hole Objectives

The drilling objectives for the 14-3/4 in. section were:

- Drill the cement inside the 16 in. shoe track (± 40 ft.) and new 14-3/4 in. hole from the 16 in. casing shoe depth to 3,300 ft. (11-3/4 in. casing shoe depth) in two bit runs.
- Maintain verticality within 3° and stabilize wellbore hazards. The departure from vertical not to exceed a radius of 250 ft. north, east, and west and no more than 150 ft. south in any portion of the well.
- Drill fast to reduce the wellbore exposure to the drilling fluid.

All above objectives were achieved to TD this hole section at 3,009 ft.

6.3.2. 14-3/4 in. Summary

After the 21-1/4 in. 2,000 psi BOPE was installed and tested, cement, float shoe and rat hole were drilled to 421 ft. and new hole was drilled to 433 ft. A Formation Integrity Test (FIT) gave

a maximum allowable mud weight of 19.2 ppg (tested to 1 psi/ft. gradient) for the next drilling section. The 14-3/4 in. vertical hole was drilled to 3,009 ft. between 29 June and 1 July. The 11-3/4 in. casing was set at 2,990 ft. and cemented. No circulation losses, reactive clays or kicks were found in this section. The wellbore deviation was approximately 0.15° at section TD.

6.3.3. 14-3/4 in. Surface Equipment

The BOPE used for the 14-3/4 in. drilling section is shown in (Figure 14), consisting of a 21-1/4 in. 2,000 psi double gate preventer and a 21-1/4 in. 2,000 psi annular preventer as the main elements. The equipment was function tested and pressure charts were sent to a Utah Department of Natural Resources representative on 29 June.

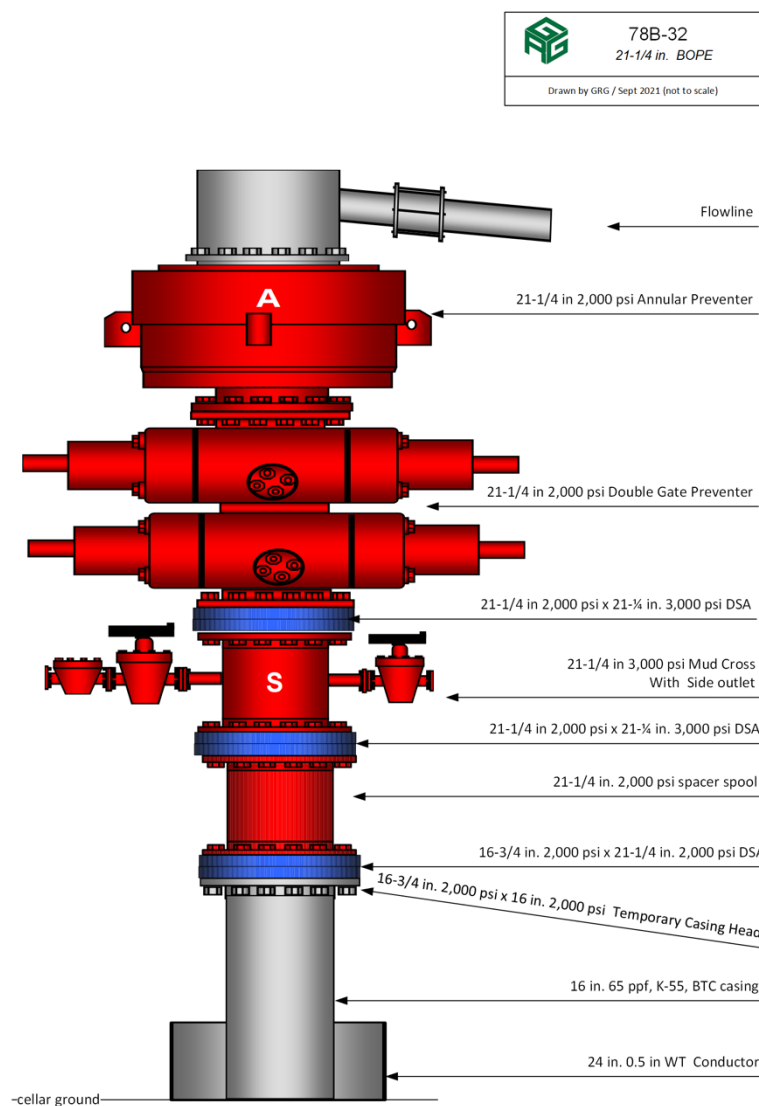


Figure 14 : BOPE 21-1/4" for drilling 14-3/4" hole.

6.3.4. 14-3/4 in. Bit, Hydraulics Program and BHA

Three bits were used to drill 14-3/4 in. hole section and Table 11 indicates some of the bit parameters.

Table 11: 14-3/4 in. Bit parameters.

Bit #/Run	Hole made (ft.)	Bit Size (in.)	IADC Code	Ave. WOB (Klb.)	Av. RPM	Jet Size (32nd)	Ave. flow rate (gpm)	Ave. ROP (fph)
2/1	12	14-3/4	GT-C1	10	50	18 18 18	450	62
3/1	2,266	14-3/4	M423	65	120	15 15 15 15 16 16	900	238.6
4/1	310	14-3/4	S333	40	188	15 15 15 15 16 16	900	36.4

BHAs used in 14-3/4 in. hole section is listed below (Table 12).

Table 12: BHAs used to drill 14-3/4 in. hole section.

BHA #	Depth In (ft.)	Depth Out (ft.)	Drilled Distance (ft.)	BHA Length (ft)	Remarks
2	421	433	12	434	Drilled out cement, float shoe and 12 ft. of new hole.
3	433	2,699	2,266	957	RSS BHA with matrix body PDC bit.
4	2,699	3,009	310	957	RSS BHA with steel body PDC bit.



End of Well Report		Ref. GRG-10230	
Utah FORGE		Ver. Final	Page 35 of 68
Seismic Monitoring Well 78B-32		Issued: 1 December 2021	

Table 13: BHA #2 used with bit #2.

BHA No: 2		Wellbore: Original Wellbore										
BHA Length (ft):	433.74											
		Weights in Air		Buoyed Weight	Mud Wt of (lbs/gal):							
BHA Wt:	48,914											
Drillstring Wt:	48,914											
Wt Above Jars:												
Wt Below Jars:												
		In	Out									
Depth (ft):	370		433									
Date/Time:	29-Jun-21 17:00		29-Jun-21 23:45									
Inclination:												
Azimuth:	0		0									
Average RPM:	50		Drilling Hrs.:	0								
Build Rate:			Walk Rate:									
WOB - Avg (lbs):	10		WOB - Max (lbs):	20								
Comments: BHA for drilling out the shoe track.												
BHA Component Details												
Item	No. Jnts	Length	OD	ID	Weight	Grade	Top Connection	P/B	Fishing Length	OD	Blade OD	Comment
BIT	1	1.25					7.625REG	Pin				S/No: FO1JY
BS	1	4.44	9.625	3.000	223.3	S-135	7.625REG	Box	8.00	2.280		S/No: DR42979
DC	9	270.00	8.000	2.750	150.7	S-135	6.625REG	Box				S/No: RIGS
XO	1	4.05	8.000	2.750	150.7	S-135	4.5IF	Box	6.75	1.950		S/No: DR44284
HWDP	5	154.00	5.000	3.000	42.7	S-135	4.5IF	Box				S/No: RIGS
Total:		433.74										



Table 14: BHA # 3 used with bit # 3.

BHA No: 3		Wellbore: Original Wellbore									
BHA Length (ft):		956.61									
		Weights in Air				Buoyed Weight		Mud Wt of (lbs/gal): 9.10			
BHA Wt:		100,526				86,544					
Drillstring Wt:		100,526				86,544					
Wt Above Jars:											
Wt Below Jars:											
		In				Out					
Depth (ft):		433				2,699					
Date/Time:		30-Jun-21 00:00				01-Jul-21 02:00					
Inclination:											
Azimuth:		0				0					
Average RPM:		80				Drilling Hrs.:		9			
Build Rate:						Walk Rate:					
WOB - Avg (lbs):		40				WOB - Max (lbs):		65			
Comments: 14 3/4" RSS Assembly											
BHA Component Details											
Item	No. Jnts	Length	OD	ID	Weight	Grade	Top Connection	P/B	Fishing Length	Blade OD	Comment
BIT	1	1.50	14.750				7.625REG	Pin			S/No: A279635
OTHER	1	13.65	9.000	5.125	146.1	S-135	6.625REG	Box			RSS PD 900 POWER V S/No: 68994
STAB	1	6.67	8.000	3.000	146.8	S-135	6.625REG	Box	8.00	2.530	14.500 NON MAG STAB S/No: DR11424
MWD	1	28.45	8.375	3.500	154.5	S-135	6.625REG	Box			S/No: DR34100
OTHER	1	3.66	8.000	3.430	139.4	S-135	6.625REG	Box			GAP SUB S/No: GSDRSN20
OTHER	1	5.76	8.125	3.500	143.5	S-135	6.625REG	Box			PULSER SUB S/No: 80001-3
OTHER	1	2.96	8.063	2.750	153.4	S-135	6.625REG	Box			FILTER SUB S/No: DR44846
OTHER	1	2.18	8.000	2.750	150.7	S-135	6.625REG	Box			CUBIC SENSOR S/No: 800CSS008
MMTR	1	33.81	9.625	7.852	82.7	S-135	6.625REG	Box	9.63	3.710	S/No: RVDF96005
Mud Motor: Type: PDM Manufacturer: Model:											
Lobe Configuration: 5/6 Speed: 0.12 Stages: 4 Torque: 19,240 ft/lbs											
Dir. Company: SLB Bend Setting: 0 Distance: 0.00 ft											
Bearing Stab. OD: 11.500 ins <input type="checkbox"/> Motor Pad <input type="checkbox"/> Motor Failure Failure Time:											
RR	1	8.06	8.125	3.000	152.2	S-135	6.625REG	Box	8.13	2.260	RED BACK ROLLER REAMER S/No: GU4505
FLOAT	1	8.00	8.000	2.750	150.7	S-135	6.625REG	Box			S/No: DR28684
OTHER	1	5.02	8.250	3.250	153.5	S-135	6.625REG	Box			DIFFUSER SUB S/No: DHRTDS399
OTHER	1	2.08	8.000	2.750	150.7	S-135	6.625REG	Box			CUBIC SENSOR S/No: 800CSS007
DC	1	450.00	8.000	2.750	150.7	S-135	6.625REG	Box			S/No: RIG
XO	1	4.05	8.000	2.750	150.7	S-135	4.5IF	Box			S/No: DR44284
HWDP	1	380.76	5.000	3.000	42.7	S-135	4.5IF	Box			S/No: RIGS
Total:		956.61									



Table 15: BHA # 4 used with bit # 4.

BHA No: 4				Wellbore: Original Wellbore													
BHA Length (ft):				956.61													
				Weights in Air				Buoyed Weight				Mud Wt of (lbs/gal): 9.10					
BHA Wt:				100,526				86,544									
Drillstring Wt:				100,526				86,544									
Wt Above Jars:																	
Wt Below Jars:																	
				In				Out									
Depth (ft):				2,699				3,009									
Date/Time:				01-Jul-21 02:00				01-Jul-21 23:45									
Inclination:				0.02													
Azimuth:				0				0									
Average RPM:				188				Drilling Hrs.:				10.25					
Build Rate:								Walk Rate:									
WOB - Avg (lbs):				40				WOB - Max (lbs):				70					
Comments: 14 3/4" RSS run #2																	
BHA Component Details																	
Item	No. Jnts	Length	OD	ID	Weight	Grade	Top Connection	P/B	Fishing Length	OD	Blade OD	Comment					
BIT	1	1.50	14.750				7.625REG	Pin				S/No: A279636					
OTHER	1	13.65	9.000	5.125	146.1	S-135	6.625REG	Box				RSS PD 900 POWER V S/No: 68994					
STAB	1	6.67	8.000	3.000	146.8	S-135	6.625REG	Box	8.00	2.530	14.500	NON MAG STAB S/No: DR11424					
MWD	1	28.45	8.375	3.500	154.5	S-135	6.625REG	Box				S/No: DR34100					
OTHER	1	3.66	8.000	3.430	139.4	S-135	6.625REG	Box				GAP SUB S/No: GSDRSN20					
OTHER	1	5.76	8.125	3.500	143.5	S-135	6.625REG	Box				PULSER SUB S/No: 80001-3					
OTHER	1	2.96	8.063	2.750	153.4	S-135	6.625REG	Box				FILTER SUB S/No: DR44846					
OTHER	1	2.18	8.000	2.750	150.7	S-135	6.625REG	Box				CUBIC SENSOR S/No: 800CSS008					
MMTR	1	33.81	9.625	7.852	82.7	S-135	6.625REG	Box	9.63	3.710		S/No: RVDF96005					
Mud Motor: Type: PDM Manufacturer: Model:																	
Lobe Configuration: 5/6 Speed: 0.12 Stages: 4 Torque: 19,240 ft lbs																	
Dir. Company: SLB Bend Setting: 0 Distance: 0.00 ft																	
Bearing Stab. OD: 11.500 ins <input type="checkbox"/> Motor Pad <input type="checkbox"/> Motor Failure Failure Time:																	
RR	1	8.06	8.125	3.000	152.2	S-135	6.625REG	Box	8.13	2.260		RED BACK ROLLER REAMER S/No: GU4505					
FLOAT	1	8.00	8.000	2.750	150.7	S-135	6.625REG	Box				S/No: DR28684					
OTHER	1	5.02	8.250	3.250	153.5	S-135	6.625REG	Box				DIFFUSER SUB S/No: DHRTDS399					
OTHER	1	2.08	8.000	2.750	150.7	S-135	6.625REG	Box				CUBIC SENSOR S/No: 800CSS007					
DC	1	450.00	8.000	2.750	150.7	S-135	6.625REG	Box				S/No: RIG					
XO	1	4.05	8.000	2.750	150.7	S-135	4.5IF	Box				S/No: DR44284					
HWDP	1	380.76	5.000	3.000	42.7	S-135	4.5IF	Box				S/No: RIGS					
Total:		956.61															



6.3.5. 14-3/4 in. Drilling Fluids

Planned basic drilling parameters and the design of the mud system for the 14-3/4 in. drilling section are shown in Table 16 and the average parameters used are shown in Table 17. The mud system was designed as a lightly dispersed clay-based mud system with a weight between 8.6 and 9.5 ppg, adding gel as needed to maintain adequate viscosity for good hole cleaning.

Table 16: Planned fluids parameters for 14-3/4 in. hole section.

Hole Size	14-3/4 in.
Casing Size	11-3/4 in.
Mud Type	HT treated Gel/Water/Polymer System
Mud Weight (ppg)	8.6 – 9.5
Viscosity (sec)	45-55
Filtrate (ML)	< 12
Total Mud Volume	1,000 bbls (500 bbls surface volume)
Directional Program	NA – Vertical Hole
Formations	Surface Alluvium, Tuff, Top of Granite
Interval BHT	< 200°F
<p>Lightly dispersed clay-based mud HT system, adding Gel as needed to maintain adequate viscosity for good hole cleaning (YP 15-25). Use Bentonite/LCM pills and Polyvis (PHPA) to sweep hole; thin mud with Desco CF/HT Thin as needed. Maintain mud weight to control any artesian influx, if encountered, and add 2 – 4 ppb Micro C for wellbore strengthening. Use DMA/PAC Polymer for desired fluid loss control, and TORKease/Walnut to reduce torque and drag; maintain pH of 9.5-10.5 with caustic soda/lime. Soybean vegetable oil will be utilized if torque and drag becomes a problem. The oil used while drilling 16A(78)-32 reduced torque by two thirds. If encountered, control lost circulation with conventional LCM pills and drill cuttings. Run and cement 9 5/8" casing.</p>	

Table 17: Average fluid properties for 14-3/4 in. section.

Fluid Parameters (spud)	Unit	Min	Max	Ave
Mud Weight	ppg	8.6	9.1	8.9
pH		10	11.5	10.8



API Fluid Loss (Filtrate)	cc/30 sec.	7.8	18.8	13.3
Plastic Viscosity	cP	8	14	11
Yield Point	lb/100ft ²	7	15	11

6.3.6. 11-3/4 in. Casing and Cementing

The 11-3/4 in. 54 ppf. K-55 casing was run on 2 July, with the shoe set at 2,990 ft. and cemented. The cement report is shown in Table 18 and pump schedule in Figure 15. No top jobs were needed.

Table 18: Cement job report for 11-3/4 in. casing.

Cement Job Information							
Start Date/Time:	02-Jul-21 12:00	Wellbore:	Original Wellbore				
Job Type:	PRIMARY	String OD (ins):	11.750				
Well Section:	INT1	String Type:	FULL				
Cementing Co:	Resource	Cementing Engineer:					
Primary Job Detail							
	Volume (bbls)	Pump Time	Rate (bbls/min)	Pressure (psi)			
Conditioning Data:		20	5.0	500			
Cement Data:	315.0	63	5.0	320			
Displacement Data:	50.0	10	5.0	480			
Calc. Displacement Vol:	50.0						
<input type="checkbox"/> Reciprocate Pipe?	<input checked="" type="checkbox"/> Batch Mix?	<input type="checkbox"/> Bump Plug?	Bump Pressure:				
Returns to Surface:	FULL	<input checked="" type="checkbox"/> Cement at Surface?	Volume (bbls):	30.0			
Calc Top of Cement (ft):	0	Excess (%):	40.00%	Avg. Hole Size (ins): 14.750			
Slurry Information							
Type	Density	Yield	Sacks	Volume	Rate	Additives	
LEAD	13.00	2.23			5.5	RC Thermalite-HT-HSLD	
Post Job Information							
Liner Top Test (lbs/gal):				Job Success?			No
Actual Top of Cmt (ft):				CBL Bond Quality:			
Misc. Comments:		Pump 2 bbl water, pressure test lines to 3000 psi, pump 52 bbls fresh water, @ 6bpm, 20 bbl mud clean, @ 6 bpm, 10 bbl fresh water @ 6bpm-HT--HSLD atr 6 bpm, , mix and pump 315 bbl RC-Thermalite (cement to surface at 300 bbl, Displace with 3 bbl water and 47 bbl drilling mud, check floats, CIP @ 16:00					



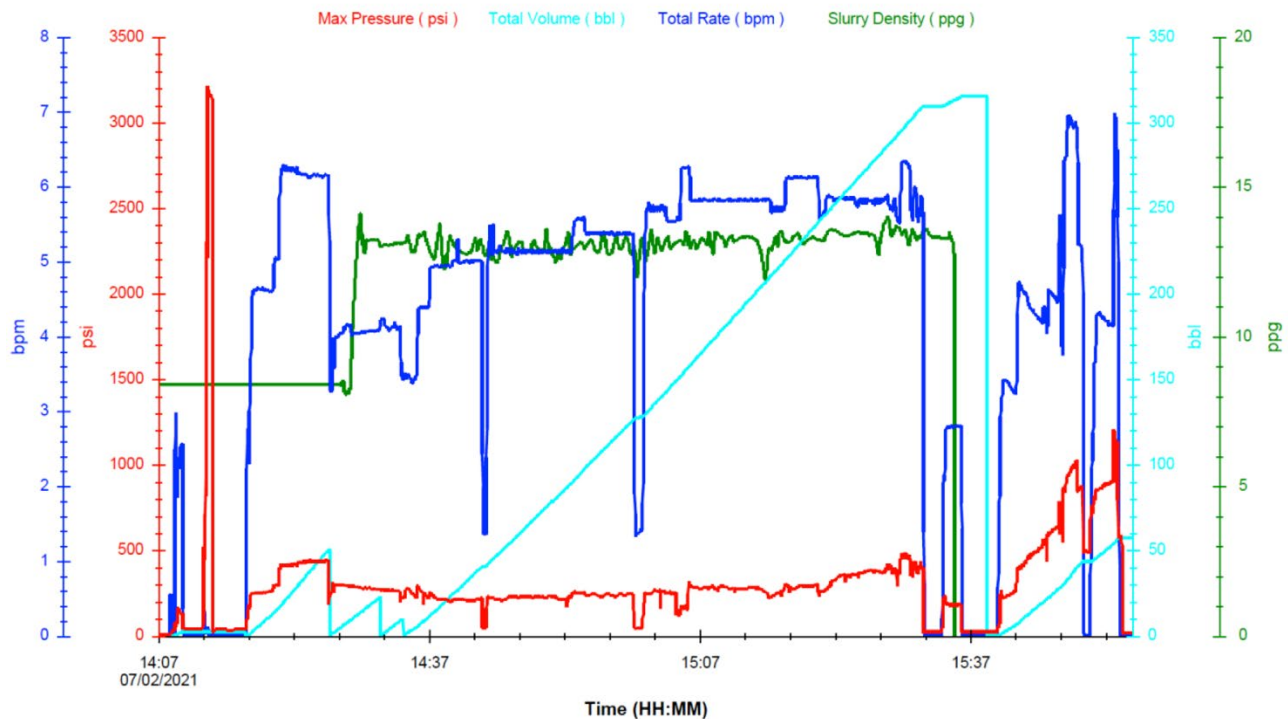


Figure 15 : 11-3/4" Intermediate casing cement pressure chart.

6.4. 10-5/8 in. Hole to 8,500 ft. and 7 in. Casing

6.4.1. 10-5/8 in. Hole Objectives

The drilling objectives for the 10-5/8 in. section were:

- Drill the cement inside the 11-3/4 in. shoe track (± 80 ft.) and 5,200 ft. of new hole from the 11-3/4 in. casing shoe to 8,500 ft. using PDC bits
- Maintain verticality within 2° and stabilize wellbore hazards
- Penetrate the reservoir test section
- Drill fast to reduce wellbore exposure to the drilling fluid
- Collect 2x 30 ft. core sections; one from approximately 6700 ft., the second from approximately 8,500 ft.
- Run suit of logs as planned.
- Install fiber optic cable on the OD of the casing from 8,500 ft. back to surface

These objectives were achieved with some deficiency: missing coring footage at 6,700 ft (21.5 ft recovered instead of planned 30 ft) and fiber-optic cable functioning failed between 3,933 and 8,508 ft.

6.4.2. 10-5/8 in. Summary

The drilling of the 10-5/8 in. hole commenced on 4 July, and total depth of 8,500 ft. was reached on 16 July. Seven 10-5/8 in. bits were required to drill this section. Maximum inclination was measured as 3.9° at 3,642 ft. Geophysical open hole logs were run in this hole section along with total four coring runs at 6,700 ft. and 8,500 ft. Initial 10-5/8" section TD was first deepened to 8,540 ft after 8-3/4 in. coring runs were performed. Section TD was extended to 8,545 ft. for rat hole purposes prior to running the 7in. casing string to 8,508 ft. and cemented in place.

6.4.3. 10-5/8 in. Surface Equipment

The 11-3/4 in. casing was cut off and the 13-5/8 in. surface BOPE equipment was used for the 10-5/8 in. section. The annular preventer and pipe rams were tested prior to running in the hole. A sFIT was performed after drilling out shoe track and rat hole to 3,009 ft., giving equivalent mud weight of 11.7 ppg.

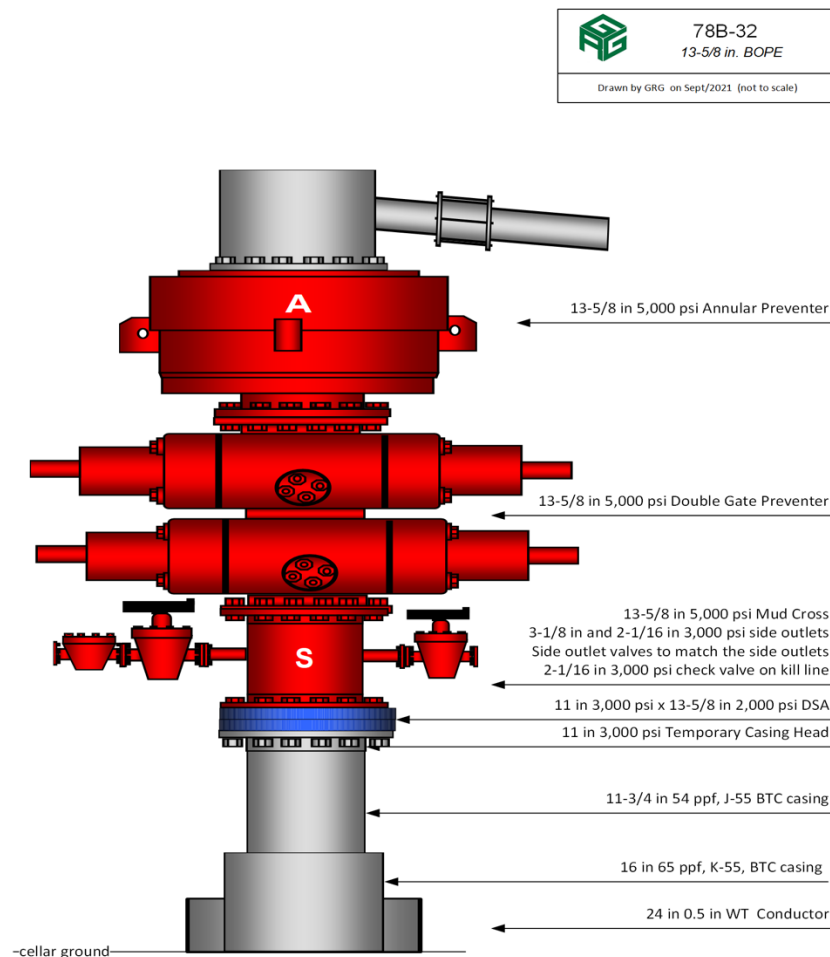


Figure 16: 13-5/8" BOPE Stack for drilling 10-5/8" hole.

6.4.4. 10-5/8 in. Bits, Hydraulics Program and BHA

In the 10-5/8 in. section, the primary formation was granodiorite, and a selection of bits were used through the section to test their performance. After the 7 in. casing was run, a 5-3/4 in. bit was run to clean out the cement inside casing. The bits used in this section is captured in Table 19 including two coring bits.

Table 19: Bits used in drilling 10-5/8" hole section.

Bit #/Run	Hole made (ft)	Bit Size (in.)	IADC Code	Ave. WOB (Klb)	Ave. RPM	Jet Size (32nd)	Ave. flow rate (gpm)	Ave. ROP (fph)
5/1	-	10.625	117	10	60	28 28 28	800	DOC
6/1	642	10.625	M433	66	170	12 12 12 12 12 12 13 13	820	49.8
7/1	2,110	10.625	M433	62	168	12 12 12 12 12 12 13 13	802	75.6
8/1	-	10.625	M433	-	-	12 12 12 12 12 12 13 13	-	-
8/2	60	10.625	M433	66	140	12 12 12 12 12 12 13 13	815	100
9/1	879	10.625	M433	66	184	12 12 12 12 12 12 13 13	844	80.6
10/1	28	8.75 x 4 Coring Bit	N/A	22	50	17 17 17 17 17 17 17 17	300	18.7
11/1	12	8.75 x 4 Coring Bit	N/A	14	55	17 17 17 17 17 17 17 17	320	44.4
12/1	2	10.625	433	21	61	20 20 20	800	3.3
12/2	26	10.625	433	23	45	20 20 20	800	26
12/3	5	10.625	433	25	45	20 20 20	820	10
13/1	871	10.625	M433	67	186	12 12 12 12 12 12 13 13	845	88.9





End of Well Report		Ref. GRG-10230	
Utah FORGE		Ver. Final	Page 43 of 68
Seismic Monitoring Well 78B-32		Issued: 1 December 2021	

Bit #/Run	Hole made (ft)	Bit Size (in.)	IADC Code	Ave. WOB (Klb)	Ave. RPM	Jet Size (32nd)	Ave. flow rate (gpm)	Ave. ROP (fph)
14/1	887	10.625	M433	65	50	12 12 12 12 12 12 13 13	800	88.7
14/2	14	10.625	M433	25	55	12 12 12 12 12 12 13 13	820	14
15/1	30	8.75 x 4 Coring Bit	N/A	8	65	17 17 17 17 17 17 17 17	290	7.5
15/2	10	8.75 x 4 Coring Bit	N/A	16	40	17 17 17 17 17 17 17 17	300	3.3

BHAs used in 10-5/8 in. hole section can be seen in Table 20 to Table 35.

Table 20: 10-5/8 in. BHA used with bit # 5.



BHA No: 5		Wellbore: Original Wellbore										
BHA Length (ft):		739.12										
Weights in Air					Buoyed Weight			Mud Wt of (lbs/gal): 9.10				
BHA Wt:		61,996			53,373							
Drillstring Wt:		61,996			53,373							
Wt Above Jars:												
Wt Below Jars:												
In					Out							
Depth (ft):		3,009			3,009							
Date/Time:		03-Jul-21 23:00			04-Jul-21 09:30							
Inclination:												
Azimuth:		0			0							
Average RPM:		50			Drilling Hrs.:			1.5				
Build Rate:					Walk Rate:							
WOB - Avg (lbs):		10			WOB - Max (lbs):			18				
Comments: 10 5/8" Clean out assembly												
BHA Component Details												
Item	No. Jnts	Length	OD	ID	Weight	Grade	Top Connection	P/B	Fishing Length	OD	Blade OD	Comment
BIT	1	1.25	10.625				6.625REG	Pin				S/No: A279636
JUNK	1	2.93	8.375	3.000	163.2	S-135	6.625REG	Box				S/No: 3595
DC	9	274.52	8.000	2.750	150.7	S-135	6.625REG	Box				S/No: RIG
XO	1	4.05	8.000	2.750	150.7	S-135	5.5IF	Box				S/No: DR44284
HWDP	15	456.37	5.000	3.000	42.7	S-135	5.5IF	Box				S/No: RIGS
Total:		739.12										

Table 21: 10-5/8 in. BHA # 6 used with bit # 6





End of Well Report		Ref. GRG-10230	
Utah FORGE		Ver. Final	Page 45 of 68
Seismic Monitoring Well 78B-32		Issued: 1 December 2021	

BHA No: 6			Wellbore: Original Wellbore									
BHA Length (ft):			966.88									
			Weights in Air				Buoyed Weight			Mud Wt of (lbs/gal): 9.10		
BHA Wt:			92,847				79,933					
Drillstring Wt:			92,847				79,933					
Wt Above Jars:												
Wt Below Jars:												
			In				Out					
Depth (ft):			3,009				3,651					
Date/Time:			04-Jul-21 09:30				05-Jul-21 13:30					
Inclination:												
Azimuth:			0				0					
Average RPM:			40				Drilling Hrs.:			13		
Build Rate:							Walk Rate:					
WOB - Avg (lbs):			65				WOB - Max (lbs):			65		
Comments: 10 5/8" RSS Assembly. BHA was pulled due to RSS failure.												
BHA Component Details												
Item	No. Jnts	Length	OD	ID	Weight	Grade	Top Connection	P/B	Fishing Length	Blade OD	Comment	
BIT	1	1.50	10.625				7.625REG	Pin			S/No: A279637	
OTHER	1	13.65	9.000	5.125	146.1	S-135	6.625REG	Box			RSS PD 900 POWER V S/No: 68994	
STAB	1	7.35	8.313	2.750	164.3	S-135	6.625REG	Box	8.00	3.550	10.500	NON MAG STAB S/No: SD604680
MWD	1	28.45	8.375	3.500	154.5	S-135	6.625REG	Box				S/No: DR34100
OTHER	1	3.66	8.000	3.430	139.4	S-135	6.625REG	Box				GAP SUB S/No: GSDRSN20
OTHER	1	5.76	8.125	3.500	143.5	S-135	6.625REG	Box				PULSER SUB S/No: 80001-3
OTHER	1	2.96	8.063	2.750	153.4	S-135	6.625REG	Box				FILTER SUB S/No: DR44846
OTHER	1	2.18	8.000	2.750	150.7	S-135	6.625REG	Box				CUBIC SENSOR S/No: 800CSS008
MMTR	1	43.40	9.625	7.852	82.7	S-135	6.625REG	Box	8.00	1.410		S/No: RVEN86118
Mud Motor: Type: PDM			Manufacturer:				Model:					
Lobe Configuration: 7/8			Speed: 0.166				Stages: 6		Torque: 22,020 ft lbs			
Dir. Company: SLB			Bend Setting: 0						Distance: 0.00 ft			
Bearing Stab. OD: 10.500 ins			<input type="checkbox"/> Motor Pad		<input type="checkbox"/> Motor Failure		Failure Time:					
RR	1	8.06	8.125	3.000	152.2	S-135	6.625REG	Box	8.13	2.260		RED BACK ROLLER REAMER S/No: GU4505
FLOAT	1	8.00	8.000	2.750	150.7	S-135	6.625REG	Box				S/No: DR28684
OTHER	1	5.02	8.250	3.250	153.5	S-135	6.625REG	Box				DIFFUSER SUB S/No: DHRTDS399
OTHER	1	2.08	8.000	2.750	150.7	S-135	6.625REG	Box				CUBIC SENSOR S/No: 800CSS007
DC	1	450.00	8.000	2.750	150.7	S-135	6.625REG	Box				S/No: RIG
XO	1	4.05	8.000	2.750	150.7	S-135	5.0XH	Box				S/No: DR44284
HWDP	1	380.76	5.500	4.776	19.9	S-135	5.0XH	Box				S/No: RIGS
Total:		966.88										



Table 22: 10-5/8 in. BHA #7 used with bit # 7.

BHA No: 7			Wellbore: Original Wellbore									
BHA Length (ft):			960.36									
			Weights in Air				Buoyed Weight			Mud Wt of (lbs/gal): 9.10		
BHA Wt:			92,360				79,513					
Drillstring Wt:			92,360				79,513					
Wt Above Jars:												
Wt Below Jars:												
			In				Out					
Depth (ft):			3,651				5,761					
Date/Time:			05-Jul-21 21:00				07-Jul-21 17:00					
Inclination:			3.93									
Azimuth:			223.19				0					
Average RPM:							Drilling Hrs.:					
Build Rate:							Walk Rate:					
WOB - Avg (lbs):							WOB - Max (lbs):					
Comments: 8" 1.5 DEG Motor. Pulled due to low ROP. Found 2 jets plugged with rubber the stator section of the motor and bit DBR'd.												
BHA Component Details												
Item	No.	Jnts	Length	OD	ID	Weight	Grade	Top Connection	P/B	Fishing Length	Blade OD	Comment
BIT	1	1.50	10.625					7.625REG	Pin			S/No: A279639
MMTR	1	30.87	8.250	6.250	77.4	S-135		6.625REG	Box			S/No: RVENN86052
Mud Motor: Type: OTHER Manufacturer: Model: RVEN												
Lobe Configuration: 7/8 Speed: 0.166 Stages: 4 Torque: 14,930 ft lbs												
Dir. Company: SLB Bend Setting: 1.5 Distance: 11.51 ft												
Bearing Stab. OD: ins <input checked="" type="checkbox"/> Motor Pad <input type="checkbox"/> Motor Failure Failure Time:												
STAB	1	7.35	8.313	2.750	164.3	S-135		6.625REG	Box	8.00	3.550	NON MAG STAB S/No: SD604680
MWD	1	28.45	8.375	3.500	154.5	S-135		6.625REG	Box			S/No: DR34100
OTHER	1	3.66	8.000	3.430	139.4	S-135		6.625REG	Box			GAP SUB S/No: GSDRSN20
OTHER	1	5.76	8.125	3.500	143.5	S-135		6.625REG	Box			PULSER SUB S/No: 80001-3
STAB	1	8.77	8.250	2.750	161.5	S-135		6.625REG	Box	8.25	4.090	10 3/8" NM STAB S/No: DR43576
MONEL	1	28.87	8.000	3.430	139.4	S-135		6.625REG	Box			S/No: DR24762
OTHER	1	2.96	8.063	2.750	153.4	S-135		6.625REG	Box			FILTER SUB S/No: DR28684
OTHER	1	2.34	8.000	2.750	150.7	S-135		6.625REG	Box			FLOAT SUB S/No: DR28684
OTHER	1	5.02	8.250	3.250	150.7	S-135		6.625REG	Box			DIFFUSER SUB S/No: DHRTDS399
DC	1	450.00	8.000	2.750	150.7	S-135		6.625REG	Box			S/No: RIGS
XO	1	4.05	8.000	2.750	150.7	S-135		5.0XH	Box			S/No: DR44284
HWDP	1	380.76	5.500	4.776	19.9	S-135		5.0XH	Box			S/No: RIGS
Total:		960.36										



Table 23: 10-5/8 in. BHA # 8 used with bit # 8.

BHA No: 8			Wellbore: Original Wellbore									
BHA Length (ft):			962.49									
			Weights in Air				Buoyed Weight			Mud Wt of (lbs/gal): 9.10		
BHA Wt:			92,524				79,655					
Drillstring Wt:			92,524				79,655					
Wt Above Jars:												
Wt Below Jars:												
			In				Out					
Depth (ft):			5,761				5,761					
Date/Time:			07-Jul-21 21:00				08-Jul-21 00:00					
Inclination:												
Azimuth:			0				0					
Average RPM:			0				Drilling Hrs.:			0		
Build Rate:							Walk Rate:					
WOB - Avg (lbs):			0				WOB - Max (lbs):			0		
Comments: 8" 1.50 DEG Assembly. Motor was not the Wright speed. BHA was pulled out of the hole and motor was swapped.												
BHA Component Details												
No.												
Item	Jnts	Length	OD	ID	Weight	Grade	Top Connection	P/B	Fishing Length	OD	Blade OD	Comment
BIT	1	1.50	10.625				7.625REG	Pin				S/No: A279690
MMTR	1	33.00	8.250	6.250	77.4	S-135	6.625REG	Box	8.00	1.420		S/No: 800-36-7618
Mud Motor: Type: OTHER Manufacturer: Model: NOV												
Lobe Configuration: 9/10 Speed: 0.111 Stages: 3.9 Torque: 14,930 ft/lbs												
Dir. Company: SLB Bend Setting: 1.5 Distance: 6.93 ft												
Bearing Stab. OD: ins <input checked="" type="checkbox"/> Motor Pad <input type="checkbox"/> Motor Failure Failure Time:												
STAB	1	7.35	8.313	2.750	164.3	S-135	6.625REG	Box	8.00	3.550	10.375	NON MAG STAB S/No: SD604680
MWD	1	28.45	8.375	3.500	154.5	S-135	6.625REG	Box				S/No: DR34100
OTHER	1	3.66	8.000	3.430	139.4	S-135	6.625REG	Box				GAP SUB S/No: GSDRSN20
OTHER	1	5.76	8.125	3.500	143.5	S-135	6.625REG	Box				PULSER SUB S/No: 80001-3
STAB	1	8.77	8.250	2.750	161.5	S-135	6.625REG	Box	8.25	4.090		10 3/8" NM STAB S/No: DR43576
MONEL	1	28.87	8.000	3.430	139.4	S-135	6.625REG	Box				S/No: DR24762
OTHER	1	2.96	8.063	2.750	153.4	S-135	6.625REG	Box				FILTER SUB S/No: DR28684
OTHER	1	2.34	8.000	2.750	150.7	S-135	6.625REG	Box				FLOAT SUB S/No: DR28684
OTHER	1	5.02	8.250	3.250	150.7	S-135	6.625REG	Box				DIFFUSER SUB S/No: DHRTDS399
DC	1	450.00	8.000	2.750	150.7	S-135	6.625REG	Box				S/No: RIGS
XO	1	4.05	8.000	2.750	150.7	S-135	5.0XH	Box				S/No: DR44284
HWDP	1	380.76	5.500	4.776	19.9	S-135	5.0XH	Box				S/No: RIGS
Total:		962.49										



Table 24: 10-5/8 in. BHA # 9 used with bit #9.

BHA No: 9			Wellbore: Original Wellbore																						
BHA Length (ft):			962.49																						
			Weights in Air				Buoyed Weight			Mud Wt of (lbs/gal): 9.10															
BHA Wt:			92,524				79,655																		
Drillstring Wt:			92,524				79,655																		
Wt Above Jars:																									
Wt Below Jars:																									
			In				Out																		
Depth (ft):			5,761				5,821																		
Date/Time:			08-Jul-21 06:00				10-Jul-21 23:00																		
Inclination:																									
Azimuth:			0				0																		
Average RPM:			40				Drilling Hrs.:			1															
Build Rate:							Walk Rate:																		
WOB - Avg (lbs):			65				WOB - Max (lbs):			65															
Comments: 1.25 DEG .166 rev. Pulled due to motor failure. Stator rubber at shakers along with high pressure.																									
BHA Component Details																									
No.		Item		Jnts		Length		OD		ID		Weight		Grade		Top Connection		P/B		Fishing Length		Blade OD		Comment	
BIT		1		1.50		10.625										7.625REG		Pin						S/No: A279690	
MMTR		1		33.00		8.250		6.250		77.4		S-135		6.625REG		Box		8.00		1.420				S/No: 800-36-7618	
Mud Motor: Type: OTHER													Manufacturer: Rival				Model: NOV								
Lobe Configuration: 9/10													Speed: 0.166		Stages: 3.9		Torque: 14,930 ft/lbs								
Dir. Company: SLB													Bend Setting: 1.25		Distance: 6.93 ft										
Bearing Stab. OD: ins													<input checked="" type="checkbox"/> Motor Pad		<input checked="" type="checkbox"/> Motor Failure		Failure Time: 10-Jul-21 16:00								
Comments: Motor failed after 1 hour stator rubber at shakers along with 2 plugged jets																									
STAB		1		7.35		8.313		2.750		164.3		S-135		6.625REG		Box		8.00		3.550		10.375		NON MAG STAB S/No: SD604680	
MWD		1		28.45		8.375		3.500		154.5		S-135		6.625REG		Box								S/No: DR34100	
OTHER		1		3.66		8.000		3.430		139.4		S-135		6.625REG		Box								GAP SUB S/No: GSDRSN20	
OTHER		1		5.76		8.125		3.500		143.5		S-135		6.625REG		Box								PULSER SUB S/No: 80001-3	
STAB		1		8.77		8.250		2.750		161.5		S-135		6.625REG		Box		8.25		4.090				10 3/8" NM STAB S/No: DR43576	
MONEL		1		28.87		8.000		3.430		139.4		S-135		6.625REG		Box								S/No: DR24762	
OTHER		1		2.96		8.063		2.750		153.4		S-135		6.625REG		Box								FILTER SUB S/No: DR28684	
OTHER		1		2.34		8.000		2.750		150.7		S-135		6.625REG		Box								FLOAT SUB S/No: DR28684	
OTHER		1		5.02		8.250		3.250		150.7		S-135		6.625REG		Box								DIFFUSER SUB S/No: DHRTDS399	
DC		1		450.00		8.000		2.750		150.7		S-135		6.625REG		Box								S/No: RIGS	
XO		1		4.05		8.000		2.750		150.7		S-135		5.0XH		Box								S/No: DR44284	
HWDP		1		380.76		5.500		4.776		19.9		S-135		5.0XH		Box								S/No: RIGS	
Total:				962.49																					



Table 25: 10-5/8 in. BHA # 10 used with bit #9.

BHA No: 10		Wellbore: Original Wellbore									
BHA Length (ft):		963.16									
		Weights in Air				Buoyed Weight			Mud Wt of (lbs/gal): 9.10		
BHA Wt:		92,634				79,750					
Drillstring Wt:		92,634				79,750					
Wt Above Jars:											
Wt Below Jars:											
		In				Out					
Depth (ft):		5,821				6,700					
Date/Time:		11-Jul-21 01:00				11-Jul-21 11:30					
Inclination:											
Azimuth:		0				0					
Average RPM:		50				Drilling Hrs.:			12		
Build Rate:						Walk Rate:					
WOB - Avg (lbs):		65				WOB - Max (lbs):			75		
Comments: 1.5 deg .111 rev											
BHA Component Details											
Item	No. Jnts	Length	OD	ID	Weight	Grade	Top Connection	P/B	Fishing Length	Blade OD	Comment
BIT	1	1.50	10.625				7.625REG	Pin			S/No: A279692
MMTR	1	33.00	8.250	6.250	77.4	S-135	6.625REG	Box	8.00	1.420	S/No: 800-36-7618
Mud Motor: Type: OTHER Manufacturer: NOV Model: NOV											
Lobe Configuration: 9/10 Speed: 0.111 Stages: 3.9 Torque: 26,270 ft lbs											
Dir. Company: SLB Bend Setting: 1.5 Distance: 6.93 ft											
Bearing Stab. OD: ins <input checked="" type="checkbox"/> Motor Pad <input type="checkbox"/> Motor Failure Failure Time:											
STAB	1	8.02	8.313	2.750	164.3	S-135	6.625REG	Box	8.00	3.550	10.375 NON MAG STAB S/No: DR43516
MWD	1	28.45	8.375	3.500	154.5	S-135	6.625REG	Box			S/No: DR34100
OTHER	1	3.66	8.000	3.430	139.4	S-135	6.625REG	Box			GAP SUB S/No: GSDRSN20
OTHER	1	5.76	8.125	3.500	143.5	S-135	6.625REG	Box			PULSER SUB S/No: 80001-3
STAB	1	8.77	8.250	2.750	161.5	S-135	6.625REG	Box	8.25	4.090	10 3/8" NM STAB S/No: DR43576
MONEL	1	28.87	8.000	3.430	139.4	S-135	6.625REG	Box			S/No: DR24762
OTHER	1	2.96	8.063	2.750	153.4	S-135	6.625REG	Box			FILTER SUB S/No: DR28684
OTHER	1	2.34	8.000	2.750	150.7	S-135	6.625REG	Box			FLOAT SUB S/No: DR28684
OTHER	1	5.02	8.250	3.250	150.7	S-135	6.625REG	Box			DIFFUSER SUB S/No: DHRTDS399
DC	1	450.00	8.000	2.750	150.7	S-135	6.625REG	Box			S/No: RIGS
XO	1	4.05	8.000	2.750	150.7	S-135	5.0XH	Box			S/No: DR44284
HWDP	1	380.76	5.500	4.776	19.9	S-135	5.0XH	Box			S/No: RIGS
Total:		963.16									



Table 26: 10-5/8 in. BHA # 11 used with bit # 10.

BHA No: 11		Wellbore: Original Wellbore										
BHA Length (ft):	612.69											
Weights in Air		Buoyed Weight	Mud Wt of (lbs/gal): 83.00									
BHA Wt:	47,376	-12,728										
Drillstring Wt:	47,376	-12,728										
Wt Above Jars:												
Wt Below Jars:												
In		Out										
Depth (ft):	6,700	6,728										
Date/Time:	12-Jul-21 00:30	12-Jul-21 20:00										
Inclination:												
Azimuth:	0	0										
Average RPM:	50	Drilling Hrs.:	1.5									
Build Rate:		Walk Rate:										
WOB - Avg (lbs):	22	WOB - Max (lbs):	30									
Comments: 8-3/4" Coring assembly. Recovered approximately 12' of good core.												
BHA Component Details												
Item	No. Jnts	Length	OD	ID	Weight	Grade	Top Connection	P/B	Fishing Length	OD	Blade OD	Comment
CORBIT	1	1.22	8.750				OTHER	Pin				8-3/4"X4"
STAB	1	4.00	8.468	4.000	148.7		OTHER	Box	1.94	7.250	8.468	
CORE	1	26.00	7.250	5.875	48.2		OTHER	Box				
STAB	1	4.00	8.468	5.875	99.3		OTHER	Box	7.25		1.940	
OTHER	1	1.50	7.250	5.875	48.2		OTHER	Box				Lower sub
OTHER	1	1.75	6.750	5.375	44.5		OTHER	Box				Upper sub
FLOAT	1	3.12	6.750	3.000	97.6		OTHER	Box				
XO	1	3.20	6.750	3.000	97.6		OTHER	Box				
RR	1	6.50	10.625	3.000	277.3		6.625REG	Box				10-5/8" Roller Reamer
DC	3	93.20	8.000	3.000	146.8		6.625REG	Box				
XO	1	3.20	8.000	3.000	146.8		5.5IF	Box				
HWDP	15	465.00	5.500	2.750	60.6		5.5IF	Box				
Total:		612.69										



Table 27: 10-5/8 in. BHA # 12 used with bit # 11.

BHA No: 12		Wellbore: Original Wellbore										
BHA Length (ft):		509.79										
Weights in Air		Buoyed Weight	Mud Wt of (lbs/gal): 83.00									
BHA Wt:	31,578	-8,484										
Drillstring Wt:	31,578	-8,484										
Wt Above Jars:												
Wt Below Jars:												
In		Out										
Depth (ft):	6,723	6,740										
Date/Time:	12-Jul-21 23:00	13-Jul-21 08:00										
Inclination:												
Azimuth:	0	0										
Average RPM:	55	Drilling Hrs.:	1									
Build Rate:		Walk Rate:										
WOB - Avg (lbs):	14	WOB - Max (lbs):	16									
Comments: 8 3/4" core assembly. Core run #2 Recovered 9.5 of core.												
BHA Component Details												
Item	No. Jnts	Length	OD	ID	Weight	Grade	Top Connection	P/B	Fishing Length	OD	Blade OD	Comment
CORBIT	1	1.22	8.750				OTHER	Pin				8-3/4"X4" S/No: 12958459
STAB	1	4.00	8.468	4.000	148.7		OTHER	Box	1.94	7.250	8.468	
CORE	1	26.00	7.250	5.875	48.2		OTHER	Box				
STAB	1	4.00	8.468	5.875	99.3		OTHER	Box	7.25		1.940	
OTHER	1	1.50	7.250	5.875	48.2		OTHER	Box				Lower sub
OTHER	1	1.75	6.750	5.375	44.5		OTHER	Box				Upper sub
FLOAT	1	3.12	6.750	3.000	97.6		OTHER	Box				
XO	1	3.20	8.000	3.000	146.8		5.5IF	Box				
HWDP	15	465.00	5.500	2.750	60.6		5.5IF	Box				
Total:		509.79										

Table 28: 10-5/8 in. BHA # 13 used with bit # 12.

BHA No: 13		Wellbore: Original Wellbore										
BHA Length (ft):	845.73											
Weights in Air		Buoyed Weight	Mud Wt of (lbs/gal): 9.10									
BHA Wt:	78,354	67,455										
Drillstring Wt:	78,354	67,455										
Wt Above Jars:												
Wt Below Jars:												
In		Out										
Depth (ft):	6,740	6,742										
Date/Time:	13-Jul-21 09:00	13-Jul-21 21:00										
Inclination:												
Azimuth:	0	0										
Average RPM:	60	Drilling Hrs.:	1									
Build Rate:		Walk Rate:										
WOB - Avg (lbs):	21	WOB - Max (lbs):	25									
Comments: BHA was used to open hole up from 8.75' to 10-5/8" drilled 2' of new formation												
BHA Component Details												
Item	No. Jnts	Length	OD	ID	Weight	Grade	Top Connection	P/B	Fishing Length	OD	Blade OD	Comment
BIT	1	1.50	10.625				7.625REG	Pin				S/No: 1116990
DC	1	31.00	8.250	3.250	150.7	S-135	6.625REG	Box				S/No: RIGS
RR	1	7.42	10.625	3.250	273.1	S-135	6.625REG	Box				
DC	1	421.00	8.000	2.750	150.7	S-135	6.625REG	Box				S/No: RIGS
XO	1	4.05	8.000	2.750	150.7	S-135	5.0XH	Box				S/No: DR44284
HWDP	1	380.76	5.500	4.776	19.9	S-135	5.0XH	Box				S/No: RIGS
Total:		845.73										

Table 29: 10-5/8 in. BHA # 14 used with bit # 13.

BHA No: 14		Wellbore: Original Wellbore												
BHA Length (ft):		1,035.59												
		Weights in Air				Buoyed Weight			Mud Wt of (lbs/gal): 9.10					
BHA Wt:		93,580				80,564								
Drillstring Wt:		93,580				80,564								
Wt Above Jars:														
Wt Below Jars:														
		In				Out								
Depth (ft):		6,742				7,613								
Date/Time:		14-Jul-21 01:00				15-Jul-21 17:00								
Inclination:														
Azimuth:		0				0								
Average RPM:		45				Drilling Hrs.:			12.5					
Build Rate:						Walk Rate:								
WOB - Avg (lbs):		65				WOB - Max (lbs):			70					
Comments: 10-5/8" dir assembly w/1.15 deg motor. 166 rev/gal. Motor took a high amount of torque to drain 45 kft/lbs. Bit had 3-plugged jets with pieces of rubber from the stator														
BHA Component Details														
Item		No. Jnts		Length	OD	ID	Weight	Grade	Top Connection	P/B	Fishing Length	OD	Blade OD	Comment
BIT		1	0.92	10.625					7.625REG	Pin				S/No: A279638
MMTR		1	33.29	8.250	6.250	77.4	S-135	6.625REG	Box	8.00	1.420			S/No: BPG2800-047
Mud Motor: Type: OTHER				Manufacturer: BICO				Model: Bico						
Lobe Configuration: 7/8				Speed: 0.166				Stages: 4		Torque:		ft lbs		
Dir. Company: SDI				Bend Setting: 1.15						Distance:		11.00 ft		
Bearing Stab. OD: 10.625 ins				<input checked="" type="checkbox"/> Motor Pad <input type="checkbox"/> Motor Failure				Failure Time:						
Comments: Motor took a high amount of torque to drain 45 kft/lbs. Bit had 3-plugged jets with pieces of rubber from the														
STAB		1	5.14	8.313	2.750	164.3	S-135	6.625REG	Box	8.00	3.550	10.250	10-1/4"NON MAG STAB S/No: 770162	
MONEL		1	29.79	8.375	3.500	154.5	S-135	6.625REG	Box				S/No: 84-121	
OTHER		1	9.28	8.000	3.430	139.4	S-135	6.625REG	Box				PONY COLLAR S/No: 126-120	
OTHER		1	5.82	8.125	3.500	143.5	S-135	6.625REG	Box				PULSER SUB S/No: 74-124	
STAB		1	4.30	8.250	2.750	161.5	S-135	6.625REG	Box	8.25	4.090		10 1/2" NM STAB S/No: 770132	
MONEL		1	29.28	8.000	3.430	139.4	S-135	6.625REG	Box				S/No: 84-350	
OTHER		1	2.96	8.063	2.750	153.4	S-135	6.625REG	Box				FILTER SUB	
DC		1	455.86	8.000	2.750	150.7	S-135	6.625REG	Box				S/No: RIGS	
XO		1	2.64	8.000	2.750	150.7	S-135	5.0XH	Box				S/No: DR44284	
HWDP		1	456.31	5.500	4.776	19.9	S-135	5.0XH	Box				S/No: RIGS	
Total:		1,035.59												



Table 30: 10-5/8 in. BHA # 15 used with bit # 14.

BHA No: 15			Wellbore: Original Wellbore									
BHA Length (ft):			1,049.30									
			Weights in Air				Buoyed Weight			Mud Wt of (lbs/gal): 9.10		
BHA Wt:			95,535				82,247					
Drillstring Wt:			95,535				82,247					
Wt Above Jars:												
Wt Below Jars:												
			In				Out					
Depth (ft):			7,613				8,500					
Date/Time:			15-Jul-21 23:00				16-Jul-21 23:00					
Inclination:												
Azimuth:			0				0					
Average RPM:			50				Drilling Hrs.:			12		
Build Rate:							Walk Rate:					
WOB - Avg (lbs):			65				WOB - Max (lbs):			70		
Comments:			1.5 deg .160 rev/gal. Motor had approximately .5" of squat in bearing assembly. Kick pad was wore smooth. Roller reamer above the motor had heavy wear on all buttons, 2 of the rollers had bad bearings. Top Stabilizer was .75" under-gauged.									
BHA Component Details												
Item	No.	Jnts	Length	OD	ID	Weight	Grade	Top Connection	P/B	Fishing Length	Blade OD	Comment
BIT	1	0.92	10.625					7.625REG	Pin			S/No: A279691
MMTR	1	33.29	8.250	6.250	77.4	S-135	6.625REG	Box	8.00	1.420		S/No: BPG2800-0035
Mud Motor: Type: OTHER Manufacturer: BICO Model: Bico												
Lobe Configuration: 7/8 Speed: 0.16 Stages: 4 Torque: ft lbs												
Dir. Company: SDI Bend Setting: 1.50 Distance: 11.00 ft												
Bearing Stab. OD: ins <input checked="" type="checkbox"/> Motor Pad <input type="checkbox"/> Motor Failure Failure Time:												
Comments: Slick												
STAB	1	5.14	8.313	2.750	164.3	S-135	6.625REG	Box	8.00	3.550	10.250	10-5/8" roller reamer
OTHER	1	9.00	8.000	3.430	139.4	S-135	6.625REG	Box				Pony Collar S/No: 126-120
OTHER	1	2.15	8.000	2.750	150.7	S-135	6.625REG	Box				Cubic sensor S/No: CSS-006
MONEL	1	29.79	8.375	3.500	154.5	S-135	6.625REG	Box				S/No: 84-121
OTHER	1	5.82	8.125	3.500	143.5	S-135	6.625REG	Box				PULSER SUB S/No: 74-124
OTHER	1	9.08	8.000	3.500	138.1	S-135	6.625REG	Box				Pony Collar S/No: 126-058
STAB	1	4.30	8.250	2.750	161.5	S-135	6.625REG	Box	8.25	4.090		10 1/2" NM STAB S/No: 770127
MONEL	1	29.28	8.000	3.430	139.4	S-135	6.625REG	Box				S/No: 84-350
OTHER	1	2.76	8.000	2.750	150.7	S-135	6.625REG	Box				Cubic sensor S/No: CS-04
OTHER	1	2.96	8.063	2.750	153.4	S-135	6.625REG	Box				FILTER SUB
DC	1	455.86	8.000	2.750	150.7	S-135	6.625REG	Box				S/No: RIGS
XO	1	2.64	8.000	2.750	150.7	S-135	5.0XH	Box				S/No: DR44284
HWDP	1	456.31	5.500	4.776	19.9	S-135	5.0XH	Box				S/No: RIGS
Total:		1,049.30										



Table 31: 8-3/4 in. Coring BHA #16 used with bit #15.

BHA No: 16		Wellbore: Original Wellbore										
BHA Length (ft):	509.79											
Weights in Air		Buoyed Weight	Mud Wt of (lbs/gal): 83.00									
BHA Wt:	31,578	-8,484										
Drillstring Wt:	31,578	-8,484										
Wt Above Jars:												
Wt Below Jars:												
In		Out										
Depth (ft):	8,500	8,530										
Date/Time:	17-Jul-21 08:00	18-Jul-21 01:00										
Inclination:												
Azimuth:	0	0										
Average RPM:	65	Drilling Hrs.:	4									
Build Rate:		Walk Rate:										
WOB - Avg (lbs):	8	WOB - Max (lbs):	10									
Comments: Core run #3. Recovered 23.7' of core. 50% 2-3" in size with the other 50% 9-12" in size. Note: Inner barrel assembly was pushed up inside of core barrel approximately 3'.												
BHA Component Details												
Item	No. Jnts	Length	OD	ID	Weight	Grade	Top Connection	P/B	Fishing Length	OD	Blade OD	Comment
CORBIT	1	1.22	8.750				OTHER	Pin				8-3/4"X4" S/No: 13206404
STAB	1	4.00	8.468	4.000	148.7		OTHER	Box	1.94	7.250	8.468	
CORE	1	26.00	7.250	5.875	48.2		OTHER	Box				
STAB	1	4.00	8.468	5.875	99.3		OTHER	Box	7.25		1.940	
OTHER	1	1.50	7.250	5.875	48.2		OTHER	Box				Lower sub
OTHER	1	1.75	6.750	5.375	44.5		OTHER	Box				Upper sub
FLOAT	1	3.12	6.750	3.000	97.6		OTHER	Box				
XO	1	3.20	8.000	3.000	146.8		5.5IF	Box				
HWDP	15	465.00	5.500	2.750	60.6		5.5IF	Box				
Total:		509.79										

Table 32: 8-3/4 in. Coring BHA # 17 used with bit # 15.

BHA No: 17		Wellbore: Original Wellbore										
BHA Length (ft):	509.79											
Weights in Air		Buoyed Weight	Mud Wt of (lbs/gal): 83.00									
BHA Wt:	31,578	-8,484										
Drillstring Wt:	31,578	-8,484										
Wt Above Jars:												
Wt Below Jars:												
In		Out										
Depth (ft):	8,530	8,540										
Date/Time:	18-Jul-21 02:00	18-Jul-21 18:00										
Inclination:												
Azimuth:	0	0										
Average RPM:	65	Drilling Hrs.:	3									
Build Rate:		Walk Rate:										
WOB - Avg (lbs):	10	WOB - Max (lbs):	16									
Comments: 8-3/4" Core assembly run #4												
BHA Component Details												
Item	No. Jnts	Length	OD	ID	Weight	Grade	Top Connection	P/B	Fishing Length	OD	Blade OD	Comment
CORBIT	1	1.22	8.750				OTHER	Pin				8-3/4"X4" S/No: 13206404
STAB	1	4.00	8.468	4.000	148.7		OTHER	Box	1.94	7.250	8.468	
CORE	1	26.00	7.250	5.875	48.2		OTHER	Box				
STAB	1	4.00	8.468	5.875	99.3		OTHER	Box	7.25		1.940	
OTHER	1	1.50	7.250	5.875	48.2		OTHER	Box				Lower sub
OTHER	1	1.75	6.750	5.375	44.5		OTHER	Box				Upper sub
FLOAT	1	3.12	6.750	3.000	97.6		OTHER	Box				
XO	1	3.20	8.000	3.000	146.8		5.5IF	Box				
HWDP	15	465.00	5.500	2.750	60.6		5.5IF	Box				
Total:		509.79										

Table 33: 10-5/8 in. BHA # 18 used with bit # 14.

BHA No: 18		Wellbore: Original Wellbore										
BHA Length (ft):	469.42											
Weights in Air		Buoyed Weight	Mud Wt of (lbs/gal): 83.00									
BHA Wt:	28,767	-7,729										
Drillstring Wt:	28,767	-7,729										
Wt Above Jars:												
Wt Below Jars:												
In		Out										
Depth (ft):	8,500	8,514										
Date/Time:	18-Jul-21 19:00	19-Jul-21 08:00										
Inclination:												
Azimuth:	0	0										
Average RPM:	55	Drilling Hrs.:	1									
Build Rate:		Walk Rate:										
WOB - Avg (lbs):	25	WOB - Max (lbs):	30									
Comments: 10-5/8" Ream out assembly.												
BHA Component Details												
Item	No. Jnts	Length	OD	ID	Weight	Grade	Top Connection	P/B	Fishing Length	OD	Blade OD	Comment
BIT	1	1.22	10.625				OTHER	Pin				S/No: A279691
BS	1	3.20	8.000				5.5IF	Box				Dressed with float
HWDP	15	465.00	5.500	2.750	60.6		5.5IF	Box				
Total:		469.42										



Table 34: 10-5/8 in. BHA # 19 used with bit # 12.

BHA No: 19		Wellbore: Original Wellbore										
BHA Length (ft):	469.42											
Weights in Air		Buoyed Weight	Mud Wt of (lbs/gal): 83.00									
BHA Wt:	28,767	-7,729										
Drillstring Wt:	28,767	-7,729										
Wt Above Jars:												
Wt Below Jars:												
In		Out										
Depth (ft):	8,514	8,540										
Date/Time:	19-Jul-21 21:00	20-Jul-21 10:00										
Inclination:												
Azimuth:	0	0										
Average RPM:	50	Drilling Hrs.:	1									
Build Rate:		Walk Rate:										
WOB - Avg (lbs):	23	WOB - Max (lbs):	28									
Comments: BHA was used to open hole from 8-3/4" to 10-5/8"												
BHA Component Details												
Item	No. Jnts	Length	OD	ID	Weight	Grade	Top Connection	P/B	Fishing Length	OD	Blade OD	Comment
BIT	1	1.22	10.625				OTHER	Pin				TCI BIT RE-RUN S/No: 1116990
BS	1	3.20	8.000				5.5IF	Box				Dressed with float
HWDP	15	465.00	5.500	2.750	60.6		5.5IF	Box				
Total:		469.42										

Table 35: 10-5/8 in. BHA # 20 used with bit # 12.

BHA No: 20		Wellbore: Original Wellbore										
BHA Length (ft):	469.42											
Weights in Air		Buoyed Weight	Mud Wt of (lbs/gal): 83.00									
BHA Wt:	28,767	-7,729										
Drillstring Wt:	28,767	-7,729										
Wt Above Jars:												
Wt Below Jars:												
In		Out										
Depth (ft):	8,540	8,545										
Date/Time:	20-Jul-21 21:30	21-Jul-21 11:00										
Inclination:												
Azimuth:	0	0										
Average RPM:	45	Drilling Hrs.:	0.5									
Build Rate:		Walk Rate:										
WOB - Avg (lbs):	25	WOB - Max (lbs):	28									
Comments: 10-5/8" clean out assembly.												
BHA Component Details												
Item	No. Jnts	Length	OD	ID	Weight	Grade	Top Connection	P/B	Fishing Length	OD	Blade OD	Comment
BIT	1	1.22	10.625				OTHER	Pin				TCI BIT RE-RUN S/No: 1116990
BS	1	3.20	8.000				5.5IF	Box				Dressed with float
HWDP	15	465.00	5.500	2.750	60.6		5.5IF	Box				
Total:		469.42										



6.4.5. 10-5/8 in. Drilling Fluids

Planned basic drilling parameters and the design of the mud system for the 10-5/8 in. drilling sections are shown in Table 36 and the average parameters used are shown in Table 37. The mud system was designed as a lightly dispersed clay-based mud system with a weight between 8.6 and 9.5 ppg. adding gel as needed to maintain adequate viscosity for good hole cleaning.

Table 36: Fluid parameters planned for 10-5/8 in.

Hole Size	10-5/8 in.
Casing Size	7 in.
Mud Type	Lime/Gel/Water System
Mud Weight (ppg)	8.6 – 9.5
Viscosity (sec)	50-60+
Filtrate (ML)	< 12
Total Mud Volume	1,200 bbls (500 bbls surface volume)
Directional Program	NA – Vertical Hole
Formations	Granite-Gneiss
Interval BHT	~ 365°F
Continue drilling 10-5/8 in. hole. The current mud system will be treated as required for a sumpless system. The drilling fluid properties for the 10-5/8 in. section shown here may be modified per the accepted detailed drilling fluids program. Lightly dispersed clay-based mud HT system, adding gel as needed to maintain adequate viscosity for good hole cleaning (YP 15-25). Use Bentonite/LCM pills and Polyvis (PHPA) to sweep hole; thin mud with Desco CF/HT Thin as needed. Maintain mud weight to control any artesian influx, if encountered, and add 2 – 4 ppb Micro C for Wellbore Strengthening. Use DMA/PAC Polymer for desired fluid loss control, and TORKease/Walnut to reduce torque and drag; maintain pH of 10 -11 with caustic soda/lime. If encountered, control lost circulation with conventional LCM pills and drill cuttings. Run and cement 7” casing to 8,500 ft.	

Table 37: Average fluid properties for 10-5/8 in. section.

Fluid Parameters (spud)	Unit	Min	Max	Ave
Mud Weight	ppg	8.6	9.5	9
pH		10	11	10.5
API Fluid Loss (Filtrate)	cc/30 sec.	12	12	12
Plastic Viscosity	cP	alap	alap	alap
Yield Point	lb/100ft ²	8	12	16

6.4.6. 7 in. Casing and Cementing

Upon reaching section TD and finished coring operations (from 8,500 to 8,540 ft.), 8-3/4 in. cored hole was opened to 10-5/8 in. from 8,500 to 8,514 ft. A suite of geophysical logs was run including sonic scanner, borehole formation imager and triple combo. Maximum BHT was recorded as 354 F° during logging operations. 8-3/4 in. cored hole was opened from 8,514 to 8,540 ft. using a 10-5/8 in. TCI bit. BHA was pulled up to surface then Schlumberger ran in hole and performed UBI log. Section TD was deepened to 8,545 ft. to provide enough rat hole prior to run 7 in. casing.

The wellhead was prepped and the 7 in. 41 ppf T-110SS Tenaris casing was run to 6,753 ft. with the Silixa fiber optic cable strapped to outside on 22 July. A continuity test of the fiber was run every 15 joints to ensure functioning and catch any damage early. While running in, at 3,722 ft. a splice was made to new spool of cable. Static temperature was 208 °F at 3,933 ft. The continuity test at 7,070 ft. indicated that the cable failed at 4,000 ft. from the surface. Circulated bottoms up at 7,106 ft. with max surface flow temperature of 99° F. Static temperature reading at 6,966 ft. with fiber-optic cable was 359° F. Continuity test once casing reached 7,812 ft. indicated fiber-optic cable lost conductivity from 4,500 ft. to 7,812 ft. Static temperature was 240° F at 4,500 ft. Continuity test from the casing setting depth of 8,508 ft. indicated fiber-optic cable failed from 3,933 ft. to 8508 ft. Static temperature was 208° F at 3,933 ft.

Cementing of 7 in. commenced on 25 July at 02:30 hours. 809 bbls of 12.7 ppg RC ThermaLite-HT cement slurry was pumped and displaced with 273 bbls of fresh water. Waited on cement while holding 2,800-3,000 psi pressure inside casing. 7-1/16 in. 10,000 psi BOPE, installed and tested on 26-27 July.

Primary cementing report and pumping schedule are provided in Table 38 and Figure 17, respectively.



Table 38: Primary cement job report for 7" casing.

Cement Job Information						
Start Date/Time:	25-Jul-21 03:00	Wellbore:	Original Wellbore			
Job Type:	PRIMARY	String OD (ins):	7.000			
Well Section:	PROD	String Type:	FULL			
Cementing Co:	Resource	Cementing Engineer:				
Primary Job Detail						
	Volume (bbls)	Pump Time	Rate (bbls/min)	Pressure (psi)		
Conditioning Data:		20	5.0	315		
Cement Data:	809.0	134	6.0	1,114		
Displacement Data:	276.0	27	12.0	3,685		
Calc. Displacement Vol:	276.0					
<input type="checkbox"/> Reciprocate Pipe?	<input type="checkbox"/> Batch Mix?	<input checked="" type="checkbox"/> Bump Plug?	Bump Pressure:			
Returns to Surface:	FULL	<input checked="" type="checkbox"/> Cement at Surface?	Volume (bbls):	126.0		
Calc Top of Cement (ft):	0	Excess (%):	50.00%	Avg. Hole Size (ins): 10.625		
Slurry Information						
Type	Density	Yield	Sacks	Volume	Rate	Additives
LEAD	12.97	2.27	2000	809.0	6.0	Thermalite-HT
Post Job Information						
Liner Top Test (lbs/gal):				Job Success?		Yes
Actual Top of Cmt (ft):				0	CBL Bond Quality:	
Misc. Comments:		Held safety meeting with all involved personal. Swapped lines to cement truck. Pumped cement as followed. Fill lines, pressure tested lines to 5,500 psi. Pumped 100 bbls of fresh water spacer @ 5 bpm. Pumped 20 bbls of RC Mud cleaner spacer @ 5 bpm. Pumped 10 bbls of fresh water spacer @ 5 bpm. Mixed and pumped 809 bbls of 12.7 ppg RC ThermoLite-HT cement @ 8 bpm. Note: Last 80 bbls of cement has 1.3% of retarder. Dropped top plug and displaced with 273 bbls of fresh water. Bumped plug with 500 psi over circulating pressure at 3385 psi. CIP at 06:16 HRS on 7-25-2021.				

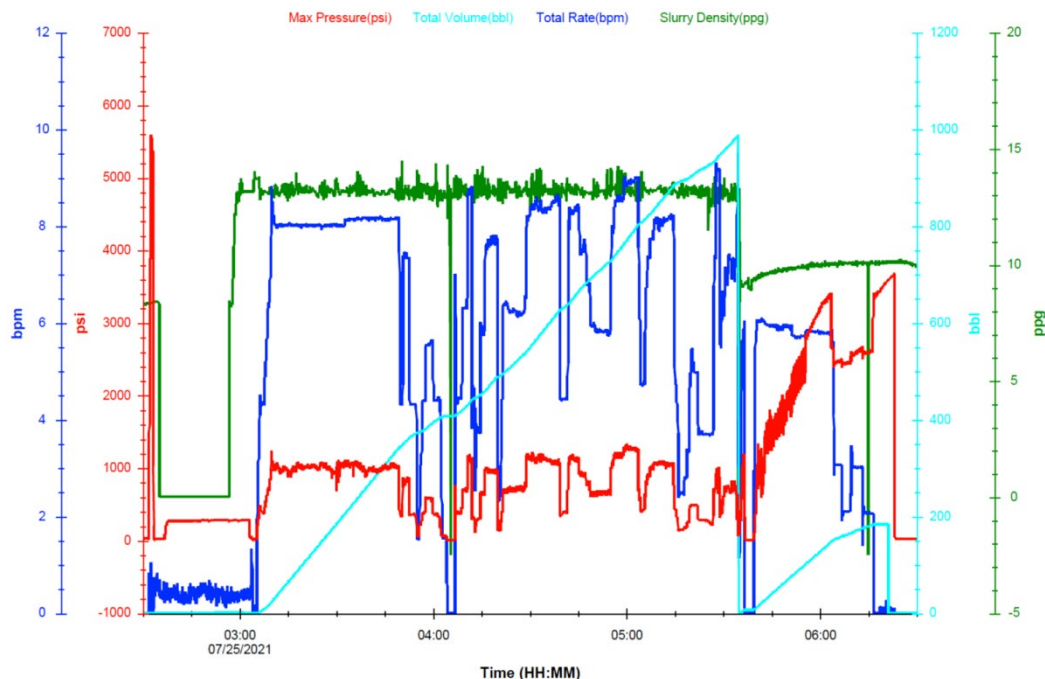


Figure 17: 7 in. Production casing cement pressure chart (primary job)



6.5. 5-3/4 in. Hole to 9,500 ft.

6.5.1. 5-3/4 in. Hole Objectives

The drilling objectives for the 5-3/4 in. section was:

- Drill the cement inside the 7 in. shoe track and new 5-3/4 in. hole from the 7 in. casing shoe depth to 9,500 ft.
- Wellbore deviation from vertical shall be surveyed at least every 200 ft. and at bottom of section, not to exceed 3° in total.
 - Departure should not exceed a radius of 250 ft. north, east, and west and no more than 150 ft. south in any portion of the well.
- Drill fast to reduce the wellbore exposure to the drilling fluid.

All these objectives were achieved.

6.5.2. 5-3/4 in. Section Summary

The drilling of the 5-3/4 in. hole commenced on 28 July, and total depth of 9,500 ft. was reached on 29 July. A TCI bit was used to drill out shoe track and 10 ft. of new formation. Remaining hole section was drilled with a PDC bit from 8,555 to 9,500 ft. in one run. Maximum inclination was measured as 3.96° at 9,412 ft. Open hole logging was performed at this hole section including the Schlumberger induction tools, sonic, compensated neutron, telemetry and gamma ray tools ('Triple Combo'). Maximum BHT was recorded as 416 F°. This hole section was completed open hole and rig was released as of 31 July 2021 23:59.

6.5.3. 5-3/4 in. Surface Equipment

Threaded type 7 in. wellhead was rigged up and torqued up on casing string, then the 7-1/16 in. 10,000 psi BOPE was installed. Following pressure tests on wellhead and BOPE, a 5-3/4 in. TCI bit was run, and shoe track and 10 ft. of new hole was drilled down to 8,555 ft. An xLOT was performed then drilling of this hole section was finished in one run using a PDC bit. The results of the xLOT was 0.78 psi/ft., which is similar to the results obtained from DFIT in well 16A-32.



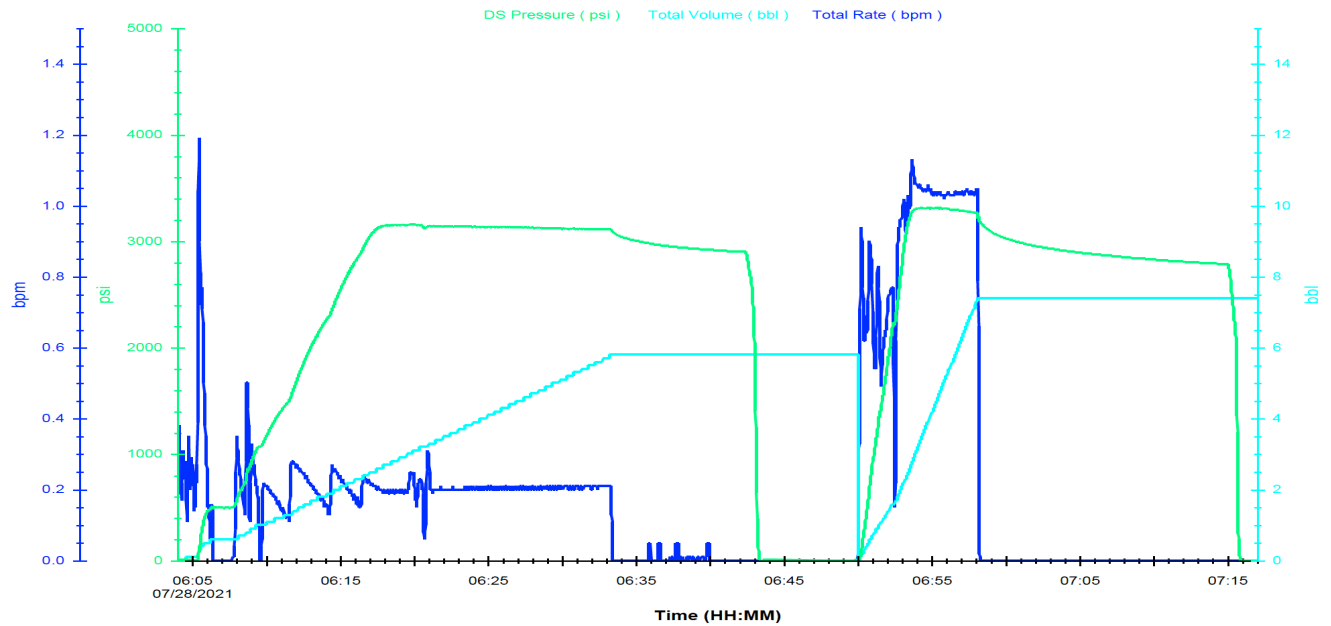


Figure 18: xLOT pump chart at 8,555 ft.



78B-32
7 in, BOPE

Drawn by GRG on Sept/2021 (not to scale)

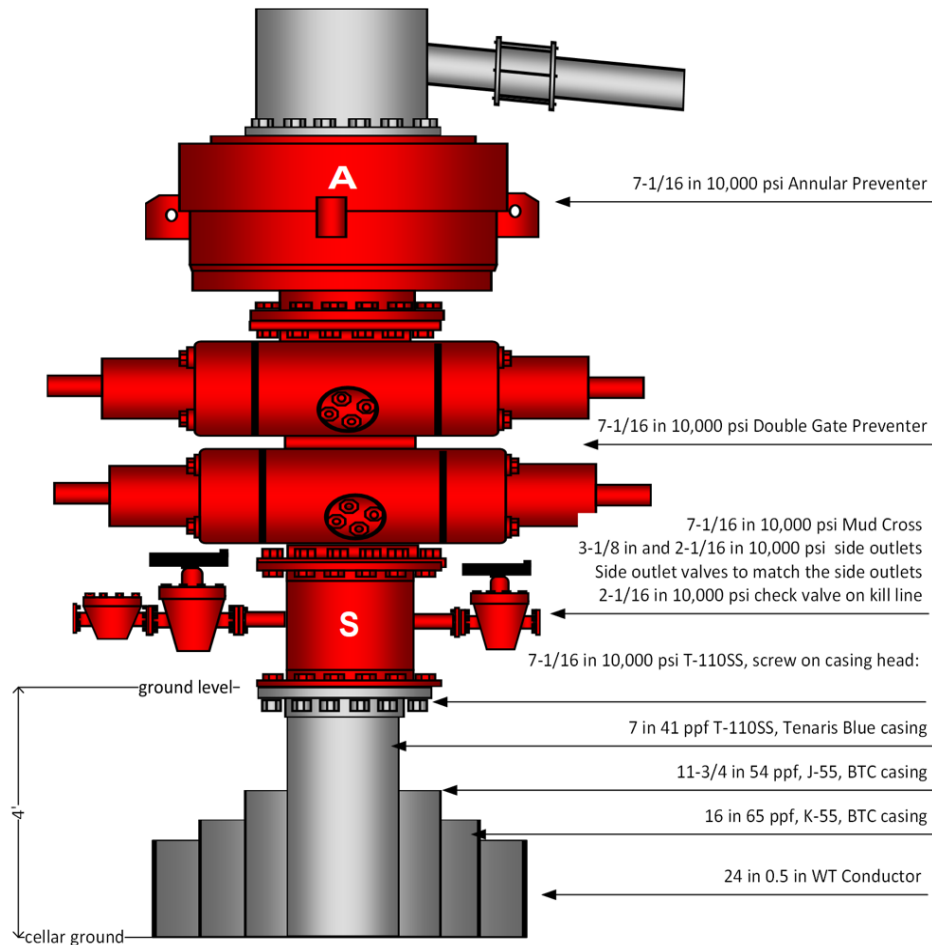


Figure 19: 7-1/16" BOPE stack for drilling 5-3/4" hole.

6.5.4. 5-3/4 in. Bits, Hydraulics Program and BHA

In the 5-3/4 in. section, formation was 100% granodiorite, and two bits were used through the section to reach to 9,500 ft. TD: one TCI bit to drill out cement and float equipment and one PDC bit to get to TD. The bits used in this section are captured in Table 39. Table 40 and Table 41 refer to BHAs used to drill the 5-3/4 in. hole section to well TD.



Table 39: Bits used to drill the 5-3/4 in. hole section.

Bit #/Run	Hole made (ft)	Bit Size (in.)	IADC Code	Ave. WOB (Klb)	Ave. RPM	Jet Size (32nd)	Ave. flow rate (gpm)	Ave. ROP (fph)
16/1	10	5.75	511	16	208	18 18 18	300	10
17/1	945	5.75	M233	30	198	12 12 12	300	99.5

Table 40: 5-3/4 in. BHA #21 to clean-out cement inside the 7 in. casing.

BHA No: 21		Wellbore: Original Wellbore										
BHA Length (ft):		921.57										
		Weights in Air		Buoyed Weight		Mud Wt of (lbs/gal):						
BHA Wt:		45,656										
Drillstring Wt:		45,656										
Wt Above Jars:												
Wt Below Jars:												
		In		Out								
Depth (ft):		8,545		8,555								
Date/Time:		28-Jul-21 01:00		28-Jul-21 09:00								
Inclination:												
Azimuth:		0		0								
Average RPM:		40		Drilling Hrs.:		1						
Build Rate:				Walk Rate:								
WOB - Avg (lbs):		16		WOB - Max (lbs):		18						
Comments: 5-3/4" TCI clean out assembly.												
BHA Component Details												
No.				Top		Fishing		Blade				
Item	Jnts	Length	OD	ID	Weight	Grade	Connection	P/B	Length	OD	OD	Comment
BIT	1	0.75	5.750				3.5REG	Pin				S/No: 5002331
BS	1	2.82	4.620	2.620	38.7	S-135	3.5IF	Box				
DC	30	918.00	4.750	2.000	49.6	S-135	3.5IF	Box				
Total:		921.57										



Table 41: 5-3/4 in. BHA # 21 used with bit # 17.

BHA No: 22		Wellbore: Original Wellbore									
BHA Length (ft):		1,020.17									
		Weights in Air	Buoyed Weight								
BHA Wt:		47,123									
Drillstring Wt:		47,123									
Wt Above Jars:											
Wt Below Jars:											
		In	Out								
Depth (ft):		8,555	10								
Date/Time:		28-Jul-21 18:00	29-Jul-21 07:00								
Inclination:											
Azimuth:		0	0								
Average RPM:		50	Drilling Hrs.:								
Build Rate:			Walk Rate:								
WOB - Avg (lbs):		30	WOB - Max (lbs):								
			32								
Comments: 5-3/4" Dir Assembly											
BHA Component Details											
Item	No. Jnts	Length	OD	ID	Weight	Grade	Top Connection	P/B	Fishing Length	Blade OD	Comment
BIT	1	0.75	5.750				3.5REG	Pin			S/No: A279641
MMTR	1	23.90	5.000	2.620	48.4	S-135	3.5IF	Box			S/No: BPG2475-0192
Mud Motor: Type: TURB Manufacturer: BICO Model:											
Lobe Configuration: 7/8 Speed: 0.56 Stages: 3 Torque: 5,175 ft/lbs											
Dir. Company: SDI Bend Setting: 1.25 Distance: 2.95 ft											
Bearing Stab. OD: 0.000 ins <input type="checkbox"/> Motor Pad <input type="checkbox"/> Motor Failure Failure Time:											
MONEL	1	9.99	4.750	2.360	45.4	S-135	3.5IF	Box			PONY COLLAR S/No: 17-261
MONEL	1	30.59	4.750	2.650	41.5	S-135	3.5IF	Box			S/No: 121-151
OTHER	1	5.58	4.750	2.650	41.5	S-135	3.5IF	Box			PULSER SUB S/No: 65-258
MONEL	1	31.10	4.750	2.650	41.5	S-135	3.5IF	Box			S/No: 121-698
DC	30	918.26	4.740	2.250	46.5	S-135	3.5IF	Box			
Total:		1,020.17									

7. CORING

Two coring runs were performed at 6,700 ft. over July 12-13. A total recovery from the two runs was 21.5 ft. The core barrel size is 7-1/4 in. with 4 in. inner barrel. 30 ft. in length. The core head diameter was 8-3/4". The first run from 6,700 to 6,728 ft. cut 28 ft., recovering 12 ft. (43 % recovery). In the second run, cored from 6728 to 6740 ft., cut 12 ft., recovering 9.4 ft (78 % recovery).

Once reached to 10-5/8 in. section TD at 8,500 ft., two more runs were performed over July 17-18, recovering an additional 32.4 ft. in total. Core barrel and head had the same specifications for the previous runs. In core run #3 8,500 ft. to 8530 ft, 30 ft. were cut with a recovery of 29.4 ft. (83% recovery), and on core run #4 from 8,530 ft. to 8,540 ft. 10 ft. were cut and 8.5 ft. recovered (85 % recovery). Contractor's report provided in Appendix 9.10.



8. DATA COLLECTION

During drilling operations, cutting samples were retrieved, washed, and described onsite, packaged and labeled for further analyses by the mud logging company on-site. A daily mud log and geology report was provided as well. In addition to lithology and alteration, the mud logging unit also captured additional parameters such like ROP, WOB, mud temperature in and out, CO₂ gas shows, and other well and drilling information. MSE was calculated within the drilling data systems and available in real time from data system. Final Mud Log and Daily Reports are provided in Appendices 9.9 and 9.1 respectively.

8.1. Geophysical Logging

A set of open hole geophysical logs were conducted at the TD of the 14-3/4 in., 10-5/8 in., and 5-3/4 in. hole as shown in Table 42. A Formation Microimager (FMI) and an Ultrasonic Borehole Imager (UBI) were run in the 14-3/4" hole. The UBI was also run in the 10-5/8 in. section. The basic geophysical logs for density, porosity, resistivity, gamma ray (Triple-Combo) were run at all three logging intervals.

Table 42: Open hole geophysical logs for 78B-32.

Service Provider	Log Name	Tool Name	Date	Start Depth (ft.)	Stop Depth (ft.)
14-3/4 in. Hole					
Schlumberger	QAIT	Hostile Slim Array Induction Tools	7/19/2021	2970.5	8563.5
Schlumberger	QSLT	Slim Xtreme Sonic Logging Tool	7/19/2021	2970.0	8529.5
Schlumberger	QCNT	Slim Hot Compensated Neutron Tool	7/19/2021	2970.5	8563.5
Schlumberger	HLDS	Hostile Litho-Density Sonde Tool	7/19/2021	2970.5	8563.5
Schlumberger	QCNT	Slim Hot Compensated Neutron Tool	7/19/2021	2970.5	8563.5
Schlumberger	FMI	Fullbore Formation Microimager	7/19/2021	2970.5	8529.5
Schlumberger	UBI	Ultrasonic Borehole Imager	7/19/2021	2970.5	8529.5
10-5/8 in. Hole					
Schlumberger	USIT	Ultrasonic Imager Tool	7/20/2021	2970.5	8518.5





End of Well Report		Ref. GRG-10230	
Utah FORGE		Ver. Final	Page 67 of 68
Seismic Monitoring Well 78B-32		Issued: 1 December 2021	

Service Provider	Log Name	Tool Name	Date	Start Depth (ft)	Stop Depth (ft.)
Schlumberger	PPC	Powered Positioning Caliper Tool	7/20/2021	2970.5	8518.5
Schlumberger	GPIT	General Purpose Inclination Tool	7/20/2021	2970.5	8518.5
5-3/4 in. Hole					
Schlumberger	QAIT	Hostile Slim Array Induction Tools	7/30/2021	7447.0	9553.0
Schlumberger	QSLT	Slim Xtreme Sonic Logging Tool	7/30/2021	7447.0	9553.0
Schlumberger	QCNT	Slim Hot Compensated Neutron Tool	7/30/2021	7447.0	9553.0
Schlumberger	QTGC	SlimXtreme Telemetry and Gamma Ray	7/30/2021	7447.0	9553.0
Schlumberger	QAIT	Slim Hostile Array Induction Tool	7/30/2021	7447.0	9553.0





End of Well Report		Ref. GRG-10230	
Utah FORGE		Ver. Final	Page 68 of 68
Seismic Monitoring Well 78B-32		Issued: 1 December 2021	

9. APPENDICES see attached file that accompanies this report

