

BREAKOUT PROJECT / SQIP PRESENTATION DULANG C-04S CEMENT PACKER

Table of Content

- **1. Introduction & Well Overview**
 - I. Acronym and Abbreviation
 - II. Introduction & Well Overview
 - III. Completion Volume

- **2. Job Execution**
 - Coiled Tubing
 - I. Slickline TCC until latest HUD
 - II. CT Run#1 – Cleanout until SSD#2 (Contingency#1 – Milling)
 - III. Slickline – Drift run until SSD#2, Set Plug at SSD#2, Pumping TIT, WLD/APD
 - IV. Slickline to open SSD#1 (Contingency#2 – CTU Open SSD#2, Contingency#3 – CTU GRCCCL and Tubing Punch)
 - V. Bullheading pumping – Injectivity
 - VI. CT Run#2 – Tubing correlation depth for Cement retainer
 - VII. CT Run#3 – Set Weatherford Cement retainer – Cement
 - VIII. CT Run#4 – Post Cleanout Cementing (Contingency#2 – Milling)
 - IX. CT Run#5 – CTU Unloading until 2,000 m MDTHF

- **3. Engineering Analysis**
 - I. TFA

Acronym and Abbreviation

No	Acronym	Abbreviation
1	CT	Coiled Tubing
2	RIH	Run In Hole
3	POOH	Pull Out of Hole
4	HUD	Hung Up Depth
5	TOC	Top of cement
6	TSW	Treated Sea Water
7	BHA	Bottom Hole Assembly
8	TFA	Tubing Force Analysis
9	RW	Running Weight
10	PW	Pulling Weight
11	HW	Hanging Weight
12	CBU	Circulation Bottom Up

Introduction & Well Overview

➤ Operation Objective

1. To perform cleanout run until target interval
2. To perform cement packer and add perforation (wireline) at DL1 Reservoir

➤ Well Background

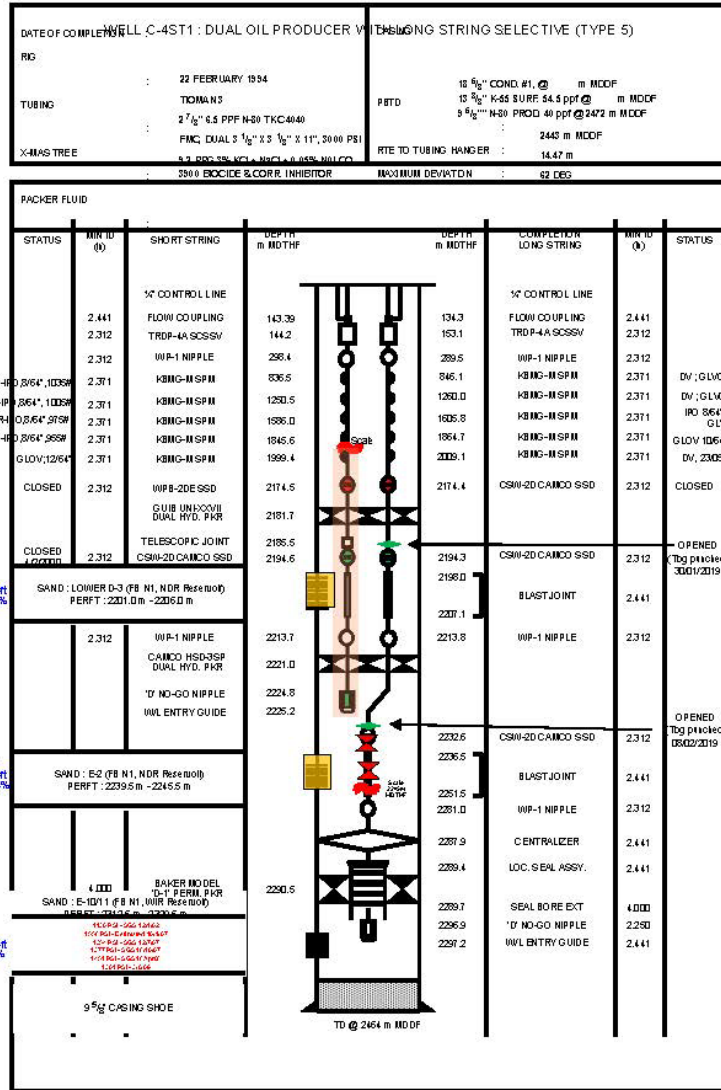
Dulang C-04 is Dual string oil producer with selective type 5 , completed completion on 1994. based on latest well intervention, experienced HUD at 1,985m MDTHF (Fe₂O₃ scale).

DULANG WELL COMPLETION DIAGRAM

■ Flowing to Short String
■ Flowing to Long string

Latest Update: FEB 2019

Well Schematic C-4S

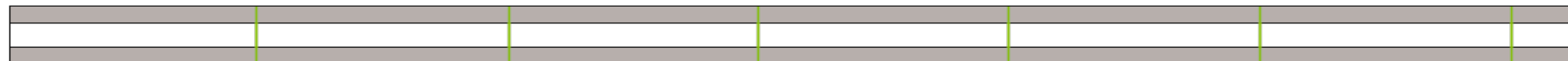
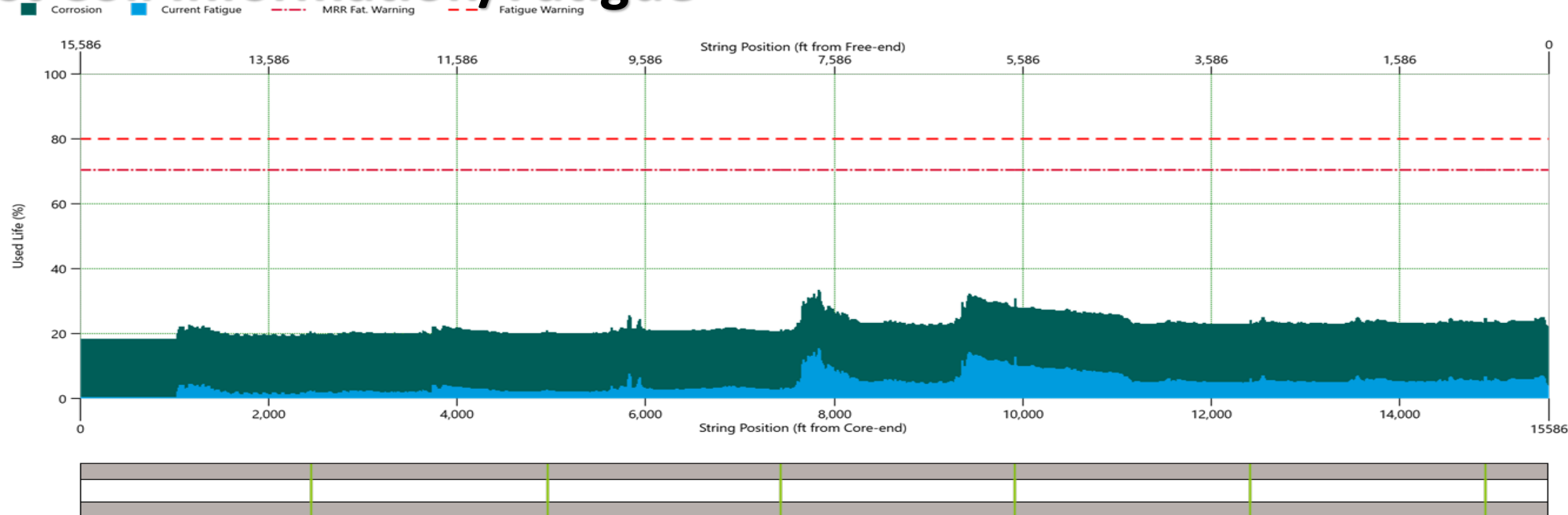


Input Parameter	Parameter Value
Field	Dulang Charlie
Max. Deviation (degrees)	62.5" at 789 m
Min. Restriction (inch)	2.25" @ No Go nipple
Type of Fluid & Density	Oil
Top of Fluid	TBC
Current Well Status	Shut-IN
Reservoir Pressure	
Reservoir Temperature	200 - 210 deg F
Fracture Gradient	0.6 – 0.7
H2S Content	N/A
CO2 Content	60%
Mercury, HG	TBC

Volume Calculation

Type	External Pipe			Internal Pipe 1			Internal Pipe 2			Caps	From	To	From	To	Length	Total Volume (bbls)
	OD (inch)	ID (inch)	W(lb/ft)	OD (inch)	ID (inch)	W(lb/ft)	OD (inch)	ID (inch)	W(lb/ft)	Barrel/lin (ft)	m	m	ft	ft	ft	
Tubing volume until EOT	2 7/8	2.441								0.00579	0	2,225	0	7,301	7,301	42.26
PCP volume	9 5/8	8.835		2 7/8			2 7/8			0.05977	0	2,182	0	7,158	7,158	427.82
Cement Volume																
Tubing volume SSD#1 to SSD#2	2 7/8	2.441								0.00579	2,175	2,195	7,135	7,200	66	0.38
Annular Volume from First packer to Top of cement (1,950 m)	9 5/8	8.835		2 7/8			2 7/8			0.05977	1,950	2,182	6,398	7,158	760	45.43
															TOTAL	45.82

Latest Coil Information/Fatigue



CT String Details

String	#40146
Manufacturer	TENARIS
OD	1.5"
Grade	HS 90
Initial Spooled Length, ft	15,974
Cable (length/ID Num)	
Weld Type	BIAS
Tubing Weight	29,395
Commision Date	22-Aug-22

Wall Thicknes

0.125
0.125

Cum. Fatigue = Last Cum. Fatigue + Job Fatigue

Cum. Corrosion = Last Cum. Corrosion + Job Corrosion

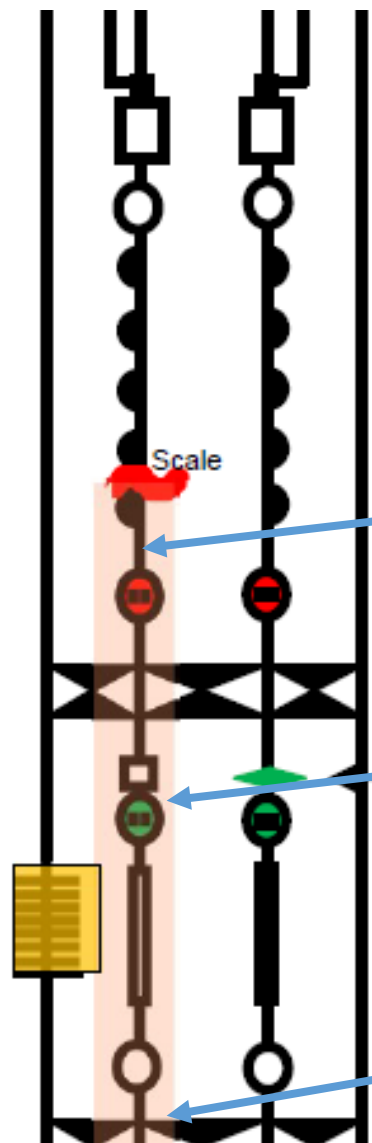
Used String Life = Max Fatigue + Cum Corrosion

Run #	Date	Client Name	Field Name	Well Num	Job type	Running ft ft	Job Description	Job Fatigue %	Job Corrosion %	Max Fatigue	Cum. Corrosion %	Used String Life %
N/A	9-Aug-23	PCSB	Angsi-A	A-16L	Trim CT 30ft	0	Trim CT 30ft and make up new connector	N/A	N/A	N/A	N/A	N/A
16	12-Aug-23	PCSB	Angsi-A	A-16L	N2 Unloading	13,164	N2 Unloading	15.42	0	15.44	15	30.44
N/A	26-Aug-23	PCSB	Dulang-D	D-15L	Trim Coiled 57 ft	0	Trim CT 57ft and make up new connector	0	0	0	0	30.44
1	29-Aug-23	PCSB	Dulang-D	D-15L	Sand Clean Out	6,123	1st Run Sand Clean Out	3.2	2	3.74	17	31.4
2	1-Sep-23	PCSB	Dulang-D	D-15L	Sand Clean Out	339	2nd Run Sand Clean Out	0.8	0	1.11	0	32.44
3	1-Sep-23	PCSB	Dulang-D	D-15L	Sand Clean Out	6,300	3rd Run Sand Clean Out	5.4	2	7.13	19	33.44

HUD due to scale at 1985 m MDTHF. (Fe2O3 scale)

LD-3 kh
754.64 mD-ft
Ave Por 25%

		4" CONTROL LINE	
	2.441	FLOW COUPLING	143.39
	2.312	TRDP-4A SCSSV	144.2
	2.312	WP-1 NIPPLE	298.4
R-IPD, 8/64", 1035#	2.371	KBMG-M SPM	836.5
R-IPD, 8/64", 1005#	2.371	KBMG-M SPM	1250.5
R-IPD, 8/64", 975#	2.371	KBMG-M SPM	1586.0
R-IPD, 8/64", 955#	2.371	KBMG-M SPM	1845.6
GLOV; 12/64"	2.371	KBMG-M SPM	1999.4
CLOSED	2.312	WPB-2DE SSD	2174.5
		GUIB UNI-XXVII DUAL HYD. PKR	2181.7
CLOSED 4/2/2000	2.312	TELESCOPIC JOINT CSW-2D CAMCO SSD	2185.5
SAND : LOWER D-3 (FB N1, NDR Reservoir) PERFT : 2201.0 m - 2206.0 m			2194.6
	2.312	WP-1 NIPPLE	2213.7
		CAMCO HSD-3SP	2213.8



Cement retainer setting depth, 2,173 m

Plug setting depth

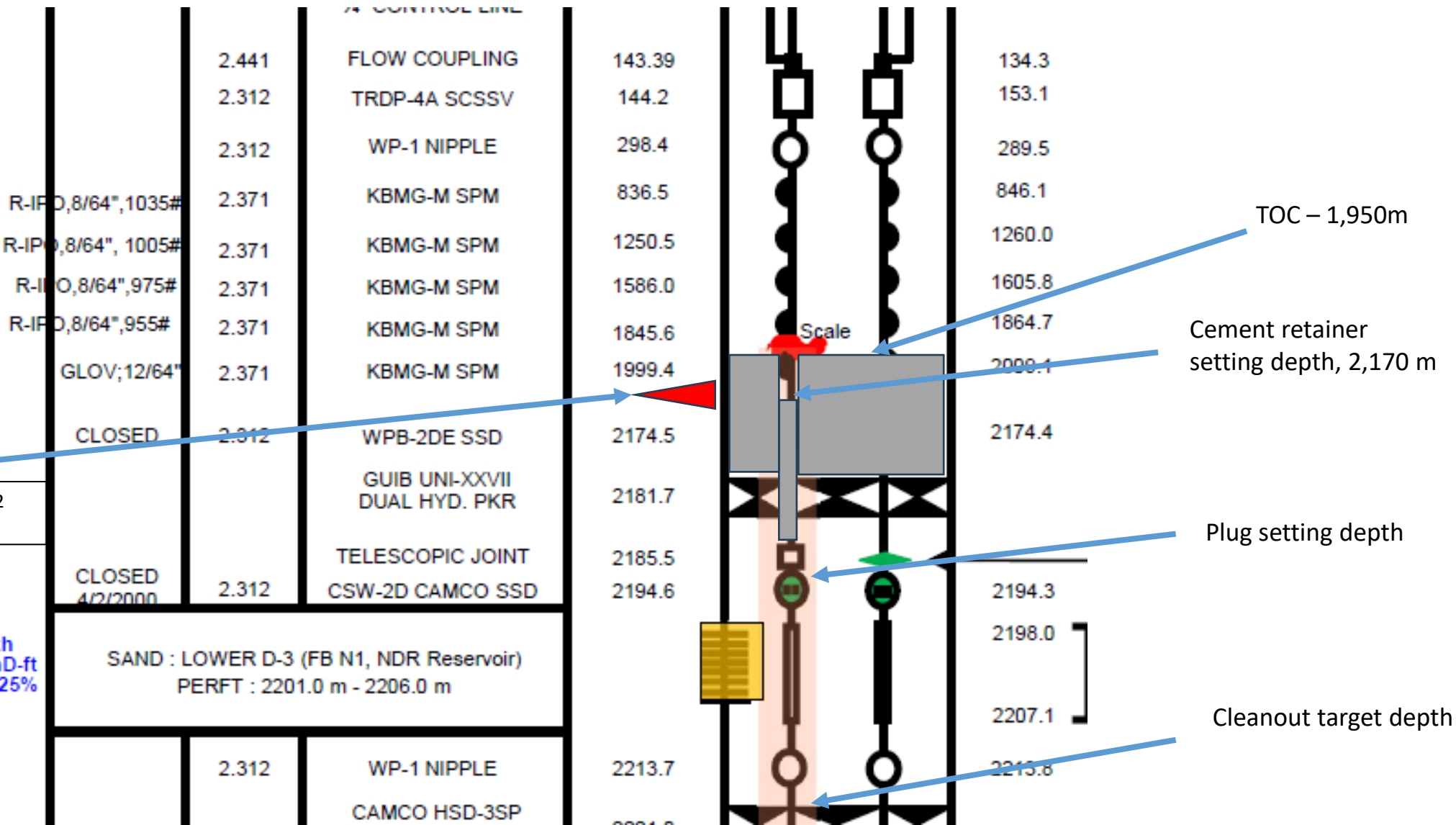
Cleanout target depth

INTENDED CEMENT LOCATION

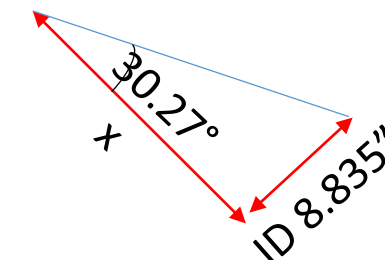
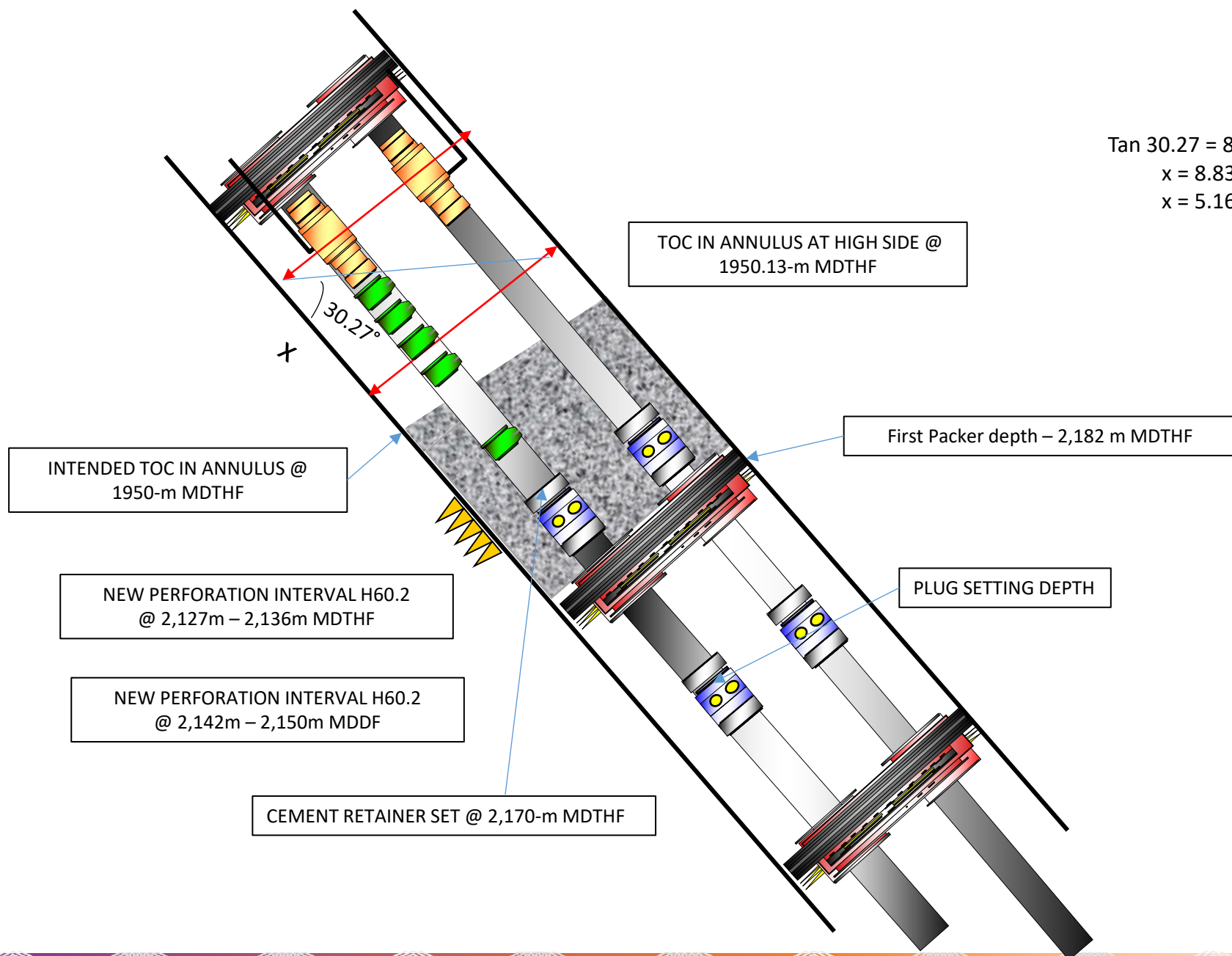
HUD due to scale at 1985 m MDTHF. (Fe2O3 scale)

NEW PERFORATION INTERVAL H60.2 @ 2,127m – 2,136m MDTHF

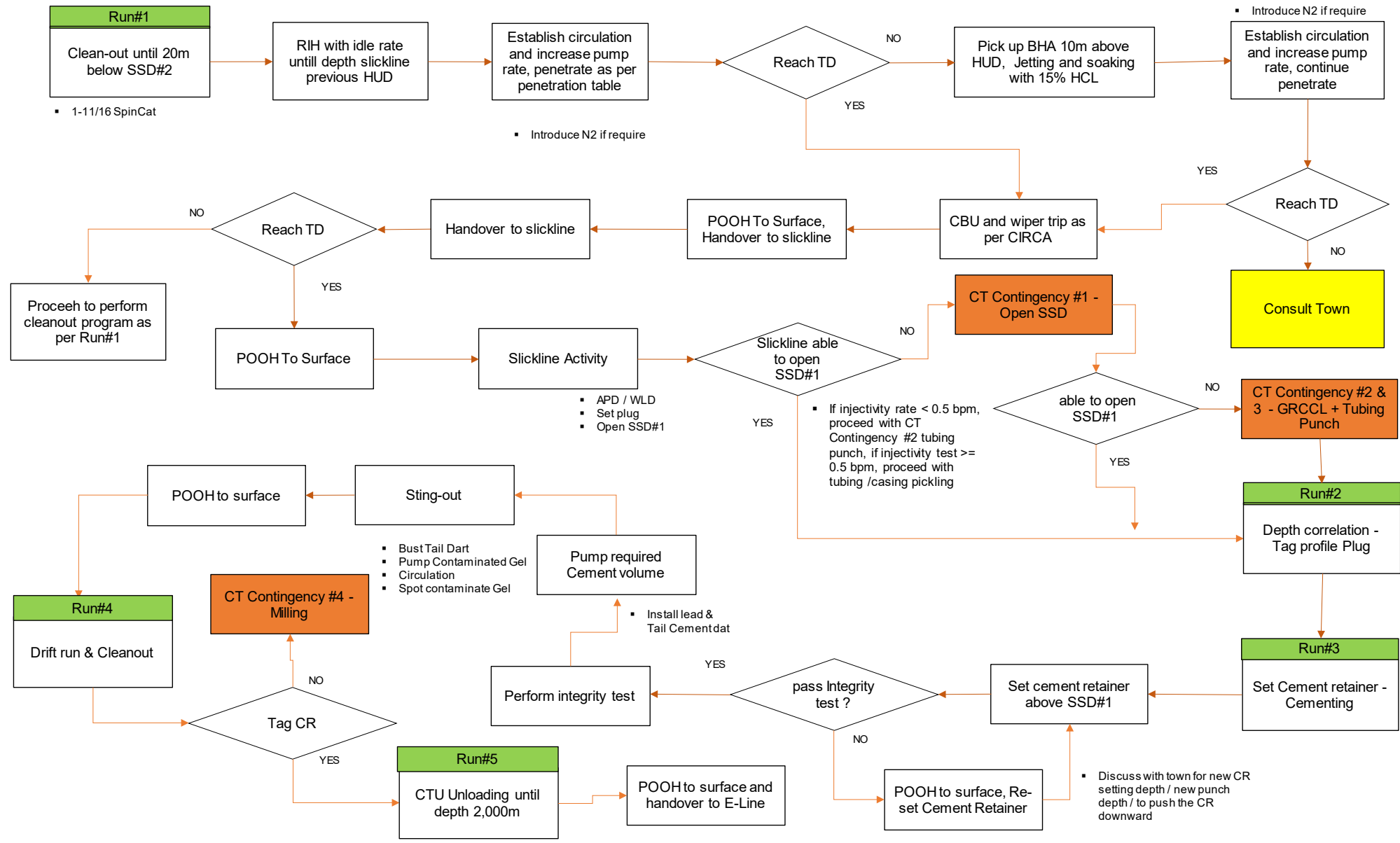
LD-3 kh
754.64 mD-ft
Ave Por 25%



$$\begin{aligned} \tan 30.27 &= 8.835 / x \\ x &= 8.835 / \tan 30.27 \\ x &= 5.16'' \text{ or } 0.13\text{m} \end{aligned}$$



DECISION TREE

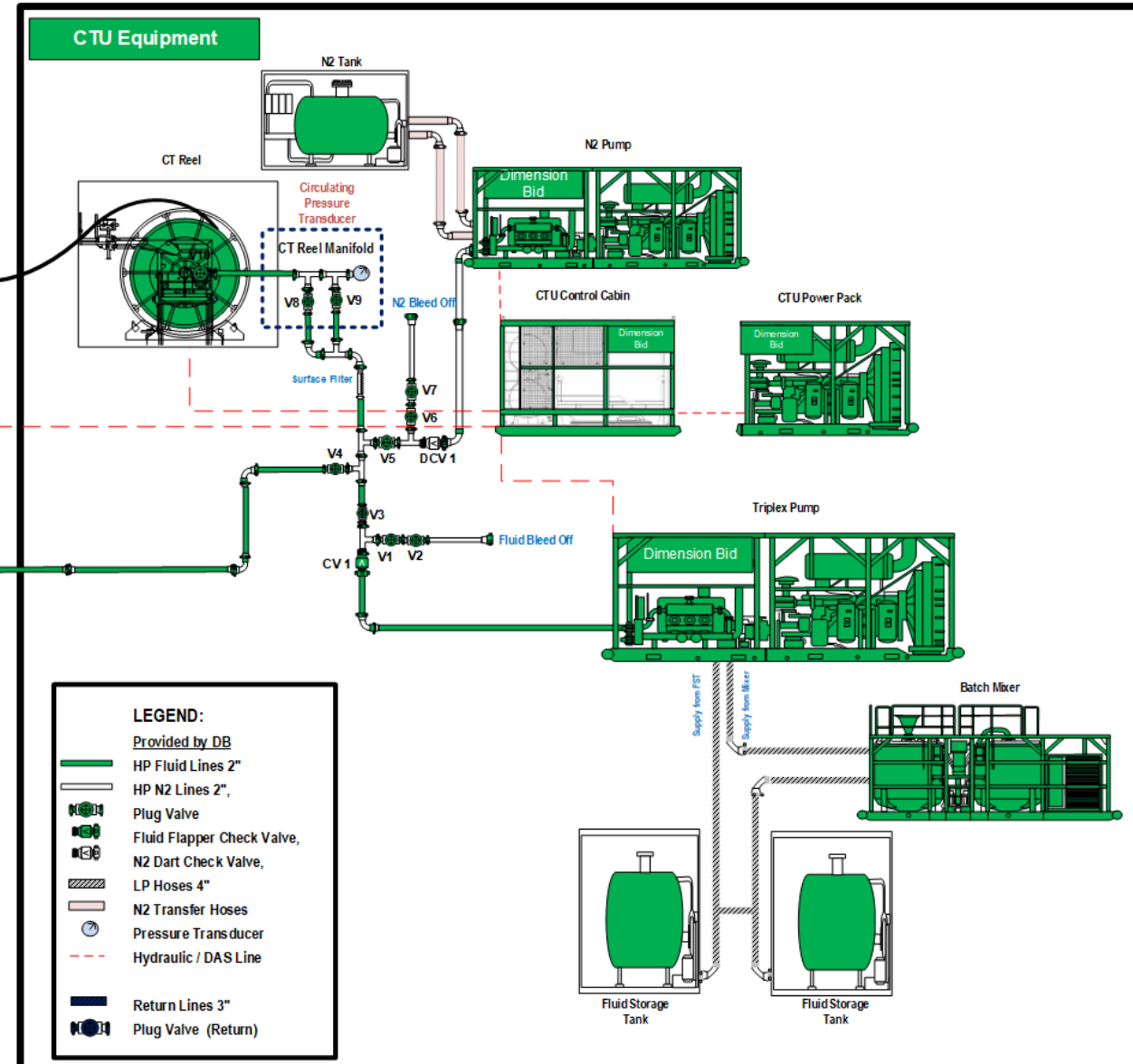
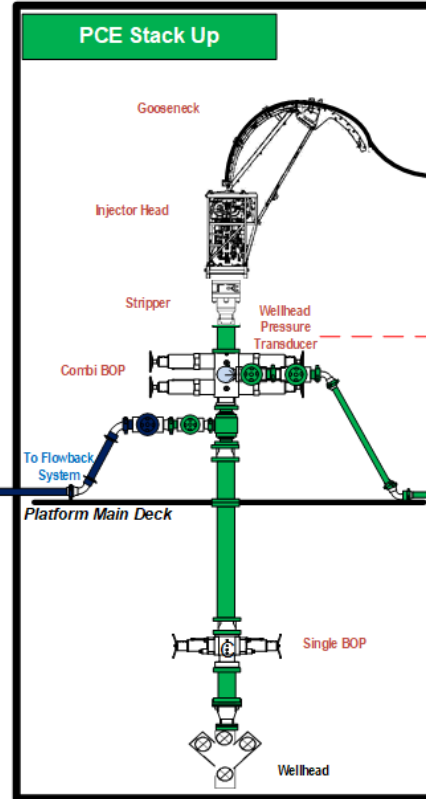
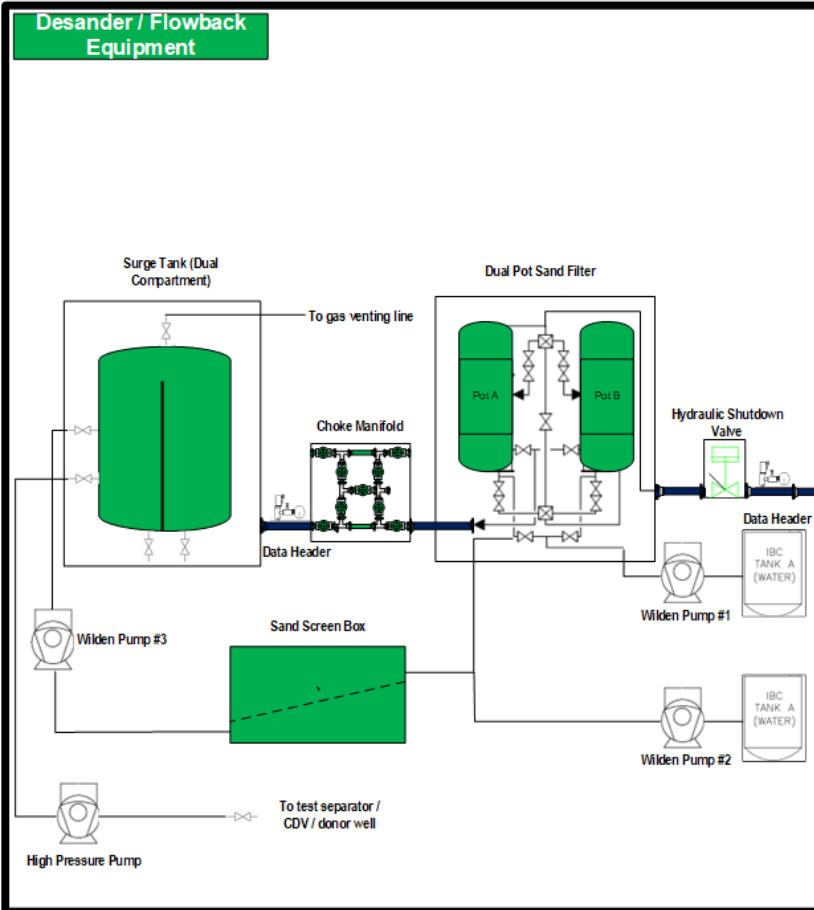


CTU OPERATION

CTU Process Flow Diagram

DIMENSION BID

Dulang C-04S Cement Packer
Coiled Tubing P&ID
Platform: Dulang C



SUMMARY OPERATION

<i>Item</i>	<i>Job Description</i>	<i>Remark</i>
A	Slickline Operation	1. Slickline to RIH and TCC until latest HUD
B	CTU Operation	1. Cleanout until 20m below SSD#2 (2,215m/7,268ft MDTHF)
C	Slickline Operation	<ol style="list-style-type: none"> 1. Drift run Until SSD#2 2. APD /WLD 3. Set Plug at SSD#2, TIT (2,195m/7,202ft MDTHF) 4. Open SSD#1(2,174m/7,133ft MDTHF)
D	CTU Operation	<ol style="list-style-type: none"> 1. Depth Correlation – GRCCCL. 2. Set Cement retainer – Cementing 3. Post Cleanout Cementing 4. Unloading until depth 2,000 m


CT Run#1 –Cleanout until SSD#2 area

BHA diagram for CT 1st Run

DIMENSION BID

BHA DIAGRAM #1 - 1.69" SPINCAT NOZZLE

Client	Petronas Carigali	Well	C-4S
Field	Dulang C	Min Restriction	2.25"
Job Type		BHP	
Job No.	Run#1	BHT	212 deg F

BHA DRAWING	DESCRIPTION	CONNECTION		ID INCH	OD INCH	TOOL LENGTH FT	CUMULATIVE LENGTH FT
		UPHOLE	DOWNHOLE				
	Internal Dimple Connector	1.5" CT	1.0" AMMT PIN		1.690	0.3	0.3
	MHA Disconnect drop ball 5/8"	1.0" AMMT BOX	1.0" AMMT PIN		1.690	2.3	2.6
	Circulating drop ball 1/2"						
	Burst Disc 5000 psi						
	3 ft Straight Bar	1.0" AMMT BOX	1.0" AMMT PIN		1.690	3.0	5.6
	Downhole Filter	1.0" AMMT BOX	1.0" AMMT PIN		1.690	3.2	8.80
SpinCat	1.0" AMMT BOX			1.690	1.0	9.8	
						BHA LENGTH	9.80
						MAXIMUM OD	1.69"
						MINIMUM ID	

CT Run#1 –Cleanout until SSD#2 (2,215m/7,268ft MDTHF) area

CT Run#1 – SCO until SSD#2

1. Rig up Coiled Tubing Equipment, Pumping & Surface Flowback equipment on DLG C-04S
2. Make up SpinCat Nozzle, pressure test treating iron and CT Stack up.
3. RIH CT into production string while pumping idle rate till slickline hard tag depth (or 10m below slickline HUD area), soft tag twice HUD and establish return before proceed to cleanout. (if no tag, pick-up to slickline HUD area before proceed to cleanout).
4. Rate suggest as per cleanout analysis :-
 - For lower Reservoir pressure, 900 psi (LD1/3) – 0.3 bpm with 400 scfm
 - For Reservoir pressure 1,500 psi (E2) – 0.8 bpm with 400 scfm
5. After Establish circulation, perform leak rate test and calculate volume losses to reservoir, Cleanout from HUD until
6. Once at target depth, pump 20 bbls gel follow with hour suggest in circa analysis as per below
 - For lower Reservoir pressure, 900 psi (LD1/3) – 5 Hour CBU follow with wiper trip 5 ftm until 1,900 m
 - For Reservoir pressure 1,500 psi (E2) – 4 Hour CBU, no wiper trip require
7. Flag Coil, POOH to Surface while Jetting across the SSD#2 and SSD#1

CT Run#1 –Cleanout until SSD#2 (2,215m/7,268ft MDTHF) area

CT Run#1 – SCO until SSD#2 (For Donor Well)

1. If require to divert the return into donor well, follow as per step below :-
 1. Bleed down THP donor well to Opsi or as minimum as possible before start CT operation.
 2. Continue to monitor the THP for both donors well, in the event of THP build up, continue to bleed the pressure, (If unable to bleed due to hydrocarbon return at surface, proceed to pump TSW to push the gas/hydrocarbon into formation. (Based on injectivity test trending, able to reduce THP of the well after pumping TSW into the well (higher THP due to low fluid level inside the well)
 3. If unable to bleed to zero, apply slightly higher pressure in injection line to overcome THP donor well.
 4. Manipulate surface return valves, and open the pumping line to the Donor Well as per process flow diagram
 5. Running water and spill kit to be made available at the following location: pumping unit and suction and discharge
 6. Do not exceed calculated MASTP as per below: -

WELL	Completion + Tubing Volume	1.5 Completion + Tubing Volume	Pump Rates	MASTP	A-Annulus Volume above first packer, bbl.
	(bbl)	bbbls	(BPM)	(psi)	
C23 L	93	139	0.5 – 3.0	820	301
C23 S	53	80	0.5 – 3.0	820	301
C08 S	104	156	0.5 – 3.0	820	425
C28 S	70	104	0.5 – 3.0	820	360

CT Run#1 –Cleanout until SSD#2 (2,215m/7,268ft MDTHF) area

Fluid Pump – TSW / TIW

Pump Rate	TFA		Set down Weight Max (lbs)	Pick-up weight Max (lbs)
	RIW (lbs)	POW (lbs)		
0 bpm	2,800	11,100	-3,070	16,880
0.3 bpm (idle rate)	2,700	11,000	-3,025	16,924
1 bpm	2,077	10,100	-2,964	16,904

Fluid Pump – Nitrified

Pump Rate	TFA		Set down Weight Max (lbs)	Pick-up weight Max (lbs)
	RIW (lbs)	POW (lbs)		
0 bpm	2,800	11,100	-3,070	16,880
1 bpm 300 scf	1,800	9,000	-2,820	16,392

CT Run#1 –Cleanout until SSD#2 (2,215m/7,268ft MDTHF) area

Cleanout Summary (Low Reservoir Pressure 900 psi)

Flow Summary

SUMMARY OF FLOW RESULTS

Produced Fluids
 Pressure known at: Perforations
 Production Mode: No Production
 Fluid Composition: Oil and Gas

Circulated Fluids	Nitrified Water
Fluid Composition:	
Liquid:	0.30 bbl/min
Solids:	0.00 bbl/min
Gas:	400.0 scf/min
Circulation Point:	2215.00 m
HHP Required :	8.73 KW

COMPLETION:

Wellhead Pressure.....	143.6 psi g
Hydrostatic pressure loss.....	481.0 psi
Friction pressure loss.....	298.7 psi
Kinetic pressure loss.....	-3.7 psi
Restriction pressure loss.....	0.4 psi
Equivalent Circulation Density[ECD]...	3.39 lb/gal (US)

Perforation Pressure.....	900.0 psi g
Hydrostatic pressure loss.....	208.4 psi
Friction pressure loss.....	1.3 psi
Kinetic pressure loss.....	-0.1 psi
Restriction pressure loss.....	0.1 psi

Bottom Hole Pressure..... 1109.7 psi g

FROM CIRCULATION POINT TO WELLHEAD:

Liquid transit time.....	14 min
Gas transit time.....	8 min
Annular volume.....	26.2 bbl

Volume below circulation point.....	57.5 bbl
Total liquid volume.....	83.0 bbl
Total gas volume.....	20.8 bbl
(Surface equivalent).....	3529.6 scf

WORKSTRING:

Liquid:	0.3000 bbl/min
Gas:	400 scf/min
Pressure at reel rotating joint.....	1577.3 psi g
Friction pressure loss on reel.....	429.5 psi
Hydrostatic pressure loss on reel.....	0.1 psi
Pressure inside WS at Gooseneck.....	1147.7 psi g
Hydrostatic pressure loss.....	-738.5 psi
Friction pressure loss.....	720.0 psi
Equivalent Circulation Density[ECD]...	0.09 lb/gal (US)

BHA total pressure loss	281.4 psi
BHA Hydrostatic loss	-0.6 psi
BHA Friction loss	1.7 psi
BHA Kinetic loss	0.9 psi
Nozzle	259.5 psi

Circulation Point pressure 904.8 psi g

FROM REEL ROTATING JOINT TO CIRCULATION POINT:

Liquid transit time.....	23 min
Gas transit time.....	17 min
Displacement Volume.....	15.9 bbl
Internal Volume.....	22.0 bbl
Internal liquid volume.....	6.9 bbl
Internal gas volume.....	15.1 bbl
(Surface equivalent).....	6967.8 scf

Length of Workstring on reel..... 2199.88 m

CT Run#1 –Cleanout until SSD#2 (2,215m/7,268ft MDTHF) area

Cleanout Summary (Low Reservoir Pressure 900 psi)

Ctran Summary

SUMMARY OF HOLE CLEANING RESULTS

Initial Condition:

% of fill interval occupied by solids before cleanout ...	50.0 %
Top of fill	1985.01 m
Deepest Circulation point	2215.01 m
Bottom of fill	2215.01 m
Initial Volume of Solids.....	2.2 bbl
Initial Mass of Solids.....	1119.1 lb
Solids type:	Mud Residue/Formation Fines
Fluid Description:	Nitrified Water

Penetration Hole Cleaning Mode:

Penetration rate.....	5.0 ft/min
Penetration time.....	2.52 hr
Solids volume in the well after penetration	2.2 bbl
Solids mass in the well after penetration	1119.1 lb

Circulation Hole Cleaning Mode:

Hole circulation time	5.00 hr
Solids volume in the well after circulation.....	0.7 bbl
Solids mass in the well after circulation.....	362.2 lb

Wiper Trip Hole Cleaning Mode:

Wiper Trip Scheme:	User Specified rate, Tornado not
Wiper trip time	3.17 hr
Solids volume in the well after wiper trip	0.0 bbl
Solids mass in the well after wiper trip	0.0 lb

Volume of Fluids Pumped During Penetration, Circulation & Wiper Trip:

Gas volume	256409.2 scf
Liquid Volume	192.3 bbl
Penetration, Circulation & Wiper Trip time	10.68 hr

Circulation results at point of Maximum Solids Head:

Project: Dulang C-4S

Field-Well:

Dulang Charlie

BHA Depth	2215.01 m
Elapsed time	1.8512 hr
Wellhead Pressure	196.4 psi g
Additional Head created by Solids.....	27.9 psi
Maximum % solids circulated up hole was	1.3%.
This occurred at a measured depth of	739.75 m
after the transient had run for	0.0 hr

Summary for low reservoir pressure (900 psi)
Cleanout :-
Pump rate – 0.3 bpm with 400 scfm
Circulation time – 5 Hour
Wiper Trip 5 ftm until depth 1,900 m
Cleanout Success!!

CT Run#1 –Cleanout until SSD#2 (2,215m/7,268ft MDTHF) area

Cleanout Summary (Low Reservoir Pressure 900 psi)

Flow State

Measured Depth[Flow]	Temperature	Completion Pressure	Workstring Pressure	Concentric Pressure	Completion Liquid Velocity	Workstring Liquid Velocity	Concentric Liquid Velocity
<i>m</i>	<i>Deg. F</i>	<i>psi g</i>	<i>psi g</i>	<i>psi g</i>	<i>in/s</i>	<i>in/s</i>	<i>in/s</i>
0.0	80.0	143.6	1147.7	0.0	104	122	0
28.4	82.7	160.4	1157.1	0.0	102	122	0
57.3	85.4	176.8	1166.8	0.0	100	122	0
86.3	88.2	192.5	1176.1	0.0	98	122	0
115.2	90.9	202.8	1185.3	0.0	139	122	0
144.2	93.6	213.1	1194.5	0.0	161	122	0
153.6	94.5	216.5	1197.5	0.0	133	122	0
182.6	97.1	226.8	1207.1	0.0	130	122	0
211.5	99.8	237.1	1216.3	0.0	126	122	0
240.5	102.5	247.3	1225.4	0.0	123	122	0
269.4	105.1	257.4	1234.6	0.0	120	122	0
298.4	107.6	267.3	1243.4	0.0	141	122	0
305.6	108.2	269.9	1245.5	0.0	117	122	0
334.5	110.6	279.6	1253.4	0.0	115	122	0
363.5	113.0	289.1	1260.9	0.0	112	122	0
392.4	115.2	298.3	1261.4	0.0	110	122	0
421.4	117.3	307.3	1261.7	0.0	109	121	0
450.3	119.3	315.9	1261.7	0.0	107	119	0
479.3	121.1	323.9	1261.3	0.0	105	116	0
508.2	122.7	331.4	1260.5	0.0	104	113	0
537.2	124.0	338.4	1259.3	0.0	103	110	0
566.2	125.4	345.2	1258.0	0.0	101	109	0
595.1	126.7	352.2	1256.8	0.0	100	110	0

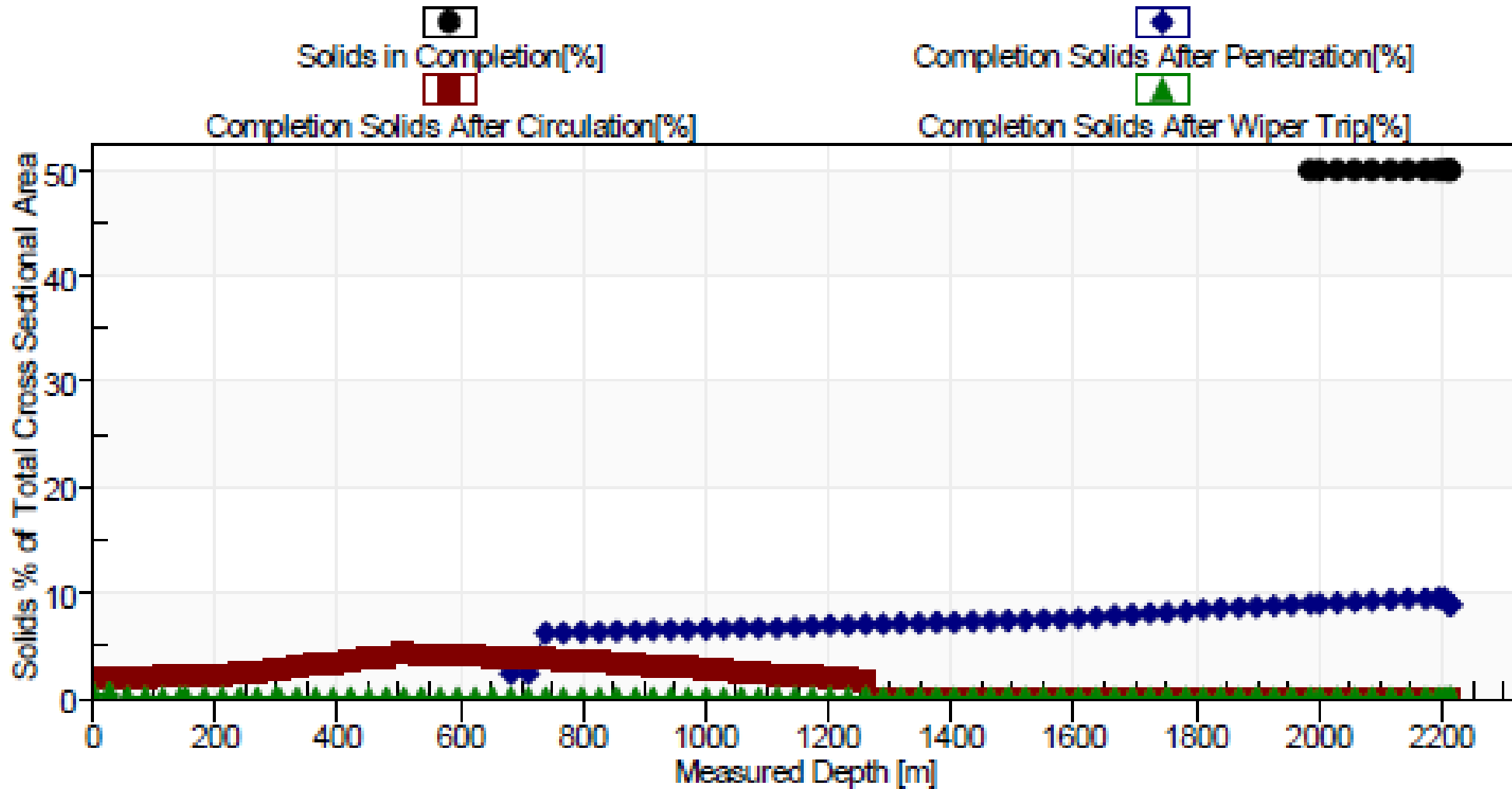
Flow State (continued)

Measured Depth[Flow]	Temperature	Completion Pressure	Workstring Pressure	Concentric Pressure	Completion Liquid Velocity	Workstring Liquid Velocity	Concentric Liquid Velocity
<i>m</i>	<i>Deg. F</i>	<i>psi g</i>	<i>psi g</i>	<i>psi g</i>	<i>in/s</i>	<i>in/s</i>	<i>in/s</i>
1956.0	191.4	809.6	1182.6	0.0	87	117	0
1985.0	192.8	819.8	1180.7	0.0	86	118	0
2000.8	193.6	825.4	1179.6	0.0	85	118	0
2029.7	195.0	835.7	1177.7	0.0	85	118	0
2058.7	196.4	846.1	1175.8	0.0	84	119	0
2087.6	197.9	856.5	1174.0	0.0	83	119	0
2116.6	199.4	867.2	1172.2	0.0	82	120	0
2145.5	200.9	877.9	1170.4	0.0	82	120	0
2174.5	202.4	888.8	1168.6	0.0	97	121	0
2194.6	203.5	896.4	1167.3	0.0	97	121	0
2204.0	204.0	900.0	1166.7	0.0	80	121	0
2212.7	204.5	903.6	1166.2	0.0	85	121	0
2213.0	204.5	903.7	1165.2	0.0	102	121	0
2213.7	204.5	904.0	1164.9	0.0	127	121	0
2213.7	204.5	904.2	1164.9	0.0	102	121	0
2214.7	204.6	904.6	1164.4	0.0	102	121	0
2215.0	204.6	904.8	1164.3	0.0	102	1205	0
2224.8	205.1	912.4	0.0	0.0	0	0	0
2225.0	205.1	912.5	0.0	0.0	0	0	0
2225.2	205.1	912.7	0.0	0.0	0	0	0
2232.6	205.5	918.5	0.0	0.0	0	0	0
2261.5	207.1	941.2	0.0	0.0	0	0	0
2290.5	208.7	964.3	0.0	0.0	0	0	0

CT Run#1 –Cleanout until SSD#2 (2,215m/7,268ft MDTHF) area

Cleanout Summary (Low Reservoir Pressure 900 psi)

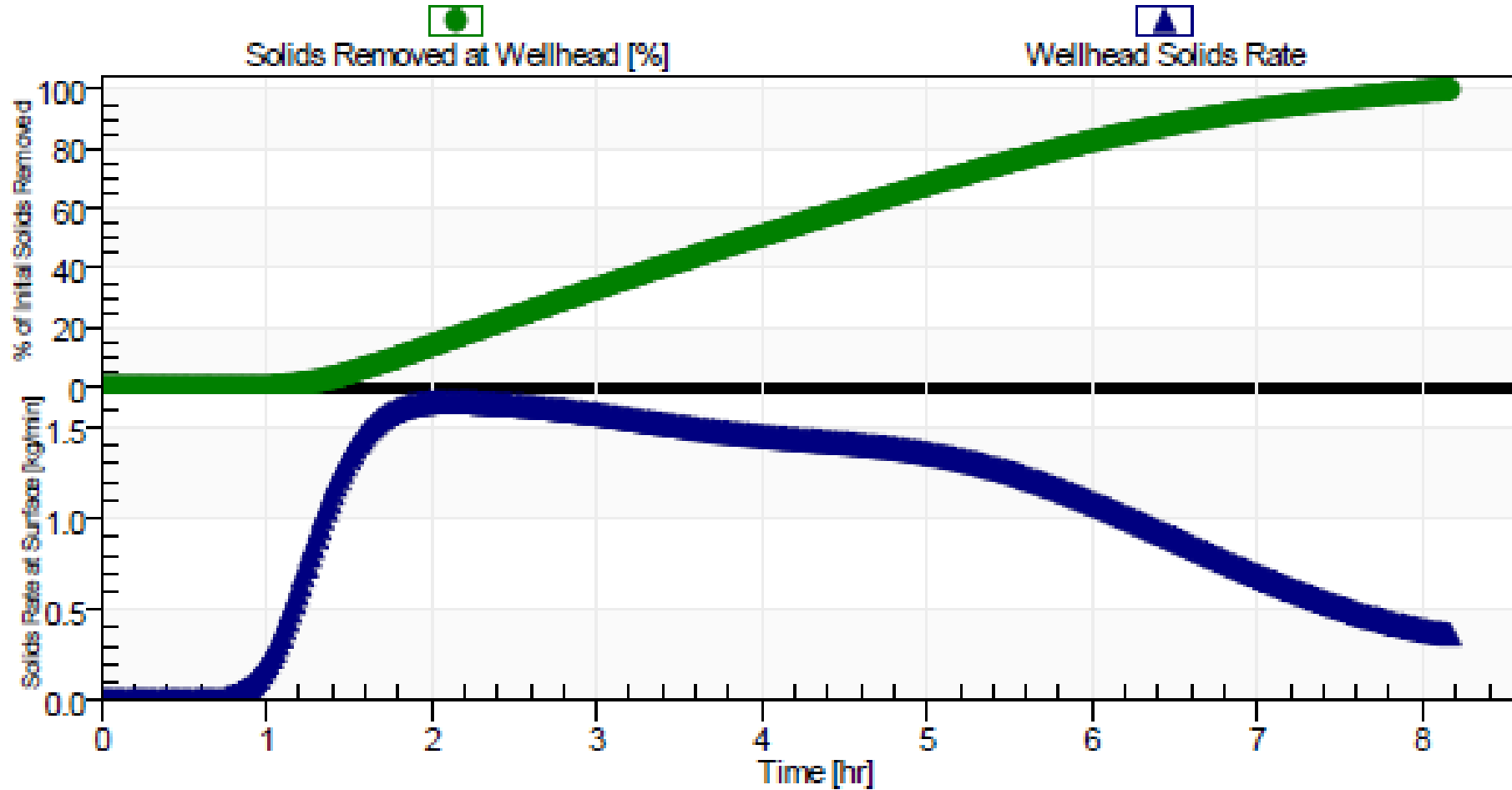
Solids Bulk Cross Sectional Area Ctran Analysis



CT Run#1 – Cleanout until SSD#2 (2,215m/7,268ft MDTHF) area

Cleanout Summary (Low Reservoir Pressure 900 psi)

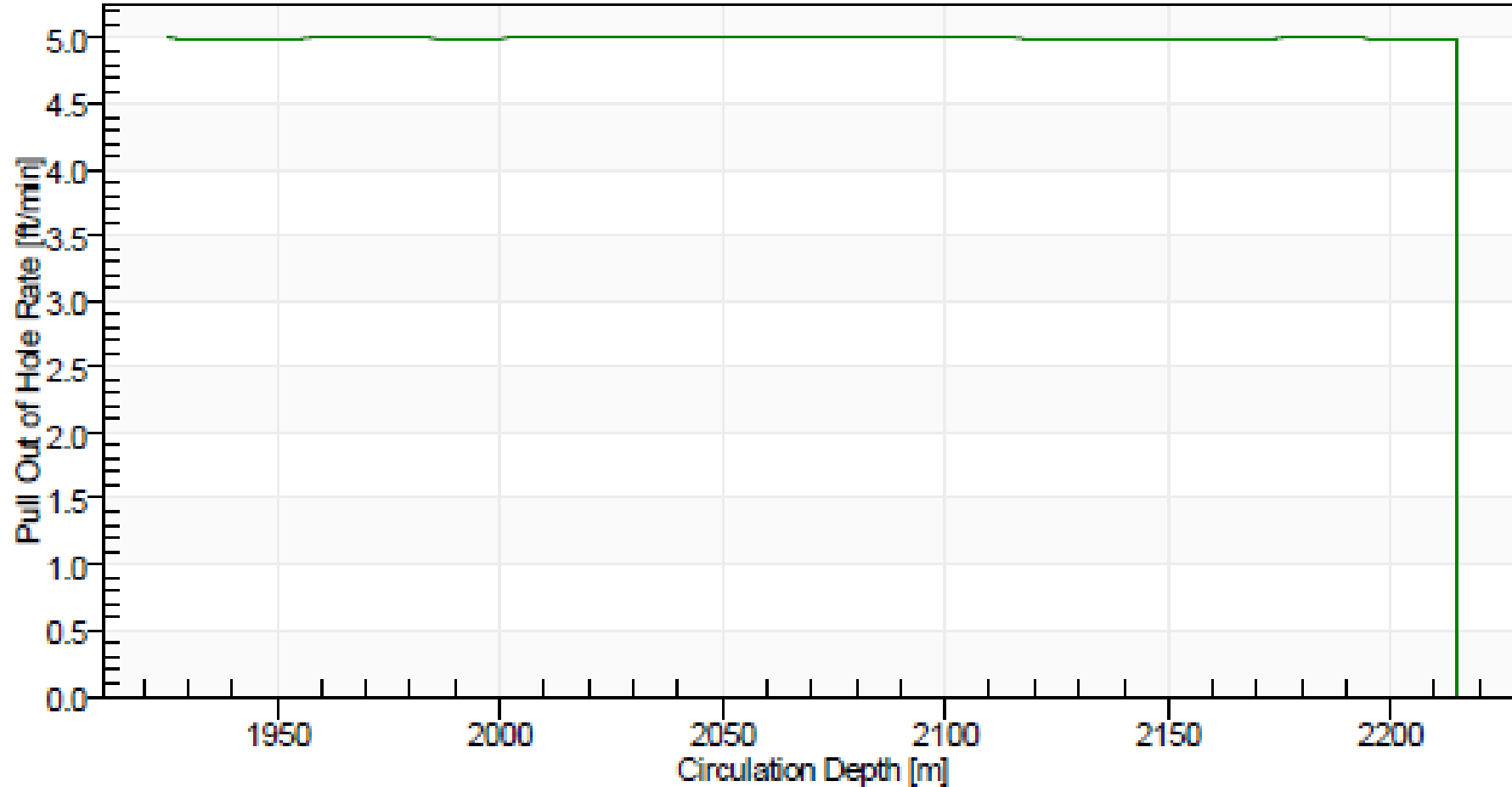
Solids Removal after Penetration to Target Depth CTran Analysis [Transient response during Circulation and Wiper Trip]



CT Run#1 –Cleanout until SSD#2 (2,215m/7,268ft MDTHF) area

Cleanout Summary (Low Reservoir Pressure 900 psi)

Tripping Speed to be used while Pulling Out of Hole CTran Analysis



CT Run#1 –Cleanout until SSD#2 (2,215m/7,268ft MDTHF) area

Cleanout Summary (Reservoir Pressure 1,500 psi)

Flow Summary

SUMMARY OF FLOW RESULTS

Produced Fluids
 Pressure known at: Perforations
 Production Mode: No Production
 Fluid Composition: Oil and Gas

Circulated Fluids	
Fluid Composition:	Nitrified Water
Liquid:	0.80 bbl/min
Solids:	0.00 bbl/min
Gas:	400.0 scf/min
Circulation Point:	2215.00 m
HHP Required :	48.01 KW

COMPLETION:

Wellhead Pressure.....	63.3 psi g
Hydrostatic pressure loss.....	771.8 psi
Friction pressure loss.....	666.6 psi
Kinetic pressure loss.....	-2.9 psi
Restriction pressure loss.....	1.1 psi
Equivalent Circulation Density[ECD]...	6.33 lb/gal (US)

Perforation Pressure.....	1500.0 psi g
Hydrostatic pressure loss.....	185.0 psi

Bottom Hole Pressure.....	1685.0 psi g
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FROM CIRCULATION POINT TO WELLHEAD:

Liquid transit time.....	11 min
Gas transit time.....	9 min
Annular volume.....	26.2 bbl
Volume below circulation point.....	57.5 bbl
Total liquid volume.....	67.7 bbl
Total gas volume.....	16.0 bbl

(Surface equivalent).....	4019.6 scf
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WORKSTRING:

Liquid:	0.8000 bbl/min
Gas:	400 scf/min
Pressure at reel rotating joint.....	3270.4 psi g
Friction pressure loss on reel.....	1427.3 psi
Pressure inside WS at Gooseneck.....	1843.2 psi g
Hydrostatic pressure loss.....	-1159.0 psi
Friction pressure loss.....	799.9 psi
Equivalent Circulation Density[ECD]...	1.61 lb/gal (US)

BHA total pressure loss	722.5 psi
BHA Hydrostatic loss	-1.2 psi
BHA Friction loss	2.0 psi
BHA Kinetic loss	1.6 psi
Nozzle	720.1 psi

Circulation Point pressure	1479.7 psi g
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FROM REEL ROTATING JOINT TO CIRCULATION POINT:

Liquid transit time.....	17 min
Gas transit time.....	16 min
Displacement Volume.....	15.9 bbl
Internal Volume.....	22.0 bbl
Internal liquid volume.....	13.5 bbl
Internal gas volume.....	8.5 bbl
(Surface equivalent).....	6581.3 scf

Length of Workstring on reel.....	2199.88 m
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CT Run#1 –Cleanout until SSD#2 (2,215m/7,268ft MDTHF) area

Cleanout Summary (Reservoir Pressure 1,500 psi)

Clean Summary

SUMMARY OF HOLE CLEANING RESULTS

Initial Condition:

% of fill interval occupied by solids before cleanout ...	50.0 %
Top of fill	1985.01 m
Deepest Circulation point	2215.01 m
Bottom of fill	2215.01 m
Initial Volume of Solids.....	2.2 bbl
Initial Mass of Solids.....	1119.1 lb
Solids type:	Mud Residue/Formation Fines
Fluid Description:	Nitrified Water

Penetration Hole Cleaning Mode:

Penetration rate.....	5.0 ft/min
Penetration time.....	2.52 hr
Solids volume in the well after penetration	1.4 bbl
Solids mass in the well after penetration	694.1 lb

Circulation Hole Cleaning Mode:

Hole circulation time	3.53 hr
Solids volume in the well after circulation.....	0.0 bbl
Solids mass in the well after circulation.....	0.0 lb

Volume of Fluids Pumped During Penetration & Circulation:

Gas volume	144988.5 scf
Liquid Volume	290.0 bbl
Penetration & Circulation time	6.04 hr

Circulation results at point of Maximum Solids Head:

BHA Depth	2215.01 m
Elapsed time	0.0000 hr
Wellhead Pressure	148.6 psi g
Additional Head created by Solids.....	13.8 psi

Maximum % solids circulated up hole was 0.6%.

This occurred at a measured depth of 28.35 m

Summary for reservoir pressure (1,500 psi)
Cleanout :-
Pump rate – 0.8 bpm with 400 scfm
Circulation time – 3.53 Hour / 4 Hour
Wiper Trip not required
Cleanout Success!!

CT Run#1 –Cleanout until SSD#2 (2,215m/7,268ft MDTHF) area

Cleanout Summary (Reservoir Pressure 1,500 psi)

Flow State

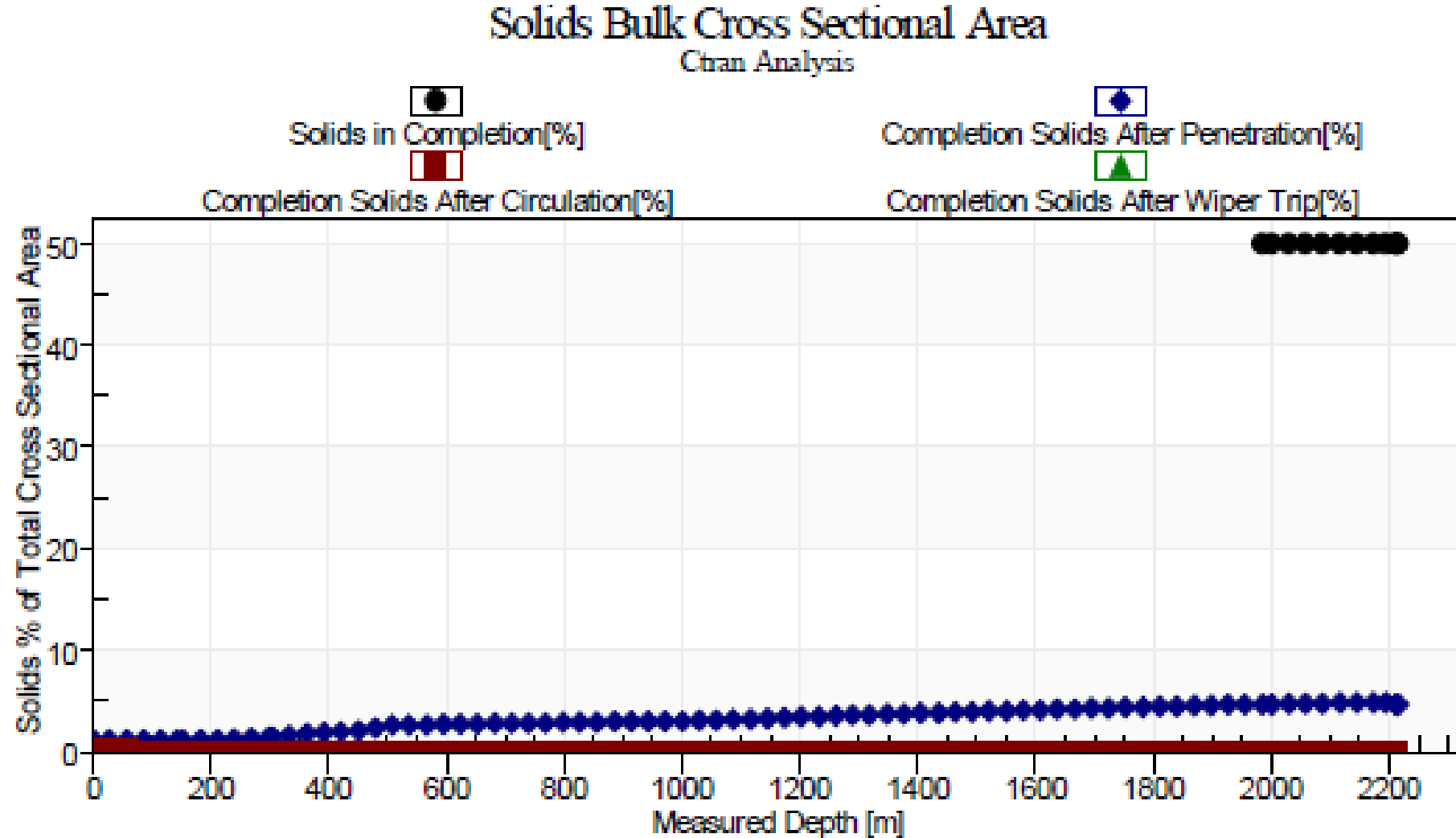
Measured Depth[Flow]	Temperature	Completion Pressure	Workstring Pressure	Concentric Pressure	Completion Liquid Velocity	Workstring Liquid Velocity	Concentric Liquid Velocity
<i>m</i>	<i>Deg. F</i>	<i>psi g</i>	<i>psi g</i>	<i>psi g</i>	<i>in/s</i>	<i>in/s</i>	<i>in/s</i>
0.0	80.0	63.3	1843.2	0.0	207	199	0
28.4	82.6	110.9	1851.8	0.0	409	199	0
57.3	85.3	143.5	1860.6	0.0	337	199	0
86.3	88.0	172.5	1869.4	0.0	294	199	0
115.2	90.7	199.3	1877.9	0.0	285	200	0
144.2	93.4	224.7	1886.4	0.0	292	200	0
153.6	94.2	233.1	1889.1	0.0	238	200	0
182.6	96.9	257.4	1897.5	0.0	222	201	0
211.5	99.5	281.1	1905.7	0.0	210	201	0
240.5	102.1	304.4	1913.7	0.0	199	202	0
269.4	104.7	327.4	1921.1	0.0	191	203	0
298.4	107.2	350.1	1928.0	0.0	220	204	0
305.6	107.8	355.9	1929.6	0.0	182	204	0
334.5	110.2	378.2	1935.6	0.0	175	206	0
363.5	112.4	399.8	1940.4	0.0	170	207	0
392.4	114.6	420.8	1944.6	0.0	165	208	0
421.4	116.7	441.1	1947.8	0.0	161	209	0
450.3	118.7	460.5	1956.9	0.0	158	179	0
479.3	120.4	479.1	1964.2	0.0	156	179	0
508.2	122.0	496.9	1969.3	0.0	155	180	0
537.2	123.3	513.6	1972.7	0.0	153	180	0
566.2	124.7	530.1	1975.6	0.0	150	180	0
595.1	126.0	546.6	1978.9	0.0	148	180	0

Flow State (continued)

Measured Depth[Flow]	Temperature	Completion Pressure	Workstring Pressure	Concentric Pressure	Completion Liquid Velocity	Workstring Liquid Velocity	Concentric Liquid Velocity
<i>m</i>	<i>Deg. F</i>	<i>psi g</i>	<i>psi g</i>	<i>psi g</i>	<i>in/s</i>	<i>in/s</i>	<i>in/s</i>
1956.0	189.6	1321.0	2157.3	0.0	103	185	0
1985.0	191.0	1338.1	2161.6	0.0	102	185	0
2000.8	191.8	1347.5	2164.0	0.0	101	185	0
2029.7	193.2	1364.7	2168.5	0.0	101	185	0
2058.7	194.6	1382.1	2173.2	0.0	101	185	0
2087.6	196.0	1399.6	2178.2	0.0	100	186	0
2116.6	197.5	1417.4	2183.4	0.0	99	186	0
2145.5	199.0	1435.4	2188.9	0.0	99	186	0
2174.5	200.5	1453.6	2194.6	0.0	118	186	0
2194.6	201.5	1466.4	2198.6	0.0	117	186	0
2212.7	202.5	1478.0	2202.3	0.0	98	186	0
2213.0	202.5	1478.0	2200.6	0.0	116	287	0
2213.7	202.5	1478.6	2200.3	0.0	145	287	0
2213.7	202.5	1478.8	2200.3	0.0	116	287	0
2214.7	202.6	1479.5	2200.0	0.0	116	287	0
2215.0	202.6	1479.7	2199.9	0.0	116	3676	0
2224.8	203.1	1487.3	0.0	0.0	0	0	0
2225.0	203.1	1487.5	0.0	0.0	0	0	0
2225.2	203.2	1487.6	0.0	0.0	0	0	0
2241.0	204.0	1500.0	0.0	0.0	0	0	0
2261.5	205.1	1516.2	0.0	0.0	0	0	0
2290.5	206.7	1539.3	0.0	0.0	0	0	0
2319.2	208.3	1562.6	0.0	0.0	0	0	0

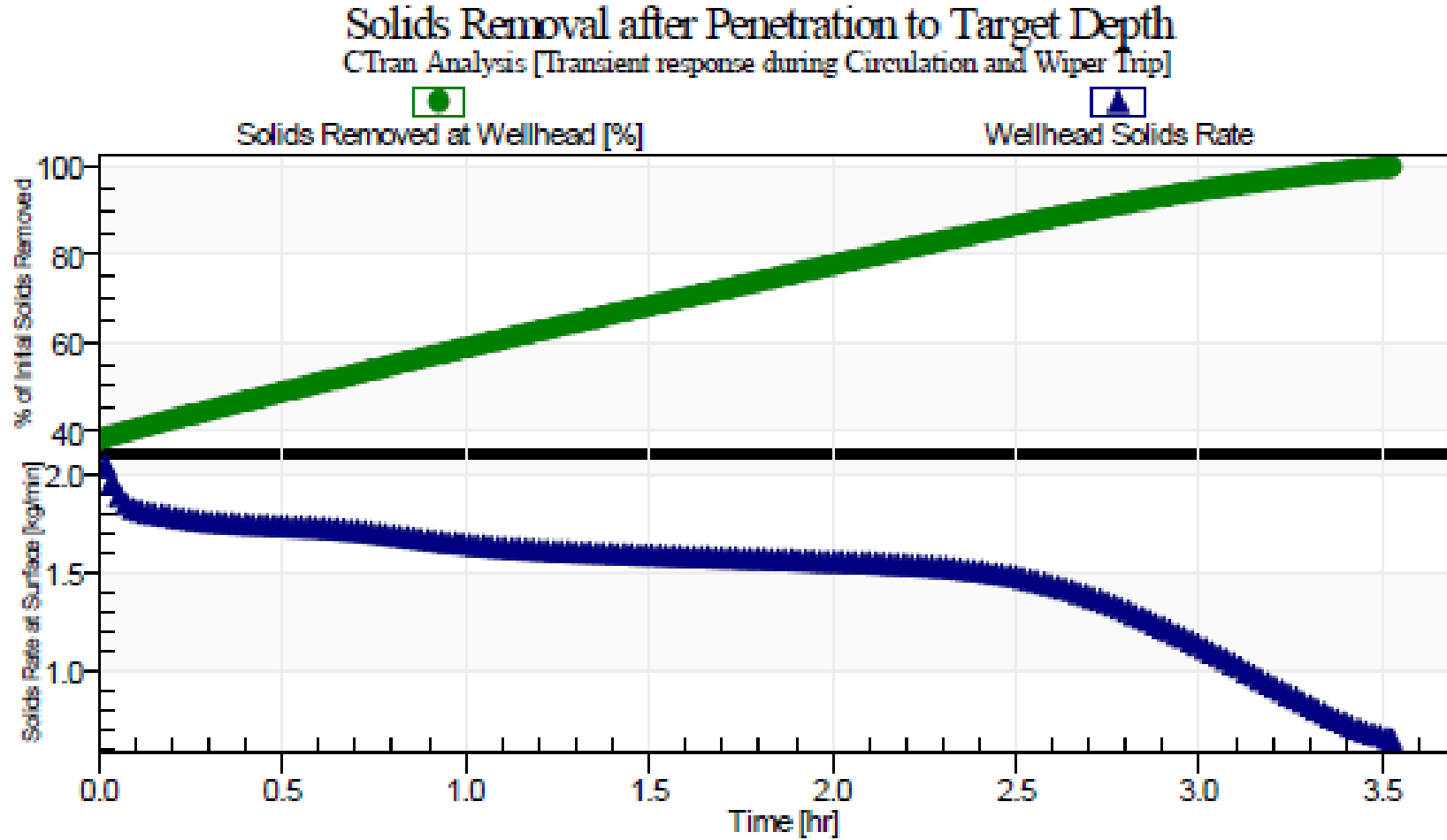
CT Run#1 –Cleanout until SSD#2 (2,215m/7,268ft MDTHF) area

Cleanout Summary (Reservoir Pressure 1,500 psi)



CT Run#1 –Cleanout until SSD#2 (2,215m/7,268ft MDTHF) area

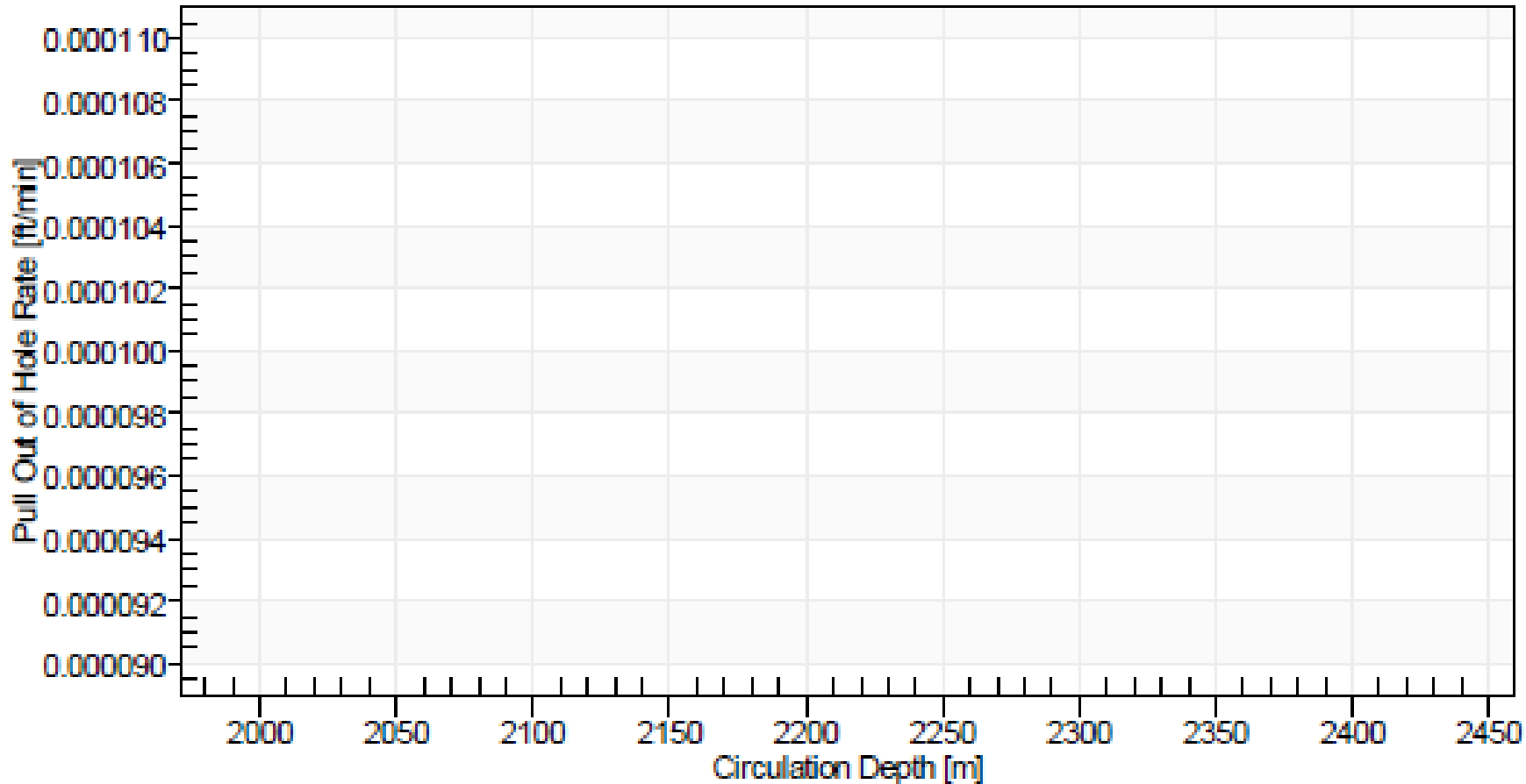
Cleanout Summary (Reservoir Pressure 1,500 psi)



CT Run#1 –Cleanout until SSD#2 (2,215m/7,268ft MDTHF) area

Cleanout Summary (Reservoir Pressure 1,500 psi)

Tripping Speed to be used while Pulling Out of Hole CTran Analysis



Bullheading pumping #1

Bullheading pumping#1

1. Once slickline confirm open the SSD#1 at depth 2,174m MDTHF, proceed with bullheading pumping operation.
2. Fill up a minimum of 1 completion Tubing volume + 1 A annulus volume (470 bbls), until fluid return at surface through Annular casing return line .
3. Start Injectivity test, from 0.3 bpm to 1.5 bpm (TSW).
4. Once complete injectivity test, proceed to pump tubing pickling, pfa 200, 55 bbls, follow with 42 bbl TIW to chase and spot the solution to clean and cover 100m from intended top of perforation (2,000m MDTHF).
5. Soak for 4 hours, once completed, proceed to pump 1.5 Tubing + A Annulus volume (705 bbls), continue to pump until clear return at surface.

Notes: - density of PFA 8.87 ppg,

Hydrostatic Pressure	Depth, ft	Fluid Type	Pressure, psi
From Surface Until SSD#1	4,241	Sea Water	1,914
From 3852, until SSD#2	3,852	PFA	179
From Surface until 3,852	3,852	Sea Water	1,739
Pressure inside casing Section			1,918
Pressure inside tubing section			1,914

CT Run#2 – Depth Correlation, GRCCL run prior for Cement Retainer

CT Run#2 – Depth Correlation, GRCCL prior for cement

1. Make up Depth correlation BHA, pressure test treating iron and CT Stack up.
2. RIH BHA into production string while break circulation every 1,000 ft until Solid tag plug/Sacrificial CR set by slickline before.
3. Once tag, reset depth accordingly (mechanical and orion depth), flag coil as reference.
4. After complete tag , Start logging until 20m above SSD#1, 2,155m MDTHF. (follow **Uzma/Weatherford** procedure)
5. After complete logging, POOH to surface and download the data to correlate the depth accordingly prior for set cement retainer.

CT Run#2 – Depth Correlation, GRCCCL run prior for Cement Retainer


BHA diagram for CT 2nd Run, GRCCCL

DIMENSION BID

BHA DIAGRAM #2- GRCCCL

Client	Petronas Carigali
Field	Dulang C
Job Type	
Job No.	Run#2

Well	C-4S
Min Restriction	2.25"
BHP	
BHT	

BHA DRAWING	DESCRIPTION	CONNECTION		ID INCH	OD INCH	TOOL LENGTH FT	CUMULATIVE LENGTH FT
		UPHOLE	DOWNHOLE				
	Internal Dimple Connector	1.5" CT	1.0" AMMT PIN		1.690	0.3	0.3
	MHA Disconnect drop ball 5/8" Shear pressure 5,456 psi	1.0" AMMT BOX	1.0" AMMT PIN		1.690	2.3	2.6
	Circulating drop ball 1/2" Shear pressure 2,520 psi Burst Disc 5000 psi						
	3 ft Straight Bar	1.0" AMMT BOX	1.0" AMMT PIN		1.690	3.0	5.6
	Crossover	1.0 AMMT BOX	15/16" Sucker Rod Box		1.688	0.37	6.0
	GR/CCL	15/16" SR			1.69	6.20	12.17
	Bull Nose						
BHA LENGTH						12.17	
MAXIMUM OD						1.69"	
MINIMUM ID							

CT Run#3 – Set Cement retainer at depth 2,170m-MDTHF

CT Run#3 – Set Cement Retainer (Proposed depth 2,170 m)

1. Perform pumping calibration test at surface prior for operation (Ensure pump rate/volume at Orion tally with Pump counter and actual rate (Fluid loss in tank during pump)).
2. Make up Cement retainer BHA, pressure test treating iron and CT stack up.
3. Dry run RIH BHA till near top Plug at SSD#2, 2,195m MDTHF, break circulation during pull test every 1,000 ft.
4. At 10m/30ft above top of Plug, slow down the speed and record the BHA parameter.
5. RIH slowly and tag top of CA plug (advisable by Weatherford toolman, if not available to setdown, run 1 – 2 ft before previous flag depth) , Monitor the flag depth, reset depth if required.
6. Pickup BHA until depth 2,170m MDTHF, station the coil and proceed as per **Weatherford procedure** to set the cement retainer. (Ensure that return line is open)
7. Perform set cement retainer by 0.5” brass ball, drop ball(apply pressure 1,000 psi) pump volume of coil till the gooseneck (1 – 1.2 bpm) and allow the ball to gravitate till it seating position. Activate the inflation process by applying pressure in sequence.
8. Pressure up to 500 psi and hold for 10 minutes. Increase the pressure till 1,000 psi. Continue to gradually increase pumping pressure to 2,000 psi, hold for 5 min. Proceed to pressure up to 3000 psi to completely set CR

CT Run#3 – Set Cement retainer at depth 2,170m-MDTHF

CT Run#3 – Set Cement Retainer (Proposed depth 2,170 m)

9. Perform integrity test on cement retainer, apply set-down 1,000 lbf (at bottom), to confirm CR already set in place. Re-do test for 3 times, seeking approval from WSS and EIC at town. Perform Injectivity test through coil tubing, sea water. (Ensure that return line at PCP in open condition).
10. Proceed mixing 50 bbls of 15 ppg cement while continue pump SW thru coil tubing at idle rate.
11. Mix cement slurry as per recipe and take frequently density check. keep two surface slurry sample. One at surface temp and another in a water bath at 205 deg F, reservoir temperature.
12. Pump 5 bbls of lead sea water. Open overboard line and pump cement slurry until clean uncontaminated slurry is observed. Close overboard line, and insert lead cement dart (3,000 psi).
13. Reset volume at data acquisition system.
14. Proceed to pump cement, once the cement dart sit on the connector, increase pressure slowly until above pressure rating of Head Dart (*psi). Slowly pump to push and squeeze the cement to enter punch hole.
15. Once complete pump cement volume, 46 bbls, install tail cement dart (2000 psi), pump 1 CT volume to displace the cement dart to the connector.
16. Once 1 CT volume pump and increase in CTP observed indicated that tail cement dart already sit on the connector. Stop pumping.

CT Run#3 – Set Cement retainer at depth 2,170m-MDTHF

CT Volume = 22 bbls /14,445 ft length

TVD at depth 1,950m / 6,398ft (50 m above intended TOC inside casing) = 1,174m/3,852 ft

TVD at depth 2,175m / 7,136 ft (SSD#1/Flow Path) = 1,292.7m/4,241.3ft.

TVD at depth 2,174.6m/7,135ft (CR setting depth) = 1,293.14m/4,243ft.

To burst **Lead cement** dart :-

Pressure Cement inside tubing, at top of CR $0.052 * 15 * 4243 = 3,309.5$ psi

Hydrostatic Pressure inside casing acting against bottom side Lead dart = $0.052 * 8.68 * 4243 = 1,915$ psi

Pumping pressure require to burst **3,000** psi burst disc dart, = **3,000** psi – (**3,309.5** – **1,915**) = 1,606 psi

CT Run#3 – Set Cement retainer at depth 2,170m-MDTHF

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TVD at depth 1,950m / 6,398ft (50 m above intended TOC inside casing) = 1,174m/3,852ft

TVD at depth 2,175m / 7,136 ft (SSD#1/Flow Path) = 1,292.7m/4,241.3ft.

TVD at depth 2,174.6m/7,135ft (CR setting depth) = 1,293.14m/4,243ft.

To burst **tail cement** dart :-

Hydrostatic pressure inside casing from surface until TOC, $0.052 * 8.68 * 3,852 = 1,739$ psi

Pressure Cement inside casing, until SSD, $0.052 * 15 * (4,243 - 3,852) = 305$ psi

Hydrostatic Pressure inside casing acting against bottom side Lead dart = $1,739 + 305 = 2,044$ psi

Pressure seawater inside tubing, at top of CR $0.052 * 8.68 * 4,243 = 1,915$ psi

Pumping pressure require to burst **2,000** psi burst disc dart, = **2,000** psi – (**1,915** – **2,044**) = 2,129 psi

CT Run#3 – Set Cement retainer at depth 2,170m-MDTHF

CT Run#4 – Set Cement Retainer (Proposed depth 2,170 m (subject to GRCCCL and tubing tally))

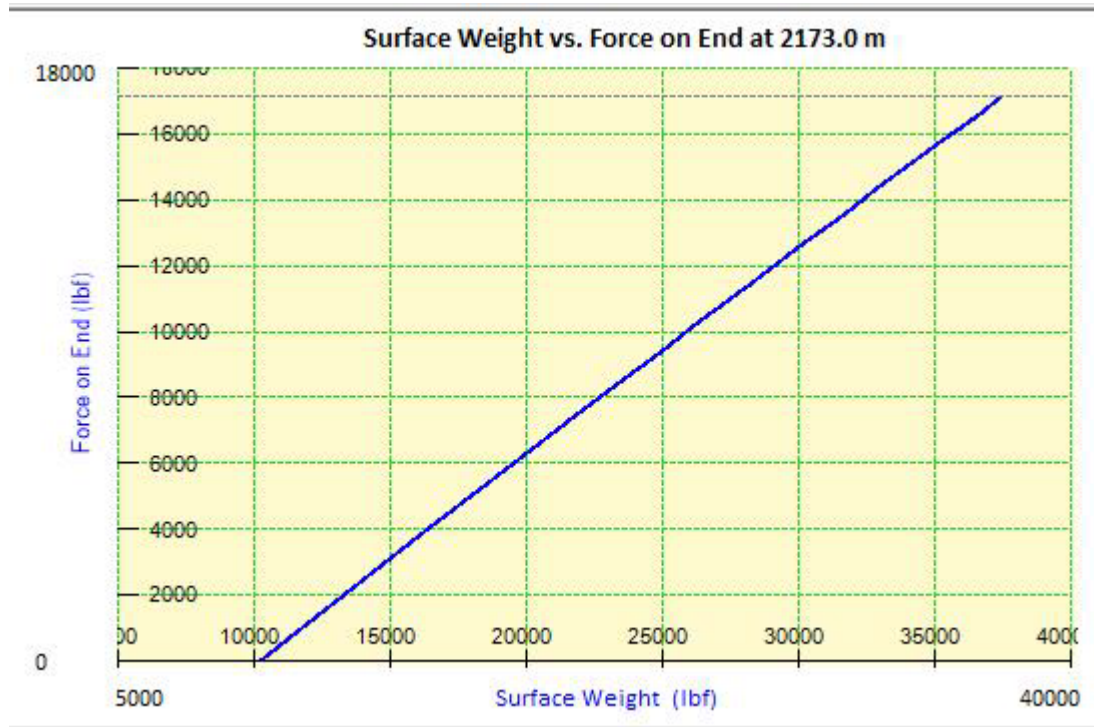
17. To sting out the from the cement retainer, apply 4,000 lbs (Bottomhole pickup force). Once release from retainer, proceed to burst the tail cement dart by applying estimated surface pump pressure 2,129 psi.
18. After that proceed to Pump 5 bbl of contaminant gel, follow with TSW until 0.5 bbl of gel exit the nozzle.
19. Pick up BHA (20 – 30 ft/m) and station 100 ft above top of cement retainer. Continue circulating fluid at max rate once at depth.
20. Continue circulation and RIH Slowly to tag top of Cement retainer.
21. After tag top of cement retainer, pump 10 bbls of gel and follow with CBU 2x CT / Tubing Annulus volume.
22. Pump another 5 bbls of Contaminant gel, pick up BHA after gel out of nozzle, POOH to surface. (Estimate top of Contaminant gel 1,912m)







CT Run#3 – Set Cement retainer at depth 2,170m-MDTHF (0.5 bpm)

No.	Stage	Fluid Used	Time, hh:mm			Fluids		Tripping			Totals		Stage	RIH	Time
			Start	End	Stage	BPM	SCFM	From	To	ft/min	BBLS	GAL N2	bbls	ft/min	hr
1	Mix 15ppg Cement 50 bbls		0:00	3:00	3:00			7,135	7,135						3.0
2	Pump Lead Sea Water 5bbls	FLUID 1 - SW	3:00	3:05	0:05	1.0		7,135	7,135	0.0	5.0		5.0		
3	Install Lead Cement Dart		3:05	3:11	0:06			7,135	7,135						0.1
4	Pump 46 bbls of Cement and install Tail Dart	FLUID 2 - Cement	3:11	4:43	1:32	0.5		7,135	7,135	0.0	46.0		46.0		
5	Displace 1 CT Volume to push Tail dart to Connector	FLUID 1 - SW	4:43	5:31	0:48	0.5		7,135	7,135	0.0	24.0		24.0		
6	Sting-out from Cement Retainer and burst Cement Dart	FLUID 3 - Gel	5:31	6:01	0:30			7,135	7,135						0.5
7	Pump 5 bbls contamination Gel	FLUID 4 - Contamination Gel	6:01	6:11	0:10	0.5		7,135	7,135	0.0	5.0		5.0		
8	Pump SW untill contamination gel at the nozzle	FLUID 1 - SW	6:11	6:30	0:19	1.0		7,135	7,135	0.0	19.0		19.0		
9	Pick-up BHA and spot 5 bbls contamination Gel	FLUID 1 - SW	6:30	6:46	0:16	0.3		7,135	6,271	51.8	5.0		5.0		
10	Pick-up BHA 100 ft above contamination Gel	FLUID 1 - SW	6:46	6:56	0:10	1.0		6,271	6,171	10.0	10.0			10.0	
11	RIH back to top of CR	FLUID 1 - SW	6:56	8:00	1:04	1.0		6,171	7,135	15.0	64.3			15.0	
12	Circulate out excess cement in Coil and tubing	FLUID 3 - Gel	8:00	8:10	0:10	1.0		7,135	7,135	0.0	10.0		10.0		
13	Bottom ups at least 2x tubing volume	FLUID 1 - SW	8:10	9:34	1:24	1.0		7,135	7,135	0.0	84.0		84.0		
14	Pump contamination Gel	FLUID 4 - Contamination Gel	9:34	9:44	0:10	0.5		7,135	7,135	0.0	5.0		5.0		
15	Pump SW untill contamination gel at the nozzle	FLUID 1 - SW	9:44	10:03	0:19	1.0		7,135	7,135	0.0	19.0		19.0		
16	Pick-up BHA and spot 5 bbls contamination Gel	FLUID 1 - SW	10:03	10:20	0:16	0.3		7,135	6,271	51.8	5.0		5.0		
17	POOH to surface	FLUID 1 - SW	10:20	12:26	2:05	0.3		6,271	0	50.0	37.6			50.0	
18	Safety Margin	FLUID 1 - SW	12:26	14:26	2:00			0							2.0

CT Run#3 – Set Cement retainer at depth 2,170 m-MDTHF

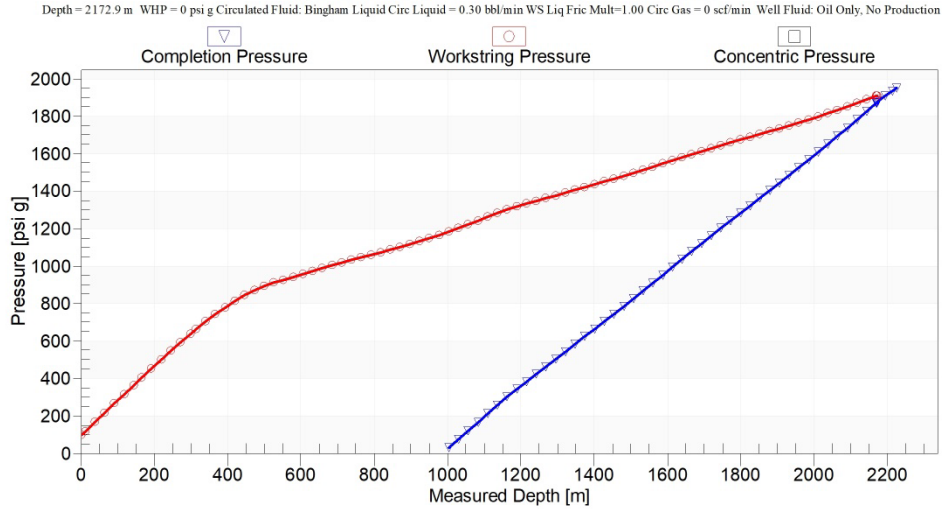
BHA diagram for CT 3th Run



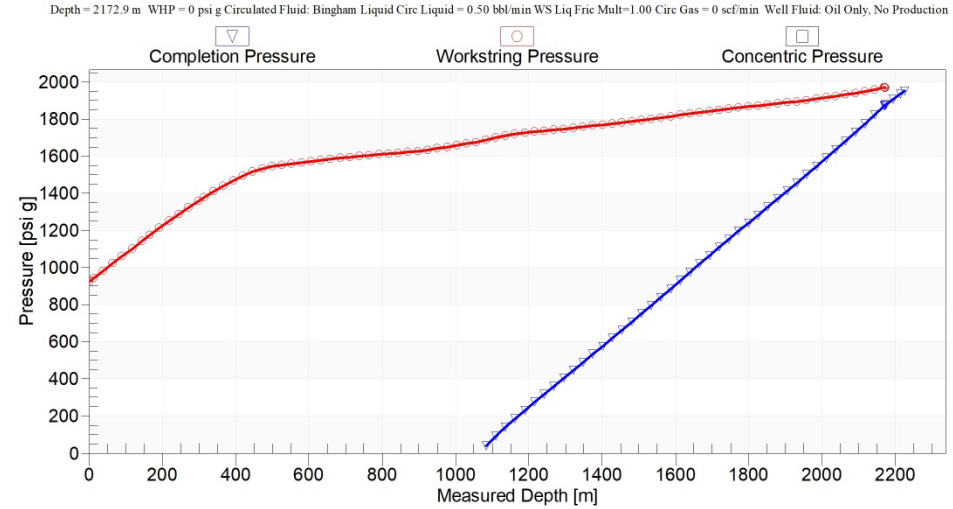
BHA DRAWING	DESCRIPTION	CONNECTION		ID INCH	OD INCH	TOOL LENGTH FT	CUMULATIVE LENGTH FT
		UPHOLE	DOWNHOLE				
	External Dimple CT	1.5" CT	1.5" AMMT PIN		2.125	0.6	0.6
	2 -1/8" MHA Disconnect drop ball 0.75" Shear pressure 5,456 psi	1.5" AMMT BOX	1.5" AMMT PIN		2.125	2.5	2.5
	Circulating drop ball 0.63" Shear pressure 2,520 psi Burst Disc 6000 psi						
	FH Setting Tool Setting force : 10,000 lbs Drop ball : 0.5" Max DP 2,500 psi	1.5" AMMT BOX	ACME		2.187	4.56	7.1
	Setting Sleeve	ACME	ACME		2.187	1.03	8.09
	FH Cement Retainer	ACME			2.187	1.18	9.27
						BHA LENGTH	9.27
						MAXIMUM OD	2.187
						MINIMUM ID	

Sensitivity Analysis for cement pumping

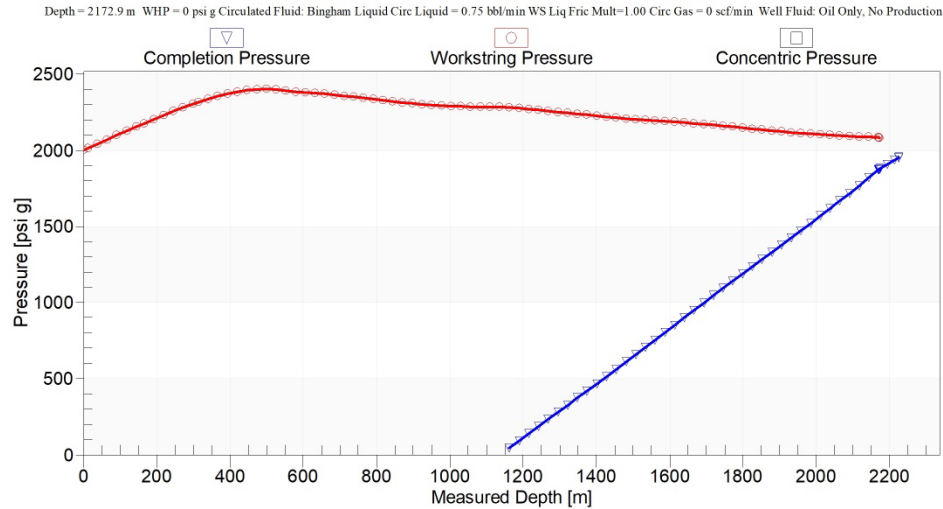
Pressure Variation with Measured Depth



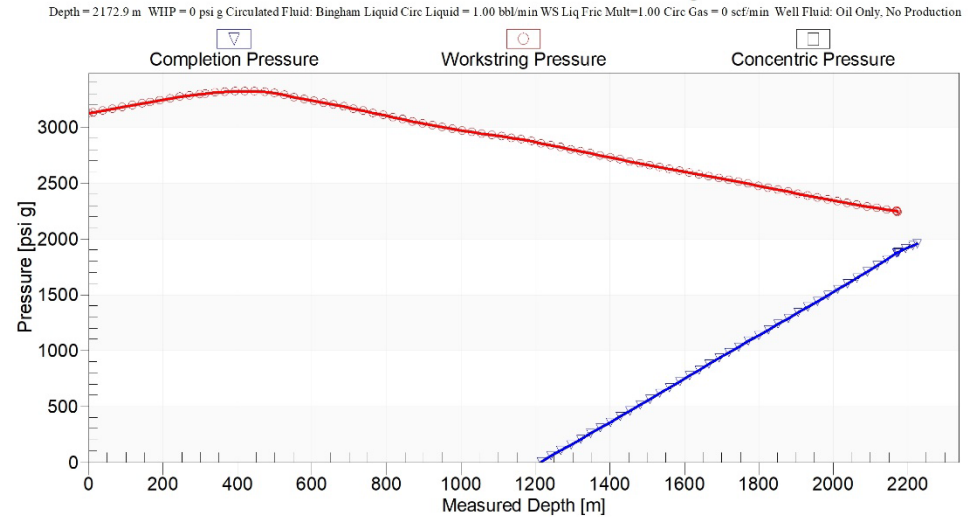
Pressure Variation with Measured Depth



Pressure Variation with Measured Depth



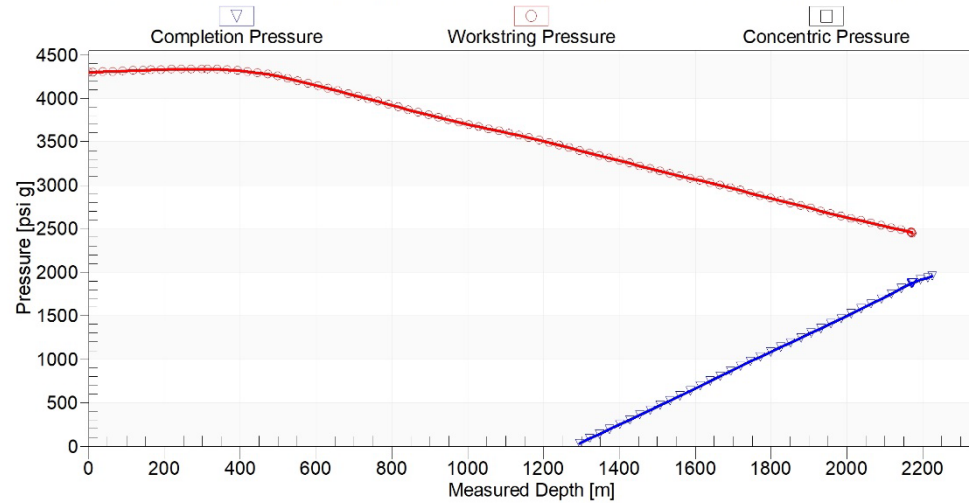
Pressure Variation with Measured Depth



Sensitivity Analysis for cement pumping

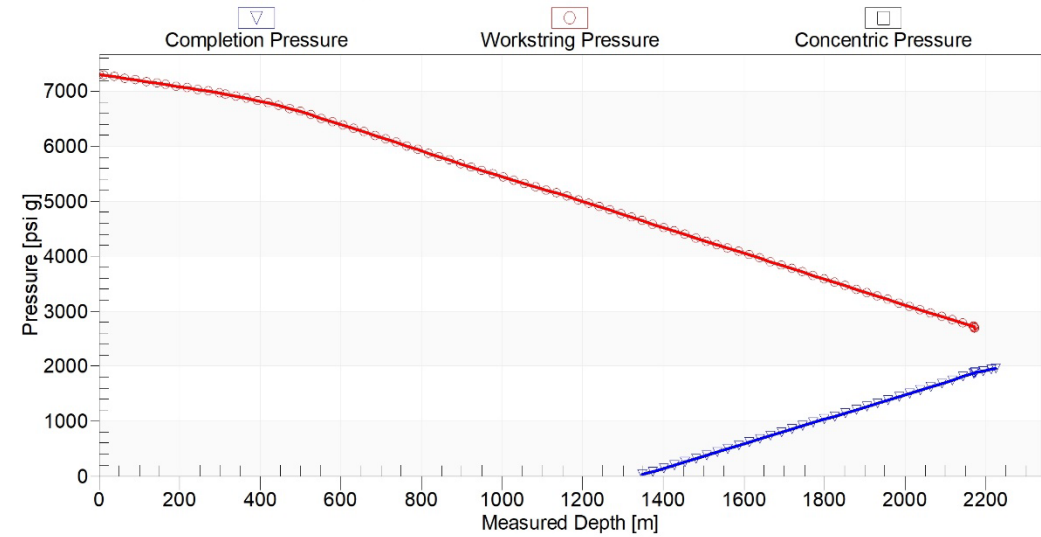
Pressure Variation with Measured Depth

Depth = 2172.9 m WHP = 0 psi g Circulated Fluid: Bingham Liquid Circ Liquid = 1.25 bbl/min WS Liq Fric Mult=1.00 Circ Gas = 0 scf/min Well Fluid: Oil Only, No Production



Pressure Variation with Measured Depth

Depth = 2172.9 m WHP = 0 psi g Circulated Fluid: Bingham Liquid Circ Liquid = 1.50 bbl/min WS Liq Fric Mult=1.00 Circ Gas = 0 scf/min Well Fluid: Oil Only, No Production



CT Run#4 – Cleanout until top of Cement retainer

CT Run#4 – SCO until top of Cement retainer

1. Make up SpinCat Nozzle, pressure test treating iron and CT Stack up.
2. RIH BHA into production string while pumping TSW at high rate (start at 2,000 m) till top of Cement retainer at 2,173m MDTHF.
3. Rate suggest as per cleanout analysis :-
 - 1 bpm with 300 scfm
4. Pick up 10m/30ft above the CR and proceed to RIH again to top of CR while pumping TSW at high rate.
5. Once at target depth, pump 20 bbls gel follow with 2 hour CBU and wiper trip with 5 ftm until 1,900m
6. POOH to surface while perform high jetting to clean the tubular wall.


CT Run#4 – Cleanout until top of Cement retainer

BHA diagram for CT 4th Run

DIMENSION BID

BHA DIAGRAM #1 - 1.69" SPINCAT NOZZLE

Client	Petronas Carigali	Well	C-4S
Field	Dulang C	Min Restriction	2.25"
Job Type		BHP	
Job No.	Run#1	BHT	212 deg F

BHA DRAWING	DESCRIPTION	CONNECTION		ID INCH	OD INCH	TOOL LENGTH FT	CUMULATIVE LENGTH FT
		UPHOLE	DOWNHOLE				
	Internal Dimple Connector	1.5" CT	1.0" AMMT PIN		1.690	0.3	0.3
	MHA Disconnect drop ball 5/8" Shear pressure 5,456 psi	1.0" AMMT BOX	1.0" AMMT PIN		1.690	2.3	2.6
	Circulating drop ball 1/2" Shear pressure 2,520 psi Burst Disc 5000 psi						
	3 ft Straight Bar	1.0" AMMT BOX	1.0" AMMT PIN		1.690	3.0	5.6
	Downhole Filter	1.0" AMMT BOX	1.0" AMMT PIN		1.690	3.2	8.80
	SpinCat	1.0" AMMT BOX			1.690	1.0	9.8

CT Run#4 – Cleanout until top of Cement retainer

Cleanout Summary

Flow Summary

SUMMARY OF FLOW RESULTS

Produced Fluids

Pressure known at:	Perforations
Production Mode:	No Production
Fluid Composition:	Oil and Gas

Circulated Fluids

Fluid Composition:	Nitrified Water
Liquid:	1.00 bbl/min
Solids:	0.00 bbl/min
Gas:	300.0 scf/min
Circulation Point:	2170.00 m
HHP Required :	83.18 KW

COMPLETION:

Wellhead Pressure.....	244.0 psi g
Hydrostatic pressure loss.....	1025.2 psi
Friction pressure loss.....	605.3 psi
Kinetic pressure loss.....	-3.9 psi
Restriction pressure loss.....	0.4 psi
Equivalent Circulation Density[ECD]...	7.40 lb/gal (US)

Perforation Pressure.....	1871.0 psi g
Hydrostatic pressure loss.....	239.9 psi

Bottom Hole Pressure.....	2110.9 psi g
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FROM CIRCULATION POINT TO WELLHEAD:

Liquid transit time.....	12 min
Gas transit time.....	11 min
Annular volume.....	25.6 bbl
Volume below circulation point.....	58.4 bbl
Total liquid volume.....	72.4 bbl
Total gas volume.....	11.6 bbl

(Surface equivalent).....	3621.4 scf
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WORKSTRING:

Liquid:	1.0000 bbl/min
Gas:	300 scf/min
Pressure at reel rotating joint.....	4538.0 psi g
Friction pressure loss on reel.....	1776.3 psi
Pressure inside WS at Gooseneck.....	2761.7 psi g
Hydrostatic pressure loss.....	-1254.7 psi
Friction pressure loss.....	1255.0 psi
Equivalent Circulation Density[ECD]...	0.02 lb/gal (US)

BHA total pressure loss	890.3 psi
BHA Hydrostatic loss	-1.2 psi
BHA Friction loss	4.2 psi
BHA Kinetic loss	1.5 psi
Nozzle	885.8 psi

Circulation Point pressure	1871.0 psi g
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FROM REEL ROTATING JOINT TO CIRCULATION POINT:

Liquid transit time.....	16 min
Gas transit time.....	21 min
Displacement Volume.....	15.6 bbl
Internal Volume.....	22.0 bbl
Internal liquid volume.....	15.7 bbl
Internal gas volume.....	6.2 bbl
(Surface equivalent).....	6264.4 scf

Length of Workstring on reel.....	2244.88 m
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CT Run#4 – Cleanout until top of Cement retainer

Cleanout Summary

Ctran Summary

SUMMARY OF HOLE CLEANING RESULTS

Initial Condition:

% of fill interval occupied by solids before cleanout ...	50.0 %
Top of fill	2000.01 m
Deepest Circulation point	2169.99 m
Bottom of fill	2169.99 m
Initial Volume of Solids.....	1.6 bbl
Initial Mass of Solids.....	1131.5 lb
Solids type:	20/40 Bauxite Proppant
Fluid Description:	Nitrified Water

Penetration Hole Cleaning Mode:

Penetration rate.....	10.0 ft/min
Penetration time.....	0.93 hr
Solids volume in the well after penetration	1.6 bbl
Solids mass in the well after penetration	1131.5 lb

Circulation Hole Cleaning Mode:

Hole circulation time	2.00 hr
Solids volume in the well after circulation.....	0.9 bbl
Solids mass in the well after circulation.....	644.7 lb

Wiper Trip Hole Cleaning Mode:

Wiper Trip Scheme:	User Specified rate, Tornado not
Wiper trip time	1.92 hr
Solids volume in the well after wiper trip	0.0 bbl
Solids mass in the well after wiper trip	0.0 lb

Volume of Fluids Pumped During Penetration, Circulation &

Wiper Trip:	
Gas volume	87352.5 scf
Liquid Volume	291.2 bbl
Penetration, Circulation & Wiper Trip time	4.85 hr

Circulation results at point of Maximum Solids Head:

BHA Depth	2169.99 m
Elapsed time	1.3980 hr
Wellhead Pressure	286.1 psi g
Additional Head created by Solids.....	24.9 psi

Maximum % solids circulated up hole was 0.8%.

This occurred at a measured depth of 1122.27 m
after the transient had run for 0.0 hr

Summary for reservoir pressure (1,871 psi) Cleanout :-
Pump rate – 1 bpm with 300 scfm
Circulation time – 2Hour
Wiper Trip 5 ftm until 1,900m
Cleanout Success!!

CT Run#4 – Cleanout until top of Cement retainer

Cleanout Summary

Flow State

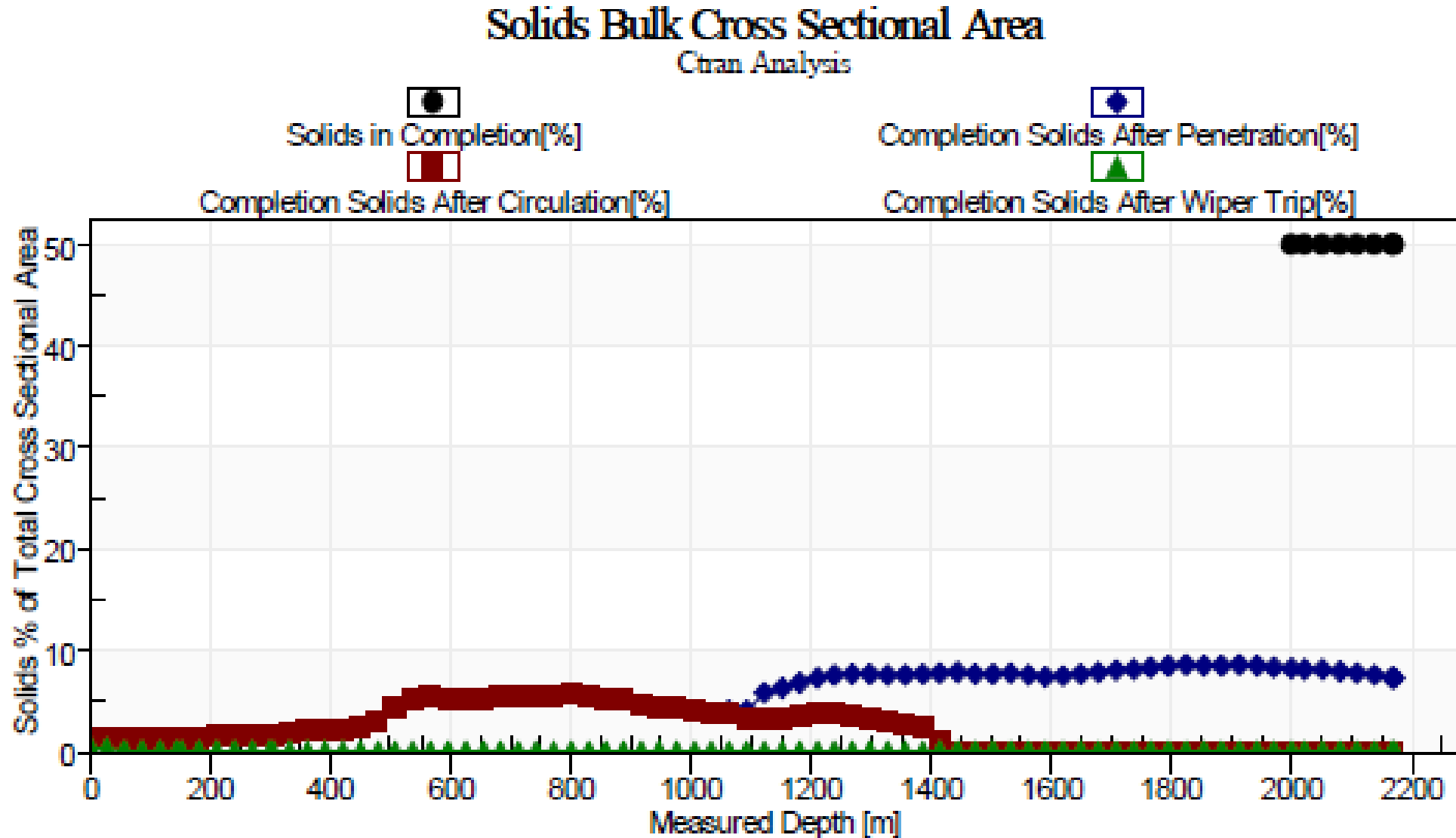
Measured Depth[Flow]	Temperature	Completion Pressure	Workstring Pressure	Concentric Pressure	Completion Liquid Velocity	Workstring Liquid Velocity	Concentric Liquid Velocity
<i>m</i>	<i>Deg. F</i>	<i>psi g</i>	<i>psi g</i>	<i>psi g</i>	<i>in/s</i>	<i>in/s</i>	<i>in/s</i>
0.0	80.0	244.0	2761.7	0.0	198	08	0
27.2	82.6	267.9	2773.4	0.0	187	08	0
56.4	85.4	293.6	2786.1	0.0	178	08	0
85.7	88.2	319.2	2798.7	0.0	170	08	0
114.9	91.0	344.7	2811.1	0.0	163	08	0
144.2	93.8	370.3	2823.3	0.0	188	09	0
152.1	94.5	377.4	2826.6	0.0	155	09	0
181.4	97.3	403.0	2838.8	0.0	150	09	0
210.6	100.0	428.7	2850.8	0.0	145	10	0
239.9	102.7	454.4	2862.4	0.0	141	10	0
269.1	105.4	479.9	2873.5	0.0	138	11	0
298.4	108.0	505.1	2883.9	0.0	161	12	0
302.9	108.4	509.1	2885.4	0.0	134	12	0
332.1	110.9	533.9	2894.7	0.0	131	13	0
361.4	113.3	558.0	2902.8	0.0	129	14	0
390.7	115.6	581.6	2910.0	0.0	126	15	0
419.9	117.8	604.6	2916.0	0.0	124	16	0
449.2	119.8	626.6	2920.4	0.0	122	16	0
478.4	121.6	647.2	2922.8	0.0	121	16	0
507.7	123.3	666.2	2922.9	0.0	119	15	0
537.0	124.7	683.8	2921.0	0.0	118	14	0
566.2	126.0	701.1	2913.7	0.0	117	71	0
595.5	127.5	718.7	2906.5	0.0	116	71	0

Flow State (continued)

Measured Depth[Flow]	Temperature	Completion Pressure	Workstring Pressure	Concentric Pressure	Completion Liquid Velocity	Workstring Liquid Velocity	Concentric Liquid Velocity
<i>m</i>	<i>Deg. F</i>	<i>psi g</i>	<i>psi g</i>	<i>psi g</i>	<i>in/s</i>	<i>in/s</i>	<i>in/s</i>
1970.7	193.8	1710.1	2778.2	0.0	105	225	0
2000.0	195.2	1733.5	2775.2	0.0	104	225	0
2021.4	196.3	1750.6	2773.2	0.0	102	228	0
2050.7	197.8	1774.0	2770.4	0.0	101	228	0
2079.9	199.2	1797.5	2767.8	0.0	101	228	0
2109.2	200.8	1821.2	2765.4	0.0	100	227	0
2138.5	202.3	1845.1	2763.4	0.0	99	227	0
2167.7	203.9	1869.1	2761.4	0.0	98	228	0
2168.0	203.9	1869.2	2759.5	0.0	115	354	0
2168.7	203.9	1869.9	2758.5	0.0	115	354	0
2169.7	204.0	1870.8	2757.3	0.0	115	354	0
2170.0	204.0	1871.0	2756.9	0.0	115	4537	0
2174.5	204.2	1874.4	0.0	0.0	0	0	0
2194.6	205.3	1889.9	0.0	0.0	0	0	0
2213.7	206.4	1904.7	0.0	0.0	0	0	0
2224.8	207.0	1913.4	0.0	0.0	0	0	0
2225.0	207.0	1913.5	0.0	0.0	0	0	0
2225.2	207.0	1913.7	0.0	0.0	0	0	0
2232.0	207.4	1919.0	0.0	0.0	0	0	0
2261.2	209.0	1942.0	0.0	0.0	0	0	0
2290.5	210.6	1965.3	0.0	0.0	0	0	0
2317.7	212.2	1987.4	0.0	0.0	0	0	0
2347.0	213.9	2011.5	0.0	0.0	0	0	0

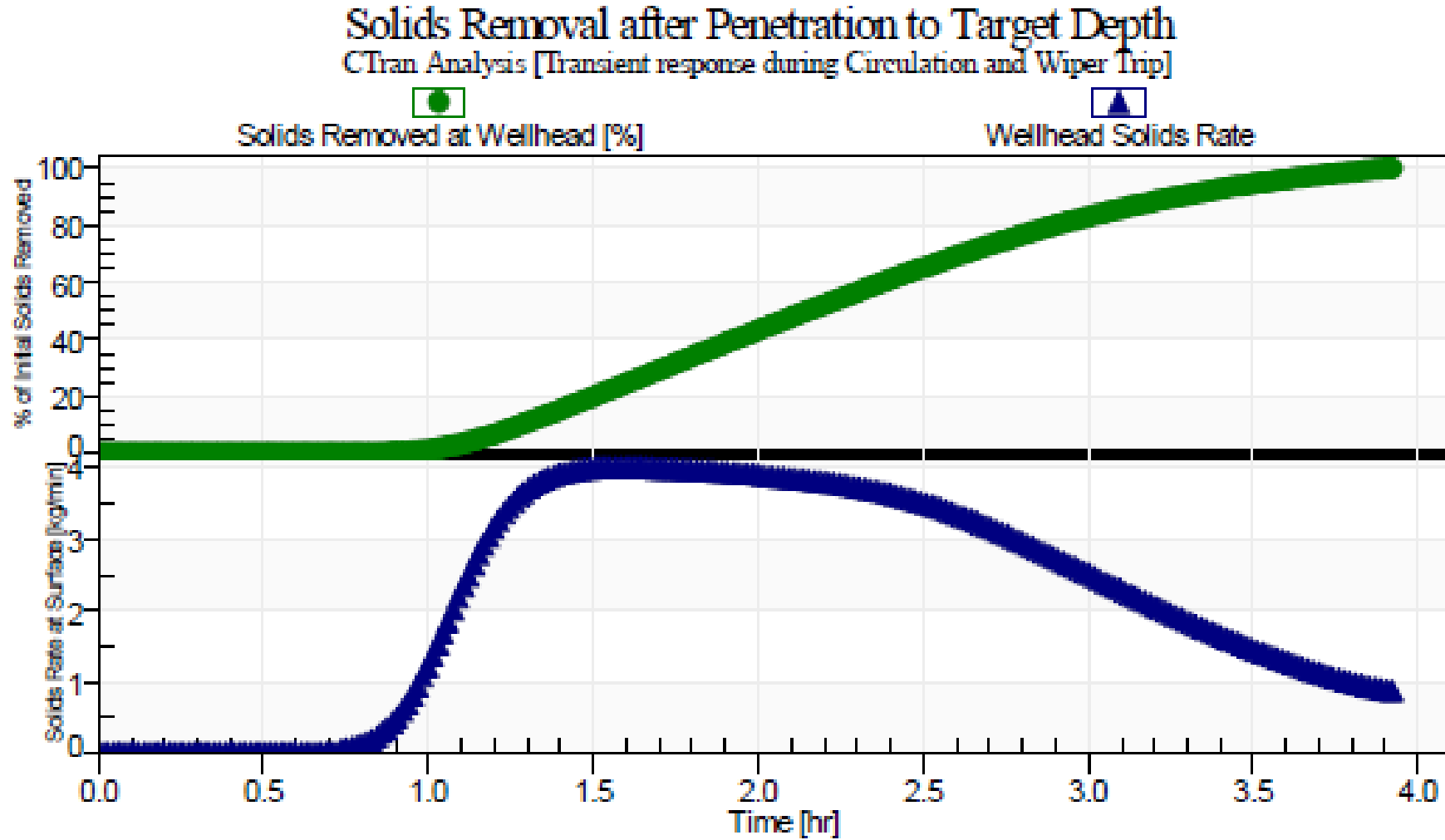
CT Run#4 – Cleanout until top of Cement retainer

Cleanout Summary



CT Run#4 – Cleanout until top of Cement retainer

Cleanout Summary

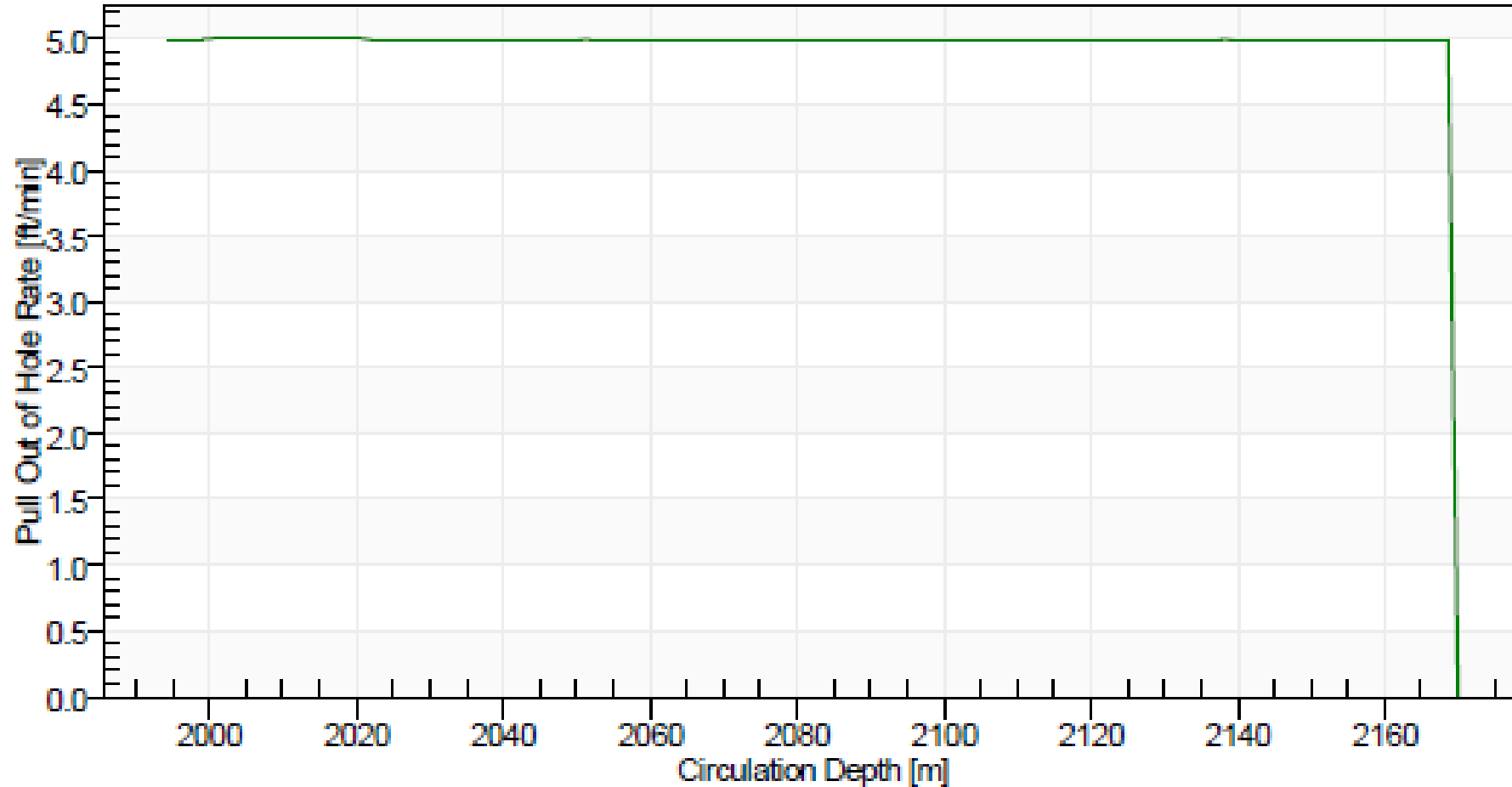


CT Run#4 – Cleanout until top of Cement retainer

Cleanout Summary

Tripping Speed to be used while Pulling Out of Hole

CTran Analysis



CT Run#5 – Nitrogen Unloading

CT Run#5 – Nitrogen Unloading

1. Make up Upward Nozzle, pressure test treating iron and CT Stack up.
2. Flush coil with nitrogen, until no water left inside the coil.
3. RIH BHA into production string while pumping nitrogen at idel rate, 300 scfm
4. Once reach 300m, increase pump rate to 400 scfm station CT for 30 minutes. Continue circulation until no return of water observed at surface. Once no return water, proceed to RIH with 300 scfm.
5. Station CT every 300m, and repeat step 4.
6. After CT Reach depth 2000m, Station CT for 1 hour. Continue circulation until no return of water observed at surface.
7. Once observe only gas return at surface, start to POOH to surface while maintain 300 – 400 scfm all the way to surface.
8. Handover well to e-line after BHA arrive at surface.

CT Run#5 – Nitrogen Unloading

BHA diagram for CT 5th Run



BHA DIAGRAM #4 - Nitrogen Unloading

Client	Petronas Carigali
Field	Dulang C
Job Type	
Job No.	Run#5

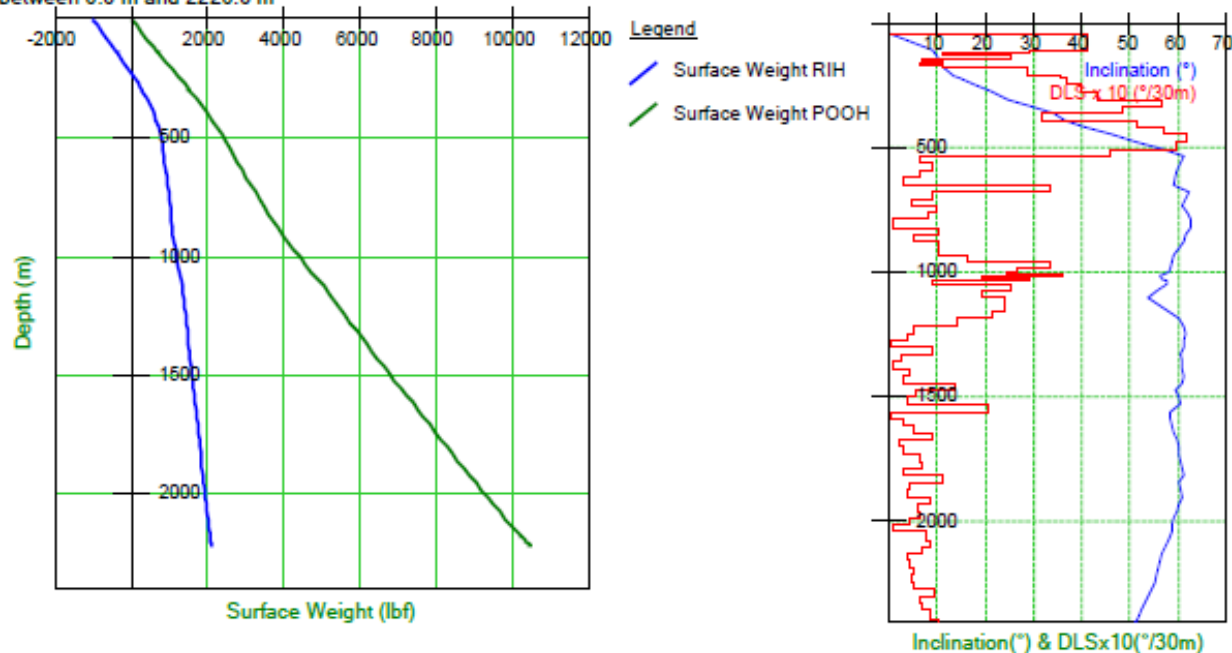
Well	C-4S
Min Restriction	2.25"
BHP	
BHT	

BHA DRAWING	DESCRIPTION	CONNECTION		ID INCH	OD INCH	TOOL LENGTH FT	CUMULATIVE LENGTH FT						
		UPHOLE	DOWNHOLE										
	External Dimple CT	1.5" CT	1.0" AMMT PIN		1.690	0.6	0.6						
	MHA Disconnect drop ball 5/8"	1.0" AMMT BOX	1.0" AMMT PIN		1.690	2.5	2.5						
	Circulating drop ball 1/2"												
	Burst Disc 5000 psi												
	5 ft Straight bar	1.0" AMMT BOX	1.0" AMMT PIN		1.690	5.00	7.50						
	5 ft Straight bar	1.0" AMMT BOX	1.0" AMMT PIN		1.690	3.00	10.50						
Upward Nozzle	1.0" AMMT BOX			1.690	1.00	11.50							
<table border="1"> <tr> <td>BHA LENGTH</td> <td>11.50</td> </tr> <tr> <td>MAXIMUM OD</td> <td>1.690</td> </tr> <tr> <td>MINIMUM ID</td> <td></td> </tr> </table>						BHA LENGTH	11.50	MAXIMUM OD	1.690	MINIMUM ID			
BHA LENGTH	11.50												
MAXIMUM OD	1.690												
MINIMUM ID													

Tubing Force Analysis

RIH and POOH

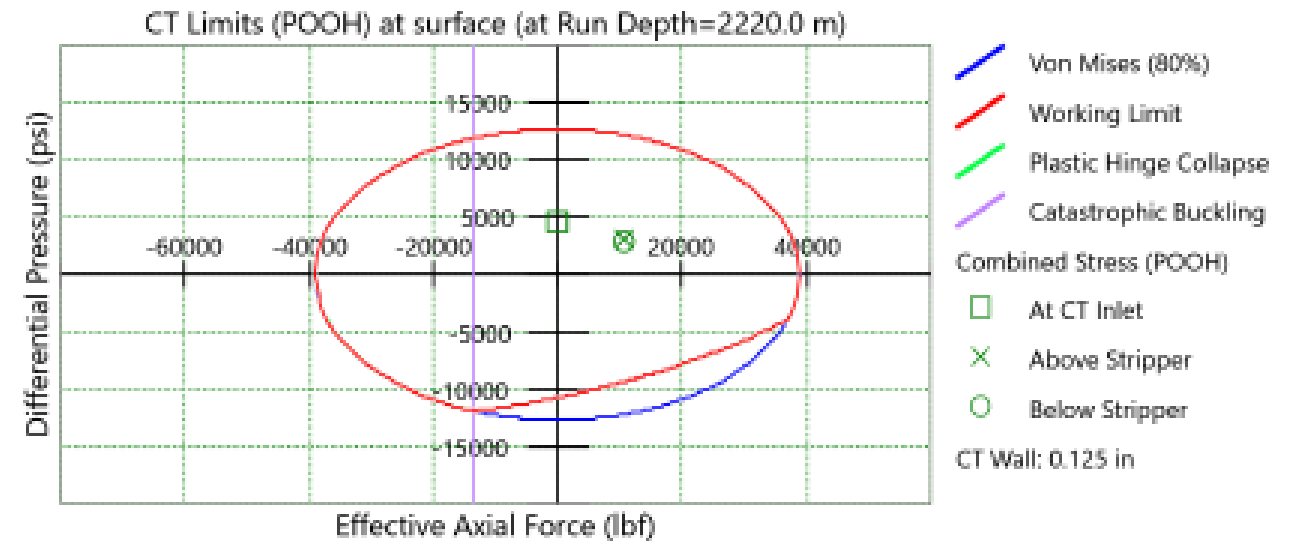
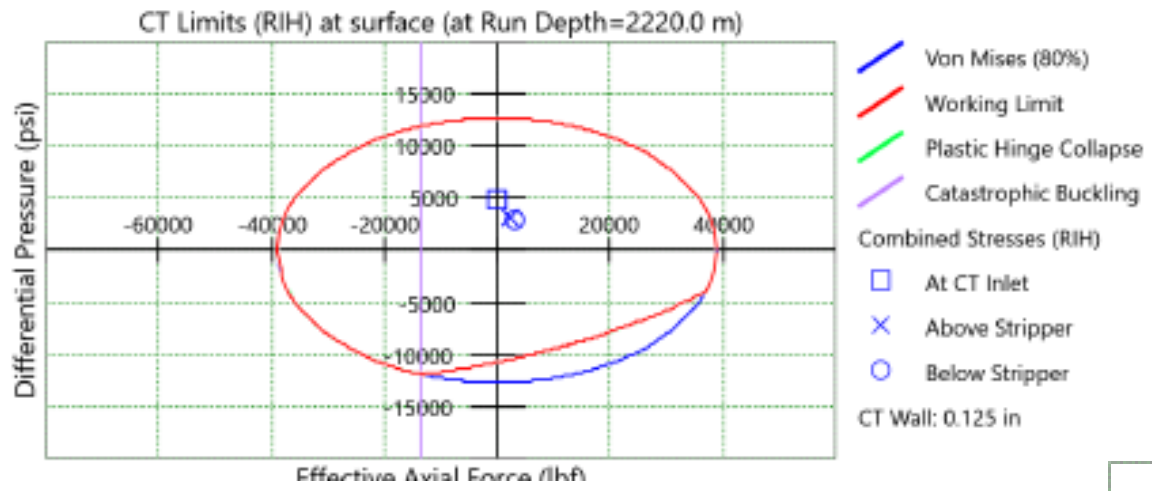
between 0.0 m and 2220.0 m



- B1 ■ RIH: CT and BHA can reach the target depth of 2220.0 m.
- no lockup detected
 - pipe yield limit not exceeded
 - pipe collapse limit not exceeded
 - BHA stress limit not exceeded
 - no catastrophic buckling detected
- B2 ■ POOH: CT and BHA can be retrieved to surface from the target depth of 2220.0 m.
- pipe yield limit not exceeded
 - pipe collapse limit not exceeded
 - BHA stress limit not exceeded

Tubing Force Analysis

CT Limits



THANK YOU