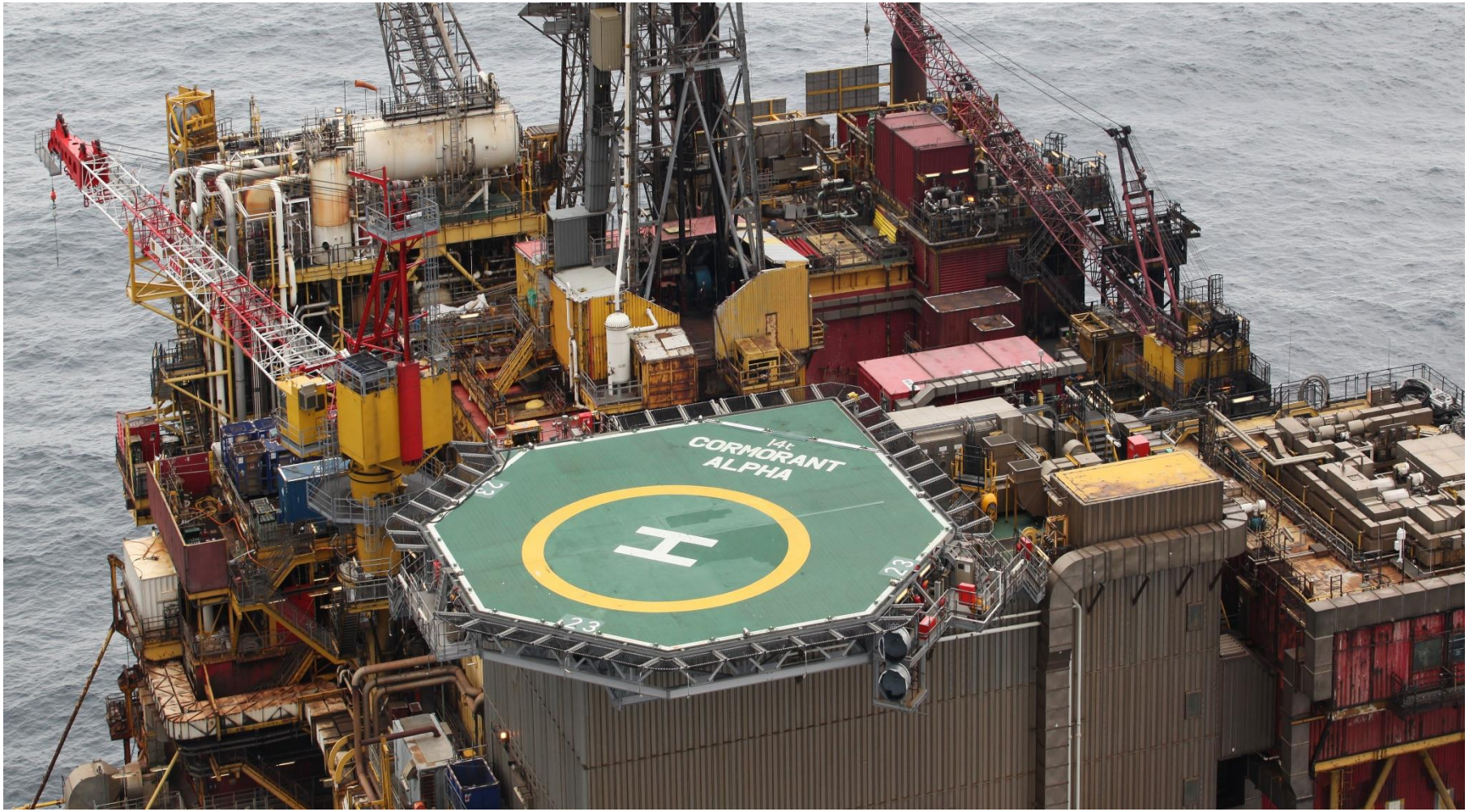
Pelican PU-P16S1 Abandonment Summary

Darren Bewick
Senior Completions & Interventions Engineer

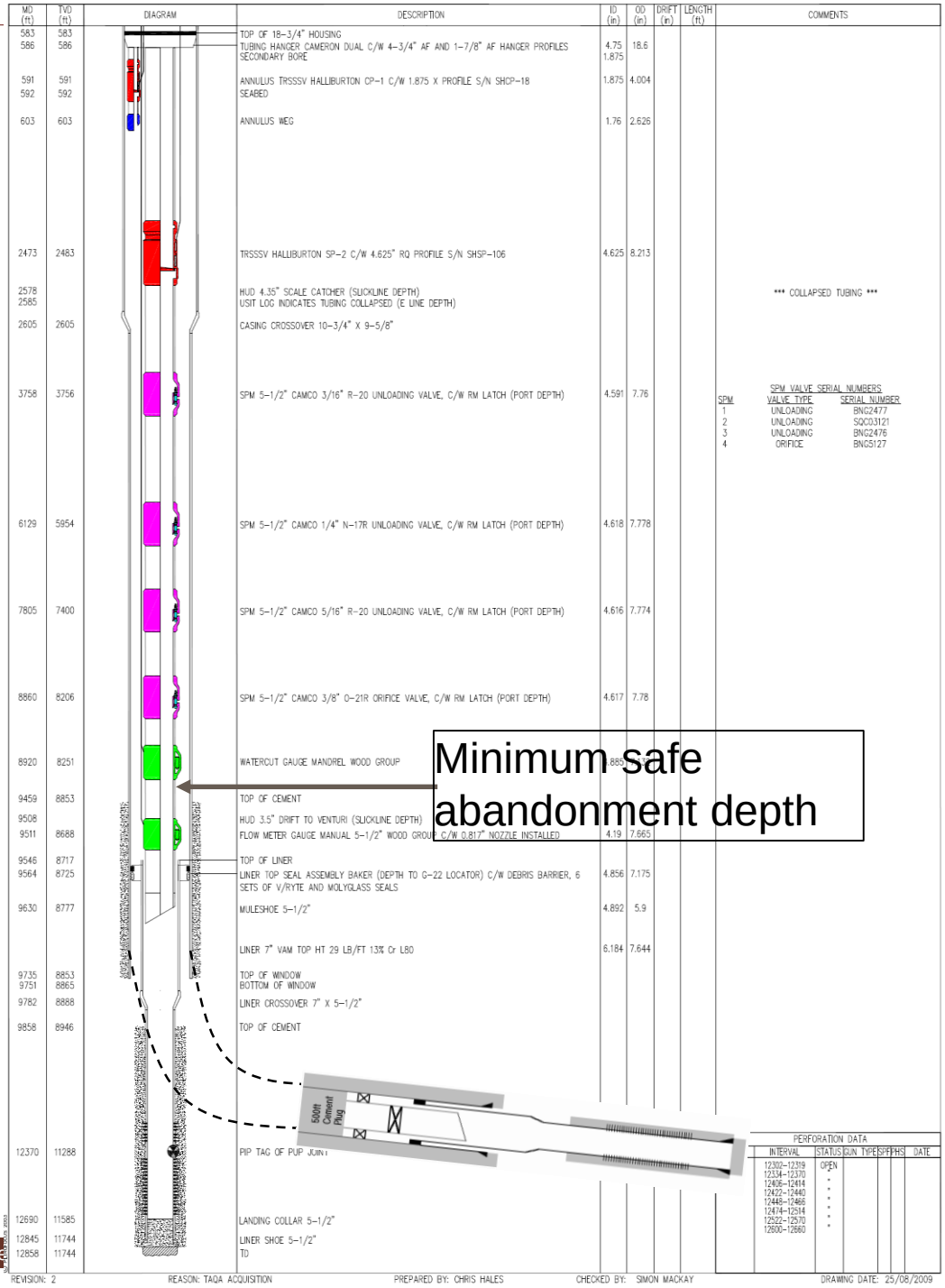


Agenda

- Introduction to P16 & its challenges
- Access to reservoir
- Completion recovery
- Final abandonment status

Introduction to PU-P16S1

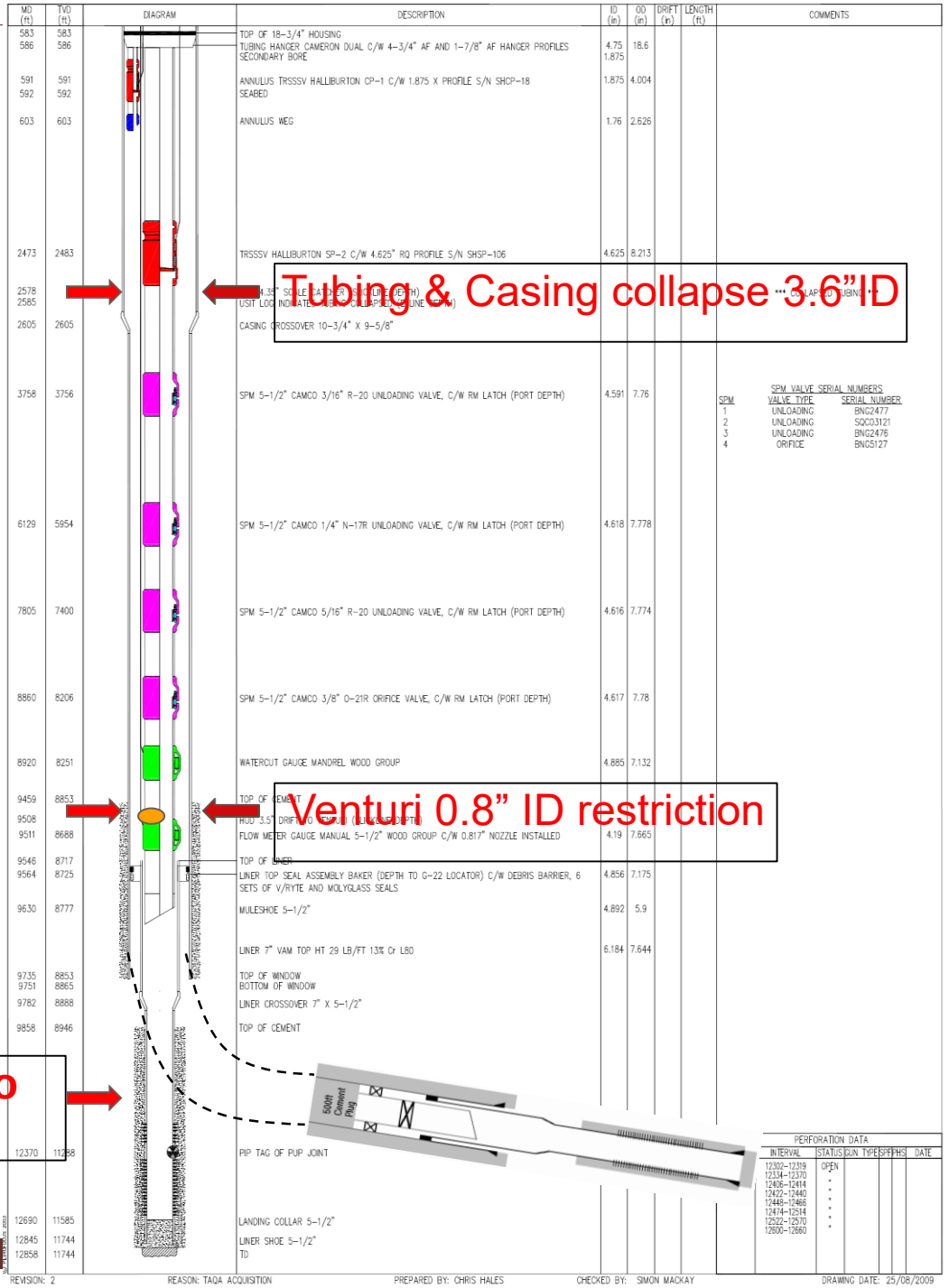
- Drilled from window at 9,735ft to TD at 12,858ft.
- 7” x 5 ½” liner (inclination 42° to 4° to 26° to 19°). Shoe @ 12,845ft, hanger @ 9,546ft. Completion seals into liner PBR.
- In 2004 tubing to annulus communications.
- 2005. Rig Well Intervention found collapsed tubing @ 2578ft (3.6” x 5.3”) over 20ft & tubing to casing contact by METT log. So casing may be collapsed. Base oil pumped & returns up annulus.
  3.5” drift passed through to 9507ft (Venturi). Unable to determine if leak from collapsed tubing or seal stack
- 2005. Two inflow tests of the SCSSSV were performed which confirmed integrity of the tubing above the safety valve.
- Continued to flow well under a dispensation.
- 2009. Attempted injectivity tests, Up to MAASP of 2,400psi – no injectivity. Performed scale dissolver in tree Displaced 70/30 glycol mix – no injection. Displaced 2 x scale dissolver, gradually displaced treatment through perfs. Flowed well. Displaced scale inhibitor into well.
- Continued to flow well under a dispensation until late 2010.
- 2012 under a review of well status, a prohibition notice was placed on the well.



PU-P16S1 – Well ISSUES

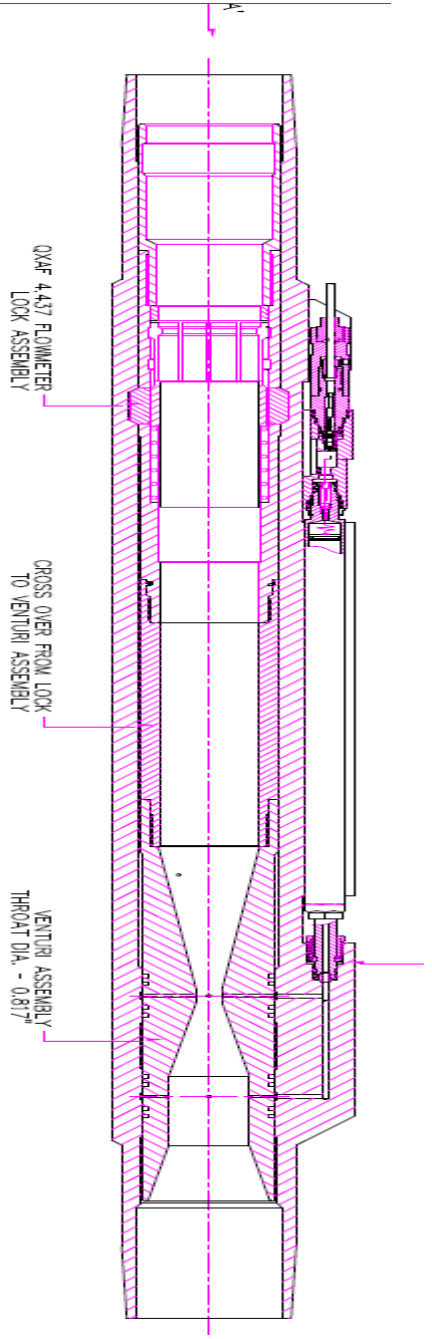
- Original well bore isolation can not be classed as primary barrier for permanent abandonment therefore need two barriers above 9-5/8” shoe.
- Tubing to Annuli communication
- Potential scale denying access
- Potential issues in the recovery of damaged tubing.
- Would also need to ‘open up’ the 10-¾” casing to get tubing out if collapsed.
- Bottom line is that the well needed a base to safely carry out operations to place abandonment plugs due to the potential issues with tubing & casing collapse.

We need to get access to here



Lower Tubing Restriction

- Tubing restriction preventing access to reservoir
  - Flowmeter Gauge / Mandrel set at 9,511ft.
  - **0.817” ID through Venturi**, **(About the size of a 20p piece).**
  - Lock is not anti rotational so whole assembly would spin whilst milling however some resistance would be given by the dogs in the profile and the two sets of o-rings on the venturi mandrel.
  - Run on QXAF Uniset Lock Mandrel, body **OD 4.477”.**
  - Tubing Restriction **3.6” ID.**

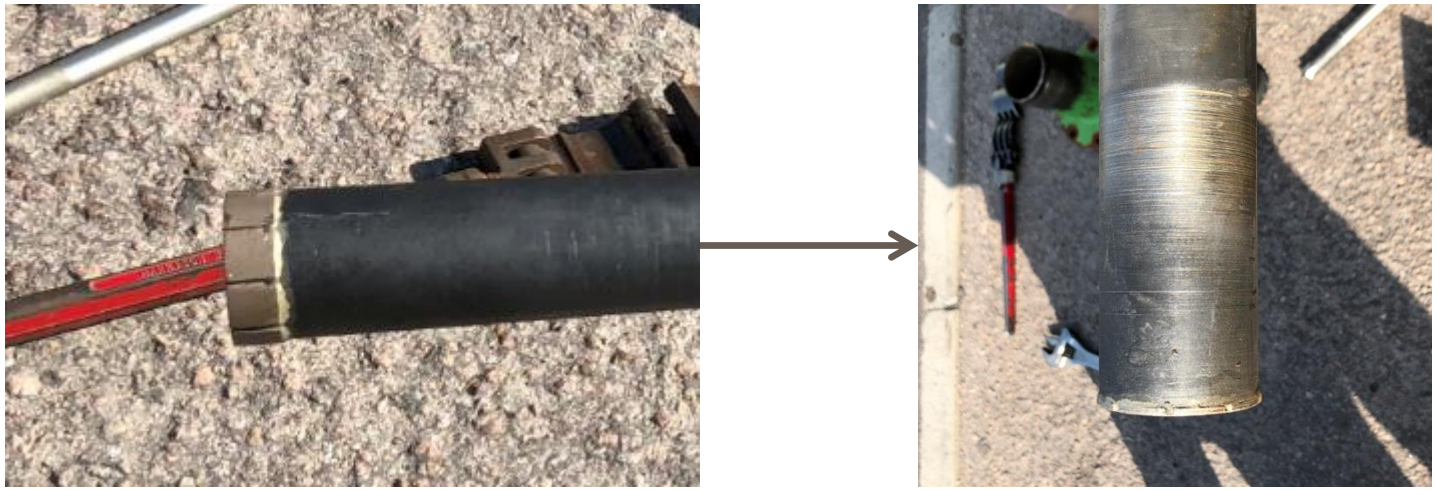


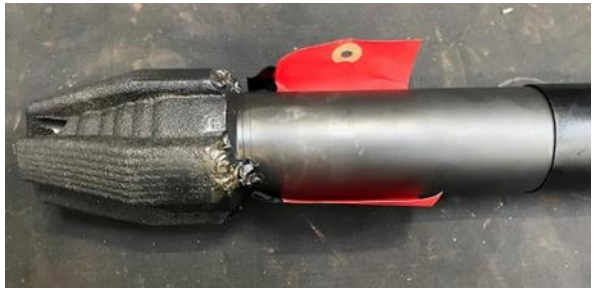
NOTE:-MATERIAL 17-4 PH CONDITION H1150+1150 HARDNESS 29-33 Rc
MIN YIELD 105,000 PSI TO NACE MR-01 75(LATEST REV).

Lower Tubing Restriction- Tractor Milling Trials

- 4.437” QXAF Lock c/w venturi mandrel did not exist so a duplicate for the Tractor Milling trials had to be manufactured.
- Test Fixture had to be manufactured.
- Anti rotation sleeve designed and manufactured from lessons learned during onshore tractor milling trials.

Lower Tubing Restriction- Mill bits tried during trials

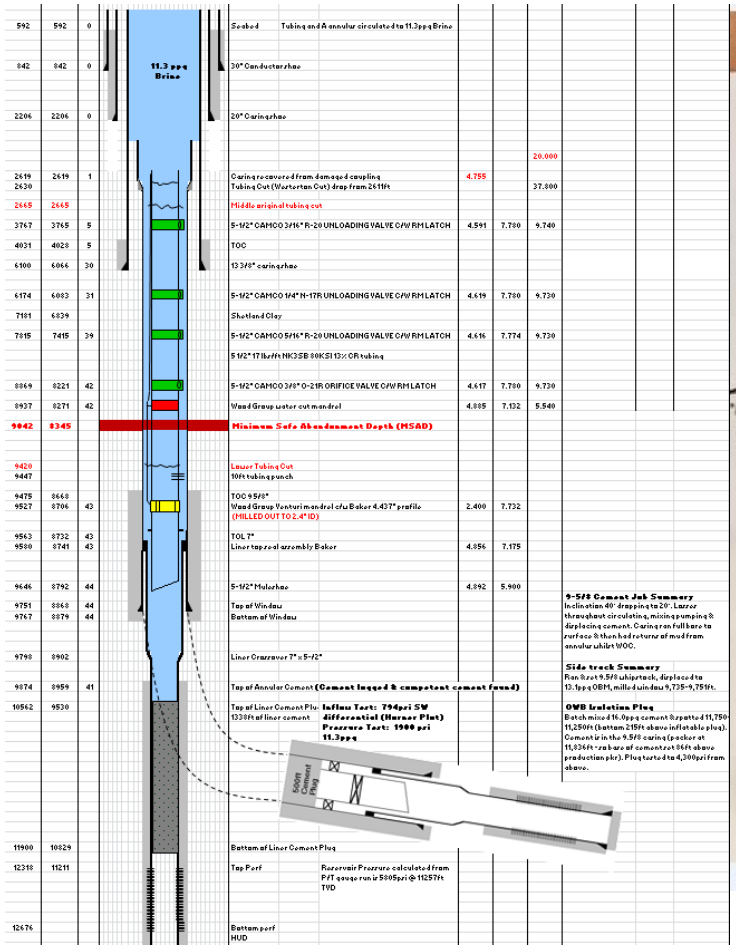


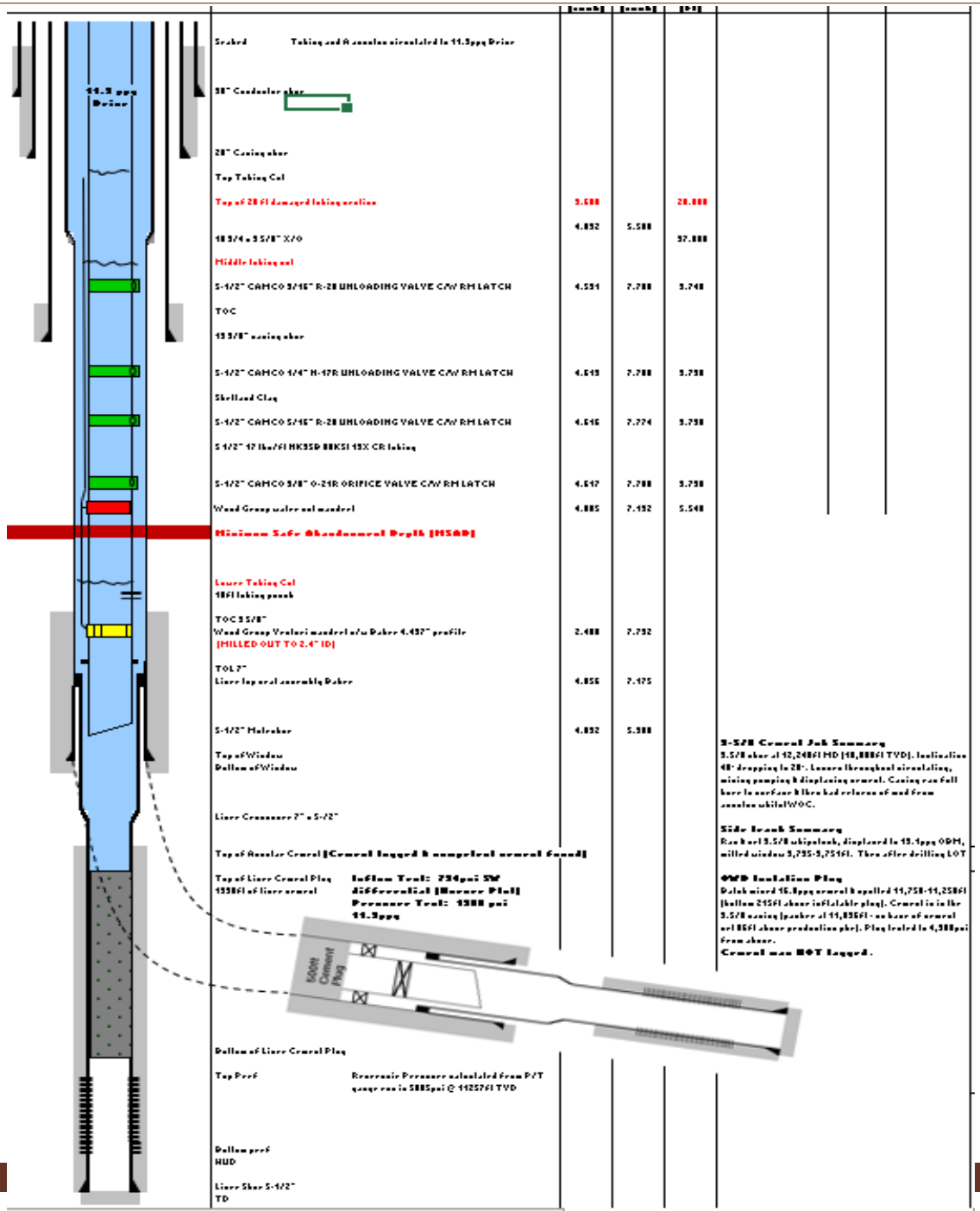


- CT could not be used for milling as assembly rotated.
- Cementing up assembly ruled out due to need to keep hole to allow bull heading if no access was achieved.

Lower Tubing Restriction- Offshore Tractor Milling

- Nine runs in total (Inc setting anti rotation sleeve)
- Three miss runs
- Three milling runs giving a total effective milling time of 64 hours

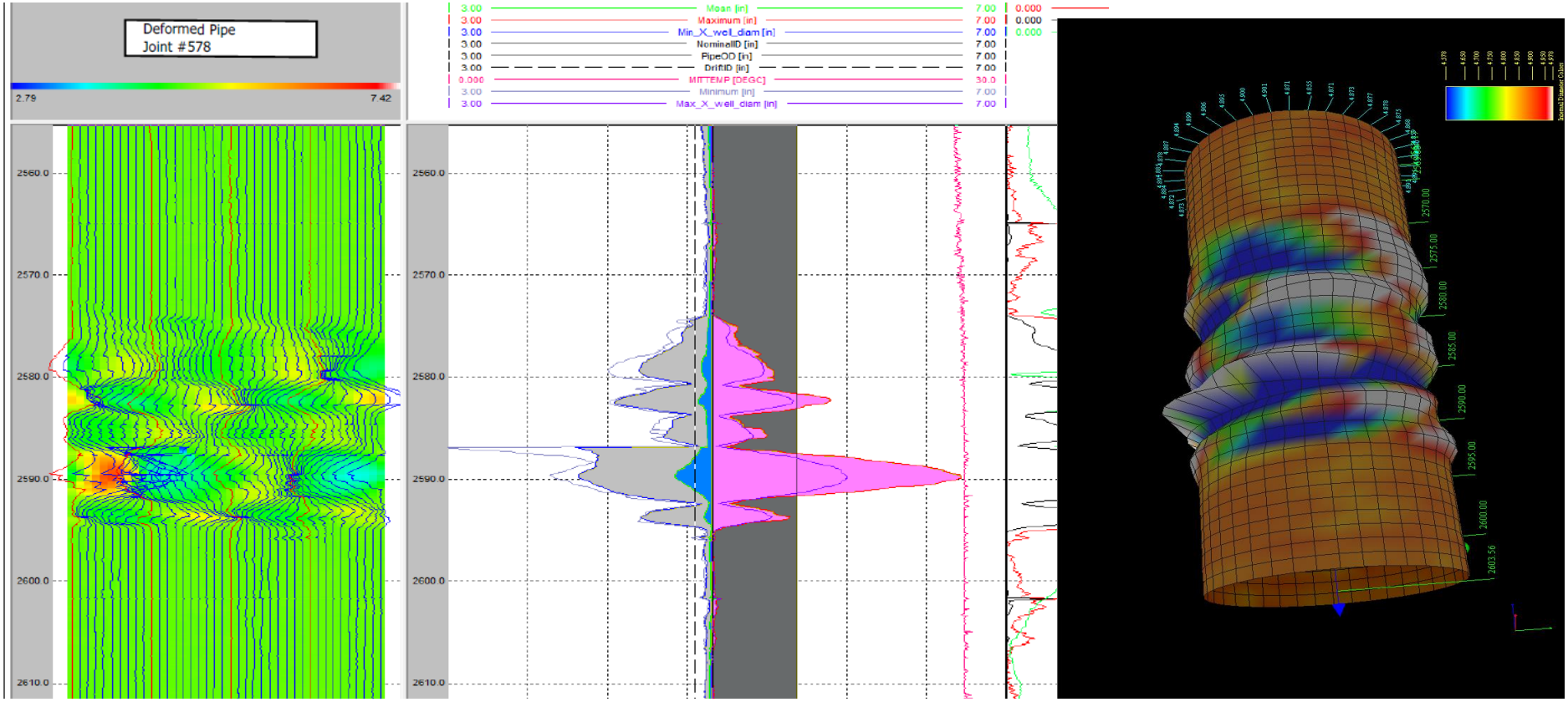




Cut tubing in three places:-

- One deep
- One below damaged section
- One above damaged section

Tubing restriction calliper results



- Two additional tubing cuts (5 in total) required to fish damaged tubing section.
- One with a blade cutter (above coupling) and one with a power cutter (mid damage)

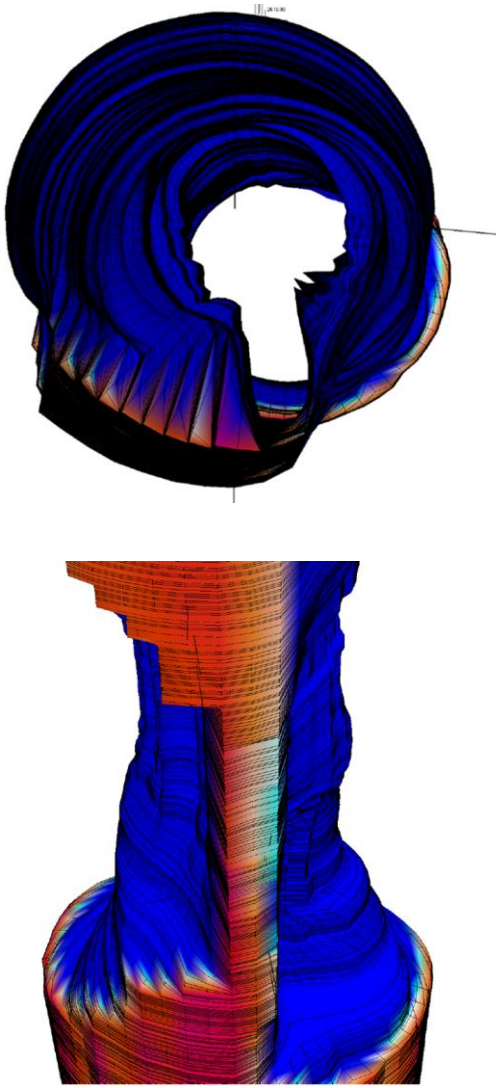
Completion Tubing Fish #1 Recovered 2538-2601 ft

- Bent and Ovalled
- 55 ft Gauge Line recovered on separate run

Completion Tubing Fish #2 Recovered 2601-2611 ft

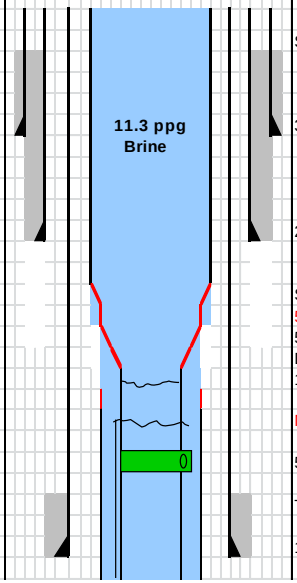
- Ovalled and Split (3 ft from lower end). 5 ft Gauge Line recovered

10-3/4” casing collapse 5.26”id

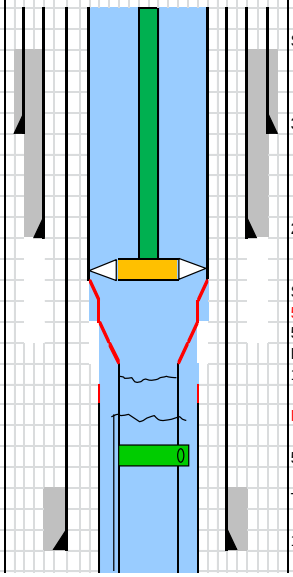


- 3 sizes of casing swages tried from 8-1/8” down to 6-3/8”
- Only 8ft of 20ft damaged section opened up

DEPTH AHBDF	DEPTH TVBDF	INC Deg	SCHEMATIC	DESCRIPTION
592	592	0		Seabed — Tubing and A annulus circulated to 11.3ppg Brine
842	842	0		30" Conductor shoe
2206	2206	0		20" Casing shoe
2595	2595			Start of Casing ID restriction
2611	2611			5-1/2" Tubing recovered from 2611ft (damaged section)
2616	2616			5-1/2" Tubing Cut (Westerton Cut)
				Damaged Casing (10-3/4" x 9-5/8" x/o)
2619	2619	1		10 3/4 x 9 5/8" X/O
2665	2665			Middle tubing cut
3767	3765	5		5-1/2" CAMCO 3/16" R-20 UNLOADING VALVE C/W RM LATCH
4031	4028	5		TOC
6100	6066	30		13 3/8" casing shoe



DEPTH AHBDF	DEPTH TVBDF	INC Deg	SCHEMATIC	DESCRIPTION
592	592	0		Seabed — Tubing and A annulus circulated to 11.3ppg Brine
842	842	0		30" Conductor shoe
2206	2206	0		20" Casing shoe
2595	2595			Start of Casing ID restriction
2611	2611			5-1/2" Tubing recovered from 2611ft (damaged section)
2616	2616			5-1/2" Tubing Cut (Westerton Cut)
				Damaged Casing (10-3/4" x 9-5/8" x/o)
2619	2619	1		10 3/4 x 9 5/8" X/O
2665	2665			Middle tubing cut
3767	3765	5		5-1/2" CAMCO 3/16" R-20 UNLOADING VALVE C/W RM LATCH
4031	4028	5		TOC
6100	6066	30		13 3/8" casing shoe



Damaged Casing Recovery

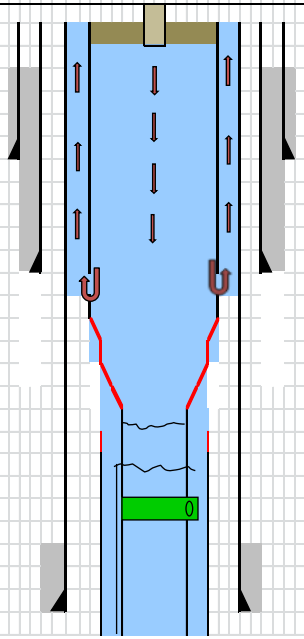
Step 1: Starting Point

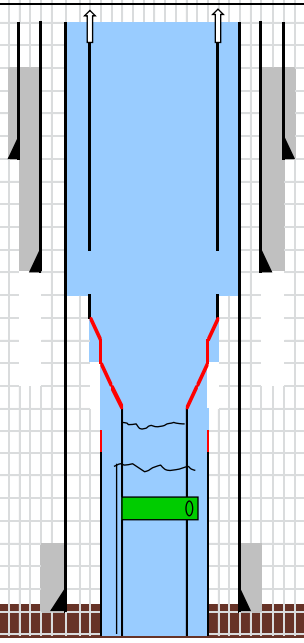
- Damaged Tubing recovered from 2611ft
- Restriction in 10-3/4” Casing from 2595ft
- Casing restriction 5.26” Min ID
- Expected length of damaged casing is 20ft
- Tubing cuts at 2616ft, 2665ft & 9420ft
- HUD 3.5” 2623ft inside 5-1/2” tubing

Step 2: Cut Casing

Hazards:

- Making cut on first attempt
- Damage to 13-3/8”

DEPTH AHBDF	DEPTH TVBDF	INC Deg	SCHEMATIC	DESCRIPTION	
592	592	0		Seabed	Tubing and A annulus circulated to 11.3ppg Brine
842	842	0		30" Conductor shoe	
2206	2206	0		20" Casing shoe	
2595				10-3/4" Casing cut	
2595	2595			Start of Casing ID restriction	
2611	2611			5-1/2" Tubing recovered from 2611ft (damaged section)	
2616	2616			5-1/2" Tubing Cut (Westerton Cut)	
				Damaged Casing (10-3/4" x 9-5/8" x/o)	
2619	2619	1		10 3/4 x 9 5/8" X/O	
2665	2665			Middle tubing cut	
3767	3765	5		5-1/2" CAMCO 3/16" R-20 UNLOADING VALVE C/W RM LATCH	
4031	4028	5		TOC	
6100	6066	30		13 3/8" casing shoe	

DEPTH AHBDF	DEPTH TVBDF	INC Deg	SCHEMATIC	DESCRIPTION	
592	592	0		Seabed	Tubing and A annulus circulated to 11.3ppg Brine
842	842	0		30" Conductor shoe	
2206	2206	0		20" Casing shoe	
2595				10-3/4" Casing cut	
2595	2595			Start of Casing ID restriction	
2611	2611			5-1/2" Tubing recovered from 2611ft (damaged section)	
2616	2616			5-1/2" Tubing Cut (Westerton Cut)	
				Damaged Casing (10-3/4" x 9-5/8" x/o)	
2619	2619	1		10 3/4 x 9 5/8" X/O	
2665	2665			Middle tubing cut	
3767	3765	5		5-1/2" CAMCO 3/16" R-20 UNLOADING VALVE C/W RM LATCH	
4031	4028	5		TOC	
6100	6066	30		13 3/8" casing shoe	

Step 3: Circulate Annulus Contents

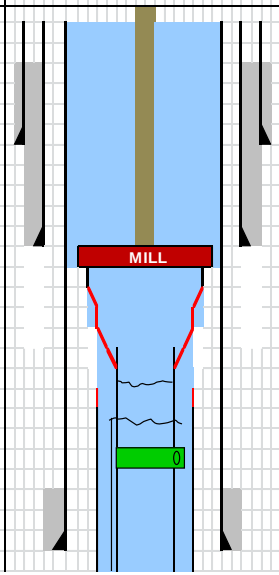
Hazards:

- Large volume of slops created and fluids required with limited handling capacity
- Ability to lift out annulus contents

Step 4: Recover Casing

Hazards:

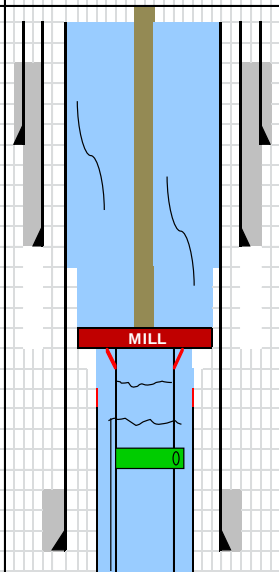
- Additional length of casing recovered
- Damage or restrictions within the 13-3/8” casing

DEPTH AHBDF	DEPTH TVBDF	INC Deg	SCHEMATIC	DESCRIPTION	
592	592	0		Seabed	Tubing and A annulus circulated to 11.3ppg Brine
842	842	0		30" Conductor shoe	
2206	2206	0		20" Casing shoe	
2595				10-3/4" Casing cut	
2595	2595			Start of Casing ID restriction	
2611	2611			5-1/2" Tubing recovered from 2611ft (damaged section)	
2616	2616			5-1/2" Tubing Cut (Westerton Cut)	
				Damaged Casing (10-3/4" x 9-5/8" x/o)	
2619	2619	1		10 3/4 x 9 5/8" X/O	
2665	2665			Middle tubing cut	
3767	3765	5		5-1/2" CAMCO 3/16" R-20 UNLOADING VALVE C/W RM LATCH	
4031	4028	5		TOC	
6100	6066	30		13 3/8" casing shoe	

Step 5: Mill Damaged Production Casing

Hazards:

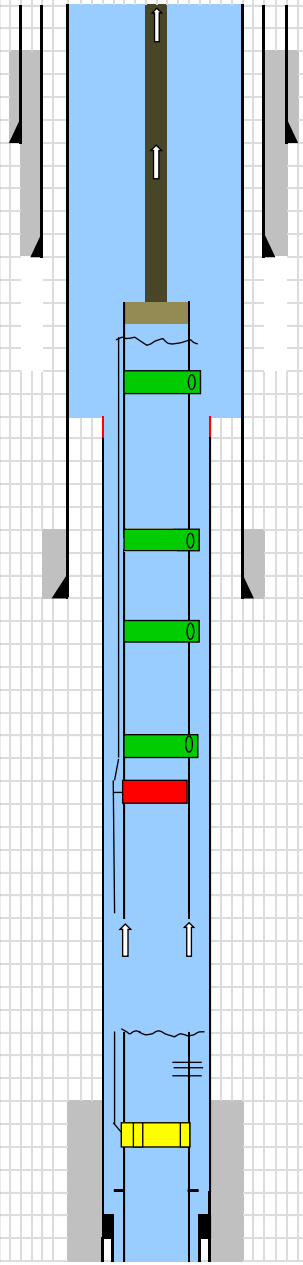
- Ability to mill damaged casing
- Milling 13-3/8” casing
- Swarf handling

DEPTH AHBDF	DEPTH TVBDF	INC Deg	SCHEMATIC	DESCRIPTION	
592	592	0		Seabed	Tubing and A annulus circulated to 11.3ppg Brine
842	842	0		30" Conductor shoe	
2206	2206	0		20" Casing shoe	
2595				10-3/4" Casing cut	
2595	2595			Start of Casing ID restriction	
2611	2611			5-1/2" Tubing recovered from 2611ft (damaged section)	
2616	2616			5-1/2" Tubing Cut (Westerton Cut)	
				Damaged Casing (10-3/4" x 9-5/8" x/o)	
2619	2619	1		10 3/4 x 9 5/8" X/O	
2665	2665			Middle tubing cut	
3767	3765	5		5-1/2" CAMCO 3/16" R-20 UNLOADING VALVE C/W RM LATCH	
4031	4028	5		TOC	
6100	6066	30		13 3/8" casing shoe	

Step 6: Mill Damaged Production Casing & Tubing to below damaged area

Hazards:

- Ability to mill casing and tubing concurrently
- Tubing rotating
- Swarf handling

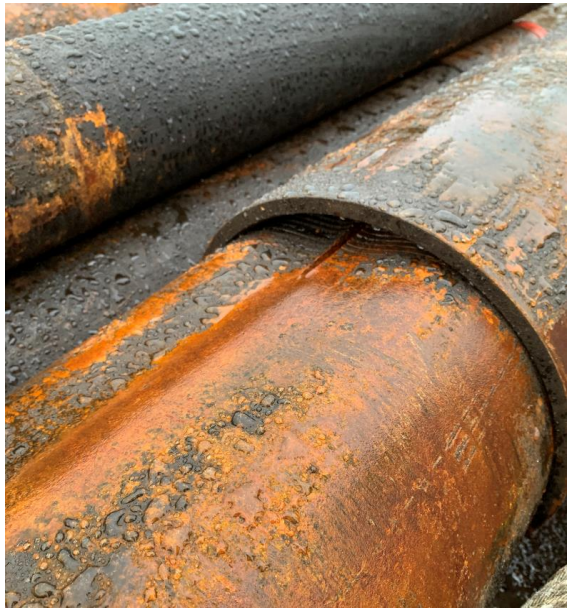
DEPTH AHBDF	DEPTH TVBDF	INC Deg	SCHEMATIC	DESCRIPTION
592	592	0		Seabed — Tubing and A annulus circulated to 11.3ppg Brine
842	842	0		30" Conductor shoe
2206	2206	0		20" Casing shoe
2595				10-3/4" Casing cut
2595	2595			Start of Casing ID restriction
2611	2611			5-1/2" Tubing recovered from 2611ft (damaged section)
2616	2616			5-1/2" Tubing Cut (Westerton Cut)
				Damaged Casing (10-3/4" x 9-5/8" x/o)
2619	2619	1		10 3/4 x 9 5/8" X/O
2665	2665			Middle tubing cut
3767	3765	5		5-1/2" CAMCO 3/16" R-20 UNLOADING VALVE C/W RM LATCH
4031	4028	5		TOC
6100	6066	30		13 3/8" casing shoe
6174	6083	31		5-1/2" CAMCO 1/4" N-17R UNLOADING VALVE C/W RM LATCH
7181	6839			Shetland Clay
7815	7415	39		5-1/2" CAMCO 5/16" R-20 UNLOADING VALVE C/W RM LATCH
				5 1/2" 17 lbs/ft NK3SB 80KSI 13% CR tubing
8869	8221	42		5-1/2" CAMCO 3/8" O-21R ORIFICE VALVE C/W RM LATCH
8937	8271	42		Wood Group water cut mandrel
9042	**8345**			**Minimum Safe Abandonment Depth (MSAD)**
9420				Lower Tubing Cut
9447				10ft tubing punch
9475	8668			TOC 9 5/8"
9527	8706	43		Wood Group Venturi mandrel c/w Baker 4.437" profile
				(MILLED OUT TO 2.4" ID)
9563	8732	43		TOL 7"
9580	8741	43		Liner top seal assembly Baker

Step 7: Recover Remaining Tubing

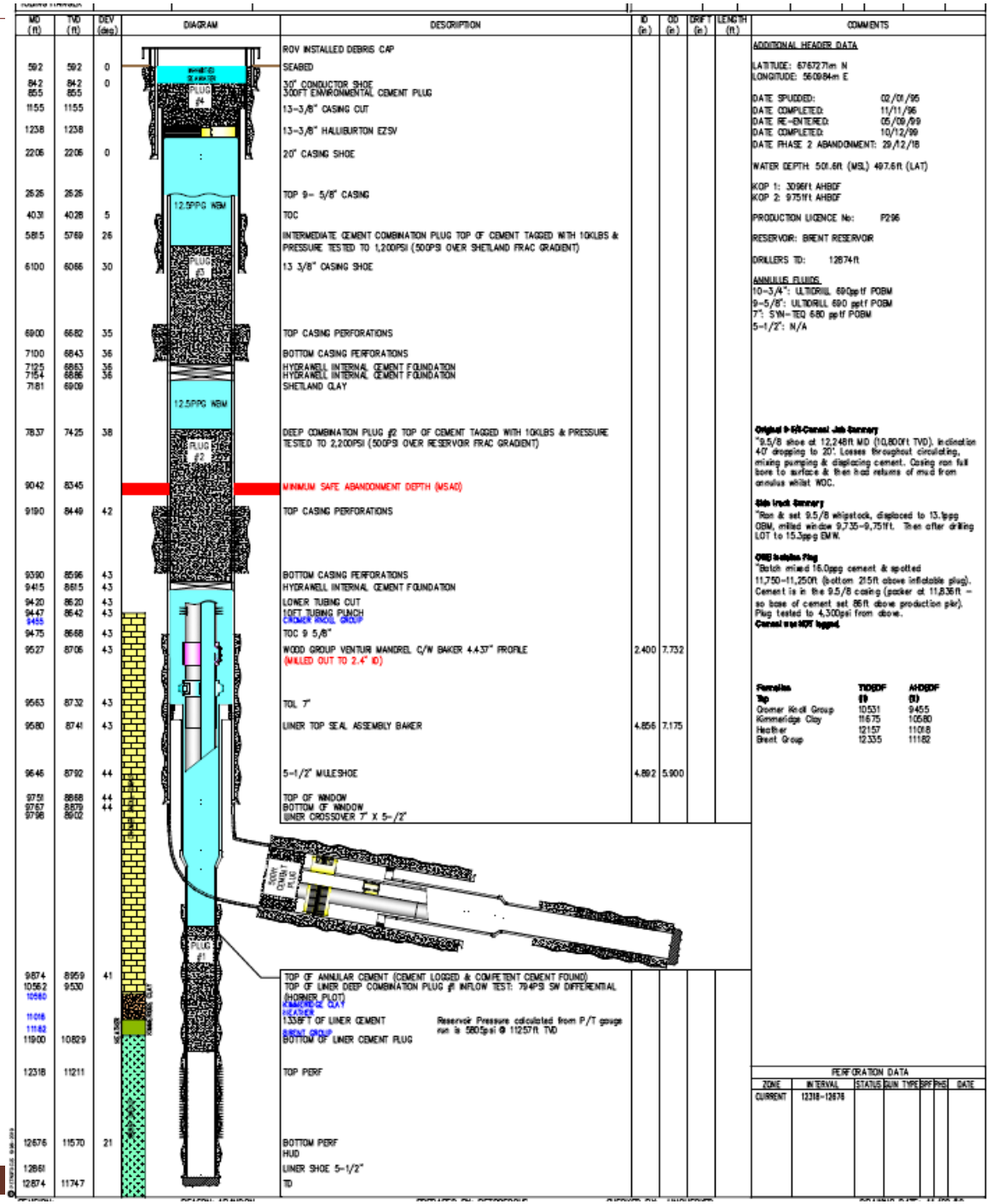
Hazards:

- Re-engaging tubing
- Production casing damage more extensive than tubing damage with further restrictions

Recovered Casing



Final abandonment status.




TAQA