



F-17 TTAC

Stavanger May 26th, 2011 Thore Bergsaker

The Challenge



The F-17 TTAC Challenge

Restore Integrity without being able to reach communication depth

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Restore Production (3000 bopd)

F-17



F-17

Completed Dec 1997

Prop frac Jan 1998

Tubing collapse identified Dec 2010

@ 3179 m MD (2438 m TVD)

Packer @ 3317 m MD

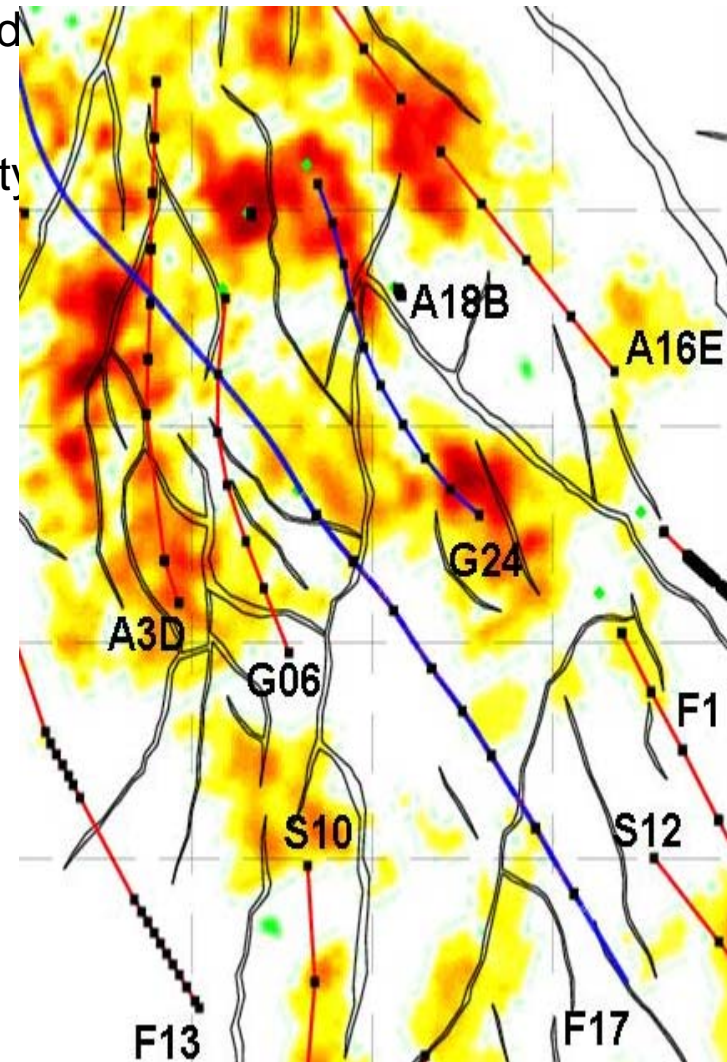
Echometer indicates a leak rate of 9,5 l/min.

Operator : BP Norway	Installation : Valhall WP Platform	
Approved by : <i>M. Helle 21/1-20</i>	Well bore name : 2/8-F-17 T3	
Checked by : T. Skjerve	Completed date : 03.01.1998	
	Recompleted date :	
	Revision no : 6	
	Updated by/Date : TS/16.01.11	
	Well details/status : Platform/Producer/Shut In	
Reference documentation: Valhall well history, End of well reports, Well files		
Well integrity problem(s) <i>If any, indicated by ⇨</i>		
Annuli	MAASP, psi	MOP, psi
A, 5 1/2" x 13 3/8"	785	700
B, 13 3/8" x 20"	339	200
Well barrier elements	Table ref. Norsok D-010 Revd	Test Pressure(Psi)/Date
Primary barrier		
9-5/8" Liner Cement	22	Squeeze job, 1.58sg EMW LOT
7-5/8" Liner Cement	22	100% returns, cement in returns
7" x 5 1/2" Liner Cement	22	100% returns, cement in returns
7" x 5 1/2" Liner	2	4500 w/1.59sg/30.12.1997
7" x 5 1/2" Liner Top Packer	43	4500 w/1.59sg/30.12.1997
Production Packer	7	5000/06.01.1998
Gauge Carrier	29	5000/06.01.1998
Tubing	25	5000/03.01.1998
TRSCSSV	8	2900/03.01.1998
Comments		
Secondary barrier		
9-5/8" Liner	2	4500 w/1.75sg/21.11.1997
9-5/8" Liner Top Packer	43	4500 w/1.75sg/21.11.1997
13-3/8" Casing Cement	22	2.5% losses, 1.89sg EMW FIT
13-3/8" Casing	2	4500/07.11.1997
Wellhead	5	4500/06.01.1998
Tubing Hanger	10	6500/03.01.1998
Annulus Valve	12	A-Annulus
X-mas tree	33	5800/05.01.1998
Comments		
Casing, Liner & Tubing	Burst, Psi	Collapse, Psi
20" Csg, X-65, 203ppf, H60MT	5690	4470
20" Csg, X-56, 94ppf, E60MT	2150	520
13 3/8" Csg, P-110, 72ppf, NV	7400	2880
9 5/8" Lnr, C-95, 53.5ppf, H-521/NV	9410	7340
7 5/8" Lnr, Q-125, 33.7ppf, H-521	12340	8340
7" Lnr, P-110, 32ppf, NV	12450	10780
5 1/2" Lnr, Q-125, 45.7ppf, H-WT46	37270	35330
5 1/2" Tbg, N-80, 20ppf, NV	6190	8930
4 1/2" Tbg, L-80, 12.8ppf, NV	8430	7500*
* Values used in MAASP calculations are: Collapse: 4 1/2" Tbg (42.06%) 3950psi (including 1.1 SF)		
Well Integrity Comments:		
Barrier Element Failure Leak into A-Annulus discovered in June 2010. Top of cement for 9-5/8" drilling liner is uncertain, squeeze job through FO collar		
Issues with scale in the past - Scale milling performed in May 2005		
Leak from tubing into SCSSV control line		
Indications of liner collapse at 3742mMD		
MFCT performed December 2010 down to 3165mMD indicated max penetration 17.73% in 5 1/2" tubing and 42.06% in 4 1/2" tubing, and depositions at 1781mMD and 3040mMD		

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- Tubing collapse not only a issue for continued production but also for P&A
- P&A of reservoir zones a major issue (integrity and enhanced recovery – where is water injection going ?)
- Tubing Collapse assumed to be due to fault movement (seismic confirmed a fault line at this depth)
- Extent of collapse assumed to be 3-5 m
- Numerous other wells on Valhall have confirmed collapses.
- Geometric Polymeric Seal Technology
- Thermatek





Geometric Polymeric Seals

Specialised patented solid polymeric material developed for oil and gas applications

Pump-deployed thru-wellhead to repair annular integrity

Fast response to well re-instatement & repair



Membrane to facilitate the forming of a external "rivet" providing a permanent seal qualified to 5000psi

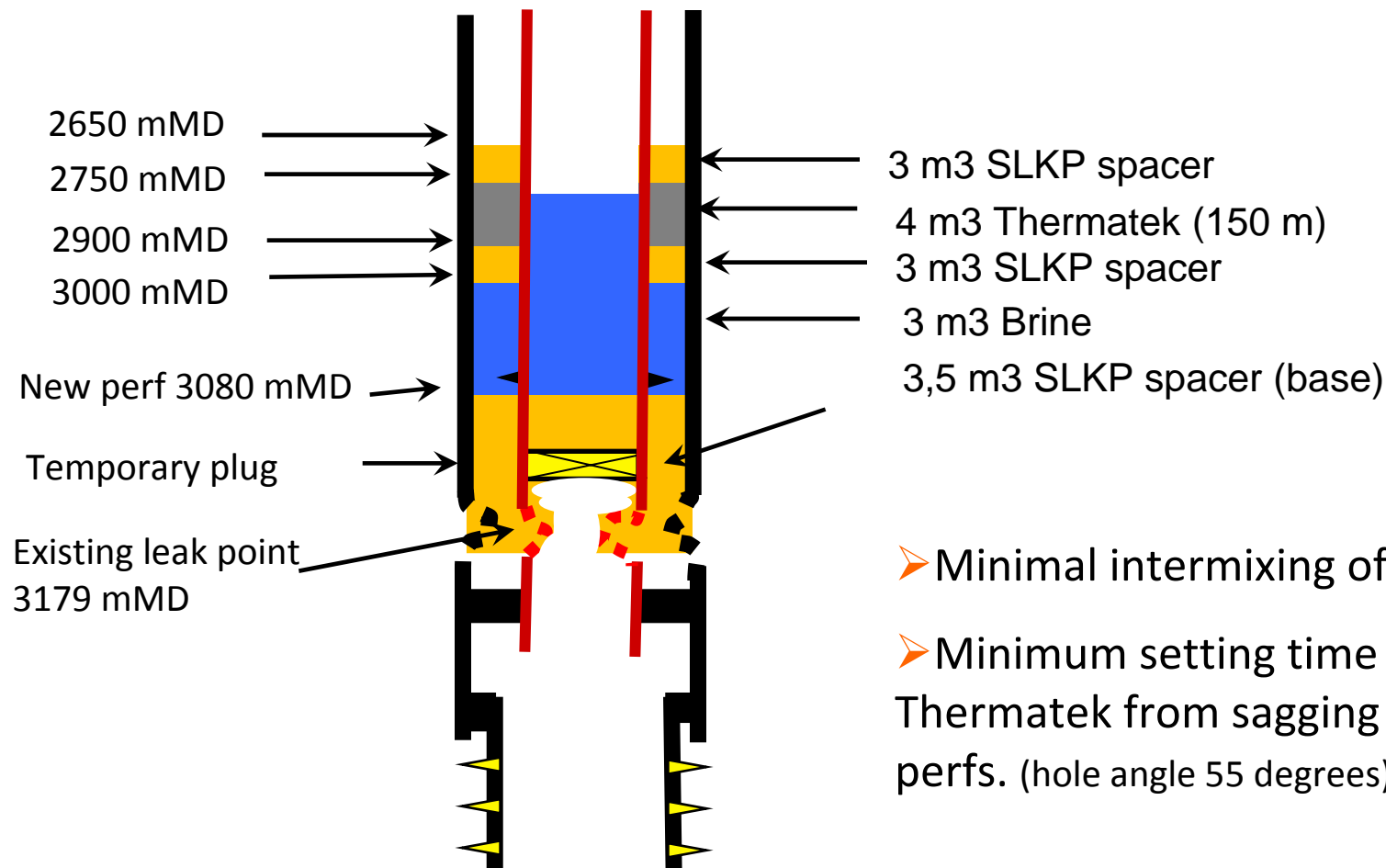
Molecular gel to create high pressure locking seal

Hard Core to provide strength tailored to client casing or tubing specifications

Objectives not met

- **Hole size determination not possible**
 - **Geometry of holes not know**
- **Gel carrier fluid/ball displacement**

Thermatek – F-17 Proposal





Operational Summary:

- **Drift run**
- **Install temporary plug – dump SLKP on top of plug**
- **Perforate Tubing**
- **Static/dynamic temperature survey**
- **Pump Spacer Base Pill down tubing (bullhead)**
- **Pump Spacer – Thermatek – Spacer (taking returns)**
- **Inflow/pressure test Thermatek annulus plug**
- **Remove plug**
- **Hand over well to production.**