



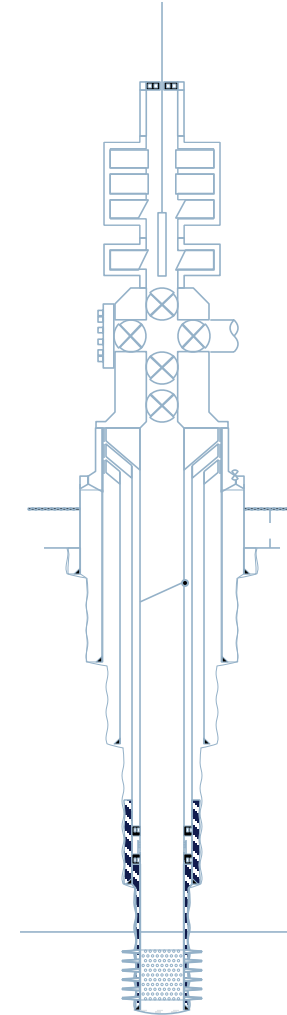
Digitalized Wellbore Schematics Enhance Collaboration

Schlumberger Digital Forum 2022

Lucerne

Agenda

- Equinor strategic pillars
- Old way versus new way
- Wellbarrier solution
 - Why Wellbarrier?
 - Foundation
 - Planning (DrillPlan integration)
 - Integrity Management
- Intuitive and consistent
- Results
- User feedback
- Next steps



Equinor strategic pillars

Always safe

High value

Low carbon

Everyone home safe



- No well control/well integrity incidents
- No people in the line of fire
- No hand and finger injuries
- Always compliant and no security breaches

Industrialize to increase well deliveries



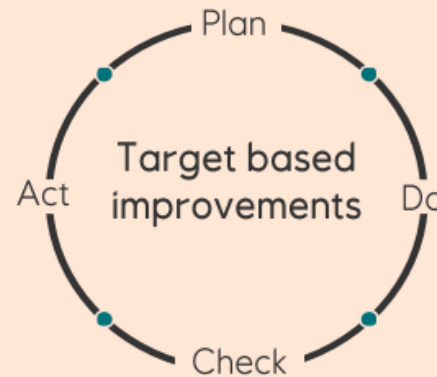
- Ensure two-year maturity in plans and increase use of standard well design across well portfolio
- Close the gap to perfect well
- Accelerate value realization from Digital Well Delivery activities

Drive towards zero emission operations



- Optimize energy efficiency on all rigs
- Drive electrification of drilling units
- Explore use of green fuels including hydrogen

D&W priorities towards 2025



Stretch target 2022

Strategic target 2025

Always safe

0 WCI
0.2 SIF
1.5 TRIF

0

High value

- 30%*
Well design cost with SUB
- 30%*
Reduced gap to perfect well in execution

- 50%
Well cost EPN IOR wells

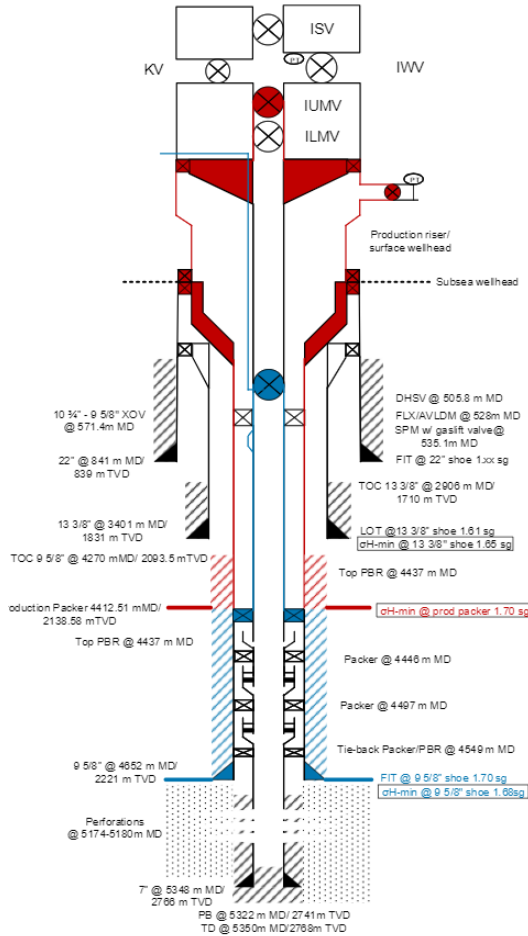
Low carbon

- 20%*
CO2 emissions

- 50%*
CO2 emissions

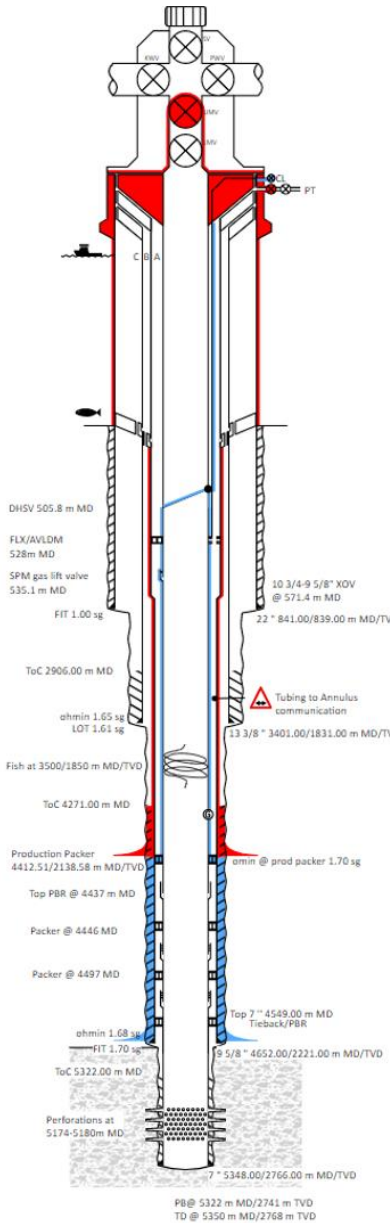
*relative to baseline 2020

Two barrier philosophy (old v new)



Traditional "spreadsheet" approach

- 4-6 hours to prepare
- Inconsistent formats
- Difficult to maintain
- Version control
- Disconnected
- Data integrity challenges



Wellbarrier approach

- 10-20 minutes to prepare
- Standard format
- Easy to maintain
- Fully auditable
- DrillPlan integration
- Strong data integrity

Common understanding

WELL BARRIERS
WELLBARRIER

Illustration name: EQ.P 4.1-a1 rev. 2 - A-04A
 Prepared by: Fabio Almeida
 Verified by:
 Modified date: 20-Jul-2022
 Status: Current - As Built - Active

Search, Chat, User, Share icons

DHSV 237.00/237.00 m MD/TVD
 ToC 2431.00 m MD
 FIT 13.01b/gal
 Production packer 4267.00/2099.00 m MD/TVD
 ToC 4453.00 m MD
 Middle completion packer 4507.00/2180.00 m MD/TVD
 Gravel pack packer 4951.00/2303.00 m MD/TVD
 FIT 13.9 lb/gal
 ESP sensor 4306.89/2112.54 m MD/TVD
 Perforated joint
 Top of reservoir 5060.00/2312.00 m MD/TVD

Producer - A-04A

Primary barrier elements			
Element	Qualification	Monitoring	
Formation (in-situ) - EAC 51	EAC FIT test to 13.9 lb/gal	Not accessible	●
Production casing annulus cement - EAC 22	EAC Job performance DBR: 22/10/2015	B-annulus pressure	●
9 5/8" x 10 3/4" production casing - EAC 2	EAC Pressure test to 3700 psi DBR: 18/10/2015	B-annulus pressure	●
Production packer - EAC 7	EAC Pressure test to 3100 psi DBR: 15/11/2015	A-annulus pressure	●
5 1/2" Tubing - EAC 25	EAC Pressure test to 3360 psi DBR: 15/11/2015	A-annulus pressure	●
Downhole safety valve and control line - EAC 8	EAC Inflow test to 2550 psi and CL pressure test to 7500 psi DBR: 15/11/2015 and Well Handover: 18/11/2015	Periodic function / pressure testing by CL	●
Chemical injection lines - EAC 29	EAC Pressure test to 2100 psi Well Handover: 18/11/2015	A-annulus pressure	●
Pacson valves - EAC 33	EAC Pressure test to 5000 psi FMC TAR: 02/02/2022	Periodic pressure testing	●

Secondary barrier elements			
Element	Qualification	Monitoring	
Formation (in-situ) - EAC 51	EAC FIT test to 13.0 lb/gal	Not accessible	●
Intermediate casing cement - EAC 22	EAC Job performance DBR: 20/09/2015	C-annulus pressure	●
13 3/8" Intermediate casing - EAC 2	EAC Pressure test to 2900 psi DBR: 19/09/2015	B-annulus pressure	●
Wellhead 13 3/8" casing pack-off - EAC 5	EAC Pressure test to 1800 psi DBR: 19/09/2015	Periodic pressure testing	●
Wellhead - EAC 5	EAC Pressure test to 5000 psi FMC FAT: 07/10/2015	External observation	●
Wellhead annulus access valve - EAC 12	EAC Pressure test to 5000 psi FMC FAT: 07/10/2015	Periodic pressure testing	●
Surface x-mas tree - EAC 33	EAC Pressure test to 5000 psi FMC FAT: 07/10/2015	Periodic pressure testing	●
Tubing hanger - EAC 10	EAC Pressure test to 5000 psi Well Handover: 14/11/2015	A-annulus pressure	●
Crown plug - EAC 11	EAC Pressure test to 5000 psi Well Handover: 15/11/2015	Tree cap pressure	●
XMT instrumentation panel valves - EAC 33	Pressure test to 5000 psi FMC TAR: 02/02/2022	Periodic pressure testing	●
Penetrators - EAC 33	Pressure test to 5000 psi Well Handover: 14/11/2015 and 18/08/2015	Periodic pressure testing	●

Barrier intact, minor integrity issue

1) A-04 is a pilot well to acquire data to drill the A-04A open hole sidetrack well.
 2) Fluid Type: Oil / Oil Density: 14° API / GOR: 73 scf/stb / Reservoir EMW high case 8.52 ppg / Oil gradient 1.351 psi/m / Reservoir Pressure and Temperature: 3361 psi and 79°C @ 2312 m TVD. Max reservoir pressure at surface = 3361 psi - 3124 psi + 500 psi = 737 psi. Max reservoir pressure at secondary well barrier @ 1683 m TVD = 3361 psi - 2561 psi + 500 psi = 300 psi.

20-Jul-2022 14:52
Fabio Almeida updated EQ.P 4.1-a1 rev. 2 - A-04A
 • Illustration modified

20-Jul-2022 14:38
Fabio Almeida updated EQ.P 4.1-a1 rev. 2 - A-04A
 • Adjusted note of well barrier
 • Well barrier modified

20-Jul-2022 13:53
Fabio Almeida updated EQ.P 4.1-a1 rev. 2 - A-04A
 • Adjusted note of well barrier
 • Well barrier modified
 • Illustration modified

19-Jul-2022 21:48
Fabio Almeida updated EQ.P 4.1-a1 rev. 2 - A-04A
 • Well barrier modified

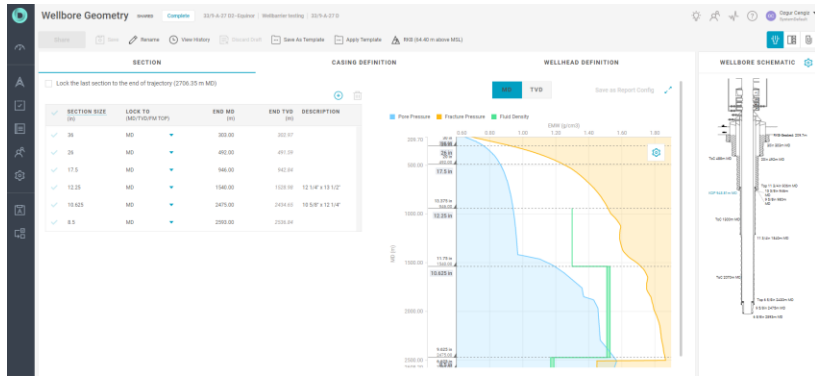
19-Jul-2022 21:46
Fabio Almeida updated EQ.P 4.1-a1 rev. 2 - A-04A
 Has increased revision from 1 to 2

19-Jul-2022 21:46
Fabio Almeida updated EQ.P 4.1-a1 rev. 2 - A-04A
 Has set as Current

19-Jul-2022 21:46
Fabio Almeida updated EQ.P 4.1-a1 rev. 2 - A-04A
 Has changed state to AsBuilt

Schlumberger-Private

Open



Wellbarriers® Data Exchange

CONTEXT

To create well barrier diagrams the following context must first be created and shared to the plan, this will be sent to the Wellbarriers® application. Note that only shared objects can be exchanged.

Formation Top: [Field]
 Surface Location: [Field]
 Pressure Window: [Field]

Rig Configuration: [Field]
 Wellbore Geometry: [Field]

In addition elevation reference, unit system and well type are taken from the project settings.

If the shared data above heavily conflicts with the existing data in Wellbarriers®, you may need to open the system and manually remove existing illustration before synchronizing. [Open Wellbarriers®](#)

Buttons: Cancel, Sync and Open Wellbarriers®

Well Barriers

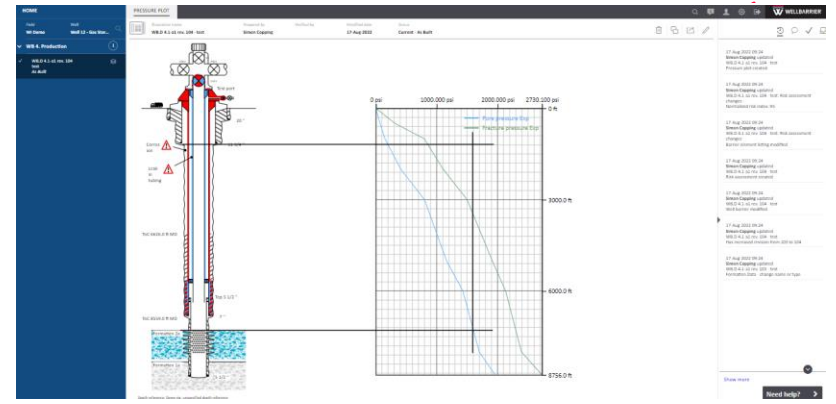
WELL BARRIERS

ACTIVITY ASSIGNMENT

CONTEXT

Surface casing section
 Tripping non-shearable pipe (In/out)
 Element

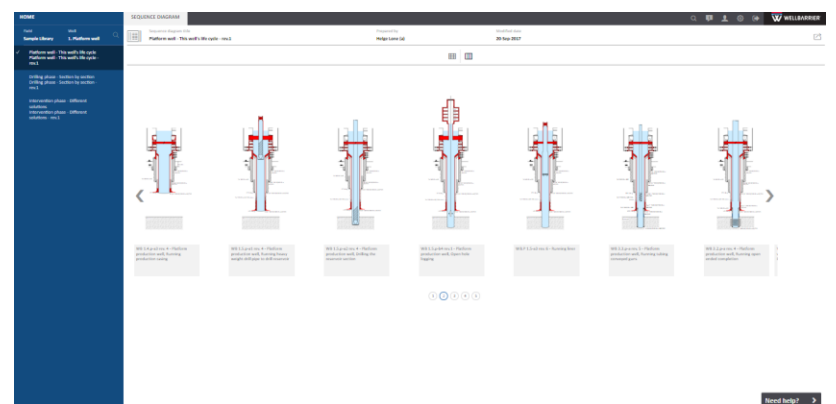
Element	Qualification	Monitoring
Wellbore Fluid	Fluid & control based on expected pore pressure	Tripping level and Pull Up Control
Drilling BOP	Pressure test to max kPa	Pressure pressure testing to max bar
Wellhead	Pressure test to max kPa	External observation
Production casing	Pressure test to max kPa	Annular pressure
Production casing cement	Compression test, job performance or bonding	Annular pressure



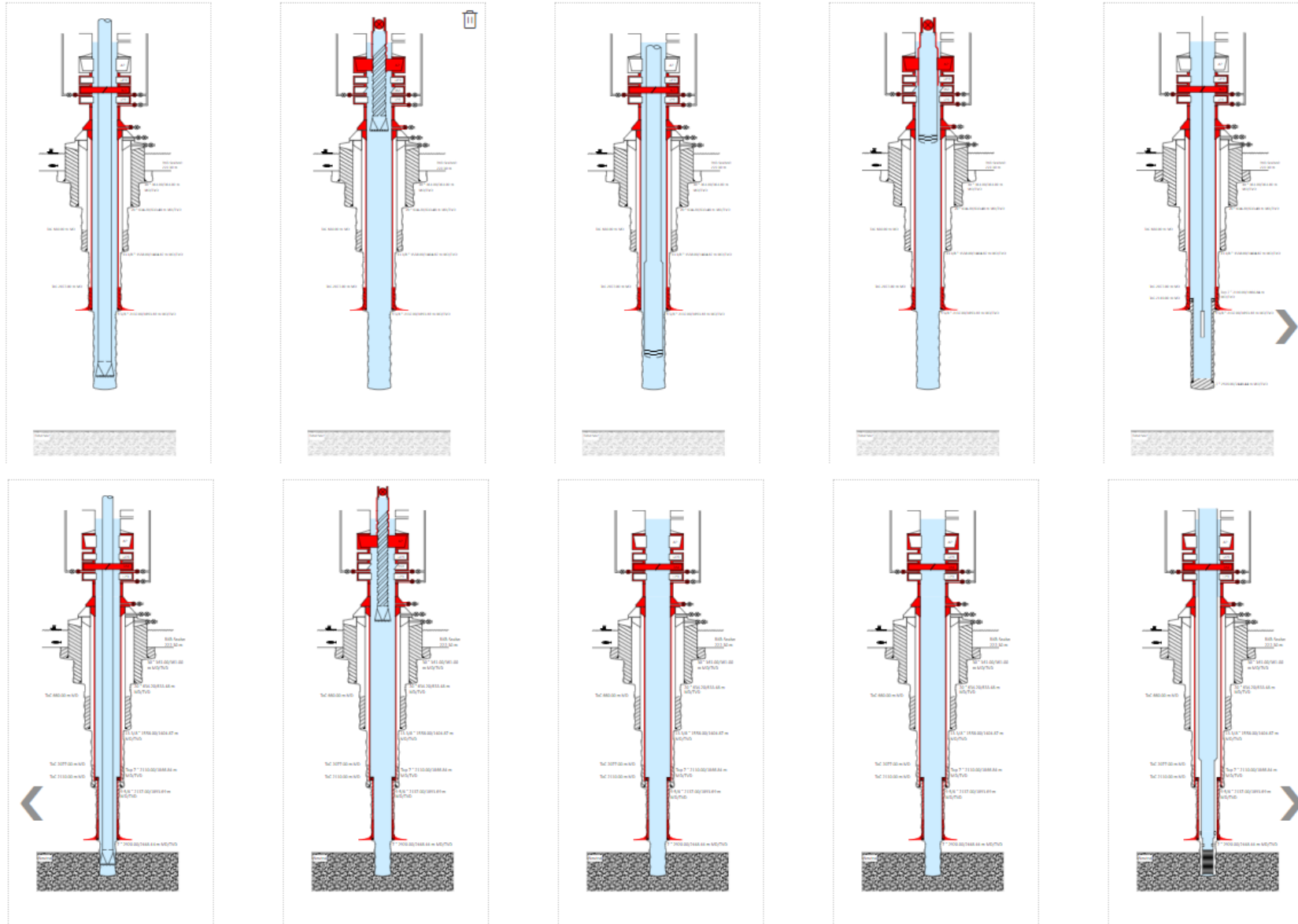
Well Barriers

RESERVOIR SECTION - DRILL RESERVOIR SECTION

Element	Qualification	Monitoring
Wellbore Fluid	Fluid & control based on expected pore pressure	Tripping level and Pull Up Control
Drilling BOP	Pressure test to max kPa	Pressure pressure testing to max bar
Wellhead	Pressure test to max kPa	External observation
Production casing	Pressure test to max kPa	Annular pressure
Production casing cement	Compression test, job performance or bonding	Annular pressure



Sequence Diagrams (Statfjord)

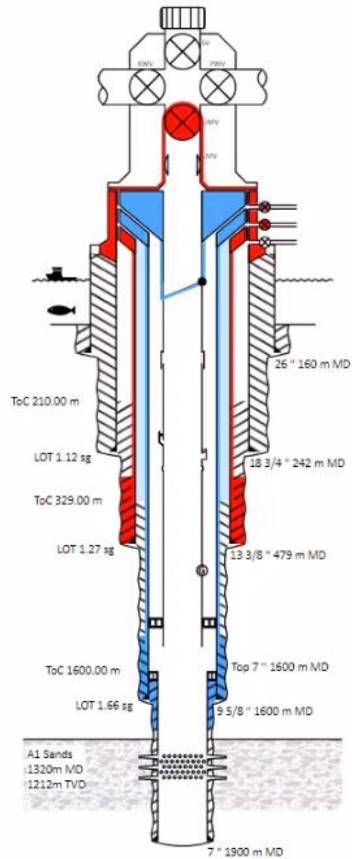


Integrity Management

WELLBARRIER

REGION: Global support | COUNTRY: Europe | FIELD: WISE Demo | WELL: Wise 1 | UWI: W00001 | WELLHEAD TYPE: Platform unihead

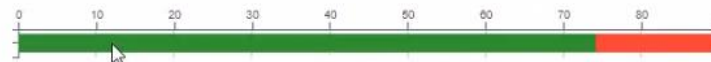
Data | Well Categorization | Risk | Observation | Qualification | Monitoring | Well Activity | Daily Overview



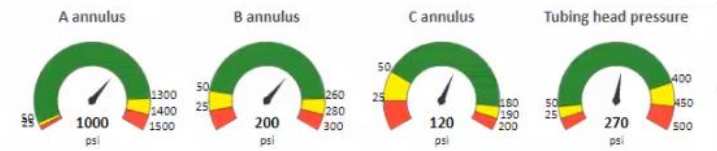
Primary barrier elements			
Element	Qualification	Monitoring	
Tubing hanger	Pressure tested 4000 Psi	A-annulus pressure	●
Downhole safety valve	Pressure tested 900 Psi	Tubing pressure	●
Tubing	Pressure tested 4000 Psi	A-annulus pressure	●
Wellhead annulus access valve	Pressure test xxx Psi	Periodic pressure testing	○
Casing hanger	Pressure tested 1 Psi	A-annulus pressure	●
Production casing	Pressure tested 1 Psi	B-annulus pressure	●
Production casing cement	Pressure tested 2300 Psi	B-annulus pressure	●
Production liner cement	Formation test, job performance or bond log	B-annulus pressure	●
Casing open hole fluid	Fluid sg control based on expected pore pressure	Triptank level and fluid sg control	○

Secondary barrier elements			
Element	Qualification	Monitoring	
Surface x-mas tree	Pressure tested 900 Psi	Pressure tested to xxx Bar	●
Wellhead annulus access valve	Pressure test xxx Psi	Periodic pressure testing	○
Wellhead	Pressure tested 4000 Psi	External observation	●
Casing hanger	Pressure tested 1 Psi	A-annulus pressure	●
Intermediate casing	Pressure tested 1 Psi	B-annulus pressure	●

Current Risk ■ 89.5
 Mitigation Risk ■ 74.2
 Initial Risk 89.5
 Date of assessment 02-Mar-2021
 Participants Simon Copping



Well type: Oil producer
 Well status: Producing



Open Observation

Raised Date	Due Date	Assigned To	Observation Title
02-Mar-2021	03-Mar-2021	Phuong Cathy	D-62938

Upcoming Periodic Testing

Last Test	Next Test	TestType	Component
		Pressure test	Wellhead right access inner valve
		Pressure test	Wellhead right access inner valve
		Pressure test	Wellhead right access inner valve
23-Mar-2021		Pressure test	Kill Wing Valve (KVV)

*“application of technical, operational and organizational solutions to **reduce risk of uncontrolled release of formation fluids and well fluids throughout the life cycle of a well**” Norsok D-010*

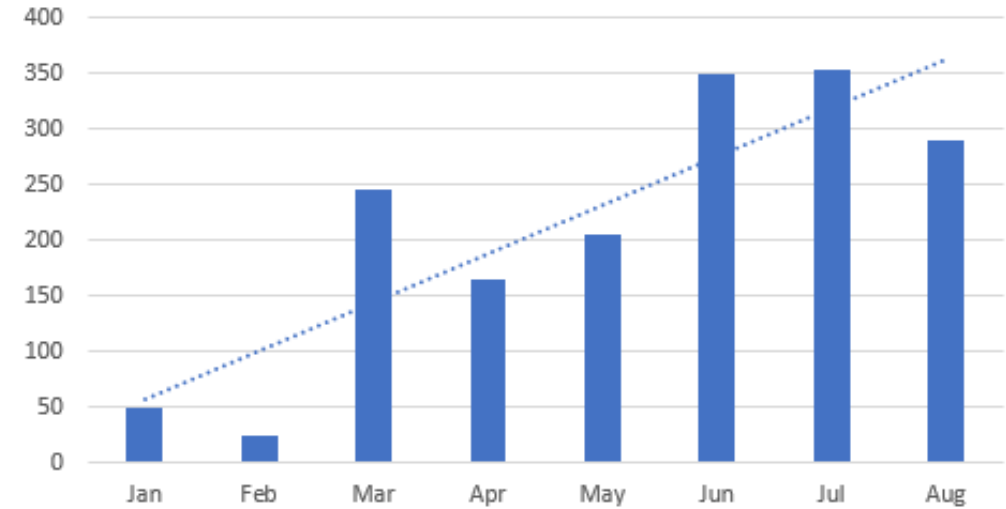
Deployment



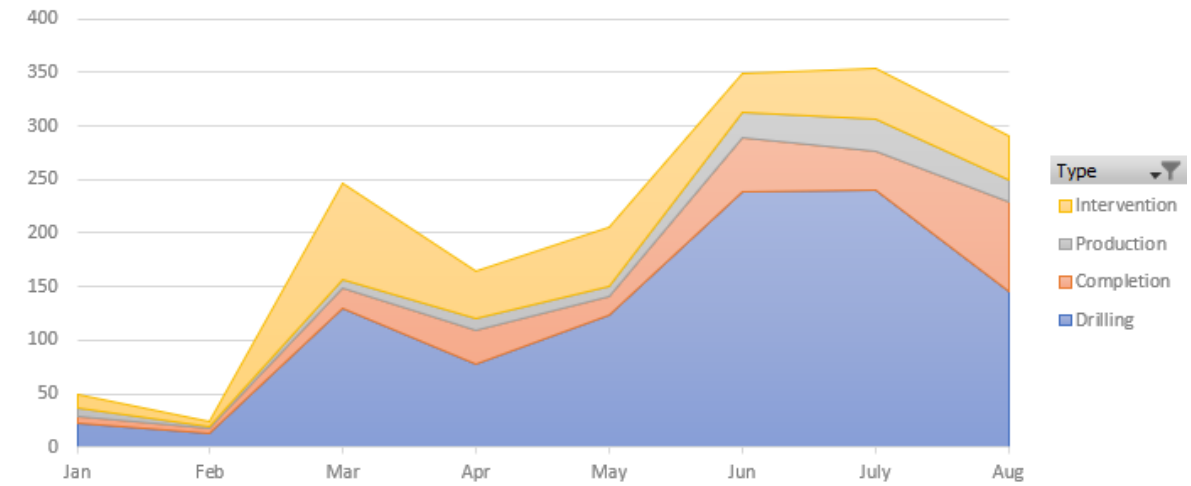
2022 Statistics

- 130 people trained since June
- 1683 barrier schematics created in 2022
- 210 registered users

Schematics Created in 2022



Lifecycle Perspective



Training feedback

1. The instructor was well prepared

[More Details](#)

[Insights](#)

20
Responses

★★★★★
4.90 Average Rating

2. The instructor communicated clearly

[More Details](#)

[Insights](#)

20
Responses

★★★★☆
4.55 Average Rating

3. I had enough time to practice skills

[More Details](#)

[Insights](#)

20
Responses

★★★★☆
3.70 Average Rating

4. As a result of the course I feel better prepared to use Wellbarrier

[More Details](#)

[Insights](#)

20
Responses

★★★★☆
4.05 Average Rating

5. I was satisfied with the course

[More Details](#)

[Insights](#)

20
Responses

★★★★☆
4.25 Average Rating

6. I would recommend the course to others

[More Details](#)

[Insights](#)

20
Responses

★★★★☆
4.50 Average Rating

*"...Very good explanations on the advantages of the Software, it was **very easy to follow!**"*

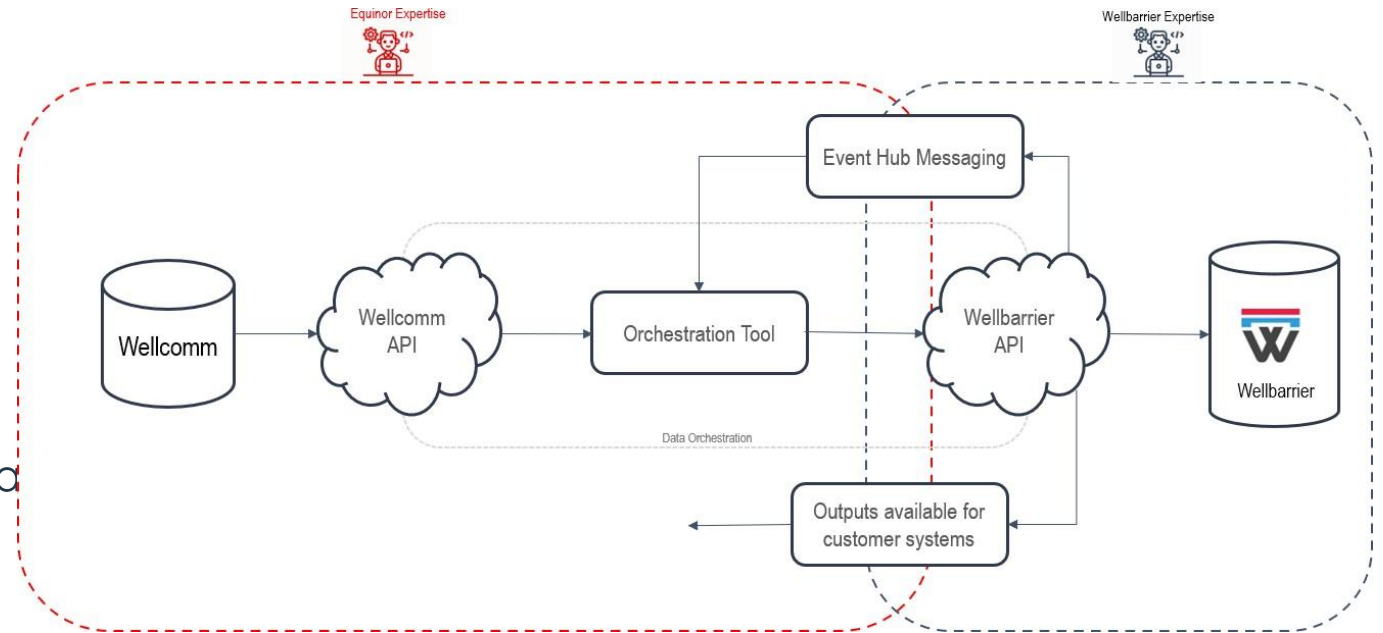
*"...Instructor well prepared and **tool easy to use and understand**"*

*"...It was nice to learn about the wellbarrier. It is **easy to implement** most of the information and features needed."*

*"...Thank you for a good course – **well needed software** 😊."*

Next steps

- Further integration (WellCom)
- Deploy integrity management solution
- Co-development opportunities
- New energy opportunities (CCS)
- Environmental focus
- ...how this aligns with Equinor strategic pillars



Questions



Digitalized Wellbarrier Schematics Enhance Collaboration

Frode Håland
Leading consultant SCM

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