



Decommissioning and Restoration – Fostering Excellence through Regulations, Innovation, and Sustainable Practices

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Data-Driven Solutions: Automating Plumbing Diagrams for Onshore Oil and Gas Fields

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Acknowledgement to Magdalena Wojtaszek, Yumni Kim, Nur Athirah Ibrahim, Norhalizayati Ibrahim, Lindsay Nairn

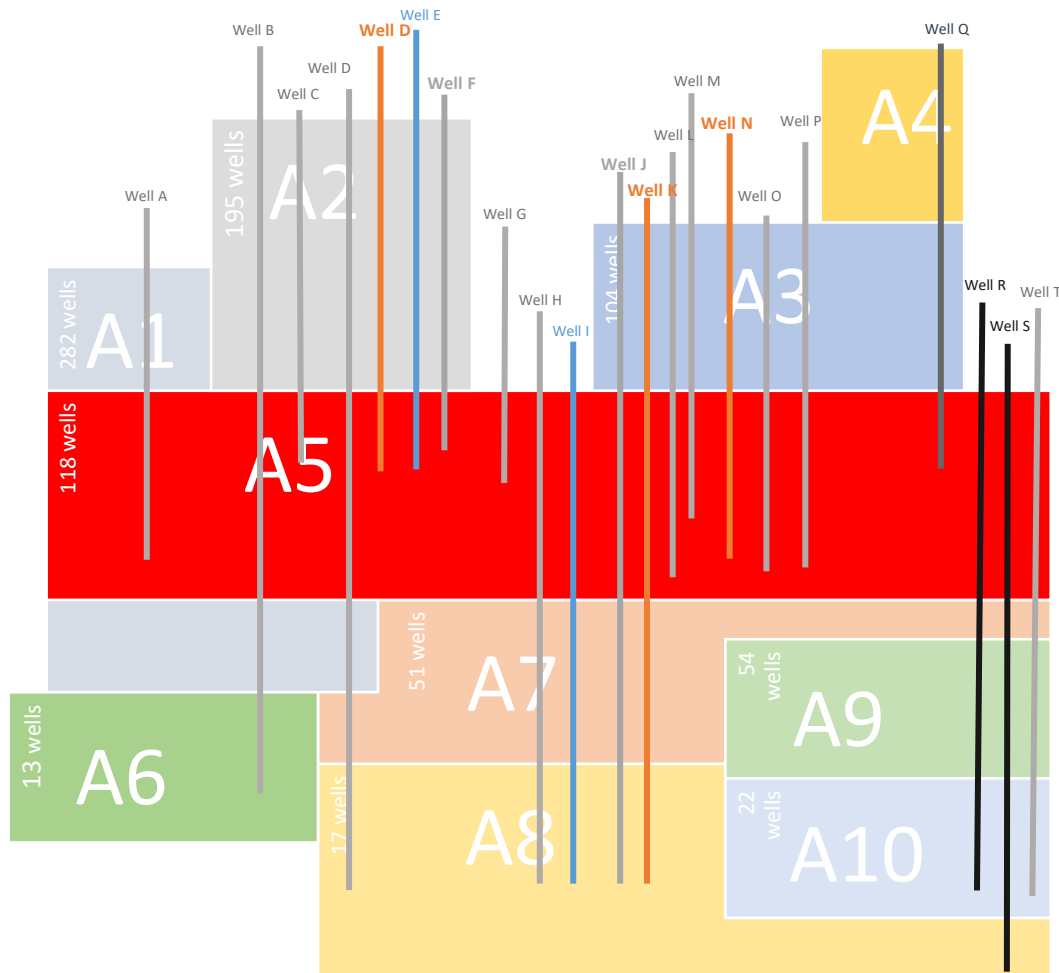




Agenda

- Background
- Problem Statement
- Abandonment Challenges
- Workflows
- Digitalization Methods and Process
- Conclusion

Background



- Land asset in BSP is 95 years old.
- ~1300 wellbores in drilled in the land assets of Brunei
- Up to 200 blocks
- Average of ~100 well penetrations per block
- 900 wells have already been abandoned (69% well stock count)
- Previous abandonment standards had different requirements

- No. of well penetrations per block is on the left corner.
- Each block is represented by a color.
- Layout of blocks is schematic only.

Problem Statement


- No Subsurface Isolation Strategy (SIS) was previously developed for the field.
- Required to comply to abandonment standards

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WELLS MANUAL

WELL ABANDONMENT MANUAL

WS 38.80.31.35-Gen.
Revision 1.0




Custodian	PTE Well Abandonment
Author	Keulijen, Wout CNSL-PTWIC
Owner	VP Wells Discipline
Status	Live
Last Revised	October 1 st , 2018
Valid To	October 1 st , 2021

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SUBSURFACE ABANDONMENT STANDARD

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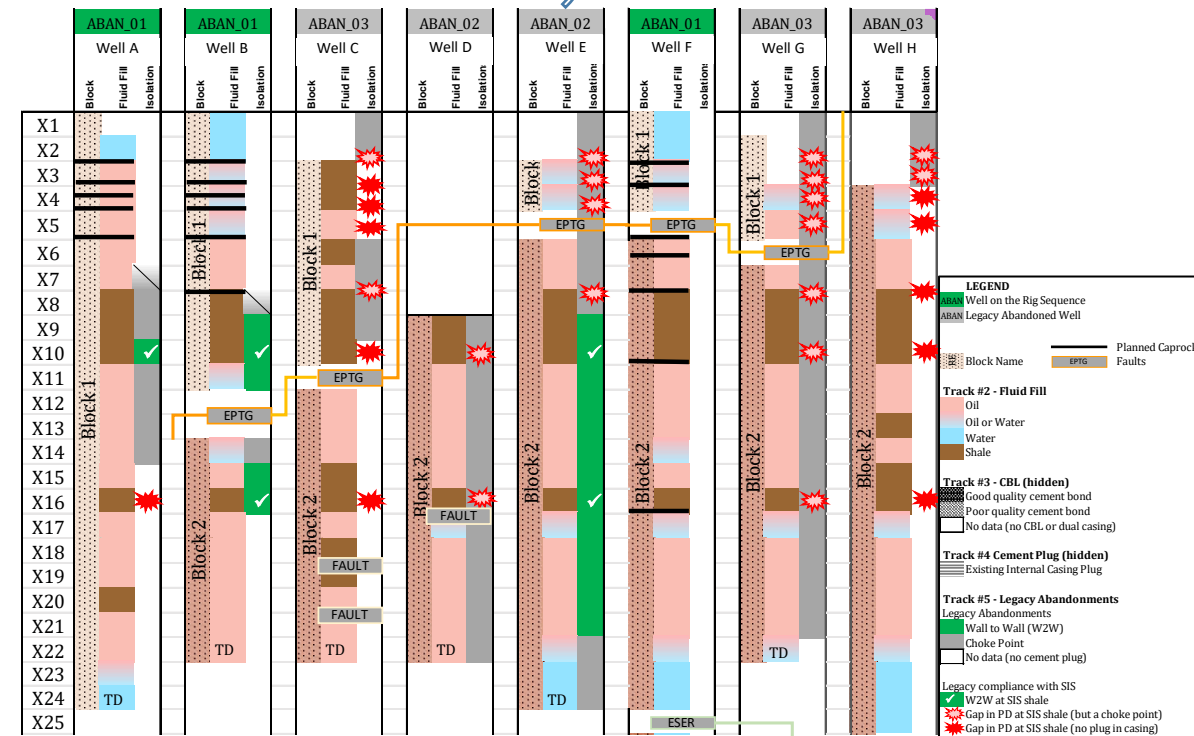
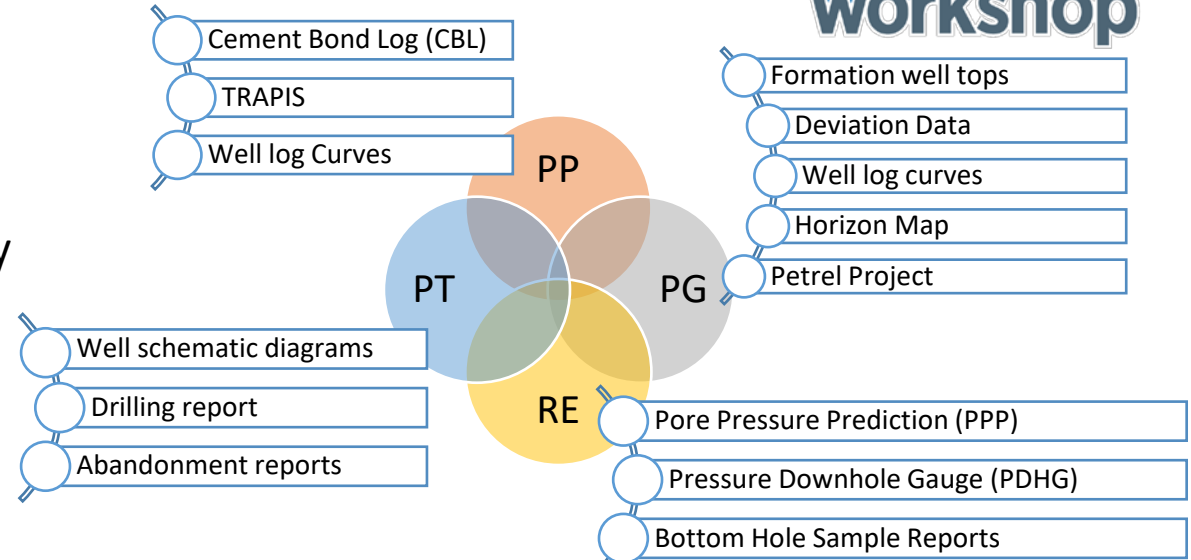
REVISION 3.0
BSP11.STD.03-3.0

Abandonment Challenges

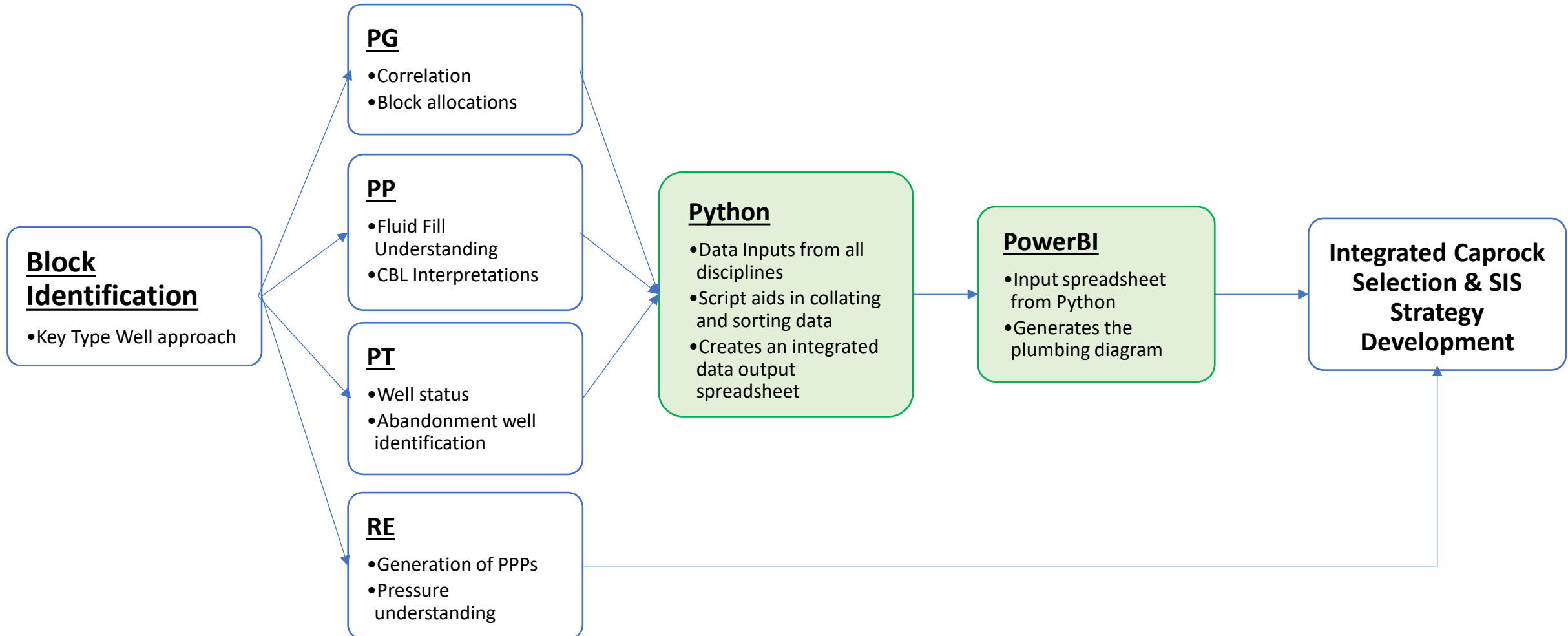
A tool to visualise and assess abandonment strategies and any existing abandonments

Challenges:

- More wells need to be considered → robust plumbing diagram
- Lack of Data:
 - Cement Bond Logs (CBL)
 - Cement plugs
- Some data (particularly older legacy data) requires understanding:
 - Cement plugs depth
 - Well Status diagram
 - Isolation methods
- Deep dive into data required.
 - Locating data is difficult
 - Time consuming to verify

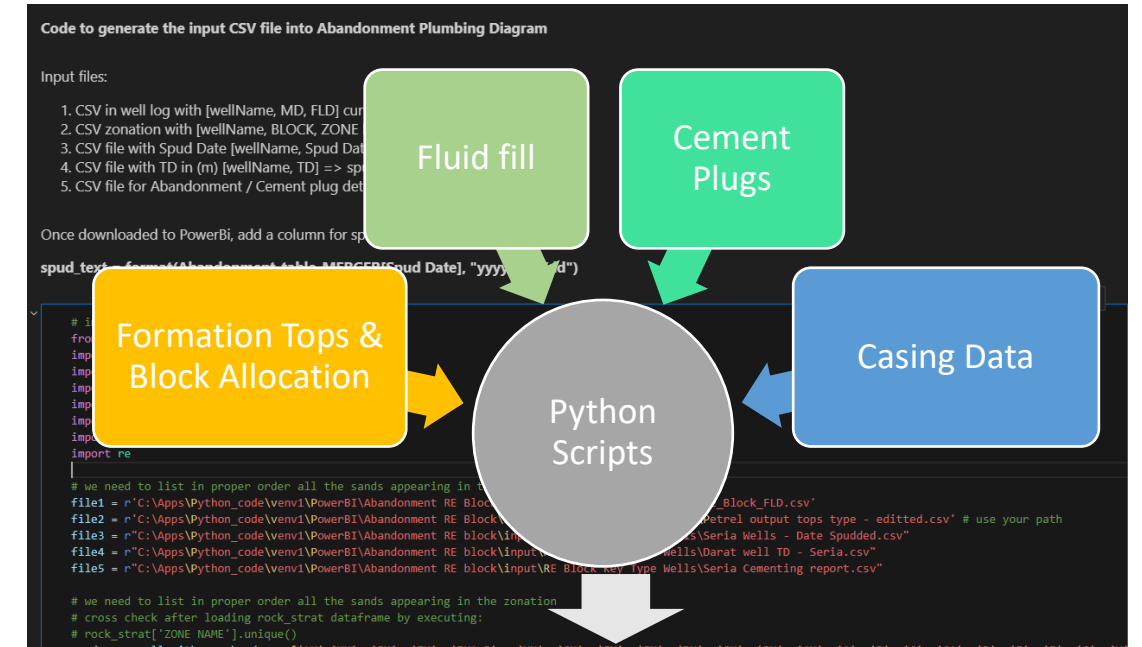


Workflow



Sorting the Data

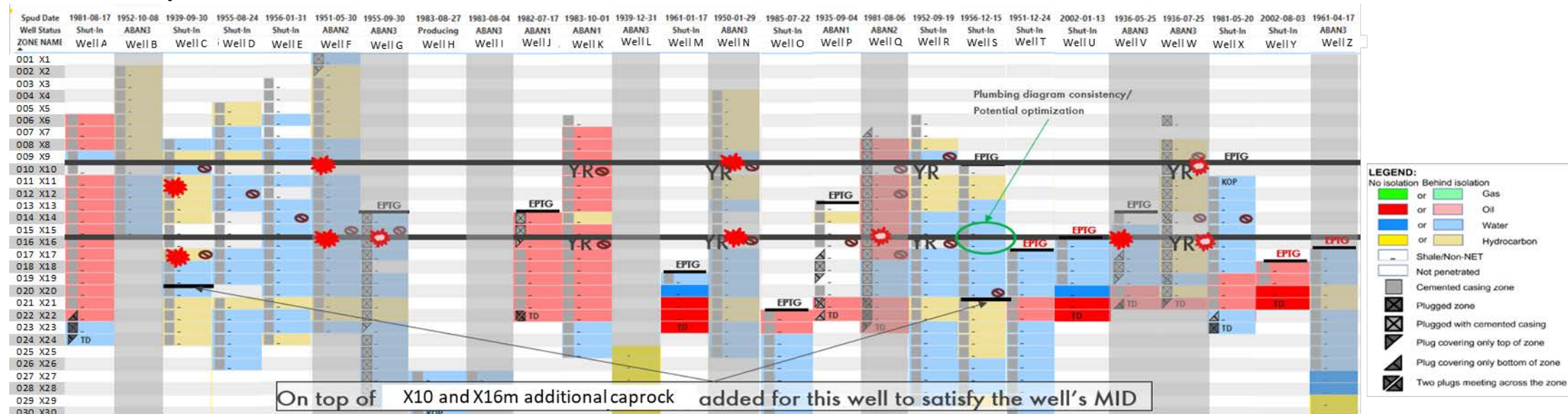
- Python scripts developed
- Used to sort and collate data
- Integrates all the different dataset with each other
- Simplified excel based output
- Readable by softwares such as PowerBI



wellName	wellname	Field	BLOCK	ZONE NAME	ZONE NAME	orig	FLUID FILL	FLUID FILL	FLUID_int	sand_inde	Spud Date	Type
Well X	Well X	ST: GS-East	A5	015_X12	X12		W	CW	32	15	03-06-76	KOP
Well X	Well X	ST: GS-East	A5	016_X13	X13		W	CW	32	16	03-06-76	_
Well X	Well X	ST: GS-East	A5	017_X14	X14		W	CW	32	17	03-06-76	_
Well X	Well X	ST: GS-East	A5	018_X15	X15		W	CW	32	18	03-06-76	_
Well X	Well X	ST: GS-East	A5	019_X16	X16		O	CO	22	19	03-06-76	_
Well X	Well X	ST: GS-East	A5	020_X17	X17		W	CLW	38	20	03-06-76	_
Well X	Well X	ST: GS-East	A5	021_X18	X18		OW	CPO	24	21	03-06-76	_
Well X	Well X	ST: GS-East	A5	022_X19	X19		O	CPO	24	22	03-06-76	_
Well X	Well X	ST: GS-East	A5	023_X20	X20		O	CPO	24	23	03-06-76	_
Well X	Well X	ST: GS-East	A5	025_X21	X21		O	CUO	29	25	03-06-76	_
Well X	Well X	ST: GS-East	A5	029_X22	X22		O	LO	25	29	03-06-76	TD
Well AB	Well AB	S: GS-East	A5	003_X1	X1			C	2	3	26-03-31	KOP
Well AB	Well AB	S: GS-East	A5	005_X2	X2			C	2	5	26-03-31	_
Well AB	Well AB	S: GS-East	A5	006_X3	X3			C	2	6	26-03-31	_
Well AB	Well AB	S: GS-East	A5	007_X4	X4			C	2	7	26-03-31	_
Well AB	Well AB	S: GS-East	A5	008_X5	X5			C	2	8	26-03-31	_
Well AB	Well AB	S: GS-East	A5	009_X6	X6			C	2	9	26-03-31	_
Well AB	Well AB	S: GS-East	A5	010_X7	X7			C	2	10	26-03-31	_
Well AB	Well AB	S: GS-East	A5	011_X8	X8			C	2	11	26-03-31	_
Well AB	Well AB	S: GS-East	A5	012_X9	X9			C	2	12	26-03-31	_

Digitalization of the Plumbing Diagram

- Usage of PowerBI for simplified grid based data visualization
- Helps with QA/QC of the data
- Achieves required objective in a fraction of the time
- Simplified but covers necessary details
- Minimum expenditure



Conclusion

- Fit for purpose
- Cost effective & efficient
- Aids in overall understanding
- Leverages tools available to greater community without additional cost
- Tool has its limitations due to simplified outlook
- Has massive improvement potential

Thank You

Questions & Thoughts?

Acknowledgement to Magdalena Wojtaszek, Yumni Kim, Nur Athirah Ibrahim, Norhalizayati Ibrahim, Lindsay Nairn

