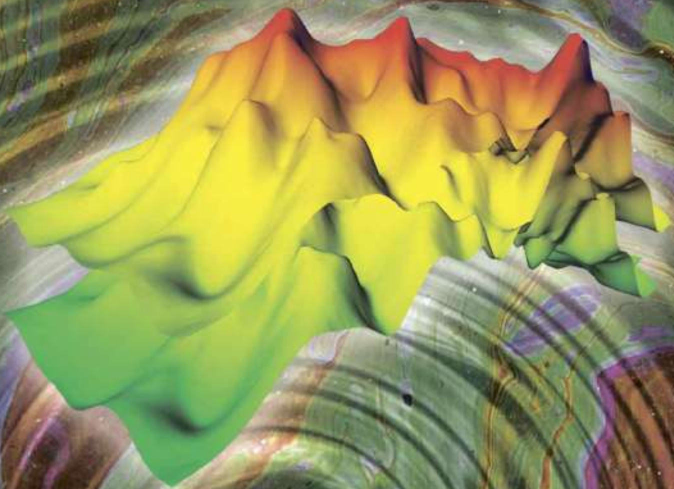
sofoil

Multiwell Retrospective Test

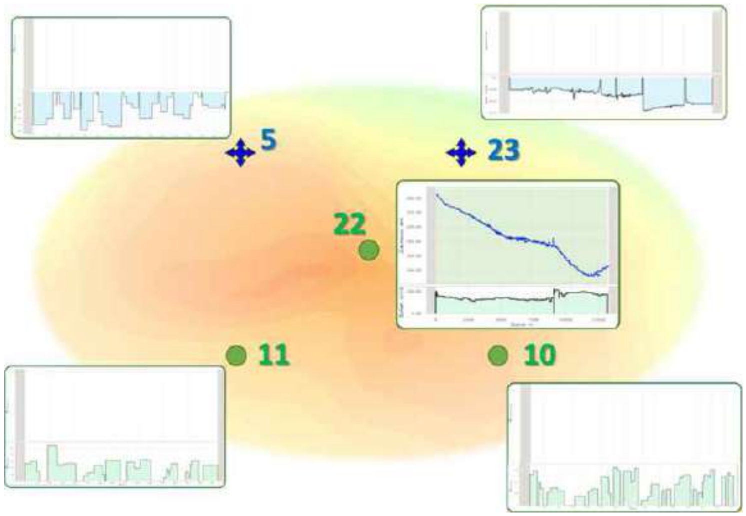


MRT SUMMARY

DEFINITION

Multiwell Retrospective Testing (**MRT**) is a data processing technique which is based on automatic matching of production rates and bottom hole pressure readings (including ESP pressure gauges) in a tested well and its neighbours to provide reconstruction of formation pressure and productivity index history, quantify the cumulative and current cross-well interference, assess transmissibility of the cross-well intervals and predict formation pressure dynamics in various production scenarios.

Unlike traditional single-well pressure transient analysis (**PTA**) or rate transient analysis (**RTA**) the **MRT** study provides opportunity to assess reservoir properties through the well data which severely affected by cross-well interference, which is normally the case in practical applications.



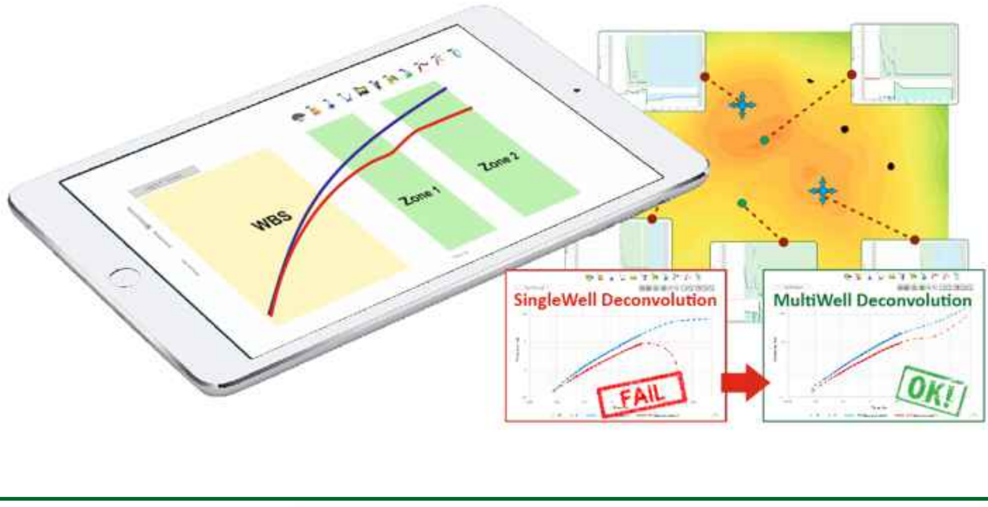
MRT analysis is performed over the existing historical data records and does not require additional data acquisition.

The **MRT** engine is based on multi-well pressure deconvolution, which is a highly parallelizable decoding algorithm running remotely on multi-core workstation.

The **MRT** workflow is facilitated by the **PolyGon** software which provides data processing, numerical modelling and data interpretation.

ADVANTAGES

- No field operations and no production deferment
- Immunity to random mistakes in rate history records
- Early diagnostics of well and reservoir underperformance



MRT SUMMARY

APPLICATIONS

Production Enhancement:

#1 Locating priority zones for the new wells and side-tracks

#2 Selecting priority candidates for workovers (water shut-off, stimulation, fracturing)

#3 Optimize production targets

#4 Identifying the best candidates for converting to injection

APPLICATIONS

Reservoir Study:

- #5 Assessing the length and orientation of hydraulic fractures
- #6 Identifying the presence of spontaneous fractures
- #7 Assessing fault conductivity
- #8 Localizing the barriers and pinch outs
- #9 Calibrating shale breaks
- #10 Quantification of the cross-well interference
- #11 Quantification of reservoir properties in cross-well interval
- #12 Quantification of reservoir properties in near-well area
- #13 Reconstructing the history of formation pressure and productivity index
- #14 Adjusting the random mistakes in flow rate history records

MRT APPLICATIONS

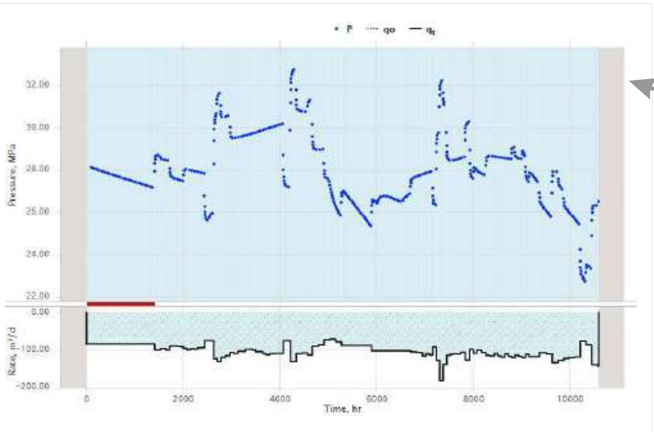
#1 Locating priority zones for the new wells and side-tracks

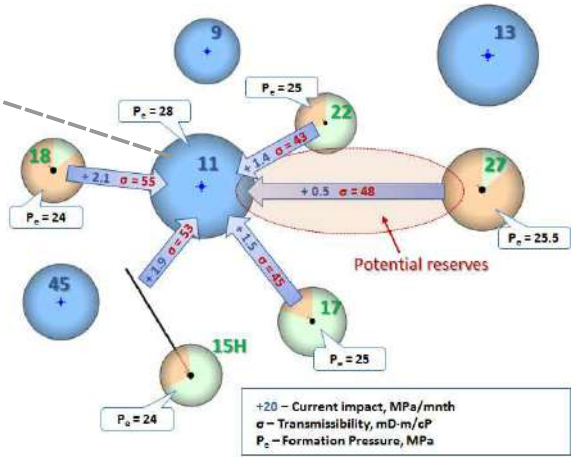
Injector **11** is surrounded by high water cut producers **22**, **17**, **15H** and two low water cut producers **18** and **27**. Based on water cut history the last two directions were considered as opportunity for the infill drilling.

The **MRT** analysis is showing a high connectivity between injector **11** and oil producers **22**, **17**, **15H** and **18** which qualifies these directions as low opportunity for infill drilling. The formation pressure in **18** is the lowest in the group and **MRT** simulator predicts that new well between **11** and **18** will compete with **18** for the pressure support from **11** resulting in accelerated pressure decline and negative impact on **18** production so that the multi-well net effect from new drilling will be less than expected.

On the other side, the area between **11** and **27** is showing a high formation pressure and high transmissibility with low water cut and low impact from **27** which means that **27** area is mostly dominated by pressure support from injector **13**.

ⓘ The area around **27** is recommended as priority for the infill drilling



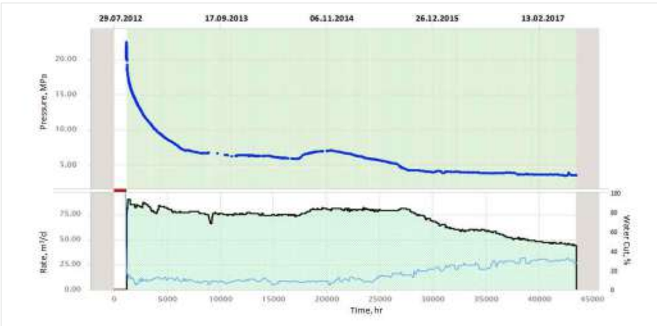


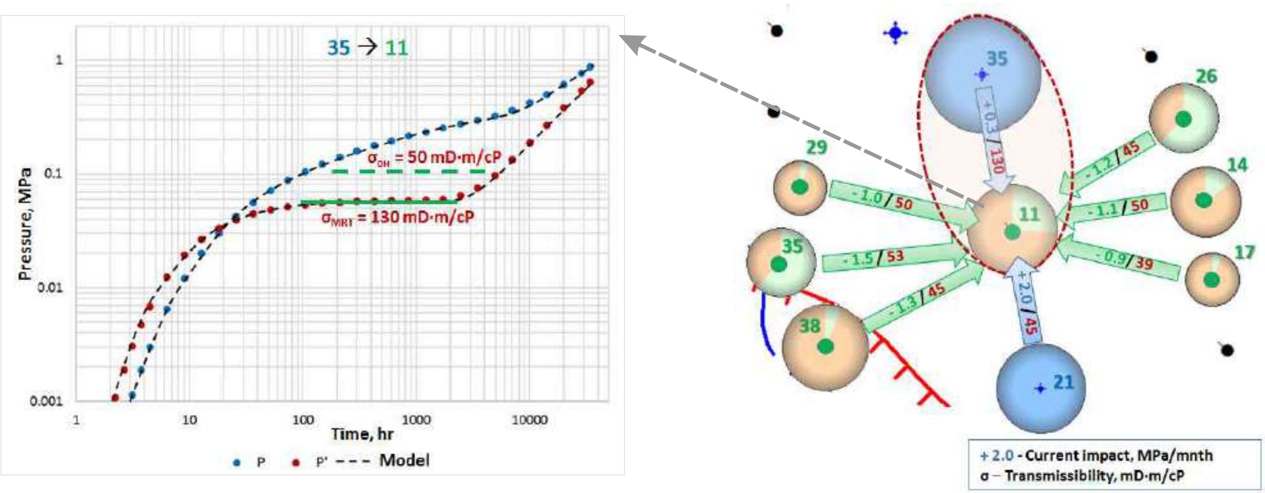
PRODUCTION ENHANCEMENT

#2a Selecting priority candidates for Water Shut-off

Based on **MRT** analysis the cross-well interval 35 → 11 is showing poor response and anomalously high transmissibility which is indicative of the thief injection in 35.

ⓘ The thief injection zone in 35 was localized with **PLT** and temperature logging and water shut-off workover in 35 resulted in production increase from 11



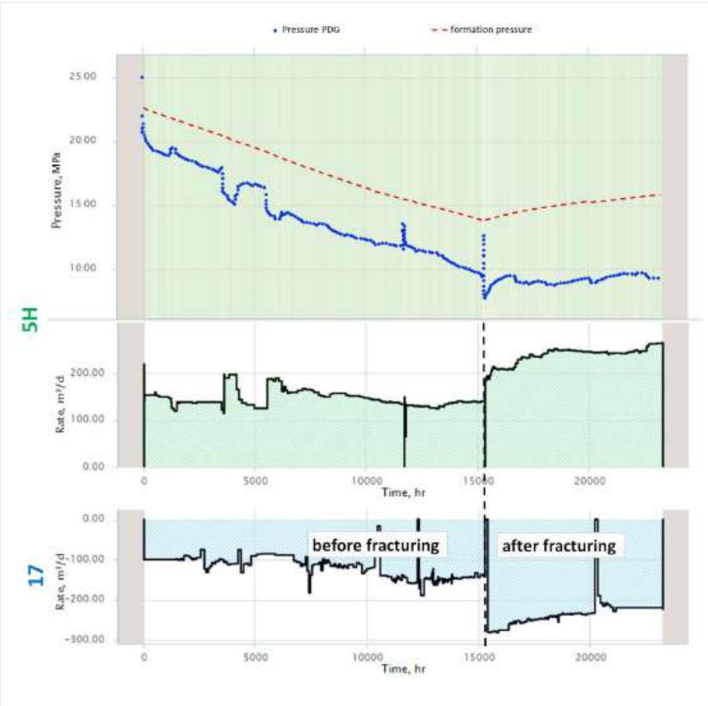


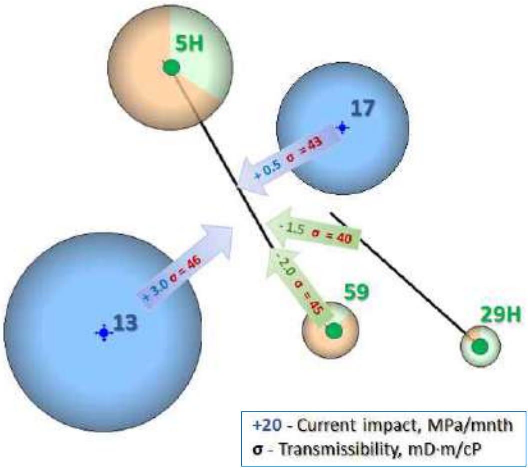
MRT APPLICATIONS

#2b Selecting priority candidates for stimulation

The **MRT** analysis around horizontal producer **5H** is showing that Injector **17** has poor injectivity and impact to offset production despite a regular value of transmissibility. It indicates the poor connectivity between well and reservoir.

The recommendation on near-zone stimulation in injector **17** has resulted in pressure build-up and production growth in **5H**





PRODUCTION ENHANCEMENT

#3a Optimize production targets

The **MRT** analysis was performed around producer **26** in order to verify and probably correct the optimal production and injection targets.

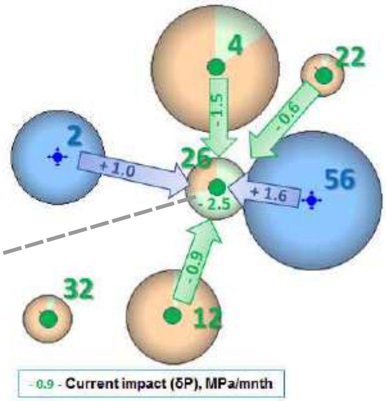
The self-response from multi-well deconvolution is showing a pseudo-state regime at late times caused by reservoir depletion which means that the area around **26** does not have an external pressure support and should be balanced with injectors from inside the group.

The current cross-well response is showing a misbalance in the way offset injectors increase the pressure in tested well **26** (totally **+ 2.6** MPa) and the way offset producers deplete pressure in tested well **26** (totally **- 3** MPa) and the way **26** depletes pressure from itself (**- 2.5** MPa).

Since the depletion from **12** and **22** are fairly balanced by injection from **56** the next focus should be shifted to improve a group balance by varying rates in **2** and **4**.

ⓘ The recommendation is to decrease production in **4** and increase injection in **2** to improve liquid production in **26** and gain oil production from the group

Unit-rate self-response at 26 from multi-well deconvolution



MRT APPLICATIONS

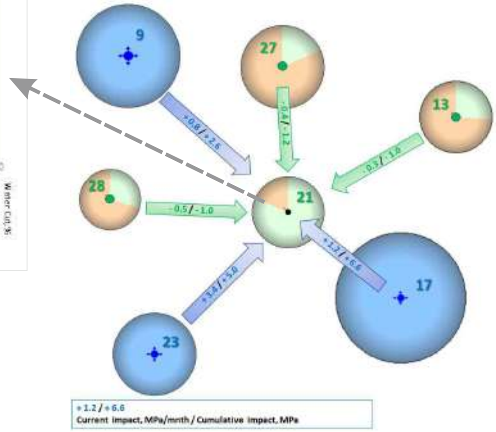
#3b Shutting down aggressive injector

The **MRT** analysis was performed around early breakthrough high water cut producer **21** in order to assess its connectivity to offset wells and identify from which direction it's being flooded.

The **MRT** results show that usual suspect **17** as the oldest and currently highest rate injector in **21** vicinity is not the cause of the water breakthrough in direction to **21**.

It turns out that the remote injector **23** has a highest degree of impact on **21** and most probably developed a fracture towards **21**.

Shutting down **23** and compensating by increasing injection in **9** resulted in water cut reduction and oil production increase from **21**.



PRODUCTION ENHANCEMENT

#4 Identifying the best candidates for converting to injection

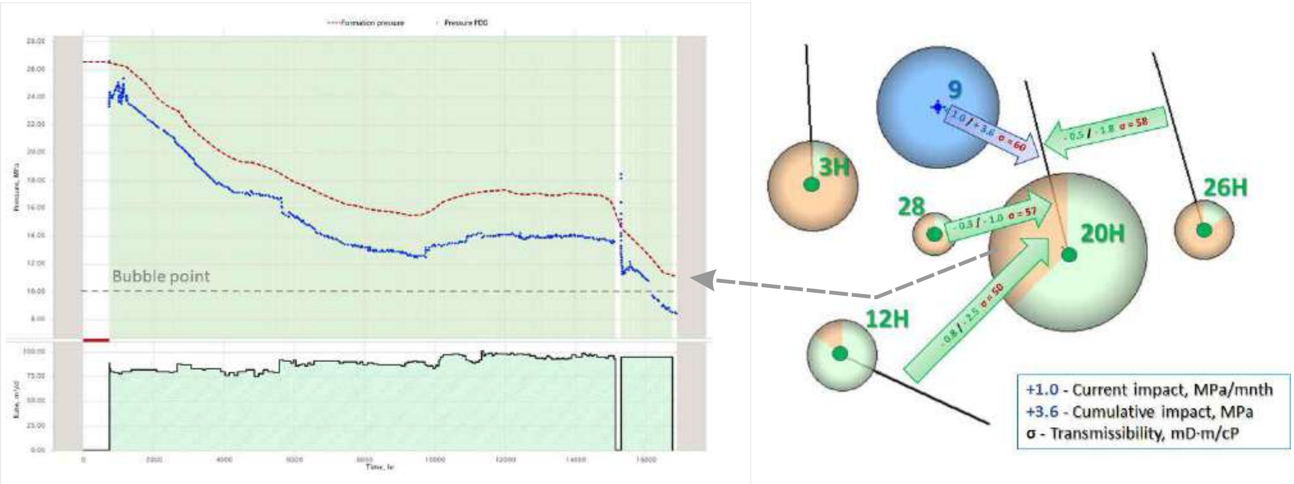
The area is lacking pressure support.

The **MRT** forecast on formation pressure dynamic in horizontal producer **20H** was suggesting it would go below bubble point in the next 10 months.

The cross-well analysis is showing that horizontal producer **12H** is depleting **20H** more efficiently (-0.8 MPa/mnth) than horizontal producer **26H** (-0.5 MPa/mnth) despite of a much further location.

These priorities **12H** as a fair choice for pressure support.

ⓘ Converting **12H** to injection resulted in pressure and production increase from **20H** with oil gain overweighting production loss from **12H**



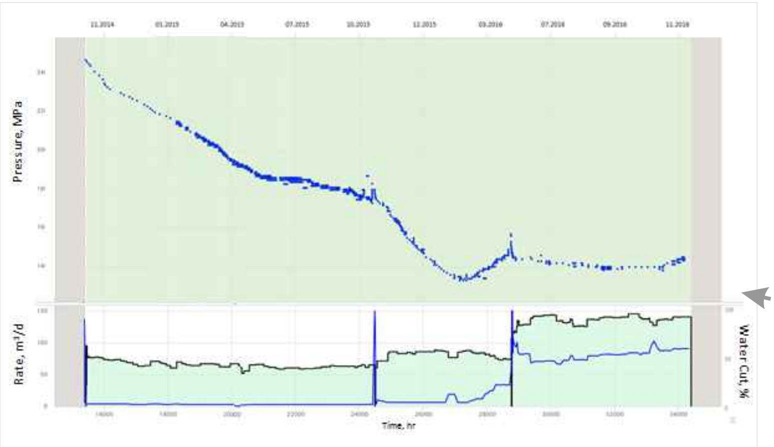
MRT APPLICATIONS

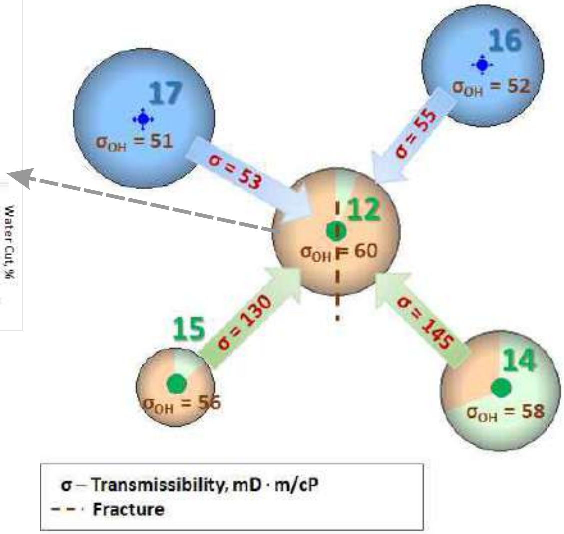
#5 Assessing the length and orientation of hydraulic fractures

The **MRT** analysis was performed around producer **12** which was hydraulically fractured one year ago. The objective was to identify the orientation and length of the fracture.

The **MRT**-based transmissibilities between **16** → **12** and **17** → **12** are in a good correlation with OH data which verifies high quality vertical sweep in these intervals. The transmissibility between **14** → **12** and **15** → **12** turned to be twice higher which indicates that hydraulic fracture has extended in a sector between **14** and **15**.

Numerical modelling in **PolyGon** software estimated the fracture length as 70 m which is 20 % of the distance towards the offset wells.





RESERVOIR STUDY

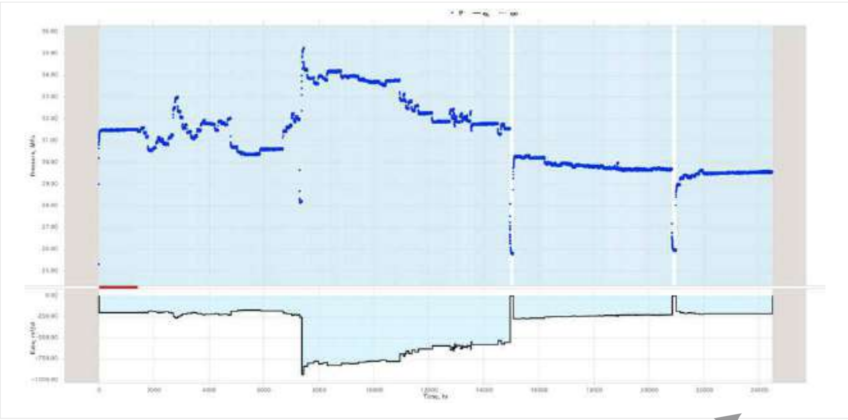
#6 Identifying the presence of spontaneous fractures

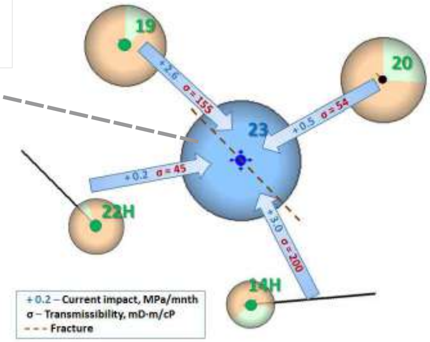
The history of injector **23** shows a short period of high infectivity in the past which was followed by water cut growth in vicinity and consequent constrain of injection rate.

The **MRT** analysis was performed around injector **23** in order to assess the presence of spontaneous fracture.

The cross-well transmissibility and pressure impact between **14H** → **23** and **19** → **23** turned to be much higher than other directions which indicates a presence of fracture communication.

Numerical modelling in **PolyGon** software estimated the fracture length as 120 m which is 30 % of the distance towards producer **19** and **14H**.



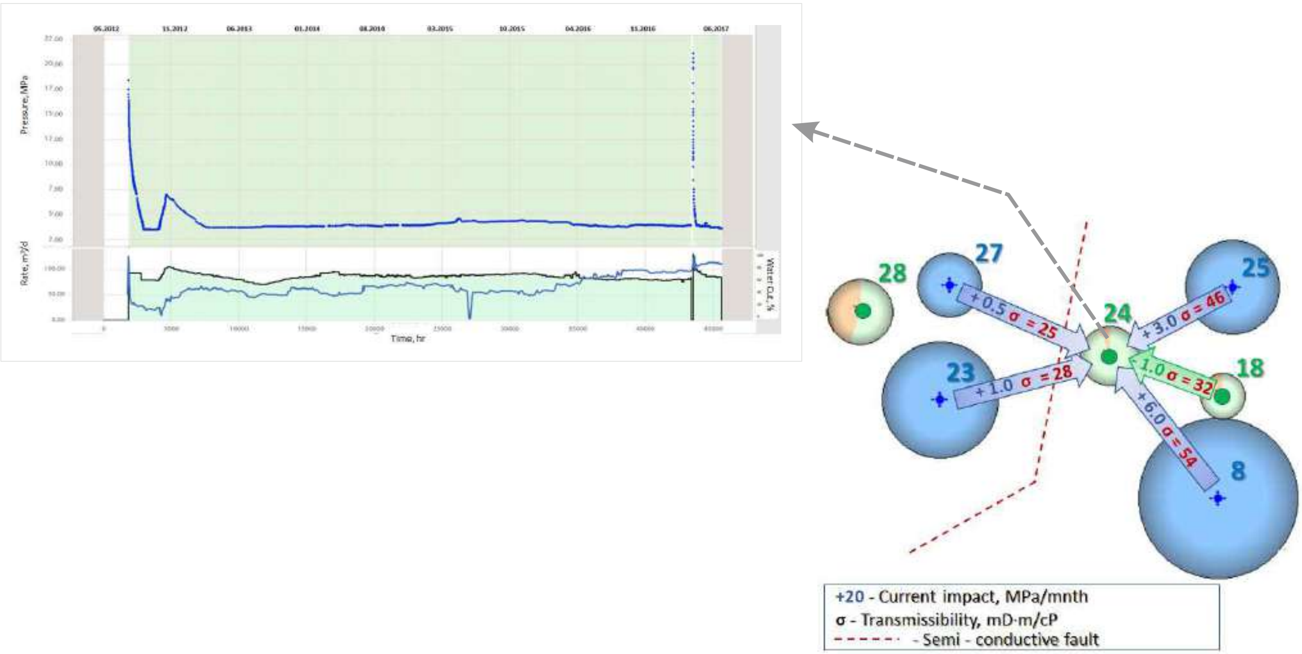


MRT APPLICATIONS

#7 Assessing fault conductivity

The **MRT** analysis was performed around producer **24** which has indication of the fault between **24** and **27**, **23** from seismic data.

The **MRT**-based transmissibility in **23** → **24** and **27** → **24** intervals turned to be much lower comparing to that of in **25** → **24**, **8** → **24** and **18** → **24** which justifies the presence of the reservoir deterioration, which in this case is most probably caused by a fault, captured by seismic. The fact that producer **24** responds to the wells **27** and **23** also means that the fault is partially transparent.



RESERVOIR STUDY

#8 Localizing the barriers and pinch outs

The north part of the field has a relatively mild slope as suggested by seismic data and stays far above OWC as suggested by petrophysical data. There is a significant distance between the northernmost producer **12** and exploration well **1E** which shows disruption of the reservoir at north.

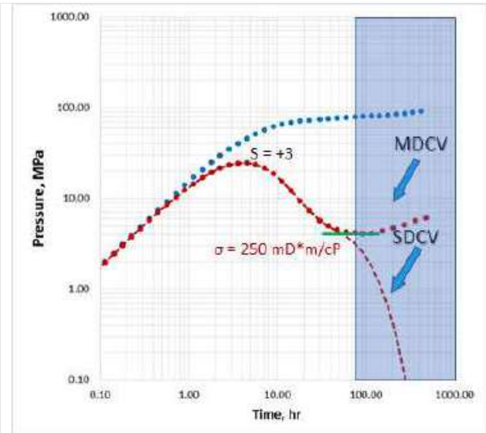
It may represent a drilling opportunity if there is an indication of reservoir extension in this direction.

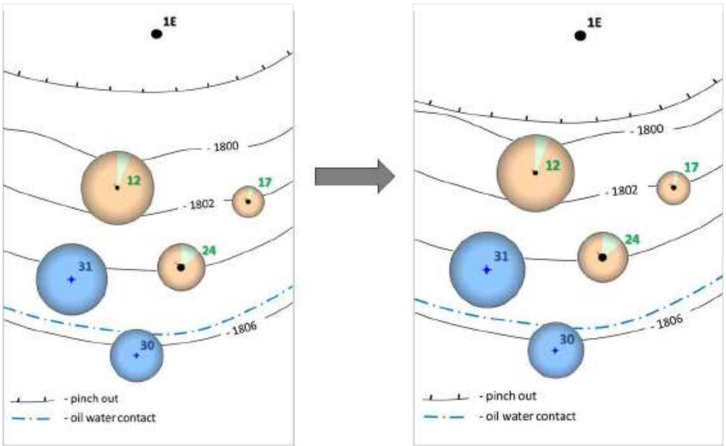
The **MRT** analysis was performed around producer **12** in order to assess reservoir continuity at north direction.

The single-well deconvolution (**SDCV)** is showing a steady state performance due to a fair pressure support from south and can't qualify reservoir continuity.

The unit-rate self-response from multi-well deconvolution (**MDCV**) has a clear indication of depletion caused by the limited extension of the reservoir at north direction which disqualifies this area from further drilling.

The similar information can be gathered from long-term **PTA** survey by shutting down the well **12** and constraining production in offset wells **24**, **17** and injectors **31** and **30** – but at a far greater cost of deferred oil production.





MRT APPLICATIONS

#9 Calibrating shale breaks

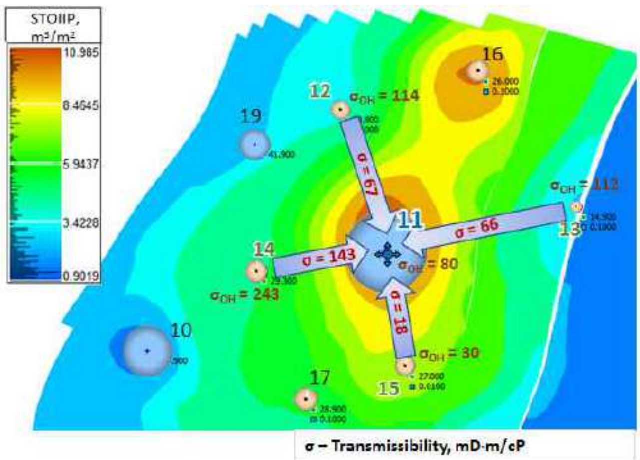
The **MRT** analysis around injector **11** is showing that transmissibility in all directions is around 30% of the OH log prediction.

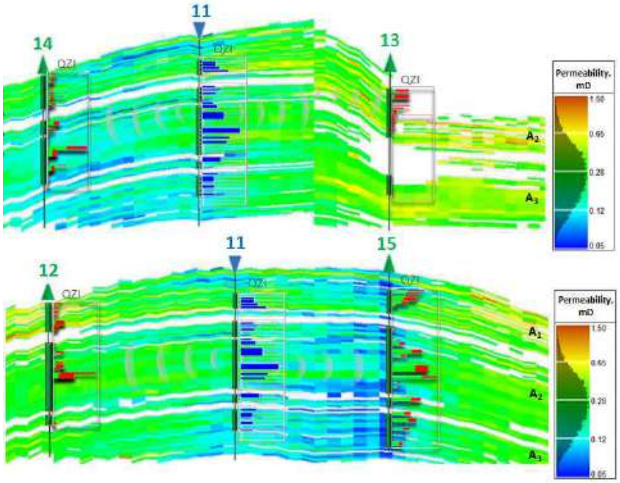
The **PLT** in injector **11** is showing a predominant injection in the middle part of the reservoir which is separated by thin tight beddings from above and below as suggested by OH logs interpretation.

The OH logs in the offset producers have the same pattern of the tights.

The **MRT** findings suggest that these beddings are all fair shale breaks with areal extension.

The integrated analysis of **MRT** and **PLT** also indicates that upper and lower formation units are not flooded efficiently.

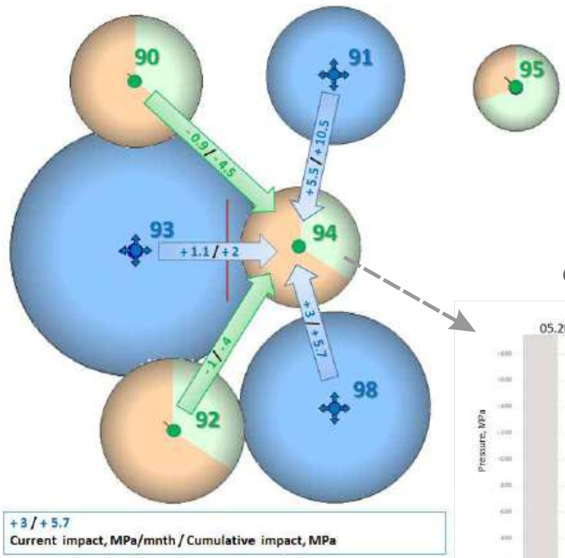




RESERVOIR STUDY

#10 Quantification of cross-well interference

The **MRT** analysis around produced **94** is showing that injector **91** is producing far greater impact than higher rate injectors **93** and **98**. A poor pressure response from **93** suggests that its streamlines trend towards producers **92** and **90**.



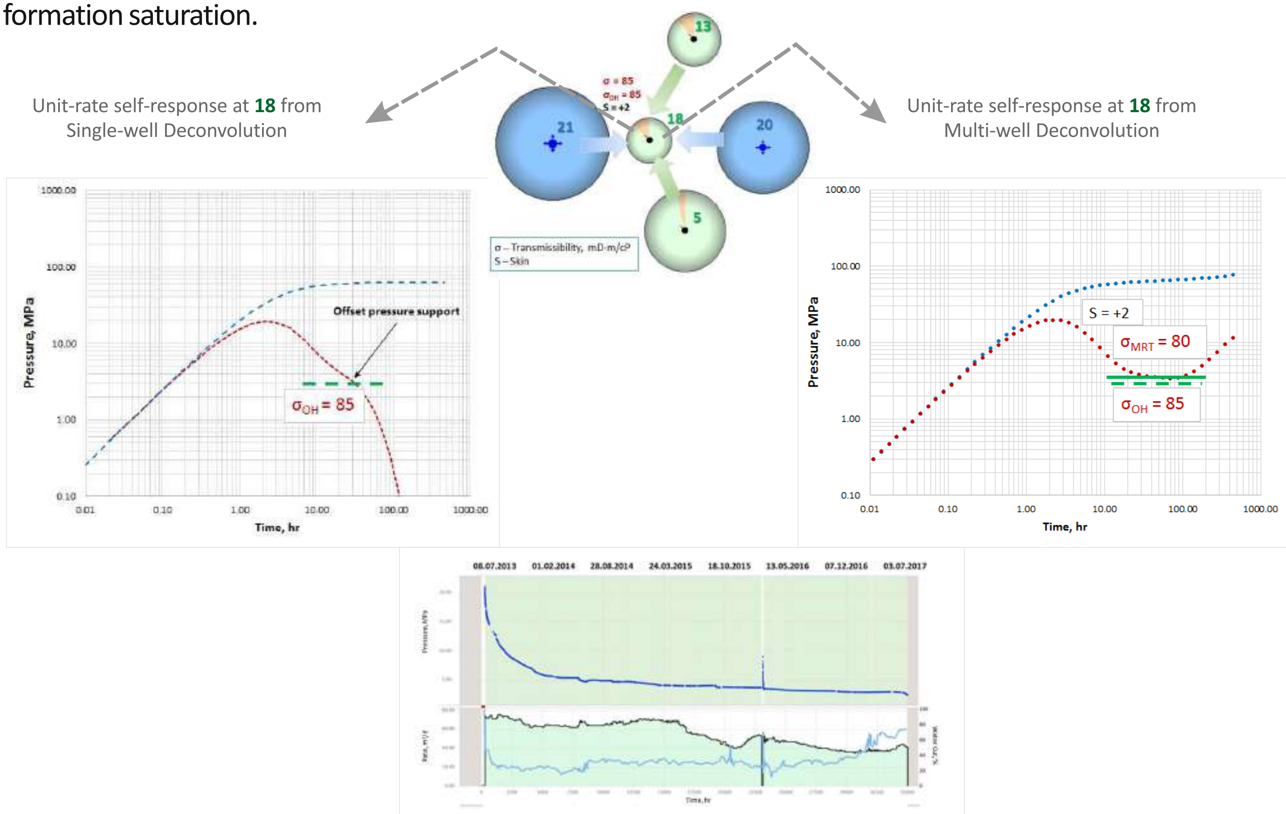
Cumulative pressure response in producer **94** to offset injectors **91**, **93** and **98**

MRT APPLICATIONS

#11 Quantification of reservoir properties in near-well area

The history of producer **18** does not contain long-term transients which could have helped reservoir characterization and formation pressure assessment. The single-well deconvolution is dramatically influenced by sever communication with offset production and can't be used for transmissibility estimation.

The **MRT** analysis around producer **18** has deconvolved the unit-rate self-response which were interpreted as conventional pressure transient analysis. The skin-factor was assessed as +2 and transmissibility turned to be 80 md · m/cp which is in good correlation with predictions from OH data logs based on the current formation saturation.



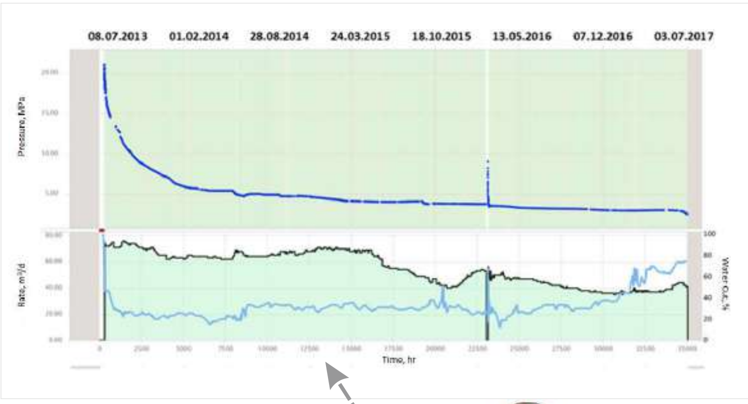
RESERVOIR STUDY

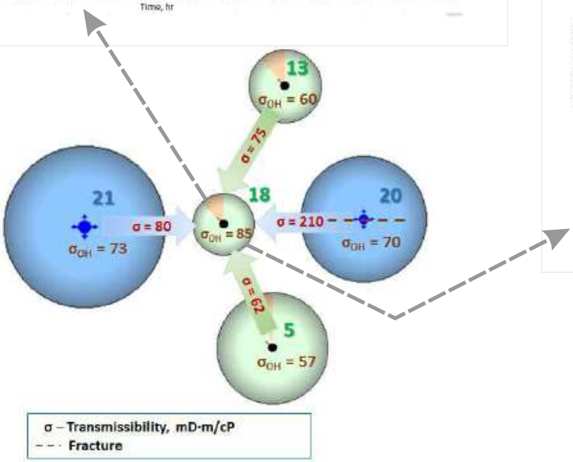
#12 Quantification of reservoir properties in cross-well interval

The **MRT** analysis around producer **18** has deconvolved the unit-rate cross-well responses which were interpreted as conventional pressure interference tests.

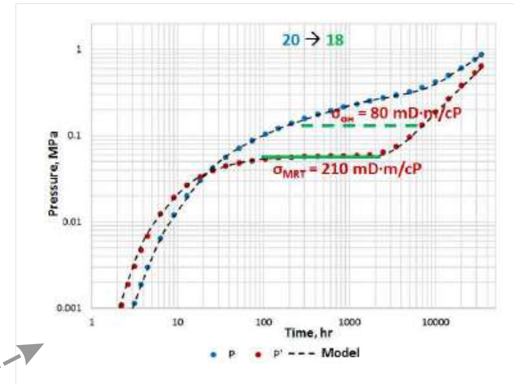
The transmissibilities in intervals **21** → **18**, **5** → **18** and **13** → **18** turned to be similar to predictions from OH logs.

The high transmissibility in interval **20** → **18** and high-pressure response from **20** is most probably a result of spontaneous hydraulic fracturing in **20**.





Unit-rate cross-well response in **21** → **18**
based on multi-well deconvolution



MRT APPLICATIONS

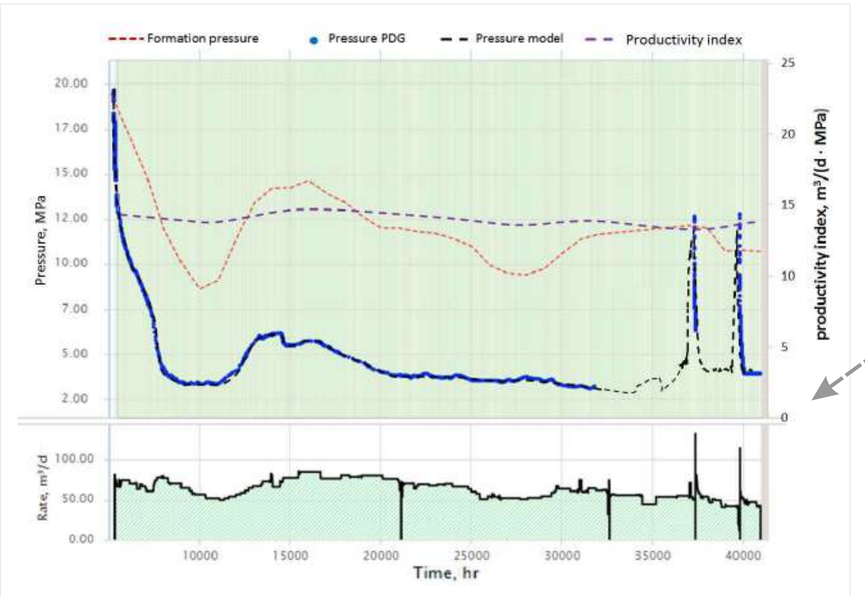
#13 Reconstructing the history of formation pressure and productivity index

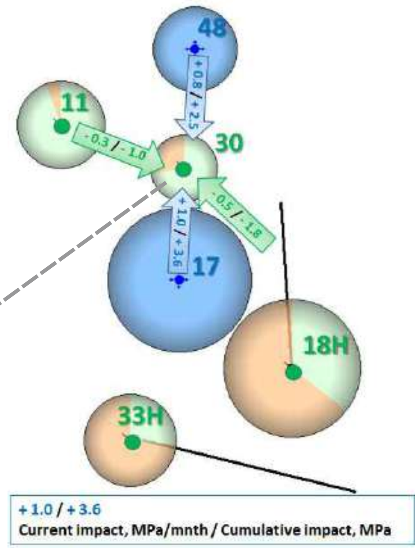
The **MRT** processing around producer **30** has reconstructed the history of formation pressure, drawdown and productivity index.

The PDG stopped functioning at 32,000 hrs and then got replacement and put back to work at 37,000 hrs. The black dash line is the **MRT** model which is accurately matching the PDG recordings and predicts its dynamics during the malfunctioning period.

The productivity index (violet dash line) is being flat over all period of production at around 12.5 m^3/d/MPa.

Reconstructed history of formation pressure and productivity index in producer **30**





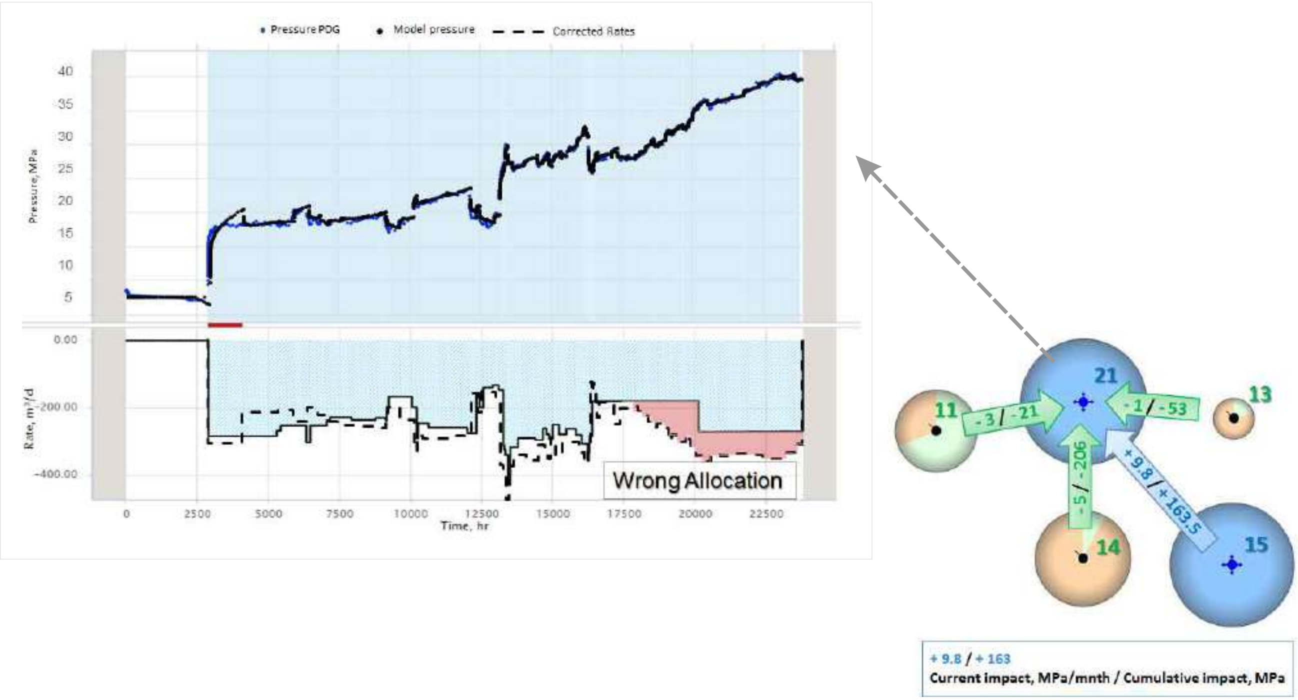
RESERVOIR STUDY

#14 Adjusting the random mistakes in flow rate history records

The **MRT** processing around producer **11** has reconstructed the history of flowrates which is showing that flow readings for 6 months in 2014 were not accurate.

This happened because of the water metering was not functioning properly and three wells on the flow line were recorded as flat rates just to match the total injection through the flow line.

The field records and corrected injection history of well **21**



SAMPLE CASE 1

MRT Objectives

Assess cross-well interference around oil producer **12H** and identify the reasons of the early water break-through.

MRT Results

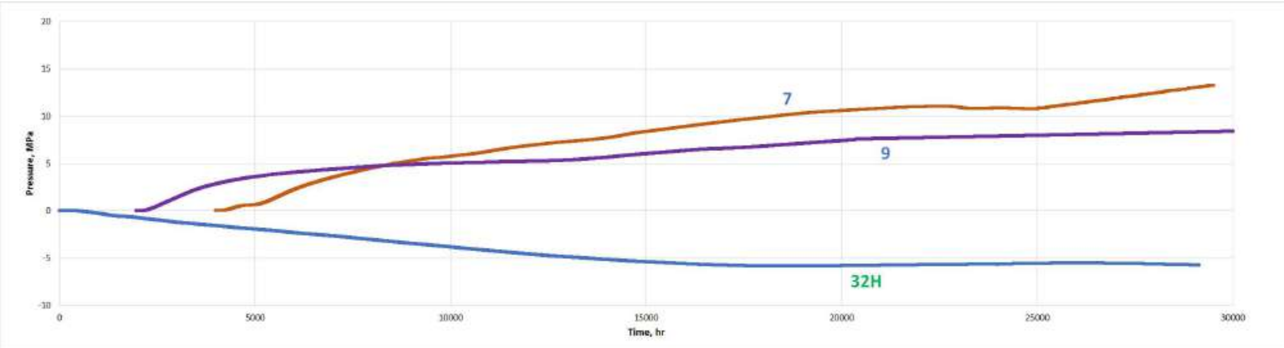
MRT has revealed that injector **7** was injecting above critical pressure which led to spontaneous fracking with uncontrolled progress and eventually to water short-circuiting towards **12H** while injector **9** is less efficient in supporting pressure in **12H**.

The recommendation to reduce injection in **7** and increase injection in **9** has led to arresting the water cut growth in **12H**.

MRT Workflow

1. Dynamic impact from offset wells on to the tested well 12H

The graph below show the reconstructed history of each offset well impact on tested well **12H.**

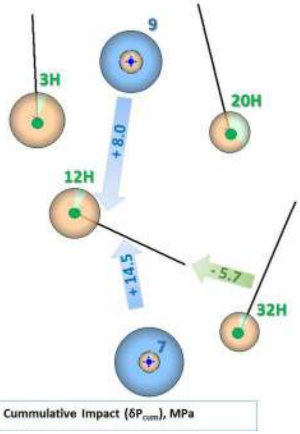


EARLY WATER BREAKTHROUGH IN SELECT PRODUCERS

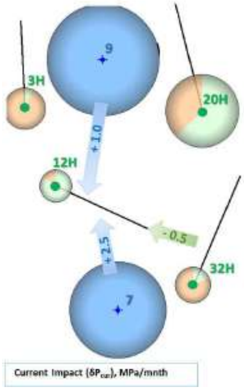
2. Analysis cross-well connectivity between offset wells and tested well 12H

The map is showing cumulative (full-history) and current (last month) connectivity between offset wells and tested well **12H**. One can see a prominent impact from injector **7** and producer **32H**.

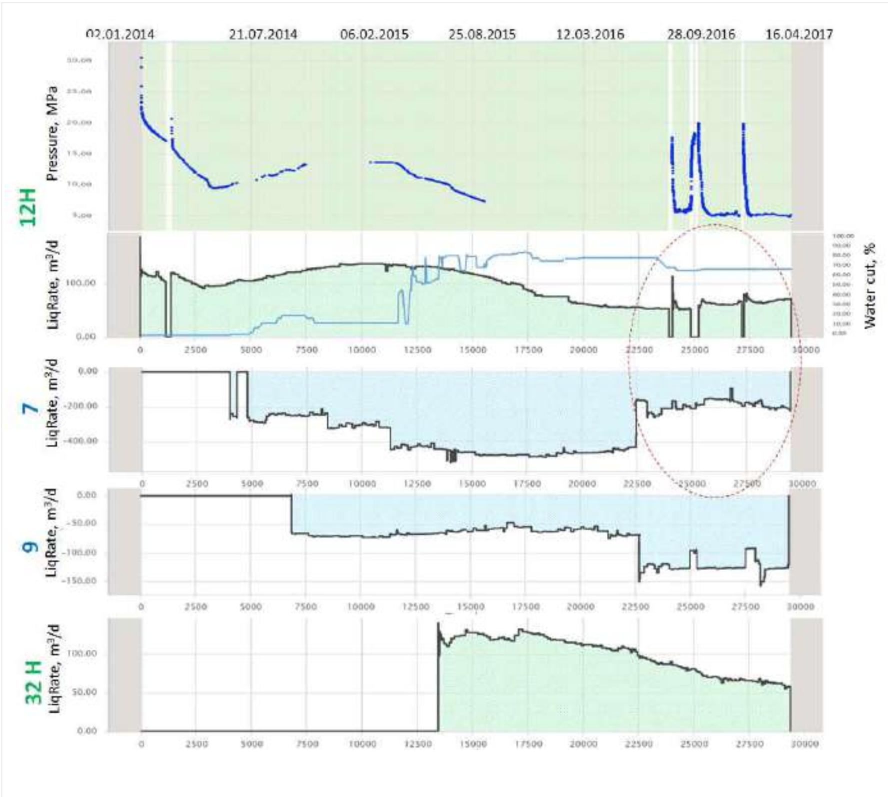
Cumulative (full history) impact from offset wells on tested well **12H**



Current (last month) impact from offset wells on tested well **12H**



Wells production history around tested well **12H**

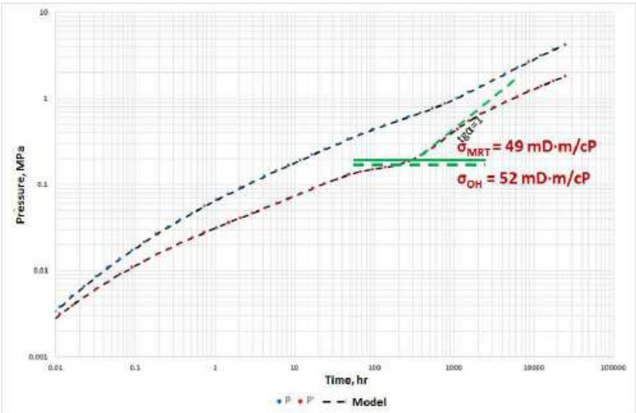


SAMPLE CASE 1

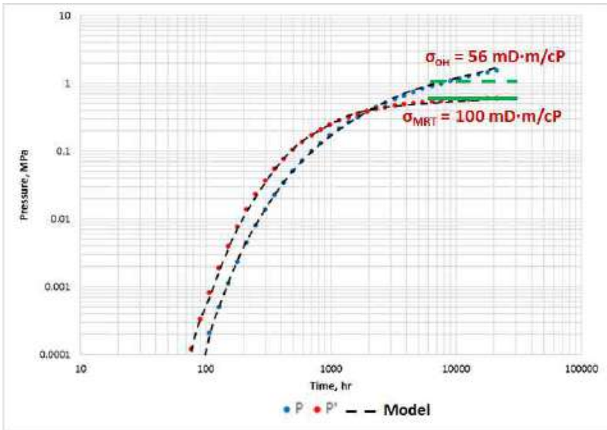
3. Cross-well transmissibility analysis

The graphs below are showing the deconvolved diagnostic log-log plot on unit-rate self-response in tested well **12H** and unit-rate cross-well response between **7** and **28**.

Self-response – diagnostic log-log plot of pressure response in tested well **12H** to the unit-rate flow in 12H



Cross-well response – diagnostic log-log plot of pressure response in tested well **12H** to the unit-rate flow in the offset injector 7



The late time of self-response in tested well **12H** indicates constrained flow, caused by the reservoir depletion.

EARLY WATER BREAKTHROUGH IN SELECT PRODUCERS

Below is the table summary of cross-well transmissibility and its correlation with interpretation of the Open Hole reservoir data logs.

Interval		Current Pressure Response	Transmissibility, σ mD · m / cP		Comparative analysis
		MPa / mnth	MRT	OH	
1	12H → 12H	-4.0	49	52	
2	32H → 12H	-0.5	56	55	
3	7 → 12H	+2.5	100	56	Indicates spontaneous fracking at inject 7
4	9 → 12H	+1.0	60	53	

One can see from the above table that transmissibility in **7 – 12H** and pressure response are noticeably higher comparing to other directions which indicates a fracture performance at **7**.

SAMPLE CASE 2

MRT Objectives

Assess cross-well interference and identify the reasons of the poor response in producer **28** to the offset water injection.

MRT Results

MRT has revealed that injectors **21** and **27** are missing injection volumes while **23** is injecting efficiently into the oil pay.

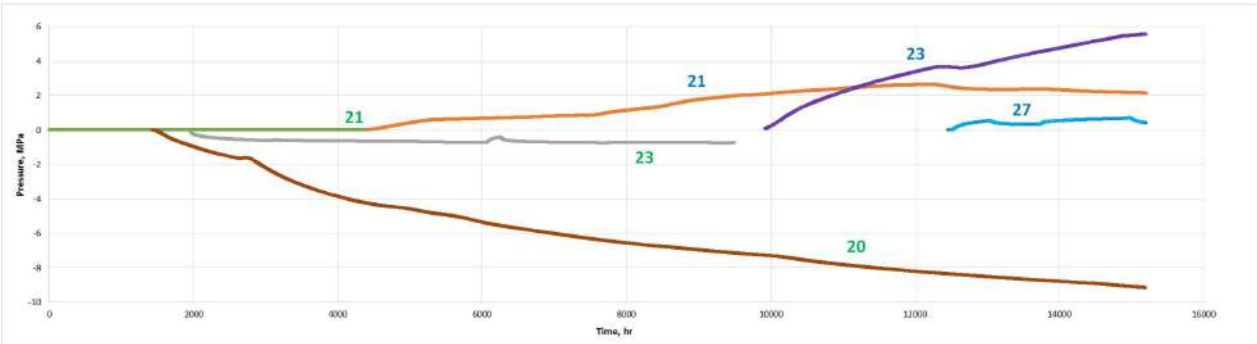
The **PLT** has localized the thief injection below the pay and the water shut-off workover resulted in substantial production increase in producer **28**.

MRT Workflow

1. Dynamic impact from offset wells on to the tested well 28

The graph below show the reconstructed history of each offset well impact on tested well **28**.

One can also see that the impact from **21** has substantially reduced in the last 4 months following the rate reduction in **21**.



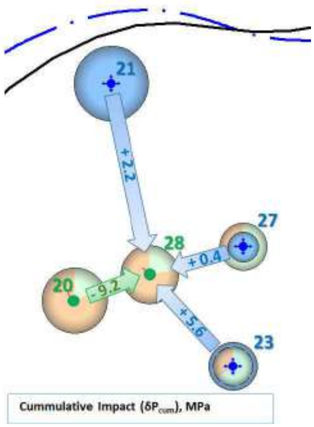
POOR RESPONSE TO WATER INJECTION

2. Analysis cross-well connectivity with tested well 28

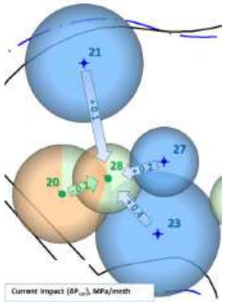
The map is showing cumulative (full-history) and current (last month) connectivity between offset wells and tested well **28**. One can see a prominent impact from injector **23** and poor impact from **21** and **27**.

One can also see that cumulative pressure drop (**- 9.2** MPa) from production in **20** is not fully compensated by the offset injection (**+ 8.2** MPa).

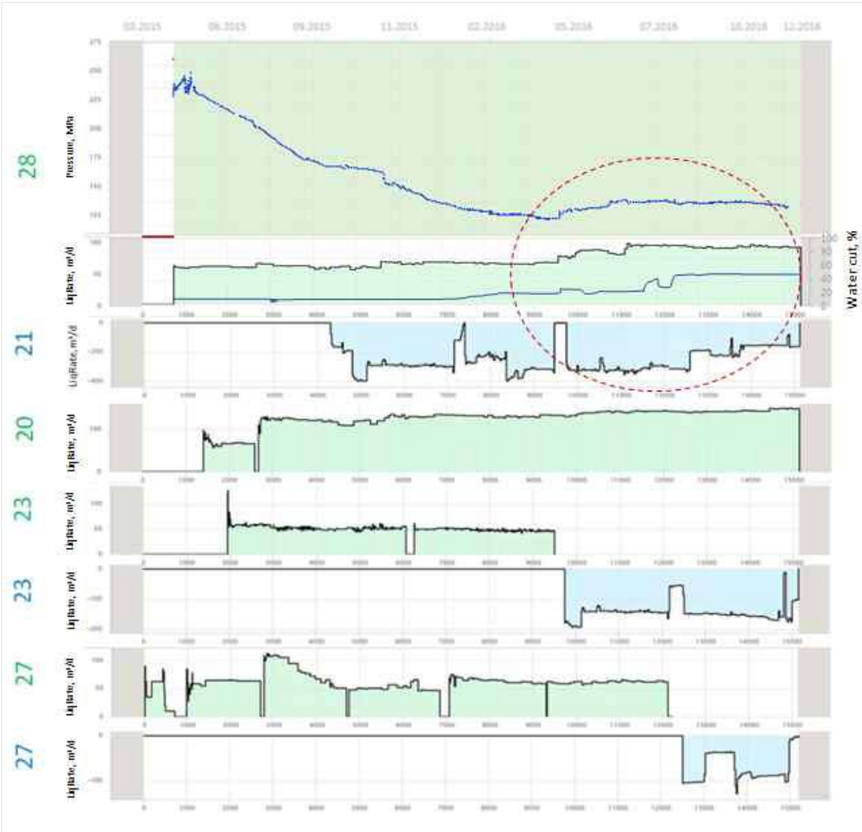
Cumulative (full history) impact from offset wells on tested well **28**



Current (last month) impact from offset wells on tested well **28**



Wells production history around tested well **28**

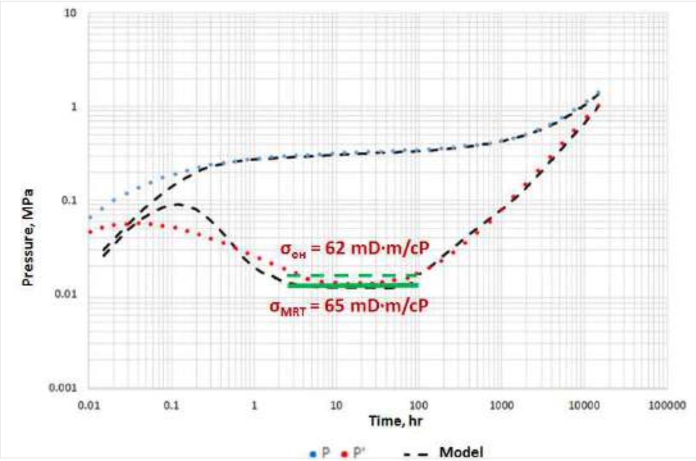


SAMPLE CASE 2

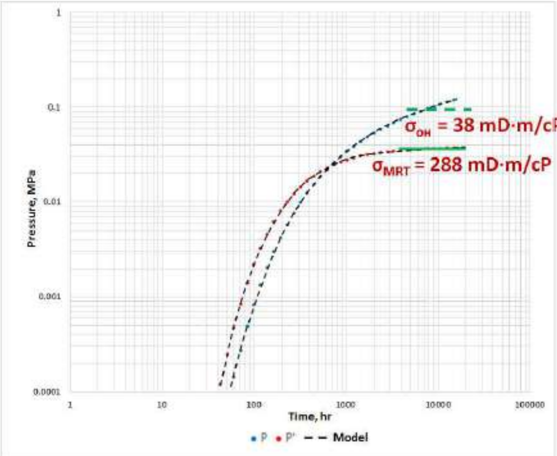
3. Cross-well transmissibility analysis

The graphs below are showing the deconvolved diagnostic log-log plot on unit-rate self-response in tested well **28** and unit-rate cross-well response between **21** and **28**.

Self-response – diagnostic log-log plot of pressure response in tested well 28 to the unit-rate flow in **28**



Cross-well response – diagnostic log-log plot of pressure response in tested well 28 to the unit-rate flow in the offset injector **21**



The late time of self-response in tested well **28** indicates constrained flow, caused by the reservoir depletion.

POOR RESPONSE TO WATER INJECTION

Below is the table summary of cross-well transmissibility and its correlation with interpretation of the Open Hole reservoir data logs.

Interval		Current Pressure Response	Transmissibility, σ mD · m / cP		Comparative analysis
		MPa / mnth	MRT	OH	
1	**28 → 28**	-2.5	65	62	
2	**20 → 28**	-0.2	54	59	
3	**21 → 28**	+0.1	288	38	Suspect of thief injection in **21**
4	**23 → 28**	+0.4	52	50	
5	**27 → 28**	+0.2	508	63	Suspect of thief injection in **27**

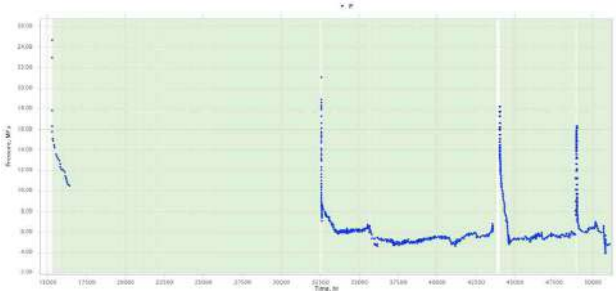
One can see from the table that transmissibility in **21 → 28** and **27 → 28** is noticeably higher comparing to other directions while pressure response is very poor which can be caused by thief injection in **21** and **27**.

Transmissibility in **23 → 28** is in a good accordance with OH interpretation which means that injector **23** gets a clean bill of health.

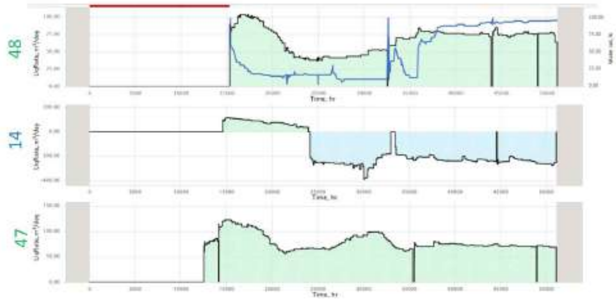
MRT TECHNOLOGY

MRT Workflow

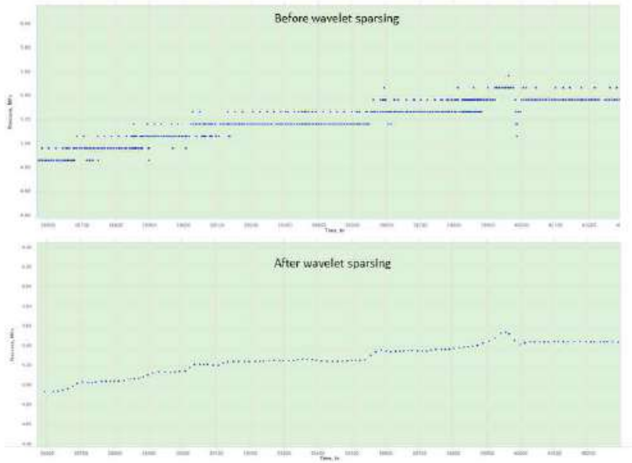
(1) Collecting PDG history on tested wel



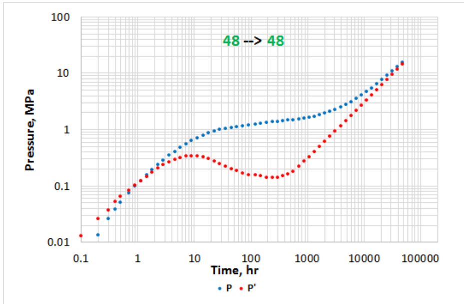
(2) Collecting flow rate history on tested well and offset wells (well tests before allocation)

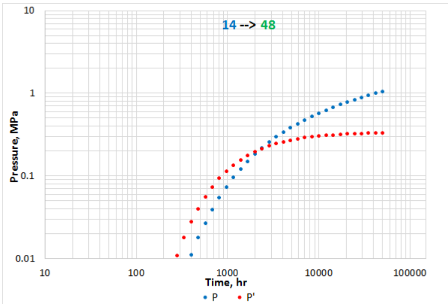


(3) Wavelet sparsing of PDG data adjusted to flowrates variations

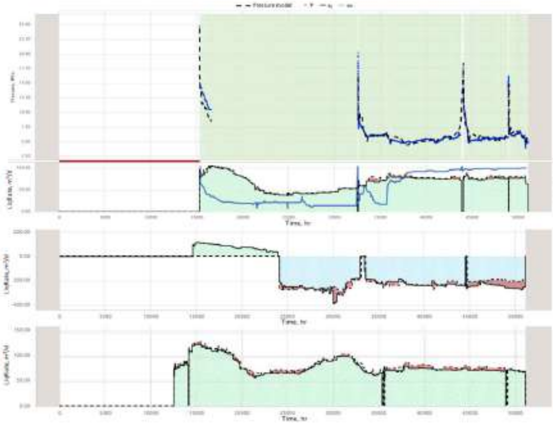


(4) Multi-well deconvolution and constructing unit-rate self-transient response (**DTR**) for tested well and unit-rate cross-well transient response (**CTR**)

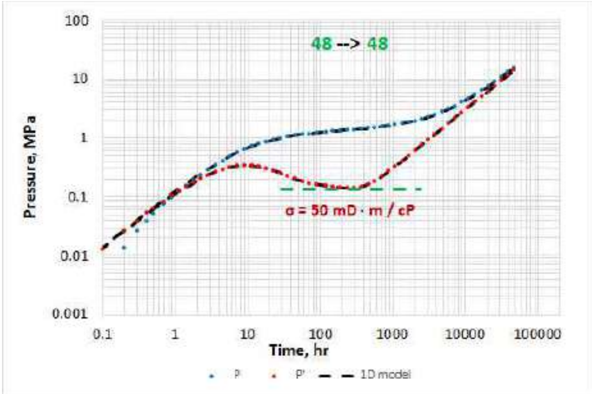




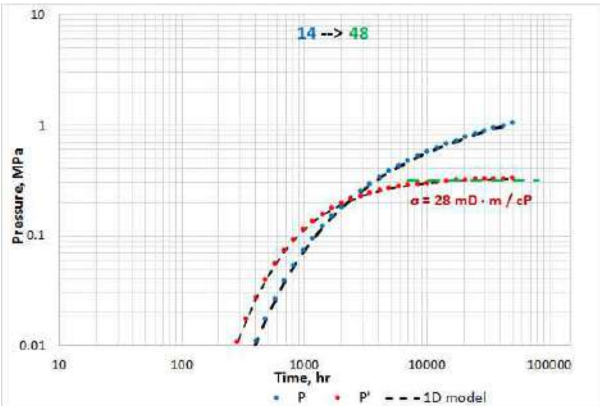
5 Rate correction on tested and offset wells



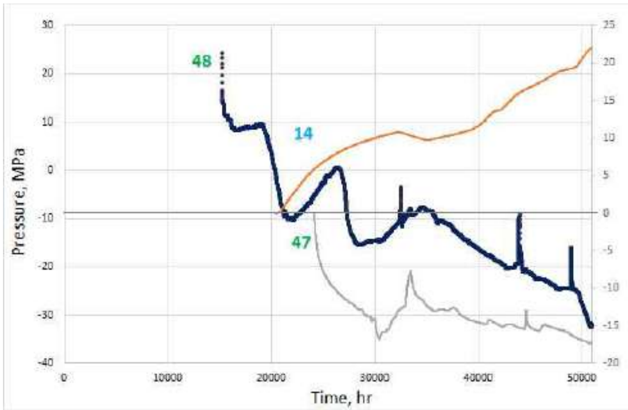
6 Computing transmissibility and boundary proximity of tested well by fitting self-transient response **DTR** with 1D diffusion model



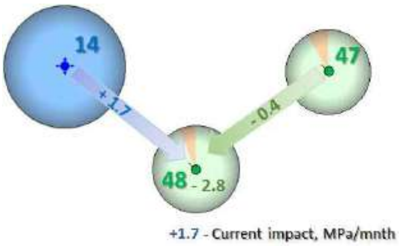
7 Computing transmissibility of cross-well intervals by fitting cross-well transient response **CTR** with 1D diffusion model



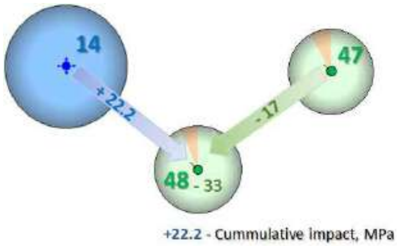
8 Reconstructing self-response and cross-well response history by convolving the transient responses with flow rate histories



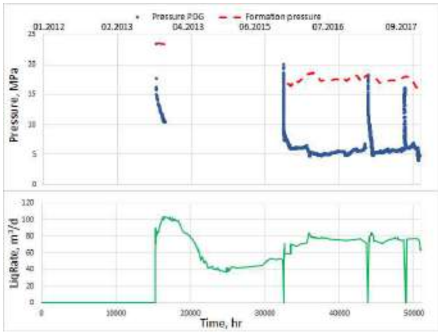
(9) Estimating the current self-response and cross-well response from last month history



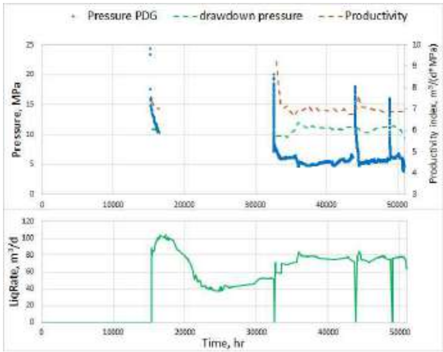
(10) Reconstructing self-response and cross-well response history by convolving the transient responses with flow rate histories



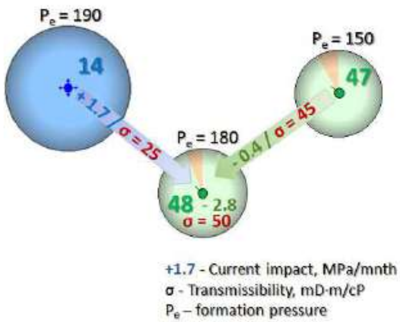
(11) Reconstructing formation pressure history for tested well via convolution of unit-rate transient responses with rate histories



(12) Reconstructing delta pressure and productivity index history



(13) Complex analysis of the collected data and suggesting recommendations



MRT Input Data List and Deliverables

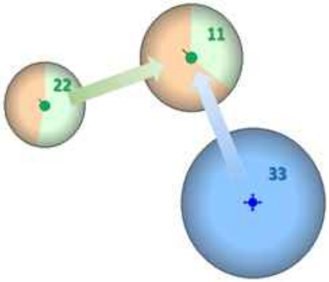
Introduction and Terminology

The MRT analysis is applied to a group of wells which may be in strong interference.
The well with PDG records is called **tested** well and the other wells are called **offset** wells.
All well should have historical production/injection data records, both from well tests and reallocations.
The offset wells may not have the bottom hole pressure records.
Injectors may have THP pressure records which is useful.

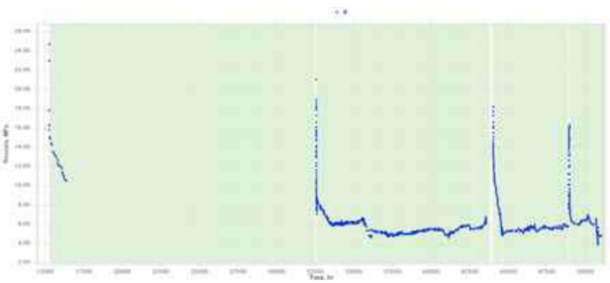
Step 1: Modelling Transient Responses

Input data

1. Location map



2. Long-term PDG pressure data records for tested wells



Output data

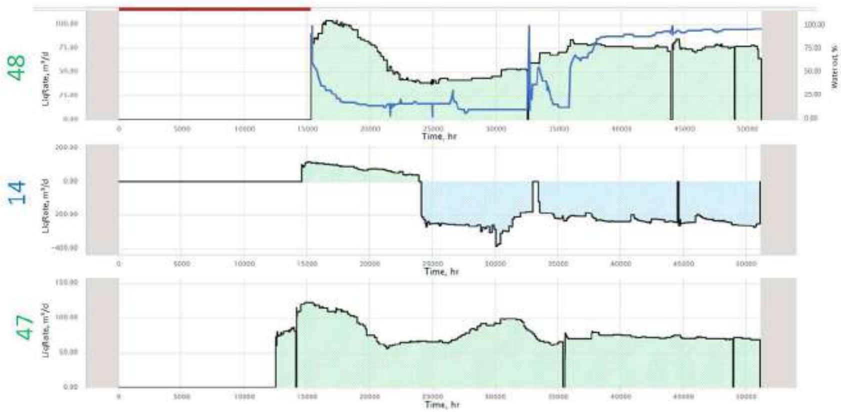
Hard Data Deliverables

1. Unit-rate self transient response
2. Unit-rate cross-well transient response
3. Rate adjustments for all wells
4. Formation pressure history for tested well
5. Drawdown history for tested well
6. Productivity index history for tested well
7. Cumulative/Current pressure response map
8. Pressure response history of offset wells onto tested well
9. Time intervals of constant production conditions

Conditional Data Deliverables

1. Formation pressure forecast for tested well under different production scenarios
2. Interference-free boundary conditions around tested and offset wells
3. Spontaneous fracture suspects
4. Fracture direction around tested or offset wells
5. Thief-production or thief-injection suspects

3. **Production history for tested well and offset wells (both well tests and reallocation data records)**



Step 1: Modelling Transient Responses

Input data

1. Field / Block Summary
2. Map and representative cross-sections with OWC/GOC
3. PVT model and/or lab data
4. SCAL model and/or lab data
5. Core data on porosity, permeability and rock compressibility
6. OH Log Data and Interpretation (porosity, permeability for each well)
7. Wells Sketches
8. PLT reports
9. PTA reports

Output data

Hard Data Deliverables

1. Skin-factor for tested well
2. Transmissibility of reservoir around tested well
3. Transmissibility of cross-well intervals between offset wells and tested well
4. Distance to the interference-free boundary

Conditional Data Deliverables

1. Quantification of production or thief-injection
2. Quantification of reservoir permeability
3. Quantification of effective reservoir thickness
4. Fracture direction and length around tested or offset wells
5. Qualitative analysis of water or gas invasion

MRT Engine

The key technology element of **MRT** analysis is **Multi-Well Deconvolution** which is a decoding parallel algorithm running remotely on multi-core workstation and functioning as a module of **PolyGon** pressure simulation software.

The mathematical engine of **Multi-Well Deconvolution** is based around the convolution equation:

$$p_n(t) = p_{i,n} + \sum_{k=1}^{N} \sum_{\alpha=1}^{N_k} (q_k^{(\alpha)} - q_k^{(\alpha-1)})\, p_{nk}^u(t - t_\alpha)$$

where

$p_n(t)$	pressure at n-well at the time moment t
$p_{i,n}$	initial pressure at n-well
$q_n^{(\alpha)}$	flowrate at α-transient at n-well
$p_{nk}^u(t)$	pressure transient response in n-well to the unit-rate variation in k-well and called **DTR** in case $n = k$ and **CTR** in case $n \neq k$
$t_{\alpha k}$	time moment of α-transient at k-well
N	number of wells in testing group
N_k	number of flowrate transitions at k-well

Multi-Well Deconvolution is trying to solve the above equation by finding N^2 functions $p_{nk}^u(t)$ and N numbers $p_{i,n}$ based on the input information on flowrate and pressure history $\{p_k(t)\}, \{q_k^{(\alpha)}\}_{\alpha = 1..N_k}\}_{k = 1..N}$

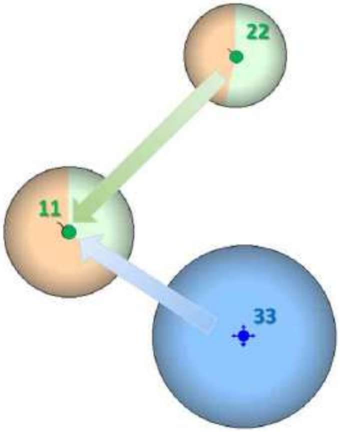
This problem is solved by running numerous search iterations in multidimensional space of **TR** unknowns using the hybrid of genetic and quasi-newtonian algorithms.

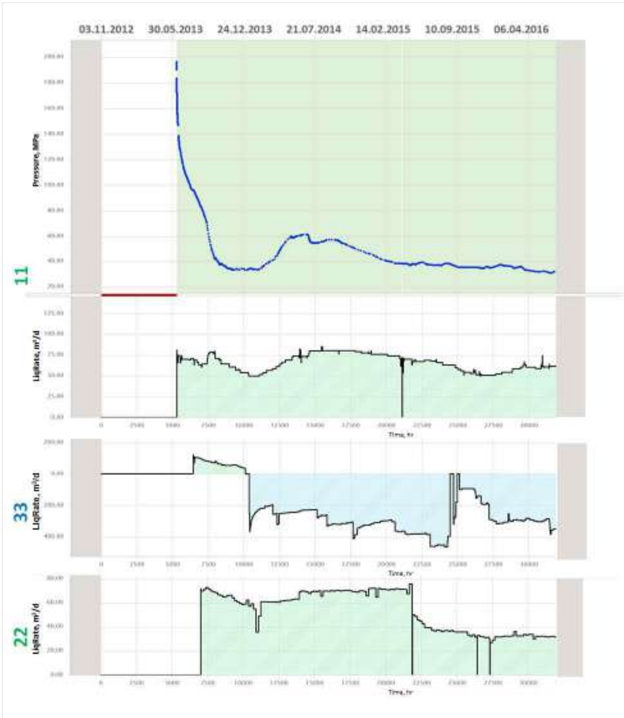
The optimization loop include a sub-routine for adjusting the flowrate history at each transition for each well $\{q_n(\alpha)\}_{\alpha = 1..N_k} \to \{\tilde{q}_k(\alpha)\}_{\alpha = 1..N_k}$ to provide the best match to the pressure gauge data.

The wells with data records on flowrate and bottom-hole pressure history are called **tested** wells.

The surrounding wells with data records on flowrate history but no bottom-hole pressure (or probably discarded pressure readings) are called **affecting** wells.

The results of **Multi-Well Deconvolution** around one tested well can be illustrated with simple case of a tested producer **11** and two affecting wells: offset producer **22** and offset injector **33**.



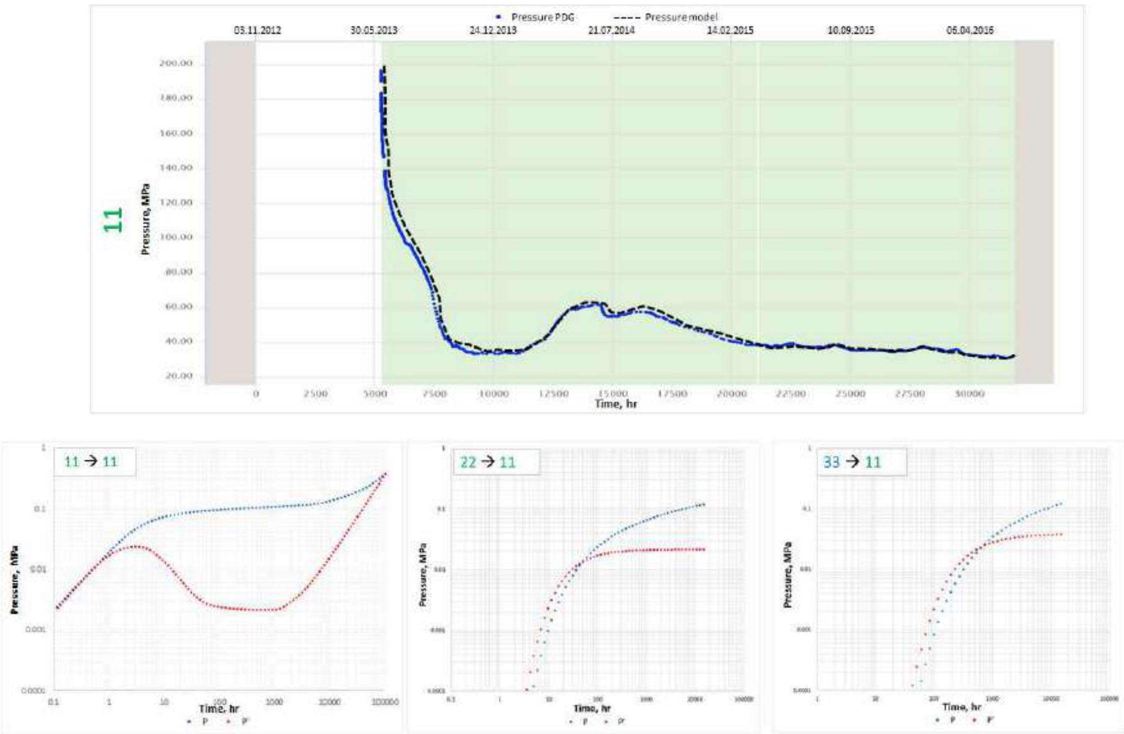


MRT TECHNOLOGY

Multi-well unit-rate transient responses

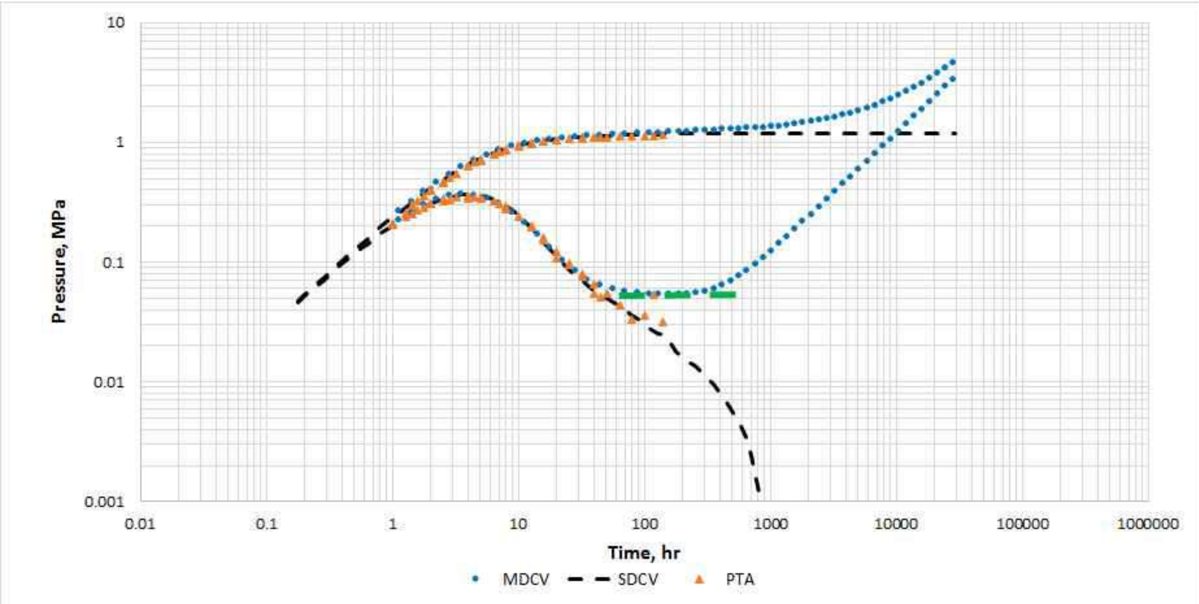
The permanent downhole pressure gauge (PDG) in well **11** is recording a bottom hole pressure very frequently (could be once a minute or once an hour) and responding to the flow rate variations in well **11** itself and to the flow rate variations in offset wells: producer **22** and injector **33**. Obviously, the offset wells produce smaller impact on PDG **11** than flowrate variations in **11** itself but still big enough to contaminate the pressure readings to such a degree that single-well analysis becomes inadequate.

The multi-well deconvolution is looking for unit-rate transient self-response in **11** and two unit-rate transient cross-well responses **22** → **11** and **33** → **11** which will honor the bottom hole pressure readings in **11** to convolution of these responses with flow rate history.



In conventional single-well pressure transient analysis and single-well deconvolution one only gets information on **DTR** **11** → **11** and no information on CTRs: **22** → **11** and **33** → **11**.

Besides the quality of **DTR** in single-well analysis is highly compromised which is illustrated on the picture below, comparing the true **DTR** from **Multi-Well Deconvolution**, single-well deconvolution and the transient respoinse form the longest transient.



Rate Correction

The unit-rate responses now look like a long-lasting conventional pressure transient analysis test and pressure interference test which can be interpreted in conventional way by using 1D analytical or numerical pressure models.

Obviously, the pressure match will never be perfect if we rely on flow rate history data as it is never as accurate as PDG readings.

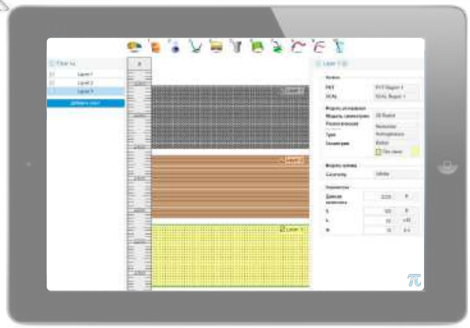
The deconvolution makes effort to correct the flow rates at each point in time in order to achieve the best fit for PDG which represents additional information for analysis.

POLYGON

Multi-well Deconvolution

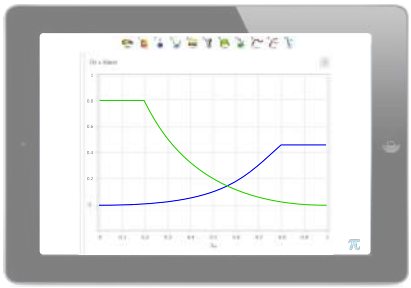
Pressure Transient Analysis

Multi-layer



PVT Modelling

SCAL Modelling

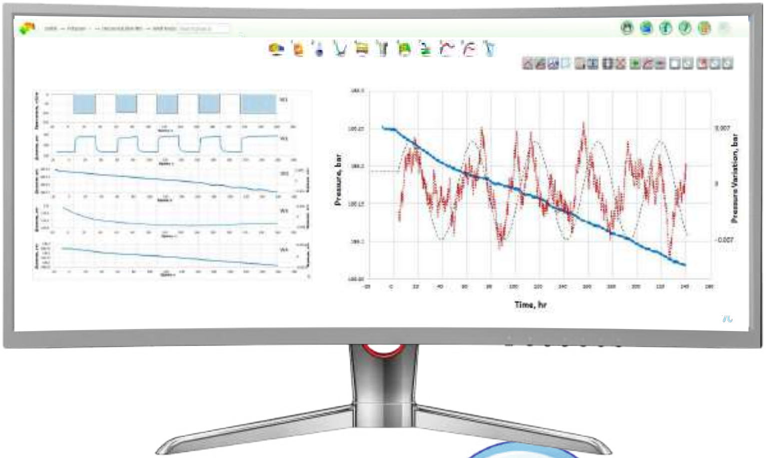


- Analytical models
- Wizard-type Web Interface
- Built-in video tutor

PRESSURE & RATE MODELLING FACILITY

Rate Transient Analysis

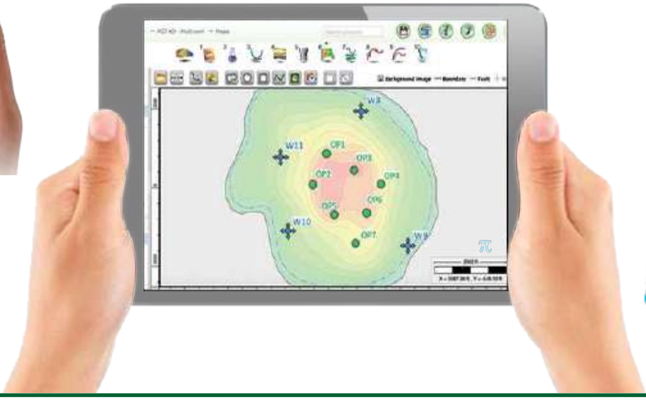
Pulse Code Decomposition



Well Sketch

Multi-core cloud computing

Numerical 2D model



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