# Well Analyzer

Pro-Active

Automated Real-Time Surveillance **(ARTS)**

Well/Reservoir Evaluation Software Package
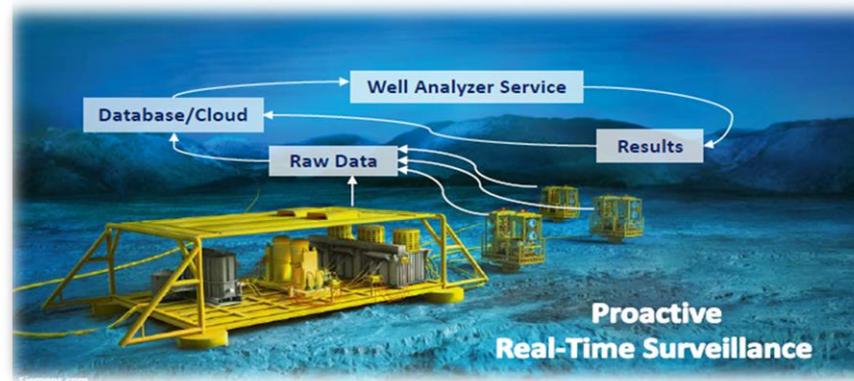
Blind Reservoir Mapping

Oilfield Data Services, Inc.

✓ Oil & Gas Reservoir Testing and Evaluation
✓ Real-Time Pressure Transient Analysis
✓ Hydrocarbon Volume Determination
✓ Well(s) Performance Tracking

✓ Multiphase Rate & BHP Calculations
✓ Optimize Gas Lift / Oil Production Rates
✓ Life Of Well Surveillance/Analysis
✓ Automated PVT Calibration

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+1 (713) 521 - 4571 | info@oilfielddataservices.com
Visit: www.odsi-energy.com

ODSI Well Analyzer
Digital Operator Support Real-Time Automated System
Real-Time Reporting on Well/Field KPI's

The Well Analyzer RTS Concept:

Experienced Surveillance Engineers

+

Automation

VFM/PVT	Flow Assurance	Production & Reservoir Performance Optimization		Field Development & NPV Optimization
Virtual Metering	Wax, Hydrates, Asphaltenes, Scale, Corrosion, Emulsion Detection & Mitigation	Auto Real-Time PTA & Reporting	In-place and recoverable hydrocarbon volume monitoring	Short- and long-term asset and NPV Optimization
Auto Real-Time PVT Tuning & Calibration		Scale, Asphaltene detection in reservoir & wellbore	In-place and recoverable hydrocarbon volume monitoring	Drilling Decisions – Optimal Well Placement

Asset Modeling, Monitoring & Diagnostics

Raw sensor data → Data Communication → Intermediate Data Repository → Real-Time Data Management

Photo credit: www.energyglobalnews.com

- Set Capillary Entry Pressure to Zero
- Derive Diffusion Equation
- Guess a Fixed Reservoir Boundary
- Assume Flow Field is Initially Connected
- Compute Solution
- Smooth Real Data and Make a Comparison
- Guess Again
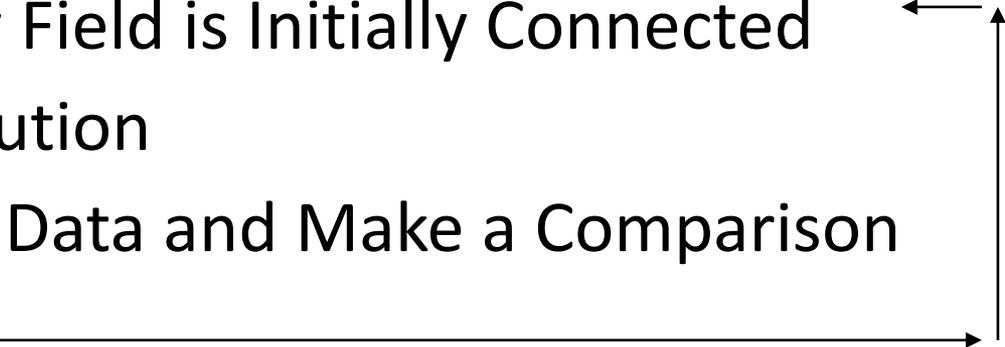
A Bit of Controversy:

ISN'T LOOKING AT THE MAP FIRST…Just…

CHEATING?

Does Blind Mapping Increase the Validity of the Model?

What if….

Instead of performing mathematical manipulation with the data and pre-setting the boundaries, we:

- Apply Thermodynamic Constraints (1st & 2nd Law)
- Include the Higher Order Terms in the Diffusivity Eqn.
- Include the Concept of Threshold Pressure (pressure drop required to initiate flow from a pore)
- Treat the System Like a Mass Transfer/Energy Dissipation Process

- A Closed Solution
- Running Volumetrics – don't have to reach PSS to get a volume
- More Accurate Permeability-Thickness
- More Accurate Distances to Limits
- Differentiate between Faults, Strat-outs & Gas-Liquid Contacts
- Relative Position of Limits to Each Other
- A Map You can show the G&G guys without getting laughed out of the room

…Now, let's meet with the G&G team

This is the point to begin integration of Well Testing & Seismic.

SMI 109

154'

No. A-1
Anomaly 508'-549'

622'

Scale: 1" = 1,000'

1,736'

1,969'

Rinv = 3,215'

Energy Width 1,798'

WAVEX Energy Map

1,345'

2,784'

1-2-3-4 Limit Rotation

Channel 3

Well

?

?
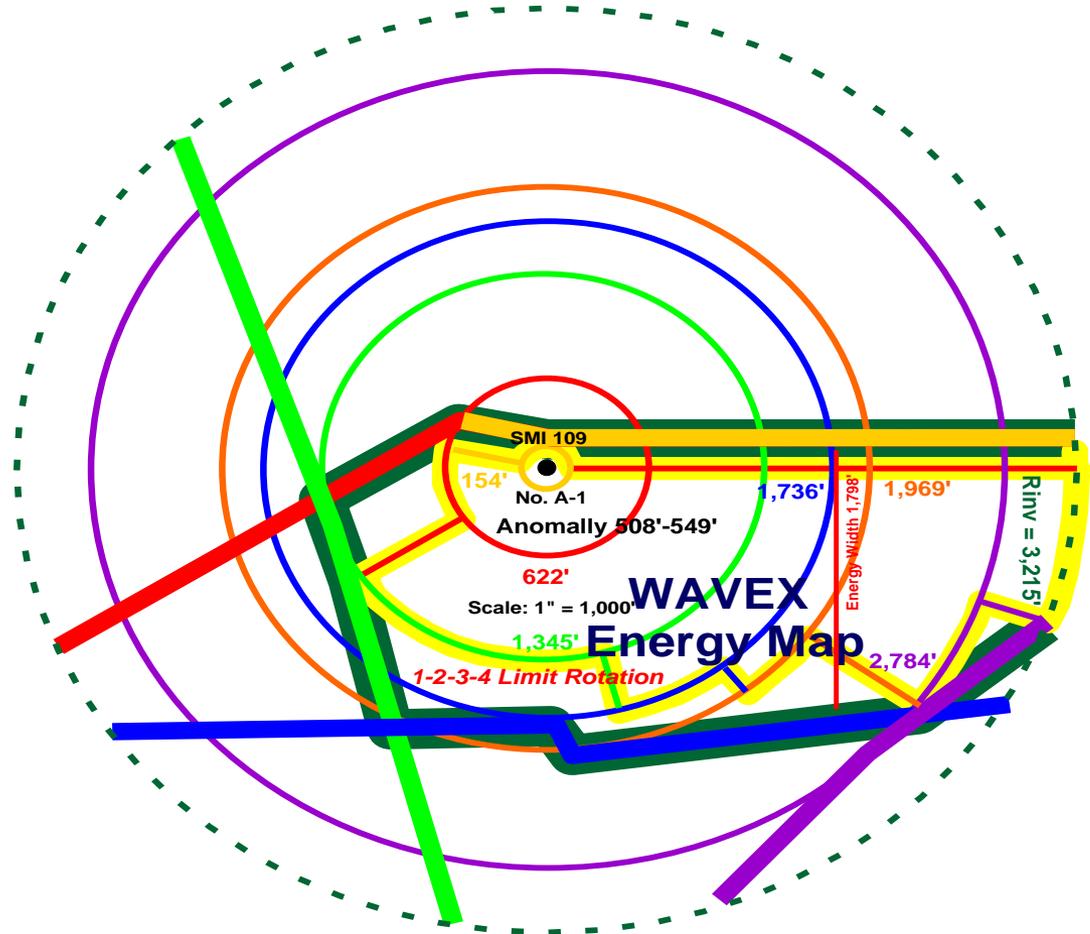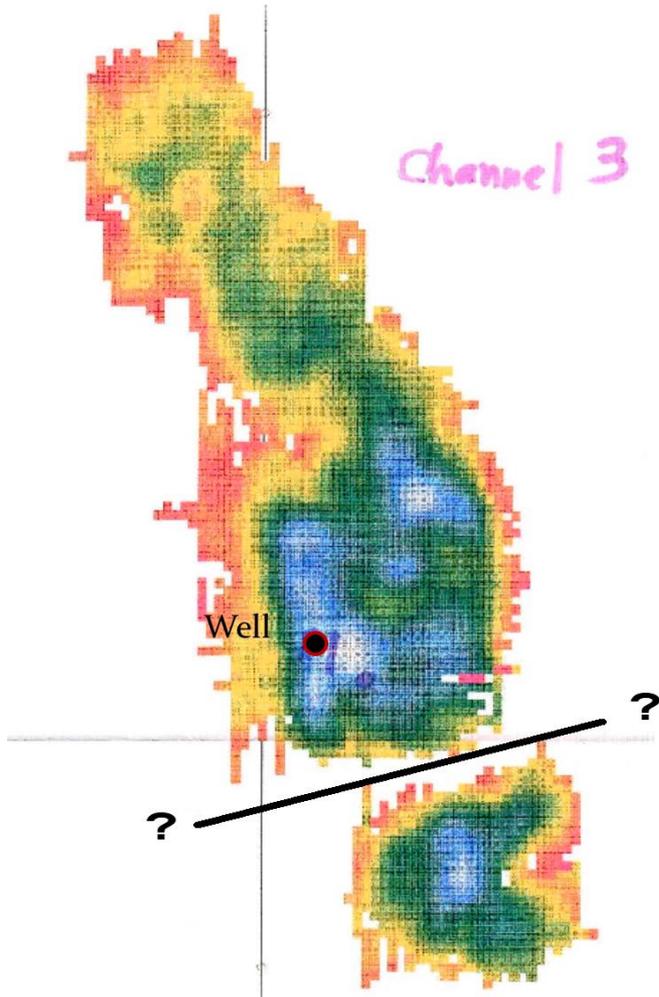
Is This One or Two Reservoir Compartments ?
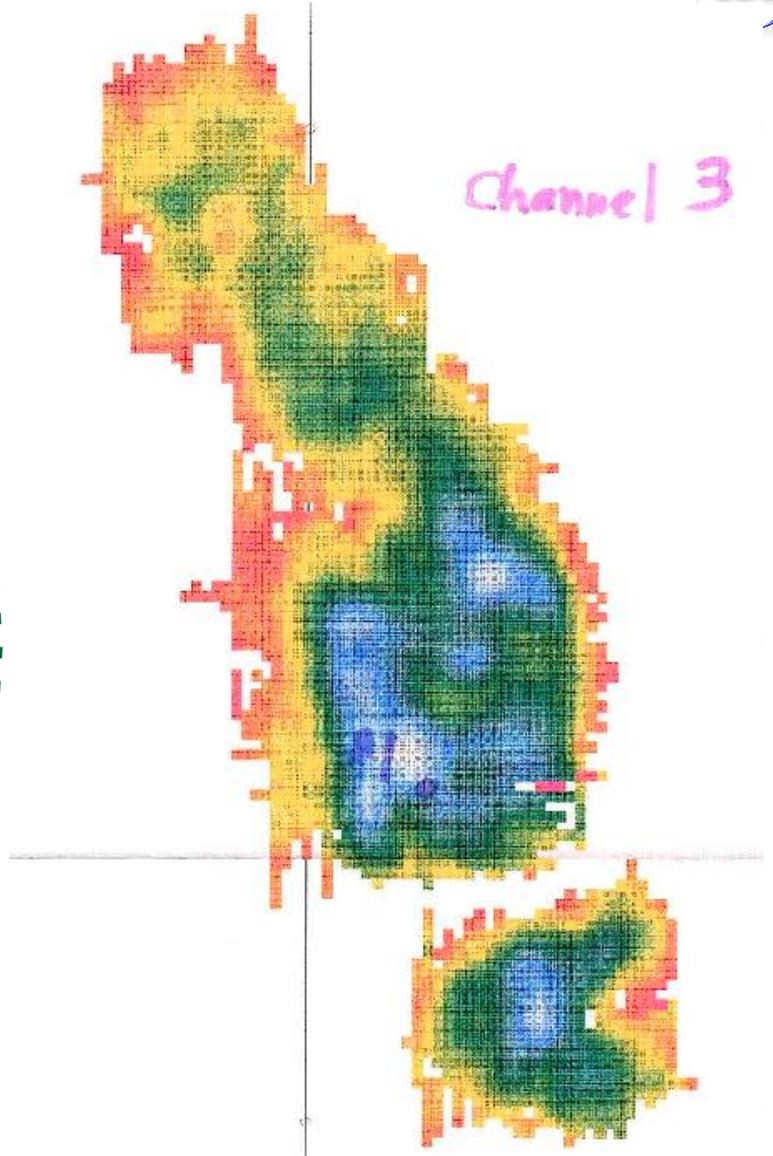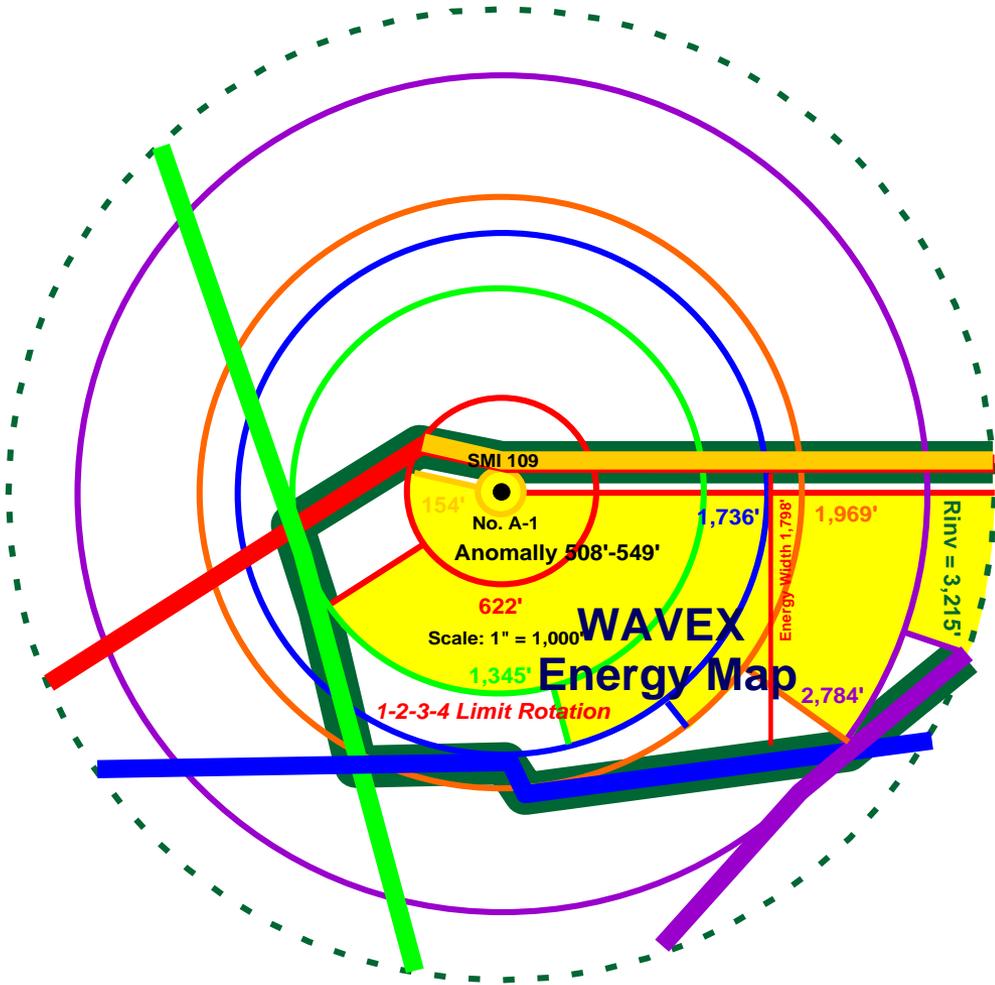
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# Blind Energy Map – Example
From Pressure/Rate Data ONLY

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Blind Energy Map – Example
From Pressure/Rate Data ONLY

Conclusion:

- The reservoir compartments are <u>NOT</u> connected

- The study improved operator's geological interpretation

- ODSI evaluated 18 BFC of gas in place; the well produced 12.7 BCF (depletion drive; high compressibility rock)

- Once the 'Top' compartment was depleted, the operator side-tracked to the 'Bottom' compartment and encountered virgin pressures

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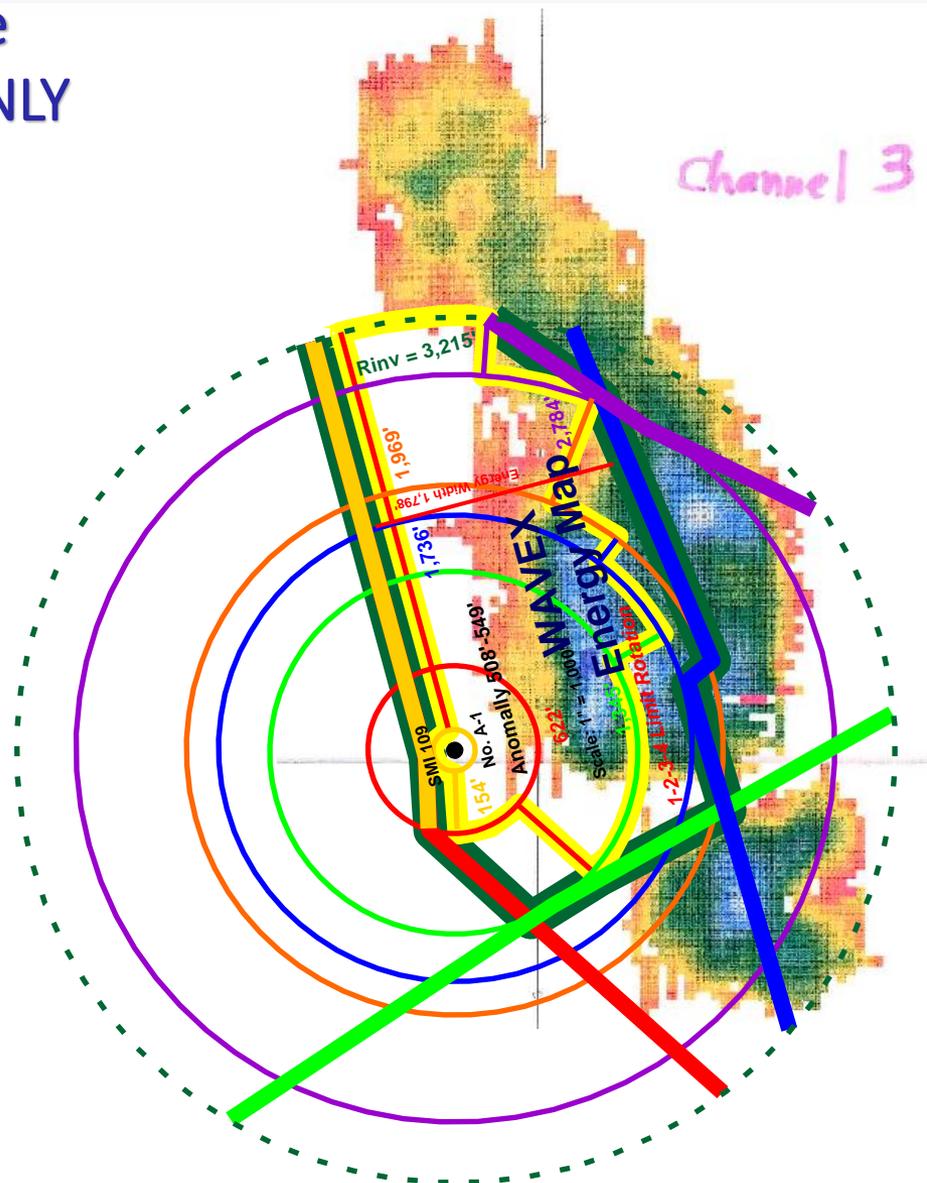
Blind Energy Map – Example
From Pressure/Rate Data ONLY
Questions?

- How Long to Generate Results? 2-5 days

- How Much? <$35,000 plus data acquisition costs

- Besides the Pressure & Rate Data, What do You Need?
  - Logs
  - Core/SWC data
  - Fluid Properties
  - Completion/Wellbore Diagram
  - NOT Your Map