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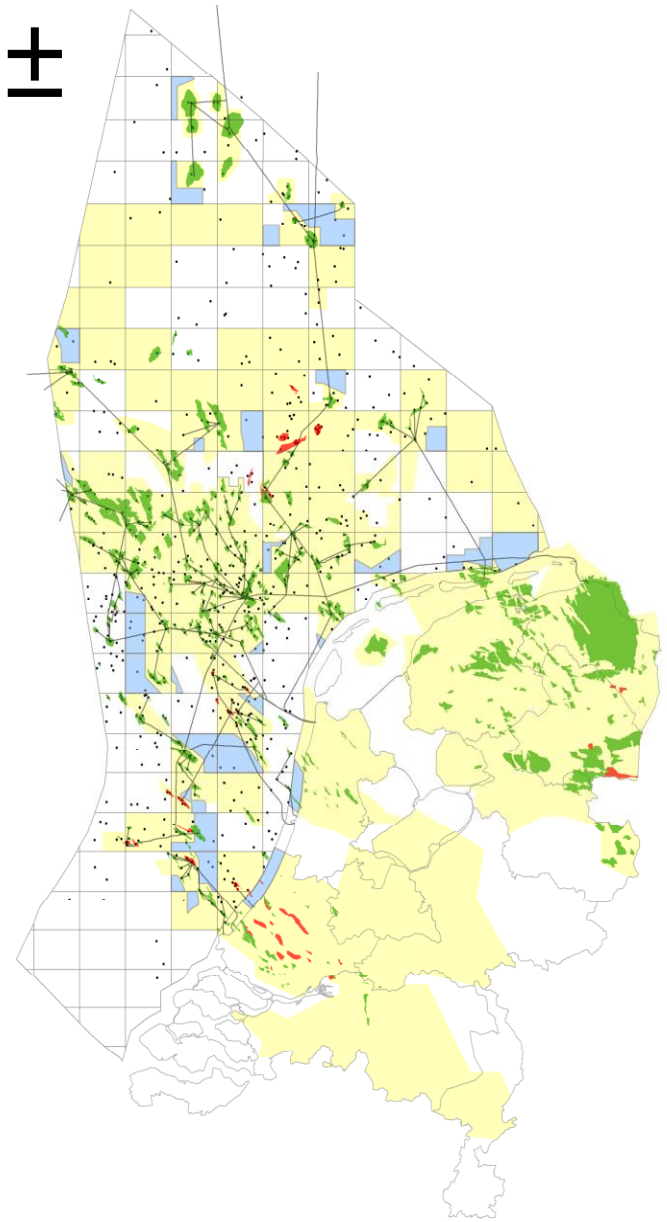
TÜV NORD TÜV Nederland QA B.V. ISO 9001

Missed Pay Study of the Dutch Offshore

EBN Dutch Exploration Day, 23 May 2016

Why Missed Pay study in the Netherlands?



- Many “unsuccessful” exploration wells
  - Classified as dry
  - Significant shows
  - Tested hydrocarbon accumulations.
- Non-target reservoirs overlooked
- Dense, aging infrastructure
- Attractive small fields policy
- Public availability of well and seismic data
- Many conventional reservoirs in different geological settings

Scope

- Missed pay study of “unsuccessful” exploration and appraisal wells
- Use all public available (NLog) well data
  - Electrical logs
  - Mud and composite logs
  - Drilling, geological well reports
  - Core, pressure, test data
- Visual review includes all conventional reservoirs
- Petrophysical evaluation of zones of interest
- Classification of reservoirs and wells

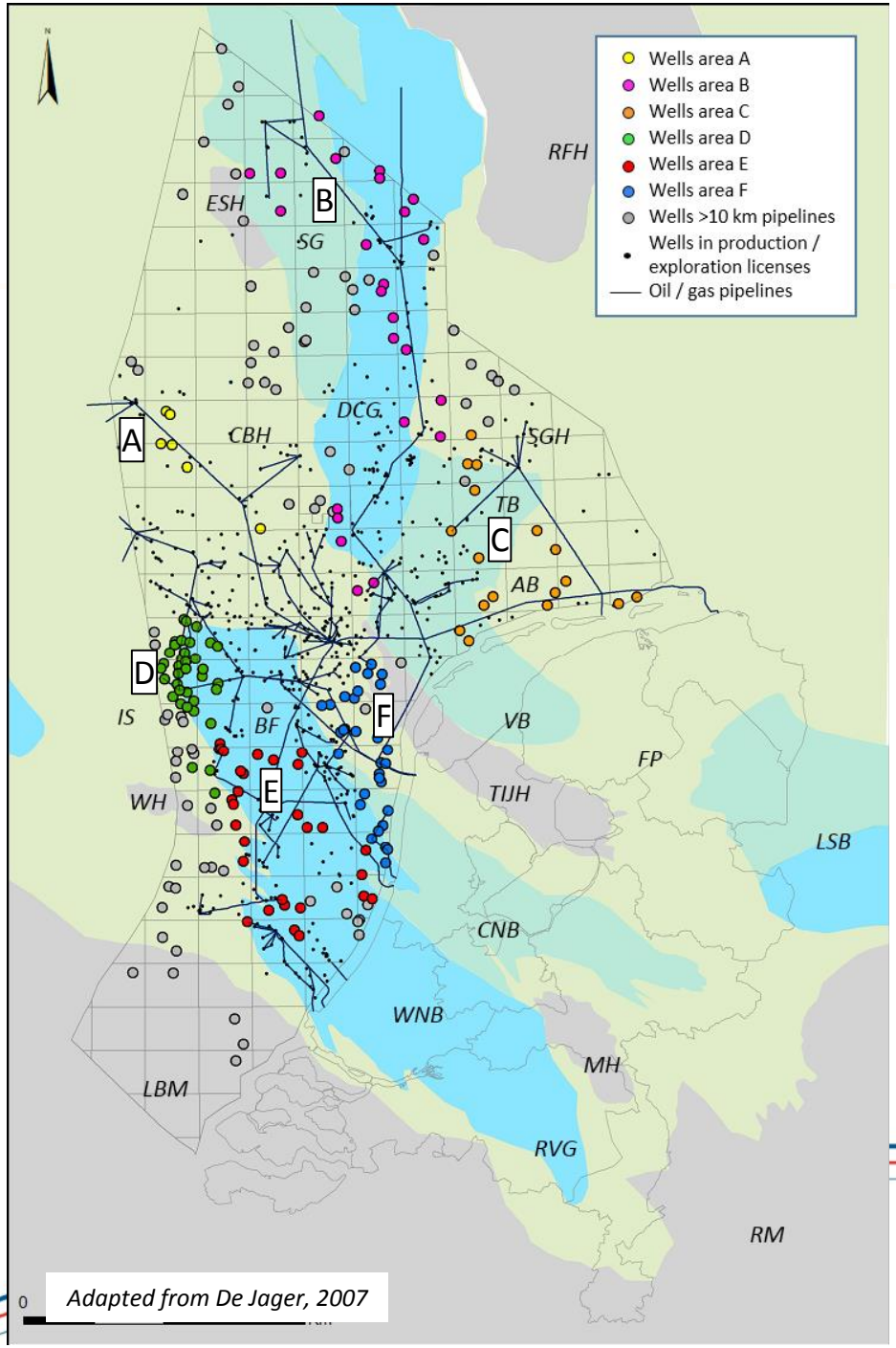
Study areas and well selection

Well selection criteria:

- Open or fallow acreage
- Exploration wells
- 10 km from infrastructure

Six study areas based on:

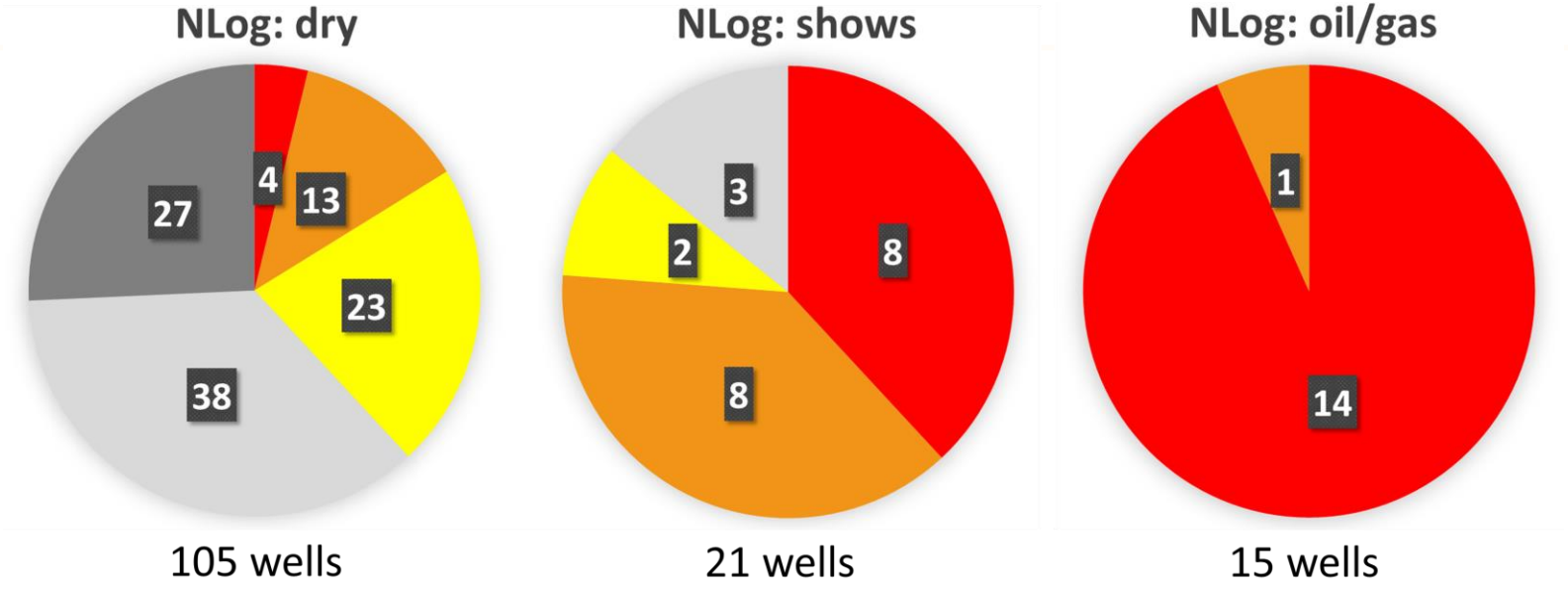
- Basin geography
- Infrastructure



Deliverables

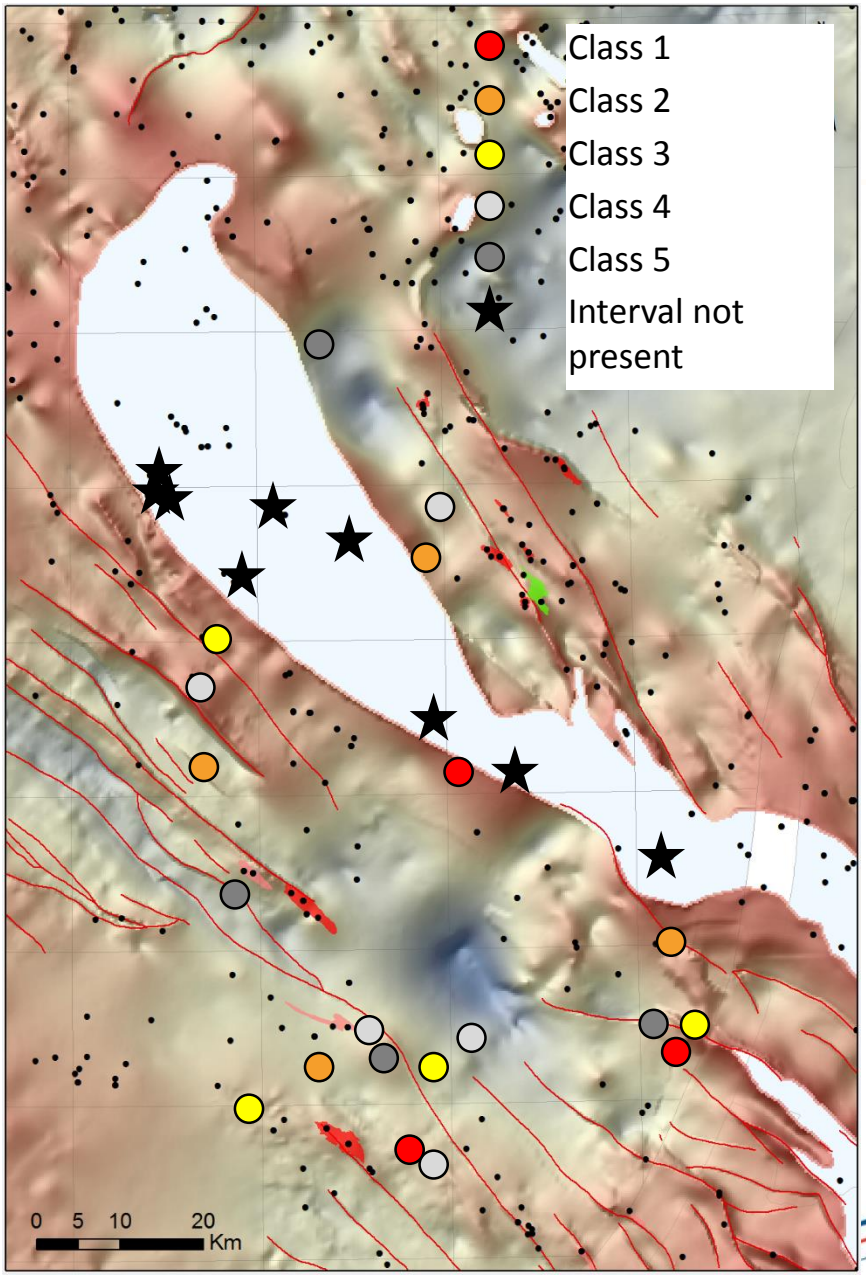
- Missed pay **report** per well and area
- **Petrophysical** interpretation of zones of interest
- **IP and Petrel** database with wells and logs
- **Excel database** of petrophysical results and classifications
- **Core** database
- **Pressure** database
- **ArcGIS** database with all wells, classifications and maps

Well classification vs. NLOG status



- Class 1: Hydrocarbons at surface
- Class 2: Hydrocarbons by logs or RFT pressures combined with shows
- Class 3: Good shows
- Class 4: Minor shows
- Class 5: Dry well

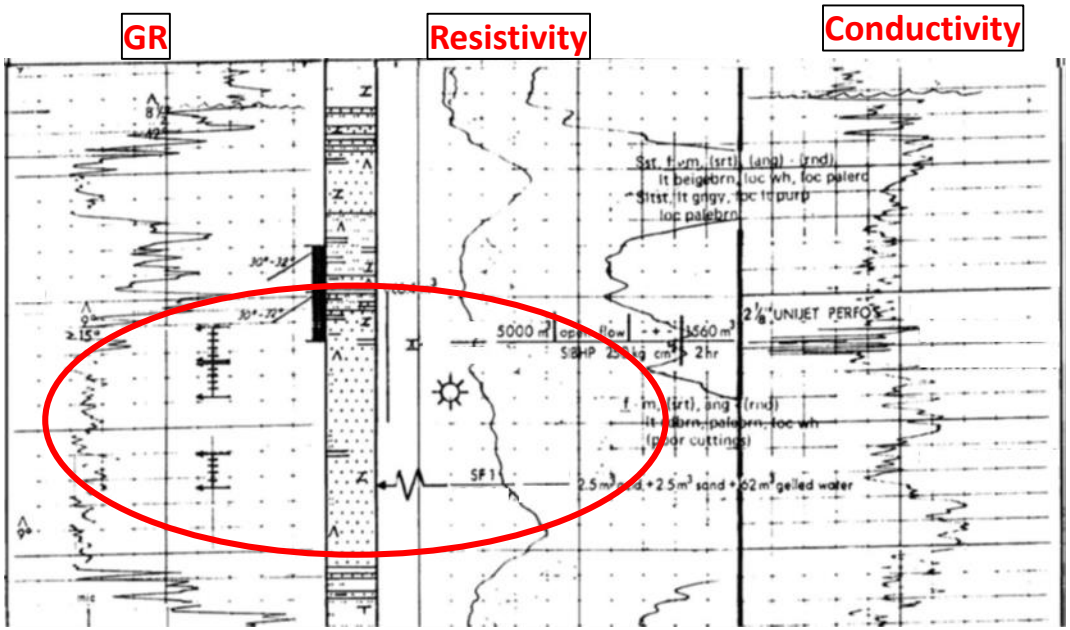
Example reservoir map



Reservoir classifications plotted on reservoir depth map

Displayed classifications are not real, this is an example of what a reservoir map could look like.

Example result



- Old well
- NLOG Classification: Shows
- Gas shows in 100 m thick sandstone
- DST: Gas flow 100,000 m^3/d
- Updip potential