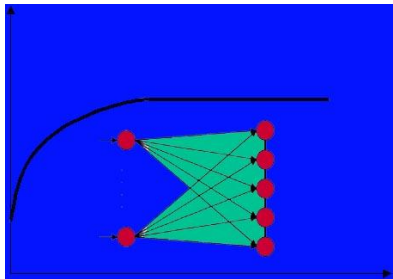
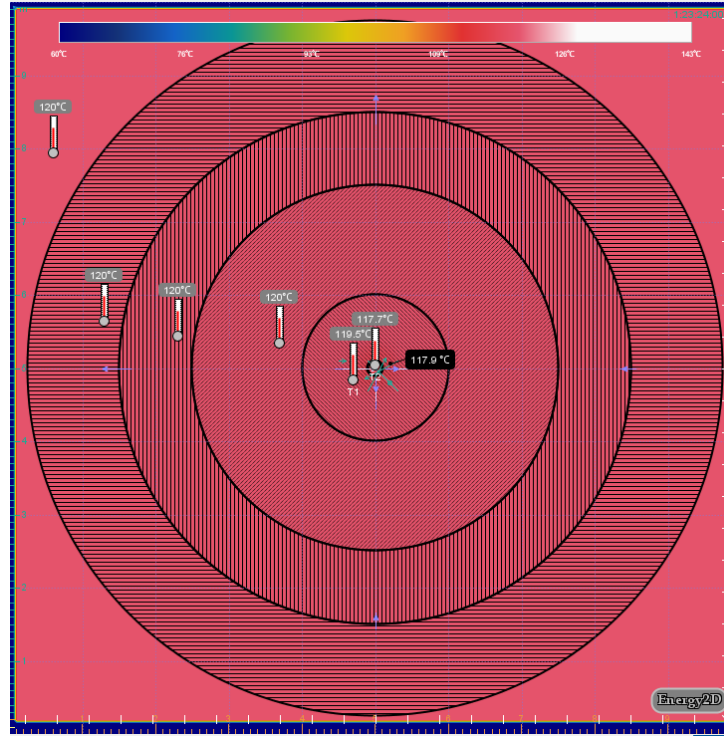
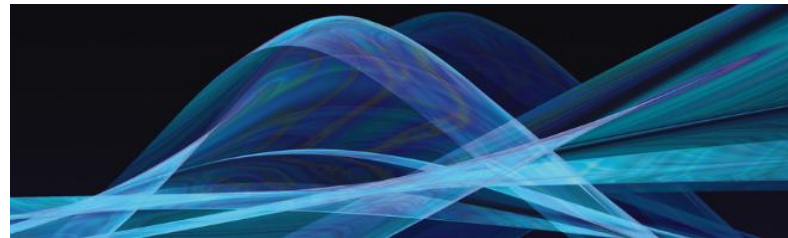


DDS 1

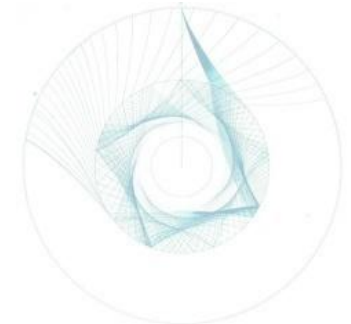
DEEP DIRECTIVITY SYSTEMS



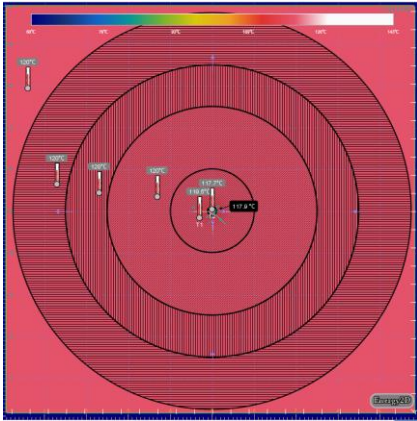
GeoNeurale



Wavefields



Petrophysic-Consultants
Geosystems Engineering



>30 YEARS EXPERIENCE

IN THE OIL EXPLORATION INDUSTRY

AND

GEOHERMAL EXPLORATION INDUSTRY

DDS1 THE NEXT GENERATION OF GEOTHERMAL PROJECTS

THERE ARE THOUSANDS OF UNKNOWNNS IN A DEEP EXPLORATION PROJECT

TO SUCCESSFULLY PERFORM AN EXPLORATION PROJECT TWO THINGS ARE ESSENTIAL:

- 1. DIRECT EXPERIENCE IN OPERATIONS → RESERVOIR ENGINEERING
- 2. EXPERIENCE IN RESERVOIR STUDIES → THEORY AND PRAXIS OF MEASUREMENTS, PROCESSING, INTERPRETATION IN PETROPHYSICS AND 3D-SEISMIC

DEEP DIRECTIVITY SYSTEMS

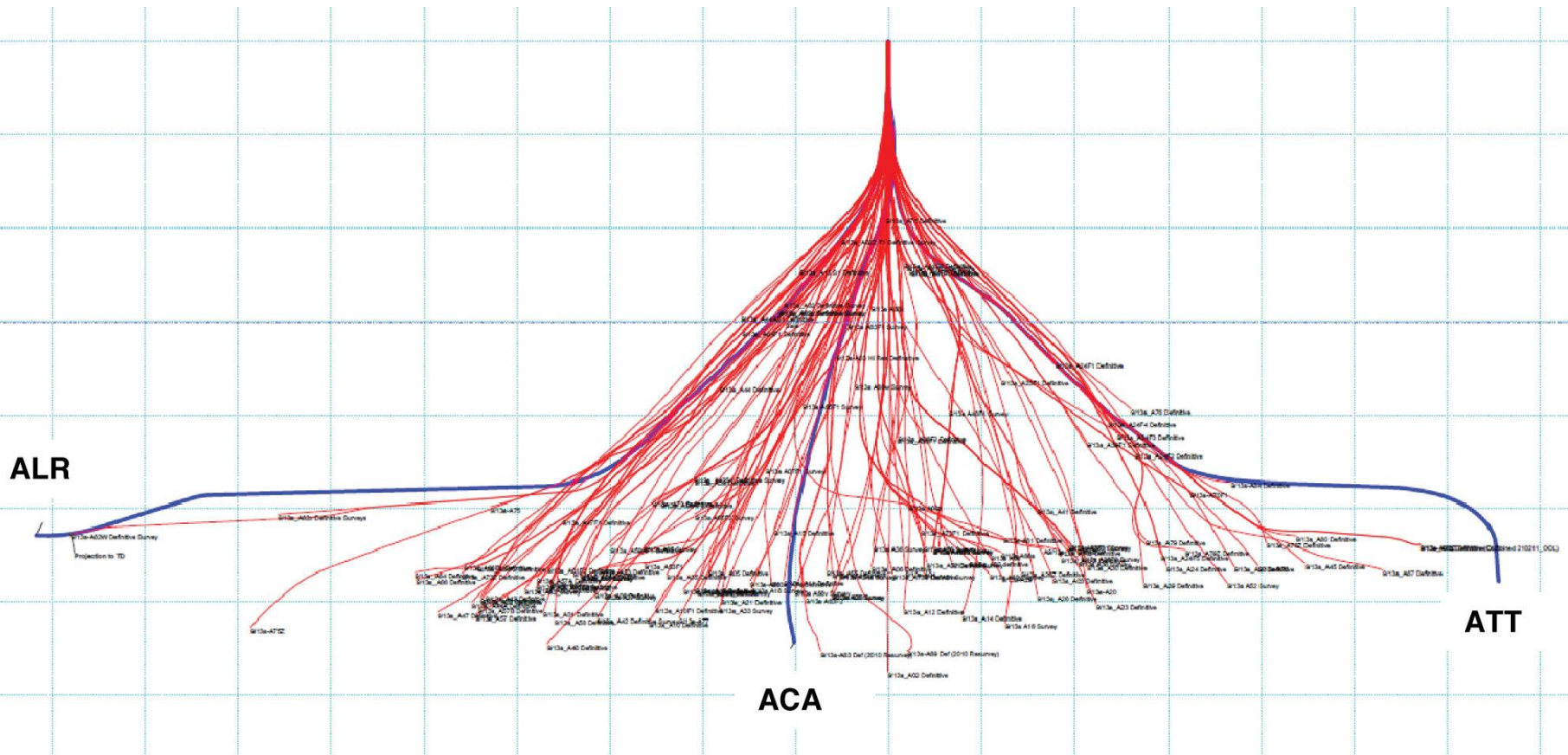
DDS1 ORIGINATES FROM A UNIQUE TECHNICAL EXPERIENCE AND KNOW-HOW IN THE OIL AND GEOTHERMAL EXPLORATION INDUSTRY

LIST OF OFFSHORE INSTALLATIONS AND LAND RIGS WHERE WE WORKED

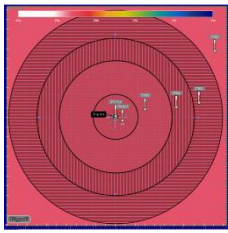
The following diapositives show a list oil platforms and land rigs for exploration and production where we worked and a description of field of servicers we performed.

An oil&gas offshore installation is a giant laboratory where at the same time exploration projects and reservoir monitoring measurements through surface and downhole sensors are performed. These measurements are input in parallel computing machines that calculate realtime reservoir dynamic parameters and static petrophysical properties. At the same time 4D seismic measurements describe the time evolution of seismic attributes to offer an image of the reservoir and its oil, gas and water reserves.

An offshore installation monitoring multiwell systems for reservoir production



BP Bruce – Brent Field North Sea



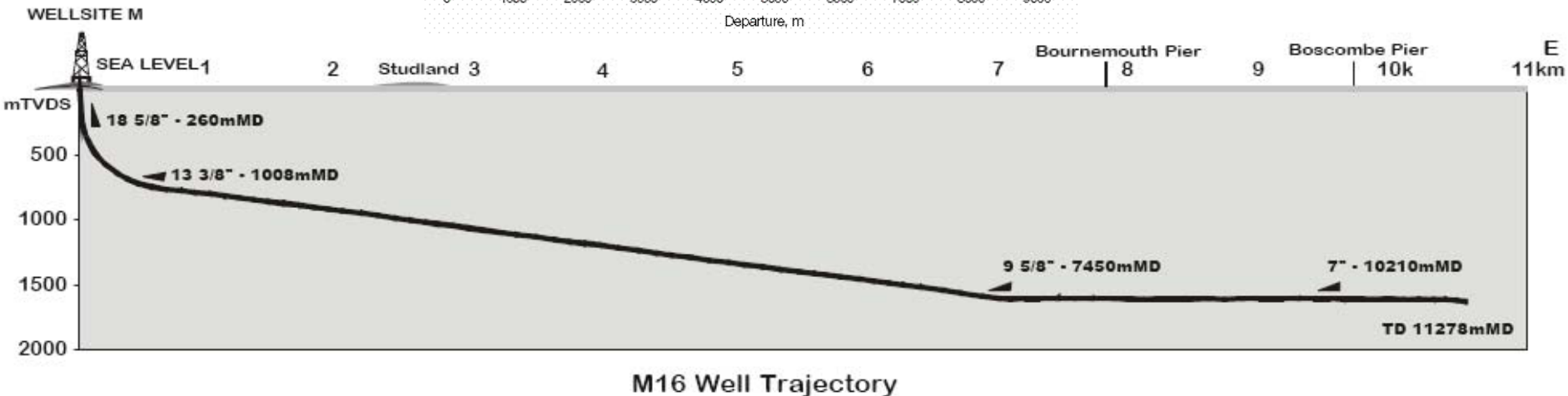
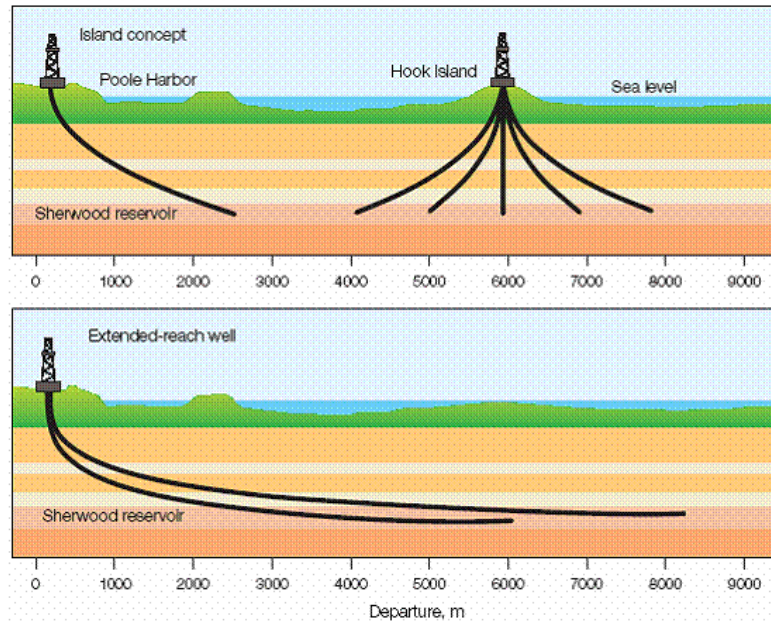
Wytch Farm

The longest “Extended-Reach Drilling” well worldwide
Measured Depth = 10658 m. (Dorset – Poole Harbours, England)



Wytch Farm

COMPARISON : Conventional Directional DRILLING (CDD) – ERD
95/8-in. casing to a departure beyond 8000 m (Casing flotation technology)



Test Rig Halliburton - Dallas U.S.A.

Halliburton – Dallas Research Rig - Downhole log tools testing facility.

Here are tested all new patented LWD and wireline Logs tools for petrophysical measurements.



North Sea – Gulf of Mexico



Brent Bravo



BP Bruce



BP Bruce



Beryl Alpha



Beryl Alpha



Beryl Bravo



SAIPEM Scarabeo 4



SAIPEM Scarabeo 6



SAIPEM Scarabeo 6



Borgsten Dolphin



Glomar Biscay 1



Glomar Labrador



Transocean



Petrobras



Glomar Adriatic VII



Gaviota



Ocean Princess



Ocean Princess



Maersk Exerter



Noble Byron



Noble George



Ensko 70



EnSCO 71



Transocean Prospector



REGIONS

North, central, south Europe, North Sea, Norway, Scotland, Denmark, USA (Texas, Louisiana, Alabama), Gulf of Mexico, Algerian Sahara, Mediterranean shelf, Italy, Libya, Spain, Germany, France, Croatia, Poland, Holland, Czech Republic, England, West Africa, Cameroun, Gabon, Angola, Congo Brazzaville, Atlantic Ocean west african continental shelf, polar circle base Brunnoysund - Norway.



Offshore Shuttles



Land Rigs



Trecate



Soltau Z5

Land Rigs

Val D´Agri, Gela, Ballan 1, Concorezzo, Dosso degli Angeli, Chiosone 1, Cascina Nuova, Malossa 11 and 14, Troina, Gela, Bizovac 1 , Soltau Z5, Huntorf, Rehden, Wytch Farm, Uhrice, Zutica, Vulaines, Malnoue



Val D´Agri



Gela



Rehden

Services

List of services in offshore installations and land rigs

LWD - PETROPHYSICS – SURFACE LOGGING

LWD Electromagnetic Resistivity tool



Wireline Log Unit

MWD - LWD - WIRELINE LOGS

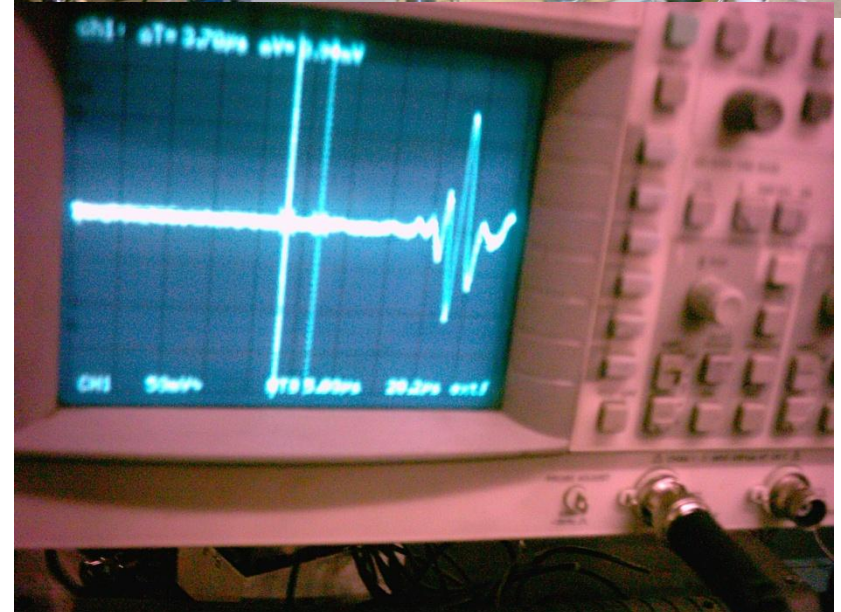
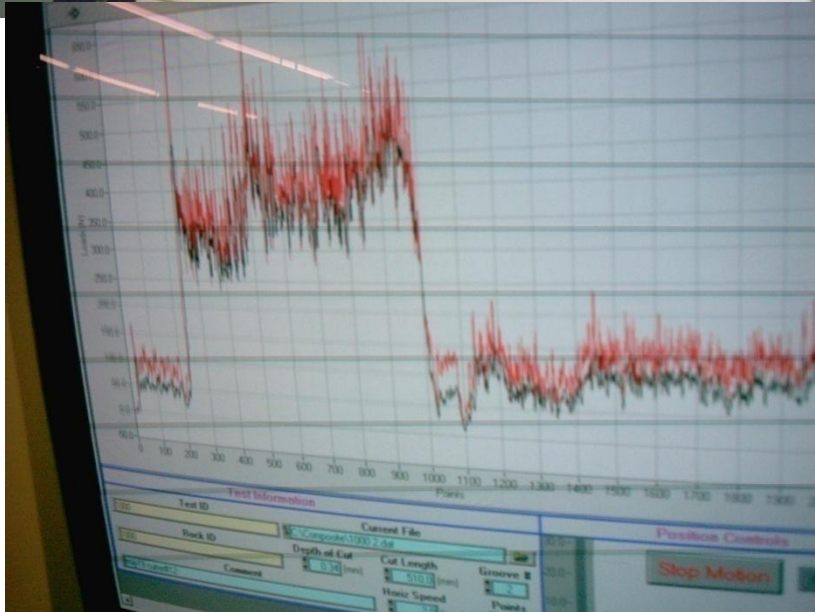
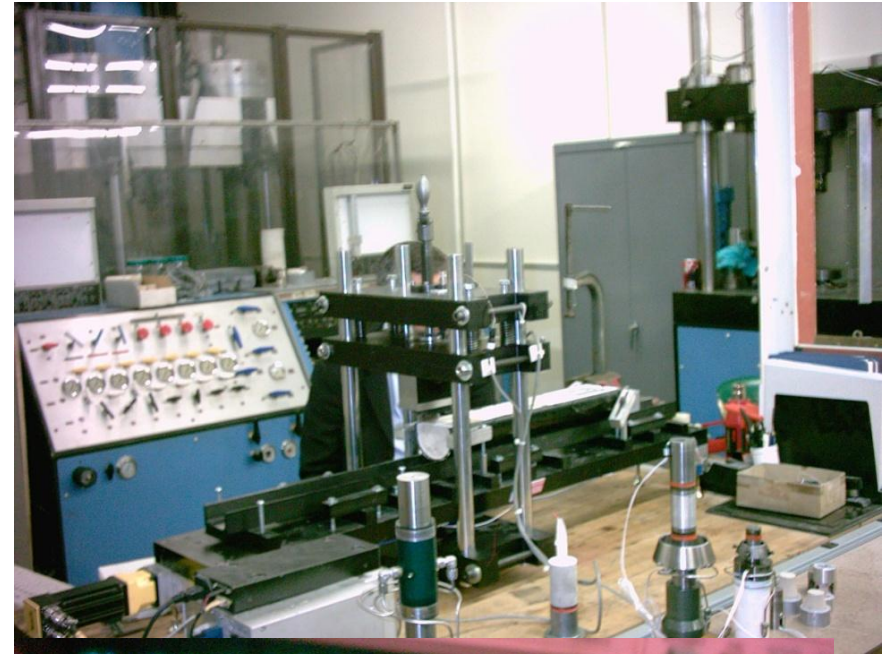


Directional and LWD
Measurements unit



EXPLORATION OPERATIONS – PETROPHYSICS / GEOMECHANICS

(Schlumberger, Halliburton, Baker-Hughes, TerraTek



SEISMIC SURVEYS



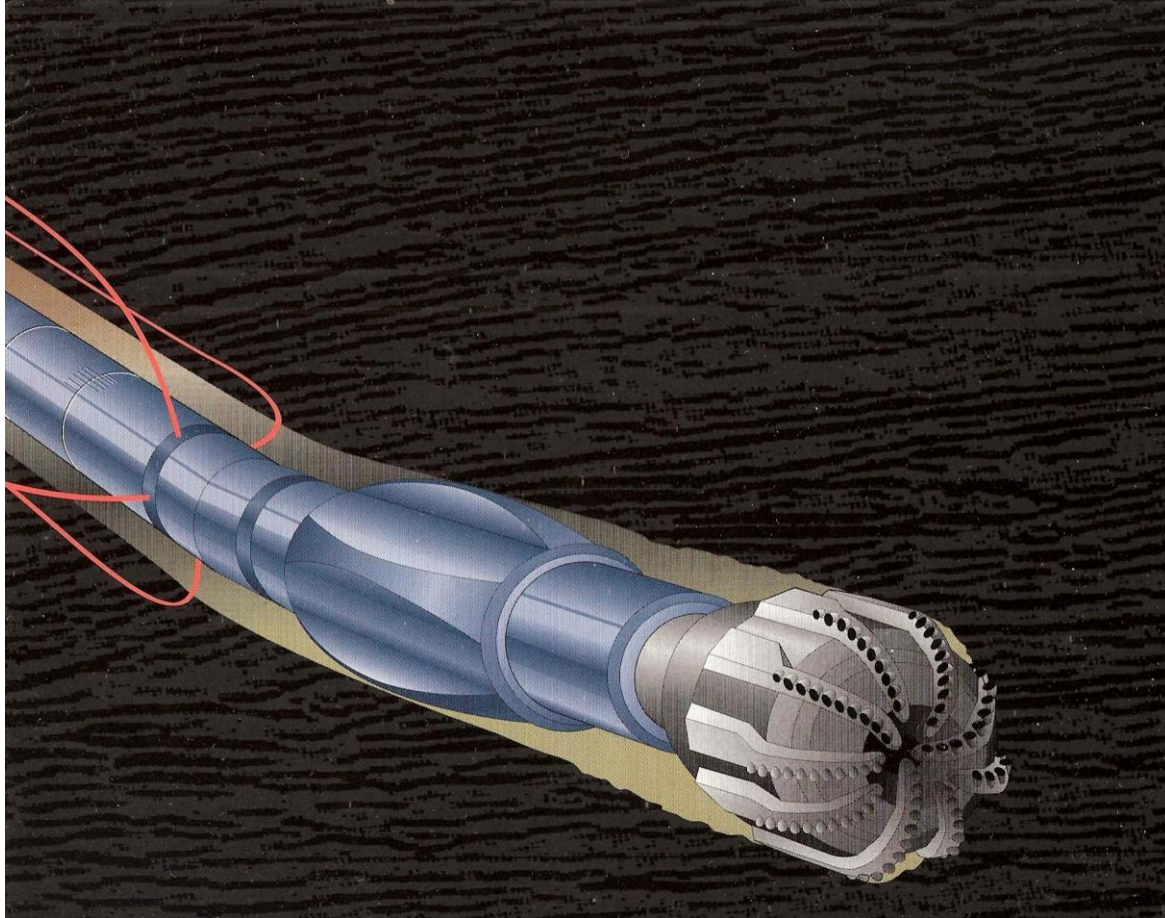
3D-Seismic - Provins France

2D Seismic - Deurne Brabant Holland

Measurements, Processing
and Interpretation
with professional software

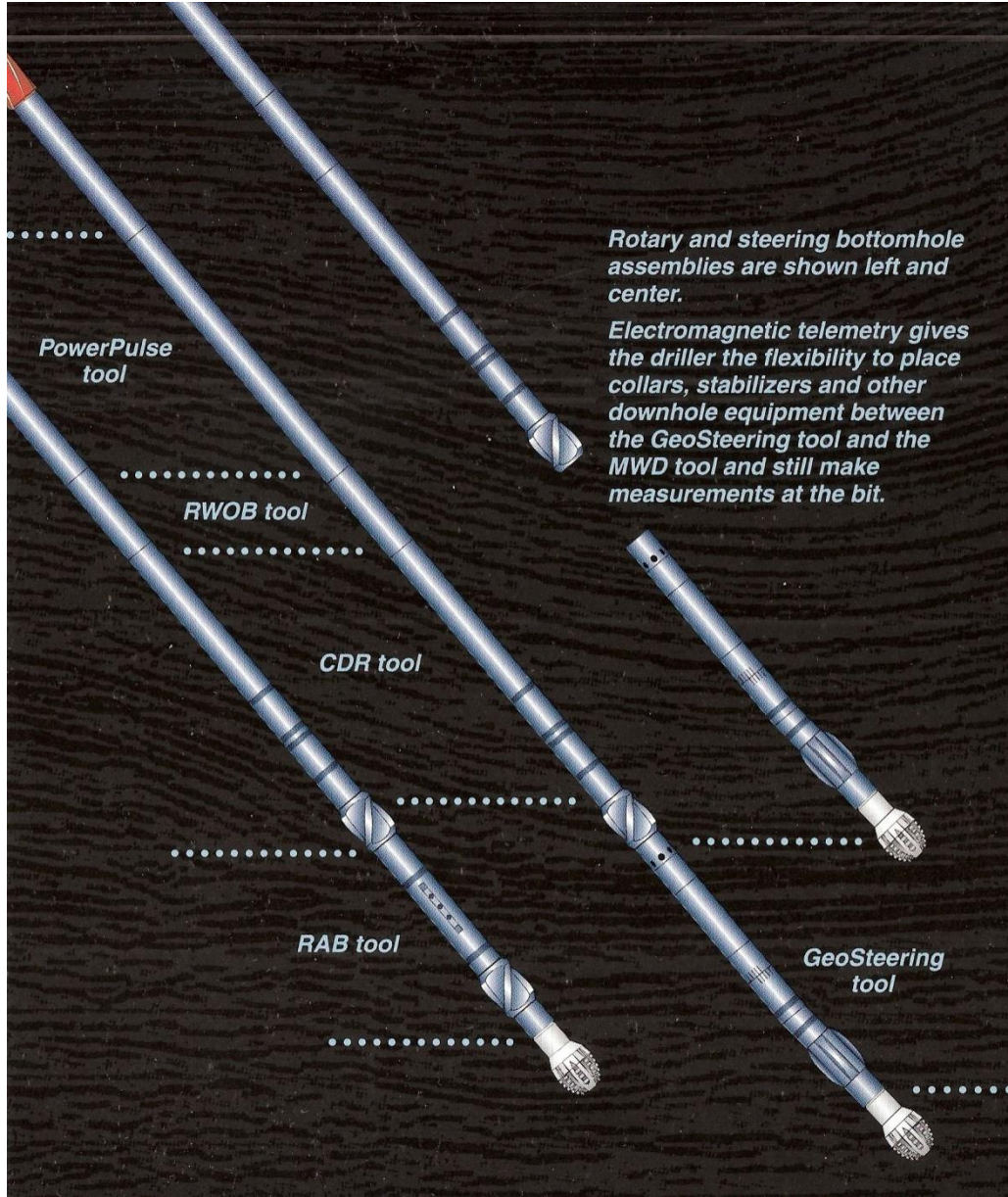
GEOSTEERING PROJECTS

EWR Resistivity - Horizontal Drilling



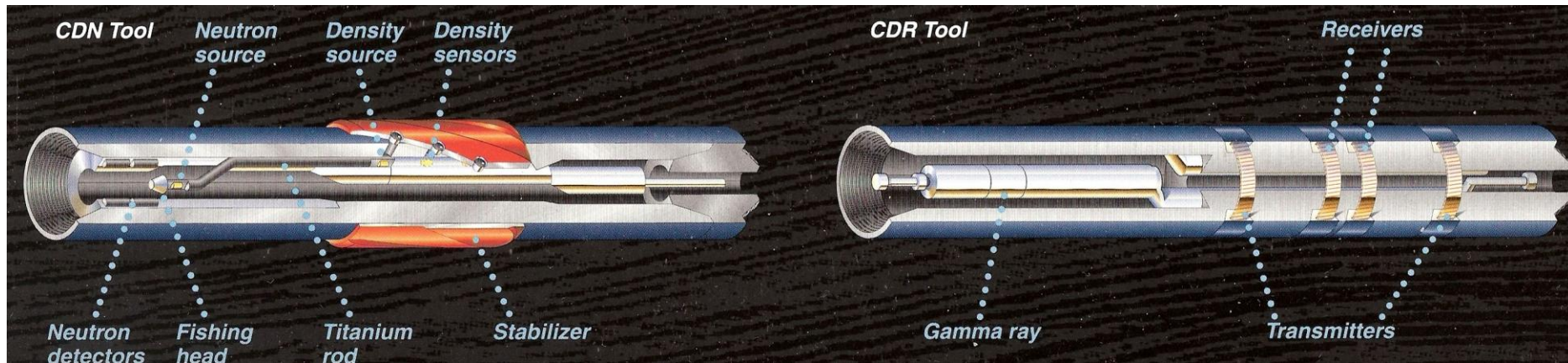
MWD / LWD STEERABLE SYSTEMS – T LOG , P LOG

REALTIME PETROPHYSICS



MWD / LWD ASSEMBLY

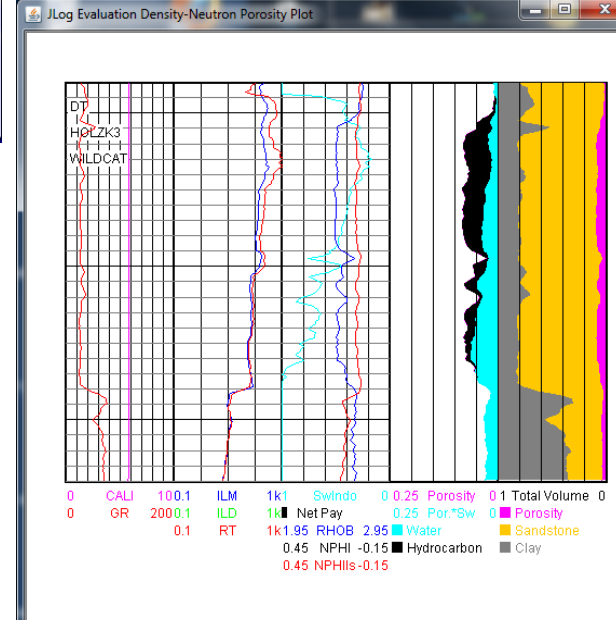
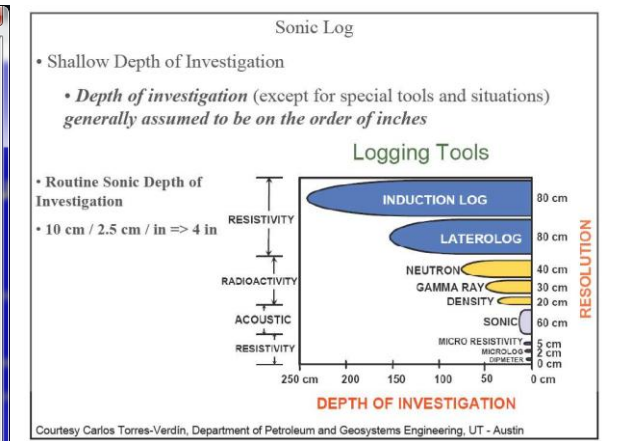
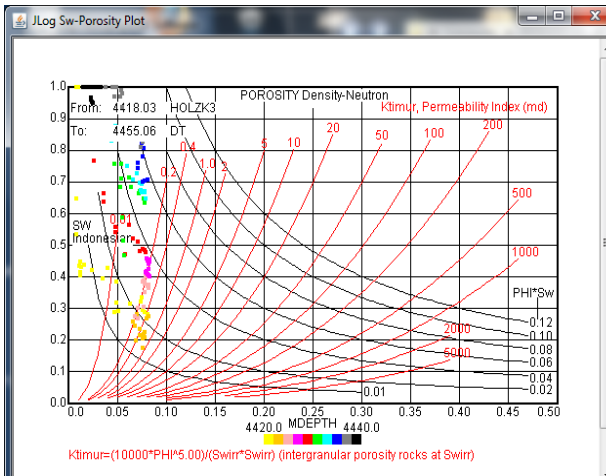
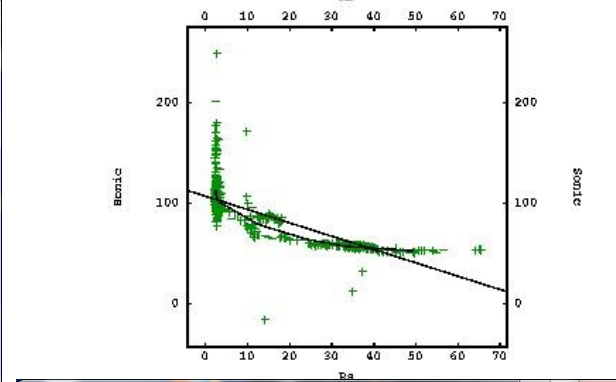
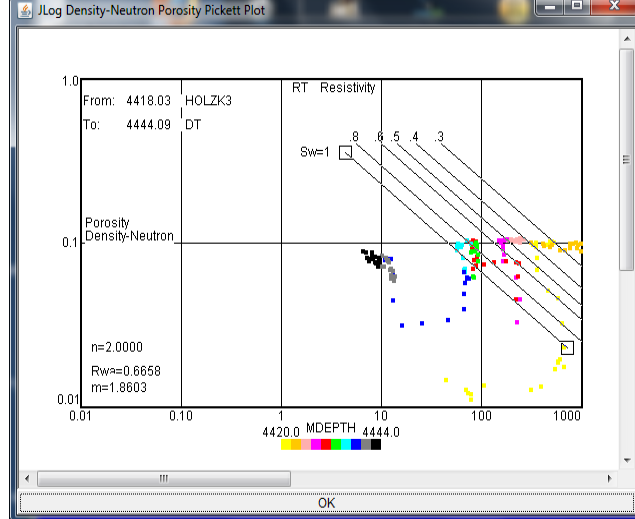
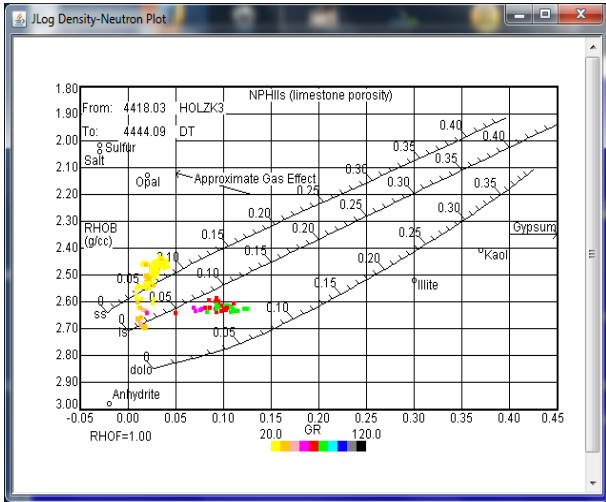
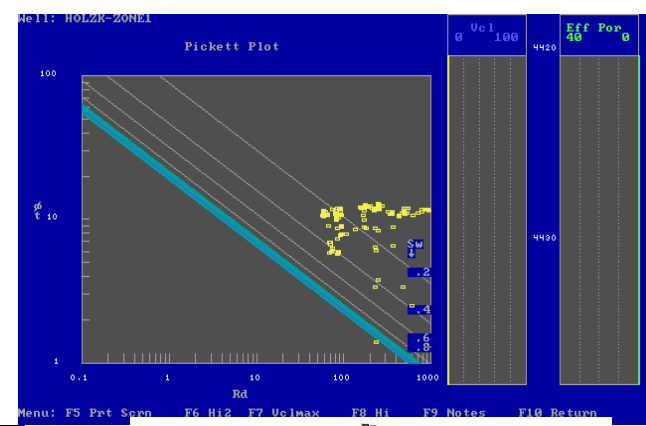
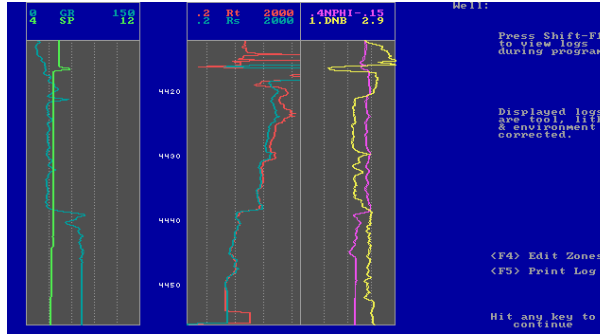
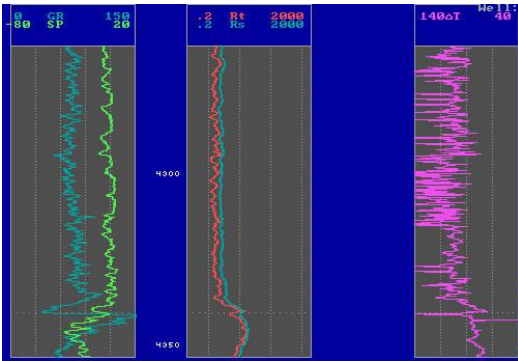
CDR – CDN – DIPOLE/DIPOLE SONIC Realtime Log Interpretation



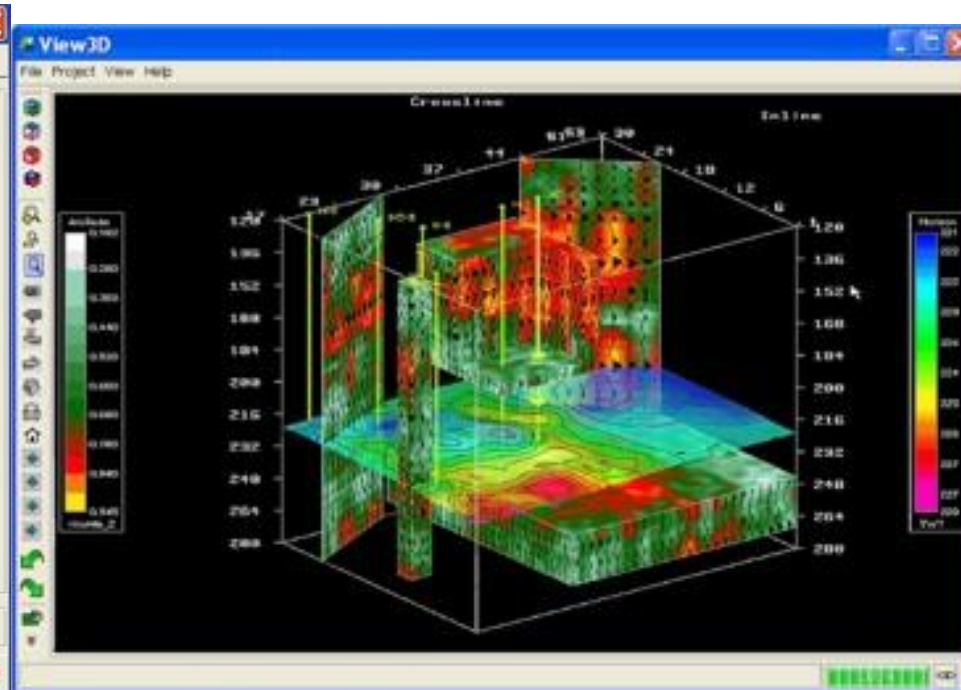
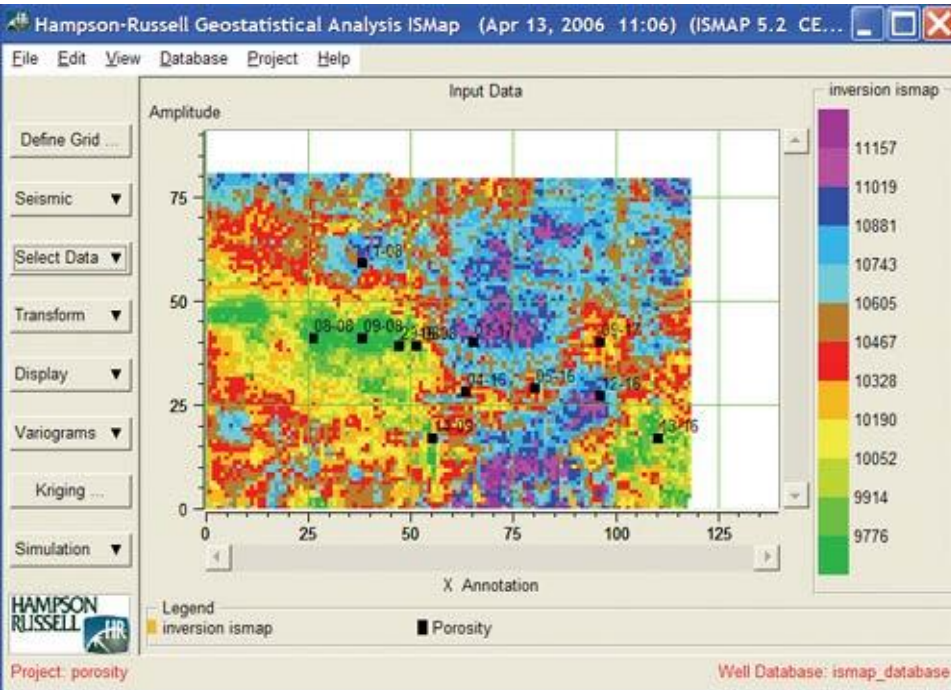
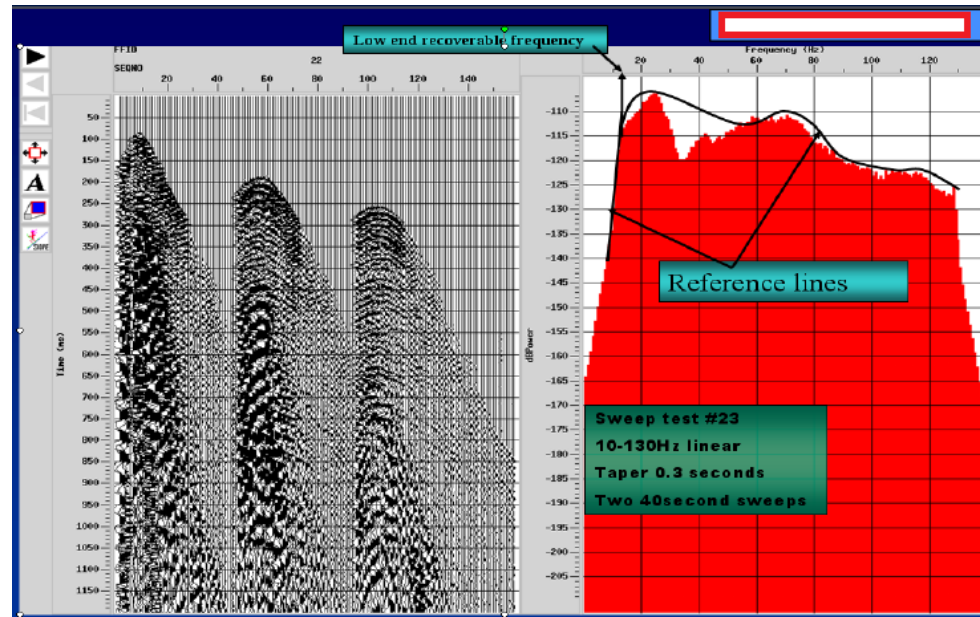
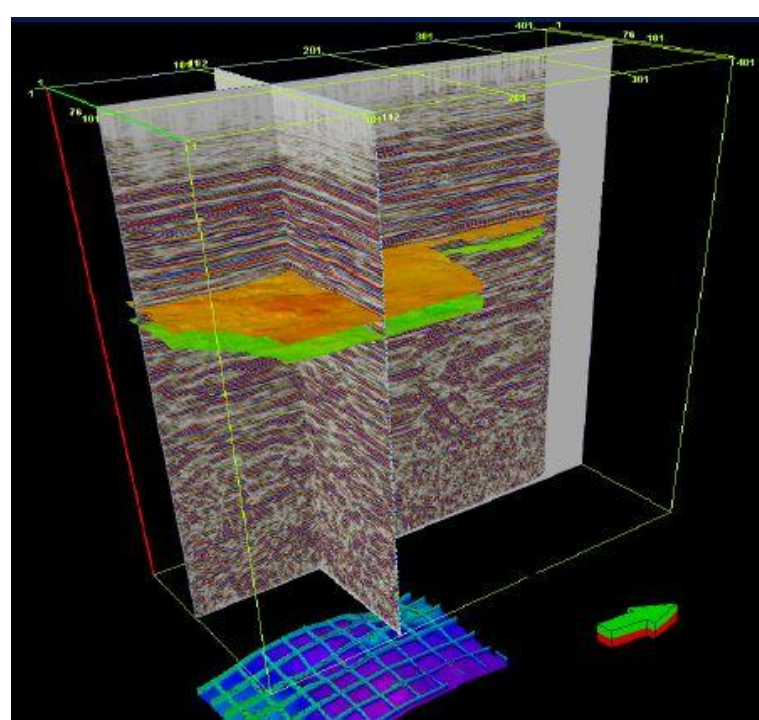
MWD / LWD SYSTEMS : TRIPLE COMBO ASSY

- Gamma-Gamma (Electron-Density)
- Neutron-Gamma (Hydrogen-Index)
- Electromagnetic Resistivity (Amplitude, Phase Delay)
- Natural Gamma Ray (Clay Index)

PETROPHYSICS



3D-SEISMIC



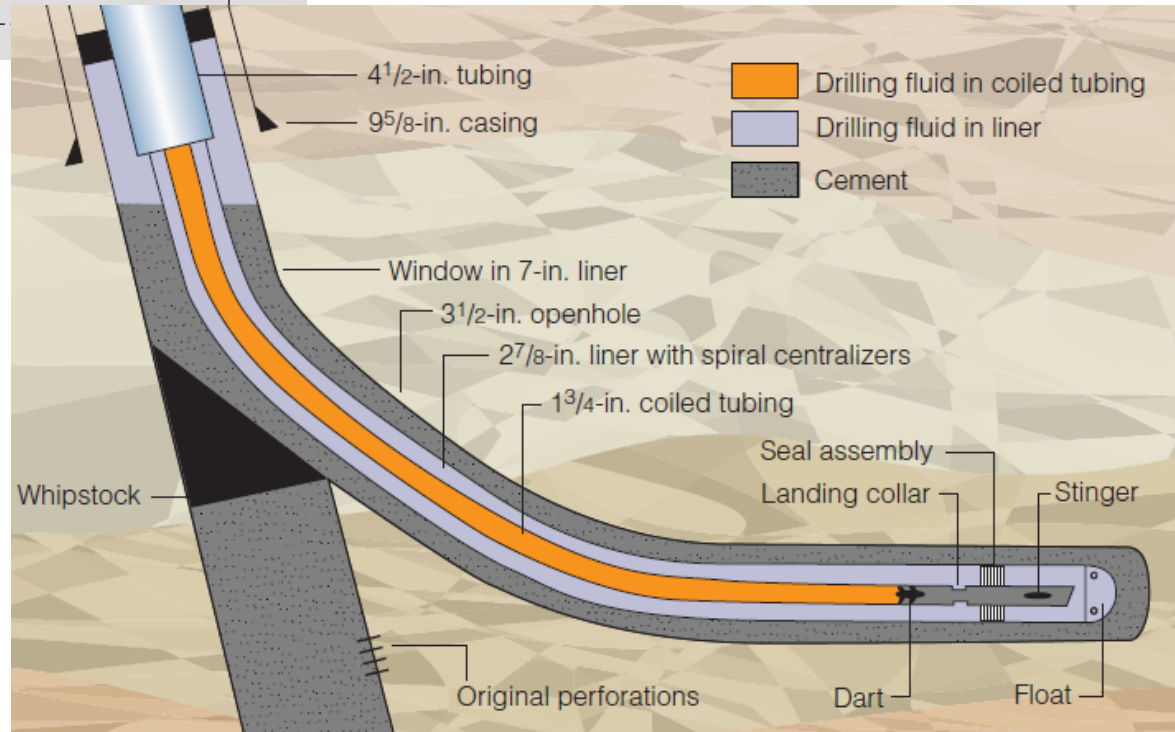
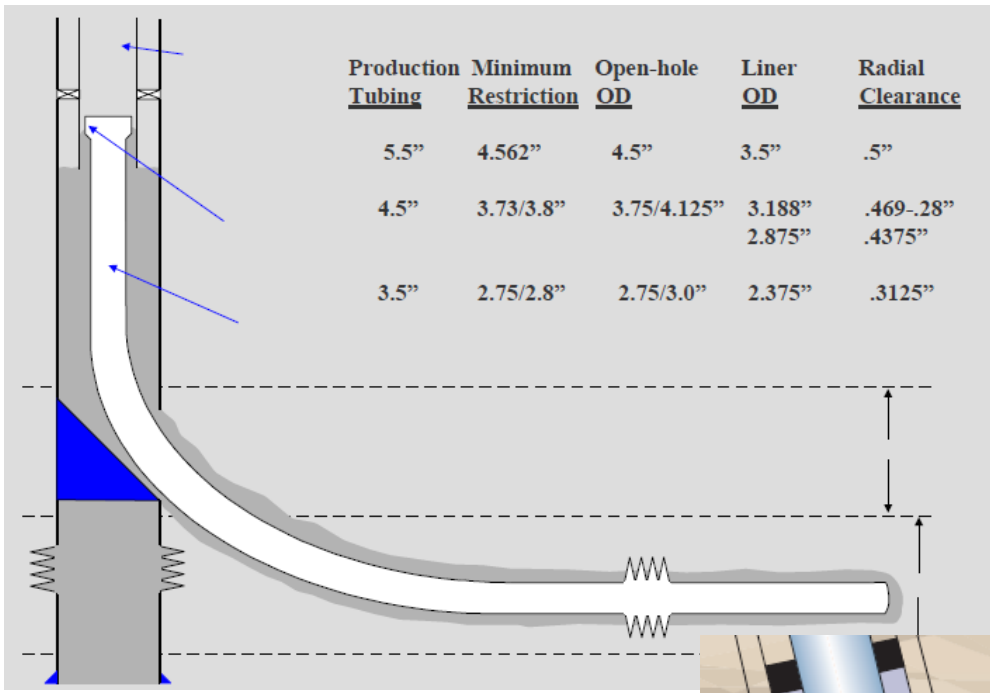
DDS1

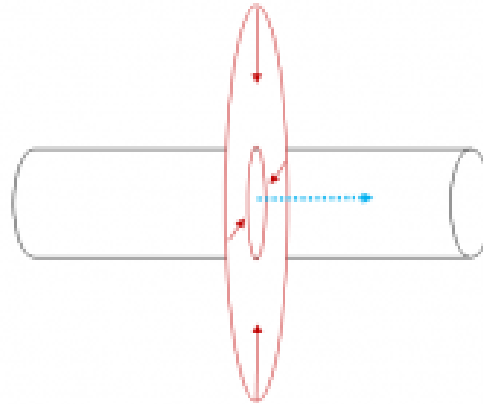
The end result of 30 years experience
in the deep reservoirs exploration and
production

→ SIDETRACK

→ MULTILATERAL WELL TECHNOLOGY

| <u>Production Tubing</u> | <u>Minimum Restriction</u> | <u>Open-hole OD</u> | <u>Liner OD</u> | <u>Radial Clearance</u> |
|--------------------------|----------------------------|---------------------|------------------|-------------------------|
| 5.5" | 4.562" | 4.5" | 3.5" | .5" |
| 4.5" | 3.73/3.8" | 3.75/4.125" | 3.188" 2.875" | .469-.28" .4375" |
| 3.5" | 2.75/2.8" | 2.75/3.0" | 2.375" | .3125" |





EFFICIENCY PARAMETERS PRODUCED BY THE SYSTEM (APPROXIMATED VALUES +/- 3%)

Flow unit:

$\sim 30 * 10^6$ Joules (29.260.000 Joules)

Thermal rate:

$\sim 15 * 10^3$ Joules/Sec (14.630 Joules/Sec)

Radial thermal conductivity of the 1st unit formation sector / area (average):

$\sim 10^5$ Joules/Sec (102.885 Joules/Sec)

Radial thermal conductivity of the 1st unit formation sector / area (worst case):

$\sim 4.6 * 10^4$ Joules/Sec (46298 Joules/Sec)

Recharge radial thermal capacity content on 2nd unit formation sector at 120°C (Vol) (average):

$\sim 10^5$ Joules (105504 Joules)

T Gradient perturbation @ external far field:

25-30%

Far field unit energy content:

$\sim 34 * 10^9$ Joules (33.912.000.000 Joules)

Far field generating surface – volume energy content:

$\sim 27 * 10^{16}$ Joules

Worst case regeneration time:

3' cycle.

$\Delta t = 70^\circ\text{C}$

DDS 1

the next geothermal generation

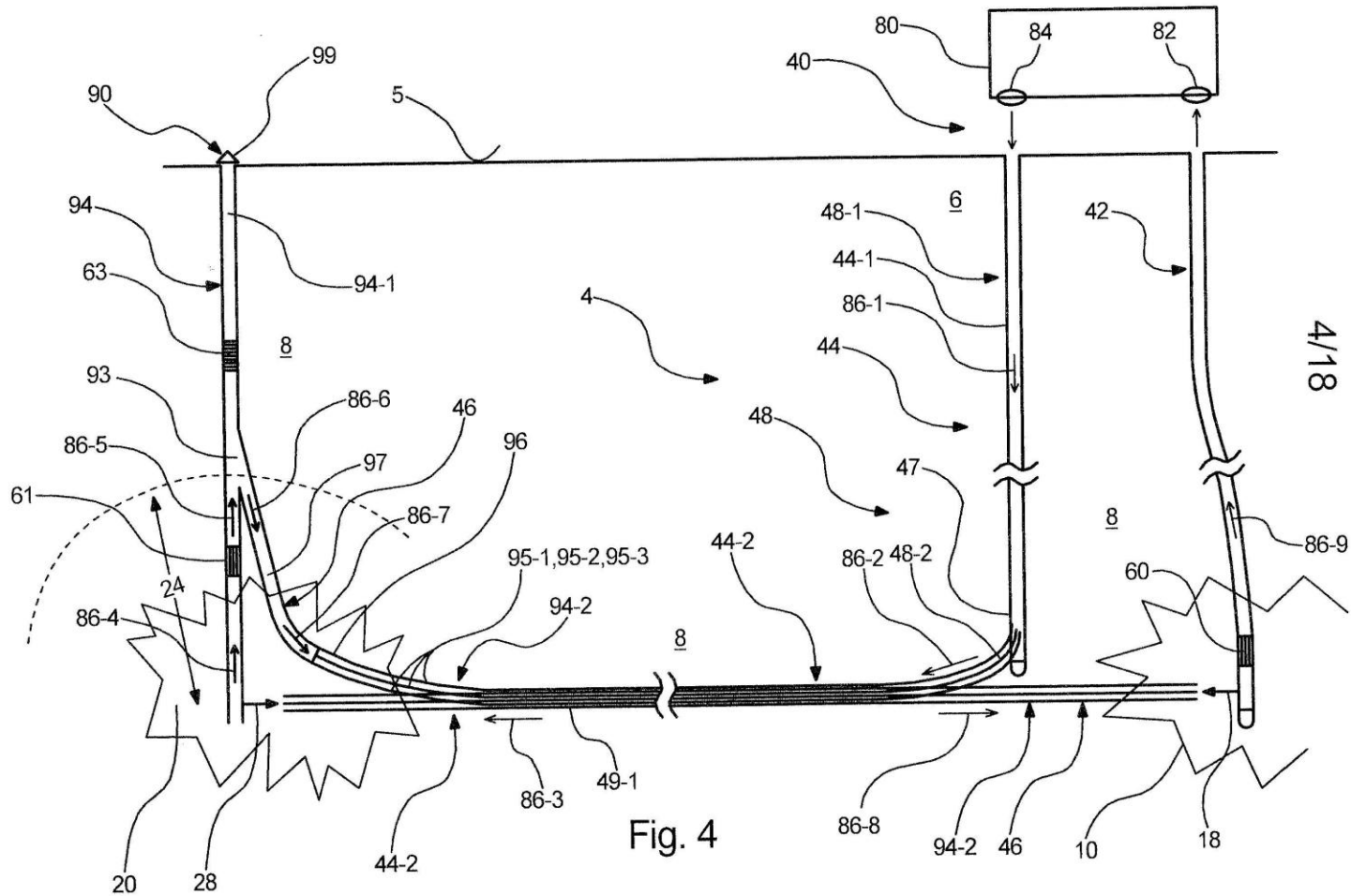


Fig. 4

4/18

DDS1

FUNDAMENTAL CONCEPT

Using these technologies, according to DDS concepts, it becomes possible to circulate water within predefined flow lines, in continuous flow and in a closed system, for more than 100 kilometers, while keeping most of or all the flow line system below a predefined depth.

This depth could be, for example 3000 m and more, so that the water flow is for most of the flow path length in a formation, the temperature of which is above 110 degrees Celsius, which is an ideal minimum temperature level enabling the production of electrical power.

LINKS

TRAINING and RESEARCH: www.GeoNeurale.com

SEISMIC and PETROPHYSICS ANALYSIS: www.Wavefields.eu

OPERATIONS: www.Petrophysic-Consultants.com

GEOHERMAL: www.DeepDirectivity.eu

Am Nymphenbad 8
81245 München
T 089 8969 1118
F 089 8969 1117

Thank you for your attention