PETROLEUM EXPLORATION, DEVELOPMENT AND PRODUCTION PROCESS

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THE STAGES OF EXPLORATION AND DEVELOPMENT

RECONNAISANCE ⇨ DETAILING ⇨ PROSPECT ⇨ STRUCTURE ⇨ DRILLING WELL ⇨ RESULT ⇨ DISCOVERY OR DRY ⇨ REVIEW ⇨ APPRAISAL ⇨ DEVELOPMENT ⇨ PRODUCTION

CONDITIONS OF FINDING PETROLEUM

IS THERE A TRAP TO HOLD PETROLEUM

Find a geological feature that can act as an accumulator of oil/gas

IS THE TRAP SEALED

Determine that the accumulator is sealed; oil/ gas cannot escape

IS THERE A MIGRATION PATH

A path must exist to allow flow of oil/gas to the trap

IS THERE SOURCE MATERIAL OF PETROLEUM

Area must had the material and environment to cook oil/gas

WHERE TO FIND A TRAP

EXPLORATION IS EXPENSIVE, SO

WHERE DO WE SEARCH

WHAT ARE THE PRIORITIES

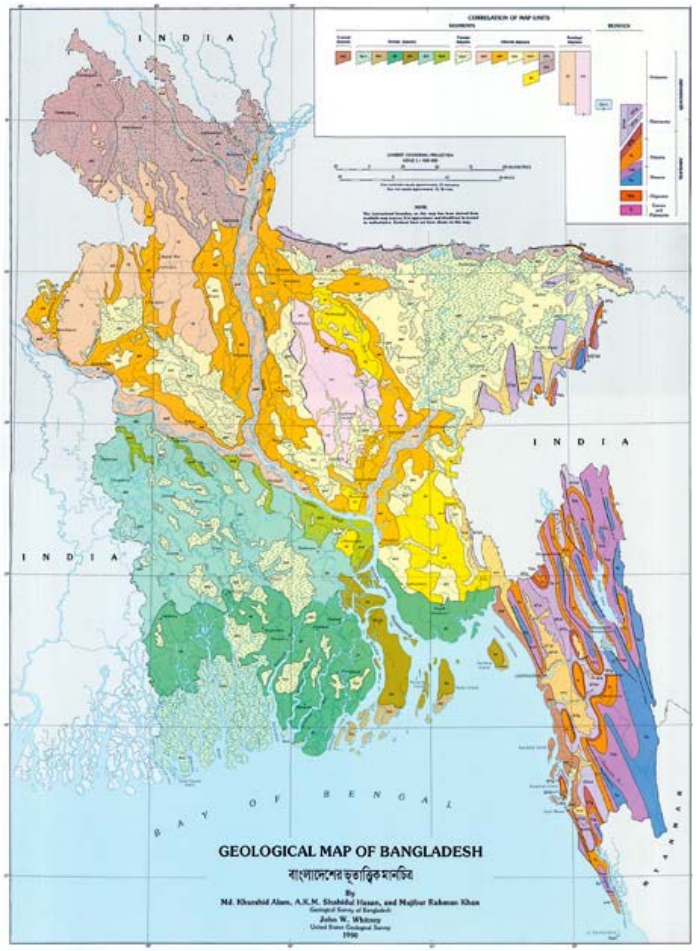
WHY SOME AREAS ARE LESS EXPLORED

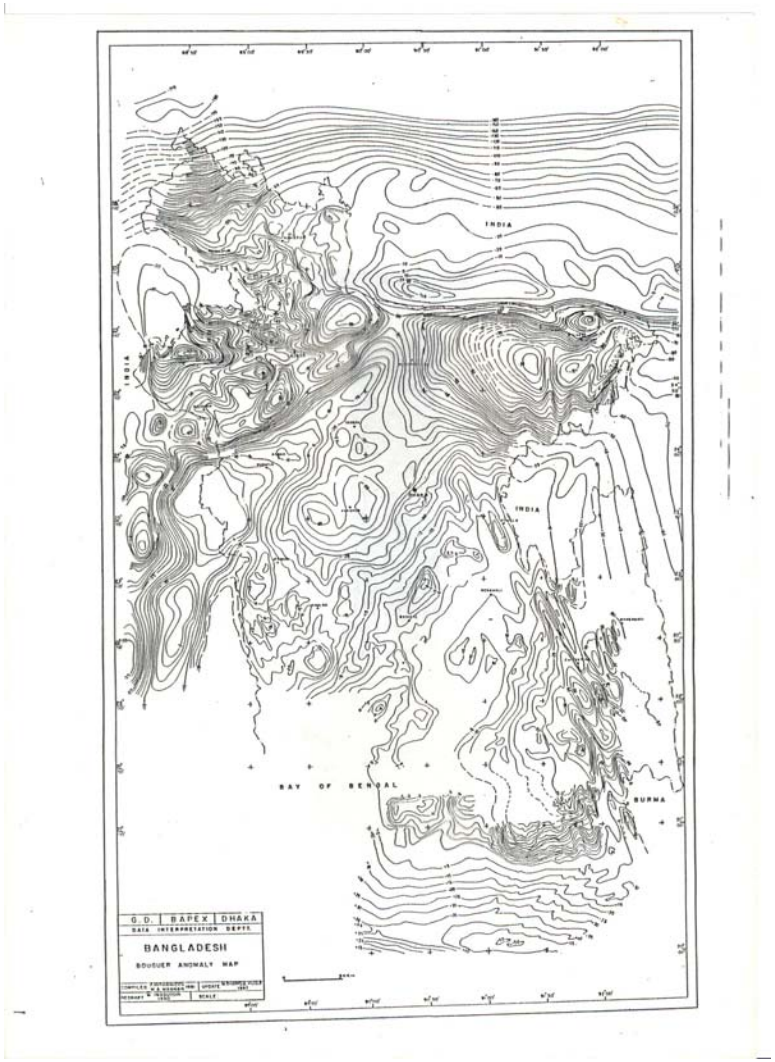
FOCUS ON MORE PROSPECTIVE AREAS

LOOK FOR LESS RISKY PROSPECT

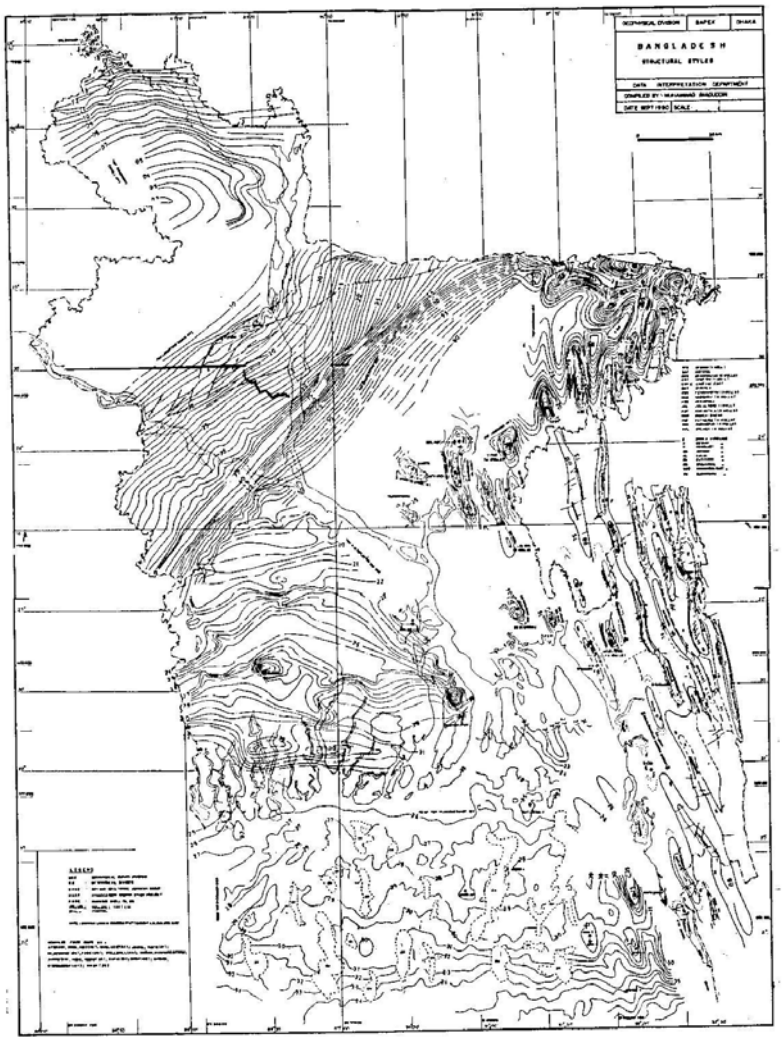
- COMPREHENSIVE SURVEY NARROWS DOWN AREA FOR EXTENSIVE SURVEY

SURFACE GEOLOGY : THE INITIAL GUIDE
GRAVITY MAP: THE FIRST INDICATION

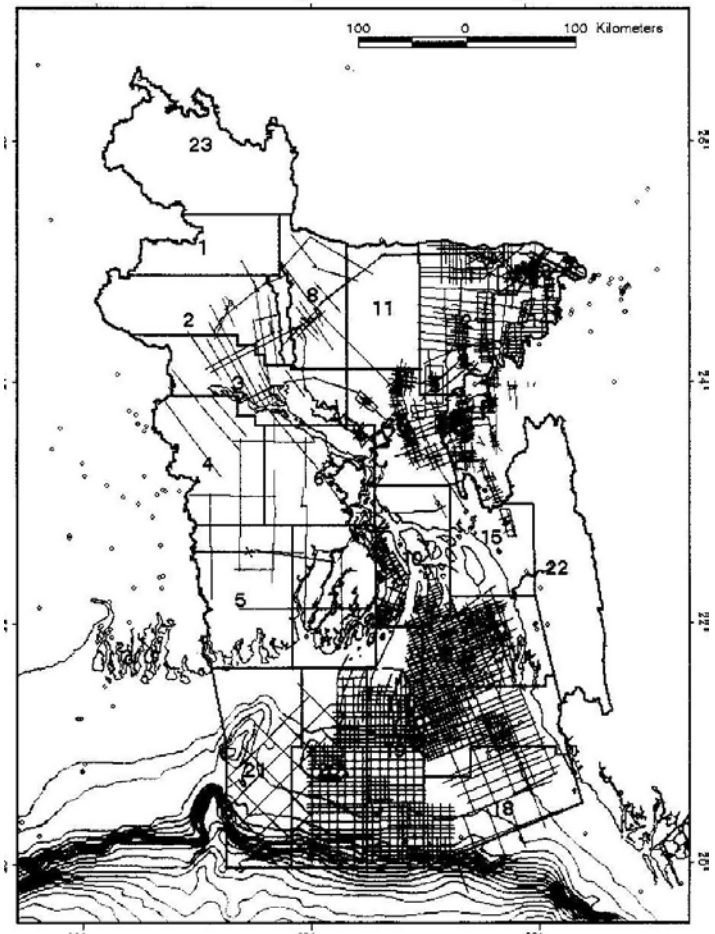




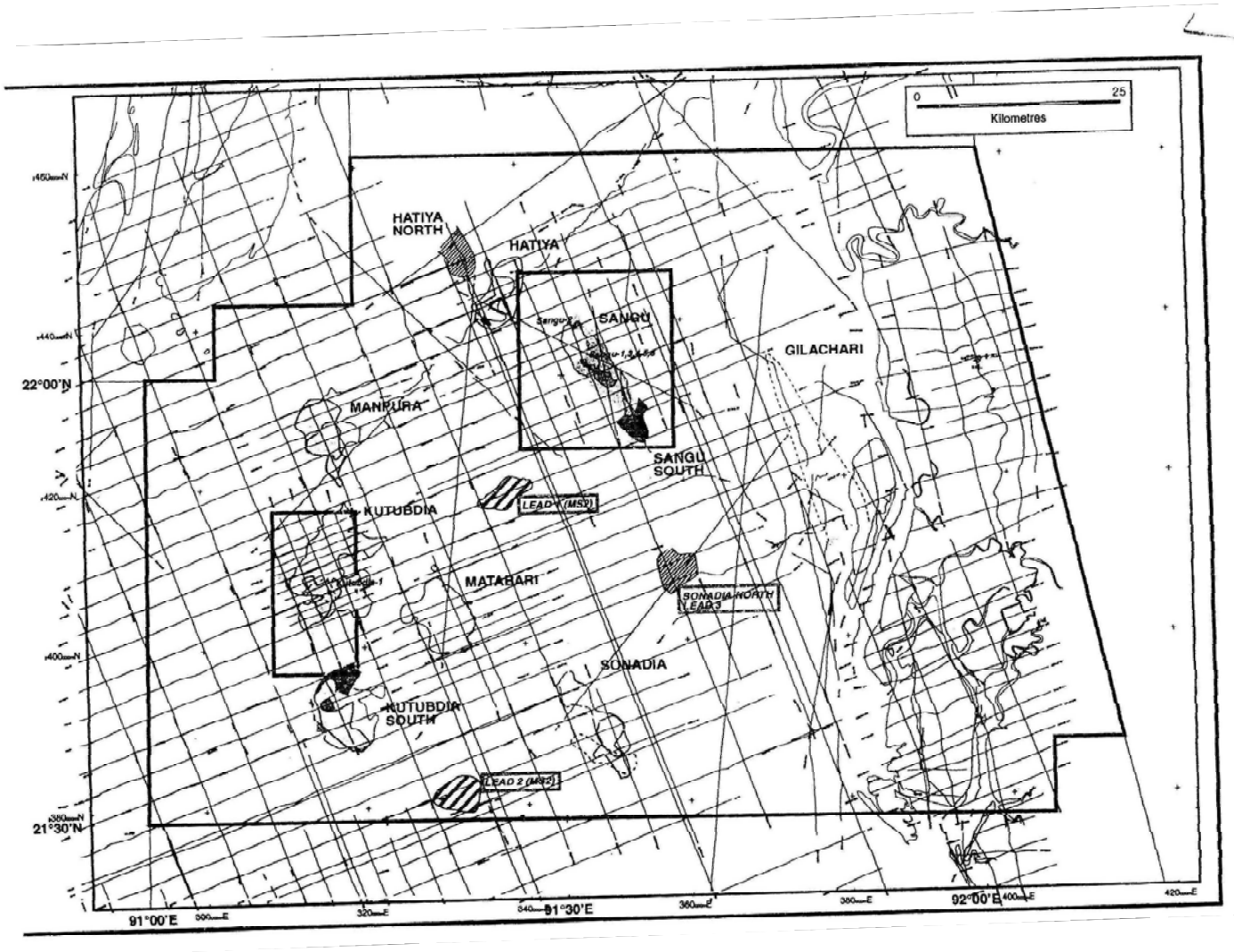
STRUCTURAL VARIATION IN BANGLADESH



SEISMIC NETWORK
THE FINAL IDENTIFICATION



SEISMIC DETAILING TO CONFIRM STRUCTURE



TYPE OF TRAPS

TRAPS COULD BE

STRUCTURAL:

Anticline easy to locate with very low risk

Fault bound easy to locate with fair risk

STRATIGRAPHIC:

Pinchouts tougher to locate with high risk

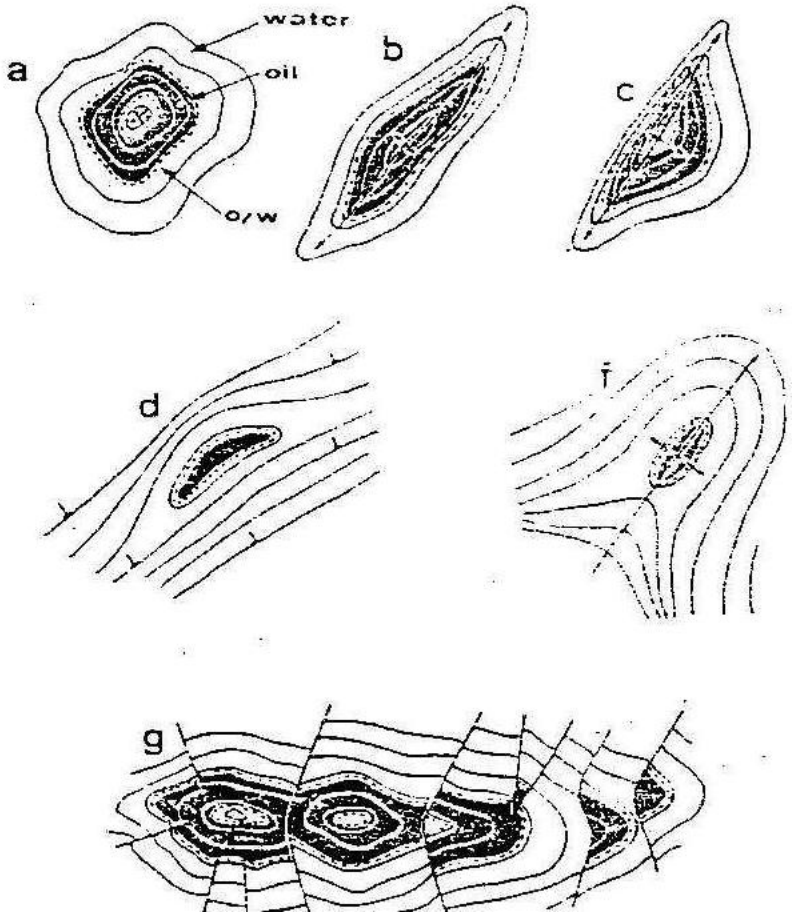
Channels tougher to locate with high risk

MORPHOLOGICAL

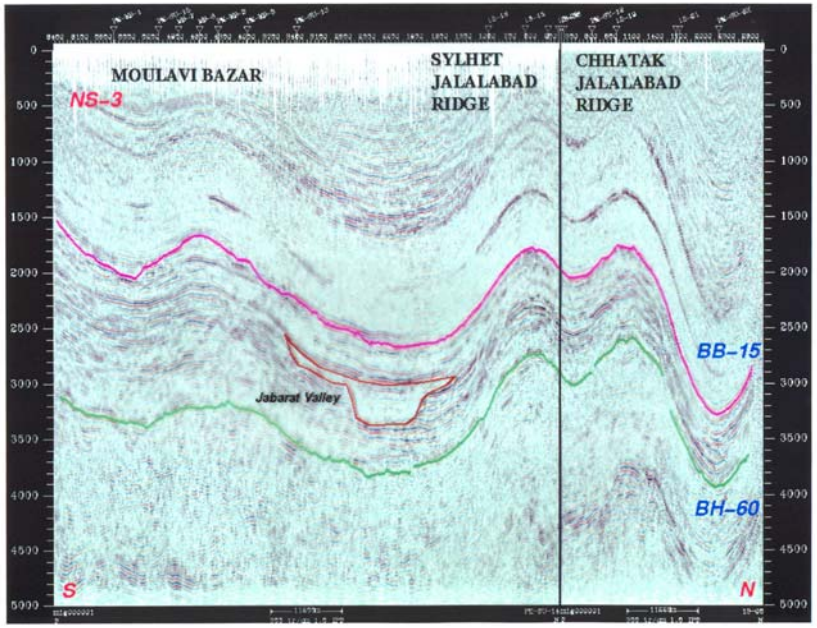
Buried hill

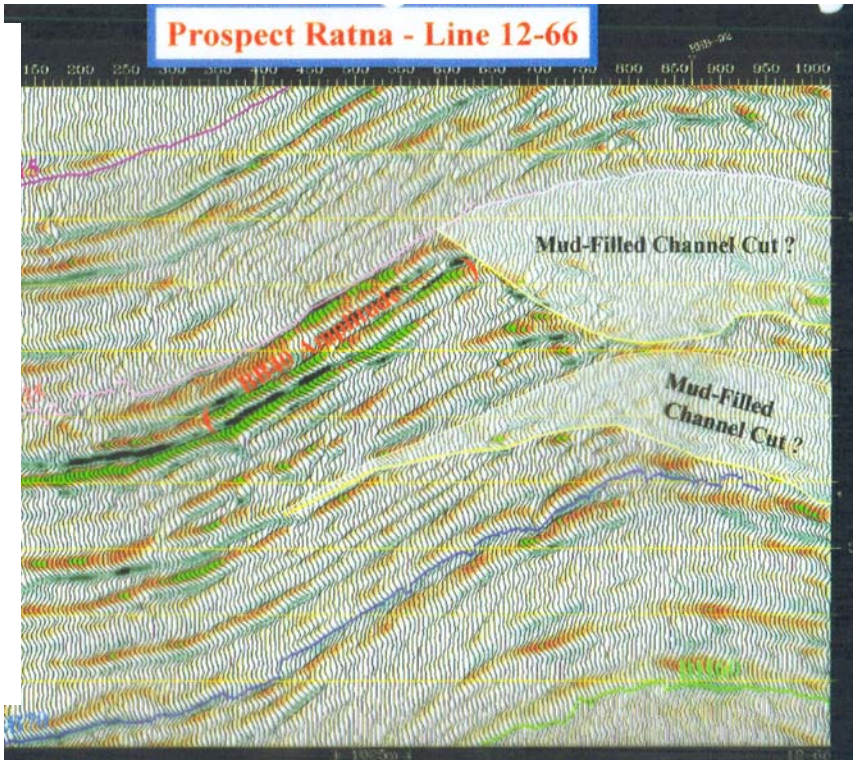
Reef

TYPES OF TRAPS



SEISMIC DATA SHOWING STRUCTURAL VARIATION





DRILLING TO CONFIRM

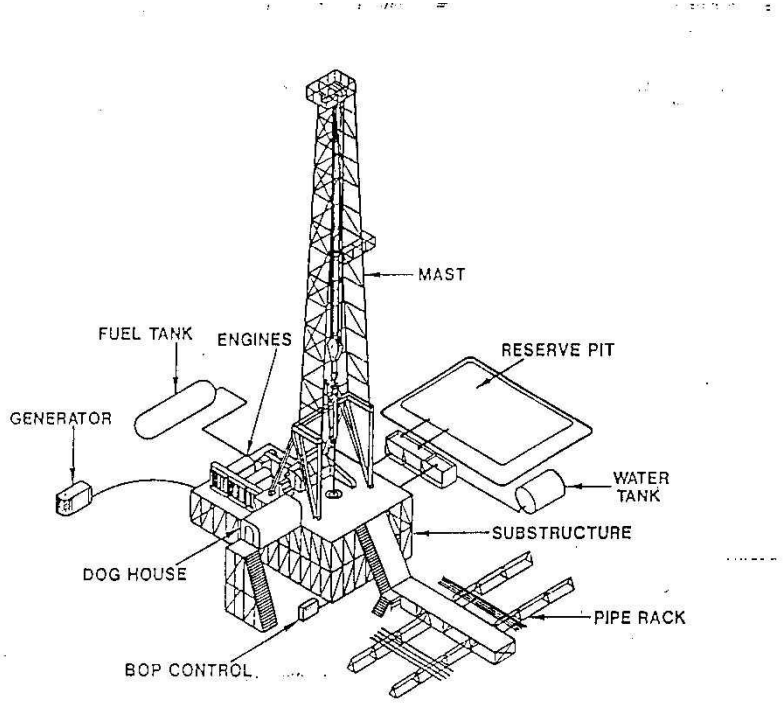
Only when a structure is rated as prospective in terms of trap, seal, migration and source, it is drilled. A chance of success (COS/POS) of 20 to 35 % is considered risk worthy.

Only 1 in 3 to 5 exploration wells find oil/ gas

Drilling is expensive, risky and tough.

Coring, logging, testing are part of drilling ops.

DRILLING AND DRILLING RIG



INCORPORATION OF DATA

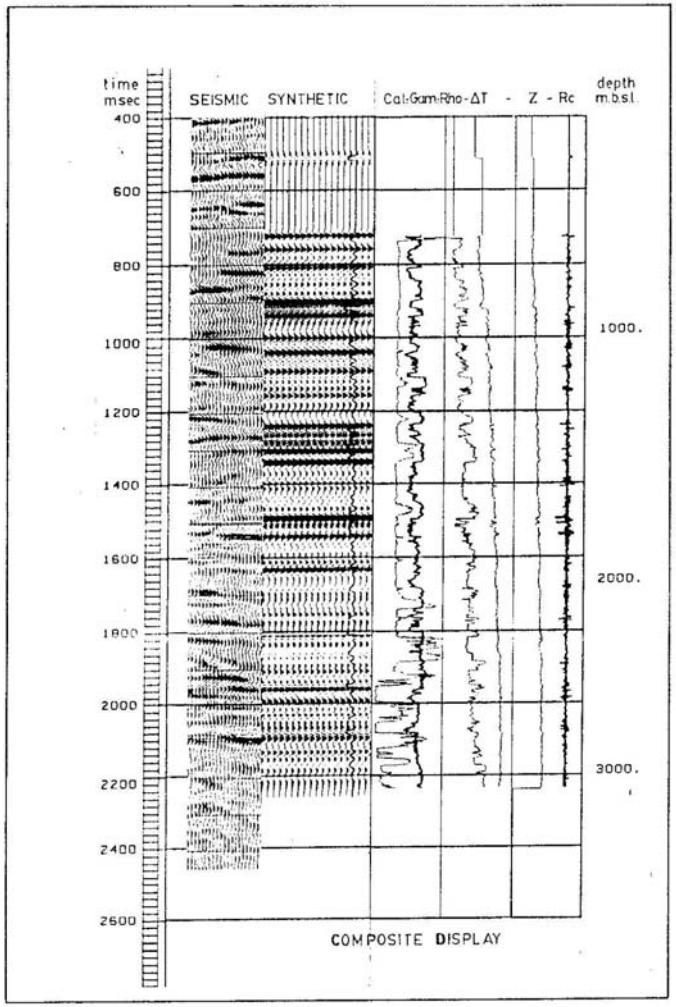


FIG. 8

HOW MUCH IS THERE

After a well is drilled, it is logged i.e. parametric measurements are taken using electric, nuclear and sonic methods. Porosity, permeability, gas/ water saturation, pressure, salinity are calculated.

Indicative zones are then perforated to test the flow of gas/oil. Testing certifies a well as discovery or dry.

Discovery will lead to estimation of likely volume of oil/ gas in the structure.

Initial estimation determines whether appraisal survey and wells are required.

APPRAISAL AND DEVELOPMENT

DISCOVERY IS APPRAISED BY ADDITIONAL SEISMIC 2D/ 3D

PRODUCTIVE ZONES ARE MAPPED FOR MORE ACCURATE EXTENT AND THICKNESS

MORE WELLS ARE DRILLED TO CONFIRM THE APPARISAL

RESERVE CALCULATED MORE ACCURATELY

PRODUCTION LEVEL DETERMINED

PRODUCTION WELLS ARE DRILLED FOR OPTIMISED PRODUCTION

HOW MANY WELLS IN A FIELD

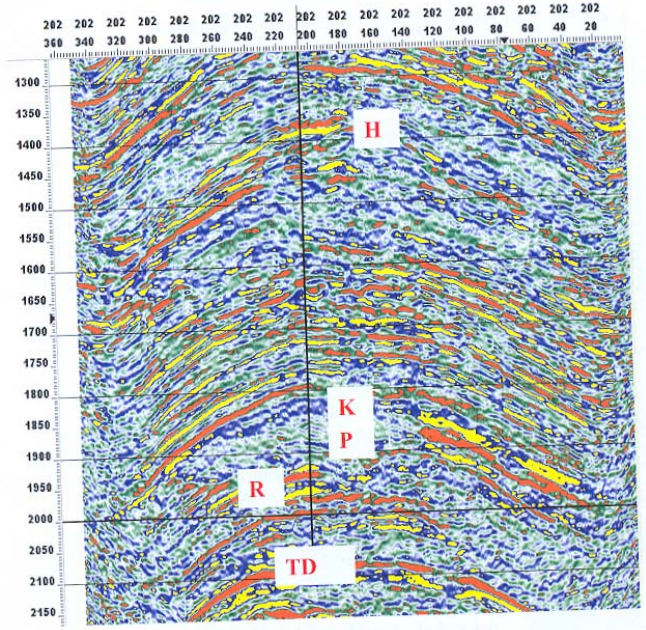
Once the reserve volume is determined number of wells that can be drilled is estimated.

Volume of reserve, distribution of reservoir, type of depletion mechanism, economic considerations are guiding factors.

Reservoirs may be continuous or discrete, depletion zone per well may vary, field life vis a vis investment required are major variables.

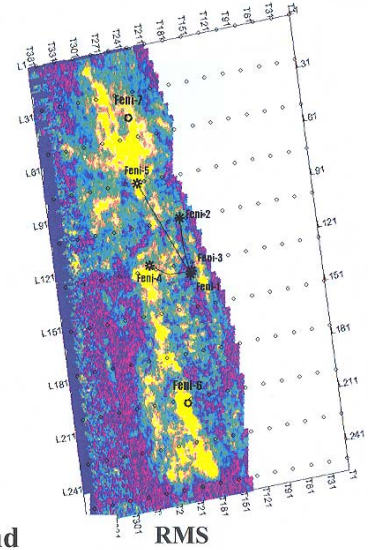
RESERVOIR VARIATION

Feni-6 is on the structural high in the W-E direction

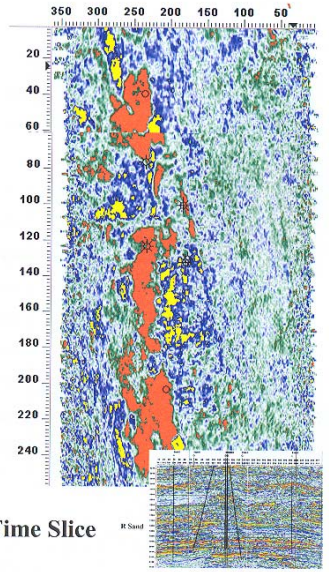


W-E Line Through Feni-6

Conventional reservoirs can be seismically mapped and identified on time slices

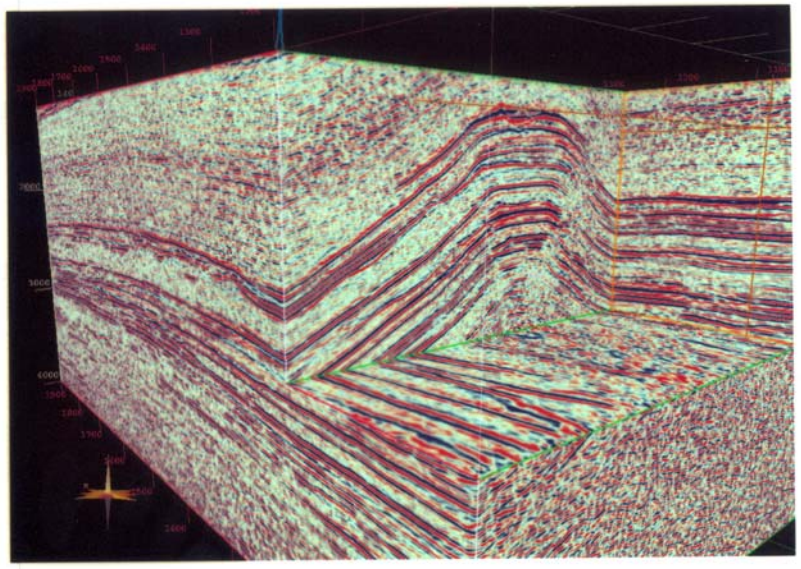


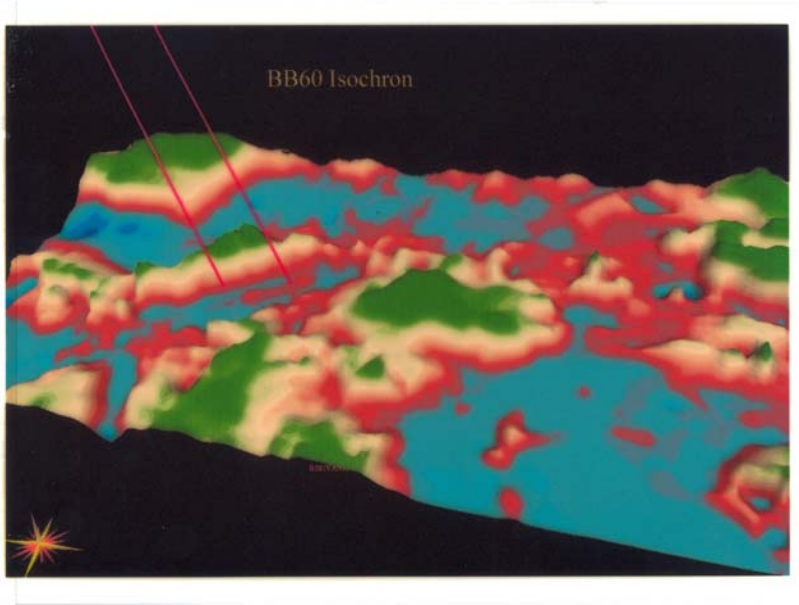
and RMS



Time Slice

RESERVOIR VARIATION





HOW MUCH PER WELL

Production volume per day/ year from each field is based on the field producibility taking in to consideration field life cycle and economic investment.

Each well is designed to produce an optimal volume based on the reservoir condition: porosity, permeability, petrology, saturation etc.

Over production ignoring rock/ reservoir property will result in reservoir damage, loss of productive sand, water coning, sand infiltration etc.

HOW MUCH PER WELL

Wells may have theoretical capability to produce more than its optimal flow; but it is undesirable to over produce wells to meet demand.

Over production sustained for long period will cause loss of reservoir, leaving isolated zones that can not be produced; or deplete the field without recovering maximum reserve.

Bakhrabad and Sangu are two significant example.

THANK YOU FOR YOUR KIND ATTENTION