Technological Progress & Natural Gas Resource Depletion

Past Experience & Prognostications of the Future

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Present Situation

- Increased costs per unit and risk on the shelf due to:
  - Smaller size field discoveries
  - Increased production decline rates
- Reduced exploration costs and risks especially in deepwater due to:
  - Higher success rates
  - Less field delineation costs

Technology Drivers (NPC ’99)

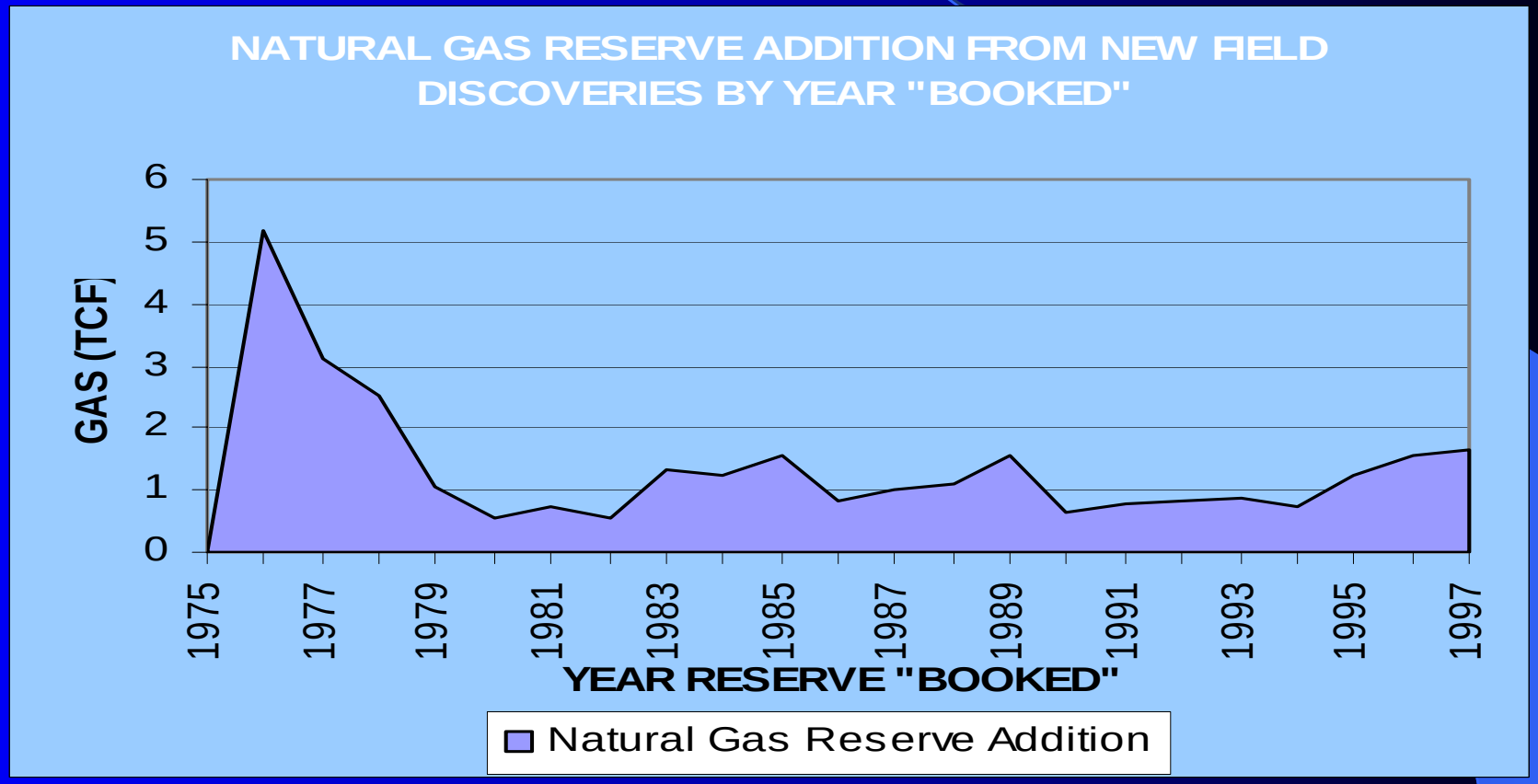
- **New Field Exploration Efficiency**
  - ***By 2015 1.1% to 4.0%***
- **Platform Cost Reduction**
  - ***0.75% - 4%***
- **Drilling & Completion Costs**
  - ***Shallow water 1.25% - 3.5% Deep Water***
- **Ultimate Recovery per Well**
  - ***0.5% to 2.5%***

Expected Areas of Technological Improvements:

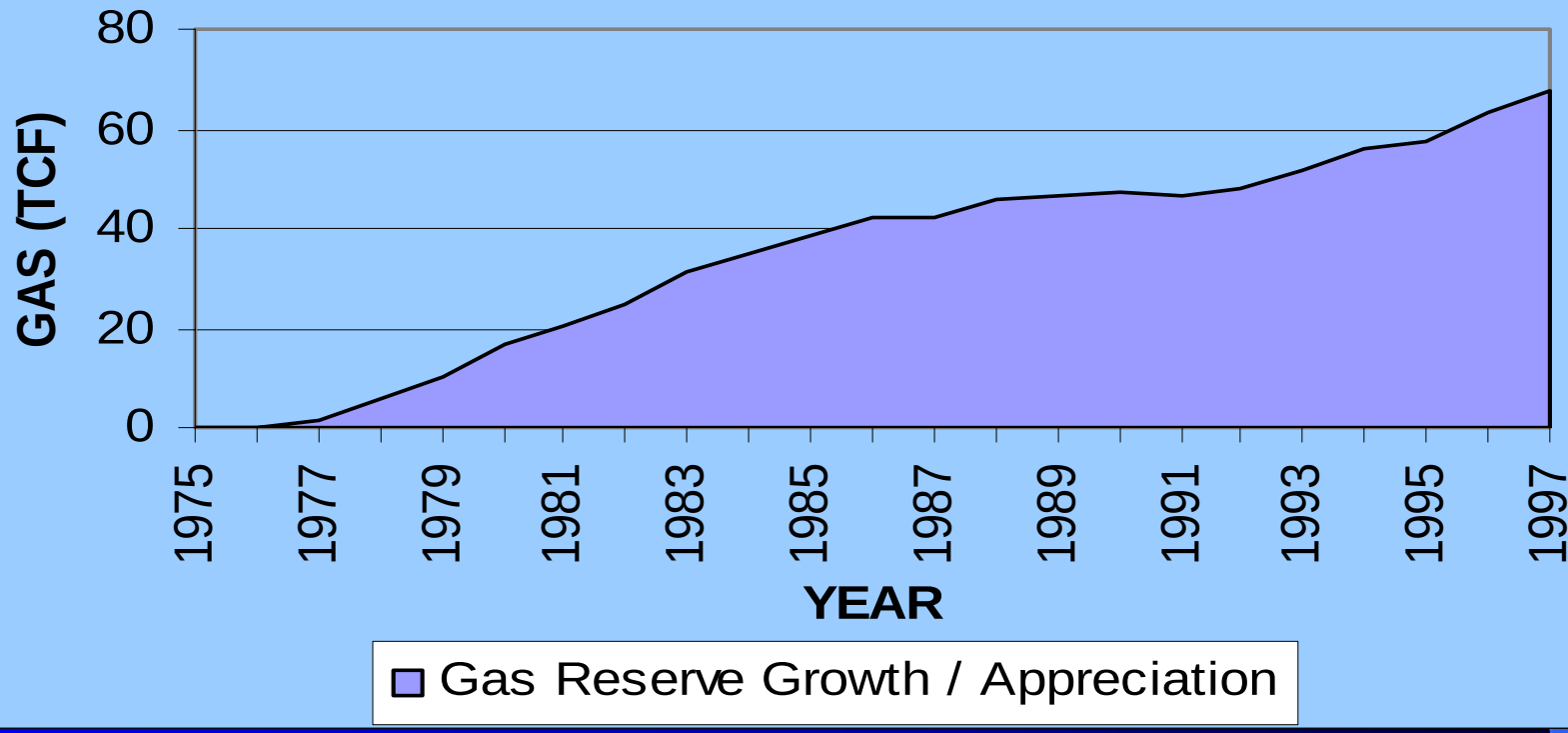
- ***Exploration Efficiency***
  - ***4D Seismic, 3D Shear wave (for infield development), Deep wireline measurements etc.***
- ***Cost Reduction***
  - ***Knowledge management, integrated well planning, improvement/innovation in drilling technology, expendable tubulars, subsea processing, free standinf drilling risers etc.***
- ***Recovery Efficiency***
  - ***Stimulation***

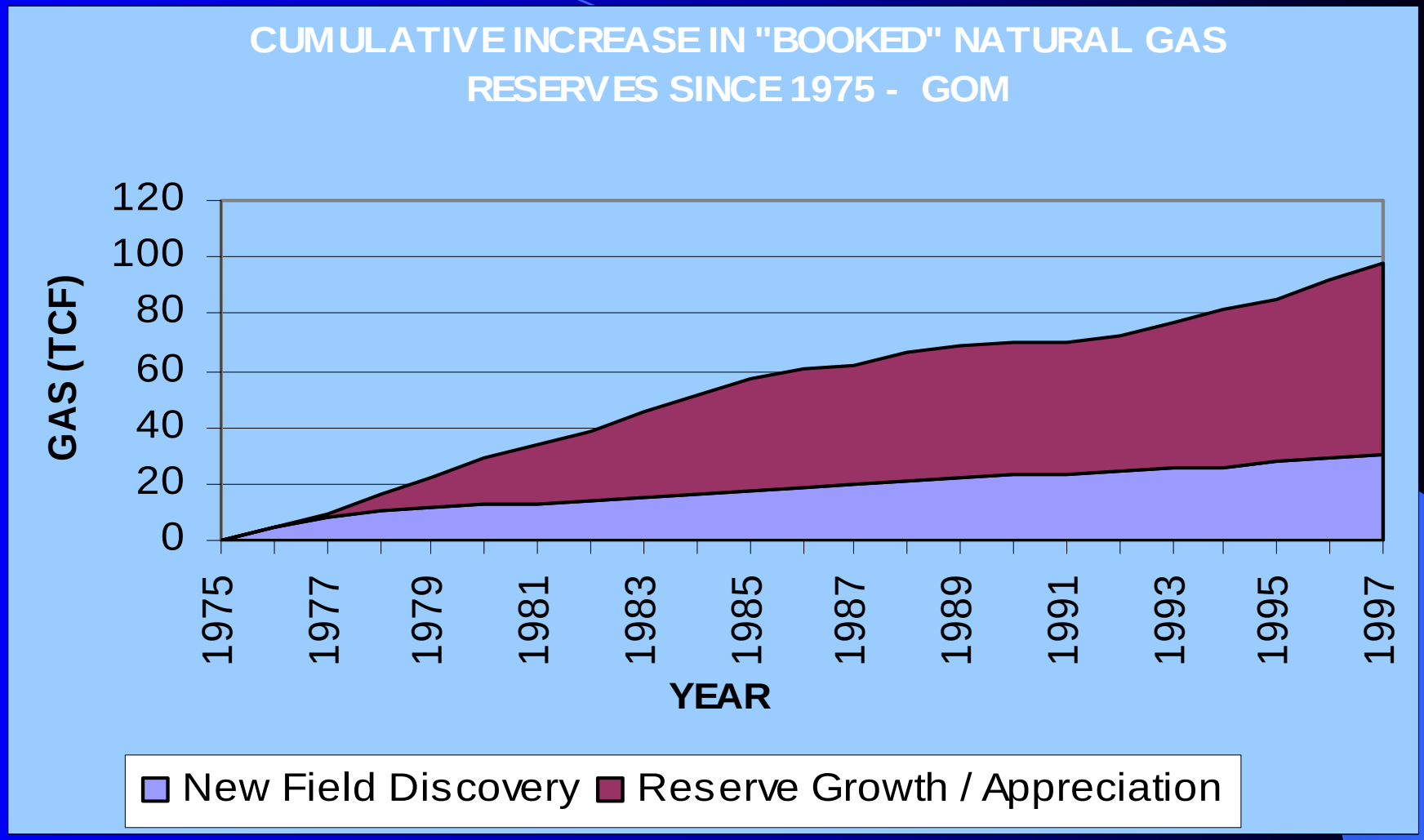
Evaluating Technological Impact

- Historical Trends in Natural Gas Production in the Gulf of Mexico
  - Reserves Addition from:
    - New field discovery
    - Reserves Appreciation/Growth
  - Completions & Production/Decline Rates
- Future Prognostications

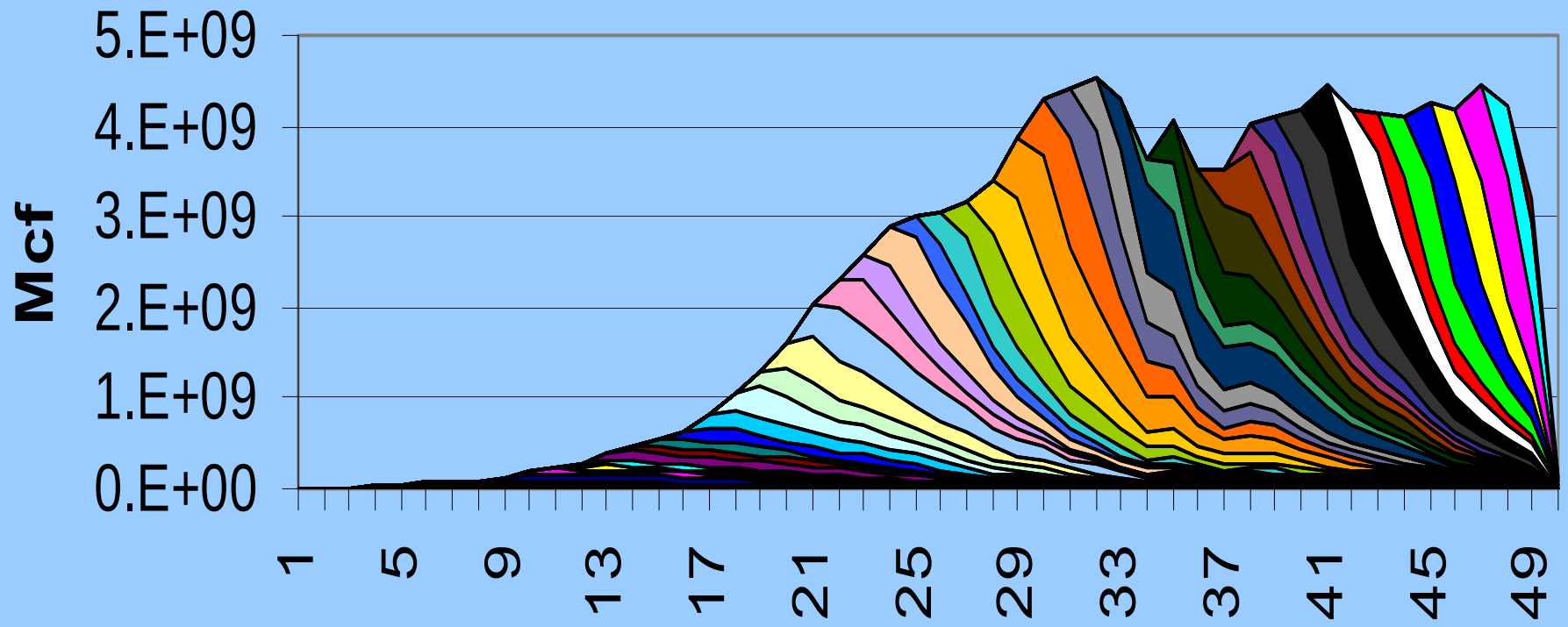

NATURAL GAS RESERVE ADDITION FROM NEW FIELD DISCOVERIES BY YEAR "BOOKED"
GAS (TCF)
0
1
2
3
4
5
6
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
YEAR RESERVE "BOOKED"
Natural Gas Reserve Addition

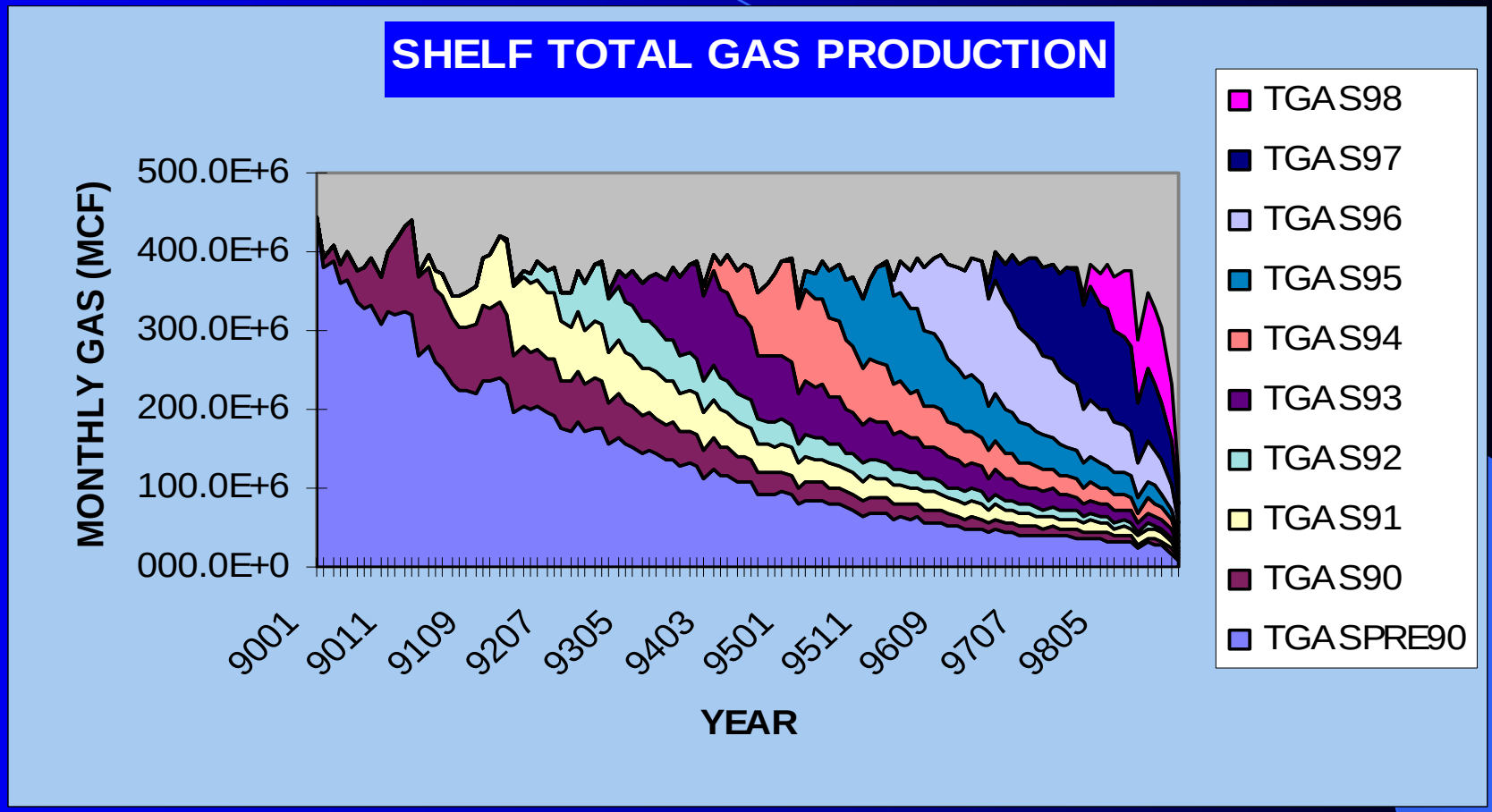
CUMULATIVE INCREASE IN "BOOKED" NATURAL GAS RESERVES FROM RESERVE GROWTH / APPRECIATION SINCE 1975 - GOM

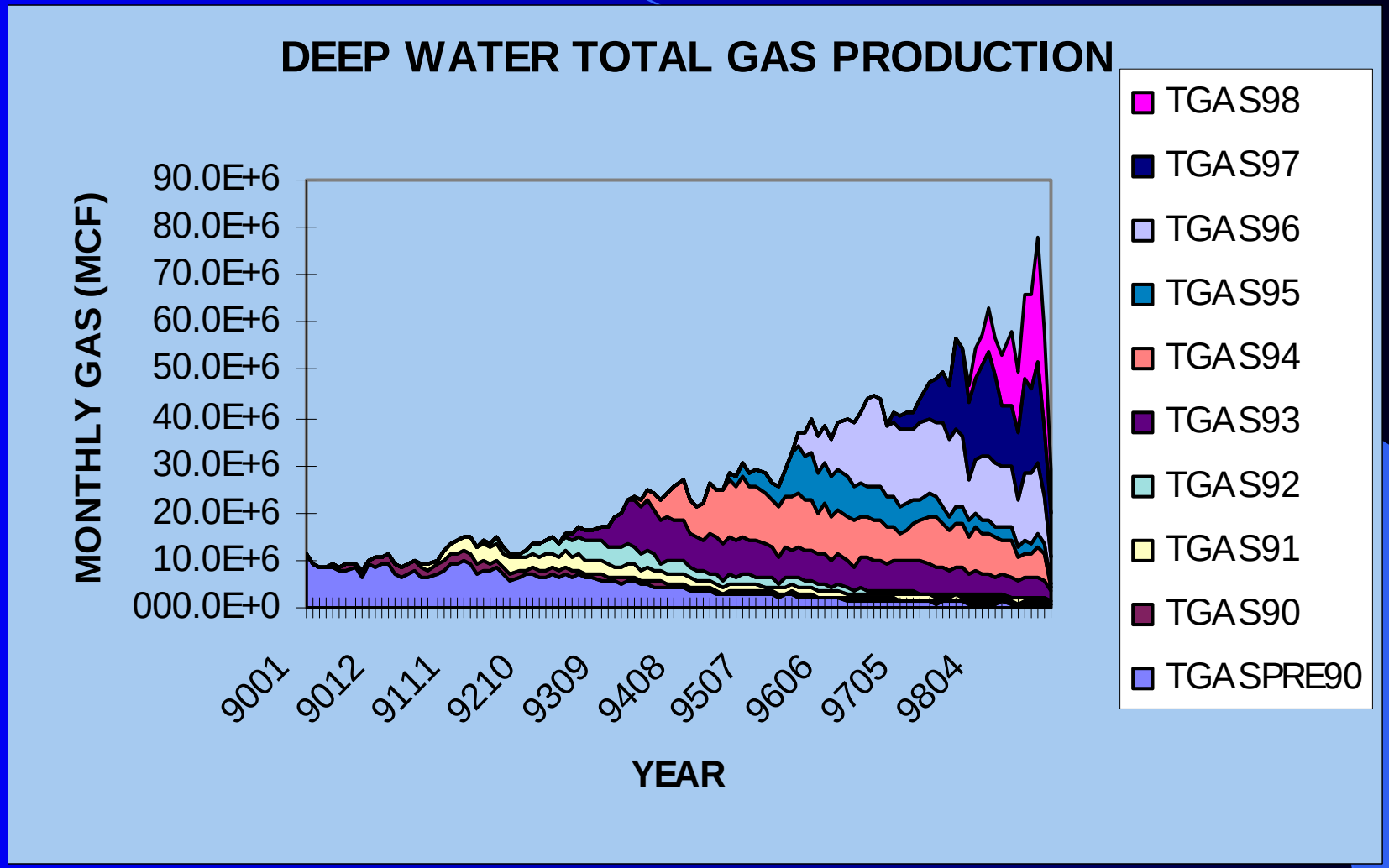



CUMULATIVE INCREASE IN "BOOKED" NATURAL GAS RESERVES SINCE 1975 - GOM
GAS (TCF)
120
100
80
60
40
20
0
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
YEAR
New Field Discovery
Reserve Growth / Appreciation

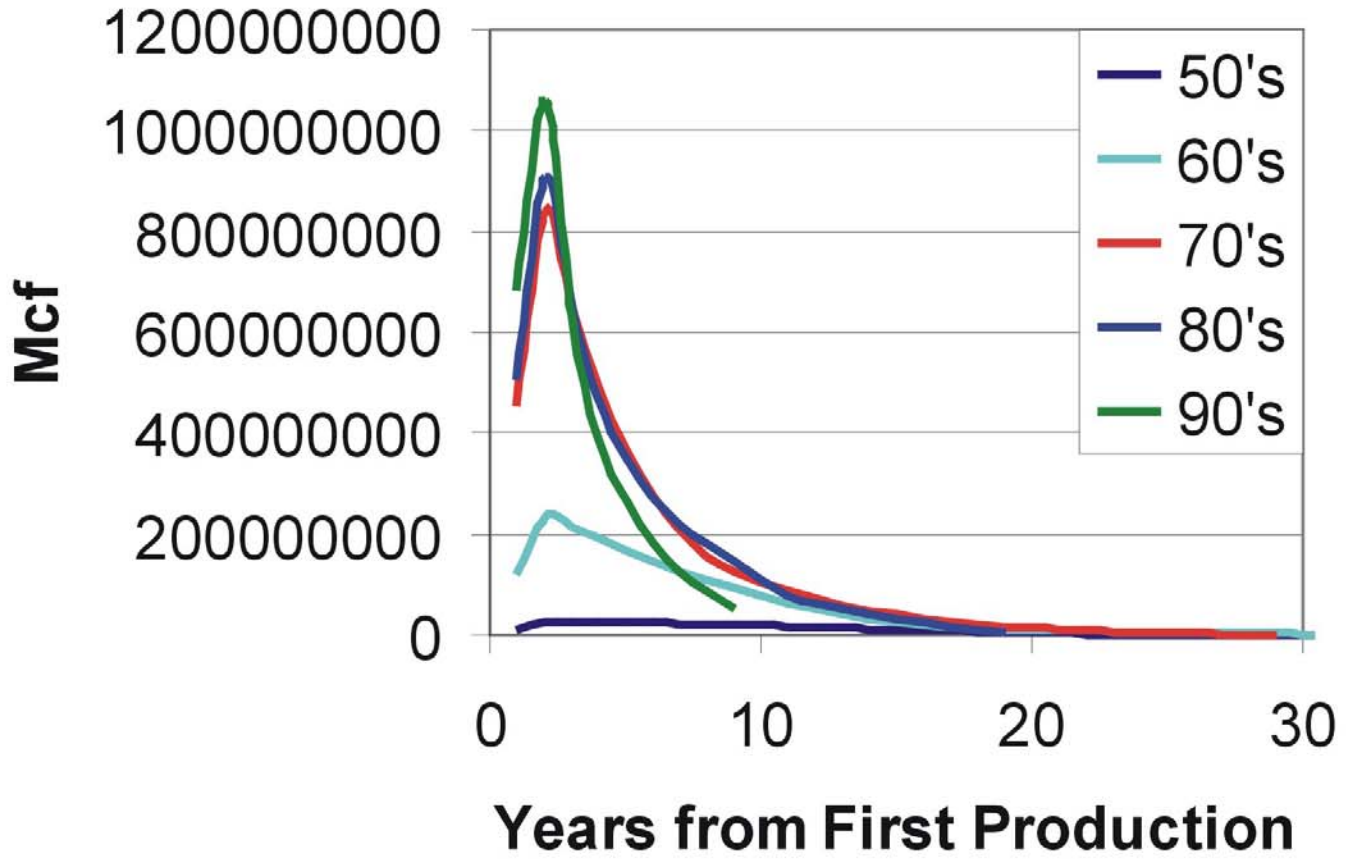
Total Natural Gas Production by Completion 1950 - 1999

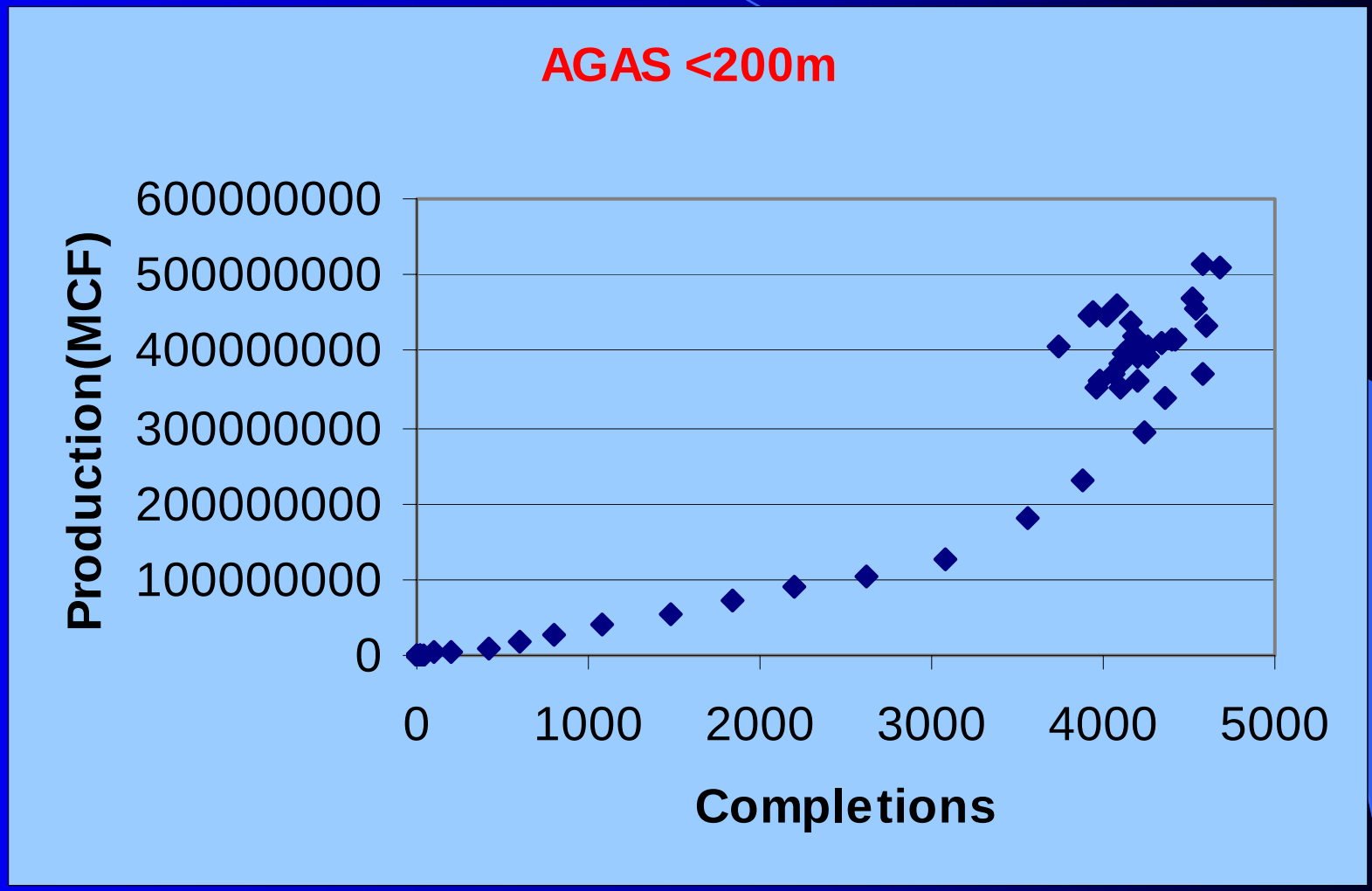


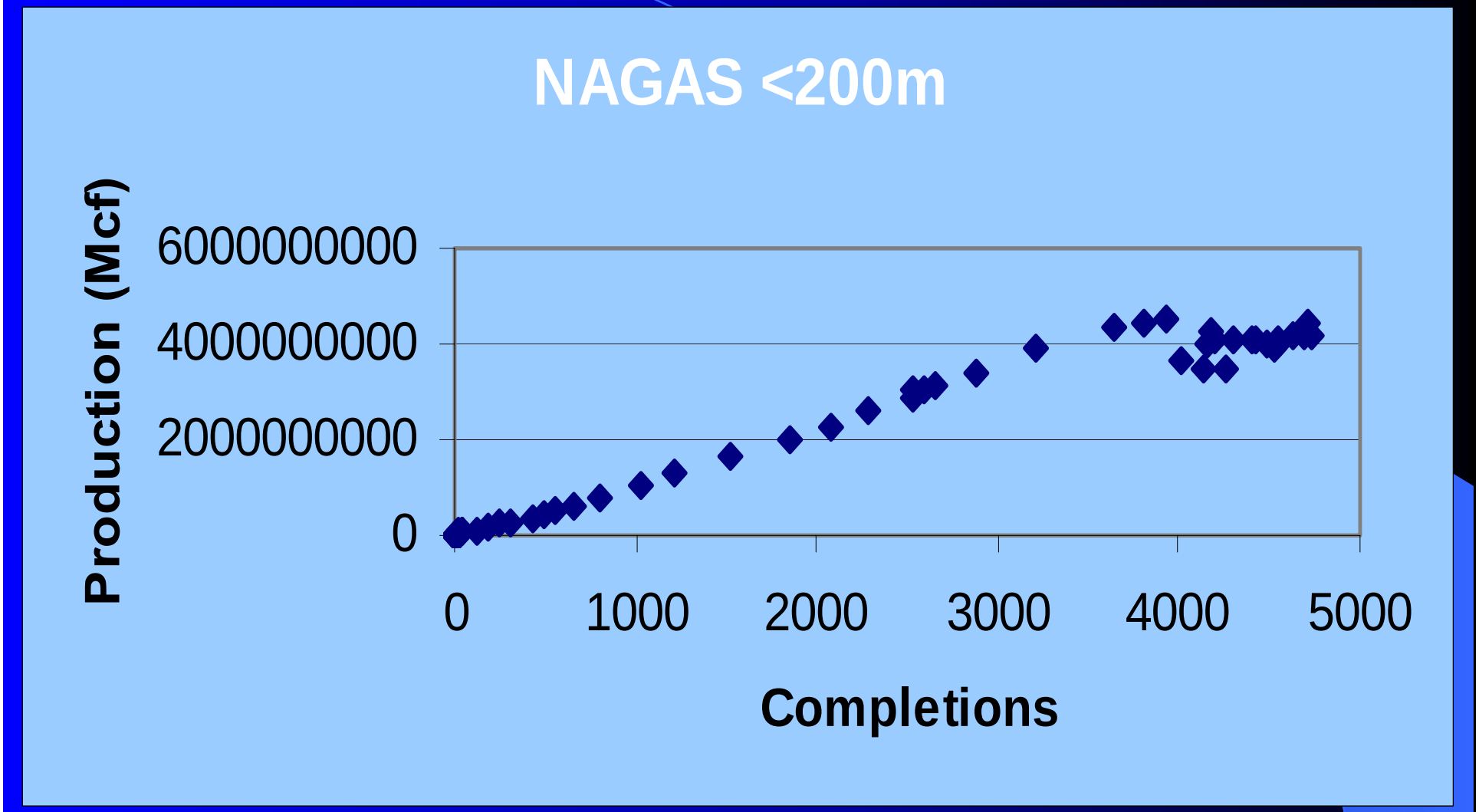

SHELF TOTAL GAS PRODUCTION
MONTHLY GAS (MCF)
500.0E+6
400.0E+6
300.0E+6
200.0E+6
100.0E+6
000.0E+0
9001
9011
9109
9207
9305
9403
9501
9511
9609
9707
9805
YEAR
TGAS98
TGAS97
TGAS96
TGAS95
TGAS94
TGAS93
TGAS92
TGAS91
TGAS90
TGASPRE90


DEEP WATER TOTAL GAS PRODUCTION
MONTHLY GAS (MCF)
90.0E+6
80.0E+6
70.0E+6
60.0E+6
50.0E+6
40.0E+6
30.0E+6
20.0E+6
10.0E+6
000.0E+0
9001
9012
9111
9210
9309
9408
9507
9606
9705
9804
YEAR
TGAS98
TGAS97
TGAS96
TGAS95
TGAS94
TGAS93
TGAS92
TGAS91
TGAS90
TGASPRE90

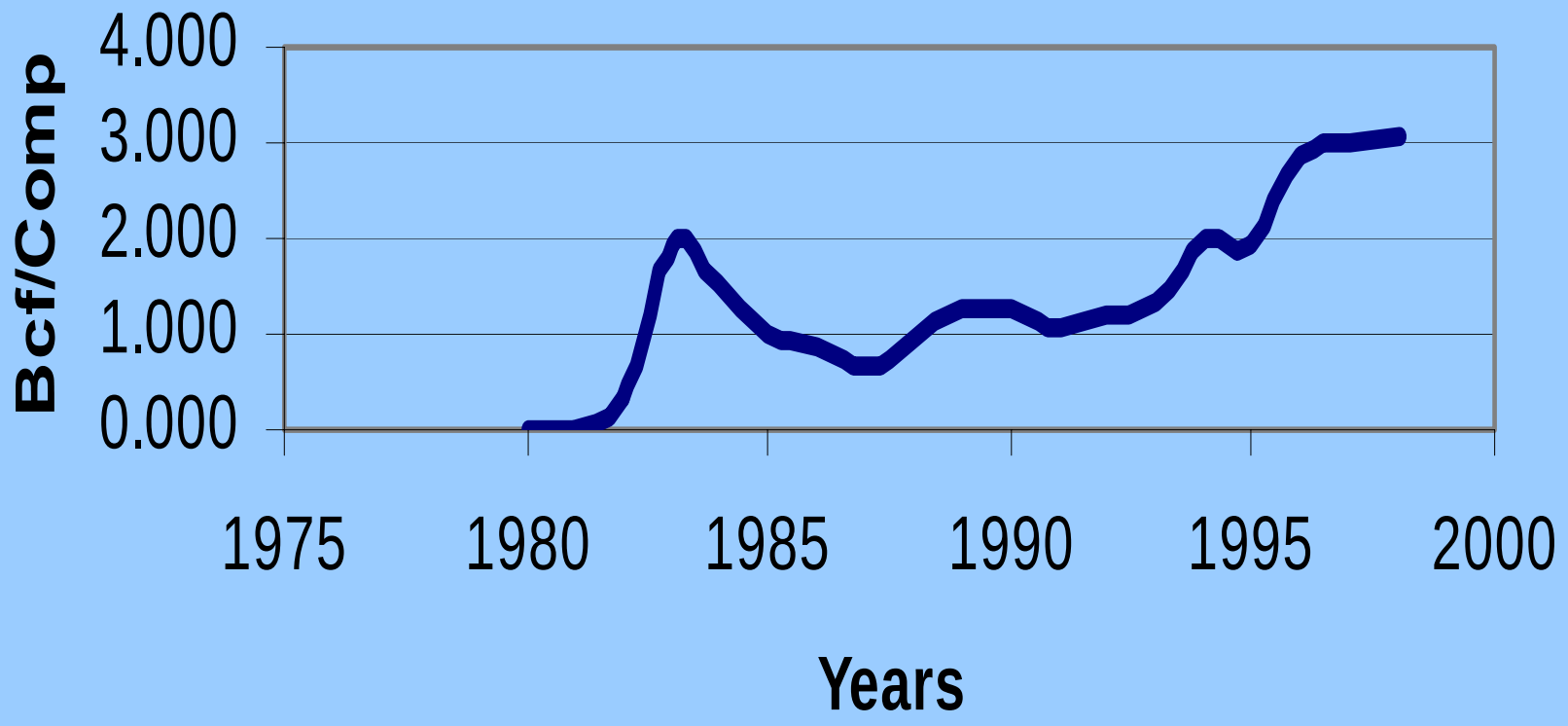
Average Annual Production by Completion



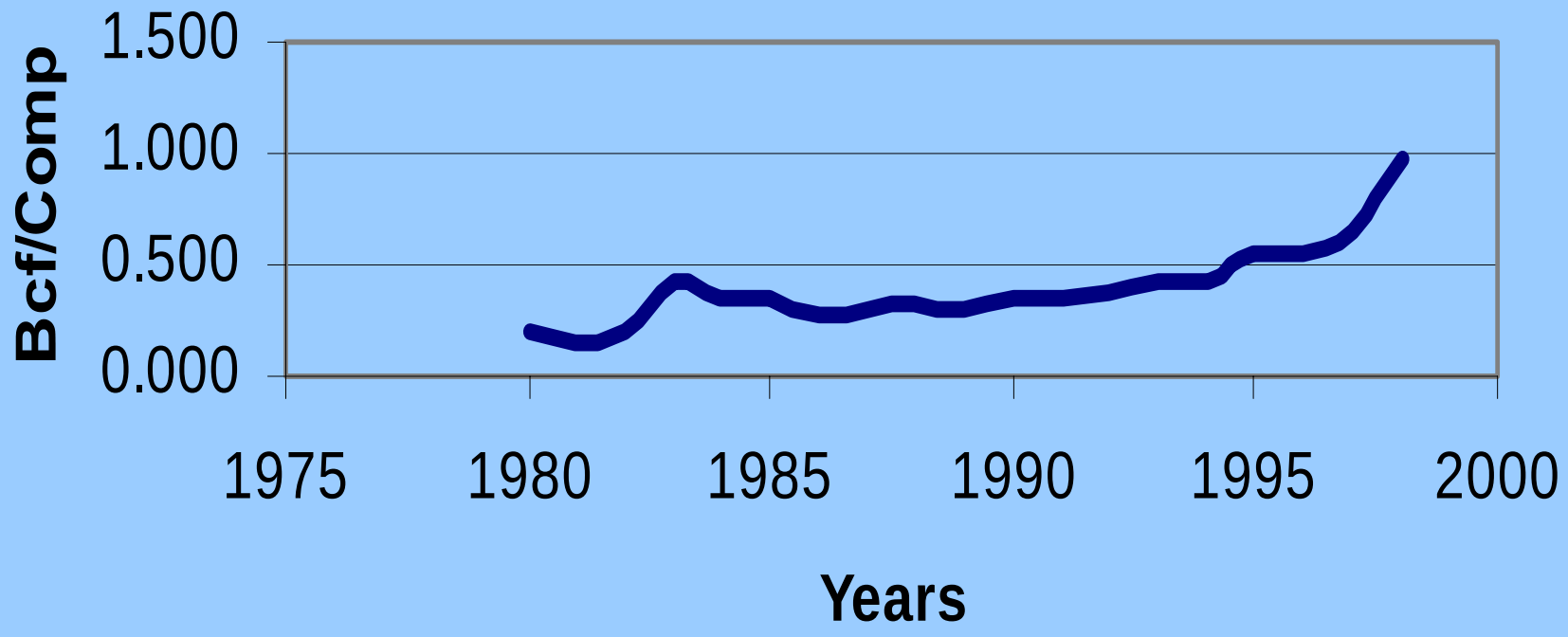

AGAS <200m
Production(MCF)
600000000
500000000
400000000
300000000
200000000
100000000
0
0
1000
2000
3000
4000
5000
Completions

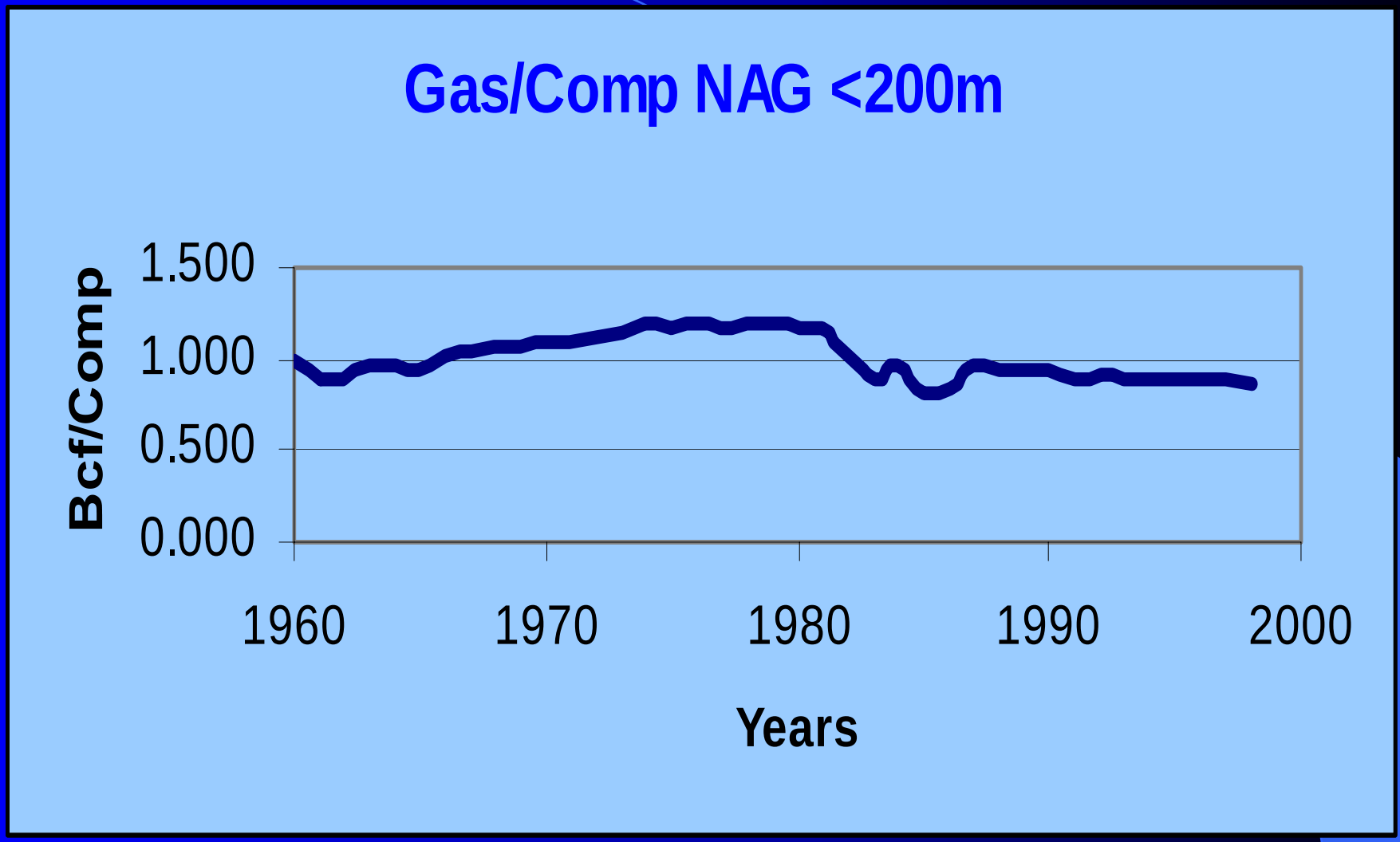

NAGAS <200m
Production (Mcf)
6000000000
4000000000
2000000000
0
0
1000
2000
3000
4000
5000
Completions

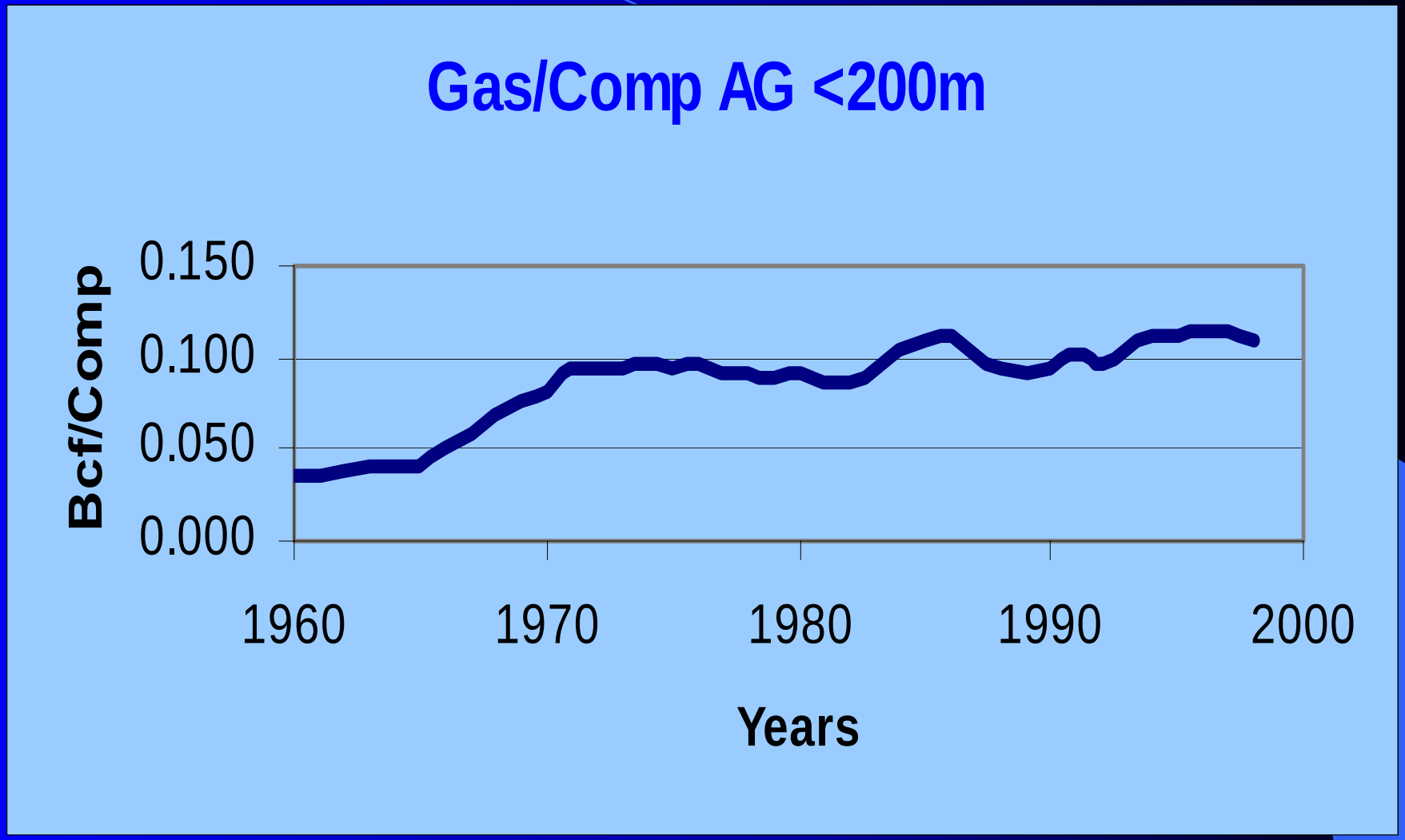
GAS/COMP NAG >200m



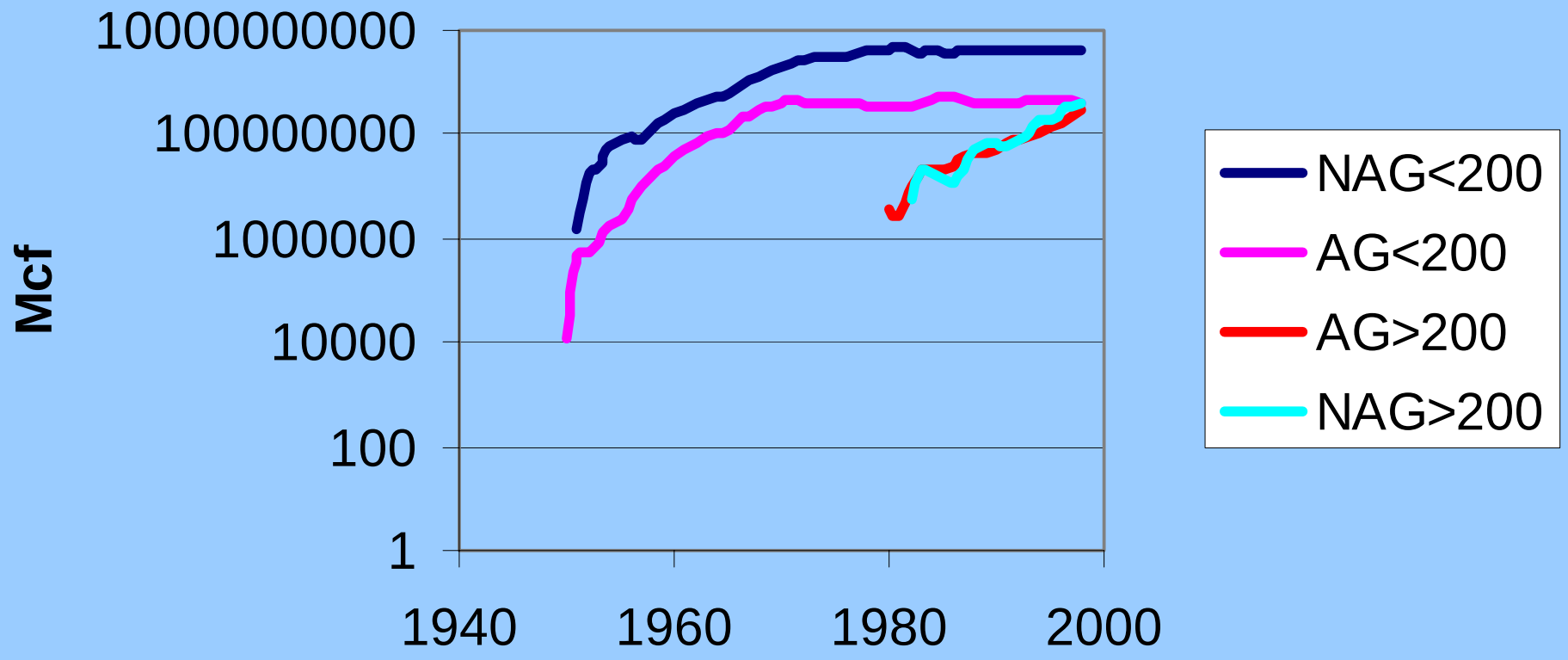
GAS/COMP AG >200m



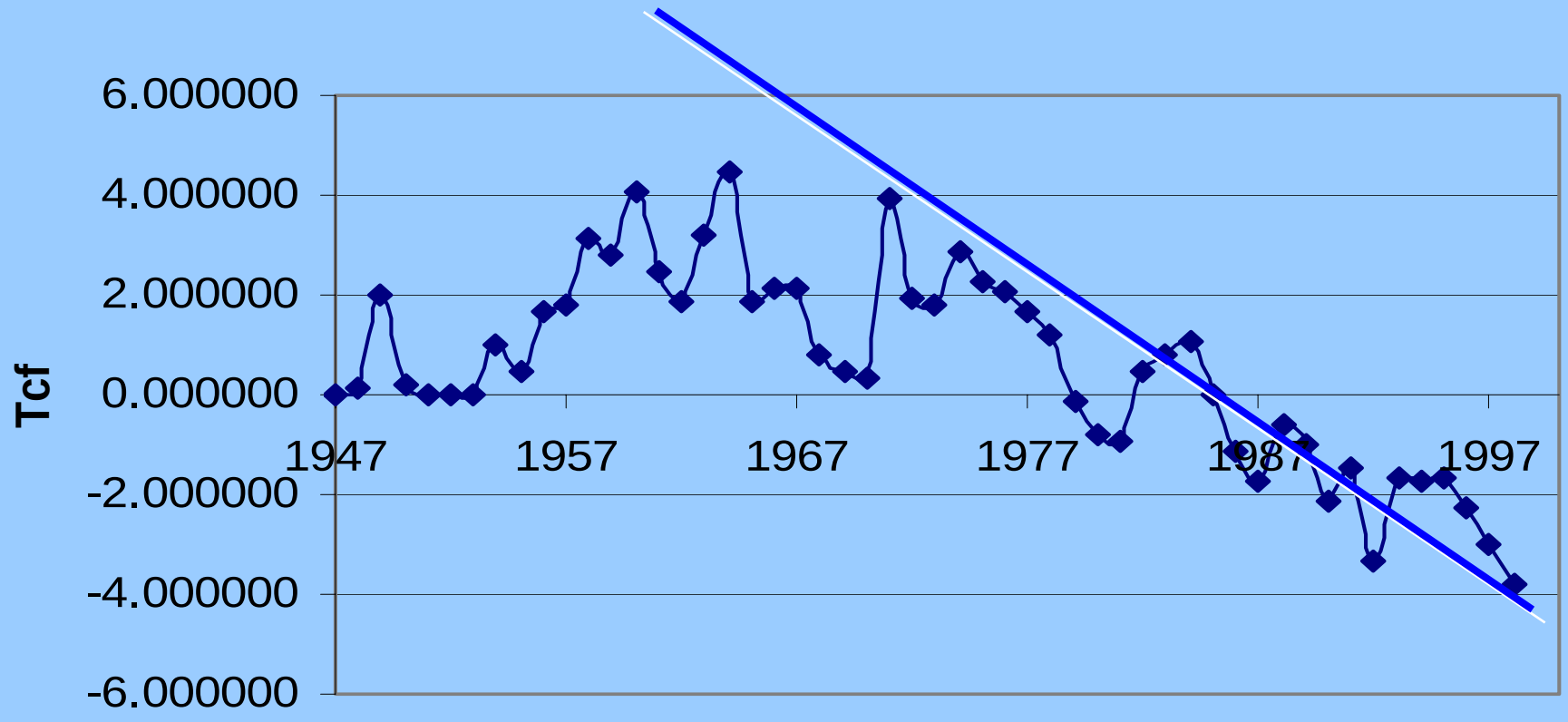

Gas/Comp NAG <200m
Bcf/Comp
1.500
1.000
0.500
0.000
1960
1970
1980
1990
2000
Years


Gas/Comp AG <200m
Bcf/Comp
0.150
0.100
0.050
0.000
1960
1970
1980
1990
2000
Years

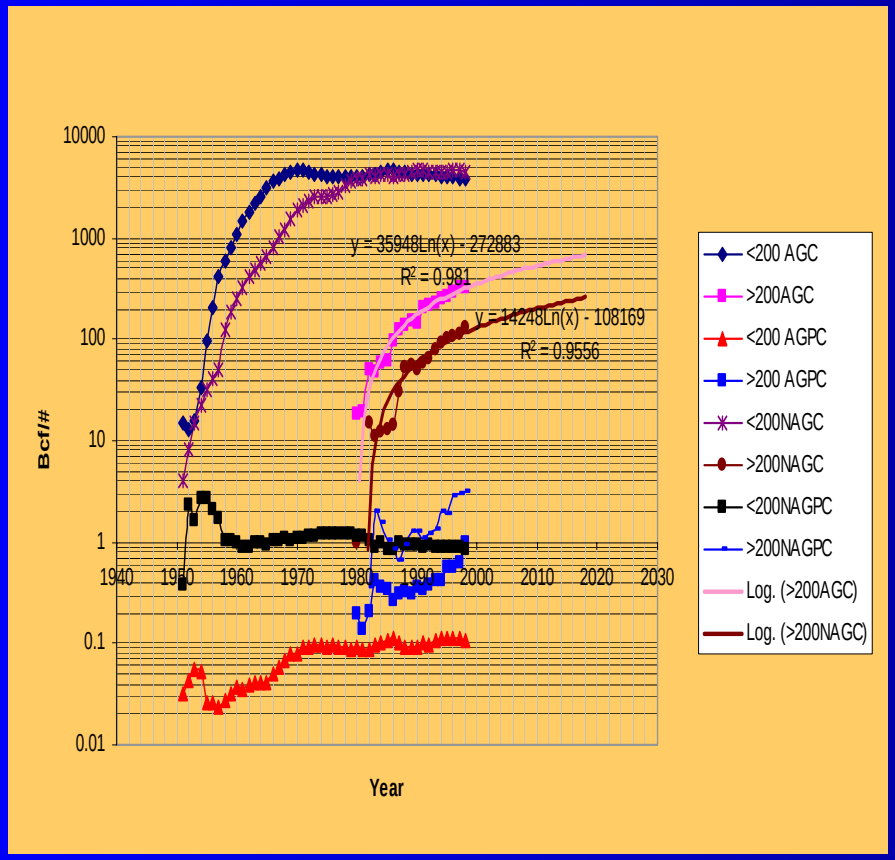
Production


10000000000
100000000
1000000
10000
100
1
Mcf
1940
1960
1980
2000
NAG<200
AG<200
AG>200
NAG>200

Reserves Balance



What is the future?



- Increased deepwater discovery and completions
- Increased deep shelf exploration & development
- Access to areas with resources
- Unimpeded implementation of new technology