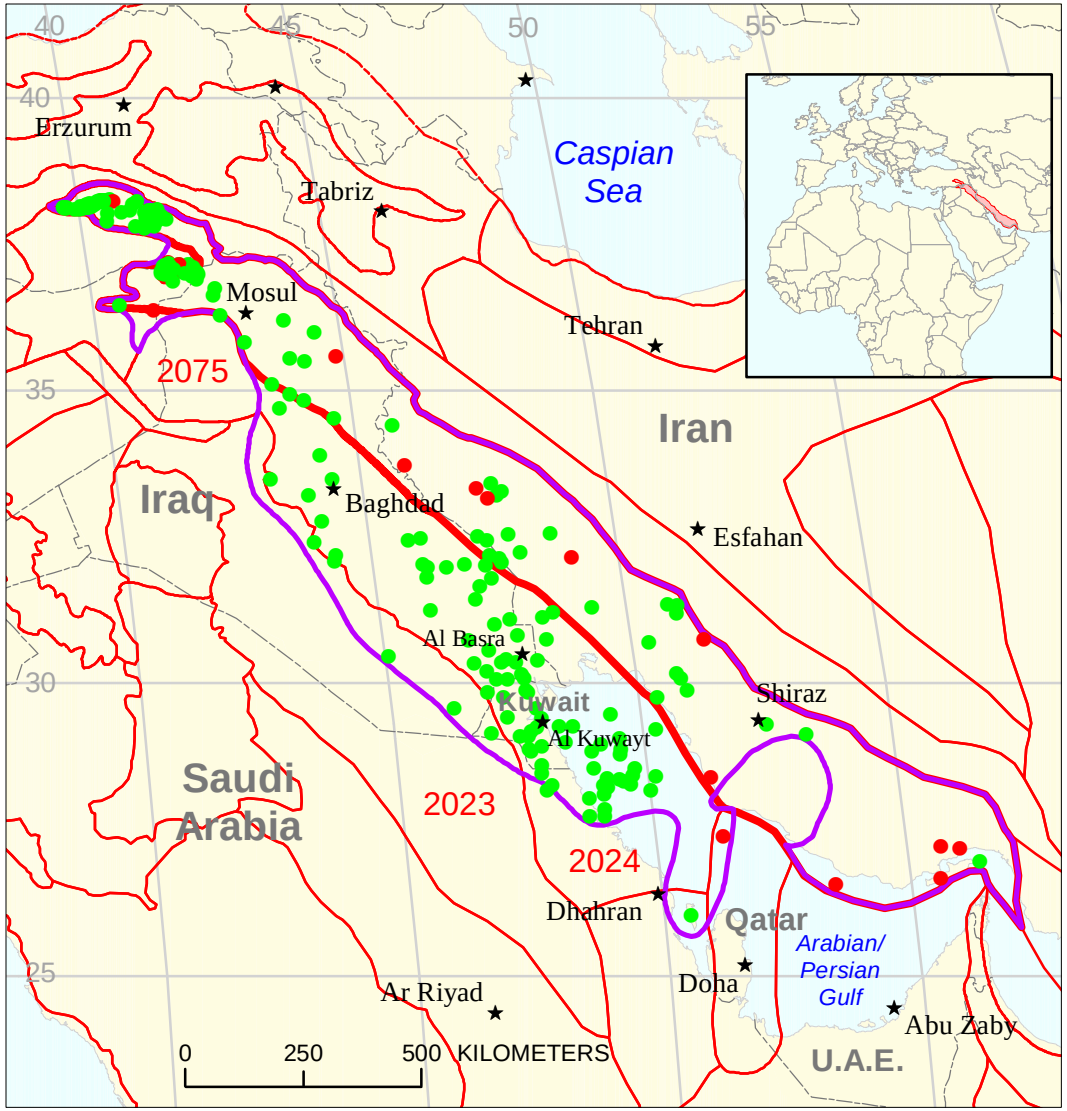
Go to Table of Contents

Go to index map

Cretaceous Reservoirs
Assessment Unit 20300101



Cretaceous Reservoirs Assessment Unit 20300101

Zagros Fold Belt Geologic Province 2030

Other geologic province boundary

Geologic Summary

Detailed map of this assessment unit

Exploration/Discovery-History Data

- Plots of Known Field Sizes
- Plots of Grown Resources
- Tables

Assessment Input Data

Assessment Results

- Assessment Unit Summary
- Detailed Assessment Results
- Undiscovered Field-Size Distributions

USGS PROVINCE: Zagros Fold Belt (2030) **GEOLOGIST:** T.S. Ahlbrandt

TOTAL PETROLEUM SYSTEM: Zagros-Mesopotamian Cretaceous-Tertiary (203001)

ASSESSMENT UNIT: Cretaceous Reservoirs (20300101)

DESCRIPTION: This assessment unit contains both Cretaceous carbonate and clastic reservoirs in the Zagros fold belt and foreland. Clastic reservoirs predominate on the western side of the assessment unit whereas carbonate reservoirs are more common to the east nearer the Zagros thrust belt. The Total Petroleum System was considered to be charged by Cretaceous source rocks although there is uncertainty about mixing of Jurassic and Cretaceous oils in the area. Considerable proprietary data was available, particularly in Iran and Iraq, that facilitated the analysis including GeoMark data and other sources. Structural complexity increases in the unit in the direction of the Zagros Mountains.

SOURCE ROCKS: Several source rock intervals have been identified dominated by Lower Cretaceous Shales. The Berriasian Sulaiy and Minagish Formations are known source intervals in Kuwait. Source rocks have been identified in several Cretaceous age intervals including Hauterivian Ratawi Shale, Albian Zubair, Aptian Burgan (Nahr Umr), Shuaiba, and Mauddud Formations. Upper Cretaceous source rocks include Cenomanian Rumaila and Mishrif Formations.

MATURATION: Maturation (expulsion) in some models commences as early as 90 Ma with peak expulsion about 27 Ma. Most models show peak generation to be very recent (15 Ma or less) in the Mid Miocene (Neogene) coincident with the Zagros collision and the thick accumulation of orogenic clastics in the Zagros foredeep.

MIGRATION: Although expulsion may have started in Late Cretaceous, significant migration commenced probably no earlier than latest Oligocene/earliest Miocene and continues to present. Migration into the Zagros fold and thrust belt has permitted extensive oil and gas seeps and tar belt formation in the eastern Zagros thrust. The eternal flame at Kirkuk is an example of the ongoing charge and seepage of petroleum on the east flank of the petroleum system.

RESERVOIR ROCKS: The dominant clastic reservoirs, principally the Zubair (Barremian) and Burgan (Aptian) Sandstone are related to clastic, dominantly deltaic, sediment influx from western source areas such as the Saudi Arabian shield or to the north the Rutbah or Mardin high. Rudistid carbonate reservoirs are common in both Lower Cretaceous carbonate reservoirs such as Shuaiba Formation (Aptian) as well as Upper Cretaceous carbonate reservoirs such as Mishrif Formation (Cenomanian). A variety of other reservoirs related to oolites, and fracturing are known to occur in Cretaceous rocks.

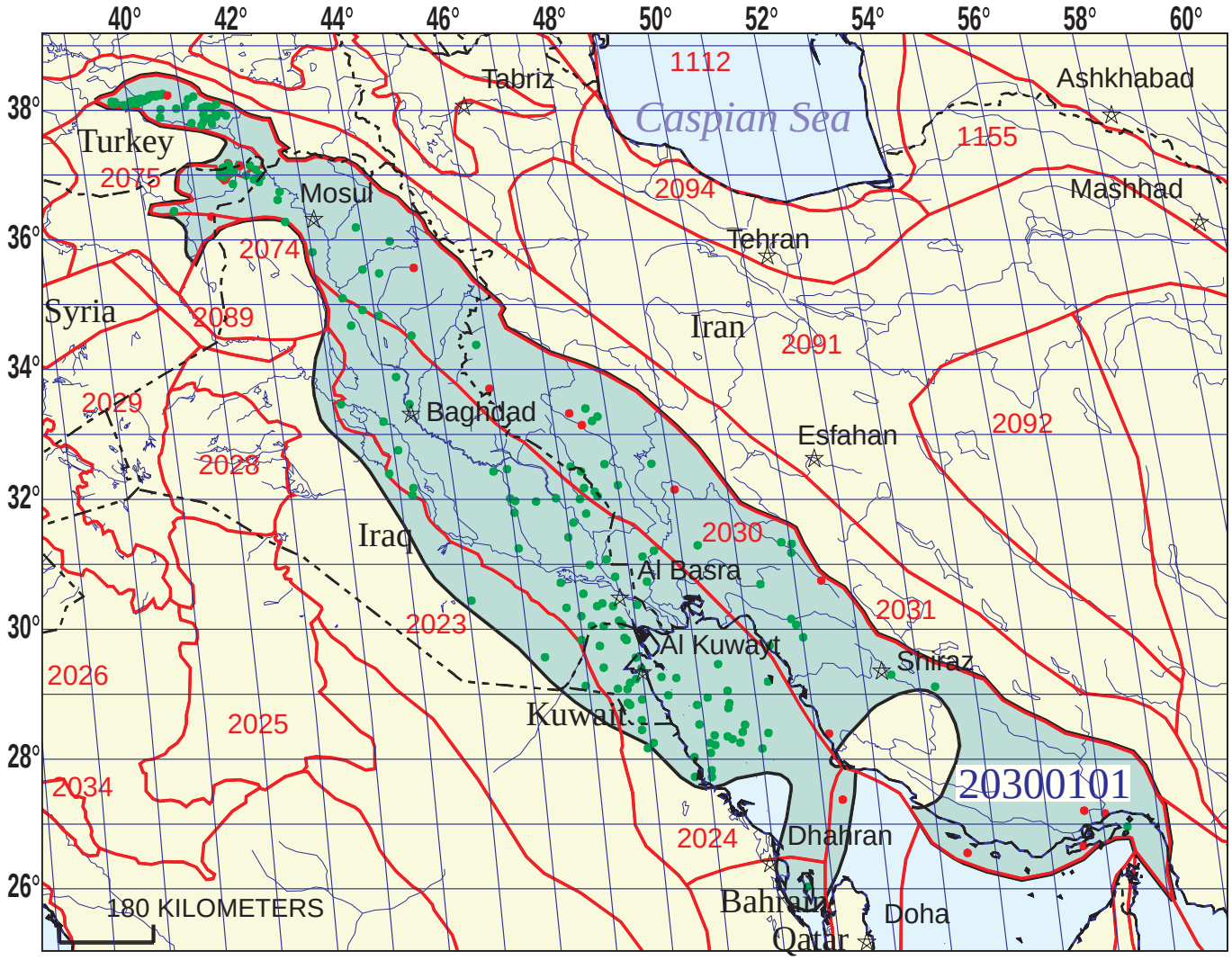
TRAPS AND SEALS: There are several regional unconformities and shales that form significant seals. The Nahr Umr Shale (Aptian) is a major regional shale seal trapping major accumulations at Burgan, Safaniya, Rumaila, Zubair, Majnoon, and East Baghdad, as well as at many other localities. A Miocene salt seal in the Zagros fold belt is a critical block to vertical migration in the thrust belt structures of Iraq and Iran.

REFERENCES:

Abdullah, F.H.A., Nederlof, P.J.R., Ormerod, M.P., and Kinghorn, R.R.F., 1997, Thermal history of the Lower and Middle Cretaceous source rocks in Kuwait: GeoArabia, v. 2, no. 2, p. 151-164.

Alsharhan, A.S., and Nairn, A.E.M., 1997, Sedimentary basins and petroleum geology of the Middle East: Netherlands, Elsevier, 843 p.

Christian, L., 1997, Cretaceous subsurface geology of the Middle East region: GeoArabia, v. 2, no. 3, p. 239-256.



Cretaceous Reservoirs
Assessment Unit - 20300101

EXPLANATION

- Hydrography
- Shoreline
- 2030 — Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 20300101 — Assessment unit code and boundary

Projection: Robinson. Central meridian: 0

SEVENTH APPROXIMATION
NEW MILLENNIUM WORLD PETROLEUM ASSESSMENT
DATA FORM FOR CONVENTIONAL ASSESSMENT UNITS

Date:……..	11/16/99		
Assessment Geologist:……..	T.S. Ahlbrandt		
Region:……..	Middle East and North Africa	Number:	2
Province:……..	Zagros Fold Belt	Number:	2030
Priority or Boutique……..	Priority		
Total Petroleum System:……	Zagros-Mesopotamian Cretaceous-Tertiary	Number:	203001
Assessment Unit:……..	Cretaceous Reservoirs	Number:	20300101
* Notes from Assessor	Lower 48 growth function.		

CHARACTERISTICS OF ASSESSMENT UNIT

Oil (<20,000 cfg/bo overall) **or** Gas (≥20,000 cfg/bo overall):… Oil

What is the minimum field size?……. 10 mmboe grown (≥1mmboe)
(the smallest field that has potential to be added to reserves in the next 30 years)

Number of discovered fields exceeding minimum size:…….. Oil: 145 Gas: 14
Established (>13 fields) X Frontier (1-13 fields) _____ Hypothetical (no fields) _____

Median size (grown) of discovered oil fields (mmboe):
1st 3rd 527.5 2nd 3rd 417 3rd 3rd 333.8
Median size (grown) of discovered gas fields (bcfg):
1st 3rd 1202.1 2nd 3rd 3948 3rd 3rd 3198

Assessment-Unit Probabilities:

Attribute	Probability of occurrence (0-1.0)
1. **CHARGE:** Adequate petroleum charge for an undiscovered field ≥ minimum size……	1.0
2. **ROCKS:** Adequate reservoirs, traps, and seals for an undiscovered field ≥ minimum size……	1.0
3. **TIMING OF GEOLOGIC EVENTS:** Favorable timing for an undiscovered field ≥ minimum size	1.0

Assessment-Unit GEOLOGIC Probability (Product of 1, 2, and 3):…….. 1.0

4. **ACCESSIBILITY:** Adequate location to allow exploration for an undiscovered field ≥ minimum size…… 1.0

UNDISCOVERED FIELDS

Number of Undiscovered Fields: How many undiscovered fields exist that are ≥ minimum size?:
(uncertainty of fixed but unknown values)

Oil fields:……min. no. (>0)	20	median no.	150	max no.	325
Gas fields:……min. no. (>0)	10	median no.	35	max no.	75

Size of Undiscovered Fields: What are the anticipated sizes (**grown**) of the above fields?:
(variations in the sizes of undiscovered fields)

Oil in oil fields (mmbo)……min. size	10	median size	100	max. size	30000
Gas in gas fields (bcfg):……min. size	60	median size	400	max. size	17000

Assessment Unit (name, no.)
Cretaceous Reservoirs, Assessment Unit 20300101

AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS

(uncertainty of fixed but unknown values)

Oil Fields:	minimum	median	maximum
Gas/oil ratio (cfg/bo)……	500	1000	1500
NGL/gas ratio (bngl/mmcfg)……	15	25	35

Gas fields:	minimum	median	maximum
Liquids/gas ratio (bngl/mmcfg)……	22	44	66
Oil/gas ratio (bo/mmcfg)……			

SELECTED ANCILLARY DATA FOR UNDISCOVERED FIELDS

(variations in the properties of undiscovered fields)

Oil Fields:	minimum	median	maximum
API gravity (degrees)……	15	34	50
Sulfur content of oil (%)……	1	2.5	5.5
Drilling Depth (m) ……	500	2500	5000
Depth (m) of water (if applicable)……	0	50	100

Gas Fields:	minimum	median	maximum
Inert gas content (%)……			
CO_2 content (%)……			
Hydrogen-sulfide content (%)……			
Drilling Depth (m)……	1000	2500	5500
Depth (m) of water (if applicable)……	0	50	100

Assessment Unit (name, no.)
Cretaceous Reservoirs, Assessment Unit 20300101

ALLOCATION OF UNDISCOVERED RESOURCES IN THE ASSESSMENT UNIT TO COUNTRIES OR OTHER LAND PARCELS (uncertainty of fixed but unknown values)

1. Iraq represents 37.1 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		45	
Portion of volume % that is offshore (0-100%)……		0	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		29	
Portion of volume % that is offshore (0-100%)……		0	

2. Iran represents 47.7 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		42	
Portion of volume % that is offshore (0-100%)……		20	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		60	
Portion of volume % that is offshore (0-100%)……		20	

3. Kuwait represents 4.3 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		5	
Portion of volume % that is offshore (0-100%)……		60	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		5	
Portion of volume % that is offshore (0-100%)……		60	

4. Saudi Arabia represents 5.1 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		5	
Portion of volume % that is offshore (0-100%)……		70	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		5	
Portion of volume % that is offshore (0-100%)……		70	

5. Turkey represents 3.1 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		1	
Portion of volume % that is offshore (0-100%).....		0	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		0	
Portion of volume % that is offshore (0-100%).....		0	

6. Bahrain represents 0.6 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		1	
Portion of volume % that is offshore (0-100%).....		95	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		1	
Portion of volume % that is offshore (0-100%).....		95	

7. Syria represents 2.1 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		1	
Portion of volume % that is offshore (0-100%).....		0	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		0	
Portion of volume % that is offshore (0-100%).....		0	

8. Province 2030 represents 56.6 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		35	
Portion of volume % that is offshore (0-100%).....		5	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		80	
Portion of volume % that is offshore (0-100%).....		3	

9. Province 2024 represents 35.9 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		60	
Portion of volume % that is offshore (0-100%).....		20	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		15	
Portion of volume % that is offshore (0-100%).....		84	

10. Province 2023 represents 6.3 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		2	
Portion of volume % that is offshore (0-100%).....		0	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		0	
Portion of volume % that is offshore (0-100%).....		0	

11. Province 2075 represents 0.6 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		1	
Portion of volume % that is offshore (0-100%).....		0	

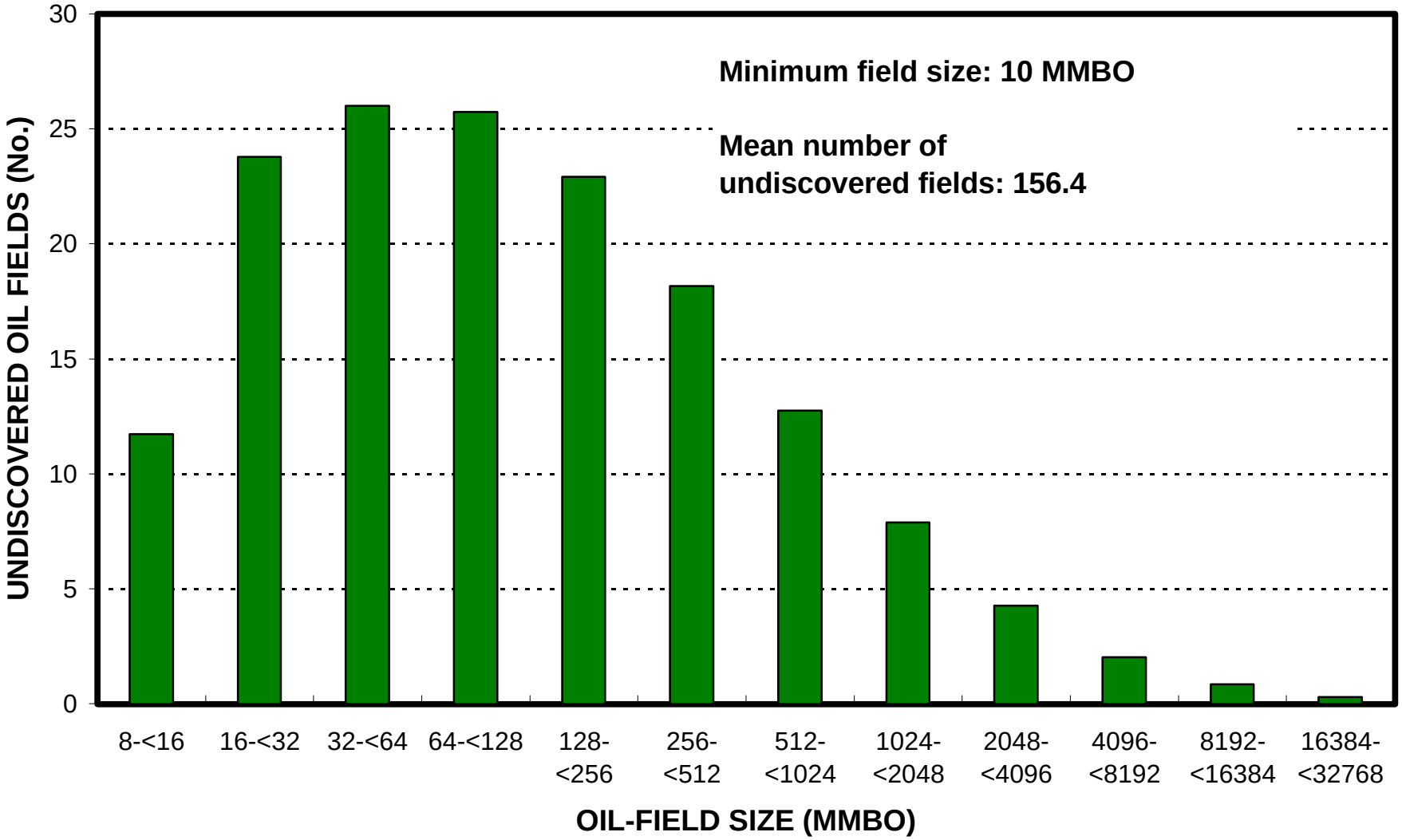
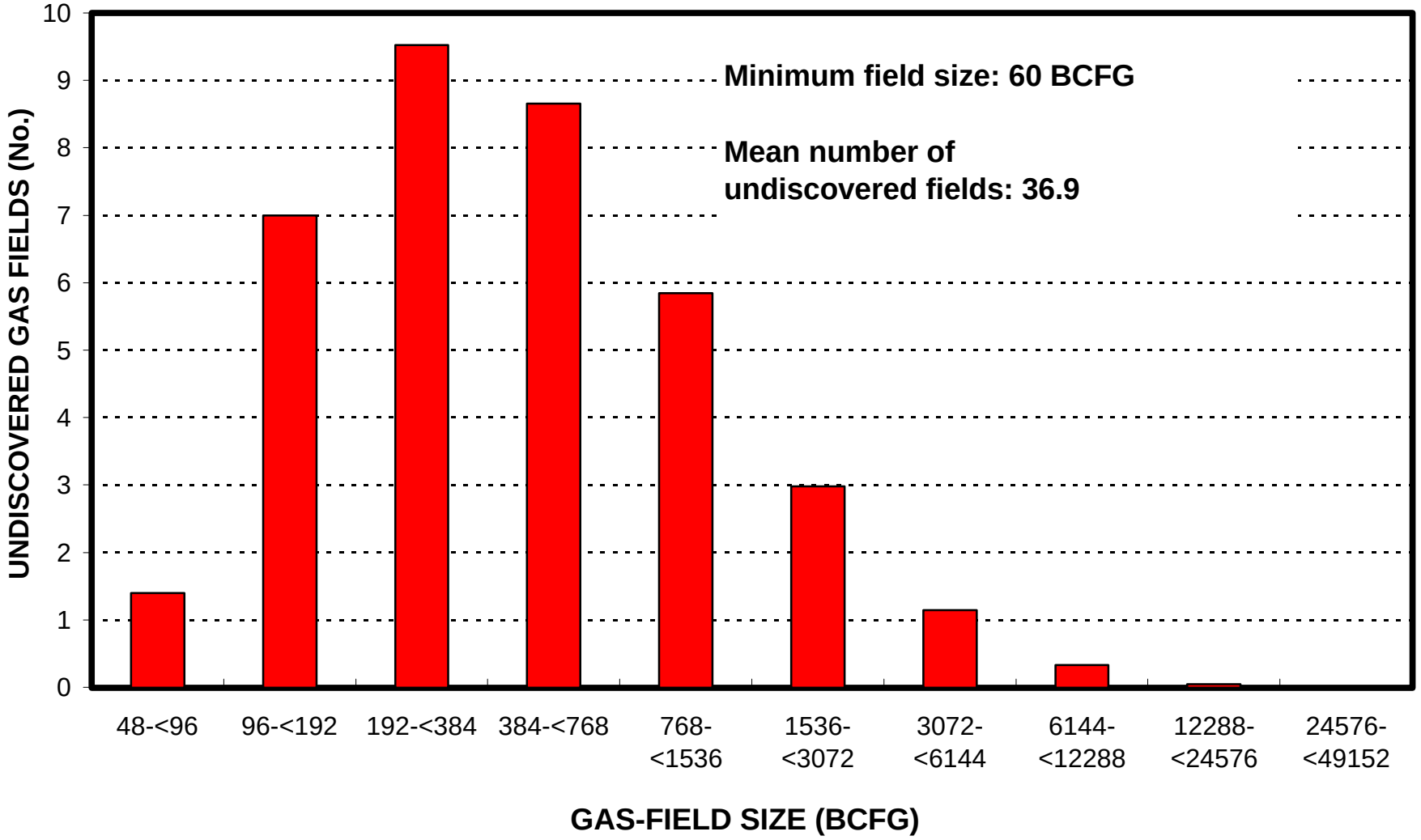
Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		0	
Portion of volume % that is offshore (0-100%).....		0	

12. Province 2021 represents 0.6 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		2	
Portion of volume % that is offshore (0-100%).....		95	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		5	
Portion of volume % that is offshore (0-100%).....		90	

Cretaceous Reservoirs, AU 20300101
Undiscovered Field-Size Distribution



Cretaceous Reservoirs, AU 20300101
Undiscovered Field-Size Distribution