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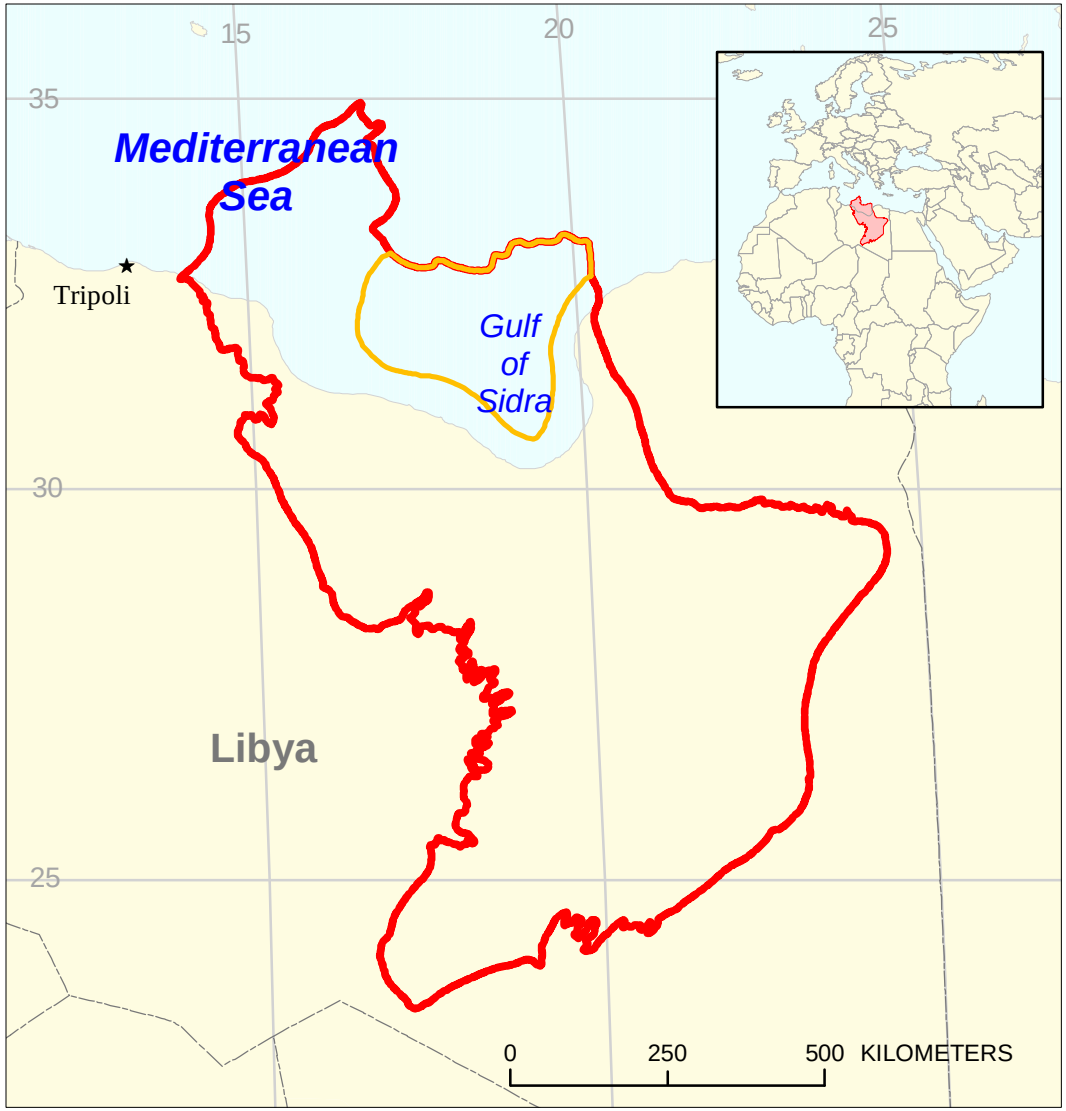
Offshore Sirte Hypothetical Assessment Unit 20430103



Offshore Sirte Hypothetical Assessment Unit 20430103

Sirte Basin Geologic Province 2043

Geologic Summary

Detailed map of this assessment unit

Assessment Input Data

Assessment Results

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

USGS PROVINCE: Sirte Basin (2043) **GEOLOGIST:** T.S.Ahlbrandt

TOTAL PETROLEUM SYSTEM: Sirte-Zelten (204301)

ASSESSMENT UNIT: Offshore Sirte Hypothetical (20430103)

DESCRIPTION: There is one dominant petroleum system in the Sirte Basin sourced by the Cretaceous (Campanian) Sirte Shale that has been explored in the offshore to water depths of 200 m. This hypothetical unit encompasses the offshore area in the Gulf of Sirte in water depths between 200 m and 2,000 m. No fields have been discovered; however, some hydrocarbon shows are known. Two of three risking elements are risked in this unit; that is, rocks and timing of geologic events. Detrimental factors offshore relate to extrusive rocks, and complex structuring related to shear zones and a subduction zone to the northeast, which may have breached potential traps. There are possible Silurian, Cretaceous, and Eocene petroleum systems in the offshore; however, only the Cretaceous source rock system (the Sirte Shale, Campanian) was assessed.

SOURCE ROCKS: The upper Cretaceous (Campanian) Sirte Shale of the Rakb Group is by far the dominant source rock although Silurian and Eocene potential source rocks are thought to exist in the offshore. Onshore the Sirte Shale generates a low sulfur, high gravity oil with low gas oil ratios; however, the deeper grabens such as the Sirte reach depths of more than 8,000 m placing the Sirte Shale in a thermal regime conducive to gas generation. Eocene source rocks may have generated oil; however, biodegradation of Cretaceous oils and migration into Eocene reservoirs is also possible.

MATURATION: Generation is thought to have begun in Eocene time (variously timed at 50 Ma to 40 Ma) and continues to present. Onshore the petroleum generated is dominantly oil; however, offshore increased thermal gradients and deeper burial suggest higher gas oil ratios and natural gas potential.

MIGRATION: Petroleum commenced migration in the Eocene from regional grabens vertically into adjacent horsts. Preservation of hydrocarbons in the deep grabens is now known.

RESERVOIR ROCKS: Potential reservoirs include both Early Cretaceous clastics and Upper Cretaceous through Eocene carbonates. Eocene nummulitid reservoirs are expected. Older Cambro-Ordovician reservoirs sourced by Silurian source rocks are possible.

TRAPS AND SEALS: The Eocene (Ypresian) Gir Formation, particularly the Hon Evaporite Member is considered to be the dominant seal in the Sirte Basin. The section is as thick as 1,305 m and halite forms 35 percent of the total section in some grabens.

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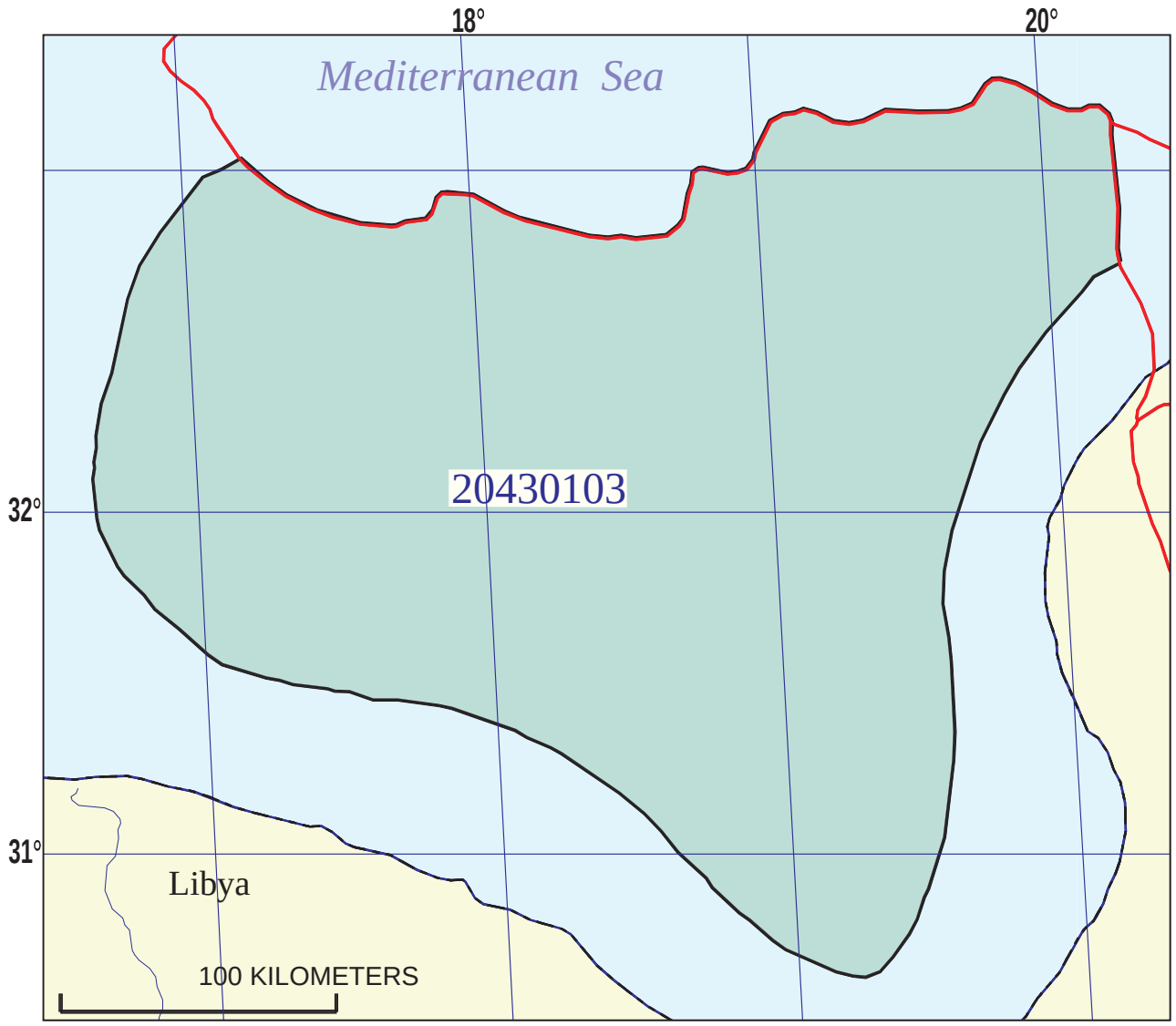


Offshore Sirte Hypothetical Assessment Unit - 20430103

EXPLANATION

- Hydrography
- Shoreline
- 2043 Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 20430103 Assessment unit code and boundary

Projection: Robinson. Central meridian: 0

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

Date:……..	6/19/98		
Assessment Geologist:……..	T.S. Ahlbrandt		
Region:……..	Middle East and North Africa	Number:	2
Province:……..	Sirte Basin	Number:	2043
Priority or Boutique……	Priority		
Total Petroleum System:……	Sirte-Zelten	Number:	204301
Assessment Unit:……..	Offshore Sirte Hypothetical	Number:	20430103
* Notes from Assessor			

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: 0 Gas: 0
Established (>13 fields) _____ Frontier (1-13 fields) _____ Hypothetical (no fields) X

Median size (grown) of discovered oil fields (mmboe):
1st 3rd _____ 2nd 3rd _____ 3rd 3rd _____
Median size (grown) of discovered gas fields (bcfg):
1st 3rd _____ 2nd 3rd _____ 3rd 3rd _____

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……	0.8
3. **TIMING OF GEOLOGIC EVENTS:** Favorable timing for an undiscovered field ≥ minimum size	0.6

Assessment-Unit GEOLOGIC Probability (Product of 1, 2, and 3):…….. 0.48

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)	5	median no.	15	max no.	25
Gas fields:……min. no. (>0)	5	median no.	15	max no.	25

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	30	max. size	1000
Gas in gas fields (bcfg):…… min. size	60	median size	180	max. size	6000

Assessment Unit (name, no.)
Offshore Sirte Hypothetical, 20430103

AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS

(uncertainty of fixed but unknown values)

Oil Fields:	minimum	median	maximum
Gas/oil ratio (cfg/bo)……	2000	5000	8000
NGL/gas ratio (bngl/mmcfg)……	50	60	70

Gas fields:	minimum	median	maximum
Liquids/gas ratio (bngl/mmcfg)……	20	30	40
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)……	30	40	55
Sulfur content of oil (%)……	0.05	0.25	0.75
Drilling Depth (m) ……	2000	3500	5000
Depth (m) of water (if applicable)……	300	1000	2000

Gas Fields:	minimum	median	maximum
Inert gas content (%)……			
CO_2 content (%)……			
Hydrogen-sulfide content (%)……			
Drilling Depth (m)……	2000	3500	5000
Depth (m) of water (if applicable)……	300	1000	2000

Assessment Unit (name, no.)
Offshore Sirte Hypothetical, 20430103

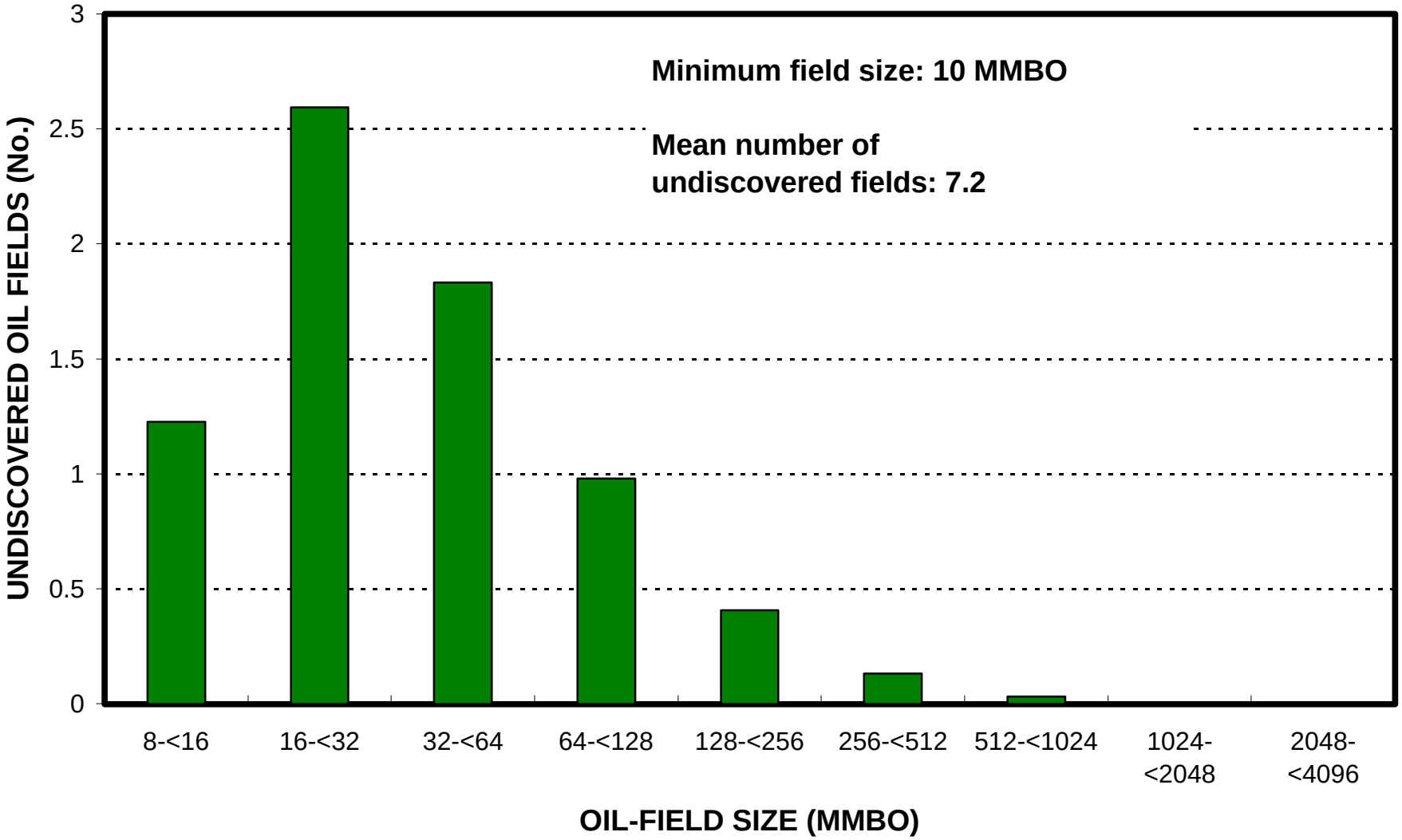
ALLOCATION OF UNDISCOVERED RESOURCES IN THE ASSESSMENT UNIT TO COUNTRIES OR OTHER LAND PARCELS (uncertainty of fixed but unknown values)

1. Libya represents 100 areal % of the total assessment unit

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

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

Offshore Sirte Hypothetical, AU 20430103
Undiscovered Field-Size Distribution



Offshore Sirte Hypothetical, AU 20430103
Undiscovered Field-Size Distribution