

UNITED STATES DEPARTMENT OF THE INTERIOR
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Assessment of conventionally recoverable petroleum resources of
southeastern Mexico, northern Guatemala, and Belize

by

Charles D. Masters and James A. Peterson

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This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.

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PREFACE

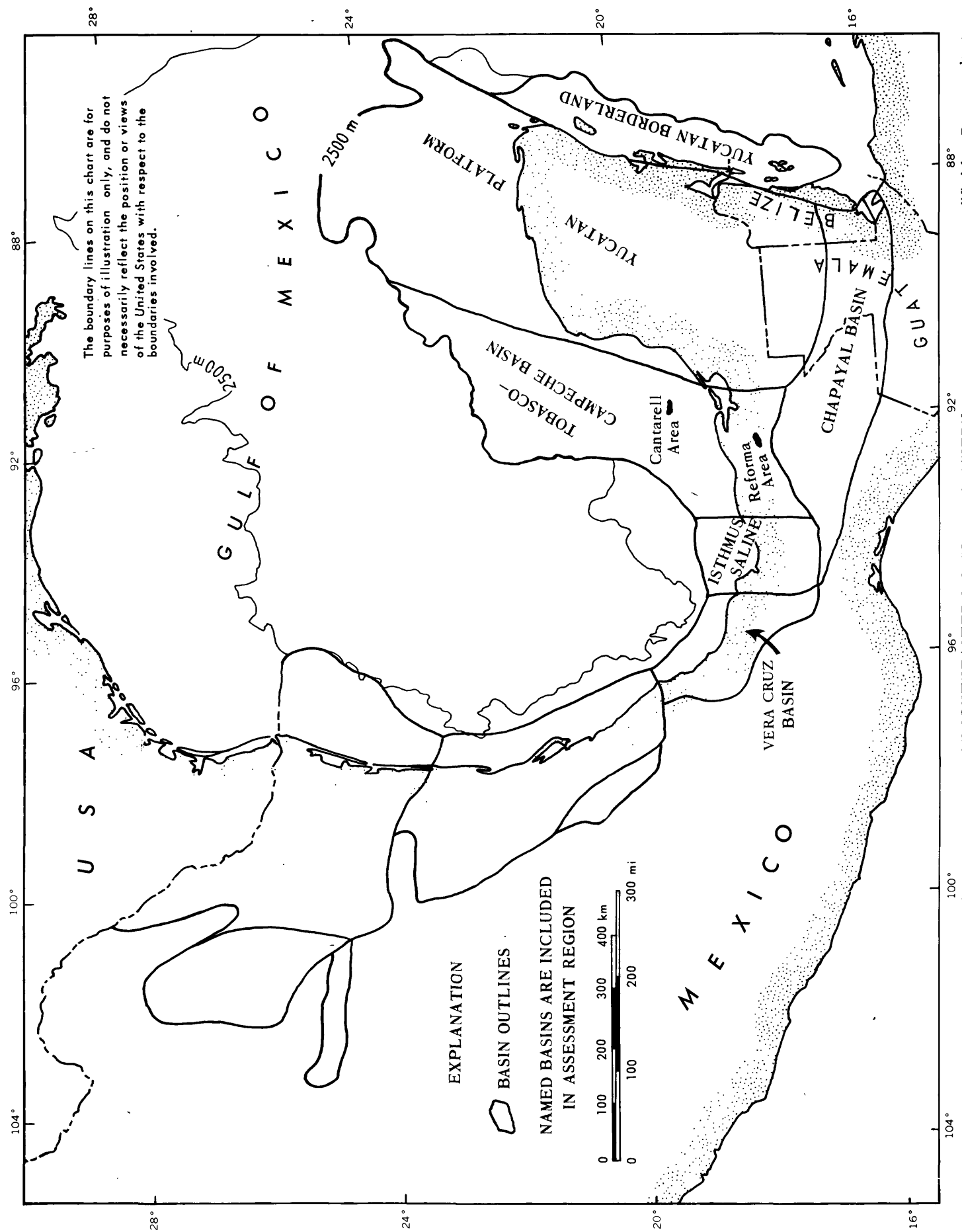
The following preliminary report is a product of the World Energy Resources Program of the U.S. Geological Survey (USGS). The program is designed to prepare geologically based resource assessments of the potential petroleum basins of the world. Initial investigations of the program focus on the major petroleum-producing regions of the world with the objective of acquiring a critical, unbiased perspective on the resource potential of a field, a basin, and ultimately a country as a whole. In selected areas, follow-on studies to analyze production potential are conducted by U.S. Department of Energy (DOE) petroleum engineers, and the combined results are incorporated in a report for the Foreign Energy Supply Assessment Program (FESAP) of the DOE and the USGS. This USGS Open-File report includes only the preliminary assessment and some minimal backup data and comments relevant to the assessment.

INTRODUCTION

The locations of the southeastern Mexico, northern Guatemala, and Belize basins are shown in figure 1. Unconditional estimates by the USGS of oil and gas resources in these basins are given in table 1 and figures 2 and 3. Data supporting these estimates are supplied in table 2.

ACKNOWLEDGEMENT

The resource assessment for this report was prepared under the guidance of the Resource Appraisal Group of the Branch of Oil and Gas Resources. The geologic investigation leading to the assessment was conducted by James A. Peterson.



Sources: modified from Petroconsultants
& from USGS MF-1044A (1978).

Fig. 1. LOCATION OF SOUTHEASTERN MEXICO, NORTHERN GUATEMALA, AND BELIZE ASSESSMENT REGION

Table 1.--Assessment of conventionally recoverable petroleum resources of southeastern Mexico, northern Guatemala, and Belize, including the following basins: Vera Cruz, Isthmus Saline, Tobasco-Campeche, Chapayal, Yucatan Platform, and Yucatan Borderland

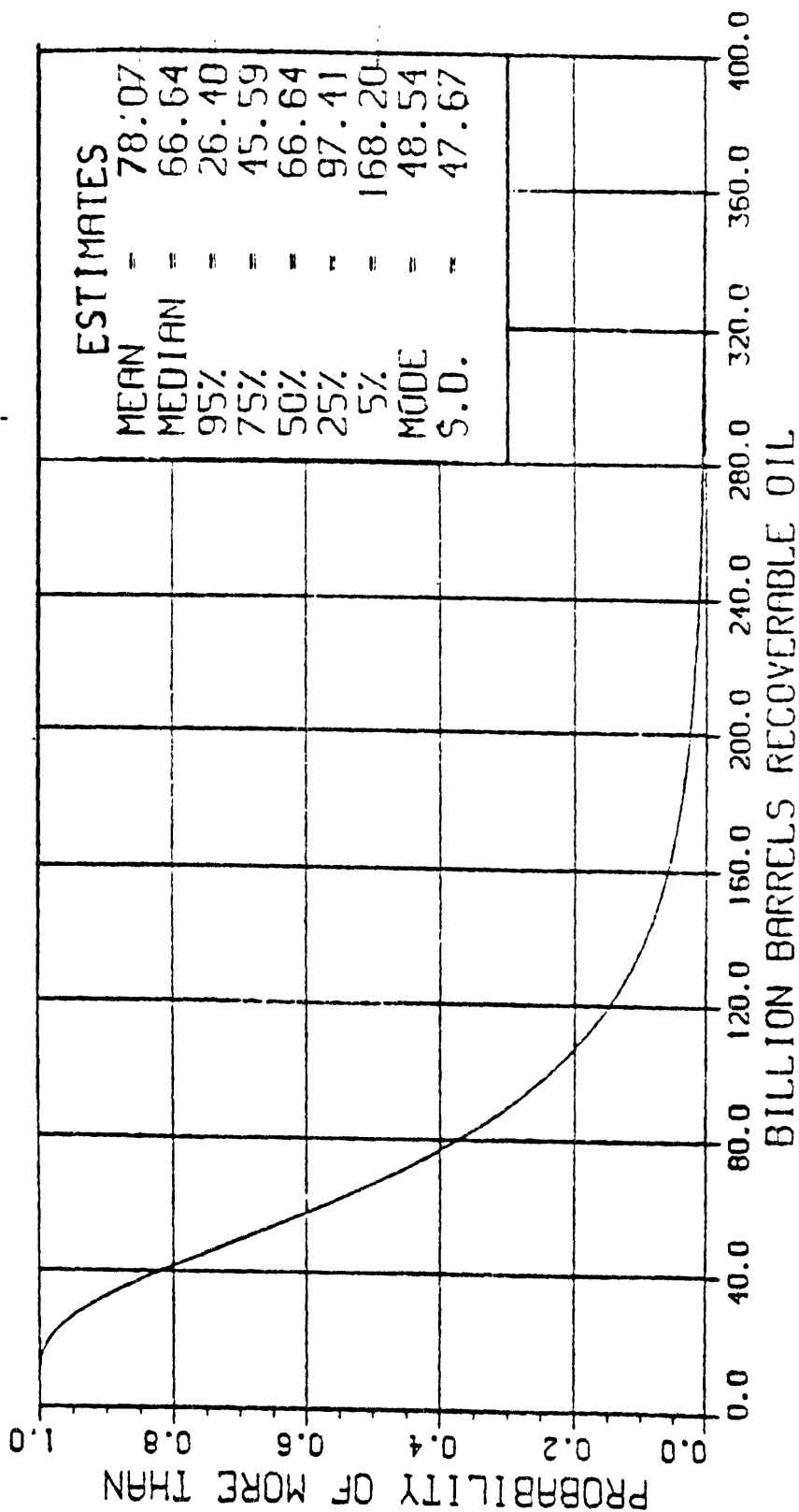
Unconditional resource assessment by USGS as of 4/3/81; see also figures 2 and 3.

Probability of occurrence in %	Crude Oil in Billions of Barrels (BB)			Natural Gas in Trillions of Cubic Feet (Tcf) and Billions of Barrels of Oil Equiv- alent (BBOE) @ 6,000 cuft/bbl. ^{1/}		
	<u>95%</u>	<u>5%</u>	<u>Mean</u>	<u>95%</u>	<u>5%</u>	<u>Mean</u>
=====						
Estimate	26	168	78	Tcf 42	254	120
				BBOE 7	42	20

^{1/} PEMEX commonly reports BOE at 5,000 cuft/bbl, but the 6,000:1 conversion is used here for comparability with other assessments made by USGS.

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Figure 2.-- S.E. Mexico, northern Guatemala, and Belize recoverable oil Assessment date: 4/3/81



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Figure 3.--S.E. MEXICO, GUATEMALA, AND BELIZE TOTAL RECOVERABLE GAS

Assessment date: 4/3/81

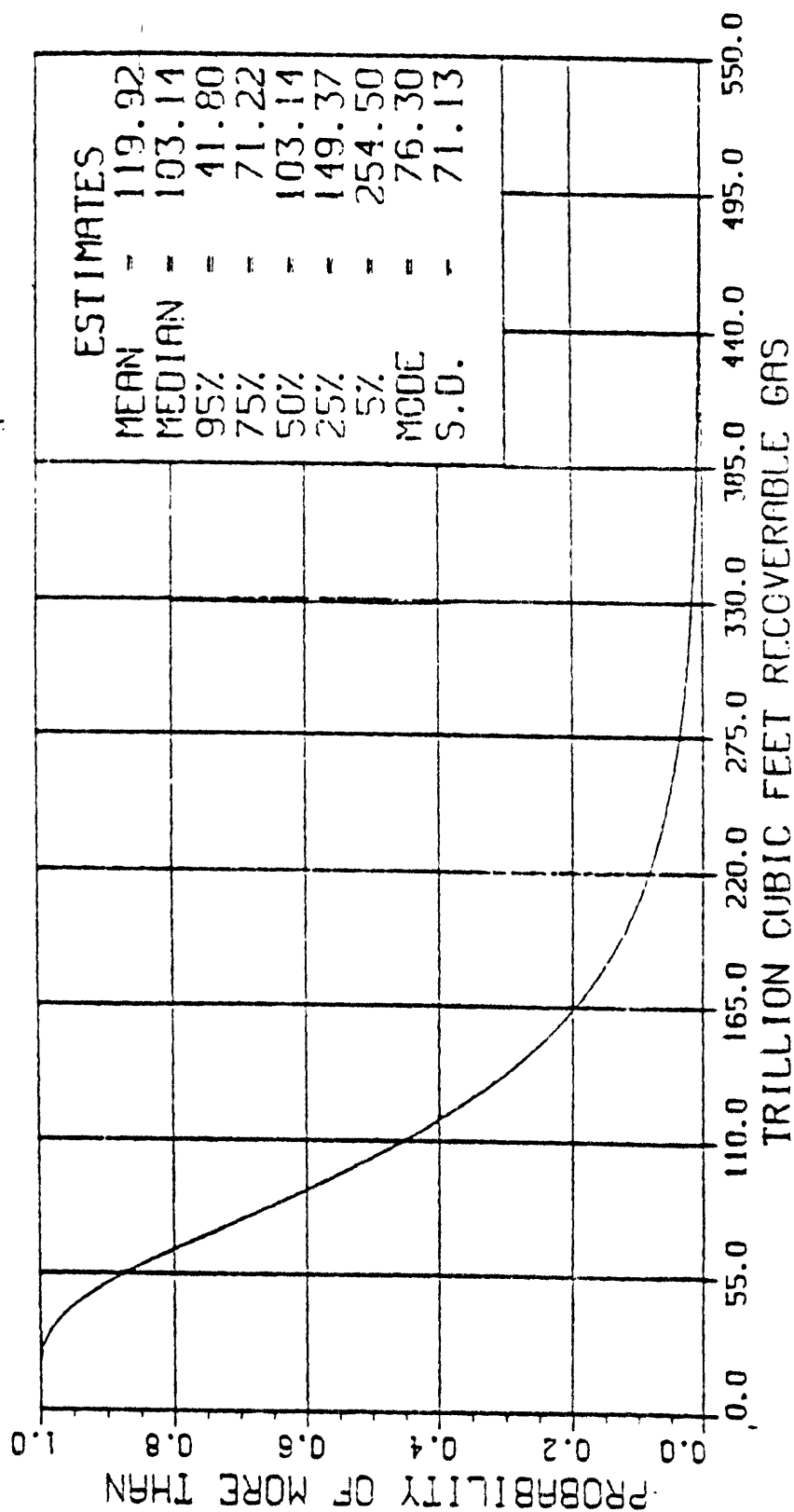


Table 2.--Supplementary and comparative data supporting this resource assessment for southeastern Mexico, northern Guatemala, and Belize^{1/}

Crude Oil (BB)		Natural Gas (Tcf)
1. Cumulative production to 1/1/80		
5		8
2. Identified reserves to 1/1/80 ^{2/}		
Demonstrated	27	45
Inferred	<u>26</u>	<u>20</u>
	53	65
		BBOE 11
3. Original recoverable resources (ultimate) of assessment area		
Cumulative	5	8
Identified reserves	56 ^{3/}	65
Undiscovered		
resources (mean)	<u>78</u>	<u>120</u>
	139	193
		BBOE 32
Total - 171 BBOE		

^{1/} Cumulative production and reserves are composited estimates from various sources.

^{2/} Follows terminology outlined in USGS Circular 831. Demonstrated is equivalent to API Proved and Indicated Additional. Inferred represents anticipated field growth in existing fields.

^{3/} Includes 3 BB natural-gas liquids.

COMMENTS

- o Area assessed includes only a part of Mexico. It does include the presumed major oil resource potential areas of Mexico in the Tobasco Campeche Basin--the Reforma (onshore) and Cantarell (offshore) areas; it does not include major potential gas basins of northeastern Mexico - Burgos, Sabinas, and Parras.
- o Reforma/Cantarell reservoirs are fractured in part by salt movement; apparently salt movement is necessary for effective reservoir fracturing.
- o Production between Reforma and Cantarell is limited by a deep trough that places potential source rock below oil or gas generation levels. An uplifted structural block is, however, inferred in the area which is part of the exploration potential.
- o North of Cantarell, production is limited by 1) loss of fracturing enhanced by salt movement, 2) loss of seal (Tertiary deltaic sands and shales derived from the south), and 3) possible flushing from the Yucatan high to Cretaceous and Jurassic outcrops on the sea floor.
- o The unverified presence or absence of the Ixchel well north of Cantarell still clouds the assessment of the North Yucatan area. This assessment assumes the well does not exist.
- o Guatemala appears to be located over a back-reef facies, which is not likely to contain major resources. Inferences of reef development, however, lend some low-probability encouragement. Recent discoveries in the area bear watching.
- o An overthrust play in the Vera Cruz region is attractive but occurs at great depth.
- o Oil occurrence and entrapment result from a combination of many factors, each of which has unique areal limits; therefore resources cannot reasonably be estimated by counting structures and assuming a percentage of discoveries.
- o Principal plays in the area are:
 - a. Structures immediately northwest and southwest of Cantarell, including a possible horst block high in the syncline between Cantarell and Reforma
 - b. Reforma step outs
 - c. Possible reef area in Guatemala
 - d. Thrust play in Vera Cruz
 - e. Stratigraphic play seaward and against the escarpment
 - f. Sediment troughs in offshore salt
- o Calculations of the volume of total sediments (320,000 mi³) include the large nonprospective Yucatan section.