UNITED STATES DEPARTMENT OF THE INTERIOR
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Assessment of undiscovered conventionally recoverable petroleum resources of the East Siberian basin, U.S.S.R.

by

James W. Clarke

Open-File Report 82-1027

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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ASSESSMENT OF ENERGY RESOURCES

This report was prepared as part of the World Energy Resources Program of the U.S. Geological Survey (USGS). The objective of the study is to assess the undiscovered conventionally recoverable resources remaining within the petroleum producing province. The study utilizes geological and petroleum engineering data, in conjunction with statistical techniques, to estimate undiscovered resources by a process involving a team of geologists and statisticians. The estimates represent the view of the U.S. Geological Survey estimation team and should not be regarded as an official position of the U.S. Department of the Interior.

Other U.S. Geological Survey publications relating to the assessment of undiscovered conventionally recoverable petroleum resources cover the following:

USGS Open-File Report 081-986 - Persian Gulf basin and Zagros fold belt (Arabian-Iranian basin)
81-1027 - Volga-Urals basin
81-1142 - Indonesia
81-1143 - Northeastern Mexico
81-1144 - Southeastern Mexico, northern Guatemala, and Belize
81-1145 - Trinidad
81-1146 - Venezuela
81-1147 - West Siberian basin and Kara Sea basin, U.S.S.R.
82-0296 - Middle Caspian basin, U.S.S.R.

INTRODUCTION

The location of the East Siberian basin is shown in figure 1. The two oil-gas provinces of the basin, the Lena-Tunguska and the Khatanga-Vilyuy, are shown in figure 2, as are also the locations of the 29 known fields. Table 1 lists estimates by the USGS of oil and gas resources for the two provinces separately and for the basin as a whole. Figures 3-8 are computer generated graphs showing the probability of occurrence relative to specific amounts of oil and gas resources.

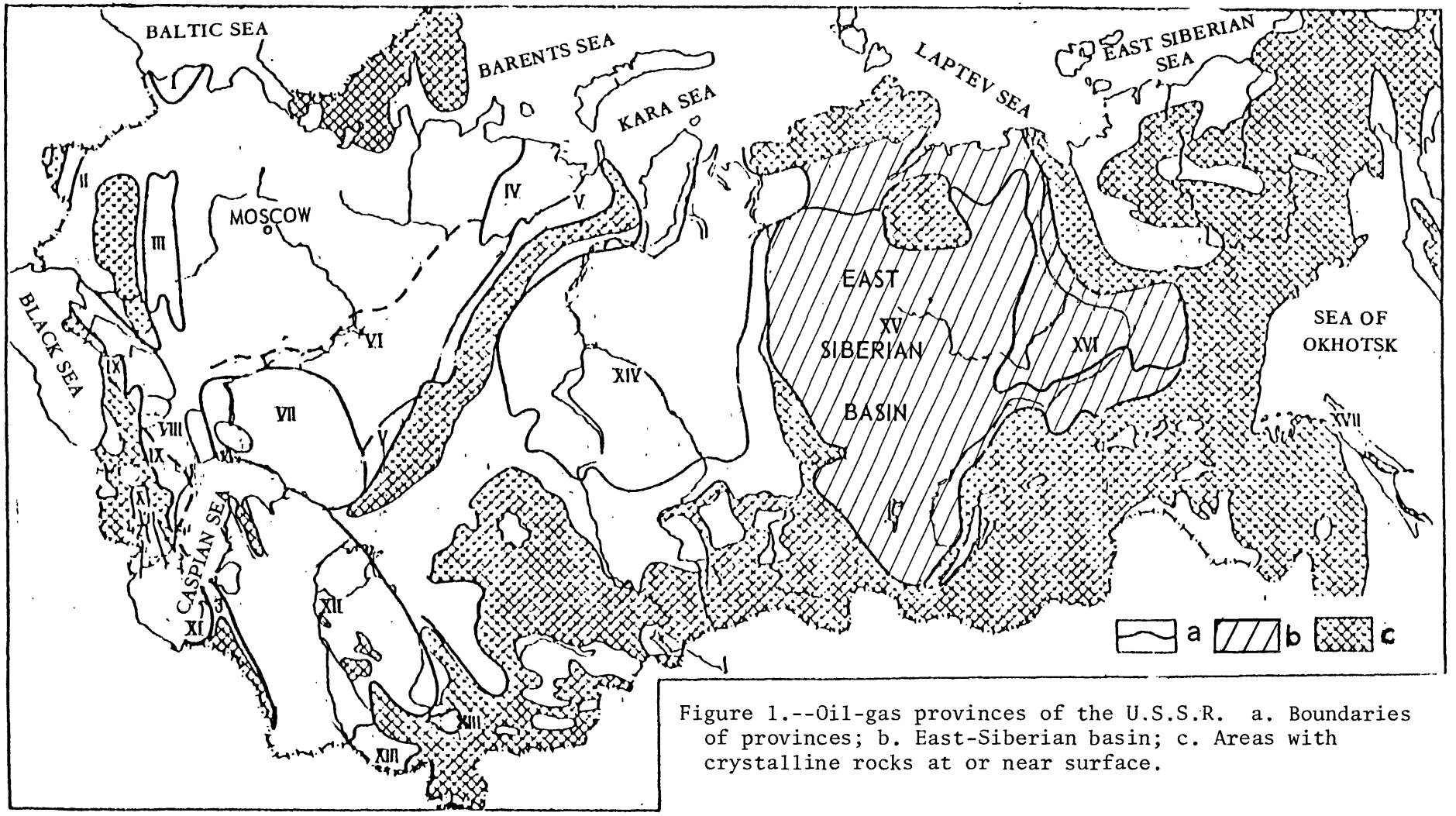


Figure 1.--Oil-gas provinces of the U.S.S.R. a. Boundaries of provinces; b. East-Siberian basin; c. Areas with crystalline rocks at or near surface.

I - Baltic
II - Cis-Carpathian
III - Dnieper-Donets
IV - Timan-Pechora
V - Cis-Ural
VI - Volga-Ural
VII - Peri-Caspian
VIII - Cis-Caucasus-Crimea
IX - North Caucasus
X - Trans-Caucasus
XI - West Turkmen
XII - Turan
XIII - Tyan-Shan-Pamir
XIV - West Siberia
XV - Lena-Tunguska } this report
XVI - Khatanga-Vilyuy }
XVII - Sakhalin

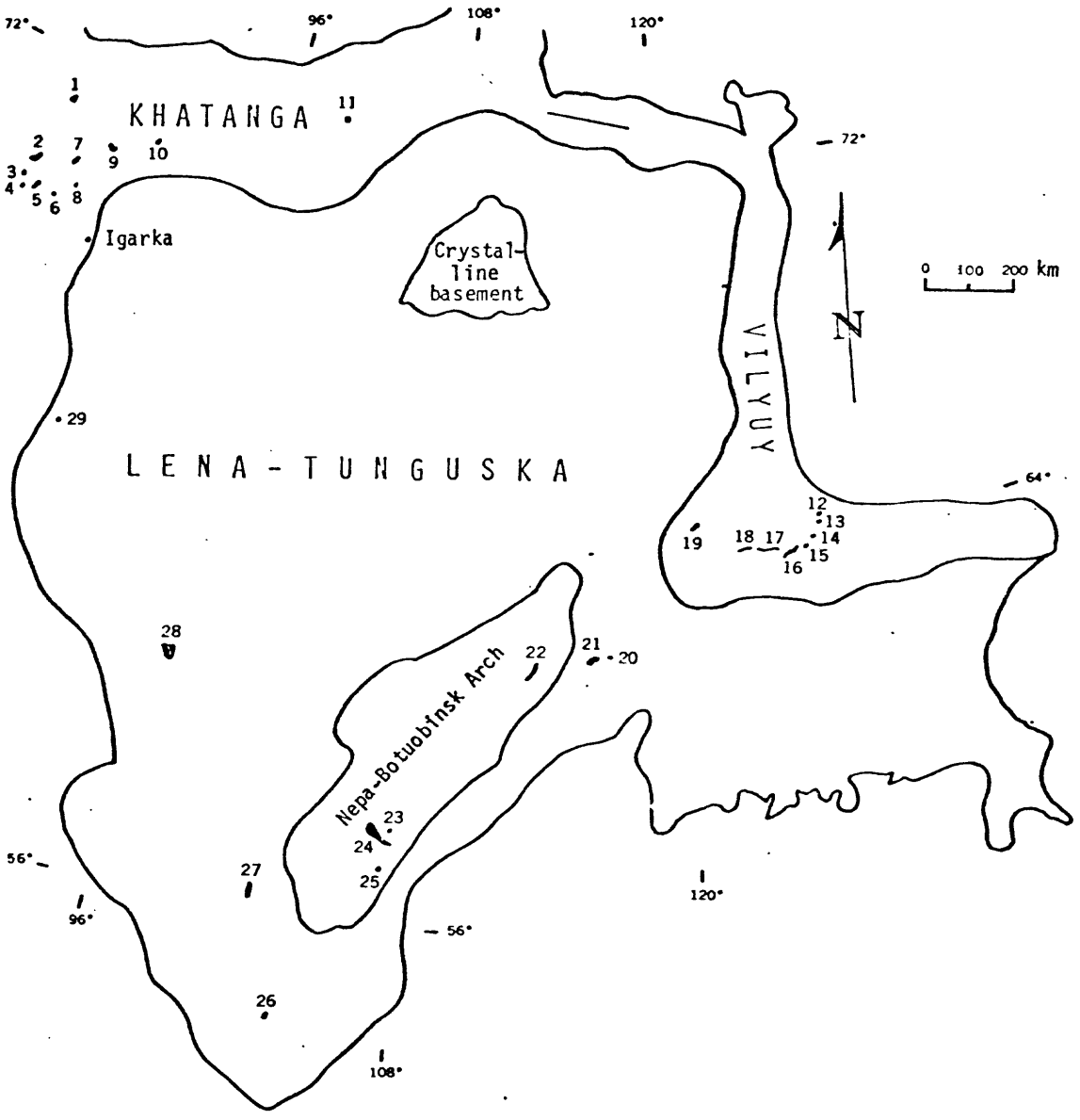


Figure 2.--Oil-gas provinces and fields of the East Siberian platform.

1 - Deryabin
2 - Pelyatkin
3 - Severo-Solenin
4 - Yuzhno-Solenin
5 - Messoyakh
6 - Zimneye
7 - Kazantsev
8 - Nizhnekhet
9 - Ozer
10 - Dzhangod
11 - Balakhnin
12 - Sobo-Khain
13 - Ust-Vilyuy
14 - Nizhnevilyuy
15 - Badaran
16 - Sobolokh-Nedzhelin
17 - Tolon-Mastakh
18 - Srednevilyuy
19 - Srednetyung
20 - Vilyuysko-Dzherbin
21 - Verkhnevilyuchan
22 - Srednebotuobinsk
23 - Ayan
24 - Yaraktino
25 - Markovo
26 - Atov
27 - Brat
28 - Kuyumba
29 - Podkamen

Table 1.--Assessment of undiscovered conventionally recoverable petroleum resources of the East Siberian basin, U.S.S.R.

[Resource assessment by USGS as of 7/30/82; see also figures 3, 4, 5, 6, 7, and 8.]

Region	Crude oil in billions of barrels (BB)				Natural gas in trillions of cubic feet (Tcf) and billions of barrels of oil equivalent (BBOE) @ 6,000 cuft/bbl.		
	Low (F_{95})[1/]	High (F_5)[1/]	Mean		Low (F_{95})[1/]	High (F_5)[1/]	Mean
Lena-Tunguska basin	1.2	11.3	5.1	Tcf	24.0	188.8	89.0
Vilyuy basin	0.0	5.6	2.2	Tcf	20.8	141.7	69.2
Total for East Siberia [2/]	2.2	14.6	7.3	Tcf	71.8	278.1	158.3
				BBOE	12.0	46.4	26.4

[1/] F_{95} denotes the 95th fractile; the probability of more than the amount F_{95} is 95 percent. F_5 is defined similarly.

[2/] Totals are derived by statistical aggregation; only the mean total equals the sum of the component parts.

Figure 3.--East Siberia - Lena-Tunguska basin undiscovered recoverable oil. Assessment date - 7/30/82

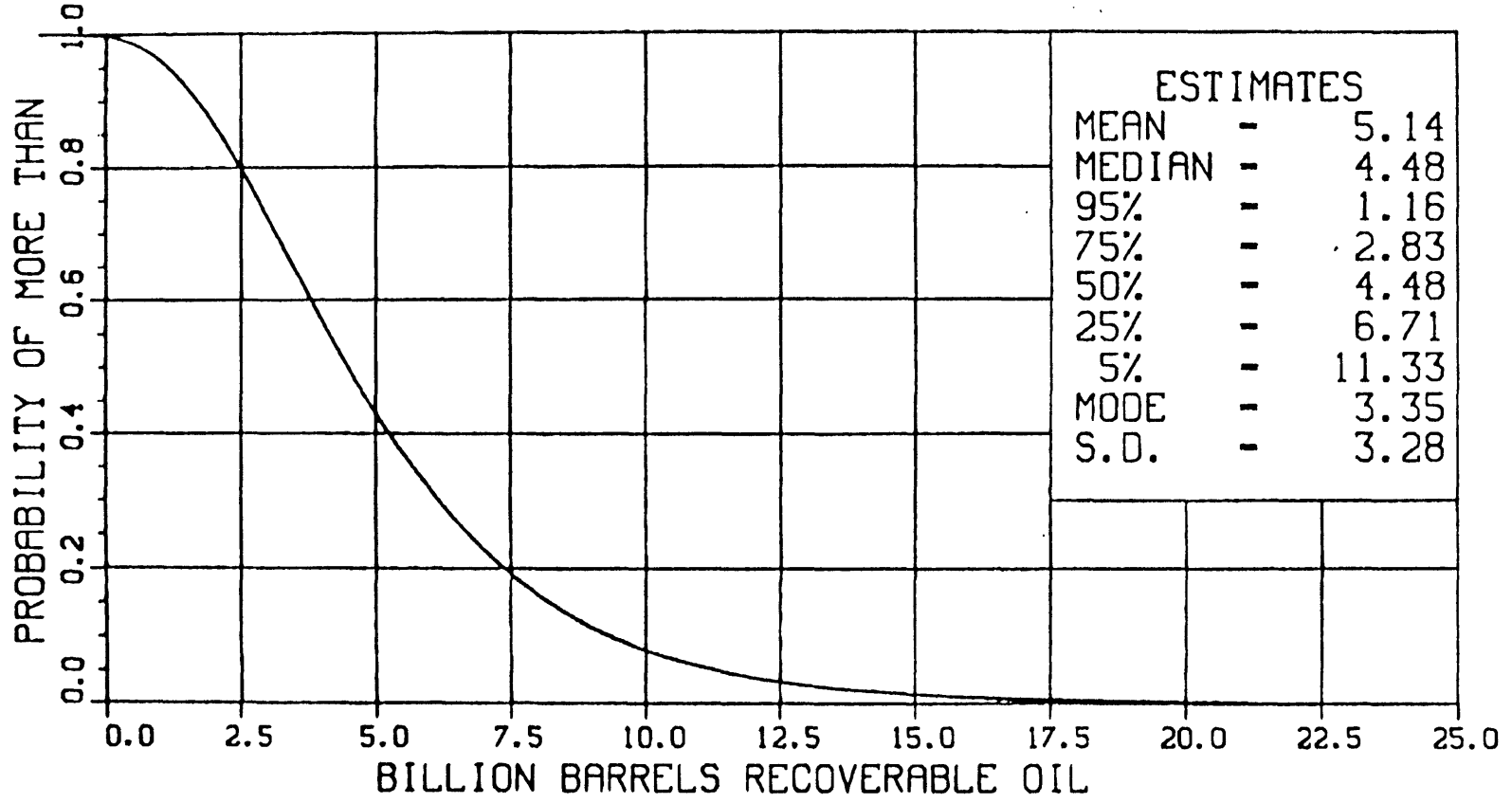


Figure 4.--East Siberia - Lena-Tunguska basin undiscovered recoverable total gas. Assessment date - 7/30/82

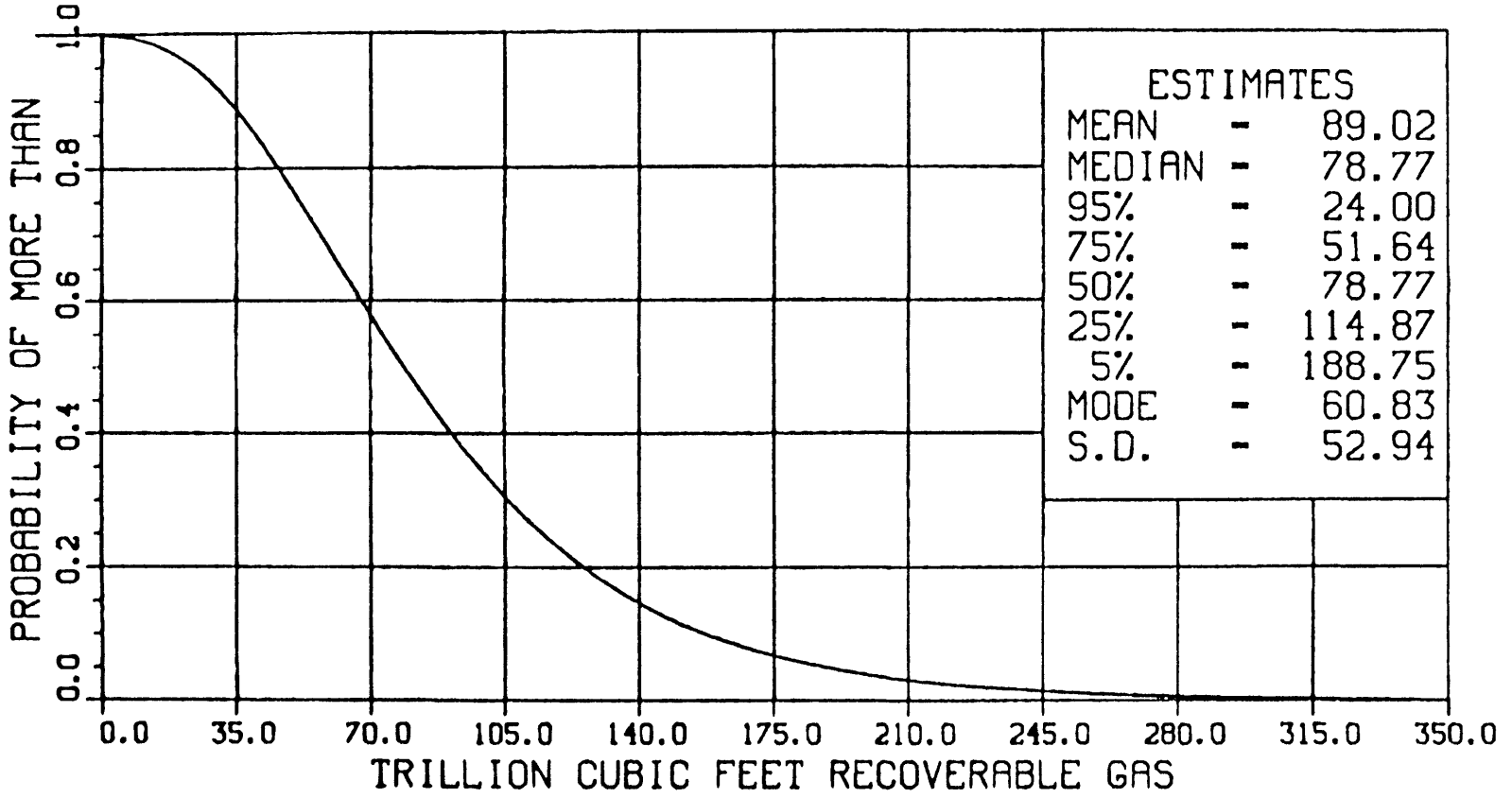
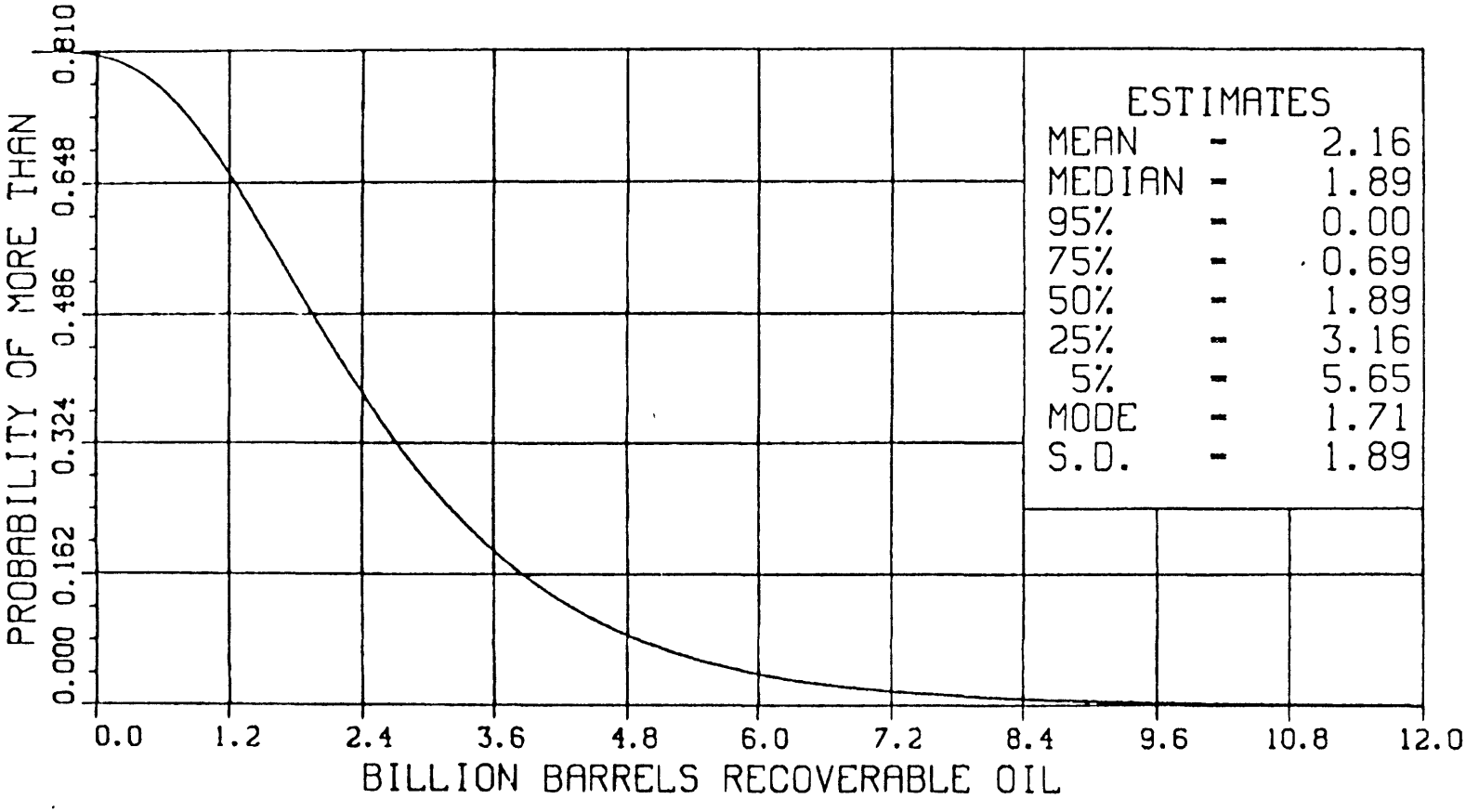


Figure 5.--East Siberia - Vilyuy basin undiscovered recoverable oil. Assessment date - 7/30/82



Note that no commercial oil has as yet been discovered in the Vilyuy basin; the marginal probability of commercial occurrence is .81.

Figure 6.--East Siberia - Vilyuy basin undiscovered recoverable total gas. Assessment date - 7/30/82

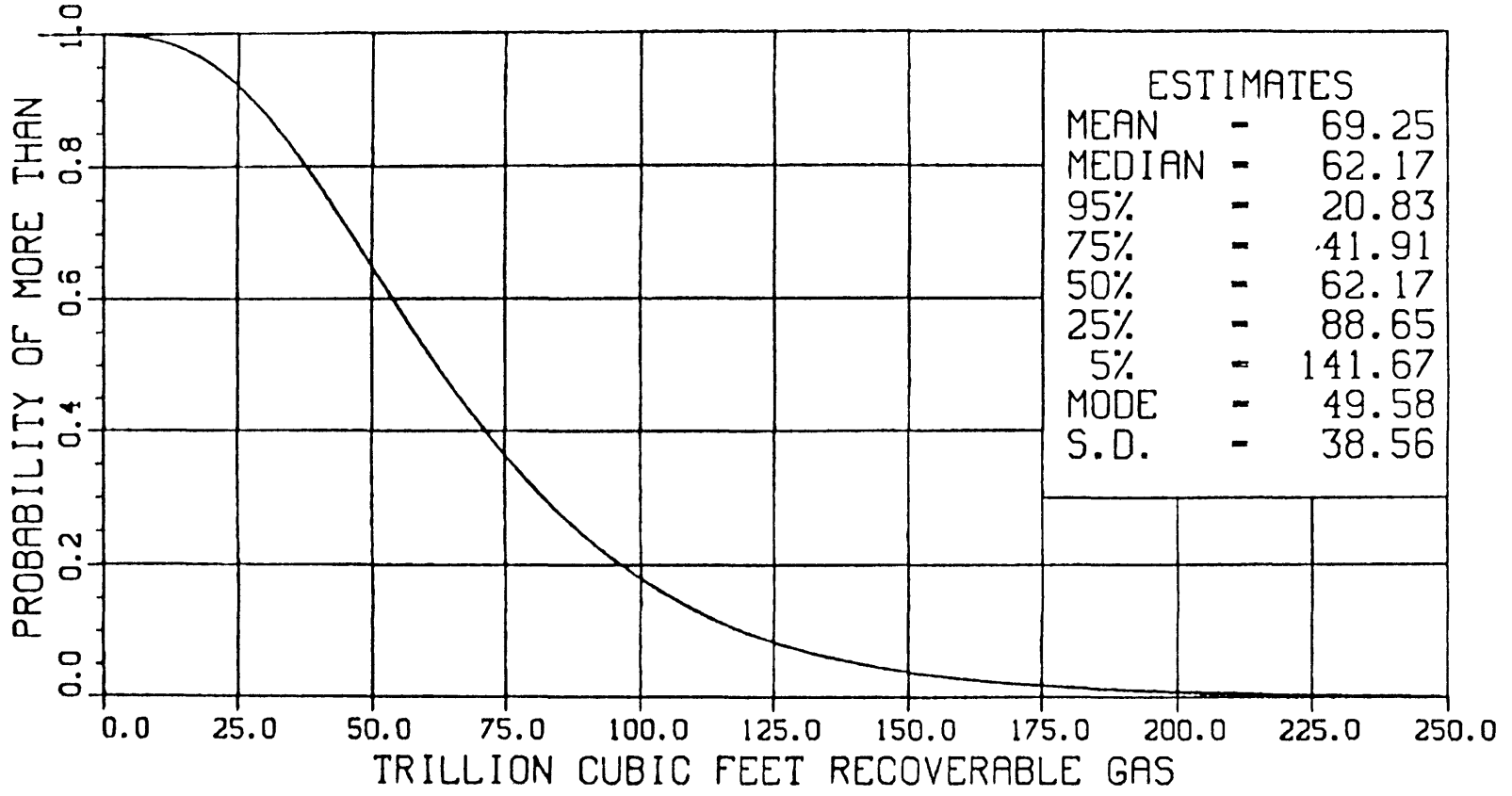


Figure 7.--East Siberia undiscovered total recoverable oil. Assessment date - 7/30/82

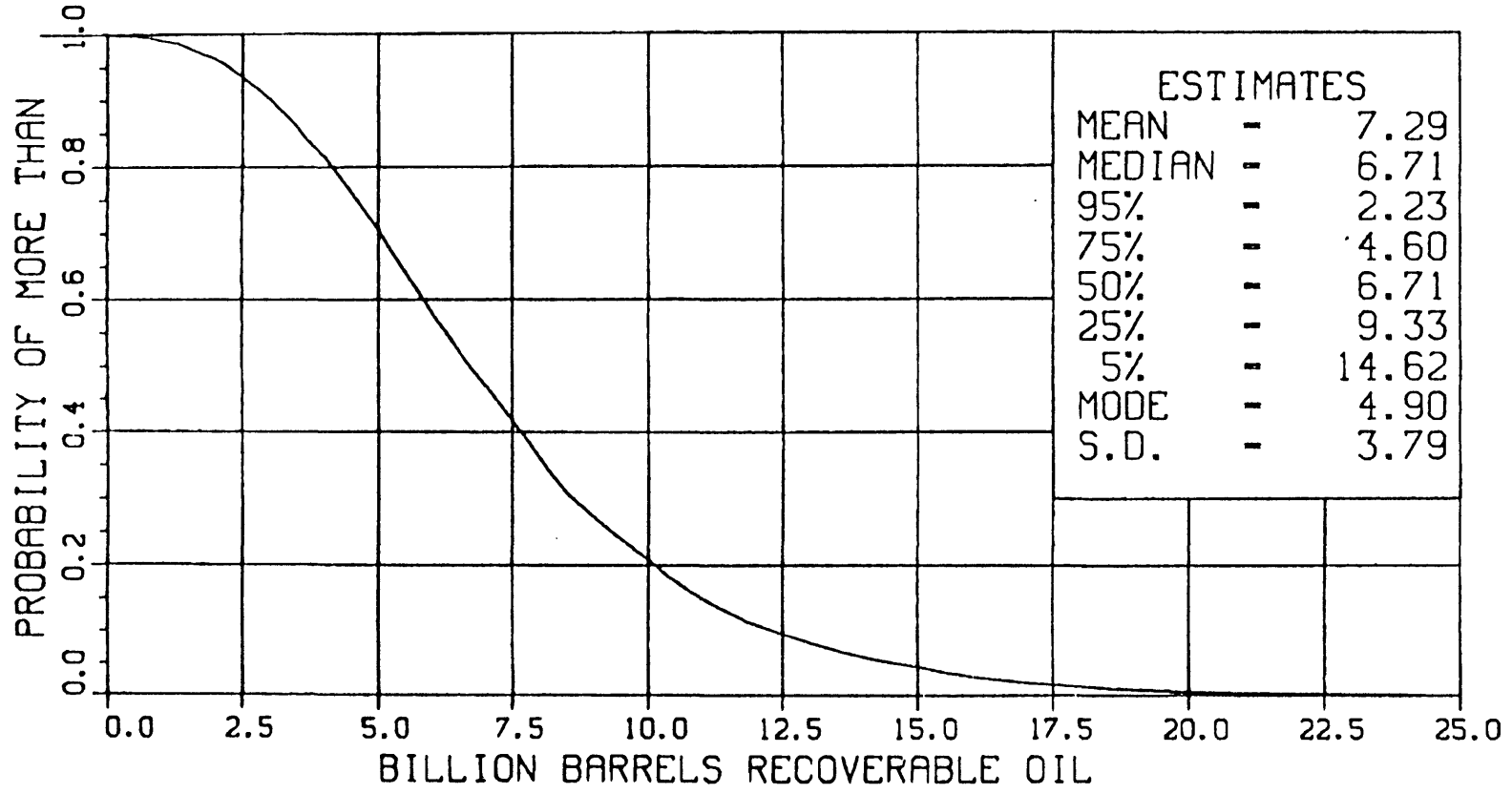
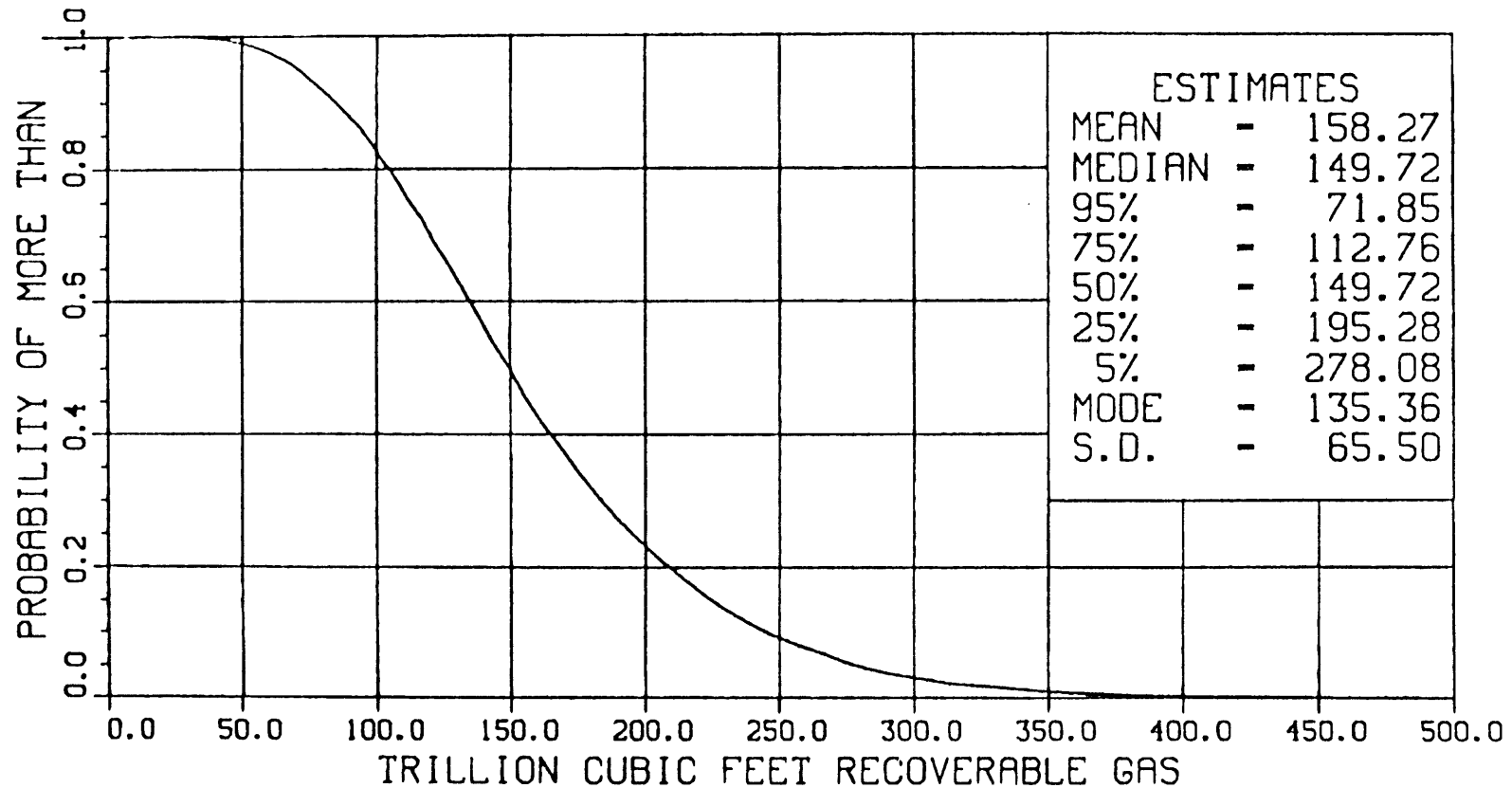


Figure 8.--East Siberia undiscovered total recoverable gas. Assessment date - 7/30/82



RESERVES

Construction of the facilities for transporting East Siberian gas to the Pacific coast for export to Japan and the United States was contingent on verifying 35 Tcf of natural gas. This goal is estimated to have been 90 percent completed, that is, 32 Tcf is proved. Negotiations on the project have been held in abeyance since the spring of 1980.

Gas-hydrate deposits associated with permafrost in the Lena-Vilyuy province are estimated to contain 27 Tcf of possibly recoverable gas. These hydrate deposits are not included in the present assessment.

COMMENTS

- Total favorable area for oil and gas of East Siberia is 3,230,000 km^2.
- The region is in the early stages of exploration. Drilling density is only one well per 3,200 km^2. This distribution itself is uneven, drilling having been concentrated in those areas where discoveries had already been made.
- The assessment does not include huge bitumen deposits in the eastern part of the Lena-Tunguska province, which account for half the bitumen deposits of the U.S.S.R.
- The Khatanga portion of the Khatanga-Vilyuy province was not included with the assessment because it is an extension of the West Siberian basin and was included in that assessment.
- No significant amounts of gas or oil have been produced in the basin.
- Most discoveries have been gas; however, several fields have oil rings.
- The pools in the Lena-Tunguska province are largely in stratigraphic traps in Proterozoic-Cambrian clastic sediments sealed by Cambrian salt. Source beds seem to be Proterozoic.
- The pools in the Vilyuy province are on anticlines in Triassic and Jurassic clastic sediments. Source beds are Permian carbonaceous shales and are gas prone.
- Abundant published Soviet literature (as recent as 1982) reporting on geophysical, geochemical, and geological surveys provide a good data base for evaluating the hydrocarbon potential of the region.