

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Assessment of undiscovered conventionally recoverable petroleum resources
of the Timan-Pechora basin, U.S.S.R., and Barents-northern Kara shelf

By

Gregory F. Ulmishek
U.S. Department of Energy
Argonne National Laboratory
Argonne, Illinois 60439

Open-File Report 82-1057

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

1982

Assessment of undiscovered conventionally recoverable petroleum resources of the Timan-Pechora basin, U.S.S.R., and Barents-northern Kara shelf

By

Gregory F. Ulmishek
U.S. Department of Energy
Argonne National Laboratory
Argonne, Illinois 60439

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 provinces. 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 views of the U.S. Geological Survey estimation team and should not be regarded as an official Department of the Interior position.

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

Open-File Reports	81-0986	- Persian Gulf basin and Zagros fold belt (Arabian-Iranian basin)
	81-1027	- Volga-Ural 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 and Kara Sea basins
	82-0296	- Middle Caspian basin
	82-1027	- East Siberian basin, U.S.S.R.
	82-1056	- North Africa

ACKNOWLEDGEMENTS

The resource assessment for this report was prepared in collaboration with the Resource Appraisal Group of the Branch of Oil and Gas Resources. The geologic investigation leading to the assessment was conducted by Gregory F. Ulmishek under contract to the U.S. Geological Survey.

INTRODUCTION

The location of the Timan-Pechora basin and its fields is shown in figures 1 and 2. Figure 3 shows the assessment area of the Barents-northern Kara shelf. Estimates by the USGS of oil and gas resources in these regions are given in table 1 and figures 4 and 5. Data supplementary to these estimates are supplied in table 2.

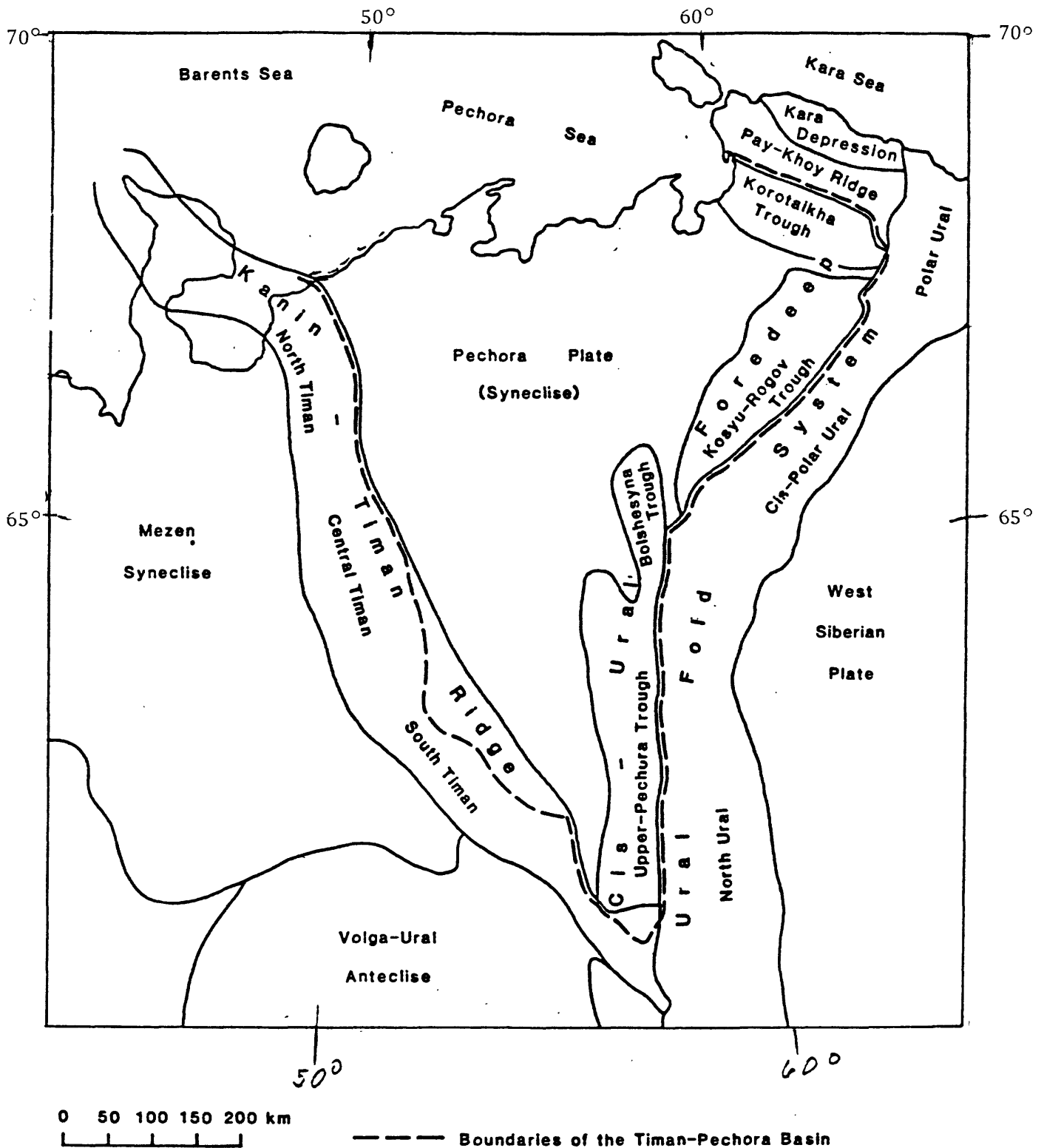


Figure 1.--Location map of the Timan-Pechora basin

Area in $\text{mi}^2 = 126,000$

Volume of sediments in $\text{mi}^3 = 378,000$

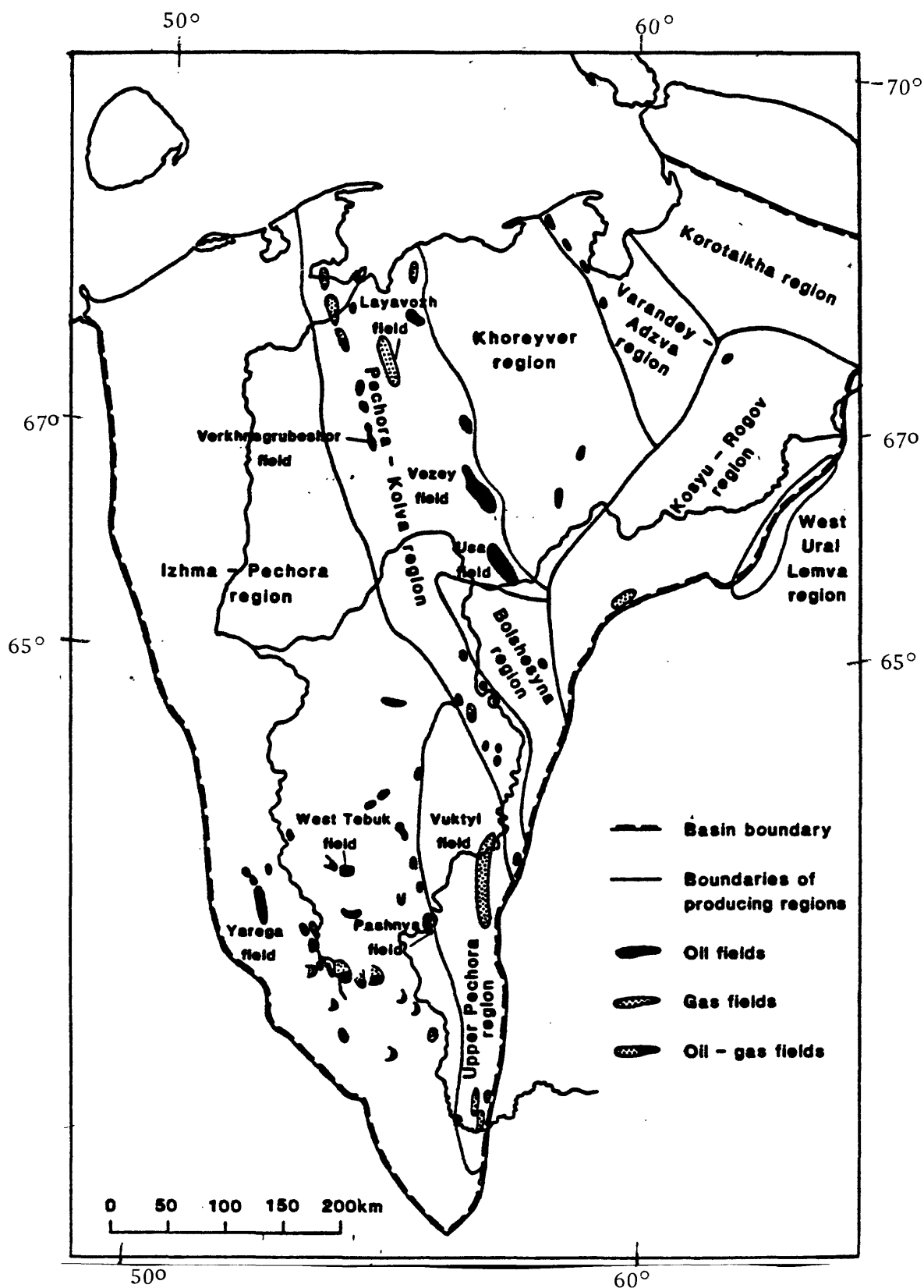


Figure 2.--Oil and gas fields of the Timan-Pechora basin

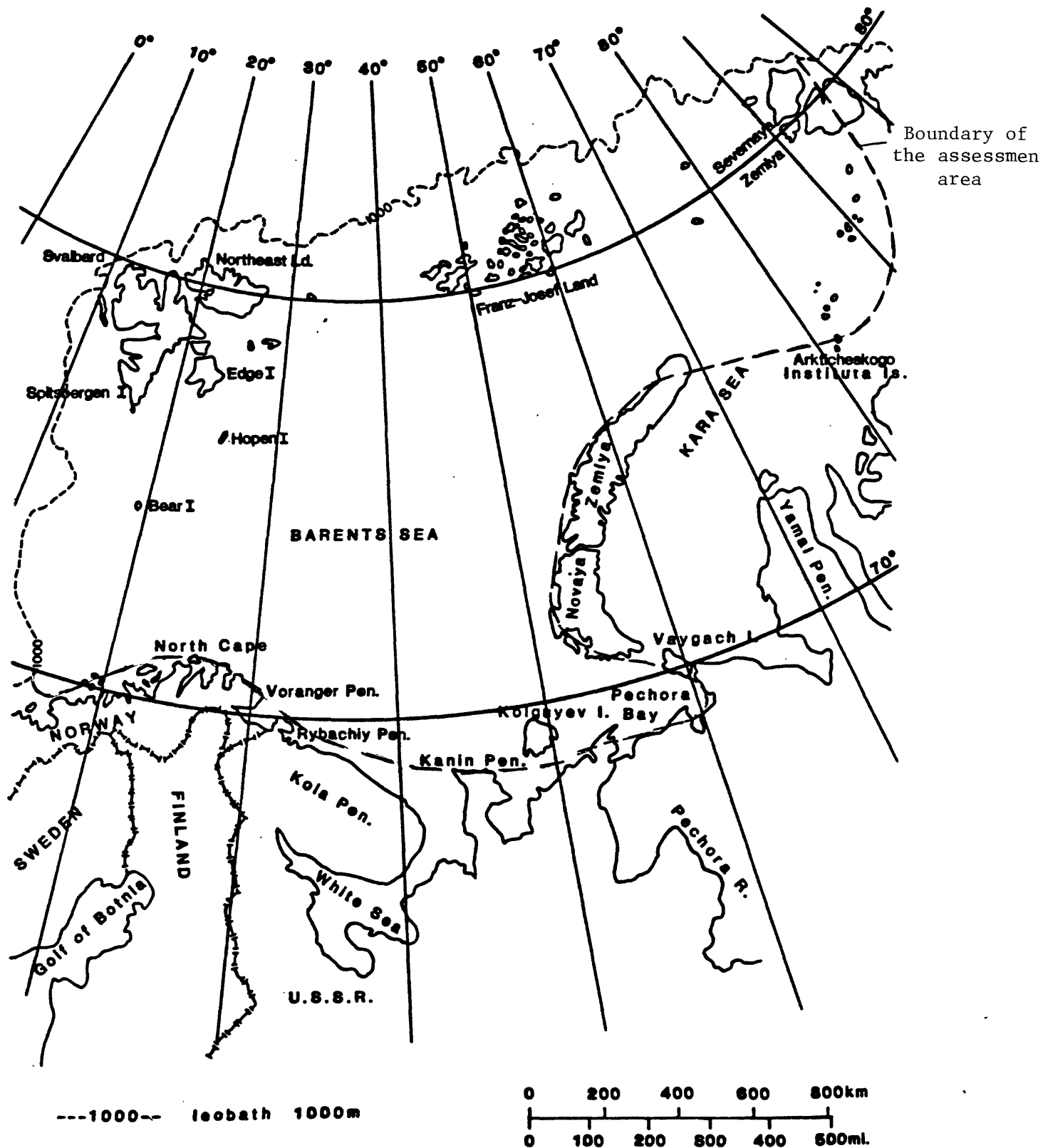


Figure 3.--Assessment area of the Barents-northern Kara shelf from shoreline to the 1,000-m isobath
 Area in $\text{mi}^2 = 957,000$
 Volume of sediments in $\text{mi}^3 = 2,560,000$

Table 1.--Assessment of undiscovered conventionally recoverable petroleum resources of the Timan-Pechora basin, U.S.S.R., and Barents-northern Kara shelf.

Resource assessment by USGS as of 03/12/82; see also figures 4 and 5.

	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 cu ft/bbl.		
	$\frac{\text{Low}}{\text{F}_{95}} \frac{1}{-}$	$\frac{\text{High}}{\text{F}_5} \frac{1}{-}$	<u>Mean</u>		$\frac{\text{Low}}{\text{F}_{95}} \frac{1}{-}$	$\frac{\text{High}}{\text{F}_5} \frac{1}{-}$	<u>Mean</u>
Estimate	7.8	58.2	28.8	Tcf	179.1	498.1	325.2
				BBOE	29.8	83.0	54.2

^{1/} F₉₅ denotes the 95th fractile; the probability of more than the amount F₉₅ is 95 percent. F₅ is defined similarly.

Assessment date: 03/12/82

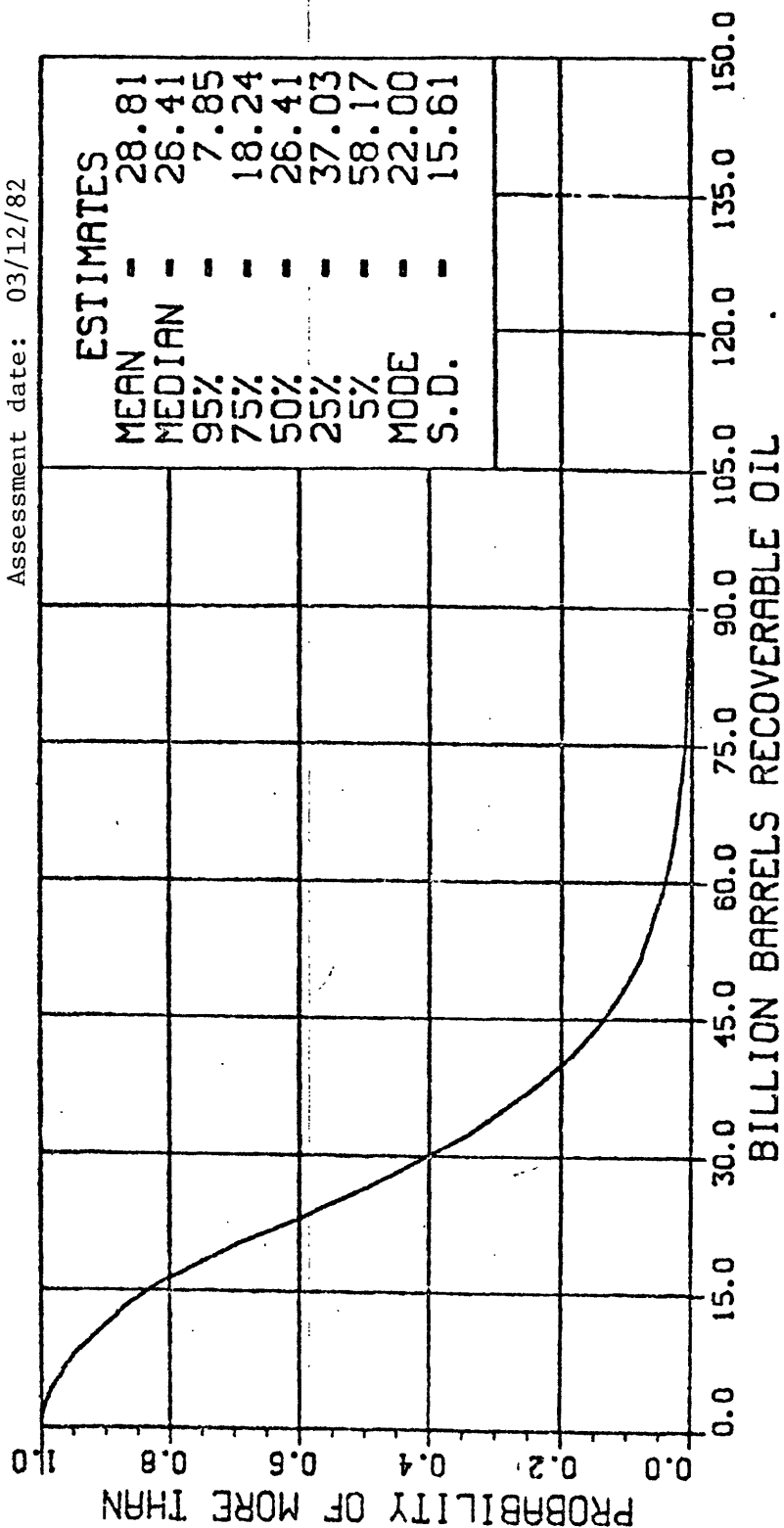


Figure 4.---Timan-Pechora basin and Barents-northern Kara shelf
undiscovered recoverable oil

Assessment date: 03/12/82

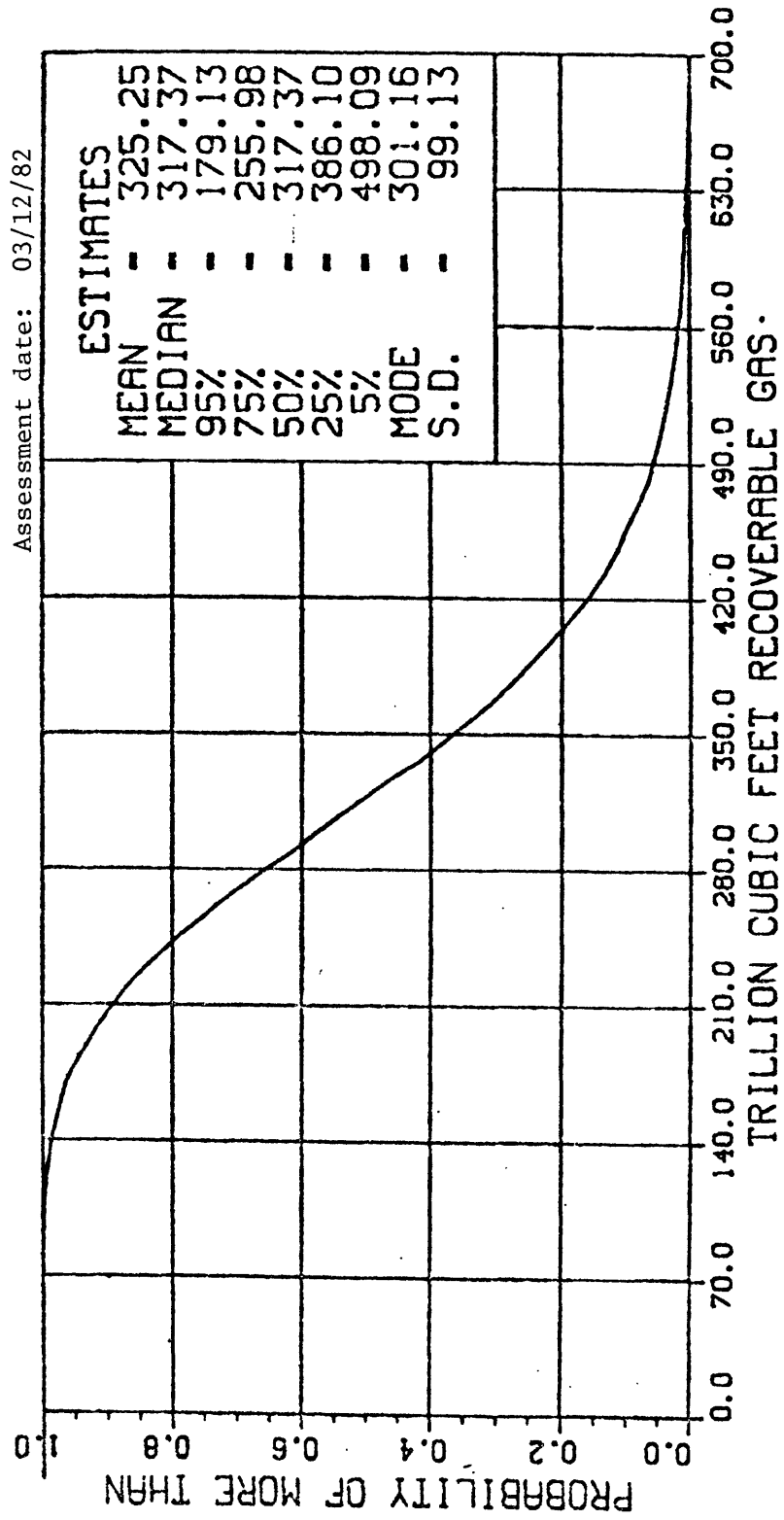


Figure 5.--Timan-Pechora basin and Barents-northern Kara shelf
undiscovered recoverable total gas

Table 2.--Supplementary and comparative data supporting this resource assessment of the Timan-Pechora basin, U.S.S.R., and Barents-northern Kara shelf^{1/}

<u>Crude Oil</u> (BB)		<u>Natural Gas</u> (Tcf)	
Cumulative production to 1/1/81		Cumulative production to 1/1/81	
1.1		7.3	
Identified reserves to 1/1/81 ^{2/}		Identified reserves to 1/1/81	
Demonstrated	2.2	Demonstrated	11.3
Inferred	+ <u>3/</u>	Inferred	+ <u>3/</u>
Original recoverable resources (ultimate) in BBOE			
Cumulative production	1.1		7.3
Identified reserves	2.2		11.3
Undiscovered			
resources (mean)	<u>28.8</u>		<u>325.2</u>
	32.1+		343.8+
BBOE = 57.3+			
Total oil and gas = 89.4+ BBOE			

Basin richness

<u>Original resources</u>	89.4 BBOE
<u>Basin volume</u>	2,938,000 mi ³

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

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

^{3/} Quantity positive but data not available.

COMMENTS

- o Cumulative production and reserve estimates are approximate.
- o Only the southwestern portion of the Timan-Pechora basin is highly explored; its central and northwestern parts are slightly to moderately explored. All the Barents-northern Kara shelf is almost unexplored, especially its central and eastern regions.
- o In most areas of the Timan-Pechora basin, inferred reserves are probably small by comparison with identified reserves.
- o In making the assessment, considerable weight was given to the supposed distribution of oil and gas source rocks, mainly in the Upper Devonian-Lower Carboniferous, Upper Permian-Triassic, and Upper Jurassic sedimentary sections.
- o The assessment does not include the foreranges of the Urals, which have large but deeply eroded folds; in the Lemra region, these folds are covered by an allochthonous sheet of impermeable miogeosynclinal-facies material.
- o Discoveries of oil giants in the Timan-Pechora basin are of low probability, but significant possibilities still exist for finding gas giants in structural traps of the foredeep. Oil prospects are tied mainly to buried, lower Paleozoic structures; also attractive is exploration of sandstone pinch-out zones in the Middle Devonian and Visean rocks and in the reef barriers of the Upper Devonian-Tournaisian section.
- o The eastern and central regions of the Barents-northern Kara shelf are mainly gas prone; the western regions and immediate offshore continuation of the Timan-Pechora basin may possess significant oil resources. Recent successful drilling in the Troms area (offshore Norway) supports a high evaluation of potential for the western Barents Sea.
- o Most oil resources in the northeastern half of the Timan-Pechora basin are heavy and very heavy oils that significantly hamper development of the fields. Some of the fields, such as the Yarega deposit, are not exploitable by conventional oil-field technology. Major resources of the Paleozoic northern Kara Sea basin are also expected to be oils of the same type.