

UNITED STATES DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

PETROLEUM POTENTIAL OF WILDERNESS  
LANDS IN THE WESTERN UNITED STATES BY PROVINCE

by

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Open-File Report 85-294

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

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Denver, Colorado

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Petroleum Potential of Wilderness Lands in  
the Western United States by Province

by

Robert A. Crovelli

INTRODUCTION

U.S. Geological Survey Circular 902-A-P, "Petroleum potential of Wilderness Lands in the western United States" (Miller, 1983, editor), presented oil and gas resource estimates of Wilderness Lands by state, namely, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. Those estimates were derived from an assessment of 183 clusters of wilderness tracts.

The petroleum potential of Wilderness Lands in the western United States is now made based on petroleum provinces. That is, the 183 clusters are partitioned and grouped by province rather than by state, and the methodology then continues as described by Crovelli, 1983. The petroleum provinces are described in Circular 902-A-P and Circular 860.

Graphs of undiscovered recoverable oil and gas resource potential in Wilderness Lands for the 11 western states are presented by province. The graphs are complementary cumulative distribution functions that give the probability of more than a specific amount of oil or gas. Summary tables of resource estimates of oil and gas are also given.

# WILDERNESS LANDS -- Oil -- Province 72 Western Oregon--Washington

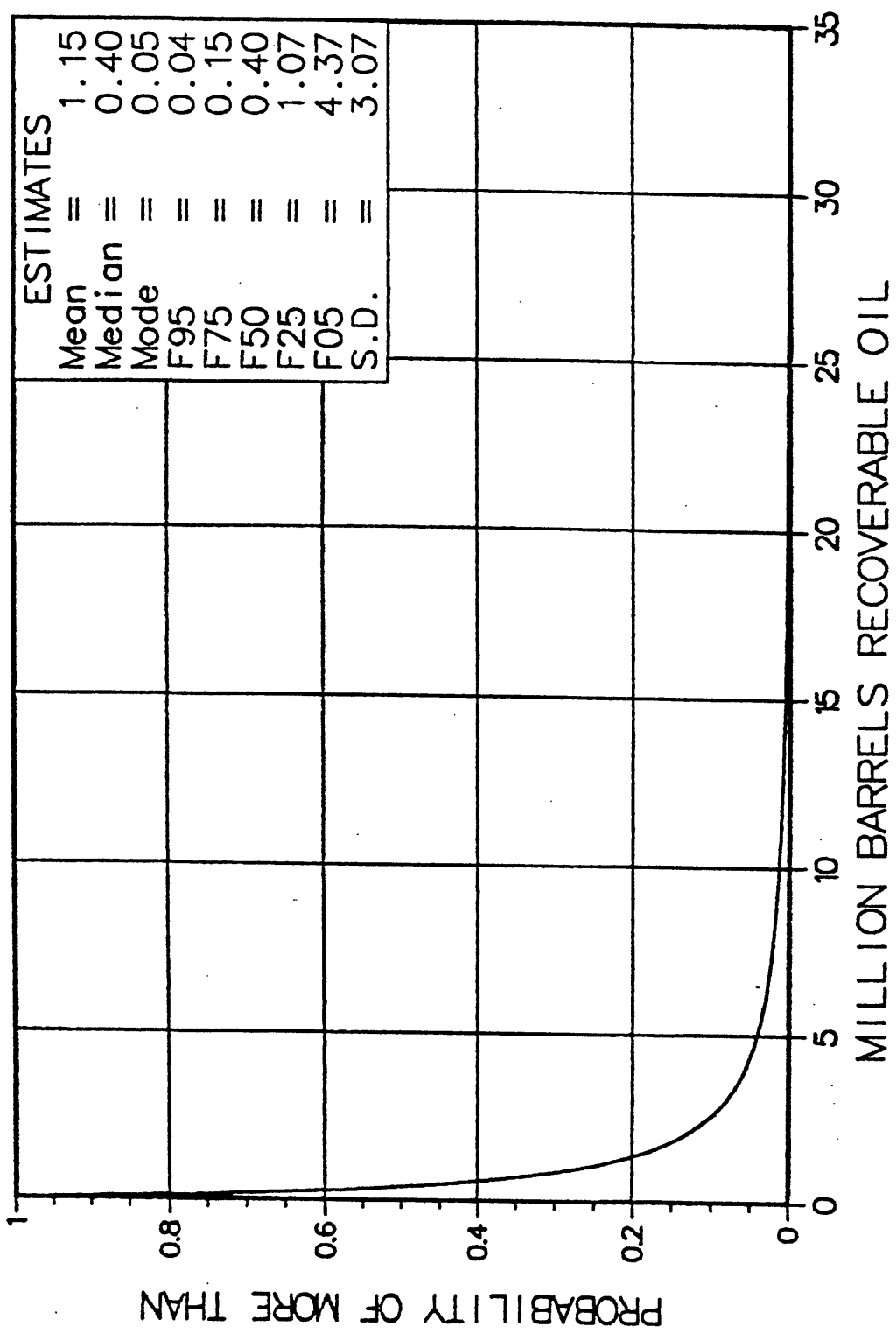


Figure 1A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 72, Western Oregon-Washington.



# WILDERNESS LANDS -- Gas -- Province 72 Western Oregon--Washington

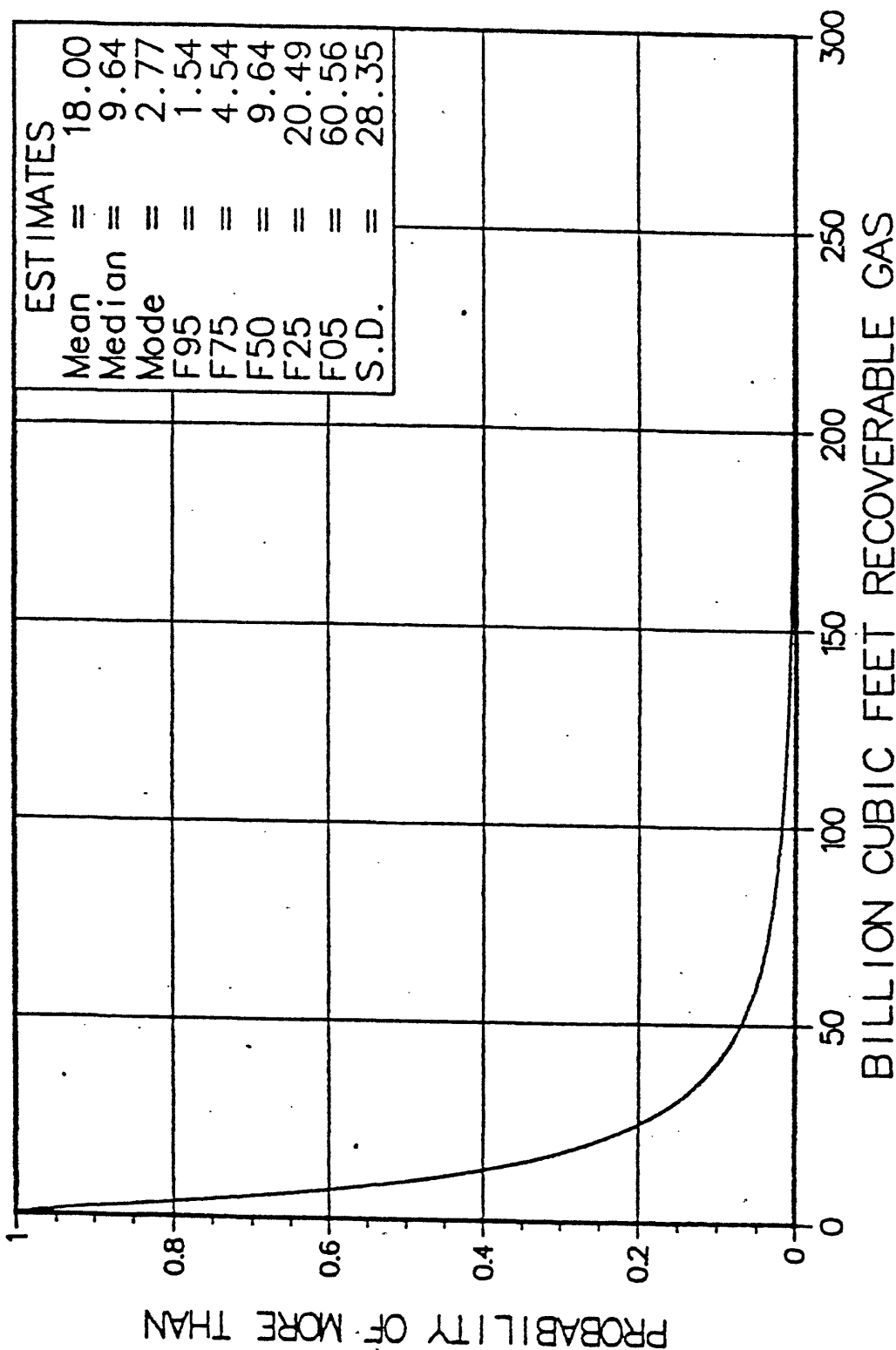


Figure 1B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 72, Western Oregon-Washington.

# WILDERNESS LANDS - Oil - Province 74 San Joaquin Basin

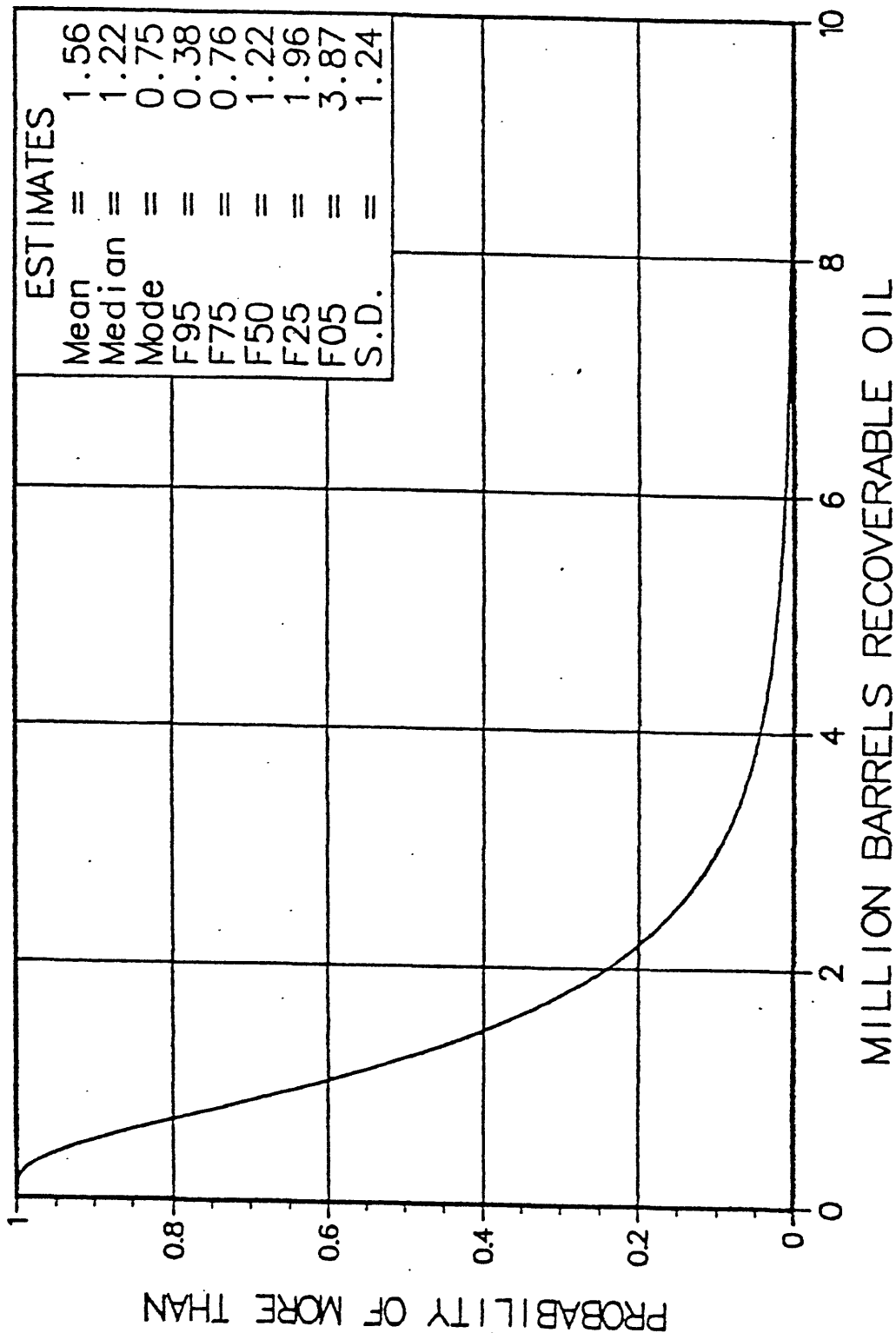


Figure 2A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 74, San Joaquin Basin.

# WILDERNESS LANDS - Gas - Province 74 San Joaquin Basin

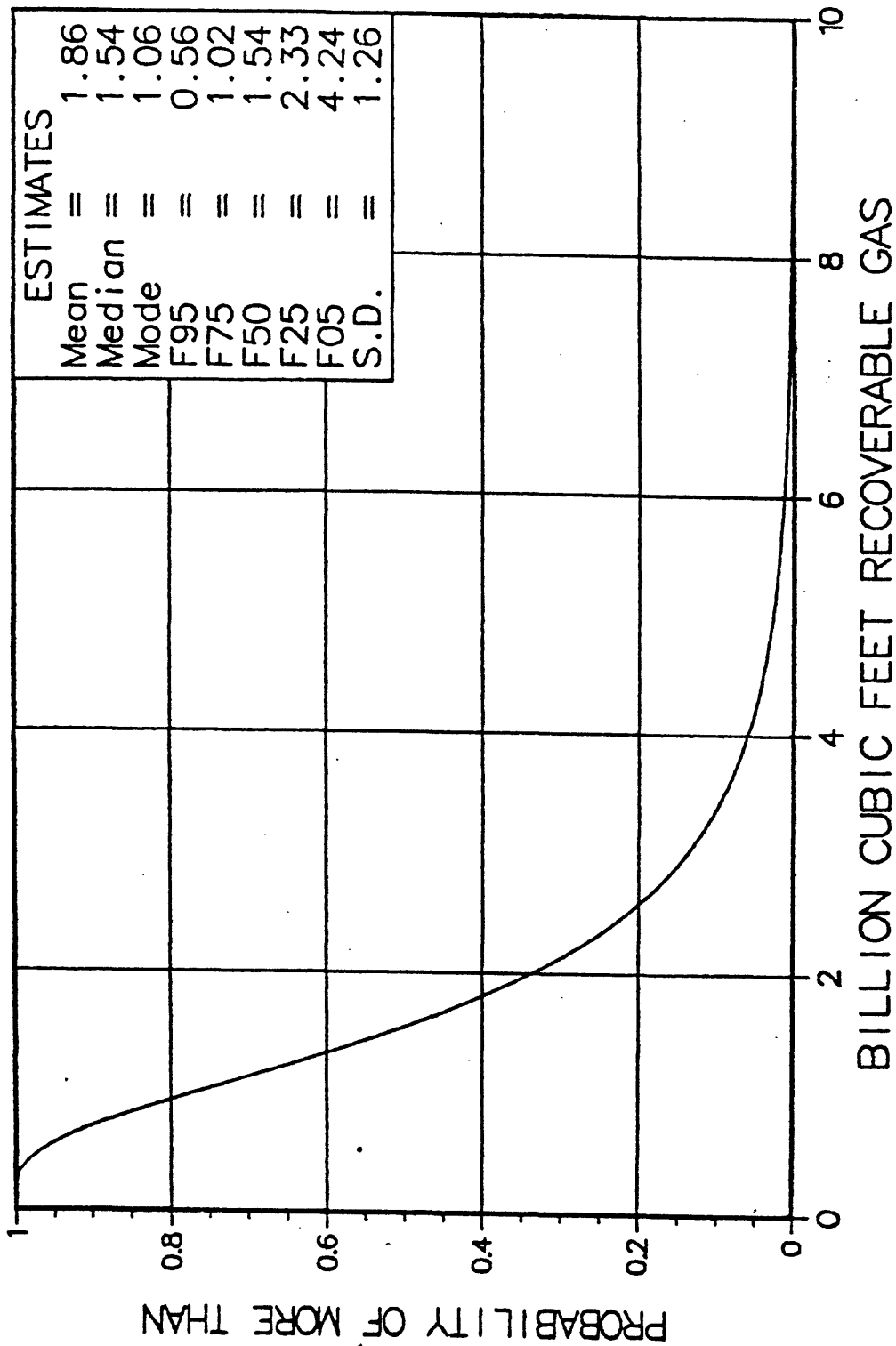


Figure 2B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 74, San Joaquin Basin.

# WILDERNESS LANDS — Oil — Province 78 Central Coastal Basins

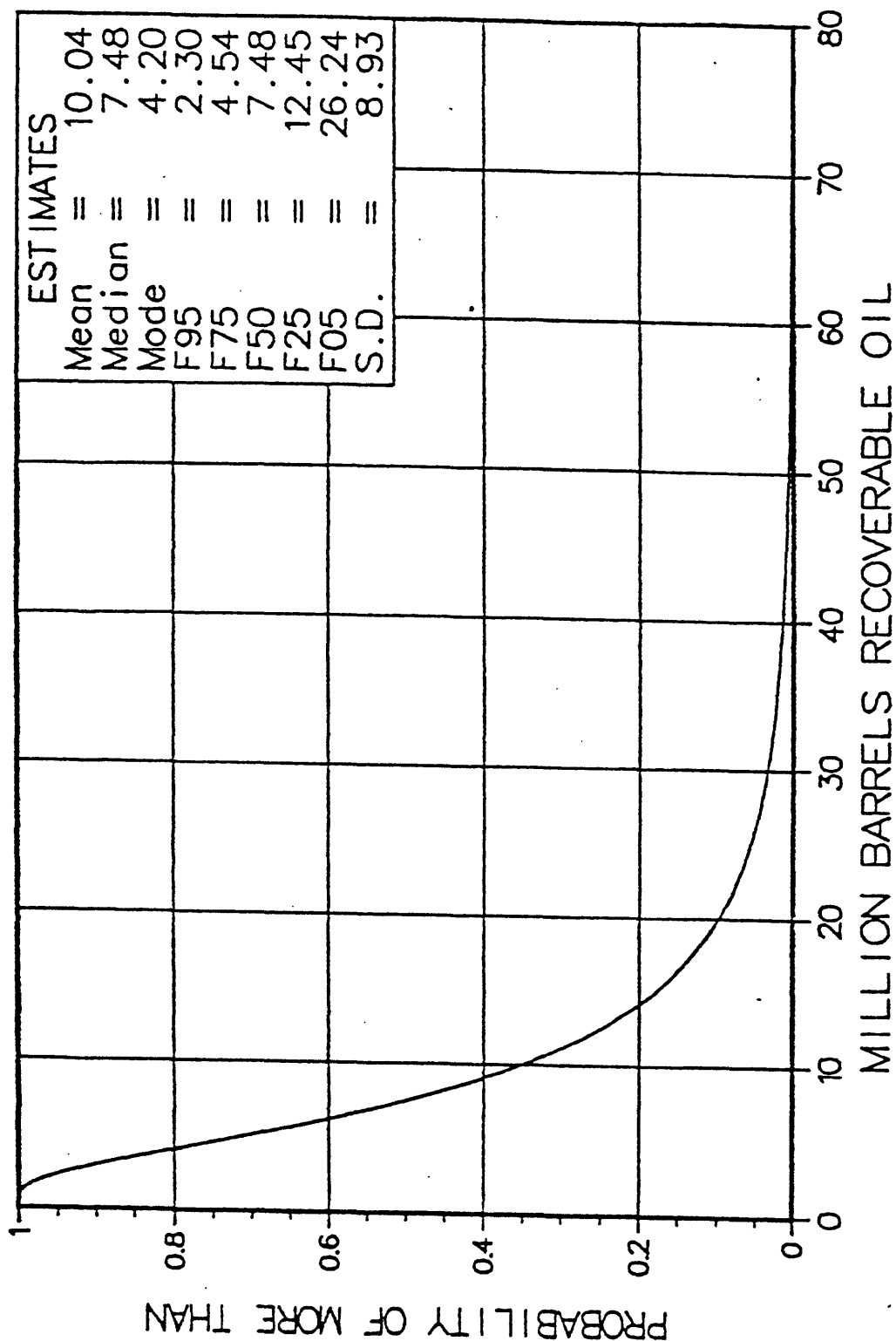
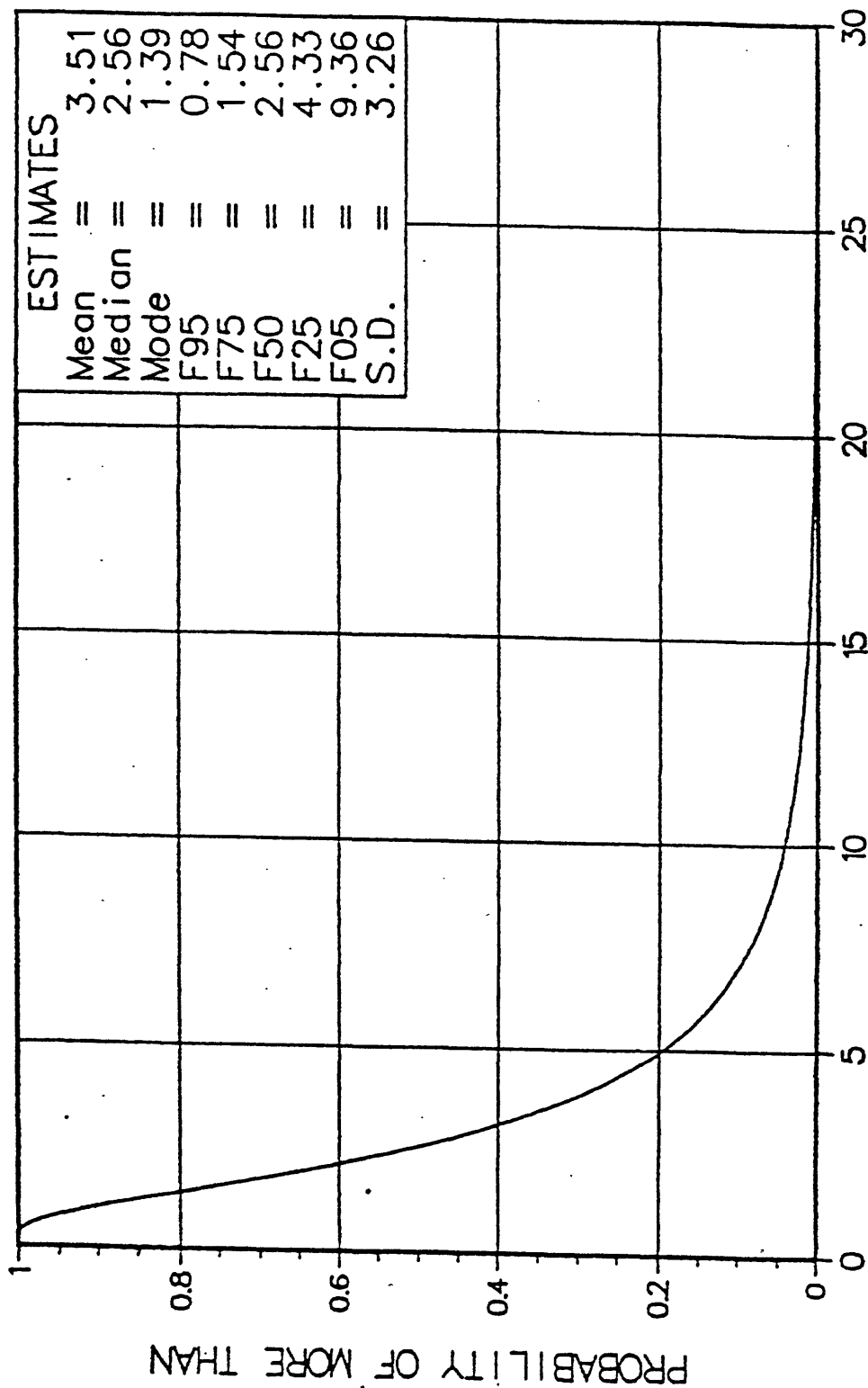


Figure 3A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 78, Central Coastal Basins.

# WILDERNESS LANDS – Gas – Province 78 Central Coastal Basins



## BILLION CUBIC FEET RECOVERABLE GAS

Figure 3B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 78, Central Coastal Basins.

# WILDERNESS LANDS -- Oil -- Province 81 Eastern Oregon--Washington

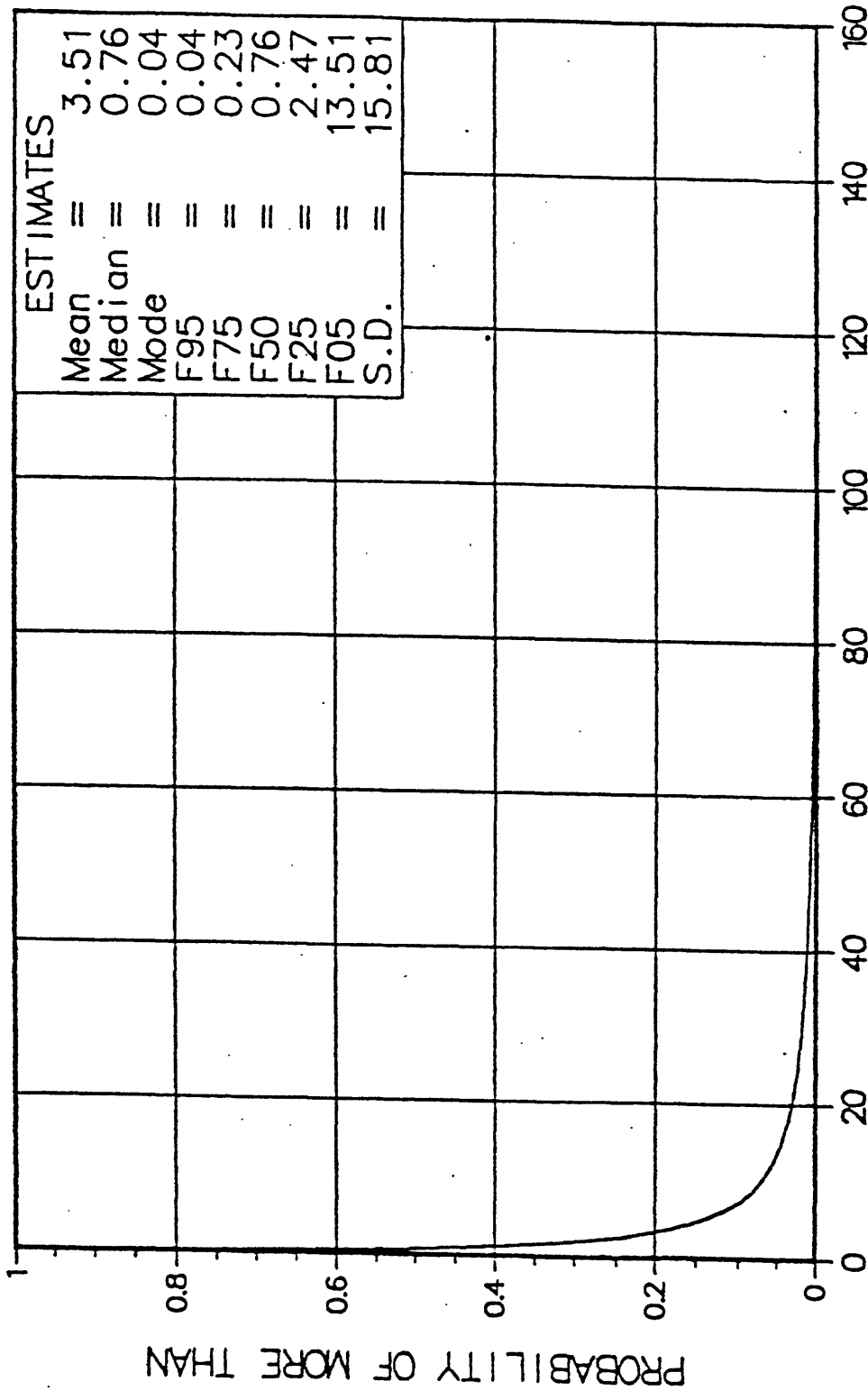


Figure 4A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 81, Eastern Oregon-Washington.

# WILDERNESS LANDS – Gas – Province 81 Eastern Oregon–Washington

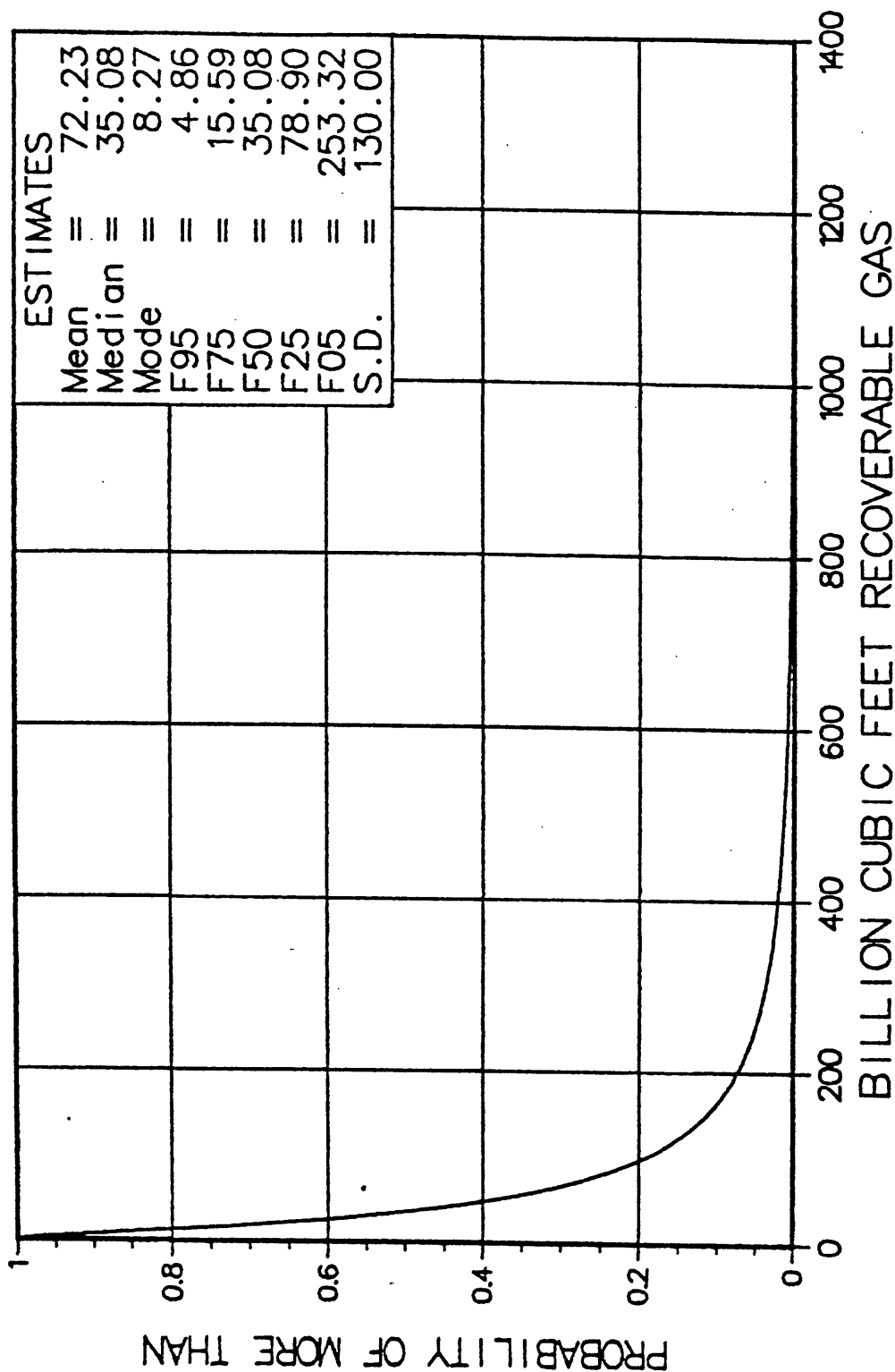


Figure 4B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 81, Eastern Oregon-Washington.

# WILDERNESS LANDS -- Oil -- Province 81a Eastern California

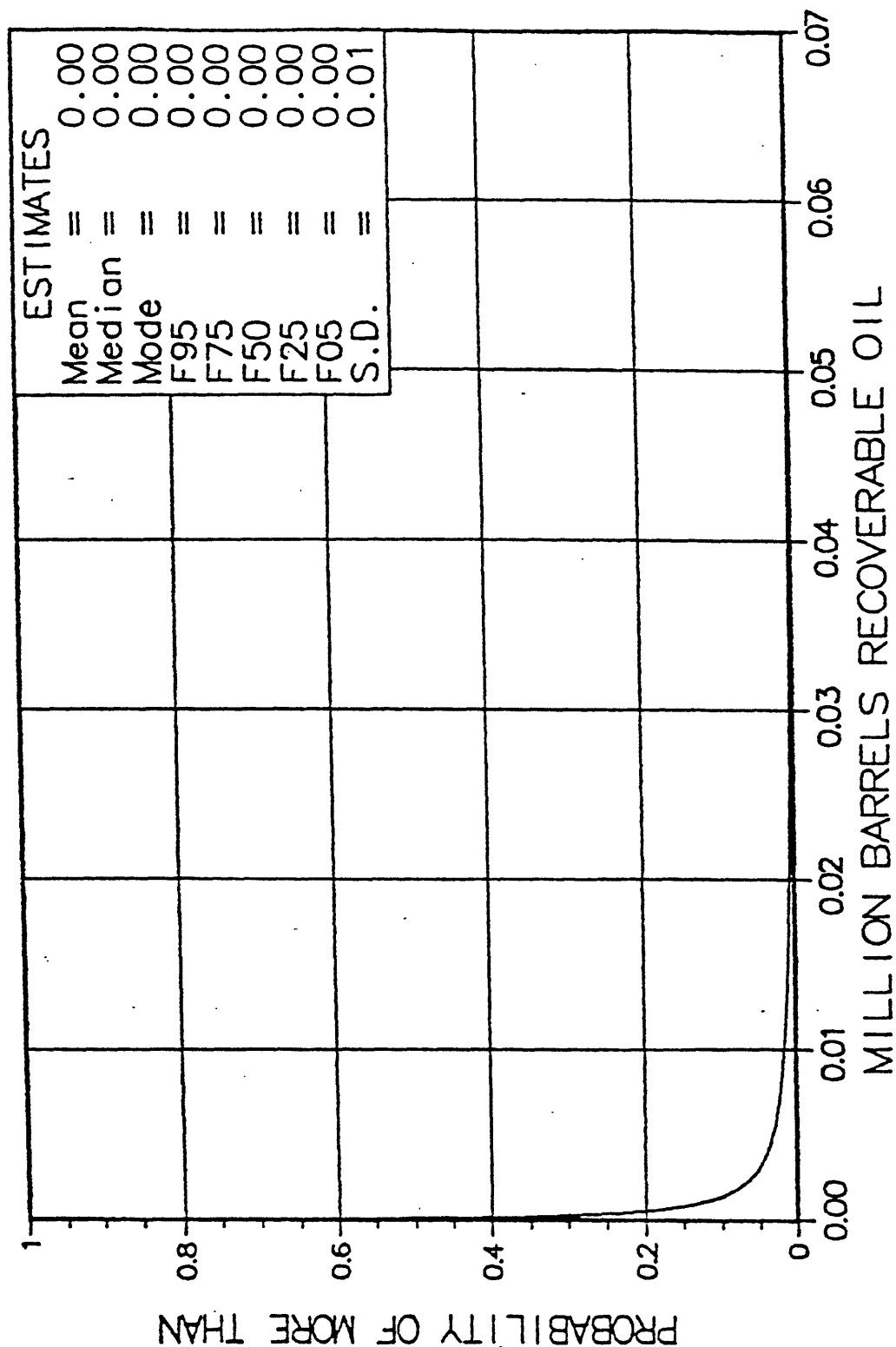


Figure 5A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 81a, Eastern California.



# WILDERNESS LANDS -- Gas -- Province 81a Eastern California

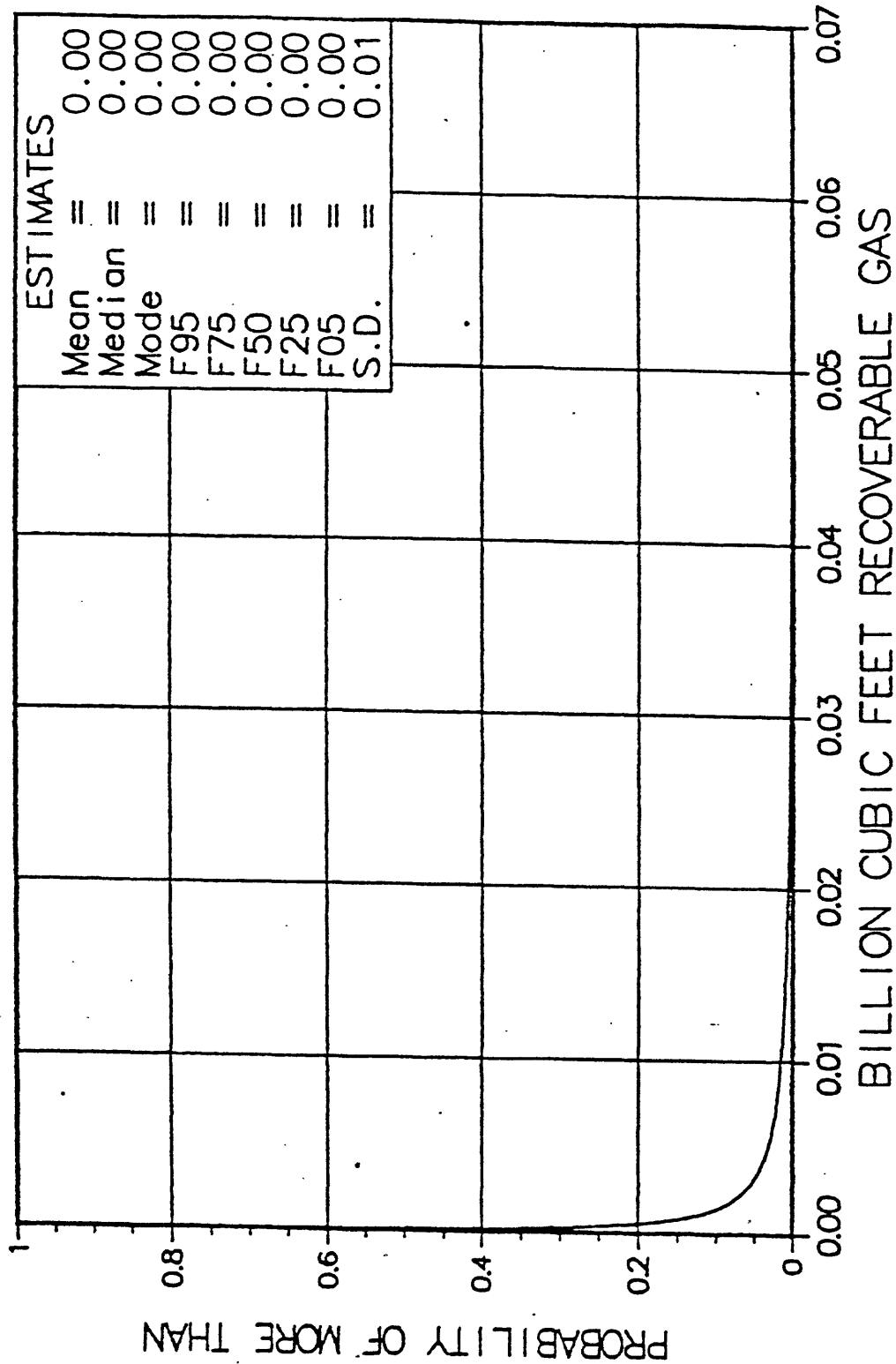


Figure 5B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 81a, Eastern California.

# WILDERNESS LANDS – Oil – Province 82 Eastern Basin and Range

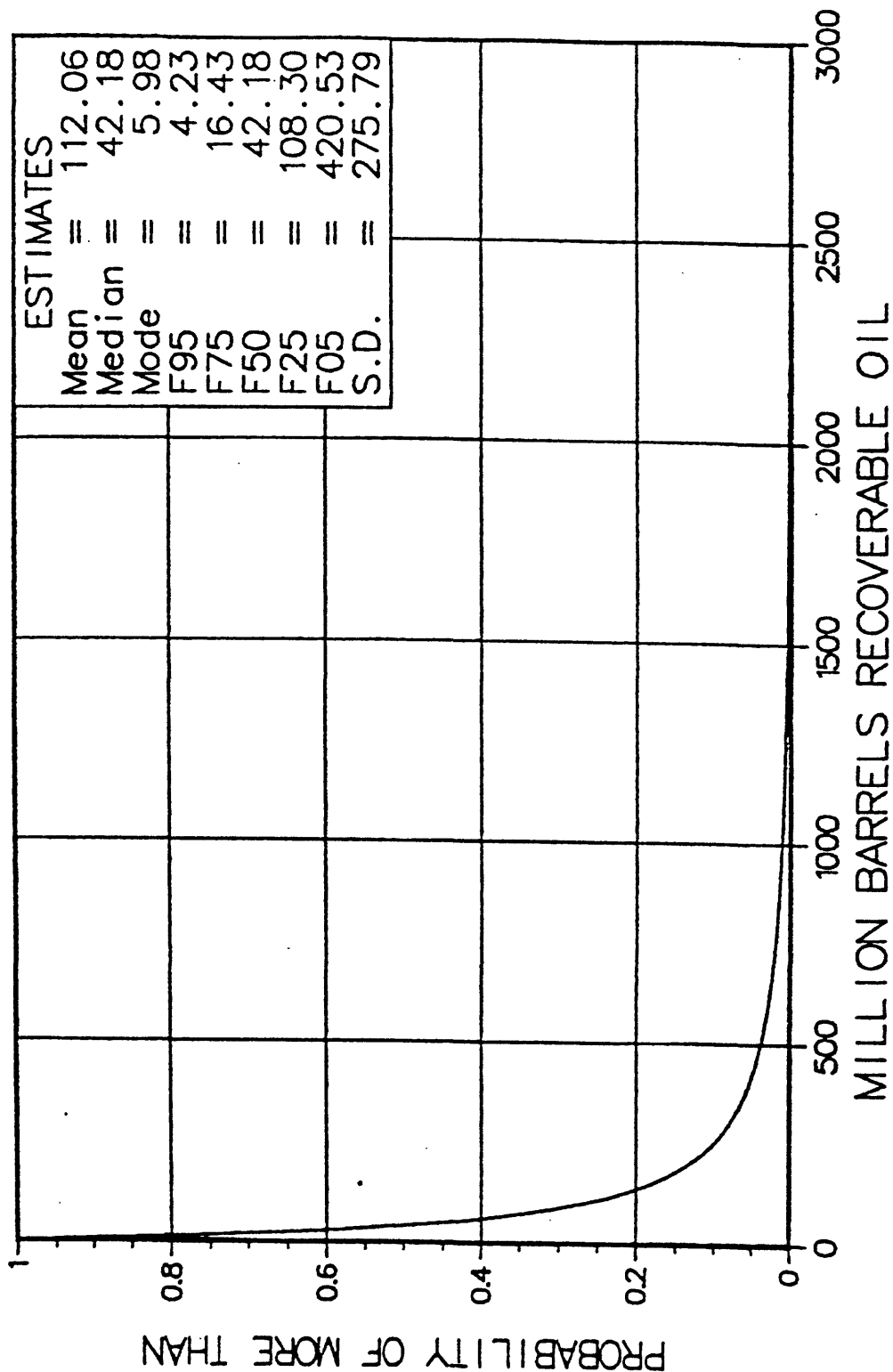
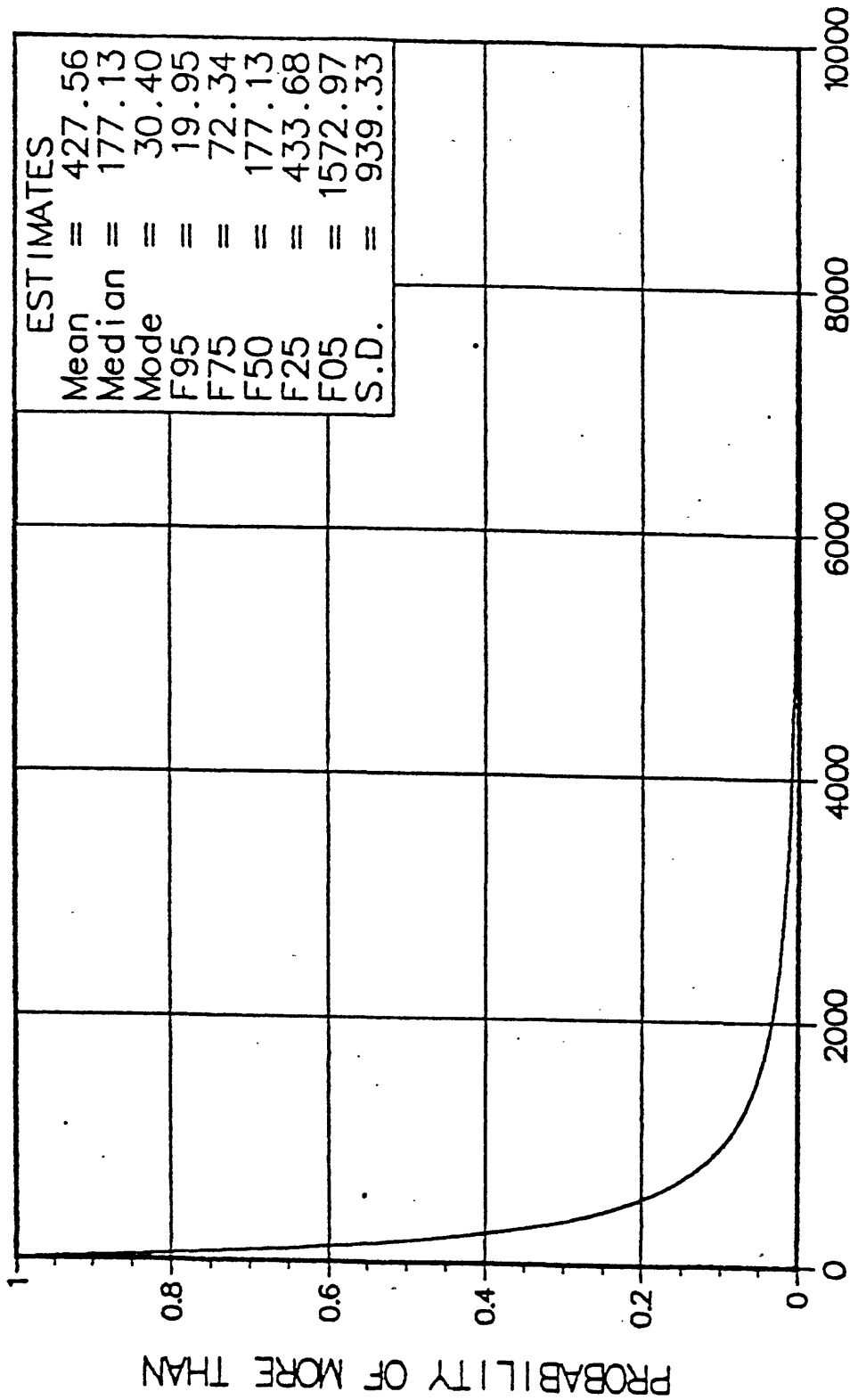


Figure 6A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 82, Eastern Basin and Range.

# WILDERNESS LANDS -- Gas -- Province 82 Eastern Basin and Range



BILLION CUBIC FEET RECOVERABLE GAS

Figure 6B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 82, Eastern Basin and Range.

# WILDERNESS LANDS – Oil – Province 83 Western Basin and Range

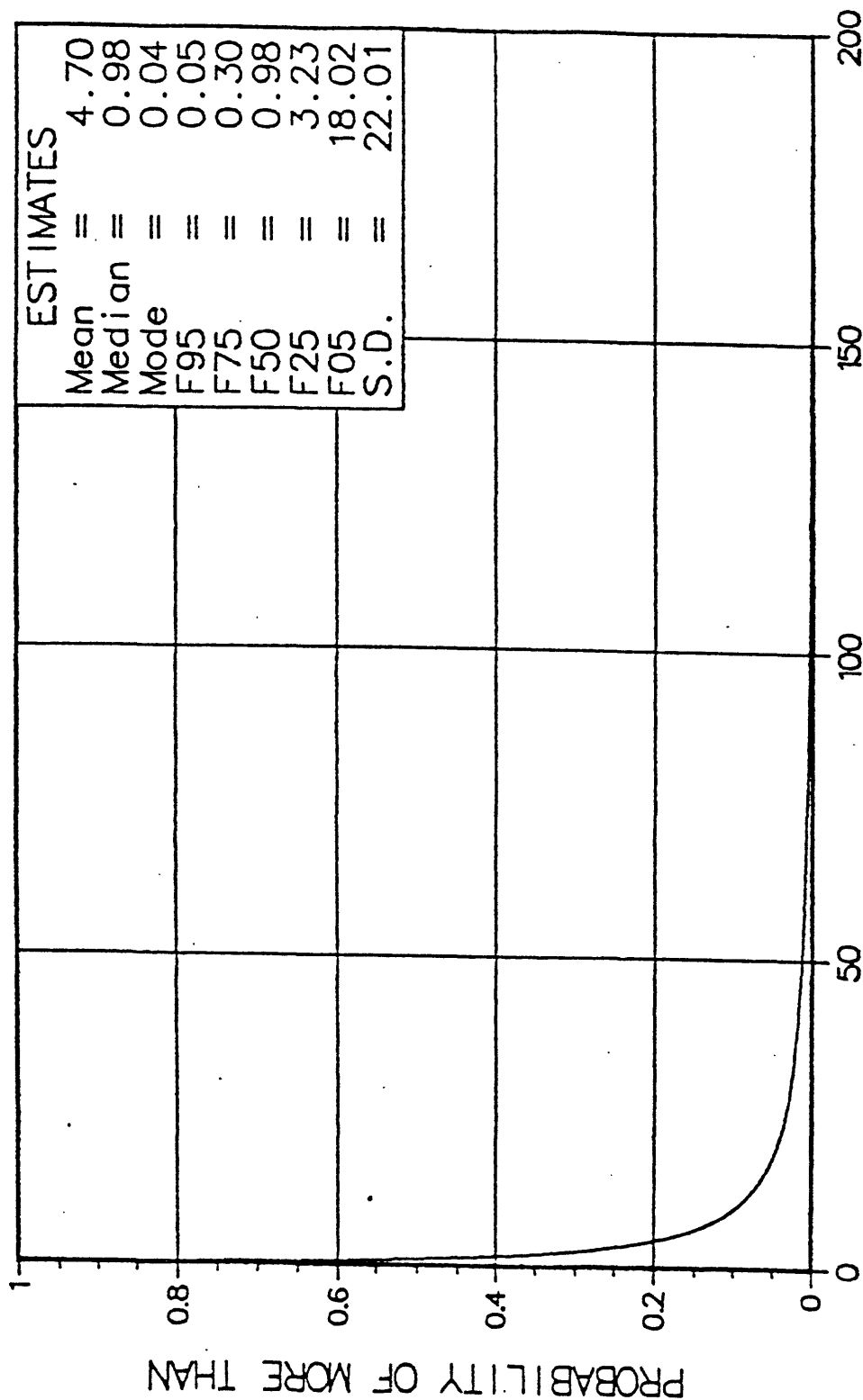


Figure 7A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 83, Western Basin and Range.

# WILDERNESS LANDS – Gas – Province 83 Western Basin and Range

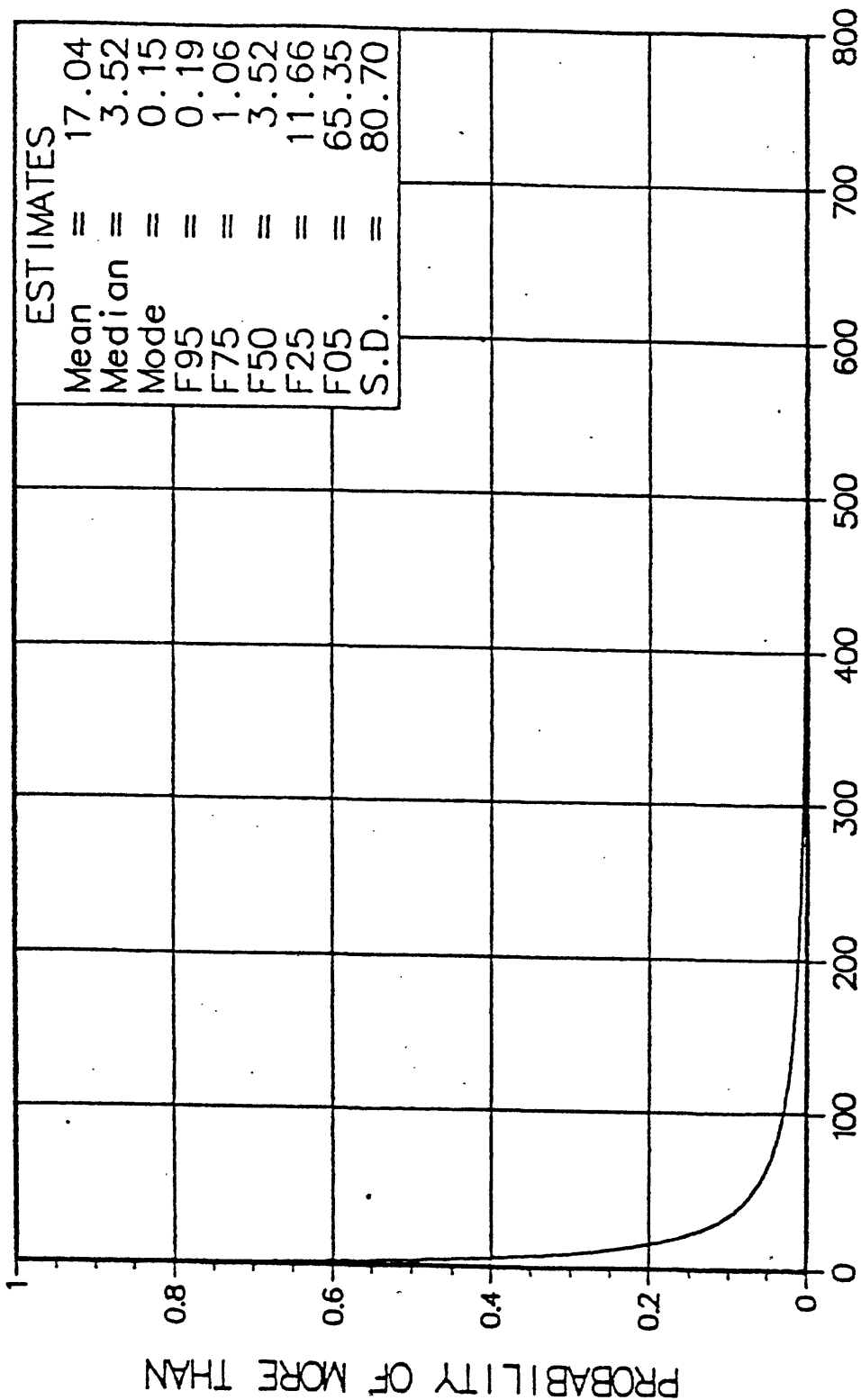


Figure 7B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 83, Western Basin and Range.

# WILDERNESS LANDS – Oil – Province 84a Idaho–Snake River Downwarp (A)

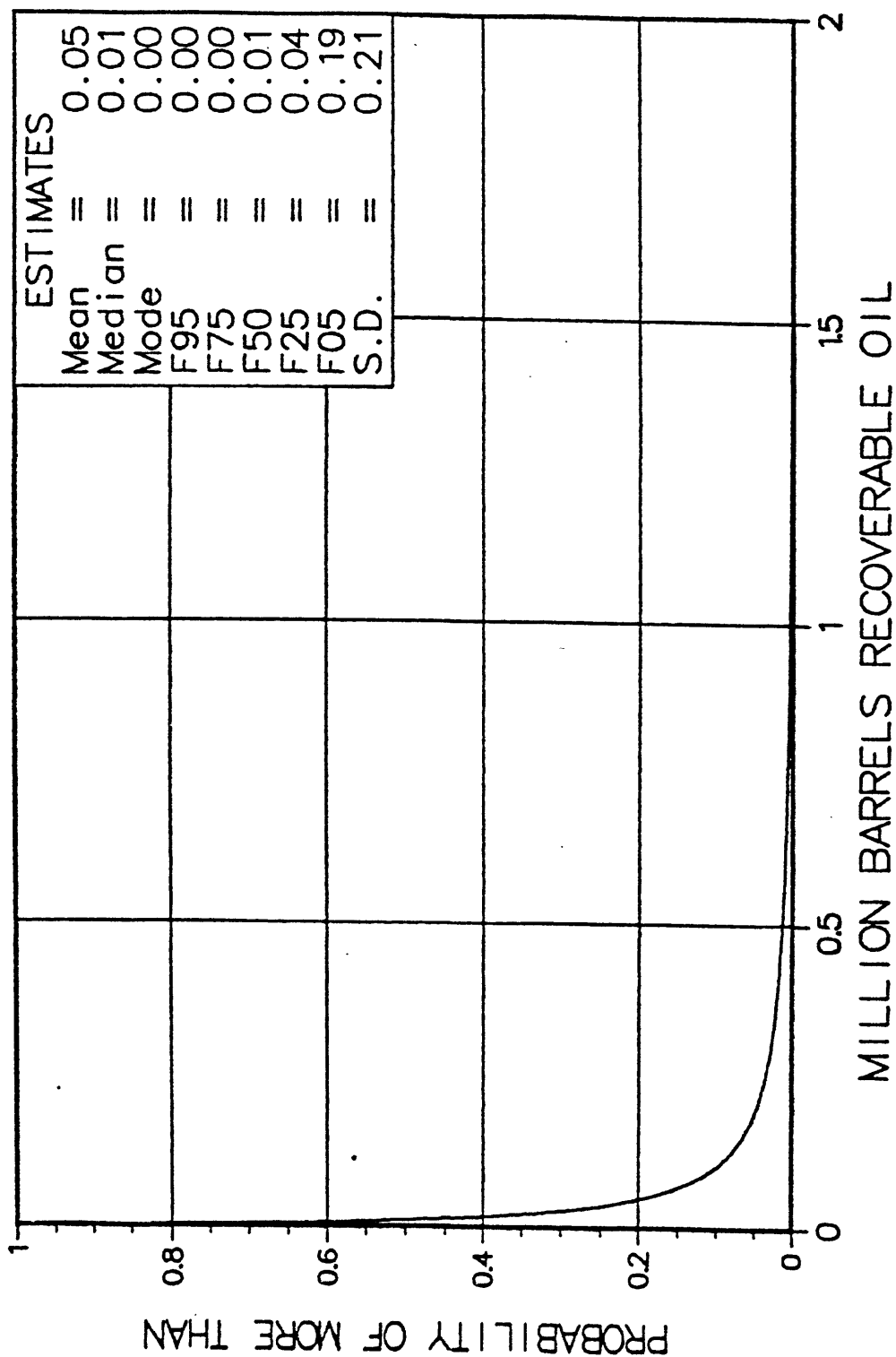


Figure 8A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 84a, Idaho-Snake River Downwarp (A).

# WILDERNESS LANDS – Gas – Province 84a Idaho–Snake River Downwarp (A)

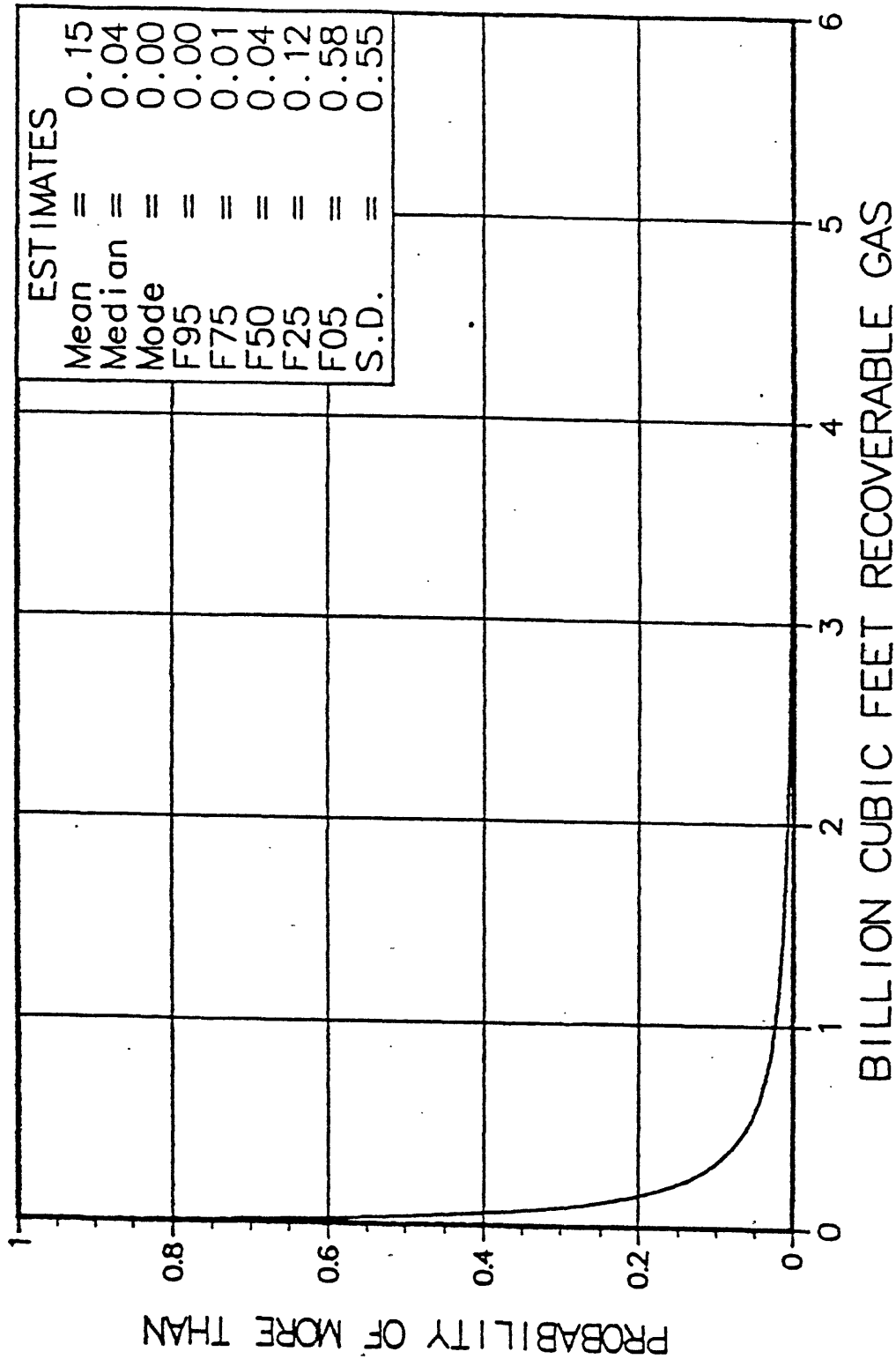


Figure 8B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 84a, Idaho–Snake River Downwarp (A).

# WILDERNESS LANDS -- Oil -- Province 84b Idaho-Snake River Downwarp (B)

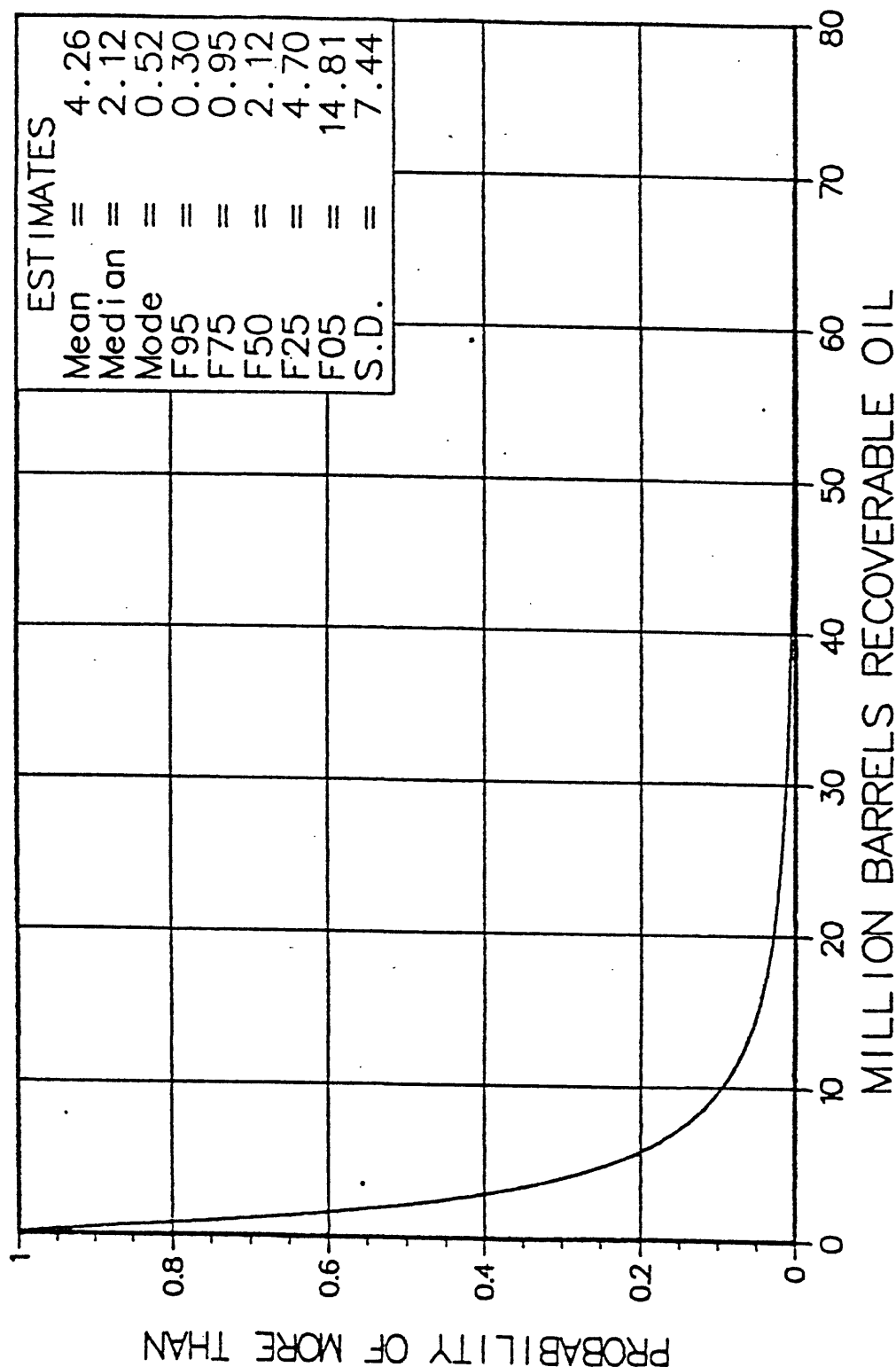


Figure 9A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 84b, Idaho-Snake River Downwarp (B).



# WILDERNESS LANDS - Gas - Province 84b Idaho-Snake River Downwarp (B)

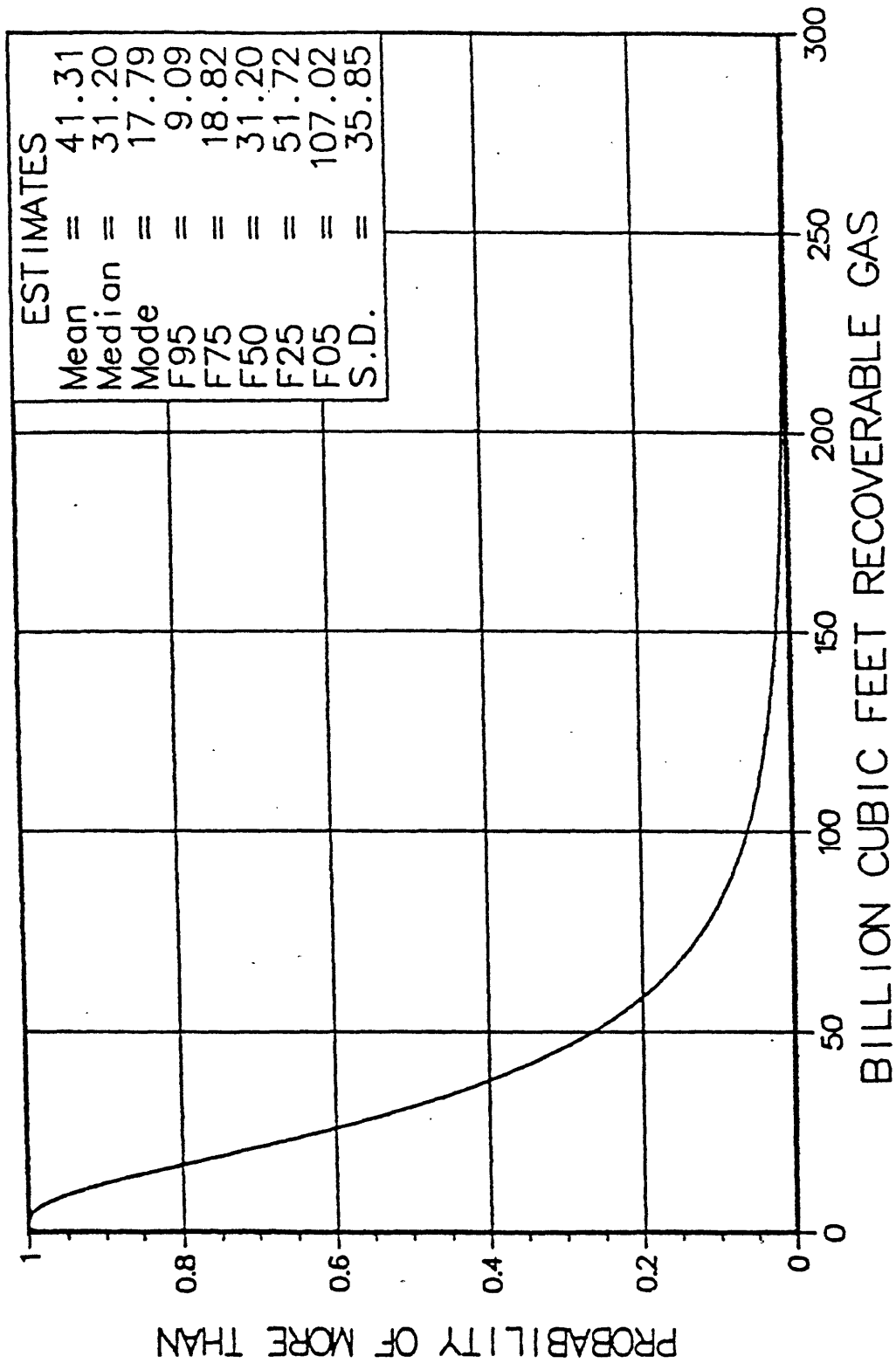


Figure 9B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 84b, Idaho-Snake River Downwarp (B).

# WILDERNESS LANDS – Oil – Province 85 Paradox Basin

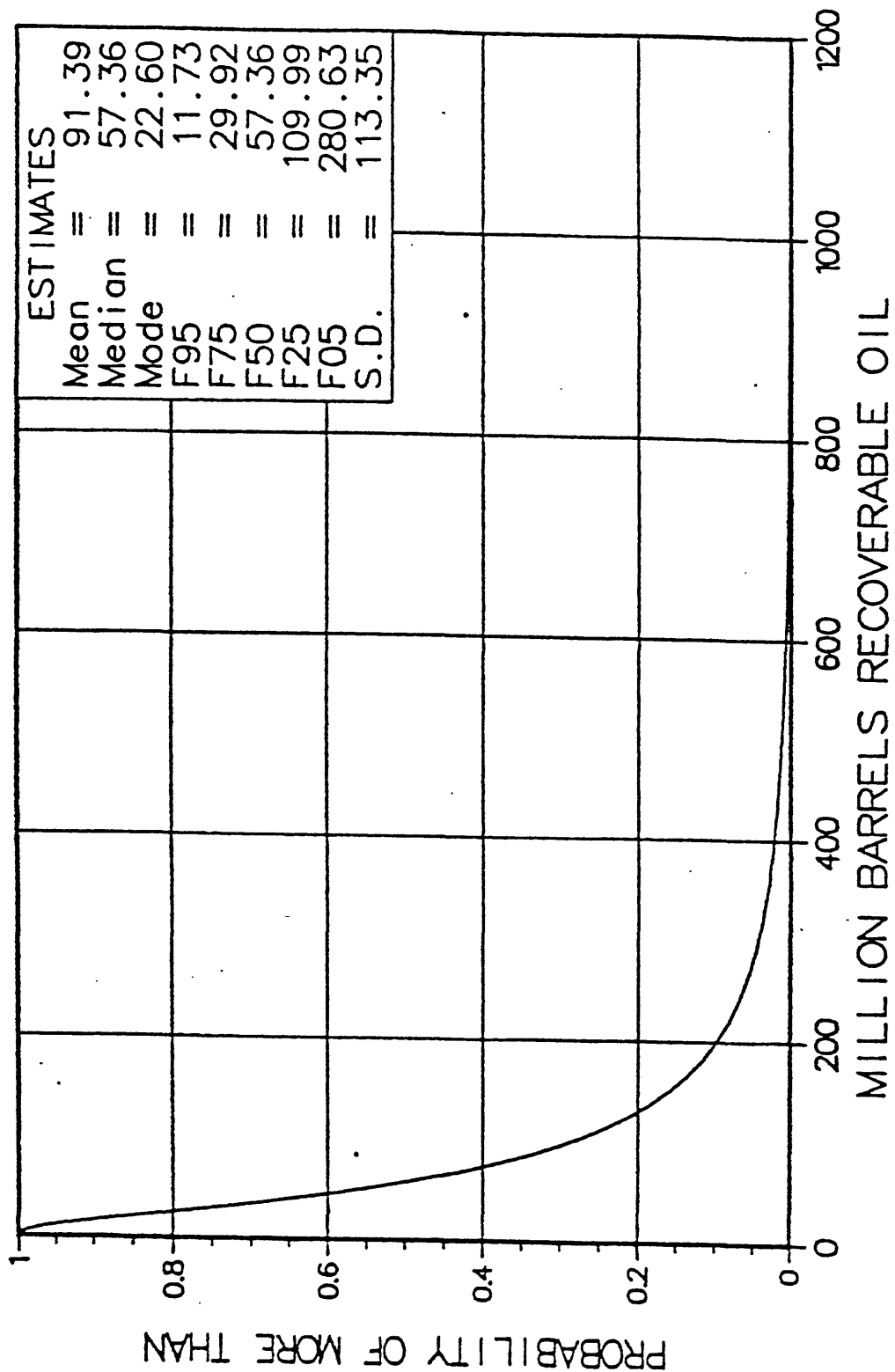


Figure 10A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 85, Paradox Basin.

# WILDERNESS LANDS -- Gas -- Province 85 Paradox Basin

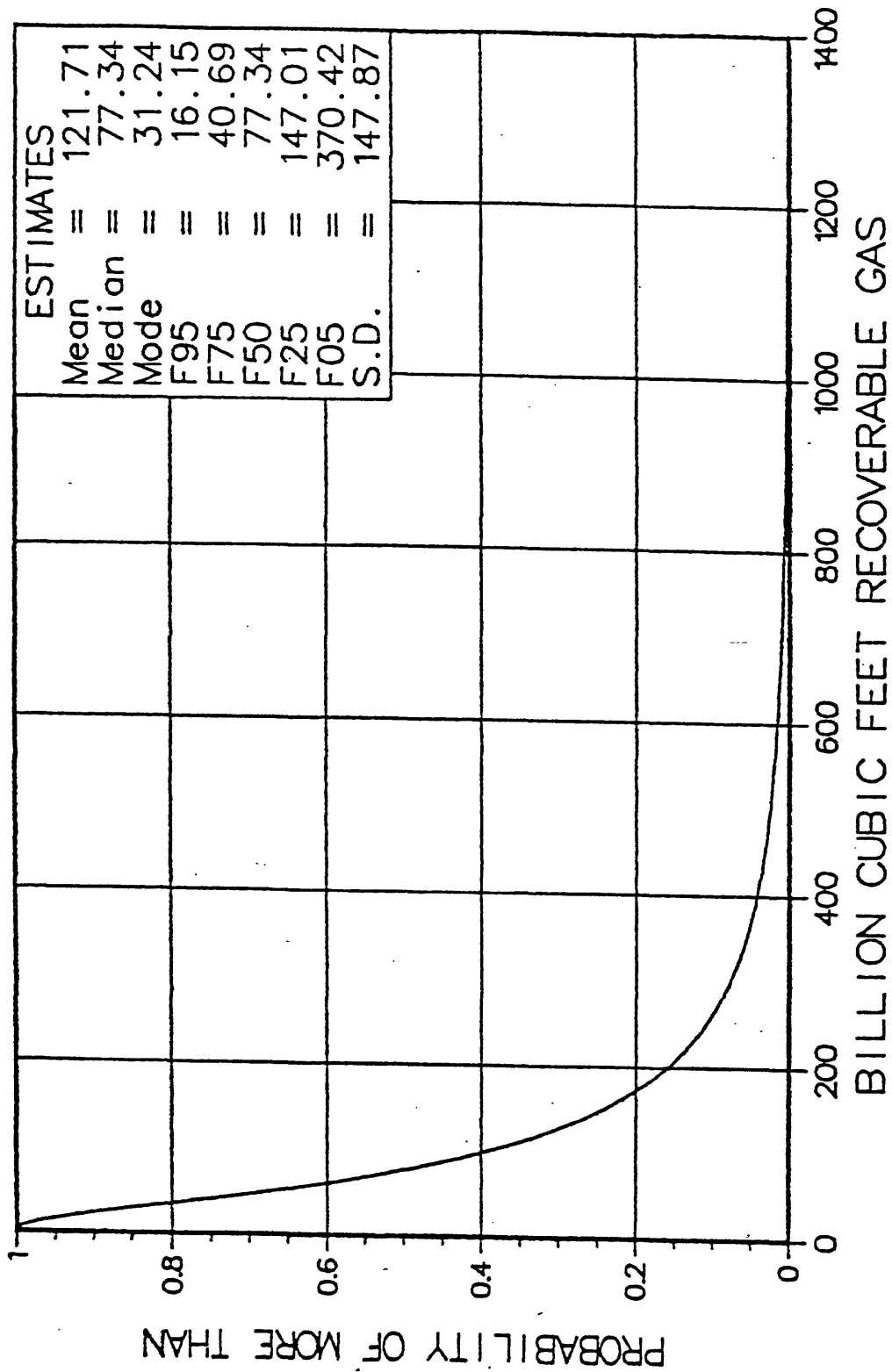


Figure 10B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 85, Paradox Basin.

# WILDERNESS LANDS -- Oil -- Province 86 Uinta--Piceance--Eagle Basins

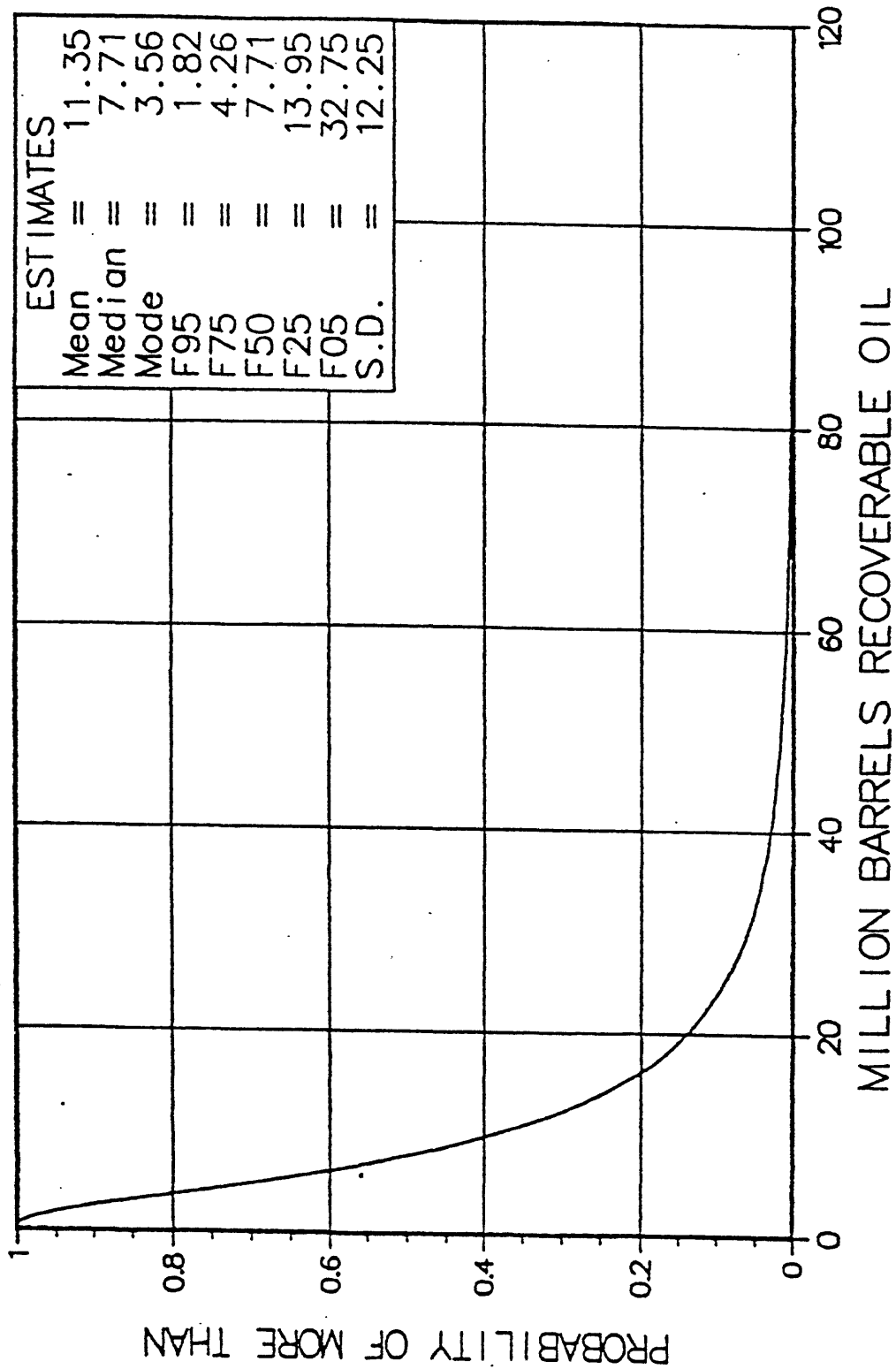


Figure 11A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 86, Uinta-Piceance-Eagle Basins.

# WILDERNESS LANDS -- Gas -- Province 86 Uinta-Piceance-Eagle Basins

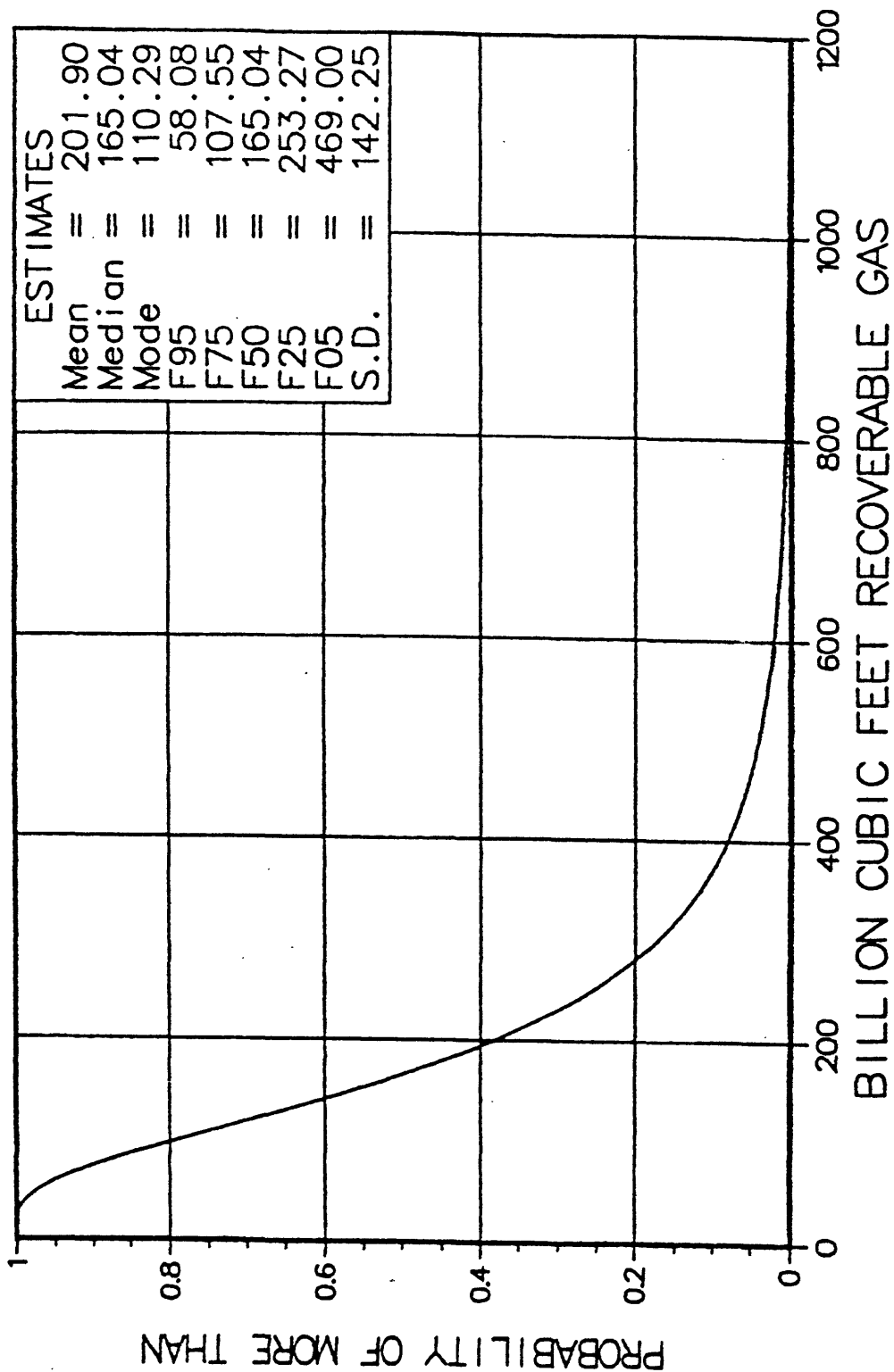


Figure 11B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 86, Uinta-Piceance-Eagle Basins.

# WILDERNESS LANDS -- Oil -- Province 87 Park Basins

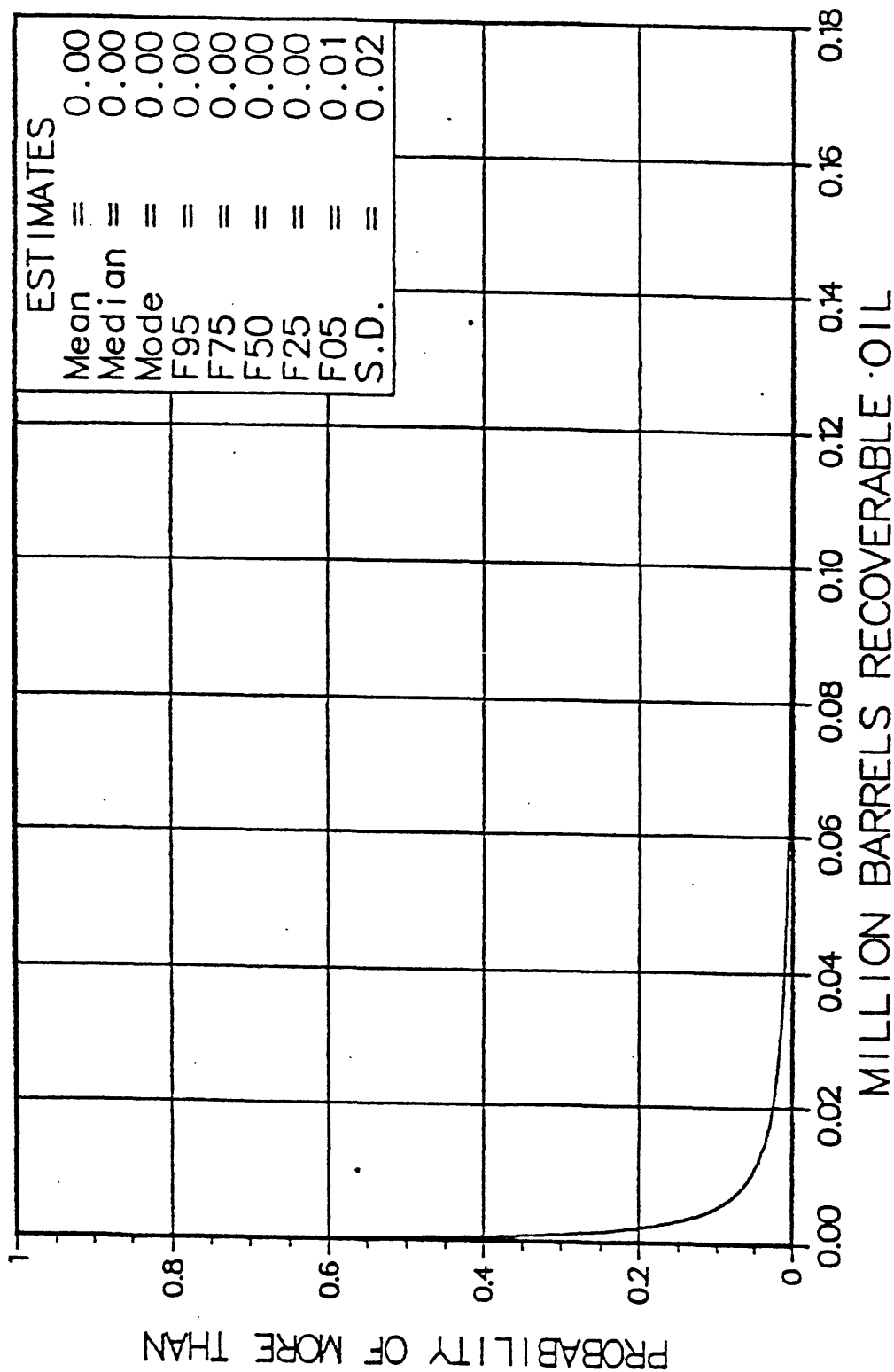


Figure 12A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 87,  
Park Basins.

# WILDERNESS LANDS – Gas – Province 87 Park Basins

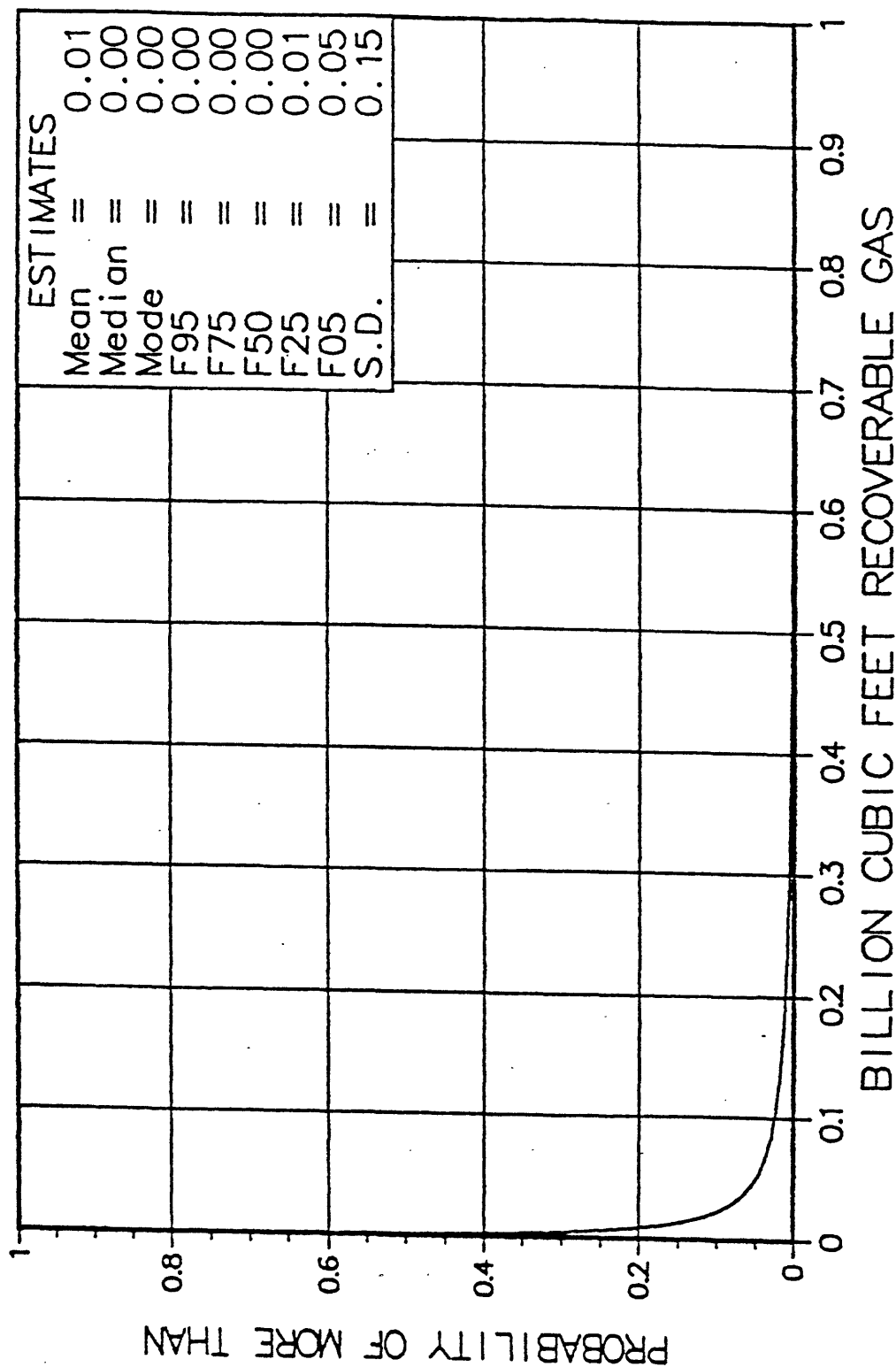


Figure 12B.---Undiscovered recoverable gas resources in Wilderness Lands of Province 87, Park Basins.

# WILDERNESS LANDS -- Oil -- Province 88 San Juan Basin

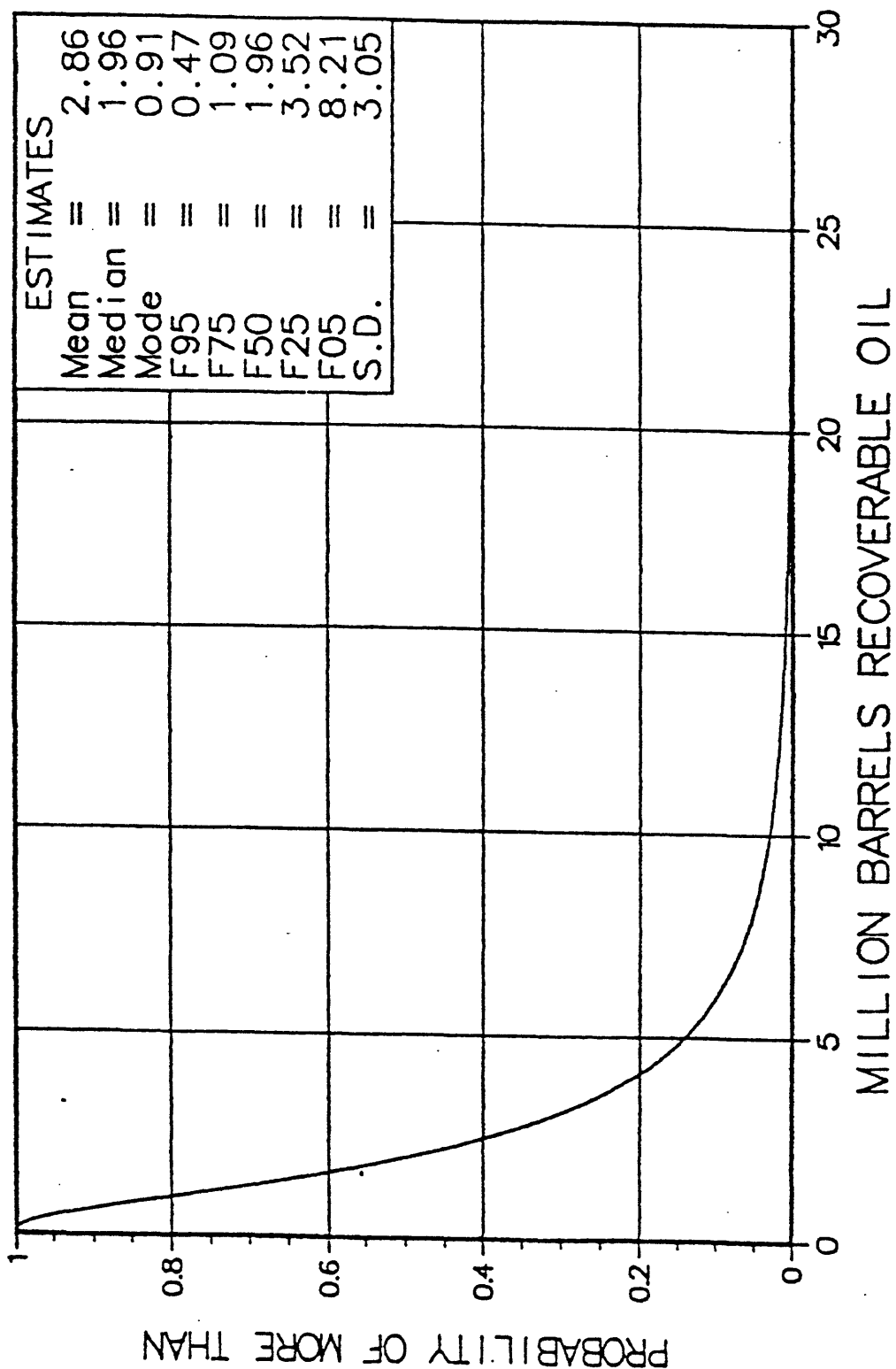


Figure 13A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 88, San Juan Basin.



# WILDERNESS LANDS - Gas - Province 88 San Juan Basin

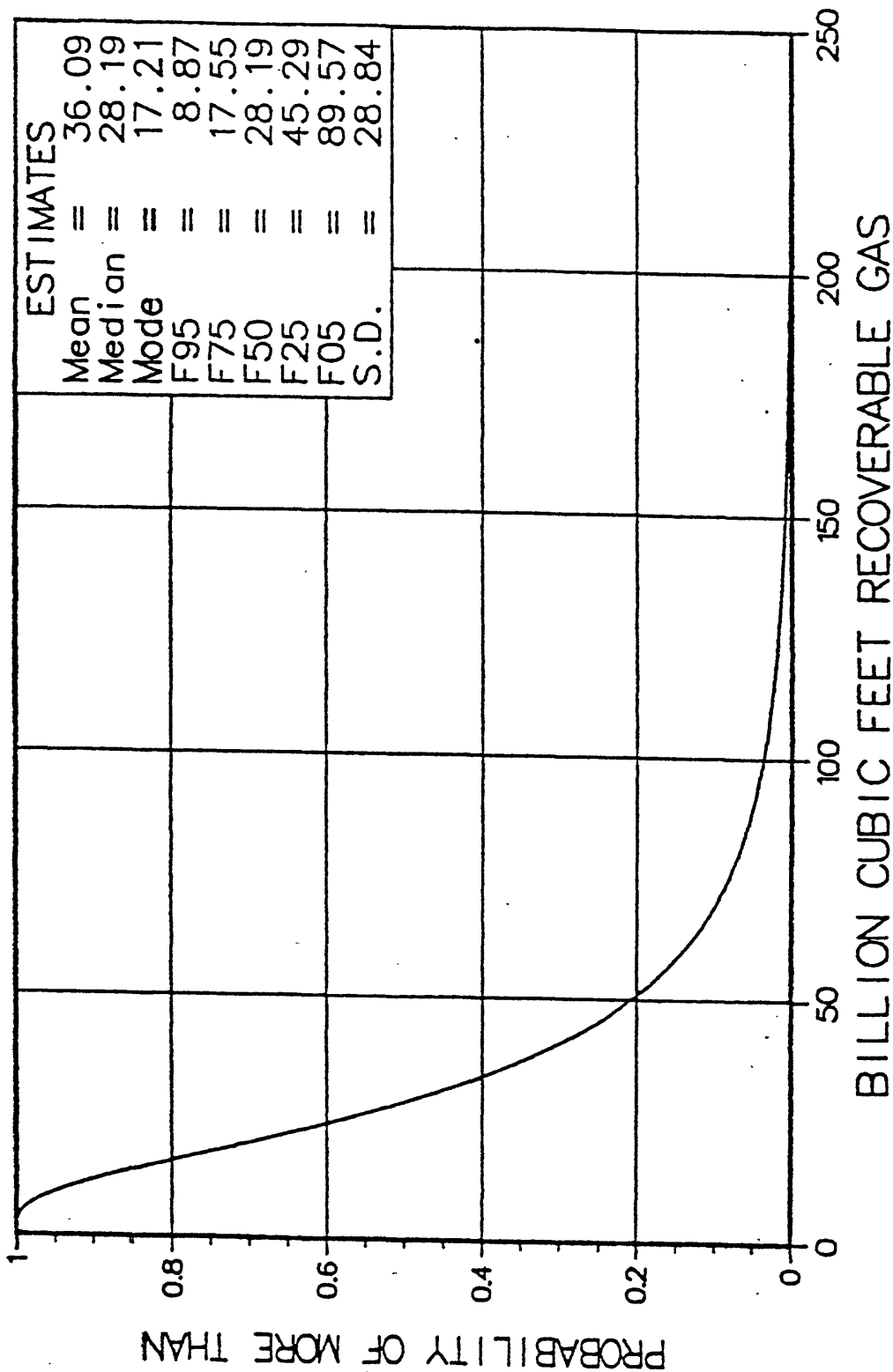


Figure 13B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 88, San Juan Basin.

# WILDERNESS LANDS -- Oil -- Province 89 Albuquerque--Santa Fe--San Luis Rift Basins

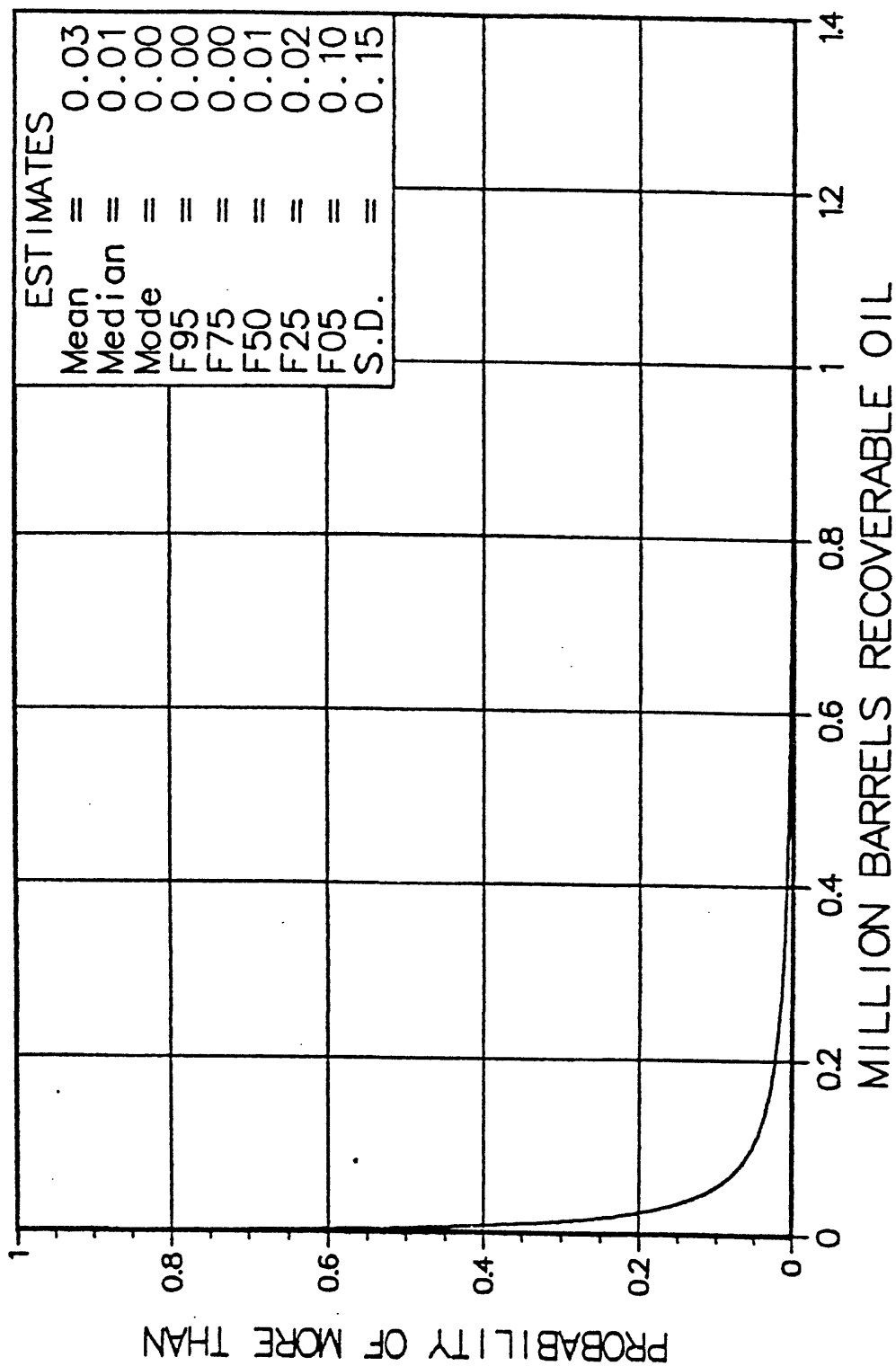


Figure 14A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 89, Albuquerque--Santa Fe--San Luis Rift Basins.

# WILDERNESS LANDS – Gas – Province 89 Albuquerque–Santa Fe–San Luis Rift Basins

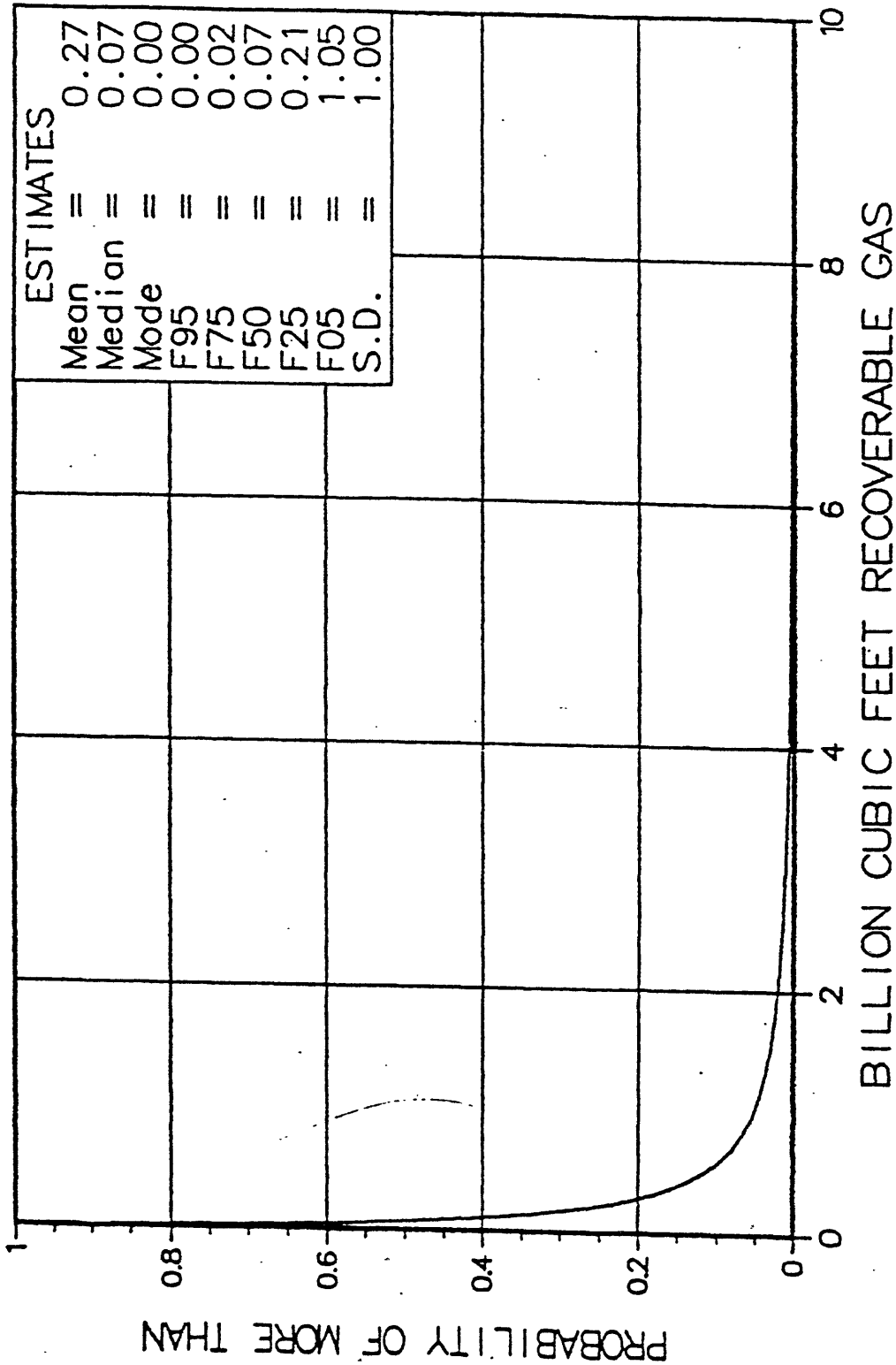


Figure 14B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 89, Albuquerque–Santa Fe–San Luis Rift Basins.

# WILDERNESS LANDS -- Oil -- Province 90 Wyoming--Utah--Idaho Overthrust Belt

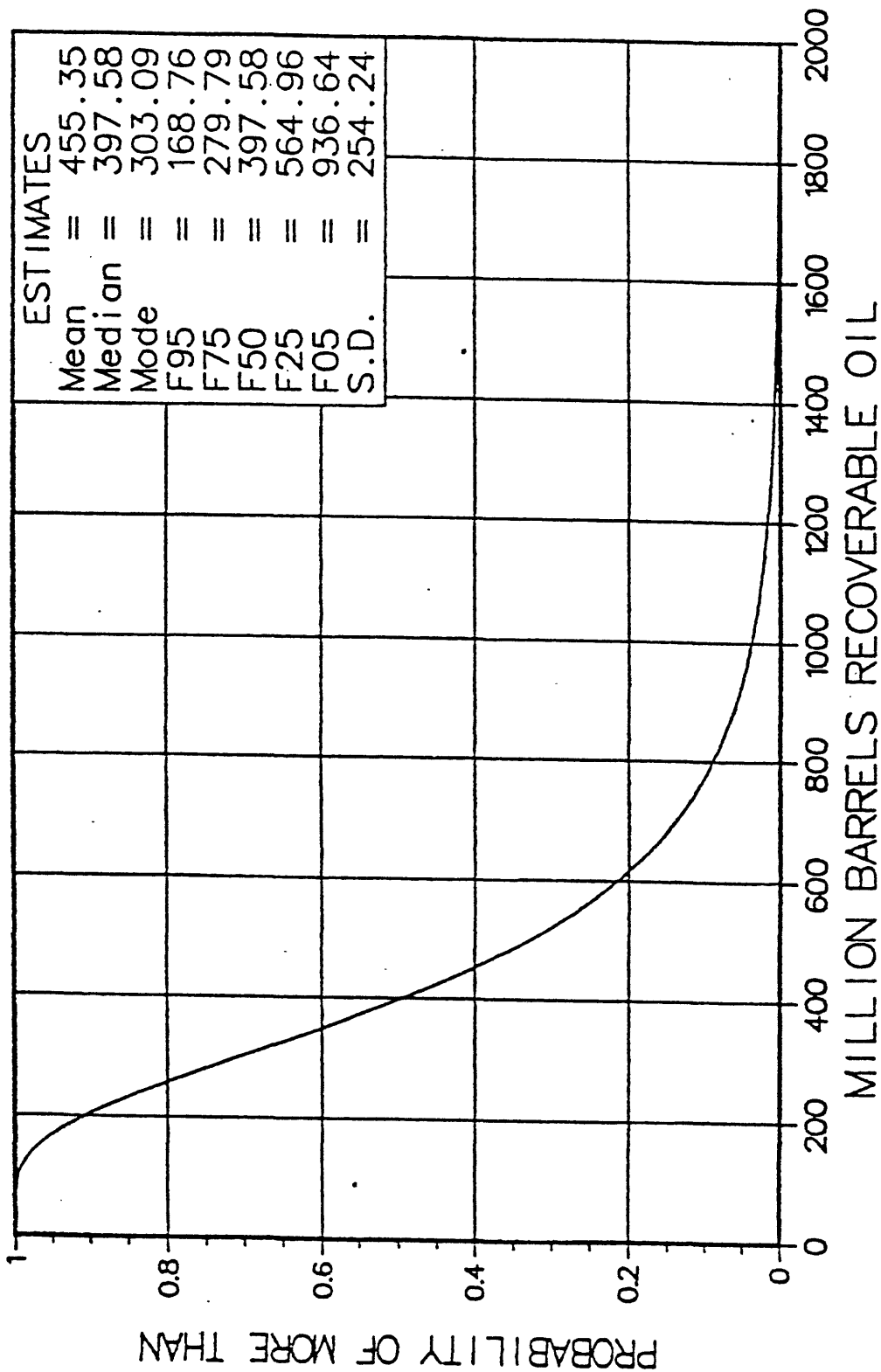


Figure 15A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 90, Wyoming--Utah--Idaho Overthrust Belt.

# WILDERNESS LANDS – Gas – Province 90 Wyoming–Utah–Idaho Overthrust Belt

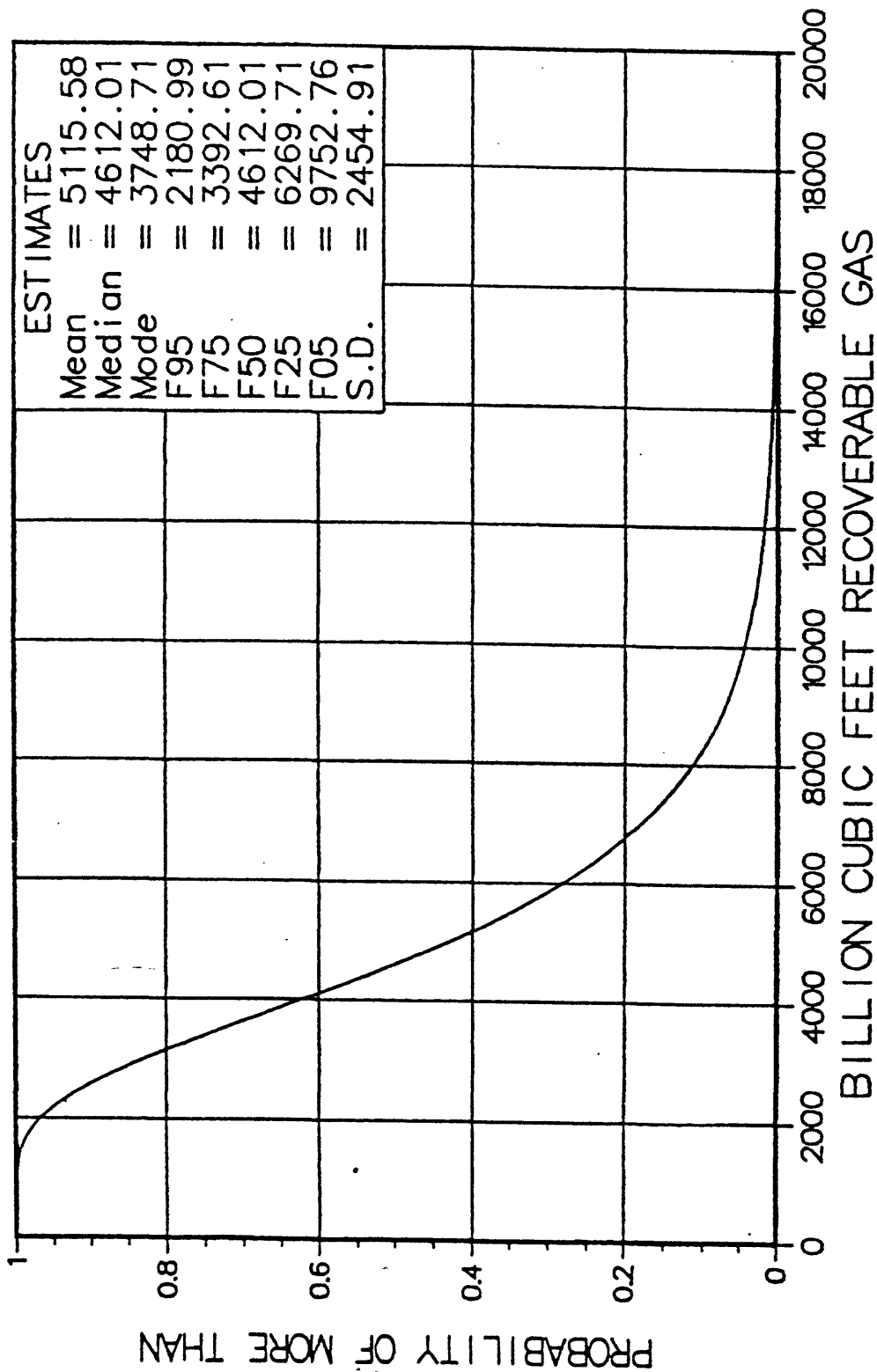


Figure 15B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 90, Wyoming-Utah-Idaho Overthrust Belt.

# WILDERNESS LANDS - Oil - Province 91 Northern Arizona

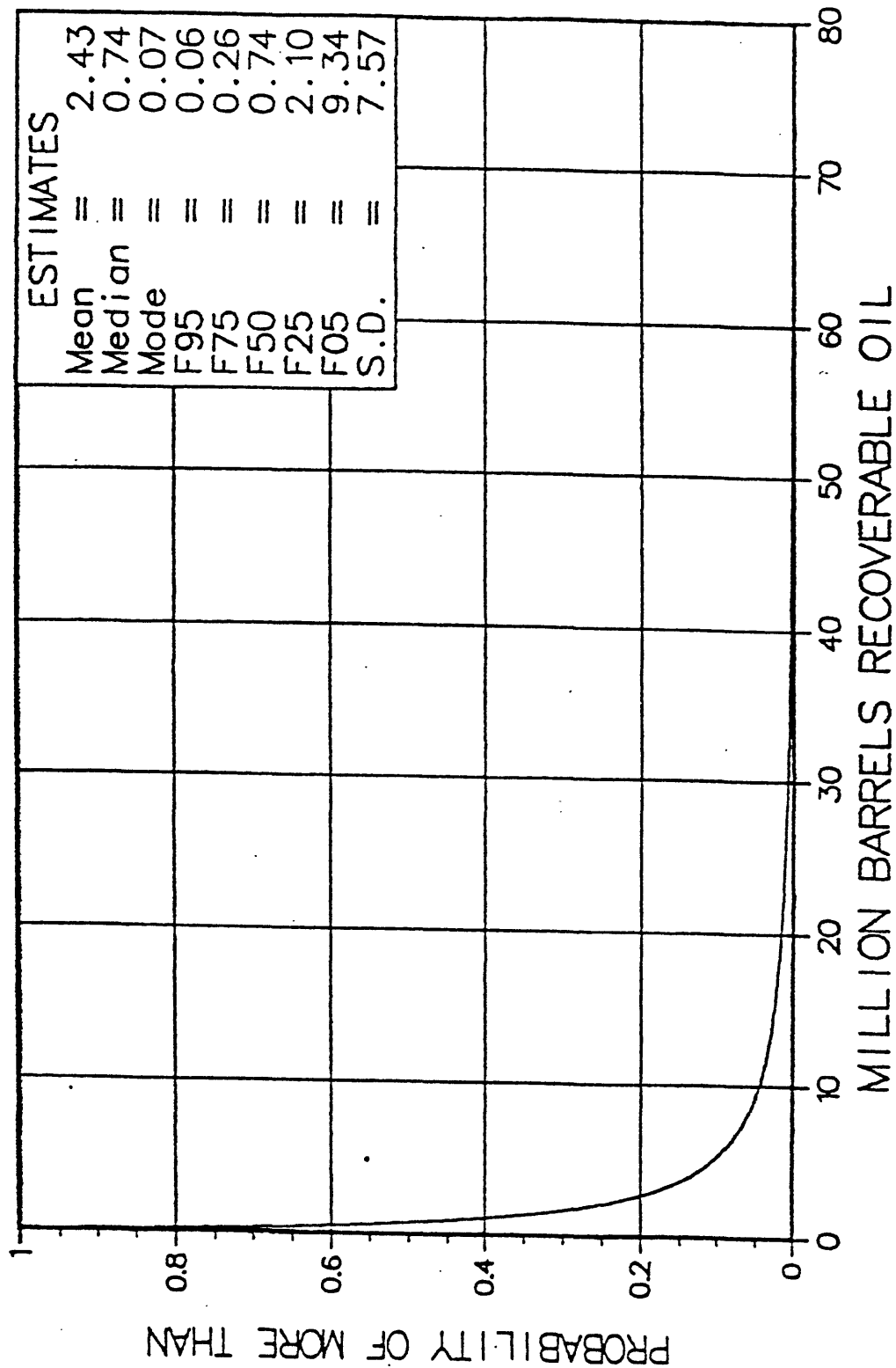


Figure 16A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 91, Northern Arizona.

# WILDERNESS LANDS -- Gas -- Province 91 Northern Arizona

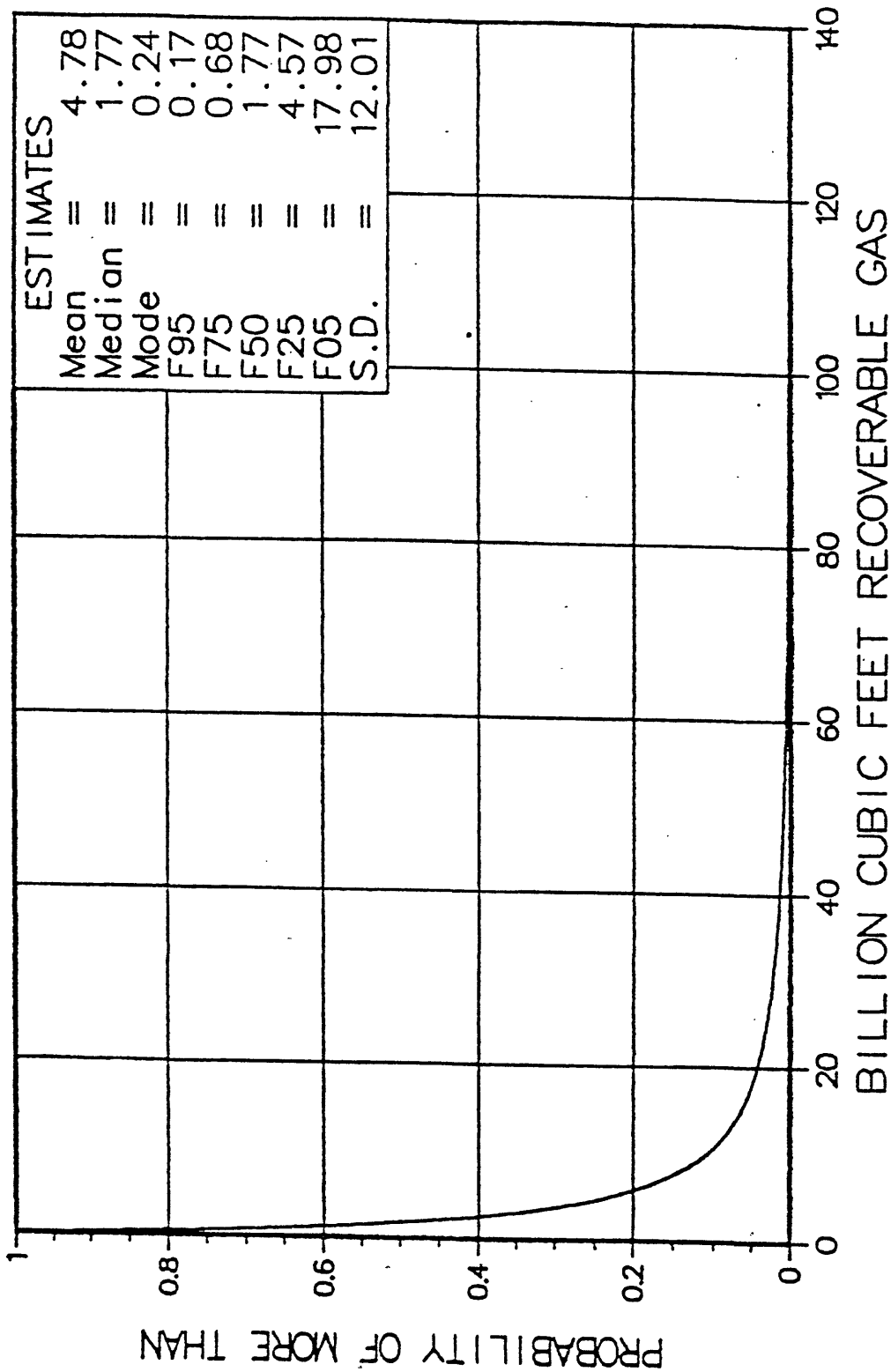


Figure 16B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 91, Northern Arizona.

# WILDERNESS LANDS -- Oil -- Province 92 South--Central New Mexico

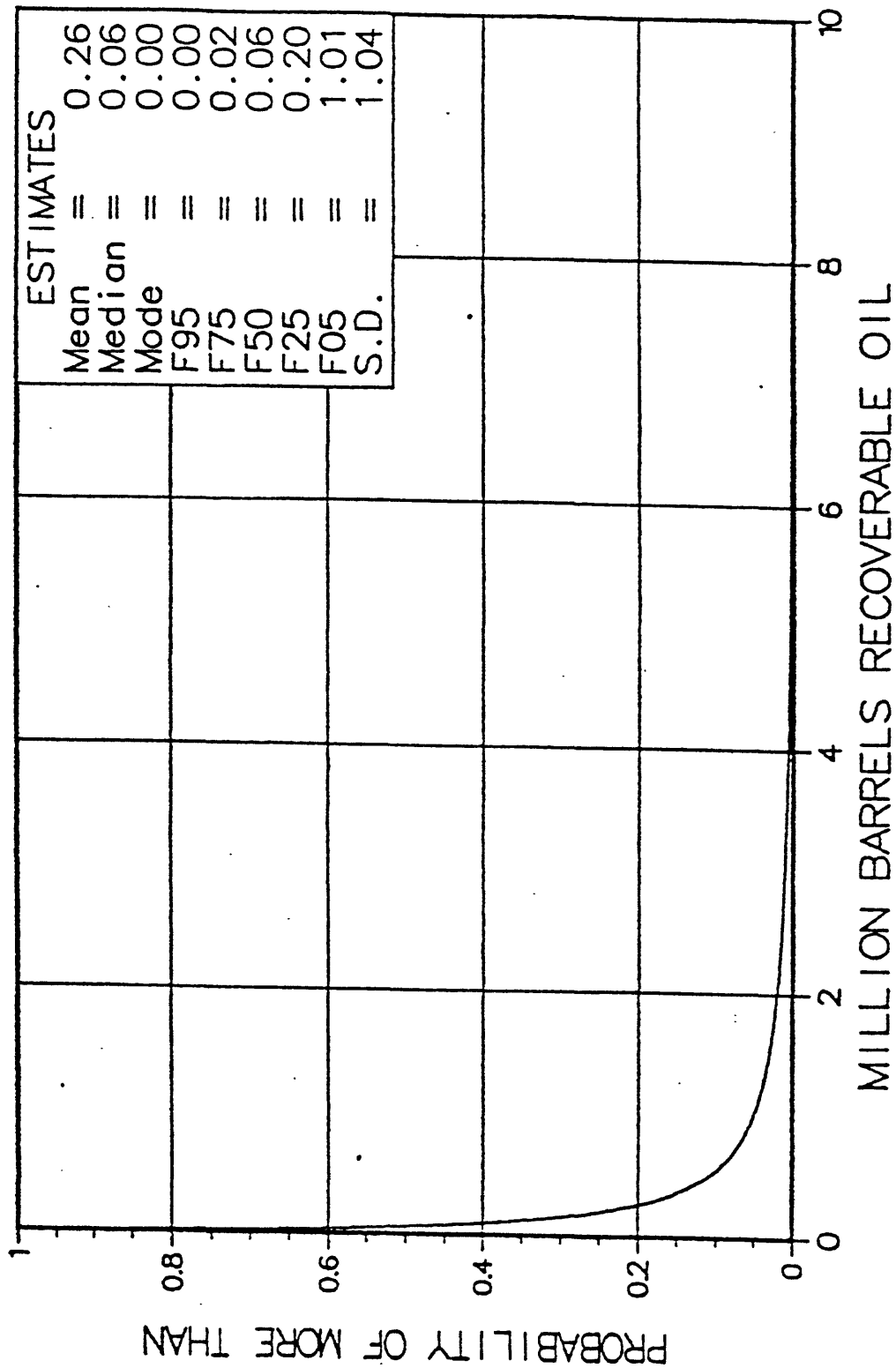


Figure 17A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 92, South-Central New Mexico.



# WILDERNESS LANDS – Gas – Province 92 South–Central New Mexico

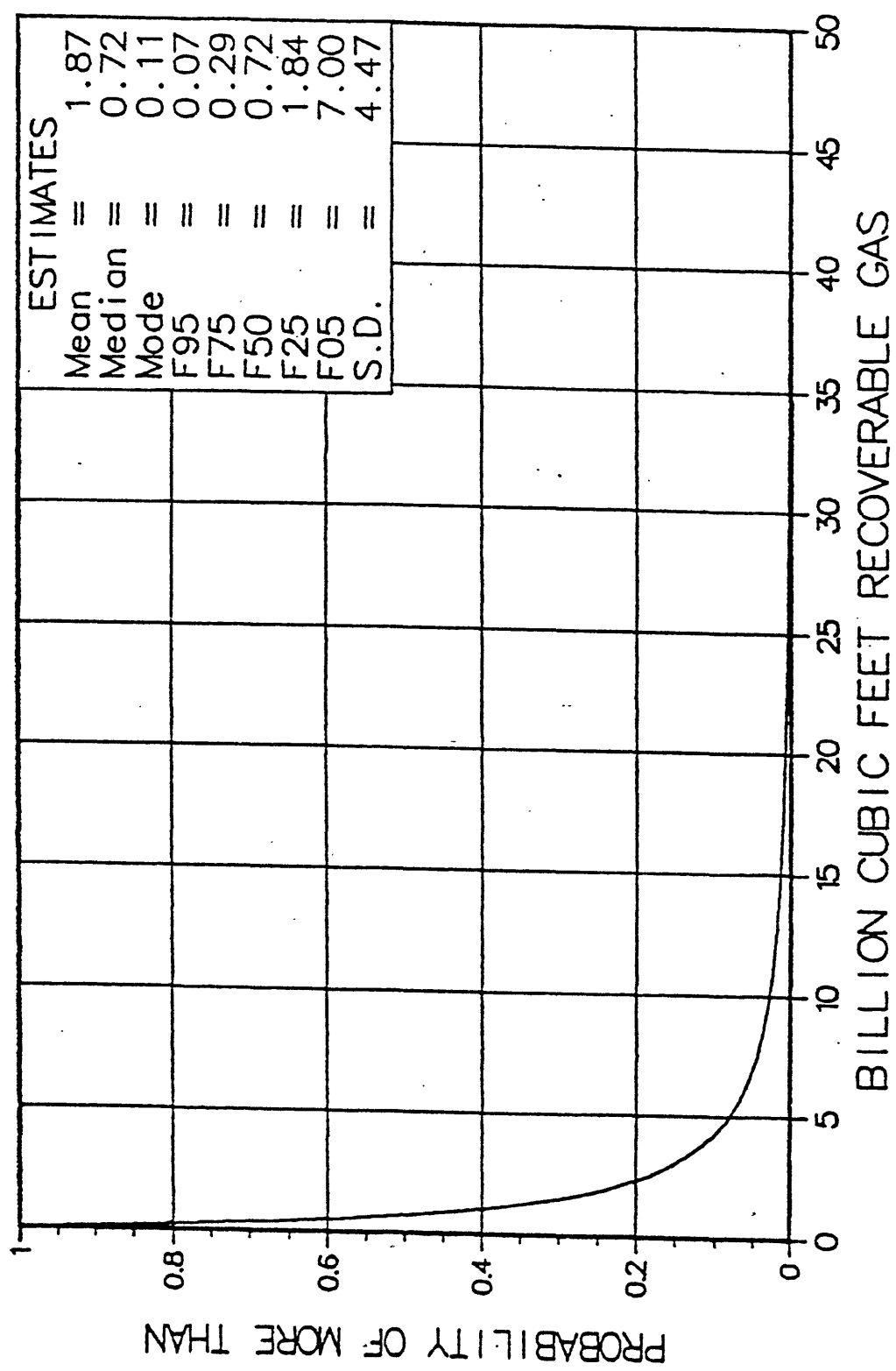


Figure 17B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 92, South-Central New Mexico.

# WILDERNESS LANDS -- Oil -- Province 93 Southern Arizona--Southwestern New Mexico

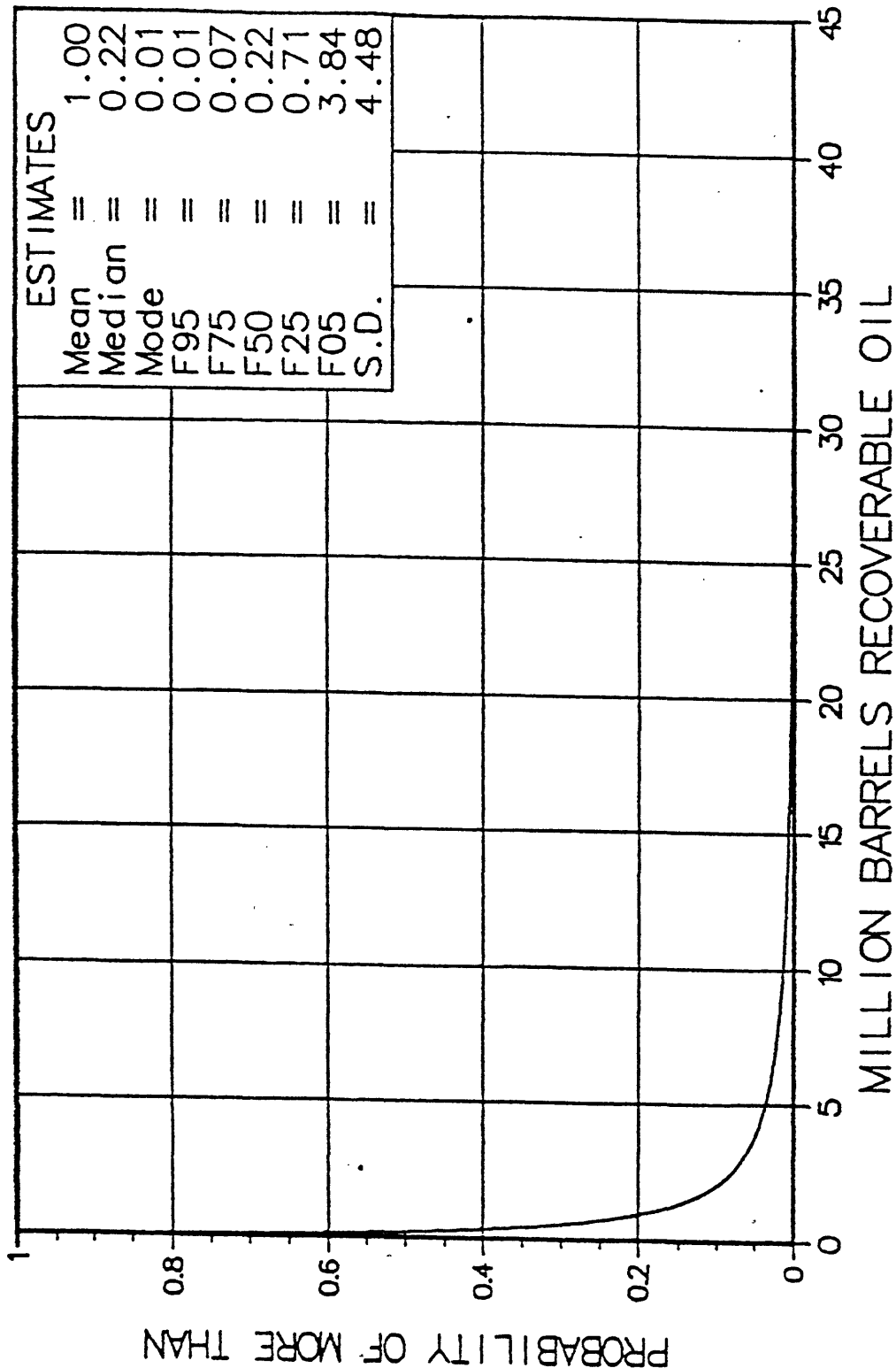


Figure 18A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 93, Southern Arizona--Southwestern New Mexico.

# WILDERNESS LANDS -- Gas -- Province 93 Southern Arizona--Southwestern New Mexico

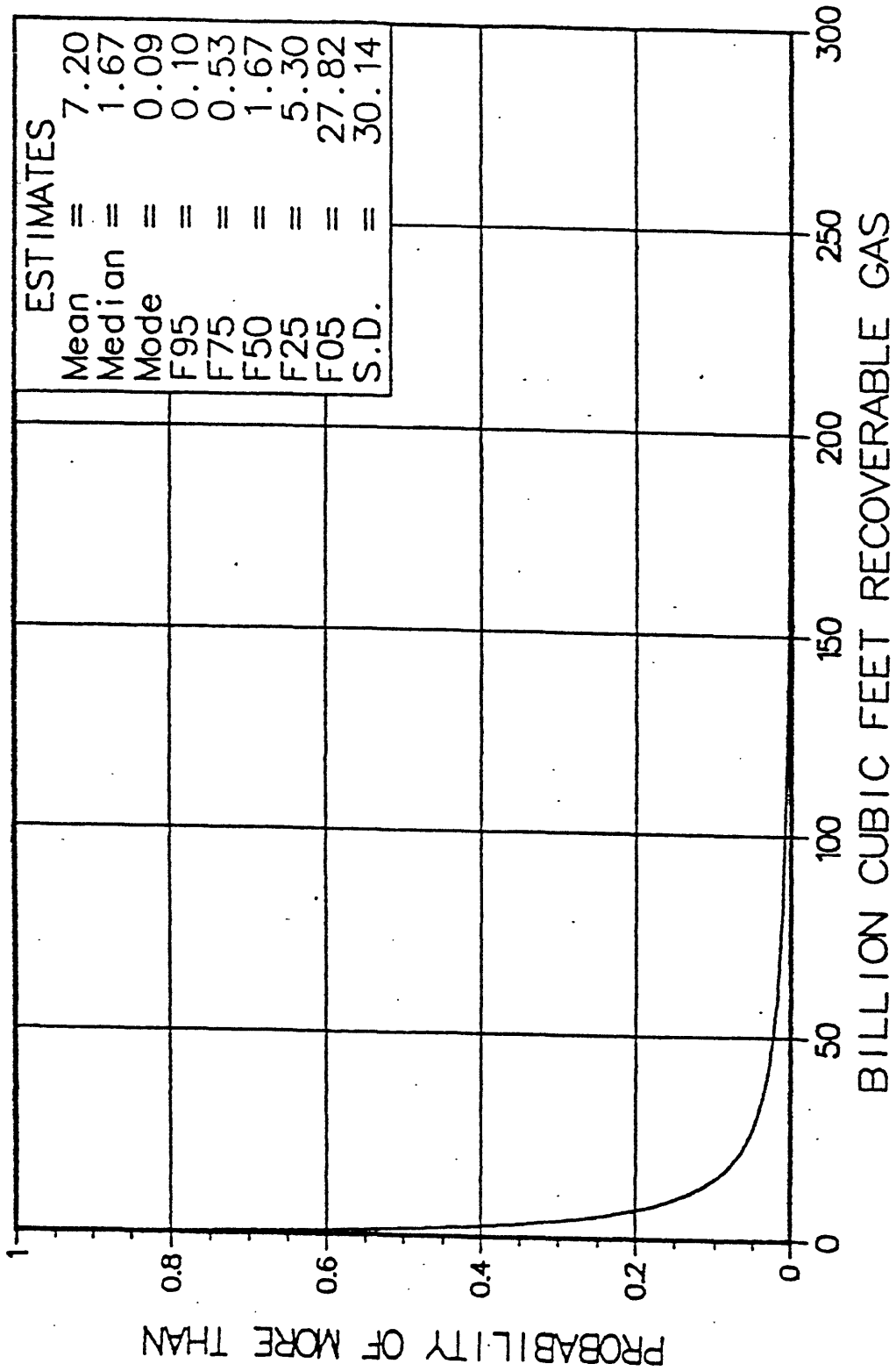


Figure 18B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 93, Southern Arizona-Southwestern New Mexico.

# WILDERNESS LANDS -- Oil -- Province 94 Williston Basin

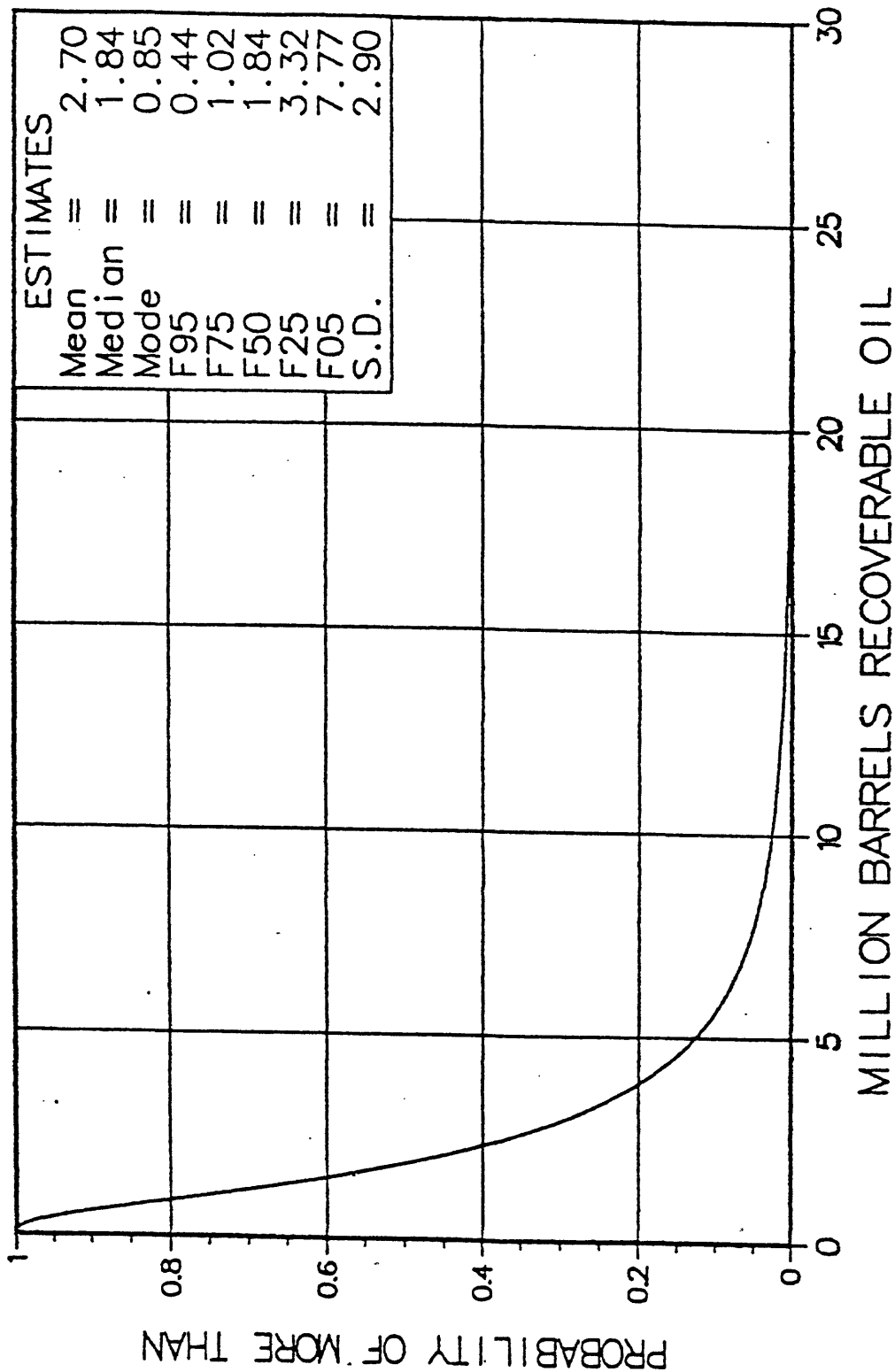


Figure 19A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 94, Williston Basin.

# WILDERNESS LANDS - Gas - Province 94 Williston Basin

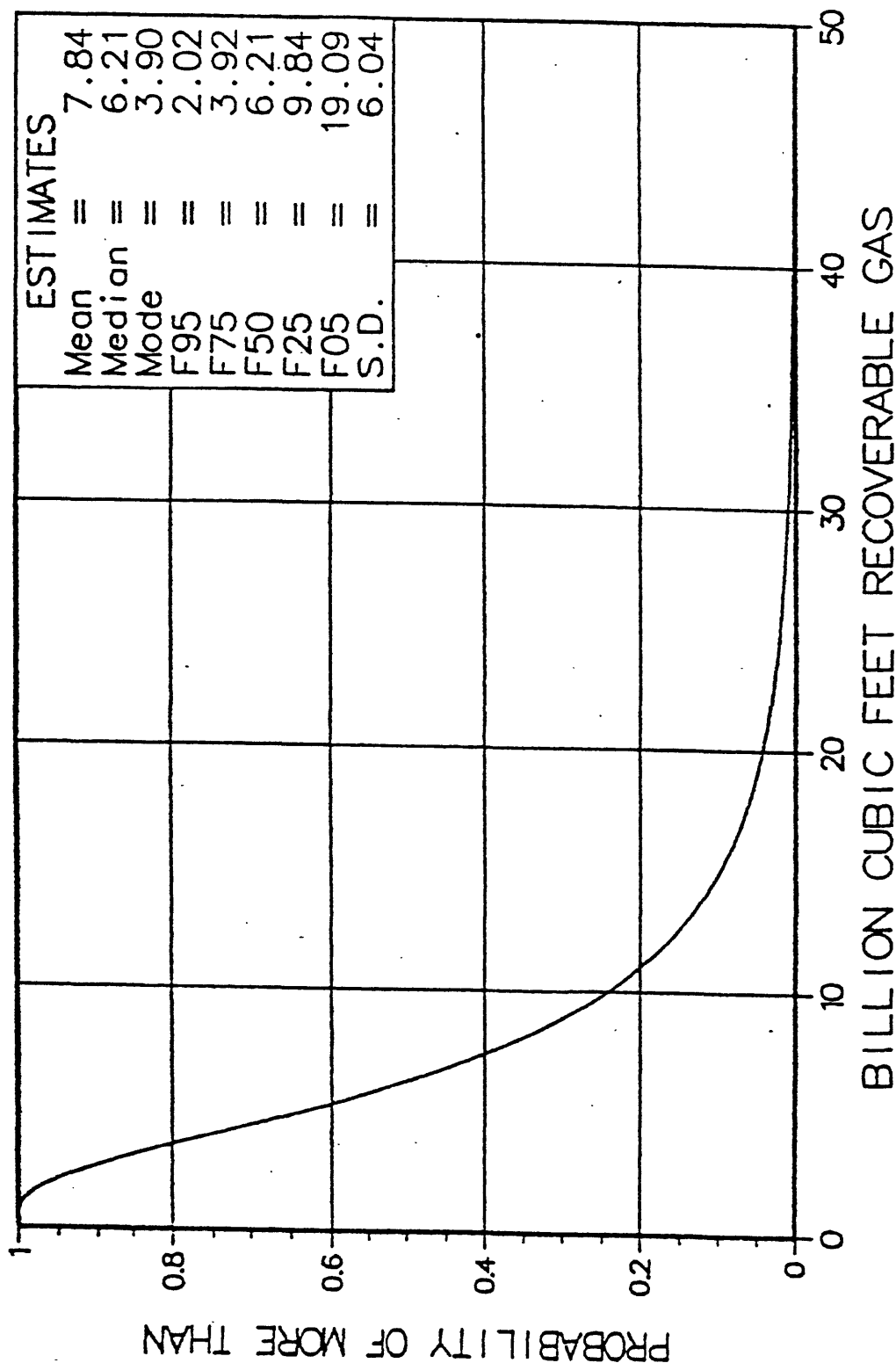
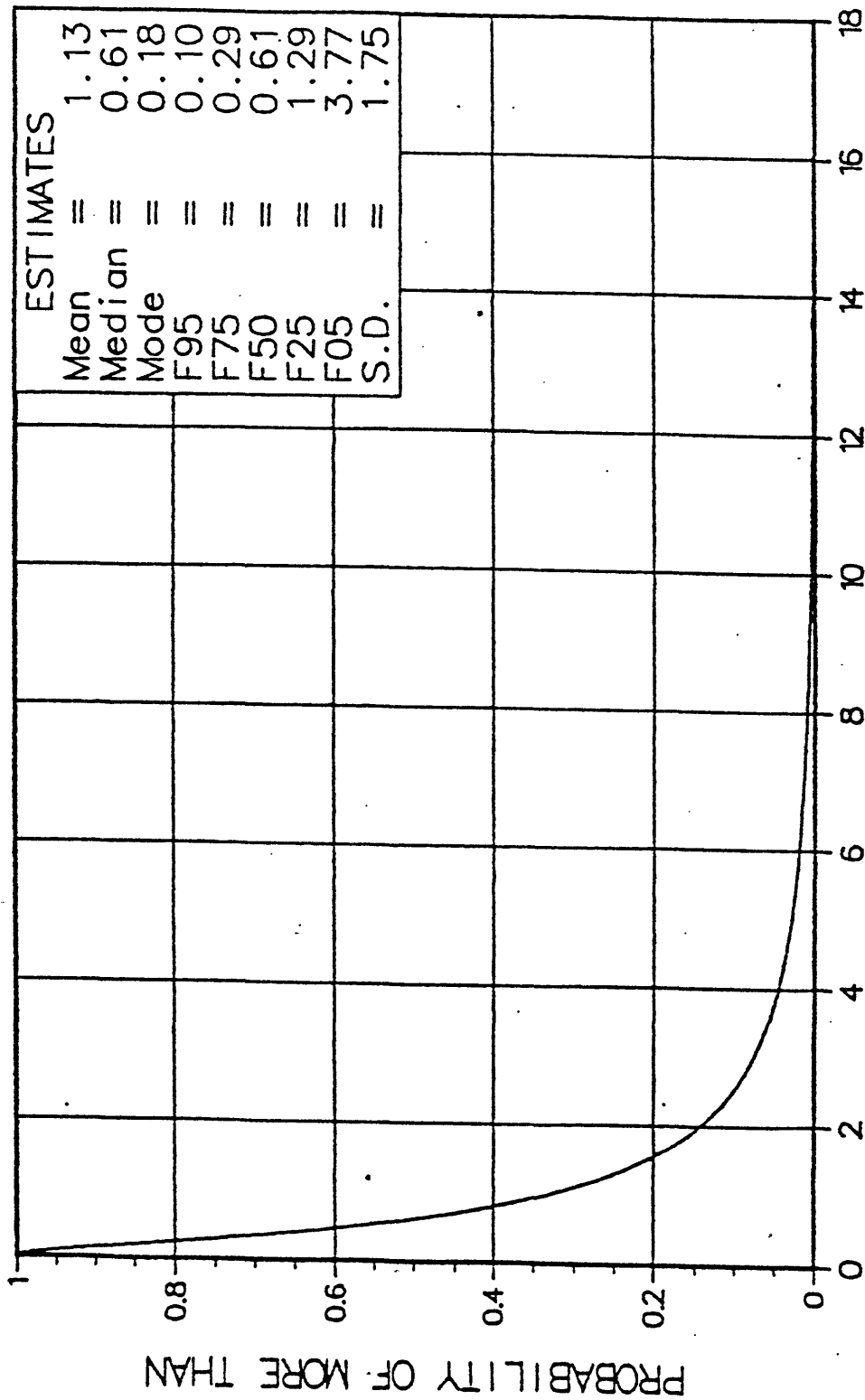


Figure 19B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 94, Williston Basin.

# WILDERNESS LANDS -- Oil -- Province 96 Sweetgrass Arch



## MILLION BARRELS RECOVERABLE OIL

Figure 20A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 96, Sweetgrass Arch.

# WILDERNESS LANDS – Gas – Province 96 Sweetgrass Arch

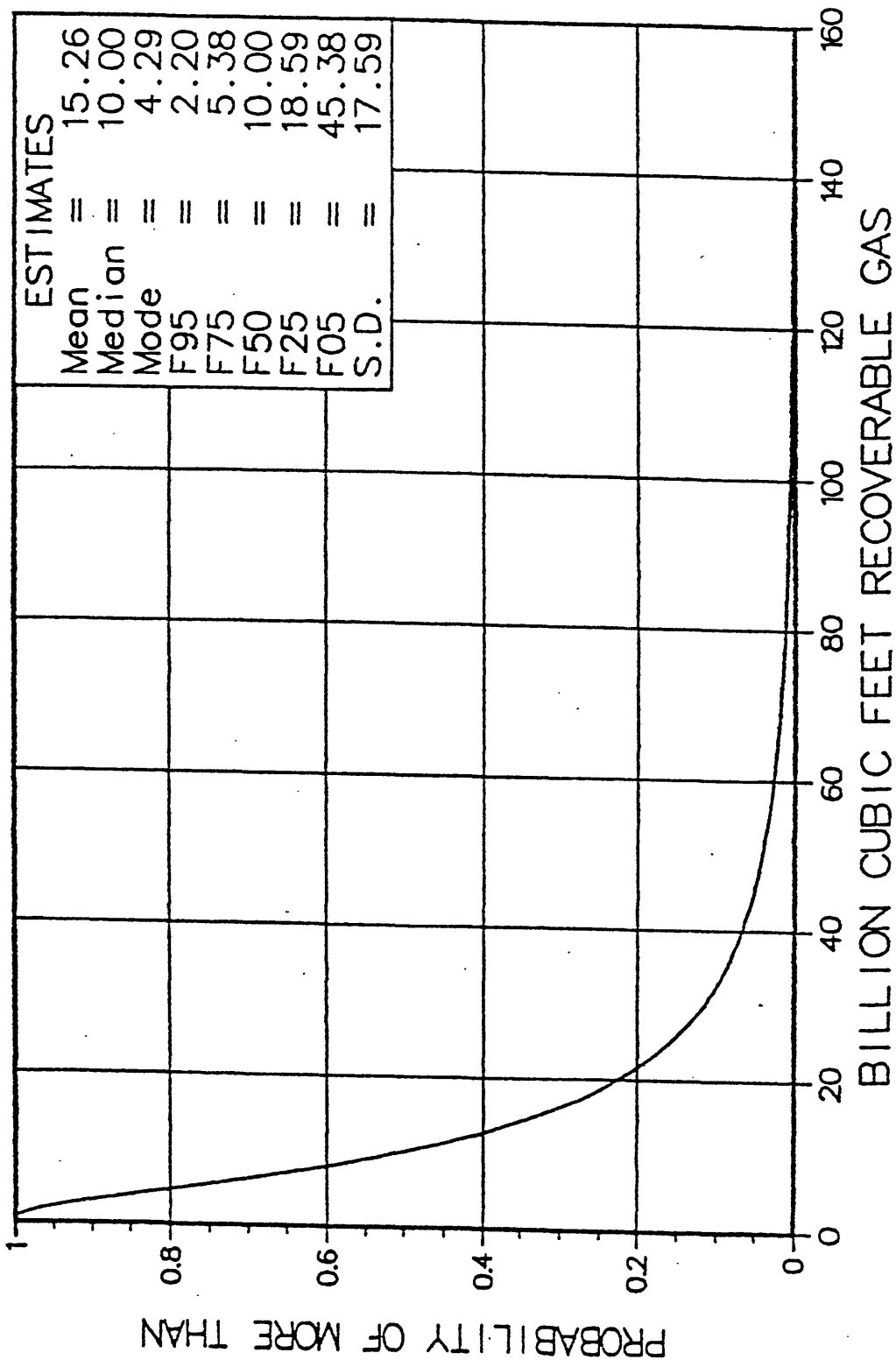


Figure 20B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 96, Sweetgrass Arch.

# WILDERNESS LANDS -- Oil -- Province 97 Central Montana

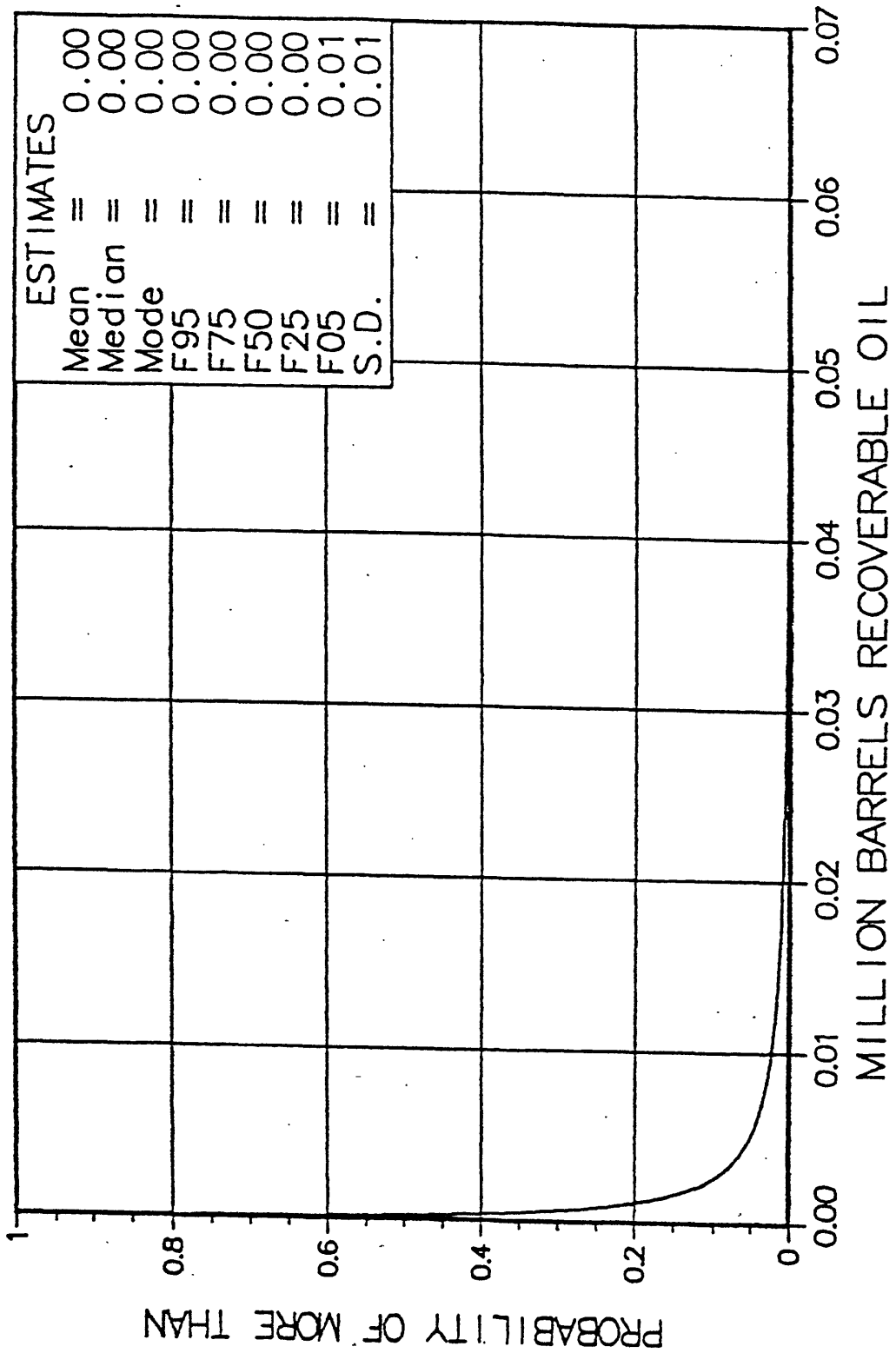


Figure 21A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 97, Central Montana.



# WILDERNESS LANDS -- Gas -- Province 97 Central Montana

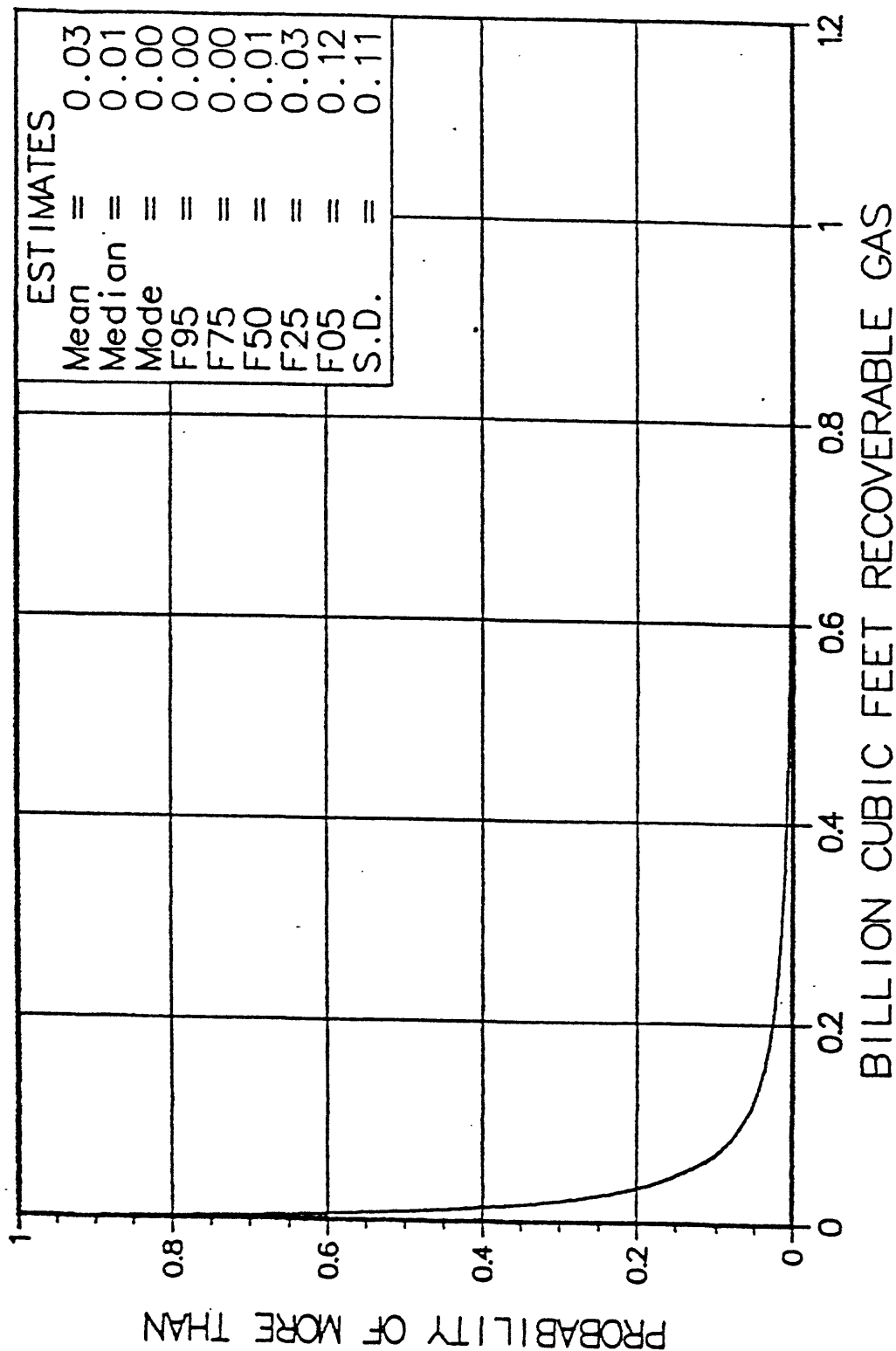


Figure 21B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 97, Central Montana.

# WILDERNESS LANDS – Oil – Province 98 Montana Overthrust Belt

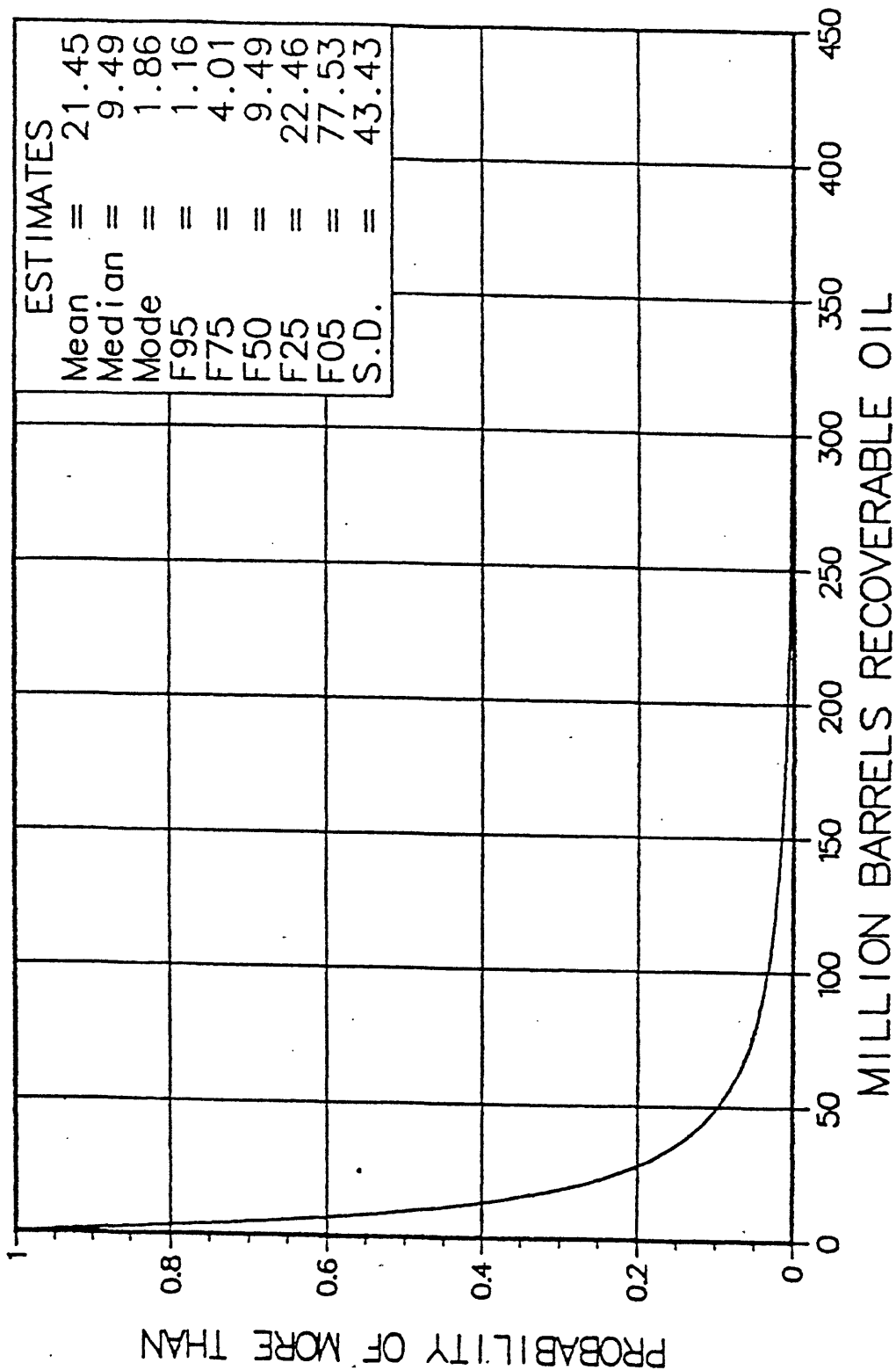


Figure 22A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 98, Montana Overthrust Belt.

# WILDERNESS LANDS - Gas - Province 98 Montana Overthrust Belt

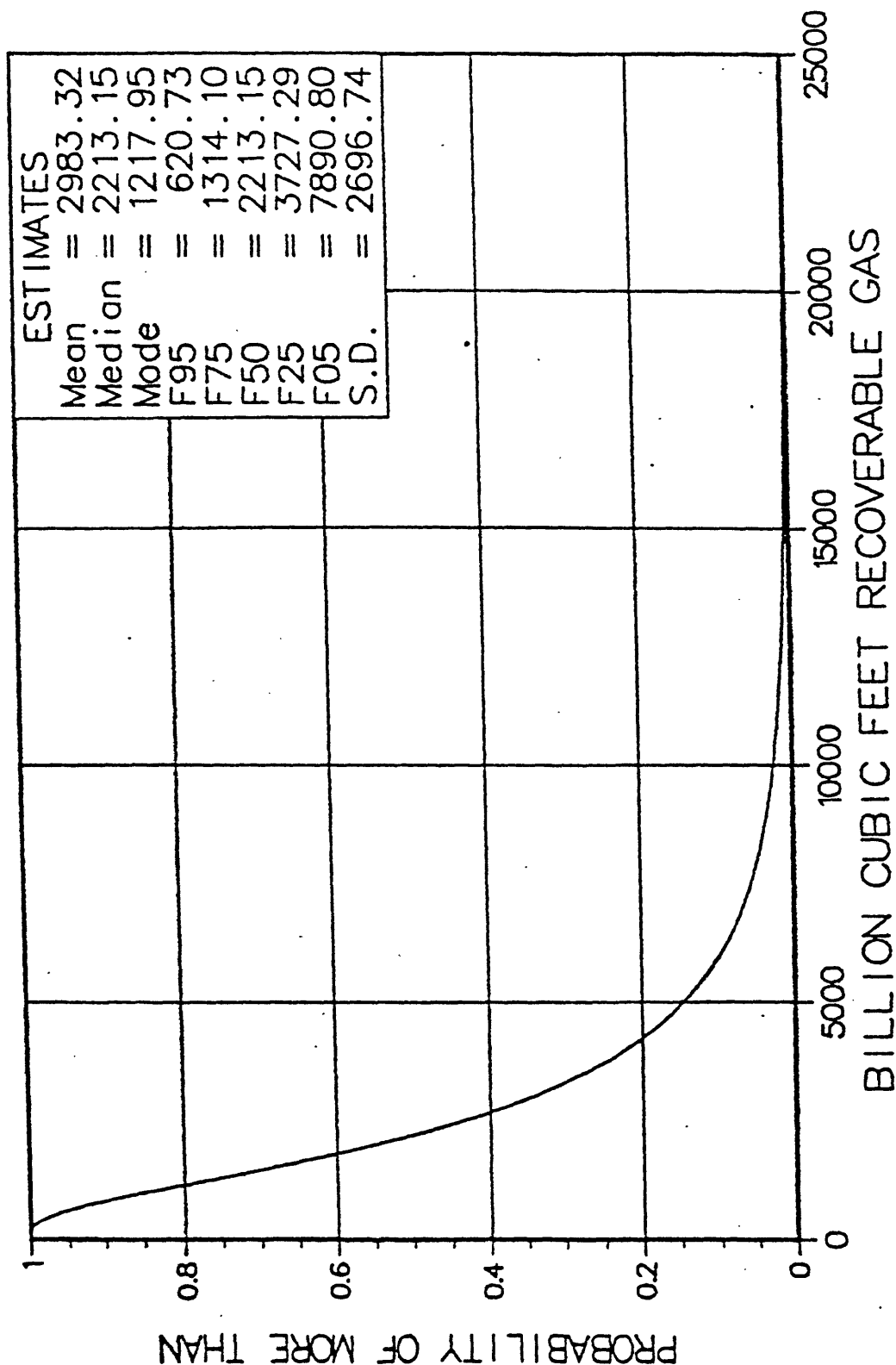


Figure 22B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 98, Montana Overthrust Belt.

# WILDERNESS LANDS -- Oil -- Province 99 Southwestern Montana

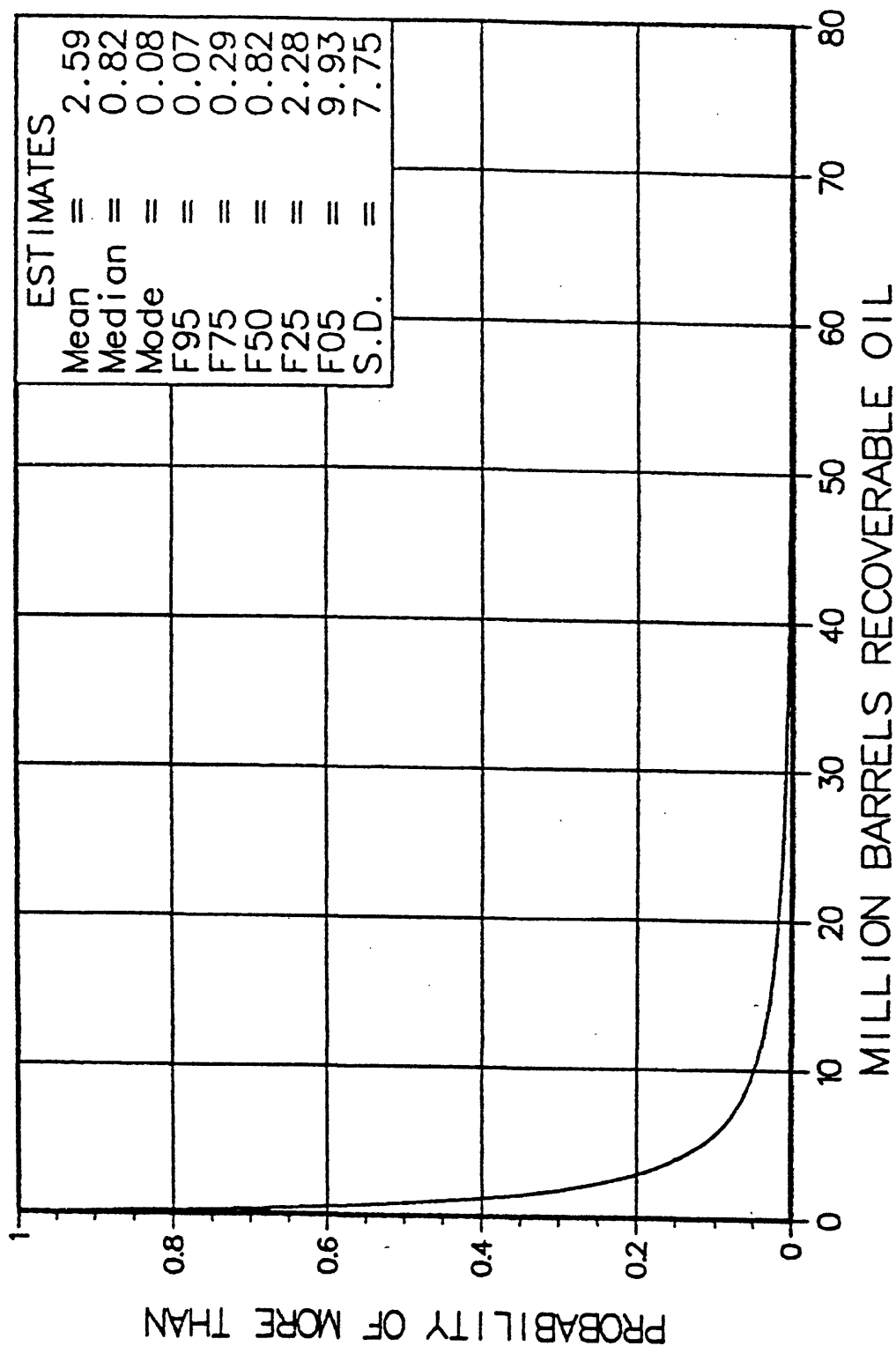


Figure 23A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 99, Southwestern Montana.

# WILDERNESS LANDS – Gas – Province 99 Southwestern Montana

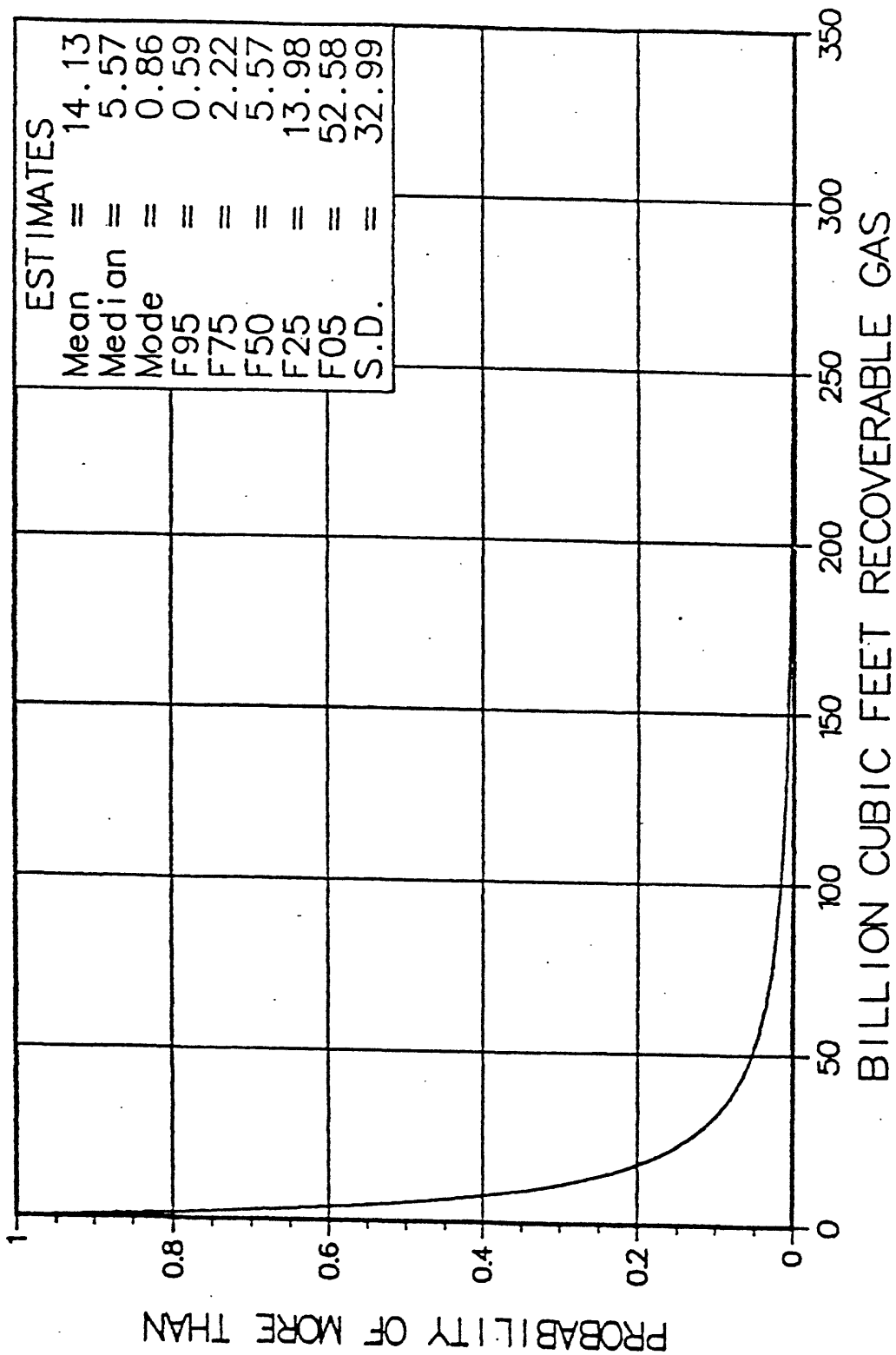


Figure 23B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 99, Southwestern Montana.

# WILDERNESS LANDS -- Oil -- Province 100 Wind River Basin

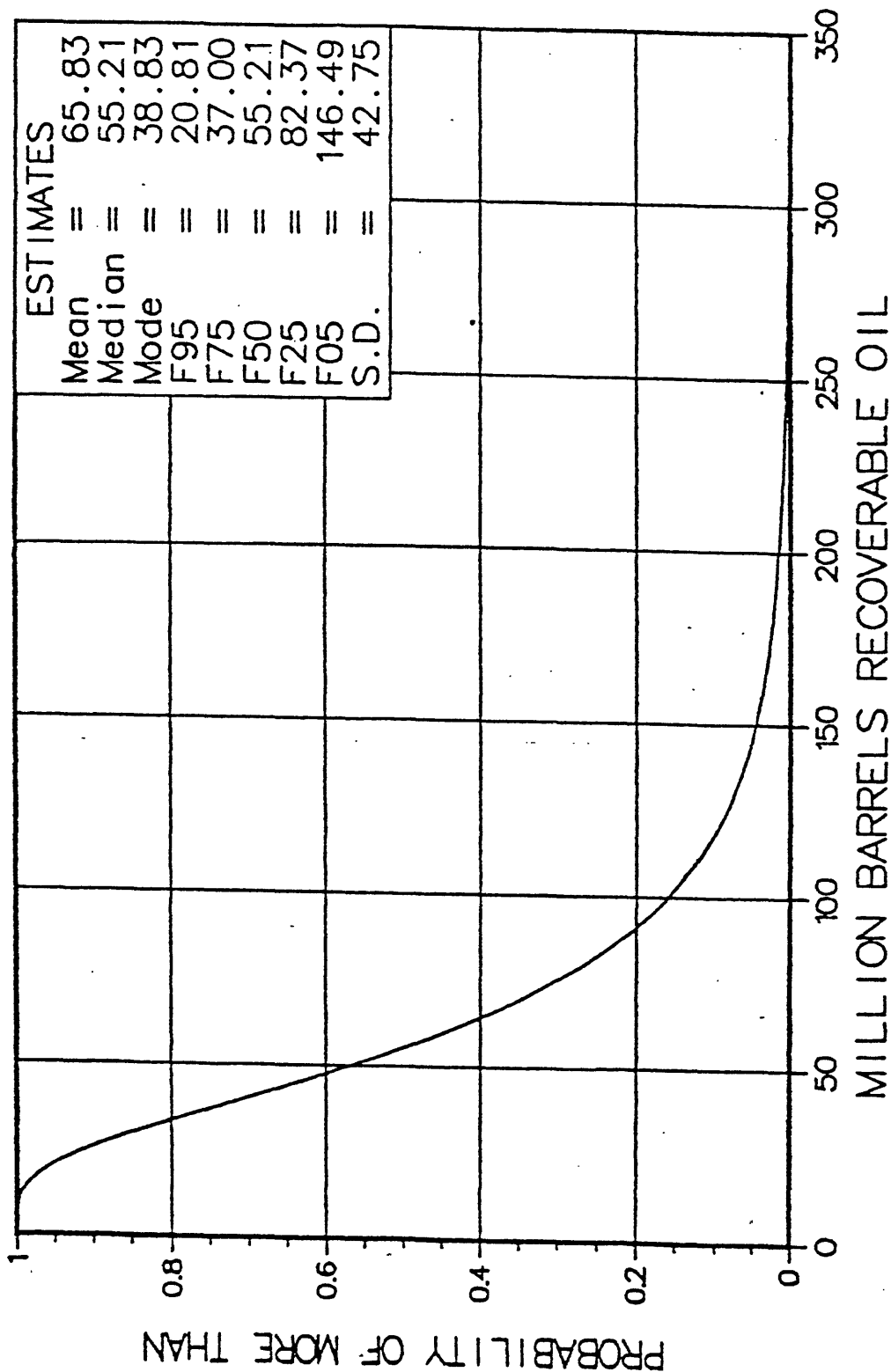


Figure 24A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 100, Wind River Basin.

# WILDERNESS LANDS - Gas - Province 100 Wind River Basin

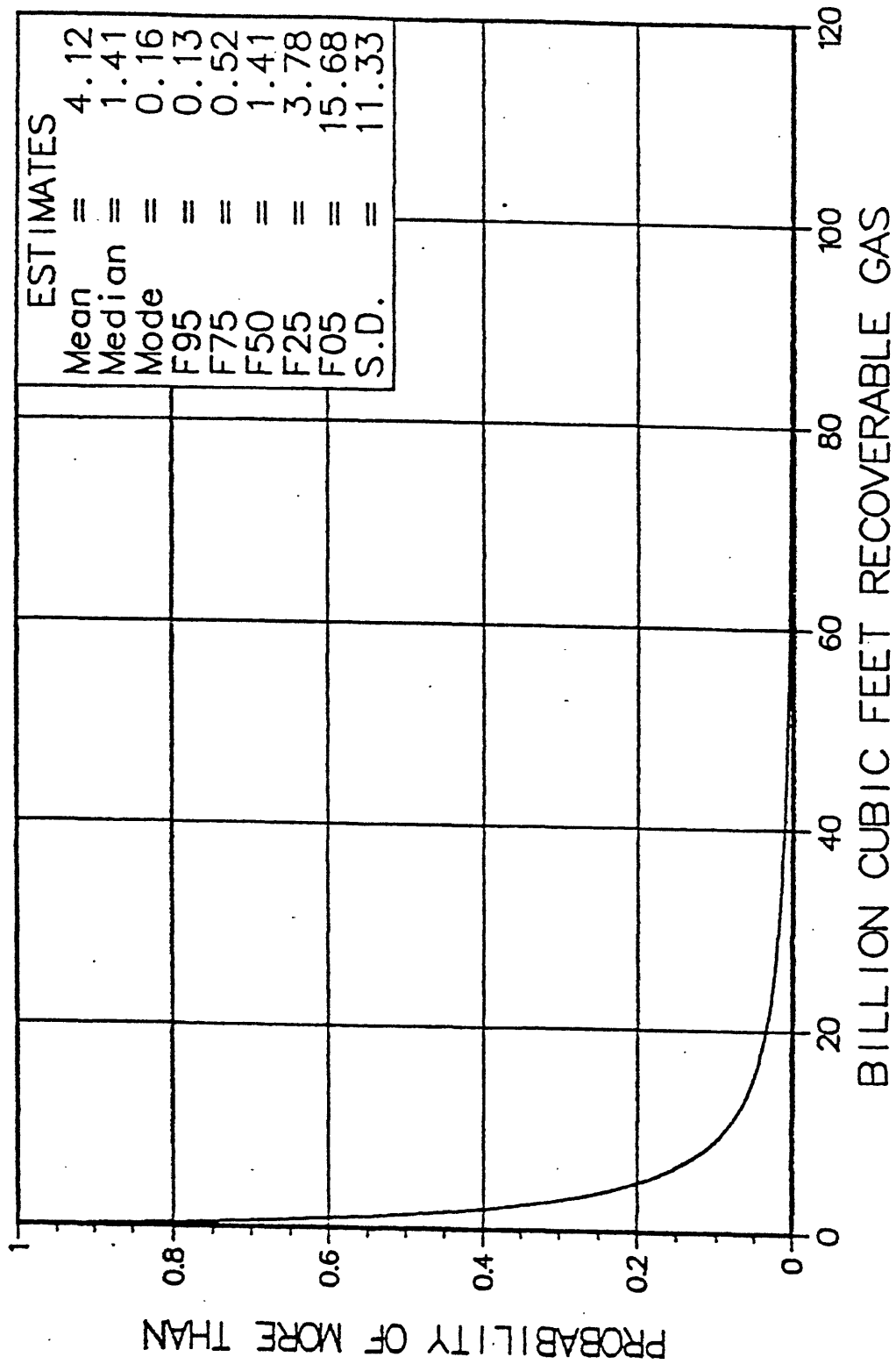


Figure 24R.--Undiscovered recoverable gas resources in Wilderness Lands of Province 100, Wind River Basin.

# WILDERNESS LANDS -- Oil -- Province 101 Powder River Basin

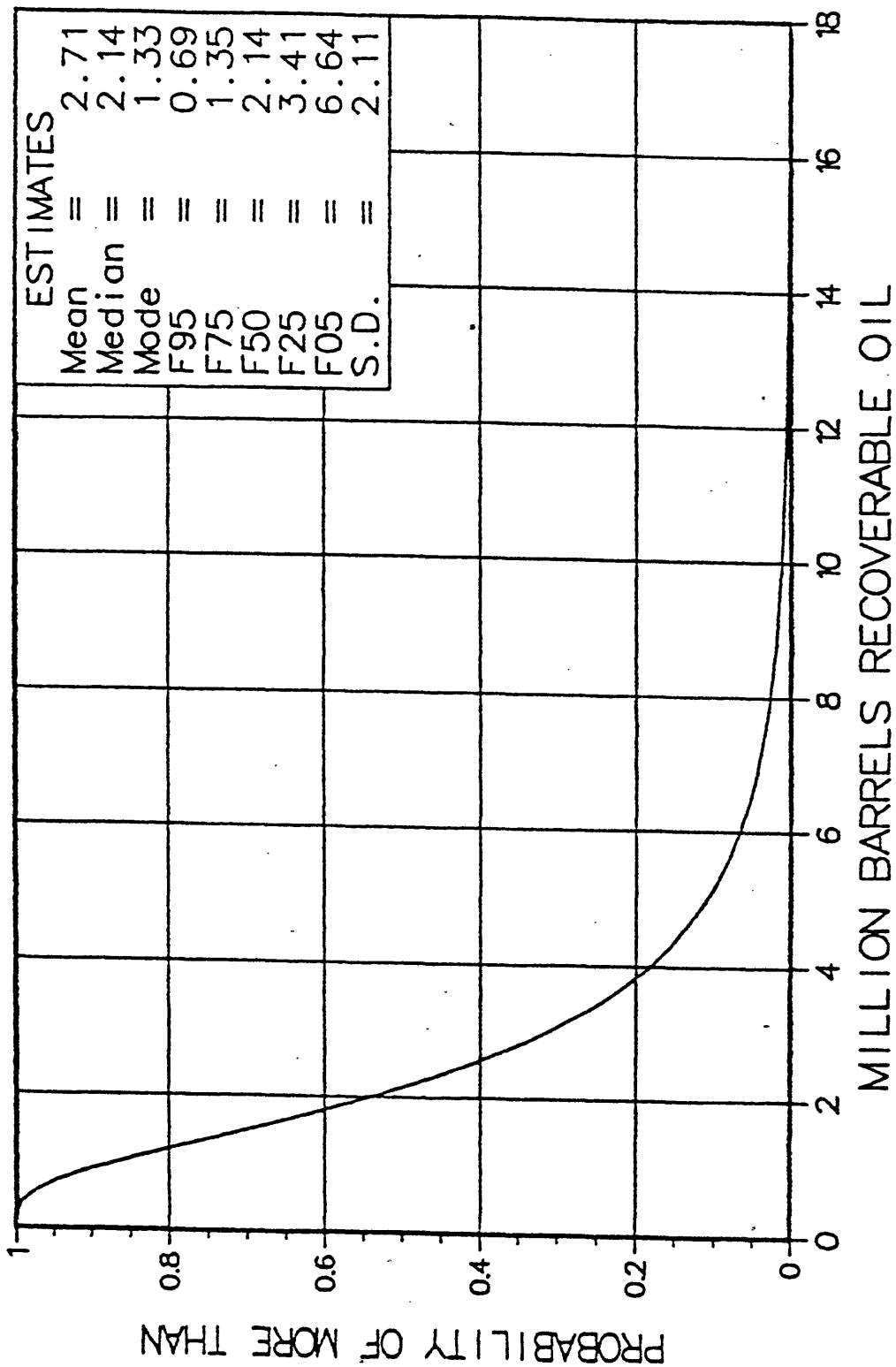


Figure 25A.---Undiscovered recoverable oil resources in Wilderness Lands of Province 101, Powder River Basin.



# WILDERNESS LANDS – Gas – Province 101 Powder River Basin

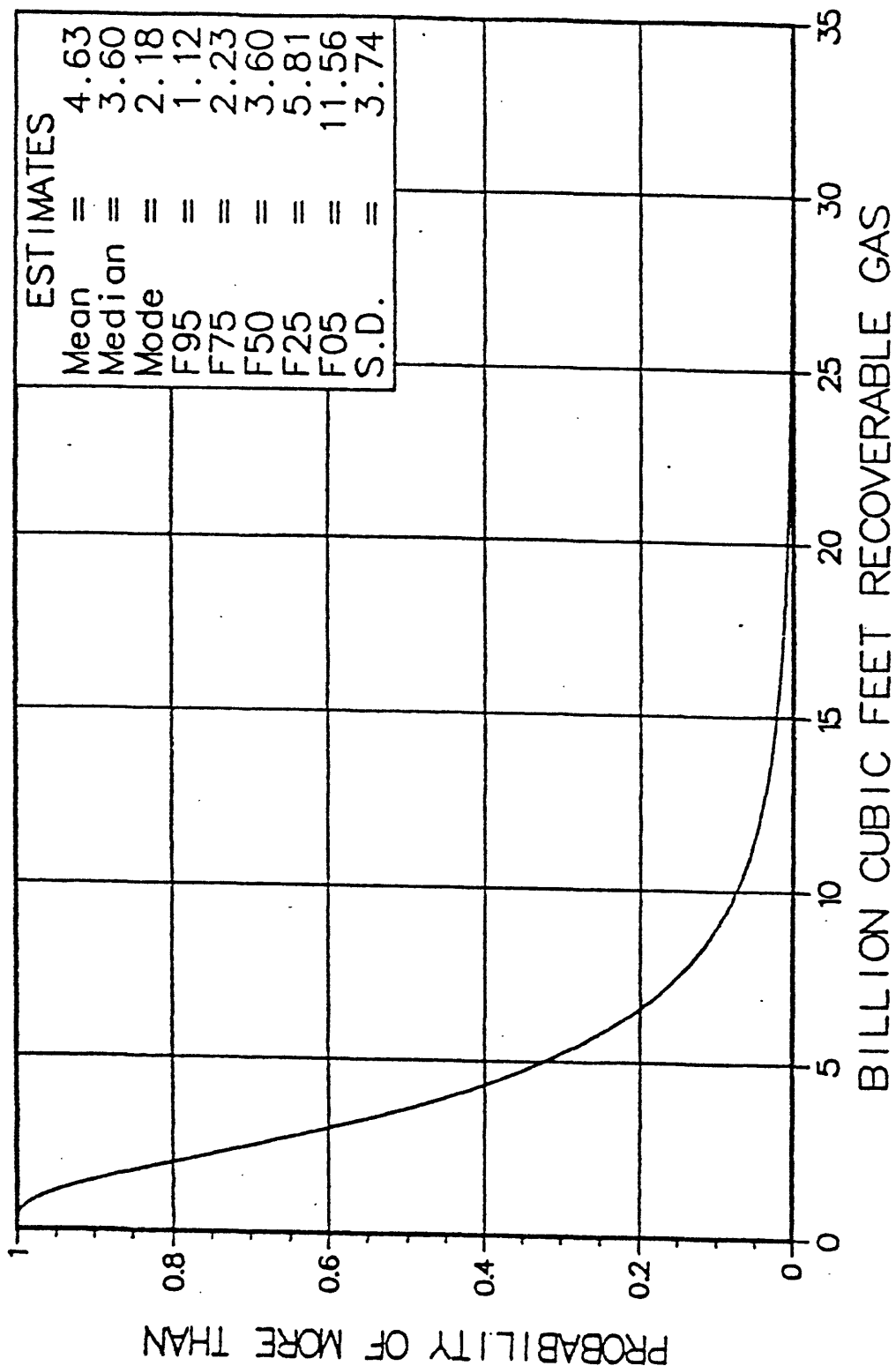


Figure 25B.---Undiscovered recoverable gas resources in Wilderness Lands of Province 101, Powder River Basin.

# WILDERNESS LANDS -- Oil -- Province 102 Southwestern Wyoming Basins

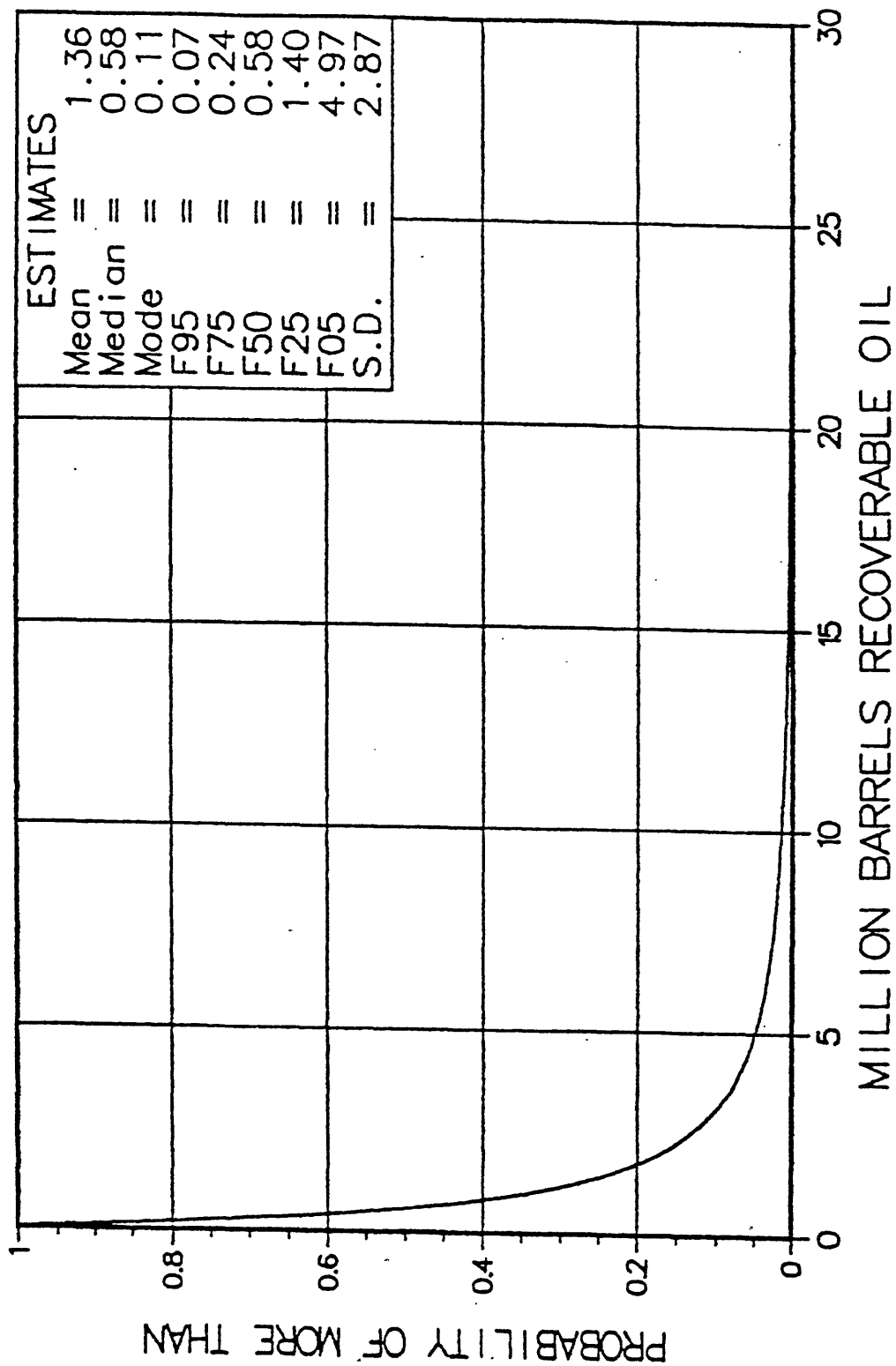


Figure 26A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 102, Southwestern Wyoming Basins.

# WILDERNESS LANDS -- Gas -- Province 102 Southwestern Wyoming Basins

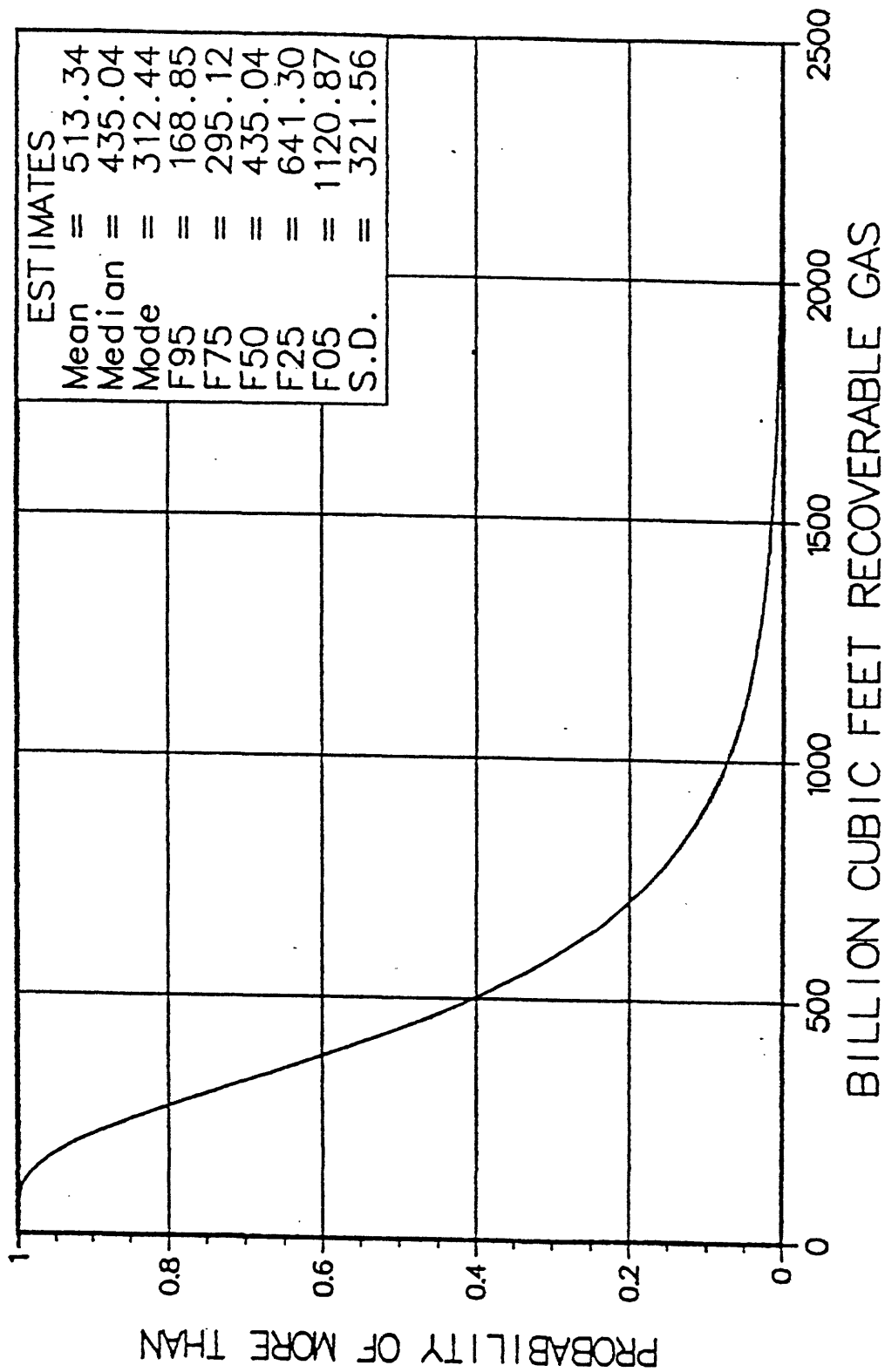


Figure 26R.--Undiscovered recoverable gas resources in Wilderness Lands of Province 102, Southwestern Wyoming Basins.

# WILDERNESS LANDS -- Oil -- Province 103 Big Horn Basin

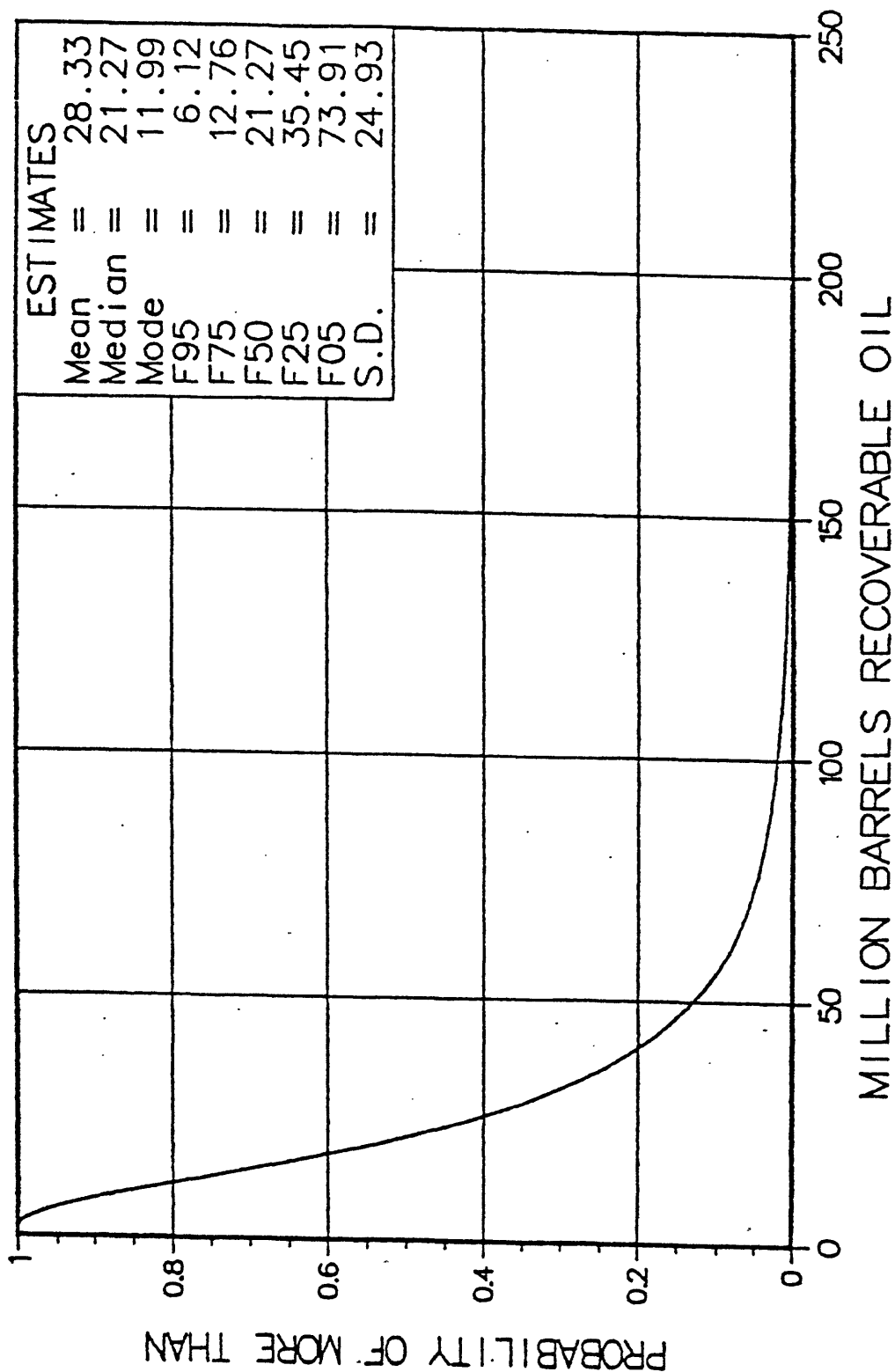


Figure 27A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 103, Big Horn Basin.

# WILDERNESS LANDS – Gas – Province 103 Big Horn Basin

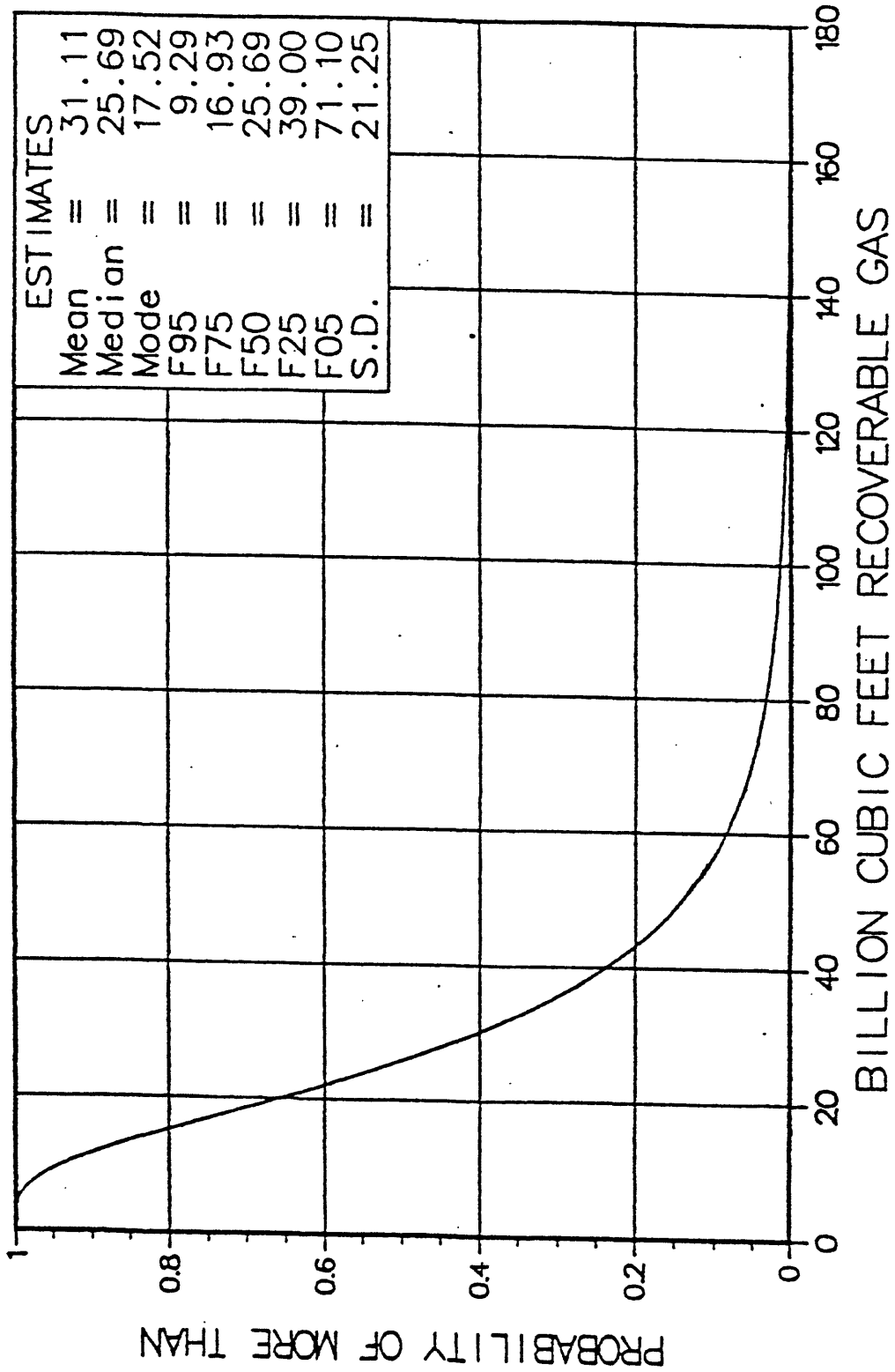


Figure 27B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 103, Big Horn Basin.

# WILDERNESS LANDS - Oil - Province 106 Raton Basin-Sierra Grande Uplift

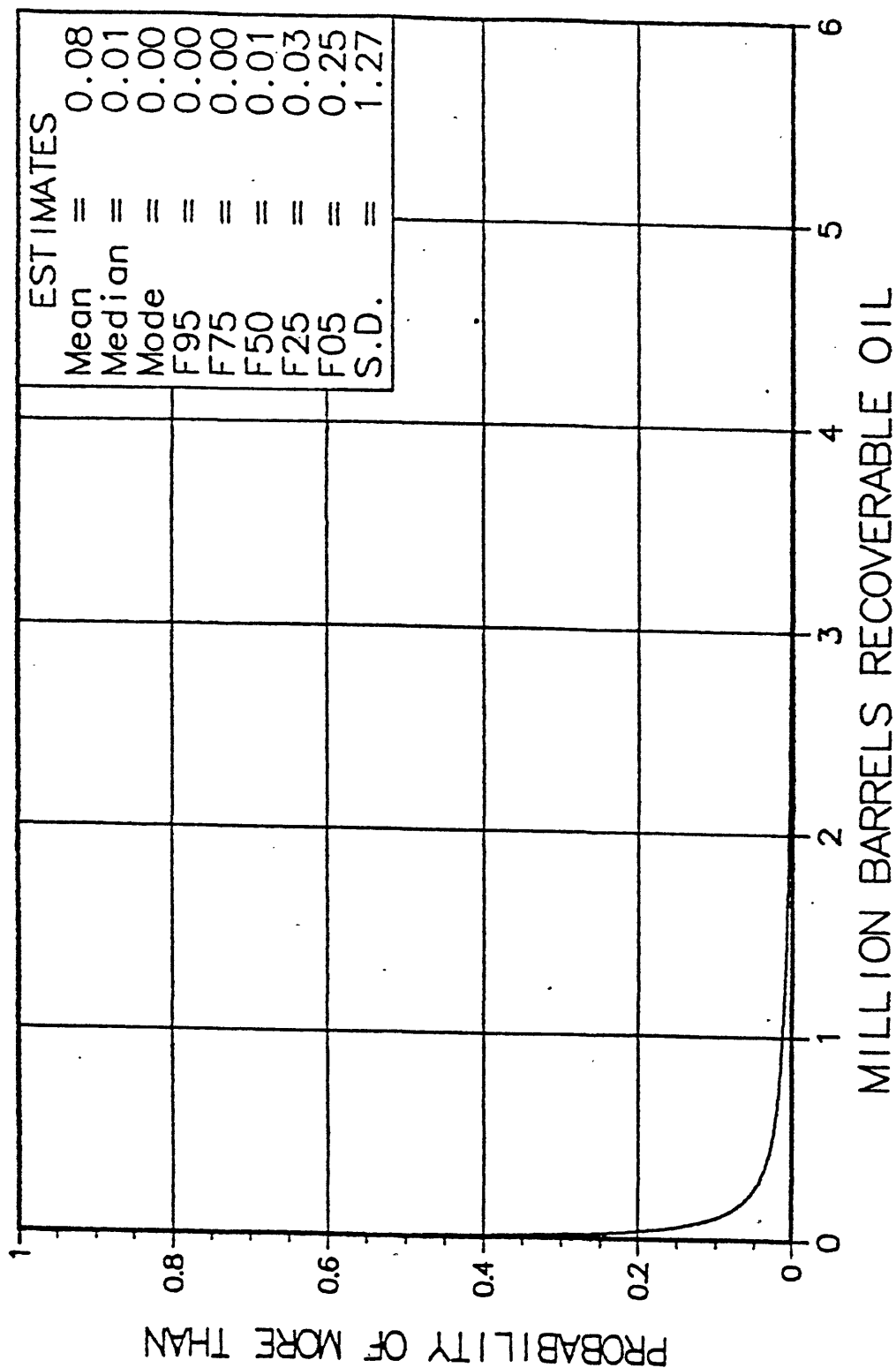


Figure 28A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 106, Raton Basin-Sierra Grande Uplift.

# WILDERNESS LANDS -- Gas -- Province 106 Raton Basin-Sierra Grande Uplift

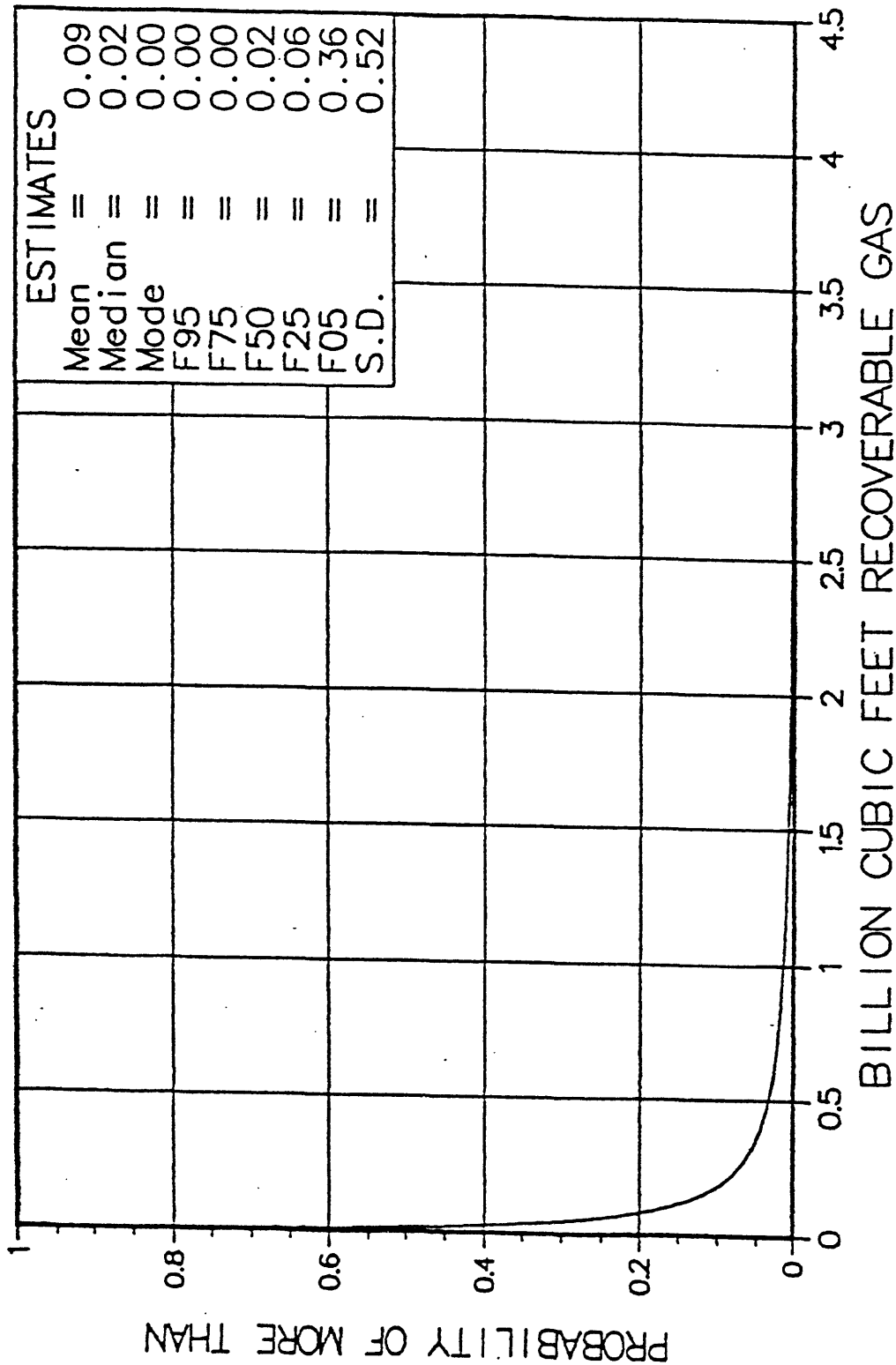


Figure 28B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 106, Raton Basin-Sierra Grande Uplift.

# WILDERNESS LANDS – Oil – Province 107 Permian Basin

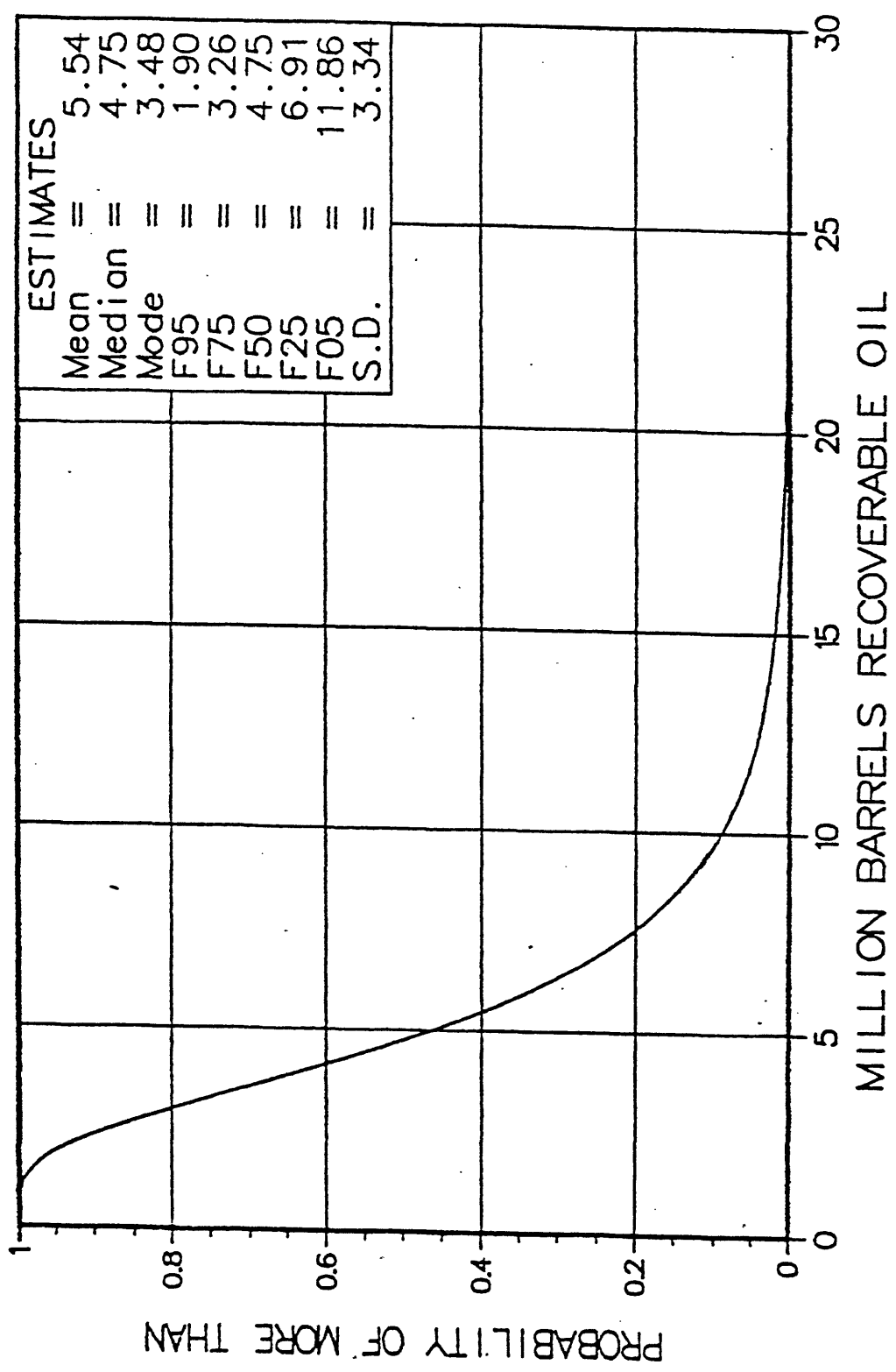


Figure 29A. ---Undiscovered recoverable oil resources in Wilderness Lands of Province 107, Permian Basin.



# WILDERNESS LANDS - Gas - Province 107 Permian Basin

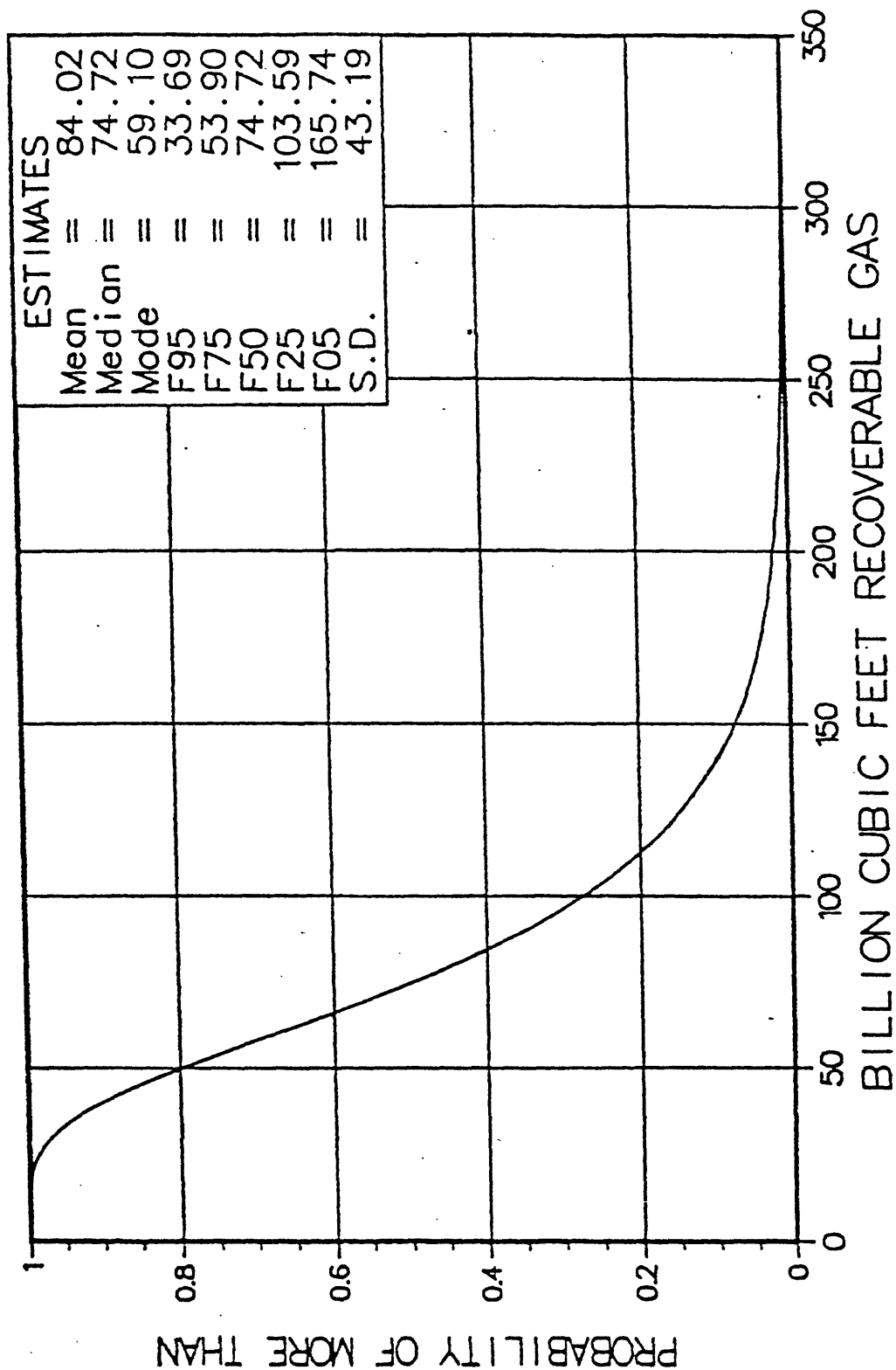


Figure 29B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 107, Permian Basin.

# WILDERNESS LANDS -- Oil -- Province 109 Pedernal Uplift

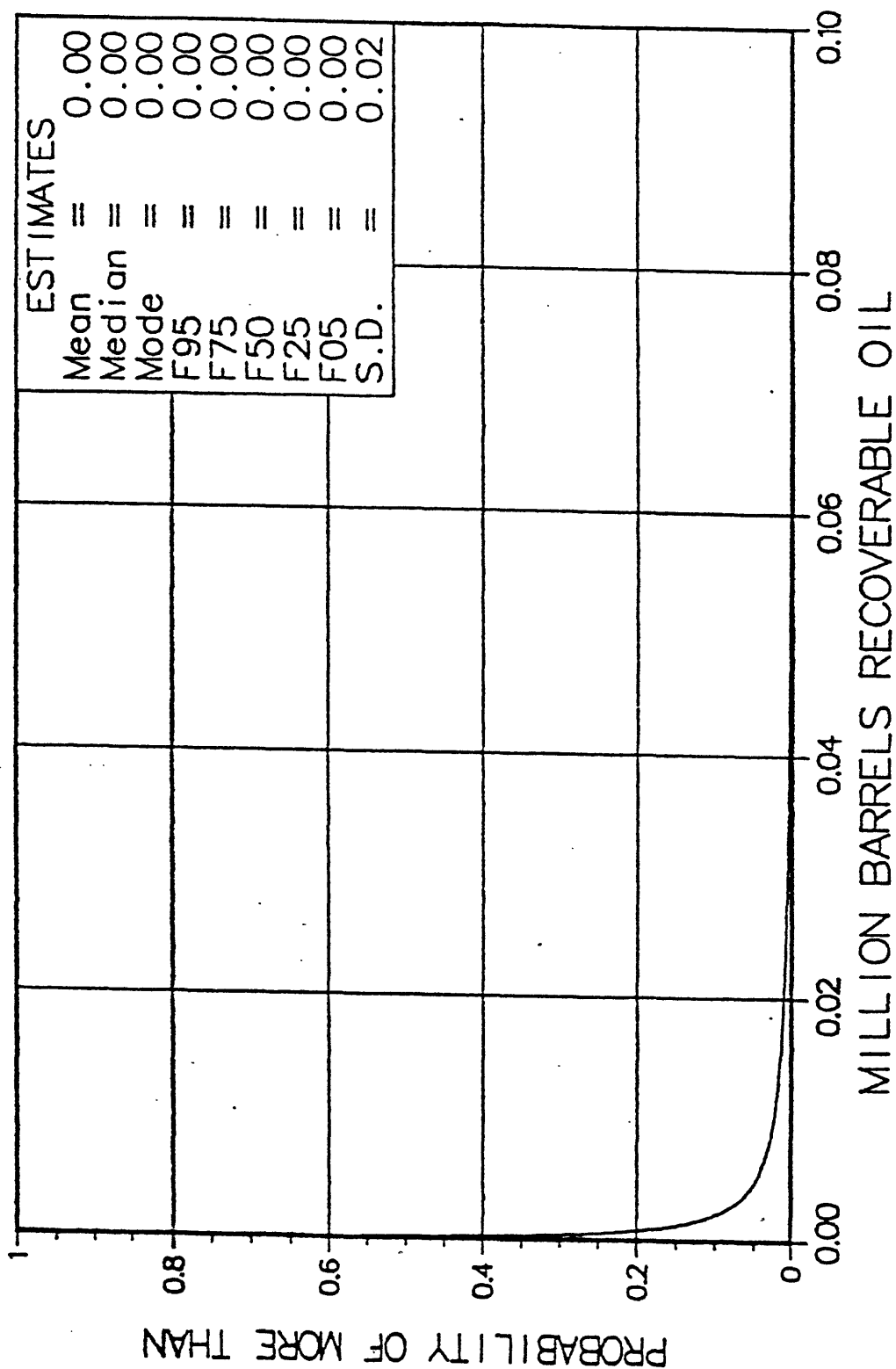


Figure 30A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 109, Pedernal Uplift.

# WILDERNESS LANDS – Gas – Province 109 Pedernal Uplift

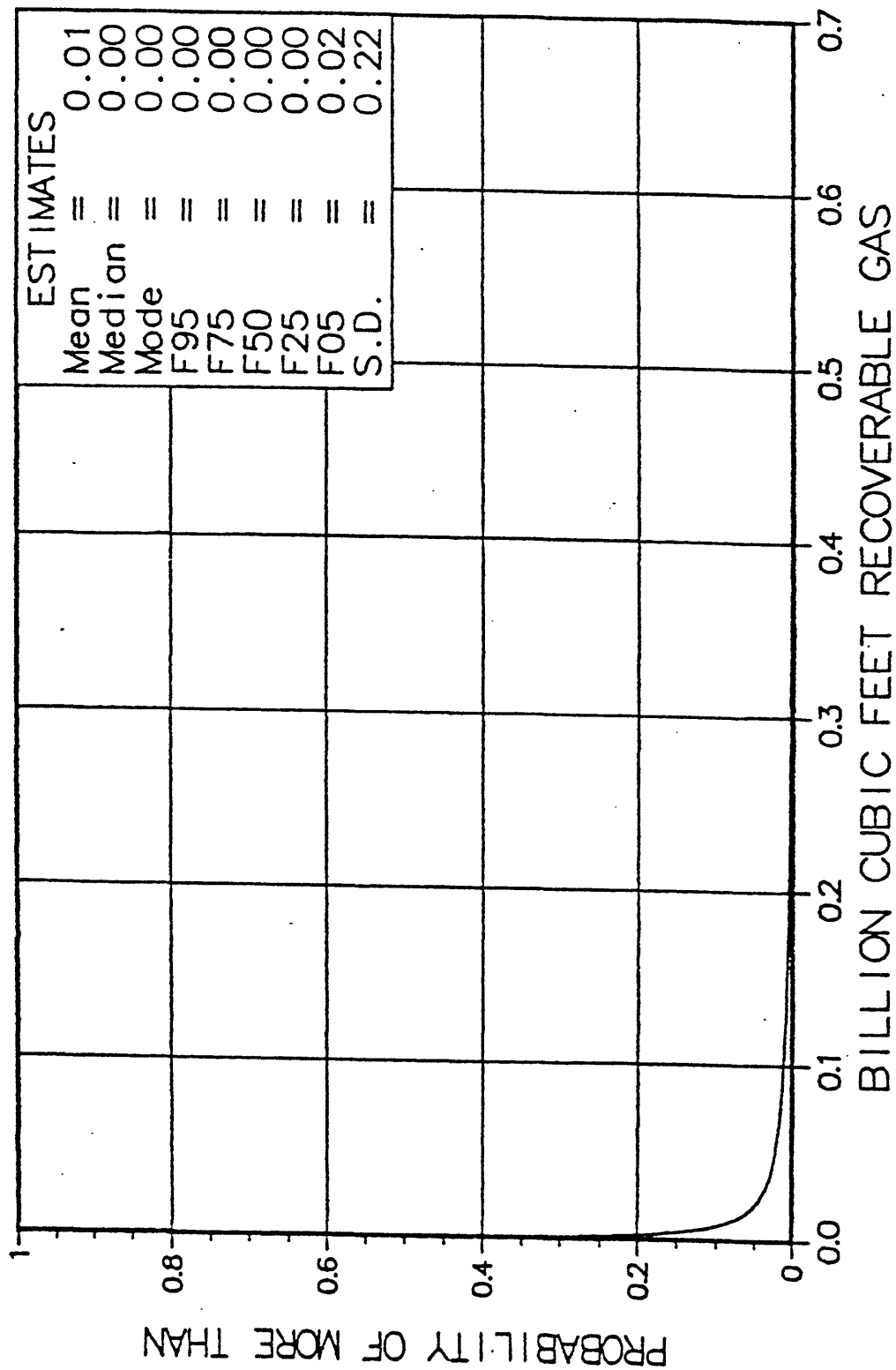


Figure 30B. ---Undiscovered recoverable gas resources in Wilderness Lands of Province 109, Pedernal Uplift.

# WILDERNESS LANDS – Oil – Province 901 Santa Lucia

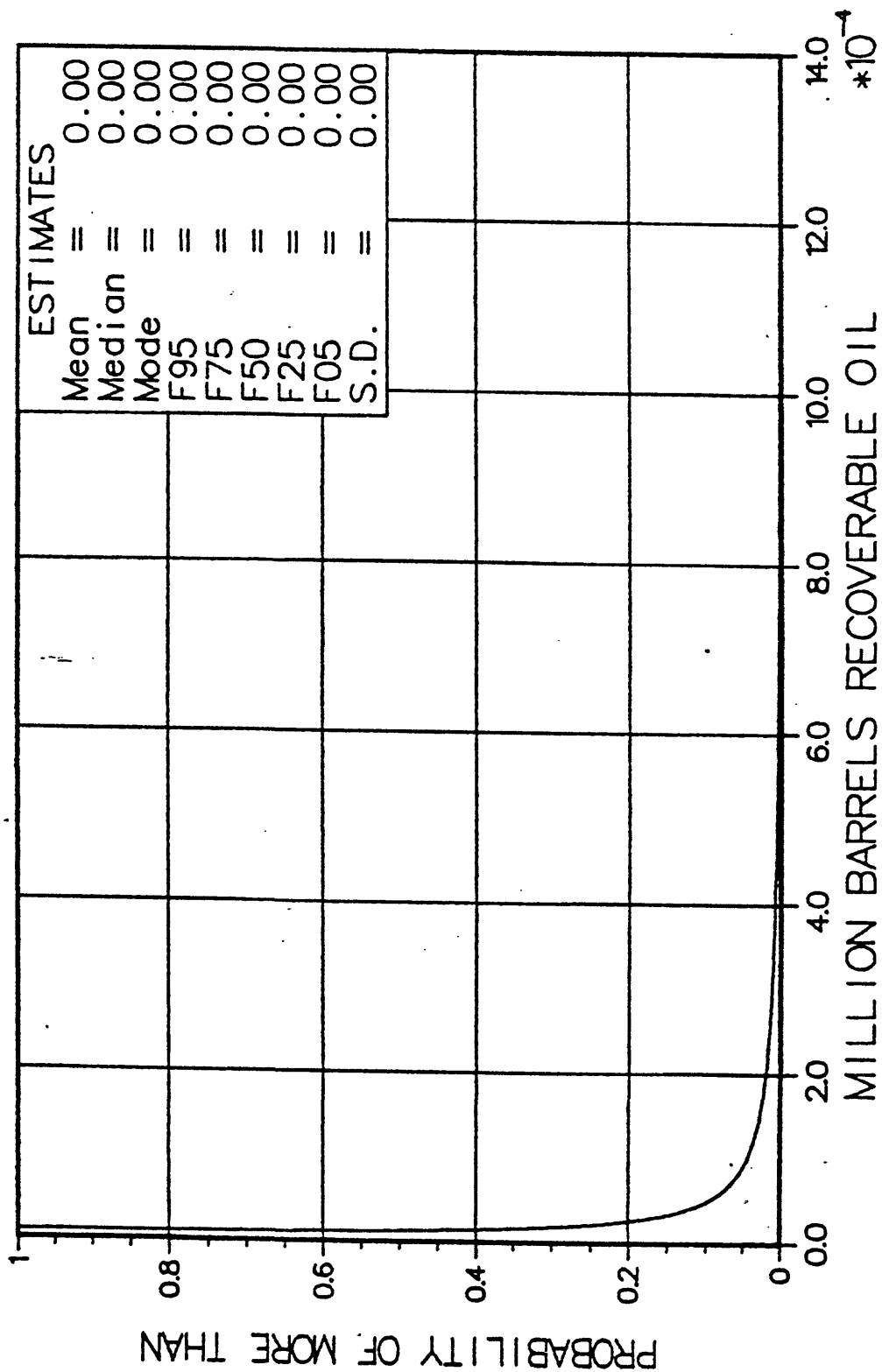


Figure 31A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 901, Santa Lucia.

# WILDERNESS LANDS -- Gas -- Province 901 Santa Lucia

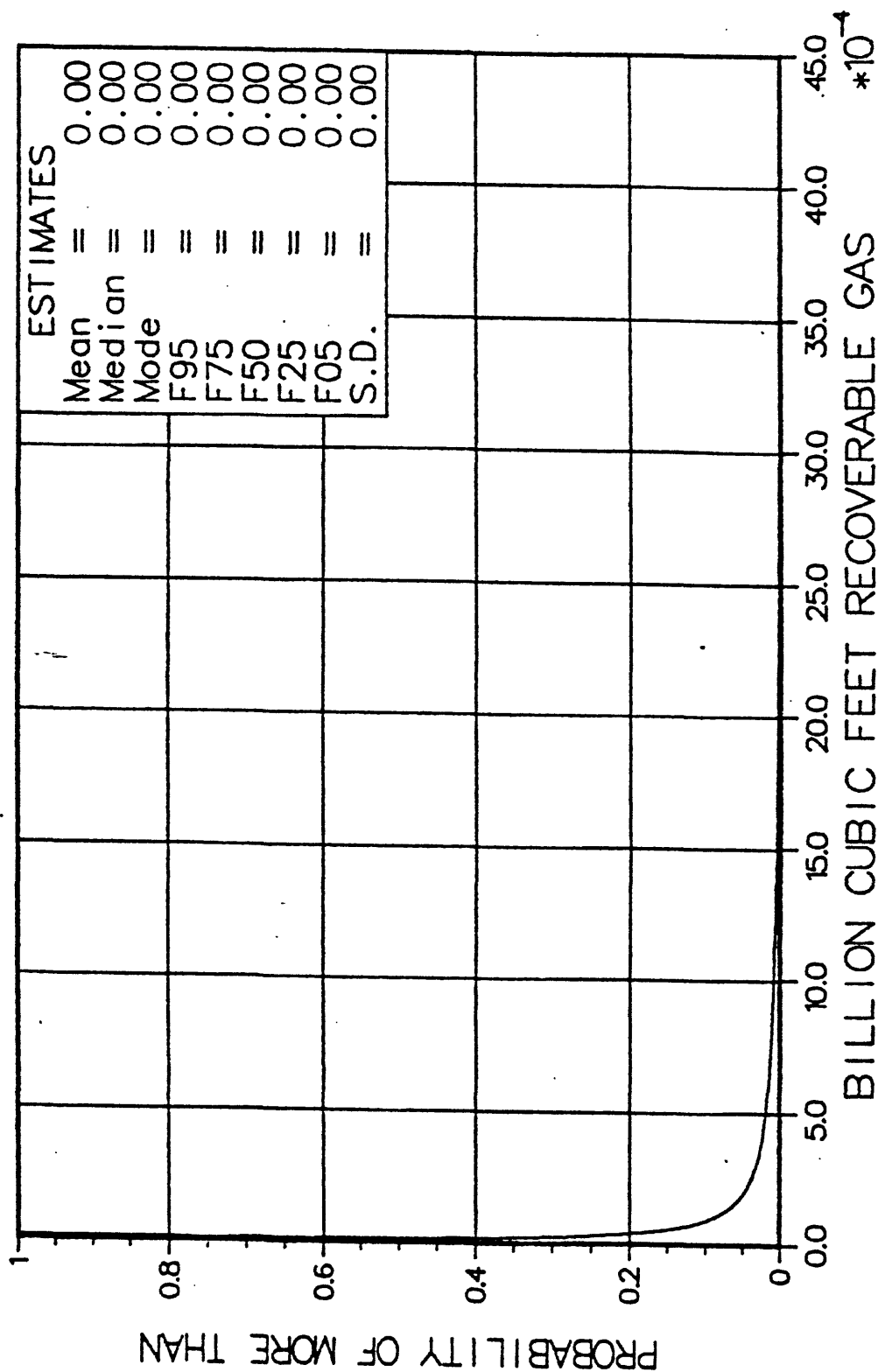


Figure 31B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 901, Santa Lucia.

# WILDERNESS LANDS -- Oil -- Province 902 Northern Coastal Ranges

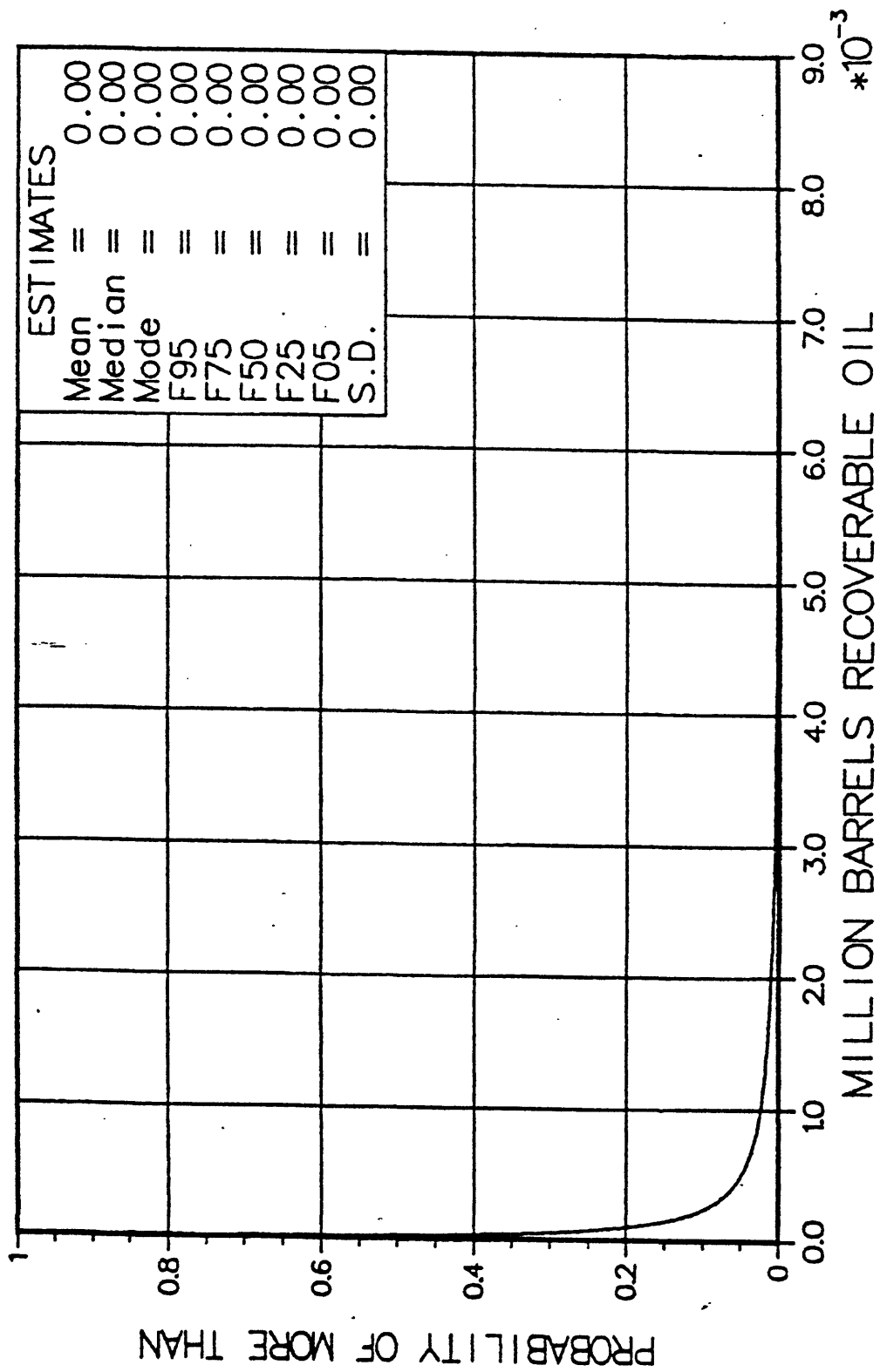


Figure 32A.--Undiscovered recoverable oil resources in Wilderness Lands of Province 902, Northern Coastal Ranges.

# WILDERNESS LANDS – Gas – Province 902 Northern Coastal Ranges

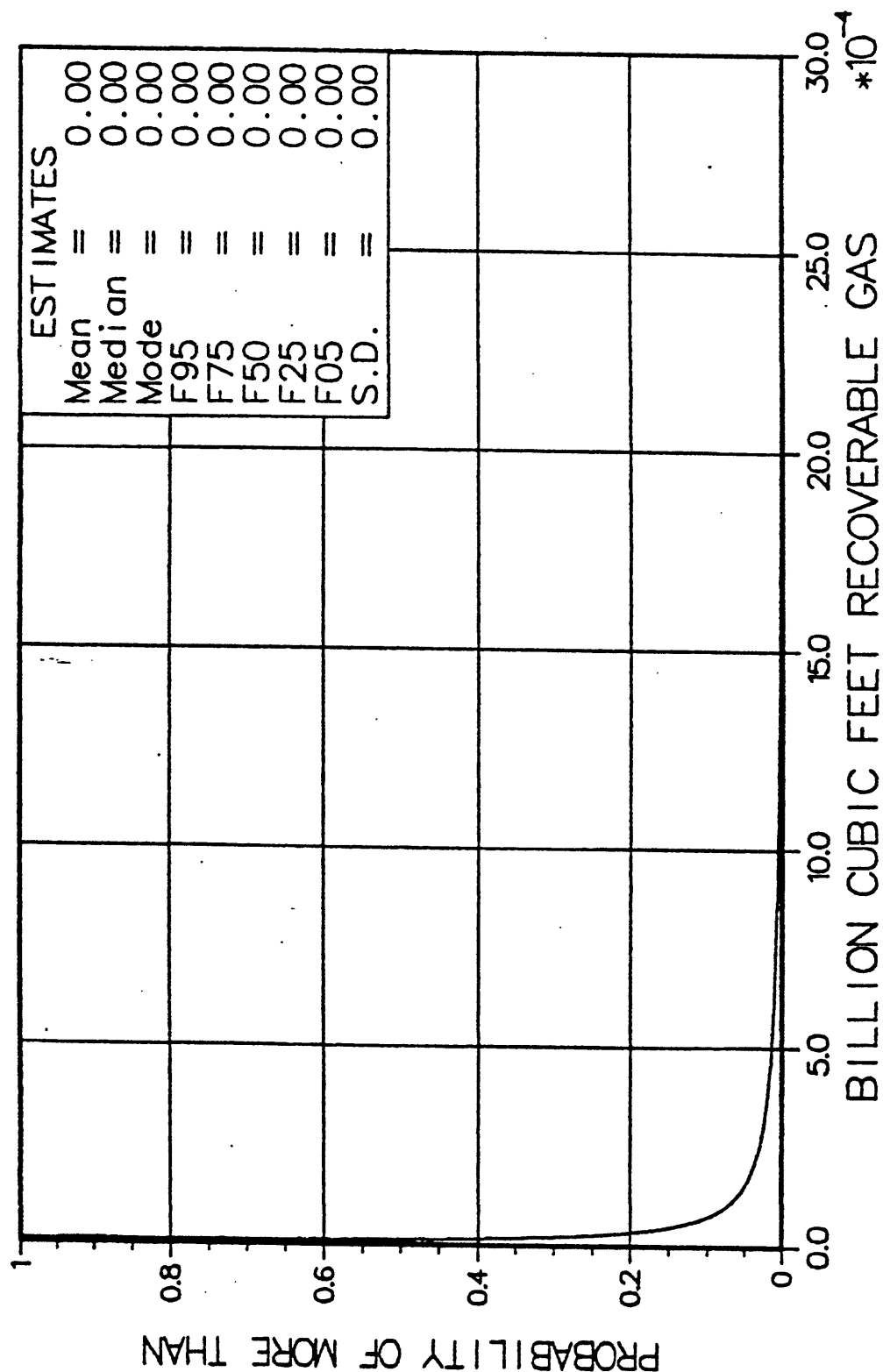


Figure 32B.--Undiscovered recoverable gas resources in Wilderness Lands of Province 902, Northern Coastal Ranges.

# WILDERNESS LANDS - OIL - 11 WESTERN STATES

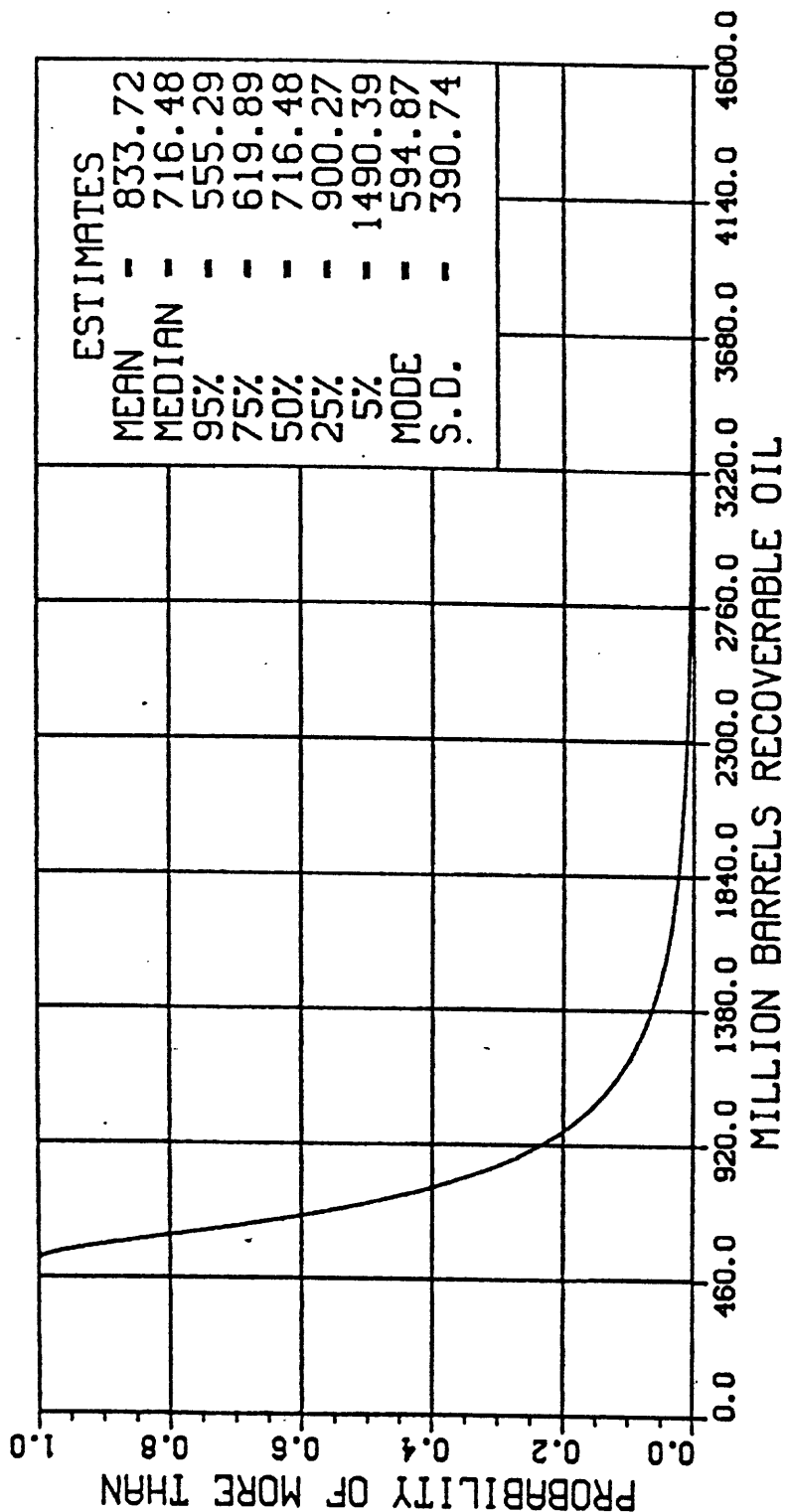


Figure 33A.--Total undiscovered recoverable oil resources in Wilderness Lands in 11 Western States.



# WILDERNESS LANDS - GAS - 11 WESTERN STATES

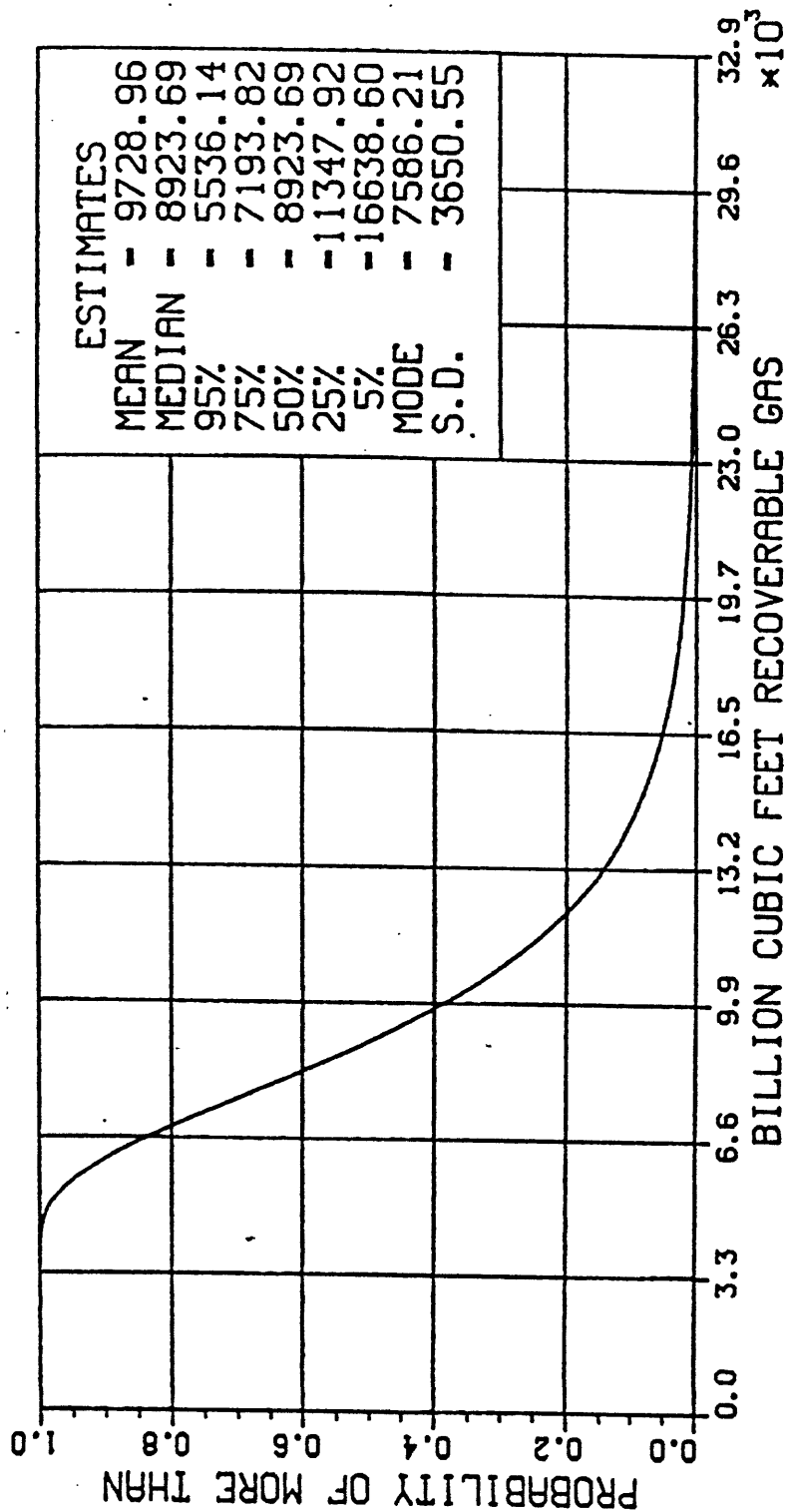


Figure 33B.--Total undiscovered recoverable gas resources in Wilderness Lands in 11 Western States.

TABLE 1.--Oil potential of Wilderness Lands by Province in Western United States.

Province number and name	Undiscovered recoverable oil (million barrels)		
	Low <sup>1</sup> F <sub>95</sub>	High F <sub>5</sub>	Mean
72 Western Oregon-Washington	0.04	4.37	1.15
74 San Joaquin Basin	0.38	3.87	1.56
78 Central Coastal Basins	2.30	26.24	10.04
81 Eastern Oregon-Washington	0.04	13.51	3.51
81a Eastern California	0.00	0.00	0.00
82 Eastern Basin and Range	4.23	420.53	112.06
83 Western Basin and Range	0.05	18.02	4.70
84a Idaho-Snake River Downwarp (A)	0.00	0.19	0.05
84b Idaho-Snake River Downwarp (B)	0.30	14.81	4.26
85 Paradox Basin	11.73	280.63	91.39
86 Uinta-Piceance-Eagle Basins	1.82	32.75	11.35
87 Park Basins	0.00	0.01	0.00
88 San Juan Basin	0.47	8.21	2.86
89 Albuquerque-Santa Fe-San Luis Rift Basins	0.00	0.10	0.03
90 Wyoming-Utah-Idaho Overthrust Belt	168.76	936.64	455.35
91 Northern Arizona	0.06	9.34	2.43
92 South-Central New Mexico	0.00	1.01	0.26
93 Southern Arizona-Southwestern New Mexico	0.01	3.84	1.00
94 Williston Basin	0.44	7.77	2.70
96 Sweetgrass Arch	0.10	3.77	1.13
97 Central Montana	0.00	0.01	0.00
98 Montana Overthrust Belt	1.16	77.53	21.45
99 Southwestern Montana	0.07	9.93	2.59
100 Wind River Basin	20.81	146.49	65.83
101 Powder River Basin	0.69	6.64	2.71
102 Southwestern Wyoming Basins	0.07	4.97	1.36
103 Big Horn Basin	6.12	73.91	28.33
106 Raton Basin-Sierra Grande Uplift	0.00	0.25	0.08
107 Permian Basin	1.90	11.86	5.54
109 Pedernal Uplift	0.00	0.00	0.00
901 Santa Lucia	0.00	0.00	0.00
902 Northern Coastal Ranges	0.00	0.00	0.00
Total	555.29	1,490.39	833.72

<sup>1</sup>F<sub>95</sub> denotes the 95th fractile; the probability of more than the amount F<sub>95</sub> is 95 percent. F<sub>5</sub> is defined similarly. Fractile values are not additive.

TABLE 2.--Gas potential of Wilderness Lands by Province in Western United States.

Province number and name	Undiscovered recoverable gas (billion cubic feet)		
	Low <sup>1</sup> F <sub>95</sub>	High F <sub>5</sub>	Mean
72 Western Oregon-Washington	1.54	60.56	18.00
74 San Joaquin Basin	0.56	4.24	1.86
78 Central Coastal Basins	0.78	9.36	3.51
81 Eastern Oregon-Washington	4.86	253.32	72.23
81a Eastern California	0.00	0.00	0.00
82 Eastern Basin and Range	19.95	1,572.97	427.56
83 Western Basin and Range	0.19	65.35	17.04
84a Idaho-Snake River Downwarp (A)	0.00	0.58	0.15
84b Idaho-Snake River Downwarp (B)	9.09	107.02	41.31
85 Paradox Basin	16.15	370.42	121.71
86 Uinta-Piceance-Eagle Basins	58.08	469.00	201.90
87 Park Basins	0.00	0.05	0.01
88 San Juan Basin	8.87	89.57	36.09
89 Albuquerque-Santa Fe-San Luis Rift Basins	0.00	1.05	0.27
90 Wyoming-Utah-Idaho Overthrust Belt	2,180.99	9,752.76	5,115.58
91 Northern Arizona	0.17	17.98	4.78
92 South-Central New Mexico	0.07	7.00	1.87
93 Southern Arizona-Southwestern New Mexico	0.10	27.82	7.20
94 Williston Basin	2.02	19.09	7.84
96 Sweetgrass Arch	2.20	45.38	15.26
97 Central Montana	0.00	0.12	0.03
98 Montana Overthrust Belt	620.73	7,890.80	2,983.32
99 Southwestern Montana	0.59	52.58	14.13
100 Wind River Basin	0.13	15.68	4.12
101 Powder River Basin	1.12	11.56	4.63
102 Southwestern Wyoming Basins	168.85	1,120.87	513.34
103 Big Horn Basin	9.29	71.10	31.11
106 Raton Basin-Sierra Grande Uplift	0.00	0.36	0.09
107 Permian Basin	33.69	165.74	84.02
109 Pedernal Uplift	0.00	0.02	0.01
901 Santa Lucia	0.00	0.00	0.00
902 Northern Coastal Ranges	0.00	0.00	0.00
Total	5,536.14	16,638.60	9,728.96

<sup>1</sup>F<sub>95</sub> denotes the 95th fractile; the probability of more than the amount F<sub>95</sub> is 95 percent. F<sub>5</sub> is defined similarly. Fractile values are not additive.

#### ACKNOWLEDGMENT

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