OPEN FILE 84-16

ESTIMATED OIL AND GAS RESERVES FOR YUMA COUNTY, COLORADO

Compiled by
A. H. Scanlon

Funded by the Department of Local Affairs--
Division of Commerce and Development

Colorado Geological Survey
Department of Natural Resources
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Acknowledgments

I would like to thank the staff of the Colorado Oil & Gas Conservation Commission (C.O.G.C.C.) who provided considerable assistance during the course of this compilation, and the staff of the Colorado Geological Survey, who assisted in the manuscript preparation.

However, I assume full responsibility for any errors or omissions in these tabulations. Users of this OPEN-FILE REPORT could provide a significant service if they would inform the Colorado Geological Survey of any misinformation or omissions.

This project was completed by the staff of the Colorado Geological Survey as part of a grant from the Department of Local Affairs - Division of Commerce and Development.

A. H. Scanlon
Senior Geologist

Contents

Tables

Figures

ESTIMATED OIL AND GAS RESERVES FOR YUMA COUNTY, COLORADO

Introduction

This report is the fourteenth* in a series of oil and gas reserve investigations undertaken for those counties in which oil and/or gas is currently being produced.

This study involves Yuma County, located in northeastern Colorado, near the eastern edge of the Denver Basin. Yuma County covers 2,383 square miles. In this county, gas and/or condensate are produced from the Niobrara limestone.

There are 21 fields considered active producers as of December 31, 1983. All of these are classified as gas fields (based on cumulative GOR >15:1).

* Refer to:
OPEN-FILE REPORT 84-3: Estimated Oil and Gas Reserves for Washington County, Colorado;
OPEN-FILE REPORT 84-4: Estimated Oil and Gas Reserves for Rio Blanco County, Colorado.
OPEN-FILE REPORT 84-5: Estimated Oil and Gas Reserves for Adams County, Colorado;
OPEN-FILE REPORT 83-6: Estimated Oil and Gas Reserves for Weld County, Colorado;
OPEN-FILE REPORT 84-7: Estimated Oil and Gas Reserves for Arapahoe County, Colorado;
OPEN-FILE REPORT 84-8: Estimated Oil and Gas Reserves for Baca County, Colorado.
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OPEN-FILE REPORT 84-15: Estimated Oil and Gas Reserves for Routt County, Colorado.

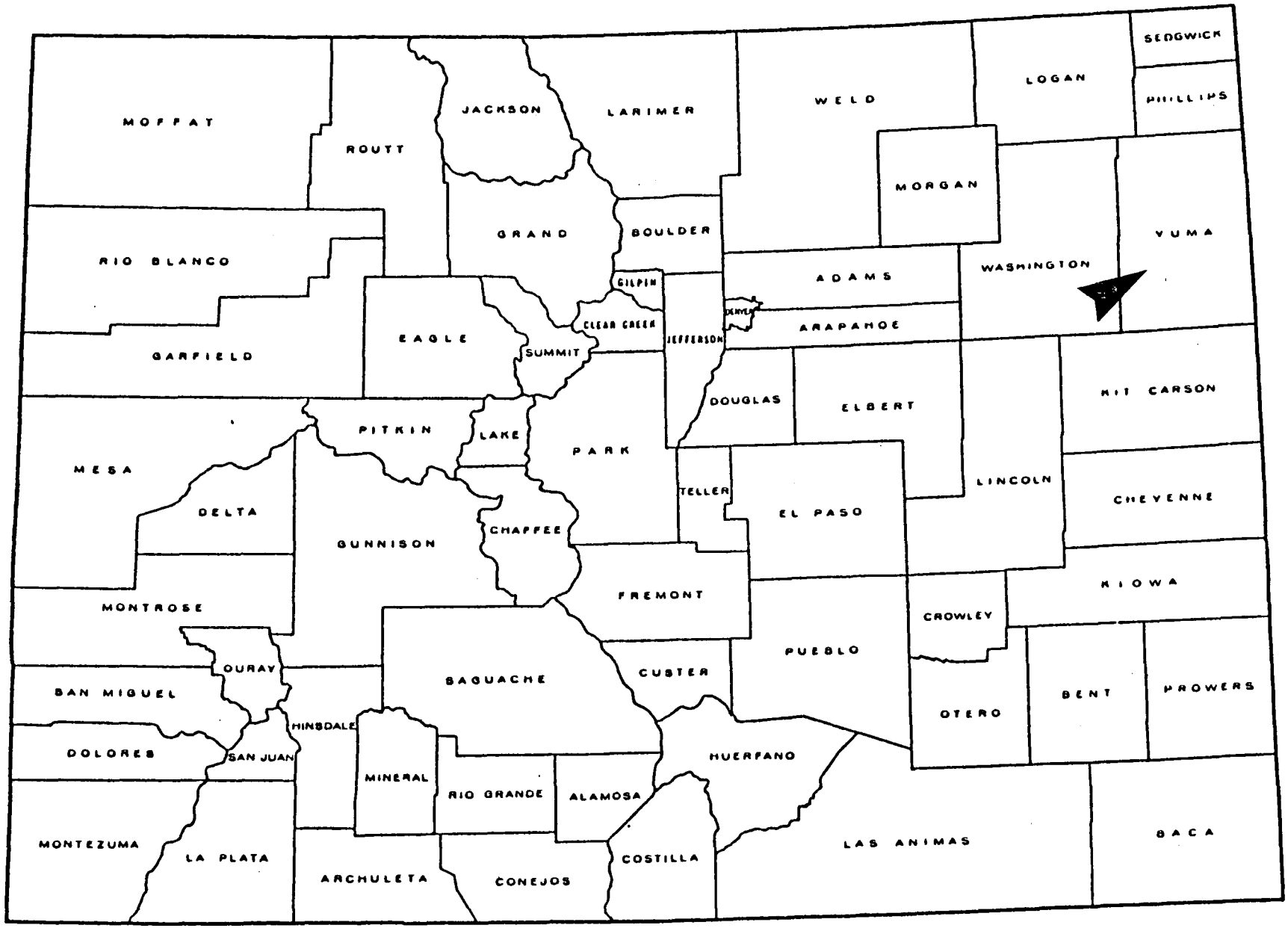


Figure 1. County Location Map

Method of Approach

Production decline curves are plotted for each currently producing horizon within each field, hereafter referred to as a field-horizon. There are 21 production decline curves plotted, one for each field-horizon. Production data were obtained from the C.O.G.C.C. annual production books. These books contain records of yearly production data, dating back to 1952. All production decline curves are plotted as rate (annual production in barrels of oil or MCF of gas) versus time (in years). The rate scale was adjusted to accommodate each field-horizon.

Gas Reserve Calculations

There are 21 gas field-horizons. Production histories have allowed for decline rates to be calculated for 8 of these. The remaining 13 gas field-horizons have not produced for a long enough time (less than 3 years) to determine reliable decline rates. Decline rates were determined for the 8 previously mentioned gas field-horizons (see Table I) and applied to the equation:

$$S = \frac{a(1-r^n)}{1-r}$$

Where:
- S = gas reserves
- a = current annual gas production
- r = (1-dy) where dy = annual decline rate
- n = number of years -- 20 years was used in all cases except where noted in the remarks column of Table I.

Results can be found in Table I.

Results

The following figures are for those field-horizons for which reserves could be calculated. Estimated gas reserves for Yuma County totaled 11,080,846 MCF. Note that the gas reserve calculations are based on a 20-year projection, therefore they do not account for gas production after the year 2003.

These figures also do not account for production increases due to secondary and/or tertiary recovery not already in progress, or account for undiscovered reserves, nor do they reflect changes in economics or demand.

In Yuma County, roughly one half of the estimated gas reserves for the next 20-year period are expected to be produced in six to seven years.

In this county there are two classes of field-horizons: I) those with a long enough production history to calculate reserves with confidence, and II) those new field-horizons with essentially no production history, or for other reasons, reserves cannot be calculated.

To be able to calculate total county gas reserves, it was necessary to apply the overall decline rate (8.9 percent per year for gas) obtained from class I field-horizons to the current production from Class II field-horizons.

Using this approach on current production from Class II field-horizons (6,440,990 MCF of gas) additional reserves of 61,152,293 MCF of gas were obtained. This gives total county reserves (Class I and II) of 72,233,139 MCF of gas.

To insure that the reserve figures calculated for Class II are reasonable using this method, a comparison was made between the sources (producing horizons) of the Class I and Class II field-horizons. It was determined that there were no differences in the sources of production for the two groups. Therefore, it is concluded that the overall decline rates can be applied with confidence.

LIST OF ABBREVIATIONS USED IN TABLE OF RESERVE DATA

'a'	annual gas production
ABD.	abandoned
Approx.	approximate, approximately
Avg.	average, averaged
Bbls.	barrels
B.W.E.	Bottom Water Encrochment
calc.	calculate, calculated
Co.(s)	county (counties)
cond.	condensate
ck.	Creek
Cum.	cumulative
Dak.	Dakota Sandstone
Deplet.	Depletion
dy	annual decline rate
Econ.	Economic
Est.	Estimated
Exp.	Expansion
g	gas
Gas Exp.	Gas Expansion
G.C.E.	Gas Cap Expansion
G.E.	Gas Expansion
GOR	Gas-Oil Ratio
Inc.	Increase, increasing, increased
Inj.	Injection, injected
Lmtd.	Limited
MCF	Thousand cubic feet
Miss.	Mississippian
Mos.	Months
Mtn.	Mountain
N	North
N.P.	New Production or less than five years production, therefore, no reliable annual decline rate could be calculated to apply to the equations to calculate reserves.
No.	number, numbers, North
o	oil
P and A	Plug (ged) and Abandon (ed)
Poss.	Possible
Prod.	Production, produced
Proj.	Projection, projected
q	current annual production of oil
qf	final economic production of oil
react.	reactivated
Rr	Remaining reserves-oil
S	Remaining reserves-gas
S.G.D.	Solution Gas Drive
S.I.(SI)	Shut-in
So	South
W	West
W.D.	Water Drive
Yr or Yrs	Year or years

TABLE I
OPEN FILE 84-16
RESERVE DATA FOR YUMA COUNTY

FIELD NAME/ PRODUCING HORIZON	LOCATION	DATE OF DISCOVERY	TYPE OF DRIVE	Dy	CUMULATIVE PRODUCTION 12/31/83		ESTIMATED RESERVES		ULTIMATE RECOVERABLE		REMARKS
					OIL (Bbls.) ()Condensate (Bbls.)	GAS (MCF)	OIL (Bbls.)	GAS (MCF)	OIL (Bbls.) ()Condensate (Bbls.)	GAS (MCF)	
1.Armel/Niobrara	3S-42W	1977		17.7 -g		45,002	24,658			69,660	
2.Beecher Island/ Niobrara	2S-43W	1919		5.4 -g		5,768,845	8,033,843				
3.Bonny/Niobrara	4S-43W	1978				2,549,363					Prod.'82 & '83. N.P.
4.Buckboard/ Niobrara	3S-46W	1977				399,779					No. of Prod. Wells Inc. N.P.
5.Duke/Niobrara	1S-45W	1978				78,833					N.P.
6.Eckley/Niobrara	3N-45W	1977				7,501,055					N.P.
7.Mildred/ Niobrara	2S-46W	1977		21.8 -g		1,438,529	1,062,211			2,500,740	
8.Old Baldy/ Niobrara	4N-45W	1977				2,080,680					Prod.'79-'83. N.P.
9.Peregrine/ Niobrara	1S-44W	1981				46,707					Prod. '82, '83. N.P.
10.Phuma/Niobrara	5N-46W	1976		11.4 -g		120,522	109,114			229,636	Also Prod. in Phillips Co.
11.Pony Express/ Niobrara	1S-48W	1977		16.1 -g		88,240	85,811			174,051	
12.Republican/ Niobrara	1N-45W	1976				931,780					N.P.
13.Rock Creek/ Niobrara	5N-47W	1979			(191)	2,684,591					Prod.'80-'83. N.P.
14.Schramm/ Niobrara	1N-47W	1977		15.0 -g		486,296			525,792		

OPEN FILE 84-16
YUMA COUNTY

FIELD NAME/ PRODUCING HORIZON	LOCATION	DATE OF DISCOVERY	TYPE OF DRIVE	Dy	CUMULATIVE PRODUCTION 12/31/82		ESTIMATED RESERVES		ULTIMATE RECOVERABLE		REMARKS
					OIL (Bbls.) ()Condensate (Bbls.)	GAS (MCF)	OIL (Bbls.)	GAS (MCF)	OIL (Bbls.) ()Condensate (Bbls.)	GAS (MCF)	
15.Shout/Niobrara	3N-47W	1976				453,965					N.P.
16.Vernon/ Niobrara	1S-44W	1976	Gas Exp.	11.4 -g		853,680	1,093,903			1,947,583	
17.Wages/Niobrara	5N-46W	1979				260,789					N.P.
18.Waverly/ Niobrara	4N-46W	1977				2,544,664					N.P.
19.Whisper/ Niobrara	3N-47W	1975				445,052					N.P.
20.Yodel/Niobrara	1S-46W	1980		25.3 -g		186,996	145,514			332,510	
21.Yodel North/ Niobrara	1N-46W	1981				51,253					N.P.
COUNTY TOTAL OF ESTIMATED RESERVES							11,080,846 MCF				

Reference List

Colorado Oil and Gas Conservation Commission Production Records and Injected Fluids - Water and/or Gas-File.

Crouch, M.C., III, editor, 1982 Oil and Gas Fields of Colorado, Nebraska and Adjacent Areas: Rocky Mountain Association of Geologists, vols. I and II, 791 pp.

Haun, J.D., Cardwell, A.L., Herrod, W.H. and Cronoble, J.M., 1976. Oil and Gas Reserves of Colorado in Colorado School of Mines Research Institute, Mineral Industries Bulletin, v. 19, #5.

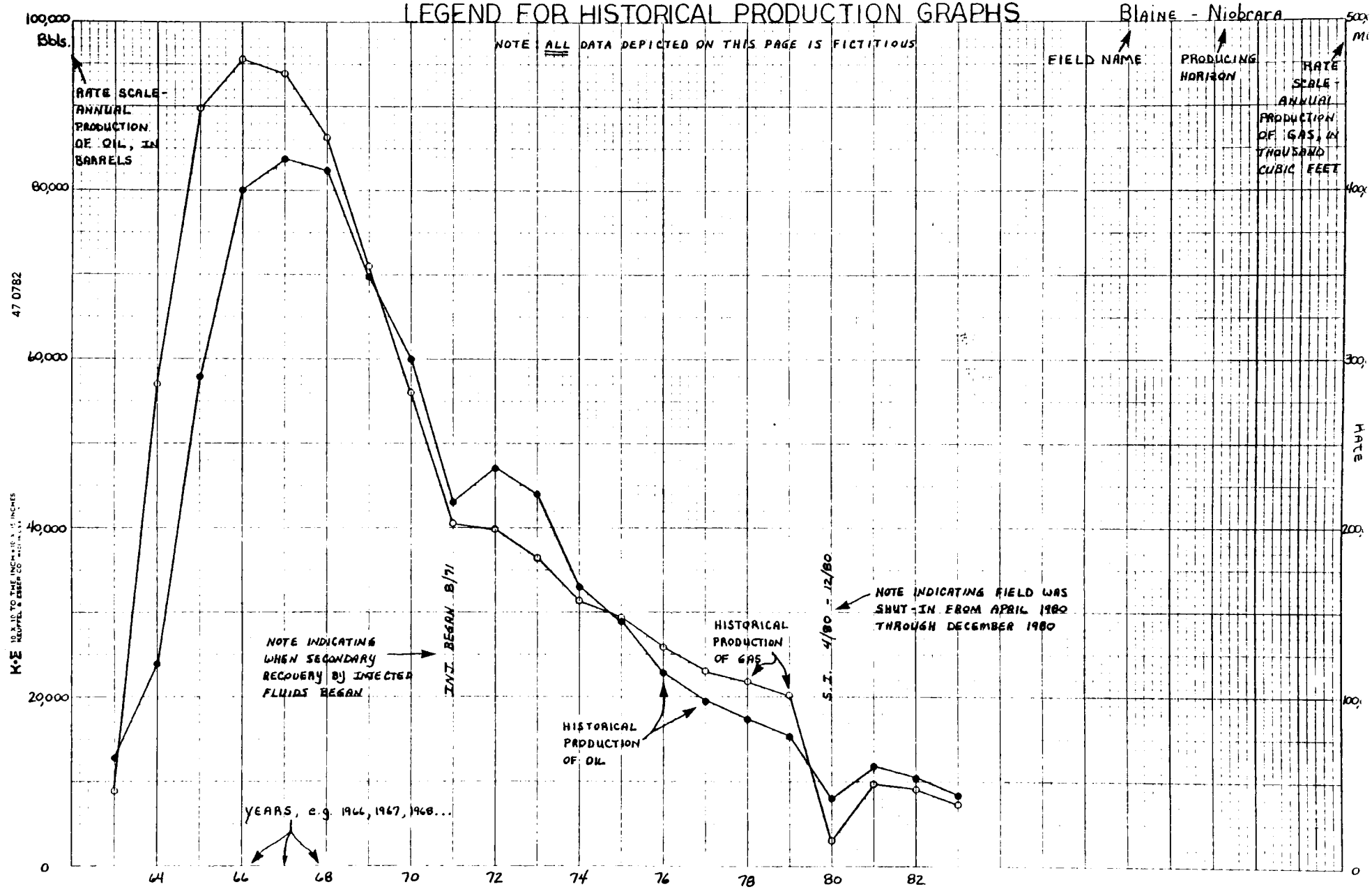
Parker, J.M., editor, 1961 Oil and Gas Field volume: Colorado-Nebraska: Rocky Mountain Association of Geologists, 389 pp.

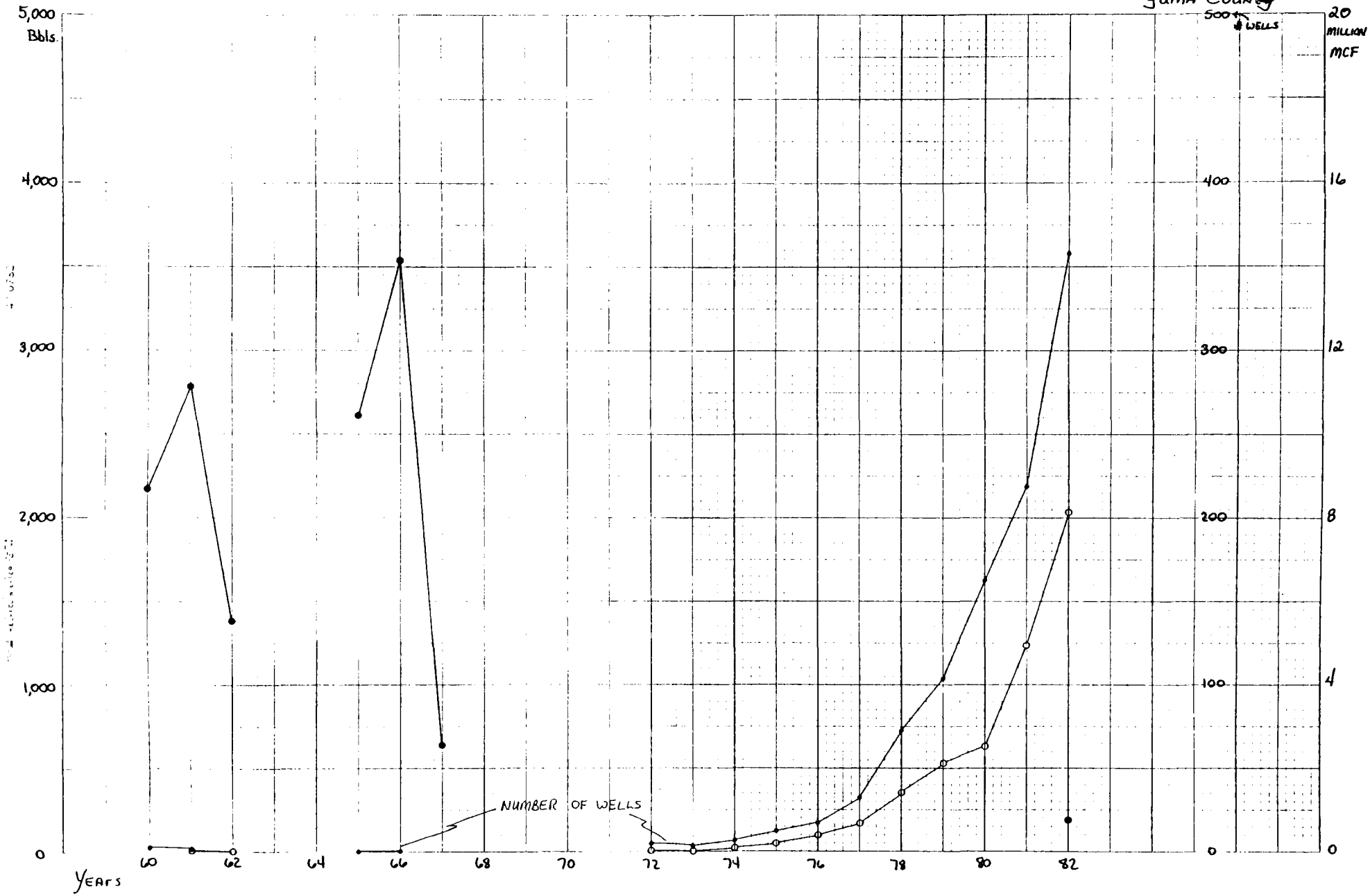
Appendix I

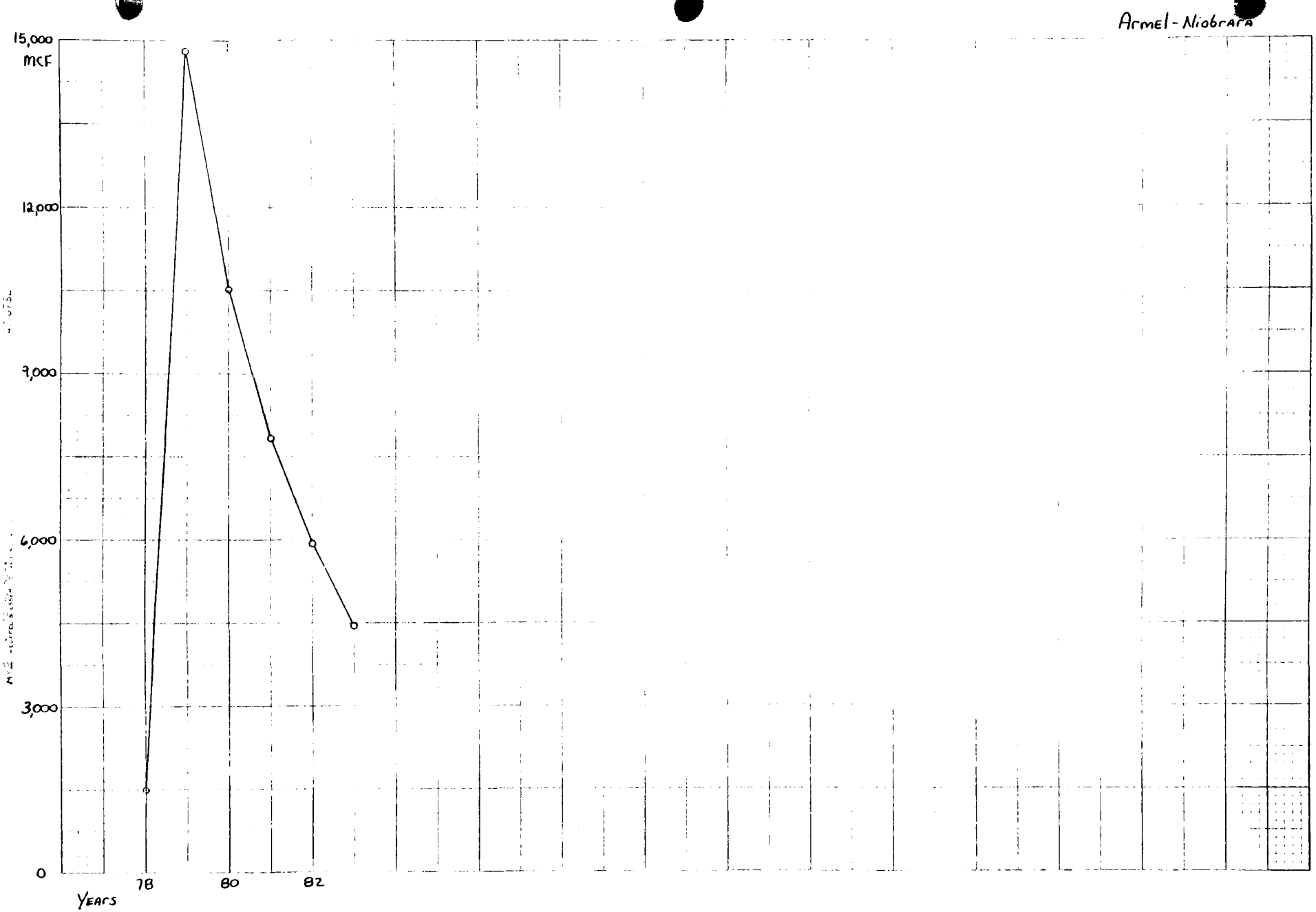
Historical production decline curve graphs for Yuma County. These graphs are presented in alphabetical order by Field name and then by producing horizons within each field.

Note that only those fields actively producing as of 12-31-83 are included. Abandoned fields or field-horizons are not included.

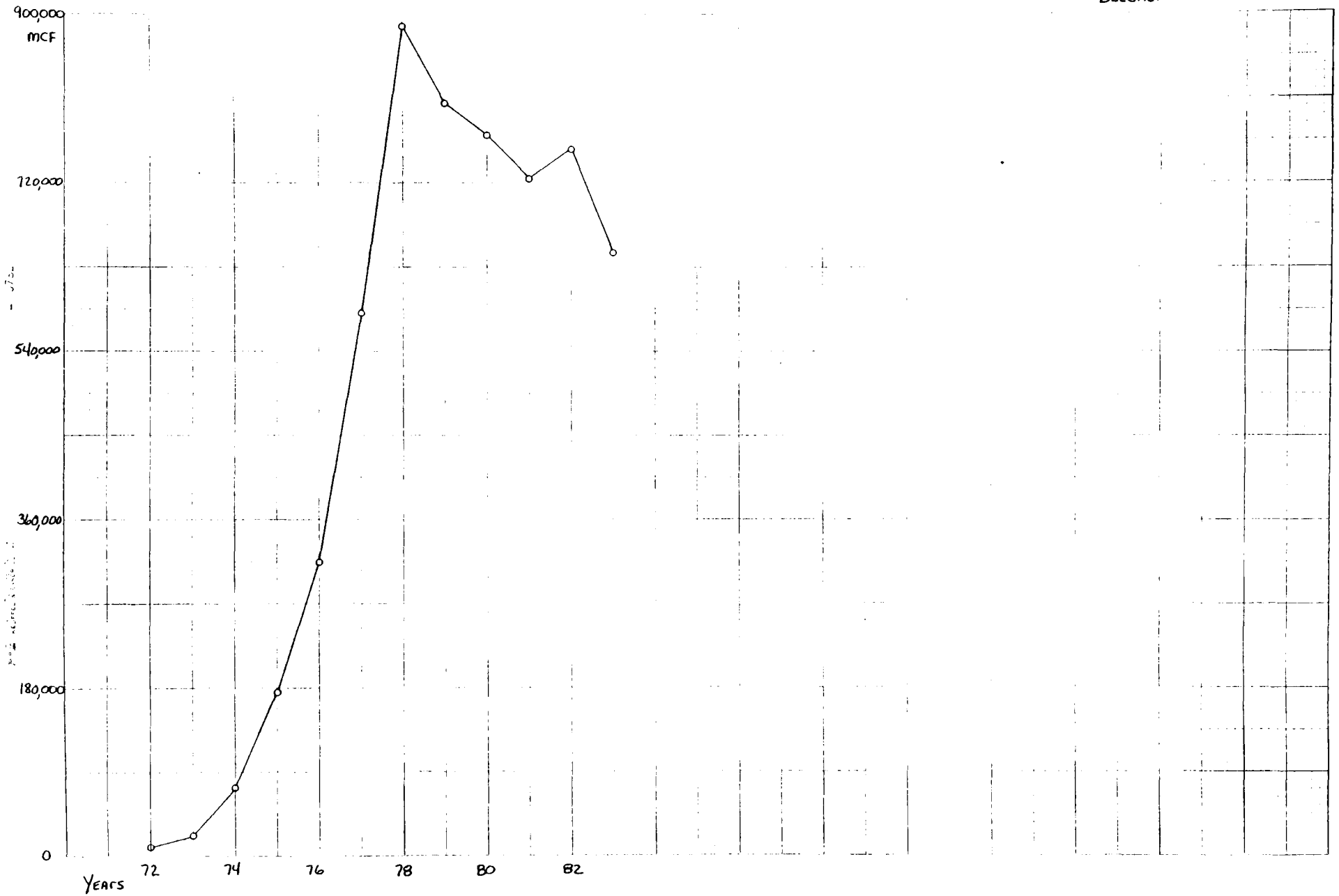
LEGEND FOR HISTORICAL PRODUCTION GRAPHS



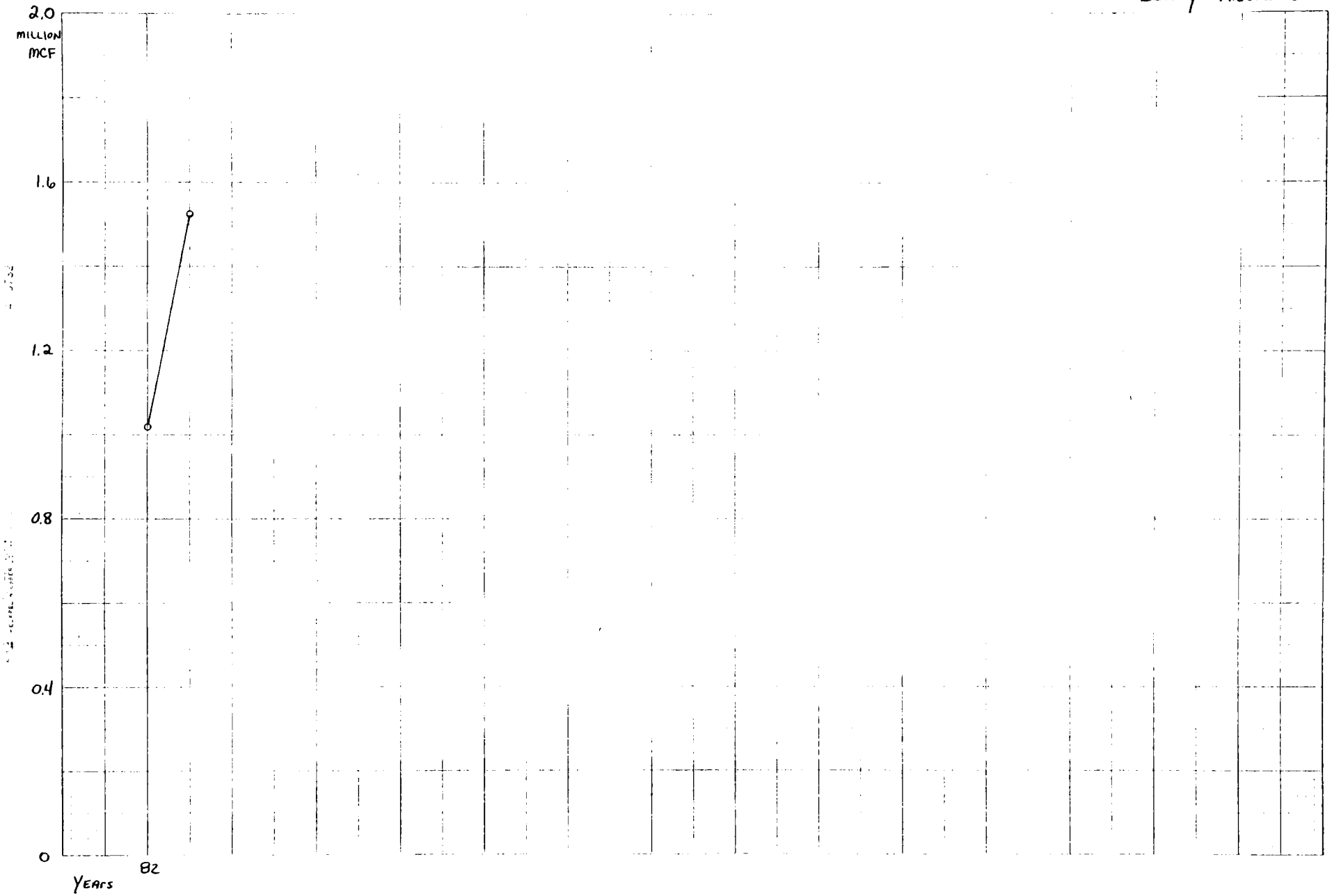

Yuma County
5,000
Bbls.
4,000
3,000
2,000
1,000
0
500
400
300
200
100
0
WELLS
20
16
12
8
4
0
MILLION
MCF
60
62
64
66
68
70
72
74
76
78
80
82
YEARS
NUMBER OF WELLS


Armel - Niobrara
15,000
MCF
12,000
9,000
6,000
3,000
0
78
80
82
Years

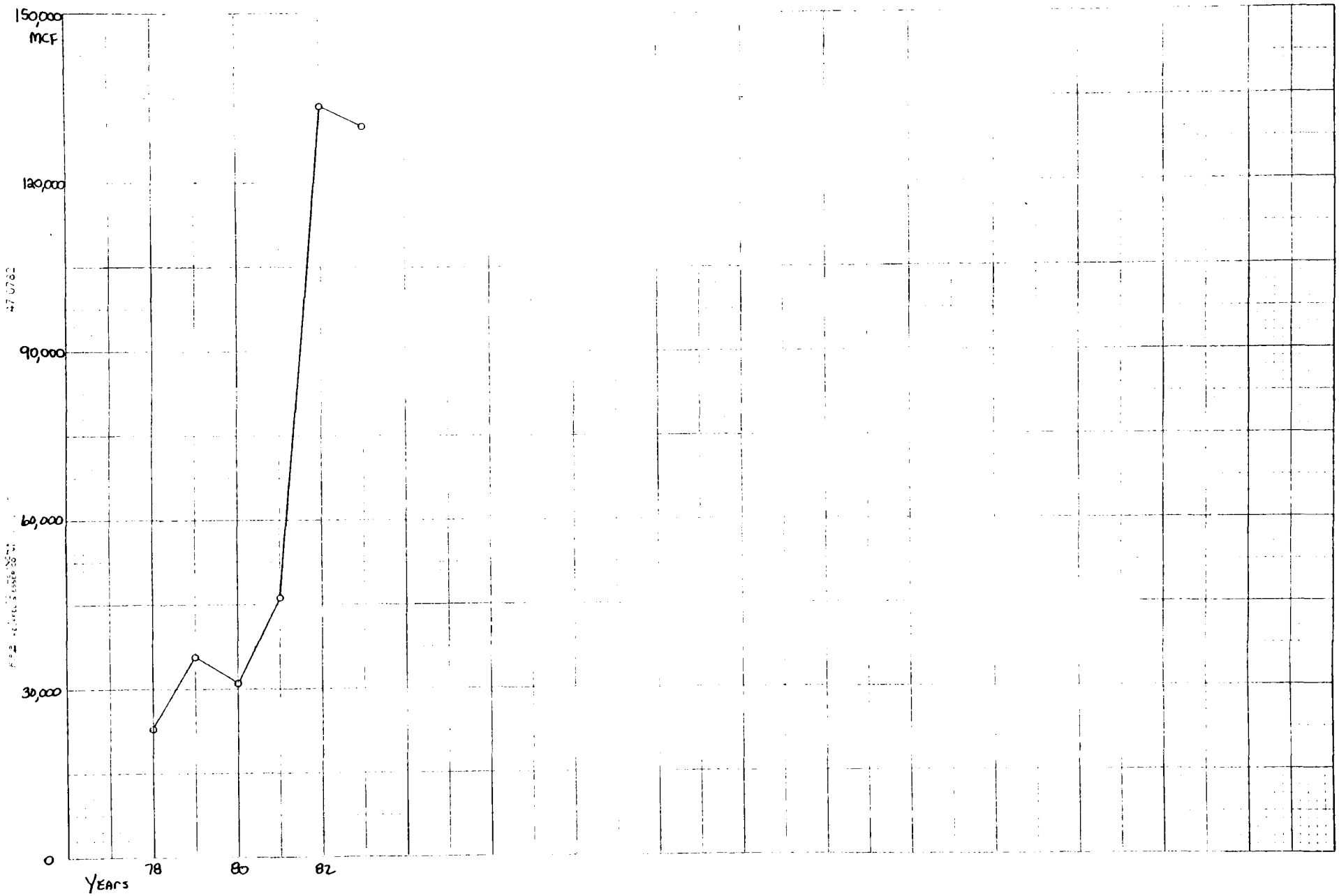
Beecher Island - Niobrara



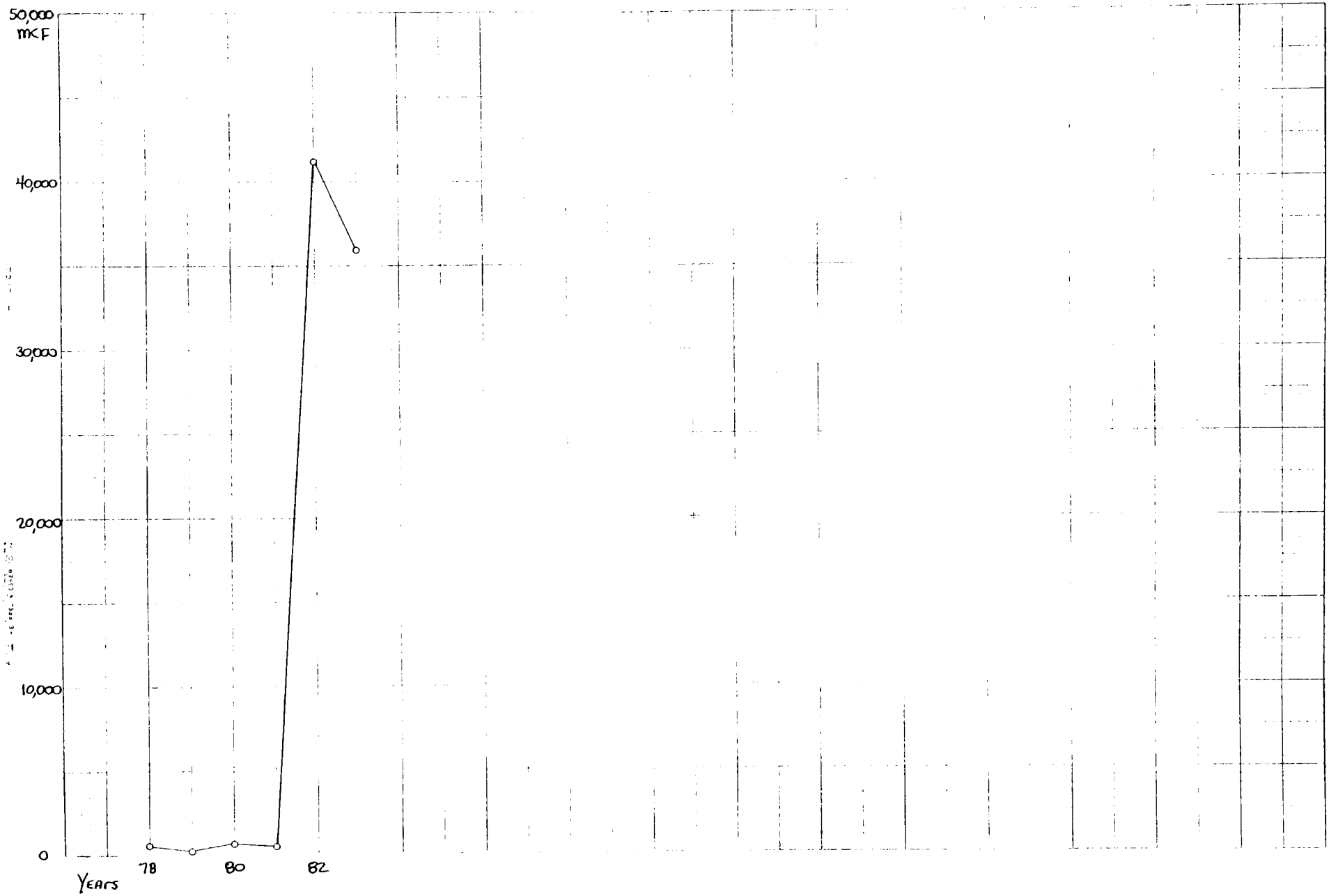
Bonny - Niobrara



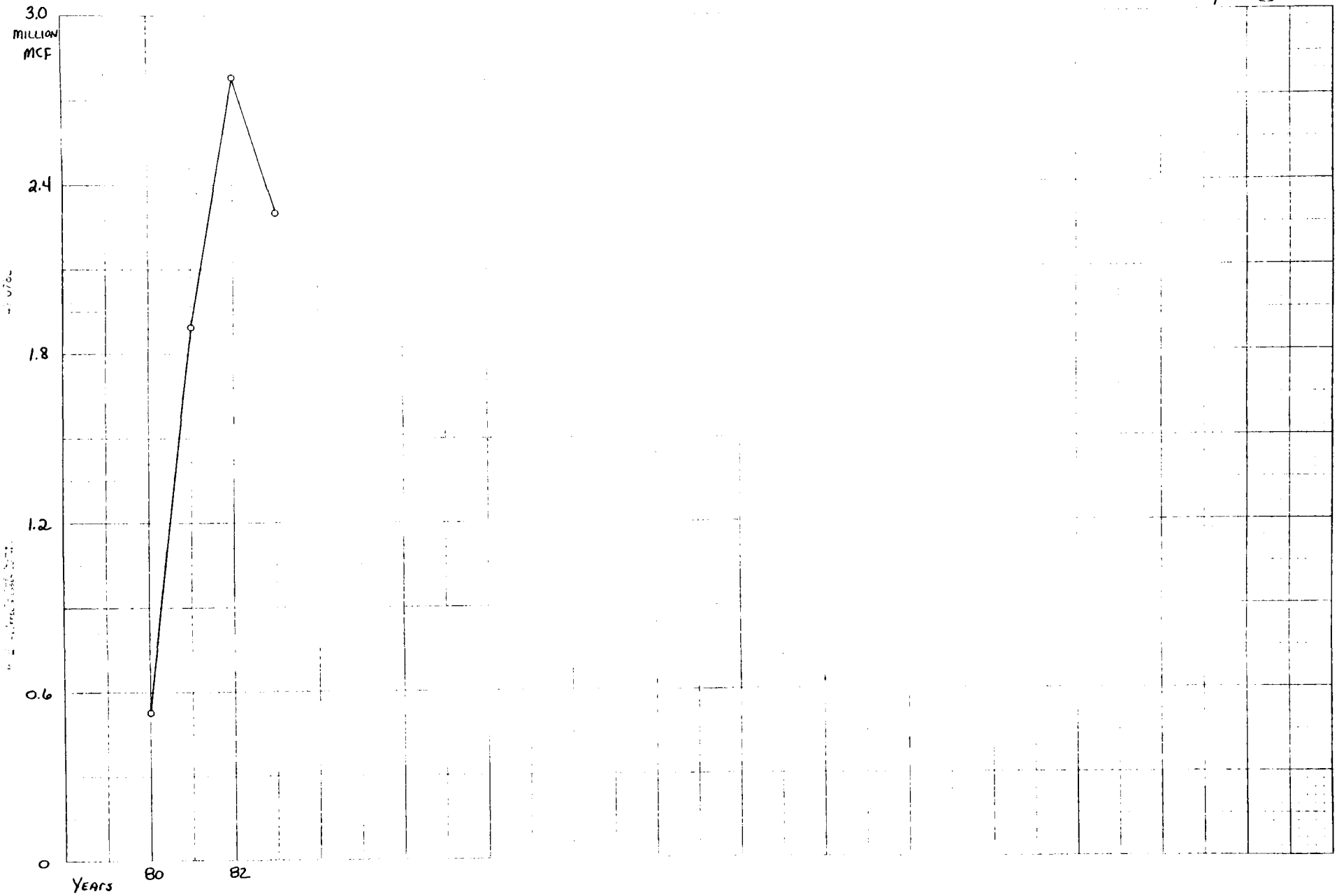
Buckboard - Niobrara



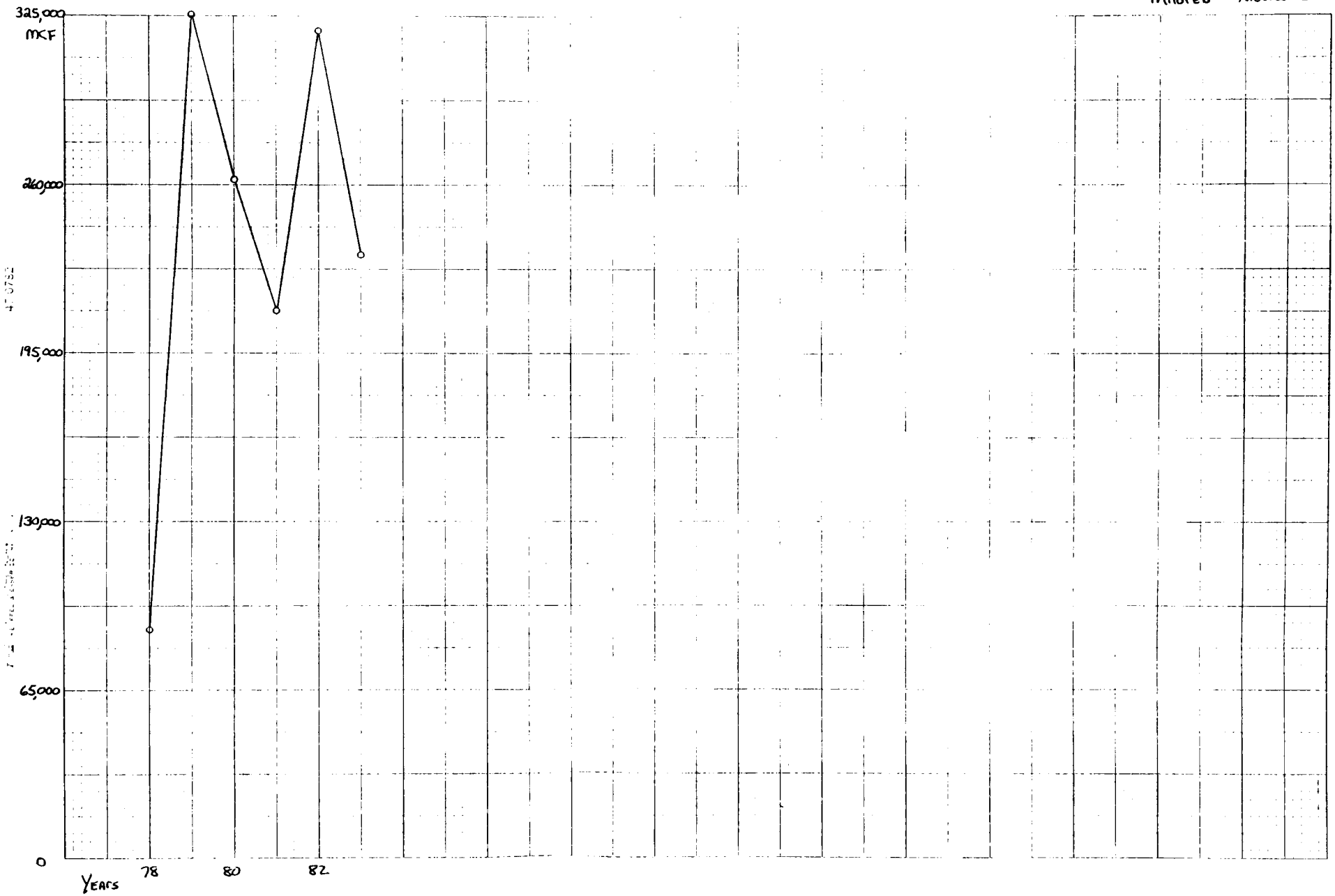
Duke - Niobrara



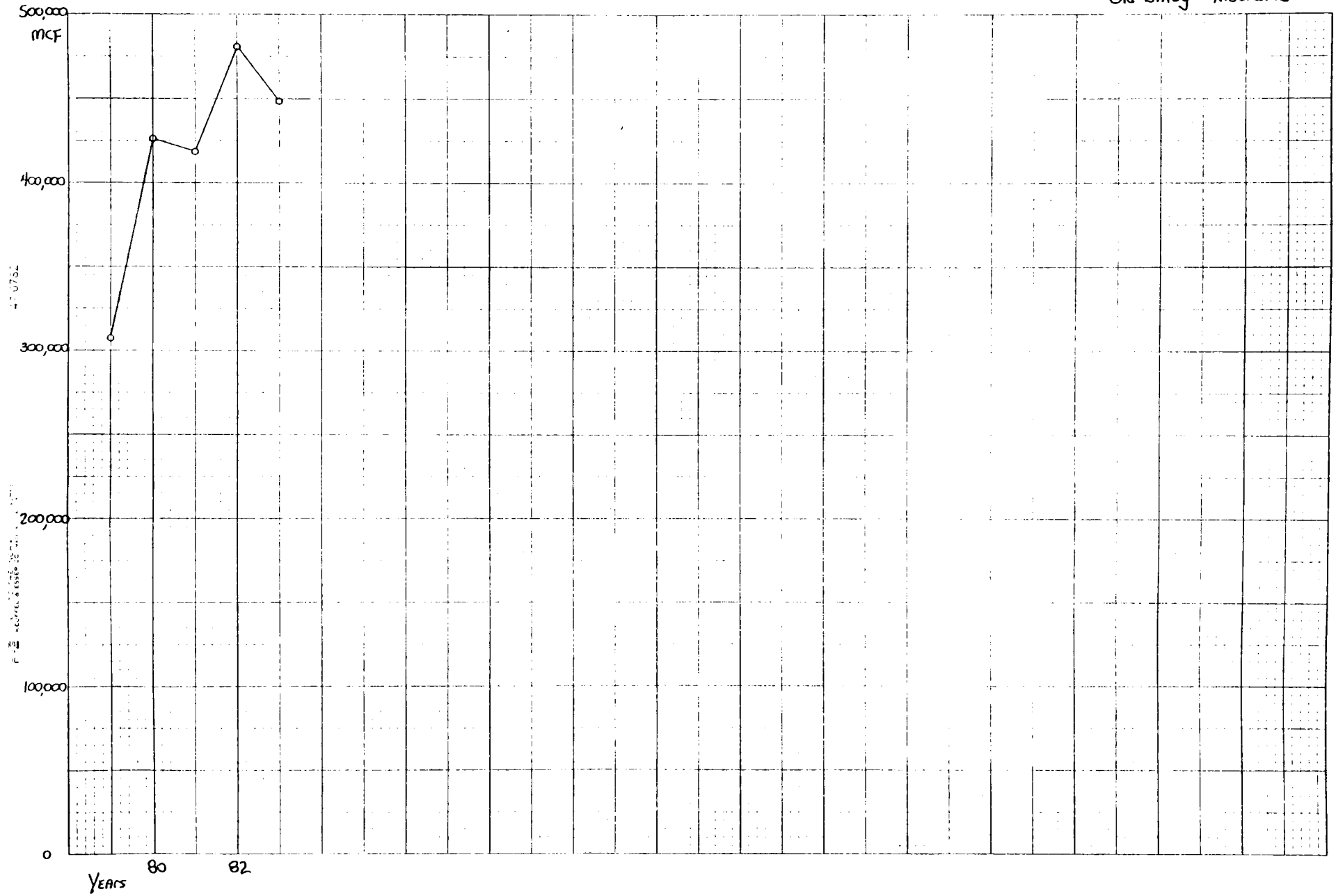
Eckley - [illegible] area



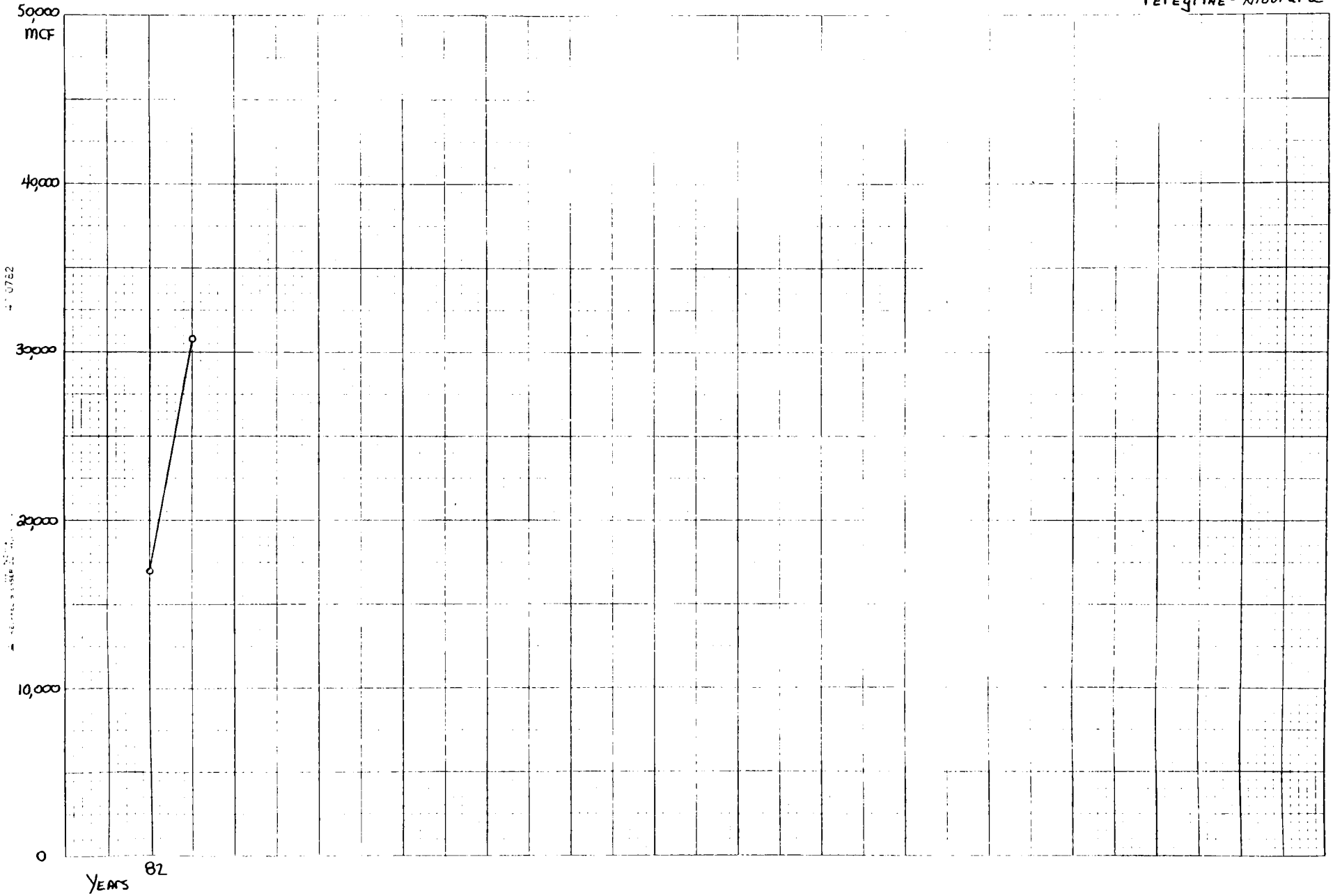
Mildred - Niobrara



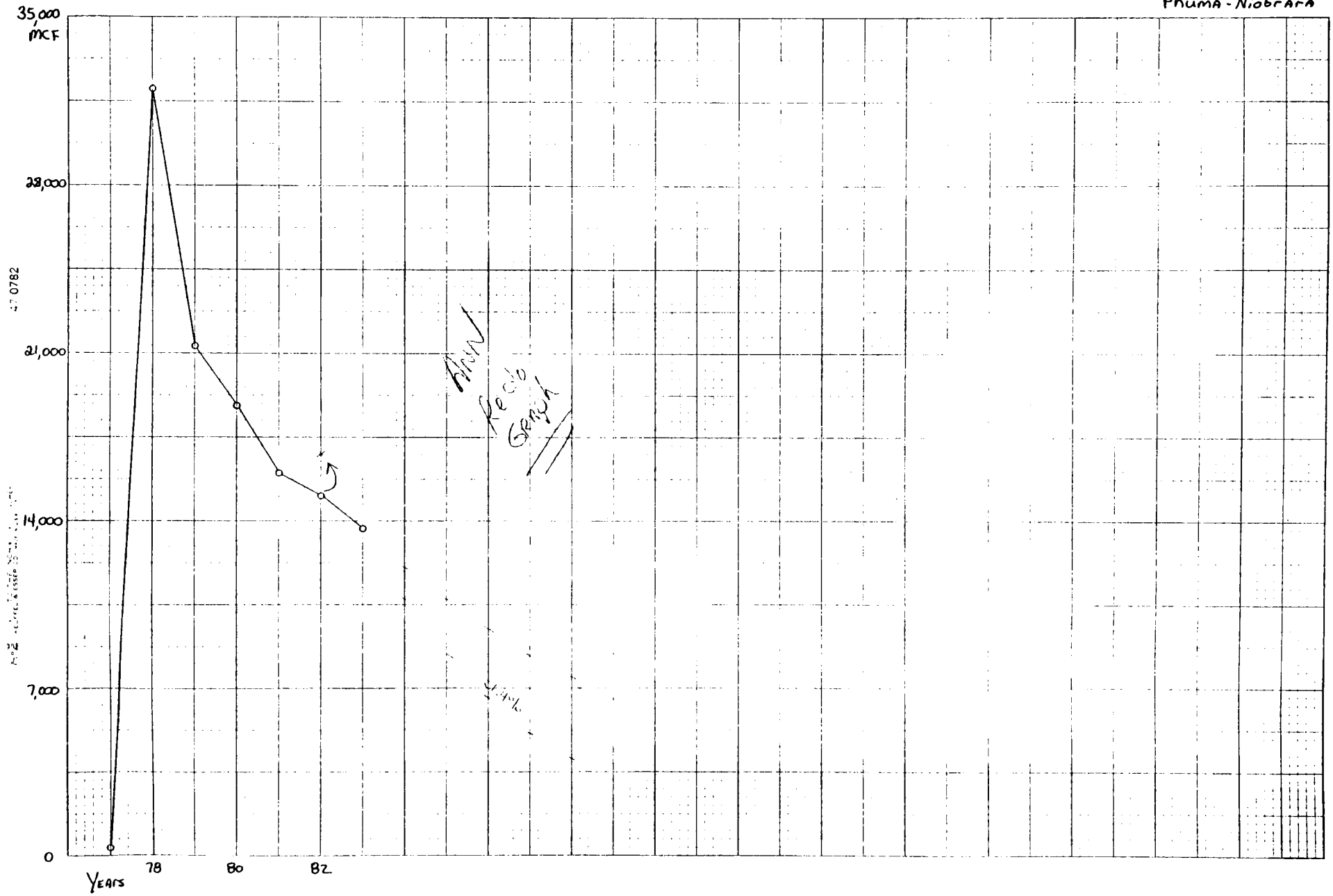
Old Baldy - Niobrara



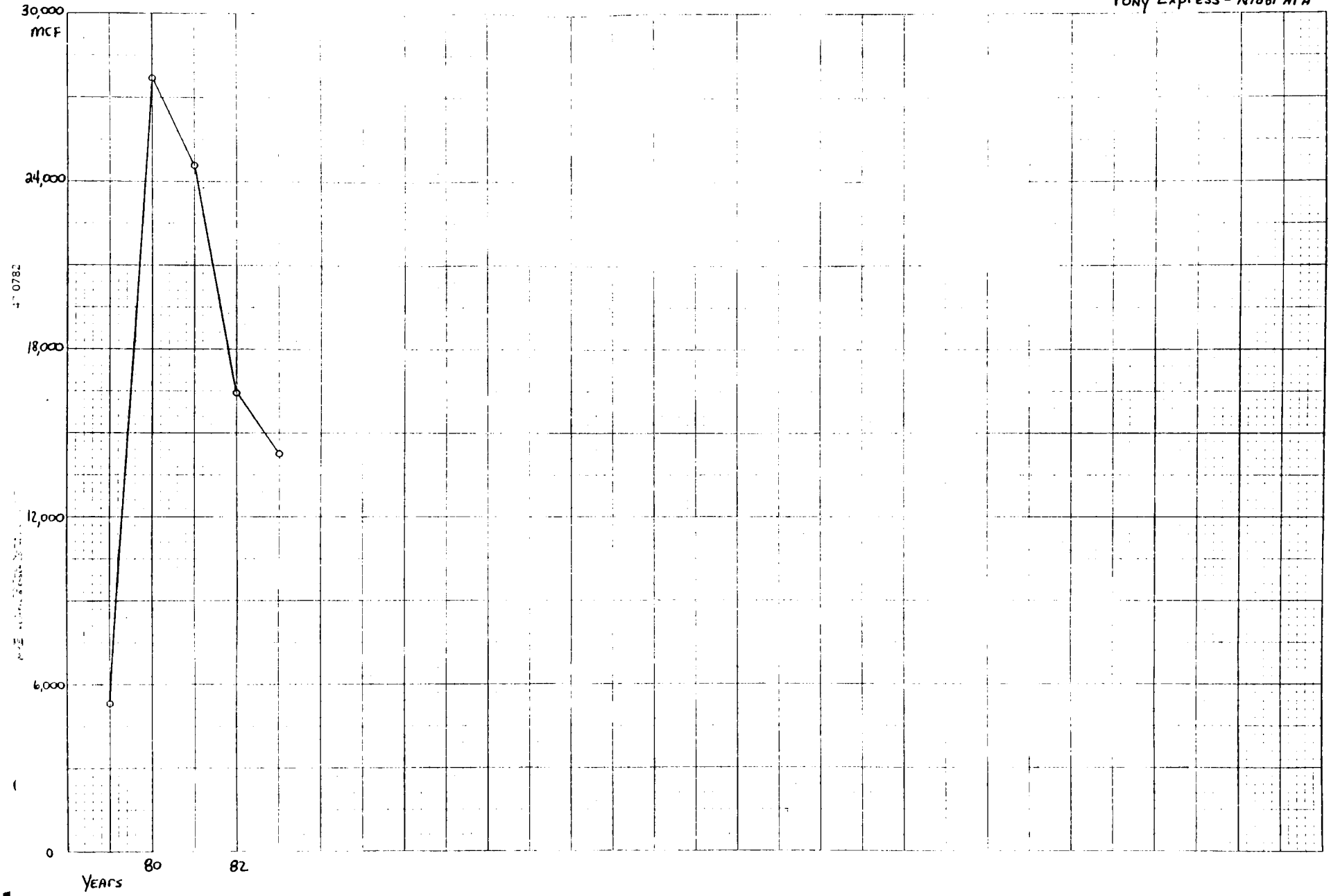
PEREGRINE - Niobrara

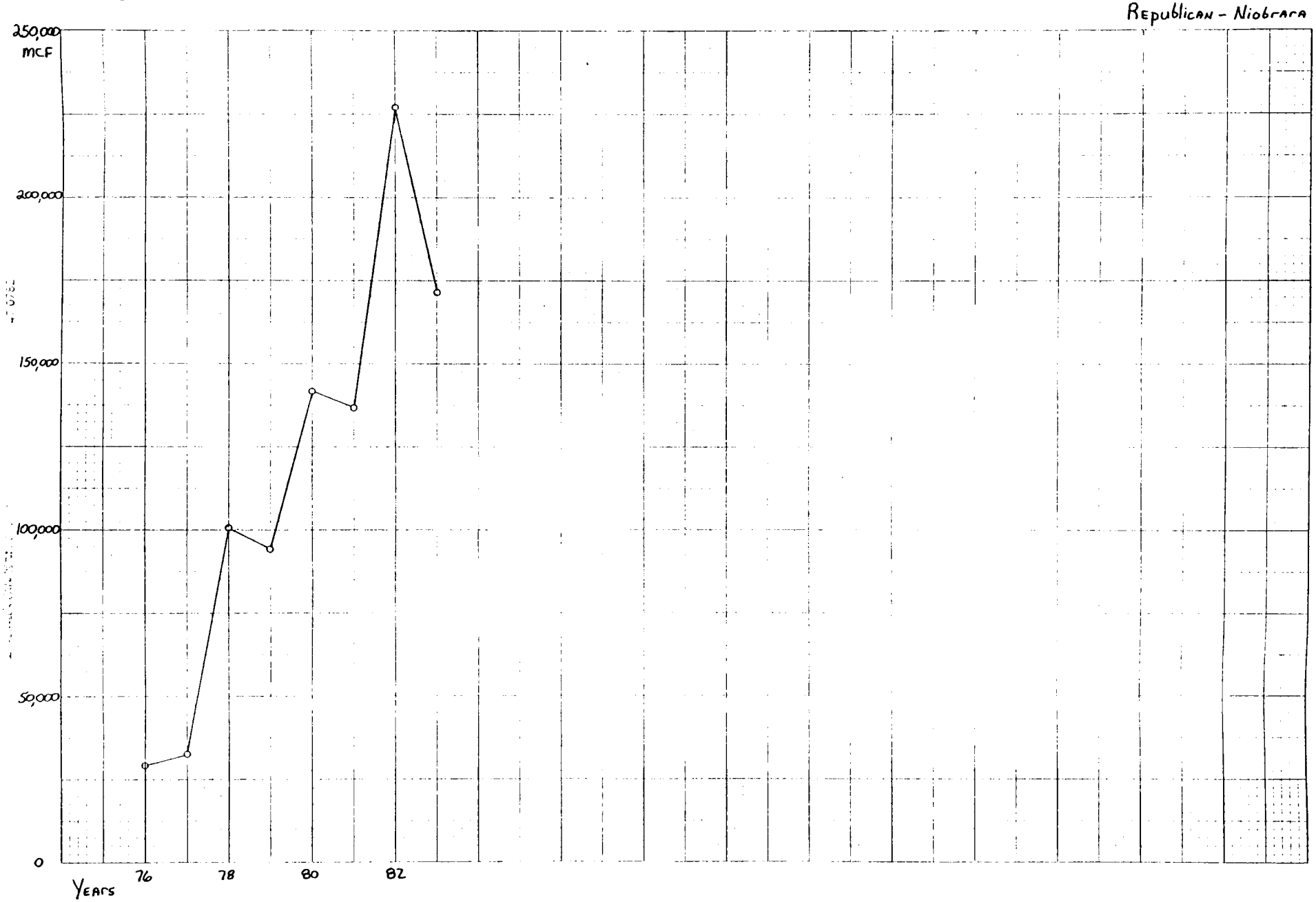


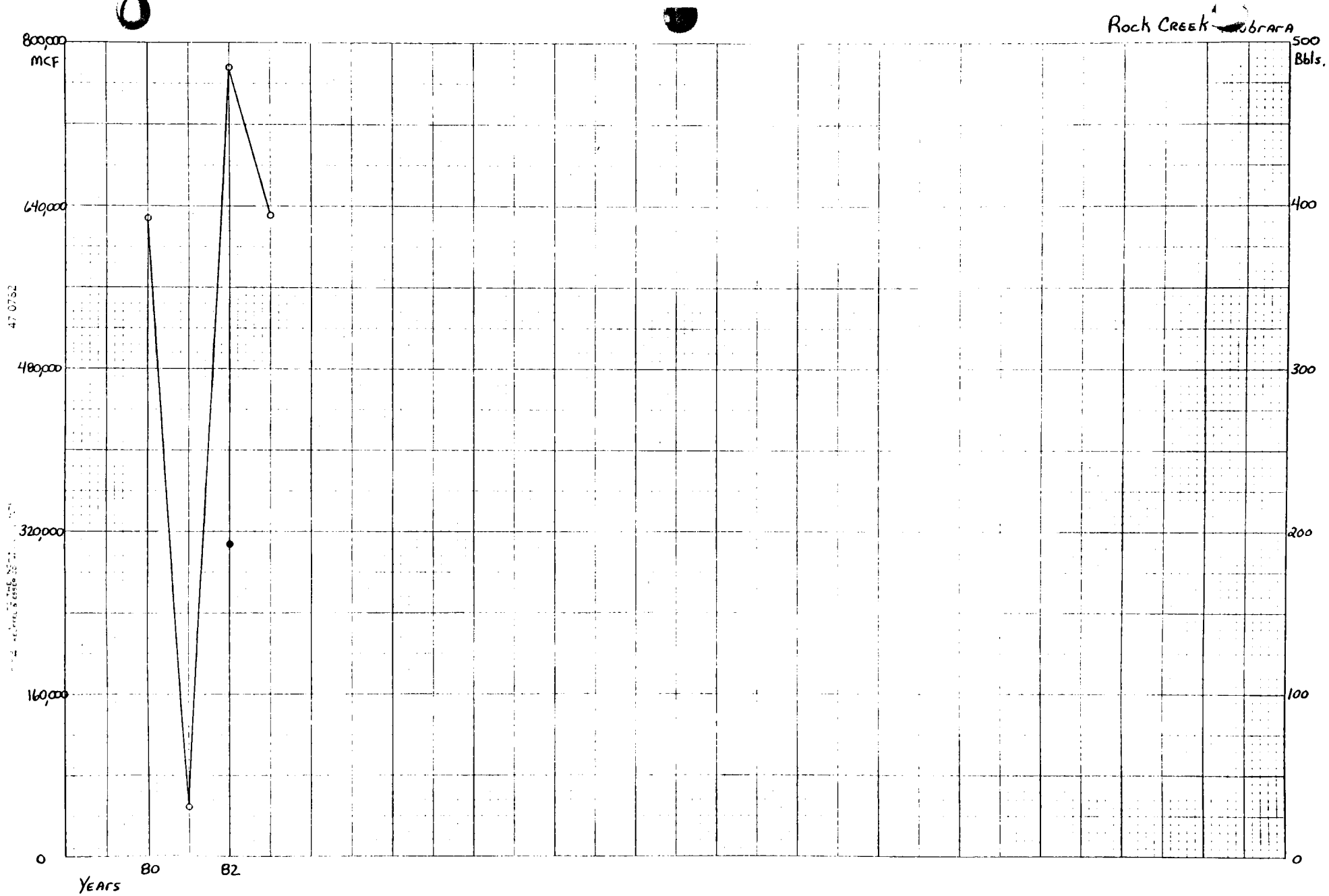
Phuma - Niobrara



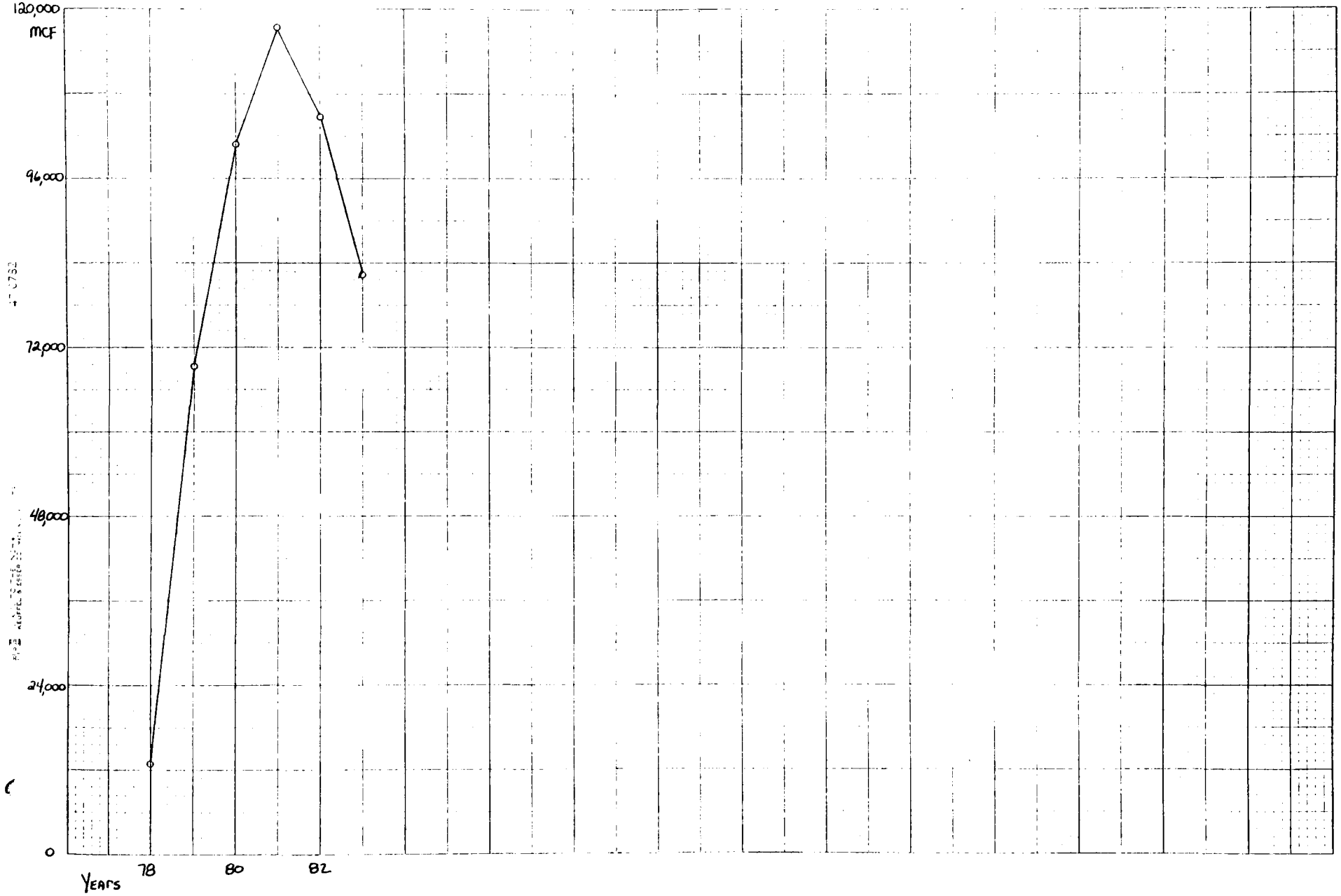
Pony Express - Niobrara



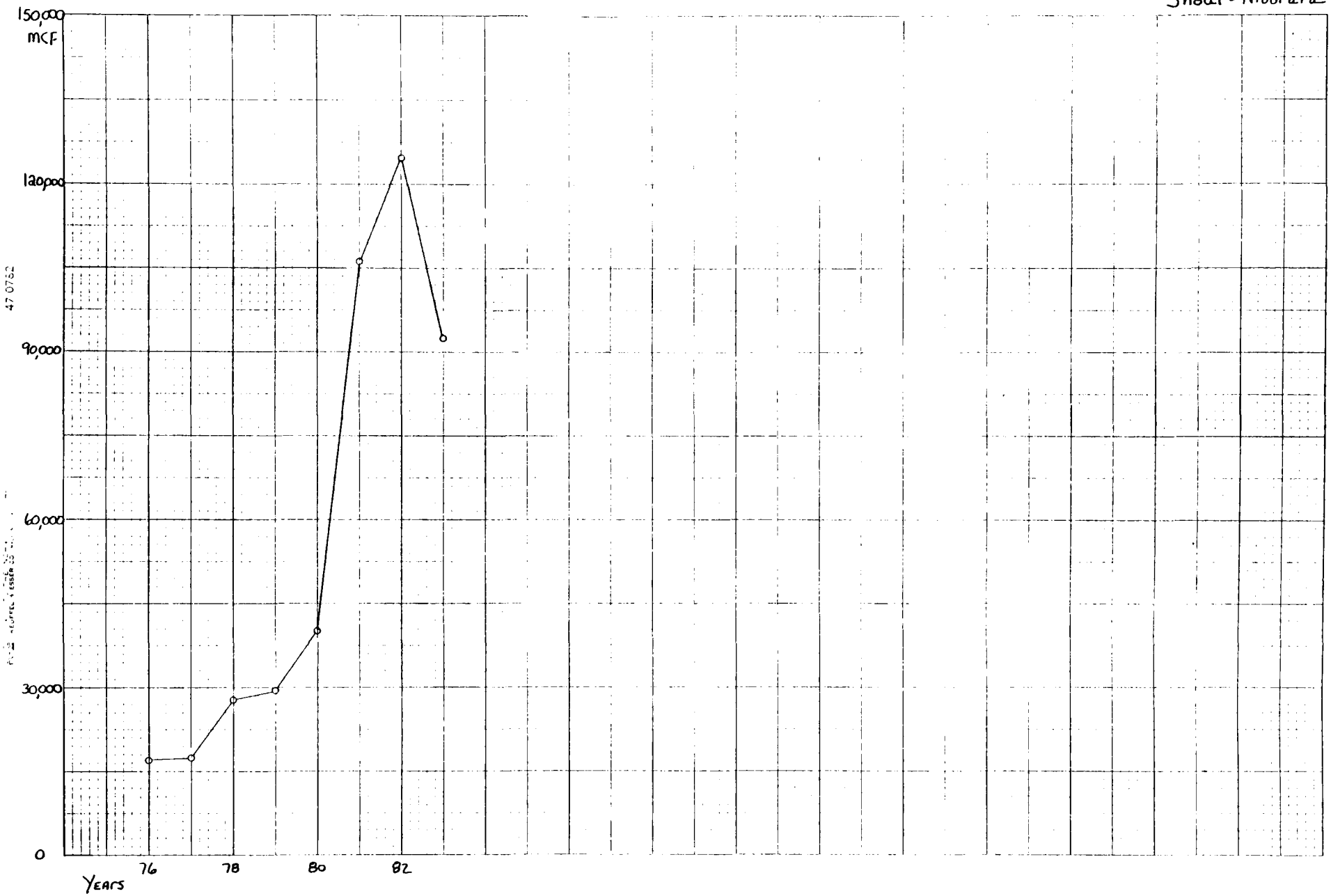

Republican - Niobrara
250,000
MCF
200,000
150,000
100,000
50,000
0
76
78
80
82
Years

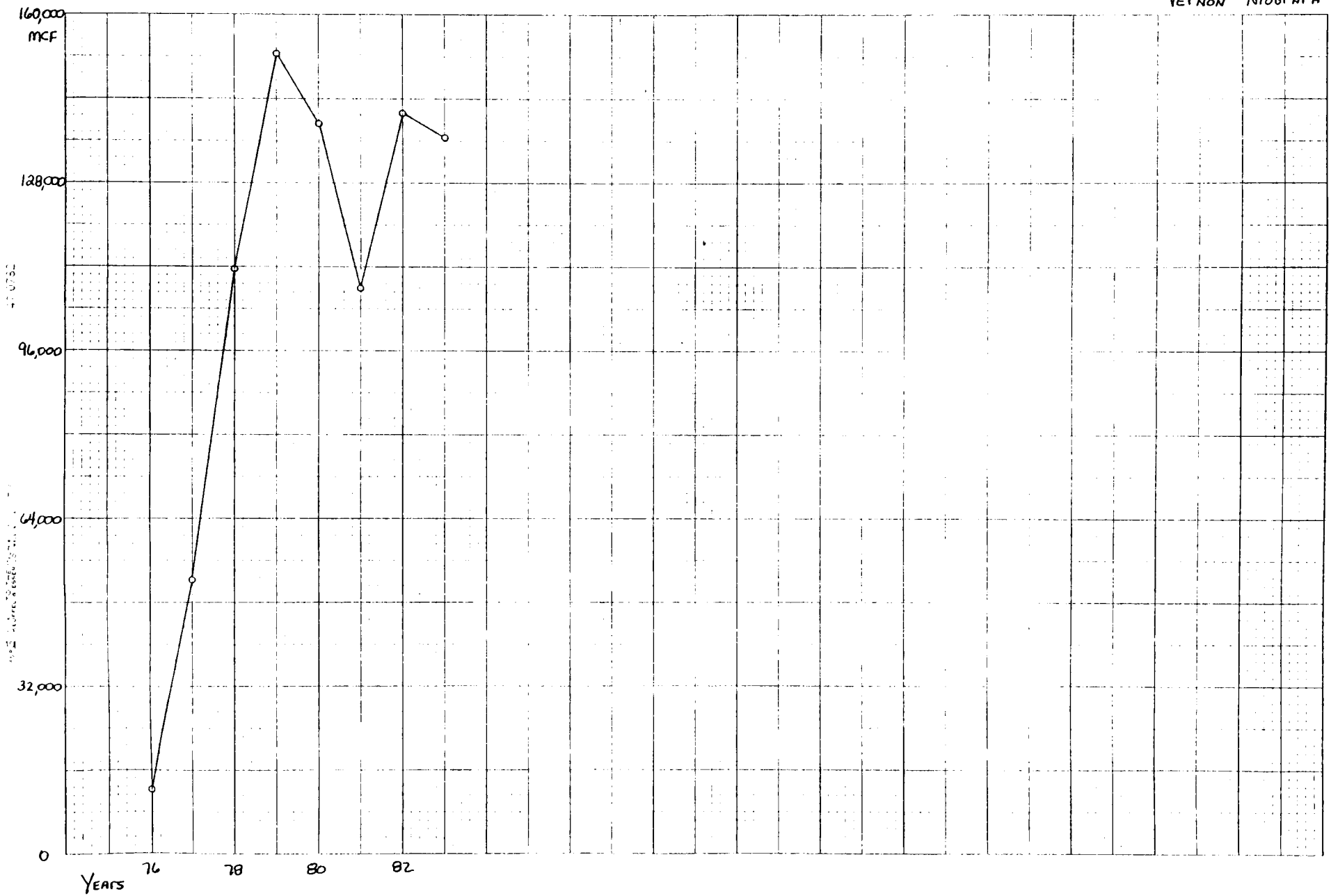

Rock Creek - Niobrara
800,000
MCF
640,000
480,000
320,000
160,000
0
500
Bbls.
400
300
200
100
0
80
82
YEARS
47 0752

Schramm - Niobrara

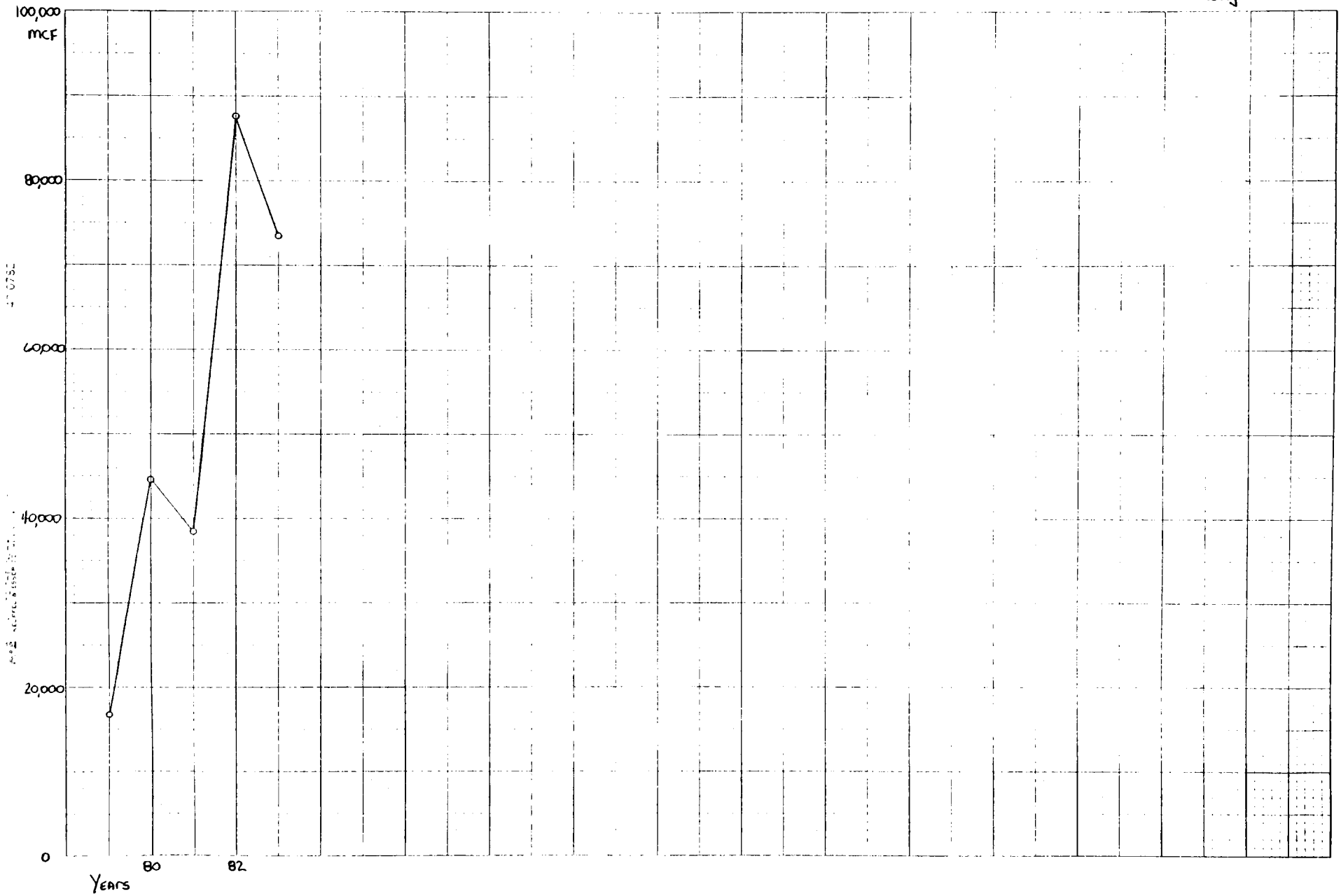


Shout - Niobrara

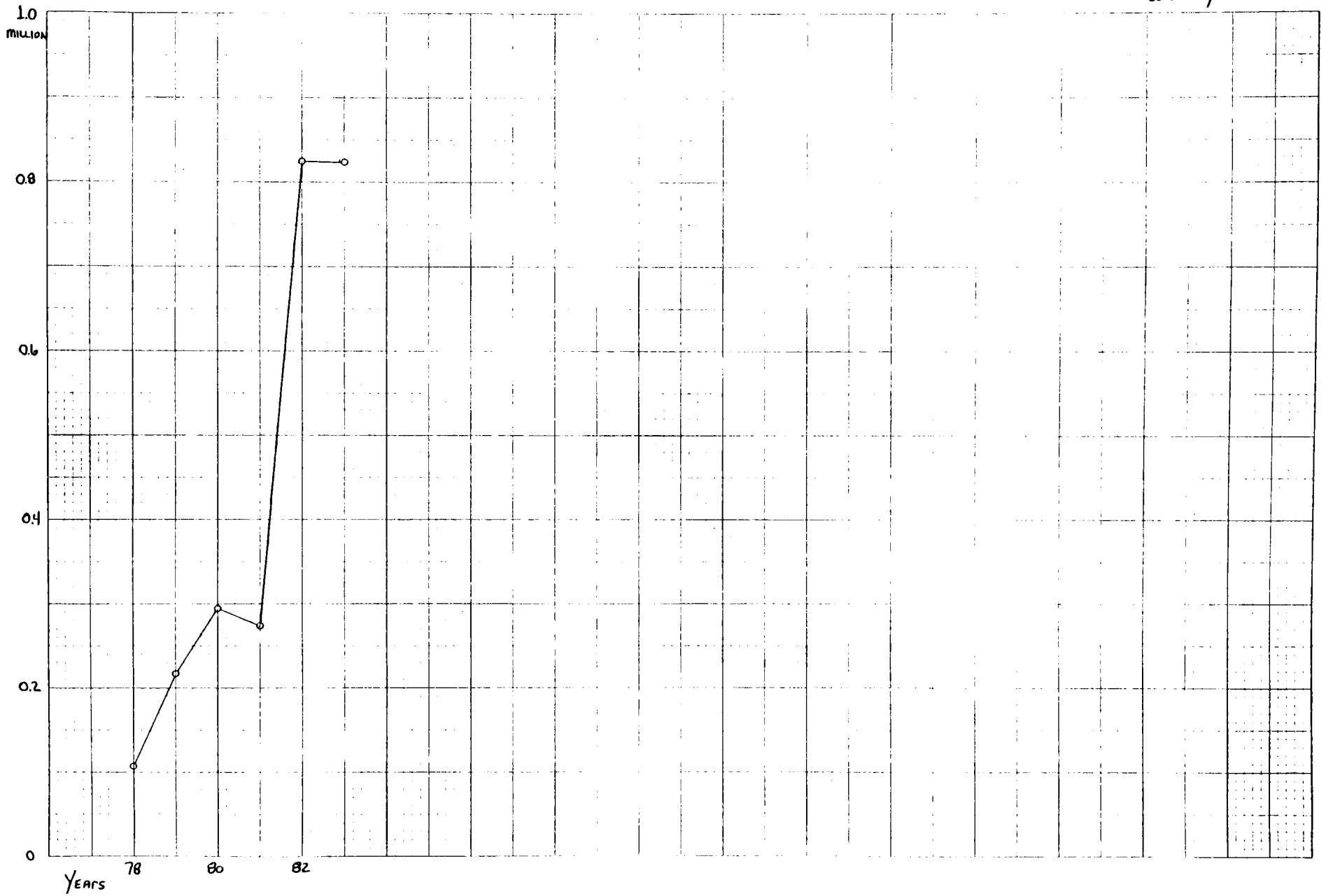



VERNON - NIOBRARA
160,000
MCF
128,000
96,000
64,000
32,000
0
76
78
80
82
YEARS

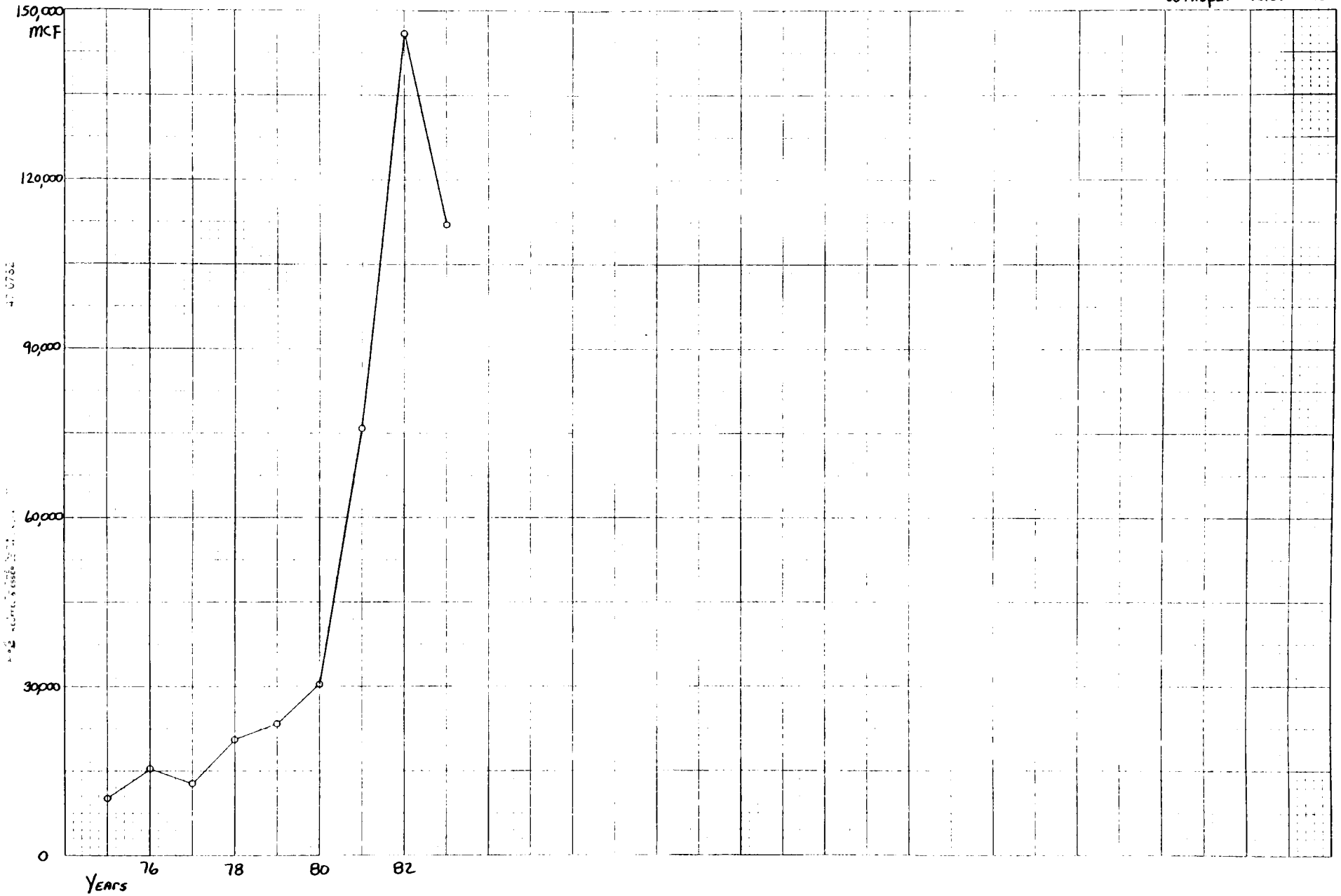
Wages - Niobrara



Waverly - Niobrara



Whisper - Niobrara



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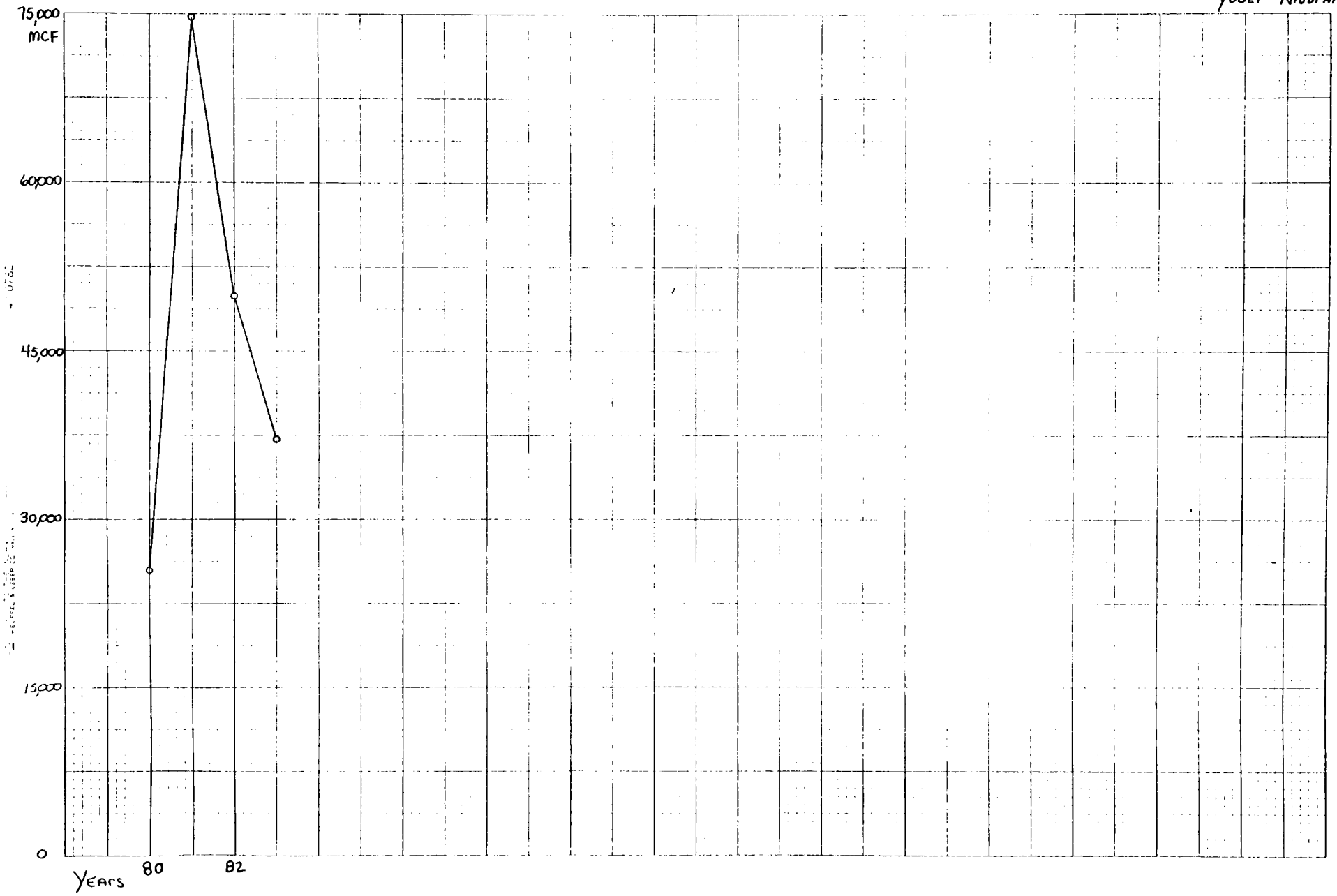
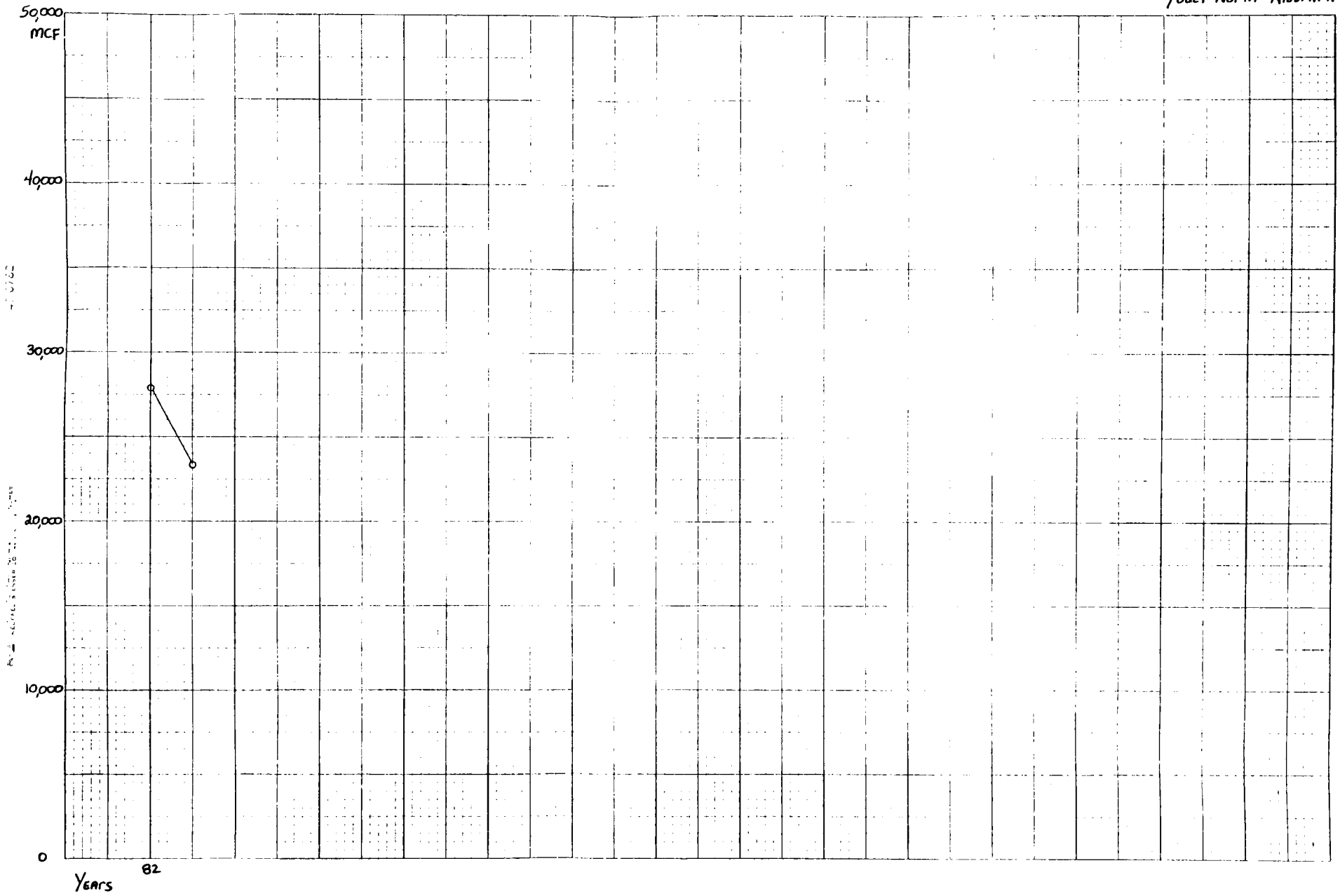


Yodel North-Niobrara



Other Publications

INFORMATION SERIES 18--Oil and Gas fields of Colorado: Statistical Data through 1981.
MAP SERIES 2A--Oil and Gas fields map of Colorado. 1983, (1:500,000).
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