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Niobrara gas indications cover wide area of western Nebraska

Raymond R. Burchett *Nebraska Geological Survey Lincoln*

The Niobrara formation was named in northeastern Nebraska by Meek and Hayden[1] for exposures along the Missouri River bluffs near the town of Niobrara in Knox County (Fig. 1).

Distribution of the Niobrara is restricted to the western four fifths of Nebraska.

Much of the formation is concealed by deposits of older Cretaceous, Tertiary, and the younger Quaternary age rocks. Exposures of the Niobrara occur in the south-central, east-central, northeastern, and northwestern parts of the state.

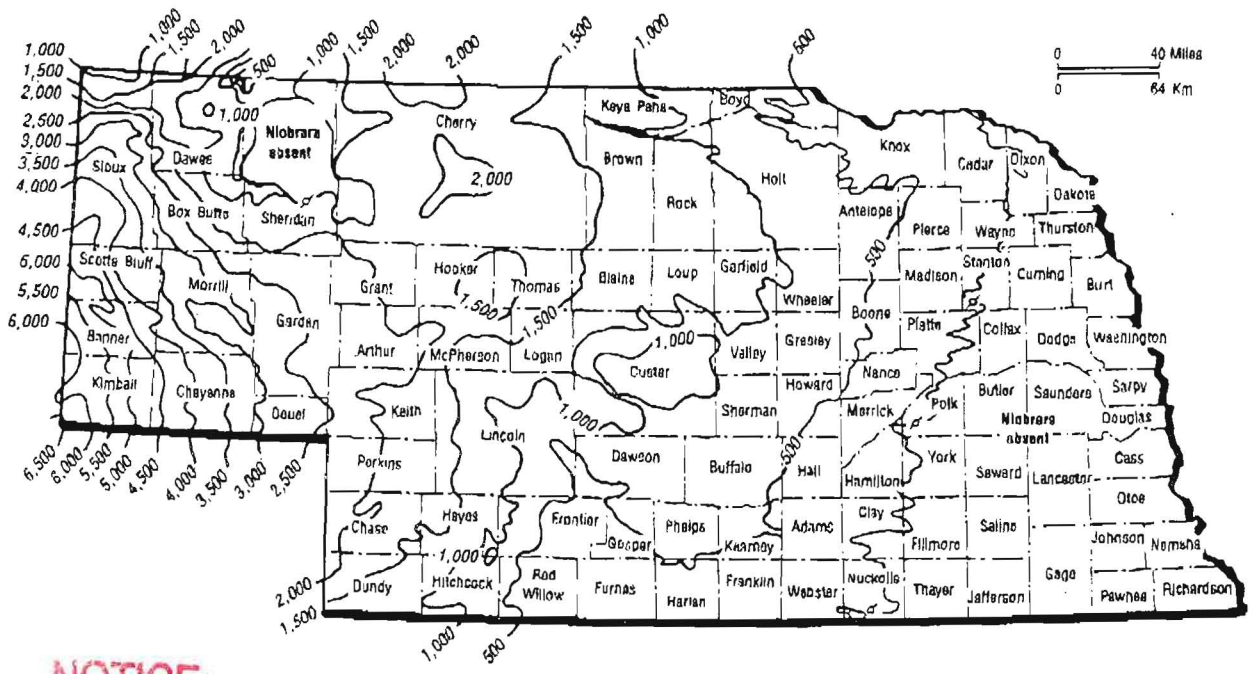
Stratigraphy

The Niobrara is divided into two members (Fig. 2). The upper Smoky Hill chalk[2] is named from the Smoky Hill River in Kansas, and the lower Fort Hays limestone[3] named for historic Fort Hays in western Kansas.

The Smoky Hill consists

Fig. 1

DEPTH TO TOP OF NIOBRARA IN NEBRASKA



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mainly of yellow, lead-gray, and orange shaly to chalky limestone with some interbedded bentonite. It ranges in thickness from a feather edge in western Nebraska to more than 450 ft in southwestern Nebraska.

The Fort Hays limestone consists mainly of massive gray to yellow chalky limestone and ranges in thickness from a feather edge in eastern Nebraska to more than 40 ft in western Nebraska.

The contact of the Smoky Hill and the Fort Hays is gradational and sometimes difficult to recognize. The Graneros shale underlies Niobrara, and the Pierre shale overlies it.

The combined thickness of the Niobrara ranges from a feather edge in eastern Nebraska to more than 500 ft in southwestern Nebraska (Fig. 3). This formation and older rocks down to the Dakota group are eroded and missing over the top of the Chadron-Cambridge arch in northwestern Nebraska.

A map on top of the Niobrara (Fig. 4) shows its configuration to range from more than 1,000 ft below sea level in the Denver basin of western Nebraska to more than 3,000 ft above sea level on top of the Chadron-Cambridge arch in the northwestern part of the state.

Depth to the top of the Niobrara from the land surface ranges from zero in eastern and northwestern Nebraska to more than 6,500 ft in the Denver basin of western Nebraska (Fig. 5).

Gas production

Shows of gas in the Niobrara formation were reported in the early 1900s near the town of Goodlin, Kan.[4]

However, no completions were attempted, and it was not until 1921 when Beecher Island gas field was discovered in Yuma County, Colo., by Midfields Oil Co.[5] that interest stirred in the Niobrara formation.

Several small Niobrara gas wells were reported drilled in the Goodlin field area of Kansas during the 1930s and

NIOBRARA GAS WELLS IN NEBRASKA

Operator	Well	Location	KB elev., ft	Total depth, ft	IP, Mcfd	Completion date
Arthur County						
Kan.-Neb. Natural Gas Co.	1-22 Cross	22-19n-39w	3,688	2,497	-	4-3-79
Kan.-Neb. Natural Gas Co.	1-33 Milldale Rch	33-20n-38w	3,601	2,195	-	3-26-79
Blaine County						
Carl L. Schneideriet	1 Schneideriet	23-24n-23w	*2,688	1,620	-	11-1-78
Box Butte County						
J-W Operating Co.	1 F. Dye	11-24n-49w	3,989	2,628	-	11-79
Cherry County						
Kan.-Neb. Natural Gas Co.	1-8 Alice Burge	8-31n-32w	3,020	4,150	-	8-78
Cheyenne County						
Central Resources	5 Hatcher	33-14n-50w	4,219	4,900	18	7-23-84
Vega Energy	11-29 Campbell	29-15n-46w	3,945	3,310	504	11-6-79
Vega Energy	1 Amsden	30-15n-46w	3,947	3,290	443	8-3-79
Vega Energy	24-3 J-Con	3-15n-48w	4,099	3,656	-	†4-16-80
Snyder Oil Corp.	1-2 Christensen	2-16n-47w	4,012	4,551	91	2-5-86
Snyder Oil Corp.	1-16 State	16-16n-47w	4,080	3,625	13	4-20-87
Rex Monahan	1 Greenwood	18-16n-47w	4,079	3,700	700	2-13-82
Snyder Oil Corp.	1-21 Thompson	21-16n-47w	4,044	3,789	1,531	1-21-86
Snyder Oil Corp.	1 Tool	3-16n-48w	4,140	6,768	762	11-18-85
Rex Monahan	1 Hayden	11-16n-48w	4,103	3,764	808	9-29-82
Rex Monahan	1 Scheeler	11-16n-48w	4,129	3,688	442	12-15-81
Rex Monahan	1 Hargens	12-16n-48w	4,089	3,779	472	2-10-82
Rex Monahan	1 Frerichs	12-16n-48w	4,094	3,702	526	2-11-82
Rex Monahan	1 Bailey	12-16n-48w	4,105	3,689	725	2-15-82
Vega Energy	11-13 Rabe	13-16n-48w	4,105	3,621	—	†4-21-80
Snyder Oil Corp.	1-22 H.A. Miller	22-16n-48w	4,137	3,852	667	6-19-79
Vega Energy	24-33 Jurgens	33-16n-48w	4,144	3,670	—	4-13-80
Deuel County						
Energetics Operating	22-17 Radke	17-14n-42w	3,723	2,770	—	7-89
Vega Energy	13-15 V.F. Fars	15-14n-43w	3,741	2,840	—	†12-15-79
Fremont Engy. & Voyageur	2 Katherine-State	16-14n-43w	3,774	3,098	—	†1-9-78
Samson Oil Co.	1-18 Richman	18-14n-43w	3,776	3,186	—	†10-18-82
Vega Energy	22-19 Porter	19-14n-43w	3,785	2,800	520	1-8-79
Energetics Inc.	24-12 Reese	12-14n-44w	3,786	2,885	260	6-89
Energetics Inc.	22-13 Reese	13-14n-44w	*3,775	2,855	88	4-89
Michael John Bowen	1 Johnson	24-14n-44w	3,794	3,100	—	4-20-78
Energetics Inc.	13-33 Krause	33-14n-45w	3,920	3,128	40	6-89
Dundy County						
John P. Lockridge	41-6 Anbrosek	6-4n-40w	3,455	2,050	273	1-11-79
John P. Lockridge	21-1 Lee	1-4n-41w	3,496	2,032	531	9-21-78
John P. Lockridge	41-1 Lee	1-4n-41w	3,479	2,028	890	6-24-78
Bass Enterprises Prod. Co.	15-31 SKS Cattle Co.	15-4n-42w	3,590	2,207	30	9-11-81
Frontier County						
Action Oil Co.	1 Lashley-State	16-5n-29w	2,681	3,845	10	7-90
Garden County						
Petronomics Inc.	1 Smith	9-15n-43w	3,758	2,900	—	*3-13-82
MECO Operating Corp.	22-8 Smith	9-15n-43w	3,761	2,813	—	7-89
Fremont Engy. & Voyageur	1 Smith	9-15n-43w	3,740	2,954	285	2-27-78
Petronomics Inc.	1 Smith-State	16-15n-43w	3,753	2,900	—	†3-17-82
Dale Cannon	1 Beard	25-16n-43w	3,706	3,720	—	1-18-83
Energetics Operating Co.	1 Minshall	20-15n-45w	3,923	3,907	14	2-82
J-W Operating Co.	1 Lee Koch	22-15n-45w	3,919	3,050	82	1-89
J-W Operating Co	1 Alice Dominy	23-15n-45w	3,883	3,040	42	1-89
Fremont Engy. & Voyageur	1 Schou	26-15n-45w	3,904	3,262	605	2-28-79
J-W Operating Co.	1-26 Phyllis Coil	26-15n-45w	3,891	3,096	25	1-89
Petronomics	1 Criswell	28-15n-45w	3,887	3,103	—	3-5-82
Vega Energy	1 McClung	27-15n-45w	3,927	3,016	660	5-30-79
Energetics Inc.	41-33 Whitney	33-15n-45w	3,898	3,035	207	6-89
Energetics Inc.	23-34 Whitney	34-15n-45w	3,882	3,016	163	6-89
Vega Energy	1 Peltzer	35-15n-46w	3,923	3,052	745	6-1-79
Vega Energy	23-16 Kastene	26-15n-46w	3,925	3,160	—	†3-20-80
Energetics Inc.	11-33 Jacobs	33-15n-46w	3,939	3,280	305	7-89
J.C. Anderson	5-1 Rohlfing	19-16n-42w	3,330	3,200	—	2-21-79
Samson Oil Co.	1-28 Blanchard	28-16n-43w	3,564	3,500	132	1-91
Samson Oil Co.	1-29 Blanchard	29-16n-43w	3,646	3,565	—	1-91
Petronomics	1-A Olson	11-16n-44w	3,387	3,126	1,177	11-5-82
Energetics Operating Co.	44-20 Porter	20-16n-44w	3,639	2,784	—	7-89
Walsh Production	1 Kaschke	26-17n-43w	3,609	3,400	—	4-20-83
J.C. Anderson	9-1 Hutson	24-17n-44w	3,570	3,510	—	2-18-79
Grant County						
Kan.-Neb. Natural Gas Co.	1-23 Rothwell	23-21n-38w	3,746	2,345	—	4-19-79
Keith County						
Fremont Engy. & Voyageur	1 Dilky	22-13n-41w	3,412	3,207	—	†12-6-77
Beard Oil Co.	1 NE State	16-14n-37w	3,345	2,278	—	10-16-78
Lincoln County						
Marshall R. Young Oil	1 Brown	10-16n-33w	3,137	2,164	937	8-17-79
Marshall R. Young Oil	11-2 Goeppinger	11-16n-33w	3,140	4,145	—	†11-15-81
Marshall R. Young Oil	2 Brown	14-16n-33w	3,141	2,313	175	†9-12-79
Morrill County						
J-W Operating Co.	2 H. Shanklin	19-23n-48w	4,056	3,656	—	11-79
Perkins County						
J.W. Operating Co.	1 Nebraska 16	16-10n-36w	3,349	2,340	20	1-89
Samson Oil Co.	1-21 Stanley	21-10n-36w	3,283	2,326	—	†10-10-82
Stelbar Oil Corp.	1-23 Prevall, Winde	23-10n-39w	3,401	2,235	346	12-15-78
Lexington Gas & Marine	1-28 Schneller	28-10n-39w	3,432	2,282	25	4-8-82
Beard Oil Co.	1 Herbert	2-10n-41w	3,558	2,506	10	5-6-80
Sheridan County						
Texas American Oil	1 D.C. Leistritz	9-24n-44w	3,885	2,500	—	9-80
Texas American Oil	1 Alvah Hamilton	9-26n-42w	3,955	2,302	—	9-80
Texas American Oil	1 Meyers L & C	18-26n-44w	3,855	2,200	—	9-80

*Estimate †Date reached total depth, no completion date given.

Fig. 2

CONFIGURATION ON TOP OF NIOBRARA

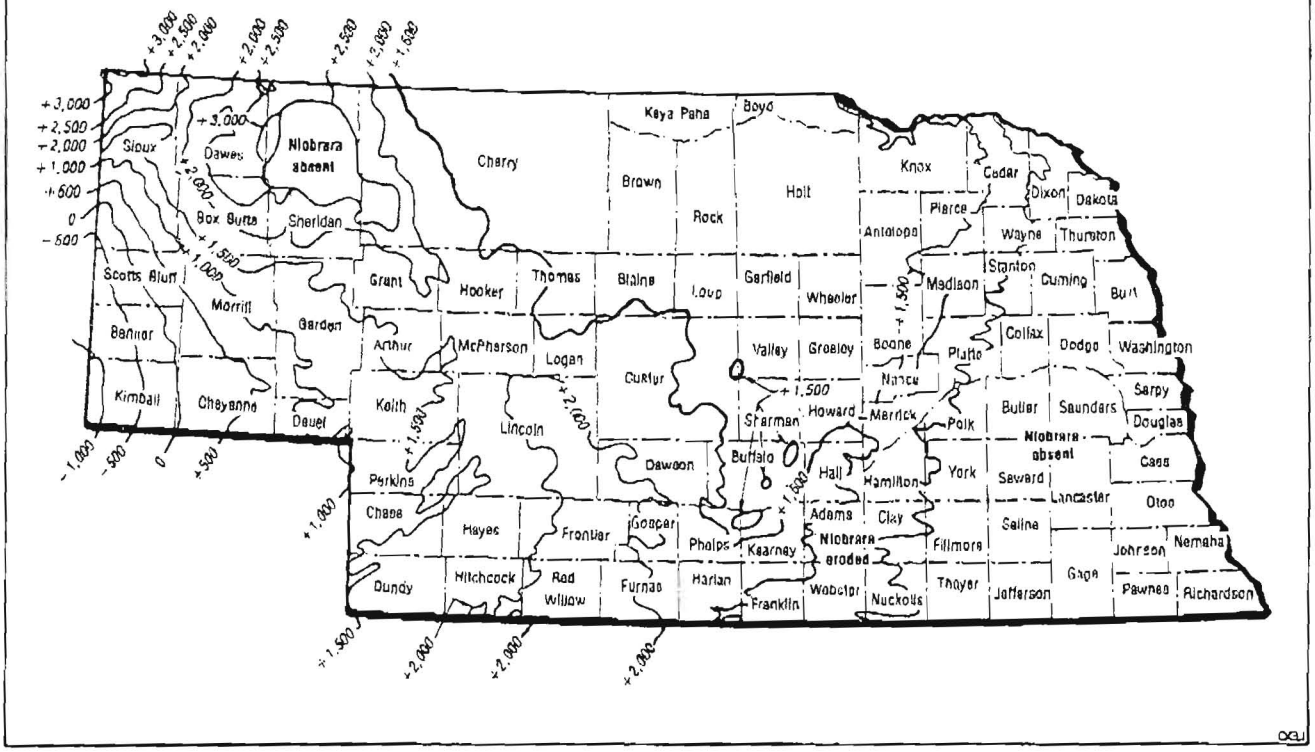
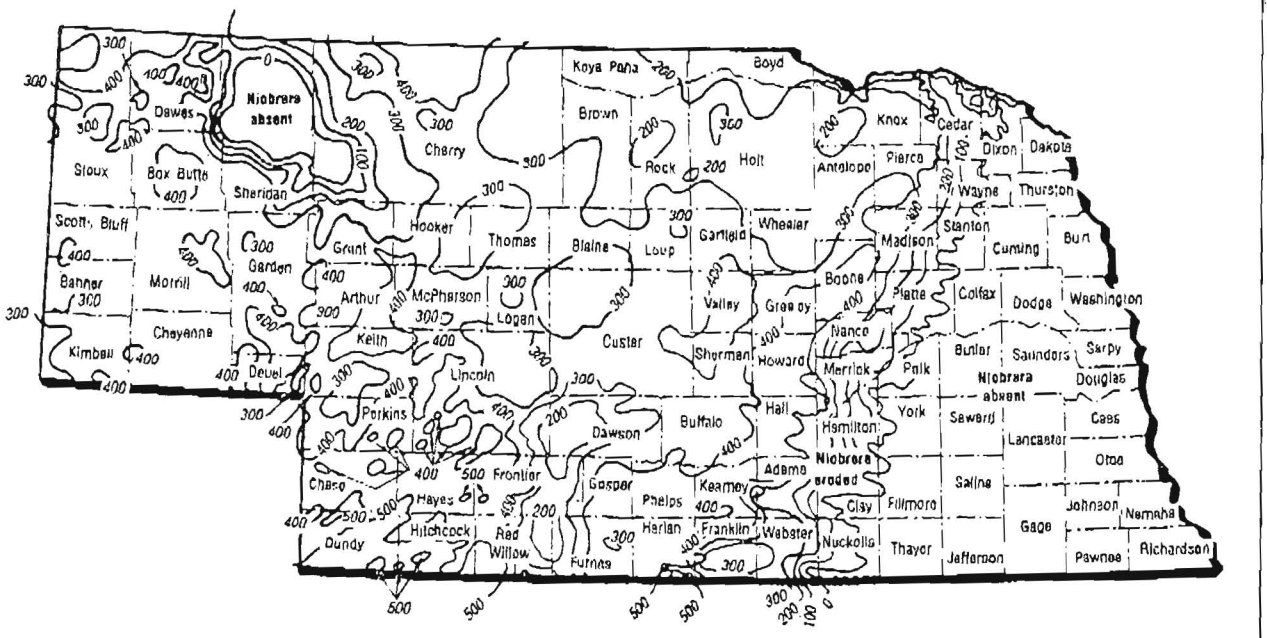


Fig. 3

THICKNESS OF NIOBRARA



The Author

Raymond R. Burchett is a geologist and research associate in the University of Nebraska-Lincoln geology department. He was a research geologist during 1959-76 at the university and research geologist and professor during 1977-87. In 1987-90 he was chief of the geology branch of the conservation and survey division, Nebraska Geological Survey. He has BS and MS degrees in geology from the university.

1940s, but they were completed only for local use.

Commercial development from the Niobrara did not start in the Midcontinent until 1972, when several wells were drilled and completed in Beecher Island field. Leasing programs resulted from these successful wells and extended from Colorado into Nebraska.

Many wells have been drilled through the Niobrara formation since the discovery of oil and gas in the panhandle of western Nebraska in 1949.

It was not until Feb. 27, 1978, when the 1 Smith in 9-15n-43w, Garden County, was completed as a shut-in gas well.

The well, drilled by Fremont Energy and Voyageur Exploration Co., flowed 285 Mcfd of gas and 50 b/d of water from the Smoky Hill member of Niobrara at 2,670-90 ft.

Including the 1 Smith, 75 Niobrara wells have been shut-in or plugged and abandoned since 1978 after having production casing set (see table).

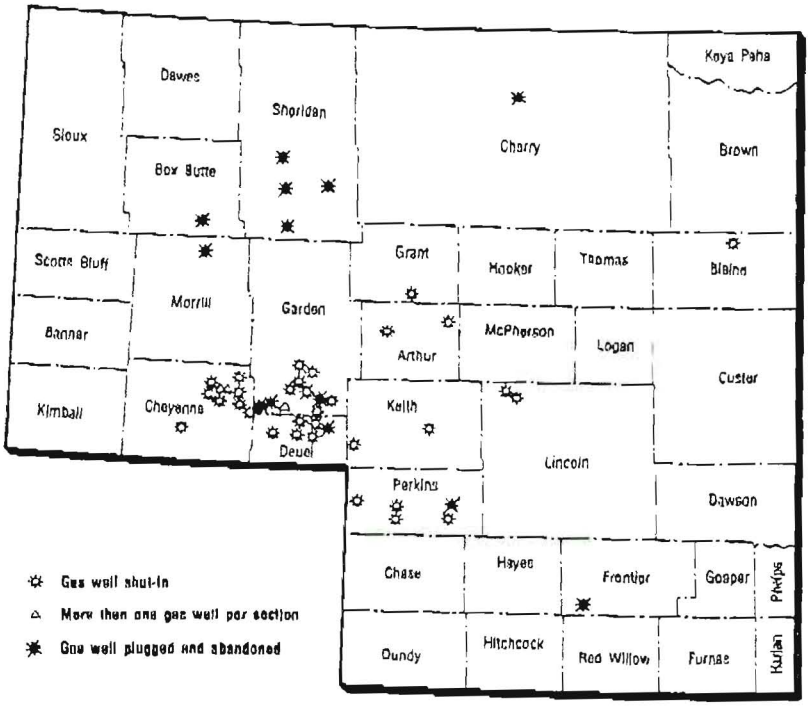
In late 1991 and early 1992 Snyder Oil Corp., Fort Worth, completed four producing gas wells in the Smoky Hill member of Niobrara (Fig. 6).

The wells are the 17-14A Miller, SE SW 17-16n-47w; 19-2A Weyerts, NW NE 19-16n-47w; 20-4A Jessen, NW NW 20-16n-47w; and 20-8A Jessen, SE NE 20-16n-47w.

These wells are located in the Denver basin about 15 miles northeast of Sidney, Neb., in Cheyenne County.

Fig. 4

Shut-in Niobrara gas wells in Nebraska



It is reported that several other shut-in wells in the area may be placed on production.

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World offshore developments to grow

Jeremy Daniel *Infield Systems Ltd. London*

Operators are considering 1,339 new offshore oil and gas fields for development between 1992 and 1997.

Tracking planned offshore field developments has become an increasingly difficult task as exploration has moved into more and more offshore areas.

The fields listed in Worldwide Offshore Field Prospects to 1997, prepared by

Table 1

Offshore developments considered through 1997

Region	Fields	Platforms	Subsea units	Pipelines (km)
Africa	284	158	11	2,594
Asia	236	324	53	9,498
Australasia	77	45	52	1,816
Europe	394	296	457	15,719
Latin America	102	70	188	3,318
Middle East	54	64	0	4,802
North America	192	147	110	3,873
Total	1,339	1,104	871	41,417