

March 29, 1967

To: Dr. Kendall Harding
P.O. Box 27
Newcastle, Wyoming 82701

Subject: Groundwater in the Newcastle area

Requirements: Availability of a water supply of 10 to 15 million gallons per day for industrial use.

Summary and Conclusion

Sufficient groundwater is believed available in the Pahasapa (Madison) limestone and the Minnelusa Formation in the Newcastle area. Approximately 8 to 10 wells, properly drilled and completed into the Pahasapa limestone, could supply the required 10 to 15 million gallons of water per day. This conclusion is based on a brief study (described below) of the geology and groundwater hydrology of the Newcastle-Osage area and the water flooding project in the Fiddler Creek oil field located approximately 18 miles north-west of Newcastle.

Groundwater Data

The Pahasapa limestone (Early Mississippian age) and the Minnelusa Formation (Permian-Pennsylvanian age) are the two principal groundwater aquifers in the Newcastle area. The Pahasapa (Madison) limestone is a gray massive limestone that is about 700 feet thick. The top of this formation lies at a depth of 2,400 to 3,000 feet in the Newcastle area. The upper part, which is cavernous or fractured, contains groundwater of the calcium bicarbonate type and is very hard. Wells drilled in this formation normally flow at a rate of 50 to 1,500 gallons per minute depending upon location, diameter, and well completion methods.

The overlying Minnelusa Formation consists of 850 feet of light- to pinkish-gray fine-grained sandstone containing numerous thin beds of limestone and dolomite with some shale, gypsum and anhydrite. The top of this formation lies at a depth of 1,600 to 2,100 feet in the Newcastle area. Wells drilled into the Minnelusa normally flow at a rate of 40 to 300 gallons/minute.

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Water from the upper part of the formation contains a relatively high concentration of calcium sulfate and bicarbonate and is excessively hard. It is believed, however, that water from the lower part of the formation is of much better quality.

Attached hereto is a list of several of the wells in the Newcastle area that penetrate both the Pahasapa and Minnelusa Formations (page 3).

In addition to the wells listed, five water wells were drilled into the Pahasapa limestone in the Fiddler Creek oil field for use in waterflooding. These wells were reported to be pumped at a continuous rate of 8 to 9 million gallons/day for a five year period. The yield from each well, based on a monthly check for this period, remained constant. The wells were cased to the top of the Pahasapa limestone which was not cavernous. It was reported by the operator of this field that these wells could have been pumped at a greater rate than was utilized. In order to secure this sustained yield from these wells, however, proper well completion methods were very important.

Water flooding is also being used in places at the Clareton oil field west of Newcastle. These wells have also penetrated the Pahasapa limestone, but no hydrologic data was available to the writer at the time of the preparation of this report.

Signed

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Well	Location	Depth of well (feet)	Diameter (inches)	Discharge (gpm)	Method of lift	Remarks
Carlson	SW $\frac{1}{4}$ SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 28, T. 45 N., R. 61 W.	2,738	7-10	1,150+	Flows	
Newcastle #1	SW $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 20, T. 45 N., R. 61 W.	2,638	7	1,500	Flows	
Newcastle #2	SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 30, T. 45 N., R. 61 W.	3,000	7	650	Flows	
Newcastle #3	SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 21, T. 45 N., R. 61 W.	3,000	7 ?	100	Flows	Pumps at 500 gpm with 400 ft. drawdown
Sioux Oil Co.	NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 29, T. 45 N., R. 61 W.	3,073	?	117	Flows	Pump installed to increase yield
Osage-Black Hills Power Co.	SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 10, T. 46 N., R. 63 W.	2,592	6-10	800	Flows	Discharge reported to be 2,200 gpm before casing was installed