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MEMORANDUM IN REGARD TO THE AVAILABILITY OF GROUND-WATER SUPPLIES IN THE HUGOTON GAS FIELD OF SOUTHWESTERN KANSAS

by

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Cooperating Agencies
Kansas State Board of Agriculture
Division of Water Resources
Kansas State Board of Health
Division of Sanitation

UNITED STATES
DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY
AND
STATE GEOLOGICAL SURVEY OF KANSAS
DIVISION OF GROUND WATER, UNIVERSITY OF KANSAS, LAWRENCE

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MEMORANDUM IN REGARD TO THE AVAILABILITY OF GROUND-WATER SUPPLIES IN THE HUGOTON GAS FIELD OF SOUTHWESTERN KANSAS

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INTRODUCTION

This memorandum has been prepared in response to a request to the Kansas Geological Survey by the Chamber of Commerce of Kansas City, Missouri, for information on the availability of ground-water supplies in the Hugoton gas field area.

The Hugoton gas field is located in southwestern Kansas, in western and northern Stevens county, eastern Morton county, southern Grant county, and northwestern Seward county. Adequate data in regard to ground water are lacking for the main part of the gas field in Stevens county. A report on the geology and ground-water resources of Morton county is now in press,[1/] and field studies of the geology and ground-water resources of Grant, Haskell and Seward counties are near completion.

GENERAL STATEMENTS

The Hugoton gas field area is underlain by unconsolidated deposits which consist principally of silt and sand with smaller amounts of gravel. These deposits range in thickness from less than 100 feet to more than 600

1/ McLaughlin, T. G., 1942, Geology and ground-water resources of Morton county, Kansas: Kansas Geol. Survey, Bull. 40.

feet. The greatest thicknesses were encountered in gas wells in southern Morton and Stevens counties. The depth to water level in this area ranges from less than 25 feet along the Cimarron river valley to about 235 feet on the upland plains north of the valley. Domestick stock, irrigation, and public-supply wells in this area range in depth from about 20 feet to more than 500 feet.

GROUND-WATER CONDITIONS IN THE GRANT-STANTON SHALLOW WATER BASIN

The Grant-Stanton shallow water basin comprises the western half of Grant county, the western third of Stanton county, the northern part of Stevens county, and a small part of northeastern Morton county. The parts of the shallow-water basin that lie in Stanton 2/ and Morton 3/ counties have been described in bulletins of the Kansas Geological Survey. The southern part of the shallow water basin lies within the Hugoton gas field.

The water-bearing materials that underlie the shallow water basin range in thickness from 200 feet in northern Stanton county to more than 500 feet in northern Stevens county. In a large part of the basin, the unconsolidated silt, sand, and gravel is underlain by Cretaceous sandstones that would yield additional supplies of water to deep wells.

Wells in the basin are from 50 to 350 feet in depth and the depth to water level ranges from about 35 to 110 feet. At present there are about 20 irrigation wells in this area. Listed below are descriptions of three of these wells.

2/ Latta, Bruce F., 1941, Geology and ground-water resources of Stanton county, Kansas: Kansas Geol. Survey, Bull. 37.

3/ McLaughlin, T. G., Op. cit.

Winger well.--The Winger irrigation well is at the NW corner NE.¼ sec. 35, T. 27 S., R. 40 W., in northeastern Stanton county. It is a gravel-packed well, is 182 feet deep, is cased with 16-inch galvanized-iron casing, and is equipped with a turbine pump. The water level in the well is about 63 feet below the land surface. The well is reported to yield about 800 gallons a minute with a draw-down of 27 feet after pumping 6 hours.

Jungferman well.--The Jungferman irrigation well in the SE. ¼ sec. 31, T. 27 S., R. 38 W., in northwestern Grant county, was drilled to a depth of 317 feet. The static water level is 57 feet. The measured yield of the well is 1,197 gallons a minute with a draw-down of 24 feet after several days of pumping.

Parsons well.--The Parsons well is in northern Stevens county in sec. 4, T. 31 S., R. 37 W. The well is 300 feet deep and the water level in it is 94 feet below the land surface. Water is obtained from coarse sand and gravel. The well, equipped with a turbine pump powered by two natural gas engines, is reported to yield 2,030 gallons a minute with a draw-down of 14 feet after several hours pumping.

GROUND-WATER CONDITIONS IN VICINITY OF LIBERAL, KANSAS

Although Liberal is not located within the limits of the Hugoton gas field, the ground-water conditions here represent those of a large part of the gas-field area. The city of Liberal is supplied with water from 3 deep wells located in town. The wells are 372, 450, and 509 feet in depth and the static water level stands about 120 feet below the land surface. One of the city wells, equipped with a turbine pump, yielded 590 gallons a minute with a draw-down of 64 feet after pumping for 1½ hours.

An irrigation well in the NW. ¼ NE. ¼ sec. 32, T. 34 S., R. 33 W., owned by the Liberal Deep Well Company, yielded about 400 gallons a minute with a draw-down of 90 feet. The well is 357 feet deep and the water level is about 120 feet below the land surface. It is a gravel-packed well cased with 16-inch perforated steel casing and is equipped with a turbine pump powered by a natural gas engine.

WELLS AT HUGOTON

The city of Hugoton, in central Stevens county, is supplied with water from two gravel-walled wells, that are about 300 feet deep and are cased with 12-inch wrought-iron casing. The depth to water level is about 80 feet. One of the wells, equipped with a turbine pump, yields about 125 gallons a minute. Greater yields probably can be obtained from deep wells in this area, however.

WELL AT ROLLA

The city of Rolla in eastern Morton county is supplied by an 8-inch drilled well that is about 280 feet deep. The water level in this well stands 200 feet below the land surface. The well is equipped with an electrically driven turbine pump and yields about 200 gallons a minute.

QUALITY OF WATER

Chemical analyses of waters collected from wells in this area indicate that, although the water is hard, it is generally of good quality. Waters collected from wells in the Grant-Stanton shallow water basin had from 180 to 360 parts per million of total hardness. The chloride content of most of the waters analyzed was less than 25 parts per million; however, a few of the waters collected from wells along Bear creek valley and Cimarron river valley contained more than 100 parts of chloride. A few of the waters contained

as much as 5 parts per million of iron, but most of them were relatively free from iron. The following table gives the significant mineral constituents in waters collected from wells at Hugoton, Liberal, Satanta, and Rolla, taken from analyses made by the Kansas State Board of Health.

Town	Parts per million				
	Hardness			Chloride	Iron
	Total	Carbonate	Non-carbonate		
Hugoton	334	192	142	29	0.05
Liberal	222	178	44	9	.11
Satanta	293	182	111	15	.14
Rolla	285	174	111	16	.02