# Ground water available in the Davenport area, Oklahoma

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## Introduction

This memorandum describes the ground-water resources in the vicinity of Davenport, Lincoln County, Oklahoma. It is based on a one-day trip to Davenport made by the writer on February 11, 1948, to obtain information in addition to that not ~~available~~ in the ground-water files in Norman on the availability of ground water for public supply or other uses in the Davenport area.

Davenport is a town of about 1,000 in east-central Lincoln County, Oklahoma, on U. S. Highway 66, about half way between Oklahoma City and Tulsa. It is in an area of undulating to gently rolling topography underlain by rocks of Pennsylvanian age. The area is drained into Deep Fork of the Canadian River, by Dry Creek and its tributary, Chuckaho Creek.

## Well system and water requirements

The following information about the water-supply system of Davenport was furnished principally by Mr. Ray A. Manning, member of the town council. In February 1948 the town was using water from two groups of wells, as follows:

The larger group consists of six wells about 100 feet in depth, and one well about 300 feet in depth, between the southernmost east-west street and the tracks of the St. Louis and San Francisco Railroad. All seven wells are in an east-west line and the distance between the end wells is only about 500 feet. The wells are pumped with jack pumps operated from a

central source of power. The 100-foot wells tap water in a sandstone ranging from 3 to 6 feet in thickness, and they yield about 3 gallons per minute each. The 300-foot well taps also a deeper sandstone and yields somewhat more, but the water is of poor quality, being reported to contain 40 grains per gallon of salt and 19 grains per gallon of alkali, and to be very hard. The water from the 300-foot well is used by mixing small quantities of it with water from the other six wells. The group will produce a 2-inch stream of water for somewhat less than 8 hours before the wells fail and pumping must be stopped until the next day.

The smaller group consists of two dug wells that are 8 to 10 feet in diameter and about 35 feet in depth. Beside each of these a 10-inch well has been drilled to obtain water from a deeper sandstone at about 100 feet, and a connection from the dug well has been made so that the pump in the drilled well gets the water from both wells. This group is said to yield two-thirds of the water used by Davenport.

A well independent of the town system has been drilled recently at the north end of the high school building. It is about 120 feet in depth, and is said to produce 10 or 12 gallons per minute, which is enough for the school. The water is slightly saline, however.

The consumption of water at Davenport ranges from 15,000 to 21,000 gallons per day, but the maximum would doubtless be higher if the supply were equal to the demand. Possibly 30,000 gallons per day is a reasonable estimate of the maximum daily requirement during the next few years. This is about 21 gallons per minute.

## Ground water in bedrock

According to the geologic map of Oklahoma,[1] Davenport is underlain by rocks of Pennsylvanian age consisting mostly of shale. Because the regional dip of the bedrock formations is westward, a well drilled at Davenport penetrates rocks that crop out at the surface in the area to the east of the town. Along U. S. Highway 66 as far east as Stroud, the rocks are mostly shale, with only few and thin sandstone beds. Hence potentially water-bearing sands should be found in the first few hundred feet of drilling at Davenport.

An attempt to find water adequate for municipal or industrial uses at Davenport by constructing a very deep well is not likely to succeed, mainly because at great depth the water is not likely to be potable. In many parts of Oklahoma the ground water at depths greater than 500 feet is too saline for human consumption, although at lesser depths in the same formation it may be entirely satisfactory. At Davenport the saline water apparently occurs at considerably less than 500 feet—at somewhat below 100 feet, if the high school well is indicative. The 300-foot well now used by the town shows that the water at 300 feet is saline, and the log of an oil well in the NE¼NE¼NW¼ sec. 3, T. 14 N., R. 5 E. (about 1 mile north of Davenport), shows salty water at 618 feet. Even if the water in the bedrock formations was originally fresh, there has doubtless been ample opportunity for contamination by brines leaking from oil wells improperly cased or so old that the casing has failed. A further objection to deep wells is that, in all probability, the only sandstones within a reasonable depth will prove to be fine-grained and therefore capable of yielding only a small quantity of water to a well.

1/ Miser, H. D., Geologic map of Oklahoma, U. S. Geological Survey, 1926.

## Ground water in alluvium

Alluvium is the material deposited by a stream. It may consist of gravel, sand, and clay in any proportion, and it underlies the flood plain, or "bottom." It is generally thickest near the middle of a valley and thinnest where the flood plain adjoins the bluffs. Along major rivers, it may be more than 100 feet in thickness, but only a few feet along small creeks. In many places the alluvium is an excellent water-bearing formation, both because the coarser beds in it will transmit water freely and because replenishment of the ground-water supply is likely to be greater in the valley than in adjacent areas. As indicated on the accompanying map, alluvium thick enough and extensive enough to afford a reliable supply of water for municipal or industrial uses at Davenport is found south of town along Chuckaho Creek, and east of town along Dry Creek.

Chuckaho Creek heads about 6 miles west of Davenport, near Chandler, and passes south of the town. It is reported to flow through most of the year, and as rains are not frequent enough to maintain a continuous flow, much of the water must come from storage in the ground. Hence the body of ground water must be fairly large. Some of the water that drains into the creek could be salvaged for beneficial use.

The flood plain of Chuckaho Creek ranges from 0.25 to 0.5 mile in width. The maximum thickness of the alluvium is not known, but two wells drilled on the Chuckaho bottom in 1947 by the Davis and Weitzenhoffer Oil Company were reported to have reached a depth of 65 feet. They yielded about 60 gallons per minute, but as they were not constructed to exclude sand, they became filled with sand and thus were unusable. The water was not analyzed, but was said by one oil company man to have a good flavor, and by another to have a "muddy" taste.

As Chuckaho Creek drains an area underlain principally by sandstone and shale which are nearly or entirely lacking in gravelly materials, it is unlikely that much gravel will be found in the alluvium. The thicker sand bodies can be found by test drilling, but at best the sand is probably fine-grained and may cause trouble by running into wells during drilling, or by entering the wells with the water during pumping. It may be possible to control the sand by means of special construction, such as by installing thick gravel walls outside the casing.

Nothing is known of the quality of the water in the Chuckaho Creek alluvium except the statements of the oil company men referred to above. Only two wells, in addition to those drilled by Davis and Weitzenhoffer, were found on the creek bottom. These are about 1.5 miles west of Davenport, one in the SE¼ sec. 8 and one in the NE¼ sec. 17. Neither pump was in working order, and therefore no water samples could be obtained.

The disposal of oil-field brines into drainage courses or the leakage of brines from old or improperly cased oil wells is a serious menace to ground-water supplies, but it is not certain that the Chuckaho Creek alluvium has been contaminated in this manner. Although oil and gas wells have been drilled near the creek upstream from Davenport, they are few and scattered, and no definite cases of brine disposal into the creek are known.

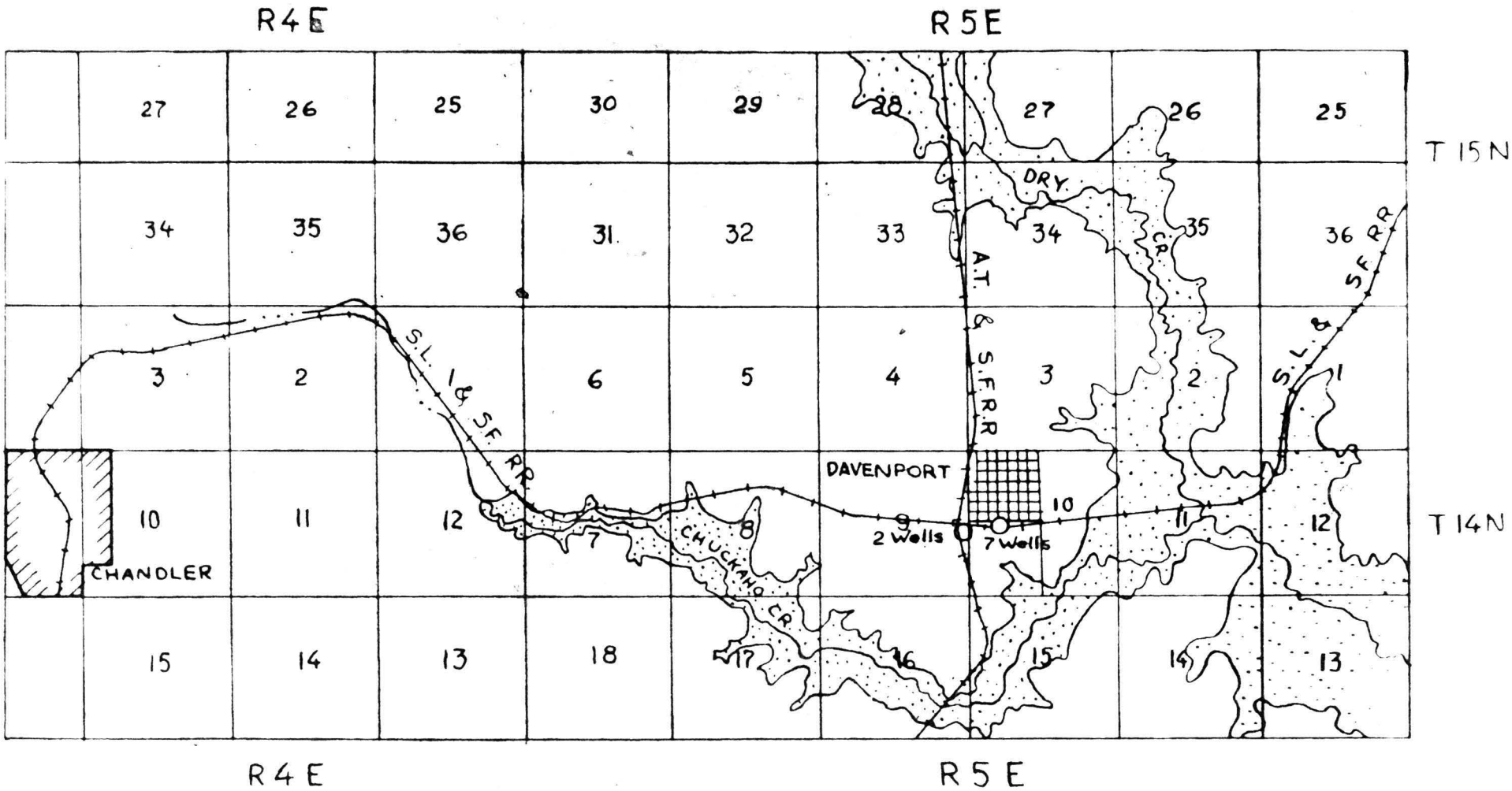
Dry Creek heads about 15 miles northwest of Davenport near Tryon, and has three tributaries between 5 and 10 miles in length. Immediately east of Davenport the flood plain is more than half a mile in width. The alluvium under the flood plain of Dry Creek should be similar to that along Chuckaho Creek. As it is a larger reservoir than that of Chuckaho Creek,

fed from a larger drainage area, the total volume of water stored in the alluvium should be greater, although individual wells probably will yield no more than wells in the Chuckaho Creek alluvium because of the limitation imposed by the relatively low permeability of fine-grained sand. Dry Creek is a little farther from Davenport than Chuckaho Creek, and it passes through the Davenport oil field, which is a potential source of saline contamination.

## Conclusions

This study shows that in the Davenport area ground water is available in the bedrock formations of the area or in the surficial deposits, which are represented by alluvium in th e principal stream valleys. The bedrocks include a few layers of sandstone that will yield only meager supplies of water, and below a depth of 100 feet the ground water is likely to be saline. Deep drilling is not likely to produce satisfactory results.

The alluvium may contain little material coarser than medium-grained sand. Although completion of wells in it may prove difficult, the alluvium is considered more favorable as a water-bearing formation than the bedrocks. Wells in it need not be very deep. The alluvium along Chuckaho Creek is less extensive than that along Dry Creek, but it is less subject to contamination from oil-field brines. The amount of water in it appears to be adequate for moderate municipal or industrial requirements if the wells are properly constructed.




# MAP OF DAVENPORT AND VICINITY