Urban geology of Portales

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This is one of many related papers that were included in the 1972 NMGS Fall Field Conference Guidebook.

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INTRODUCTION

Portales is one of the oldest settlements in North America in the sense that early man established at least a campsite in nearby Blackwater Draw over 11,000 years ago. The Brazos River was then flowing through Portales Valley. It was water also that attracted early settlers to the area because here were bountiful springs that allowed them to water their stock as they moved along the Fort Sumner trail. The first settler, Doak Good, established his ranch at Portales Springs' Caves, in 1881. The town itself was founded in 1898 when the Pecos Valley and Northeastern Railroad was laying track through the region; the nucleus of the town in fact was the construction camp for railroad builders. Today Portales is a farming center. Every year Portales Valley produces a variety of crops, the most important being a large crop of peanuts—about 15 million pounds of peanuts is harvested every year. Crops here are the result mostly of irrigation—although dry-farming also is common. Irrigation water, however, is being depleted at the rate of about one foot of drop in the water-table-level per year. The lenticular Brazos (i.e., ancestral Brazos) stream de-

WATER RESOURCES

Quaternary-Recent.—Most ground water in the Portales area is derived from the valley fill of the ancestral Brazos River, a river that formerly ran through Portales Valley into Texas until it was beheaded by the Pecos River near Fort Sumner. The fill, Pleistocene to Holocene in age, is about 150 feet maximum thick. The water generally is good in quality except for a narrow strip in the southeastern part of the Portales Valley where the salt content is high, or where the water is contaminated (see below). The Valley fill is underlain by Triassic red beds of the Dockum Group, which yield only small quantities of water to wells. S. E. Galloway estimates that irrigation water of the valley is being depleted at rapid rate, the ground-water table dropping at the rate of about 1 foot per year. The recharge rate is much less, about ½ inch per year. At the present rate of removal, the recoverable irrigation water in the valley fill will be depleted in 20 to 30 years! Compound-

MATERIALS

Aggregate.—A gravel pit about 3 miles northwest of Portales supplied Roosevelt County and neighboring counties with gravel and road aggregate for many years. Now, however, most of the gravel and sand comes from gravel pits near Fort Sumner. Occasionally a pit is opened locally to supply road ballast.

Building stone.—No building stone is quarried in the Portales area unless local use of hard caliche is considered building stone.

soil association; this association consists of shallow to very shallow calcareous, medium-textured or gravelly soils and rock (caliche) outcrops. Metal pipes or lines are subject to corrosion if buried in some of these soils because of high content of lime; corrosion is especially a problem in those soils where resistance readings are 5,000 ohms or less.

Structures both large and small, require careful site selection because of the gravel rock, high content of lime, rough topographic surface, or hazard of wind and water erosion of top soil. The Portales area is flat to very gently rolling, so that slow runoff is typical. Because the area is flat and dry, mass wasting is no problem in the area. Locally the Potter-Mansker soils are underlain by hard caliche; blasting, in fact, is necessary to excavate some basements.

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depth to the top of the water table in the Ogallala ranges from
about 80 feet in the Melrose area to about 130 feet in south-
eastern Quay County.

Pollution potential.—Studies by Taylor indicate that the
Portales Valley locally is being contaminated by urban and
rural “activities.” Bacterial contamination by both fecal and
non-fecal coliforms have been observed in numerous wells.
This type of contamination is indicative of improper disposal
of sewage, and of the use of manure for fertilizer. Chemical
contamination is indicative of improper nitrate concentrations,
which cycle with irrigation practices, have been observed at
three and four times the recommended safe limit of 45 Mg
NO$_3$ per liter of water. These impacts of human use, together
with the declining water table, strongly suggest increasing con-
tamination for the aquifer of the Portales Valley. It is hoped
that continued investigations and appropriate legislation and
control will reverse this increase-in-contamination trend. Inter-
state cooperation will be necessary to alleviate much of the
water-table decline.

NATURAL-DISASTER POTENTIAL

Portales is located at the edge of the West Texas tornado
belt; hence, the area is subject to about 1/10 the number of
tornado alerts of either Amarillo or Lubbock. Earthquakes are
even more rare in this stable part of the continental interior.
Occasionally some streets are flooded during heavy rain
storms, but flood danger in this area of normally light rainfall
is only slight.