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URBAN GEOLOGY OF VAUGHN

by

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PHYSICAL SETTING

Vaughn lies in southwestern Guadalupe County at the junctions of U.S. Highways 54, 60, and 285. It is also the crossing point of the Santa Fe and Southern Pacific railroads. It is a high (6,000 ft) area occasionally frequented by severe winter blizzards, but its summers are generally cool and mild. In addition to being a railroad town and a shipping point for cattle, sheep, and wool, it is commonly a stopping point for tourists and travelers especially between southeastern and central New Mexico.

The town is on a low ridge which forms a divide between drainage eastward to the Pecos River and local interior drainage to the west. This ridge consists mostly of limestone and gypsum of the Permian Fourmile Draw Member of the San Andres Formation, but locally at Vaughn the ridge has an inset of Ogallala sand and gravel. Just west of town a fault bends and drops these rocks as well as the Permian bedrock several hundred feet on the west. Where the Permian limestone and gypsum are at or near the surface, as just north of the Southern Pacific railroad, the surface is much pockmarked by numerous coalescing sink holes forming what is known as a karst topography. Just east of town between the two railroad tracks there is a wide subsidence area which has been covered by sand and gravel washed from the high ground to the west. At the eastern end of this area there is a large sink hole rimmed on the east by the irregular bedrock karst. All precipitation runoff in Vaughn drains eastward and funnels into this hole. Precipitation at Vaughn averages 12.8 inches a year with most falling from May through October.

MINERAL AND WATER RESOURCES

The principal known resource at Vaughn is gravel. A large gravel pit exists at the northwest outskirts of town and a considerable reserve still exists. Dolomite and limestone of the San Andres Formation is extensive just north of the Southern Pacific railroad and this could be used for crushed aggregate. Wells drilled for water at Vaughn have generally not encountered good or abundant water at reasonable depths. As a consequence the city pipes its water from 2 or 3 wells near Negra about 22 miles to the west. These wells are near the overlap of the Yeso Formation onto the Precambrian basement. They penetrate the Precambrian at 175-185 feet and are drilled in schist and quartzite to depths of 700-915 feet. The

Yeso is cased off and relatively good water is gotten from the fractures in the crystalline rocks. The Santa Fe Railway developed the water but with the coming of diesel-powered locomotives gave the water to the city in 1956. It is reported that the water source is ample for the foreseeable future. Water is sold to Encino through which the pipeline passes and to some ranches enroute to Vaughn. The city owns the pipeline but leases and maintains the wells and supplies the railroad with its water needs.

GEOLOGIC HAZARDS

Vaughn is essentially free from geologic hazards such as landslides, mudflows, floods, earthquakes, etc. The town is situated on a stable sand and gravel inset on a Permian bedrock of dolomite and gypsum. Vaughn is at drainage divide and no concentrated stream runoff could cause flood damage. The slopes are sufficient to immediately discharge all surface water even during torrential rainfall. Two minor potential hazards are earthquakes and cavern collapse. The west side of the Vaughn ridge is followed by a fault that has dropped the valley to the west by several hundred feet in the geologic past. There are no signs of recent scarps or breaks along the fault. Elsewhere in this guidebook Northrop and Sanford locate one or two earthquake epicenters near Vaughn which may have focus on the Vaughn fault. Nevertheless the local earthquake hazard is not considered great.

The Permian bedrock beneath Vaughn and to the north around the city dump is composed of limestone and gypsum both of which are notably soluble. Rain water has dissolved the formation into cavernous ground which has collapsed or subsided from time to time. The karst and sink-hole topography so prevalent surrounding Vaughn is evidence of the collapse. The gravel inset over the cavernous ground masks the bedrock collapse and perhaps has filled much of the earlier collapses. If collapse in the bedrock were to occur at Vaughn only broad gentle sagging rather than sharp sink holes might form. The west face of the gravel pit northwest of town exposes an old small collapse that did at one time affect the gravel.

Although most of the collapse in the limestone terrane may be over, years ago a small collapse occurred beneath the Southern Pacific track at a point about 10 miles northeast of Vaughn.