

WINNFIELD MINE FLOODING AND COLLAPSE EVENT OF 1965

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Abstract

The Winnfield rock salt mine in north central Louisiana flooded on November 17-18, 1965. The onset of flooding was discovered in the mine in the evening of the first day as a stream of water jetting from a pillar face and impinging on an opposite wall. Flooding continued until noon of the second day, when fractures and expressions of abrupt subsidence were observed on the surface over the mine and up to 1000 ft (300 m) beyond its boundary.

The geological setting and features of the mine and events leading up to the flooding are presented. Factors that may have played a role in the Winnfield flood are discussed and assessed for their likely impact on water intrusion into the mine and the related collapse event.

General Background

The Winnfield dome is located in the north Louisiana basin of salt domes, as shown in Fig. 1. Like other salt domes of the U.S. Gulf region, it evolved from the "mother bed" Louann salt of Upper Triassic-Lower Jurassic age (Halbouty, 1979). Exploratory wells for oil and gas were drilled over and around the Winnfield dome from 1914 to 1921. One of these wells encountered shallow salt at a depth of 999 ft (305 m), thus confirming its suspected presence beneath an unusual outcrop of calcite caprock (Huner, 1939).

The Carey Salt Company of Hutchinson, Kansas sank a mine shaft to a total depth of 838 ft (255 m) at the Winnfield dome in 1931 and penetrated 435 ft (133 m) into the salt stock (Belchic, 1960). Figure 2 depicts a section through the mine relative to other features of the dome. Room and pillar mining of rock salt was started in 1932 using the drill and blast method at a depth of 811 ft (247 m). Typical rooms and pillars in the mine had widths of 50 ft (15 m), and 50 to 75 ft (15 to 22.5 m), respectively (Belchic, *ibid*; Hoy, et al., 1962). Fully developed rooms reached heights of 60 to 70 ft (18 to 21 m). Cumulative salt production from the mine at the time of flooding in 1965 was about 3,360,000 tons ($3,413,760 \times 10^3$ kg) (Elliott, 1965).

Features at Winnfield

The Winnfield caprock originally exhibited all three stages of a "mature or complete" Gulf Coast salt dome caprock, i.e., anhydrite over the salt contact, gypsum in an intermediate zone, and calcite in the crest (Halbouty, *ibid*). (Salt dome caprocks are formed by an "underplating" process in which primary