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AT

INTERPACE CORPORATION'S - CAREY SALT DIVISION

BRINEFIELD

HUTCHINSON, KANSAS

By

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SUMMARY

In June 1978, two relatively small subsidence areas formed, 700 feet apart, in the Hutchinson, Kansas brinefield of Interpace Corporation's Carey Salt Division. There were no buildings, pavements, or installations to be damaged. Plant operation was interrupted only briefly. The two subsidence areas developed above a gallery of nine old interconnected brine wells drilled on 300-foot spacing and abandoned, but not plugged, 14 months earlier. The subsidence around well 57 occurred May 31, June 1 and 2, 1978, forming a circular depression with a diameter of 117 feet and an estimated maximum depth of 10 feet, or an estimated volume of 1500 cubic yards. About a week later, June 7, 8 and 9, 1978, a similar but larger subsidence area formed around well 50, with surveyed dimensions of 300 feet north-south and 215 feet east-west, and with a maximum of 13 feet of vertical subsidence at the wellhead. The volume is about 8500 cubic yards. Compacted soil in a lease road preserved open cracks caused by both tension and compression faults with scarps of one to two feet caused by the subsidence. A pond formed and the wellhead equipment, in vertical position, is now under water.

No prior elevations surveys are available, and there are no monuments or permanent reference points. The old brine wells - drilled in the years 1942 to 1946 - have never been logged with gamma-neutron logs or other wire line tools.

The Permian Hutchinson Salt Member, drilled from 400 to 725 feet, consists of bedded halite with interbeds or partings of shale accounting for 20 percent of the section. Permian red beds form the structurally weak roof rock from 400 to 50 feet. Unconsolidated sands and gravels from five to 50 feet are a major aquifer providing fresh water for solution mining.

The brinefield has been operated continuously for 70 years from 1909, with 108 salt wells drilled. Wells drilled on 300-foot spacing are operated individually by pumping water down tubing near 700 feet and forcing brine up the annular space. During one 23-year period from 1952 to 1975, no new wells were drilled yet salt production was increased 40 percent by the end of the period. The urgency of demand for salt production led to the unsound production practices of operating coalesced brine wells and galleries of nine to 13 coalesced wells; sometimes producing undersaturated return brine; to concentrating input water in certain wells; and, in desperation, to "reversing" wells, pumping water down the casing set 150 feet above the salt, and returning brine through the tubing or through other wells in the unplanned fortuitous gallery. Roof spans exceeded roof strength with resulting sagging and development of cracks in the roof rocks from one of which brine flowed at a depth of 150 feet when drilling well 106 in 1977. At that time, the 50-57 gallery was shut down. Slow subsidence unmeasured and undetected doubtless continued with the bleeding off of forcing pressure. Rapid

SUMMARY - continued

subsidence at wells 57 and 50 lasted three days in each place, with no detectable movement since June 1978. The abandoned 50-57 gallery appears stable (December 1978). New brine wells have been put on production and sound production practices restored. Brine wells adjacent to the 50-57 gallery need to be abandoned while in pressure-tight condition to minimize future subsidence in the brinefield.