NATURAL SOLUTION OF SALADO SALT SOUTHEASTERN NEW MEXICO

T. E. Kelly
Geohydrology Associates, Inc.
Albuquerque, New Mexico

Abstract

In the late 1950's United Salt Corporation began mining surficial halite deposits at Laguna Grande de la Sal in southeastern New Mexico. Recently their product has become contaminated by liquid waste from nearby potash refineries. USC plans to develop an alternate source, a brine aquifer that underlies their property at a depth of 300 feet. Wells will be drilled to produce 1,000 acre-feet (625 gpm) of water. The produced brine contains 2.02 pounds of salt per gallon yielding an annual production of 330,000 tons or 900 tons per day. The brine aquifer and nearby Pecos River are hydraulically connected. Withdrawal of brine from the aquifer will reduce the flow in the river by an equal amount; the amount of salt entering the river will be reduced by more than 40 percent.

Introduction

The natural solution of salt from the Permian Salado salt Formation has resulted in creation of a 125 square mile collapse feature, a brine lake, and significant increase in mineralization in the Pecos River. Now, United Salt Corporation of Houston, Texas, plans to develop this natural brine resource for the manufacture of salt products.

Laguna Grande de la Sal (Salt Lake) is located about 15 miles southeast of Carlsbad, New Mexico, and about two miles east of the Pecos River (fig. 1). The lake and associated salt deposits are in the lowest point of Nash Draw, a wide topographic valley more than 30 miles long and two to eight miles wide. The salt deposits (sodium chloride) have been used by Native Americans for eons, and the Spanish conquistadors used the salt and named the lake. The salt was so valuable to the earlier settlers that it resulted in the so-called "salt wars." In 1925 potash was discovered in the deposits beneath the region, and the lake subsequently became a discharge point for potash refineries. In the late 1950's United Salt Corporation (USC) began mining the salt deposits at Laguna Grande; however due to the continued inflow for potash refinery waste into the lake, USC plans to drill wells which will tap the brine aquifer which underlie the lake at a depth of about 300 feet.

Geology of the Area

Southeastern New Mexico is underlain by the Delaware Basin, a structural feature that began to evolve during the Mississippian Period. Downwarping continued throughout the Pennsylvanian and Permian Periods. By mid-Permian, shallow marine environments dominated the basin and thick sequences of evaporites of the Castile and Salado Formations were deposited. Deposits of the Rustler Formation then blanketed the evaporites by the end of the period. Little is known of the Mesozoic Era, but by mid-Tertiary the Pecos River and its tributaries began scowering the region, and the river entrenched itself in the Permian deposits. For the purpose of this article, only the Castile, Salado, and Rustler Formations are important.

The Castile Formation, which is as much as 2,000 feet thick, is composed chiefly of massive anhydrite, limestone interlaminated with anhydrite, and halite in beds as much as several hundred feet thick (Vine, 1963). Near the edges of the basin, the anhydrite has been converted to gypsum where it has been invaded by ground water.

The Salado Formation consists of thick beds of halite and anhydrite and thin beds of siltstone and polyhalite. Strata of sylvite and other potassium minerals are mined as potash ore. The Salado is locally as much as 600 feet thick and is 85 to 90 percent halite (Jones, 1954).