

NO SUBSIDENCE AT DIEUZE (LORRAINE, FRANCE) DESPITE A CENTURY OF WILD BRINING

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ABSTRACT – The underground area of Dieuze, a small town in Lorraine, North-Eastern France, is the site of a huge shallow salt deposit dating from the Lower Keuper period. The top of the salt formation is being actively dissolved by rainwater, which seeps down as far as the salt, where it is transformed into brine before flowing out towards the low points of the soil surface. Following the discovery of rock salt layers in the region, at the beginning of the 19th century, a room and pillar mine was opened at Dieuze. It produced 450 000 metric tons of salt between 1826 and 1864, at which time it had to be abandoned following accidental flooding. After the loss of the mine, salt production continued by pumping brine from wells. Nine wells were worked, from 1885 to 1973. They produced about 3.5 million metric tons of salt.

To assess the risk represented by this old wild brining operation with respect to surface stability, Geoderis has reconstructed the history of each of these nine wells in detail. This has revealed that, contrary to the salt company's conclusions at the time, these wells did not create cavities in the heart of the salt formation, but merely removed brine from the *salty aquifer* at the top of the salt. In the Dieuze region, this *salty aquifer*, which results from the natural dissolution of salt, is very widespread and constitutes an almost inexhaustible brine reservoir, compared to the brine production rate at that time. This is why, apart from a very particular and localized case, no movement of the soil surface connected to brine production has ever been observed at Dieuze. The analysis therefore concluded that the risk represented by the old wells is negligible.

The case of Dieuze is exceptional. In the other salt basins of Lorraine, with much less extensive *salty aquifers* than at Dieuze and greater brine production, the same kind of wild brining led to major dissolution at the base of the wells, resulting in subsidence to a depth of several metres at some places in the mined areas.