

A RE-EXAMINATION OF THE PROCESSES OF SINKHOLE FORMATION,
WINDSOR (CANADA) BRINEFIELD

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ABSTRACT

A comprehensive engineering geological study has been made of the 1954 solution mining - related sinkhole at Windsor, Ontario, by a thorough literature search and program of sampling and testing. Following previous workers, it is concluded that the Sylvania Sandstone is an important factor in the process of sinkhole formation. The intergranular contacts of this Middle Devonian sandstone cause it to have relatively low strength and the characteristic of forming large volume of loose sand upon compressive failure.

Previous models of sinkhole formation at Windsor and Gross Ile, Michigan either do not take into account the large bulking factor in stoped rock masses or do not explain the locations of the sinkhole satisfactorily. The efficient mass transfer afforded by "granular stoping" of failed Sylvania Sandstone accounts in part for the first of these deficiencies. Detailed analysis of operating records enables a sensible explanation of the location of the collapse. The current production practices during the life of the Windsor brinefield cause formation of extensive lateral and vertical interconnections throughout the salt beds. At the point of most extensive vertical communication, upward migration of the void was caused by solution of the topmost, supposedly unused, salt bed. A combination of conventional dry stoping and granular stoping of sandstone grains then allowed propagation of the void to the surface.

The model summarized above is based on all data presently available. The information required to confirm or refute it would be derived from a borehole through the sinkhole. Although involving many technical difficulties, this work would provide invaluable data bearing on methods of void migration, a subject of extreme importance to the solution mining industry.