MICROSEISMIC MONITORING AT TIMPA DEL SALTO BRINE-FIELD (Crotonese Basin, Southern Italy)

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ABSTRACT

In April 1984, at Belvedere Spinello Mine (Crotone, Southern Italy), which is being operated by the Montedipe Company using hydrodissolution, a sinkhole appeared on the property, about 400 metres from a group of production wells, along the slope of a hill and right on the TIMPA del SALTO fault which borders the deposit to the west. Overburden rocks slipped into the voids created by leaching operations, causing a considerable outflow of brine mixed with debris and rock fragments that damaged the surrounding countryside.

After a long period of suspension, production resumed at a number of wells, and some of the operating parameters are being varied, namely: reduced distances between coupled wells, reduced specific flows, abandonment of the hydraulic fracturings and high pressure linkages. A series of experiments with single wells, that had already been planned before the April 1984 event, were also started.

In order to ensure maximum safety of mining operations during this phase of resumed production, monitoring is being performed on subsidience, on landsliding phenomena linked to the 1984 event, on the water table (using piezometric wells), and on microseismic activity (using a network of geophones).

The present brief paper describes the basic concepts and operating techniques for the continuous microseismic monitoring of the mining area. This technique can be of considerable help both in monitoring how the work is done and preventing the onset of undesirable and at times negative phenomena.

The preliminary condition for determing the locations of the sources of seismic impulses is the availability of a reliable seismic ground model. In the specific case described, a suitable model was constructed based on the available geological and geophysical information.

A network of geophones has been designed for the continuous recording of ground signals generated by collapses and/or stresses around the expanding cavities, and an appropriate hardware/software system has been implemented to allow the collection of the signals, their analysis and interpretation.

The main result is the classification and identification of the hypocentres according to the modifications of their locations in space and over time.

The mapping of the loci of the classified hypocentres in the 3D space-time will be a strongly useful tool for controlling cavity development for safety purposes.