

**SOLUTION MINING  
RESEARCH INSTITUTE**

3336 Lone Hill Lane  
Encinitas, California 92024

USA

Country Code: 1 ♦ Voice: 858-759-7532 ♦ Fax: 858-759-7542  
E-mail: [smri@solutionmining.org](mailto:smri@solutionmining.org) ♦ [www.solutionmining.org](http://www.solutionmining.org)

Research Project  
Report  
No. 2001-6-SMRI



**Review of a Remediation Plan for the  
Potential Sinkhole Development at the  
Ocnele Mari Brinefield, Romania**

*by*

**Dr. T. William Thompson  
Golder Associates, Inc.  
44 Union Boulevard, Suite 300  
Lakewood, Colorado 80228**

July 2001

As it stands at this time this conceptual plan has a low probability of success. In fact this plan, if it is not successful, may lead to a more critical situation than at present.

### **3.3 Remediation proposed by ICPMRR Bucharest**

As this reviewer understands the ICPMRR proposal, this involves performing an analysis and evaluation of the problem, including gathering of more data on the cavity geometry, performing calculations on the stability, conducting experiments on potential fill materials and development of a remediation plan. As such, much of what exists in this plan relates to the items noted above as “missing efforts”, rather than presenting a separate remediation plan. This plan includes the institutions who have proposed other plans, as well as additional institutions. These efforts are encouraged, however the overall time frame for the proposed work (3.6 years) should be accelerated.

## **4.0 SUMMARY AND CONCLUSIONS**

All indications are that the roof of the coalesced cavity at Ocnele Mari, Field II, is undergoing progressive caving and collapse, and that this will break through to the surface at some time. The exact nature of the collapse is not known, nor is its timing, however a fairly extensive rigid collapse forming a sink-hole is possible, and this could occur sooner rather than later. The results of such a collapse would be extensive damage to surface facilities and dwellings. Brine could be expelled during such a collapse, although it seems unlikely that a major outflow would occur due to the restricted egress points. Outflows could probably be contained by the design and construction of suitable berms.

Two primary remediation methods have been proposed at a conceptual level. The first of these is to provide permanent support for the roof by backfilling with material quarried from above, and to the north of the cavity. The second is to initiate collapse by removal of the brine, which is presumed to provide roof support. Both of these methods have potential difficulties, and both suffer from lack of hard design calculations and data. The evaluation of these plans is summarized below.

***A statement of the appropriateness of the three proposed remediation plans to effectively reduce risk to life and property, including risks to those working on the cavern or in the area that would be affected by the collapse.***

The plan for backfilling is attractive in concept since, if successful, it would provide a permanent solution while retaining the current land-form and use. The problems lie in implementation, since as described in the AHR report there seems little likelihood that the backfilling materials can be effectively emplaced, and no account is taken of the effect of consolidation of these materials after they are emplaced. The risks associated with this method are quite high during implementation, since they involve working on the cavity roof during backfilling, and quarrying near the cavity.

The plan for removal of brine and deliberately initiating collapse and caving relies on the unproved assumption that removal of the brine pressure supporting the roof will lead to rapid caving. If this does not occur then the situation will be no better, and may be worse, than at present. Risks are small during brine withdrawal since this will be done off the cavity roof area. However if collapse does not occur, or even if it does, risks will be quite high due to the need to perform additional remediation work on the unstable, partially collapsed roof area.

***Delineation of the pros and cons of the three proposed remediation plans.***

The major advantages of the backfilling plan are the potential for a stable long-term solution with the land surface close to its initial condition. The major disadvantage lies in the uncertainty of the effectiveness of the implementation.

The major advantage of the brine removal plan is the ability to work off the cavity roof during implementation. The major disadvantage lies in the considerable risk that the cavity will either not, or only partially collapse. In this event considerable risk would be associated with finalizing the remediation.