**FRACTURED ROCK, SUBSIDENCE, AND TRACE OF MOAB FAULT**

**MOAB - SPANISH VALLEY**

**GRAND COUNTY, UTAH**

**by**

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**Digital Compilation by**

Justin P. Johnson and Matt Butler

**2003**

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**EXPLANATION**

- Fractured rock and potential subsidence
- Potential valley floor subsidence
- Fault, bar and ball on downthrown side; dotted where concealed
- Inferred trace of fault prior to salt dissolution

**USE OF THIS MAP**

This map shows areas where site-specific studies concerning fractured rock are recommended prior to development. The map shows potential hazard areas for planning purposes only, and the boundaries of these hazard areas should be considered approximate. In these areas, site-specific studies are needed to evaluate hazards. It is recommended that site-specific studies be performed by qualified professionals (engineering geologists, geotechnical engineers, hydrologists) and signed by a licensed Professional Geologist or Engineer, as appropriate. Because of the relatively small scale of the map (1:34,000), the possibility exists that some small hazard areas are not shown. Studies are therefore recommended for critical facilities even outside the mapped hazard areas. Those with any evidence of subsidence or surficial faulting should particularly look for evidence of subsidence or surficial faulting.

**DISCUSSION**

Deactivation of salt in the subsurface beneath Moab-Spanish Valley and accompanying collapse caused fracturing and displacement of much of the overlying rock. Fractured rock is exposed to and along the base of the cliffs that border Moab-Spanish Valley (the northeast and southeast valley-wall deformation belts), and is likely present on or below the valley floor adjacent to these exposures. The faulted rock may extend to great depths, although relatively little is known concerning potential displacements at depth. Potential displacements are likely characteristic of other types of fractures, including possible small subsidence-related displacements. This type of geologic zone includes areas that present a significant hazard from earthquake-related surface fault rupture.

Fractures increase secondary permeability and weaken the rock. Problems associated with fractured rock are complex at best and often involve rock and surface instability, and increased permeability for karstic conditions. Fractured rock can be the site of increased permeability due to fractures enabling efficient transport of water without blockage by debris or other sediment. Fractured rock can be susceptible to rock fall and slope instability.

Subsidence due to dissolution of salt at depth appears to be an ongoing process in Moab-Spanish Valley that needs further evaluation. A lowering of the ground surface would take place slowly anywhere on the valley floor, including within the valley-wall deformation belts. Subsidence could affect development in a number of ways, including tilting and/or damage to structures due to differential settlement, related earth pressures, ground cracks or earth cracks, and increased potential for groundwater contamination. Potential valley floor subsidence due to salt dissolution beneath Moab-Spanish Valley is likely characterized by small, incremental displacements over a broad area, and so the overall hazard is probably low. Also, the absence of sinkholes in Moab-Spanish Valley indicates that the hazard associated with local subsidence or collapse related to underground solution cavities is also low.

This map also shows the trace of the Moab fault for informational purposes only. Although surface fault rupture is possible, the fault is likely buried by Quaternary deposits, making the location of such a rupture difficult to predict. Because of the lack of evidence for late Quaternary displacement, the hazard associated with ground shaking produced by movement on the fault is low. Also, the absence of sinkholes in Moab-Spanish Valley indicates that the hazard associated with local subsidence or collapse related to underground solution cavities is also low.

SUBSIDENCE DUE TO DISSOLUTION OF SALT AT DEPTH APPEARS TO BE AN ONGOING PROCESS IN MOAB-SPANISH VALLEY THAT NEEDS FURTHER EVALUATION. A LOWERING OF THE GROUND SURFACE WOULD TAKE PLACE SLOWLY ANYWHERE ON THE VALLEY FLOOR, INCLUDING WITHIN THE VALLEY-WALL DEFORMATION BELTS. SUBSIDENCE COULD AFFECT DEVELOPMENT IN A NUMBER OF WAYS, INCLUDING TILTING AND/OR DAMAGE TO STRUCTURES DUE TO DIFFERENTIAL SETTLEMENT, RELATED EARTH PRESSURES, GROUND CRACKS OR EARTH CRACKS, AND INCREASED POTENTIAL FOR GROUNDWATER CONTAMINATION. POTENTIAL VALLEY FLOOR SUBSIDENCE DUE TO SALT DISSOLUTION BEHIND MOAB-SPANISH VALLEY IS LIKELY CHARACTERIZED BY SMALL, INCREMENTAL DISPLACEMENTS OVER A BROAD AREA, AND SO THE OVERALL HAZARD IS PROBABLY LOW. ALSO, THE ABSENCE OF SINKHOLES IN MOAB-SPANISH VALLEY INDICATES THAT THE HAZARD ASSOCIATED WITH LOCAL SUBSIDENCE OR COLLAPSE RELATED TO UNDERGROUND SOLUTION CAVITIES IS ALSO LOW.

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**CONTOUR INTERVAL 40 FEET**

**SCALE 1:24,000**

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