GEOTECHNICAL RULE DEVELOPMENT FOR GROUND INSTABILITY ASSESSMENT USING INTELLIGENT GIS AND NETWORKED MONITORING SENSORS

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Ground instability, induced both by natural and human processes, occurs regularly, in the form of landslides and ground surface subsidence (see photos below). In some cases, where impending failure is anticipated and where the consequence of failure is not tolerable, geotechnical monitoring is used to gain some understanding of the processes involved, to assess the expected rate of movement and to provide early warning of important changes in the state of stability. Both *in situ* sensors and/or remote sensors may be used in the data collection exercise. The data may be collected, reduced and presented using software supplied with automated data acquisition systems or with customized spreadsheet or database programs.

Interpretation of the monitoring data is likely to be two-fold: i) by operations and maintenance personnel, who examine the reduced data to ensure that the facility or site remains safe on an ongoing basis, and ii) by experienced geotechnical engineers who examine the data to assess the appropriateness of assumptions about material behavior and instability theories and modeling. As experience is gained with the material and instability mechanisms for a site, it is useful to develop a formal decision support system based on sound geotechnical rules to provide the basis for early warning of changing conditions and for safe operation of the site.

The development of geotechnical rules for a decision support system is based on an understanding of the material behavior sometimes derived from monitoring a network of geotechnical sensors. The rule systems for a landslide case history site, based on interpretation of archived data, will be discussed, to provide an example of the development and utility of these techniques. Implementation of the techniques in the dynamic GIS system, GIST, currently under development (see Harrap et al., this volume), will also be presented.

Figure 1: Ground movement associated with: 1) mine subsidence, and 2) mine pit wall instability.

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