

SOLUTION MINING RESEARCH INSTITUTE

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MEETING
PAPER



BOREHOLE TELEVISION DEVELOPMENTS INCORPORATING A UNIQUE DISTANCE INDICATOR FOR SALT CAVERN INVESTIGATIONS

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ABSTRACT

Several recent borehole television probes developed by Southwest Research Institute have features that are applicable to inspecting underground solution-mined caverns. A borehole television system can be used to monitor the salt leaching process and inspect for abnormalities caused by bedded salt and impurities. High-resolution monochrome and color borehole and cavern inspection systems have been developed that include such features as: operation in the telephoto side view mode; control of focus, zoom, iris, light, and side view orientation from the surface; side view orientation and depth digitally displayed on video image; focused parabolic light source; and operation at elevated pressure and temperature.

A unique feature that has been incorporated into a cavern inspection system is an effective and rugged means to determine the distance and relief of viewed surfaces. The distance indication system requires no moving parts, electronics, or transducers. To obtain a side view image within a small diameter probe, a side view mirror at a 45-degree angle is positioned in front of a vertically-oriented camera. The distance indicator includes a low-power laser, cylindrical lens, and mirror to provide a beam of light that is collimated to a plane at the range of interest. The plane of light intersects the field of view at a small vertical angle, so objects that are closer to the camera are illuminated lower on the video screen and vice versa. The distance is indicated by a calibrated transparent overlay on the video screen. Because the illumination is in the form of a plane of light, a two-dimensional indication of depth is provided. Washouts, protrusions, depressions, and jaggedness can be assessed in this way. Scans of the entire cavern wall can be made to determine the volume of underground cavities. The range can easily be changed by adjusting the angle of the distance indicator mirror. Because no moving parts or complicated electronics or transducers are needed, this distance indicator arrangement is rugged and easy to implement.

The presentation includes video tape excerpts demonstrating the features of two borehole television systems.

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