



Geophysics
International

CASE HISTORY - CHINA KARST VOID

Petro-Sonde Survey - Coal and Engineering Divisions

LOCATION. Survey was conducted at the Fangezhaung Coal Mine, Kailuan Mining District within the Kai Pan Coal Basin, Peoples Republic of China (Figure 1).

OBJECTIVE OF THE PETRO-SONDE SURVEY. To delineate the boundaries of a large karst void.

GEOLOGY.

Stratigraphy: The Kai Pan Coal Basin consists of three main geologic sedimentary sections (Figure 2):

- 1) Quaternary Alluvium.
- 2) Permian sedimentary deposits composed of coal, sandstones, siltstones, mudstones, and some fresh water limestones.
- 3) Pennsylvanian limestone.

Regional Structure: The Permian and Pennsylvanian sections are moderately dipping in the east and gradually flatten to west. Topography was flat in test area (Figure 2).

INFORMATION AVAILABLE. Cross Sections, maps and twenty-five drill hole records.

CALIBRATION STATIONS. Drill holes 19 and 24 served as the complete calibration for the geologic column. The void calibration was performed at a known void located 7 km away from the test site.

PETRO-SONDE SURVEY STRATEGY. Calibrate Petro-Sonde with two known drill holes. Construct Petro-Log Graphs at six stations along a north-south traverse (Figures 3 and 4), and an east-west traverse (not shown). Traverses and depth intervals were dictated by the Coal Ministry in order to determine the Petro-Sonde's ability to delineate karst void boundaries and coal seam locations. This survey was conducted by Geophysics International on September 14, 1985 - through September 19, 1985.

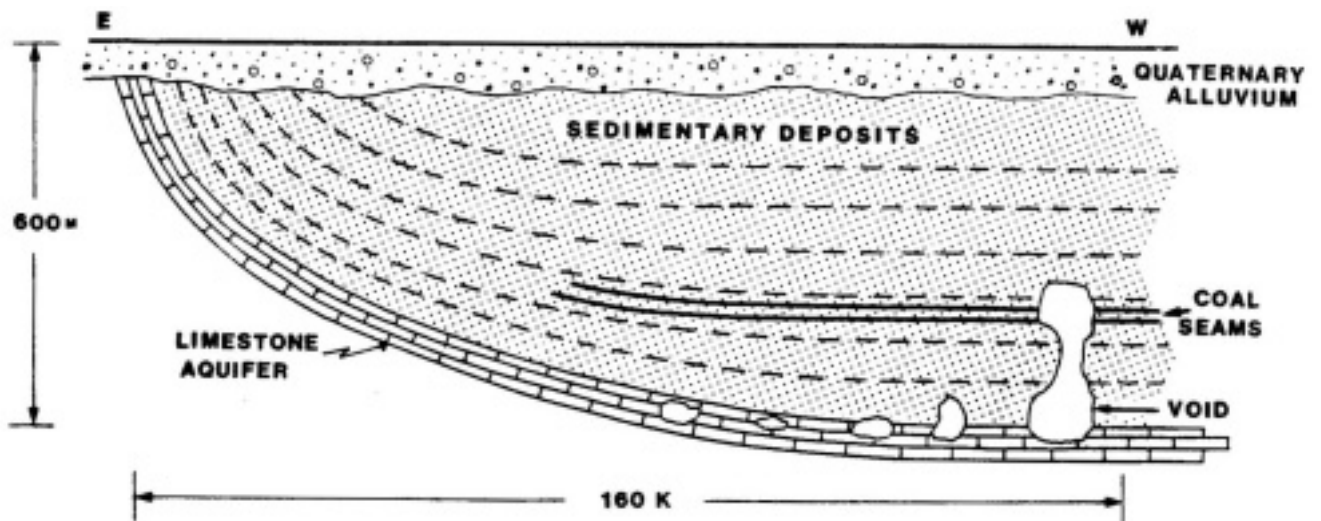
CONCLUSIONS AND COMMENTS. Delineation of the void by the Petro-Logs was possible due to the resistivity contrast between the lithologic sections and the void. The information gathered from this one week study accurately matched the data from 32 drill holes collected during an 8 month intensive drilling program.

The Petro-Log Graphs showed that the Pennsylvanian limestone has an irregular karsted surface with many subordinate voids. The void itself does not extend deep into the limestone as previously thought. The Petro-Sonde was able to detect coal seams, as well as, the flooded tunnel. The Petro-Log Graphs also detected lithologic sections within the void. This suggests that large slump blocks have collapsed into the void.



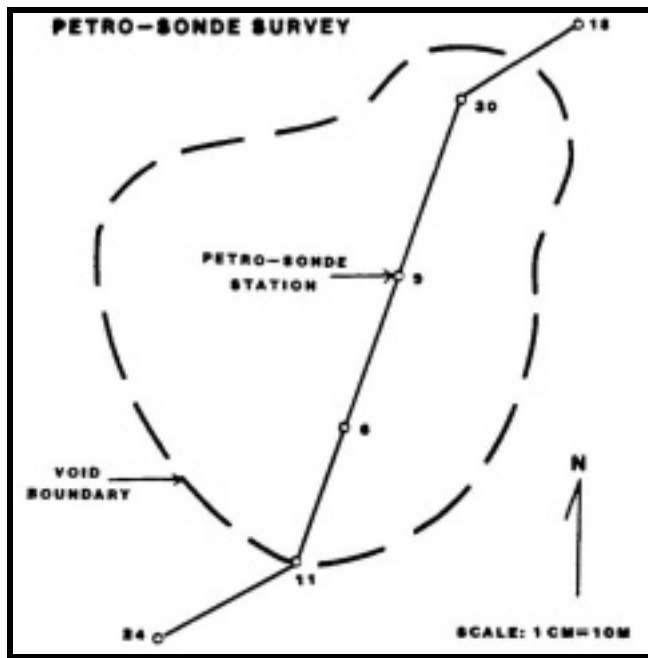
LOCATION OF THE KAILUAN MINING DISTRICT.

FIGURE 1



GENERALIZED CROSS SECTION OF THE KAI PAN COAL BASIN, CHINA.

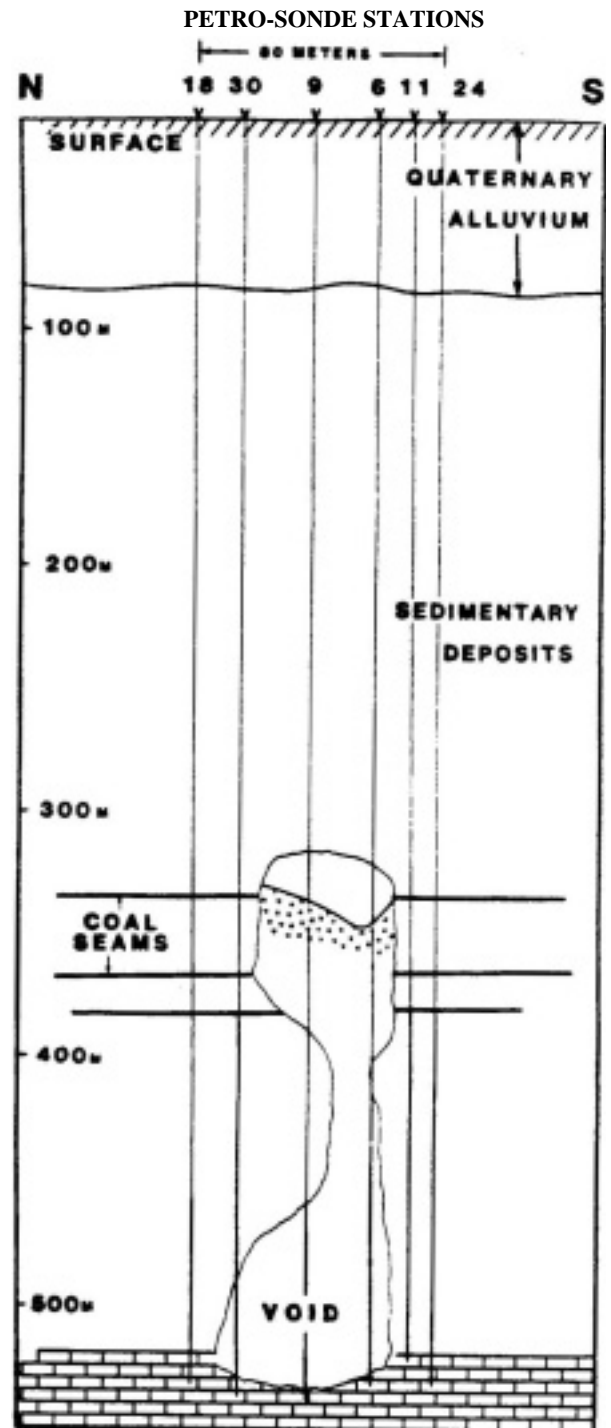
FIGURE 2



PLAN VIEW OF VOID.

FIGURE 3

DISCUSSION. Water flowing through the porous Pennsylvanian limestone causes rock dissolution and void development. The high water table present in the outer rims of the basin is responsible for the high hydrostatic pressure in the limestone and voids. Vertical enlargement of these voids occurs as the limestone and the overlying sediments collapse. Flooding of underground mine tunnels takes place when miners penetrate the voids. The void, in the present study, is filled with rubble, water and air (Figure 5). Other voids exist in the Kai Pan Coal Basin and their delineation is important to the safety and future development of the mines.



CROSS SECTION OF VOID.

FIGURE 4

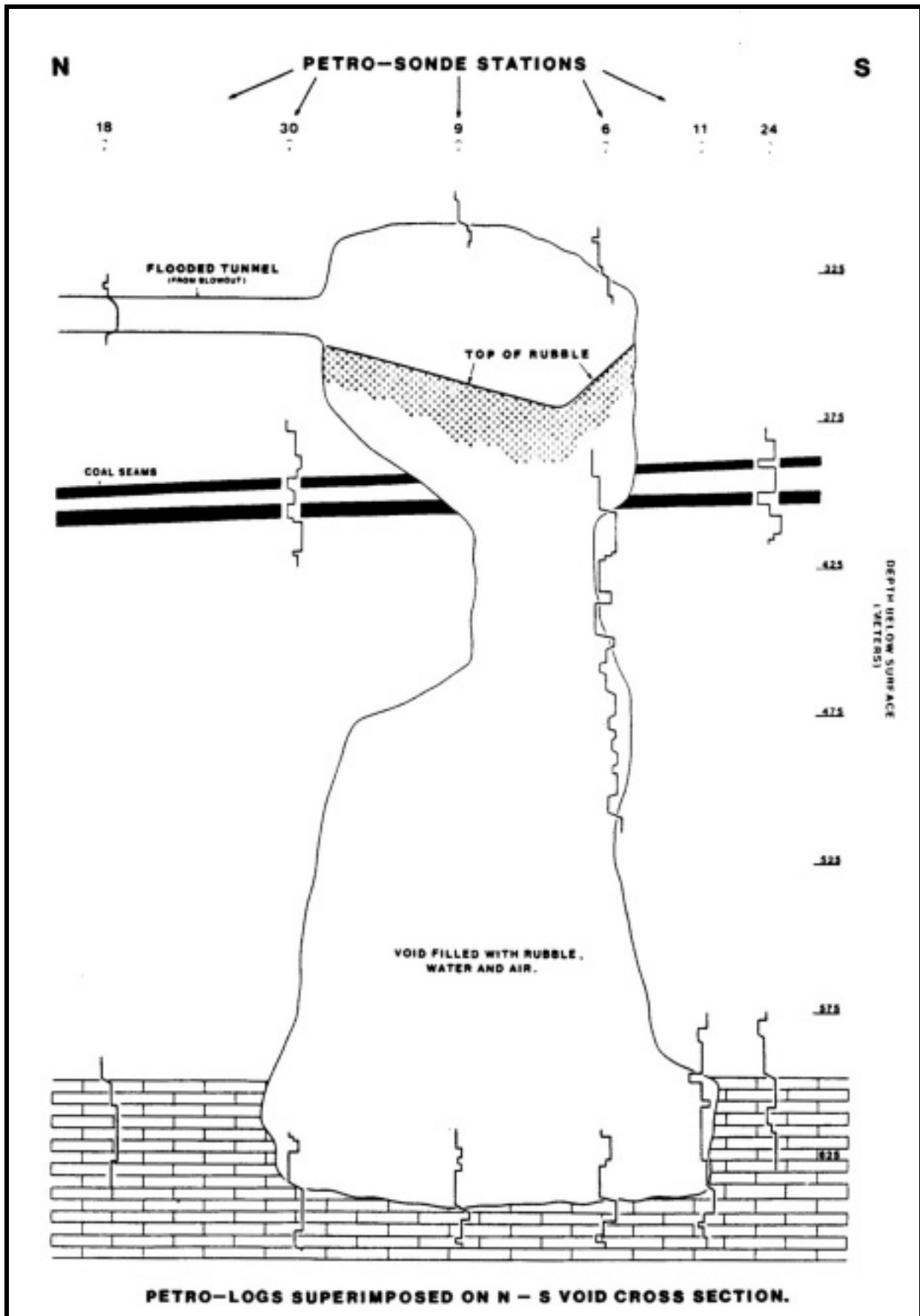


FIGURE 5