

Research Advances

Advances in Drilling Instead of Trenching Technology

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Traditional surface exposure methods, such as trenching and exploratory shaft sinking, have their own limitations and do harm to the environment. Thus, shallow drilling was applied in geological mapping to expose shallow orebody and to determine the thickness of top soil layer, and then to illustrate bedrock lithology and geological boundary. It can also help to study geological structures and to reveal the orebody shape, and further to combine with rock core sampling and chemical analysis to develop the systematic method of drilling instead of trenching technology.

The application of this method to the Caojian tin mine

in Yunnan Province demonstrates that: (1) when the overburden layer is thicker than the standard working depth of exploratory trenching, shallow drilling can be deployed by three steps. First, drill the tentative sites (QZYN01 and QZYN09) to initially determine the strata contact face and its dip, and speculate the fault dip direction. Second, arrange the tracing sites (QZYN02) to further reveal the strike. Last, arrange the confirmed sites (QZYN03 and QZYN04) to get the dip direction of the strata contact face (Fig. 1). With this progressive drilling strategy called as “trail site–tracing site–confirmed site” drilling method, stratified and planar geological structures

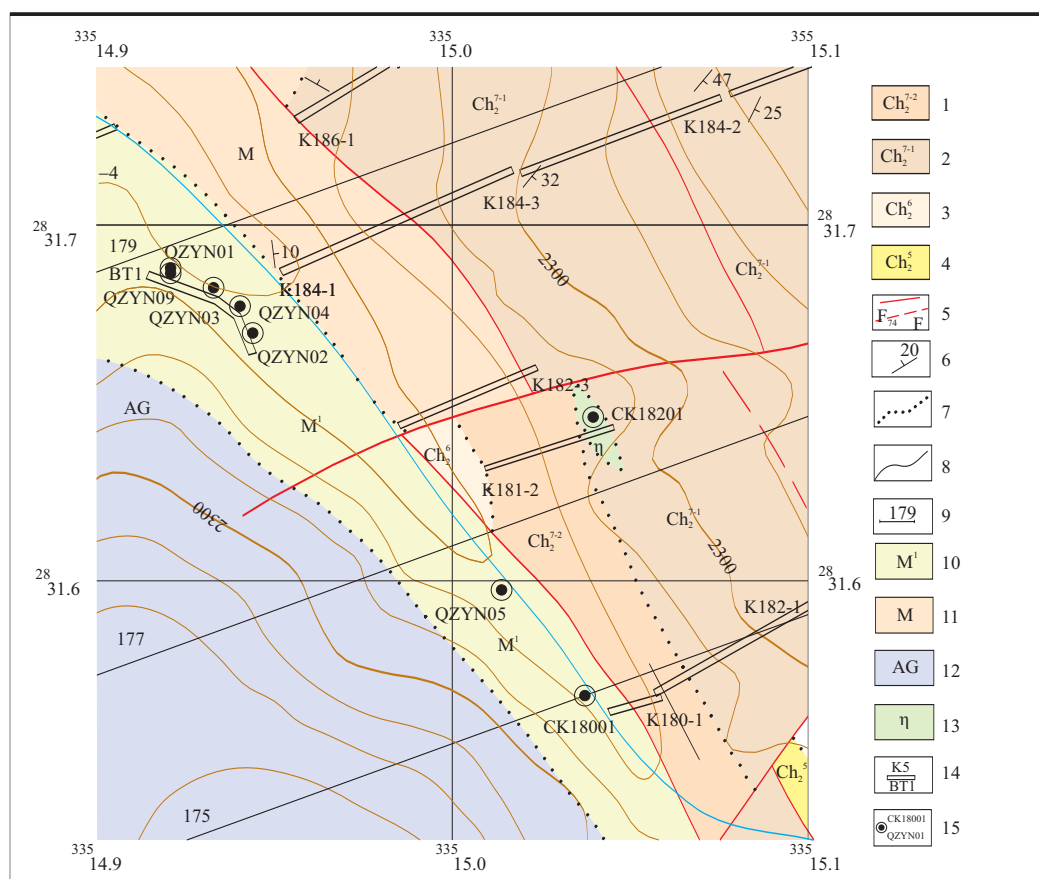


Fig. 1. Shallow drilling strategy in the Caojian tin mine of Yunnan Province.

1, Grey thick-bedded fine-grained marble; 2, Grey green, grey violet muddy and calcicolous slate-schist; 3, Grey thick-bedded marble; 4, Calcareous slate with pod-like marble; 5, Measured and speculated fault; 6, Strata occurrence; 7, Speculated geological boundary; 8, Measured geological boundary; 9, Exploratory boundary number; 10, Pomphoid biotite; 11, Leptite; 12, Augen gneiss; 13, Monzonite; 14, Trenching site number, overburden number; 15, Drilling hole number, shallow drilling hole number.

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can be determined initiatively, flexibly and accurately during the exploration so as to effectively understand their occurrence. (2) For the large area of cataclastic migmatitic granitic pluton featured by its highly irregular, variable orebody/lode and loose lithology, it is quite difficult to apply exploratory trenching method especially when pitch directions vary. However, with cross shaped borehole strategy (plum blossom hole), irregular and highly variable geologic body can be determined to get the occurrence and spatial pattern.

In the application practice, the working depth of shallow drilling is deeper than the standard depth of

exploratory trenching and shallow shaft. It is inferred that shallow drilling is capable of replacing exploratory trenching, and also taking some place of shallow shaft under special geological setting.

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