

Subsurface Stratigraphy of Diatomite Quarry in Nam Cho Subdistrict, Mae Tha District, Lampang Province Using 2D Electrical Resistivity Survey



Author : Pimpakorn Konkaew 640510450

Advisor : Asst. Prof. Dr. Suwimon Udphuay

Department of Geological Sciences, Faculty of Science, Chiang Mai University

Abstract

The characterization of subsurface rock layers is essential for understanding geological formations and resource potential, particularly in areas of economic significance such as diatomite quarries. This study conducted a 2D electrical resistivity survey in a diatomite quarry area of Nam Cho Subdistrict, Mae Tha District, Lampang Province, to investigate the subsurface stratigraphy and establish a geological and geophysical database for the area. The survey utilized a dipole-dipole electrode configuration with four survey lines. Line 1 was 360 meters long with an electrode spacing of 4.5 meters; Lines 2 and 4 were each 240 meters long with a 3-meter spacing, and Line 3 extended 280 meters with a 3.5-meter spacing. The acquired resistivity data were processed and analyzed using AGI EarthImager™ 2D software, achieving a maximum imaging depth of approximately 60 meters below the surface. The results were presented as 2D resistivity cross-sections and interpreted alongside the area's geological data. The subsurface stratigraphy was classified into two distinct layers: the upper layer, characterized by high resistivity values, was approximately 22 meters thick and interpreted as diatomite, while the underlying layer, exhibiting low resistivity values, was identified as shale. However, due to overlapping resistivity values between these layers, borehole data integration was necessary for a more precise interpretation.

Study Area

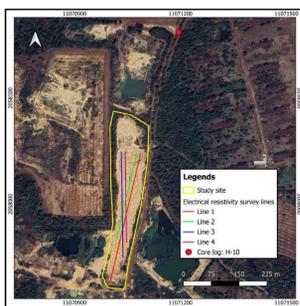


Fig.1 Survey lines: line 1 (red line) is parallel to line 2 (green line), and line 3 (blue line) is parallel to line 4 (purple line). The borehole data from the nearest point to the study area is located 400 meters to the northeast.



Fig.2 Diatomite profile from the outcrop in a diatomite quarry, Nam Cho Subdistrict, Mae Tha District, Lampang Province.

Objective

To investigate the stratigraphy and subsurface geology of a diatomite quarry area in Nam Cho Subdistrict, Mae Tha District, Lampang Province, using 2D electrical resistivity survey.

Methodology

Field survey

- 4 2D electrical resistivity survey lines were collected;
- **Line 1:** length of about 360 m with electrode spacing of 4.5 m
- **Line 2 and 4:** length of about 240 m with electrode spacing of 3 m
- **Line 3:** length of about 280 m with electrode spacing of 3.5 m
- Collect coordinate using DGPS



Fig.3 Electrical resistivity survey at Diatomite quarry in Nam Cho Subdistrict, Mae Tha District, Lampang Province.

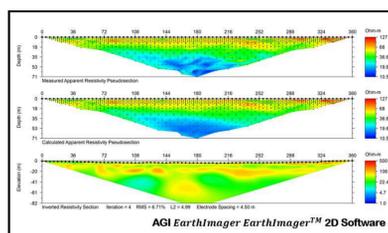
Data processing

Collected data were undergone inversion processing using AGI EarthImager™ 2D software

Data interpretation

Determine the layer of rock formation using an invert section profile, geological data, and core log data.

Fig.4 Example of a result from AGI EarthImager™ 2D data processing showing 3 different resistivity sections.

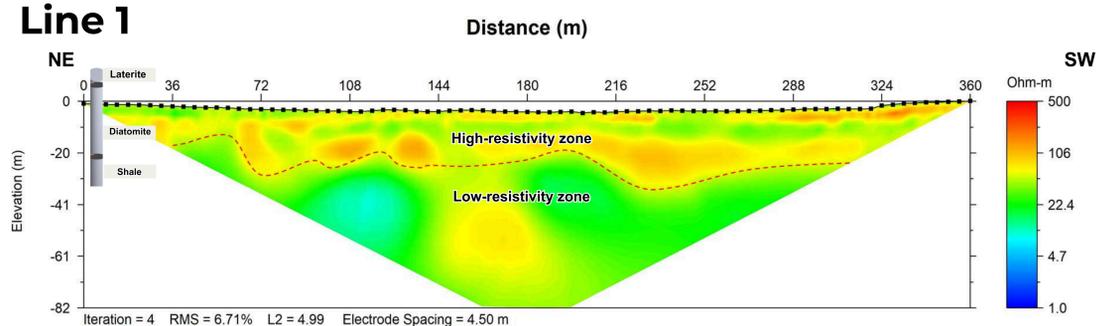


Conclusion

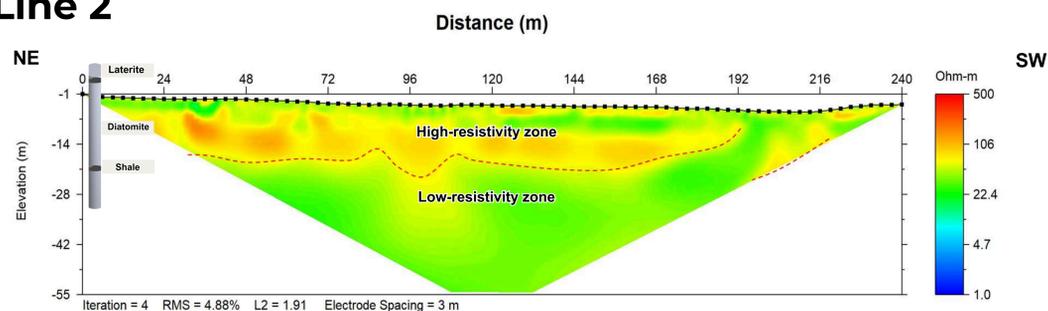
The subsurface stratigraphy of the diatomite quarry in Nam Cho Subdistrict, Mae Tha District, Lampang Province, classified using the 2D electrical resistivity survey method, can be divided into two main layers: a high-resistivity layer interpreted as diatomite and a low-resistivity layer interpreted as shale. However, the resistivity values of these layers overlap. Therefore accurate interpretation requires supplementary data from boreholes or other survey methods.

Results

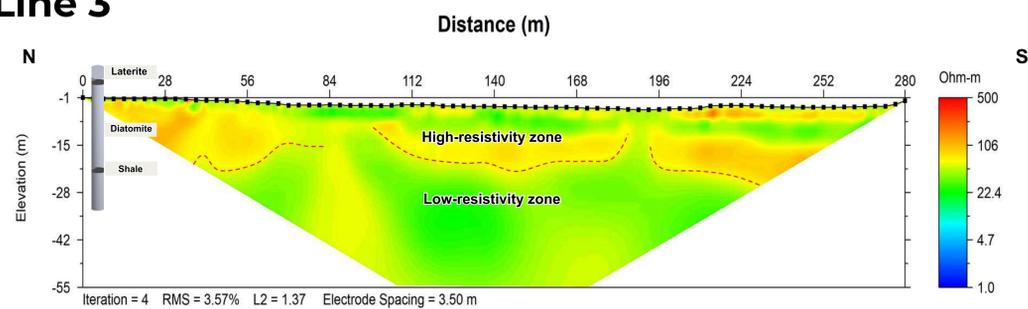
Line 1



Line 2



Line 3



Line 4

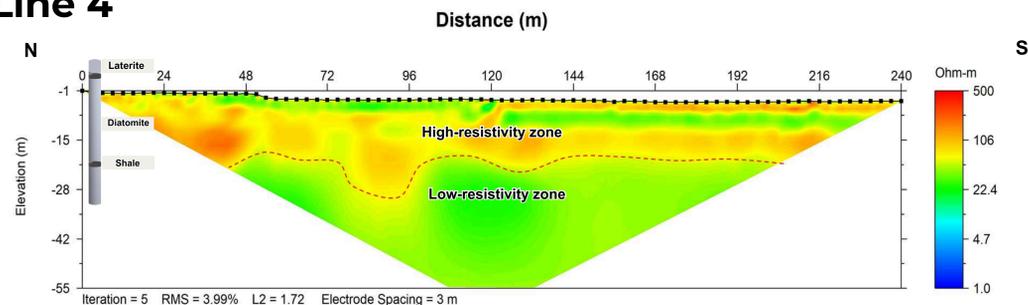


Fig.5 showing the inverted resistivity sections of lines 1, 2, 3 and 4 was interpreted as a two-layer structure consisting of a high-resistivity zone and a low-resistivity zone. The high-resistivity layer has an average thickness of 21 m from the surface.

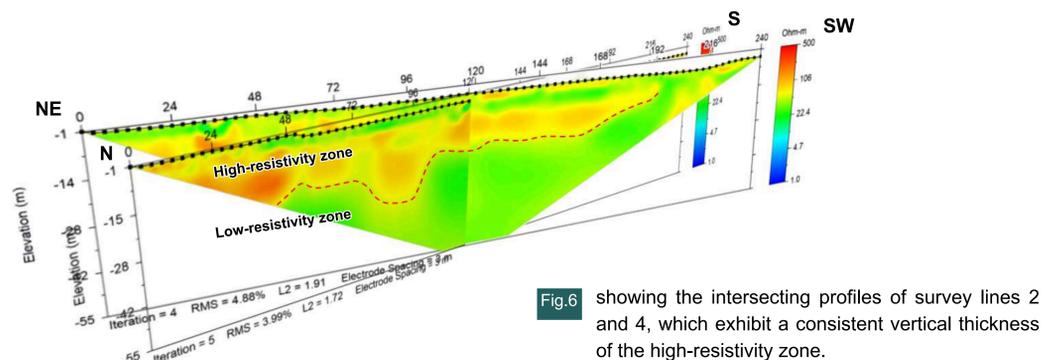


Fig.6 showing the intersecting profiles of survey lines 2 and 4, which exhibit a consistent vertical thickness of the high-resistivity zone.

References

- Economic Geology Division, Department of Mineral Resources. (1983). Industrial Minerals Development Project.
- Sripongpan, P. (1984). Lithostratigraphy and depositional environment of diatomite deposits in the southeastern part of Lampang basin, Changwat Lampang. Master of Science Thesis, Chulalongkorn University.