Journal of Geology & Exploration
Vol. 1, No. 1, June 2022 : 18 – 21

Block Model of Laterite Nickel Reserve in the Sorowako Village Research Area, South Sulawesi Province

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ABSTRACTS

The manufacture of laterite nickel deposit model blocks is one of the stages after exploration activities are carried out in an area that shows potential resources that are feasible to be exploited. The purpose of this study was to determine the tonnage value of an estimated resource of saprolite and limonite ore deposits in the drilling area. The research method is the implementation of fieldwork, which includes a survey of the area to be drilled, tools and materials used in drilling production, and determining the stages in making model blocks. The data used in this study are data from analysis of nickel content, data on the total depth of drill points, lithology data of laterite nickel profiles, and data on coordinates and elevation of drill points. In research conducted in the concession area of the research area with a number of drill points of as many as 275 points and a drill spacing of 25 meters and 50 meters, the number of resources that have been calculated in the form of a 3D block model and a cross-sectional vertical correlation where in the limonite layer the volume value is obtained. of 757,031 m3 with an average Ni content: 0.84%, while the saprolite layer obtained a volume value of 210,781 m3 with an average Ni content: 1.80%. The conclusion obtained is that the tonnage value for the limonite layer is 1,211,250 tons, and for the saprolite layer the tonnage value is 400,484 tons.

ARTICLE INFO

Article History:
Received 02 May 2022
Revised 03 May 2022
Accepted 29 June 2022
Available 30 June 2022

Keyword:
Nickel; Laterite; Block Model; Tonnage

INTRODUCTION

Nickel is a versatile metal with a very unique combination of properties that make it suitable for use in a variety of different functions. A deposit can be known its thickness if it has carried out systematic drilling activities and determination of grades. It does not stop there, the results of the drilling of laterite nickel deposits can be visualized in the form of 3D modeling with the help of computers to process field data, so that mining planning can be carried out as well as possible (Akhsanul et al., 2018; Rafsanjani, 2016; Thamsi, 2017).

Block modeling techniques are widely applied in the modeling and calculation methods of mineral resources in the mining industry. This technique has generally been done computerized (Anshariah, 2016; Ramadhan et al., 2022; Thayib et al., 2017). The distribution of resources/reserves in these blocks is able to make it easier for us to do quality assessments so that a quality distribution can be produced with location details (coordinates) and block unit volumes that are adjusted to the mining dimensions (Afriandi, 2015; Mustika, 2016).

The purpose of this study is to create a model block for laterite nickel reserves based on the data from the drilling results in the area. The purpose of this study was to determine the tonnage value of an estimated resource of saprolite and limonite ore deposits in the drilling area.

METHODS

The research method consists of 4 (four) stages, namely research preparation, data collection stage, data processing stage and data analysis.

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Research Preparation This preparatory stage includes work: Literature study and preparation of field equipment used. The data collection method is basically a method of carrying out field work, which includes a survey of the area to be drilled, tools and materials used in drilling production.
The data used in this study are:

1. The assay data is in the form of nickel content analysis data.
2. Collar data in the form of total drill point depth data.
3. Survey data in the form of coordinates and elevation of the drill point.
4. Lithological data in the form of laterite nickel profile lithology data.

From all the data that has been collected, starting from assay data, coring, field surveys and geological data, then these data will be processed using Microsoft Office Word, Microsoft Office Excel and a backup model block is made using Surpac 6.5.1 software.
After processing, we will get the value of volume and tonnage. Then the results of these calculations obtained are a block image of the 3D model of laterite nickel reserves in the study area.

RESULTS AND DISCUSSION

Topography of Laterite Nickel Distribution Area

In the research stage of making this laterite nickel reserve model block, the data used is data from exploration drilling. Drilling carried out in the area starts from 200m spacing, 100m space, 50m space, 25m space, to the smallest space depending on the level of confidence. The number of drill points from the data obtained from the company is 275 drill points. For more details, see the image in the appendix on page 56.

Saprolite Zone Vertical Correlation Section

The next step is making block model boundaries based on the limonite and saprolite layers, generated from the Digital Terrain Model (DTM) file, which is a 3-dimensional shape obtained from string data. Where the String data is the point that correlates the top and bottom points of the saprolite zone in the form of a line for each layer. In the picture below, the yellow color shows the limonite zone, the red color shows the saprolite zone and for the blue color shows the bedrock zone.

For the cross-sectional image of the saprolite zone A-A' below the connecting line in the saprolite zone, it does not follow the topography of the study area, which can be seen from the several hole ids in the image below whose thickness is different so that it passes the existing topographic boundary line.

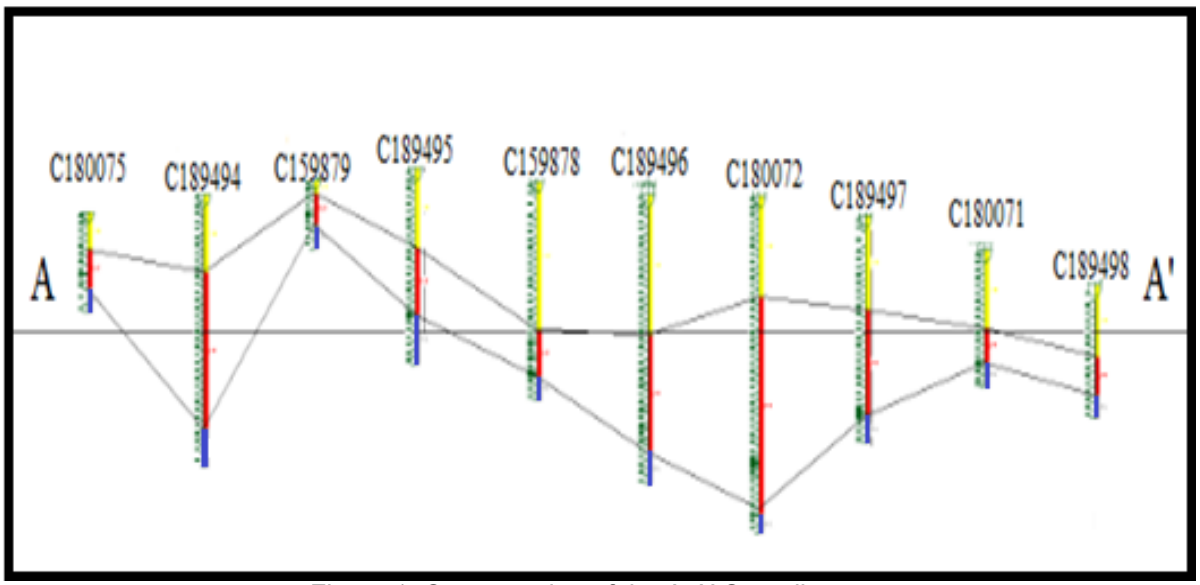

Figure 1. Cross section of the A-A' Saprolite zone

Resource Estimation of Laterite Nickel Deposits in Region X

The important parameters used in the estimation of laterite nickel reserves include following the 2011 KCMI code. In this area, the economic block size for mining is 12.5 x 12.5 x 1 meter. In addition, the material density factor also plays an important role in the estimation of ore resources. This is because the density of the material is a parameter used to` get the number tonnage of a resource

obtained by multiplying the volume by the density of the material itself. The density of nickel limonite material in the area is 1.6 tons/m^3, and for saprolite 1.9 tons/m^3. The grade parameter used to estimate the resource is only based on the levels of Ni, Fe, and MgO. In addition to estimating ore from the saprolite and limonite layers, of course there is a mining limit level that is carried out so that the classification of nickel ore from the saprolite and limonite layers is different. From the company's data, the classification parameters for limonite nickel ore with cut off grade are:

Ni > 1.5%
Fe > 35%

While in the cut-off grade saprolite ore layer, namely:
Ni > 1.5%
Fe < 35%

Mining Block Model

From all the model blocks of laterite nickel reserves, the final result to be achieved is to find out the total volume, tonnage, and grade of an estimate of saprolite and limonite ore deposits.
Where in the limonite zone it is known that the volume is 757,031 m^3, the tonnage is 1,211,250 tons, the overall ni content is 0.84% and the density is 1.6. Meanwhile, in the saprolite zone, the total volume obtained is 2,107,031m^3, the tonnage is 400,484 tons, the total ni content is 1.80% and the density is 1.9 tons/m^3.

CONCLUSION

From the research conducted, it can be concluded as follows: The total resource of laterite nickel deposits in the Limonite zone with a density of 0.0 – 1.6 tons/m3 the tonnage value is 1,211,250 tons while in the Saprolite zone with a density of 1.6 – 2.5 tons. /m3 Tonnage value is 400,484 tons.

ACKNOWLEDGMENT

The author would like to thank all parties, especially:

1. Mr. Basri Kambatu as Senior General Manager Mines and Exploration Department PT. Vale Indonesia Tbk.
2. Mr. Abd. Rauf, as Manager of Ore Quality System and Support has given the author the opportunity to carry out research at PT. Vale Indonesia, Tbk.
3. Mr. Punri Mustafa, as Assistant Geologist of Ore Quality System and Support as well as a field supervisor.

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