
DETERMINATION OF MINING ZONING ANDESITE, SIRTU AND TRAS MATERIALS IN PURBALINGGA DISTRICT CENTRAL JAVA

Ariyanto^{1†}, Ahmad Fauzan Haryono², Dimas Chaidir Adinugroho²

¹Mining Engineering Study Program, Faculty of Engineering, Jln. KH Ahmad Dahlan No 01 Pagesangan,
Kecamatan Mataram, Kota Mataram, Nusa Tenggara Barat.

²Mining Engineering Study Program, Faculty of Science and Technology, Syarif Hidayatullah State Islamic
University Jakarta, Jalan. Ir. H. Djuanda No.95, Cempaka Putih, Ciputat, Kota Tangerang Selatan, Banten 15412,
Indonesia

[†]ariyanto@ummat.ac.id

ABSTRACT

Purbalingga Regency has quite a large amount of Andesite, Sirtu and Tras Digging Materials. So a research was carried out in Purbalingga Regency to assist the Ministry of Energy and Mineral Resources (ESDM) in Determining the Mining Permit Zoning. This research was conducted only in 5 districts, namely Karangrejo District, Bojongsari District, Bobotsari District, Mrebet District and Kutasari District. The potential of Andesite Excavation Material with 2,159,081,136BCM resources spread across Karangrejo District, Bojongsari District, Bobotsari District, Mrebet District, and Kutasari District. Sirtu with 14,859,100BCM resources scattered in Karangrejo District, Bobotsari District, Bojongsari District and Mrebet District. Meanwhile, Tras with 15,510,500BCM resources which are only scattered in Karangrejo District. The determination to get the permit is closely related to the 11 parameters that have been shown in map form. Each of these parameters has a rating, weight, and value and a mining process is carried out in order to determine whether the area is suitable for permits, eligible for conditional permits, and not worthy of permits. Scores 10-19.5 are directed to be granted permission, scores 20-29.5 are directed to be eligible for conditional permission, while ≥ 30 are directed to be not granted permission. The potential that is directed to be eligible for a permit is andesite 1,038,841,000BCM, Sirtu 6,861,400BCM and tras 9,280,500BCM, the potential that is directed to be eligible for conditional permits is andesite 67,520,000, sirtu 4,675,000BCM and tras 1,180,000BCM, while the potential that is directed is not feasible The permits are andesite 1,052,720.0BCM, sirtu 3,226,700BCM and tras 5,050,000BCM.

Keywords : *Mining, Materials, Tras, Zoning*

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INTRODUCTION

Purbalingga Regency is one of the districts in Central Java province. Geographically, Purbalingga Regency is in the northern part bordering Pemalang Regency, the eastern and southern part is bordering Banjarnegara Regency, while the West and South part is bordering Banyumas Regency, with coordinates $1^{\circ} 10' 00''$ LS - $7^{\circ} 29' 00''$ LS and $101^{\circ} 11' 00''$ BT - $119^{\circ} 35' 00''$ BT. Administratively, the research district in the Purbalingga Regency area is as follows:

- a. North of Bojongsari District.
- b. South of Kemangkon District.
- c. West side of Padamara District.
- d. East of Kaligondang and Bukateja District.



Figure 1. Location Map of Research Areas

Purbalingga Regency has quite a large amount of andesite, sirtu and tras Digging Materials, located in Karangrejo District, Bobotsari District, Mrebet District, Bojongsari District and Kutasari District. The surrounding community has been mining the materials with simple equipment. In uncertain economic conditions, it turns out that andesite, sirtu and tras Digging Materials are very promising for local and regional development needs, as many people apply for licenses and there is mining without permits, supervision of the community or investors who will conduct mining in Purbalingga Regency is needed.

According to Van Bemmelen (1949), physiographically, the research area includes the depression zone of Central Java, part of the Bogor anticlinorium in the west and part of the kendeng anticlinorium in the east. This depression continued to West Java, in the East until the end of East Java.

Geographically, Purbalingga Regency has various topographical conditions, including: lowlands, hills and mountain rocks. Purbalingga Regency is in a basin flanked by several mountain ranges. On the west side is a series of mountains (Mount Slamet and Dieng plateau). The southern part is the Serayu Depression, which is fed by two major rivers Serayu River and its ankles, Kali Pekacangan, Kali Klawing, and Kali Gintung. Purbalingga Regency has many

springs that flow into 66 rivers with a total length of 643 km, these water sources have been used for irrigation, clean water, and bottled water. The abundance of water indicates that Purbalingga Regency is an area that has generally never experienced drought. In general, the research location has a tropical climate and experiences two seasons, namely the dry season and the rainy season. (Badan Pusat Statistik, Kabupaten Purbalingga dalam angka, 2013). Many fossils found in this formation are in the form of Molluscs, Corals and Foraminifera Fossils. Based on the fossils found in the Formation, the age of the Halang Formation to Upper Miocene (Kastowo, 1975).

For the purpose of granting permits, the Purbalingga Regency government needs research results on the Zoning of andesite, sirtu and tras Mining Permits. This research is expected to be able to determine the Zoning area of Purbalingga Regency to be given permits, conditional and unconditional permits. Tujuan dari pnlitian ini adalah untuk mngtahui sumbrdaya pada kabupatn purbalingga dan penentuan layak dan tidaknya pemberian izin pertambangan pada kabupaten purbalingga
How you get this information?

METHODS

The resource estimate is based on the results of a survey and the exploration process in Purbalingga Regency, which is a hypothetical mineral resource. Hypothetical Mineral Resources are mineral resources whose quantity and quality are obtained based on estimates at the review survey stage (SNI 13-4726-1998). What is estimated is the average thickness, based on observations in the field of andesite thickness which is between 2 meters – 18 meters so that for andesite the average thickness is 10 meters, tras is exposed between 2 meters – 8 meters so that for tras the average thickness is 5 meters and sirtu which is exposed in the research location 0.5 meters – 1.5 meters so that for sirtu the average thickness is 1 meter.

The largest andesite excavation material is in Kutasari District and the smallest potential is Bojongsari. The potential resources of 649,943,895BCM in Kutasari and Bojongsari districts are 200,013,522BCM. The size of the potential for andesite is determined by the result of the dominant eruption of Mount Slamet towards the southeast. The potential of andesite in Kutasari District is greater because the direction of the eruption is greater towards Kutasari Subdistrict than towards other Districts located around the eruption center area of Mount Slamet. However, the difference between the potential of andesite in Kutasari and Karangrejo and Mrebet Districts is relatively small compared to Bojongsari and Bobotsari Districts.

Sirtu extracted materials are scattered in Bobotsari District of 8,326,800BCM and the smallest is in Karangrejo District of 392,700BCM, even in Kutasari District, sirtu is not found. The size of the potential for Sirtu is determined by the material transported through the river channels when it rains. In Bobotsari District, the largest potential for sirtu is due to the many river channels that pass through the area, while in Kutasari District the river channels are relatively few and not for sirtu deposition because the slope of the river flow is relatively large, while in Bobotsari District the river flow is relatively gentle and the location as a place of deposition of sirtu.

The deposits of tras excavated material are determined by volcanic material of the size of sand and fine sand (volcanic ash). tras deposits are only found in Karangrejo District of 15,510,500BCM, in other Districts this is not found because the volcanic material of the size of sand and fine sand (volcanic ash) is deposited in the east from Mount Slamet. The results of the eruption as a source of tras formation only occurred in 1 eruption so that relatively few other eruptions were directed outside the Karangrejo area so that they did not accumulate.

The determination of the appropriateness and non-existence of granting a mining permit in Purbalingga Regency is determined by 11 parameters with the calculation of rank multiplied by the weight to produce a score. The highest score is if 4 parameters have a rank of 210 and other parameters have a rank of 30 or the highest score is $84 + 18 = 102$ and the lowest score is if the eleven parameters have a rank of 10 or the total score is 10., of which 11 parameters have an absolute value with a rank of 210. The value of the rank 30 is that it can be granted permission but it is conditional and the conditions are that these parameters have a rank of 30 and some have a rank of 10 or 20. The rank value of 20 is directed to clarify whether the location can be given permission or can be given permission but it is conditional, if the number Rank 20 has relatively many directions to be granted conditional permission, on the other hand, if the rank value is relatively small, permission can be given. The value of rank 10 is that a mining permit can be granted at the research location because it is considered the lowest score.

THEORETICALLY

The marketing of Andesite, Sirtu and Tras Stone Materials is relatively simple but can also be difficult due to the lack of functioning of the established producer and consumer associations. The dependence on foreign market developments is also decisive, but in many ways it still depends on the locations of domestic growth. The relatively low value of Andesite, Sirtu and Tras Minerals causes the marketing reach to be very small, because it is related to their location.[1]

As a result of the increased demand for raw materials in the industrial and agricultural sectors, Andesite, Sirtu and Tras Mining Materials are needed to grow from year to year. Sometimes these needs cannot be met by domestic mining production, but need to be imported. This is due in addition to the inadequate specifications or quality as raw materials, especially in the manufacturing industry such as feldspar (glaze), manganese, kaolin (ultrafine) and bentonite (drilling mud), it is also caused by the potential for Andesite, Tras and Sirtu Mineral Reserves. in the country which have not been recorded in detail.[2]

General characteristics of Andesite, Gravel and Tras are:[3]

- a. Mining can be done in a simple way.
- b. The processing is also from low value to high value products.
- c. Licensing is relatively easy.

The prospects for Andesite, Gravel and Tras are different from those of metal, where by the 2000s the prospects for Andesite, Sirtu and Tras Mining were getting much better, this is due to:[4]

- a. The potential threat posed by recycling such as metallic minerals is almost minimal.
- b. The threat of substitution material, the intensity is not as strong as that of metal minerals, this is because most of the substitution comes from the minerals themselves. Likewise, the threat of a decrease in the intensity of use as a result of technological advances in the manufacture of finished goods is relatively weak.
- c. Commodity prices on the international market are relatively more stable than metal commodities which often experience price fluctuations.

Type of Land and Land Empowerment

Soil type is influenced by climate, topography, source rock, vegetation and human activities, climate and rocks are determinants of soil formation, wet climate causes weathering of source rocks to run rapidly, in

the research area the source rocks are tertiary age so that the type of soil formed is composed of sandstones, clay stones, limestone shales, marl as well as volcanic breccia and Andesite lava. The erosion of the surface of the hills and mountains will result in the debris being deposited in a relatively low place, forming a type of latosol.[5]

The types of soil found in the Purbalingga Regency area from the results of direct observations are as follows:[6]

1. Alluvial Soil.
2. Soil Latosol.
3. Soil Litosol.
4. Soil Regosol.
5. Andosol soil.
6. Soil Grumosol.
7. Podsollic Soils.

Basically, geological investigations have not been able to accurately and quantitatively determine the formation of these minerals, but they can be categorized as resources. If the investigation is carried out more carefully, using a variety of geophysical, geochemical, drilling and other methods, the mining material can be known with more certainty, both qualitatively and quantitatively. The minerals can be categorized as reserves. Mineral resources are part of mineral deposits which are expected to be economically utilized and processed further. This resource can be increased to become a reserve after a feasibility study is carried out and it is declared feasible to be mined economically and in accordance with existing technology.[7]

Resource classification (SNI 13-4726-1998) as follows:[8]

a. Hypothetical Mineral Resources

Mineral resources whose quantity and quality are obtained based on estimates at the review survey stage.

b. Inferred Mineral Resources

Mineral resources that are determined based on geological evidence, drilling, test trenches, test wells, or other sampling methods, where the data obtained from these activities are limited so that the continuity of sediment and geological data has very low confidence and is still in the stages. prospecting of mineral deposits.

c. Indicated Mineral Resource

Mineral resources that are determined based on geological evidence, drilling, test trenches, test wells, or other sampling methods, where the distance between sampling points is relatively far but sufficient to describe the continuity of deposits with a higher level of confidence than Inferred mineral resources, and have gone through the preliminary exploration stage and some of them have entered detailed exploration.

d. Measured Mineral Resources

Mineral resources that are determined based on geological evidence, drilling, test trenches, test wells, or other sampling methods, where the distance between sampling points is relatively tight so that the continuity of deposits can be ascertained with a high level of confidence, and has goes into detailed exploration.

e. Prefeasibility Resources

Mineral resources declared to be economic potential from the results of the Pre-Feasibility Study which are usually carried out in the General Exploration and Detailed Exploration areas.

f. Feasibility Resources

Mineral resources that are declared to have economic potential from the results of a Feasibility Study or from a mining activity previously carried out in a Detailed Exploration area.

Resource Assessment Methods

The calculation of reserves at the general exploration stage is different from the detailed exploration stage, the difference lies in the different exploration methods and the level of data confidence (sampling distance, amount and support). To inventory / design a prospect does not require a complicated and time consuming method. In contrast to mine construction or design, high calculation accuracy is required, so the procedure is more complicated and takes a long time.

The resource calculation methods are categorized into 2:

a. Conventional method

b. Non conventional method

Considering the above aspects, the method used is the broad method and the average factor. The choice of this method is also based on the assumption that the segments / blocks are based on the similarity of the geological deposits, the geological similarities reflect the similarities in the economy and the similarities in mining techniques.[9]

$$V = t_{av} \times L$$

Information :

V : Volume (m³)

t_{av} : Average thickness (m)

L : Area or Area (m²)

Source: Abdul Rauf, 1998, Calculation of Mineral Deposited Reserves

The tonnage of the mineral deposits is calculated using the equation:

$$\text{Tonnage} = \text{Volume} \times \text{Density of Mineral}$$

Zoning is an area or area that has specific environmental characteristics and functions. Zoning regulations are provisions that regulate the requirements for spatial use and control which are drawn up for each zone where zoning is in accordance with the spatial plan. The Regional Spatial Planning (RTRW) policy is one of the considerations in determining the issuance of a Mining Business Permit (IUP).

RESULT AND DISCUSSION

Mineral Resources for Andesite, Sirtu and Tras Excavation in Purbalingga Regency and Determination of Appropriateness and Unworthiness of Granting Mining Permits in Purbalingga Regency,

Andesite, Gravel and Tras Mineral Resources in Purbalingga Regency

The resource estimate is based on the results of a survey survey and the exploration process in Purbalingga Regency, which is a hypothetical mineral resource. Based on observations in the field of andesite thickness which is exposed between 2 meters – 18 meters so that for andesites the average thickness is 10 meters, tras which is exposed is between 2 meter – 8 meters so that for tras the average thickness is 5 meters and sirtu is exposed in the research location between 0.5 meter – 1.5 meters so that for sirtu the average thickness is 1 meter.

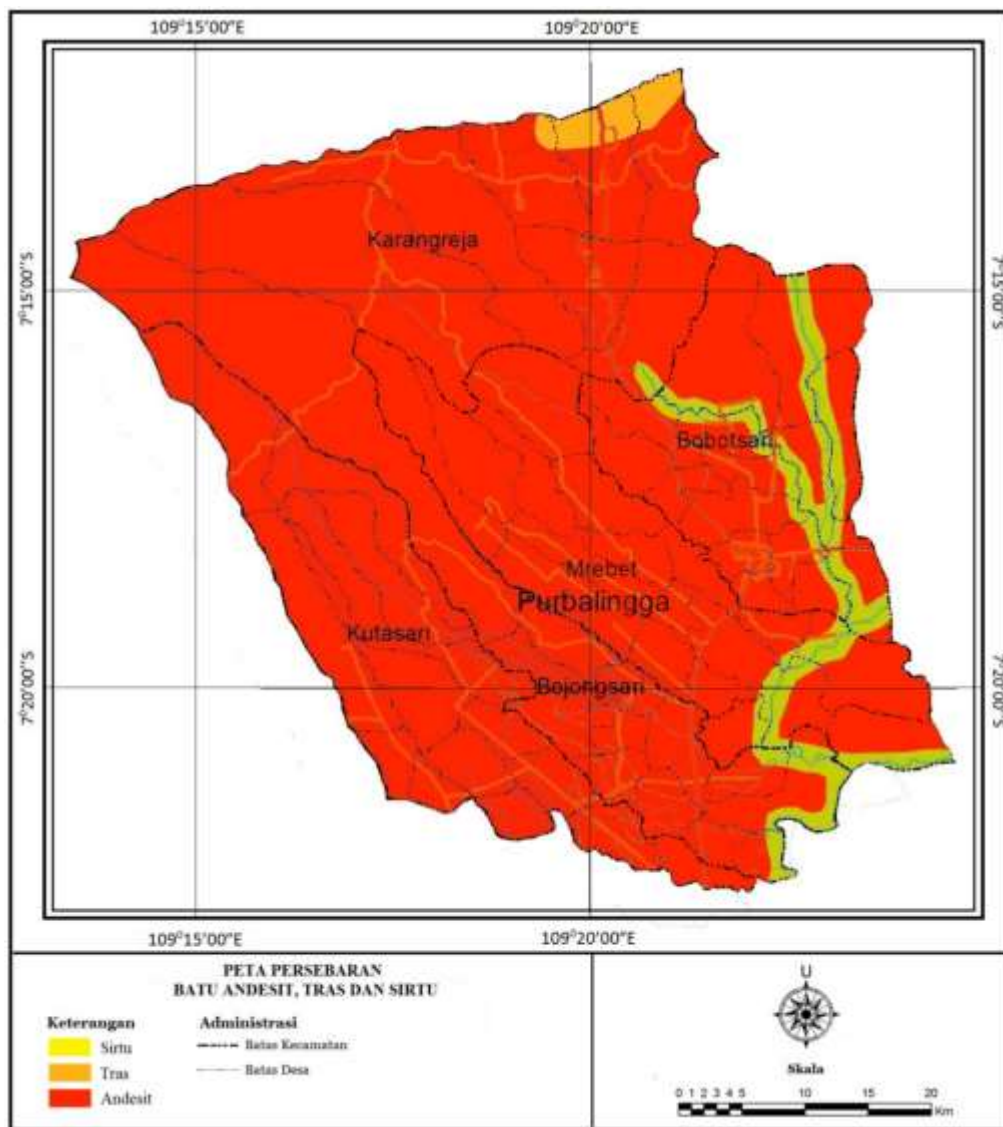


Figure 2. Map of the Distribution of Andesite, Gravel and Tras

The largest andesite excavation material is in Kutasari District and the smallest potential is Bojongsari. The potential resources of 649,943,895BCM in Kutasari and Bojongsari districts are 200,013,522BCM. Bojongsari Subdistrict has the least potential. This is influenced by the area of Bojongsari District being smaller than other Districts. Besides that, Kutasari and Bojongsari Districts are separated by an igrir (ridge) which blocks the direction of the eruption of Mount Slamet. Likewise, Bobotsari District, which is lower than Karangrejo District. The results of the eruption of Mount Slamet are mostly elevated, in this case Karangrejo District, while Bobotsari District is only the runoff from the eruption that has passed through Karangrejo District.

Table 1. Andesit Resources in Purbalingga Regency

NO	District	Large (m ²)	Thickness (m)	Amount of Resource (BCM)
1	Karangrejo	56.224.567,4	10	562.245.674
2	Kutasari	64.994.389,5	10	649.943.895
3	Bobotsari	30.138.596,4	10	301.385.964
4	Bojongsari	20.001.352,2	10	200.013.522
5.	Mrebet	44.549.210,8	10	445.492.108
Total				2.159.081.136

Sirtu extracted materials are scattered in Bobotsari District of 8,326,800BCM and the smallest is in Karangrejo District of 392,700BCM, even in Kutasari District, sirtu is not found. The size of the potential for sirtu is determined by the material transported through the river channels when it rains. In Bobotsari District, the largest potential for sirtu is due to the many river channels that pass through the area, while in Kutasari District the river channels are relatively few and not for sirtu deposition because the slope of the river flow is relatively large, while in Bobotsari District the river flow is relatively gentle and the location as a place of deposition of sirtu.

Table 2. Sirtu Resources in Purbalingga Regency

NO	District	Large (m ²)	Thickness (m)	Amount of Resource (BCM)
1	Karangrejo	392.711,7	1	392.700
2	Bobotsari	8.326.800,9	1	8.326.800
3	Bojongsari	2.705.510	1	2.705.500
4	Mrebet	3.434.100,9	1	3.434.100
Total				14.859.100

Tras deposits are only found in Karangrejo District of 15,510,500BCM, in other Districts this is not found because the volcanic material of the size of sand and fine sand (volcanic ash) is deposited in the east from Mount Slamet. The deposits of Tras excavated materials are determined by volcanic material with the size of sand and fine sand from the eruption which only occurs in 1 volcanic eruption.

Table 3. Tras Resources in Purbalingga Regency

NO	District	Large (m ²)	Thickness (m)	Amount of Resource (BCM)
1	Karangrejo	3.102.135,48	5	15.510.500
Total				15.510.500

Determination of the Appropriateness and Not the Granting of Mining Permits in Purbalingga Regency

The determination of whether a permit is granted or not is determined by 11 parameters, of which 11 parameters have an absolute value with rank 210. Rank multiplied by weight gives a score. The highest score is if 4 parameters have a rank of 210 and other parameters have a rank of 30 or the highest score is $84 + 18 = 102$ and the lowest score is if all eleven parameters have a rank of 10 or the total score is 10.

The potential for andesite that can be granted a license is 1,038,841,000BCM, which can be granted a conditional license of 67,520,000BCM and those that are not granted a license of 1,052,720,000BCM. For gravel mining materials that can be granted a permit of 6,861,400BCM, those that are granted a conditional license of 4,675,000BCM and those that are not eligible to be granted a permit of 3,226,700BCM. Tras mining materials that can be granted a license are 9,280,500BCM, those granted are eligible for conditional permits of 1,180,000BCM and those that are not granted a permit are 5,050,000BCM.

CONCLUSION

From the results of this research is the volcanic eruption which determines the potential magnitude of the Andesite. The biggest potential is in Kutasari Subdistrict with 649,943,895BCM and the smallest is Bojongsari Subdistrict with 200,013,522BCM. The potential for Sirtu is largely determined by the number and slope of the river channel, the largest potential for Sirtu in Bobotsari District of 8,326,800BCM and Sirtu which is not found in Kutasari District. Meanwhile, the Tras Resource was influenced by the eruption of Mount Slamet, which was the size of sand and fine sand (volcanic ash), only found in Karangrejo District at 15,510,677BCM.

The determination of whether permission is granted is seen from 11 parameters, parameters that have rank 210 are absolutely not granted permission, parameters that have rank 30 are given conditional permission, parameters that have rank 20 to clarify directions can be given permission and can be given conditional permission, and parameters with rank 10 of his directions were given permission.

The potential for andesite that can be granted a license is 1,038,841,000BCM, which can be granted a conditional license of 67,520,000BCM and those that are not granted a license of 1,052,720,000BCM. For gravel mining materials that can be granted a permit of 6,861,400BCM, those that are granted a conditional license of 4,675,000BCM and those that are not eligible to be granted a permit of 3,226,700BCM. Tras minerals that can be granted a license are 9,280,500BCM, those that are granted a conditional permit of 1,180,000BCM and those that are not granted a permit are 5,050,000BCM.

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