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Utilization of Reject coal from hauling activities as fertilizer: Coal handling strategies

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ABSTRACT

Management of rejected coal in the coal mining industry has become a major concern in efforts to reduce waste and manage resources more sustainably. One approach that has been proposed is the use of rejected coal as an agricultural fertilizer, with the aim of reducing the amount of rejected coal that must be transported and disposed of in active disposal. The research aims to analyze the effect of using reject coal as a fertilizer on the transportation of rejected coal to active disposal. This research will examine the impact of using reject coal as fertilizer on the volume and frequency of transporting rejected coal to active disposal.reject coal.

INTRODUCTION

Disposal and management of fine coal in the coal mining industry has long been a significant environmental and economic issue. Fine coal, which is often a byproduct of coal mining operations, poses challenges regarding storage, transportation and its potential impact on the environment. One common practice is the dumping of fine coal at active dump sites, which not only uses up valuable land but also raises questions about the environmental sustainability of the method. Proper management of fine coal is essential not only to reduce the environmental impact of coal mining but also to explore potential alternative uses that could reduce the need to transport and dispose of this material in active disposal areas. This research focuses on investigating the impact of transporting fine coal to active disposal sites, aiming to better understand the associated challenges and potential improvement opportunities. Transporting fine coal to active disposal sites requires significant logistical considerations and can have far-reaching impacts. This has an impact on the environment, public health and safety, as well as the sustainability of coal mining operations as a whole. Additionally, the economic costs associated with transporting and disposing of fine coal are enormous, and optimizing these processes can result in cost savings for the coal mining industry.

Fine coal from processing that does not meet the coal specifications that can be sold can still be used for

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fertilizer. In 2021, the total volume of rejected coal disposed of for disposal will be 38,719 tons. Handling rejected coal at PT. Borneo Indobara is stockpiling coal in the coal stockpile area so that this will reduce the capacity of the coal stockpile. Fertilizer resulting from reject coal processing can be used to support reclamation activities. Using this will help conserve and add value to coal resources. One of the wastes produced in large quantities in the coal mining industry is reject coal (rejected coal). Reject coal is formed when the coal separation process produces a fraction that does not meet quality standards for sale as a final product. The main problem that arises is how to manage rejected coal efficiently without causing negative impacts on the surrounding environment, reject coal management has become a major concern among researchers, industry practitioners and environmental regulators. The main option that is often used is to transport rejected coal to active disposal, which is a special area designed to accommodate this waste. however, transporting rejected coal to active disposal is not an ideal solution, considering the various challenges associated with this practice.

Even though active disposal is the main choice for dealing with rejected coal, this approach is not always efficient, especially when the amount of rejected coal produced is very large. In addition, transporting reject coal to active disposal requires high transportation costs, which can affect mining companies' operational costs. In some cases, the distance between the mine and active disposal can be very large, increasing the costs and environmental impact of transportation, on the other hand, the potential for using rejected coal as an organic fertilizer has emerged as an attractive alternative. Processing rejected coal into useful organic fertilizer can reduce the amount of rejected coal that must be transported and disposed of for active disposal. Organic fertilizer produced from rejected coal has the potential to increase agricultural soil fertility and reduce dependence on synthetic chemical fertilizers.

Figure 1. Reject Coal

METHODOLOGY

Research Time and Location

This research method includes analysis of the chemical composition of rejected coal which will be used as fertilizer. Next, laboratory experiments will be carried out to evaluate the effects of reject coal on plant growth and soil quality. Parameters such as plant height, crop yield, soil nutrient content, and soil properties will be measured and compared with the use of conventional fertilizers.

Apart from that, this research will examine the impact of using reject coal as fertilizer on the volume and frequency of transporting reject coal to active disposal, namely with a transport distance of 23-32 kilometers using more than 10 hauler units for transportation. Data regarding the amount of rejected coal produced and transported will be recorded before and after the use of rejected coal as a fertilizer material.

This research was carried out by taking data from 2021 to 2023, where there is quite a large volume of rejected coal each year which could be used as fertilizer if in this research it could be categorized as organic fertilizer using the method that will be carried out. The location for data collection is in the South Kalimantan area, namely Tanah Spice Regency, in one of the well-known coal companies and with a very large production target, resulting in coal rejects due to the continuous coal processing process.

Data Collection

This research is also to explore the effect of transporting rejected coal to active disposal on the potential use of rejected coal as an organic fertilizer material. benefits and how these can be integrated into sustainable mining practices. The data collected includes ultimate and proximate laboratory results; volume of rejected coal transported; transport distance and number of haulers used.

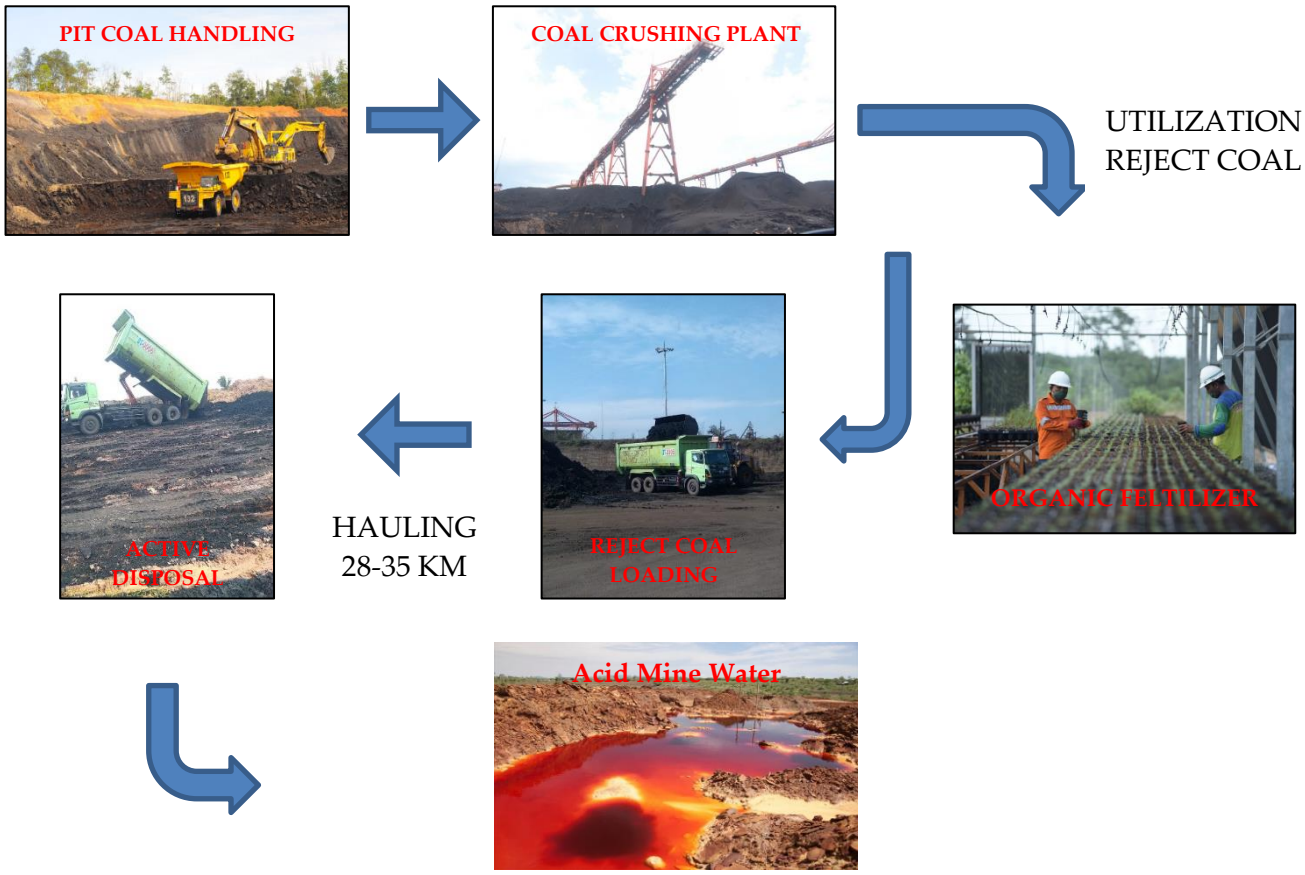

Figure 2. Flow Process of The Handling and Utilization of Reject Coal

Data Processing and Data Analysis

Table 1. Ultimate Analysis of Reject Coal

No	Keterangan	Ph	C organik	N	P	K	Mg	Na	S	Fe
1	Soil	6,2	2,72	0,11	11,73	0,13	0,30	0,22	TU	TU
2	Reject coal	7,41	42,25	0,67	TU	0,01	0,05	0,07	0,06	0,32

Table 2. Test Results for various Organic Fertilizers

No	Feltilizer Type	N Total (%)	P205 (%)	K20 (%)	C-Organic (%)	C/N Ratio	Water content(%)
1	**Sp Organic**	**0.06**	**10.96**	**0.06**	**5.06**	**84**	**13.28**
2	**Chicken manure**	**1.17**	**1.87**	**0.38**	**7.16**	**6.1**	**13.01**
3	**Organic Fertilizer KJD**	**0.97**	**2.08**	**1.21.**	**9.85**	**10.1**	**25.34**
4	**Fertilizer Organic OCP**	**9.07**	**8.58**	**6.13**	**15.82**	**1.7**	**16.23**
5	**Compost AU**	**2.03**	**0.34**	**3.25**	**17.83**	**8.8**	**13.10**
6	**pellets**	**2.69**	**8.25**	**7.02**	**12.25**	**4.7**	**9.23**
7	**Cypramin Miwon**	**4.57**	**0.17**	**1.73**	**6.94**	**2.0**	**-**
8	**Organic Fertilizer Semigrup**	**0.53**	**1.86**	**1.08**	**9.21**	**14.26**	**42.98**
9	**Liquid raya fertilizer**	**4.07**	**0.18**	**1.03**	**4.80**	**1.2**	**-**
10	**Alfinase**	**0.81**	**4.47**	**1.09**	**19.02**	**23.5**	**22.54**
11	**Fine compost**	**0.68**	**1.40**	**1.09**	**5.04**	**7.4**	**46.43**
12	**Solid raya feltilizer**	**2.25**	**0.46**	**0.57**	**11.9**	**5.3**	**37.96**
13	**Bokasi**	**0.73**	**0.62**	**1.0**	**9.39**	**12.9**	**43.86**
14	**Organic feltilizer Granula 1**	**6.57**	**4.76**	**3.9**	**20.2**	**3.1**	**13.79**
15	**Organic feltilizer Granula 2**	**6.08**	**4.9**	**4.3**	**21.2**	**4.3**	**11.25**
16	**Organic feltilizer Granula 3**	**0.18**	**11.04**	**0.39**	**4.56**	**25**	**31.84**
17	**Organic feltilizer Granula 4**	**1.54**	**7.34**	**0.41**	**10.3**	**7**	**40.9**
18	**Organic feltilizer Granula 5**	**1.89**	**1.9**	**0.27**	**12.89**	**7**	**57.1**
19	**Organic feltilizer Granula 6**	**0.61**	**0.3**	**0.09**	**4.11**	**7**	**26.58**
20	**Organic feltilizer Granula 7**	**1.38**	**0.2**	**0.09**	**6.28**	**5**	**34.24**
21	**Compost**	**0.37**	**0.77**	**8.95**	**8.95**	**14**	**62.86**

Table 3. Coal Handling of reject coal 2021-2023

Date	Volume of Reject Coal transported (tons)	Location of transportation and disposal	Distance From Port to Disposal (kilometers)	Haulers used (units)
2021	38.719	Port Bunati – Disposal Girimulya	35	26
2022	13.972	Port Bunati – Disposal Kusan bawah dan Girimulya	9 & 32	23
2023	9.490	Port Bunati – Girimulya	30	20

RESULT

Through a deeper understanding of the potential for using reject coal as organic fertilizer and the impact of transporting rejected coal to active disposal, this research can provide valuable insight for the coal mining industry in an effort to reduce environmental impacts and increase efficiency in managing rejected coal. Apart from that, the potential use of rejected coal as an organic fertilizer material can support more sustainable agricultural practices, reduce dependence on chemical fertilizers, and improve the quality of agricultural soil. The impact of this research is on the Environmental Impact and Sustainability which discusses the environmental impact of transporting rejected coal to active disposal. Reducing the volume of rejected coal transported to active disposal by converting it into organic fertilizer can reduce pressure on active disposal sites and extend their service life. This has the potential to reduce the negative environmental impacts associated with the large-scale disposition of reject coal, and the impact of supporting Sustainable Agriculture where the results of this research provide further support for sustainable agricultural practices by integrating the use of organic fertilizer from reject coal. The use of organic fertilizer can help increase soil fertility and reduce dependence on synthetic chemical fertilizers in agriculture.

CONCLUSION

Environmental and Sustainability Impact: Using rejected coal as organic fertilizer can reduce the volume of rejected coal transported to active disposal, reduce pressure on active disposal sites, and extend the service life of disposal sites. This has the potential to reduce the environmental impact of large-scale disposition of reject coal. Mining Operational Efficiency: If the use of rejected coal as organic fertilizer is proven to be effective, this can help mining companies reduce transportation and management costs for rejected coal. This can have a positive impact on operational efficiency and financial sustainability of mining companies. Support for Sustainable Agriculture: The use of organic fertilizer from rejected coal can support sustainable agricultural practices by increasing soil fertility and reducing dependence on synthetic chemical fertilizers in agriculture.

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