The Significance of Size Screening on the Pretreatment of Low Grade Bauxite: A Case Study of Block E70 / 3160 in Darling Range of Australia

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Abstract. In this paper, the size screening method and X-ray fluorescent spectroscopy were used to analyze low-grade bauxite samples from Darling Range, Australia. The results showed that the Av Al / Re Si (available alumina to reactive silica ratio) of samples JDB225 and JDB364 increased by 34.5% (8.7% to 11.7%) and 11.2% (8.9% to 9.9%); the available aluminum increased by 11.2% (27.8% to 30.9%) and 4.9% (30.9% to 32.4%) respectively. In screening, the optimum particle sizes of the two samples were 4 mm and 2.8 mm respectively. The results show that the best screening particle size can be determined by the size screening method, which can achieve the optimal combination of available aluminum grade, Av Al / Re Si and mass recovery rate, so as to significantly improve the grade and Av Al / Re Si of low-grade bauxite.

Keywords: Low Grade Bauxite, Size Screening, Particle Size in Screening, available aluminum, Available Alumina to Reactive Silica Ratio.

1 Introduction
In recent years, the scale of bauxite development and utilization has been expanding in China, and the domestic supply of bauxite has become increasingly difficult. In addition to policy restrictions of environmental supervision, mine rectification and the reform of mining right transfer system, China's bauxite output has been affected to a certain extent. In addition, the downstream market has huge consumption scale of bauxite. Under that situation, China has the highest import scale on bauxite in the world, up to 100 million tons in 2019 [1].

With the continuous development of the aluminium oxide industry, domestic high-quality bauxite resources have been exhausted. The rest are low-grade bauxite resources [2]. In order to effectively solve the resource problem, it is necessary to fully develop and utilize bauxite resources with low Av Al / Re Si (available alumina to reactive silica ratio) to adapt to the current alumina production process. Therefore, a large number of scholars have carried out experimental research on the dressing test of bauxite with low Al Si ratio [3-5]. In the past, the bauxite with Al Si ratio of about 5.7 was taken as the...
research object [6, 7]. There are also a lot of systematic researches on the dressing test of low-grade bauxite, but the research on the pretreatment of the dressing test is scarce.

In this paper, the low-grade bauxite in Darling Range area of western Australia is taken as the research object. Through the size screening test, the low-grade bauxite is pretreated to improve the grade and Av Al / Re Si, so that the low-grade bauxite ore can have industrial mining value. It is of great significance to the development and utilization of low-grade bauxite.

2 Geological Background

Archean and Quaternary strata are mainly exposed in the mining area (Fig. 1). The main lithology of Archean strata is greenschist and gneiss; the quaternary system mainly includes the residual slope deposit (laterite layer), which can be divided into three sub-horizons. The second sub-horizon is the ore bearing horizon of bauxite, and the relationship between each horizon is gradual transition.

![Figure 1. Geological sketch of working area](image_url)

The first sub-horizon includes topsoil, lateritic gravel and duricrust. It is the roof of the ore body with a thickness of 0.5-3m.

The second sub-horizon is the bauxite ore body, including Nodular gibbsitic zone and Granular gibbsitic zone. The upper part is maroon and purplish red clay bearing bauxite. The nodule size is generally 2-8mm; the maximum is 10mm, and gradually increases from top to bottom. The lower part is maroon, grayish purple clay containing granular and massive bauxite. The main mineral composition is gibbsite, which is a small amount of monohydrate; secondary minerals are hematite, goethite, and so on. The boundary between the nodular gibbsite zone and the granular gibbsite zone is gradual. The thickness of this layer is 2-8m.

The third sub-horizon is the mottle zone, mainly containing argillaceous gravel, with a small amount of granite and quartz bedrock fragments at the bottom.

Magmatic rocks exposed in the mining area are mainly Archean granite, and the lithology is mainly equigranular granite, light quartz monzonite and gneissic granite. The three kinds of rocks have different degrees of regional or mixed metamorphism. In the mining area, the formation of bauxite deposits is related to granite, and the most suitable parent rock for bauxite formation is the massive granite with relatively uniform composition.

The structure in the mining area is mainly composed of two groups of fault structures. One group is in NW direction; the other group is near SN direction. The NW trending faults are all concealed faults. They are arranged in parallel in the area, with the spacing of 2-3km. The dip direction is NE and dip angle is about 35 degrees. They are normal faults. The near SN trending fault is an unconformity
boundary between the rock mass and the Quaternary sediments. The dip angle of the fault is about 40 degrees and the dip direction is W.

3 Research Methods
The purpose of this experiment is, based on the same weight, the same element distribution and the same particle size, low-grade bauxite can be pre-treated by size screening.

3.1 Sample Collection
In this experiment, two samples, each weighing 1t, were collected from the bauxite mining area in the north of Darling Range area. The specific location is in the Jones Farm (E70 / 3160 mineral right lease). Among them, the gossan of JDB225 ferritic bauxite was collected at 0.5m-1m, which was mainly medium coarse to grained lenticular lateritic zone conglomerate; the gossan of JDB364 ferrite was collected at 0.4-0.8m, which was mainly coarse-grained to extremely coarse-grained lenticular laterite zone conglomerate. Samples were collected and sent to extract to enrich minerals.

3.2 Sample Preparation and Analysis
Test process: sample preparation (mixed / split sample) → first batch (head array) test analysis → particle size test analysis. The test work is undertaken by the Nagrom metallurgical laboratory.

3.2.1 Sample Preparation. After mixing samples evenly, the samples are divided into several equal parts for the first batch test and particle size test. One of them was selected as the first batch of test samples. The samples were dried in the convection furnace for 12 hours, and then rolled into < 10 mm. Afterwards they were weighed and screened for 700 g to 1200 g, they were grinded into 160 µm mineral powder in the disc LM-5 pulverizer. These mineral powders were separated into 200 g samples for storage and analysis by X-ray fluorescent spectroscopy (hereinafter referred to as XRF method). The remaining several equal parts should be analyzed by particle size. The samples should be screened and weighed according to the selected particle size (to measure the mass recovery rate), and then the same sample preparation method as the head array analysis was carried out.

3.2.2 Analysis Method. The analysis method of the first batch and the particle size analysis method are the same. 0.80 ± 0.04g ore powder was taken from the prepared sample and put into the dissolving crucible with solvent; the composition was analyzed by XRF method, and the silicate was prepared for dissolving. The sample test result was more than or equal to 27% of total Al2O3. It is Bomb digested by ICP-OES at 148 degrees; the fusible Al2O3 (Av Al) and active SiO2 (Re SiO2) were determined by 1.0 ± 0.04g sample. 1 g sample was dried at 1000 degrees for half an hour to determine the loss on ignition. Generally, 38 samples and 2 reference samples are analyzed, and the average value is taken as the final result.

4 Results Analysis
4.1 Analysis of the Head Assay
The separated main samples were extracted (RDS sampling / crushing separation / secondary sampling / crushing) and analyzed by the droplet XRF method. The results of the head assay analysis are shown in Table 1.

| Sample number | Total Al2O3 (%) | Total SiO2 (%) | Quartz (%) | Fe2O3 (%) | TiO2 (%) | LO I(%) | Av Al (%) | Re SiO2 (%) | Av Al/Re SiO2 (%) | Organic carbon (%) |
|---------------|----------------|---------------|------------|------------|----------|---------|-----------|-------------|-------------------|-------------------|
| JDB225        | 38.80          | 24.92         | 21.32      | 18.33      | 2.25     | 15.5    | 24.1      | 3.6         | 6.7               | 0.42              |
| JDB364        | 43.31          | 21.40         | 17.60      | 14.18      | 3.10     | 17.6    | 28.8      | 3.8         | 7.6               | 0.40              |

Note: Av Al is available aluminum; Re SiO2 is reactive silicon
4.2 Analysis of the Particle Size Test of Sample JDB225

The analysis results of the sample JDB225 (Table 2) show that the sample is a low-grade ore. The main contents of Av Al (available aluminum) and Re SiO₂ (reactive silicon) are 27.8% and 3.2% respectively, and Av Al : Re SiO₂ (Al Si ratio) is 8.7.

The results show that, if we sieve out raw materials with particle size less than 1mm, the mass loss of the sample is 12.2%; the content of Re SiO₂ is decreased by 9.4% (from 3.2% to 2.9%); the content of Av Al (at 148 degrees) is increased by 7.2% (from 27.8% to 29.8%). The content of quartz is reduced by 46.7% (from 12.2% to 6.5%); the content of organic carbon is reduced by 19.0% (from 0.42% to 0.34%). The content of Av Al : Re SiO₂ is increased from 8.7% to 10.3%.

When sieve out raw materials with particle size less than 4mm, 25.9% of the sample mass will be lost. Meanwhile, the content of Re SiO₂ will be decreased by 15.6% (from 3.2% to 2.7%); the content of Av Al (148 degrees) will be increased by 11.2% (from 27.8% to 30.9%). The content of quartz will be decreased by 51.6% (from 12.2% to 5.9%); the content of organic carbon will be reduced by 26.2% (from 0.42% to 0.31%). The Av Al : Re SiO₂ will be increased from 8.7 to 11.7.

| particle size (mm) | mass recovery (%) | Total Al₂O₃ (%) | Av Al(%) (148degrees) | Re SiO₂(%) (148degrees) | Organic carbon (%) | Total SiO₂ (%) | Av Al/Re SiO₂ | Organic carbon (%) |
|-------------------|-------------------|-----------------|----------------------|------------------------|------------------|----------------|----------------|------------------|
| 67.0              | 2.6               | 44.7            | 36.5                 | 2.5                    | 4.7              | 7.2            | 14.6           | 0.41             |
| 45.0              | 9.4               | 45.5            | 37.6                 | 2.6                    | 5.3              | 7.9            | 14.2           | 0.37             |
| 37.5              | 12.2              | 45.1            | 35.7                 | 2.8                    | 4.9              | 7.7            | 13.0           | 0.38             |
| 22.4              | 22.8              | 45.0            | 36.3                 | 2.8                    | 6.3              | 9.1            | 13.1           | 0.36             |
| 16.0              | 31.8              | 45.0            | 36.4                 | 2.7                    | 5.9              | 8.6            | 13.5           | 0.35             |
| 13.2              | 38.1              | 45.0            | 35.7                 | 2.7                    | 5.8              | 8.5            | 13.2           | 0.34             |
| 11.2              | 42.6              | 45.1            | 35.1                 | 2.7                    | 5.8              | 8.5            | 12.9           | 0.33             |
| 9.50              | 46.4              | 45.1            | 35.3                 | 2.7                    | 5.8              | 8.5            | 13.1           | 0.33             |
| 8.00              | 53.9              | 45.4            | 34.1                 | 2.6                    | 5.7              | 8.4            | 13.0           | 0.32             |
| 6.70              | 59.7              | 45.5            | 33.0                 | 2.6                    | 5.8              | 8.4            | 12.7           | 0.31             |
| 6.30              | 60.8              | 45.5            | 32.7                 | 2.6                    | 5.8              | 8.4            | 12.6           | 0.31             |
| 4.00              | 74.1              | 45.9            | 30.9                 | 2.7                    | 5.9              | 8.5            | 11.7           | 0.31             |
| 2.80              | 80.1              | 45.8            | 30.1                 | 2.7                    | 6.0              | 8.7            | 11.1           | 0.32             |
| 2.00              | 84.6              | 45.8            | 29.9                 | 2.8                    | 6.2              | 9.0            | 10.6           | 0.33             |
| 1.40              | 86.7              | 45.7            | 29.8                 | 2.9                    | 6.3              | 9.2            | 10.4           | 0.34             |
| 1.00              | 87.8              | 45.6            | 29.8                 | 2.9                    | 6.5              | 9.4            | 10.3           | 0.34             |
| 0.71              | 88.7              | 45.5            | 29.7                 | 2.9                    | 6.8              | 9.7            | 10.2           | 0.34             |
| 0.50              | 89.9              | 45.2            | 29.5                 | 2.9                    | 7.4              | 10.3           | 10.0           | 0.35             |
| 0.36              | 90.9              | 44.9            | 29.3                 | 3.0                    | 7.9              | 10.9           | 9.9            | 0.35             |
| 0.25              | 92.1              | 44.5            | 29.1                 | 3.0                    | 8.7              | 11.7           | 9.7            | 0.35             |
| 0.18              | 93.6              | 44.1            | 28.8                 | 3.0                    | 9.6              | 12.6           | 9.5            | 0.35             |
| 0.13              | 94.9              | 43.7            | 28.5                 | 3.1                    | 10.4             | 13.4           | 9.3            | 0.36             |
| 0.09              | 95.9              | 43.4            | 28.3                 | 3.1                    | 10.9             | 14.0           | 9.2            | 0.36             |
| 0.06              | 96.8              | 43.1            | 28.3                 | 3.1                    | 10.9             | 14.0           | 9.2            | 0.37             |
| 0.05              | 97.6              | 43.0            | 28.0                 | 3.1                    | 11.7             | 14.8           | 9.0            | 0.38             |
| <0.05             | 100.0             | 42.7            | 27.8                 | 3.2                    | 12.2             | 15.4           | 8.7            | 0.42             |

Note: <0.05 mm represents the particle size of the raw material (equivalent to 100% mass recovery)
Av Al is available aluminum; Re SiO₂ is reactive silicon
4.3 Analysis of the Particle Size of Sample JDB364

The grade of JDB364 is slightly higher, containing 30.9% Av Al (available aluminum) and 3.5% Re SiO2 (reactive silicon). The Av Al: Re SiO2 (Al Si ratio) is 8.9.

If raw materials with particle size less than 1mm are removed, 10.6% of sample mass will be lost. In addition, the content of Re SiO2 decreased by 5.7% (from 3.5% to 2.3%); the content of Av Al (148 degrees) increased by 3.56% (from 30.9% to 32.4%); the content of quartz decreased by 28.5% (from 13.0% to 9.1%); the content of organic carbon decreased by 10.0% (from 0.40% to 0.35%). Table 3 shows details.

| particle size (mm) | mass recovery (%) | TotalAl2O3 (%) | Av Al (148 degrees) | Re SiO2 (%) (148 degrees) | Quartz (%) | Total SiO2 (%) | Av Al/Re SiO2 | Organic carbon (%) |
|-------------------|-------------------|----------------|---------------------|--------------------------|------------|----------------|----------------|------------------|
| 90.0              | 16.5              | 47.7           | 33.9                | 3.9                      | 10.8       | 14.7           | 8.7            | 0.40             |
| 67.0              | 21.6              | 48.1           | 34.9                | 3.8                      | 10.5       | 14.4           | 9.1            | 0.40             |
| 45.0              | 27.9              | 48.5           | 35.8                | 3.7                      | 10.5       | 14.2           | 9.6            | 0.38             |
| 37.5              | 28.8              | 48.4           | 35.8                | 3.7                      | 10.5       | 14.2           | 9.6            | 0.38             |
| 22.4              | 35.6              | 48.5           | 36.0                | 3.7                      | 10.4       | 14.1           | 9.7            | 0.38             |
| 16.0              | 40.4              | 48.5           | 35.8                | 3.7                      | 10.3       | 14.0           | 9.7            | 0.37             |
| 13.2              | 43.3              | 48.6           | 35.4                | 3.7                      | 10.3       | 13.9           | 9.7            | 0.37             |
| 11.2              | 46.3              | 48.7           | 35.1                | 3.6                      | 10.2       | 13.8           | 9.7            | 0.36             |
| 9.50              | 48.8              | 48.9           | 34.8                | 3.6                      | 10.2       | 13.7           | 9.7            | 0.36             |
| 8.00              | 55.2              | 49.2           | 34.3                | 3.5                      | 10.0       | 13.5           | 9.8            | 0.36             |
| 6.70              | 61.6              | 49.5           | 33.7                | 3.4                      | 9.7        | 13.2           | 9.8            | 0.35             |
| 6.30              | 62.8              | 49.6           | 33.6                | 3.4                      | 9.7        | 13.1           | 9.8            | 0.35             |
| 4.00              | 77.8              | 49.7           | 32.8                | 3.3                      | 9.2        | 12.5           | 9.9            | 0.35             |
| 2.80              | 83.5              | 49.6           | 32.4                | 3.3                      | 9.1        | 12.4           | 9.9            | 0.35             |
| 2.00              | 86.7              | 49.4           | 32.1                | 3.3                      | 9.1        | 12.4           | 9.8            | 0.36             |
| 1.40              | 88.3              | 49.3           | 32.0                | 3.3                      | 9.2        | 12.5           | 9.7            | 0.36             |
| 1.00              | 89.4              | 49.2           | 32.0                | 3.3                      | 9.3        | 12.6           | 9.6            | 0.36             |
| 0.71              | 90.1              | 49.1           | 32.0                | 3.3                      | 9.4        | 12.8           | 9.6            | 0.37             |
| 0.50              | 91.1              | 49.0           | 32.0                | 3.3                      | 9.7        | 13.0           | 9.6            | 0.37             |
| 0.36              | 91.8              | 48.8           | 31.9                | 3.3                      | 9.9        | 13.3           | 9.5            | 0.37             |
| 0.25              | 92.8              | 48.6           | 31.8                | 3.4                      | 10.4       | 13.7           | 9.5            | 0.37             |
| 0.18              | 93.8              | 48.2           | 31.6                | 3.4                      | 10.9       | 14.3           | 9.4            | 0.37             |
| 0.13              | 95.3              | 47.8           | 31.3                | 3.4                      | 11.8       | 15.1           | 9.3            | 0.37             |
| 0.09              | 96.1              | 47.5           | 31.2                | 3.4                      | 12.2       | 15.5           | 9.3            | 0.37             |
| 0.06              | 97.0              | 47.3           | 31.0                | 3.4                      | 12.5       | 15.9           | 9.2            | 0.37             |
| 0.05              | 97.6              | 47.2           | 31.0                | 3.4                      | 12.7       | 16.1           | 9.1            | 0.38             |
| <0.05             | 100.0             | 47.0           | 30.9                | 3.5                      | 13.0       | 16.5           | 8.9            | 0.40             |

Note: <0.05 mm represents the particle size of the raw material (equivalent to 100% mass recovery)

Av Al is available aluminum; Re SiO2 is reactive silicon

Sieve out raw materials with particle size less than 2.8mm, the increase of Av Al: Re SiO2 (Al / Si ratio) cannot be increased by more than 9.9% in the dressing test. The sample quality will lose by 16.5%. In addition, the content of Re SiO2 decreased by 5.7% (from 3.5% to 2.3%); the Av Al (148 degrees) content increased by 4.9% (from 30.9% to 32.4%); the quartz content decreased by 30.0% (from 13.0% to 9.1%); the organic carbon content decreased by 12.5% (from 0.40% to 0.35%).
5 Discussion

Due to the difference between separation methods used in the first batch of analysis and those used in the particle size analysis, there will be small changes in the chemical composition (Table 1, Table 2 and Table 3). Therefore, in order to make the results more reliable, the results of particle size analysis at all levels are compared with the results of the initial particle size analysis; results of the first batch (head assay) analysis are used only for reference (Table 4).

First, through the test of two samples, it can be determined (Table 2) that when the particle size of sample JDB225 is 1 mm or 4 mm, the optimal effect can be achieved (the best match of the ratio of aluminum to silicon, the recovery rate of mass and the available aluminum). When the particle size of sample JDB364 is 1 mm or 2.8 mm, it can achieve the optimal effect (Table 3). The latter is more prone to have peak values, and the screening particle size is easier to determine. The results show that, after the sample JDB225 screens out substances with particle size less than 4mm, the aluminum-silicon ratio increased from 8.7 to 11.7, with an increase of 34.5%. After screening materials with particle size less than 2.8mm in sample JDB364, the Av Al / Re Si can be increased from 8.9 to 9.9, with an increase of 11.2% (Table 4).

Table 4. Comparison of ore dressing test results between sample JDB225 and sample JDB364

| Sample number | Particle size (mm) | Mass recovery (%) | Total Al2O3 (%) | Av Al (148 degrees) (%) | Re SiO2 (148 degrees) (%) | Quartz (%) | Total SiO2 (%) | Av Al :ReSiO2 | Organic carbon (%) |
|---------------|--------------------|-------------------|-----------------|------------------------|--------------------------|-----------|----------------|----------------|------------------|
| JDB225        | initial particle size | 100 | 42.7 | 27.8 | 3.2 | 12.2 | 15.4 | 8.7 | 0.42 |
|               | 1.00mm screen      | 87.8 | 45.6 (6.8) | 29.8 (7.2) | 2.9 | 6.5 (-46.7) | 9.4 (-39.0) | 10.3 | 0.34 |
|               | 4.00mm screen      | 74.1 | 45.9 (7.5) | 30.9 (11.2) | 2.7 | 5.9 (-51.6) | 8.5 (-44.8) | 11.7 | 0.31 |
| JDB364        | initial particle size | 100 | 47.0 | 30.9 | 3.5 | 13.0 | 16.5 | 8.9 | 0.4 |
|               | 1.00mm screen      | 89.4 | 49.5 (4.7) | 32.0 (3.6) | 3.3 (-5.7) | 9.3 (-28.5) | 12.6 (-23.6) | 9.6 | 0.36 |
|               | 2.80mm screen      | 83.5 | 49.6 (5.5) | 32.4 (4.9) | 3.3 (-5.7) | 9.1 (-30.0) | 12.4 (-24.8) | 9.9 | 0.35 |

Note: the initial particle size represents the particle size of the raw material (equivalent to 100% mass recovery). Av Al is available aluminum; Re SiO2 is reactive silicon; the degree of change (%) is shown in brackets, and - indicates decrease.

Second, by comparing the analysis results of the two samples, it can be found that the mass recovery rate and other components of the two samples will show following characteristics as the screening particle size becomes smaller.

Mass recovery: both samples increase. The smaller the particle size, the closer the recovery rate of the two samples. On the whole, JDB225 is slightly lower than JDB364 (Fig. 2a).

Al / Si ratio: JDB225 decreases as a whole, and decreases sharply when it is less than 4mm. JDB364 increases steadily all the time, reaches the peak value of 9.9% at 4-2.80mm, and decreases again when it is less than 2.80mm (Fig.2b).
available aluminum: the overall trend is downward. JDB225 has a large decline range, ranging from 38% to 27%; JDB364 has a small range, ranging from 36% to 32%, with a peak value of 36% at 22.4mm (Fig. 2c).

**Figure 2.** Change trend of JDB225 and JDB364 under the same particle size screening level

Reactive silicon: JDB225 increases as a whole, and sharply increases when it is below 8mm; JDB364 decreases as a whole, with a valley value at 4.0-0.36mm (Fig. 2d).

Quartz: JDB225 is on the rise, rising sharply when it is below 8mm. JDB364 drops steadily, with a valley value of 2.8-2mm, and then rises again (Fig. 2e).

Organic carbon: they both decrease first and then increase. The difference is that JDB225 has a valley value at 6.7-4mm, and JDB364 has a valley value at 6.7-2.8mm (Fig. 2f).

Combined with Table 2 and Table 3, when the particle size of sample JDB225 is less than 10 mm, the Al Si ratio and available aluminum decrease, while the reactive silicon and quartz increase. The Al Si ratio decreases throughout the test process; the mass recovery rate increases all the time, and the mass recovery rate is lower than 45% when the screening particle size is less than 10 mm. Therefore, if the available aluminum content and aluminum silicon ratio can be increased after the particle size screening, and the high recovery rate can be maintained, and the selection of screening granularity needs to be comprehensively analyzed to determine the optimal particle size. Compared with JDB225, JDB364 is easier to select the appropriate screening particle size; it is more suitable for 4-2.8mm screening particle size, and the effect is very good. The aluminum silicon ratio and available aluminum have peaks, while reactive silicon, quartz and other harmful components also have valley values. The mass recovery rate of JDB364 is always higher than that of JDB225 under the same screening particle size.

Fourth, The Al / Si ratio and available aluminum of the two samples are improved, and the quality recovery rate is ensured. To a certain extent, this method can achieve the purpose of low-grade bauxite preconcentration. However, there are some differences in the trend of each component reflected in the curve of the two samples: JDB364 is more prone to have peak or valley values than the sample JDB225,
and it is easier to determine the optimal screening particle size. In the actual production, ores similar to JDB364 will consume less than ores similar to JDB225.

Fifth, the validity of samples in similar dressing tests should be evaluated to ensure the accuracy of test results, and to confirm whether the similar mineral processing test is universal to different ore bodies.

Sixth, a large amount of quartz, reactive silicon and organic carbon can be separated from low-grade bauxite ore after sample washing and screening. According to the results of the test (the representativeness of data to be determined), from the perspective of cost-benefit analysis, the following methods can be used to reduce costs and increase benefits.

We can reduce the sample quality and ultimately reduce the transportation cost.

In the operation cost of refinery, the content and influence of quartz, reactive silicon and organic matter should be reduced.

We should pay attention to the potential market of mineral processing by-products, such as quartz or other clay components.

6 Conclusion
First, based on the same weight, the same element distribution and the same particle size, low-grade bauxite can be pretreated by size screening, and the optimal screening particle size can be determined to achieve the optimal combination of the available aluminum grade, the Al Si ratio and the mass recovery rate, so as to significantly improve the grade and Al Si ratio of low-grade bauxite.

Second, the results show that in the two samples, the trends of different components are different. Sample JDB364 is more likely to have peak and valley values than sample JDB225, and it is easier to determine the optimal screening particle size.

Third, the results show that the best dressing test effect is obtained when the particle size of JDB225 is 4mm and when the particle size of JDB364 is 2.8mm.

Fourth, a batch of static samples should be collected from the mineralized and transitional zones at the bauxite / soil boundary, and static control tests should be conducted to evaluate the validity of samples and ensure the accuracy of test results.

Fifth, before the treatment of low-grade bauxite, low-grade ores of different ore bodies or mining areas should be classified, and the size screening test should be carried out respectively. Comprehensive research and evaluation should be carried out to determine the suitable screening particle size of each sample, and then a large number of screening should be carried out to improve the utilization rate of ores, reduce costs and increase benefits.

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