PAPER NO: 2

# BENEFICIATION OF BAUXITE(*)

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A primary objective of the beneficiation process is to reduce the silica content in the ore, as the latter reacts with caustic soda during the digestion step to precipitate out as insoluble sodium aluminium silicates, e.g. $2\ Na_2O.2\ Al_2O_3.3\ SiO_2.2\ H_2O$. This salt is eliminated from the process along with the insoluble iron and titanium oxides in red mud, consequently entailing the loss of valuable alumina and caustic soda from the process.

In order to evaluate the economics of using screened bauxite it was decided to investigate

(a) The extent of fines present in the run-of-mine

(b) The amount and quality of fines generated during the primary crushing operation, and

(c) The variations in the silica and alumina contents as a function of size

A number of samples were drawn from the run-of-mine and the crusher product streams. Screen and chemical analyses were carried out on all these samples, Screen and moisture analyses were carried out on "as such" samples, while the samples were powdered to pass through 100 mesh and dried at 105°C for 1 hour before proceeding with chemical analyses.

The size distribution for run-of-mine and crushed product streams is summarised below:

PRODUCT SIZE DISTRIBUTION FOR RUN-OF-MINE AND CRUSHER PRODUCT BAUXITE

| | Percent Weight Fraction | | | | | |
|---|---|---|---|---|---|---|
| | +½" | -½"+¼" | -¼"+1/8" | -1/8"+10 mesh | -10 mesh | -20 mesh |
| 1. Run-of-mine | 77 | 5 | 6 | 3 | 5 | 4 |
| 2. Crusher-Product | 60 | 12 | 10 | 4 | 9 | 5 |

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The variation in silica and caustic extractable alumina contents as a function of screen size was determined on a number of run-of-mine samples and is shown in Table II.

TABLE - II

VARIATIONS IN THE SILICA AND CAUSTIC EXTRACTABLE ALUMINA CONTENTS IN RUN-OF-MINE BAUXITE.

| | Screen Size | | | | | |
|---|---|---|---|---|---|---|
| | +¼" | -¼" + 1/8" | -1/8" + 10 mesh | -10 mesh | -20 mesh | Composite sample |
| 1. % Reactive silica | 4.01 | 4.26 | 4.57 | 5.25 | 9.20 | 4.43 |
| 2. % Caustic Extractable alumina | 46.25 | 45.70 | 44.93 | 42.60 | 35.70 | 45.29 |

On the basis of the above data, detailed investigations with respect to the economic attractiveness of the project were next carried out and a flow diagram has been developed for the proposed beneficiation plant.

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