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## **Making Bricks with Red Mud in Jamaica**

*by Peter Newton*

Jamaica, like many developing countries, has a shortage of affordable, safe housing. On the other hand, it has too much waste "red mud" from mining operations, creating a disposal headache.

But researchers from the Jamaica Bauxite Institute and the University of Toronto are hitting two birds with one stone by using the red mud to make bricks for inexpensive housing.

Jamaica's alumina industry produces 12 million tonnes of waste red mud annually. Bauxite containing alumina (the mineral compound from which aluminum is made) is mined in surface pit mines. The red mud is created when the bauxite undergoes the Bayer process, in which caustic soda is added to bauxite, producing alumina and residual minerals. This process creates huge amounts of waste red mud. It is pumped into abandoned bauxite mines or valleys that have been dammed at one end to make artificial ponds. The ponds fill quickly, producing an environmental and waste disposal problem.

The idea for using the red mud to make bricks came from Dr Arun Wagh of the University of the West Indies, Dr Carleton Davis of the Jamaican Bauxite Institute, and Dr J W Smith of the University of Toronto. With funding from IDRC, the team set out to develop a technology to turn the mud into safe, low-cost bricks with qualities - similar to conventionally fired bricks.

The red mud is extremely alkaline owing to the caustic soda used in the Bayer process. Therefore, the researchers used its high pH level to their benefit. By adding sodium silica to the mud particles, a reaction between the alumina silica and sodium ions takes place, gluing the particles together. The bricks need only be dried in the sun, instead of being fired in ovens.

Not having to fire the bricks is an important consideration in Jamaica, says Dr Smith. "The advantage of using sodium silicate is that you are importing the equivalent amount of electrical energy into Jamaica, which is energy deficient, at a fraction of the cost and using sunshine to do the job."

The process for making this innovative product is extremely simple and inexpensive. The red mud is pressed into bricks using a standard brick press, immersed in sodium silicate, then dried in the sun. Although not as strong as fired bricks, they are substantially cheaper. A home built with the red mud bricks costs about half the price of one made from fired bricks.

Early in the project, the researchers were worried about the safety of red mud bricks. Jamaican soils are quite radioactive. But after conducting studies in a research lab in Toronto, it was discovered that the sodium silicate treatment reduces radon emissions by 30%. The bricks easily meet international standards for radiation. A demonstration house has been built using the bricks at the Jamaican Bauxite Institute. Double coursing, two thicknesses of the bricks, and steel reinforcing are incorporated in the design to make the structure more durable during hurricanes and earthquakes. The roofs are also well secured to the walls.

Making red mud bricks may provide a partial answer to the alumina industry's waste disposal problem. The red mud brick industry could also help protect Jamaica's booming tourism industry by keeping the growth of the unsightly slurry ponds in check.

Dr Smith says the potential for a red mud brick industry is good. Someone will likely be interested in building a large-scale production facility for the bricks, he says.

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