

Soviet Use of Nepheline Syenite Ores

The Soviet Union has long been interested in the exploitation of non-bauxite ores. In the 1930s a scheme was developed for the metallurgical use of alkaline syenite rocks, involving the use of lime to achieve decomposition of aluminosilicates in the alkaline rocks. Products of the reaction were found useful for the production of cement, soda, and potash. The high yield of by-products, in fact, provided the incentive for further study of nepheline syenites despite their low alumina content. Industrial exploitation of nepheline syenite ores from the Kola Peninsula was initiated at an alumina facility in Volkhov (near Leningrad) in the late 1940s. In 1959, another alumina plant employing Kola Peninsula nepheline syenites was put into operation at Pikalevo (also near Leningrad). The scale of operations at these two plants is limited.

The Soviet Union also has undertaken a large-scale project for exploitation of nepheline syenites in Eastern Siberia near the large aluminum plants which have been built to take advantage of the inexpensive hydroelectric power in the region. The project involves construction of a plant, located at Achinsk (near Krasnoyarsk on the Trans-Siberian Railway), with a planned annual capacity of 800,000 tons of alumina. Ample supplies of limestone, required in the processing of nephelines, are available in the area. The mine site for the nepheline syenite ore is about 200 miles to the southwest of Achinsk.

The concept of the Achinsk Plant and preliminary plans were formulated in the 1950s. Work on the project reportedly was started as early as 1956 but until well into the 1960s construction was largely limited to housing for workers and other infrastructure, including facilities for the manufacture of building materials. In the early 1960s work was started on a pilot plant. Numerous changes and modifications were made in the overall design and flow scheme of the plant as well as in the design of individual facilities for crushing, leaching, sintering, and materials handling. It was not until 1966 that trial operations were completed and designs and technical documentation prepared for the full-scale plant. Many delays were encountered in construction of various portions of the large industrial complex at Achinsk which reportedly covers an area of nearly a thousand acres. In 1970, however, the plant became operational, producing alumina as well as cement, soda, potassium chloride and potassium sulfate. By the end of 1972 construction of facilities reportedly was essentially completed but satisfactory results apparently were not being achieved. In December a top Soviet planning official cited the Achinsk Alumina Combine as a leading example of an installation in nonferrous metallurgy where serious shortcomings existed in the processing of raw materials.