PETROLOGIC EVOLUTION OF THE RIO NEGRO MAFIC HORNBLENDE PLAGIOCLASE GNEISS AT THE ANGRA-3 SITE, ANGRA DOS REIS, RJ

Ancelmo Pederassi[1]; Fernando Roberto Mendes Pires[2]

[1] UNIVERSIDADE FEDERAL DO RIO DE JANEIRO; [2] INB-INDÚSTRIAS NUCLEARES DO BRASIL SA

RESUMO: Detailed lithological mapping of the Angra-3 nuclear power plant site, showed the metamorphic transformations of Rio Negro plagioclase-hornblende gneiss into a suite of granitic rocks in the area of continuous exposures at the plant foundations. The plagioclase-hornblende orthogneisses of the Rio Negro Complex corresponding to the oldest rock unit in the site consist of a Ca-rich portion, named as "Mafic gneiss", resembling a migmatite with tonalitic and trondhjemitic composition, characterized by the presence of quartz, sphene, apatite, magnetite, pyrite, zircon and biotite besides the predominant minerals. The orthogneiss displays banded structure and centimetric to metric intercalations of granitic portions defined as biotite microcline gneiss composed of quartz, biotite, microcline, albite, allanite, magnetite and pyrite. The contacts between the two phases may be either abrupt or gradational due to the gradations of hornblende and biotite. The biotite microcline gneiss exhibits two distinct facies: 1. A porphyritc facies with K feldspar phenocrysts; 2. Equigranular facies with matrix biotite and microcline, known as "Paiol Velho granitoid", with granitic composition. A third type of gneiss, comprised within and as a transition phase, in the gneiss described above, corresponds to a leucocratic biotite-poor, microcline-orthoclase rich gneiss with plagioclase, sphene and apatite as relic minerals. Some portions are composed almost exclusively of microcline and quartz. The porphyritic facies contain perthitic microcline porphyroclasts surrounded by biotite-plagioclase and hornblende-plagioclase zones suggesting K-metasomatism, resulting in the replacement of hornblende by biotite and plagioclase by microcline. Along the contact zone between the leucocratic gneiss and the biotite gneiss is marked by plagioclase-rich fringes. In some biotite-rich bands the biotite replacement by microcline suggests the reactions biotite = microcline + magnetite + H2O (1) and biotite = microcline + garnet + H2O (2). In the dark biotite-hornblende rich bands the replacement of the amphibole is clear, according to the reactions: hornblende + H2O + K+ = biotite + Ca2+ + magnetite (3) and hornblende + K+ + H2O = quartz + biotite + garnet (4). Microcline enrichment in gneiss occurred due to the uplift during the deformation, which changed the fO2 of the system promoting the partial replacement of Al by Fe3+ in the feldspar which became pinkish. The Ti-content and the relative availability of Ca define the sphene crystallization. The petrologic scenario points out for the existence of a mafic rock, probable with gabbro or norite composition undergoing metamorphism and partial melting forming a trondhjemite/tonalite and a regional K-metasomatism leading to the formation of granite. Apparently deformation played a significant role during the metamorphism and metasomatism facilitating fluid percolation and the generation of the dominant foliation, banding and lamination. Late-, post-kinematic, fine- to medium-grained granite dikes and small stocks represent the last plutonic episode in the whole evolution. The geotectonic studies may locate the area in the central segment of the Ribeira belt that developed during the Brasiliano/Pan-African amalgamation.

PALAVRAS-CHAVE: ORTHOGNEISSES; MICROCLINE-GNEISS; GRANITE.