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Mineralogical aspects of Morro de Seis Lagos deposit (Amazonas, Brazil).

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The alkaline body Morro dos Seis Lagos, situated in the northwest Amazonian region, is a Nb bearing deposit formed by thick lateritic regolith as circular geological feature about 5 km in diameter. The host rock of this deposit is an intensely weathered siderite carbonatite. The alkaline intrusion body was formed during the late Mesozoic and enriched during the Cenozoic by process of denudation of the surrounding rocks and formation of lateritic cover with thickness in the order of hundreds of meters. In this process, enrichment of Nb, Fe, Ti, Mn, P and rare earth elements (REE) occurred where the lateritic regolith represents the major Nb mineralization, with estimated inferred reserves of 2.9 billion ton@ 2.8 % Nb2O5, one of the largest deposits of Nb in the world. The mineralogical composition of the lateritic regolith has the predominance of the goethite and hematite, followed by oxy - hydroxides of Mn, Ti - Nb oxides, pyrochlore, cerianite and phosphates. The lateritic regolith samples showed high contents of $Fe2O_3$ < 89.0%, TiO_2 (< 12.54 %) and MnO_2 (< 9.90 %). The goethite minerals show several generations that are related to different environmental conditions with dissolution and precipitation process, which indicate intense movement of the solutions with Fe in the aqueous medium. The main Nb minerals are ilmenorutile, rutile and brookite where the ilmenorutile can have content up to 20 % Nb2O5. The P-rich minerals, like monazite and its alteration products, is the main REE phases. These minerals have high concentration of $Ce2O_3$, $La2O_3$ and $Nb2O_3$, where $\sum$REE > 40 %, and is followed by elevated Th concentration, which locally has concentration higher than (18%). Another REE mineral is the cerianite. The main manganese minerals are hollandite, romanechite (BaMn9O16[OH4] - mixtures of manganese oxides) and amorphous Mn oxy – hydroxides. The higher concentration of MnO_2 (about 40 %) is restricted to manganesiferous range, where manganese minerals occur as layers and filling voids, indicating strong remobilization by later process.