Landslides in Sison, Pangasinan: X – Ray Diffraction Mineralogy of Slump Materials

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In November 2009, following the successive passage of several typhoons beginning with Pepeng, numerous slope failures occurred within the property of Northern Cement Corporation in Sison, Pangasinan. Most of the failures were slumps having arcuate failure planes. The area where the failures occurred is underlain by a sequence of conglomerates and clay – rich sedimentary rocks. The clay-rich sedimentary unit is an interlayer of massive, and brittle and loose materials. Samples were collected from several locations within the failure areas and analyzed via X – ray diffraction to determine the mineralogy and its possible implication to slope failure. Analysis revealed the presence of plagioclase, calcite, smectite and quartz in all of the samples. Compared to the loose and brittle layer, the massive layer contains a higher amount of calcite and a lower amount of smectite. Minor occurrence of zeolite is also notable in this layer. The ubiquitous presence of smectite could have aided slope failure. Extraordinary amounts of rainfall brought by successive typhoons may have saturated the soils and caused swelling of the smectites which could have helped induce material flowage. The expansion of these clay phases increases pore pressure, causing the materials to fail. Continued failures and material movement are thus likely to occur in this area during periods of intense rainfall.