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Follow-up soil survey to evaluate regional Pb and Zn soil anomalies in Nylstroom, Limpopo Province, South Africa.

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The Council for Geoscience embarked on a regional geochemical mapping programme at sampling density of one soil sample per km². The Archean craton which includes the Bushveld Complex was sampled in the early 1990's as part of the national geochemical mapping programme. The objectives were to update the geological maps, mineral exploration and determine geochemical background in soils derived from underlying geology. In this study, northern part of Nylstroom was chosen as the study area for follow-up soil survey to evaluate the elevated concentrations of Pb and Zn. The chosen northern part of Nylstroom is characterized mainly by red porphyritic felsites, pyroclastic rocks, minor sandstone and quartzite rocks. In this study, Pb-Zn anomalies from the initial exploration are verified and potential target zones of Pb-Zn deposits are identified. The soil samples taken in Nylstroom were sampled at 200m intervals and analyzed by XRF. High anomalies of Pb, Zn and pathfinder elements were interpreted to understand the type of mineralization. High concentrations of Pb and Zn within the study area spatially coincide with high Pb-Zn concentrations of initial exploration phase. The regional study in Nylstroom region indicated high anomalies of Pb and Zn concentrations ranging from (0-429 ppm) and (1-1064 ppm) respectively. In the follow up study, locations with high concentrations of Pb and Zn were targeted and yielded concentrations of Pb and Zn ranging from (15.95-1042.62 ppm) and (27.77-4563.92 ppm) respectively. The mineralogical composition of rock samples comprised mainly of quartz, K-feldspar, mica, kaolinite, chlorite, hematite, goethite, ilmenite and anatase. The main types of alteration which affected sampled rocks include chlorite-pyrite-sericite, sericite-chlorite-pyrite and sericitic alteration. The mineralization styles characterizing the northern part of Nylstroom are represented by primary Zn-Pb-Cu-W and secondary Pb-As-Mo mineralization. The primary Zn-Pb-Cu-W and secondary Pb-As-Mo mineralizations reflect metallogenic classification of hydrothermal metasomatic skarn ore deposit. The scanning electron microscope also indicated the presence of sphalerite and galena which confirms the presence of sulphides. The recommendations made for primary Pb-Zn-Cu-W and secondary Pb-As-Mo mineralizations include follow-up exploration through trenching and geophysical surveys. Trenching will aid in identifying vertical and lateral zonations of both Zn-Pb-Cu and Pb-As-Mo mineralizations. The electromagnetic survey will aid in identifying sulphide deposits and conductivities in the rocks. Magnetic survey will assist in identifying faults along the mineralized zones.

