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Critical Metal Occurrences in Historic Mining Waste in Sweden

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In 2023, the Geological Survey of Sweden completed a project focused on sampling and characterisation of occurrences of historic mining waste in Sweden. Sampling methodology focused on both finding compositional anomalies and enabling the calculation of approximated average compositions. Analyses included whole-rock chemistry and mineralogy.

Waste rock (mine dump material) was sampled from 34 historic mines, in total comprising some 31 Mt of waste rock material. Average concentrations for battery and critical metals are highly variable and include 2–2,930 ppm Ni, 3–371 ppm Co, 77–8,200 ppm REE+Y, and 6–6,960 ppm Cu. Assuming that these average concentrations are representative for the entire waste rock volumes, the sampled dumps contain some 1,200 t Ni, 850 t Co, 10,000 t REE+Y, and 24,100 t Cu.

Tailings were sampled from 23 historic tailings dams, comprising some 121 Mt of overall material. Average concentrations include 1–114 ppm Li, 2–124 ppm Ni, 1–321 ppm Co, 54–2,680 ppm REE+Y, and 5–3,000 ppm Cu. Assuming that the average concentrations are representative for the entire tailings, these contain some 2,200 t Li, 2,600 t Ni, 4,900 t Co, 49,000 t REE+Y, and 60,000 t Cu.

Pyrometallurgical slags from both Fe and Cu smelters were sampled from six historic occurrences. Average concentrations include 1–3,275 ppm Co, 98–3,087 ppm REE+Y, and 6–21,800 ppm Cu. The total tonnages of remaining slag material are unknown.

These results should be seen as order-of-magnitude estimations and by no means as qualified mineral resource estimates. Neither do they weigh in whether the metals are extractable or not from technical and/or economic standpoints. Nevertheless, the results clearly highlight historic mining wastes as a potential source for battery and critical metals, especially so if extraction is combined with primary mining of similar resources.