

# SEG 2024 Conference: Sustainable Mineral Exploration and Development

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## **Facies-Constrained Lithogeochemistry in the Irish Midlands: A Comparison Between the Collinstown Prospect and the Stonepark Zn Deposit**

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Lower Carboniferous marine sedimentary rocks are host to some of the most significant Zn-Pb deposits in the world. In the Irish Midlands, more than 25 economic and sub-economic base metal deposits (>20 Mt Zn metal) are hosted by a succession of Lower Carboniferous carbonate rocks host. Lithogeochemical data is now routinely generated on mineralized rocks during mineral exploration and project development, resulting in large quantities of multivariate data. However, there is a marked drop-off in resolution and quality of data immediately beyond ore zones. Facies-constrained sampling approaches that extend from ore zones to unmineralized rocks could help to define more sensitive vectors towards ore, but remain time consuming, costly, and subjective. In this study, legacy data has been compiled from two sites in the Irish Midlands to evaluate i) the geochemical footprint of mineralization in the Limerick Basin, where the Stonepark deposit is located; and ii) the potential for undiscovered mineralization at depth in the Dublin Basin, which is peripheral to the world-class Navan deposit. A workflow is presented for extracting maximum value from these data sets, which involves the imputation of missing data and evaluation of data structure using statistical methods (e.g., PCA). The legacy data has then been augmented with more discrete sampling of individual sedimentary facies in stratigraphic intervals that extend beyond ore zones and prospective intervals, to constrain whether specific beds might preserve cryptic alteration. Importantly, facies containing pyrite are shown to be enriched in trace elements with a known hydrothermal affinity (e.g., As).