

Quantifying the Financial Implications of Orebody Knowledge Deficiencies in Mining Projects

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Technical errors, particularly those related to poor geological interpretation or integration, are among the leading causes of mine project write-downs, often accounting for a substantial portion of overall impairments. Many of these failures stem from insufficient orebody knowledge (OBK) during mine planning, development, and operations. This underscores the critical importance of enhancing OBK across the mining value chain to reduce financial risk, enhance shareholder returns, and ensure long-term project viability across increasingly complex exploration, mining, and mineral processing environments.

In this study, we analyze historical and contemporary exploration and mine project data derived from regulatory filings, including Canada's National Instrument 43-101, Australia's Joint Ore Reserves Committee (JORC) Code, and the United States Securities and Exchange Commission's Form 10-K. Using Natural Language Processing (NLP), we extract key technical metrics—including reserve downgrades, recovery shortfalls, and capital cost overruns—and integrate them with associated financial performance indicators reported in annual reports and filings across stock exchanges (TSX, ASX, NYSE, and LSE).

The resulting integrated dataset allows us to assess patterns and the implications of technical errors on project impairments and financial underperformance from 2001 to 2025. The overall aim is to quantify the financial impact of poor OBK and demonstrate how linking technical and financial data can proactively flag high-risk projects. This integrated approach supports data-driven decision-making in mine planning, improves capital efficiency, and reduces the likelihood of future technical error-related write-downs.