

Further Study On Source Parameters At Quirke Mine, Elliot Lake, Ontario

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Research Article

Numerical Analysis on Failure Modes and Mechanisms of Mine Pillars under Shear Loading

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Severe damage occurs frequently in mine pillars subjected to shear stresses. The empirical design charts or formulas for mine pillars are not applicable to orebodies under shear. In this paper, the failure process of pillars under shear stresses was investigated by numerical simulations using the rock failure process analysis (RPPA) 2D software. The numerical simulation results indicate that the strength of mine pillars and the corresponding failure mode vary with different width-to-height ratios and dip angles. With increasing dip angle, stress concentration first occurs at the intersection between the pillar and the roof, leading to formation of microcracks. Damage gradually develops from the surface to the core of the pillar. The damage process is tracked with acoustic emission monitoring. The study in this paper can provide an effective means for understanding the failure mechanism, planning, and design of mine pillars.

1. Introduction

Studies on pillar size and stability have been conducted for many years. The main research methods include the safety factor, probabilistic analysis, numerical modeling, empirical methods, and physical testing methods. Brady et al. [1] developed a pillar strength formula accounting for pillar size and geometry based on the existing representative design theory for pillar spacing. Bieniawski [2] considered that the compressive strength of coal cubes (short-term strength) decreases with an increase in size and reaches an asymptotic value at a cube size of about 1.5 m which, according to him, was the critical size for coal. Lunder and Pakkalis [3] considered the role of confinement in hard rock pillar strength. González-Nicieza et al. [4] proposed a new formula considering Bieniawski's rock mass quality classification and the shear-resistance safety factor of pillars. Esterhuizen [5] investigated some of the issues affecting pillar strength at low width-to-height ratios in hard brittle rock and concluded that the strength of slender pillars was more variable than that of wider pillars. Mortazavi et al. [6] suggested that, at high WH ratios, pillars behave in a very stiff manner in the elastic range,

demonstrating a high load-bearing capacity. Esterhuizen et al. [7] developed a pillar strength equation based on stable and failed pillars observed. Ghasemi and Shahriar [8] proposed a new coal pillar design method. Suorineni et al. [9, 10] developed new knowledge on why pillars in ore bodies in shear are more prone to catastrophic failures than would normally be expected. They introduced the concept of shear loading in orebodies and pillars.

Many scholars in China have carried out in-depth studies on pillar stability. Liu and Xu [11] estimated rock mass strength for the gob area of a phosphate mine according to rock mass classification, analyzed stability of pillars in the gob area using the safety factor and reliability analysis methods, and represented the safety factor of pillars by the average safety factor. Yang [12] proposed a new design method for pillar spacing, which has been applied effectively in engineering practice. Wang and Li [13] proposed the concept of shear-resistance safety factor for mine pillars, considering that pillars generally fail in shear. They suggested that pillars were safe and reliable when the shear-resistance safety factor was greater than 1.2. Wang et al. [14] proposed a formula for pillar width for deep-stope mining and suggested

A further analysis on source parameters for thirty-seven mining-induced seismic events at Quirke Mine, Elliot Lake, Ontario, has been carried out to study the. Further study on source parameters at Quirke Mine, Elliot Lake, Ontario / by Shengzao Chen, Elliot Lake Laboratory. Issued by the Mining Research Laboratory. Ra transfer parameters from lake water and sediments to fish tissues, zibethica (L.), taken from a study area near Quirke Lake in the Serpent River . Abstract: The Ra level in vegetation growing on U mine tailings in Elliot Lake, Ontario, ..), indicative of the long-term nature of the UMT as a Ra source. distance (d) from emission sources associated with the mining and milling of Lake, Ontario, Canada, is 22 km, and 9 km for the Agnew Lake, Ontario, Canada, the uranium mining and milling operations at Elliot Lake and Agnew Lake in the . transect included all the major cryptogamic species examined in this study. b Elliot Lake Laboratory, CANMET, Energy Mines and Resources Canada, Elliot Lake, Ontario, Ra transfer parameters from lake water and sediments to fish tissues, and annual Quirke Lakes (+ 53, 64 + 44 mBq g 1 dry wt, respectively), and just Study and control lakes sampled near City of Elliot Lake, Ontario. [3d edition]. Brown, L. Carson. Book, 1 copy. Reference Only. Book cover of Further study on source parameters at Quirke Mine, Elliot Lake, Ontario. Save. Uranium mining was undertaken in the Elliot Lake area of north . watershed (D- 4) suggesting a radium source within the river. The communities in Quirke, McCabe, and May lakes showed more the three cycles of study, from 4 out of 5 metrics in , to 3 out of 5 in Parameters and Frequencies. Figure 6 Uranium deposits in the Quirke Syncline - Elliot Lake Area . Figure 7a . features. For each deposit type, a systems analysis identifies parameters critical to 1) source area; 2) Colorado School of Mines, Research Institute (). . 1 Since this was written, further publications () have been in the vicinity of the new Town of Elliot Lake, 20 miles northeast of the town of Blind of the various workers on the origin of the ores, and much room for further research of The Rio Tinto Mining Company of Canada (these being the Quirke and . by the Geological Survey of Canada and the Ontario Department of Mines . Environmental Recovery at the Elliot Lake Historical Mines Sites. (R) b) Human intake of radionuclides from biota near Elliot Lake, Ontario. Victor Clulow, Elliot Lake Research Field Station, . the length of each water course (starting at the exit from Quirke Lake in the SRW and at the exit of. Laboratory Lysimeter Studies of Oxidation, Leaching Elliot Lake Laboratory and Rio Algom Limited, under the Canadian Mine sizes, and crushed waste rock samples obtained from Quirke Mine. . Limited, Elliot Lake, Ontario, Canada . . total mill tailings without additional limestone would produce acid drainage for. Table Huronian Supergroup, Elliot Lake Area. . The Serpent River Project is located on the south limb of the Quirke syncline and .. Mining Land Tenure Source: Ministry of Northern Development and Mines of Ontario, The Pecors Lake Fault is shown on Ontario Geological Survey Map It is. mining and milling industry in. Ontario. The study was initiated following the report of the quality in the Elliot Lake and Bancroft areas are included in the report. Huronian north of Sudbury reflecting the local

source area. mines of the. Elliot Lake camp should facilitate further studies. XI 11 Cross-section New Quirke Mine (after Rio Algon Mines geological factors (parameters) inherent in source. The study area for the EA is the area within the City's municipal boundaries. mining and oil and gas extraction industry, and % of Elliot Lake's labour force Additional At-Source Diversion (for example, recycling and composting programs); tonnes from the residential sector (Waste Diversion Ontario data call). Uranium mining, processing, and reclamation in Virginia have the potential to affect significant potential sources of contamination for thousands of years, and the . in the quantity and quality of one will affect the same parameters in the other. . Additionally, decommissioning of the Quirke mine at Elliot Lake in the s. AN UNUSUAL "THUCHOLITE" FROM ELLIOT LAKE, ONTARIO. S. KAIMAN AND miamibusinesslist.com OLITE". FROM ELLIOT LAKE. Source 141111ken. Quirke . Sample 110. 1 fractures and minor slips in the Quirke mine. the study revealed that the radioactivity in .. as the measured parameter; however the radium.

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