



## **Behavior and Release of Nitrogen at Mines and Quarries in Nordic Conditions**

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The increased extraction of mineral resources and mining activities creates added pressure on the environmental issues and a proper water management in mining areas in Finland. Among others, nitrogen compounds released from explosives or from mining processes can have a detrimental effect on the environment. Thus, this project aimed at comprehensive understanding on the nitrogen issue in the extractive industry. The project collected essential data on nitrogen compounds present in the environments of mines and quarries, and generated better understanding of the discharge and behaviour of nitrogen compounds in mining areas. The sources and balances of explosives-originated nitrogen compounds at mines and quarries of different sizes were investigated and compared. Additionally, the focus was in 'nitrogen smudging' problem of waste rocks and the intensity, as well as evolution and chemical characteristics of their nitrogen contamination.

According to the results, the total load of potential nitrogen to the environment depends on the scale and type of the activity as well as the type of explosives used. The main emission sources of nitrogen are process and dewatering waters. A lysimeter study showed that the explosives originated nitrogen content of left over stones from natural stone quarrying is relatively low and ca. half of the nitrogen is leached within the first weeks after detonation. The "nitrogen smudging" of natural stone quarrying left over stones is relatively low to begin with and enhanced by the rapid flushing by rainwater, thus the residues of explosives should not be considered to prevent the utilization of otherwise mineralogically inert waste rocks of good technical quality. The overall nitrogen management should take into account the background concentrations and sensitivity of the local ecosystem.

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