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COMPARATIVE STUDY ON LAND-USE PLANNING METHODOLOGIES BASED ON PHYSICAL EFFECTS, CONSEQUENCE AND RISK ANALYSIS FOR AMMONIUM NITRATE FERTILIZER PRODUCTION FACILITIES

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Abstract

This article examines the risk assessment and land-use planning for a Seveso-type fertilizer production plant in Romania, focusing on the storage and production of ammonium nitrate (AN). The study compares the Romanian land-use planning criteria with a risk-based approach. The analysis includes the identification of major accident scenarios, modeling of physical effects and consequences, and territorial compatibility assessment. Eight AN explosion scenarios are considered, including production, storage, and handling at the selected site. The TNT Equivalency model, implemented in Effects software, is introduced as a suitable method for solid explosion modeling, despite the potential uncertainty in the results. The results demonstrate discrepancies between the Romanian criteria and the risk-based approach, indicating uncertainty in the potential territorial incompatibilities calculated for industrial, communal, and residential areas. The study emphasizes the importance of considering explosion scenarios in land-use planning and proposes recommendations for an improved LUP - decision making procedure, by using a multi-level analysis and a mixture of methods for existing Seveso sites, while for newly designed Seveso plants the conservative Romanian method was found suitable.

Key words: ammonium nitrate, land-use planning, major accidents, physical effects, risk assessment

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