

TOOLS AND METHODS FOR QUANTITATIVE RISK ASSESSMENT IN PROCESS FACILITIES AND IN HAZMAT TRANSPORTATION MATERIALS

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The concentration of industrial activities close to residential areas and the related supply of hazardous materials requires operating companies and control authorities to implement adequate measures in control of major accident hazard, in appropriate land use planning, and in integrated emergency planning. The decision-making process requires the analysis of a large amount of information on risk sources, accident modeling, population distribution, etc. The treatment of such information needs the support of software tools. ARIPAR and TRAT are two software packages that implement a probabilistic methodology to the assessment of the risks of complex industrial areas, including transport of dangerous substances, producing a number of different risk indexes.

The research activities in this area mainly addressed the development of new methods, tools and models for the identification of accident scenario and their quantitative assessment. Improved methods for the identification of atypical accident scenarios are addressed within the activities of two FP7 research projects (iNTeg-Risk and TOSCA). Specific models for the assessment of risk to the environment caused by spills of oil and/or of hazardous chemicals from pipelines were developed. More specifically, innovative risk indexes are defined for soil and groundwater and for superficial water bodies, and a well-defined procedure for their evaluation was established.

In the field of risk mitigation, operative strategies of “hazmat routing” were addressed for the transportation of hazardous substances. Hazmat routing consists in the determination of alternative paths, less risky than those usually taken by the drivers.

A further important research topic concerned fireproofing. Basic performance data for fireproofing materials were explored by experimental tests. Risk-based criteria for application to different plant areas were explored. Detailed models for the assessment of fireproofing performance were developed.

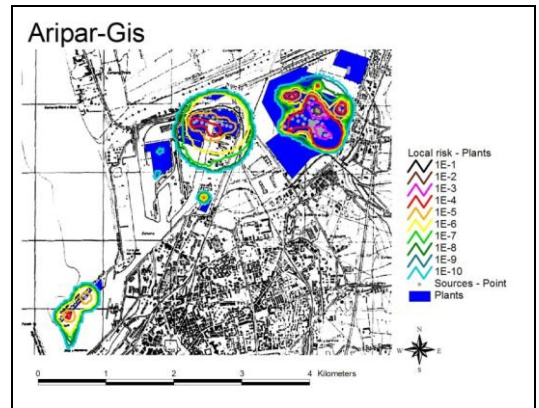


Fig.1 Individual risk contours for fixed plants calculated using the ARIPAR software.

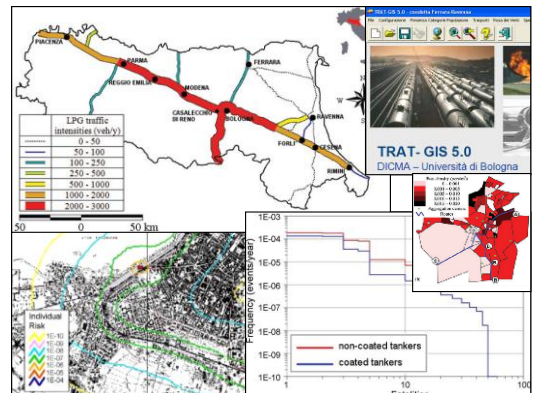


Fig.2 Transportation risk analysis: example of data and results

MAIN PUBLICATIONS

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P.Leonelli, S.Bonvicini, G.Spadoni, 1999, New detailed numerical procedures for calculating risk measures in hazardous materials transportation, *Journ. Loss Prev.*, 12(6), 507-515.

RESEARCH PROJECTS

Convention with the Civil Protection Agency of

the Region Emilia Romagna about: "Activities of Civil Protection in the Emilia Romagna region for the control and reduction of the risks posed by industrial installations and hazmat transport". Project leader: Gigliola Spadoni (2008-2012)

Convention with the Municipality of Ferrara about: "Investigation on the risks caused by pipelines transport of flammable and toxic substances". Project leader: Gigliola Spadoni (2007)

Convention with Trenitalia about: "Risk analysis in the railroad transport of propylene from Brindisi to Terni". Project leader: Gigliola Spadoni (2004)

Convention with RFI – Rete Ferroviaria Italiana about: "Operational Plan Dangerous Goods". Project leader: Gigliola Spadoni (2002)

Convention with ITALFERR s.p.a. about: "Risk reduction in the railway transport of dangerous goods". Project leader: Gigliola Spadoni (2000)

Young Researchers' Project of the University of Bologna about: "Evaluation of the environmental risk posed by pipeline transport of hazardous materials". Project leader: Sarah Bonvicini (2000)

Research Contract of the National Research Council CNR / G.N.D.R.C.I.E. – National Group for the Defense from chemical, industrial and natural risks about: "Procedures, tools and guidelines for the risk analysis of road and railway transport of hazardous materials". Project leaders: Paolo Leonelli, Sarah Bonvicini (2000-2002)

Research Contract of the National Research Council CNR "Routing of vehicles shipping hazardous materials". Project leader: Gigliola Spadoni (1996-1998)

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