QRA for Emergency Planning: What, Why and When?

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Abstract:
Quantitative Risk Assessment (QRA) can be used as the basis for emergency planning in the process industries. Release scenarios are usually identified using standard hazard identification techniques, sometimes followed by a qualitative risk assessment for screening credible accident scenarios. Final quantitative risk assessment of these scenarios helps screen scenarios that were used for preparation of the emergency management plan (EMP). The EMP addresses various threats pertaining to the plant based on risk assessment by a multidisciplinary team. Using this approach, the EMP is developed so that it is dedicated to representative hazard scenarios that seamlessly and neatly cover major sources and open (utility or offsites) ends of the process. The final outcome of the said scenarios can be seen either in process area, utility units, or even beyond plant boundaries, that is the neighboring sites, adjacent service and personnel areas and nearby residential areas. Briefly reviewing the plan itself, the current paper mainly discusses three crucial questions concentrated on the practicality of application of QRA for emergency planning based on the experience of a series of projects undertaken by my team, namely: (1) Is QRA necessary for EMP? (2) Is QRA cost-effective for EMP? (3) When is QRA advantageous for EMP? Each question has been analyzed in terms of the four major categories covered in modern EMP's: mitigation, preparedness, response, and recovery. It is concluded that although QRA is costly and time-consuming, it does have obvious benefits that outweigh its disadvantages, namely: comprehensiveness, relative accuracy and reliability. When preparing an EMP using QRA, there are also side benefits, viz. revealing plant operability problems, and building consequence models that can be used online during a real emergency.