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Completeness Assessment of Emergency System – Engineering Application in a Petrochemical Reservoir

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Abstract

A mature emergency system is the premise to ensure emergency planning to be performed perfectly. Aimed at the six emergency management goals, the challenge caused by risk potential and contribution caused by emergency competence formed by emergency system are calculated separately. The emergency system is viewed as mature when the emergency competence can encounter the risk potential effectively. The completeness assessment method is used in a petrochemical reservoir. The engineering application indicates that the evaluation results can reflect the general condition and the shortcomings of the emergency system. The advices given to the depot can help the safety manager to take some pointed measures to improve the emergency system.

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Keywords: Completeness assessment; Emergency system; Engineering application

1. Introduction

All know that risk is permanent and safety is relative. But the influence caused by accident can be preventive and mitigated. The loss caused by the accident may be aggravated if the emergency system play disabled efficiency. Some references indicate that the accident loss can be reduced to 6% if the accident sites with the effective emergency system [1]. Hence the completeness of the emergency system affects much to the emergency rescue performance.

Towards to the assessment of emergency system, many researchers have done fruitful research [2-6]. But the emergency system is not isolated, its composition need to be consistent to the potential risk. Simple assessment of the emergency response system does not reflect the completeness of the emergency system.

The potential and emergency capability can not be compared for they reflected the different attributes of the subject. But one point should be emphasized is that both of them can affect the performance of emergency management. Towards the emergency management goals, potential risk will bring about the challenge and emergency system bring about the contribution. That is to say potential risk plays negative role and emergency system plays positive role to the achievement of emergency management goals. Hence according to the influence to emergency management goals, the potential risk and emergency capability forms by emergency system can be

compared and the compare result is provided to justify the emergency system is whether mature or not. Authors have investigated a petrochemical reservoir and the index system characterized both potential risk and emergency system has been established. The application indicates that the evaluation results can reflect the general condition and the shortcomings of the emergency system. The advices given to the depot can help the safety manager to take some pointed measures to improve the emergency system.

2. Evaluation of emergency system completeness

Aiming at improving emergency management in China, six emergency management goals(EMGs) including initiate rapid response, control incident & prevent escalation, evacuate, escape & rescue, protect lives, protect environment and protect assets are established according to emergency management in some developed countries. Emergency capability and potential risk play positive and negative roles to fulfill EMGs separately. The qualitative evaluation of emergency system completeness is to judge whether the emergency capability formed by emergency system encounters the potential risk. The frame of emergency system completeness evaluation is shown in Fig.1. The framework includes a method of assessing the emergency management strategy.

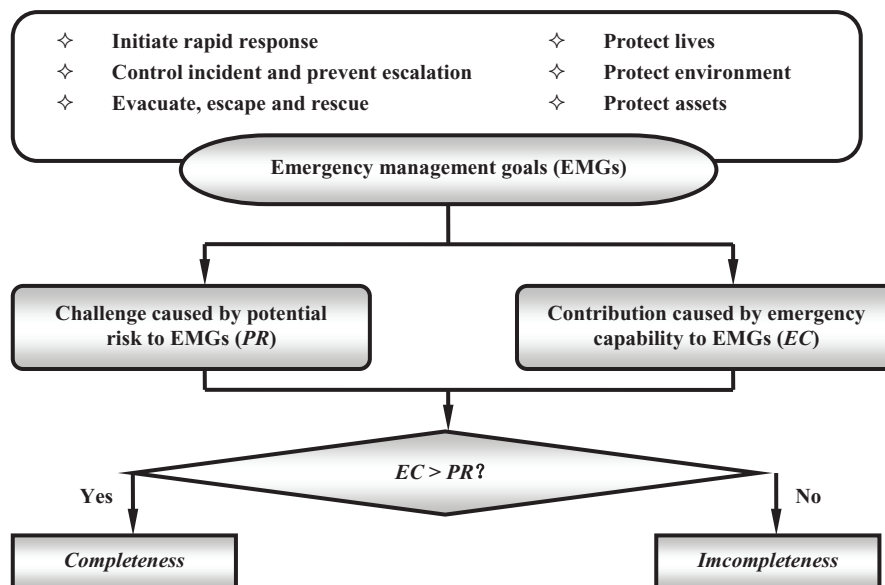


Fig.1. Frame diagram of emergency system completeness evaluation

From Fig.1, the aim is to provide a means of linking between potential risk and emergency capability to emergency management goals. Main phases and evaluation indicators of emergency system completeness evaluation are as follows[7]:

(1) Calculation of the challenge caused by potential risk (*PR*)

Factors that cause risk and play negative role in emergency management include inventory of materials in major hazard installations, complex of technology, population density, diversities of hazards, rate of escalation considering some worst credible scenarios and level of off-site risk.

(2) Calculation of the emergency capability (*EC*)

Emergency measurement of emergency management effectiveness through a set of key performance indicators ensures a repeatable, numerical measure of emergency capability. Factors which play positive role in emergency management contain emergency management philosophy, emergency management structure, emergency facilities, emergency management organization, emergency drilling and emergency planning. Details of the factors are demonstrated in Table 1. Further benefits can be obtained by grouping the performance indicator across a hierarchy of perspectives.

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