

## Comprehensive Risk Analysis of Decommissioning Activities with Multifaceted Hazard Factors

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**Abstract :** Decommissioning process of nuclear facilities can be said to consist of a sequence of problem solving activities, partly because there may exist working environments contaminated by radiological exposure, and partly because there may also exist industrial hazards such as fire, explosions, toxic materials, and electrical and physical hazards. As for an individual hazard factor, risk assessment techniques are getting known to industrial workers with advance of safety technology, but the way how to integrate those results is not. Furthermore, there are few workers who experienced decommissioning operations a lot in the past. Therefore, not a few countries in the world have been trying to develop appropriate counter techniques in order to guarantee safety and efficiency of the process. In spite of that, there still exists neither domestic nor international standard since nuclear facilities are too diverse and unique. In the consequence, it is quite inevitable to imagine and assess the whole risk in the situation anticipated one by one. This paper aimed to find out an appropriate technique to integrate individual risk assessment results from the viewpoint of experts. Thus, on one hand the whole risk assessment activity for decommissioning operations was modeled as a sequence of individual risk assessment steps, and on the other, a hierarchical risk structure was developed. Then, risk assessment procedure that can elicit individual hazard factors one by one were introduced with reference to the standard operation procedure (SOP) and hierarchical task analysis (HTA). With an assumption of quantification and normalization of individual risks, a technique to estimate relative weight factors was tried by using the conventional Analytic Hierarchical Process (AHP) and its result was reviewed with reference to judgment of experts. Besides, taking the ambiguity of human judgment into consideration, debates based upon fuzzy inference was added with a mathematical case study.

**Keywords :** decommissioning, risk assessment, analytic hierarchical process (AHP), fuzzy inference

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