

Research of protection against fires in nuclear power plants in Japan

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Purpose: The purpose of this research is to consider the ideal state of the fire safety in the nuclear power plant in Japan through conducting investigation of both IAEA international safety standards and fire protection regulation of Japan addresses to extracting relevant technical subjects.

A system of international safety standards of IAEA: IAEA establishes the "safety standards" which address ensuring nuclear safety including targets, policies and principles under rules and regulations of the IAEA charter. Although the safety standards of IAEA do not require compliance for each affiliate country, they are reflected upon domestic legislations by activity and judgment of each affiliate country because of being considered as the international standards. The system of safety standards consist of one main "Safety Fundamental", branches of 16 "Safety Criteria" and branches of 115 "Guidelines" branched from each Safety Criterion. In this system safety guidelines for fire protection stipulate Series No. NS-G-1.7, "Protection Against Internal Fires and Explosions in the Design of Nuclear Power Plants Safety Guide" for hardware and Series No. NS-G-2.1, "Fire Safety in the Operation of Nuclear Power Plants Safety Guide" for software.

A system of regulations for fire protection in Japan: Japanese national legislations and guidelines concerning fire protection in nuclear power plant stipulate (1) "Safety Design Guidelines for light-water reactor nuclear power plant", (2) "Screening guidelines for light-water reactor nuclear power plant" and (3) "Technological Criteria for electric power generating nuclear facilities (ministerial ordinance No. 16)". Addition to these regulations civil standard, JEAG4607-2010 "Fire Protection Guideline for Nuclear Power Plant" is established for hardware in light with Fire Defense Law of Japan. Concerning to operation and maintenance control another civil standard, JEAG4103-2009 "Fire Protection Guideline for Nuclear Power Plant" is established for software.

Comparison of international safety standards of IAEA and regulations for fire protection in Japan:

One of the most significant items required by IAEA standard may be requirement of hazard analysis. IAEA standard stipulates to determine risk for fire and explosion through evaluation result from hazard analysis, and requires countermeasures of rules and regulations to reflect to both hardware and software. Though IAEA standard stipulates to establish rules and regulations through findings from fire hazard analysis, it is significant distinction of Japanese rules and regulations that implementing each corrective action against 6 types of supposable fire disaster should be sufficient.

Conclusion: Japanese fire protection regulations and guidelines should be insufficient in terms of eliminating fire risk completely in special facility of nuclear power plant.

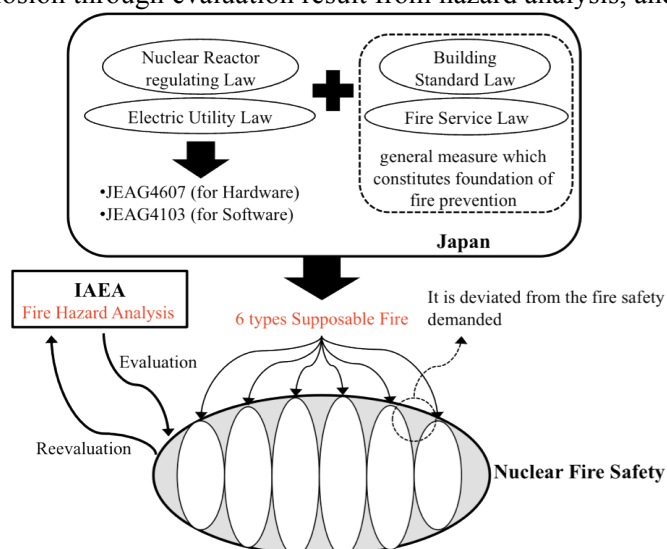


Figure 1. The image of protection against fires in IAEA and Japan