Framework for Process Safety Management Based on Engineering Activity Through Plant Lifecycle

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ABSTRACT

Process Safety Management (PSM) is a management system that is focused on prevention of, preparedness for, mitigation of, response to, and restoration from catastrophic releases of chemicals or energy from a process plant. OSHA in USA emphasizes PSM which requires not only the improvement of safety engineering techniques but also the established safety management system as a company. AIChE/CCPS has also published guidelines for risk based process safety. However, for example, OSHA/PSM guidelines just indicate the 14-elements, but does not mention about concrete PSM activities on performing each element, as it is a performance-oriented standard. Furthermore, consistency between elements is not ensured and practical level of elements is not consistent each other. Level of each element is not consistent. Because of these factors, there are issues on the position of PSM and the practices such as “how the PSM activity should be executed?”, “how far the PSM is done for enough process safety?”.

In Japan, the importance of PSM based on plant lifecycle engineering (Plant-LCE) for chemical processes, which is from process development to plant safety design, construction, operation and consistent maintenance phases, has been recognized for several years. Through the development of engineering activity model for process design, plant operation and maintenance, it has been clearly specified what kind of activity should be performed at each phase, what kind of information on activity should be collected and how it should be conveyed to other engineering activity, and so on.

Activity model for PSM has been also developed to extract the essential activities for maintaining process safety of operating plant. This activity model makes relationships between PSM activities clear and can be applied for improvement of PSM as a reference model. In this paper, a comprehensive framework of PSM is structured based on activity model for PSM. The positions of PSM elements can be defined on the concrete activities for Plant-LCE. This makes it possible to specify how each PSM element should function in the PSM. As a result of it, information sharing on PSM through the plant-LCE can be realized. Furthermore, glossary table and practical examples of PSM activities are summarized to lead the user to understand the activity model for PSM. Resources such as process safety information and engineering standard needed for execution of PSM activities can be also clearly specified.

Keywords: Process Safety Management (PSM), Engineering Activity Model (EAM), Plant Lifecycle Engineering (Plant-LCE)