



## An overview of evaluating Nuclear Power Plant Operational Events and their importance to ensuring Operational Safety

J. B. Araujo<sup>1</sup>, R. B. N. Vital<sup>1</sup>, N. C. Araujo<sup>2</sup> and T. M. Vital<sup>3</sup>

<sup>1</sup>*jefferson.borges@cnen.gov.br,  
richard.brandao@cnen.gov.br,  
General Severiano, 90, Rio de Janeiro,  
ZIPCode: 22290-091,  
2nathaliaaraujouerj@gmail.com,  
3 tati.mv7@gmail.com*

### Abstract

Specification, in order to ensure operational safety. However, like any industrial installation, nuclear power plants are subject to failures and outages of structures, systems and components. Depending on the failure, simple corrective maintenance can occur, even situations of unavailability of equipment, systems or structures. In general, nuclear power plants have preventive maintenance programs, based on manufacturers' recommendations and operational experience, in order to avoid the occurrence of failures. However, these run in different degrees of importance, requiring an assessment and classification of these failures to be carried out. The most significant failures must be analyzed carefully and robustly. These failure situations can even compromise one or more critical safety functions, functions which, if satisfied, guarantee the operational safety of a nuclear plant. Such a situation, where the safety of the plant can be challenged, leading to an abnormal operating situation, interruption of operation, or even nuclear accident situations. It is called an operational event. An operational event is any event that may occur in a nuclear plant causing an unplanned transient or significantly affecting the plant's response characteristics, which may evolve into unscheduled or forced, automatic shutdowns and even events leading to emergency plan activations or nuclear accidents. In this way, it is important that each event is classified, analyzed, understood, presented its root cause(s) and associated corrective actions. In this context, there is also an important space to identify events that may be recurrent, related to human failures, degradations due to aging, design deficiencies, among other causes. In general, these events must present an assessment consisting of Lessons Learned, in order to avoid the recurrence of these events and also create material to be used in a necessary Knowledge Management. There are several methodologies for determining the root cause and an event. The IAEA presents a methodology considered efficient and also allows an integration with the information sharing system on nuclear events that occur in several nuclear power plants around the world. This system is called the International Report System – IRS. This paper aims to present an overview of this methodology, this international information sharing system and the main aspects associated with the evaluation of nuclear power plant events.

*Keywords:* operational events, root cause, event classification, aging

## References

- [1] CNEN, Norma NN 1.14, Relatórios de Usinas Nucleoelétricas, Rio de Janeiro (2001).
- [2] IAEA, INSAG 23, Improving the IRS for Operating Experience, Viena (2008).
- [3] IAEA, Safety Report Series 73, Low Level Events and Near Misses Processes - Best Practices, Viena (2013).
- [4] IAEA, Specific Safety Guide SSG-50, Operational Experience feedback for Nuclear Installations, Viena (2018).
- [4] IAEA, Technical Document TECDOC-1550, Deterministic Analysis of Operational Events in NPP, Viena (2007).
- [5] IAEA, Technical Document TECDOC-1581, Best Practices in Identifying, Reporting and Screening Operational Experience at NPP, Viena (2007).
- [6] IAEA, Technical Document TECDOC-1653, Best Practices in the Management of Operational Events Program at Nuclear Power Plants, Viena (2010).
- [7] IAEA, Technical Document TECDOC-1756, Root Cause - Reference Manual, Viena (2015).