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PEER REVIEW OF THE RISK MONITOR ON THE SAPHIRE CODE

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ABSTRACT

Some years ago Russian Research Center "Kurchatov Institute" suggested the U.S. Department of Energy to develop for Russian NPPs a Risk Monitor, putting in its basis the SAPHIRE code. Kurchatov Institute became to apply in its activity the SAPHIRE code at once after the Chernobyl accident, is applying it now and shall be applying it in the future. It is natural that the U.S.DOE has charged the fulfillment of this work to the developer of the SAPHIRE code, i.e. Idaho National Engineering and Environmental Laboratory (INEEL). Last year the first version of the Risk Monitor on the SAPHIRE code was developed and INEEL offered Kurchatov Institute to review this work. But the work, putting before Kutchatov Institute, was wider than the suggested contents of the review and consisted of the following parts:

- Review of the document "Requirements Specifications for the SAPHIRE Risk Monitor",
- Develop a plan for integration of INEEL, Kurchatov Institute, and Leningrad NPP,
- Test and verify the conversion of the Risk Spectrum data to the SAPHIRE code,
- To make a conclusion about Risk Monitor appropriateness for use in Russian NPPs.

The appropriate works were made at INEEL and the following results were received:

- The SAPHIRE Risk Monitor satisfies to one of the basic purposes of this software. It allows the unit operational personnel, management of the NPP and regulatory bodies to monitor and control the risk level (instantaneous and average) constantly and, if it is necessary, to receive the Safety Essential Component List for the analysis of operational safety,
- A plan of joint works between INEEL, Kurchatov Institute and Leningrad NPP for pilot introduction, i.e. demonstration, verification and validation on real data, of the SAPHIRE Risk Monitor on the second Unit of Leningrad NPP was made,
- So it has turned out historically that the Probabilistic Models for NPPs with RBMK type reactors, in the contrary to the Units with WWER type reactors, has been developed in Swedish Risk Spectrum code format. Therefore it is not impossible to use without modification the available Probabilistic Models in the SAPHIRE Risk Monitor. In this connection it is necessary to develop a converter for automatic transformation of the available Probabilistic Models to the SAPHIRE Risk Monitor format,
- The available version of the SAPHIRE Risk Monitor is not intended for planning of maintenance service and operating repair of NPPs Units. So it is not intended for the analysis of risk in the case of a casual removal of Units components from operation, that is at a casual refusal of the component(s). In this connection it was offered to develop such a version of the SAPHIRE Risk Monitor which would be an advisor of the Unit operator. Such a version of the SAPHIRE Risk Monitor for the Unit operators was operatively developed during fulfillment of the review.