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## Treatment of Events Representing System Success in Accident Sequences in PSA Models with ET / FT Linking

Ivan Vrbanić<sup>(a)</sup>, Jože Špiler<sup>(a)</sup>, Vladimir Mikuličić<sup>(b)</sup>, Zdenko Šimić<sup>(b)</sup>

<sup>(a)</sup> NPP Krško Engineering and Nuclear Oversight Division, Vrbina 12, Krško, Slovenia  
ivan.vrbanic@nek.si, joze.spiler@nek.si

<sup>(b)</sup> Faculty of Electrical Engineering and Computing, University of Zagreb, Unska 3, Zagreb, Croatia  
vladimir.mikulicic@fer.hr, zdenko.simic@fer.hr

### Abstract

Treatment of events that represent systems' successes in accident sequences is well known issue associated primarily with those PSA models that employ event tree / fault tree (ET / FT) linking technique. Even theoretically clear, practical implementation and usage creates for certain PSA models a number of difficulties regarding result correctness. Strict treatment of success-events would require consistent applying of de Morgan laws. However, there are several problems related to it. First, Boolean resolution of the overall model, such as the one representing occurrence of reactor core damage, becomes very challenging task if De Morgan rules are applied consistently at all levels. Even PSA tools of the newest generation have some problems with performing such a task in a reasonable time frame. The second potential issue is related to the presence of negated basic events in minimal cutsets. If all the basic events that result from strict applying of De Morgan rules are retained in presentation of minimal cutsets, their readability and interpretability may be impaired severely. It is also worth noting that the concept of a minimal cutset is tied to equipment failures, rather than to successes. For reasons like these, various simplifications are employed in PSA models and tools, when it comes to the treatment of success-events in the sequences. This paper provides a discussion of major concerns associated with the treatment of success-events in accident sequences of a typical PSA model.