

Derivation of Accident-Specific Material at Risk Equivalency Factors

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A novel method for calculating material at risk (MAR) dose equivalency developed at the Idaho National Laboratory (INL) now allows for increased utilization of dose equivalency for facility MAR control. This method involves near-real time accounting for the use of accident and material specific release and transport. It utilizes all information from the committed effective dose equation and the five factor source term equation to derive dose equivalency factors which can be used to establish an overall facility or process MAR limit. The equivalency factors allow different nuclide spectrums to be compared for their respective dose consequences by relating them to a specific quantity of an identified reference nuclide. The ability to compare spectrums to a reference limit ensures that MAR limits are in fact bounding instead of attempting to establish a representative or bounding spectrum which may lead to unintended or unanalyzed configurations. This methodology is then coupled with a near real time material tracking system which allows for accurate and timely material composition information and corresponding MAR equivalency values. The development of this approach was driven by the complex nature of processing operations in some INL facilities. This type of approach is ideally suited for facilities and processes where the composition of the MAR and possible release mechanisms change frequently but in well defined fashions and in a batch-type nature.