THE CONCEPT OF RISK IN THE DESIGN BASIS THREAT

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Mathematically defined, risk is a product of one or more probability factors and one or more consequences. Actuarial analysis of risk requires the creation of a numeric algorithm that reflects the interaction of different probability factors, where probability data usually draws on direct measurements of incidence. For physical protection purposes, the algorithms take the general form:

Risk = Probability of successful attack x Consequence

where the overall probability of a successful attack will be determined by the product of, amongst other things, the probability of there being sufficient intent, the probability of there being available hostile resources, the probability of deterrence, and the probability that a hostile act will be detected and prevented.

Deliberate, malevolent acts against nuclear facilities are rare. In so far as it is possible to make an actuarial type of judgement, the probability of malevolent activity against a nuclear facility is almost zero. This creates a problem for a numerical assessment of risk for nuclear facilities where the value (consequence) term could be almost infinite. As can be seen from the general equation above, a numerical algorithm of risk of malevolent activity affecting nuclear facilities could only yield a zero or infinite result.

In such circumstances, intelligence-based threat assessments are sometimes thought of as a substitute for historic data in the determination of probability. However, if the paucity of historic data reflects the actual threat - which by and large it should - no amount of intelligence is likely to yield a substantially different conclusion. This mathematical approach to analysing risk appears to lead us either to no risk and no protection or to an infinite risk demanding every conceivable protective measure.

The Design Basis Threat (DBT) approach offers a way out of the dilemma. Firstly, it allows us to eliminate from further consideration all zero or near zero probabilities. Secondly, it allows us to categorise consequences. Where the consequences would be less serious, a higher probability can be allowed before protection becomes necessary. For those consequences that would be severe, strong protective measures are justified because we have eliminated the zero probabilities. Furthermore, the protective measures can be specifically focussed to reduce those probabilities to a tolerable, near zero, level.

The presentation discusses the relationship between risk assessment, threat assessment, and the Design Basis Threat. The paper argues that criteria-based judgement at the level of Regulator is just as responsive to circumstances as criteria-based judgement at the facilities level, and, in addition, offers a more coherent method for determining priorities and for considering intangible assets at risk.