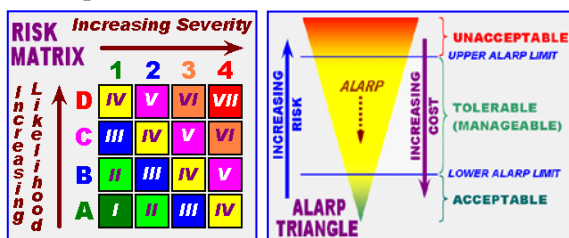




**SAFER** (“*Safe And Feasible Exponential Risk*”) **Diamond**<sup>®</sup> offers a novel method of risk assessment and management, with a novel graphical presentation format of data and results.

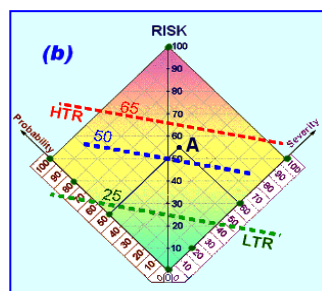
While quite different from existing methods, it also incorporates the best features of the familiar RISK MATRIX of hazard probability and severity analysis, and the ALARP (“*As Low As Reasonably Practicable*”) triangle as depicted below, plus a few other recent tricks of the trade.



The SAFER technique differs from existing job hazard analysis methods in the following:

- (1) It seeks from the user only the minimum and maximum values of probability  $P$  of occurrence and severity  $S$  of consequence for any hazard, instead of a set of three or more fixed values or stations in the sequence. Any extra data supplied may simply serve as additional bench marks.
- (2) It provides a continuous and precise functional analysis rather than broad qualitative estimates or a step-wise quantitative analysis.
- (3) It maps data points and scenario steps in the risk domain distinctly and uniquely, rather than lump them into a few broad categories.
- (4) It avoids problems arising from the wide variations of actual values and normalises the entire range of data and results to a standard span of 0-100%, so that comparative evaluations of various projects or industries become feasible.

The diamond shaped graphical representation of data and results as proposed, differs from the risk matrix rectangle and the ALARP triangle, and further yields benefits to the risk analysis as follows:



(1) The exponential (log-log) scales present the vast ranges of the data and results compressed into a comprehensible standardised format.

(2) Risk level rises vertically from minimum at bottom to maximum at top, governed by  $P$  and  $S$  variations along the two inclined bottom edges, risk contours providing visual guides and limits.

Although SAFER Diamond calculations and graphic representation do not require a computer, they are facilitated by a computer spread-sheet as MS-EXCEL<sup>®</sup> shown in screen-shot alongside.



Output includes, in addition to the input echo, display of intermediate values of probability, severity, and risk loss, for various percentages.

Dialogue boxes allow forward and backward computations for given values of probability, severity, and risk, as well as for specified combinations of any two of them. Any analysed risk status may be located on the chart, as at ‘A’.

With the SAFER Diamond technique, different scenarios may be investigated and mapped, and various questions as follows may be examined:

- (a) What is the expected risk loss for a certain combination of probability and severity?
- (b) To achieve a desired risk protection, what investment (or insurance coverage) should be planned for? What  $P$  and  $S$  options are available to control risk within this limit?
- (c) How are losses of same value  $R$  incurred by two combinations of  $P$  and  $S$  different?
- (d) If the project can afford only  $x$  dollars for risk protection, what risk percentage must be set as “Unacceptable Risk Limit”?
- (e) If risk loss below  $y$  dollars is insignificant in the overall budget, what risk percentage may be set as the “Acceptable Risk Limit”?
- (f) To reduce the risk of a certain hazard scenario to a desired level, if probability can be reduced by  $p$  units, then, by how many units  $s$  of severity should the hazard be reduced (or, perhaps, even be allowed to increase)? Or vice versa?

SAFER Diamond can thus serve as a handy and convenient tool for experimenting with and evaluating various risk management scenarios.

15 August 2007

N. Krishnamurthy