

TABLE 11.10 The Risk Assessment Matrix Example in Z10

Likelihood of OCCURRENCE or EXPOSURE For selected Unit of Time or Activity	Example of a Risk Assessment Matrix				
	Severity of Injury or Catastrophic Death or permanent total disability	Illness or Consequence Critical Disability in excess of 3 months	Remedial Action Marginal Minor injury, lost workday accident	Negligible First Aid or Minor Medical Treatment	
Frequent Likely to occur repeatedly	HIGH Operation not permissible	HIGH Operation not permissible	SERIOUS High priority remedial action	MEDIUM Take Remedial action at appropriate time	
Probable Likely to occur several times	HIGH Operation not permissible	HIGH Operation not permissible	SERIOUS High priority remedial action	MEDIUM Take Remedial action at appropriate time	
Occasional Likely to occur sometime	HIGH Operation not permissible	SERIOUS High priority Remedial action	MEDIUM Take Remedial Action at appropriate time	LOW Risk Acceptable: Remedial Action discretionary	
Remote Not likely to occur	SERIOUS High Priority Remedial action	MEDIUM Take Remedial action at appropriate time	MEDIUM Take Remedial action at appropriate time	LOW Risk Acceptable: Remedial Action Discretionary	
Improbable Very unlikely - may assume exposure will not happen	MEDIUM Take Remedial action at appropriate time	LOW Risk Acceptable: Remedial Action Discretionary	LOW Risk Acceptable: Remedial Action Discretionary	LOW Risk Acceptable: Remedial Action Discretionary	

risk assessments, extensions were made to include severity and probability descriptions and action levels.

In two instances, shop floor personnel said to safety professionals that relating numbers to each other first—such as 6 to 12—was a big help in understanding whether the risk category was moderate or serious. If using a risk assessment matrix in which numbers are used to begin with to establish risk levels makes the process more understandable and acceptable for operating personnel, that should be encouraged.

As noted in Figure 11.1, numbers in the matrix were derived intuitively. They are qualitative, not quantitative. Thus, the numbers have value only in relation to each other. And that is the case for all risk scoring systems that are not based on hard probability and severity numbers, which are rarely available.

On Acceptable Risk

The theoretical goal should always be to eliminate all hazards, but that may not be feasible. When a hazard cannot be eliminated, the associated risk should be reduced to a level as low as reasonably practicable and acceptable, considering cost constraints

Severity levels and values	Occurrence probabilities and values				
	Unlikely (1)	Seldom (2)	Occasional (3)	Likely (4)	Frequent (5)
Catastrophic (5)	5	10	15	20	25
Critical (4)	4	8	12	16	20
Marginal (3)	3	6	9	12	15
Negligible (2)	2	4	6	8	10
Insignificant (1)	1	2	3	4	5

Numbers were intuitively derived. They are qualitative, not quantitative. They have meaning only in relation to each other.

Incident or Exposure Severity Descriptions

- Catastrophic: One or more fatalities, total system loss and major business down time, environmental release with lasting impact on others with respect to health, property damage or business interruption.
- Critical: Disabling injury or illness, major property damage and business down time, environmental release with temporary impact on others with respect to health, property damage or business interruption.
- Marginal: Medical treatment or restricted work, minor subsystem loss or property damage, environmental release triggering external reporting requirements.
- Negligible: First aid or minor medical treatment only, non-serious equipment or facility damage, environmental release requiring routine cleanup without reporting.
- Insignificant: Inconsequential with respect to injuries or illnesses, system loss or down time, or environmental release.
- Incident or Exposure Probability Descriptions
- Unlikely: Improbable, unrealistically perceivable.
- Seldom: Could occur but hardly ever.
- Occasional: Could occur intermittently.
- Likely: Probably will occur several times.
- Frequent: Likely to occur repeatedly.

Risk Levels

Combining the Severity and Occurrence Probability values yields a risk score in the matrix. The risk levels and the action levels are categorized below.

Risk Categories, Scoring, and Action Levels

Category	Risk Score	Action Level
Low risk	1 to 5	Remedial action discretionary.
Moderate risk	6 to 9	Remedial action to be taken at appropriate time.
Serious risk	10 to 14	Remedial action to be given high priority.
High risk	15 or greater	Immediate action necessary. Operation not permissible except in an unusual circumstance and as a closely monitored and limited exception with approval of the person having authority to accept the risk.

FIGURE 11.1 Risk assessment matrix: numerical gradings.

in relation to the extent of risk reduction to be obtained and performance requirements. In Chapter 2, "Achieving Acceptable Risk Levels: The Operational Goal," it is said that as every element in Z10 is applied, the outcome is to achieve acceptable risk levels so that the risk of harm is as low as reasonably practicable. It is also said that the risk assessment matrices in this chapter and the discussions of risk categories will help in determining acceptable risk levels.

Applying the concept of ALARP—as low as reasonably practicable—is recognized as a valuable tool to assist in determining acceptable risk levels. But a caution was offered indicating that, on occasion, achieving risk levels as low as reasonably