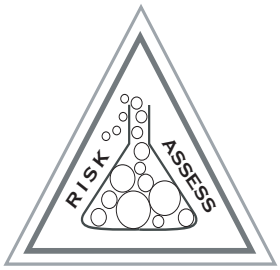

School risk matrix: assessing the severity of risk

The International Standards Organisation Standard on Risk Management (ISO 31000:2009) requires that each risk that is identified be assessed on the basis of its likelihood and its consequences, using a risk matrix that is appropriate to the school situation. From the matrix, there emerges a measure of the severity of the risk, and a recommendation on how to proceed.

Your school should hold copies of the Standard (ISO 31000:2009) and the Risk Management Guidelines (HB 89-2012) in its library, and staff should be familiar with them.

The ISO Standard is accepted as the national standard in
• Australia
• New Zealand
• Canada
• UK
and most other countries.

A system for assessing the severity of a risk, requires three components:
- a multi-level scale for rating the likelihood of a risk,
- a multi-level scale for rating the consequences of a risk, and
- a matrix for scoring the severity of each possible combination of likelihood and consequences.

The ISO standard requires that the three components be realistic within the context of the school and reflect the perception of risk within the school. Each school is free to choose whatever scales and matrix are most appropriate for its circumstances.

Your school should enter in its safety records the details of the risk matrix that is being used to assess risks. The same risk matrix should be used consistently throughout the school.

The school's risk matrix should be reviewed regularly as part of the school's OHS management system[1].

Choice of risk matrix

On the following pages, we describe six risk matrices.
- RiskAssess risk matrix, which is a 3 x 3 matrix with the advantage of simplicity. The Calgary Board of Education uses this matrix.
- CEO Sydney, NSW, risk matrix, which is a 4 x 4 matrix, and
- four similar 5 x 5 matrices, required to be used, respectively, in
  * Queensland Department of Education and Training (QLD DET) schools,
  * Victorian Department of Education and Early Childhood Development (VIC DEECD) schools,
  * South Australian Department of Education and Child Development (SA DECD) schools
  * CSO Broken Bay, NSW, schools.

All six risk matrices comply with the ISO Standard.

[1.] An excellent management system is given in the Australian/New Zealand Standard for Occupational Health and Safety Management Systems (AS/NZS 4801:2001).

The RiskAssess risk matrix[2] has emerged from discussions with school staff over many years and is the simplest one that we have been able to devise to date. Your school may choose to adopt this matrix, if it wishes. If you can improve upon the RiskAssess risk matrix, please let us know!

[2]*Extracted from P.T. Crisp, "Safety in Schools", 2014, Chapter 2 "Risk Assessment and Control of Hazards".*

RiskAssess risk matrix

This matrix is based on the following scales for likelihood and consequences:

Multi-level scale of consequences

A scale of consequences with three levels, corresponding to
- Level 1: first-aid treatment within the school,
- Level 2: treatment by a doctor (general practitioner), and
- Level 3: immediate hospitalisation

has the benefit of a simple test basis and corresponds to the manner in which most people would see levels of consequences for personal injuries.

The terms "minor", "moderate" and "severe" can be applied to the three levels, and some examples of injuies at each level are as follows:

Minor
- splinter in the skin
  e.g. wood splinter in finger
- small shallow cut
  e.g. cut fingers while picking up broken glass
- heat burn to minor area of body (<1 cm^2)
  e.g. touching a hot object with fingers

Prognosis: full recovery with no long-term ill effects
(First-aid treatment within the school)

The RiskAssess risk matrix is used by
- hundreds of schools in Australia and New Zealand
- Calgary Board of Education, Canada.

Moderate
- heat burn to moderate area of body (1-5 cm^2)
  e.g. splash of burning liquid on skin
- eye injury without damage to the cornea
  e.g. wood dust in the eye
- cut requiring stitches, but with damage only to skin (no damage to arteries or tendons)

Prognosis: full recovery or, at worst, an insignificant scar
(Treatment by doctor)

Severe
- death
  e.g. fall from height
- eye injury with damage to the cornea
  e.g. concentrated sodium hydroxide solution in the eye
- heat burn to large area of the body (>100 cm^2)
  e.g. methylated spirits fire

Prognosis: permanent injury, serious scarring or death
(Immediate hospitalization)

Multi-level scale of likelihood

A scale of likelihood with three levels, corresponding to
- Level 1: known to commonly occur, not unexpected in the class,
- Level 2: uncommon, rare, but sufficiently frequent to have been witnessed in class by self or a known person, and
- Level 3: very rare, have heard of it happening, may possibly have been witnessed in class by self or a known person,

should be adequate to rate likelihoods.

The terms "likely", "unlikely" and "very unlikely" can be applied to the three levels, and some examples of events at each level are as follows:

Likely
- cutting fingers while cleaning up broken glass
  e.g. a broken test tube on the floor
- bruises and abrasions in playground
  e.g. falling over at play on hard surface
- injury during fight between students in a bad class
  e.g. black eye

Unlikely
- injury during fight between students in a satisfactory class
  e.g. black eye
- eating biological materials for a "dare"
  e.g. roasting lobe of rat's liver over Bunsen flame and eating it
- burns from flaming gas jet
  e.g. turning bench gas tap full on and lighting with a match

Very unlikely
- deliberate self-harm
  e.g. burning self, eating a toxic chemical
- injury during fight between students in a good class
  e.g. black eye
- motor vehicle accident
  e.g. car or bus accident

The likelihood of many injuries depends on the behaviour of the class, in general, and certain individuals, in particular. In the examples above, the likelihood of injury during fighting ranges from likely to very unlikely, depending on whether the class is "bad", "satisfactory" or "good".

Examples at each level should be chosen, depending on the circumstances of the school.

Matrix for severity of risk

A 3 x 3 matrix (Table 1) is needed to score the 9 possible combinations of likelihood and consequences in the 3-level system just described.

For the three cells in the top right, the chance of an adverse outcome is simply too great to carry out the experiment or activity. For the three cells in the bottom left, the chance of anything serious happening is reassuringly low and it is acceptable to proceed with the usual precautionary measures. The Likely/Minor combination also must be allowed, otherwise nearly all school activities would be prohibited. The matrix gives a low-risk rating to all activities that would, at worst, result in a minor injury.

Two cells in the middle have doubtful levels of risk. If possible avoid such activities, or think carefully about them if you reasonably need to carry them out and introduce suitable control measures.

The Unlikely/Moderate combination arises when, for example, a student sprains an ankle while running (or mucking about) on wet steps. Improved stair surfaces or administrative control measures might be considered.

An example of an activity in the Severe/Very unlikely category is travel by car or bus; there is an unavoidable possibility of motor vehicle "accident". There is common acceptance in society of the risks taken in using motor vehicles or walking in their vicinity. It would be impractical to prohibit motor vehicle use, though it presents the greatest likelihood of severe consequences.
Many sporting activities, e.g. football, may also be assessed in the Severe/Very unlikely category.

RiskAssess risk matrix

Likelihood	Consequences: Minor	Moderate	Severe
Likely	✓	x	x
Unlikely	✓	?	x
Very unlikely	✓	✓	??

✓ = low risk

? = medium risk
CONSIDER OTHER OPTIONS
or INTRODUCE CONTROLS

?? = high risk
Either DON'T DO IT
or INTRODUCE SIGNIFICANT
EXTRA CONTROLS

X = extreme risk
DON'T DO IT!

Table 1
RiskAssess risk-level matrix for calculating the severity of a risk.

The CEO SYDNEY risk matrix must be used in all schools of the Archdiocese of Sydney. It is a 4 x 4 risk matrix. Other schools may adopt it if they believe that the gradation of likelihood and consequence levels is appropriate, or if they seek conformity with the CEO SYDNEY system.

CEO SYDNEY risk matrix

This matrix is based on the following scales for likelihood and consequences:

Multi-level scale of consequences

The scale of consequences has four levels as follows:

- Level 1: First aid
  Minor injury requiring first-aid treatment
- Level 2: Medical attention
  Injury requiring medical attention and several days off work
- Level 3: Serious illness/injury
  Long-term illness or serious injury
- Level 4: Disability or death
  Injury causing permanent disability or death

Multi-level scale of likelihood

The scale of likelihood with five levels as follows:

- Level 1: Very unlikely
  May happen but probably won't
- Level 2: Unlikely
  Could happen, but very rarely
- Level 3: Likely
  Could happen at some time
- Level 4: Very likely
  Could happen at any time

Matrix for severity of risk

A 4 x 4 matrix (Table 2) is needed to score the 16 possible combinations of likelihood and consequences in the 4-level system just described.

CEO SYDNEY risk matrix

Likelihood	Consequences: First aid	Medical attention	Long-term illness/injury	Disability or death
Very likely	?	??	x	x
Likely	?	?	??	x
Unlikely	✓	?	?	??
Very unlikely	✓	✓	?	?

✓ = **Low risk**
TOLERABLE: monitor and manage risks

? = **Moderate risk**
Reduce risk to as low as reasonably practicable

?? = **High risk**
Reduce risk to as low as reasonably practicable

X = **Extreme risk**
INTOLERABLE: significant and urgent actions required

Table 2
CEO SYDNEY risk matrix for calculating the severity of a risk.

The QLD DET risk matrix[3] must be used in all Queensland schools of the Department of Education and Training. It is a 5 x 5 risk matrix. Other schools may adopt it if they believe that the gradation of likelihood and consequence levels is appropriate, or if they seek conformity with the QLD DET system.

[3]*Based on Queensland Department of Education and Training "Curriculum Activity Risk Assessment Template", available for download as a pdf file from "HLS-PR-012: Managing Risks in School Ciurriculum Activities" at http://education.qld.gov.au/strategic/eppr/health/hlspr012/.*

QLD DET risk matrix

This matrix is based on the following scales for likelihood and consequences:

Multi-level scale of consequences

The scale of consequences has five levels as follows:

- Level 1: Insignificant
  No treatment required
- Level 2: Minor
  Minor injury requiring First Aid treatment (e.g. minor cuts, bruises, bumps)
- Level 3: Moderate
  Injury requiring medical treatment or lost time of four of fewer days
- Level 4: Major
  Serious injury (injuries) requiring specialist medical treatment or hospitalisation, or greater than four days lost time
- Level 5: Critical
  Loss of life, permanent disability or multiple serious injuries

Multi-level scale of likelihood

The scale of likelihood with five levels as follows:

- Level 1: Rare
- Level 2: Unlikely
- Level 3: Possible
- Level 4: Likely
- Level 5: Almost certain

Matrix for severity of risk

A 5 x 5 matrix (Table 3) is needed to score the 25 possible combinations of likelihood and consequences in the 5-level system just described.

QLD DET risk matrix

Likelihood	Consequences: Insignificant	Minor	Moderate	Major	Critical
Almost certain	?	?	??	x	x
Likely	✓	?	??	??	x
Possible	✓	?	??	??	??
Unlikely	✓	✓	?	?	??
Rare	✓	✓	✓	✓	?

✓ = **Low risk**
Little chance of an incident or serious injury

? = **Medium risk**
Some chance of an incident and injury requiring first aid

?? = **High risk**
Likely chance of a serious incident and injury requiring medical treatment

X = **Extreme risk**
High chance of a serious incident and injury resulting in highly debilitating injury

Table 3
QLD DET risk matrix for calculating the severity of a risk.

The VIC DEECD risk matrix[4] must be used in all Victorian schools of the Department of Education and Early Childhood Development. It is a 5 x 5 risk matrix. Other schools may adopt it if they believe that the gradation of likelihood and consequence levels is appropriate, or if they seek conformity with the VIC DEECD system.

[4]*Based on Victorian Department of Education and Early Childhood Development "OHS Risk Management Procedure", available for download as a pdf file at http://www.eduweb.vic.gov.au/edulibrary/public/ohs/DEE_EHU-04-1-1_OHS_Risk_Management.pdf.*

VIC DEECD risk matrix

This matrix is based on the following scales for likelihood and consequences:

Multi-level scale of consequences

The scale of consequences has five levels as follows:

- Level 1: Insignificant
  No injury
- Level 2: Minor
  Injury / ill health requiring first aid
- Level 3: Moderate
  Injury / ill health requiring medical attention
- Level 4: Major
  Injury / ill health requiring hospital admission
- Level 5: Severe
  Fatality

Multi-level scale of likelihood

The scale of likelihood with five levels as follows:

- Level 1: Rare
  The event may occur only in exceptional circumstances
- Level 2: Unlikely
  The event may occur sometime, say once in 10 years
- Level 3: Possible
  The event may occur sometime, say once in 3 years
- Level 4: Likely
  The event may occur in most circumstances, say once a year
- Level 5: Almost certain
  The event may occur in most circumstances, say msny times a year

Matrix for severity of risk

A 5 x 5 matrix (Table 4) is needed to score the 25 possible combinations of likelihood and consequences in the 5-level system just described.

Table 4 Opposite
VIC DEECD risk matrix for calculating the severity of a risk.

VIC DEECD risk matrix

Likelihood	Consequences: Insignificant	Minor	Moderate	Major	Severe
Almost certain	??	??	x	x	x
Likely	?	??	??	x	x
Possible	✓	?	??	x	x
Unlikely	✓	✓	?	??	x
Rare	✓	✓	?	??	??

✓ = **Low risk**

Notify **Nominated employee, HSR/OHS Committee**. Nominated employee, HSR /OHS Committee is to follow up that corrective action is taken within a reasonable time.

? = **Medium risk**

Notify **Nominated employee, HSR/OHS Committee**. Nominated employee, OHS Representative /OHS Committee is to follow up that corrective action is taken within 7 days.

?? = **High risk**

Notify **Workplace Manager and/or Management OHS Nominee** immediately. Corrective actions should be taken within 48 hours of notification.

X = **Extreme risk**

Notify **Workplace Manager and/or Management OHS Nominee** immediately. Corrective actions should be taken immediately. Cease associated activity.

The SA DECD risk matrix[5] must be used in all South Australian schools of the Department of Education and Child Development. It is a 5 x 5 risk matrix. Other schools may adopt it if they believe that the gradation of likelihood and consequence levels is appropriate, or if they seek conformity with the SA DECD system.

[5]*Based on South Australian Department of Education and Child Development "Risk Assessment Criteria Matrix", available for download as a pdf file at http://www.decd.sa.gov.au/docs/documents/1/RiskAssessmentCriteriaMat.pdf*

SA DECD risk matrix

This matrix is based on the following scales for likelihood and consequences:

Multi-level scale of consequences

The scale of consequences has five levels as follows:

- Level 1: Insignificant
  Incident with or without minor injury
- Level 2: Minor
  First aid or minor lost time injury
- Level 3: Moderate
  Serious injury and/or illness
- Level 4: Major
  Multiple serious injuries
- Level 5: Critical
  Death of adult or child

Multi-level scale of likelihood

The scale of likelihood with five levels as follows:

- Level 1: Rare
  Less than once in 15 years (possibility <5%)
- Level 2: Unlikely
  At least once in 5-15 years (possibility 5-25%)
- Level 3: Possible
  At least once in 2-5 years (possibility 25-50%)
- Level 4: Likely
  At least once in a year (possibility 50-75%)
- Level 5: Almost certain
  Multiple times in a year (possibility >75%)

Matrix for severity of risk

A 5 x 5 matrix (Table 5) is needed to score the 25 possible combinations of likelihood and consequences in the 5-level system just described.

Table 5 Opposite
SA DECD risk matrix for calculating the severity of a risk[6].

[6]*Actions based on SA DECD "Risk Assessment Matrix", Health and Safety Services, June 2006.*

SA DECD risk matrix

Likelihood	Consequences: Insignificant	Minor	Moderate	Major	Critical
Almost certain	?	??	??	X	X
Likely	?	?	??	??	X
Possible	✓	?	?	??	??
Unlikely	✓	✓	?	?	??
Rare	✓	✓	✓	?	??

✓ = **Low risk**

Take reasonable steps to mitigate and monitor the risk.

? = **Medium risk**

Take reasonable steps to mitigate the risk.
Consider temporary use of lower-level controls (administrative or personal protection).

?? = **High risk**

Act immediately to mitigate the risk.
Either eliminate, substitute or implement engineering controls.

X = **Extreme risk**

Act immediately to mitigate the risk.
Either eliminate, substitute or implement engineering controls.
Remove the hazard at its source.
Do not use low-level controls, even in short term.

The CSO BROKEN BAY risk matrix must be used in all schools of the Diocese of Broken Bay. It is a 5 x 5 risk matrix. Other schools may adopt it if they believe that the gradation of likelihood and consequence levels is appropriate, or if they seek conformity with the CSO BROKEN BAY system.

CSO BROKEN BAY risk matrix

This matrix is based on the following scales for likelihood and consequences:

Multi-level scale of consequences

The scale of consequences has five levels as follows:

- Level 1: Insignificant
  No injury or very minor health impact on individual
- Level 2: Minor
  Individual requires first aid
- Level 3: Moderate
  Multiple/single medical treatment required
- Level 4: Major
  Serious long-term/permanent health impact on individual
- Level 5: Catastrophic
  Single or multiple fatalities or multiple serious long-term/permanent health impacts/pandemic

Multi-level scale of likelihood

The scale of likelihood with five levels as follows:

- Level 1: Rare
  May occur in exceptional circumstances
- Level 2: Unlikely
  Could occur from time to time
- Level 3: Possible
  May occur at some time
- Level 4: Likely
  Will probably occur in most circumstances
- Level 5: Almost certain
  Is expected to occur in most circumstances

Matrix for severity of risk

A 5 x 5 matrix (Table 6) is needed to score the 25 possible combinations of likelihood and consequences in the 5-level system just described.

Table 6 Opposite
CSO BROKEN BAY risk matrix for calculating the severity of a risk.

CSO BROKEN BAY risk matrix

Likelihood	Consequences: Insignificant	Minor	Moderate	Major	Catastrophic
Almost certain	✓	?	??	x	x
Likely	✓	?	??	x	x
Possible	✓	?	?	??	x
Unlikely	✓	✓	?	?	??
Rare	✓	✓	✓	?	?

✓ = **Low risk**

Risks monitored in routine activity and periodically reviewed

? = **Moderate risk**

Risk controls to be reconsidered/reapplied and monitored

?? = **High risk**

Risk controls to be revised and addressed urgently

X = **Extreme risk**

Risk controls to be addressed immediately

Comparison of risk matrices

The approximate correspondences between the six risk matrices are as follows:

CONSEQUENCES

QLD DET SA DECD VIC DEECD CSO BR BAY	CEO SYDNEY	RiskAssess
Insignificant + Minor	First aid	Minor
Moderate	Medical attention	Moderate
Major + Critical/ Severe/ Catastrophic	Long-term illness/injury +Disability/ death	Severe

LIKELIHOOD

QLD DET SA DECD VIC DEECD CSO BR BAY	CEO SYDNEY	RiskAssess
Almost certain + Likely	Very likely + Likely	Likely
Possible	Unlikely	Unlikely
Unlikely + Rare	Very unlikely	Very unlikely