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Risk Management

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A Start

Risk Assessment = Risk x Probability

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RISK ASSESSMENT MATRIX
Determining the Level of Risk

This document can be used to identify the level of risk and help to prioritise any control measures.
Consider the **consequences** and **likelihood** for each of the identified hazards and use the table to obtain the risk level.

			Consequences				
			1 – Insignificant Dealt with by in-house first aid, etc	**2 – Minor** Medical help needed. Treatment by medical professional/hospital outpatient, etc	**3 – Moderate** Significant non-permanent injury. Overnight hospitalisation (inpatient)	**4 – Major** Extensive permanent injury (eg loss of finger/s) Extended hospitalisation	**5 – Catastrophic** Death. Permanent disabling injury (eg blindness, loss of hand/s, quadriplegia)
Likelihood	**A -**	Almost certain to occur in most circumstances	High (H)	High (H)	Extreme (X)	Extreme (X)	Extreme (X)
	B -	Likely to occur frequently	Moderate (M)	High (H)	High (H)	Extreme (X)	Extreme (X)
	C -	Possible and likely to occur at some time	Low (L)	Moderate(M)	High (H)	Extreme (X)	Extreme (X)
	D -	Unlikely to occur but could happen	Low (L)	Low (L)	Moderate(M)	High (H)	Extreme (X)
	E -	May occur but only in rare and exceptional circumstances	Low (L)	Low (L)	Moderate (M)	High (H)	High (H)

How to Prioritise the Risk Rating

Once the level of risk has been determined the following table may be of use in determining when to act to institute the control measures.

Extreme	Act immediately to mitigate the risk.Either eliminate, substitute or implement engineering control measures.	Remove the hazard at the source. An identified extreme risk does not allow scope for the use of administrative controls or PPE , even in the short term.
High	Act immediately to mitigate the risk. Either eliminate, substitute or implement engineering control measures. If these controls are not immediately accessible, set a timeframe for their implementation and establish interim risk reduction strategies for the period of the set timeframe.	An achievable timeframe must be established to ensure that elimination, substitution or engineering controls are implemented. **NOTE:** Risk (and not cost) must be the primary consideration in determining the timeframe. A timeframe of greater than 6 months would generally not be acceptable for any hazard identified as high risk.
Medium	Take reasonable steps to mitigate the risk. Until elimination, substitution or engineering controls can be implemented, institute administrative or personal protective equipment controls. These "lower level" controls must not be considered permanent solutions. The time for which they are established must be based on risk. At the end of the time, if the risk has not been addressed by elimination, substitution or engineering controls a further risk assessment must be undertaken.	**Interim measures until permanent solutions can be implemented:** • Develop administrative controls to limit the use or access. • Provide supervision and specific training related to the issue of concern. (See Administrative Controls below)
Low	Take reasonable steps to mitigate and monitor the risk. Institute permanent controls in the long term. Permanent controls may be administrative in nature if the hazard has low frequency, rare likelihood and insignificant consequence.	

Hierarchy of Control Controls identified may be a mixture of the hierarchy in order to provide minimum operator exposure.

Elimination	Eliminate the hazard.
Substitution	Provide an alternative that is capable of performing the same task and is safer to use.
Engineering Controls	Provide or construct a physical barrier or guard.
Administrative Controls	Develop policies, procedures practices and guidelines, in consultation with employees, to mitigate the risk. Provide training, instruction and supervision about the hazard.
Personal Protective Equipment	Personal equipment designed to protect the individual from the hazard.

What's the Problem

Introduction to Risk Assessment – you have to know what can go wrong before you can start to manage it.

I have but one lamp by which my feet are guided, and that is the lamp of experience. I know no way of judging the future but by the past. --Patrick Henry, 1775

plus many other problems

Problems continued

- Recent study had more than 50% of published experimental information is not reproducible.
- Experimenters have limited experiences

  due to curriculum constraints (education v training)

  the technological infrastructure

  for example: glassblowers – are students using glassware aware of possible problems
- Using the internet

Approaches to a Solution

The beginning steps work in both academia and industry.

Teaching situational awareness:

- Start off with the very simple experiments
- For example: cabbage leaves as indicator then go to any flower as an indicator (usually add small about of MeOH or EtOH to boiling water)
- Have the student develop their own checklists.

- Decision Based Upon????

Data →

Information → (when used properly wrt problem)

Knowledge → (and hopefully)

Wisdom

Dealing with the Future and New Materials - Another Major Problem

Made popular by Donald Rumsfeld -

There are questions we have that we have answers to -

There are questions we have that we do not have answers to -

and there is much we do not know enough about to realize we should have questions

and, Finally

Call it the human problem

We humans are terrible monitors. And we are at our least effective when assigned the task of looking constantly for something that almost never happens. Countless studies over the years have shown that people simple can't maintain a high level of altertness when their attention is almost never rewarded by discovering danger, or at least something new. Whether it's a sentry on guard for an enemy that never shows, or a pilot staring, or at least monitoring, a gauge that never moves, boredom and routine quickly rob us of the ability to spot a problem if it ever does occur.

--j.mac mcclellan

In summary

Situational awareness must be taught.

A lowering of the chance of an accident taking place occurs when one actually understands the risk.