Guidance on Hazard Identification and Risk Assessment

1.0 GENERAL

All FME engineers/designers are required to consider the safety aspects of the construction, maintenance and eventual demolition of their designs, and of the designs of others which they are required to review and co-ordinate with. This Exhibit provides guidance on the identification of hazards and risk assessment

At an early stage in the design process, the responsible FME engineer/designer will need to consider general hazards which their designs have the potential to create such as "falls from height", "release of harmful substances", etc. As the design develops, hazards relating to specific items will need to be considered. Once hazards have been identified, the responsible FME engineer/designer will need to consider the risk from the hazard and the means by which it can be reduced. Some clear definitions should be used:

Hazard - the potential to cause harm.

Risk - the likelihood that harm will occur.

The purpose of risk assessment is to indicate to the FME engineer/designer, the potential effect of their design on the safety of workers. As a consequence, FME engineers/designers will be able to judge the weight they should give to the safety with reference to the criteria of the hierarchy of risk control when identifying appropriate steps to reduce the risks. What is "reasonably practicable" (which may involve cost and other design goals) becomes part of the judgment.

2.0 IDENTIFICATION OF HAZARDS

The actual hazards likely to be encountered will vary depending upon equipment and structures being designed,and the lifecycle stages or activities being considered; construction, maintenance or demolition. A selection of the principal hazards to be considered would include:

- FALLS FROM ELEVATIONS. Typically these are from access points, ladders, scaffolding, fragile roofs, roof edges or holes in roofs, structural steelwork, temporary work platforms and other parts of floors or surfaces.

- TRAPPED BY SOMETHING COLLAPSING OR OVERTURNING. Typically these are buildings or structures or parts of these, earth or rocks e.g. trench collapse, plant including lifting machinery, collapse of scaffolding and vehicles falling from supports or overturning.

- STRUCK BY MOVING VEHICLE. These include bulldozers, excavators, private vehicles, road tankers, etc.

- CONTACT WITH ELECTRICITY OR AN ELECTRICAL DISCHARGE. Caused by industrial work equipment, hand tools or hand lamps, contact with or close proximity to overhead or underground electric cables.

- STRUCK BY FALLING/FLYING OBJECTS. Objects falling from height, falling into excavations or from vehicles.

- CONTACT WITH MOVING MACHINERY. Conveyor belt and hoist, vehicles or plant and pedestrians.

- EXPOSURE TO HOT OR HARMFUL SUBSTANCE.

- HIGH ENERGY SYSTEMS such as steam pressurized fluids, powered mechanical equipment, and electrical power distribution.

3.0 RISK ASSESSMENT

A simple way to assess the risk associated with any hazard is to is to begin by considering two elements:

a) The likely severity of harm caused if the hazard actually becomes a reality (consequence)

b) The likelihood that harm will occur (frequency)

Three broad categories of severity can be used where:

"HIGH" - Fatality, major injury or long term illness

"MEDIUM" - Injury or short term illness

"LOW" - Other injury or illness

Table 1, gives some examples as to the likely severity of the harm caused by a number of typical hazards.

Table 1: Typical Risk Levels

HAZARD		SEVERITY		
		HIGH	MEDIUM	LOW
Falls from height	more than 2 meters	X		
	2 meters or less		X	
Tripping				X
Collapse		X		
Manual handling	depending on the object handled		X	X
Moving objects		X		
Electricity	Greater than or equal to 480V	X		
	240V		X	
	110v and below			X
Contact with moving machinery		X		
Fire		X		
Harmful substances	depending on the substance concerned	X	X	X
Noise and vibration	depending on exposure levels	X	X	X
Steam/Pressurized Fluids/Powered Mechanical Equipment/Electrical Power Distribution		X		

The responsible FME engineer/designer will then need to make a judgment as to the **likelihood** of the event occurring. Again three categories can be defined as :

'**HIGH'** - certain or near certain to occur.

'**MEDIUM'** - reasonably likely to occur.

'**LOW'** - very seldom or never occurs.

The product of the elements, e.g. (**severity**) x (**likelihood**), will give some measure of the assessed risk which, in turn, can be seen as exerting a pressure to alter the design. The risks may be assessed and compared using a simple risk assessment key as shown in Table 2.

Table 2. Risk Assessment Key

LIKELIHOOD	SEVERITY		
	Low	**Medium**	**High**
High	H/L	H/M	H/H
Medium	M/L	M/M	M/H
Low	L/L	L/M	L/H

In view of the assessed risk, the FME engineer/designer may conclude that design alteration is not practicable, but they should be prepared to justify their choice in the light of the particular risk assessment. Any assessment, which results in a severity/likelihood product within the shaded areas, should be addressed. Note that the severity of hazard is generally considered to be more significant than likelihood of occurrence, i.e., it is more important that measures are taken to prevent one fatality, than several minor bruises.

4.0 HIERARCHY OF RISK CONTROL

Measures should be taken in order to mitigate the risks identified on the basis of what is "reasonably practicable" for the FME engineer/designer to do at the time the design is being prepared. In determining what is reasonably practicable, the risks to safety should be weighed against the cost of excluding the feature by preferably designing to avoid the risk. If not reasonably practicable to do so, the cause of the risk should be tackled at the source, and if this is not possible, measures should be aimed at reducing or controlling the effects by protecting anybody at work who may be exposed to the risk.

The cost of mitigating measures may be counted not just in financial terms but also those of fitness for purpose, aesthetics, or build ability. The recommended approach has been termed the "hierarchy of risk control" and can be summarized as follows:

(a) if possible, alter the design to avoid the risk *(e.g.: relocate equipment requiring regular maintenance to a more easily accessible location)*

If this is not "reasonably practicable"....

(b) combat the risk at source *(e.g.: ensure that design details of items to be lifted include attachment points)*

Failing this....

(c) give priority to measures that will protect all workers *(e.g.: provide a one-way system for construction traffic)*

Then, as a last resort....

(d) provide for means of personnel protection (e.g.: special instructions on design documentation)