

4. Estimate risk

4.1 The risk from the hazard may be determined by estimating:

- (a) the potential severity of harm;
- (b) the likelihood that harm will occur.

These two components should be judged independently.

4.2 When seeking to establish potential severity of harm, the following should be considered:

- (a) part(s) of the body likely to be affected;
- (b) nature of the harm, ranging from slight to extreme.

Care should be taken to ensure that harm category definitions reflect both the short and long term health and safety consequences. A possible categorisation of severity harm levels based on the three bands of slight, moderate and extreme is shown in table 1:

Table 1: Examples of categories for severity of harm

Category	Slight harm	Moderate harm	Extreme harm
Health	Nuisance and irritation (e.g. headaches); temporary ill health leading to discomfort (e.g. diarrhoea).	Deafness; dermatitis; asthma; work related upper limb disorders; ill-health leading to permanent minor disability.	Occupational cancer; severe life shortening diseases; acute fatal diseases; permanent substantial disability.
Safety	Superficial injuries; Minor cuts and bruises; Eye irritation from dust.	Lacerations; burns; concussion; serious sprains; minor fractures; musculo-skeletal disorders.	Amputations; major fractures; poisonings; multiple injuries; fatal injuries.

The health and safety harm categories are effectively defined by quoted examples and these lists are not exhaustive

4.3 Individuals can adapt the structure of table 1 to reflect their objectives. For example the structure described could be expanded from three “harm” bands (slight, moderate and extreme) to four bands by dividing the extreme harm band into two categories such as “severe harm” (e.g. major fractures) and “extreme harm” (e.g. fatal).

4.4 In order to establish the likelihood of harm the adequacy of control measures already in place should be considered. Legal requirements and guidance in this Code and other safety publications are good guides to adequate control of specific hazards.

The following issues should then typically be assessed:

- (a) number of personnel exposed;
- (b) frequency and duration of exposure to the hazard;
- (c) effects of failure of power or water supply;
- (d) effects of failure of plant and machinery components and safety devices;
- (e) exposure to the elements;
- (f) protection afforded by personal protective equipment and its limitations;
- (g) possibility of unsafe acts by persons for example, who:
 - (i) may not know what the hazards are;
 - (ii) may not have the knowledge, physical capacity, or skills to do the work;
 - (iii) underestimate risks to which they are exposed;
 - (iv) underestimate the practicality and utility of safe working methods.

A possible categorisation of severity harm levels based on the four bands, of very likely; likely; unlikely or very unlikely, is shown in table 2:

Table 2: Examples of categories for likelihood of harm

Categories for the likelihood of harm	Very Likely	Likely	Unlikely	Very Unlikely
Type of occurrence	Typically experienced at least once every six months by an individual.	Typically experienced once every five years by an individual.	Typically experienced once during the working lifetime of an individual.	Less than 1% chance of being experienced by an individual during their working lifetime.

Source: British Standard 8800:2004 Pg. 48

4.5 Any given hazard is more serious if it affects a greater number of people.

But some of the more serious hazards may be associated with an occasional task carried out by just one person, for example maintenance of inaccessible parts of lifting equipment. Table 3 shows a simple method for estimating risks according to the potential severity of harm and the likelihood, as described above.

Table 3: A simple risk estimator

Likelihood of Harm	Severity of Harm		
	Slight Harm	Moderate Harm	Extreme Harm
Very unlikely	VERY LOW RISK	VERY LOW RISK	HIGH RISK
Unlikely	VERY LOW RISK	MEDIUM RISK	VERY HIGH RISK
Likely	LOW RISK	HIGH RISK	VERY HIGH RISK
Very Likely	LOW RISK	VERY HIGH RISK	VERY HIGH RISK

Note: Very Low risk here means that the risk has been reduced to the lowest level that is reasonably practicable

Source: British Standard 8800:2004 Pg. 49

5. Determine the tolerability of the risks

5.1 The next step is to decide which risks are acceptable, tolerable or unacceptable. In making decisions as to whether the risk is tolerable the work force should be consulted. To do this the organisation should first establish tolerability criteria to provide a basis for consistency in all its risk assessments. This should involve consultation with workers representatives, other stakeholders and should take account of legislation and regulatory agency guidance, where applicable. A simple evaluation of risk tolerability, based on a five band structure is shown in table 4:

Table 4: A simple risk categorization

Category of risk	Evaluation of tolerability
Very low	Acceptable
Low	Tolerable
Medium	Risks that should be reduced so that they are tolerable or acceptable
High	
Very high	Unacceptable

Source: British Standard 8800:2004 Pg. 50

6. Prepare risk control action plan

- 6.1** Having determined the significant risks, the next step is to decide what action should be taken to improve safety, taking account of precautions and controls already in place.
- 6.2** Risk categories form the basis for deciding whether improved controls are required and the timescale for action. Table 5 suggests a possible simple approach. This shows that the effort made to control risk should reflect the seriousness of that risk.

Table 5: A simple risk – based control plan

ACTION AND TIMESCALE	
VERY LOW	These risks are considered acceptable. No further action is necessary other than to ensure that the controls are maintained.
LOW	No additional controls are required unless they can be implemented at a very low cost (in terms of time, money and effort). Actions to further reduce these risks are assigned low priority. Arrangements should be made to ensure that controls are maintained.
MEDIUM	Consideration should be given as to whether the risks can be lowered, where applicable, to a tolerable level, and preferably to an acceptable level, but the costs of additional risk should be taken into account. The risk reduction measures should be implemented within a defined time period. Arrangements should be made to ensure that the control measures are maintained, particularly if the risk levels are associated with harmful consequences.
HIGH	Substantial efforts should be made to reduce the risk. Risk reduction measures should be implemented urgently within a defined time period and it might be necessary to consider suspending or restricting activity, or to apply interim risk control measures, until this has been completed. Considerable resources might have to be allocated to additional control measures. Arrangements should be made to ensure that the control measures are maintained, particularly if the risk levels are associated with extremely harmful consequences and very harmful consequences.
VERY HIGH	These risks are unacceptable. Substantial improvements in risk controls are necessary, so that the risk is reduced to a tolerable or acceptable level. The work activity should be halted until the risk controls that are implemented reduce the risk so that it is no longer very high. If it is not possible to reduce the risk the work should remain prohibited.

Note: Also where the risk is associated with extremely harmful consequences, further assessment is necessary to increase confidence in the actual likelihood of harm.

Source: British Standard 8800:2004 Pg. 50

6.3 The outcome of a risk assessment should be an inventory of actions, in priority order, to devise, maintain or improve controls.

6.4 Controls should be chosen taking into account the following, which are in order of effectiveness:

1. Elimination;
2. Substitution by something less hazardous and risky;
3. Enclosure (enclose the hazard in a way that eliminates or controls the risk);
4. Guarding/Segregation of people;
5. Safe system of work that reduces the risk to an acceptable level;
6. Written procedures that are known and understood by those affected;
7. Review the blend of technical and procedural control;
8. Adequate supervision;
9. Identification of training needs;
10. Information/Instruction (signs, hand-outs);
11. Personal Protective Equipment (last resort) – cannot be controlled by any other means.

6.5 In addition to emergency and evacuation plans (see Chapter 10), it may be necessary to provide emergency equipment relevant to the specific hazards.

7. Review adequacy of action plan

7.1 Any action plan should be reviewed before implementation, typically by asking:

- (a) Will the revised controls lead to tolerable risk levels?
- (b) Are new hazards created?
- (c) What do people affected think about the need for, and practicality of, the revised preventive measures?
- (d) Will the revised controls be used in practice, and not ignored in the face of, for example, pressures to get the job done?

8. Ensure risk assessment and controls are effective and up-to-date

8.1 Risk Assessment and control is a continual process. Hence, written risk assessments should be subject to periodic formal reviews to confirm the validity of the assessment and whether the risk controls are still effective and adequate.

8.2 The regulations require that risk assessments are carried out before any work is commenced but these do not have to be written. Where a written risk assessment already exists, the implicit assumptions upon which it was based should be checked to ensure that they remain true. The risks arising from any new hazards identified should be assessed before work commences, either by sending details of the new hazard to the person responsible for the assessment, or by the person in charge of the work.

8.3 Irrespective of the schedule for formal review, if conditions are changing to the extent that hazards and risks are significantly affected then risk assessments should be reviewed. Such changes can include:

- (a) expansion, contraction or restructuring of activities;
- (b) relocation of responsibilities;
- (c) changes to methods of working or patterns of behaviour;
- (d) occurrence of a hazardous event.

8.4 The review of risk assessments and in particular, the scrutiny of risk assessments during audits is a useful tool to help maintain the validity and effectiveness of the risk assessments and controls. The review can also help ensure consistency across risk assessments carried out by different people or at different times.

8.5 Since risk assessment is intended to reduce the occurrence of hazardous events, such occurrences might indicate weakness in the way risks have been assessed or in the way controls have been designed, implemented or monitored.

8.6 Having completed a detailed risk assessment and put control measures in place to reduce the risk to an acceptable or tolerable level, a **Safe Work Procedure** should be written. A Safe Work Procedure should be understandable to all, and made available prior to any work being carried out.

Name of Ship _____

Record no. _____

[illegible]

Where no significant risk has been listed, we as assessors have judged that the only risks identified were of an inconsequential nature and therefore do not require a more detailed assessment.

DETAILED RISK ASSESSMENT

Ship name _____

Record Number _____

Current assessment date: Last assessment date:

Work activity being assessed:

Section 1

Hazard Analysis of the Intended Work Activity

Hazard no.	Description of Identified Hazards	Existing Control Measures to Protect Personnel from Harm
1		(a) (b) (c)
2		(a) (b) (c)
3		(a) (b) (c)
4		(a) (b) (c)
5		(a) (b) (c)
6		(a) (b) (c)
7		(a) (b) (c)
8		(a) (b) (c)
9		(a) (b) (c)
10		(a) (b) (c)

Assessment of Risk Factor

Likelihood of Harm	Severity of Harm		
	Slight Harm	Moderate Harm	Extreme Harm
Very Unlikely	VERY LOW RISK	VERY LOW RISK	HIGH RISK
Unlikely	VERY LOW RISK	MEDIUM RISK	VERY HIGH RISK
Likely	LOW RISK	HIGH RISK	VERY HIGH RISK
Very Likely	LOW RISK	VERY HIGH RISK	VERY HIGH RISK

Hazard no.	Likelihood of Harm	Severity of Harm	Risk Factor
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

To assess the risk factor arising from the hazard:

1. Select the expression for likelihood which most applies to the hazard;
2. Select the expression for severity of harm which most applies to the hazard;
3. Cross reference using the Risk Estimator table (above left) to determine the level of risk;
4. If the Risk Factor is MEDIUM or above (Yellow, Orange or Red) additional control measures should be implemented and recorded in Section 3.

Section 3

Additional Control Measures to Reduce the Risk of Harm

Hazard no.	Further Risk Control Measures	Remedial Action Date	Review Date
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Additional comments:

Assessment review date _____

DETAILED RISK ASSESSMENT - SPECIMEN

Ship name MV ExampleRecord Number Example / Risk Assessment / File 01-0001Current assessment date: December 05Last assessment date: December 04Work activity being assessed:
Working aloft on the Main Mast

Section 1

Hazard Analysis of the Intended Work Activity

Hazard no.	Description of Identified Hazards	Existing Control Measures to Protect Personnel from Harm
1	<i>Working aloft</i>	(a) <i>Permit-to-Work issued for work while aloft</i> (b) <i>Permit-to-Work procedure followed</i>
2	<i>Falling off ladder while climbing</i>	(a) <i>Use appropriate safety harness</i> (b) <i>Supply appropriate PPE</i> (c) <i>Obey guidance from local safety sign</i> (d) <i>Endorsement of working aloft procedures and training</i>
3	<i>Falling from heights whilst working</i>	(a) <i>Safety harness secured</i> (b) <i>Endorsement of working aloft procedures and training</i>
4	<i>Ships whistle being sounded whilst aloft</i>	(a) <i>Isolate whistle</i> (b) <i>Place "Man Aloft" signs on all whistle controls</i>
5	<i>Being hit by a rotating radar aerial</i>	(a) <i>Isolate radar to stop rotation</i> (b) <i>Place "Man Aloft" sign on radars</i>
6	<i>Radiation hazard from radar and radio aerals</i>	(a) <i>Isolate radar</i> (b) <i>Isolate all aerals</i> (c) <i>Place appropriate safety notices on mast</i>
7	<i>Electrocution hazard</i>	(a) <i>Isolate electrical equipment as appropriate</i> (b) <i>Place appropriate safety notices on isolators</i>
8	<i>Object falling from aloft/above</i>	(a) <i>Adequate training of support staff below</i> (b) <i>Supply appropriate PPE</i>
9	<i>Weather and Sea hazard</i>	(a) <i>Arrange work in daylight conditions</i> (b) <i>Arrange work in dry conditions</i> (c) <i>Arrange work in calm weather</i> (d) <i>Arrange work to be carried out in port or calm seas</i>

Assessment of Risk Factor

Likelihood of Harm	Severity of Harm			Hazard no.	Likelihood of Harm	Severity of Harm	Risk Factor
	Slight Harm	Moderate Harm	Extreme Harm				
Very Unlikely	VERY LOW RISK	VERY LOW RISK	HIGH RISK	1	<i>Very Unlikely</i>	<i>Moderate</i>	<i>Very Low</i>
				2	<i>Unlikely</i>	<i>Moderate</i>	<i>Medium</i>
				3	<i>Unlikely</i>	<i>Moderate</i>	<i>Medium</i>
Unlikely	VERY LOW RISK	MEDIUM RISK	VERY HIGH RISK	4	<i>Very Unlikely</i>	<i>Slight</i>	<i>Very Low</i>
				5	<i>Very Unlikely</i>	<i>Slight</i>	<i>Very Low</i>
				6	<i>Very Unlikely</i>	<i>Slight</i>	<i>Very Low</i>
Likely	LOW RISK	HIGH RISK	VERY HIGH RISK	7	<i>Very Unlikely</i>	<i>Slight</i>	<i>Very Low</i>
				8	<i>Likely</i>	<i>Moderate</i>	<i>High</i>
				9	<i>Very Unlikely</i>	<i>Moderate</i>	<i>Very Low</i>
Very Likely	LOW RISK	VERY HIGH RISK	VERY HIGH RISK	10			

To assess the risk factor arising from the hazard:

1. Select the expression for likelihood which most applies to the hazard;
2. Select the expression for severity of harm which most applies to the hazard;
3. Cross reference using the Risk Estimator table (above left) to determine the level of risk;
4. If the Risk Factor is MEDIUM or above (Yellow, Orange or Red) additional control measures should be implemented and recorded in Section 3.

Section 3

Additional Control Measures to Reduce the Risk of Harm

Hazard no.	Further Risk Control Measures	Remedial Action Date	Review Date
1			
2	<i>Can work be delayed to enable other means of access</i>	<i>As of job date</i>	<i>Next annual review</i>
3	<i>Can work be delayed to enable other means of access</i>	<i>As of job date</i>	<i>Next annual review</i>
4			
5			
6			
7			
8	<i>Secure all tools appropriately</i>	<i>As of job date</i>	<i>Immediate</i>
9	<i>Monitor local conditions</i>	<i>As of job date</i>	<i>Next annual review</i>
10			

Additional comments:

*Remedial action will be addressed at the next assessment review date*Assessment review date December 2006