Risk Management

Introduction

Risk Management aims to reduce risks at source by making stakeholders accountable for managing the risks they create. Risk management duties are imposed on every employees and contractors. These parties must take all reasonably practicable measures to ensure that the workplace is safe to every person within its premises.

Risk Management entails:

- Risk assessment of any work activity or trade;
- Control and monitoring of such risks; and
- Communicating these risks to all persons involved.

Risk Assessment is an integral part of risk management. It is the process of:

- Identifying and analysing safety and health hazards associated with work;
- Assessing the risks involved; and
- Prioritising measures to control the hazards and reduce the risks.

Every workplace conducts risk assessments for all routine and non-routine work undertaken. Applying these basic steps will help us meet industry best practices expected by oil majors.

Risk Assessment Team

Risk assessments are conducted by a team who have a thorough knowledge of the work to be assessed. Team members include management staff, technical personnel, supervisors, production operators, maintenance staff and safety officer. The team leader would have undergone training in risk assessment.

Roles and Responsibilities

Risk management duties are imposed on every employee and contractor.

PLI Management:

- Assign competent person to lead a team associated with the work activity to conduct risk assessments;
- Ensure that the risk control measures are implemented without undue delay after the completion of risk assessment;
- Inform all persons working at the workplace of the risks, and the means to minimise or, where possible, eliminate the risks;
- Provide a risk assessment register to record the findings of risk assessment; Keep the risk assessment record for inspection for at least three years from the date of the assessment.
- Endorse and approve the risk assessments conducted;
- Review and update the risk assessment at least once every three years or earlier should there be a significant change in the work, or if there is reason to suspect that the assessment is no longer valid;
- Develop and implement written safe work procedures for work which poses safety or health risks to workers; and

Team Leader :

- Have adequate knowledge of the risk assessment method;
- Recommend appropriate risk control measures to reduce or eliminate the risks identified;
- Prepare a record of the risk assessment for the employer after completion of the assessment; and
- Assist management in monitoring the effectiveness of risk control measures after their implementation.

Employees & contractors :

- Participate in the risk assessment or assist in conducting the risk assessment;
- Adhere to the safe work procedures established to reduce any safety and health risks at the workplace; and
- Inform their supervisors of any shortcomings in the safe work procedures or risk control measures.

Risk Assessment Process

The risk assessment team should visit the workplace to ensure that all work areas are covered, including routine and nonroutine operations. Routine operations include activities such as preparatory and troubleshooting work activities. Non-routine operations include commissioning, repair and maintenance. The team should also consider the various environmental situations, e.g. weather.

The three basic steps are:

1. Hazard Identification,
2. Risk Evaluation and
3. Risk Control (the selection of control measures must be based on the principles of Hierarchy of Control)

Preparation Work

Prior to conducting a risk assessment, the following information should be obtained as far as possible:

- Plant layout plan;
- Process flowchart;
- List of work activities
- List of chemicals used;
- List of machinery and tools used;
- Records of past incidents and accidents;
- Relevant legislation;
- Relevant codes of practice or specifications;
- Inspection records;
- Details of existing risk controls;
- Health and safety audit reports;
- Feedback from staff, clients, suppliers or other stakeholders;
- Safe work procedures;
- Other information such as material safety data sheet (MSDS), manufacturer's instruction manual; and
- Copies of any relevant previous risk assessments.

Step 1. Hazard Identification

Hazard identification is perhaps the most important step in risk assessment because hazards can only be controlled if they are identified. Hazard identification involves identifying the hazards associated with the activity of each process and type of potential accidents or incidents. During this phase, the aim is to spot hazards, brainstorm on all the possible types of accidents and ill health that can happen due to the hazard, and identify the persons that can be victims of the accident or ill health.

Workplace safety and health hazards can be identified by considering:

- Method of work e.g. repeated tasks and unsafe work practices;
- Electrical and mechanical hazards;
- Manual material handling e.g. lifting, pulling and pushing;
- Chemicals e.g. corrosive substances;
- Machinery or plant e.g. unguarded machines;
- Temporary structure e.g. scaffolds;
- Environmental conditions, e.g. slippery surfaces, lighting level, unstable soil conditions; and
- Layout and location of equipment.

Possible types of accident or incident and ill health include:

- Person falling from height
- Noise - induced deafness
- Slips or falls on the level
- Skin dermatitis
- Asphyxiation
- Collapse of structure
- Object falling from height
- Fire and explosion
- Electrocution
- Struck by or against object
- Drowning
- Soft tissue damage (sprains, strains)

Persons-at-risk include:

- Persons directly involved in the operation;
- Persons not directly involved in the operation;
- Visitors of the workplace; and
- Members of the public.

Step 2. Risk Evaluation

Risk evaluation consists of:

- Identifying the existing risk control measures;
- Assessing the potential severity of the hazards;
- Determining the likelihood of occurrence; and
- Assessing the risk level based on the severity and likelihood.

Risk evaluation is the process of estimating the risk levels for the hazards and their acceptability. This is used as a basis for prioritising actions to control these hazards and to minimise safety and health risks.

Existing Risk Control

The presence of existing control measures should first be identified for individual activity for each process. By considering the effectiveness of the existing controls and the consequences of their failure, the risk of the activity can be assessed. Examples of risk control measures include engineering controls, safe work procedures and personal protective equipment. For more details on risk control measures, please refer to STEP 3 of risk assessment.

Risk is made up of two parts:

1) Expected severity of the hazard; and

2) Likelihood of the occurrence of the accident / incident or ill health taking into account the existing risk controls.

Severity of Hazard

Severity is the degree or extent of injury or harm caused by the hazards, or as a result of an accident. The severity is classified into three categories as minor, moderate and major.

Table 1

Severity	**Description**
Minor	No injury, injury or ill health requiring first aid treatment only *(includes minor cuts and bruises, irritation, ill health with temporary discomfort)*
Moderate	Injury requiring medical treatment or ill health leading to disability *(includes lacerations, burns, sprains, minor fractures, dermatitis, deafness, work-related upper limb disorders)*
Major	Fatal, serious injury or life-threatening occupational disease*(includes amputations, major fractures, multiple injuries, occupational cancer, acute poisoning and fatal diseases)*

As the severity of the hazard refers to the intrinsic or inherent nature of the adverse effect (e.g. cancer, amputation or fatal injury) that may result from the hazard, it does not depend on the controls in place. Therefore, in assigning the severity level, the existing controls should not be taken into account.

Likelihood of Occurrence

Likelihood of occurrence of an accident or incident or ill health is also classified into three categories as remote, occasional and frequent.

Table 2

Likelihood	**Description**
Remote	Not likely to occur
Occassional	Possible or known to occur
Frequent	Common or repeating occurrence

To minimise the subjectivity of estimating likelihood, in addition to looking at existing controls, the following sources of information should
be considered:

- Past incident and accident records;
- Industry practice and experience; and
- Relevant published literature

Risk Level

Once the severity and likelihood have been established, the risk level can be determined using the table below..

For example, if the severity is moderate and the likelihood is occasional, the risk level is medium risk.

Table 3. Likelihood

Severity	Remote	Occasional	Frequent
Major	Medium Risk	High Risk	High Risk
Moderate	Low Risk	Medium Risk	High Risk
Minor	Low Risk	Low Risk	Medium Risk

Step 3. Risk Control

Based on the risk level determined in STEP 2, risk controls should be selected to reduce the risk level to an acceptable level. This can be done by reducing the severity and / or likelihood. When the risk level is ñHighò effective and practicable risk controls must be implemented to bring down the high risk level to at least ñMedium Riskò. Table 4 shows the acceptability of risk and recommended actions for different risk levels, which can be used to guide the selection of risk controls.

Table 4

Risk Level	Acceptability of Risk	Recommended Actions
Low Risk	Acceptable	No additional risk control measures may be needed. However, frequent review may be needed to ensure that the risk level assigned is accurate and does not increase over time.
Medium Risk	Moderately Acceptable	A careful evaluation of the hazards should be carried out to ensure that the risk level is reduced to as low as is practicable within a defined time period. Interim risk control measures, such as administrative controls, may be implemented. Management attention is required.
High Risk	Not Acceptable	High Risk level must be reduced to at least Medium Risk before work commences. There should not be any interim risk control measures and risk control measures should not be overly dependent on personal protective equipment or appliances. If need be, the hazard should be eliminated before work commences. Immediate management intervention is required before work commences.

It is essential for risks to be eliminated or reduced ñat sourceò. If a risk cannot be controlled completely by engineering measures, it is necessary to protect the employees by administrative control or personal protection.

The control of hazards and reduction of risks can be accomplished by following the Hierarchy of Control measures below. These control measures are not usually mutually exclusive e.g. engineering controls can be implemented together with administrative controls like training and safe work procedures.

Elimination

Elimination of hazards refers to the total removal of the hazards and hence effectively making all the identified possible accidents and ill health impossible. This is a permanent solution and should be attempted in the first instance. If the hazard is removed, all the other management controls, such as workplace monitoring and surveillance, training, safety auditing, and record keeping will no longer be required.

E.g. Laser marking of semiconductors eliminates the use of solvent for ink marking. Laser cutting eliminates noise hazard from powered saws.

Substitution

This involves replacing the hazard by one that presents a lower risk. E.g. Asbestos can be substituted with non-asbestos materials. A water-based paint can be used instead of a solvent-based paint.

Engineering Controls

Engineering controls are physical means that limit the hazard. These include structural changes to the work environment or work processes, erecting a barrier to interrupt the transmission path between the worker and the hazard. E.g. Isolation or containment of hazards, application of machine guards and manual handling devices.

Administrative Controls

These reduce or eliminate exposure to a hazard by adherence to procedures or instructions. Documentation should emphasise all the steps to be taken and the controls to be used in carrying out the activity safely. e.g. Implementation of permit-to-work systems and scheduling of incompatible works; OSH training.

Personal Protective Equipment

This should be used only as a last resort, after all other control measures have been considered, or as a short term contingency during maintenance / repair or as an additional protective measure. The success of this control is dependent on the protective equipment being chosen correctly, as well as fitted correctly and worn at all times when required by employees.

Safe Work Procedures

Arising from the risk assessment, safe work procedures for work which may pose safety and health risks should be established and implemented. The safe work procedures should include the safety precautions to be taken in the course of work and during an emergency, as well as the provision of personal protective equipment.

Residual Risks

The risk assessment team should ensure that the risk assessment is conducted properly, and that any residual risks are acceptable and manageable. Residual risks are the remaining risks for which the planned risk controls are not able to effectively remove or control. The risk assessment team should also highlight the residual risks of each of the controls. For example, if the risk control involves the use of fall arrest harness and lanyards (a type of personal protective equipment), then one of the residual risks is that the workers may not hook up the lanyards to protect themselves. In this case, the risk assessment team may highlight training (administrative control) as a further measure to ensure that residual risk is further minimised.

Once all the risk controls are selected and their residual risks highlighted, the risk assessment team needs to identify the action officers and follow-up dates. In this way, the specific action officers to implement the controls can be clearly identified, and the follow-up dates will help to ensure timeliness in implementation.