CONSTRUCTION SAFETY: 5

HAZARD IDENTIFICATION, RISK ASSESSMENT & RISK CONTROL (HIRARC)

SBC 3363

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OBJECTIVE

• The principles and practices of OSH HIRARC
• When to conduct HIRARC/Risk Assessments
• Why HIRARC is important
• How to identify hazard and evaluate risk
• To identify types of Hazard in work area
• To suggest Risk Controls to Organization
• To implementing Risk Controls
• To review Risk Controls

Content

Section 1 : HIRARC – Definitions & Concepts
Section 2 : Process of HIRARC
Section 3 : Hazard Identification
Section 3.1 : Hazard Identification Tools
Section 3.2 : Types of Hazards
Section 4 : Risk Assessment
Section 4.1 : Analyzing Risk
Section 4.2 : Evaluation of Risk
Section 5 : Risk Control Approach
OSH-MS (MS 1722:2003)

**Key Elements**
- Policy
- Organizing
- Planning And Implementation
- Measuring Performance
- Action for Improvement

**Why We Need OSH-MS**
- Our Organization to be **No. 1**
- Increase “Return of Investment”
  - employees, money, time.....
- Safe work place
How To Start

• Organization should have vision
• Commitment from management
  - right people
  - resource
  - time
• Should have internal audit
• Management committee to review reports
• External audit
• Specific organization policy- hazard specific
• Employee’s participation - meeting, training
• Safety as basic training
Introduction to HIRARC

• Principles used in workplace to manage safety and health.
• Section 15 (2)(a) of OSHA 1994: which reads “ the provision and maintenance of plants and systems of work that are, so far as is practicable, safe and without risks to health”

Overview Of HIRARC

• Definition of Hazards
• Classification of Hazards
• Potential sources of Hazards
• Basic components of Risk Management
To identify all the factors that may cause harm to employees and others (*the hazards*)

To consider what the chances are of that harm actually befalling anyone in the circumstances of a particular case and the possible consequences that could come from it (*the risks*)

To enable employers to plan, introduce and monitor preventive measures to ensure that the risks are adequately controlled at all times.
What is a Hazard?

Source or situation with potential for harm in term of:

i. Human injury
ii. Ill health
iii. Damage to property
iv. Damage to workplace environment
v. Or combination of these

What is a Risk?

Combination of the likelihood and consequence(s) of a specified hazardous event occurring.
Risk – 2 Elements

• **Likelihood** that a hazard may occur (probability).

• Consequence(s) of the hazardous event (severity).

Definition

• **Hazard**
  A source or a situation with a potential for harm to humans, property and damage of environment or a combination of these.

• **Danger**
  Relative exposure to hazard.

• **Risk**
  A combination of likelihood of occurrence and severity of injury or damage.
What is risk assessment?

Overall process of estimating the magnitude of risk and deciding whether or not the risk is tolerable.

Risk Control

Measure taken to eliminate or mitigate the identified risks.
Other Definitions

• Tolerable risk – risk that has been reduced to a level that can be endured by the organization having regard to its legal obligations and its own OSH policy.

• Interested party – individual or group concerned with or affected by the OSH performance of an organization.

The Process of Risk Management

Classify Activities
(Work, Product, Services)

Identify Hazard

Assess The Risk

Risk Control

Review Risk Control
Risk Management

Risk Management describes the total procedure associated with identifying a hazard, assessing the risk, putting in place control measures, and reviewing the outcomes.

Planning of HIRARC

• Ongoing HIRARC activities

• HIRARC Covers:
  - Routine and non-routine activities
  - Activities of all personnel including non employees (contractors, visitors)
  - Facilities at the workplace
Process of HIRARC

SECTION 2
When to Conduct HIRARC

- For situation:
  - Where hazard appear to pose significant threat
  - Uncertain whether existing controls are adequate
  - Before implementing corrective or preventive measures

- By organization intending to continuously improve OSHMS.

HIRARC Process – 3 Basic Steps

1. Identify Hazard

2. Estimate risk from each hazard
   - Probability of occurrence
   - Severity of harm

3. Decide if risk is tolerable.
Why is HIRARC Important?

- Legal obligations (certain countries).
- To determine whether existing or planned controls are adequate.
- "Risks should be controlled before harm could occur".

Criteria for HIRARC Process

1. Classify work activities
2. Consultation
   - Employer Representative
   - Worker Representative
3. Identify Hazards
4. Risk Assessment
5. Prepare Risk Control Action Plan (if necessary)
6. Implement
7. Review
Classify work activities

Possible ways.

- geographical or physical areas within/ outside premises.
- Stages in production/service process
- Not too big. E.g. building a car
- Not too small. E.g. fixing a nut
- Defined task
  - e.g. loading, packing, mixing, fixing the door

Work activities Information Requirement

- Tasks carries out
  - duration & frequency
  - Site/location
  - Who involved/affected
  - Written system of work
- Plant/machinery used
- Tolls/equipment used
- MSDS/CSDS
- Services used
  - Compressed air, steam
- Type of material handled
- Distances/heights material to be moved
- Acts/Regulations/COP
- Reactive monitoring data
- Advice from specialist
Determine risk
Make a subjective assessment of risk associated with each hazard assuming that planned or existing controls are in place.

Decide if risk is tolerable
Judge whether planned or existing OSH precautions (if any) are sufficient to keep the hazard under control and meet legal requirements.

Prepare risk control action plan (if necessary)

Prepare a plan to deal with any issues found by the assessment to require attention.

Organizations should ensure that new and existing controls remain in place and are effective.
Execute the risk control plan.

Monitor the effectiveness of the plan.

Review

Re-assess risks on the basis of the revised controls.

Check that risks will be tolerable.
HAZARD IDENTIFICATION

Hazard Identification

- To keep workplace safe and healthy. Employers should make sure there are no hazards to which employees could be exposed.
- Employers should look for hazards in advance as part of their risk management plan to prevent potential hazards.
Classify Work Activities

Identify Hazards

Identify all significant hazards relating to each work activity.

Consider who might be harmed and how.
1. Is there a source of harm?
2. Who could be harmed?
3. How harm could occur?

General (Qualitative) methods

1. Previewing legislation and COP
2. Using hazard checklist
3. Conducting survey (audit), observation
4. Assessing competency of personnel
5. Analyzing reactive data (previous incidents data)
6. Analyzing work process
7. Through consultation with employees
8. MSDS/CSDS
9. Seeking advice from specialist
10. OSH Journal / publications
HAZARD IDENTIFICATION TOOLS

Quantitative Methods

- Hazard and Operability Study (HAZOP)
- Failure Mode and Effects Analysis (FMEA)
- Job Safety Analysis (JSA)
- Fault Tree Analysis (FTA)
HAZOP

• To identify hazard in process and operability problems.

• To study effects of deviation from process design condition.

• It takes a representation of a system and analyses how its operation may lead to an unsafe deviation from the intent of the system.
**HAZOP**

Guide Words

- None of ..... 
- More of ..... 
- Less of ..... 
- Part of ..... 
- As well as ..... 
- Reverse ..... 
- Other than ..... 

**FMEA**

FMEA is a systematic approach to;

- Recognize and evaluate the potential failure of a product/process and the effects of that failure.
- Identify actions that could eliminate or reduce the chance of potential failure occurring.
- Document the entire process.
Types of FMEA

All FMEAs focus on the design, be it product or process:

• Design of FMEA (of product)

• Process FMEA (of process)

FMEA

<table>
<thead>
<tr>
<th>System</th>
<th>Component</th>
<th>Failure Mode</th>
<th>Failure Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrubber</td>
<td>Water pump</td>
<td>Inadequate water flow</td>
<td>Increased environmental pollution</td>
</tr>
</tbody>
</table>
Where are FMEA's currently used?

• Aerospace - Complex systems, processes and products
  Low volume manufacturer

• Automotive - Complex systems, processes and products
  High volume manufacturer

When are FMEA applied?

• During the Advanced Product Quality Planning Process (APQP).

• Design FMEA applied during the product design and development.

• Process FMEA applied during process design and development.
JSA

• Ideally, all jobs should be subjected to JSA.

• Usually useful for non routine activities.

JSA basic procedure

• Select job to be analyzed
• Define the scope of the job
• Organize the job into sequential logical steps
• Observe each job step to determine the hazards
• Develop preventive measure to eliminate the hazards
• Shows the relation between system failure
  - a specific undesirable event in the system, and
  failures of the components of the system

• Technique based on deductive logic, using
  “AND” and “OR” gates

• An undesirable event is first defined and casual
  relationships of the failures leading to that
  event
  are then identified

• Based on factual approach
SECTION 3.2

HAZARD TYPES
Safety Levels

**Prevention**
- Mechanical Integrity
- Predictive/preventive maintenance
- Operator training
- Human factors
- Impact barriers
- Adequate procedure

**Control**
- Automatic Process control system
- Manual controls
- On-line spares
- Backup systems

**Protection**
- Alarms
- Operator intervention
- Interlocks, trips
- Emergency shutdown
- Last resort controls
- Emergency relief
- Ignition source control

**Mitigation**
- Emergency response
- Sprinkler, deluge
- Dike, trench
- Blast wall, barricade
- Water curtain
- Personal Protective Equipment

**Hazard** → **Cause** → **Deviation** → **Accidental Event** → **Impact**

**Classification & Potential Sources of Hazards**

<table>
<thead>
<tr>
<th>Classification</th>
<th>Example of Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical</td>
<td>- Sharp points &amp; edges, overload.</td>
</tr>
<tr>
<td>Electrical</td>
<td>- Insulation damaged or cover broken</td>
</tr>
<tr>
<td>Biological</td>
<td>- Exposed, airborne/blood borne microorganism.</td>
</tr>
<tr>
<td>Chemical</td>
<td>- Expose to carcinogens chemical</td>
</tr>
<tr>
<td>Ergonomics</td>
<td>- Expose to unnatural postures</td>
</tr>
<tr>
<td>Psychological</td>
<td>- Stress or violent at workplace.</td>
</tr>
</tbody>
</table>
Classification of Hazards in construction

• Physical
• Electrical
• Mechanical
• Psychosocial
• Biological
• Chemical
• Ergonomics

 SOURCES OF HAZARDS

Man  Unsafe acts
Machinery  Installation, layout and design of equipment
Materials  Substances such as chemicals and gases use in the workplace
Method  The way people carry out their work
Media  Workplace condition i.e. air quality, ventilation, lighting, noise, vibration etc.
• To facilitate hazards identification, useful to categorizes hazards in different ways, e.g. by topic;

  ✓ Chemical
  ✓ Physical
  ✓ Biological
  ✓ Ergonomics
  ✓ Psychosocial
  ✓ Mechanical
  ✓ Electrical
  ✓ Machinery

**Broad Categories of Hazards**

**Physical Hazards**

**PHYSICAL**

- Noise/Vibration
- Extreme Temperature (Heat/Cold)
- Radiation
- Machinery/Equipment
- Height/Gravitational
- Electrical
- Fire/Explosion
- Confined Space
- Slip/Trip/Fall
- Vehicles
- Water
Chemical Hazards

**CHEMICAL**

- Very Toxic
- Toxic
- Corrosive
- Harmful
- Irritant
- Explosive
- Oxidizing
- Extremely Flammable
- Highly Flammable
- Flammable

Biological Hazards

**BIOLOGICAL**

- Animals – Wild Dogs, Snakes, Scorpions
- Plants – Poisons, irritants, Rashes
- Bacteria – Legionella
- Viruses – Influenza, HIV, Hepatitis
- Yeast – Cryptococcus
- Fungi – Tineas
- Parasites – Ticks, Gardia,
Ergonomics Hazards

ERGONOMIC

- Repetitive Work - Prolonged Similar Task
- Manual Handling - Lifting, Pulling, Pushing, Twisting
- Computer Works - Sitting Posture, Eyes Strain
- Lighting - Adequacy of Light
- Ventilation - Indoor Air Quality

Psychosocial Hazards

PSYCHOSOCIAL

- Shift work - Prolonged night duty
- Stress - Multifactor
- Violence - Individual, Group
- Harassment - Sexual, Bullying
### Classification and Potential Sources of Hazards

<table>
<thead>
<tr>
<th>Classification of Hazards</th>
<th>Example of Potential Sources of Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical</td>
<td>Pinch points, sharp points and edges, overload or force a tool beyond its capabilities and grinding wheel without guard</td>
</tr>
<tr>
<td>Electrical</td>
<td>Electrical cord insulation damaged, electrical face plate or cover broken or missing and fan cord insulation pulled loose</td>
</tr>
<tr>
<td>Biological</td>
<td>Exposed to airborne and blood borne viruses, bacteria and fungus</td>
</tr>
</tbody>
</table>
# Classification and Potential Sources of Hazards

<table>
<thead>
<tr>
<th>Classification of Hazards</th>
<th>Example of Potential Sources of Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical</td>
<td>Exposed to carcinogens chemicals, sensitizers and corrosive chemicals.</td>
</tr>
<tr>
<td>Ergonomics</td>
<td>Repeated exposure to unnatural postures and unnatural movement, wrong design of workstation, tools and task.</td>
</tr>
<tr>
<td>Psychological</td>
<td>Stress, sexual harassment and violent at work.</td>
</tr>
</tbody>
</table>

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## RISK ASSESSMENT
Classify Work Activities

Identify Hazards

Risk Assessment

Determine Risk

Risk = Likelihood \times Severity

Likelihood: \text{likelihood} the specified hazardous event occurring
Severity: \text{consequence(s)} of specified hazardous event occurring
ANALYZING RISK

SECTION 4.1

Likelihood of Occurrence

• Consider
  - The availability of control measures
  - The existing control measures
  - Likelihood of failure of the control measures
  - Legal requirements and Code of Practice covering controls of specific hazards
Consider:
- No. of personnel exposed
- Frequency & duration of exposure to hazard
- Failure of services (electricity, water)
- Failure of machinery & safety devices
- Protection afforded by PPE

Likelihood of Occurrence

Consider unsafe acts by personnel who
- unaware of hazards
- do not have knowledge or skills to do the task
- underestimate risks
- overlook safety procedures

Establish the ranking. Example;
- Very unlikely
- Unlikely
- Likely
- Most likely
- Certain
Factors for consideration in a workplace risk assessment.

- Maintenance: Maintenance of structure, equipment, systems, 5S etc.

- Environmental Factors: Ventilation, Temperature control, Lighting, 5S, Room dimensions and space, workstations, seating etc.

- Structural Features: Floor & traffic routes, transparent windows & doors, gates, escalator etc.

- Fire Protection

- Emergency Procedure

- Vehicle Movements

- Electrical Installations and Appliances

- Information, Instruction, Training and Supervision
Factors for consideration in a **work equipment** risk assessment.

- **Suitability**
- **Maintenance**
- **Specific Risk**
  - Only be used by designated and trained user.
- **Information, Instructions and Training**
- **High or very low temperature**

- **Controls**
  - Stop controls, emergency stop controls, controls etc.
- **Stability**
- **Lighting**
- **Markings and Warnings Sign**
Factors for consideration in a **health** risk assessment.

- Substances or type of substances
- Effects of the substances
- Location and form (gas, fumes, mist etc.)
- Exposure Duration (including OSHA requirements)
- Storage Requirements
- Air Monitoring & Health Surveillance Requirements
- Information, Instruction and Training

Factors for consideration in a **noise** risk assessment.

- **Noise exposure records**
  - Noise mapping, Audiometric Test etc.
- **Action taken**
- **Noise control programmes**
- **Information, Instruction and Training**
Very unlikely (1) | Unlikely (2) | Likely (3) | Most Likely (4)
---|---|---|---
The probability to happen is extremely small (<1%) | Could happen, however very rare (1 – 9%) | Chances to happen is relatively high (10 – 59%) | Can happen frequently (60 – 100%)

Severity of Harm

- To establish potential severity of harm, consider
  - part(s) of the body likely to be affected
  - nature of harm
  - nature of property damage
  - establish the ranking. Example;
    - Negligible
    - Minor
    - Major
    - Critical
    - Catastrophe
<table>
<thead>
<tr>
<th>Risk Level</th>
<th>Nature of Injury</th>
<th>Nature of Property Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negligible (1)</td>
<td>First aid only</td>
<td>Unnoticeable damage</td>
</tr>
<tr>
<td>Minor (2)</td>
<td>Medical treatment, Outpatient</td>
<td>Damage with repair cost &lt; RM1K</td>
</tr>
<tr>
<td>Major (3)</td>
<td>Hospitalized, disabling injury, recoverable</td>
<td>Significant damage with repair cost &gt; RM1K but &lt; RM50,000</td>
</tr>
<tr>
<td>Critical (4)</td>
<td>Permanent Disability, Single casualty, Multiple casualty</td>
<td>Heavy damage with repair cost &gt; RM50K but &lt; RM0.5M; or more Damage cost &gt; RM0.5M</td>
</tr>
</tbody>
</table>

**SECTION 4.2**

**EVALUATION OF RISK**
RISK RATING

Risk Rating = Existing Control Measure (ECM) X Frequency (F) X Likelihood (L) X Severity (S)

Likelihood: likelihood or probability that an accident or incident could occur
Severity: consequence(s) that an accident or incident could occur (in terms of injury, damage or loss)

<table>
<thead>
<tr>
<th>TAHAP</th>
<th>KEMUNGKINAN</th>
<th>KETERANGAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Sangat mungkin</td>
<td>Kejadian boleh berlaku dengan kerap (setiap hari)</td>
</tr>
<tr>
<td>3</td>
<td>Mungkin</td>
<td>Kejadian boleh berlaku sekali-sekala (setiap minggu)</td>
</tr>
<tr>
<td>2</td>
<td>Tidak mungkin</td>
<td>Kejadian boleh berlaku tetapi jarang (setiap bulan)</td>
</tr>
<tr>
<td>1</td>
<td>Sangat tidak mungkin</td>
<td>Kejadian boleh berlaku tetapi kemungkinan tidak (setiap tahun)</td>
</tr>
</tbody>
</table>
### Jadual : Ukurtara keterukan (kualitatif)

<table>
<thead>
<tr>
<th>TAHAP</th>
<th>AKIBAT</th>
<th>KETERANGAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kecederaan yang boleh diabaikan</td>
<td>Kecederaan hanya memerlukan pertolongan cemas di tempat kerja/saja kemanangan hampir</td>
</tr>
<tr>
<td>2</td>
<td>Kecederaan ringan</td>
<td>Cedera atau sakit yang memerlukan cuti daripada kerja (maksimum 4 hari)</td>
</tr>
<tr>
<td>3</td>
<td>Kecederaan teruk</td>
<td>Hilang upaya sementara atau cuti sakit melebihi 4 hari</td>
</tr>
<tr>
<td>4</td>
<td>Kematian</td>
<td>Kematian atau hilang upaya kekal</td>
</tr>
</tbody>
</table>

### Jadual : Jadual Risiko Kuantitatif

<table>
<thead>
<tr>
<th>AKIBAT</th>
<th>KEMUNGKINAN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sangat Mungkin</td>
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<tr>
<td>Kematian</td>
<td>4</td>
</tr>
<tr>
<td>Kecederaan Teruk</td>
<td>3</td>
</tr>
<tr>
<td>Kecederaan Ringan</td>
<td>2</td>
</tr>
<tr>
<td>Kecederaan yang boleh diabaikan</td>
<td>1</td>
</tr>
</tbody>
</table>

**Formula Penaksiran Risiko:**

\[
\text{Risiko} = \text{Akibat} \times \text{Kemungkinan}
\]
### RISK MATRIX

#### Example

<table>
<thead>
<tr>
<th>CONSEQUENCE</th>
<th>LIKELIHOOD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very Likely</td>
</tr>
<tr>
<td>Fatality</td>
<td>HIGH</td>
</tr>
<tr>
<td>Major injuries</td>
<td>HIGH</td>
</tr>
<tr>
<td>Minor injuries</td>
<td>HIGH</td>
</tr>
<tr>
<td>Negligible injuries</td>
<td>MEDIUM</td>
</tr>
</tbody>
</table>

**Nomogram for analyzing risk and cost justification (from G. F. Kinney and A. D. Wiruth, Practical Risk Analysis for Safety Management).**
Risk Assessment

Gather information about each hazard identified

How many people are exposed to each hazard and for how long

Use the information to assess the LIKELIHOOD and CONSEQUENCES of each hazards

Use a risk table to work out the RISK associated with each hazards

How LIKELY is it that a hazardous event or situation will occur?
- Very likely - frequently
- Likely - Occasionally
- Unlikely - happen but only rarely
- Highly unlikely - happen but probably never will

What might be the CONSEQUENCES of a hazardous event or situations
- Fatality
- Major injuries (normally irreversible)
- Minor injuries (normally reversible requiring several days off work)
- Negligible injuries (First Aid)

Is the RISK tolerable?

✦ IF YES !
  - Leave them alone,
  - But need MONITORING……..

✦ IF NO !
  - Need CORRECTIVE /PREVENTIVE MEASURES.
Actions & Recommendations

• All related statements should be made
• With no cost restraints
• Should be reviewed every 4 months
• Need management support

Risk Assessment

• Is the process of evaluating the risk to safety & health from hazards at work

Types
- Qualitative
- Semi-quantitative
- Quantitative
How To Assess Risk

1) Look for the Hazards
2) Decide who might be harmed & how
3) Evaluate the risk and check what is done to prevent it from happening
   • 4) Record finding
   • 5) Review assessment and revise it if necessary

Types of Risk Assessment

• Qualitative - (Use Risk Matrix)
  -table scales for likelihood and severity
• Fatality
• Major injuries
• Minor injuries
• First aid or near misses
Types of Risk Assessment

- Based on statistic
  - Likelihood
    - Very likely
    - Likely
    - Unlikely
    - Highly Unlikely

Qualitative Risk Table

<table>
<thead>
<tr>
<th>Severity</th>
<th>V/Likely</th>
<th>Likely</th>
<th>Unlikely</th>
<th>H/Unlikely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatality</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>Major Injuries</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Minor Injuries</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>First Aid/N/misses</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>
Semi-Quantitative Risk Assessment

Severity Categories
1. First Aid
2. Less than 4 days M/C
3. More than 4 days M/C
4. Fatality & Permanent Disability

Semi-Quantitative Risk Assessment

Likelihood Occurrence
1. Yearly
2. Monthly
3. Weekly
4. Daily
Semi-Quantitative Risk Table

<table>
<thead>
<tr>
<th>SEVERITY</th>
<th>LIKELIHOOD</th>
<th>Yearly</th>
<th>Monthly</th>
<th>Weekly</th>
<th>Daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Aid</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>&lt; 4 Days MC</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>&gt; 4 Days MC</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Fatality &amp; Permanent Disability</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>12</td>
<td>16</td>
</tr>
</tbody>
</table>

Quantitative Risk Assessment

- In cases where hazards are numerous and complex eg; Chemical process plant

- Should have Job Safety Analysis (JSA)
  - describe job in less than 10 steps
  - List things that can go wrong
    - eg; Changing a Car Wheel
SECTION 5

RISK CONTROL APPROACH

Classify Work Activities

Identify Hazards

Risk Assessment

Prepare risk control action plan
Selection of Risk Controls

• **Eliminate hazards**
• **Substitution**
  - Using less hazardous chemicals
• **Engineering Control**
  - Isolation
  - Safety switch
  - Adapt work to individual
  - Local exhaust ventilation (LEV)
  - Water spray
  - Machine Guarding
  - Detection system
  - Enclosure / closed system

Selection of Risk Controls

• **Administration Control**
  - Planned maintenance
  - Emergency preparedness and Response (ERP)
  - Training – on work instruction, PPE, ERP, safe handling etc.
  - Competency requirement
  - Signage
  - Procedure, work instruction
  - Medical Surveillance
  - Supervision
  - Hygiene practice
Selection of Risk Controls

• PPE as last resort
  - Safety helmet
  - Safety shoes
  - Body harness
  - Protective clothing
  - Goggle
  - Face shield
  - Mask/Respirator – dust, vapor, fume, gas
  - Glove
  - Ear plug
Classify Work Activities

Identify Hazards

Risk Assessment

Prepare risk control action plan

Review adequacy of action plan

Review adequacy of action plan

• Tolerable risk achieved?
• New hazard created?
• Is it cost effective?
• Control practical?
The HIRARC will be reviewed and maintained as follows:

- As part of the annual management review process
- As a consequence of any significant changes to the organization’s activities, products or services
- As a consequence of any relevant changes to the register of applicable legislation
- As a consequence of feedback from non-conformances identified during internal or external audit process

When to Review HIRARC

- Incorporate into OSH objectives
- Continuing process
  - Feedback loop from subsequent experience to amend HIRARC, if necessary
- Proactive measure, not reactive.
- Review at a pre-determined time or period

Managing HIRARC
**Actions & Recommendations**

- EL - Eliminate
- SL - Substitute
- IS - Isolation
- EC - Engineering Control
- AC - Administration Control
- PPE - Personal Protection Equipment

Eg;
EL - stop work, cover hazard...
SL - use other route, other material..
IS - put up temporary barrier,...
EC - construct permanent wall,..
AC - put up notice, job rotation,...
PPE - gloves, respirator,......
The Process of Safety Risk Management

Start

1. Classify Activities
   (Work, Product, Services, Activities)

2. Identify Hazards

3. Determine Risk*/Impact

4. Decide if Risk is Tolerable
   Decide if Impact is Significant

5. Prepare Risk Control Action Plan

6. Review Adequacy of Action Plan

*Risk = Harm X Likelihood

Conclusion

Hazard identification, risk assessment, control and review is not a task that is completed and then forgotten about.

Hazard identification should be properly documented even in the simplest of situations.

Risk assessment should include a careful assessment of both likelihood and consequence. Control measures should conform to the recommendations of the hierarchy of control.

The risk management process is an ongoing one.
Terima Kasih

Be Safety Minded Be Safety Smart,
Think of Safety Before You Start.