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Detection of Threats and Risk Assessment Methodology

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Abstract- **Detection of Threats and risk assessment may be a tool employed in industries to spot the hazard and supply suitable control measures as per the danger concerned in every hazard during this risk area unit assed by quantitative and qualitative methodology it helps to provide control measures. Qualitative risk assessment is performed by analysis the known risk with Stakeholders, Legal necessities, Incident information and Emergency considerations. Quantitative risk assessment is performed by Risk priority range that obtained from multiplying frequency and length of exposure with severity of hurt. At the moment effective management measures are created supported the danger priority range. Management measures area unit provided to be in following order Elimination, Substitution, Isolation, Engineering management, body management and private protecting instrumentality. This methodology applicable to any or all industries to assess risk and improve safety standards within plant**

Index terms: - **Hazards, risk**

I. INTRODUCTION

Hazards are unplanned event that have potential to cause damage or harm to employees, setting and Property and risk is that the likelihood or chance of that hazard to cause damage. All the industries geographic point consists of hazard and risk that creates and cause accidents. To eliminate these accidents each industries performed Hazard identification and Risk assessment technique during this Qualitative and Quantitative assessment area unit helpful technique to spot hazard there are a 3 reason for acting HIRA. It helps emergency management professionals brace oneself for the worst and/or presumably risks, permits for the creation of exercises, coaching programs, and plans supported the foremost probably eventualities, Saves time by uninflected hazards that may not occur within the selected space.

II. PROCEDURE FOR HAZARD IDENTIFICATION AND RISK ASSESSMENTS

1) The purpose is to evaluate the probability that people may be exposed to injury, illness or disease arising from any situation identified during hazard identification and determine the appropriate measures for risk control.

- Identifying and analyzing safety and health hazards associated with the works;
- Assessing the risks involved; and
- Prioritizing measures to control the hazards and reduce the risks.

2) Risk Assessment should be conducted by a team of persons who are involved in the respective area of activity. They should have a thorough knowledge of the work to be assessed. Team members should include management staff, engineers, technical personnel, supervisors, workers, machinery operators, maintenance staff and SHE personnel who are involved with the work, whenever necessary.

The RA Team shall be headed by the Project Manager or his appointed deputy who has undergone training and experience in risk assessment. Alternatively, a safety consultant trained in job safety analysis and risk management and has experience in risk assessment may be engaged to conduct risk assessment on the activities to be carried out in the Project.

3) The principal / employer / self-employed person / Project Director shall have the following responsibilities and delegated powers for Risk Management, which shall be exercised subject to any instructions, restrictions or requirements from time to time directed to or imposed upon him but not limited to the following:

- Designate, assign, appoint or engage a competent person leading a team of personnel (including contractors) associated with the process or activity to conduct risk assessment;
- 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 minimize or where possible, eliminate the risks;
- Provide a risk assessment register to record the findings of risk assessment;
- Endorse and approve the risk assessments conducted;
- Keep the risk assessment record for inspection by an inspector for at least three years from the date of assessment and submit the record to the Commissioner for Workplace Safety and Health if the Commissioner requires so;
- Review and update the risk assessment at least once every three years or progressively throughout the project or when there is significant change in the work process or after any incident/accident or if there is reason to suspect that the assessment is no longer valid;
- Ensure that all employees are aware of the risk assessment for the work activity they carry out;
- Develop and implement safe work procedures for work posing safety or health risks to workers; and
- Keep a written description of the safe work procedures and produce this to the inspector for inspection when requested.

4) The following three questions enable hazard identification

1. What can go wrong?
2. How bad could it be?

3. How could harm occur?

5) Prior to conducting a risk assessment, the following information (non-exhaustive) should be obtained:

- Work location plan
- Process flowchart
- List of work activities and/or trades
- List of chemicals used
- List of machinery and tools used
- Records of past incidents and accidents
- Relevant legislations
- Relevant code of practices or specifications
- Inspection records
- Details of existing risk controls
- Safety and health audit reports
- Feedback from staff, clients, suppliers or other stakeholders
- Safe work procedures
- Other information such as Safety Data Sheets (SDS), manufacturer's instruction manual, etc.
- Copies of any relevant previous risk assessment

6) Risk Assessment shall be updated or amended under the following circumstances:

- During initial risk assessment;
- Where there are a new or modified processes, products, activities or equipment as part of management of change;
- When there are other circumstances that may result in changes in risk level;
- Changes to comply with newly gazette legal requirements;
- When monitoring results indicate an abnormality;
- After occurrence of an incident or accident.
- When encounter with new or unfamiliar hazards and respective controls, consultation and communication with contractors shall be carried out.

7) The general risk control approach adopted shall comply with the following principles on hierarchy of controls:

- Elimination of the hazards as far as reasonably practicable;
- Substitution of the hazards as far as reasonably practicable;
- Applying the Engineering Controls;
- Administrative Control to reduce and mitigate the exposure to risks & hazards;
- Where the above fails, provision of suitable and effective Personal Protective Equipment (PPE).

8) The Risk Assessment shall be reviewed at least once every 3 years for continued relevancy, or progressively throughout the project duration when;

- New information on safety and health surfaces.
- Significant change in work practices or processes.
- Accident/incident happens as a result of exposure to a hazard.

The revised requirements shall be communicated to all affected parties.

9) When the risk assessment for an activity is completed, the Project Director shall ensure that control measures recommended are implemented during execution of the work by assigning responsibilities to the appropriate site managers/engineers.

Site inspection and hazard identification shall be carried out as works proceed to assess compliance with the control measures and their effectiveness. The inspection should check maintenance standards, employees' involvement, safe work practices, adherence to safe work procedures, etc.

10) After implementation of all risk control measures, the action officers shall monitor to ensure the continual effectiveness of risk control measures and All risk control measures shall be listed within the Trade-Based Risk Assessment form and monitored by action officers.

When the risk control measures are found deficient in meeting their intended goals of hazard reduction, appropriate modification or new risk control measure or additional risk control measures have to be in placed to mitigate and lower the risk level. The evaluation shall be reviewed by the immediate superior of the action officer.

III. QUALITATIVE ASSESSMENT OF RISK

Qualitative risk assessment methods can be used to identify assets to be detailed and bear a simple and rapid assessment. In this case, a single person or team can gather information. This assessment is used often when numerical data are inadequate or unavailable, resources are limited (budget or expertise) and time allowed is reduced. Like any risk assessment, the quality begins with obtaining information on risk factors, followed by risk classification in terms like "acceptable" or "unacceptable" or classifications such as "low", "medium", "high".

1. Incident data: Having Company and/or external incident data at hand can assist in validating the opinions/experience of the team
2. Stakeholders: Hazard/risk are expressed by Employees, Neighbors, Local residents
3. Legal requirement: Hazards/risk are expressed in applicable legal requirement such Indian factories act, State rules and regulation
4. Emergency situation: Emergency situation loss or damage to Environment, Property and Human

5. Brainstorming: It is a group creativity technique by which efforts are made to find a conclusion for the hazard/risk by gathering a list of ideas spontaneously contributed by its members.

IV. QUANTITATIVE ASSESSMENT OF RISK

RISK PRIORITY NUMBER (RPN) is obtained by multiplying Frequency & Duration of Exposure (A) and Likelihood & Severity (B)

RPN= A*B

1. Frequency &Duration of Exposure: Frequency and Duration of Exposure are determined by how long hazard get involved in the process?
2. Likelihood: This value is based on the likelihood of an event occurring. You may ask the question "How many times has this event happened in the past?"
3. Severity: Severity is based upon increasing level of severity to an individual's health, the environmental
4. Refer following tables to assign values for A and B

TABLE I (A) FREQUENCY & DURATION OF EXPOSURE

A(Frequency & Duration of Exposure)					
Duration of exposure	Frequency of Activity				
	Every shit	Daily	Weekly	Monthly	>1Month
<1hr	4	3	2	1.5	1
1hr-2hr	6	5	4	3	2
2hr-3:30hr	9	7	6	5	3
>3:30hr	10	8	7	6	4

TABLE II (B) LIKELIHOOD & SEVERITY

B(Severity & Likelihood)					
Likelihood	Severity				
	Catastrophic/Fatal	Major	Temporary disability	Minor Injury require first aid	Negligible/Physical discomfort
Almost Certain	25	18	12	8	5
Frequent	20	16	11	7	4
Occasional	15	12	8	5	3
Remote	10	8	5	3	2
Rare	5	4	3	2	1

TABLE III RECOMMENDED ACTIONS

RPN	Risk Category	Recommended Actions
<15	Very Low Risk	• These risks are acceptable. No further actions are not required
16-32	Low risk	• No additional risk control measures may be needed • Frequent review and monitoring of hazards are required to ensure that the risk level assigned is accurate does not increase over time
33-66	Medium risk	• A careful evaluation of hazards should be carried out to ensure that the risk level is reduced as low as reasonably practicable (ALARP) with in a defined time period • Interim risk control measures ,such as administrative consists of PPE, may be implemented while longer term measures are established • Management attention is required
67-112	High risk	• It must be necessary to prohibit or restrict activity • Arrangements should be made as quick as possible

>112	Very high risk	• These risks are not acceptable • High risk must be reduced to at least medium risk before work starts • If practicable hazard should be eliminated before work starts • Management review is required before work starts • Continual improvement in risk control is necessary

TABLE IV RISK MATRIX

(B)	25	25	50	75	100	125	150	175	200	225	250
	20	20	40	60	80	100	120	140	160	180	200
	18	18	36	54	72	90	108	126	144	162	180
	16	16	32	48	64	80	96	112	128	144	160
	15	15	30	45	60	75	90	105	120	135	150
	12	12	24	36	48	60	72	84	96	108	120
	10	10	20	30	40	50	60	70	80	90	100
	8	8	16	24	32	40	48	56	64	72	80
	7	7	14	21	28	35	42	49	56	63	70
	5	5	10	15	20	25	30	35	40	45	50
	4	4	8	12	16	20	24	28	32	36	40
	3	3	6	9	12	15	18	21	24	27	30
		1	2	3	4	5	6	7	8	9	10
	(A)										

	Very High Risk
	High Risk
	Medium Risk
	Low Risk
	Very Low Risk

V. CONCLUSION

Hazard identification and risk assessment is the effective tool used to reduce the risk and it is cost effective .It is easy to follow by all types of worker. It is also applicable to all the hazardous process. It helps the industry to provide control measures for hazards and risk by using the RPN. It helps to ensure zero accident/incident in shop floor. Production will be improved and loss time due to accidents is reduced as the employees will be from injuries.

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