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Health, Safety And Environmental Management Risk Evaluation Strategy: Hazard Matrix Application Case

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ABSTRACT: *To ensure that workers are protected during construction activities, all projects must have a construction safety management program in place to ensure compliance with mandated codes and standards. The Environment, Health & Safety Plan is required for each construction project. Environment Health & Safety plan is a written set of guides for managing site health and safety matters. The EHS plan must be prepared by the main contractor before the project is commenced. It is important that the safety plan is understood by every staff and worker on the site and be made available at all times. It addresses those activities associated with work to be performed. The outline of project EHS Plan contains objective of project, description of project ,resources and organization chart, roles and responsibilities of all, details of project EHS committee members, EHS risk assessment and safe work procedure for all activities, list of applicable legal & other requirement, work permit system to be followed, emergency response plan to deal with emergency situations, list of PPE applicable to perform the specific activity & their standard, training calendar and communication/reporting system EHS Plan assisting the project management team to perform their tasks in a normal and emergency situation. The field staff and the Site Safety professional will implement this plan during site work. Compliance with this Environmental, Health, and Safety Plan is required of all persons and third parties that perform fieldwork for project. The content of this EHS Plan may change or undergo revision based upon additional information made available to health and safety personnel, monitoring results, or changes in the technical scope of the work.*

Keywords: *EHS, Hazard matrix, PPE, IMS.*

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I. INTRODUCTION

This paper presents a risk evaluation and estimation methodology used for health, safety and environmental management prioritization strategies. Two case studies are presented and discussed throughout the usage of the hazard matrix. The hazard matrix is a risk management tool that promotes an organizations global health and safety at work evaluation. Workers, plant sectors and the work flow are interrelated and the exposure to hazards and environmental agents are evaluated and estimated. Analysis and discussion of the application contribute to the risk management process and determine loss prevention investments. The Health, Safety and Environmental – HSE Managers of any organization are constantly challenged to minimize the risks towards his productive processes Prioritization of actions is something always present. On the other hand shareholders need some form of guarantee showing their investments regarding health and safety at

work are being effective. This is a difficult matter to verify, once this investmen's expected result is something determined not to occur. Any event, accident or failure that as a consequence brings in return deaths, productivity losses or environmental accidents are undesired ones. In this management process one relates as necessary variable mapping and their relations, probabilistic parameters and classification of their impacts magnitude. The efficiency and efficacy of the implemented strategies should be evaluated in any company's safety performance determination. The learning curve of this process of development of risk knowledge must followed by the company's social body. Risk analysis most important techniques, like Preliminary Risk Analysis – PRA, Fault Tree Analysis – FTA, HAZOP and the Risk Matrix [1] are applied to discrete events to estimate parameters in a qualitative or

quantitative form. Normally Health and Safety at Work aims at the identification of agents and factors of hazard in the workplace where one finds difficulties in the determination, as well as, low standardization for the probabilistic factor and the gravity of consequences factor. With such a mixed pattern of hazards as noise, heat, ergonomic risks, fire and other accidents risk, environment risk, and their respective forms of estimation, comparison among them is a hard task. This becomes even worse inside a complex organization with several sectors and workers distributed around various production activities. It is necessary to consider that the level of exposition to each one of these agents and hazards has dimensions sufficiently differentiated. While the noise risk is the one that a worker is displayed depends on the intensity (gravity factor) and on the time of exposition (probability factor), that they are verified inside of the workplace; the fire risk, on the other hand, has its many

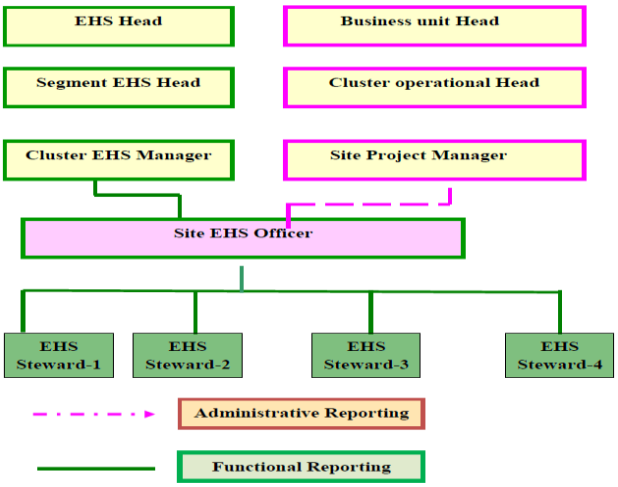
causes originated in other processes and sectors and its impact reaches diverse other stages of the production flow throughout the company, being its probabilistic and gravity factors affected by dimensions of the extended accident. However, the HSE manager during the recognition phase, inspection or technical audit perceives, with his

experience the weight of each estimate, which, if compared with a scale of normalized classification, will be able to analyze in a relative form the priority and convenience of each risk management strategy. This paper presents a methodology to approach this management activity regarding multiple hazards and agents of risks that operate in a production process. Two case studies of industrial plants in Rio de Janeiro, Brazil are presented and analyzed.

II. EHS RISK ASSESMENT

The initial questionnaire documented use of protective equipment and awareness about benefits of personal protective equipment (PPE), NIHL, hearing disability, and noise-induced syndromes, such as speech interference, noise annoyance, headache, anxiety, and sleep disturbance. The questionnaire was pretested and validated by the independent observers before it was used to assess the information. Data were collected through one-to-one interaction, as workers of these units were mostly illiterate or less educated; therefore the questions and statements were translated in Punjabi and Hindi and then workers were asked to fill out the questionnaires.

➢ **EHS organization chart:** EHS is an acronym for the set that studies and implements the practical aspects of protecting the environment and maintaining health and safety at occupation.



➢ **Severity of Hazard:** Severity is the degree or extent of injury or harm caused by the hazards, or as a result of an accident**.**

Severity Descriptions (The highest category will always be used)		
Value	**Result of Hazard to Personnel**	**Result of Hazard to Assets / Progress**
5	Single or multiple Fatality	Catastrophic Damages, Critical Delay
4	Serious Injury requiring hospitalisation	Major Damages, Serious Delay
3	Lost Time Accident	Serious Damage, Moderate Delay
2	Injury requiring Medical Treatment but not Lost Time	Moderate Damage, Minor Delay
1	First Aid treatment only	Minor Damage, No Delay

➢ **Control of Risk / Impact:** Based on the level determined, controls should be selected to reduce the risk / impact level to an acceptable level. This can be done by reducing the Severity and/or Likelihood. Health & Safety Risks, Environmental Impact As indicated in the risk matrix, when the risk level is "High" or "Medium", effective and practicable risk controls must be implemented to bring down the High Risk level to ALARP Level "As low as reasonably practicable".

➢ **The Hazard Matrix:** The Hazard Matrix is a risk management tool that promotes an organization's global evaluation in relation to health and safety at work. This methodology allows a general or global view of a company's occupational risks. Determination of a Risk Ranking for all company's sectors and their respective hazards is fundamental for a Health and Safety Action Plan development.

- **EHS Risk Assessment:** The input for conducting the EHS Risk Assessment shall include, List of work activities, List of machinery and tools used Records of past incidents and accidents Relevant legislation Relevant codes of practice or specifications, Details of existing control measures, Feedback from staff, clients, suppliers, interested parties, Other information such as material safety data sheet (MSDS), manufacturer's instruction manual.
- **Residual Risks / Impact:** Residual risks / Impacts are the remaining risks, impacts for which the planned controls are not able to effectively remove or control. It shall be ensured that the residual risks / impacts are acceptable and manageable**.**
- **Communication:** Employees at the workplace shall be communicated about the possible H&S risk they may be exposed to and / or the environmental impact which may be caused, during the course of work as identified in the risk assessment**.**
- **Work permit systems:** The following are the work Permit Systems to be followed in project:

Name of the Activity	Permit required
Work on Electrical lines	Shutdown checklist
Blasting	Blasting permit
Work on Railway electrification lines	Shut Down Clearance (HT / LT) cum Work Permit for Transmission Line, APDRP / Rural Electrification and other Works
Work at heights	Permit to work at night

- **Emergency response plan:** The main objectives of the emergency response plan shall be preserving the life, property and environment from the consequences of emergencies arising within the site, Systematic coordination of Emergency control action to arrest Escalation of emergency, to evacuate personnel within or outside the site where necessary and to rehabilitate them. Restoring normalcy in site operation with minimum loss of time.

III. CONCLUSION

All examples and studies presented demonstrate how this simple qualitative management tool is capable of integrating hazards, agents and exposition factors in a single matrix. This method gives an overview of a company's hazard load. Major risks' mitigation strategies can be proposed throughout analysis of the Hazard Matrix, considering probabilistic factors, gravity of consequences factors and the differentiated nature of all hazards. These investments effectively contribute for companies', as well as, governments, workers and society sustainability.

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