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Hazard Identification, Risk Assessment And Control Measures As An Iron Ore Pelletizing Industry

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Abstract- With the growing numbers of iron ore pelletization industries in India, various impacts on environment and health in relation to the workplace will rise. Therefore, understanding the hazardous process is crucial in the development of effective control measures. Hazard Identification, Risk Assessment, and Control measures (HIRAC) acts as an effective tool of Occupational Health Assessment. Objective: The aim of the study was to identify all the possible hazards at different workplaces of an iron ore pelletizing industry, to conduct an occupational health risk assessment, to calculate the risk rating based on the risk matrix, and to compare the risk rating before and after the control measures. From the data sources analysis make a an average, risk reduction was about 6.33 points lower after taking control measures. The hazards having high-risk rating and above were reduced to a level considered As Low as Reasonably Practicable (ALARP) when the control measures were applied, thereby reducing the occurrence of injury or disease in the workplace.

Keywords- HIRAC,ALARP,BFS, BHP

I. INTRODUCTION

Hazard Identification Risk Assessment (HIRA) is a method of defining and describing hazards by characterizing their probability, frequency, and severity and assessing unfavorable outcomes, such as potential losses and injuries. Typically 6-16 mm (0.24-0.63 in) in diameter, iron ore pellets are used as the primary fuel in blast furnaces. They typically have between 64 and 72 percent iron as well as various other materials that modify the pellets' chemical and metallurgical properties.

Evaluation of the risks associated with a hazard, consideration of the effectiveness of any existing controls, and determination of whether or not the risks are acceptable are all steps in the risk assessment process. The objective is to eliminate and/or control the hazards with critical and high potential risk to the lowest reasonable risk level in order to safeguard workers from harm because it is impossible to completely eliminate all hazards. Iron and steel slags contain higher levels of the elements manganese, barium, and vanadium than the background soil environment values.

It is recommended that industrial solid wastes, such as iron and steel slags, be prohibited from being used for soil remediation or conditioning directly in farmlands by solid waste disposal methods in order to ensure soil health, food safety, and environmental quality and to prevent pollutants from entering the food chain and endangering human health [1]. The purpose of this study was to measure physiological and phenological parameters in order to assess the effects of industry emissions on representative members of the restinga flora [2]. These findings point to a potential new approach for reclaiming challenging sites using compost made from municipal solid waste [2]. The study uses a case study approach based on openly available data to evaluate the companies' water risk management. The analysis identifies a number of problems, including the overuse of joint ventures' discretion in assessing water risk, the need for a dedicated water risk function, and inadequate contingency planning for communities affected by the organization's operations [3]. Disruptions can occur during any stage of production, which can result in the production of faulty goods.

The disturbances are rarely found right away; instead, they must be tracked down later. Therefore, traceability—the ability to track a product through the manufacturing process—is essential because it helps identify the source of any disturbance [4]. This chapter begins with a summary of global iron ore production, trade, reserves, and resources. It then goes on to list the top ten countries that produce the most iron ore [5]. The paper makes the case that there were numerous missed opportunities for learning. The classification of a hazardous area was based on faulty reasoning, significant root causes were not identified, inherent safety in design principles were disregarded, the ATEX assessment was insufficient because it only considered electrical installations and ignored work operations, and powered industrial trucks were not recognized as a source of ignition [6].

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II. HAZARD AND RISK IN IRON ORE PELLETIZING INDUSTRY

This chapter's goal is to identify the safety risks connected to daily operations and to put risk management strategies into action for the Pellet Plant. Burns, fire, falls, exposure to dust, smoke, noise, heat, and gas, among other safety hazards, are all part of the entire process of producing iron oxide pellets.

1. Process In Iron Ore Pelletizing Industry:
Pellet Plant produces Pellets using Iron ore and additives such as limestone, bentonite, coke, anthracite coal, quartzite which are passed through balling disc/drum and the green pellets so formed are passed through a furnace either straight grate or rotary kiln to produce High Grade Pellet which are used in Steel making in Blast furnace or Direct reduction plants for steel making A pelletizing plant includes five processes: Raw material receiving, 2) Pre-treatment 3) Additive and Binder proportionating and Mixing.

1. Process of receiving raw material:
A pelletizing plant's location has an impact on how raw materials like iron ore, additives, and binders are delivered.

2. Pre-treatment process of Iron Ore Fines:
Iron ore fines are ground into a finer size during the pre-treatment process, making them suitable for the formation of green balls. The iron ore fines are ground using either a dry or wet grinding process. Equipment such as a drier, ball mill, cyclones/bag filters, hot air generator recirculation fan, air slide, bucket elevator, etc. are needed in the dry grinding process. Equipment like a ball mill, cyclones, slurry pumps, thickener, filter press, etc. are needed for the wet grinding process. Iron ore fines are ground in a ball mill while adding coal, lime stone, and other additives during dry grinding.

3. Pre-treatment process of additives
Before combining with iron ore fines, additives like lime stone, dolomite, and coal/coke must be ground. In contrast to the dry grinding of iron ore, lime stone/dolomite, coke, and bentonite are all ground in separate roller mills while the others are combined in a ball mill. The mill itself, a recirculation fan, a HAG, a cyclone or bag filter, etc., make up the grinding system.

4. Proportionating & Mixing
Pre-wetting entails evenly distributing a sufficient amount of water into the dry ground material to create pre-wetted material that is ideal for balling. To create the green balls and obtain the necessary quality in the finished product, an iron oxide pellet, this material must be mixed with additional materials known as binders and additives.

5. Safety policies
The following goals are to be attained: a) Ongoing decrease in the frequency of work-related illnesses, accidents, fatalities, disasters, and the loss of national assets. b) Better coverage of work-related illnesses, fatalities, and injuries as well as the availability of a larger data base to support improved performance and oversight.

6.Preamble
The preamble contains Directive Principles of state policy under theconstitution of India relating, Securing the health and strength of employees, men and women; Non-abuse of the tender age of children, Citizens are not forced by economic necessity to enter avocations unsuited to their age or strength, Just and human conditions of work and maternity relief. Providing a statutory framework on Occupational Safety and Health in respect of all sectors of industrial activities including the construction sector, designing suitable control systems of compliance, enforcement and incentives for better compliance.

7.Safety leadership:

It is possible to think of safety leadership as playing a part in setting a course and assisting others in moving in that direction. The presentation and measurement of focus points, the management of critical incidents and crises, resource allocation, deliberate role modeling, teaching and coaching, rewarding systems, recruitment and promotion, and resource allocation are some examples of primary embedding mechanisms that can be used to achieve this.

8. Safety culture
More clarification is still required regarding the meanings of and connections between safety culture and safety climate. The factors and indicators that support safety culture and climate, as well as their causes, still need to be addressed. Generally speaking, culture derives from three sources: 1) The ideas, principles, and presumptions that guided the creation of an organization; 2) Group members' learning experiences as their organization changed.

9. Safety climate
One of the key indicators or predictors of safety outcomes in organizations is the safety climate. Although an empirical connection between limited safety climate perceptions and actual safety behavior has been established, there is still a lack of understanding of how these issues are related in detail.

10. Safety performance
The evaluation of safety processes and procedures to ascertain how well those systems operate is known as safety performance. It entails assessing safety policies and regulations, determining potential hazards, assessing risk levels, and conducting accident investigations.

III. CONCLUSION

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Defining and analyzing hazards is the first step in ensuring worker safety and protection from occupational diseases. In all manufacturing industries, studying should be a standard procedure. This aids in achieving two goals: first, it helps identify the critical and high-risk hazards that need to be dealt with first; and second, by putting control measures in place as soon as possible, it lowers the risk to an acceptable level. Regardless of the method employed for hazard elimination and/or control, it is crucial to assess how the method will affect how the equipment, substance, system, or environment is used. This will help to ensure that the control does not exacerbate already-existing risks or create new ones. It is also crucial that everyone involved is made aware of the changes and, as needed, given the proper information, instruction, training, and supervision to guarantee that every worker is protected from harm and health risks. It is also advised that the area supervisor review the system or control after some time has passed in order to assess its continued suitability.

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