RISK ASSESSMENT AND HAZARD EVALUATION FOR PAPER INDUSTRIES

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Abstract

The paper industry has an important social role to play for the country. Use of paper is considered as an index of cultural growth. The paper industry is also contributing towards fulfillment of various requirements of the industry as a whole like information dissemination, publicity, etc. Pulp and paper manufacturing can be very hazardous due to massive weight and falling, rolling, and sliding pulpwood loads. Workers may be struck or crushed by loads or suffer lacerations from the misuse of equipment, particularly when machines are used improperly or without proper safeguards. Hazardous chemicals used in pulp and paper mills require careful handling and continuous monitoring to minimize threat to workers, processes, and nearby communities. The production and use of paper has a number of adverse effects on the environment like deforestation, air pollution(NO_2,SO_2,CO_2 emissions), waste water discharge (contains solids, lignin, alcohols, transition metal compounds, nitrogen and phosphorus, etc.), landfills. This project helps to identify various safety and health hazards in the pulp making process and recommend the new suited methods to improve the workplace safety and health in paper industry.

Key words: Effluents, Pollution, Wastewater, Industrialization.

1.INTRODUCTION

Seshasayee Paper and Boards Limited (SPB), the flagship company belonging to 'ESVIN GROUP', operates an integrated pulp, paper and paper board Mill at Pallipalayam, Erode-638007, District Namakkal, Tamilnadu, India. SPB, incorporated in June 1960, was promoted by Seshasayee Brothers (Pvt) Limited in association with a foreign collaborator M/s Parsons and Whittemore, South East Asia Inc., USA. After commencement of commercial production, having fulfilled their performance guarantee obligations, the foreign collaborators withdrew in 1969. Main promoters of the Company on date are a group of companies belonging to the ESVIN group headed by Sri Mr N.Gopalaratnam chairman SPB Group‟s. SPB commenced commercial production in December 1962, on commissioning a 20000 tpa integrated facility, comprising a Pulp Mill and two Paper Machines (PM-1 and PM-2), capable of producing, writing, printing, Kraft and poster varieties of paper .The Plant capacity was expanded to 35000 tpa in 1967-68, by modification of PM-2 and

addition of a third Paper Machine (PM-3). The cost of the expansion scheme, at Rs 34 Million, was part financed by All India Financial Institutions (Rs 31Million).

In the second stage of expansion, undertaken in 1976, capacity was enhanced to55000 TPA, through addition of a 60 tpd new Paper Machine (PM-4). Cost of the project including cost of a Chemical Recovery Boiler and other facilities for enhanced requirementof utilities, was estimated at Rs. 176 Millions. The same was part financed by term loansfrom Institutions and Banks to the extent of Rs. 145 Millions and the balance out ofinternal generation. SPB undertook various equipment balancing and modernizationprograms, since then, for improving its operating efficiency, captive power generationcapacity, etc., up to 1992-93.

VISION

To excel as a trusted, socially responsible and customer driven organization providing maximum value to all stake holders.

MISSION

To manufacture quality products at competitive cost through technology and team work.

VALUES

The Company has adopted the following values:

- Customer focus
- Commitment to society, safety and environment
- Professional and Transparent Management
- Empowerment and Accountability
- Adaptability to “Change”
- Innovation and Creativity
- Emphasis on human resources development, cost reduction, productivity enhancement.

2 PROBLEM IDENTIFICATION

2.1 BAGASSE PULPING PROCESS HAZARDS

Bagasse pulping process is a large integrated sector. This sector employs lot of conventional technologies and also it‟s an old pulp mill process in SPB mill. In this area, found a more number of medical aid injuries due to lack of attention in safety system. The following hazards are commonly associated with the bagasse pulp mill such as

2.1.1 Physical Hazards

- Slip and fall
- Caught between belt and conveyor system
- Electrical shock during starting of digester

- Explosion to oil splash
- Hit injury due to moving parts
- Noise level is high during starting of vacuum pump
- Hot surface area.
- Trapping contact with rotary parts.

2.1.2 Chemical Hazards

- Burn injury due to contact with hot pulp
- Chemical burn due to liquor splash
- Hot steam and white liquor splash on skin they cause severe burn injury

2.1.3 Ergonomical Hazards

- Body strain due to repetitive work
- Unpleasant work area due to machine vibration.

2.1.4 Biological Hazards

- Skin irritation due to contact with wastewater from washing of pulp.

3.0OH&S MONITORING

DEPARTMENT: Bagasse PulpMill

Sl.no	Location	EXPOSURE			Method of handling by Manual or Equipment (if the chemical handled in equipment, please mention the unloading persons or operators)		No of person involved	Health Monitoring		
		CHEMICALS				Purpose/Usage				Frequency
1	ECF bleaching	H2SO4	liquid	Heart, Skin, Respiratory System	Transper by pump (unloading by employee)	To maintain pulp Ph.	4		Hematology, PFT, X-ray Chest	Annual
2		H2O2	Gas	Skin, Eyes, Mucos membranes, Respiratory System	Transper by pump (unloading by employee)	To increase pulp brightness.	4		PFT, X-ray Chest	Annual
3		Chlorine dioxide	Gas	Eyes, Mucos membranes, Respiratory System	Supply from RDH plant.				PFT, X-ray Chest	Annual
						TOTAL	8			

Table3.0Bagasse pulp chemicals

4.0RESEARCH METHODOLOGY

4.1 HIRA

HIRA means Hazard identification and Risk Assessment. Hazard as relates to „Accident‟ is defined as the potential for causing harm to persons, damage to property or environmental degradation. It will particularly cause unwanted transfer of energy and can occur in random variations of normal operations or from changes in physical or human factors. An HIRA is a systematic way to identify and analyses hazard to determine their scope, impact and the vulnerability of the built environment to such hazards and its purpose is to ensure that, there is a formal process for hazard identification, risk assessment and control to effectively manage hazards that may occur within the workplaces. This process is called as Hazard Identification and Risk Assessment (HIRA) and is conducted in four distinct, but related, assessment steps:

1. Hazard Identification – identify and research hazards;
2. Risk Assessment – conduct a risk assessment for each hazard;
3. Program Priorities – establish program priorities based on assessment;
4. Risk Profile – summarize program vulnerabilities and highlight preventative, controls and mitigation measures.

The ultimate purpose of the HIRA process is to develop the Risk Profile. The Risk Profile identifies priority areas requiring attention during the development of the risk management strategy. The result of this process is a risk-based management program.

There are no fixed rules about how the risk assessment should be under taken. The following steps could be used as guidance.

4.2 STEPS FOR HIRA

4.2.1 Initiating the HIRA and selecting the approach

Two principles should be taken in consideration before an assessment is carried out:

- Structure the assessment to ensure that all relevant hazards and risks are addressed. This should be done to ensure that tasks like night security that might take place „„out‟‟ of working hours, is not overlooked.
- When a hazard is identified, the first option should always be to eliminate it first. A number of approaches (and combinations thereof) to risk assessment can be adopted to perform the HIRA.

The approaches to risk assessment at work which are used are normally based upon: Observation of the workplace environment (e.g. means of access, conditions of floors; machinery safety; dust and fumes, temperature, lighting; noise; etc.)

- Identification of tasks carried out at the workplace (to identify all tasks so that they are all included in risk assessment).
- Consideration of tasks carried out at the workplace (evaluation of risks from the different tasks).

- Observation of work in progress (check that procedures are as laid down or predicted, and that there are no other risks arising).
- Consideration of patterns of work (to access exposure to hazards).
- Consideration of external factors that could affect the workplace (e.g. weather consideration for outdoor workers).
- Review of psychological, social and physical factors which might contribute to stress at work, how they interact together and with other factors in the workplace organization and environment.
- Consideration of organization to maintain conditions, including safeguards (e.g. that systems are in place to assess risks from new plant, materials and so on to update information on risks).

  After the selection of the desired HIRA approach, the following information should be completed by the above mentioned assessor(s).

- Date: Insert date that assessment form is completed. The assessment must be valid on that day, and subsequent days, unless circumstances change and amendments are necessary.
- Assessed by: Insert the name, designation and signature of the assessor or in the case of a team the names, designations and signatures of all the team members.
- Checked by: Insert the name and signature of someone in a position to check that the assessment has been carried out by a competent person who can identify hazards and assess risk, and that the control measures are reasonable and in place. The checker will normally be a line manager, supervisor, principal investigator, etc. Checking will be appropriate for most risk assessments.
- Validated by: Use this for higher risk scenarios, e.g.- where complex calculations have to be validated by another "independent" person who is competent to do so, or where the control measure is a strict permit-to-work procedure requiring thorough preparation of a workplace. The validator should also be a competent engineer or professional with expertise in the task being considered. Examples of where validation is required include designs for pressure vessels, load-bearing equipment, lifting equipment carrying personnel or items over populated areas, and similar situations.
- Location: Insert details of the exact location, e.g. building, floor, room or laboratory etc.
- Task / premises: Insert a brief summary of the task, e.g. typical office activities such as filing, DSE work, lifting and moving small objects, use of misc. electrical equipment. Or, research project involving the use of typical laboratory hardware, including fume cupboards, hot plates, ovens, analysis equipment, flammable solvents, etc.
- Activity: use the column to describe each separate activity covered by the assessment. The number of rows is unlimited, although how many are used for one assessment will depend on how the task / premises is sub-divided. For laboratory work, activities in one particular lab or for one particular project might include; use of gas cylinders, use of fume cupboard, use of computer or other electrical equipment, use of lab ovens, hot plates or heaters, use of substances hazardous to health, etc.

4.1.3 Identify the hazards

The importance of this element cannot be over emphasized. It is by far the most important element of the risk assessment process and should be performed in a systematic manner.

4.1.4 Gathering and analysis of information before the assessment

The gathering and analysis of information is an essential task before the risk assessment can start. This would normally be conducted by the safety practitioner or person responsible for health and safety and it is one of his more important duties.

The person should access the databases on the business to assess the types and major underlying causes of past accidents and incidents. It is advisable to also review accident reports and investigations together with other records such as those maintained by engineering staff, log books and audit reports.

Externally, he or she may be able to gather information from government and industry organizations or from publications and databases.

4.1.5 During the physical assessment or after the assessment

The adoption of some systematic way of allowing relevant persons to “see” or “spot” the hazards present in the workplace. If the hazard identification is not carried out carefully, the subsequent analysis of risk and the development of risk control measures become pointless. The identification of hazards is not only an essential part of the risk assessment process, but also acts very effectively to change the way people think, causing them to act more safely and so become more proactive in hazard awareness. When you work in a place every day it is easy to overlook some hazards. There are many techniques and tools that can be used as part of the hazard identification process, here are some tips to help you identify the ones that matter.

4.1.6 Identify all parties affected by the hazard and determine how they can be affected

Next you need to identify who might be harmed; it will help you identify the best way of managing the risk. That doesn‟t mean listing everyone by name, but rather identifying.

Observation - walk around your workplace and look at what could reasonably be expected to cause harm.

- Communication - ask your employees what they think. They may have noticed things that are not immediately obvious to you.

- Information - check „„manufacturers"" instructions or MSDS for chemicals and equipment as they can be very helpful in spelling out the hazards and putting them in their true perspective.
- Records - Have a look at your incident and sickness records – these often help to identify the less obvious hazards.
- Visit relevant Websites to gain information. Increasingly, the internet is a valuable means of gathering international data. All this data needs to be assimilated and converted into a useful format to prepare the team who undertakes risk assessment.
- Calling legal your labour inspector at the labour centre.
- Consultation with the workplace health and safety committee and representatives.
- Brainstorm ideas and group under appropriate risk headings. Consider the effects on people (staff, students and other people), information, physical assets and finances, reputation. Write the final list onto the table (risk assessment summary).
- Data from health surveillance program.
- Consulting with subject matter experts or consultants.
- Minimum standard legislation.
- Analyse specific scenarios, this is mostly a preventative method used for the identification of hazards and is performed by stating or picturing certain possibilities or scenarios and then breaking it down, examining and studying the possibly outcome of the event or activity.

groups of people (e.g. people working in the storeroom or kitchen). In each case, identify how they might be harmed, e.g. what type of injury or ill health might occur.

Remember: Some workers might be more vulnerable like new and young workers, new or expectant mothers and people with disabilities, lone workers.

- Cleaners, visitors, contractors, maintenance workers etc, who may not be in the workplace all the time.
- Members of the public, if they could be hurt by your activities.
- If you share your workplace, you will need to think about how your work affects others present.

As well as how their work affects your staff – talk to them; and ask your staff if they can think of anyone you may have missed.

4.1.7 Evaluate or assess the risk

Having identified the hazards, you then have to decide what to do about them. Legislation requires you to do everything „„reasonably practicable"" to protect people from harm.

5.0 RISK RATING

One of the most simplistic forms of risk assessment is to rate the remaining risk as high, medium or low; depending on how likely the activity is to cause harm and how serious that harm might be. This is called „„Risk rating‟‟.

5.1 Low risk items

Need to be considered, but there is a smaller chance that they will cause the entire project to go off the rails. It is most unlikely that harm would arise under the controlled conditions listed, and even if exposure occurred, the injury would be relatively slight.

5.2 Medium risk items

These types of risks are ones that could cause issues, but that there is still a lower chance that they will cause your project to fail. It is more likely that harm might actually occur and the outcome could be more serious (e.g. some time off work, or a minor physical injury).

5.3 High risk items

These are the risks that take the highest priority. They can cause your project to fail, and you need to plan for these risks ahead of time. If injury is likely to arise (e.g. there have been previous incidents, the situation looks like an accident waiting to happen) and that injury might be serious (broken bones, trip to the hospital, loss of consciousness), or even a fatality.

5.4 Risk ranking matrix

In order to do a risk rating, we normally make use of a matrix scoring system. Numerical scores are given to the different elements (e.g. consequence, exposure, likelihood) of risks and these scores are added or multiplied to get a rating for the risk. For the initial risk evaluation, consider the risks identified in the worst case scenario before any controls are applied.

6.0 ELEMENTS OF RISK

6.1 Consequence/ severity (How serious)

Consequences are the expected severity. The severity is expressed in terms of the effect on the person, whether injury or ill health, and ranging from minor injury to death. Think about how serious the likely outcomes would be if harm from a hazard was realized. The risks are clearly higher if an accident is likely to result in serious injury or death, for example, than a bruise or a scratch.

6.2 Probability/ Likelihood (How likely)

By evaluating the risks associated with each hazard you have identified, you're deciding how likely it is that harm will occur from the hazard. The likelihood is the probability of loss when a sub-standard act occurs or sub-standard condition exists.

The likelihood should be based on the worst case scenario, ranging from a remote possibility to the inevitable. Factors affecting the likelihood include:

- Number of times the situation occurs
- Location of the hazard
- Duration of the exposure
- Environmental conditions
- Competence of the people involved and
- The condition of equipment

6.4 Frequency (How often)

How often is the activity involving the hazard taking place? How many people come into contact with it? Risks are higher when frequency of contact is higher.

7.0 CONCLUSION & SCOPE OF FUTURE

Pulping process in paper industry is complex activity. From this project thus the various activities in bagasse pulp mill for paper industry HIRA is taken to identify the hazard and the failure with high risk priority number (RPN) was identified and corrective action should be taken to reduce the risk to a tolerable limit in order to ensure the safe working environment for an employee. Hence to improve safety, every organization has to perform risk analysis by means of HIRA or any other tools. HIRA provide suitable corrective action to the failures that reduces the Severity and Occurrence, while the hazard can be reduced and controlled. And future work is to achieve zero level of risk and hazards in the required bagasse pulping process by improving safety and by satisfying the peoples involved in the company.

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