

# SAFETY AUDIT – A TOOL TO PREVENT ACCIDENTS IN FIREWORKS INDUSTRIES

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**Abstract :** *Safety is of prime importance to every industry. It is all the more essential to industries that handle chemicals, which are flammable, explosive and toxic in nature. As most of the chemicals are hazardous, the storage, processing and handling have to be done with extreme care. Occupational accidents severely deteriorate human capital, and hence negatively affect the productivity and competitiveness of countries. So, to prevent the accidents safety audit is to be carried. There are several techniques of assessing the safety levels of an industry. Safety audit is a simple, straightforward and qualitative technique for understanding the standards of safety in the organization. It could be done for the Management and Technical systems. Fire works industries are generally prone to hazards as the chemicals are dangerous and the industry is more labour oriented. This paper deals Safety Audit Study carried out for a firework factory near Sivakasi.*

**Indexterms:** *Safety , Training, fireworks, Hazardous*

## I. INTRODUCTION

The impact of catastrophic events all over the world had mobilized public opinion in our country to strengthen safety measures in hazardous installations. It is the disastrous incident at Bhopal that prompted the government of India to seek help from International Safety Organizations like ILO and take steps to strengthen safety legislation in India with a view to avert major disasters or atleast limit consequences.

Safety has assumed the top priority in any industry, the nature of the industry being irrespective. It is the “SAFETY” which is the cause of all happenings, both good and bad. “Know Safety No Accidents, No Safety Know Accidents” is a saying of great importance in the industrial scenario.

This significant word called “SAFETY” was in our minds when we decided to lay our minds on the fireworks industry. On careful analysis we realized that there is a danger in every nook and corner of the industry, where even a careless scratching of the nails on the aluminum powder could cause an explosion which may be fatal to many.

After all we have taken up this project on “SAFETY AUDIT IN FIREWORKS INDUSTRY” our prime aim was to reveal the accident prone areas, activities, etc and to make recommendations for the same.

## II. OBJECTIVES

Safety Audit Studies are helpful in identifying the hazard potential in any industry as this exercise examines all the areas of operation critically. However it is a qualitative exercise and the recommendations evolved from the studies will help the industry in improving the safety levels of the same.

This assignment has been carried out in one of the fireworks in Sivakasi with the consent of the management.

The technical aspects of the safety audit take care of the aspects listed below:

- ❖ Building and structure
- ❖ Storage and Process Area
- ❖ Fire fighting system
- ❖ Hand tools
- ❖ Lighting and Illumination
- ❖ Housekeeping

## III. OBSERVATIONS OF THE SAFETY AUDIT

### 3.1 Safety and Health Policy

Every company is expected to have a safety and Health policy of their own and it has to be displayed in the industry for encouraging the attitude of the workers towards their health and safety.

Based on the queries raised to the management and workers the following observations were made:

- ❖ The company follows explosive and factory safety rules.
- ❖ The management provides all necessary PPE's like Dust Prevention mask, chest apron, goggles and gloves, etc.
- ❖ The employees are allowed to utilize ESI hospitals. For this, the management and the workers have to pay a small amount to ESI. In case of emergency the management provides medical checkups. Otherwise the workers working under hazardous condition can go for checkups in ESI hospitals. However, there is no medical officer inside the unit. The safety equipment includes anti static sheet and other PPE's.

### 3.2 Safety Organizational Setup/ Committees

- ❖ There is no particular committee for safety policy by workers
- ❖ There is no quality circle adopted by the management inside the industry.
- ❖ The type of safety precautions adopted by the organization is good.

- ❖ General safety rules are displayed in local language (Tamil) outside the working area (or) entrance.
- ❖ The management is fully cooperative in promoting safety.
- ❖ The workers claim that the present type of management is good.

### 3.3 Education and Training

Department of explosives has framed explosive rules and regulations for the manufacture of fire works storage of semi finished and finished fireworks, etc.

The factors that ensure safety in fire works industries have to be made known to the workers through proper education and training. The following observations were made:

- ❖ The type of education and training given to workers is good.
- ❖ Teaching on safety aspects is carried out by management.
- ❖ Periodic supervision is done on all days.
- ❖ The type of education and training involves mainly safety precautions.
- ❖ The type of education involves in giving first aid to workers.
- ❖ The system involves in promoting welfare consciousness of the worker.
- ❖ Licensed foreman teaches everything concerned with safety.

### 3.4 Motivation / Promotional Activities

The participation of workers in not only production but also decision - making activities has to be encouraged. This can be achieved by the attitude of the management. The management has to be impartial in dealing with the employees (or) employees unions.

Based on the queries to the management staff and workers, it was observed that:

- ❖ The organization is involved in motivational or promotional activities only if acceptable to them.
- ❖ The company does not give any special incentive for workers towards safety.
- ❖ The management encourages profit sharing, like giving the benefit of bonus during festival seasons.
- ❖ The management encourages the workers role in decision making only in safety precautions.
- ❖ The management helps the workers in following the government policies meant for workers.
- ❖ The management is said to be impartial in giving promotion.

### 3.5 Safety Inspections

Safety inspections can bring to light very useful information regarding safety and health status, which will include not only unsafe conditions and unsafe methods of work and indirect causes leading to them.

The audit brought out the following points.

- Internal Inspection (by management)
- Inspection by Government officials, Department Chief Inspector of Office.
  - ❖ No steps are taken against the workers responsible for the damages.
  - ❖ Only trained persons carryout the inspection.
  - ❖ The cost for inspection does not affect the investment of the management in production.
  - ❖ There is cooperation of workers in inspection.
  - ❖ The inspection is thorough and carried out in all sections.

### 3.6 Personal Protective Equipment (PPE)

Employers and the self employed must ensure that the PPE they purchase is maintained in an efficient state, replaced and cleaned as appropriate and kept in good repair and in efficient working order.

Based on the queries the following observations were made:

- ❖ The workers place their PPE's inside the respective sheds after cleaning.
- ❖ The PPE's are placed in correct places.
- ❖ No special training is given in utilizing the PPE.
- ❖ The workers take care in maintaining their PPE.
- ❖ Except certain PPE's like (rubber gloves, rubber shoes, which cause sweating) others are worthwhile.
- ❖ The supervisors are involved in checking whether the workers are using PPE.

### 3.7 Work environment-monitoring system

The workers environment monitoring ensures safe operations through safe methods of work, systems and procedures.

Based on queries the following observations were made:-

- ❖ The major action areas which are monitored are Chemical mixing, Filling, Fuse cutting.
- ❖ The factors that are usually monitored are Quality of chemicals, Quantity of chemicals, Checking whether the workers use PPE's
- ❖ High room temperature and certain PPEs constitute poor working environment.
- ❖ The number of personals involved in checking depends upon the number of workers.
- ❖ The people for checking usually do not have much qualification.

### 3.8 Waste Treatment and Disposal

The routine cleaning procedure for each building and installation itself will help in improving the working condition. There has to be a standard procedure and frequency in which it has to be cleared. All explosive waste on the floor of the buildings are removed immediately and discarded into the waste bin.

The following conditions were observed:

- ❖ The routine cleaning procedure for each building and installations include daily cleaning the floors by using brooms after working hours.
- ❖ Periodic removal of wastes is carried out to keep the working area clean.
- ❖ The wooden boxes with inner part covered by rubber sheet are used as waste containers.
- ❖ No great damages in the pit where wastes are burnt.

- ❖ The method of igniting is safe. Long fuse is used. It is burnt opposite to wind direction.
- ❖ Each pit is 2 m in depth and 5 x 4 m. Totally, there are 4 pits and each one is used alternatively for 4 days.

### 3.9 Building and structures

The kind of building and structures in an industry is decided mainly upon the operations to be performed. They should be strong in construction and should be constructed as per the norms of the government. All hazardous units located at safe distances from the periphery of the site and from offices and similar buildings.

Based on the audit the following observations were made:

- ❖ The buildings are constructed as per the norms.
- ❖ All the working sheds are constructed in a well-planned manner.
- ❖ There are no pits and cracks in the raw material section, mixing / filling shed, etc.
- ❖ Reinforced concrete is used for chemical mixing and filling transit shed.
- ❖ Mostly wooden doors with aluminium locks (for mixing, filling sheds etc.). For certain working sheds wooden frame with G.I sheet is preferred.
- ❖ Adequate amount of sunlight is brought to the rooms.
- ❖ The distances between each shed are as per the safety requirements.
- ❖ The shed containing aluminium powder was not having rubber mats. But all other sheds were having the rubber mats.
- ❖ Good fire fighting methods and equipment are to be adopted.
- ❖ The chemicals name is displayed on the table of container and sheds.
- ❖ The material of the container is and the tools used for chemical handling of are made of non-ferrous material.
- ❖ The workers use protective equipment. The workers prefer Cotton mask as other devices create profound sweating during working.
- ❖ The fuse is dried in open platform.
- ❖ The temperature of drying platform is maintained at atmospheric temperature.
- ❖ No electrical lighting inside the magazine.
- ❖ No great damages in the waste pit due to previous use.

### 3.10 Fire fighting system

Based on the audit the following observations were made.

- ❖ The type of fire fighting system was not sufficient.
- ❖ There is only one fire station in the whole of Sivakasi town.
- ❖ There is no fire alarm signal available.
- ❖ The well-trained workers are aware of the fire fighting methods.

### 3.11 Hand tools

Before the operation, the worker has to select the right kind of tool. In fireworks all the hand tools used are of non-ferrous in nature. They have to be inspected before the operation.

Based on the quires the following observations were made:

- ❖ The hand tools are made of non-ferrous materials.
- ❖ The hand tools provided are brass knife, wooden hammer, wooden stick, etc.
- ❖ No special training is given to the workers in handling the hand tools.

### 3.12 Lighting and Illumination

A well-designed lighting scheme in the work place increases individual and group productivity and reduces accidents at work. It also reduces rejection in process and fatigue to individuals. It gives a feeling of well being to the work Well thought out working procedures regularly updated, using properly tested and equipment installed in well adapted working places is essential to the safe handling of explosives. The source of light and the level of illumination to be provided depends upon:

- ❖ Reflection of light from ceilings and walls.
- ❖ Prevailing day light condition.
- ❖ Day light can be admitted into the work place through the doors provided.
- ❖ Electrical lighting is not encouraged inside the working area.
- ❖ No night work is allowed inside the industry.

### 3.13 House Keeping

- ❖ Quality circle (QC) is yet to be started by the management.
- ❖ The work place is properly maintained from dry grass, etc. to prevent the external source of fire.

## IV. RECOMMENDATIONS

This chapter presents the general and specific recommendations to improve the safety levels of the industry under study. The recommendations are offered completely based on the observations made in the earlier chapter.

- ❖ Safety and Health Policy has to be updated and be made for the organization and to be displayed in the office/factory
- ❖ Workers should be trained periodically in adopting safety precautions.
- ❖ Training of the workers in the following areas is very essential.
  - Keeping raw materials in a proper safety place.
  - Mixing of firework chemicals.
  - Filling of firework chemicals.
  - Safety manufacturing process details.
  - Drying of firework chemicals.
  - Storage of semi finished firework items.
  - Collection and disposal of firework wastes.
  - Testing of finished firework items.
- ❖ The participation of workers in decision-making shall be worth wise. This raises the morale of the workers.
- ❖ When there is regular inspection the worker will understand the importance of inspection and constitute better shop floor relations.
- ❖ The method of removing unsafe mechanical or physical conditions by changing manual work to mechanized work.

- ❖ Introducing safety awards or safety incentive schemes can motivate workers.
- ❖ forcing workers to follow the safety precautions, rules and regulations strictly and the defaulters must be penalized.
- ❖ The training on utilizing the PPE's should cover the following:
  - a. Risk that the PPE will avoid or limit.
  - b. Purpose and the method of utilizing it.
  - c. Methods to keep the PPE's in good working order
- ❖ Proper waste containers and a routine procedure for removal should be part of the operating instructions.
- ❖ Quality circle is to be started.

## V. CONCLUSION

We have made the observations and our keen recommendations to enhance safety in almost every aspect viz. management systems and technical aspects in the Fireworks. Recommendations given in this paper will be implemented by the management, will help the industry made an accident free environment and thus improve the productivity.

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