

# SAFETY AWARENESS SURVEY – A TOOL FOR EMPLOYEES’ TRAINING NEED ASSESSMENT

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**Abstract-**In any progressive organisation, Employees’ Safety Awareness is of paramount importance to ensure safety in operations. Information and knowledge gaps in critical issues have been the predominant causes of industrial accidents in the past. The issue assumes great significance particularly when we talk of implementation of pro-active Safety Management System in a petroleum processing plant or in a refinery. In order to maintain much needed safety awareness among employees and other workers, a Safety Awareness Survey was conducted in a process plant for a period of one month, initially among the operations employees working in different shifts in the plant. The survey objectives include recognizing the existing levels of safety awareness over a range of critical safety issues, identifying the subject areas where exist any knowledge/information gap and suggesting ways and means to bridge them in order to ensure continual improvement in awareness level. Multiple choice questionnaire on the subjects relevant to plant safety was used for the survey. About more than 85% shift working employees across all age groups and from all the designations with varying degree of experiences were identified as Respondents. The responses were assessed both for positive score as well as for wrong answers. Results from Inter-shift as well as Intra-shift responses were analysed. Six scoring ranges have been chosen for the analysis with less than 50% is taken as ‘undesirable’ and a score of 90% and above is considered as ‘excellent’. Finally, inter-shift analysis has been used to prioritize the subject area based on the wrong answers recorded in each of the seven subject categories. Further training needs were identified based on the observations that information on emergency responses, siren system, mock-drills and fire fighting systems available in the plant, H<sub>2</sub>S and utility chemical safety and their emergency responses, hazardous area concepts, statutory requirements etc. seems to be somewhat inadequately known to the respondents. Survey recommendations were currently being implemented in the plant in a phased manner.

**Keywords-** Safety Management System, emergency response, hazardous area, information gap.

## Introduction

Safety Awareness among the employees and other workforce is the foundation of any Safety Management System implementation in the hazardous workplace. In order to create and maintain much needed safety awareness among employees and other workers, a Safety Awareness Survey was conducted in a petroleum process plant handling various flammable and toxic chemicals either as product or as utility chemicals. The plant has a robust Safety Management System in place and the workforce both regular and on contracts are fairly acquainted with the safety procedures and processes. The survey was conducted for a period of one month and subjects were chosen from among the operations employees working in different shifts in the plant.

## Objectives of the Survey

The overall objectives of the safety awareness survey were:

- i) To recognize the existing levels of safety awareness among the employees.
- ii) To analyze the existing awareness over a range of critical safety issues.
- iii) To identify the subject areas those require to be strengthened to bridge any knowledge/information gap.
- iv) To suggest ways and means to ensure continual improvement in awareness levels.

## Methodology

The survey was carried out through a multiple choice questionnaire (quiz) on the subjects relevant to plant safety. For this purpose a booklet containing plant safety information was distributed well in advance to all the shift personnel. Two sets of questionnaires containing 28 questions each were prepared and intermixed to install desired level of complexity in answering. The survey covered mainly operations personnel in shifts working both in Control Room as well as in the fields. Respondents covered were in the range of 85 to 90% of shift strength spanning over all age groups including the recently joined graduate engineers. The respondents were chosen from all the designations with varying degree of experiences in process plant operations starting from Junior Technician to middle level executives. The answer sheets were assessed not only for overall positive scoring but also for the areas where wrong answers were recorded.

## Criteria for Questionnaire

The questionnaire covers important aspects of process plant safety. Certain subjects are grouped in one broader topic for the purpose of easy analysis. Number of questions are different in different subject categories. Considering the criticality, most number of questions were included from fire and first-aid and emergency preparedness categories.

As such the following 7 categories of subjects were considered:

1. General and Process safety - which includes questions related to MOC, colour coding, accident reporting, PPEs, gas testing requirements etc.
2. Chemical Safety -including MSDS, H2S and Chlorine safety.
3. Quality, Health, Safety & Environment (QHSE) awareness.
4. Legislative or statutory requirements.
5. Hazardous area classification.
6. Fire and First-aid.
7. Emergency preparedness.

After the completion of the rigorous survey, the responses from personnel of different shifts are compiled for scoring and analysis has been done in two broad categories: Inter-Shift and Intra-shift. Both the categories of analysis of safety awareness responses of the predefined questionnaires have been carried out in terms of overall scores obtained by employees at different levels.

Six scoring ranges have been chosen for the analysis as:

< 50%	-	Undesirable
50 -60%	-	Comfortable
60 -70%	-	Satisfactory
70-80%	-	Good
80 -90%	-	Very Good
> 90%	-	Excellent

Not only that, analysis of the wrong answers given for each of the subject category is done subject-wise in order to identify any grey area for improvement. Further, cumulative numbers of wrong answers were assessed and contribution of each level to this are analysed as well. Another important analysis that has been performed is on the prioritization of subject category in which more number of wrong answers were recorded. Such analysis will help in understanding the extent of knowledge gap in those areas and the need to have focused attention towards launching appropriate safety awareness programmes. Inter-shift awareness analysis, however, is an overall assessment and has been carried out in similar ways as in the case of intra-shift analysis, but with an overall view of the safety awareness situations prevailing in different shifts.

**Results and Observations**

Overall score analysis (Fig.1) of the respondents in all the shifts brings out that 38% (15 out of 40) of B-shifts personnel, 35% (10 out of 29) of D-shift , 30% (8 out of 27) of C shift and 22% (6 out of 27) A-shift personnel scored below 50%(undesirable). However, about 40% (16 out of 40) employees of B-shift scored more than 60% marks (satisfactory). Also, it can be noted the number of respondents are more in B-shift than in other shifts.

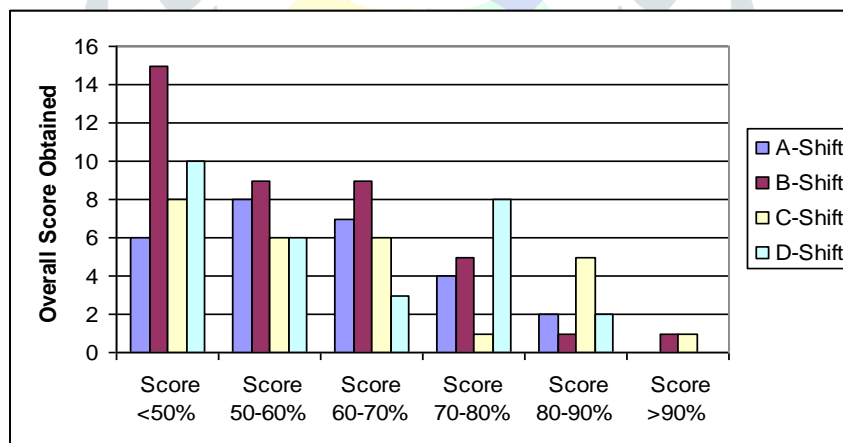


Fig.1 Inter-shift overall score analysis

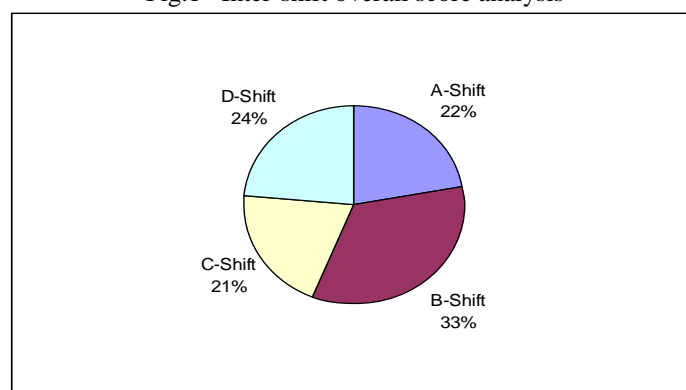


Fig.2 Shift-wise contribution to cumulative wrong answers

Percentage wise contribution to the cumulative wrong answers (Fig.2) provides the information that B-shift contributed more (33%) to the overall negative score followed by D (24%), A (22%) and C (21%).

Subject category-wise analysis has been shown in Fig.3, which indicates that more wrong answers were recorded in mainly three categories in order of priority i.e. Emergency Preparedness, General & Process Safety and Fire & first-aid respectively. Other subjects on which survey was conducted were Chemical Safety, Legislation (i.e. statutory requirements), Hazardous Area Classifications and QHSEawareness.

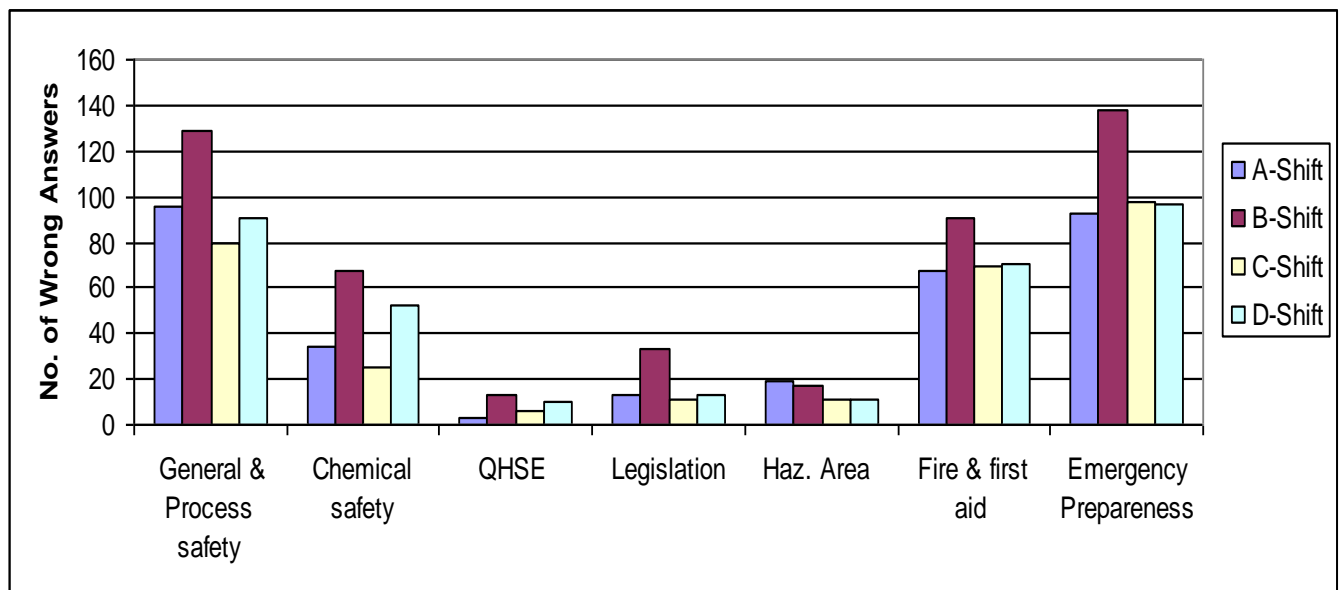


Fig.3 Shift-wise performance on different subject categories

Here one point needs to be added that number of questions in each subject category were not the same. That is, more number of questions were from first 3 above mentioned subjects than the others. However, even response to one question can indicate weakness or strength of awareness concerning to that subject. In fact the survey is indicative of the areas needs to be under focus for improvements.

Inter-shift subject-wise awareness analysis shows that B-shift recorded more wrong answers in first 3 subject categories compared to other shifts. However, other shifts also contributed significantly to the overall wrong answers in those subjects. Employee designation or level-wise analysis has also been performed to obtain the target groups for further awareness improvement initiatives and presented in Fig.4. The analysis brought out that respondents belonging to middle level executives scored most of the negative marks cumulatively, followed by other respondents. Although again the number of respondents in each level varies, one thing is clear that all level of employees should be targeted for renewed safety awareness programme.

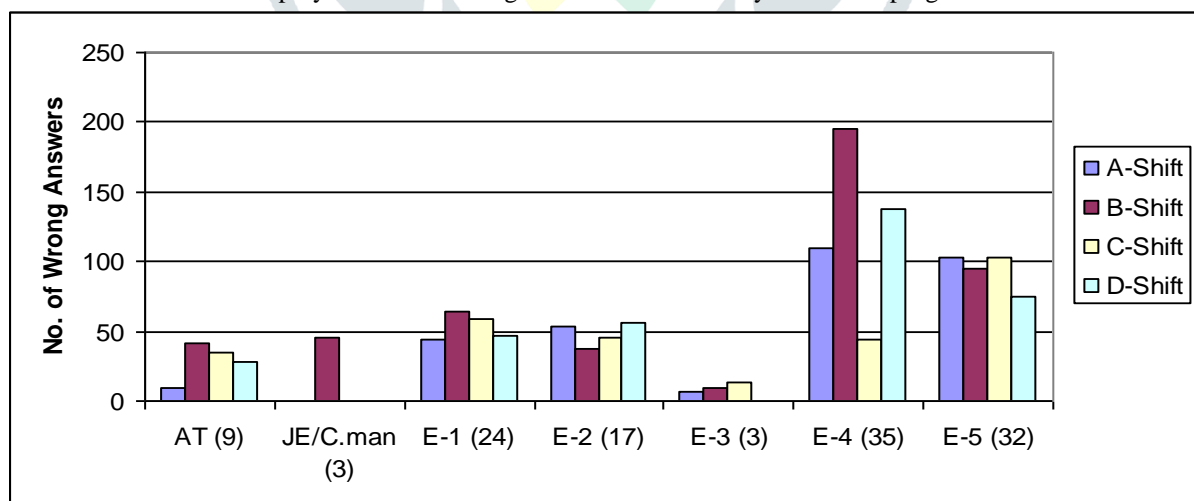


Fig.4 Designation-wise performance in each shift (number of respondents is in bracket)

Finally, inter-shift analysis has been used to prioritize the subject area as evident from the percentage contribution of wrong answers recorded in the survey (Fig.5) with respect to each subject category. Information on emergency responses, siren system, mock-drills and fire fighting systems available in the plant seems to be somewhat inadequately known to the respondents. In addition, some people are not fully aware of H2S and other chemical properties and their emergency responses. As far as the awareness on legislative/statutory requirements and hazardous area concepts are concerned, wrong answers were widespread across almost all designations and these are few additional areas that require attention.

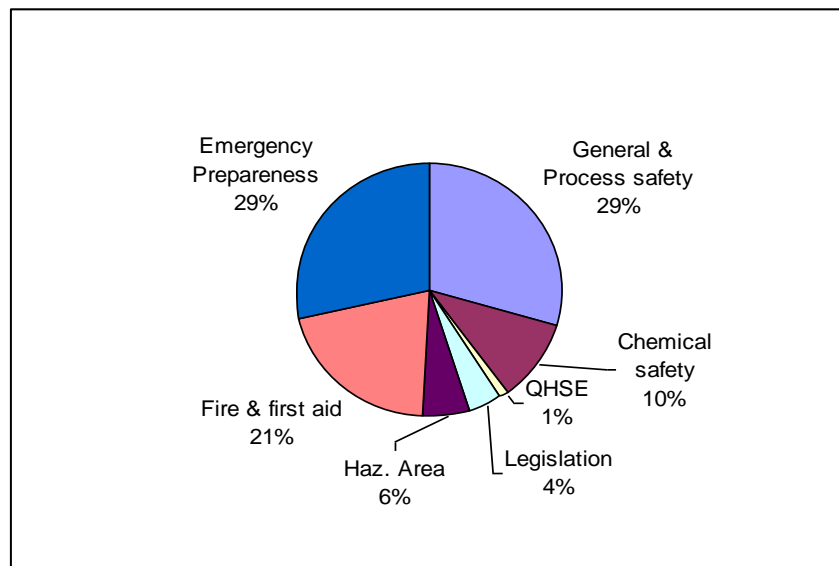


Fig.5 Overall percentage of wrong answers in each subject category

### Conclusion

Safety Awareness Survey is a useful tool to identify the information and knowledge gap among the workforce. Developing a survey questionnaire relevant to the operations of the plant is essential to pinpoint the areas of improvement needed to bridge any such gaps in the rank and file of field level employees. Shift-wise performance on different subject categories suggests gaps in all the categories, particularly in four important areas 'emergency preparedness', 'general & process safety', 'fire & first-aid' and 'chemical safety'. Prioritization of subjects which should be under constant focus are in the following order of importance: Emergency Preparedness, General & Process Safety, Fire & first-aid, Chemical Safety, Legislation (i.e. statutory requirements), Hazardous Area Classifications and QHSE awareness. As such, the results indicated that employees at all levels should be targeted for renewed safety awareness programmes. Some of the immediate actions that can be initiated by the management are On-the-spot 10 minutes briefing in each shift should be planned to inform them any existing or new development in HSE issues and floor level safety meetings are required to be regularly conducted. Orientation and Refresher courses should specially focus on the priority subjects identified in the survey. Employees should be encouraged to use online HSE information system to the maximum extent possible to keep abreast of the safety requirements and instructions concerning to the process plant operations.

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