



Assessment of Occupational Health, Safety & Environmental Problems in Chemical Industries of Uttarakhand

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ABSTRACT

The significance of Safety & Health in chemical industries has been a vital issue in achieving productivity and an edge in the competitive world. This paper is an effort to present the various factors governing the safety and Health of chemical industries with a special focus on air quality, water quality, noise, light intensity monitoring, fire safety and safety audit. This paper has mentioned the issues arise from the industry, which can lead to incident or hazard in it. It has raised psychological issues such as occupational safety, safety, safety attitudes, safety climate and environmental problems in the chemical industries of Uttarakhand. The study will also help in development of standard checklist and safety training required for the specific industry.

This survey and analysis on occupational health, safety and environmental problems of chemical industries of Uttarakhand will provide the organization with the capacity to anticipate and assess health and safety issues before they lead to an incident or accident. Administrative workers may be exposed to a variety of workplace hazards in the course of performing their functions. The type and degree of exposure is dependent upon a variety of individual factors including human factors as well as environmental issues.

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1. Introduction

Chemicals industries are one of the most significant sectors of the process industry. It plays a vital developmental role by providing chemicals and intermediates as inputs to other sectors of the industry like paints, adhesives, pharmaceuticals, dye stuffs and intermediates, leather chemicals, pesticides etc. Every year many workers are injured, become ill or are killed because of exposure to harmful chemical substances. These incidents cause human suffering, loss of production and high medical cost. Industrial hazards associated with these industries include large scale high pressure and temperature reactors and separations equipment containing highly flammable chemicals. Toxic gas emissions

include hydrogen sulfide, phenols, ammonia, cyanides as well as various volatile hydrocarbons. Chemical solvents vary in their toxicity and potential for exposure to workers, with highly volatile solvents presenting the greatest potential for inhalation exposure. In addition petroleum and petrochemical processing includes thermal, high pressure, reactive and confined space hazards. Toxic and flammable solvents and the high-pressure reactors, distillation columns and separation units that produce them need to be protected from accidents as well as industrial sabotage. Safe and secure operation of these facilities is an essential aspect of their operation. This study aims to give assistance and guidance to employers and workers to promote a safe and healthy work environment and prevent injuries.

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2. Materials and methods

Work Methodology includes:

- Identification of various automotive industries in Uttarakhand.
- Circulation of self-audit questionnaire to each site.
- Industrial visit.
- Data collection/sampling

Identification of various industries in this sector:

First of all we have to identify respective industries in Uttarakhand, where we can go & perform assessment of health safety & environment problems.

Circulation of self-audit questionnaire to each site:

150 questionnaires have been sent to various industries.

Survey of the respective industries:

Going to the respective industries for inspection to find out the health, safety and environment related problems in the industry. Carrying out sampling of the effluent discharge there, noise monitoring, air quality monitoring, ergonomics hazard, manual handling work inspection, first-aid facilities provided, efficient lighting arrangements, housekeeping problems, floor space area inspection, fire fighting facilities, making emergency response plan, inspection of the hazardous chemical storage area, study of the MSDS provided for the hazardous chemicals, PPEs to be provided of appropriate standard.

Data collection/ sampling:

Sampling procedure:

- Stratified random sampling technique is applied to get the desired sampling unit (industries).
- The required sample sizes for industries are allocated using probability proportional to size.

Data collection:

The data collection shall be done by two methods: Primary Data Collection; Secondary Data Collection.

Primary Data is being collected by:

Industrial visit: For Collecting air, water, ambient noise level and light intensity at different points of the industry; Questionnaire to collect qualitative data. It included combination of closed and open-ended questions.

Secondary Data is being collected:

From review of literature and other credible sources.

Health safety & fire audit:

For this purpose we have to interview workers & employees of the

industry regarding their health, workplace, work conditions, stress, ergonomics, hygiene etc. We also follow some standard checklists for fire safety audit.

Analysis of data:

After taking samples of effluent & air emissions from industries, various parameters have to be analysed such as alkalinity, heavy metal, pH, and hardness etc. for water sample & oxides of sulphur & nitrogen for air samples. Comparison with standard data of CPCB. Similarly for Lux & noise monitoring data.

3. Results

All the results were collected from one of a pharmaceutical industry located at Saharanpur road in Dehradun. Instrument used for collecting the data was reparable dust sampler. Below is the result in the tabulated form.

Table 1 – Air Monitoring Data:

Location	SO ₂ (µg/Nm ³)	NO ₂ (µg/Nm ³)	NRSPM (µg/Nm ³)	RSPM (µg/Nm ³)
Location 1	0.98	1.49	419.16	179.60
Location 2	0.39	4.59	138.79	100.24
Location 3	2.66	3.36	287.31	383.09
CPCB stds.	80	80	60	100

Table 2 – Noise monitoring (unit = db):

Location	Max	Min	Leq	SEL
Granulation area	88.9	67.3	77.7	96.8
QC (instrumentation)	59.9	50.6	54	70.3
Granulation packing	71.4	54.7	61.3	79.1
Reception	63.9	45.8	50.4	66.2
Production	102.7	45.7	90.6	111
Godown	54.4	44.6	50.2	69

Table 3 – Light intensity monitoring (unit = lux):

Location	Light intensity	Range
Granulation packing	125	0-2000
QC(instrumentation)	132	0-2000
Reception	950(sunlight)	0-2000
Godown	41	0-2000

Table 4 – Waste water monitoring:

Location - inlet			Location – outlet		
S.No	Parameter	Value	S.No	Parameter	Value
1.	Acidity	371.8	1.	Acidity	33.8
2.	Alkalinity	834.4mg/l	2.	Alkalinity	251mg/l
3.	Turbidity	1299.4 NTU	3.	Turbidity	16.6NTU
4.	TSS	798.8 mg/l	4.	TSS	60.8 mg/l
5.	TDS	1201.2 mg/l	5.	TDS	841.2 mg/l

4. Discussion

Limitations

During this project of assessing the occupational health, safety and environmental problems there were certain challenges faced by us. Industries were very slow in their response in carrying out the survey in their premises. We were allowed to do safety audit for the limited place only. All the technical details passed to us were in a very slow and reluctant manner. There was lack of technical expertise in the industry. Also technical data was not available in a common place or server and therefore it took a lot of efforts for getting the technical data from different system owners. Uttarakhand has much different type of chemical as well as pharmaceutical industries and it was physically not viable to cover all the industry in this project.

5. Conclusion

Some common major & minor observations from the industries are as follows:

Major observations

Industries were found on the backside when it came to follow standard or best practice at site. It has a non-compliance with section 21(1) (i) of the Factories Act, 1948. All the machine need to be guarded in a much proper way and it should be properly maintained to reduce the incident or accident of workers while working on the machine. One of the main important aspect of the safety i.e. Personal Protective Equipment (PPE) were either worn improperly or not worn by the workers at the time of operation. There were inadequacies of first aid as well as its management which may lead to loss of life or property during emergency. Inadequate housekeeping facilities in toilets and kitchen premises also call for the

alarm. Fire safety training was limited a very few employees in the industry which needs to be expanded to all the employees. Some of the industries do not have external fire safety audit reports. Also fire detectors were not installed in some industries, which are mandatory if an industry uses flammable or combustible materials. There was lack of static water tank for fire hydrants. Fire pump houses were not installed in some of the industries. Fire fighting facilities were not present around the diesel storage tank which should have been provided by at least basic fire fighting or fire controlling equipment's such as fire extinguisher, sand and flame arrestor in the vent of the diesel tank. Empty LPG gas cylinders were present near the ignition source, which calls for a major incident/accident at site.

Minor observations

It includes excessive spillage from the machine due to its improper maintenance or leakage. There were absences of accident/incident statistic display at locations. Also lack of safety signs was observed in the industries, which must in a place where flammable or combustible material are being used or handled. There was no proper stacking on the DG set. Improper ergonomics were observed in the industries, which can lead to chronic effect on the employees.

The results of my study will be useful for the respective industries for improving their environmental, health and safety performance and in reducing no. of accidents.

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