OCCUPATIONAL HEALTH AND CHEMICAL SAFETY AT ETP AND STP IN PROCESS INDUSTRY

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Abstract

Wastewater treatment is a process used to convert wastewater into an effluent (out flowing of water to a receiving body of water) that can be returned to the water cycle with minimal impact on the environment or directly reused. Sewage treatment is the process of removing contaminants from wastewater, primarily from household sewage. Physical, chemical, and biological processes are used to remove contaminants and produce treated wastewater (or treated effluent) that is safer for the environment. In this research we first identify the hazards then analyze these hazards and classify it into several degrees according to their severity. And also we mention the steps and methods to be used and followed by workers in dealing with the various hazards.

Keywords—eyewash, safety shower, packing and disposal of effluents, packing and disposal of sludge.

1. INTRODUCTION

Hazardous chemicals escape to the environment by a number of natural and/or anthropogenic activities and may cause adverse effects on human health and the environment. Proper management of hazardous materials is vital to minimizing potential health and/or environmental damage.

1.1 PURPOSE OF THE STUDY

The purpose of this study is to identify and analyze the exposure of hazards within the Effluent and Sewage treatment plant sites of the company. Among the various activities in the site, the major activities by which the ETP or STP operators or the house keeping persons or the visitors are exposed to the hazards are taken in account.

Touching, breathing, eating or drinking harmful **chemicals**. **Exposure** to **chemicals** can result in varying symptoms with different degrees of danger. Mild reactions include burning and tearing of the eyes, throat, nose, chest and skin.

Conducting Hazard Identification and Risk Assessments (HIRA) within the selected site, will help in analyzing various tasks, activities and operating procedure in relation to safety. According to the hazards identified, each hazard will be analyzed for finding out severity of risk in it. And proper safety measures will be determined.

1.2 BASIC DEFINITIONS

HAZARD: It is a source or situation having potential which can cause harm in terms of human injury or damage to the property or to the environment or combination of these.

HAZARD IDENTIFICATION: Recognizing that a hazard exists and defining its characteristics.

RISK: Combination of the likelihood of an occurrence of a hazardous event or exposure(s) and the severity of injury or ill health that can because by the event or exposure(s).

Risk Assessment: Is defined as the process of assessing the risks associated with each of the hazards identified so the nature of the risk can be understood. This includes the nature of the harm that may result from the hazard, the severity of that harm and the likelihood of this occurring.

Risk Control: Taking actions to eliminate health and safety risks so far as is reasonably practicable. Where risks cannot be eliminated, then implementation of control measures is required, to minimize risks so far as is reasonably practicable. A hierarchy of controls has been developed and is described below to assist in selection of the most appropriate risk control measure/s.

Monitoring and Review: This involves ongoing monitoring of the hazards identified, risks assessed and risk control processes and reviewing them to make sure they are working effectively.

1.3 OBJECTIVES OF THE PROJECT

The objectives of this project are:

- ✓ To investigate the factors affecting the safety in Effluent and Sewage treatment plant of a process industry.
- ✓ To identify the health hazards and risks in the ETP & STP site
- ✓ To analyze the hazard assessment
- ✓ To provide a proper suggestion to avoid hazards in the particular site.

2. LITERATURE SURVEY

2.1 Said Ali El-Quliti, Refat Basarwan, published a paper on the title **Procedure for Hazard Identification and Risk Assessment in Waste- water Treatment Planting Saudi Arabia.** In this research the authors mentioned the steps and methods to be used and followed by workers in dealing with the various hazards. They start by identifying the hazards then point out how to analyze these hazards and classified into several degrees according to their severity. And also specified the responsibilities and roles of employees in dealing with the risks identified.

2.2 L.Shivanathan, S.Kamalakannan, published a paper on the title **Portable eyewash & shower for pretreatment of chemical spillage.** In this research the authors done a study on an existing system for the safety of eyes and skin named as eyewash and shower, gives the First Aid treatment to prevent the severity of injury by washing chemicals off a person in the event of chemical spill. In this project they have made a try to make this existing system much user friendly by making it as portable.

2.3 G. Manoj kumar, K. Visagavel, published a paper on the title **Safety assessment in high rise buildings using JSA,** This paper aims at assessing to identify the health hazards, risks and causes of poor safety practices in high rise buildings. Mostly reported acute health hazards are “fall from height” and “electrocution”, while mostly reported chronic health hazard is “exposure to hazardous substances”. Lack of awareness about site safety and dislikes to wear PPE’s were identified as main cause of poor safety practices in construction sites. And this paper aims to give a complete study of all hazards in the sites and their corrective measures.

3. PROBLEM IDENTIFICATION

The visual inspection has been carried out in the ETP & STP site. The major problems of site are listed below:

1. Over smell from the sewage collection tank.

2. Number of operators for ETP & STP.
3. Handling of chemicals.
4. Oil on floor (slippery hazard).
5. Motor guarding cover.
6. Oil collection containers.
7. ETP chemical storage to be specified.
8. Overall structure of tank (top surface covered with sheet).
9. Pipeline safety hazard.
10. Identification of hazard.
11. Sharp roof metal sheet cover over control panel.
12. Height of the hand rail.
13. Work permit information.
14. Sump tank cover to be as mesh type.
15. ETP sludge stored in carry bags & placed on ground.
16. Electrical hazards when operating control panel and while performing any work permits.
17. Sharp roof metal sheet cover over the control panel.
18. Damaged electrical switches.

4. CONSEQUENCES

Consequences of each Findings/Hazard mentioned above:

Findings / Hazards	Consequences
Over smell from the sewage collection tank.	Possibility of presence of H2S or CH4
Less number of operators for ETP & STP.	Total operating procedure of plant effects in the site.
Handling of chemicals.	Irritation, skin corrosion, skin burns, etc.
Oil on floor	Slippery or fall Hazard
Motor guarding cover.	Smell and poor appearance
Oil collection containers.	Surroundings becomes slippery hazard.
ETP chemical storage to be specified.	Easy exposure hazard.
Improper cover over structure of tank.	Rise in Temperature of the sludge present inside can release out toxic gases.
Pipeline safety hazard.	Availability of leaks
Identification of hazard.	Identifications of the surroundings
Sharp roof metal sheet cover over control panel.	Cut hazard

Height of the hand rail.	Low height, not as per standard
Work permit information.	Need correction for parameters like work location and description of work.
Sump tank cover to be as mesh type.	Availability of toxic gases
ETP sludge stored in carry bags & placed on ground.	Toxic exposure hazard
Electrical hazards when operating control panel and while performing any work permits.	Electrocution hazard
Sharp roof metal sheet cover over the control panel.	Cut, Abrasion hazard
Damaged electrical switches.	Electrocution hazard

5. PROBLEM IDENTIFICATION

The systematic method is applied in a field of study. It includes selection of job activities, hazard identification, risk severity and probability and finally suggesting corrective actions and frames the operating procedures.

Hazards Identified	**Severity Number**	**Probability Number**
Over smell from the sewage collection tank.	**1**	**5**
Less number of operators for ETP & STP.	**3**	**5**
Handling of chemicals.	**3**	**5**
Oil on floor	**1**	**4**
Motor guarding cover.	**4**	**4**
Oil collection containers.	**1**	**4**
ETP chemical storage to be specified.	**3**	**5**
Improper cover over structure of tank.	**2**	**3**
Pipeline safety hazard.	**2**	**3**
Identification of hazard.	**1**	**5**
Sharp roof metal sheet cover over control panel.	**2**	**3**

Height of the hand rail.	**4**	**4**
Work permit information.	**1**	**3**
Sump tank cover to be as mesh type.	**1**	**2**
ETP sludge stored in carry bags & placed on ground.	**3**	**5**
Electrical hazards when operating control panel and while performing any work permits.	**4**	**2**
Sharp roof metal sheet cover over the control panel.	**2**	**2**
Damaged electrical switches.	**4**	**2**

Calculation of Risk value using the formula,

RISK = SEVERITY * PROBABILITY

SEVERITY	PROBABILITY	RISK
1	5	**5**
3	5	**15**
3	5	**15**
1	4	**4**
4	4	**16**
1	4	**4**
3	5	**15**
2	3	**6**
2	3	**6**
1	5	**5**
2	3	**6**
4	4	**16**
1	3	**3**
1	2	**2**
3	5	**15**
4	2	**8**
2	2	**4**
4	2	**8**

Risk Priority		
>=20	E	Extreme risk - immediate action required (Red)
>10 & <20	H	High risk - urgent management attention needed (Yellow)
>5 & <=10	M	Medium risk - management attention as soon as possible (Green)
>=5	L	Low risk – non urgent management attention needed (White)

6. RESULT & ANALYSIS

As per the problem identification listed above corrective actions has been discussed for general problems found based on OSHA standards and checklist has been listed out.

General checklist for safety and health provisions for ETP & STP site as per OSHA standard:

S.No	SAFETY CHECKS	OSHA STANDARD
1	Safety and Training Education: All the employee are instructed in the recognition and avoidance of unsafe conditions?	1926.21 (b)(2)
2	Are employees, who are required to handle or use poisons, caustics, and other harmful substances instructed in their safe handling and use?	1926.21 (b)(3)
3	Are employees, who are required to enter confined spaces and in the use of protective and emergency equipment?	1926.21 (b)(6)
4	Housekeeping: Is all the debris kept cleared from work areas, passageways, and stairs?	1926.25 (a)
5	Personal protective equipment: Are employees required to wear appropriate personal protective equipment?	1926.28 (a)
6	Medical Services and First Aid: Is the facility for the treatment of injured employees located within three minutes of the jobsite?	1926.50 (c)
7	Are telephone numbers of physicians, hospitals, or ambulances conspicuously posted?	1926.50 (f)
8	Sanitation: Are drinking water and adequate toilet	1926.51

	facilities available at the jobsite?	
9	Occupational Noise Exposure: Are the employees is exposed are affected by noise exposure?	1926.52
10	Gases, Vapors, Fumes, Dusts and Mists: Does the employer assure that no employees exposed to inhalation, ingestion, skin absorption, or contact with any substance?	1926.55 (a)
11	Illumination: Are employees provided with light not less than the minimum illumination?	1926.56 (a)
12	Are containers of hazardous chemicals, labeled, tagged, or marked?	1910.1200(f)(1)
13	Ventilation: Does	1926.57 (a)
	the employer ensure that concentration of hazardous substances such as dusts, fumes, mists, vapors, or gases?	
14	Hazard Communication: Does the employer have any hazardous material?	1910.12 00(e)(1)
15	Does the employer have an SDS for each hazardous chemical on site?	1910.12 00(g)(1)
16	Are the employees trained in hazards of chemical in their work area?	1920.12 00(h)

CONCLUSION

Hence by following this general checklist which has been discussed for the solutions of the problems identified in terms of OSHA standards we can achieve a better safe work environment by reducing near misses and accidents occurring in the ETP & STP site of the company premises.

7. REFERENCES

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