STUDIES ON GAS AND PIPELINE SAFETY IN STEEL INDUSTRY'S

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Abstract-This paper deals with, Identification of hazards present in the gas pipeline and storage of steel industries, To study about plant gas pipeline installation as per NFPA, OISD, norms, To study about available fire protection facilities, safety organization and safety system of the plant and to recommend better suggestions to enhance safety of the plant.

Keywords: LPG, Gas pipeline, OISD Standards, steel industry

I. INTRODUCTION:

Gas is an air-like fluid substance which expands freely to fill any space available, irrespective of its quantity.

A gas is a sample of matter that conforms to the shape of a container in which it is held and acquires a uniform density inside the container regardless of the amount of substance present in the container. If not confined gaseous stuff, is called as vapor, will disperse into space.

In my project I am going to take OISD (oil Indian safety Directorate), API (American petroleum institute), and NFPA (National fire protection agency) standards to identify the deviations and to provide possible recommendation to enhance the safety in gas pipeline, storage area and handing of gas cylinders.

LPG GAS INTRODUCTION AND ITS HAZARDS:

Liquefied petroleum gas is generic expression for propane and butane and mixtures of the two. LPG is produced from two distinct sources; firstly it is obtained from the processing of crude oil in refineries or as a bye product from secondary processing plant.The current global LPG consumption is over 270 million tones/yr.

Broadly, the Hazards of LPG is their vapours maybe classified into following categories:-

[1] Asphyxia
[2] Cold Burns
[3] Metal Brittleness Due to Low Temperature.
[4] Flammability and Explosion

NITROGEN GAS AND ITS HAZARDS:

Nitrogen has two main uses: cooling and as an inert atmosphere. The liquid nitrogen is mainly used for cooling in many industrial processes .Gaseous nitrogen it is used to form an inert blanket over substances that would otherwise be oxidized by the air. A carrier and purge gas in steel fabrication, nitrogen is used to avert oxidation and also it can be used in the heat-treating process.

HAZARD: Its displaces oxygen which results in Oxygen deficiency

OXYGEN GAS AND ITS HAZARDS:

Oxygen is a part of metal processing, and is used to substitute or develop air, eventually increasing combustion efficiency in both ferrous and non-ferrous metal production. It is extremely reactive at high pressure; pure oxygen from a cylinder can react violently with common materials like oil and grease. Rubber, textile and even metals burn vigorously in oxygen.

The key causes of fires and explosions when using oxygen are

- oxygen enrichment due to the leak in the equipment;
- using materials which is incompatible with oxygen;
- use of oxygen in equipment which is not designed for oxygen service;
- Careless operation of oxygen equipment.

ARGON GAS AND ITS HAZARDS:

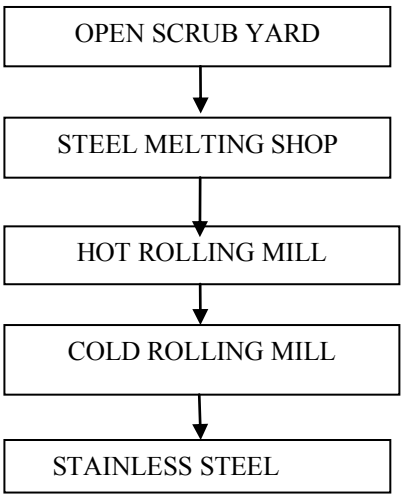
A key component in refining stainless steel, argon helps to avert oxidation of molten steel as is used as a stirring agent. Argon gas is colorless, odorless and not flammable and toxic.

Asphyxiation is the main health hazard which is happened due to displacement of oxygen.

OIL INDUSTRY SAFETY DIRECTORATE (OISD):

Oil Industry Safety Directorate (OISD) was set up in 1986 with the aim of formulation of standards and reviewing its implementation through safety audits to enhance safety level and reduce risk inherent with fuel industry especially petroleum. OISD frequently conducts External Safety Audits of Exploration and Production installations refineries, gas processing plants, LPG Plants to further improve safety systems. OISD also arrange safety training programmes for all oil/Gas installations.

PROCESS FLOW DIAGRAM OF STEEL INDUSTRY



II.MATERIAL AND METHODOLOGY:

COLLECTION

All the information regarding the plant with respect to process, maintenance Instrumentation, electrical and safety were collected. The collection process was done by field visit, interaction with senior officials and getting the appropriate data.

VERIFICATION

The collected information's are checked by analyzing the data, clarifying with diagrams, Physical verification interaction with concern people and observing the operational activities

COMPARISON

Comparing the collected information's with the statutory requirements like prevailing Standards of existing OISD, AIP, NFPA, BIS, and Global standards etc for the best operation practices in steel industry

IDENTIFICATION

The deviation in the gas pipeline, storage and installation was found out by comparing the collected Information's with laws and standards

RECOMMENDATION

Arrived deviation is listed area wise. Recommendations and suggestion for elimination or Alternate suggestion for improvement of system in accordance to comply the standards

OISD standards

Table no1: List of oisd (oil Indian safety directorate standards)

OISD-STD-118	Oil & gas installations layout
OISD-STD-144	Liquefied petroleum gas (LPG) installation
OISD-STD-116	Fire protection facilities regarding petroleum gas processing plants.
OISD-STD-117	Fire protection facilities regarding petroleum terminals and pipelines.
OISD-STD-139	Inspection of pipelines

OISD 144: SALIENT FEATURES

- Design consideration & layout for installation
- Storage & Handling of Bulk LPG,
- Bottling operations,
- Maintenance and inspection,
- Safety –

a) Facilities for fire protection,

b) Gas Monitoring System,

c) Emergency Plan

d) Safety Audit.

Table 2:OISD (144) INTER DISTANCES REGARDING LPG FACILITIES

s.no	Contents	1	2	3	4	5	6	7
1	LPG STORAGE VESSELS	*	T-11	30	30	30	15	60
2	BOUNDARY/ PROPERTY LINE	T-11	--	30	30	30	30	--
3	SHED-LPG	30	30	15	30	30	15	60
4	TW/TT GANTRY-LPG	30	30	30	50	50	30	60
5	LPG/RAIL SPURS	30	30	30	50	50	30	60
6	PUMP HOUSE/COMPRESSOR HOUSE(LPG)	15	30	15	30	30	-	60
7	FIRE Protection House	60	**	60	60	60	60	60

Note: All distance are in meters, ** any distance for convenient operation

,* ¼ of sum of diameter of adjacent vessels.

Table 3: OISD 144 -TABLE –II
DIST BETWEEN THE STORAGE VESSELS OF LPG & BOUNDARY LINE OF BUILDINGS NOT ASSOCIATED WITH THE PLANT

Capacity of each vessel(cubic meters of water)	Distance (M)
10-20	15
21-40	20
41-350	30
351-450	40
451-750	60
751-3800	90
>3800	120

III. RESULTS AND TABLES:

FACILITY	AS PER OISD STD	Satisfied or not
Vessel area	Distance between two spheres should be minimum 30metres Design temperature: (-) 27oC to (+) 55 ^{0}C. Design pressure should be 14.5kg/square centimeter	
Filling shed area	Antistatic mastic flooring conforming to IS- 8374 shall be provided Three shed concept to be provided	
Fire protection facilities	At least one fire water pumps should be provided if there are two main pumps	
Maintenance and inspection	Fire Fighting system shall be periodically tested for proper functioning and logged for record and corrective actions. The periodic inspection/ testing should be ensured.	
Gas monitoring systems	It should be mounted in such a way it should give early warning for gas concentration below the LEL (lower explosive limit).	
Safety audit		
Personal protective devices	Selection of PPE should be done according to Hazards	

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IV. CONCLUSION:

Thus by comparing the collected information with statutory requirements like prevailing Standards of existing OISD, AIP, NFPA, BIS, Global standards deviation noted area wise ,This deviation are controlled by suitable engineering and controls measures . After the implementation I will review, it will be considered as my future work

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