Effect of Air Pollution By Petroleum Industry

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Abstract- *India is the fastest growing economy in world on the basis of high stake of production. In last decades, between public and local government having disputes related to Indian Refineries which are regularly accounted for environmental and human health risk. Operations of refining the Crude oil are made serious effects on environment as well as public health by emission of air pollutant. This study highlighted the cause of pollution, permissible factors of air pollutant, effects of pollution, solution of pollution and recommendations to minimizing pollution related to refinery or petrochemical industries in India.*

Keywords- Particulate Matter (PM), Nitrogen Oxides (NO_x), Carbon Monoxide (CO), Hydrogen Sulphide (H_2S), Sulphur Dioxide (SO_2)

I. INTRODUCTION

The atmospheric contamination has been gradually increasing over the past hundred years, it is only during the last 30 years, since the beginning of the industrial revolution in India to sustain economic development. Contamination is mainly a chemical interference or effect or changing chemical composition of nature and its adverse effect on public or human health. Human health is driving key that accounted while measuring the emission of air pollutant. Under welfare of ecosystem considered human health risk, environment risk and effect of contamination on engineering structure. The primary and secondary air pollutant which known to cause harm at high concentration. Many frameworks have been developed to control air quality standards in India, to protect public health, including the health of "sensitive" populations such as children, older adults, and people with asthma.

II. LITERATURE REVIEW

In developing activities the waste production is the certain outcome of the industries. In last thirty decade, many of studies released in all over the world regarding waste management and public health assessment. Some of are included in this review.**Azam et al. [9]** stated that air pollution is the major risk factor for human it causes respiratory and cardiovascular diseases, neuropsychiatric complications, the eyes irritation, skin diseases, and long-term chronic diseases such as cancer.**Ragothaman et al. [10]**suggested that world health organization (WHO) identified polluted air as the single largest environmental risk.**Sharma et al. [11]** revealed that environmental issues have now become important considerations due to the potential harmful impacts produced by chemical releases. Petrochemicals cause acute and chronic health diseases such as ulcer, allergy, cancer, and liver and kidney problems to the living beings.**Garg et al. [13]** assessed to environment through adopted methodology that is similar to that prescribed by the Intergovernmental Panel on Climate Change (IPCC) for greenhouse gas (GHG) emissions.**Shrivastav [15]** stated that ecological issues generated new competitive tool for some industries. **Wang et al. [14]**analysed that no nation can develop without proper ecosystem or environmental balance. **Misra et al. [12]** attempted to make better cost effective strategy on basis of present scenario of waste management in India.**Olajire [8]** revealed the total pollution that comes out from exploration and production operation in petroleum industries. **Pathak et al. [7]** presented a substantial portion of management & health effect information into a single reference. **Field [1]** studied about the human behaviour or health impact by exceeding noise limit. In the study of relation of human health in terms of temporary/permanent hearing loss (**Yildirim etal. [2]; Keipert [3]),** sleep disruption (**Freedman et al. [4]; Freedman et al. [5]**), vertigo, agitation, weariness, hypertension, gastrointestinal system problems (including gastric and duodenal ulcer), cardiac arrhythmia, nervous and psychic disorders (**Van Kempen et al., [6]**) with noise pollution in terms of intensity of sound released by machinery in giant industries.

Air Pollutant

Production of petroleum is preceded by exploration and discovery of the respective resources, which however do not involve a significant impact on environmental pollution, as compared to the main activities of the petroleum industry. For instance, contribution to emissions of VOCs and SO_xisdetermined by their concentration in the particular fuel. That is why, hereunder, we present briefly selected characteristics of crude oils. Typical element analysis gives 79.5-87.3% carbon; 10.4-14.8% hydrogen; 0-8%sulphur; 0-2% oxygen, 0-0.1% nitrogen and 0-0.05% metals (Fe, V, Ni, As,etc.).Pollutants can be classified into two categories: primary and secondary. Primary pollutants refer to pollutants

emitted directly from the source. Secondary pollutants are generated by interaction of primary pollutants with another chemical or by dissociation of a primary pollutant.

Air pollution may be considered a major environmental health risk having been associated with a number of acute (e.g., respiratory and cardiovascular events, hospital and emergency room admissions) and chronic (e.g., chronic bronchitis, lung cancer, mortality) effects. Air pollution having a similar classification as asbestos, benzene, tobacco smoke and polychlorinated biphenyls is disconcerting, however, it should be emphasized that the individual risk for developing cancer from air pollution is very low, yet the issue should be acknowledged and addressed by the international community. This study primarily focuses on pollutants exerted during the processes of exploration, development, and production of petroleum, awide variety of air pollutants such as volatile organic compounds (VOCs), nitrogenoxides (NO_x), sulfur oxides (SO_x), hydrogen sulfide (HS), hydrocarbons (such asCH_4), carbon dioxide (CO_2), partially burned hydrocarbons (such as carbon monoxide and particulates), polyaromatic hydrocarbons (PAHs), etc., are generated and emitted. At most drilling and production sites, halon gases [determined as an ozone-depleting chlorofluorocarbon (CFC)] are also used for fire suppression that use of them releases these gases to the atmosphere.

TABLE I AIR EMITTING COMPONENTS AND IT'S SOURCES & OPERATIONS

S.No.	Major Operation	Main Sources	Air Emitting Components
1	Seismic Construction and Commissioning Drilling Production Maintenance Abandonment	Vent Gases	NO_x, SO_x ,H_2S, CO, VOC, hydrocarbons such as CH_4, carbon, particulates, PAHs, benzene, toluene, ethyl-benzene, and ortho-, meta-, and para-xylene (BTEX)
2		Flare Gases	
3		Blowdown From Bulk Chemicals	
4		Engine Exhausts	NO_x ,SO_x, CO, VOC, PAHs, formaldehyde, carbon particulates
5		Fugitive gases	VOC, BTEX
6		Fire-protection equipment/ facilities	Halons, CFCs, HCFCs, fire-fighting foams
7		Air conditioning/ refrigerant systems	CFC, HCFC

*Emission factor (EF):*According to the US EPA [16], an emissions factor refers to a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant. These factors are generally expressed as the weight of the pollutant divided by a unit weight, volume, distance, or duration of the activity emitting the pollutant (e.g., kilograms of particulate emitted per mega gram of coal burned).

E= A*EF*(1-ER/100)

Where, E= Emission, A=Activity of components, EF= Emission Factor, ER= Emission Reduction.

Overall, major emission sources under normal operation conditions include dry gas, LPG, fuel oil, burning coke and evaporation of crude oil. As reported, every emission source would have some emission factor, which can characterize its emission distribution with respect to per unit weight of the emission source.

Effects and Assessments of Air Pollution

Effects has many different meanings. For example, in technology and economics effect is expressed as an expected value that an event will be accompanied by undesirable consequences. This is measured by both the probability of the event and the seriousness of the consequences. Petroleum refineries are a major source of hazardous and toxic air pollutants such as BTEX compounds (benzene, toluene, ethylbenzene, and xylene). They are also a major source of criteria air pollutants: particulate matter (PM), nitrogen oxides (NOx), carbon monoxide (CO), hydrogensulfide (H2S), and sulfur dioxide (SO2). Refineries also release less toxic hydrocarbons such as natural gas (methane) and other light volatile fuels and oils. Some of the chemicals released are known or suspected cancer-causing agents, responsible for developmental and reproductive problems. They may also aggravate certain respiratory conditions such as childhood asthma. Along with the possible health effects from exposure to these chemicals, these chemicals may cause worry and fear among residents of surrounding communities.

Table II Air Emission Levels for Petroleum Refining

S.No.	Pollutant	Unit	Threshold Limit
1	NO_X	mg/Nm^3	450
2	SO_X		150 after sulphur recovery Unit 500 for other units
3	PM		50
4	Vanadium		5
5	Nickel		1
6	H_2S		10

The following pollution prevention and control measures:

- Source gas reduction measures to the maximum extent with efficient flare management and optimization of the size and number of burning nozzles.
- Maximizing flare combustion efficiency with minimizing flaring from purges and pilots blow-out and reliable pilot ignition system.
- High integrity instrument pressure protection systems and knock-out drums to prevent condensate emissions.
- Minimizing liquid carry-over and entrainment in the gas flare stream as well as flame lift off.
- Control odour and visible smoke emissions at a safe distance from local communities.
- Maintenance & Replacement programs and Metering flare gas.
- Careful monitoring and maintenance or replacement of streams and equipment that lead to fugitive VOC emissions and Naphtha, gasoline, methanol / ethanol, and MTBE / ETBE / TAME loading / unloading stations.
- Arrangement of Vent gas scrubbers and Incineration of gas.
- Minimize SO_X emissions through desulfurization.
- Recover sulfur from tail gases.
- Install mist precipitators for sulfuric acid mist.
- Install scrubbers with caustic soda solution.
- Install cyclones, electrostatic precipitators, bag filters, and/or wet scrubbers to reduce emissions of particulates from point sources.
- Implement particulate emission reduction techniques during coke handling.

III. RESULT AND DISCUSSION

The aim of this work was directed to involve the Environmental significant components of air emission. This study define the emission factor of significant components through air emission. This study shows the *Prevention & Control Measures* of Air Emission. The discharge of air pollutant is allowed as per permissible threshold limit of concentration.

In the accidents like Bhopal, it was clearly demonstrated that the consequences of any industrial accidents can be severely affected by juxtaposition of dangerous sites with the high population density. The situation for Haldia is also same. Many developed countries have adopted legislation for land use planning taking risk as a criterion. Developing countries like India still now couldn't implement risk assessment techniques efficiently in land use planning mainly due to lack of centralised database information. Thus the present study is an attempt to estimate the vulnerability and risk for industrial hazard and the utilization of the risk maps for future land use planning.

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