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Research Article

EMPLOYEES OCCUPATIONAL DISEASES: REFERENCE TO OIL AND GAS COMPANIES

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ABSTRACT
Occupational diseases are the result of the physical conditions and the presence of industrial and non-poisonous products in the atmosphere. Raw materials, products, by-products and the waste products may in the process of being extracted or manufactured, enter the body in such quantities a to endanger the health of employees. Thus, an occupational diseases or health disorders are caused by the nature of work or working conditions. An "occupational disease" is any disease contracted primarily as a result of an exposure to risk factors arising from work activity. Occupational diseases usually develop over an extended periods of time. They are slow and generally develop over an extended period of time. They are slow and generally cumulative in their effects, are irreversible and often complicated by non-occupational factors. Generally, the occupational diseases are the effects of frequent exposure to the influence of toxic substances, of micro organism, or air borne contaminants, and stress producing factors. The most common occupational health disorder musculoskeletal problems, respiratory diseases, noise induced hearing loss and occupational injuries.

Keywords: *Occupational Disease, Oil and Gas Companies*

INTRODUCTION
There is no international standards definition for the term "occupational disease", however, occupational diseases are these arising out of or in the course of employment. According to Gerald and Katheleen (2005), "Occupational disease is an illness resulting from long term employment in a particular type of work such as black lung disease among asbestos installers". In the third edition of the International Labor Organization's Encyclopedia of Occupational Health and Safety, a distinction was made among the pathological conditions that could affect workers in which diseases due to occupation and diseases aggravated by work or having a higher incidence owing to conditions of work were separated from conditions having no connection with work. However, in some countries work related diseases are treated the same as work-caused diseases, which are in fact occupational diseases. The term 'occupational diseases' have always been a matter of discussion. Employees in oil and gas companies exposed to various chemicals and gases produced and used in various segments of activities. These chemicals and gases caused for occupational diseases of the lungs, skin and other organs, depending on the duration of exposures. The present informative article is intended to focus on the occupational diseases being faced by oil and gas company's employees, its effects on their health, family life and some remedies have been discussed to overcome the problems related to their health.

Review of Literature
i) Australian Institute of Petroleum, (1980), has conducted Watch Research Program with a view to find out what happens to employees in terms of their health. The information stated in the report is important in identifying factors that may be a risk to health and ways in which the risk of occupational diseases may be controlled. Through the study over 20000 past and present employees in their organizations have been interviewed. It was found that, the employees of oil and Gas Company are facing dizziness, problem of headaches, drowsiness and nausea, which is associated with exposure to hydrocarbons and dermatitis and sensitization from reseated skin contact with the drilling fluids.
ii) A study conducted in year 2000 by researchers of the national Cancer Institute, under the title "Mesothelioma and Lung Tumors Attributable to asbestos among petroleum workers". Researchers have

found that, 96 percent to 100 percent employees were concerned with Mesothelioma and 42 percent to 49 percent employees were concerned with lung cancer cases. Through the study researchers have also found two cases of asbestos related lung cancer among these employees for each case of Mesothelioma.

iii) Jefferson (2013). Has opined that, health and safety have been a priority for oil and gas companies for many years. However, occupational hygiene is often not properly assessed to determine the true risk to employees. Author has also highlighted some of the occupational diseases and other hazards that employees of oil and gas companies should be aware of.

iv) Eide (2009), considers the nature, recognition and control of health risks in the offshore oil and Gas Company from the occupational hygiene point of view. Particular attention is given by the author to the changes in the nature of exposure and control of inhalation risks from substances hazardous to health. Other risks such as dermatitis noise and vibration are also considered by the author.

v) Hanna and Sella (2012), have suggested that each of the industries, including oil and gas company should pay attention to aspects of industrial hygiene, as well as possible, given the magnitude of the risk level of activity contained in each employee. The study aims to design what should be done to manage occupational health risks in oil and Gas Company based on the frame work of industrial hygiene.

1) Occupation Related Diseases in Oil and Gas Companies

During the years 2003-2009, the annual rate of occupational diseases in the oil and gas industry was 27.5 percent per 100000 employees i.e. it was more than seven times higher than the rate for all US workers. In the year 2010-11, oil and gas industry employed 4,35,000 employees. The annual fatality rate in this industry is highly variable and this variation is correlated with the level of drilling activity in the company. It was observed that, the rate of occupational diseases are higher whenever there is growth in number of active drilling and work over rigs. This is because of increased proportion of untrained and inexperienced employees, longer overtimes, and utilization of outdated old equipments with fewer safeguards. Employees of oil and gas companies are generally engaged in various functions of which lead to various diseases. These functions contained chemical hazards (i.e. toxic, corrosive carcinogens, asphyxiates, irritant and sensitizing substances), physical hazards (i.e. noise, vibration, radiations and higher temperature) and ergonomic hazards (i.e. manual handling dangerous activities and repetitive motions, awkward postures).

The following table shows the diseases from the various processes included in upstream, midstream and downstream segments of activities.

	Segment	**Processes**	**Diseases**
1	Upstream Activities	Seismic survey and evaluation, Exploration and drilling, development, production, decommissioning	Infectious and parasitic diseases such as Hepatitis A, Cholera, Typhoid fever, cumulative trauma disorders, chronic obstructive pulmonary diseases, Gastrointestinal disorders, Dermal and eye issues, spinal disorders, neoplasm cancer, heat strike, stress, sleep deficits, noise induced hearing loss, drug and alcohol abuse.
2	Midstream Activities	Pipeline maintenance, transport, storage and marketing etc.	Dermal and eye problems, Gastrointestinal disorders, neoplasm/ cancer.
3	Downstream Activities	Product refining and petro chemicals	Dermal and eye problems, Gastrointestinal disorders, neoplasm/ cancer, loss of hearing due to noise.

Source: www.bls.gov/iif/oshwc/os/osaroo13.htm

In all segments, many chemical products are used and also produced. The employees exposed to chemicals and gases produced in the oil and gas companies. It develops occupational diseases of the

lungs, skin and other organs if employees are associated for a longer period with these chemicals. Some adversely affected elements have been highlighted in the following paragraphs.

i) Hydrogen Sulfide - Hydrogen Sulfide is a important element of oil and natural gas deposits. It is also found in some mineral rocks. Hydrogen Sulfide is a very toxic gas which is colorless and smells like rotten eggs. This gas can adversely affect on the eyes, nose, throat and lungs of the employee. The body of employee may tremble and death may follow within minutes as a result of breathing failure.

ii) Asbestos – In the process of refining oil, asbestos is used. Refining oil requires the oil to be boiled, which releases gases and allows for chemicals to separate. In this process asbestos is use to reduce the risk of fire, preventing of burns. It is also used to resist the chemical reactions on the health of the employees. Inhaling small tiny asbestos fibers can cause inflammation and scaring that may lead to the development of Mesothelioma, cancer and other asbestos related diseases. Asbestos is also used in clothing of oil employees for the protection against heat and the risk of fires. Any damage occurred to the protective clothing; the asbestos fibers are released and potentially inhaled by employees. There is chance of disease like cancer. It is strongly associated with asbestos exposure. Even though, the use of asbestos is banned in some oil producing countries, it is still widely used in many other oil producing countries.

iii) Drilling Fluids – In the process of drilling, a large volume of fluid is circulated through the well and into open, partially enclosed or, completely enclosed systems at elevated temperatures. When these fluids are agitated during the circulation process, there is a potential for exposure of employees and subsequent health effects. These effects include dizziness, headaches, nausea (associated with exposure to hydrocarbons) and drowsiness, as well as dermatitis and sensitization from repeated skin contact with the drilling fluids. Apart from this, exposure to oil mists can cause irritation and inflammation of the respiratory system. Some of the mildly refined base oils have also been associated with cancer, as a result of the aromatic compounds in the oil mists.

iv) Silica – It is primary element of sand and rock. It contains minerals like granite, sand, fill dirt and top soil. Hydraulic fracturing sand contains up to 99 percent silica. A disease like silicosis is caused by the longer breathing of fine crystalline silica dust. The particles are deposited in the lungs of employees, causing thickening and scarring of the lung tissues. Employees associated with silicosis disease may have no any symptoms, but later, as the disease progresses, employees experience shortness of breath, sever cough and weakness. These symptoms can worsen overtime and may lead to death. Crystalline silica exposure has also been linked to lung cancer. The employees engaged in the following functions are at the risk of breathing silica dust – abrasive blasting using silica containing products, cementing operations, drilling using dry product additives which contain quartz, shale dryers maintenance, hydraulic fracturing which contained loading- unloading, moving or storing sand; and sweeping or moving sand or gravel containing silica.

v) Mercury – Mercury is found in various chemicals. It is natural element in oil and gas and may be present at high concentrations in some formations. It is likely separated from geological storage due to heat and pressure and migrated as a vapor,, to the oil and gas storage. Mercury in liquid nature can condense within heat exchangers separators, coolers, valves and piping. When this equipment is used for the purpose of maintenance or repair, employees can be exposed to the vapors of mercury. The risk of exposure to mercury is related with the functions like - vessel cleaning, welding, pipefitting, hydro excavating and electrical work, buffing and polishing. A long term exposure to mercury vapor adversely affects the central nervous system of employees' body.

Due to this, employees may face the diseases like stupor, tremors and problems related to vision and hearing. Apart from this, employees may face the nervousness, personality changes etc. and most important thing is that, if an employee is contacted with mercury, it can adversely affect his kidneys and cause irritation and burns to the skin and eyes.

vi) Diesel Exhaust – In the oil and gas companies, diesel engines are used to generate power for operations of many types of vehicles, heavy equipments, power generators etc. The exhaust of these engines includes carbon monoxide and oxides of nitrogen. The exhaust also contains a mixture of many other gases. The diesel exhaust can affect on worker health. This can also cause diseases for eyes, nose

and throat. Long term health issues can include respiratory diseases, lung cancer and cardiovascular problems.

vii) Radioactive Materials – there are many radioactive materials which are found naturally in the environment and in the earth's crust. These materials include uranium, radium, radon and thorium. In the oil and gas companies, these materials may be available in the form of liquids and gases from some geological formations. The concentration of these higher levels, because of human activities in the oil and gas company. Special precaution is necessary for handling, transporting and disposing of these materials. Scale from oil recovery brine, may contain radium at much higher concentrations than the original water source. Drilling fluids and sludge may also contain these radioactive materials. Employees of oil and Gas Company can be exposed to these radioactive materials through external source (irradiation) or internal source that is through inhalation, ingestion or absorption. The effects of the exposure to these materials on the employee's health, depends on the intensity of the radiation and the duration of the exposure. It is obvious that, the long term exposure to the radioactive materials, above exposure limits has been associated with certain forms of cancer.

Radioactive materials can also be found in well heads, production manifolds, gas and oil separator flow lines, valves, storage tanks and dehydrators and desalinators etc.

Apart from the gases and other chemicals, there are some factors which are adversely affects the health of the employees of oil and Gas Company. These factors are availability of limited and enclosed work space and hazardous noise.

viii) Availability of Limited and Enclosed Work Space – In many oil and gas companies, work place is limited and fully enclosed or partially enclosed. This space is not designed for someone to work in regularly, but employees may need to enter the enclosed space or area for activities like inspection, maintenance and repair or cleaning etc. Area layout with obstructions can make entry and exit difficult and may complicate rescue procedures. Many times employees have deceased because of they did not know that they were entering such a enclosed area with a hazardous atmosphere and therefore, they did not take necessary precautions before entering in such area. Such enclosed areas are common in oil and gas companies; particularly in processing operations. The examples of such enclosed or confined areas are – storage tanks, boilers, tunnels and pits, pipelines, ventilations and exhaust ducts, process and reaction vessels.

ix) Hazardous Noise – A noise in oil and gas companies, include hearing loss of employees. This hearing loss may be permanent due to long term exposure to hazardous noise. The severity of hearing loss is affected by the intensity of the noise and the duration of exposure.

In a nut shell, employees of oil and gas company exposing to wide range of hazardous substances, noise, vibrations, radiations, extreme heat and cold and ergonomic hazards. All these have the potential to adversely impact or to harm the health of employee immediately or in later life. Noise level in oil and Gas Company can exceed 90 decibels, posing a significant threat to the health of employees.

2) Impact of Occupational Diseases on Employee' Family and Social Life

Occupational diseases not only affects the health of the employee but also affects their family and social life, which includes unsatisfactory or disharmony marital life; and cumulative stress trauma. Due to severe diseases employee keep himself away from his children and spouse and sometimes gets addicted to alcohol, He suffers from anxiety, depression and even face sexual difficulties which occur as a result of frequent parting between employee and spouse; and employee may undergo some sort of psychological problems. The social life of the oil and gas employee almost comes to an end. He keeps himself away from society or avoids participating in any social ceremony.

The employees of oil and Gas Company are associated with poorer psychological wellbeing or health, this is to say that the employees tend to experience high level of stress and depression, dissatisfaction towards job and also sleep disorders.

3) Remedies to Overcome the Problems

i) In case of leakage of Hydrogen Sulfide, the leakage area must be evacuated immediately and allowed to enter those employees who are wearing appropriate protective clothing and equipment to correct the

problem. Management authority must implement effective rescue and exposure control plans in case of leakage of hydrogen sulfide. There should be proper training programs for employees and supervisors.
ii) The engineering controls and safety work procedures should be properly implemented while utilizing personal protective equipment in the function of drilling.
iii) The hazardous material survey and risk assessment programs for mercury must be conducted by management authority frequently. The information related with this must be kept on site and communicated to all contractors who will work at these sites.
iv) There should be engineering controls over the diesel exhaust by installing oxidation catalysts and exhaust filters and utilization of low sulphur fuels or special fuel additives. There must be restriction on the diesel power machinery in a work area and designate areas that are off limits for vehicles and engine related activities.
v) In order to provide safety to the workers who are related to the functions of maintaining and cleaning equipments and tanks or vessels which are polluted by radioactive materials, written radioactive materials management programmes should be developed and implemented in the company.
vi) A program of hazard assessment must be conducted by management authority for every enclosed working space work. Management authority must prepare and implement a program for enclosed work area which must be included in written safe work procedures for entry and regarding work procedure in every enclosed work area.
vii) In case of hazardous noise, there should be annual hearing test programme to determine the success of hearing conservation efforts. It is important to review test results and to impart training to employees regarding the exposure risk to hazardous noise.
viii) Apart from the above remedies, political leaders of oil and gas producing countries should support diseases. Injury prevention research and studies in the field of occupational health in general.
ix) Products containing highly toxic elements should be avoided and other alternatives should be used.
x) Training for workers regarding personal hygiene and health should be promoted with emphasizing the necessity for maintaining high standards of personal health and hygiene.
xi) There should be frequency in the disposal of oil products wastages.
xii) There should be cooperation among the oil producing countries regarding the elaboration and clarification of exposure limits for petroleum products and components of petroleum products in water and entire environment.
xiii) It is necessary to understand the elements responsible for the production of oil mists and the significance to health of inhalation of particles of various sizes.

CONCLUSION

The oil and natural gas sector has a significant place in the world's economy. This sector is expanding rapidly and providing many new job opportunities; but at the same time there is a increasing risk of work related fatality, injury and diseases.
New exposures hazards are some of the challenges being faced by the employees to maintain a safe and healthy work environment. Employees exposed to chemicals, gases produced and used in the oil and Gas Company may develop occupational diseases of lungs, skin, and other organs. Therefore, to overcome the problems of occupational diseases, some remedies have been suggested in this information article.

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