

## **ON THE EFFECTS OF PETROL STATIONS IN NIGERIA**

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## **ABSTRACT**

In recent times, petrol stations are rapidly increasing since million of automobiles on Nigeria roads run on premium motor spirit (PMS) or diesel fuel. The inhalation of petrol fumes constitutes a high potential risk to the environment and the general population. The aim of this paper is to discuss a number of general hazards of concentration of petrol stations especially in urban areas and recommending measures aimed at controlling them.

Keywords: petrol stations, petrol, hazards, environment, control measures.

## **I INTRODUCTION**

In [1], a petrol station is defined as a facility where fuel and lubricants for automobiles are sold. The location of filling station in our various cities are largely influenced by a number of factors such as marketability, accessibility and approval by local authorities. In many countries, there is heavy presence of petrol stations due to urban growth [2], [3]. As a result, the health of people living close to these areas are endangered due to constant traffic and vapour emission. Fuels sold at petrol stations include petrol, liquefied natural gas (LNG), diesel and kerosene. These fuels especially petrol contain volatile organic compounds like benzene which are flammable and can give off vapour even at low temperatures. This means that there is always a risk of fire or explosion if ignited. Furthermore, they float in water and many travel long distances eventually causing danger away from the place where they have escaped [4]. An estimated 7,400 fires and explosions occurred at public service stations per year between 1994 and 1998 in the United States of America [5].

Studies have reported that inhalation of benzene in the environment causes mucous membrane irritation, heart attack, cancers of the lung, brain and stomach, leukaemia, aplasia, dermatitis and bone marrow depression [6], [7], [8]. Exposure assessment studies have found that important microenvironments for benzene exposure are those associated with petrol use: driving, working at or visiting a service station and living close to waste sites of petroleum refinery or chemical manufacturing plants [9], [10]. Also, evidence of serious health effects linked with automobile mechanics and petrol service attendants who are at constant exposure to benzene have been widely reported in the literature [11], [12]. Cases of haematological disorders and respiratory failures due to exposure of persons to benzene at filling stations in less developed countries have been reported in [13], [14], [15]. Hence, the safety of these classes of workers

should raise serious public health concern. In addition, petroleum products are potential pollutants of aquatic life. They are injurious to fishes and other animals living inside water. Such animals if eaten can have serious health-related effects on humans.

Due to the environmental impacts of petrol stations and its attendant adverse public health consequences, there is need to study safety measures that could help in stemming these harmful effects. This paper therefore, will discuss the negative effects of public service stations and highlight some control measures needed to avoid these hazards.

## **II ENVIRONMENTAL IMPACTS OF PETROL STATIONS**

In this section, we discuss some environmental problems associated with siting petrol stations in any area.

### **\* Fire outbreak**

The storage of petrol may lead to fuel spillage which can cause fire outbreak if not properly handled. During the inferno, a lot of lives would be lost and valuable properties destroyed. Leakages through storage tanks and dispense pumps may also pose some risks.

### **\* Road accident**

Usually, there is considerable movement of vehicles during fuel scarcity which could lead to accidental collision with structures, people and other vehicles.

### **\* Traffic congestion**

Traffic congestion is a common feature at petrol stations situated very close to each other, near a market place or next to road intersection and junction. Also, traffic congestion

occurs during loading and unloading of passengers and goods around the premises of petrol stations.

\* **Hazardous substances**

Some items of stock and chemicals used in car wash and general cleaning in service stations can be harmful. Chronic exposure to them through use, accidental spillage or leakage can cause respiratory problems, dermatitis or chemical burns.

\* **Electricity**

Misuse or badly maintained electrical equipment can lead to increased risk of electric shock and fire risks at petrol filling stations. Wet environment resulting from commercial vacuums and car washes can also cause malfunctioning of electrical equipment.

\* **Violence to staff**

Petrol service attendants are placed at the risk of violence during robbery attacks or public disorder at filling stations. These workers may be killed or maimed for life if they do not cooperate well with the invaders.

\* **Pollution**

The volatile organic compounds in petroleum motor spirit pollutes the air with attendant health effects on the environment. In areas where fuel stations are situated very close to rivers, these vapours are potential threats to aquatic life.

### **III CONTROL MEASURES**

Towards reducing the negative environmental impacts discussed in the previous section, we recommend the following control measures at petrol stations

- enforcement of required safety regulation and standards for safety in filling stations.
- indiscriminate siting of fuel stations within residential areas should be stopped to avoid fire outbreaks and accidents during fuel scarcity.
- enlightenment campaign to educate petrol station attendants and other staff on the negative health implications of exposure to petrol fumes.
- petrol staff should be adequately trained on operational procedures at filling stations and should be provided with appropriate protective clothing.
- storage tanks and dispense pumps should be well maintained and monitored.
- provision of sufficient designated parking areas away from tanks and pumps.
- devise a safe system of traffic movement at filling stations.
- provide mechanical protection to vulnerable structures such as fuel tanks and LNG storage areas.
- identify hazardous (dangerous) area and control all sources of ignition.
- all electrical equipment should be suitably insulated and supplied through a circuit protected by a residual current device.
- appropriate wet stock management procedures should be used.
- use of closed circuit television, panic alarms and other security measures.
- store all hazardous substances in their original containers.
- keep all escape routes and fire exits clear and make regular checks.

## REFERENCES

- [1] O.T. Afolabi, F.O. Olajide and S.K. Omotayo, “Assessment of safety practices in filling stations in Ile-Ife, South Western Nigeria”, *Journal of Community Medicine and Primary Health Care*, vol 23, no 1 & 2, pp. 9-15, 2011.
- [2] World Health Organization (WHO), “Why urban health matters”, Geneva Switzerland, <http://www.cbsnews.com/stories>, 2010.
- [3] United Nations (UN), “World population increasingly urban”, <http://www.cbsnews.com/stories>, 2010.
- [4] D.B Menkes and J.P. Fawcett. “Too easily lead?”Health effects of gasoline additives”, *Environmental Health Perspectives*, vol 105, no 3, pp. 270-273, 1997.
- [5] National Fire Protection Association’s special date information package, “Fires in or at service stations and motor vehicle repair and paint shops”, <http://www.nfpa.org/assets/files>, 2011.
- [6] C.G. Hunter, “Aromatic solvents”, *Annals of Occupational Hygiene*, vol 9, no 4, pp.191-198,1966.
- [7] IARC, “Some industrial chemicals and dyestuffs”, *Monogr Eval Carcinog Risks*, vol 29, pp.95-148, 1982.
- [8] HSE, “Dispensing Petrol: assessing and controlling the risk of fire and explosion at sites where petrol is stored and dispensed”, <http://www.hse.gov.uk>, 2002
- [9] L. Wallace, “Environmental exposure to benzene: an update”, *Environmental Health Perspective*, vol 104, no 6, pp.1129-1136, 1996.

- [10] Health Safety Authority (HSA), “Petrol Station Safety”, wch@hsa.ie, 2015.
- [11] F. Brugnone, L. Perbellini and L. Romeo, “Benzene in environmental air and human blood”, *International Archives of Occupational and Environmental Health*, vol 67, no 3, pp.195-200, 1998.
- [12] N.E. Udonwa, E.K. Uko, B.M. Ikpeni, I.A. Ibanga and B.O. Okon, “Exposure of petrol station attendants and auto mechanics to PMS fumes in Calabar, Nigeria”, *Journal of Environmental and Public Health*, vol 2009, pp. 1-5, 2009.
- [13] M.S. Linet, S.N. Yin, L.B. Travis, C.Y. Li, Z.N. Zhang and D.G. Li, “Clinical features of hematoplastic malignancies and related disorders among benzene – exposed workers in China”, *Environmental Health Perspectives*, vol 104, pp. 1159 – 1163, 1996.
- [14] F. Meneses et al., “Environmental exposure to volatile organic compounds among workers in Mexico city as assessed by personal monitors and blood concentrations”, *Environmental Health Perspectives*, vol 107, no 7, pp. 511 – 515, 1999.
- [15] S.S. Ovuru and I.K.E. Ekweozor, “Haematological changes associated with crude oil ingestion in experimental rabbits”, *African Journal of Biotechnology*, vol 3, no 6, pp. 346 – 348, 2004