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Environmental Assessment of Noise Pollution from Dhu Qar Oil Refinery

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Abstract

15 sites have been identified for measuring noise pollution resulting from an in-situ oil refinery in public places (perimeter where workers move), and inside buildings (places where workers practice their profession) And another close to the residential areas of the refinery, where the measurement results showed that the locations of the study area exceeded most of them the permissible environmental determinant of noise and proved this through the questionnaire form of the employees where the percentage was recorded (49%) of the study sample has hearing impairment, and 83.2% suffer from sleep disorders and disturbing dreams. The results of the field study showed that there was a discrepancy in the noise level of the Dhu Qar Oil Refinery's measurement sites, with the highest noise level recorded during the summer (July 2023) and winter (January 2024), near the asphalt unit (the highest aspect) with a noise rate of 103 decibels.

Keywords: *Environmental Assessment, Noise Pollution, Noise Measurement Methods, Noise Classification, Measurement Unit, Monitoring Sites, Environmental and Health Damage.*

INTRODUCTION

Noise or hearing pollution is one of the forms of pollution that today's human societies suffer. as a result of its multiple sources, the most important of which is industrial development and the introduction of machinery in all aspects of life and the concomitant voices that are not palatable and uncomfortable with the hearing of human beings, No less dangerous to humans than air, water or soil pollution. According to the definition of the World Health Organization (WHO), healthy health means compatibility between the human body and its environment so that all its organs and devices perform their functions adequately and in harmony with this environment.

First: Noise pollution concept and methods of measurement

Noise is an abnormal type of contamination, as it is known to be a kind-sounding and out-of-the-ordinary physiological effect that causes a hearing-disturbing and nerve-inducing physiological effect. Including noise from industrial pollution as a result of factory workers' exposure to noise leading to temporary and then permanent design This type is called internal noise. The other type of noise is external noise. It is the result of small workshop activities, power plants, transportation and traffic over cities. and construction work, drilling, loudspeakers, household noise emanating from appliances and noise has adverse effects on human health, especially hearing effects, psychological and neurological complications, as well as organic diseases resulting from hormonal disorders, Emergency physiological responses turn into persistent organic changes, such as atherosclerosis, clot disease, bleeding in the heart or brain, muscle impact and associated pain in the head, back and joints, The effects of noise on the health side do not depend only on the social aspect. It adversely affects behaviour, and it has been found from field experiments that areas where noise increases do not tend to provide aid, no matter how small it may be. It is an aggression by voice against others and represents a phenomenon of immature societies.

The health and psychological effects of noise have been recorded by many studies, all of which have demonstrated the fact that hearing loss is one of the most prominent effects of noise exposure at high levels because when it exceeds 90 dB, it may directly damage the hearing nervous system and low sound levels. (50-55 Desbel) may be a direct factor of insomnia or feeling tired when waking up. This is further compounded by

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noise from certain stress-related diseases such as stomach ulcers, hypertension and various physiological disorders.

Industrial noise accompanying production and manufacturing processes is one of the most intense and widespread in modern times. Therefore, in this study it is necessary to identify the noise pollution concept in the study area and how it is measured, and then to address its classification based on several criteria, Among them is starvation, whether caused by natural or human factors and permanent in the sense of temporary or permanent exposure, and the health effect of painful noise, irritant and orderly. Oil refineries are one of the sources of noise pollution. To identify this phenomenon in a Qar oil refinery, noise pollution concepts must be identified as follows:

Noise can be defined as, unwanted sounds traveling through the air medium at a high frequency leading to severe eardrum vibration, causing discomfort to the hearing because there is no consistency or regularity but is characterized by intensity and overlap of sounds with each other and two distinct types of sound transmitted in the air in the form of successive waves.

It is also known as sound waves transmitted in different circles, especially in the air in the form of pulses of high and low pressure of the sound-transmitting medium with energy that affects the ability of the organism to distinguish sounds and offends the effectiveness of audio and nerve devices.

Noise pollution is called unwanted sounds that cause disturbance or disturbance either because of their intensity or because of their intensity or because of their persistence over such a long period of time that it prevents man from doing or concentrating in it. Because the speed of sound in the air is equal to (331.5 m/tha) at zero ° C and the higher the temperature of the air is one ° C, the higher the speed of sound at (0.6 m/tha).

Each noise cannot be counted for reasons of overlap between the sounds, which are high and sharp and undesirable. The number of points depends on the rating of the sound if it is noise or not as follows:

1- Sound intensity: Its characteristic characteristic of sound ear is strong or weak and depends on the area of the shaky body and the distance between it and the ear.

2- Sound Score: It is the property in which the ear distinguishes sharp and strong sound and has its relationship to the shaky body frequency.

3- Sound type: It is the characteristic of the sound tone even when its intensity and grade are equal as that of the man and his mirror.

Second: Classification of Noise Pollution

The classification of noise pollution is classified as follows:

First, According to Origin, It Is Divided into Two Types

A- Natural noise: It is caused by nature's sounds such as volcanoes, explosions and crackers.

B- Human noise: It is caused by various human events. It was the sound of all vehicles or the sounds of machinery and factories, not to mention people's interactions with each other.

Second: According To Permanence: It Is Classified into Two Types

A- Chronic noise: In other words, its occurrence or exposure is permanent and continuous, which is more influential than type II because it causes sustained hearing impairment.

B- Temporary noise: occurs for a specified period of time and does not constitute a permanent condition when it occurs suddenly.

Third: According To the Health Impact: It Is Classified into Three Types

A-Excruciating noise: When levels exceed 120 decibels where the alma causes the hearing system and serious repercussions on the cardiovascular system.

B- Very unpleasant noise: its intensity ranges from 80 to 120 dB, resulting in lower hearing intensity causing pain when exposed to it for a period of more than 8 hours per day.

C- Moderate disturbance noise: It has a level of 40 to 80 dB, causing health damage in the neurological sentence and psychological reactions such as anxiety and stress and may last for months or years when exposed to it and for long periods.

Third: Sound Intensity and Permissible Boundary Measurement Unit

Sound intensity is measured alone as "Disbell", which is the lowest degree of sound that an ordinary person can hear, where the intensity of whispering is estimated to be 30 Decbels and normal speech from 30 to 50. The number of decibels is measured using logartimatic measurement, from dim sounds to severe pain sounds, and the criteria for noise levels in the working environment vary in time depending on the duration of noise exposure. The permissible bases and criteria for votes vary from state to state depending on the different nature of life and activity it exercises, with the World Health Organization (WHO) setting the allowable limits at 85 decibels and for a period of 8 hours per day for different areas of Schedule 1.

Table (1) Maximum and acceptable noise levels according to World Health Organization (WHO) standard

DB acceptable level of noise	Region
40 – 25	**Residential /outside**
60 – 30	**Commercial /outside**
40 – 30	**Educational /outside**
35 – 20	**Hospitals /outside**
45day-35 night	**Home /outside**
60 – 40	**Industrial /outside**
55day-45 night	**The general community**

Source: Ministry of Labour and Social Affairs of Iraq, National Occupational Health and Safety Centre, Occupational Health and Safety Section, 2012.

Fourth: Spatial And Time Monitoring Sites for Noise Pollution Measurements Within the Dhi Qar Oil Refinery

15 locations were selected for noise intensity measurements at the Dhi Qar oil refinery, and measurements were made on two types, in public places (The perimeter in which workers move) and inside buildings (places where workers practise their profession) Table (2), as well as residential locations adjacent to the refinery, where it contained more than one source of noise, so measurements were made for each source (Such as the asphalt unit and the tanks and the first, second and third refining units, inside the workers' rooms and in the black oil loading yard and near the residences of liquidated employees etc.).

It turns out that there are differences in the variance of measurements in time due to the impact of sound transmission in the hot atmosphere more than cold, and there is almost no discrepancies in measurements near the source of noise, but the spatial variation records a clear difference in the intensity rates depending on the proximity and distance of the target or the difference of the place. Enclosed spaces, such as buildings, are less affected from the inside by noise, due to blocking sound transmission, thick glass and tight windows.

Measurements of closed sites below the industrial environmental determinants between (40 - 60 dB) which is considered healthy and psychological and that all other sites studied except for those mentioned are outside environmental determinants and do not depart from noise pollution levels ranging from average inconvenience to extreme nuisance followed by their proximity to and after noise sources and observed from table (38); Sound levels and different sound intensity rates, where the results of the field study showed that workers suffer from hearing impairment, sleep disorders and disturbing dreams as well as poor concentration, This is due to PPE and the use of public safety tools which poses a health hazard and has a psychological impact on workers as a result of production, Noise exposure should not exceed the prescribed time period. Each noise level has a fixed time period. When PPE is not adhered to and with long periods of noise exposure, anxiety is shifted to the state of stress. Its symptoms appear in the speed of breathing rate, metabolic speed, muscle tightness, hypertension, heart pulse disorders and ulcers in the digestive system. The results of one field study showed

that the appearance of symptoms and work accidents among noise-prone workers was not susceptible to vulnerability.

The results of the field study showed that there was a discrepancy in the noise level of Dhu Qar Oil Refinery's measurement sites, with the highest noise level recorded during the summer two seasons. (July 2023) and winter (January 2024), near the asphalt unit (the highest aspirates) with a noise rate of up to (103 dB) The lowest level of noise was recorded. (85 dB) This is due to the loud sounds raised by those fans, due to the lack of natural air fluctuations when those fans drag the air inward, as well as the foot of those fans and their lack of continuous maintenance, causing them to be repeatedly fricted by very loud sounds. While the proximity of the first, second and third refining units recorded a modified noise level.

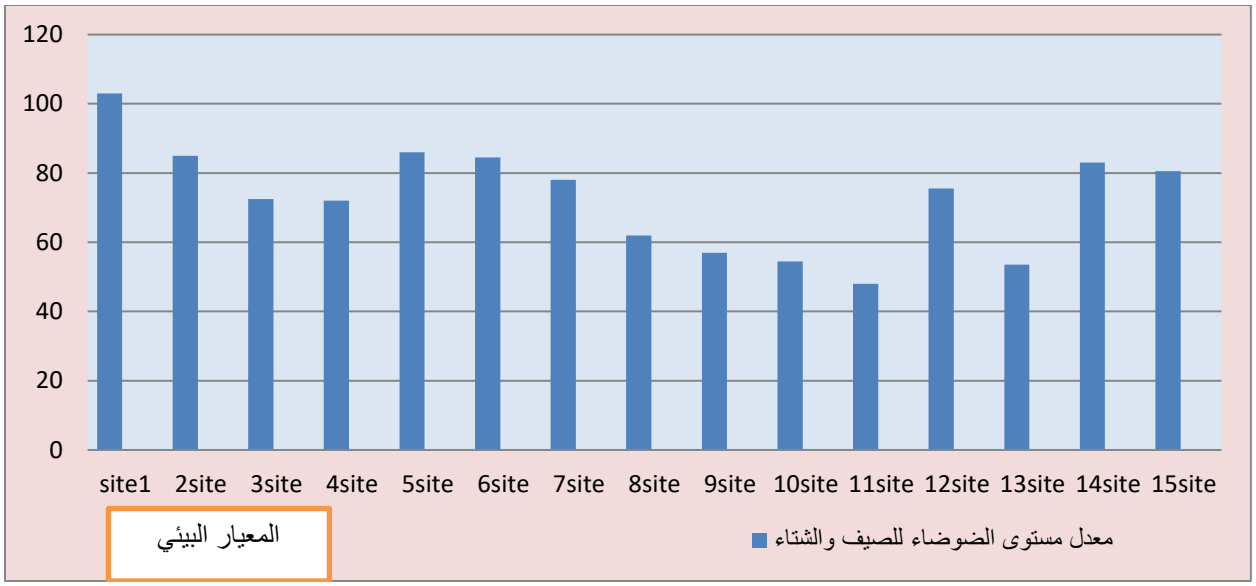
(78 - 84.5 - 72 dB) respectively, at the refining unit oven site, it recorded a higher noise level (86 dB), and near the maintenance workshop it recorded a noise level (75.5 dB).

Table (2) Locations of noise levels (dB) for the study area for the period (July 2023-January 2024)

Environmental Damage Effects	Noise intensity level	Noise Level (dB)			Measurement duration (min)	Section name	T
		Level	Winter	Summer			
Bad effects on the nerve sentence damage the hair cells	Extremely disturbing	103	101	105		ASPHALT UNIT (TOP ASPIRATES	**site1**
constitutes a threat and health damage to persistence	Disturbing	85	84	86	2	ASPHALT UNIT (TOP ASPIRATES	**2site**
Perpetual psychological effects	Medium inconvenience	72.5	73	72	2	Between vertical asphalt tanks	**3site**
Perpetual psychological effects	Medium inconvenience	72	73	71	2	Third refining unt	**4site**
constitutes a threat and health damage to persistence	Disturbing	86	85	87	2	Refining Unit Ovens	**5site**
constitutes a threat and health damage to persistence	Disturbing	84.5	84	85	2	Second refining unit	**6site**
Perpetual psychological effects	Medium inconvenience	78	77	79	2	First refining unit	**7site**
Temporal and customary effects	Medium inconvenience	62	61	63	2	Health and Safety Division	**8site**
Temporal and customary effects	Medium inconvenience	57	55	59	2	General management	**9site**
Temporal and customary effects	Medium inconvenience	54.5	55	54	2	Medical and Safety Unit	**10site**
Secure mode	Quite	48	47	49	2	General Maintenance Division	**11site**
Perpetual psychological effects	Medium inconvenience	75.5	75	76	2	Maintenance workshop	**12site**
Temporal and customary effects	Medium inconvenience	53.5	52	55	2	Inside Staff Rooms	**13site**
constitutes a threat and health damage to persistence	Disturbing	83	82	84	2	Black Oil Loading Square	**14site**
constitutes a threat and health damage to persistence	Disturbing	80.5	79	82	2	Refinery Staff Accommodation	**15site**

Source: Researcher based on field measurements of sound level meter lutron.

Table (2) and figure (1) data show that a bitumen oil refinery contributes significantly to its increase and the spread of noise contaminants at the study site, owing to the presence of heavy machinery, devices and transformers that result in increased noise levels, a number of which may amount to a lack of human permission to bear their high intensity.



Form (1) Noise measurement level at study sites and comparison with global environmental determinants (WHO)

Source: Researcher's work based on table (2).

When the noise rate near the black oil loading yard recorded a level of (83 dB) This is due to the intensity of the movement of transport trucks and machinery used for towing and loading, but at least it has recorded general maintenance at a noise rate of (48 dB), in medicine and environmental safety alone, the noise level recorded a rate of (54.5 dSPL), image (1), while inside the staff rooms recorded a noise level of up to (53.5 dB) When the World Health Organization (WHO) Global Standard is Authorized of the (40-60 dB), note that all measurement site rates have exceeded the permissible environmental determinant for its period of exposure (8 hours), except for locations (General Administration, Medical and Safety Unit, General Maintenance Division, Maintenance Workshop, Staff Rooms), recorded a noise level within the permitted limit.

The study indicates that the measurement effect not only stops inside the refinery but goes beyond distances up to (200 meters), where noise level was observed in the residential homes of the refinery staff, photo (2) The noise level recorded a rate of 80.5 dB, which means that the noise outside the refinery site has exceeded the world limit, thus contributing to the impact on the residential areas adjacent to it.

Image (2) Measurement of noise rates in its liquidated staff accommodation Picture (1) Measurement of noise rates within the refinery

Source: Field study of 8/7/2023 's history.

This indicates that workers in the working environment and residents of neighbouring neighbourhoods are inflicted mainly by adverse effects on the nerve sentence as well as damage to the hairline cells in the body of the ear from the loss of their sensitivity, especially those working near the machines and the abundance of refining units and aspirators.

Fifth: Environmental And Health Damage to Auditory Pollution (Noise)

Noise pollution is a mixture of unsolicited sounds. Noise pollution is closely related in mainly industrial places, and Daspel is the unit where sound and noise intensity are measured.

Noise is an abnormal type of pollution, including noise from industrial pollution as a result of factory workers' exposure to noise that leads to temporary and then permanent design. The other type of noise is external noise and is the result of the activities of small workshops, power plants, transportation, over-city traffic, construction, drilling, loudspeakers and household noise emanating from devices, The noise on the street in general has increased in recent years so clearly that the noise level on the street in some major cities at peak times has reached (96 dSPL) which is well above the permissible global limit of (45 dB) day and (35 dB) night, it is higher than the noise level allowed in factories (85 dB), and noise has adverse effects on human health, especially hearing effects, psychological and neurological complications, as well as organic diseases resulting from hormonal disorders, Emergency physiological responses turn into persistent organic changes such as atherosclerosis, clot disease, bleeding in the heart or brain, muscle impact and associated pain in the head, back and joints The effects of noise depend not only on the health side but on the social side. It adversely affects behaviour, and it has been found from field experiments that areas where noise increases do not tend to provide aid to their need no matter how small, They are aggression by voice against others and represent a phenomenon of immature societies.

There are also health and psychological effects of noise, most important of which are hearing loss. This is one of the most significant effects of high levels of noise exposure, as well as damage to the hearing nervous system and insomnia, or feeling tired when waking up.

Many studies have shown that urban dwellers are often the enemy of noise. Noise is considered to be one of the biggest factors leading to population displacement and moving to other quieter districts, so noise is a persistent and chronic problem. The intensity of the noise depends on the quality of the sound issued is it durable or temporary, as well as the length of time the person is exposed to the noise.

Medical studies confirm that noise affects human mental health and the functioning of the body, especially high sounds (which are more than 80 dB) and for a long period of time. This leads to deafness, and explosions more than 115 dSpell tear the drum membrane. It may also cause noise to intestinal disorders and general weakness in blood circulation. The effects of noise on human beings and their mental health are nervous stress, distress, headaches, loss of appetite, poor concentration, poor ability to deal with others, dropouts and frequent absenteeism. The effects of noise contamination on the physiological side of humans are an increase in the release of the pituitary gland, an increase in the body's sensitivity to the hormone adrenaline, and an impact on hearing and impairment.

According to the results of the field study and through the locations where the noise was taken The workplace, especially the outer space in which workers move, was found to have a high noise rate as a result of industrial machinery and oil-producing units, As well as the sounds of generators, turbines and suctions, in areas near the workplace it is also shown that they suffer from high rates of disturbing sounds, which are mainly the result of large carrier cars transporting oil material, where the questionnaire form number one clarified paragraph (3 - 9) The proportion of investigators accounted for 50% of those suffering from disturbing dreams and noise resulting from the refinery.

The World Health Organization (WHO) and the National Accredited Organization (WHO) also set permissible noise rates as between the national determinant of service and commercial areas (65 dB) and industrial areas (70 dB), and educational centres (55 dB), and health centres and hospitals (55 dB). These determinants are based on maintaining people's health in their environment and ensuring a life in an atmosphere that guarantees their psychological and mental well-being. Increased noise results in tension in the human personality with insufficient mental assimilation and increased psychiatric conditions, as well as increased anxiety for long periods of time, such as in the noisy work atmosphere (such as in the work of the refinery).

This shows that the noise created by the refinery through the work of machinery, equipment, movement of machinery, tanks and devices used in the refinery's work constitutes a kind of auditory contamination However, the variability in the effect depending on the study sample is due to the issue of proximity or distance from the noise source of residents near the refinery or on the car traffic route, The impact on both worlds is greater as a result of their practice of working inside the refinery, especially the operators and maintenance owners. The factor in these places is affected by the auditory sense of the sounds that he hears every day. It is a dangerous noise that directly affects human health, although the rest of the species are harmful to him. (2) The second paragraph for employees in the refinery is 49%. 245 Researchers with hearing impairment. The largest percentage of the referendum was for the group with more than 16 years of employment in the refinery nausea, high blood pressure and headache (headaches).

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