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Research Article

Assessment of Noise Pollution in West Qurna-2 Oil Field Southern Iraq

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Abstract The objective of this study was to determine the levels of Noise pollutants, emitted from the industrial area of West Qurna-2 oil field, Southern Iraq. Fieldwork carried out during 2015-2016 at ten selected stations. The results of the regional Noise levels was shown that the highest mean at station 10 (79.150Db) while the lowest at station 1(44.725Db),while seasonal levels showed that higher mean concentrations was recorded during winter (68.31Db), and the lower mean concentrations recorded during summer (64.12Db).

With respect to spatial variably of studied parameters, the parameters concentrations in studied stations gradually increased from station 1 to station 5, and then significantly decreased at station 6 and finally increased to station 10. The fluctuation in concentrations of stations is due to distance from the flame of the flare which near to the stations 8,9,10 and far to the stations 1,2,3,4,5,6,7, while the seasonal concentration arrange as following: winter >spring >autumn>summer.

By comprising the result concentration of this study with literature reviews and standard level of the variable concentration, the concentration levels lie within the recommended guidelines.

Keywords pollution, noise, West Qurna-2, oil field, southern Iraq

Introduction

Noise is unwanted sound. Sound is a shape of energy which is emitted by a vibrating body and on reaching the ear causes the sensation of hearing through nerves [1]. Noise also can be defined as any sound is undesirable and not from the heart of nature [2]. Noise is derived from the Latin word "nausea" which means 'unwanted sound' or 'sound that is loud, unpleasant or unexpected'[3]. Noise is an annoying sound caused by vibration of the matter. Sounds produced by all vibrating bodies are not audible. The frequency limits of audibility are from 20 HZ to 20,000 HZ. Noise intensity is measured in decibel (Db) [4and5].Noise have two sources: natural source like wind, thunder, volcanic eruptions, shores, birds, animal shouts, wind movement, sea tide movement, waterfalls etc. Anthropogenic like voices of machinery and plants and traffic, home appliances and Transportation systems are the main source of noise pollution in urban areas. Construction of buildings, highways, and streets cause a lot of noise, due to the usage of air compressors, bulldozers, oaders, dump trucks, and pavement breakers.

Industrial noise also adds to the already undesirable state of noise pollution. Loud speakers, plumbing, boilers, generators, air conditioners, fans, and vacuum cleaners add to the existing noise pollution. Road Traffic noise, Air Craft, Noise from railroads, Construction Noise, Noise in Industry, Noise from Consumer products, Loud Speakers / Public Address Systems and Firecrackers [6].

Noise is vary from other pollutants as follows:noise have multiple sources exist everywhere and it is not easier to control it, as in the case of other environmental pollutants like contaminants of water, air and soil, pollution caused by one of the factories can be processed, reduce or shut down the factory, while the noise found in the home, school, street, office and everywhere where human found it's difficult to control it.[6] Cut off after the

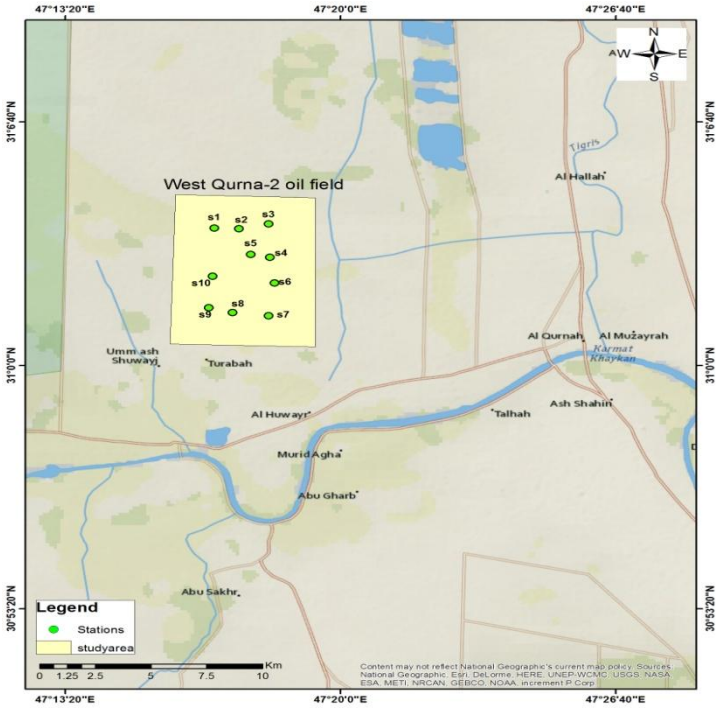
noise stopped as soon as they do not leave behind a clear impact on the environment and it remains something of them around us and therefore its impact on the environment were ends after the noise cut off. noise for other pollutants vary as local to a large extent in the sense that we do not feel it, but next to the source only and does not spread effects or effect of moving to another location as in the case of air pollution or water that moves from one area to another [7].

West Qurna is one of the biggest oil fields in Basrah Governorate. It has certain oil reserve estimated by 18 billion barrel, and possible reserve of about 40 billion barrel. The present product is 620,000 barrel/day, and it could be reached up to 1 million barrel/day. It is light and wanted allover the world.The study area is bordered from north by Missanprovince, west ThiQar province, southBasrah province and from the east Republic of Islamic Iran. Basrah governorate is located in south of Iraq, (32° 46¯- 48° 42¯) longitude and (29° 06¯ - 31°19¯) latitude [8].

This study aims to directly determine the levels of Noise pollutants emitted from the drilling and extraction of oil operationsat West Qurna-2 oil field.

Materials and Methods

Fieldwork carried out during 2015-2016 at ten selected stations from West Qurna-2 Oil field, Basrah, Southern Iraq As shown in (Fig. 1**)**, Noise pollution measured at field by using Sound Level Meter Lutron. SL-4011.



Result and Discussion

The Noise pollution at ten stations were range as following: Station 1 (40.8-47.8Db), station2 (50.3-61.7Db), station3 (55.4-61.00Db), station4 (61.5-66.3), station5 (74.2-79.9Db), station6 (64.1-70.2Db), station7 (64.9-71.7Db), station8 (72.3-77.5Db), station9 (77.1-80.2Db) and station10 (77.5-81.00Db) (Table 1).The mean concentration during different season range in station 1 from 40.9Db during summer to 46.8Db during winter, station2 ranged from 50.5 Db during summer to 59.8Db during winter, station3 ranged from 55.8 Db during summer to 60.2 Db during Spring, station4 ranged from 61.7 Db during summer to 65.3 Db during winter, station5 ranged from 74.5Db during summer to 77.4 during Autumn, station 6 ranged from 64.4Db during summer to 69.3 Db during winter, station7 ranged from 65.1Db during summer to 70.4Db during winter, station8 ranged from 72.8Db during summer to 76.6Db during winter, station9 ranged from 77.5Db during summer to 79.2 during winter and Spring and at station10 ranged from 78.0Db during summer to 79.8Db during winter. (Table 1, Table 2 and Fig.2).

Seasonal variation of Noise were observed during this study. The highest concentration was observed during winter season while lower concentration observed during summer season (Fig. 3).

Based on our data, the GIS maps were representing the levels of Noise measured during different seasons (Fig.4).

Table 1: Regional Concentration of Noise (Db) gas in ten stations during different seasons

Stations	Summer 2015				Autumn 2015				Winter 2015				Spring 2016			
	Noise	Range	Mean	±SD	Noise	Range	Mean	±SD	Noise	Range	Mean	±SD	Noise	Range	Mean	±SD
1	40.8 40.9 41	40.8- 41	40.9	0.1	43.6 44.7 45.5	43.6- 45.5	44.6	0.953	45.7 46.9 47.8	45.7- 47.8	46.8	1.053	46.2 46.5 47.1	46.2- 47.1	46.6	0.458
2	50.3 50.5 50.7	50.3- 50.7	50.5	0.2	54.1 54.9 55.4	54.1- 55.4	54.8	0.655	57.9 59.8 61.7	57.9- 61.7	59.8	1.9	58.4 58.6 59.1	58.4- 59.1	58.7	0.36
3	55.4 55.7 56.3	55.4- 56.3	55.8	0.458	57.1 58.2 59.6	57.1- 59.6	58.3	1.252	59.1 60.2 61	59.1- 61	60.1	0.953	60.1 60.2 60.3	60.1- 60.3	60.2	0.099
4	61.5 61.7 61.9	61.5- 61.9	61.7	0.199	62.1 63.5 64.6	62.1- 64.6	63.4	1.252	64.2 65.4 66.3	64.2- 66.3	65.3	1.053	63 63.1 63.5	63- 63.5	63.2	0.264
5	74.2 74.6 74.7	74.2- 74.7	74.5	0.264	75.1 77.2 79.9	75.1- 79.9	77.4	2.406	74.6 76 76.8	74.6- 76.8	75.8	1.113	73.2 73.6 74.6	73.2- 74.6	73.8	0.721
6	64.1 64.3 64.8	64.1- 64.8	64.4	0.36	66.5 67.6 69.3	66.5- 69.3	67.8	1.41	68.4 69.3 70.2	68.4- 70.2	69.3	0.899	67.9 68.1 68.3	67.9- 68.3	68.1	0.199
7	64.9 65.1 65.3	64.9- 65.3	65.1	0.199	68.3 69.4 69.9	68.3- 69.9	69.2	0.818	69.3 70.2 71.7	69.3- 71.7	70.4	1.212	69.8 70.1 70.7	69.8- 70.7	70.2	0.458
8	72.3 72.5 73.6	72.3- 73.6	72.8	0.699	73.1 74.2 75.6	73.1- 75.6	74.3	1.252	75.6 76.7 77.5	75.6- 77.5	76.6	0.953	75.9 76.1 76.3	75.9- 76.3	76.1	0.199
9	77.1 77.4 78	77.1- 78	77.5	0.458	77.3 78.4 79.8	77.3- 79.8	78.5	1.252	78.1 79.3 80.2	78.1- 80.2	79.2	1.053	78.8 79.1 79.7	78.8- 79.7	79.2	0.458
10	77.5 78 78.5	77.5- 78.5	78	0.5	78.5 79.1 80	78.5- 80	79.2	0.754	78.5 79.9 81	78.5- 81	79.8	1.252	79.3 79.5 80	79.3- 80	79.6	0.36

Table 2: Seasonal variation of Noise (Db) with mean in West Qurna-2 oil field

Station	Summer	Autumn	Winter	Spring	R. Mean	±SD
1	40.9	44.6	46.8	46.6	44.725	2.736
2	50.5	54.8	59.8	58.7	55.950	4.219
3	55.8	58.3	60.1	60.2	58.600	2.060
4	61.7	63.4	65.3	63.2	63.400	1.476
5	74.5	77.4	75.8	73.8	75.375	1.584
6	64.4	67.8	69.3	68.1	67.400	2.102
7	65.1	69.2	70.4	70.2	68.725	2.473
8	72.8	74.3	76.6	76.1	74.950	1.740
9	77.5	78.5	79.2	79.2	78.600	0.804
10	78.0	79.2	79.8	79.6	79.150	0.806
S. Mean	64.12	66.75	68.31	67.57	-	-

R. Mean= regional mean, S. Mean= seasonal mean.

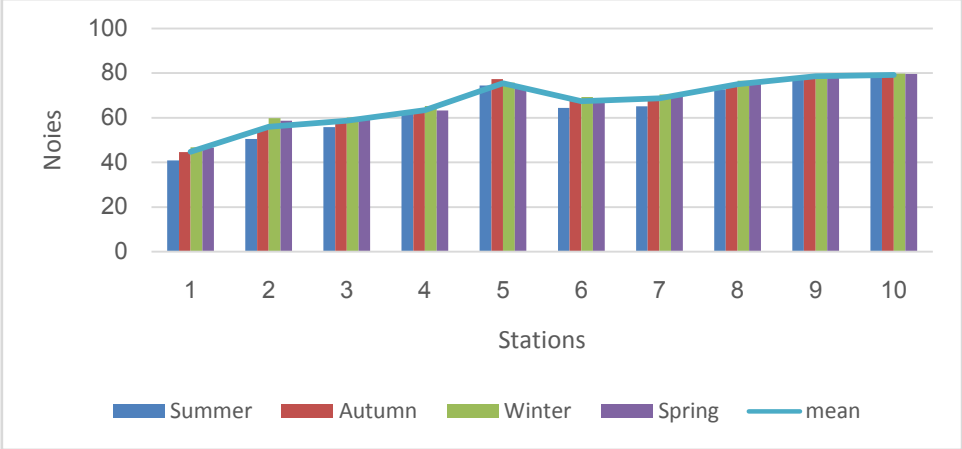


Figure 2: Seasonal and Mean concentrations of Noise (Db) at West Qurna-2 oil field

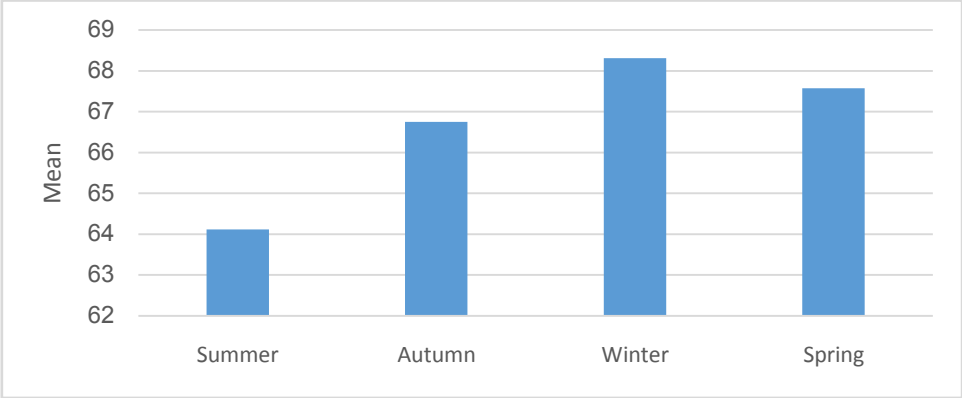
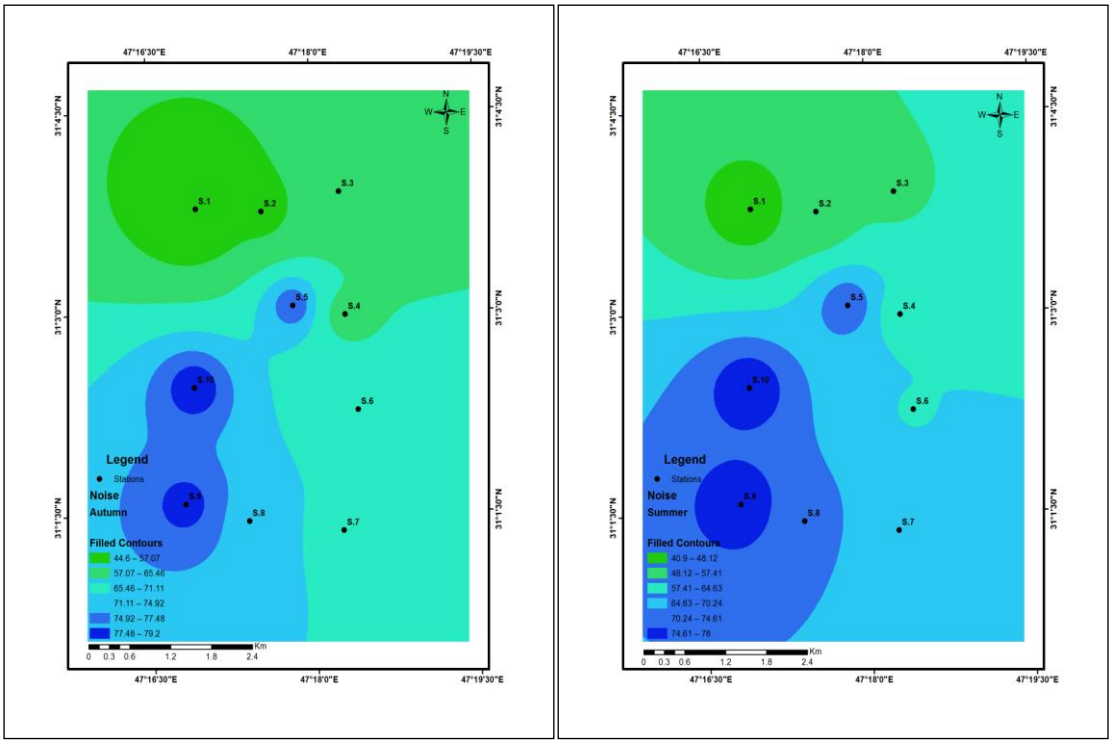


Figure 3: Seasonal Variation of Noise (Db) at West Qurna-2 oil field



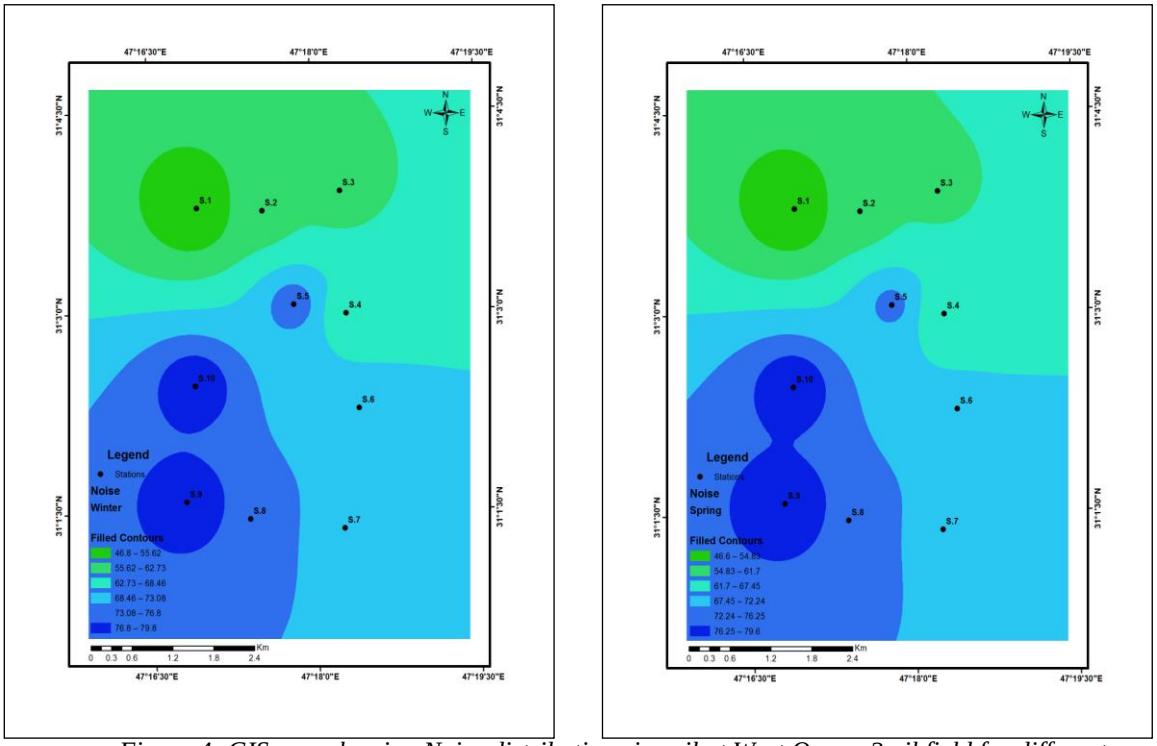


Figure 4: GIS map showing Noise distributions in soil at West Qurna-2 oil field for different seasons

During our measurements, the noise levels in all stations at West Qurna-2 oil field showed noise level values of >40.8 dB,. As shown in (Table 1), the highest mean of noise level among the tested stations was detected at station 10 (79.8dB) in winter and the lowest was recorded at station 1 (40.9 dB) in summer.

Noise from industrial facilities, construction sites and fixed recreation facilities radiates from a point source and the shape of the exposure area is generally a circle. The noise from various sources may either be steady for a long period or fluctuate over a specified period considerably.

The West Qurna-2 oil field is located by LUK OIL company and there are a camps of their company and also for Basrah oil company and there is many movement by the worker in the site by cars, that make a road traffic which is the key source of noise in the field . The speed and exhaust system determines the noise released by road traffic. The contact between tiers and the road surface is dominant source of noise at speeds above 60km/h for light vehicles. In future, tier to surface noise is likely to become an important issue to be addressed in noise abatement strategies.

The results show that there is a variation in the recorded of noise pollutants. They gradually increased starting from the sampling station 1 until station 5, and then significantly decreased at station 6 and then increased to station 10. This is due to the distance from the flame of flare. In general, station10 records the higher concentrations when compared to the other studied stations. This is due to the location of its existing near the flame. The results of the regional levels were the highest mean of noise at station 10 (79.150Db) while the lowers at station 1(44.725Db) Table (2) (Fig. 4).

Exposure to noise pollution exceeding 75 decibels for more than eight hours daily for a long period of time can cause loss of hearing. The hazards increase with the intensity of the noise and the period of exposure. The sound produced by a bursting cracker, exceeding 150dB, can cause a ringing sensation called ‘tinnitus’ and can impair hearing permanently [3].

[4]Found that the noise levels in industrial areas was (68-101 Db) while [6] found that the noise levels in industrial areas was (74-96 Db) and[7]said it was (80 -112 Db).

[9]Investigated the issue of noise pollution in the Bid Boland gas refinery in Iran and found that the noise levels detected in all tested industries was much above 80 Db limit specified by regulations.

Results of this study showed that the seasonal levels was the higher mean concentrations recorded during winter (68.31Db), and the lower mean concentrations recorded during summer (64.12Db),while spring was (67.57Db) and autumn (66.75Db)the seasonal concentration arrange as following: winter >spring>autumn>summer (Table 2) and (Fig 2), this may be attributed to the climatic condition,a relative humidity decrease lowers the noise level at the receiver and a temperature decrease raises the noise level at the receiver [7].

By comprising the result concentration of this study with literature reviews and standard level of the variable concentration, the concentration levels lie within the recommended guidelines.

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