

# The Concentration of Some Heavy Elements of the Dust Falling on the Shattrah City North of the Nasiriyah City (Dhi Qar)

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## Abstract

This study is to point out the concentration of the heavy elements such as (pb, cd, zn, cu) in the fallen dust over Shattrah city, and to point out the pollution's sources according to the standard criteria and finally the affection of these element on the human health in the city, as well as the diseases are caused by these heavy elements. Seven samples are chosen from different place through dusty days to include modern residential places, ancient residential places, commercial places, and industrial places. The concentrations of the heavy elements are examined according to the data of these samples. The results confirm the increased ratio of heavy elements according to the standard criteria; the Pb increased to (214.35 ppm) the Cd concentrations is (10.57 ppm) and the Zn concentrations is (108.28 ppm) and Cu concentrations is (35 ppm). The main reason behind the increased ratio of the concentration is the human activities of the large population, the stormy wind, the toxic gases of cars' exhaustions, the dust of the movement of the cars, the toxic gases of brick platforms and by the electricity platforms.

**Keywords:** dust; the Shattrah city; heavy elements; pollution.

## 1. Introduction

As a result of the industrial development in the most countries of the world, Iraq environmental is characterized by an additional toxic elements and heavy elements that affect hazardously the water, air, and plants [1].

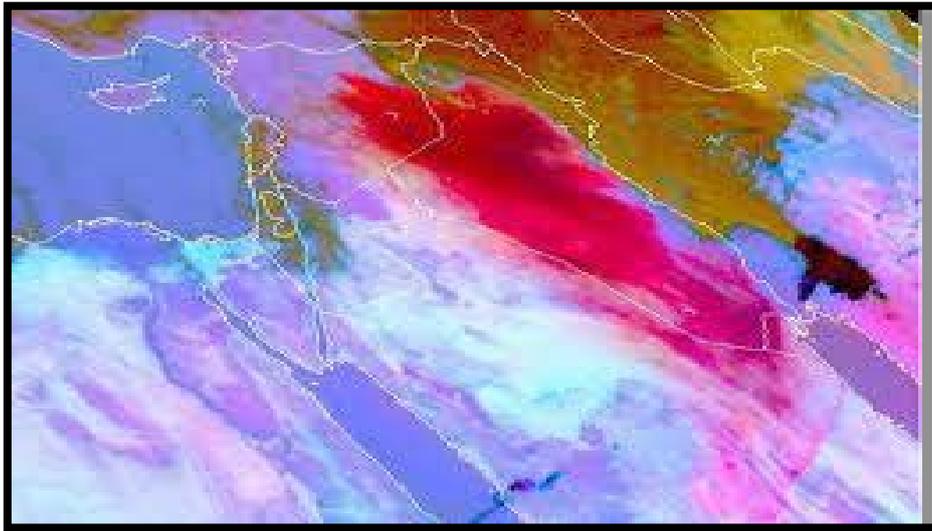
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It is known ,that the environmental pollution is a result of the natural and industrial affect .the natural factors such as volcanoes , forest fire, storms, hurricanes, drought and other things may affect the environmental in a one way or in other .these factors effect negatively in different ways ,their affections may prolong for a long time or for a short time according to the climate and according to the geological factors ,whereas the affection of the industrial is caused mainly by the human actions on the earth generally, and specially on the place of the study [2].

It is to be noticeable, that the majority of the Iraqi cities and of course all the Iraqi environment exposes to strong dusty storms. The dusty storms come from different directions; the storms affect the temperature and eventually the environment of the country.

As a result to the changeable atmospheric pressure , the air moves hyperactively in many directions toward the low pressure places of high degrees of temperature to elevated the dust with hot air to a certain altitudes .The elevated air comes colder gradually to move back again by the gravity of the earth (See figure 8- 9) [3].



**Figure 1:** the dust storms of Iraqi atmosphere [3]



**Figure 2:** the dust storms of Iraqi big cities [3]

The study is to examine the atmospheric of Shattrah city. Shattrah lies on Graph sub- River of Tigris in the middle of Furat area of Iraq. It is a part of Thi-Qar government .it lies in between Baghdad and the Arab Gulf , it is an important center for trading [4] .( See Figure 1-2) [4].

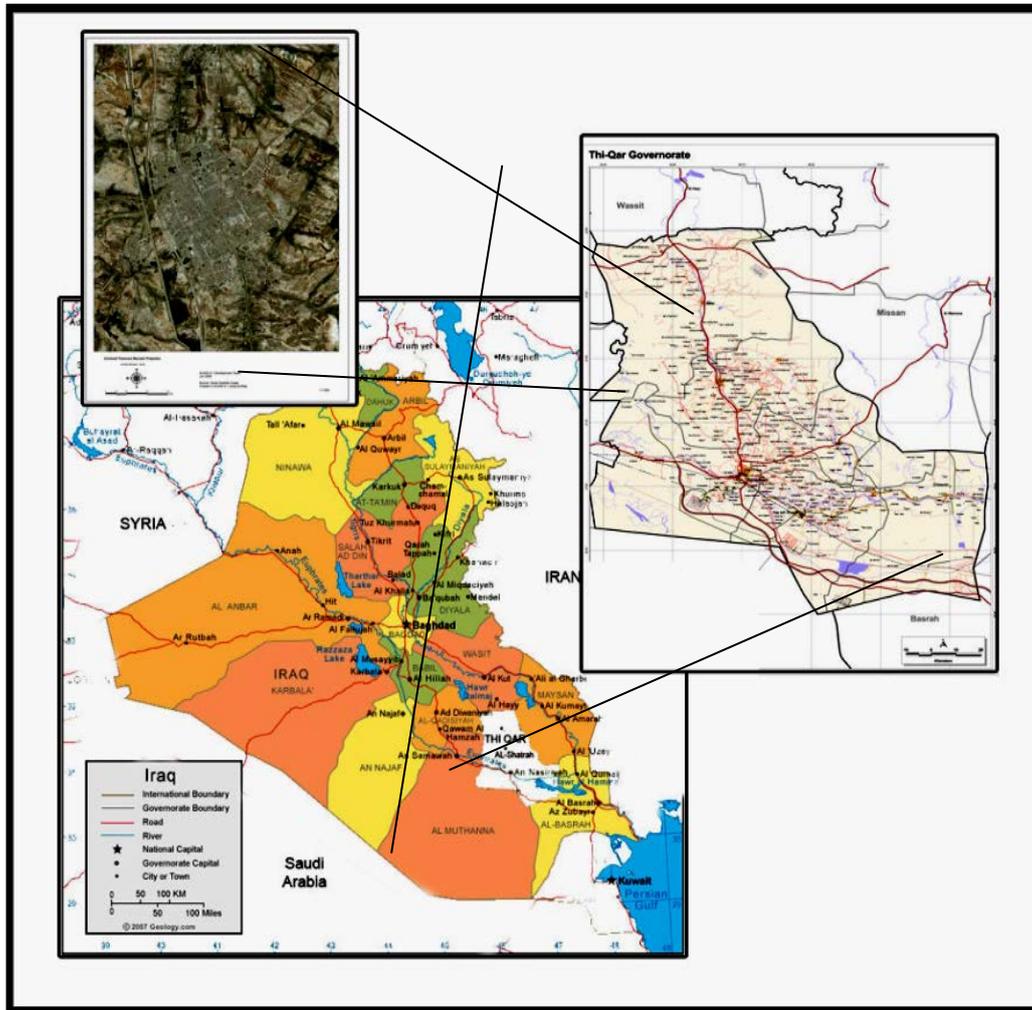


Figure 1: administrative map of Shattrah [4].

## 2. The aims of the study

1. Examining the concentration of the toxic elements of the dust by dusty storms.
2. the health affections of the heavy and toxic elements.

### *The process:*

Many Samples of the fallen dust on the Shattrah city from **July to September , 2014** have been examined by using cylindrical containers of **2.5-3.5** meters high from different residential places of the city ,such as the

modern ,ancient , trading and industrial place (see Figure 2).

The samples are prepared by low sampler. The samples examined in a specific lab after packaging them in specific containers.

The data has examined to point out the concentration of toxic dust by the Atomic Absorption (AAS) and to define of the result according the standard value [5].



Figure 2: the places of the study [4].

The Samples are prepared according to the standard criteria of the General Company for Geological of Mining Geological Survey as follows: [6]

1. Drying the samples for two hours by baking the sample of ( 100C° ).
2. Baking ( 1 gm) of sample in a container (250 ml) by using a sensitive scale.
3. Adding ( 150 ml) of HCl with( 5 ml) of HNO<sub>3</sub> to the sample to be absorbed Completely.
4. Putting the sample in a sandy bath (45-60) minutes.
5. Cooling the baker and adding ( 5 ml) of HCl and heating in a sand bath to be dried.
6. Cooling the baker again and adding ( 5 ml) of HCl and( 50 ml) of hot distilled water to clean the baker from any remnants.
7. Heating the mixture up to the boiling degree for( 2-3 minutes).
8. Filtering the mixture by using filter paper (42) and putting the filtered mixture in a bottle of (100 ml).
9. washing the deposits by distilled water and adding the washing water to the filtered mixture to fill the

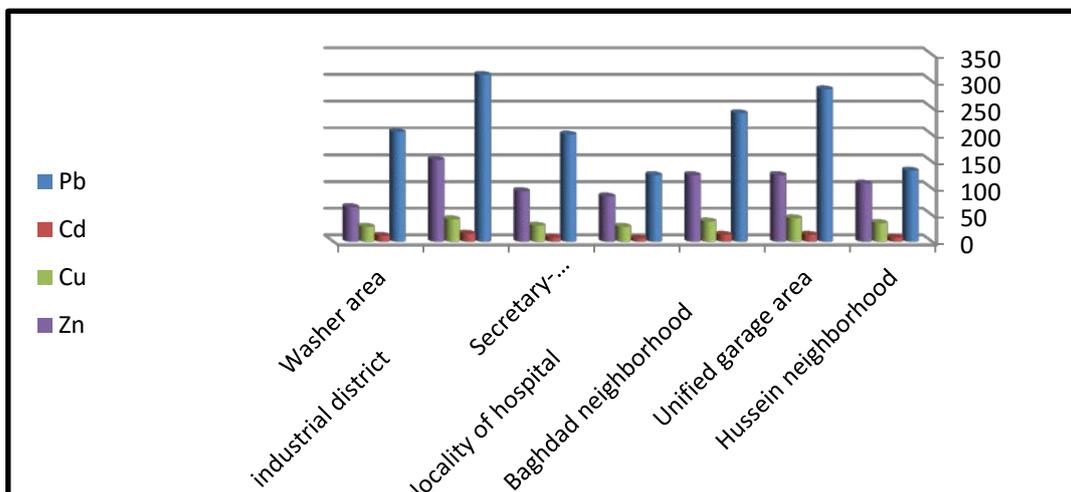
bottle (100 ml) again and then analyzing the mixture by the atomic absorption spectrophotometer (AAS).

### 3. Results and discussion

The following table (1) shows the high ratio of concentration of the toxic and heavy elements according to the standard values and as follow :

**Table 1:** the concentrations of heavy metals in the dust samples (ppm)

No.	the region name	the concentrations of heavy metals(ppm)			
		Pb (ppm)	Cd (ppm)	Zn (ppm)	Cu (ppm)
<u>1</u>	Hussein neighborhood	133.5	8	109	35
<u>2</u>	Unified garage area	285	13	125	44
<u>3</u>	Baghdad neighborhood	240	13	125	38
<u>4</u>	locality of hospital	125	6	85	8
<u>5</u>	Secretary- neighborhood	200	8	95	30
<u>6</u>	industrial district	312	15	154	42
<u>7</u>	Washer area	205	3	65	28
	Average	214.35	10.57	108.28	35
	(Adjusted Lindsay, 1979) [7].	10	0.06	50	50



**Figure 3:** graphic the concentration of heavy and toxic elements of the study areas.

Shows from the above table height ratio of lead in all study areas, as shown in the graphic representation in Figure (4) , and the highest value for the lead in the industrial district area (312) ppm and reached its lowest value in the locality in Al-Mustashifa residential (125) ppm and reached the overall rate the concentration of

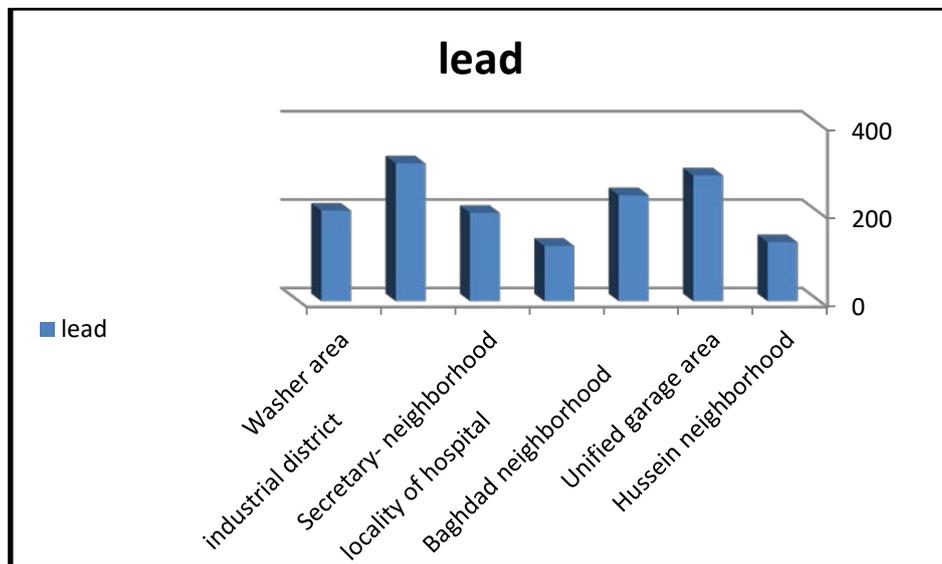
lead in the soil of the study area (214.35) ppm higher than the average in the world's soils and (10) part of the 1Million [7] .

The reason for increasing the ratio of the lead concentration in the dust caused by the smoke from industrial processes as well as products of fuel combustion in gasoline-powered vehicles as well as for electric generators and wind is one of the most important elements that help to move the dust fly by dust storms.

The lead element of the toxic elements that must be monitored and that high gravity on humans and the environment and an increase leads to problems with behavior and learning in addition to the continuous and systematic exposure leads to mental retardation, and this element transmissible with blood stream was moving to fetuses through the placenta when pregnant women have been slushy come out with breast milk as that term exposure to component or one of its compounds leads to low levels of intelligence and lack of fertility and abortion and changing hormones and menstrual disorders and delayed puberty [8].

The cadmium concentration results of the study have shown high concentration in all study areas recorded the highest value in the industrial district area scored (15 ppm) scored the lowest value in an area washer where the record (3 ppm) The overall rate scored (10.57) ppm As shown in Figure(5).

One of the reasons to increase the cadmium concentration of is burning plastic material where the combustion products is working to increase the concentration of cadmium in the air [9] as explained [10] contain the products of combustion of fuel in transport high concentrations of heavy metals (lead, cadmium, copper) .



**Figure 4:** shows the concentration of lead in the dust component of the study areas

Cadmium poisoning leads to kidney damage and high blood pressure and replace calcium in addition to the place of his property accumulated in the human body works on the attenuation of bone [11] and by poisoning

leads to the appearance of symptoms such as muscle spasm, vomiting, diarrhea, and sensory disorders [12]. Of the table (1) note that the highest concentration of zinc in the current study were in the industrial neighborhood where he scored 154 ppm and less than the value recorded in the washer area (65) ppm, while the overall rate him (108) ppm higher than the average According to the World [7].

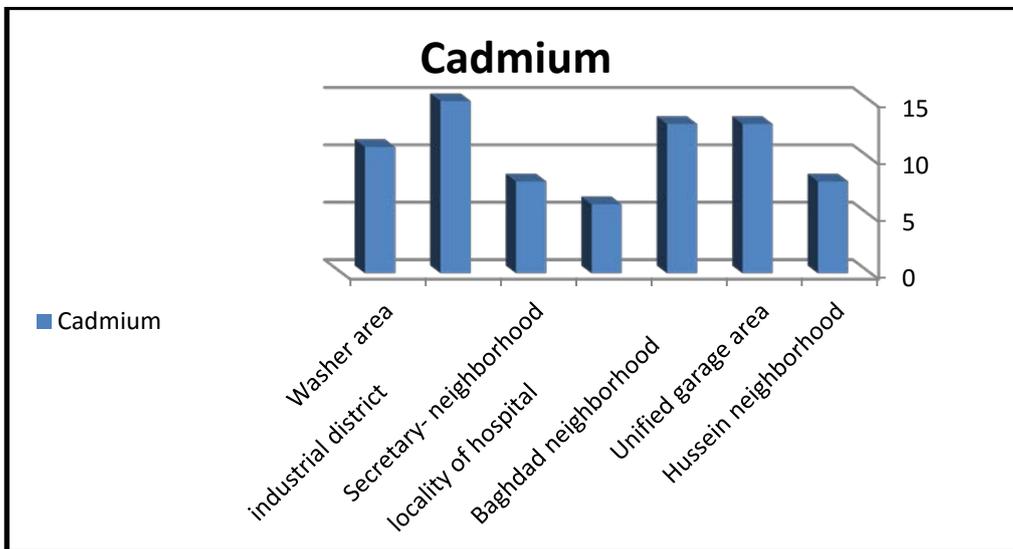


Figure 5: cadmium dust concentration in the study areas

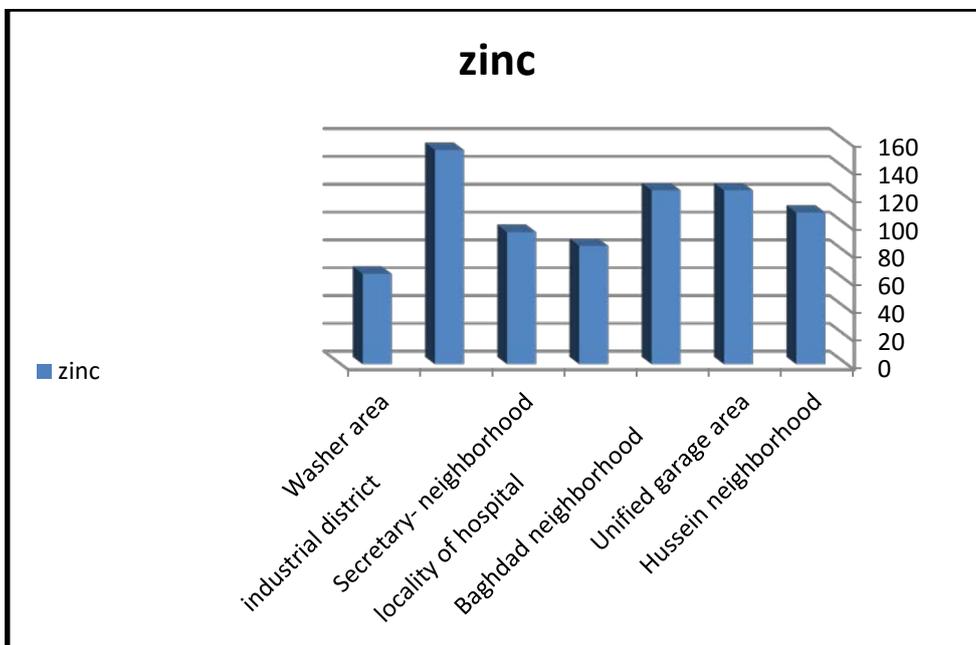
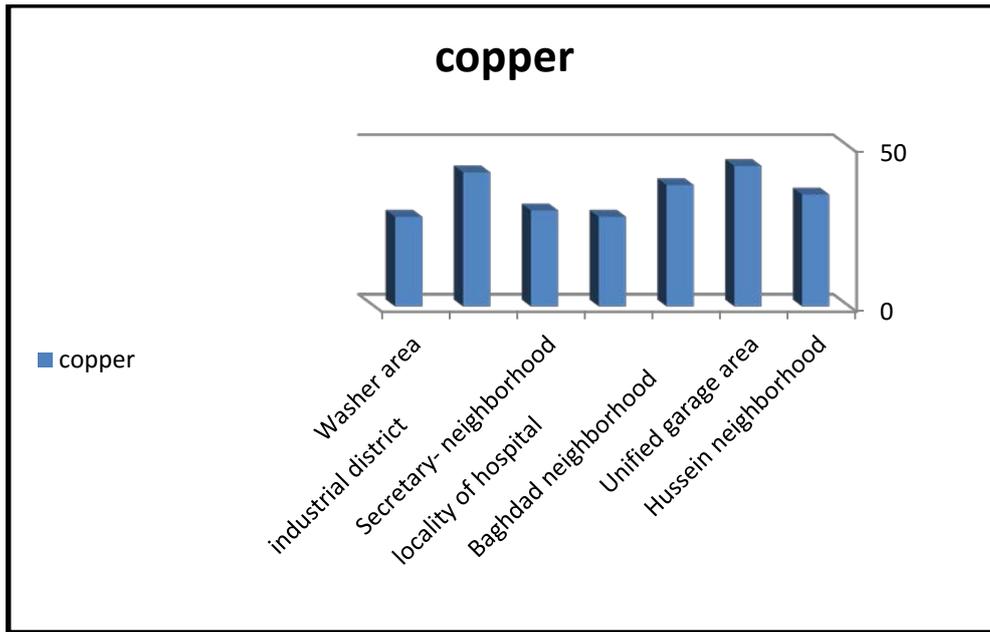


Figure 6: the concentration of zinc dust component in the study areas

As shown in Figure 6. The reason for the increase in the concentration of zinc human events element of foundries and the use of up graders and pesticides as well as the vegetation cover ratio, enters the zinc in the metabolism of both plants and animals process and is essential for human growth and livestock, especially in the

early stages of growth and development of low rates but the lack of this ratio cause a malfunction in the bones, joints and fertility [13]. The rate of increase as in humans be at the expense of iron, copper and cause nausea, vomiting, headaches and pains abdomen [14].

Copper has the overall rate for its focus record in the Shattrah city (35 ppm). The highest his focus in the area of the common garage where he scored (44 ppm), while the lowest log concentration him in the camp of Al-Mustashifa residential and the washer where he scored 28 ppm lower than rates in comparison with the global determinants As shown in Figure (7).



**Figure 7:** the concentration of copper in the dust of the study areas

The proportion of copper deficiency in the human body leads to anemia and osteoporosis, as high percentage of copper in the body leads to the case of copper poisoning [15].

#### 4. Conclusions

1. High results of the current study in the concentration of heavy elements compared with the allowable limits.
2. Plurality concentration of heavy metals has exceeded the permissible limits.
3. Dust stormy and strong winds that blow over the city is an important factor in increasing the concentration of toxic elements in the atmosphere.
4. Movement and transport plays an important role in increasing the concentration of heavy metals in the air as a result of its movement that lead to blowing dust, as well as emitted from car exhausts minutes.

5. the most important sources that lead to increased concentration of heavy metals in the air of industrial activities:

A. Factories bricks and power plants and others.

B. Dust storms have obvious effects on the health of the population living in cities they are more susceptible to frequent bouts of sensitivity affects the body and especially the eye, nose and chest.

## 5. Recommendations

1. Attention various agricultural projects such as the adoption of the system of agricultural oases in the desert land and planting windbreaks.

2. Setting up projects green belts around cities to install the sand dunes.

3. Stay and the establishment of tourist complexes in the desert and outside urban areas.

4. Positioning decisions and legislation to address desertification and its causes.

5. Stay major investment projects funded by the State and are beneficial to the country and eliminate the phenomenon of desertification.

6. Positioning filters highest chimneys brick plants and other factories that rely on the use of fuel in operation.

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