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LEVELS OF SOME TRACE METALS IN FALLING DUST AT BASRAH GOVERNORATE, SOUTHERN IRAQ

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ABSTRACT

Cu, Fe, Mn & Ni trace metals in falling dust were estimated in seven selected locations in Basrah governorate, Southern Iraq, 1- Qurna, 2-Al- Ma'aqil, 3-Shatt Al-Arab Sector, 4- Abu Al-Khaseeb, 5-Al-Fao, 6 -Al-Zubair, & 7- Safwan. Samples were collected for the period March-April 2007, and trace metals were determined by atomic absorption technique after digestion treatments with mixed acids of HNO_3 & $HClO_4$. The highest concentrations of trace metals recorded were, 9312.68 ppm (Fe) in Qurna, 350.17 ppm (Cu) in Al-Ma'aqil, 300.79 ppm (Mn) in Qurna and 76.31 (Ni) in Al-Ma'aqil, while lower values were 0.25 ppm (Cu) in Safwan, 2256.98 ppm (Fe) in Al-Zubair, 178.03 ppm (Mn) in Abu Al-Khaseeb and ND (Ni) in Al-Fao. Cu, Fe, Mn & Ni were highly correlated with each other.

INTRODUCTION

Dust refers to the mixture of airborne materials that settle upon surfaces, most of these airborne materials are inorganic in character such as trace metals (Ballard, 2001).

Particulate matter is the sum of all solid and liquid particles suspended in air, many of which are hazardous, dust particulate emitted into the atmosphere will cause a seriouse threat due to their quick and uncontrolled spread, dust is the carrier of trace metals in the atmosphere from which they get into the soil from agricultural lands, the main sources of trace metals in the atmosphere are fuels combustion and electric power industry (Krolak, 2000).

Trace metals can be expected to show the greatest increase due to human activity, and because of the dynamic nature of the atmosphere, metals can be deposited in areas remote from their initial sources. (Galloway *et al*., 1982), the higher levels of metals such as Cu. This is likely due to the leaching of metals from metal pipes that used for several purposes (Singh and Mosley, 2003). Also the Mineral dust, highly weather and wind eroded soils and negligible in cultivated soils are the major sources for increase the concentration of trace metals in falling dust (Schutz and Rahn, 1981).

The agricultural lands are the evaluation of environment pollution with trace metals in the aspect of falling dusts (Krolak, 2001). And the main sources of metals are first of all the fuel combustion processes in which its introduce from 50% to 90% of metals (Hlawiczka, 1997).

Metals may enter water and air from petroleum and petrochemicals industries wastes, storm drain out falls and solid waste land fills (UNEP, 1980).

And due to increase industrial, agricultural as well as urbanization activities, trace metals in waste discharges pollutants which showed health problems (Luckey *et al.*, 1975).

The studied area lies along highly agricultural regions in addition to small industrialized states to the north especially manufacturing of bricks in which RC (Refined Crude) is used as a fuel (Dawood, 1985).

In this area the prevailing winds is the northern which facilitate carriage of polluted dust and smoke towards the south (Yaaqub, 1991).

The reduced amounts of dust due to high velocity of dominant north west winds, which origin dust storms and increasing in soil moisture resulted from rainfall and consequently increase in soil cohesion of soils, the dust fallouts are effected by soil texture of surrounded area, the percentage of silt and clay increase in Al-Ma'aqil location while sand% is dominant in dust fallouts of Al-Zubair, Safwan (Al-Ali *et al*, 2001).

The aim of this study was the determination of the levels of some trace metals in falling dust within Basrah, southern Iraq.

MATERIALS & METHODS

The examination for four trace metals covered seven locations within Basrah, southern Iraq, as shown in fig.1, plates use as collector for dust samples, the same procedure of pool collecting and collector plate.

After the collection, samples were digested, treatments with mixed acids of HNO_3 & $HClO_4$ following the method of Sturgeon *et al*., (1982) and trace metals Cu, Fe, Mn and Ni were determined by using pyeunicam SP9 atomic absorption spectrophotometer.

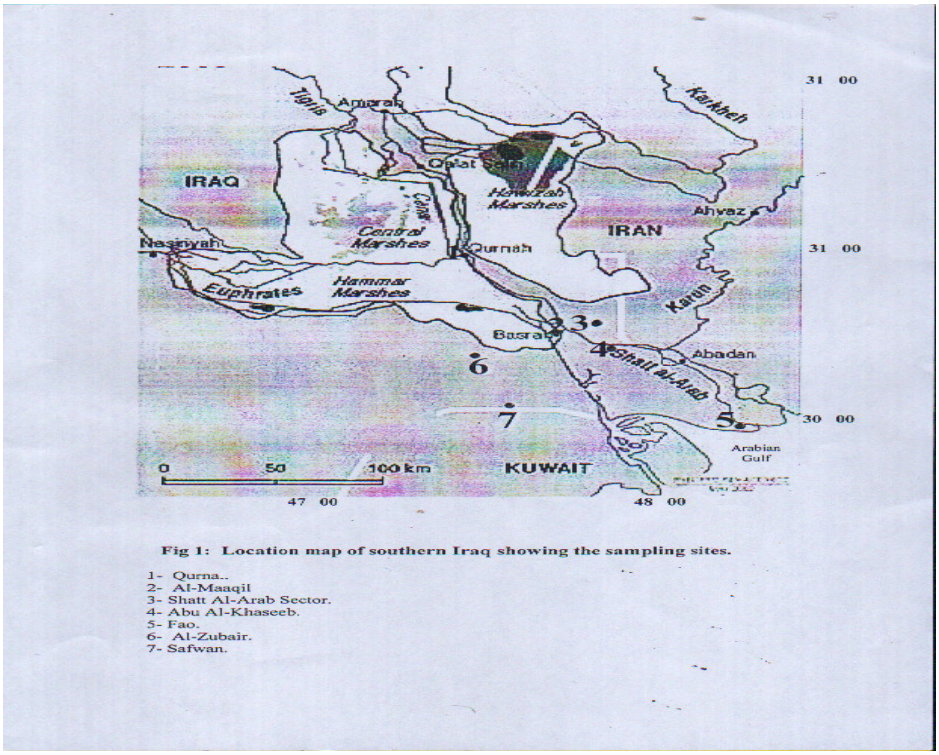

Fig 1: Location map of southern Iraq showing the sampling sites.

1- Qurna..
2- Al-Maaqil
3- Shatt Al-Arab Sector.
4- Abu Al-Khaseeb.
5- Fao.
6- Al-Zubair.
7- Safwan.

RESULTS & DISCUSSION:

The concentration of trace metals Cu, Fe, Mn & Ni in dust samples from selected sites within Basrah governorate, southern Iraq are listed in (Table -1-).

Table -1- the concentration of Cu, Fe, Mn & Ni in falling dust in the chosen locations of southern Iraq, Basrah. "μ g/g dry whight, ppm"

Locations	Cu	Fe	Mn	Ni
Al-Ma'aqil	350.17	3656.71	259.84	76.31
Qurna	35.49	9312.68	300.79	41.72
Abu Al-Khaseeb	44.04	3961.19	178.03	66.66
Al-Zubair	6.23	2256.98	83.99	36.81
Shatt Al-Arab Sector	46.41	7437.26	237.95	35.01
Al-Fao	2.6	8653.23	230.69	N.D
Safwan	0.25	3832.75	269.43	37.33

According to table 1, high concentrations of trace metals were nearly recorded in all locations as shown in figs. (2–5).

This increase in Al-Ma'aqil & Qurna locations could be related with the urbanizations activities. Pollution could be arises due to the domestic wastes (Lucky *et al*., 1975). Fuel combustion sources, the electric power generators & the traffic jams, the burning of large amount of domestic wastes, are main sources for increase trace metals concentration in the atmosphere (Krolak, 2000). As the levels of trace metals were determined in falling dust in eastern Mazowieckie province and Poland, this is also become clear when this study is compared with (Malik *et al*., 1985) it is shown that main sources of increasing trace metals concentration, also from exhausts of motorized vehicles and the other sources were batteries, sheets and pipe (Hepple, 1971).

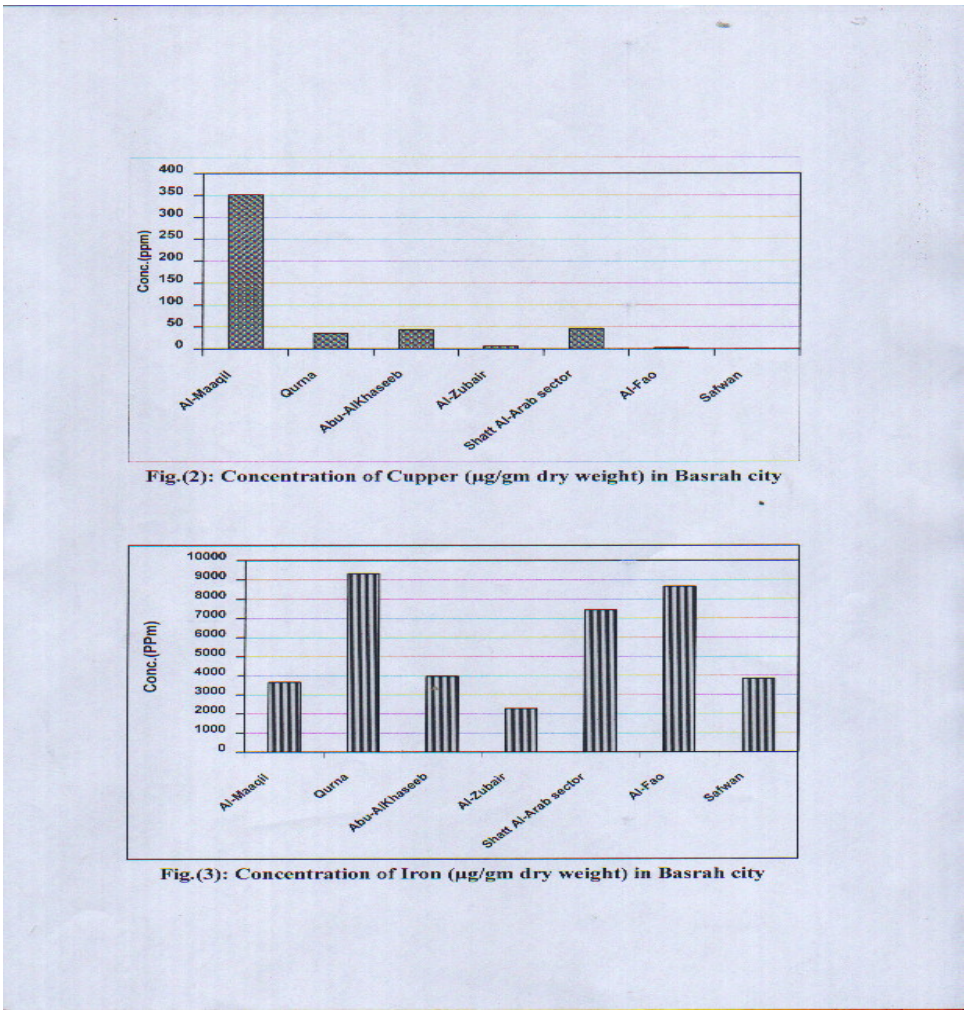

Fig.(2): Concentration of Cupper (µg/gm dry weight) in Basrah city

Fig.(3): Concentration of Iron (µg/gm dry weight) in Basrah city

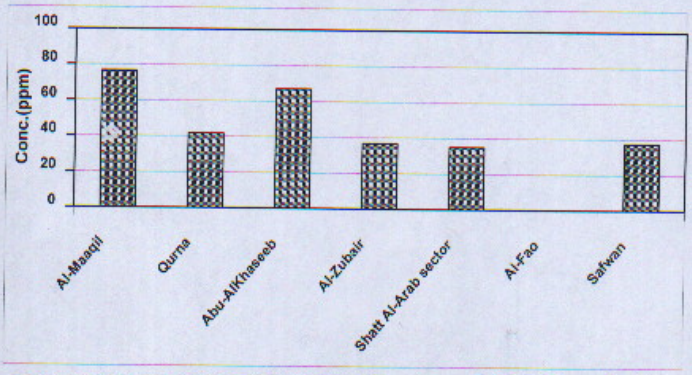

Fig.(4): Concentration of Nickel (µg/gm dry weight) in Basrah city

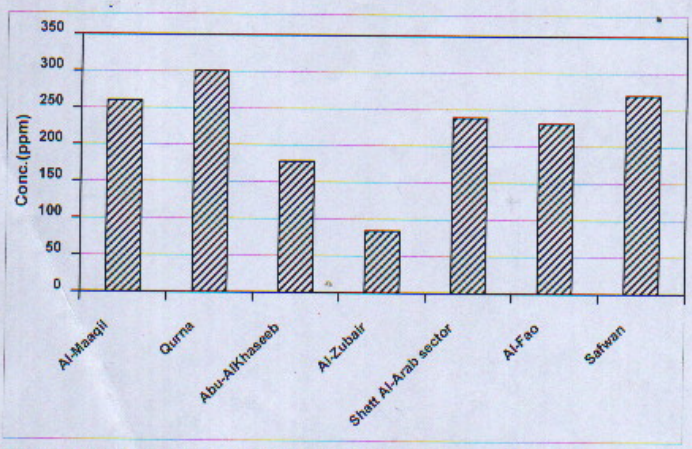

Fig.(5): Concentration of Manganese (µg/gm dry weight) in Basrah city

Aerosol dust particles are dispersed to a wide area in summer which is responsible for the transfer of trace metals from one location to another (Malik *et al*., 1985) Fine dust particles stay long in the air (Warych, 1999), and they are particularly rich in trace metals because of the combustion processes which explaine the increasing of trace metal levels in Al-Zubair & Safwan because they are closer to industrialization sources, Shuaibah refinary, LPG liquified petroleum, gas & petrochemical industry (Al- Imarah *et al*., 2000).

The other areas such as Al-Fao, Shatt Al-Arab sector they are closer to the effected sources from the Arabian Gulf, so they are also recorded highly levels of trace metals (Al-Mussawy & Salman, 1989), as they determined the distribution of trace metals in sediments from NW Arabian Gulf. All studied trace metals showed an increase in their levels, this behaviour could be explained on the bases of increased urbanization and industry, which represented as major sources of different pollutants throng to the environment (Al-Imarah *et al*., 2000).

Abu Al-Khaseeb consider as one of the agricultural land so the increasing in trace metal levels deal with the agricultural processes and anthropogenic sources that companied with it.

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مستويات لبعض العناصر النزرة في الغبار المتساقط على محافظة البصرة، جنوب العراق

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الخلاصة :

في هذه الدراسة تم قياس معادن النحاس والحديد والمنغنيز والنيكل في الغبار المتساقط في سبع مواقع من محافظة البصرة جنوب العراق. 1- القرنة، 2- المعقل، 3- قاطع شـط العـرب، 4- ابـو الخـصيب، 5- الفاو، 6- الزبير، 7- سفوان. جمعت العينات للفترة من اذار 2007 لغاية نيسان 2007 وتم فحص وقياس العناصر النزرة بأستخدام تقنيـة الامتصاص الذري بعد عمليات هضم للعينات بخلـيط مـن حامـضي النتريك والبيركلوريك. تم تسجيل تراكيز عالية للعناصر النزرة في هذه الدراسة (9312.68) جزء بالمليون للحديد في القرنة و(350.17) جزء بالمليون للنحاس في المعقل و(300.79) جزء بالمليون للمنغنيـز فـي القرنة و(76.31) جزء بالمليون للنيكل في المعقل. بينما كانـت اوطـأ القيم (0,25) جزء بالمليون للنحاس في سـفوان و(2256.98) جـزء بالمليون للحديد في الزبير و(178.03) جزء بالمليون للمنغنيز في ابـو الخصيب ولم يعطي اي قراءة وقيمة للنيكل في الفـاو. وقـد أظهـرت تراكيز هذه المعادن ارتباطا وثيقا فيما بينها.