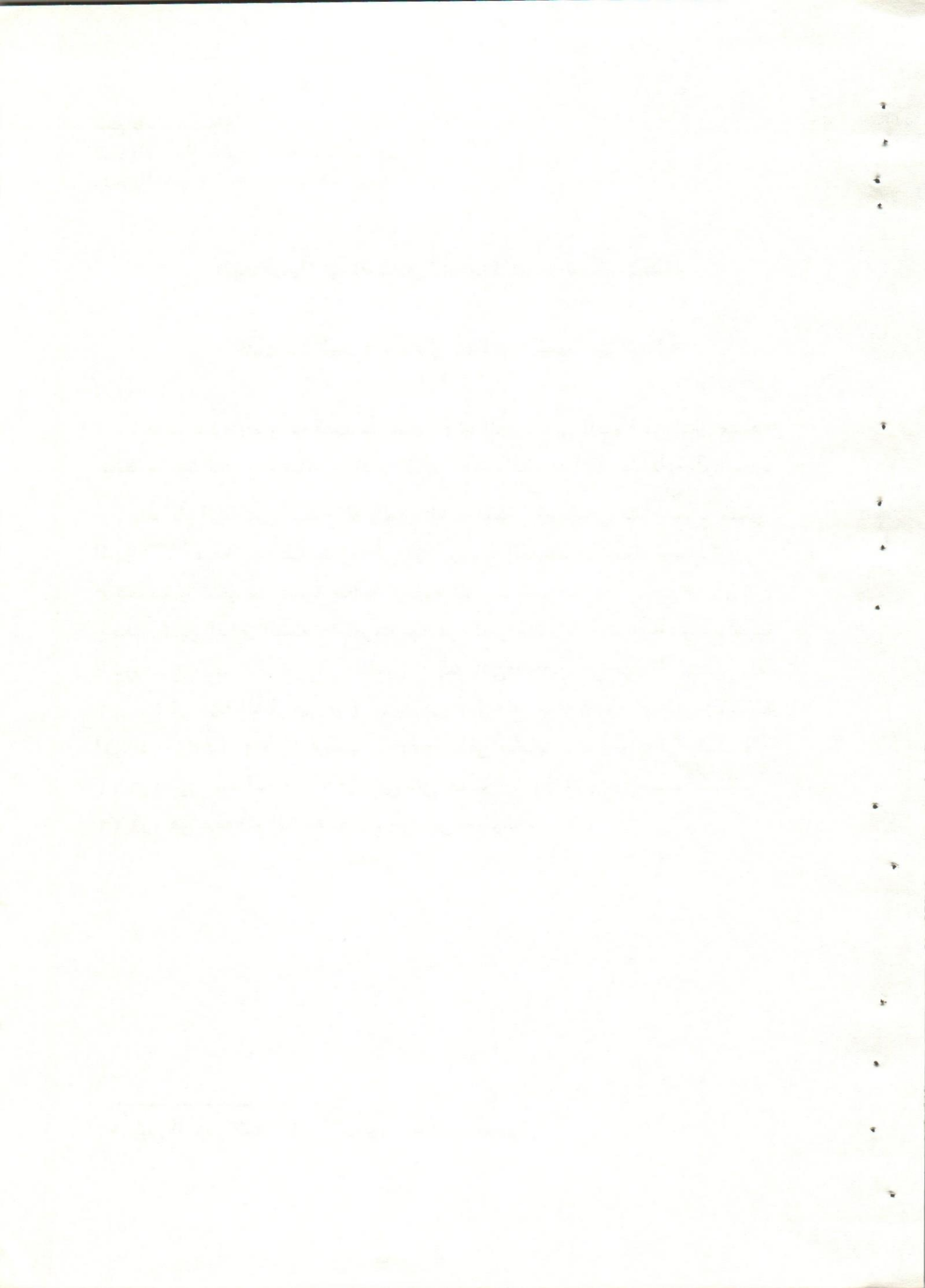


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تلوث الهواء فى المناطق المحيطة بمصنع السماد بمنقباد

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اجريت هذه الدراسة لتحديد نسبة تركيز الكبريت فى الهواء فى اثنى عشره منطقة متاخمة لمصنع السماد بمنقباد الذى يعتبر الكبريت أحد مخلفاته الرئيسية . وقد قام الباحثون بهذه الدراسة بتقدير نسبة الكبريت فى عشرة عينات من الهواء بكل منطقة ودلت النتائج على ارتفاع نسبة الكبريت فى معظم عينات الهواء المفحوصة واستخدمت منطقة منفلوط كضابط للبحث لبعدها عن المصنع (١٨ كم) ولعدم ظهور اعراض التسمم بالكبريت بها فى الدراسات السابقة . وقد رت نسبة الكبريت فى الهواء (جزء فى المليون) كما ياتى ١٩٣ره فى عزبة الأكراد ١١ره فى عزبة الشارونى ، ١٤ره فى عزبة خلف ، ٩٩ره فى بنى زيد الاكراد ، ٣٤ره فى الطوابيه ، ٢٣ره فى منقباد ، ٤٠ره فى علوان ١١ره فى الهدايا ، ٧٠ره فى بنى حسين ، ٨٩ره فى سـلام ، ٩٦ره فى عزبة أبو القاسم ، ٣٠ره فى منفلوط .



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**AIR POLLUTION IN AREAS SURROUNDING
THE SUPERPHOSPHATE FACTORY AT MANQUABAD
I- SULPHUR
(With One Table)**

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SUMMARY

The present study recorded sulphur concentrations in air of 11 areas surrounding the superphosphate factory of Manquabad. The sulphur concentrations were 5.193, 5.011, 2.814, 2.799, 4.634, 4.323, 0.940, 1.661, 3.370, 3.989, 0.896, and 0.903 ppm for Ezbet El-Akrad, Ezbet El-Sharuni, Ezbet Khalaf, Beni-Zeid El-Akrad, El-Twabiya, Manquabad, Ilwan, El-Haddaia, Beni-Hussin, Sallam, Ezbet Abo-El-Kassem, and Manfa-loute respectively.

INTRODUCTION

For many centuries, polluted air has been considered to be a hazard to human and animal health. The development of control measures to prevent or limit air pollution is now a matter of concern in all countries and not only those with highly industrial communities. The first step in the control is the determination and estimation of pollutants concentration in the suspected area.

In Assiut province, the manufacture of superphosphate fertilizer at Manquabad area is a major industry. The annual production is equivalent to rather more than million tons of superphosphate. This involves sulphuric acidulation of raw tricalcium phosphate rock to produce soluble monocalcium phosphate available for fertilizer purposes (ABDEL-MEGUID *et al.* 1982). Sulphuric acid is formed firstly by burning sulphur in an excess of air to form sulphur dioxide gas, and then inducing this to the unit with further oxidation to form sulphuric anhydride and then, in the presence of moisture, sulphuric acid (NORRIS and BRINK, 1976). During the previous process, excess of SO₂ and SO₃ (produced through further oxidation of SO₂) gases are emitted outside (96.12 and 9.99 kg./hour), contaminating the atmosphere, in addition some elemental sulphur (which is stored uncovered inside the plant) are emitted outside (IBRAHIM, 1980).

Numerous studies have demonstrated the toxic effects of sulphur dioxide, sulphur trioxide and elemental sulphur in air on both human and animal health (REID, 1963; LILLIE, 1970 and PURDOM, 1980).

The acute sulphur poisoning in cattle are manifested by depression of animals, Colicky pain, unwilling to stand. Fast and shallow breathing beside smell of hydrogen sulphide. Apparent diarrhoea was characterised by blackish colouration (MCFARLANE, 1952). Anaemia, achromotrichia, neonatal ataxia, bone fractures were described in sheep suffering from copper deficiency due to sulphate poisoning as an elementary sulphur (UNDERWOOD, 1962). Signs of sulphur dioxide poisoning are

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severe respiratory and circulatory disturbances, and sever irritation of the nasal mucous membrane (AKMAN, 1955). Pigs exposed to concentration of 5-40 ppm. for 8 hours, showed clinical evidence of eye respiratory tract irritation (O'DONAJHUE and GRAESSER, 1962). Metabolic disorder were observed in goats exposed to SO_2 concentration of 1.5-2.5 mg/m^3 of air (LAUNER and RUHLE, 1983).

The aim of our present study in estimation of SO_2 & SO_3 and elemental sulphur concentration in the air in the areas surrounding superphosphate factory at Manquabad as a first step for control of pollution in this areas.

MATERIAL and METHODS

The study of sulphur concentration in air involved 11 areas, surrounding the superphosphate factory of Manquabad (Manquabad, El-Akrad, Ezbet El-Sharuni, Ezbet-Khalaf, Beni-Zeid El-Akrad, El-Tawabia, Ilwan, El-Hadaia, Beni-Hussin, Sallam, Ezbet Abo El Kassem, and Manfaloute). The distances and directions of these areas in relation to the superphosphate factory are illustrated in table (1). Ten air samples from different localities were collected from each studied area. Air was aspirated by means of a small electric pump, through a Drechsel bottle containing 10 ml. of 30% hydrogen peroxide. The air volume was measured by a gas meter at a rate of 10 cubic litre/minute (MORROW and BRIEF, 1972).

The hydrogen peroxide method involve absorption of sulphur in H_2O_2 in which it oxidized to sulphuric acid. The quantity of sulphuric acid is determined by titration with 10% of barium chloride (SEINFELD, 1975). The amount of barium sulphates was determined gravimetrically as recommended by VOGEL (1961).

RESULTS

Results obtained are recorded in table (1).

Table (1): Sulphur levels in air in areas surrounding the superphosphate factory of Manquabad

| Areas | Mean±S.E. (ppm) | Distance from the factory (K.M.) | Direction from the factory | Angle of direction |
|---------------------|--------------------|--|-------------------------------|-----------------------|
| Ezbet EL-Akrad | 5.193±1.499** | 0.50 | South | 0 |
| Ezbet El-Sharuni | 5.011±1.581** | 1.00 | South | 0 |
| Ezbet-Khalaf | 2.814±0.783* | 3.25 | South-Eastern | 22 |
| Beni-Zeid El-Akrad | 2.799±1.526 | 4.00 | South-Eastern | 75 |
| El-Tawabiya | 4.634±1.564** | 1.00 | North-Eastern | 17 |
| Manquabad | 4.323±1.452** | 1.00 | North-Western | 22 |
| Ilwan | 0.940±0.412 | 1.50 | North-Western | 40 |
| El-Hadaia | 1.661±0.447 | 3.50 | North-Western | 32 |
| Beni-Hussin | 3.370±0.772* | 3.00 | North-Eastern | 10 |
| Sallam | 3.989±2.513* | 3.50 | North-Eastern | 43 |
| Ezbet-Abo El-Kassem | 0.896±0.525 | 1.50 | South-Western | 65 |
| Manfaloute | 0.903±0.265 | 18 | North | 0 |

** Highly significant at $P/0.01$

* Significant at $P/0.05$

SULPHUR AND AIR POLLUTION

DISCUSSION

The measurement of the toxic hazards from environmental pollution depends in the first instance on the area considered as control. Manfaloute city was chosen as control because it is located 18 kms. to the north of the factory. The previous toxicological studies in this city, revealed no clinical signs, that could point to exposure to any hazardous substance (ABDEL-MEGUID, *et al.* 1982). The analytical findings in 11 areas surrounding the superphosphate factory at Manquabad, revealed a highly significant elevation in air sulphur levels in Ezbet El-Akrad (5.193 ppm), Ezbet El-Sharuni (5.011 ppm), El-Tawabiya (4.634 ppm), and Manquabad (4.323 ppm). A significant elevation was recorded in the areas of Sallam (3.989 ppm), Beni-Hussin (3.370 ppm), and Ezbet Khalaf (2.814 ppm). The rest of the examined areas (Beni-Zeid El-Akrad, Ilwan, El-Hadaia, and Ezbet Abo-El-Kassem) showed no significant elevation in sulphur levels. The results indicated that the areas which showed highly significant sulphur levels were located not more than one km. from the factory. The areas showed significant elevation of sulphur level were located at a distance of 3 to 3.5 K.ms. from the factory. Areas that showed no significant sulphur levels in the air were either located at a distance more than 3.5 k.ms. or have a deviated position in relation to the factory.

Thus it is obvious from previous results that pollution is reversably related to the distance from the source of industrial pollution. Also wind direction affects the Transmission of air pollutants. In agreement with our results what was mentioned by KROCK and MAYLIAN (1979) that the more toxic effect is obtained in the more nearer place to the Source of pollution. Some authors described the toxic effects that point to endemic sulphurosis mainly affect the respiratory system (DALHAMAN and STRANDBERG, 1961, WHITE, 1964 and MARTIN and WILLOUGHBY, 1971). Also IBRAHIM (1980) and ABDEL-MEGUID, *et al.* (1982) recorded the toxic signs of sulphurosis in both sheep and buffaloes in the areas surrounding the superphosphate factory of Manquabad. The primary standard of sulphur in air is (0.03 ppm. annual average) as stated by PURDOM (1980). For this reason any notable increase in this average showed be warned for to avoid environmental pollution and resultant toxicity for human-beings and animals in such areas.

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