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STATE OF NEW YORK - DEPARTMENT OF HEALTH

INTER-OFFICE MEMORANDUM

TO: Mr. Michael Linse

FROM: Dr. John Hawley

DATE: June 22, 1987

SUBJECT: Elevated Metal Concentrations in Soils Near Geneva Foundry
(C) Geneva, Ontario County

We have reviewed the data on the heavy metals contamination of soils and green beans from the Gringeri residence in the City of Geneva. Our review focused on the lead contamination and the toxicity of lead. However, the levels of zinc, copper and, to a lesser extent, cadmium also appear to be elevated.

The concentration of lead in the two soil samples from Geneva are highly elevated when compared to natural levels and also above levels typically found in urban areas but not immediately adjacent to busy highways. The levels of lead in soils in the Gringeri's yard (1340 and 1020 ppm) also fall at the high end of the range of lead concentrations found in urban yards in limited sampling performed by this Bureau in 1985. The Bureau's data are consistent with other studies of urban areas. For example, a 1983 study of soil in and around Baltimore, Maryland found only 10% of soil samples from gardens in the city or within 30 miles of the city contained lead levels greater than 777 ppm. Elevated levels of lead in soil and dusts are of concern due primarily to the potential for increased exposure by ingestion. This problem is particularly serious for young children. Blood lead levels in children appear to increase above background levels when the lead concentration in residential soil or dust exceed around 500 to 1000 ppm. Therefore, young children with daily access to non-vegetated areas of the Gringeri yard may be subject to increased blood levels due to this exposure.

Studies have also shown that vegetables can be contaminated by lead in garden soil. The concentrations of lead in green beans from the Gringeri garden may be typical of vegetables grown in soils with lead contamination greater than 1,000 ppm. We contacted Cornell University to determine how the green beans were analyzed. The heavy metal concentrations were reported on a dry weight basis; therefore, assuming a water content in the beans of 80%, the actual lead concentrations in the fresh beans would have been about 1.2 mg/kg or 1.2 ppm. In studies with lead in soils in the range of 2,000 ppm, Spittler and Feder (1978, cited in Elias, 1985) reported 0.98 - 5.2 ppm in vegetables, and Preer et al. (1980, cited in Elias 1985) reported 0.1 to 0.9 ppm (corrected to fresh weight).

In a recent summary of lead exposure data, R.W. Elias of EPA has estimated that the average daily lead intake for an urban child is 138 ug/day (47 ug/day baseline dietary exposure plus 91 ug/day for dust and soil) without the consumption of vegetables grown in an urban garden; a child's intake would increase by 48 ug/day (about 30%) if all leafy and root vegetables, corn and potatoes were from an urban garden and the average lead concentration in the vegetables was 0.9 mg/kg. An urban adult male's estimated daily intake would increase from 67 ug/day to 187 ug/day based on the above scenario.

The degree of contamination in the Gringeri yard and vegetables and known emissions problems associated with the Geneva Foundry indicate this problem warrants further investigation. I suggest the following steps be taken:

(1) Ms. Gringeri should be advised that the elevated contaminant levels in soil create the possibility of elevated exposure. Young children (those prone to placing fingers other objects or dirt in their mouths) are of particular concern because they can be exposed to such contamination from repeated daily contact with non-vegetated areas in the yard. Such exposure can be minimized by covering with clean soil. Ms. Gringeri should be advised that she may want to discuss with her physician the possibility of being screened for elevated blood-lead levels using the erythrocyte protoporphorin (EP) test or a blood-lead test expecially if young children are involved. If there are other properties adjoining the foundry, the same advice may be warranted for them as well.

(2) Exposure to lead may be significantly increased for all family members if a high proportion of vegetables consumed on a year round basis are from the garden. If Ms. Gringeri has any remaining preserved vegetables from her garden, we would like to analyze a sample in our laboratory. If a sample is submitted, it should be accompanied by information on how the beans were prepared (washing, blanching, freezing, etc). Regardless of the outcome of such analyses, Ms. Gringeri and other local gardeners should be advised to wash thoroughly all produce from their gardens to remove soil particules which may contain high levels of lead or other metals.

(3) Work with DEC to obtain all data on the foundry that may potentially be useful in further investigating this problem. Such information would include foundry operating history, emissions data, reports of emissions violations, wind roses, and on- or off-site soil sampling data if avialable.

(4) Provide a map showing the locations of the foundry, residential areas, and other potentially sensitive receptors such as schools within a 1/4 mile radius of the foundry. Of particular concern are facilities with outdoor play areas for young children.

After we have reviewed the additional information you provide, we will schedule a meeting to discuss further measures that may be needed. Please contact Steven Bates at (518) 473-8427 if you have any questions or if Ms. Gringeri or her physician would like to discuss the lead-screening tests with a Health Department physician.

Elias, R.W. Lead Exposure in the Human Environment in K.R. Mahaffey (ed.) Dietary and Environmental Lead: Human Health Effects, 1985, Elsivier Science Publishers, Amsterdam, The Netherlands.

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