

U.S. DEPARTMENT OF HEALTH EDUCATION AND WELFARE
CENTER FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
CINCINNATI, OHIO 45226

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 77-96-495
NEW YORK TELEPHONE COMPANY
NEW YORK, NEW YORK 10036

JUNE 1978

I. TOXICITY DETERMINATION

It has been determined that employees of the New York Telephone Company were exposed to lead concentrations less than both the existing OSHA standard of 200 $\mu\text{g}/\text{m}^3$ as well as the proposed standard of 100 $\mu\text{g}/\text{m}^3$ while "wiping sleeves" in underground man-hole operations at various locations in Queens County, New York.

II. DISTRIBUTION AND AVAILABILITY OF REPORT

Copies of this report are currently available upon request from NIOSH Division of Technical Services, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days, the report will be available through the National Technical Information Service, (NTIS) Springfield, Virginia 22161. Information regarding its availability from NTIS can be obtained from NIOSH's Publication Office at the Cincinnati, address.

Copies of this report have been sent to:

- a. The New York Telephone Company, New York, NY
- b. Communications Workers of America, Washington, D.C.
- c. Communications Workers of America, Local 1106, Queens, NY
- d. U.S. Department of Labor, Region II, New York, NY
- e. NIOSH, Region II, New York, NY

III. INTRODUCTION

Section 20 (a) (6) of the Occupational Safety and Health Act of 1970, 29, U.S.C. 669 (a) (6), authorizes the Secretary of Health, Education and Welfare, following a written request by an employer or authorized representative of employees, to determine whether any substance in the place of employment might have potentially

toxic effects as is used or may be found.

NIOSH received such a request from the Communications Workers of America, Local 1106, Queens County, New York (176-60 Union Turnpike Jamaica, New York 11466). The request was concerned with exposure of union members to lead while performing certain operations in underground manholes in Queens County, New York.

The union was concerned with possible lead exposures from this operation because analyses of blood samples taken by an independent medical group reportedly indicated elevated lead blood levels and/or zinc protoporphyrins. The results of the blood analyses have not been officially been made available to NIOSH.

IV. HEALTH HAZARD EVALUATION

a) Description of Process.

The only process using lead in manholes is the repair of old telephone cables, specifically enclosing the cables in a lead sleeve, pouring molten lead over the sleeve's seams, and "wiping" excess lead from the seams with an asbestos cloth to effect a permanent seal. This operation is sporadic, since most cables splices are protected by splice cases which do not require the use of molten lead.

In practice, this is a two man operation. One employee, working above ground, heats a small, propane-fired malt pot (temperature ranged 800-1000° F) and passes it (and other supplies) down to another employee inside the manhole. The molten lead is applied to the sleeve, and the seam is then wiped. The time of the sleeve-wiping operation ranged from approximately 60 to 150 minutes. The manholes in which work was performed during the surveys ranged from approximately six to ten feet deep. The work-space was too confined to allow for more than one person.

b) Sampling, Evaluation Methods and Procedures.

Sampling procedure consisted of using calibrated, battery powered pumps to draw air through cellulose filters. The filters subsequently were analyzed for lead content. With the knowledge of the lead content per filter and the amount of air drawn through the filter, the air concentrations could be calculated.

Because of the confined space within the manholes, filters were hung from cables within the manholes or otherwise positioned near to or in each worker's breathing zone. Duplicate filters were collected by industrial hygienists from Bell Laboratories.

c) Analysis

The filter samples were wet-ashed with HNO_3 and taken to volume with distilled water. NIOSH method P & CAM 173, utilizing atomic absorption spectrometry was employed for the analysis of trace metal concentrations. The limit of detection was 3 microgram of total lead. The following table lists the results of the analysis.

DATE	LOCATION	SAMPLE POSITION	SAMPLING TIME (Minutes)	SLEEVE SIZE (Inches)	Microgram/ Meter 3
9-8-77	Survey Place & 80th Drive	Breathing Zone outside helper	71	----	*
		inside manhold	69	3½	*
9-8-77	150th St. & 73rd Avenue	inside manhold	54	6½	*
		Breathing Zone outside helper	53	---	*
9-9-77	64th St. & 39th Avenue	inside manhold below sleeve	152	4	*
		inside manhole above sleeve	152	4	*
9-9-77	Northern Blvd. 196th St.	inside manhold behind worker	112	4	*
		inside manhole above sleeve	102	4	14.8
9-14-77	153rd Avenue & 155th Av.	inside manhold behind worker	66	8	45.2
9-14-77	Rockaway Blvd.	inside manhold paralled to breathing zone = 1 ft. away	50	6½	*
		inside manhold	45	6½	*

*filter contained less than 3 microgram - limit of detection

OSHA standard is 200 microgram of lead per cubic meter of air, the weighted average for an 8 hour work day.

d) TOXICOLOGY OF INORGANIC LEAD

Inorganic lead is a widespread heavy metal which may be highly toxic with sufficient exposure. Lead may be ingested into the body via contamination of dusts and the leaching of lead from utensils, or it may be inhaled via dusts or fumes generated by heating metallic lead. Once absorbed through the lungs or gastrointestinal (GI) tract the lead binds to blood erythrocytes and other soft tissues. Eventually 90% of the total body lead is bound into bones, teeth, and hair. This absorbed lead is excreted very slowly; and after exposure has ended, it may remain in the body for years. Excretion is primarily via the kidneys into the urine and a small amount is eliminated in the feces.

There are many toxic properties of lead. Most are biochemically related to inhibition of cellular enzymes. The hematopoietic (blood) system is affected by inhibition of cell formation and decreased stability of the cells resulting in anemia. The neuromuscular system signs and symptoms are secondary to peripheral neuropathies (nerve damage) resulting in muscle weaknesses especially in the extensor muscles of the hands and feet and tremors. Other neurologic abnormalities are incoordination, mental lethargy, insomnia, headache and dizziness. Encephalopathy with convulsions is rare in adults but is common in pediatric cases. The kidneys are usually damaged by heavy or prolonged exposure to lead. Lead nephropathy is characterized by fibrosis and degeneration of the tubules. This results in a progressive impairment of renal function. Gout and hypertension may result from this kidney damage since the kidney is related to the control of these functions. GI tract toxicity is responsible for many of the signs of acute lead poisoning. Loss of appetite, colic (abdominal cramping), and constipation may result.

Inorganic lead has been known to be teratogenic by multiple epidemiologic studies. The lead crosses the placenta and affects embryonic and fetal development resulting in premature births, miscarriages and deformities. Some specific compounds of lead are thought to be mutagenic (damaging to chromosome material).

Lead poisoning is diagnosed by noting the presence of the signs and symptoms described above. Rarely, an indication of lead absorption may be a blue line along the gums, often referred to as a "lead line." A definitive diagnosis is made by determining the amount of lead present in the blood or excreted in the urine.

Treatment is mainly prevention and removal of the person from the lead environment. If lead levels are very high with the presence of symptoms, chelation therapy may be used to bind the lead in the blood so that it may be filtered out by the kidneys. These medications do, however, have some toxic effects so their use should be carefully evaluated.

e) Discussion

Because of the sporadic nature of this operation, it is doubtful that employees exposure might exceed the current OSHA standard of 200 micrograms per cubic meter of air. OSHA has proposed a reduction of their lead standard, to 100 micrograms per cubic meter of air, with an "action level" requiring medical monitoring and possible job replacement should exposure exceed 50% of the standard. Should the new lower standard be adopted, and should any worker perform sleeve wiping for a prolonged period of time, it is possible that over-exposure may occur if job assignments are not monitored to assure that exposure is limited.

V. Authorship and Acknowledgements

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