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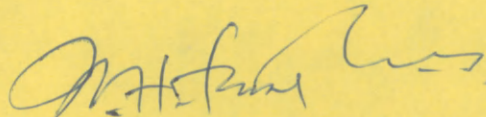
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ARSENIC - YELLOWKNIFE

I am enclosing herewith a draft summary of the situation at Yellowknife resulting from arsenic pollution of the countryside as a result of smelter operations. The text has been vetted by the Public Health Engineering Division, but unfortunately we have not been able to have it vetted by the Occupational Health Division due to the absence of both Dr. Patterson and Dr. DeVilliers.

Your comments and advice would be appreciated as regards the draft in its present state of revision.


W. H. Frost, M.D., D.P.H.

M161

Enc.

135 tons per year

ARSENIC - YELLOWKNIFE

Following the discovery of gold at Yellowknife in 1933 three major gold mines developed. Two are located on the perimeter of the city while the third, Discovery Mine, (230 ton mill operated January 1950 to April 1969) is located some distance north of the city at Giauque Lake. The two active mines in the immediate vicinity are Giant Yellowknife Mines (1000 ton mill) and the Con Mine (500 ton mill), a subsidiary of Cominco. At the Con Mine, approximately 80% of the gold is extracted by the cyanide flotation process, a roasting process being used only to recover gold from the residue.

At the Giant Yellowknife group of mines the gold is bound so intimately with sulphides that it cannot be extracted by the cyanide process and 100% of the ore is roasted. Smoke containing arsenic is a by-product of the roasting process, and large quantities have been deposited on the surrounding countryside since the mid thirties. Since 1950 however the smoke has been washed and since 1954 bag collectors have also been employed to remove particulate material. These measures reduced the gaseous and particulate arsenic emitted from the stacks to approximately ^{1000 to} 750 pounds per average day or ^{235 to} ~~685~~ tons per year. The washings go to a tailings pond. At Giant Yellowknife Mines the tailings pond ~~used to~~ overflow periodically into Yellowknife Bay which was the source of water for the city of Yellowknife. To avoid this pollution, the intake for city water supply, which also supplies the two mines, was moved to the mouth of the Yellowknife River and the discharge from the tailings pond into the bay has been controlled to some extent by construction of better berms. Lime precipitation of arsenic from the tailings has reduced the level of dissolved arsenic reaching the Bay ^{to} ~~about 300 lbs per day~~. Bi-monthly monitoring of domestic water supplies from several sources is carried out routinely. The arsenic content in the Bay is being maintained below the maximum permissible limit of 0.05 milligrammes per litre. The arsenic level in the source of supply (ie, the Yellowknife River) has met the recommended limit of 0.01 milligrammes

per litre.

At various times there have been small market gardens in the Yellowknife area, but it is believed that none exist today. If the soil, used for gardening purposes, were heavily contaminated with arsenic as a result of years of fall-out, a series of analyses would be advisable for locally grown vegetable produce to determine its arsenic content, not only in vegetable cores, but also on vegetable surfaces, prior to washing. No adequate or recent information is available, principally because commercial market gardening is not practiced at present.

Yellowknife survey information has not proven the existence of any significant or harmful effects of the arsenic pollution on health. It demonstrated some increased incidence of heart block and, in mill workers, of dermatitis, but no firm evidence is available to connect either of these with ingestion of excessive amounts of arsenic or withdrawal of same.

The most effective measures which have been taken to date are:

- (1) washing and trapping arsenic to prevent most of it from being emitted from the stacks;
- (2) removal of the city water intake to the mouth of the Yellowknife River;
- (3) better control of precipitation and improved berms to prevent leaks from Giant Yellowknife tailings pond.

Since no market gardens are active at present, arsenic in vegetables offered for sale should not present a problem. If vegetables are grown in private plots, they should be checked periodically for arsenic. Vegetables grown locally should be well washed before use to remove any surface deposits of arsenic.