

{ - Alec Morrison
- De Villiers
- Wm Frost

Brief D. Frost.

Call meeting.

Terms of reference

- As.

- Kg.

MEMORANDUM

CLASSIFICATION

TO
A

Dr. W.H. Frost,
Senior Medical Adviser,
Health and Treatment,
Medical Services Branch.

YOUR FILE No.
Votre dossier

OUR FILE No.
Notre dossier

FROM
De

Deputy Director-General,
Food and Drug Directorate.

DATE
October 15, 1970

FOLD

SUBJECT
Sujet

Arsenic - Yellowknife

We have looked at the attached material entitled
"Arsenic - Yellowknife", and we find it satisfactory.

A. B. Morrison

Attachment

TO	FCG H.C.	FCG ACT.	REMARKS	DISPOSAL AND DATE
MIC				

021037

OCT 19 11 35 AM '70



ACTION REQUEST FICHE DE SERVICE

FILE NO. — DOSSIER N°

TO — À

DATE

LOCATION — ENDROIT

FROM — DE

☐ ACTION
DONNER SUITE

☐ APPROVAL
APPROBATION

☐ COMMENTS
COMMENTAIRES

☐ DRAFT REPLY
PROJET DE RÉPONSE

☐ MAKE
FAIRE.....COPIES

☐ NOTE AND FILE
NOTER ET CLASSER

☐ NOTE & RETURN/OR FORWARD
NOTER ET RETOURNER/OU FAIRE SUIVRE

☐ P. A. ON FILE
CLASSER

☐ REPLY
RÉPONSE

☐ SEE ME
ME VOIR

☐ SIGNATURE

☐ TRANSLATION
TRADUCTION

☐ YOUR REQUEST
À VOTRE DEMANDE

☐

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 135 tons per year. The washings go to a tailings pond. At Giant Yellowknife Mines the tailings pond overflows 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. 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. According to recent information some vegetables tested contained 2-4 parts per million arsenic, which is 2 to 4 times the minimum acceptable level for safety. 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.

ARSENIC - YELLOWKNIFEW.H. Frost, M.D., C.M., DPH
F.D.S.

Following the discovery of gold at Yellowknife, 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, which came into production in 1938. At the Con Mine, approximately 80% of the gold is extracted by a cyanide flotation process, a roasting process being used only to recover gold from the residue. Smoke containing arsenic is a by-product of the roasting process. At the Con Mine, arsenic is removed from the smoke by the impinger method which is 85 - 95% efficient. The effluent is circulated through a Slurry basin and there is believed to be no leakage or overflow. Smoke from the Con Mill usually blows out over the lake due to the prevailing northerly winds.

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 has been falling on the surrounding countryside since 1949. 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 750 to 1000 pounds per average day or 135 to 235 tons per year. At Giant Yellowknife Mines the cleansing of the smoke runs between 98% and 99.7% efficiency. The washings go to a tailings pond.

At Giant Yellowknife Mines the tailings pond overflows periodically ^{approx. 7%} 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 ^{Yellowknife} the Bay. Bi-monthly monitoring of domestic

water supplies from several sources is carried out routinely. The arsenic content

^{Yellowknife} in the Bay is being maintained below the maximum permissible limit of 0.05 milligrammes ^{the} per litre. ^{→ Fish taken from Great Slave Lake showed minimal amounts of arsenic well below permissible levels.} 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. According to recent information some vegetables tested contained 2-4 parts per million arsenic, which is 2 to 4 times the minimum acceptable level for safety. 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. ^{the} ~~It demonstrated~~ ^{the general public,} ~~however, the occurrence of the skin lesions of the skin and mucous membranes of some increased incidence of heart block and, in mill workers, of dermatitis, but no~~

^{It demonstrated,} ~~the occurrence of the skin lesions of the skin and mucous membranes of~~ ^{the more among certain individuals who were exposed to arsenic at work (mill workers).}3

~~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
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