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MINISTER OF
INDIAN AFFAIRS AND
NORTHERN DEVELOPMENT



MINISTRE DES
AFFAIRES INDIENNES
ET DU NORD CANADIEN

NOV 13 1970

Mr. S.M. Hodgson,
Commissioner of the Northwest Territories,
Yellowknife, Northwest Territories.

Dear Stu:

I regret the delay in replying to your letter of September 25th, which dealt with reports of arsenic contamination of vegetables grown in the Yellowknife area. I am advised that some suspicion has fallen on the methods by which the degree of arsenic contamination of vegetables was calculated in this particular case, and it has been suggested that the recent figures may not be a true measure of the amount of arsenic which could be ingested by humans. For this reason, the Department of National Health and Welfare has arranged for a Public Health Engineer to obtain samples of vegetables on a controlled basis, and these will be analyzed for arsenic content. It is, of course, essential that this sampling be done discreetly, in order to prevent the spreading of rumours about contamination. I am not sure how they will obtain samples of local vegetables at this late date.

I would not suggest that this is not a serious matter but I think it is important that the facts be determined beyond question before any action is taken to warn the population or to force the gold mines to introduce additional anti-pollution measures. The Department of National Health and Welfare has advised Dr. Butler that he should not release any statements to the press which might spread undue alarm, and I think that — this is the correct approach at this time. I enclose copies of briefing material on the problem, which has been produced for my use and the Minister of National Health and Welfare.

When proper analysis of the samples has been made, it will then be possible to evaluate the potential danger to human health, and appropriate action can be taken. I shall be in touch with you as soon as I receive the analysis report and comments from the Department of National Health and Welfare.

Yours sincerely,
Original Signed by
HON. JEAN CHRÉTIEN

Jean Chrétien

TO	FOR INFO.	FOR ACTION	REMARKS	DISPOSAL AND DATE
<i>MH</i>			<i>Noted</i>	<i>20-11-70</i>

Ottawa 4, October 9, 1970

Arsenic Emissions - Yellowknife

Contamination of Vegetables Grown In Yellowknife Area

Dr. G.C. Butler, Chief of the Northern Region of Medical Services, Department of National Health and Welfare, in a memorandum to his Director General, stated that recent tests of vegetables grown at Yellowknife indicate that they are unfit for human consumption because they contain arsenic, and that he must make a statement to the public warning residents of Yellowknife that they should not consume vegetables grown in the area.

The soil in the vicinity of Yellowknife will contain residual arsenic from past arsenic trioxide emissions from the mine roaster stacks before the collection plants were perfected and only a continued program of arsenic sampling in vegetables, together with soil and other sampling will indicate the true connection between past and present conditions. Surveys carried out by the Department of National Health and Welfare several years ago indicated relatively low arsenic levels in washed vegetables and it is important to compare today's results with previous tests. Inasmuch as Dr. Butler's anxiety is based on one set of samples only, he has been advised by his superiors not to issue any such alarming announcement at this time.

It would appear that the vegetables in the recent tests were not washed before analysis since the notations on some of the samples indicate that they were coated with soil. This would result in higher assay results and would not give the correct figure for the ingested arsenic in vegetables.

A meeting is being convened (similar to the one held to decide the fresh water pipeline for Yellowknife) between officers of the Departments of Indian Affairs and Northern Development and National Health and Welfare to decide on the course of action to be taken with regard to the possible contamination of vegetables grown at Yellowknife. It is desirable to have more accurate analysis of vegetables grown at Yellowknife. Consequently, Mr. Grainge, Public Health Engineer, Edmonton, has indicated that he will proceed immediately to discreetly obtain the necessary samples. These samples will be properly washed so that only the ingested arsenic levels in these vegetables will be measured.

The efficiency of arsenic trioxide collection plants at the Con-Rycon mine approaches 95% and at the Giant Yellowknife mines is 99.5%. This is about the best they can achieve. The remaining 5% at Con and .5% at Giant (in stack loss to atmosphere) means that approximately 200 and 150 pounds respectively, or a total of some 350 pounds of arsenic trioxide is emitted per day in the Yellowknife area. Of course, if the efficiency of collection drops, the amount of arsenic trioxide allowed to be emitted to the atmosphere will rise. It is important that mines conduct stack sampling programs to ensure the high efficiency of collection is maintained.

Consequently, a further meeting is recommended with the mines to ensure that all precautions are being taken to maintain the efficiency of arsenic collection plants.

The attached briefing material on this situation has been provided the Minister of National Health and Welfare by his Departmental officials. This material also refers briefly to the contamination of water and the following notes provide additional information in this regard.

Contamination of Water

During 1965, the Yellowknife Bay Water (used as the town water source) showed high arsenic readings due to an unusually large amount of soluble arsenic entering the Bay from tailings pond effluent. (This might account for the high arsenic content found in vegetables at that time). A meeting was held between officers of Indian Affairs and Northern Development and National Health and Welfare to decide a course of action. It was decided that detailed survey be made of the waters of Yellowknife Bay before a decision was made.

Following this survey, it was recommended that a fresh water pipeline be constructed to ensure arsenic free water for the City of Yellowknife and adjoining townsites (this pipeline is now completed). Negotiations were held with the mines to arrive at a cost sharing arrangement. The mines were also instructed to lower the amount of soluble arsenic permitted to enter the Bay so that it could continue to be used for recreational purposes. This was achieved by addition of lime to tailing ponds, thus lowering the quantity from a high of 925 pounds per day to 60 to 75 pounds per day average.

Briefing material for Ministers, N.H. & W.

ARSENIC - YELLOWKNIFE

Following the discovery of gold at Yellowknife in 1936 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-forties. 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 (i.e., 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 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 practised 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.