

850-5-12

PA 201/177



Government of Canada

Gouvernement du Canada

MEMORANDUM

NOTE DE SERVICE

TO  
À

Director General  
Program Management

FROM  
DE

Regional Director  
Northwest Territories Region

SUBJECT  
OBJET

Yellowknife Arsenic Problems

ACTION		PA date	BF date
M	79	29 Jan 75	
INFORMATION			
M	16	M	M
M	FC	M	M
M		M	1

SECURITY - CLASSIFICATION - DE SÉCURITÉ
OUR FILE - N/RÉFÉRENCE 151-1-5 (N3)
YOUR FILE - V/RÉFÉRENCE
DATE January 17, 1975

As of the end of this week, the following action has been taken by this Region:

1. A plan of action has been developed for survey of "at risk" groups - copy attached.
2. Arrangements have been made to discuss the planning of further As and heavy metal contamination surveys with Department of Environment in accordance with Section 4 of the Minister's statement. Dr. Eaton is going to Yellowknife on this business on January 21st - 22nd. Investigations to cover air, water, ground, fish and produce.
3. Territorial Government has been asked to fulfill the Minister's promise to make city water available to residents of the city who do not have a piped supply, regardless of ability to pay.
4. Data on As levels in Detah Village water supply have been extracted - see attached copy. These indicate no Arsenic hazard in this community.
5. Copies of the deVillier's report have been made and forwarded for members of Territorial Council.

for

R.D.P. Eaton, M.B., Ch.B., D.P.H.  
Regional Director

/sa

1231







Those individuals to be surveyed may be grouped as:

1. Mill workers in both the Giant and the Can mines, especially workers involved in the roasting process.
2. Indians and others who draw water direct from Yellowknife Bay including Detah Village.
3. Other residents on request.

For each individual tested, we must know:

1. Name
2. Age
3. Sex
4. Address (street address in Yellowknife; not a box number)  
We must know exactly where the individual lives.
5. Length of residence at that address
6. Length of residence in Yellowknife
7. Occupation
8. Number of years at that occupation
9. Drinking water supply
10. Does individual eat locally grown fruits and/or vegetables





MEMORANDUM

NOTE DE SERVICE

TO:  
A

Zone Director  
Mackenzie Zone

FROM  
DE

A/Director, Programs Development  
Northwest Territories Region

SUBJECT  
OBJET

Arsenic Survey - Yellowknife

SECURITY - CLASSIFICATION - DE SÉCURITÉ

OUR FILE - N/RÉFÉRENCE

151-1-5 (N3)

YOUR FILE - V/RÉFÉRENCE

DATE

January 14, 1975

You are aware that we are committed to mounting an Arsenic Testing Programme on the inhabitants of the Yellowknife area.

Those individuals to be surveyed may be grouped as:

1. Mill workers in both the Giant and the Can mines, especially workers involved in the roasting process.
2. Indians and others who draw water direct from Yellowknife Bay including Detah Village.
3. Other residents on request.

For each individual tested, we must know:

1. Name
2. Age
3. Sex
4. Address (street address in Yellowknife; not a box number)  
We must know exactly where the individual lives.
5. Length of residence at that address
6. Length of residence in Yellowknife
7. Occupation
8. Number of years at that occupation
9. Drinking water supply
10. Does individual eat locally grown fruits and/or vegetables



Zone Director  
Mackenzie Zone

151-1-5 (N3)  
January 14, 1975

Phase I

The sample required in the first instance is of scalp hair - (except in bald individuals). The amount needed for testing is 5-10 gm., (not less than 5 gm.).

Samples should be taken with scissors as close to the scalp as possible (multiple sites if required) and enclosed in a clean envelope or folded paper which is sealed with tape and stapled to a data card. (If you can obtain them conveniently, it might be a further safeguard to use duplicate adhesive numbers, one to seal the sample package and the duplicate to be attached to the data card.)

Collected samples should be shipped to Regional Office, at least until the programme is well established, and we will forward them to an appropriate laboratory.

Phase II

Further testing will depend on the scalp hair findings.

If raised levels are found, the donor will be revisited and a 24-hour urine sample will be requested, from which a 100 ml. sample can be extracted for analysis, using the same data and a similar (i.e. duplicate number) identification system. Such samples are to be shipped in plastic bottles as soon after collection as possible. The receiving laboratory will be identified at a later date.

Phase III

The final stage - if raised As levels are found in both hair and urine will be for the patient to be offered a complete medical check at a referral hospital, e.g. Camshell, University of Alberta Hospital or Stanton-Yellowknife.

If evidence of As intoxication were found, appropriate action to reduce intake would be necessary as well as regular follow-up via the Chronic Disease Registry.

From the environmental data available to us, we do not expect that this investigation will progress beyond Phase I, but both Phase II and III will be available if the need arises.

If any points need clarification, please advise - and please do not make alternative arrangements without prior consultation.

R.D.P. Eaton, M.B., Ch.B., D.P.H.  
A/Director, Programs Development

/sa





## MEMORANDUM

## NOTE DE SERVICE

TO  
AAssistant Deputy Minister  
Medical Services Branch

ATTENTION: Mr. M. Fillion

FROM  
DERegional Director  
Northwest Territories RegionSUBJECT  
OBJET

SECURITY - CLASSIFICATION - DE SÉCURITÉ

OUR FILE - N/RÉFÉRENCE

150-5-3-N (N3)

YOUR FILE - V/RÉFÉRENCE

DATE January 16, 1975

The following figures are all the readings on water from Detah Indian Village that I have been able to extract from the files in this office.

I cannot be sure why no records have been received since May 1972, but I am certain that there is no reason to consider the figures would be in any way different since there has been no deterioration in effluent handling methods at the mines since that time.

There is, therefore, absolutely no hazard from Arsenic at this Village.

October 14, 1969	0.005
October 20, 1969	0.008
October 31, 1969	0.002
November 12, 1969(1)	0.003
November 12, 1969(2)	0.002
November 17, 1969	0.008
December 1, 1969	0.005
March 17, 1970	0.002
April 6, 1970	0.004
June 26, 1970	0.005
August 31, 1970	0.004
October 13, 1970	0.002
January 15, 1971	0.003
February 16, 1971	0.001
March 24, 1971	0.002
April 14, 1971	0.006
May 28, 1971	0.019
August 16, 1971	0.005
August 25, 1971	0.003
September 8, 1971	0.004
October 13, 1971	0.007
February 8, 1972	0.019
April 28, 1972	0.003
May 30, 1972	0.009

for

R.D.P. Eaton, M.B., Ch.B., D.P.H.  
Regional Director

/sa



850-5-X751  
JAN 9 1975

final DBP - 4

The 1969 study reported on during the CBC broadcast "As it Happens" January 8, 1974, was carried out as a result of a concern in the Yellowknife area and by the health authorities about the presence of arsenic in the local environment from mining operations in the area.

It was apparently decided at the time that the report should not be made public because it might cause alarm on the arsenic question, when there were doubts and uncertainties about the significance of the findings. For example, the report itself recognized that causes other than arsenic pollution were probably involved in the health conditions reported, and the report did not establish a relationship between arsenic pollution and the incidence of cancer. Indeed the report stated that deaths from cancer in Yellowknife seemed to be lower than elsewhere in Canada.

Nevertheless there was and is a proper concern about any significant pollution problem, especially its long-range health implications. A number of steps were taken to control and monitor the problem, and especially to ensure a safe water supply. A new source of water for the town was put in place in 1968-69 and has operated since then. It has been continually monitored since, I am assured it has been free of pollution problems. Analysis was done of arsenic content in vegetables grown in the Yellowknife area and it was found that if the vegetables were washed the <sup>arsenic</sup> contact was within the limits established in the Food and Drug Regulations. The local population was informed of these results. In addition, I am told that there have been major improvements in the control of pollution in the operations of the mines. Effluent is contained in tailing ponds, and airborne waste is captured and bagged.



The radio broadcast reported on the problem of some residents using the water from Yellowknife Bay rather than the protected town supply, and eating fish from the Bay. This is a matter of concern to the health authorities, especially since significantly higher readings of contamination in the Bay were measured by the Department of the Environment after spills of mine tailings into the water in the Spring of 1974. The local health authorities warned the town of Yellowknife of the problem in July and posted signs to warn residents not to use the water. The health authorities also consulted with the Department of the Environment and the decision was taken that DOE would launch the suit against the firm responsible since that Department possesses stronger legal powers in this connection.

I am notified that there has been a considerable effort to monitor and control the problem in Yellowknife, but I have asked for certain further steps to be taken as well:

1. Local health officials will urge on the town of Yellowknife the need to ensure a supply of safe water from the town supply to all residents, notwithstanding their ability to pay for it. Indeed I have been told that the Territorial Government has already issued instructions that this be done.
2. There will be an increased campaign to inform residents of the dangers of the use of water from the Bay, through the activities of public health personnel and by information bulletins to the news media.
3. We will discuss with N.W.T. authorities arrangements for carrying out a survey of arsenic levels in residents of Yellowknife. Persons found to have significant levels will be encouraged to undergo detailed clinical examination and thereafter will be followed up, on a regular basis, by the health authorities.



4. The health staff in Yukon will be augmented to provide these services and to provide also an augmented environmental health inspection service as well as co-ordination and collection of all available data arsenic levels in humans, fish, water and soil etc. within the Yellowknife area.

I have also asked urgently for a report on the findings to date of the continuing survey of incidence of illnesses in YK area that might be attributed to arsenic in the environment, and a comparison of them to average Canadian rates.



for  
the project is completed the government would no longer need to employ the workers.

However the Alliance wonders if hos-

government employees entitled to the wages, working conditions and benefits of other civil servants.

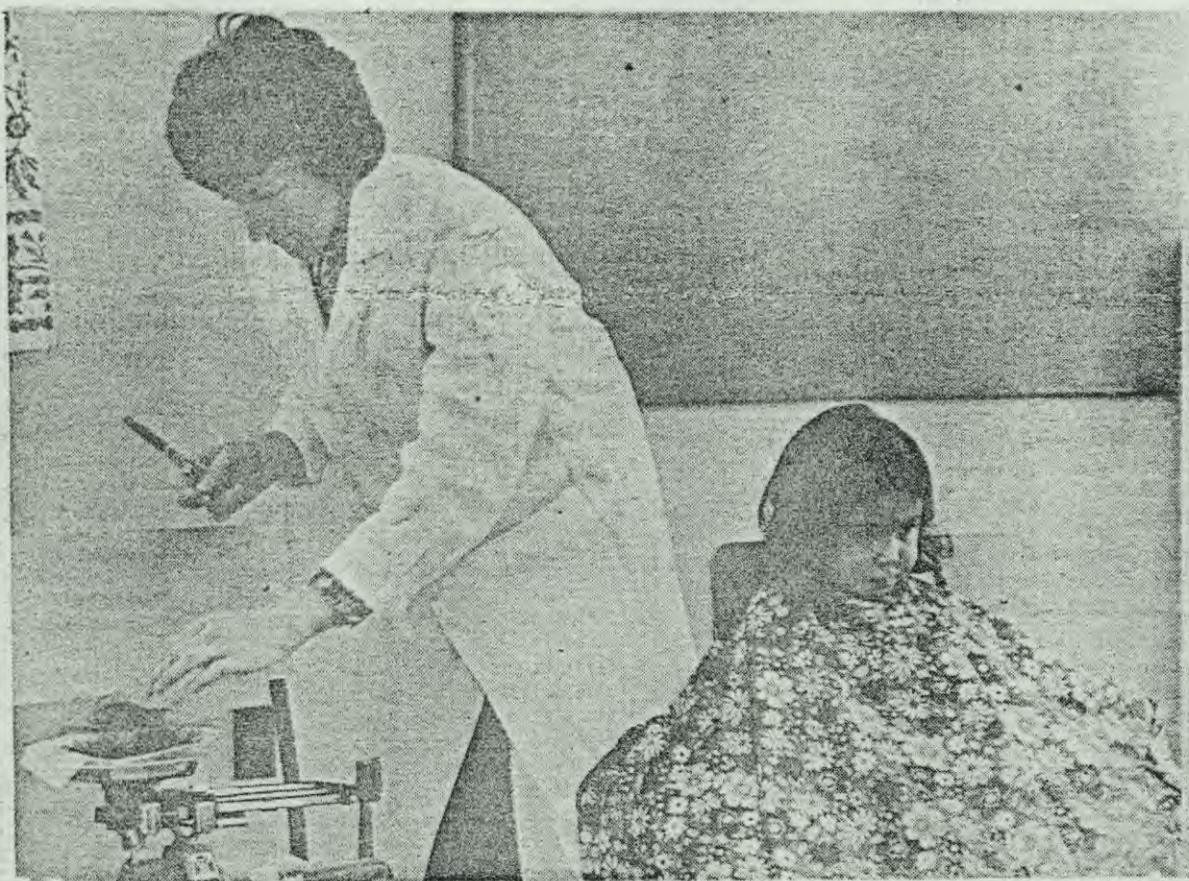
CONTINUED ON PAGE SEVENTEEN

# Native Press

20¢

OF THE NORTHWEST TERRITORIES

published by the Indian Brotherhood of the N.W.T.  
Box 2338, Yellowknife



Health nurse, Marlene Glazir turns barber as she snips a hair sample from this young Detah resident. The arsenic tests flopped as few adults showed up for testing.

**Only 5% clipped**

## Arsenic hair tests are a flop

A program to test local Yellowknife people to see if they have any arsenic poisoning is turning out to be a failure. Only about 400 out of Yellowknife's 9,000 people have been tested so far and the last day of testing is on February 28.

The worst part of the disappointing program is that less than 50 native people have been tested, despite the fact that the native people were supposed to be tested very closely, because they have been living here all their lives.

No one knows for sure whether local people have been poisoned by drinking the arsenic in the water and by eating fish who live in the same water. This is why the tests were to be carried out to see if there is a serious problem or not.

The arsenic tests were first demanded in January by many groups, including

the Indian Brotherhood, when a secret report done by the Health and Welfare Department was made public. That health report about Yellowknife people was done in 1969 and it said that people in the area were a lot sicker than they should be because of the arsenic pollution leaked into the air, water, and onto the land by the two local gold mines.

### "HIGH RISK" POPULATION

The Health and Welfare Department got a lot of people angry because of the secret report. It was felt by many people that the local health officers and doctors were not doing their job properly and had let the health situation of the people get out of control.

At that time last month, the federal Minister Marc Lalonde stepped in and promised the free medical tests, but

CONTINUED ON PAGE SIXTEEN



Mr. Remnant also explained that the Territorial Government tries to find Returning Officers in a central location so that the candidates can hand in their papers easily. However it's not always easy to find the right person to be a Returning Officer, he says. The person has to be willing and able to do the job properly. And "we can't always get the ideal someone at the ideal spot", he added.

# Arsenic tests

CONTINUED FROM PAGE ONE

said they would be carried out by the same local health officials. He also promised that the tests would pay special attention to "high-risk" people, that is, old people and young children, as well as people who have lived here for a very long time - whites as well as natives.

The test which are being carried out from February 3rd to the 28th are done by a nurse and her assistant, plus an interpreter when necessary. All that happens during the test is that the person tested has a very small amount of hair (less than one-fifth of an ounce) snipped from their head.

The hair is then sent south to be tested and this will tell how much arsenic is in the person's body. People will get their test results back by a letter sent to them in the mail.

## PLANS FAIL

However the plans to pay close attention during the tests to the "high-risk" population have clearly failed. Less than 5 per cent of all local people have been tested, and of this, over 90 per cent are whites who have been getting drinking water from the safe town supply instead of from the polluted Bay. The whites do not eat the fish every day either as do the native people.

The lady barbers "visited Detach on February 7 and collected hair samples from a small total of only 17 people, almost all of whom were school children at lunchtime. Not a single man of the village was tested and only a few ladies. None of the older people of the village were tested at all.

The problem clearly lies again with the Health Department bosses who have made a very poor effort to inform and explain the testing program to the people. Very few people had ever heard about the tests and most did not understand them at all.

February 7 was a cold winter's day in Detach. The road was very slippery and the older and sick people did not feel like going over to the nursing station to get their hair cut. Several said they wouldn't mind having the tests in their home or even cutting their own hair and having someone come over to pick up the sample. But this was not done.

The reason, according to Nurse Margaret Glazier, was that the doctors think the water around Detach is safe to drink and therefore the Health Department does not expect people to be sick. But this is not true according to Rose Crepeau, Band Secretary in Detach. She says that drinking water from the lake is making people sick and that people also get scabs on their hands if they use the water for washing.

## VISITED VALLEY HOMES

An attempt was made to give special treatment to the native people living CONTINUED ON NEXT PAGE

...at the contracts however he requested that the Native Press obtain the evidence for him. Rather than directly approaching the Ed-

## ARSENIC FROM PREVIOUS PAGE

in Rainbow Valley, which is closest to Giant Mines and to the polluted water of Back Bay. The nurse was given two hours on the morning of February 10 and again the next day to visit all the houses in the Valley. But much less than half of the houses were given the tests.

Many people actually refused to be tested because they didn't understand what was going on. The health worker interpreter, Mary Jane Martin, tried to explain why the important tests were being done and how simple they were. But still many people refused. "I don't believe you", they said when told that the tests would help to tell if they were going to get sick. Or "I don't want my hair cut", were some of the answers.

Mary Jane Martin explained that not much could be done in a couple of hours each morning. She felt that at least an hour was needed for each house and there certainly was not enough time to go to every house. The people preferred to have the tests done in their houses, she

"I would appreciate hearing from you immediately."

observed, and didn't care to go uptown to the health offices.

It's hard for many to get transportation all the way uptown, says Mary Jane, but it's very important because only by having the tests done will the people know if they are already poisoned and may get sick years later. This is why she is still trying to get more people to get tested even if they have to go uptown.

Arsenic can make you sick many years after you first get it in your system and it is foolish to wait until you get sick later before complaining about the pain. Then it will be too late for you, explained Mary Jane.

The local health officials have not shown as much interest as Mary Jane in getting people tested. The bosses had nothing to say to explain the failure of the testing program. Mr. John Hill, who is in charge of it, told a Native Press reporter to speak to the Director, Dr. Ali Uyghur. Dr. Uyghur's comment was that he had "no time" to talk about it because he was "very busy."

would become angry over the use of a government building to make crafts too.

Following their meetings with Mrs. Pederson, the Education Department closed Elihakvik for making crafts. Now, says Simons, Cal Abrahamson will visit the community to see if a compromise can be arranged. Mr. Simons stated that the Craft Guild might in future be selling all their products through the Co-op.

Such a situation might please all three groups - the Craft Guild, Co-op and Mrs. Pederson. If an agreement is not reached the ladies will have a hard time doing their work. Sewing patterns cannot be laid out in their houses with the children running around. Nor can they afford to buy their own sewing equipment.

In the past, Elihakvik had proved to be a very good location for the work. Not only could the ladies all get together in one place and enjoy each other's company, but the sewing was also an opportunity to become involved in other programs of adult education.

SOCIAL  
ECONOM  
CONCERN ABOUT HOUSING  
POLITIC  
TRANSP  
IN YELLOWKNIFE NORTH

## YUKON LAND

Enrollment is now being by the Council for Yuk To date we have encountered of Yukon people who have the N.W.T.

To complete the enrollment require the names and addresses of these people to see how eligible for the Yukon

Contact: Albert R. Webb  
Enrollment Of  
Council For Yuk  
22 Nisutlin D  
Whitehorse, Y



0 4 8 5 4 1

MEDICAL SERVICES  
HEADQUARTERS

MAR 25 9 49 AM '75

QUARTIERS GENERAUX  
SERVICES MEDICAUX



de Villiers  
Report





Government  
of Canada

Gouvernement  
du Canada

**ACTION  
REQUEST**

**FICHE DE  
SERVICE**

To — A	File No. — Dossier N°
	Date

From — De

<input type="checkbox"/> Please call Prière d'appeler	Tel. No. — N° de tél.	Ext. — Poste
<input type="checkbox"/> Returned your call Vous a rappelé	<input type="checkbox"/> Will call again Vous rappellera	<input type="checkbox"/> Wants to see you Désire vous voir
Date	Time — Heure	Message received by Message reçu par
<input type="checkbox"/> Action Donner suite	<input type="checkbox"/> Approval Approbation	<input type="checkbox"/> Note & return Noter et retourner
<input type="checkbox"/> Comments Commentaires	<input type="checkbox"/> Draft reply Projet de réponse	<input type="checkbox"/> Note & forward Noter et faire suivre
<input type="checkbox"/> As requested Comme demandé	<input type="checkbox"/> Signature	<input type="checkbox"/> Note & file Noter et classer



850-5-X 751

JAN 9, 1975

AN INVESTIGATION OF THE HEALTH STATUS  
OF INHABITANTS OF YELLOWKNIFE, NORTHWEST TERRITORIES

Reported by

A. J. de Villiers and P. M. Baker

OCCUPATIONAL HEALTH DIVISION, ENVIRONMENTAL HEALTH DIRECTORATE  
DEPARTMENT OF NATIONAL HEALTH AND WELFARE  
OTTAWA



# TABLE OF CONTENTS

SUMMARY.....	(ii)
I. INTRODUCTION.....	1
1.1 Purpose.....	1
1.2 History of Yellowknife.....	1
1.3 Source of Arsenic.....	1
1.4 Dispersal of Arsenic.....	1
1.5 Assessment of the Environment.....	2
1.6 Extent of Contamination of Environment.....	3
1.6.1 Emissions to the Atmosphere.....	3
1.6.2 Settled Arsenic.....	4
1.6.3 Arsenic in the Water Supply.....	4
1.6.4 Sulphur Oxides and Particulates.....	7
1.7 Arsenic Toxicity.....	7
1.7.1 Review of Toxic Effects.....	7
1.7.2 Arsenic and Cancer.....	10
1.7.3 Arsenic Excretion and Storage.....	10
1.8 Observed Effects in Yellowknife.....	11
1.8.1 Early Cases.....	11
1.8.2 First Medical Survey.....	11
II. METHODOLOGY.....	12
2.1 Basis for Study Design.....	12
2.2 Study Design.....	13
III. MORTALITY EXPERIENCE: YELLOWKNIFE 1957-66.....	14
3.1 Review of Major Findings.....	14
3.2 Summary and Discussion.....	19
IV. HOSPITAL STATISTICS.....	20
4.1 Population Structure.....	20
4.2 Main Findings.....	21
4.3 Summary of Findings.....	27
V. OUT-PATIENT VISITS.....	27
5.1 Main Findings.....	27
5.2 Discussion and Summary.....	31
VI. UNATTENDED ILLNESSES.....	32
6.1 Reported Sickness: House-to-house survey.....	32
VII. HEALTH QUESTIONNAIRE DATA.....	35
VIII. FINDINGS OF CLINICAL STUDY.....	37
8.1 The Participants in the Clinical Study.....	37
8.2 Characteristics of Examined Population.....	37
8.3 Main Clinical Findings.....	37
8.3.1 Information obtained by Interview and Questionnaire.....	37
8.3.2 Most Important Clinical Findings.....	40
8.3.3 Summary.....	43
8.4 Clinical Findings Among a Group of 'Responders'.....	45
8.5 Significance of Periods of Residence.....	45
8.6 Findings Among Mill workers.....	46
8.7 Relative Importance of Residence and High Exposure.....	47
8.8 Levels of Arsenic in Urine.....	47
IX. DISCUSSION AND SUMMARY.....	48
X. REFERENCES.....	55
XI. APPENDICES: Tables A1 to A8.....	57



## SUMMARY

Evidence of an association between arsenic exposure and a high prevalence of skin lesions among individuals occupationally exposed to contact with arsenical dusts was found. Ingestion of arsenic appeared to play only a minor role, if any.

There is a high incidence of acute respiratory disease (in males) in the Yellowknife community together with a high prevalence of chronic non-specific respiratory disease. It is possible that the irritant action of inhaled arsenical dusts may have had a minor contributing role to play in the etiology of these conditions but this could be of less importance than other environmental factors, for example, the harsh climate in association with other insults on the respiratory system such as smoking.

The high incidence of deaths and out-patient visits due to accidents, poisonings and violence and the high incidence of hospital admissions for mental, particularly psycho-neurotic disorders appear to reflect the severity of non-specific stress factors inherent in the transplantation of a sizeable European population to a new environment characterized by isolation, severe climatic conditions and lack of accustomed facilities.

Abnormal electrocardiographic changes and certain other neurological findings were found more frequently than would have been expected. The significance of this occurrence cannot be explained at this time.



AN INVESTIGATION OF THE HEALTH STATUS  
OF INHABITANTS OF YELLOWKNIFE, NORTHWEST TERRITORIES

I. INTRODUCTION

1.1 Purpose

This investigation was carried out at the request of the Medical Services Branch of the Department of National Health and Welfare, the purpose being to determine the extent to which the health and well-being of the residents of Yellowknife and the immediate surrounding district is affected by arsenic in the environment.

1.2 History of Yellowknife

Gold was discovered in the Yellowknife area in 1936. A small town site was established one year later on a peninsula and adjoining island which jut into the northwest end of Yellowknife Bay. An enlarged town site was developed in 1948 but many people remained in the old town on the peninsula and on Latham Island. The town is situated between the plants of two gold-producing companies, Giant Yellowknife Gold Mines Limited, three and a half miles to the north, and the Consolidated Mining and Smelting Company of Canada, one mile to the south. In 1966, at the time of the survey, Yellowknife was already a thriving community of approximately 3,741 inhabitants<sup>(1)</sup>. It is the capital of the Northwest Territories.

1.3 Source of Arsenic

Gold is found in the native but finely-divided state in ore bodies characterized by an abundance of arsenopyrite. Full recovery of the gold requires, in addition to cyanidation, roasting of the ore at one stage of the process. The fumes so produced by the roasting process contain arsenic trioxide and sulphur oxides.

Roasting was first introduced in 1941 but for a few months only. It was resumed as an integral part of the extraction process in 1948. Arsenic, volatilized during the extraction process, was widely dispersed in the area, principally through stack effluents.

1.4 Dispersal of Arsenic

To curb the large-scale dispersal of arsenic into the environment, the Consolidated Mining and Smelting Company of Canada Limited installed an impinger or scrubbing device in 1949. The



resultant sludge was discharged into a nearby lake, later it was discharged into trenches dug in the tailings pond and still later into a natural depression which, upon geological examination, had been shown to contain no faults.

Giant Yellowknife Gold Mines Limited installed a Cottrell precipitator in 1951. A second precipitator and a bag collector was added in 1954. Dry arsenic trioxide collected by the Cottrell plant was stored underground in specially prepared and sealed stopes in a permafrost area of the mine at least five hundred feet from the nearest mine workings. Liquid mine wastes containing arsenic were initially pumped into Bow Lake which emptied into Baker Creek and from there into Yellowknife Bay. It was estimated that approximately 83 pounds of arsenic per day<sup>(2)</sup> entered the Bay in winter with an additional 61 pounds per day in summer. An undetermined amount of arsenic was and is washed into the Bay during the spring run-off period. Discharge of the Giant effluent was redirected to the upper end of Yellowknife Bay in 1963 in order to minimize the possibility of contaminating drinking water sources.

#### 1.5 Assessment of the Environment

Attention was first focussed on the arsenic problem by the Public Health Engineering and Occupational Health Divisions of this Department in May 1949<sup>(3)</sup>. In 1950, a continuing assessment of the hazard was begun by the Occupational Health Division and periodic sampling was initiated in 1951. Samples of drinking water, the water of lakes and rivers, winter and summer grass were taken while measurements of the arsenic settling from the atmosphere were obtained. Samples of milk and locally-grown vegetables were also analyzed.

The efficiency of the equipment installed by the two companies to reduce the discharge of arsenic into the atmosphere was checked by stack sampling tests which began in 1954.

Initially, analyses of samples were carried out by the Occupational Health Division. Responsibility for routine water analyses and other water surveys was assumed by the Public Health Engineering Division at a later date. Assistance in various environmental assessment activities was also provided by the two companies involved, the



Department of Energy, Mines and Resources (then the Department of Mines and Technical Surveys) and the Department of Northern Affairs.

## 1.6 Extent of Contamination of Environment

### 1.6.1 Emissions to the Atmosphere

Most of the arsenic entered the environment of Yellowknife as an effluent from the roaster stacks. The exact fall-out pattern of the very finely dispersed arsenic trioxide is not known with precision.

Results of the roaster stack tests which were taken from 1954 to 1969 may be found in Appendix Tables A1.1 and A1.2, arsenic being measured as elemental arsenic rather than as arsenic trioxide. Where two tests were conducted in the same month, one by the company, the other by the Department of National Health and Welfare, the result of the test by the Department of National Health and Welfare was incorporated into Table A1.1. In some five months in which tests were conducted by both Con and the Department of National Health and Welfare, it was observed that there was a considerable variation in the results, the National Health and Welfare readings in two of those cases being lower than the Con readings by approximately 50%.

It is estimated that during the early years of operation, two to three tons of arsenic trioxide per day were released directly into the atmosphere from the Con stack and approximately eight tons per day from the Giant stack giving a total of approximately eleven tons of arsenic trioxide per day (22,000 lbs). Estimates based on the limited data available were prepared for the years 1954-69 and are given in the accompanying Table 1. From the data in this table, it is clear that the period may be broken into two parts; the period 1954-58 in which there was a daily discharge into the atmosphere of approximately 7,250 lbs of elemental arsenic per day, and the period 1959-69, during which approximately 695 lbs of arsenic were emitted per day. The difference in the two rates of arsenic emissions was due to a change in the procedures used for extracting arsenic from the exhaust gases in the roaster stack at Giant, somewhere between July 1957 and July 1959.

In total, it could be estimated that 6,617 tons of arsenic were emitted into the atmosphere from 1954-58 inclusive and 1,396 tons



from 1959-69 inclusive for a total of 8,012 tons from 1954-69.

#### 1.6.2 Settled Arsenic

Fall-pan evaluations, arsenic contents of summer and winter grass samples as well as arsenic values for surface and core samples of locally-grown vegetables reflected the degree of environmental contamination and paralleled also the reductions in the amounts of settled arsenic brought about by the improvements introduced with regard to arsenic collection efficiencies at the two mills.

Table A1.3 contains estimates of this fall-out in the region of the Yellowknife town site. There is much variation in the estimates given but changes in the weather may be expected to produce considerable variations in the patterns of fall-out. The fall-out sampling periods were not systematic and accurate estimates on the basis of the available data cannot be made. However, on the basis of the data in Table A1.3, one would expect that there was a fall-out on the town site of Yellowknife of about two pounds of elemental arsenic per acre per year. Core samples of locally-grown vegetables did not reveal significant amounts of arsenic and are not considered to have contributed significantly to the amount of arsenic ingested.

#### 1.6.3 Arsenic in the Water Supply

In the period 1951-59, some 727 samples were taken from the town water supply. This was the water supply used by most people in the Yellowknife area. Certain small fractions of the populations covered did, however, live on Latham Island and on the premises of Giant Yellowknife Gold Mines Limited, and on the premises of the Consolidated Mining and Smelting Company of Canada. Regardless of location, their drinking water supply was derived directly or indirectly from the west side of Yellowknife Bay on Great Slave Lake, the only exception being residents of Indian Village which is located on the west bank of Yellowknife Bay nearer to the main body of Great Slave Lake.

The data on the samples collected during 1951-69 are summarized in Appendix Tables A1.4 to A1.7. Averages calculated for each individual year in Tables A1.4 to A1.7, where given, are based upon the unweighted averages for each month within that year. Where no samples were taken within the month and consequently where there was no average value, the average value for that month in the previous year was used.



TABLE 1

ESTIMATED AMOUNTS OF ARSENIC (POUNDS PER DAY)  
DISCHARGED INTO ATMOSPHERE 1954 to 1969

<u>Year</u>	<u>Giant*</u>	<u>Con**</u>	<u>Total</u>
1954	11,980	395	12,375
55	6,392	421	6,813
56	5,998	412	6,410
57	6,544	401	6,945
58	3,330	385	3,715
59	115	434	549
1960	165	586	751
61	330	440	770
62	330	440	770
63	330	440	770
64	496	294	790
65	372	369	741
66	247	309	556
67	124	340	464
68	256	337	593
1969	466	428	894

\* Giant Yellowknife Gold Mines Limited

\*\* Consolidated Mining and Smelting Co. of Canada Ltd.



In examining Table Al.4, no trend in time is apparent either as regards the overall averages for the years or for the months within the years. There is, however, a sizeable variation by month, the arsenic concentration being considerably higher during the spring run-off period of May, June and July than in the remainder of the year.

Table Al.5 contains data illustrating the degree of contamination of the drinking water supply at the Consolidated Mining and Smelting Company of Canada Limited. The data here appears to be quite similar to that for the town supply in terms of the arsenic content, whereas the water supply at Giant Mines Limited, see Table Al.6, although based upon far fewer samples than either the Con or town water supplies, appears to have been more heavily contaminated with arsenic. The Giant Mines water intake is situated near the mouth of the heavily contaminated Baker Creek.

Table Al.7 gives the levels of arsenic concentrations in Frame Lake, a lake in the immediate vicinity of Yellowknife but differing hydrologically from Yellowknife Bay in that it is fed by local drainage rather than by a stream bearing water from further afield. Also, its waters are not subject to mixing with any other major body of water as is the case with Yellowknife Bay. In terms of arsenic concentrations, water from Frame Lake differs from the water drawn from Yellowknife Bay in that the arsenic levels appear to be at least ten times as high, and also there is a less pronounced seasonal variation. In fact, there does appear to be a reverse seasonal trend as compared to Yellowknife Bay in that the arsenic concentrations tend to be highest in the December to March period. In all probability, the levels of arsenic contamination in Frame Lake are typical of those in the many small lakes in the vicinity of Yellowknife.

The generally accepted limits for arsenic contamination of a water supply to be used for human consumption are as follows(16):

Acceptable	- less than 0.01 ppm
Maximum permissible	- 0.05 ppm
Emergency	- 0.3 ppm

On the assumption that during the period 1951-69, there was no trend, other than seasonal variations, in the degree of arsenic contamination of the town water supply, then it is possible to estimate from the data in Table 2 the proportion of the time during which



the levels of contamination in the town water supply were within the above-described limits. It is seen that the water supply was within acceptable limits less than 16% of the time; for almost 70% of the time, the level of contamination, while being higher than the accepted limit of 0.01 ppm, was less than the maximum permissible limit, 0.05 ppm. Approximately 15% of the time, the water supply is estimated to have been above the maximum permissible level of 0.05 ppm. On one day, June 20, 1966, the water contained 2.92 ppm arsenic, assuming no error in the laboratory determination or subsequent errors in typing, etc. This value is ten times greater than generally accepted emergency level of 0.3 ppm.

In the months of June and July, it may be seen from Table 2 that the water was of an acceptable quality only 1.3% of the time. In no one month could one estimate that the water would be of an acceptable standard for more than 30% of the time.

In the latter part of December 1969, the town and the community at Giant were connected up to a water supply derived from the Yellowknife River north of its confluence with Yellowknife Bay.

#### 1.6.4 Sulphur Oxides and Particulates

Estimates of the amounts of sulphur dioxide in the atmosphere based on sulphation rates were obtained for a one-month period during the 1966 health survey. Particulate measurements obtained by high volume samplers are also available for a three-month period. The amount of arsenic present in the particulate material was not determined.

Because of the limited amount of information available, it is not possible to draw firm conclusions. The results given in Appendix Tables A1.8 and A1.9 suggest, however, that the particulate loading in the air of Yellowknife and the sulphation rates obtained for the Yellowknife and Giant Mines communities approached levels comparable with those generally observed in an average small to medium-sized industrial town or city.

### 1.7 Arsenic Toxicity

#### 1.7.1 Review of Toxic Effects

Arsenic is ubiquitously distributed in the environment and in all animal tissues<sup>(6)</sup>. It is used in pesticides, wood preservatives,



TABLE 2

WATER SAMPLES AND PERCENTAGE FREQUENCY OF OCCURRENCE OF SAMPLES  
 BY MAGNITUDE OF ARSENIC CONTAMINATION (PPM)  
 BY MONTH IN THE PERIOD 1951-69

MONTH	WATER SAMPLES				PERCENTAGE		
	Less than 0.011 ppm	0.011 to 0.050 ppm	0.051 to 0.3 As.	Total	Less than 0.011 ppm	0.011 to 0.050 As.	0.051 to 0.3 As.
Jan 1952-69	16	43	2	61	26.2	70.5	3.3
February	14	32	1	47	29.8	68.1	2.1
March	14	39	2	55	25.5	70.9	3.6
April	16	42	2	60	26.7	70.0	3.3
May	4	29	51	84	4.8	34.5	60.7
June	1	28	46*	75	1.3	37.4	61.3
July	1	60	15	76	1.3	79.0	19.7
Aug 1951-69	5	45	4	54	9.3	83.3	7.4
September	4	49	2	55	7.3	89.1	3.6
October	5	45	4	54	9.3	83.3	7.4
November	11	40	2	53	20.8	75.4	3.8
December	15	37	1	53	28.3	69.8	1.9
					15.9	69.3	14.8

\* Includes one value greater than 0.3 ppm



the chemical and metallurgical industries; as a growth stimulant in swine and poultry feeds and it is also used for medicinal purposes.

In terms of its biological effects, arsenic occurs in three chemical forms:

- (a) inorganic arsenicals including white arsenic (arsenic trioxide), arsenates and arsenites
- (b) organic arsenicals, and
- (c) gaseous arsenic or arsine

The fatal dose of arsenic trioxide for man is 70-180 mgs., although toxicity may result from much smaller quantities. Arsenical concentrations in blood, urine, hair, nails, increase from 10-100 times normal in instances of acute poisoning.

Acute systemic poisoning from ingestion produces a violent gastroenteritis. Inhalation may cause bronchitis. External contact with arsenic may cause dermatitis, sometimes of the exzematous type -- most of the effects being due to primary irritation.

Polyneuritis and motor palsies may be the only manifestation of chronic exposure. Weakness most likely affects the long extensors of the fingers and toes. Personality changes may be part of the neurologic syndrome along with headache and other symptoms. Increased salivation, hoarseness, cough, laryngitis, conjunctivitis and mucous membrane changes have also been reported.

Of special note are specific skin changes consisting of dry, brawny, non-pruritis desquamation and scattered areas of deeper pigmentation which may occur over the trunk and extremities. Pronounced hyper-keratosis especially of the palms and soles may occur. An allergic type of contact dermatitis is frequently seen in individuals handling white arsenic. Irritation of the mucous membranes of the nasal septum may result in ulceration and perforation. Certain blood changes, for example, lucopenia<sup>(9)</sup> and eosinophilia, toxic hepatitis and optic nerve toxicity are other changes which have been reported.

Arsenic is also said to interfere with the production of hemoglobin and is the physiological antagonist of iodine. Goitre and cretinism have been reported among arsenic eaters.

Arsine is the most dangerous form of arsenic. It may be produced whenever nascent hydrogen comes in contact with arsenic.



Three to 10 ppm may cause symptoms in man in several hours, 10 to 60 ppm may be dangerous in 30 to 60 minutes and 250 ppm may be lethal in 30 minutes. Arsine induces a hemolysis of the red blood corpuscles resulting in acute anemia and jaundice; chronic intoxication may result in nephritis, myocarditis and hepatitis.

The recommended threshold limit value<sup>(15)</sup> for an eight-hour day industrial exposure to arsenic and compounds in the atmosphere is 0.5 mg/cubic metre; for arsine, it is 0.2 mg/cubic metre. The acceptable limit in drinking water is 0.01 mg/litre with a maximum permissible limit of 0.05 mg/litre<sup>(16)</sup>.

#### 1.7.2 Arsenic and Cancer

It has been suggested that there is an association between exposure to arsenic and the development of cancer. Skin cancers following arsenic medication have been reported but the latent period is long and, in some cases, ranged between 16 to 44 years with a mean of 28 years. Considerable attention has been focussed on the arsenic content of cigarette tobacco as a possible explanation of the increased risk of lung cancer associated with cigarette smoking<sup>(12)</sup>. However, the number of cancers of the lung and other sites directly attributable to arsenic are few and the exact significance of arsenic as a carcinogen is still uncertain.

#### 1.7.3 Arsenic Excretion and Storage

Excretion of inorganic arsenic is chiefly via the kidney; 10% of ingested arsenic is found in the faeces. Initial excretion of single doses occurs fairly rapidly, then decreases exponentially with only small amounts (less than 5%) being retained for longer periods. Major storage areas are the skin, hair, bone and muscle tissues.

A wide range of urinary arsenic values have been reported and are shown in Appendix Table A1.10. The highest amounts appear to be excreted after sea food diets<sup>(7)</sup>. Values between 0.003 and 0.150 mg arsenic per litre<sup>(5)</sup> would appear to reflect the best normal range.

The range of urinary arsenic values reported among asymptomatic individuals occupationally exposed to arsenic is much higher and varies between less than 0.1 mg and 3.0 mg per litre, or more<sup>(7)</sup>. Pinto and McGill<sup>(8)</sup> reported asymptomatic cases with urinary arsenic excretion values of 4 or 5 mg per litre. Thus, there is no reliable index of a harmful level. Elkins<sup>(14)</sup>, however, suggested a maximum allowable



concentration of 1 mg per litre if the exposure was to arsenic trioxide and 0.5 mg per litre for exposure to arsine..

Normal values for arsenic in hair range between 0.0036 to 0.088 mg per 100 grams of hair<sup>(5, 20)</sup>. Average values of 0.081 mg/100 gms<sup>(21)</sup> have been reported. Samples of hair from individuals occupationally exposed may contain many times the above values.

## 1.8 Observed Effects in Yellowknife

### 1.8.1 Early Cases

In Yellowknife, cases of arsenic intoxication were observed soon after the introduction of the roasting process. By Mid-February, 1949<sup>(3)</sup>, two men working at Akaitcho, one and a half miles north of Giant Mines, had been hospitalized with a definite diagnosis of arsenic poisoning caused by drinking contaminated snow-water. In May, arsenic poisoning resulted in the death of six cows pastured one mile west of Con Mines. Many dogs in the town and surrounding district showed signs of poisoning and there was some loss of wildlife. Arsenic was also said to be the cause of death of an Indian infant.

### 1.8.2 First Medical Survey

In 1951, it was decided to add a medical investigation to the continuing environmental survey<sup>(3)</sup>. The purpose was to examine a selected cross-section of the population for evidence of ill effects which could be attributed to exposure to arsenic. The school population of 230 pupils was selected as being representative of the community. The study consisted of a physical examination of all the school children and urinary arsenic determinations of urines of randomly-selected students. No evidence of ill effects was found on examination, the urine samples confirmed absorption of small amounts of arsenic even though the arsenic levels were not considered to be excessive.

Hospital admission data for the five-year period January 1948 to December 1952 were reviewed. Notable was the high admission rates for diseases of the skin and cellular tissues, and diseases of the respiratory system. It was, however, not possible to attribute these findings to arsenic exposure.



## II. METHODOLOGY

### 2.1 Basis for Study Design

In addition to studying the health status of the population which had been exposed to low levels of arsenic over a long period of time, the present survey was designed to coincide with the peak period of arsenic exposure which occurs in the spring when the arsenic contamination of the water supply is at its height.

With low dose type of exposure, chronic effects may be expected to manifest themselves only after long latent periods, perhaps up to twenty years or more. With the elapse of a maximum of seventeen years' exposure, the establishment of significant correlations between exposure and effect cannot, therefore, be expected to be the overriding criterion of an effect upon health, even in this second survey. With this in mind, as much health information as was feasibly possible was collected if it could be considered useful as an indicator of the health status of the local inhabitants. Consideration was given to the levels at which deviations from a 'normal' healthy condition occur, the various sources of information available for the measurement of possible effects upon health and the development of a procedure for the collection of information pertaining to symptoms, minor physiological deviations and medically unattended illness.

To define an acute effect possibly associated with the arsenic levels found in the water supply during the spring run-off, for example, it was considered necessary to screen as large a population as possible including, in particular, the most susceptible portions of the population. A general health survey procedure using questionnaires was indicated. The population subgroups considered most likely to provide information on possible effects were thought to be those comprised of individuals who had had a long exposure period consequential to having lived in the general environment for a long time -- these effects being compounded among those who were occupationally exposed to arsenic, e.g. mill workers. Clinical examinations or multiphasic screening techniques were thought to constitute the most useful procedure according to the indicated level of exposure. Clinical examinations were also carried out on individuals selected on the basis of signs and symptoms judged to be compatible with effects attributable to chronic arsenic poisoning or exposure.



Only individuals in the bunk houses on the respective mine properties were excluded from the survey.

## 2.2 Study Design

The study reported here is comprised of

- (a) a review of available mortality, hospital admission and out-patient records;
- (b) a health survey of the whole community using a specially-designed series of questionnaires;
- (c) a house-to-house morbidity survey of the community involving regular household visits by a team of interviewers and the weekly recording of individual illnesses;
- (d) a clinical examination of a group of male inhabitants including
  - (i) those who, on the basis of their responses to the health questionnaires, were considered to have one or more symptoms which could be attributed to the effects of arsenic exposure. In this respect, responses to questions dealing with diseases of the skin, nervous system and neoplasia were subjected to special screening.
  - (ii) individuals assumed to have been exposed to an increased risk of arsenic intoxication by reason of their occupation (e.g. in the mill, or as Cottrell or bag-house employees)
  - (iii) individuals who were assumed to be exposed to an increased risk of arsenic intoxication by reason of ten or more years residence in the area.

All individuals in the above categories were contacted individually and invited to participate in the survey.

The main portion of the survey commenced on June 1, 1966 and continued through July and August. Execution of all phases of the survey was preceded by a programme of public and interviewer orientation under the direction of a Public Education Adviser. Meetings were held with officials and representatives of the community. Public announcements were made in the local press and over the local radio.

Five medical students and two Indian health officers were employed as interviewers. In addition to detailed written instructions, interviewers were briefed and instructed in the use of the questionnaires and on the equipment to be used.



The clinical examinations were completed by a group of consultants supported by nursing and clinical laboratory personnel. A multi-phasic diagnostic screening procedure, as outlined in Appendix 8.1 was adopted with special emphasis on the examination of organ systems by individual consultants.

All information obtained during this survey was coded using prepared instructions. Morbidity information was coded using the International Classification of Diseases.

### III. MORTALITY EXPERIENCE: YELLOWKNIFE 1957-66

#### 3.1 Review of Major Findings

In this study, a comparison is made between the death rates and the patterns of death of persons resident in Yellowknife with those of the total population of Canada by sex and by age groups.

Deaths which occurred in Yellowknife in the years 1957-66 are compared with the "expected" deaths which would have occurred in Yellowknife in that period had the death rates prevalent in Canada in the year 1961 also prevailed in Yellowknife during that ten-year period. In calculating these expected deaths, the population of Yellowknife in 1961 was taken as being representative of the years 1957-66. In this respect, it should be noted that the population of Yellowknife changed markedly between the years 1956 and 1966 as shown in Table A3.1. For instance, in 1956, the male age group 20 to 24 formed 13.5% of the male population, whereas in 1961, it was 8.1% and in 1966, it was 7.1%. Similarly, for males in the age group 25-34, the percentages were 25.3%, 20.5% and 15.8% in those years. In the same period, the population in the male age group 35-44 remained relatively constant at 14.3%, 14.1% and 14.2% respectively.

The mortality ratios given in Table 3 relate the observed deaths to the expected deaths. A mortality ratio of unity denotes that the death rates are essentially equal, while a mortality ratio of greater than unity denotes a higher than expected death rate and vice versa. Mortality ratios should be considered in relation to the sizes of the observed and expected deaths from which they were derived.

In view of the small numbers of deaths involved as shown in Table 3, there does not appear to be an increase in the death rates



from tuberculosis or from infectious and parasitic diseases which could be considered as significant.

Deaths from malignant neoplasms appear to be lower in Yellowknife than one would expect on the basis of the age specific rates prevailing for these diseases in Canada as a whole.

Diseases of the nervous system are higher than may be expected among males and somewhat lower than may be expected among females. Despite the small numbers, it may be seen that the observed deaths among males are consistently higher than may be expected except in the age group 5 to 19 where there were no observed deaths and the expected deaths are only 0.143.

Deaths from diseases of the circulatory system are considerably lower in Yellowknife than would be expected. This decrease in the death rate from such diseases is consistent in both sexes through all age groups.

Diseases of the respiratory system are high in Yellowknife. While quite small numbers are involved, it is noted that in the different age groups where there was at least one death in Yellowknife, the rate from these diseases was higher than may be expected in all age and sex groups.

Among deaths from diseases of the digestive system, the death rate was double the expected death rate for both males and females in the age groups 0 to 4. However, there were only two deaths in each category and the overall mortality ratio for both males and females as a whole was approximately unity.

There were no deaths from diseases of the genito-urinary system in Yellowknife. Ill-defined and unknown causes accounted for four deaths in Yellowknife from 1957-66, whereas less than one death would have been expected, two of these deaths occurring in the male age group 20 to 44.

The most outstanding differences from the public health point of view in the death rates in Yellowknife as compared to the death rates for Canada as a whole concerns deaths from accidents, poisonings and violence. Here, 59 deaths occurred whereas less than 20 were expected. Most of these "excess" deaths occurred in the age group 20 to 44 in both sexes and to a lesser extent in the age group 45 to 64 among males. The data in this category is investigated in further



TABLE 3

ALL CAUSES: OBSERVED AND EXPECTED DEATHS\* WITH MORTALITY RATIOS  
FOR YELLOWKNIFE IN THE PERIOD 1957-66 by CAUSE, AGE AND SEX

Cause of Death	Inter- mediate I.C.D. Number (1957)	Sex	Observed and Expected* Deaths with Mortality Ratios by Age Group											
			Total		0 - 4		5 - 19		20 - 44		45 - 64		65 +	
			Obs Exp	M.R.	Obs Exp	M.R.	Obs Exp	M.R.	Obs Exp	M.R.	Obs Exp	M.R.	Obs Exp	M.R.
Tuberculosis of respiratory system	A1	M	2 0.641	3.12	0 0.007	-	0 0.005	-	0 0.163	-	1 0.305	3.28	1 0.161	6.2
		F	0 0.224	-	0 0.007	-	0 0.005	-	0 0.130	-	0 0.051	-	0 0.031	-
All other <u>infective and parasitic</u> diseases	A2-A43	M	2 1.936	1.03	1 0.692	1.45	1 0.171	5.85	0 0.465	-	0 0.396	-	0 0.212	-
		F	3 0.955	3.14	2 0.391	5.12	0 0.082	-	1 0.113	8.85	0 0.274	-	0 0.095	-
All <u>malignant neoplasms</u>	A44-A59	M	4 15.435	0.26	0 0.317	-	0 0.359	-	0 1.923	-	3 7.129	0.42	1 5.707	0.18
		F	5 8.343	0.60	1 0.221	4.52	0 0.225	-	0 1.907	-	0 3.992	-	4 1.998	2.00
Diseases of the <u>nervous</u> system and sense organs	A70-A78	M	11 8.251	1.33	2 0.537	3.72	0 0.143	-	1 0.770	1.30	3 2.298	1.31	5 4.503	1.11
		F	3 4.897	0.61	0 0.368	-	0 0.124	-	0 0.525	-	2 1.322	1.51	1 2.558	0.391
Diseases of the <u>circulatory</u> system	A79-A86	M	18 35.902	0.51	0 0.023	-	0 0.084	-	3 3.332	0.90	7 16.427	0.43	8 16.036	0.50
		F	2 10.775	0.19	0 0.020	-	0 0.050	-	0 0.804	-	0 3.438	-	2 6.463	0.31
Diseases of the <u>respiratory</u> system	A87-A97	M	13 6.211	2.09	6 2.425	2.47	0 0.128	-	0 0.390	-	2 1.253	1.60	5 2.015	2.48
		F	5 3.255	1.54	3 1.943	1.54	0 0.092	-	1 0.228	4.39	0 0.317	-	1 0.675	1.48
Diseases of the <u>digestive</u> system	A98-A107	M	4 4.311	0.93	2 0.965	2.07	0 0.102	-	0 0.636	-	1 1.545	0.647	1 1.063	0.94
		F	2 2.026	0.99	2 0.703	2.84	0 0.066	-	0 0.335	-	0 0.498	-	0 0.424	-
Diseases of the <u>genito-urinary</u> system	A108-A114	M	0 2.007	-	0 0.042	-	0 0.072	-	0 0.354	-	0 0.566	-	0 0.973	-
		F	0 0.821	-	0 0.038	-	0 0.055	-	0 0.222	-	0 0.257	-	0 0.240	-
<u>Congenital</u> malformations	A127-A129	M	2 3.416	0.59	2 3.042	0.66	0 0.138	-	0 0.147	-	0 0.075	-	0 0.014	-
		F	2 2.783	0.72	2 2.498	0.80	0 0.108	-	0 0.121	-	0 0.051	-	0 0.005	-
<u>Ill-defined</u> and unknown causes	A137	M	3 0.630	5.66	0 0.118	-	0 0.012	-	2 0.031	64.52	0 0.165	-	1 0.204	4.90
		F	1 0.249	4.02	0 0.104	-	0 0.009	-	0 0.031	-	0 0.049	-	1 0.056	17.86
Accidents, poisonings, <u>violence</u>	AE138-AE150	M	51 15.863	3.22	5 1.895	2.64	3 2.160	1.39	32 7.663	4.18	9 3.192	2.82	2 0.953	2.10
		F	8 3.764	2.13	0 1.202	-	1 0.564	1.77	5 1.105	4.52	1 0.534	1.87	1 0.359	2.79
All other diseases		M	19 12.048	1.58	13 9.837	1.32	0 0.049	-	1 0.264	3.79	2 0.943	2.12	3 0.955	3.14
		F	13 5.763	1.48	10 6.820	1.47	1 0.086	11.63	2 0.801	2.50	0 0.443	-	0 0.613	-
All causes		M	129 106.549	1.21	31 19.898	1.56	4 3.422	1.17	39 16.139	2.42	28 34.293	0.82	27 32.797	0.82
		F	44 46.854	0.94	20 14.315	1.40	2 1.465	1.37	9 6.322	1.42	3 11.226	0.27	10 13.526	0.74

\* Based upon the death rates of persons of equivalent age and sex in Canada in 1967



detail in Table 4 from which it may be seen that within this category, the major sources of these excess deaths came from "other transport" accidents, accidents caused by machinery (mostly among males age 20 to 44), accidental drowning and suicide. Suicide, in fact, accounted for 8 of the 39 "excess" deaths in the category "Accidents, Poisonings and Violence".

As seen above, deaths from "Accidents, Poisonings and Violence" are significantly higher in Yellowknife than in Canada. They are not, however, elevated to quite the same extent when considered in relation to the Northwest Territories or the Yukon. On the basis of crude death rates, i.e., death rates which have not been adjusted for differences in age distribution, the death rates in Yellowknife in the period 1957-66 in comparison with the Northwest Territories, the Yukon and Canada in 1961 were as follows:

DEATHS PER 1,000 POPULATION FROM  
ACCIDENTS, POISONINGS AND VIOLENCE

	<u>Yellowknife</u> (1956-1967)	<u>N.W.T.</u> (1961)	<u>Yukon</u> (1961)	<u>Canada</u> (1961)
Males	2.77	1.56	1.40	0.90
Females	0.57	0.98	0.69	0.33

From this data, one may see that the male death rate from "Accidents, Poisonings and Violence" in Yellowknife is strongly augmented in relation to Canada as a whole, but less so to the northern regions excluding Yellowknife.

Previously, it was shown that the highest mortality ratios were for deaths in the age group 20 to 44. The crude death rates above could, therefore, be influenced, to some extent, by the proportions of the populations which are in the age group 20 to 44. Data on these proportions have been extracted from DBS publications and are found below:

Percentage of Population Aged 20-44 in 1961

	<u>Yellowknife</u>	<u>N.W.T.</u>	<u>Yukon</u>	<u>Canada</u>
Males	42.7	41.0	43.8	32.2
Females	41.2	35.5	40.3	32.5



TABLE 4

ACCIDENTS, POISONINGS, VIOLENCE: DESERVED AND EXPECTED\* DEATHS WITH MORTALITY RATIOS FOR YELLOWKNIFE  
IN THE PERIOD 1957-66 BY CAUSE, AGE AND SEX

	Inter- mediate I.C.D. Number (1957)		Observed and Expected* Deaths With Mortality Ratios by Age Group											
			Total		0 - 4		5 - 19		20 - 44		45 - 64		65 +	
			Obs Exp	M.R.	Obs Exp	M.R.	Obs Exp	M.R.	Obs Exp	M.R.	Obs Exp	M.R.	Obs Exp	M.R.
Motor vehicle accidents	AE138	M	2 5.670	0.34	1 0.414	2.42	0 1.005	-	0 3.250	-	1 0.948	1.05	0 0.253	-
		F	1 1.386	0.72	0 0.294	-	1 0.335	2.99	0 0.504	-	0 0.204	-	0 0.049	-
Other transport accidents	AE139	M	7 1.072	6.53	0 0.021	-	0 0.118	-	7 0.708	9.89	0 0.182	-	0 0.023	-
		F	1 0.065	15.38	0 0.011	-	0 0.013	-	1 0.031	12.26	0 0.008	-	0 0.002	-
Accidental poisoning	AE140	M	2 0.550	7.27	0 0.044	-	0 0.030	-	0 0.279	-	1 0.181	5.52	0 0.016	62.50
		F	1 0.184	5.43	0 0.043	-	0 0.015	-	1 0.080	12.50	0 0.043	-	0 0.003	-
Accidental falls	AE141	M	2 1.033	1.94	0 0.032	-	0 0.057	-	2 0.300	6.67	0 0.295	-	0 0.349	-
		F	2 0.384	5.21	0 0.048	-	0 0.009	-	1 0.029	34.48	0 0.040	-	1 0.261	3.83
Accident caused by machinery	AE142	M	4 0.420	9.52	0 0.016	-	0 0.052	-	4 0.230	17.39	0 0.113	-	0 0.009	-
		F	0 0.020	-	0 0.016	-	0 0.003	-	0 0	-	0 0.001	-	0 0.000	-
Accident caused by fire and explosion of combustible material	AE143	M	3 0.672	4.46	1 0.167	5.99	1 0.096	10.42	1 0.215	4.65	0 0.119	-	0 0.055	-
		F	0 0.357	-	0 0.156	-	0 0.061	-	0 0.077	-	0 0.049	-	0 0.014	-
Accident caused by hot substance, corrosive liquid, steam and radiation	AE144	M	0 0.053	-	0 0.037	-	0 0	-	0 0.005	-	0 0.007	-	0 0.004	-
		F	0 0.015	-	0 0.009	-	0 0	-	0 0.004	-	0 0.001	-	0 0.001	-
Accident caused by fire-arm	AE145	M	1 0.342	2.92	0 0.005	-	0 0.107	-	1 0.158	6.33	0 0.069	-	0 0.003	-
		F	0 0.009	-	0 0	-	0 0.001	-	0 0.008	-	0 0	-	0 0	-
Accidental drowning	AE146	M	11 1.405	7.83	1 0.248	4.03	1 0.428	2.34	7 0.564	12.41	2 0.137	14.60	0 0.028	-
		F	0 0.224	-	0 0.095	-	0 0.080	-	0 0.033	-	0 0.013	-	0 0.003	-
All other accidental causes	AE147	M	9 2.104	4.28	2 0.886	2.26	1 0.171	5.85	6 0.693	8.66	0 0.302	-	0 0.052	-
		F	1 0.635	1.57	0 0.520	-	0 0.026	-	0 0.048	-	1 0.029	34.48	0 0.012	-
Suicide	AE148	M	10 2.055	4.87	0 0	-	0 0.059	-	4 1.091	3.67	5 0.760	6.58	1 0.145	6.90
		F	0 0.362	-	0 0	-	0 0.009	-	0 0.218	-	0 0.122	-	0 0.013	-
Homicide and injury purposely inflicted by other persons (not in war)	AE149	M	0 0.284	-	0 0.025	-	0 0.017	-	0 0.171	-	0 0.057	-	0 0.014	-
		F	2 0.124	16.13	0 0.014	-	0 0.012	-	2 0.075	26.67	0 0.022	-	0 0.001	-
Injury resulting from operations of war	AE150	M	0 0.006	-	0 0	-	0 0	-	0 0	-	0 0.002	-	0 0.004	-
		F	0 0	-	0 0	-	0 0	-	0 0	-	0 0	-	0 0	-
All accidents, poisonings and violence		M	51 15.863	3.32	5 1.895	2.64	3 2.160	1.39	32 7.663	4.18	9 3.192	2.82	2 0.953	2.10
		F	8 3.763	2.13	0 1.202	-	1 0.564	1.77	5 1.105	4.52	1 0.533	1.88	1 0.359	2.79

\* Based upon the death rates of persons of equivalent age and sex in Canada in 1961



This data demonstrates that the proportion of persons in the age group 20 to 44 was not meaningfully different between Yellowknife, the N.W.T. and the Yukon in the case of males, while the proportion of females aged 20 to 44 was somewhat lower in the Northwest Territories than in Yellowknife.

Comparing the crude female death rates for the Yellowknife community with the other regions north of the 60th parallel, the death rate from Accidents, Poisonings and Violence would appear to be no greater, in fact, somewhat lower. However, as has been observed, the proportion of males aged 20 to 44 in Yellowknife is not meaningfully different from the Northwest Territories as a whole or from the Yukon, while the death rate from Accidents, Poisonings and Violence is approximately double the rate for the Yukon and considerably higher than the rate for the Northwest Territories.

### 3.2 Summary and Discussion

Of particular note in this review of the mortality experience in Yellowknife are:

- (a) the extraordinarily high death rate from Accidents, Poisonings and Violence among males;
- (b) the increased death rate due to Diseases of the Respiratory System, and
- (c) the apparently lower death rate for diseases of the circulatory system.

When interpreting the above statistics, it must be borne in mind that to a large extent, persons who live in Yellowknife were not born there. It would appear that a larger than average proportion is self-selected. Persons, when arriving at Yellowknife, probably have a higher physical health status than other Canadians of equivalent age and sex.

Probably even more important in relation to mortality statistics is the fact that there is, in all probability, a tendency for persons who become seriously ill while in Yellowknife to leave Yellowknife for treatment. The observed deaths contained in Table 3 include six persons who were coded by the DBS as being residents of Yellowknife, but who did not die in Yellowknife. It is quite hard to estimate if there were other persons who had lived in Yellowknife for a considerable



portion of their lives and who left Yellowknife and died shortly after leaving. In this respect, it should be noted that the residence of persons who die in Canada are coded by the province in which death occurs. There is not complete uniformity in this respect between provinces. In general, if a person enters an institution such as a hospital, should the person die in that hospital, the residence coded against the death will be the residence which the patient declared, or had declared for him upon entering that hospital. If, however, a person died outside of an institution, in all probability residence would be coded to the place where the person died.

To what extent the mobility of the population and the other factors alluded to above were operative in Yellowknife in, e.g., the lower numbers of deaths due to neoplasms, is a matter for conjecture. Ethnic differences may also play a part and may be a significant factor in deaths due to Accidents, Poisonings and Violence.

#### IV. HOSPITAL STATISTICS

Hospital statistics can provide one of the best guides or indices to the prevalence of serious disease conditions in a population.

The hospital statistics included in this report were derived from the data sent by the Territorial Hospital Insurance Board to the Research and Statistics Directorate of the Department of National Health and Welfare where they were coded and tabulated into a report by the Biostatistics Division<sup>(32)</sup>.

The computer programme used to formulate the annual set of tables was taken and modified so as to print out two separate sets of tables; one for Yellowknife and the other for the Northwest Territories less Yellowknife. The data in the tables for the Territories less Yellowknife was used as a control for the hospitalization in Yellowknife. The data considered below is for the year 1967, this being the first year for which it was possible to separate out the medical district of Yellowknife.

##### 4.1 Population Structure

When comparing two sets of hospital data, assuming equivalent standards of hospitalization, availability and entrance criteria, consideration must be given to the populations upon which the statistics



are based. Of primary importance are the age and sex distributions and the ethnic origin of the populations involved.

The most recent statistics on native populations in the Northwest Territories were produced by the DBS for the year 1961 (see Table A4.1). At that time, there were 12 eskimos resident in Yellowknife. This number of eskimos may be considered negligible for the purposes of this report as the total population of Yellowknife in 1961 was 3,245. In the Northwest Territories as a whole, there were 7,977 eskimos in a total population of 22,998 or 34.7%.

There were 306 Indians in Yellowknife in 1961 as compared to 5,256 in the Northwest Territories, Indians comprising 9.4% and 22.8% of the two populations respectively.

Regarding the age of persons in the Northwest Territories in 1961 by origin, 60% of Indians, 65% of eskimos but only 25% of all other persons in the Northwest Territories were below the age of 20. Further, in 1966, 51.6% of the population of the Northwest Territories was aged less than 20 in comparison to 46.8% of the population of Yellowknife. Please see Table A4.2 for a comparison of the age distribution of the estimated populations of Yellowknife and the Northwest Territories less Yellowknife in 1967. The populations contained in this table are the populations upon which rates are based when comparing hospital separations and also out-patient services.

#### 4.2 Main Findings

A summary of the THIS separations by diagnostic class is given in Table 5. Further detail is given in Appendix Table A4.3 in which separations by the 98 categories of the Canadian List are given. In the remainder of this discussion of hospital statistics, all references will be made to one or both of these tables, unless otherwise specified.

The rates given in these two tables are based upon the total, excluding newborn, separations and are not adjusted for differences in age distribution or the ethnic origin of the persons separated from hospital. The rates quoted are based upon an estimated 2,081 males and 1,739 females in Yellowknife, and 13,719 males and 11,461 females in Northwest Territories less Yellowknife. The percentage column refers to the total male and female separations individually and are based upon the total male and female separations less newborn separations.



TABLE 5

SEPARATIONS, PERCENTAGE SEPARATIONS, AND SEPARATION RATES PER 100,000 POPULATION BY PRINCIPAL DIAGNOSIS  
FOR TERRITORIAL PLAN IN-PATIENTS FROM THE YELLOWKNIFE HEALTH DISTRICT AND THE N.W.T. LESS YELLOWKNIFE

Class Description	YELLOWKNIFE						NWT LESS YELLOWKNIFE						RATIO SEP RATE YK TO NWT	
	Male			Female			Male			Female			Male Female	
	Sep	%Sep	Rate	Sep	%Sep	Rate	Sep	%Sep	Rate	Sep	%Sep	Rate	Male	Female
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
I. Infective and parasitic diseases	11	3.1	529	9	1.7	518	114	4.8	831	128	3.4	1117	0.64	0.46
II. Neoplasms	10	2.8	480	20	3.8	1150	54	2.3	394	91	2.4	794	1.22	1.45
III. Allergic, endocrine system, metabolic and nutritional diseases	6	1.7	288	10	1.9	575	31	1.3	226	40	1.1	349	1.28	1.65
IV. Disease of the blood and blood forming organs	2	0.6	96	2	0.4	115	8	0.34	58	6	0.2	52	1.63	2.19
V. Mental, psychoneurotic and personality disorders	28	8.0	1346	46	8.6	2645	70	2.97	510	104	2.7	907	2.64	2.92
VI. Diseases of the nervous system and sense organs	21	6.0	1009	22	4.1	1265	198	8.4	1443	199	5.2	1736	0.70	0.73
VII. Diseases of the circulatory system	16	4.6	769	16	3.0	920	90	3.8	656	115	3.0	1003	1.17	0.92
VIII. Diseases of respiratory system	105	29.9	5046	57	10.7	3278	745	31.6	5430	697	18.3	6082	0.93	0.54
IX. Diseases of digestive system	49	14.0	2355	48	9.0	2760	288	12.2	2099	314	8.2	2740	1.12	1.01
X. Disorders of genital urinary system	12	3.4	577	52	9.8	2990	83	3.5	605	250	6.6	2181	0.95	1.37
XI. Deliveries and complications of pregnancy, childbirth & puerperium	0	0.0	0	173	32.5	9949	0	0.0	0	1249	32.8	1088	---	0.91
XII. Diseases of skin & cellular tissues	12	3.4	577	9	1.7	517	116	4.9	845	86	2.3	750	0.68	0.69
XIII. Diseases of bones and organs of movement	7	2.0	336	4	0.7	230	56	2.4	408	63	1.7	550	0.82	0.42
XIV. Congenital malformations	3	0.8	144	2	0.4	115	32	1.4	233	30	0.8	262	0.62	0.44
XV. Certain diseases of early infancy	0	0.0	0	1	0.2	58	23	1.0	168	19	0.5	166	---	0.35
XVI. Senility and ill-defined conditions	20	5.7	961	23	4.3	1323	113	4.8	824	157	4.1	1370	1.17	0.97
XVII. Accidents, poisonings, violence (nature of injury)	49	14.0	2355	37	7.0	2128	320	13.6	2335	221	5.8	1928	1.01	1.01
Y. Supplementary classification for special admissions, live births and still borns	0	0.0	0	2	0.4	115	16	0.7	117	37	1.0	323	---	0.36
TOTAL ALL DIAGNOSES	351	100	16866	533	100	16670	2537	100	17180	3806	100	33208	0.98	0.92



From Table 5, it may be seen that the ratio of the overall separation rates for both males and females in Yellowknife compared to males and females in the remainder of the Northwest Territories is less than unity. For males, it is 0.98 and for females 0.92. These separation ratios indicate that the hospitalization rates in Yellowknife are somewhat lower than in the remaining territories. However, because as previously described, there are considerable differences in the populations at risk, it is not possible to draw such a conclusion from the two summary ratios quoted but it is necessary to examine in detail the diagnostic classes and the Canadian List numbers comprising the various diagnostic classes in order to draw more valid conclusions.

Taking the disease classes in order of presentation, it can be seen that the separation ratios for Class I, Infective and Parasitic Diseases, are lower for Yellowknife than the remainder of the Northwest Territories. From Table 6, one may observe that the separation rate for Indian and eskimos with diseases in diagnostic Class I was three to four times as high for Indians as for others in the Northwest Territories as a whole in 1967. With few eskimos and a relatively low Indian population in Yellowknife, the lower rate for Infective and Parasitic Diseases in Yellowknife is, therefore, not unusual.

The overall separation rates for Neoplasms are 1.22 and 1.45 for males and females respectively. Within this class, the numbers associated with diagnoses according to the Canadian Class List are very small (see Table A4.2). However, it is noted that there were a total of five separations for leukemia and aleukemia in Yellowknife in comparison to one for the remainder of the Northwest Territories. Of the five separations, two separations were for females aged 4 while the three male separations were comprised of two separations for boys aged 10 and one for a boy aged 9. It is quite possible, therefore, that these five separations could have been incurred by two persons. Similarly, for List No. 18, Other Malignant Neoplasms and Neoplasms of the Lymphatic and Hematopoietic Tissue, the ratios were 2.20 and 1.80 for males and females respectively. In Yellowknife, there were, again, five separations. The two male separations were for persons aged 20 and 34 and were, therefore, different persons, but the three female separations, all aged 65, were comprised of at least two persons as there was a difference in ethnic origin. In passing, it is noted that neoplasms



TABLE 6

TERRITORIAL HOSPITAL INSURANCE SERVICES  
HOSPITAL SEPARATION RATES PER 100,000\*\* POPULATION  
BY DIAGNOSTIC CLASS AND ORIGIN\*  
IN THE NORTHWEST TERRITORIES

Class	Diagnostic Class	Indian	Eskimo	Other	Total
I	Infective & parasitic diseases	1484	1268	411	907
II	Neoplasms	416	487	764	603
III	Allergic endocrine system metabolic & nutritional diseases	235	183	418	303
IV	Disease of the blood & blood-forming organs	145	41	44	62
V	Mental, psychoneurotic & personality disorders	561	507	1219	852
VI	Diseases of the nervous system & sense organs	1575	2293	962	1531
VII	Diseases of the circulatory system	778	710	896	810
VIII	Diseases of the respiratory system	7439	6941	3774	5548
IX	Diseases of the digestive system	1846	2587	2504	2407
X	Disorders of genital urinary system	1357	954	1674	1369
XI	Deliveries & complications of pregnancy, childbirth & puerperium	4833	5774	4332	4917
XII	Diseases of skin & cellular tissues	1195	751	609	769
XIII	Diseases of bones & organs of movement	561	304	507	448
XIV	Congenital malformations	362	233	184	234
XV	Certain diseases of early infancy	235	223	59	148
XVI	Senility and ill- defined conditions	833	1045	1211	1083
XVII	Accidents, poisonings, violence (nature of injury)	2317	1979	2232	2162
Y	Supplementary classification for special admissions, live births and still borns	235	213	154	190
	TOTAL ALL DIAGNOSES	26425	26514	22004	24379

SOURCE: Portion of Table 6C of the Report;  
Hospital Morbidity Statistics, Territorial Hospital  
Insurance Services, 1967 prepared by Biostatistics  
Division, Research & Statistics Directorate,  
Department of National Health & Welfare

\* Ethnic origin

\*\* Unadjusted for differences in age or sex distribution.



for the female reproductive organs as described by List Nos. 19, 20 and 21, are consistently higher in Yellowknife than in the Territories. This could be dependent, to a certain extent, upon the fact that there is a somewhat higher proportion of Caucasian females aged 25 to 55 in Yellowknife as opposed to the Northwest Territories, see Table A4.2.

The separation rates in Yellowknife are high for Class III, Allergic, Endocrine System, Metabolic and Nutritional Diseases. This is particularly the case for allergic disorders and diabetes among females, but within this class, as a whole, there is considerable variation when consideration is given to the individual list numbers comprising the class. Similarly, there is a high separation rate for Class IV, Disease of the Blood and Blood-forming Organs, where there are ratios above unity for both males and females. However, these ratios are based upon only two separations for males and two separations for females.

The separation rates for Mental, Psychoneurotic and Personality Disorders, Class V, are almost three times as high in Yellowknife as in the remainder of the Territories. Here, the numbers of separations are relatively large and separations for this class of diseases form 8 to 9% of all hospital separations in Yellowknife as compared to 2 to 3% of hospital separations in the Northwest Territories. The excess separations are from List No. 29, Psychoses and List No. 30, Psychoneurotic Disorders.

The data illustrate that the ratios of separations, List Nos. 29 and 30 in Yellowknife as compared to the Northwest Territories less Yellowknife cannot be completely offset by differences in age groups nor by differences in ethnic origin. While Indians and eskimos appear to have a separation rate for mental psychoneurotic and personality disorders somewhat less than half that of the remainder of the population, the difference in the ethnic composition of Yellowknife versus the Northwest Territories is not sufficient to explain fully the difference in separation rates. One would, therefore, assume that these conditions are, in fact, more prevalent in Yellowknife and this finding is, perhaps, compatible with the high rates of death from accidents, poisonings and violence which were indicated in the review of the mortality patterns in Yellowknife.



Diseases of the Nervous System and Sense Organs, Class VI, are, on the whole, lower for Yellowknife. Within this class, however, there is a considerable fluctuation and in all cases, the numbers of separations are quite small. Similarly, for Class VII, Diseases of the Circulatory System, the overall ratios approximate to unity but there is considerable fluctuation among the Canadian List Numbers comprising this class and one is not able to draw any clear-cut conclusions from the data on account of the small numbers of separations involved. Class VIII, Diseases of the Respiratory System, involve for males some 40% of all separations and 10 to 20% of all separations for females. Within this class, there is a certain amount of non-uniformity. The male separation rate for upper respiratory infections is elevated in Yellowknife as compared to the Northwest Territories, as is the rate for bronchitis. Pneumonia, however, which forms 12.8% of all male separations in Yellowknife and 20.3% of all male separations in the Northwest Territories is considerably lower for Yellowknife males. The contrast is even more marked for females; the ratio of the separation rates here being 0.33.

Regarding Diseases of the Digestive System, Class IX, the separation ratios approximate unity. Within this class, there are considerable differences. It should be noted that the ratios for List No. 53, Ulcer of Stomach, Duodenum and Jejunum are high for males and considerably so for females. The largest numbers of male separations in this class in Yellowknife are for appendicitis which has a ratio of 3.03.

Class X, Disorders of the Genito Urinary System, is of interest in that the ratios are high for Diseases of the Female Genital Organs as exemplified by the overall ratios of 1.67, 2.20 and 1.86 for List Nos. 69, 71 and 72, respectively. One notes at this stage that Neoplasms of the Female Genital Organs were also higher for Yellowknife than in the rest of the Northwest Territories.

Class XI, Deliveries and Complications of Pregnancy, Childbirth and Puerperium are only of interest in that one notes that Canadian List No. 75, Delivery Without Complications, has a separation rate of 8.50.

For Classes XIII, XIV, XV and XVI, there does not appear to be any clearcut or pronounced difference between the hospitalization



rates prevalent in Yellowknife as compared to those prevailing in the remainder of the Northwest Territories.

Accidents, Poisonings and Violence, Class XVII, has overall separation ratios of unity. One notes that there is an excess of separations among males for Canadian List Nos. 86, 87, 88 and for List Nos. 86 and 87 for females. There were, among males and females in Yellowknife, 19 separations for Fractures involving the Skull, Face, Bones, Head Injuries.

#### 4.3 Summary of Findings

The most notable findings are:

- (a) the higher separation rates for mental psychoneurotic and personality disorders in Yellowknife with particular reference to psychoneurotic disorders;
- (b) the increased rates for respiratory infections (excluding pneumonias) with particular reference to upper respiratory conditions among males in Yellowknife;
- (c) ethnic origin was a significant factor in explaining the lower separation rates for infective and parasitic diseases and possibly influenced also in a similar manner the lower rates reported for Diseases of the Skin and Cellular Tissues. The latter condition, however, does not often require hospitalization;
- (d) other findings of interest include the increased rates for leukemia, neoplasms of the lymphatic system, allergic manifestations, diabetes, ulceration of stomach and duodenum, arterio sclerotic degenerative heart disease but these rates were based on small numbers and require further investigation.

#### V. OUT-PATIENT VISITS

Data on out-patient services for 1967 are detailed in Table A5.1 and summarized in Table 7. They are based upon the same populations as were the hospital statistics.

##### 5.1 Main Findings

It may be seen from Tables 7 and A5.1 that the overall visit rates are approximately 2.5 times as high for Yellowknife as for the remainder of the Territories. It should be noted, however, that the



TABLE 7

OUT-PATIENT VISITS, PERCENTAGE VISITS, AND RATE OF VISITS PER 100,000 POPULATION BY PRINCIPAL DIAGNOSIS  
FROM THE YELLOWKNIFE HEALTH DISTRICT AND THE N.W.T. LESS YELLOWKNIFE, 1967

Class Description	YELLOWKNIFE						N.W.T. LESS YELLOWKNIFE						RATIO VISIT RATE YK LESS N.W.T.	
	Male			Female			Male			Female			Male	Female
	Visit	%	Rate	Visit	%	Rate	Visit	%	Rate	Visit	%	Rate		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
I. Infective & parasitic diseases	6	1.2	288	7	1.6	402	15	1.1	109	25	1.9	218	2.6	1.8
II. Neoplasms	10	2.0	480	11	2.5	633	13	1.0	95	23	1.8	201	5.1	3.1
III. Allergic, endocrine system, metabolic and nutritional diseases	18	3.6	865	37	8.5	2128	24	1.7	175	61	4.7	532	3.6	4.0
IV. Disease of the blood and blood-forming organs	3	0.6	144	8	1.8	460	1	0.1	7	4	0.3	35	19.7	13.2
V. Mental, psycho-neurotic and personality disorders	1	0.2	48	3	0.7	172	0	0.0	0	0	0.0	0	---	---
VI. Diseases of the nervous system and sense organs	3	0.6	144	5	1.1	287	40	2.9	292	36	2.8	314	0.5	0.9
VII. Diseases of the circulatory system	18	3.6	865	11	2.5	632	19	1.4	138	38	2.9	332	6.2	1.9
VIII. Diseases of the respiratory system	27	5.4	1297	28	6.4	1610	90	6.6	656	95	7.3	829	2.0	1.9
IX. Diseases of the digestive system	26	5.2	1250	30	6.9	1725	39	2.9	284	52	4.0	454	4.4	3.8
X. Disorders of genital urinary system	16	3.2	769	35	8.0	2013	47	3.5	343	205	15.8	1789	2.2	1.1
XI. Deliveries & complications of pregnancy, childbirth & puerperium	0	0.0	0	11	2.5	632	0	0.0	0	18	1.4	157	---	4.0
XII. Diseases of skin & cellular tissues	18	3.6	865	13	3.0	747	49	3.6	357	40	3.1	349	2.4	2.1
XIII. Diseases of bones & organs of movement	28	5.6	1345	24	5.5	1380	27	2.0	197	43	3.3	375	6.8	3.7
XIV. Congenital malformations	1	0.2	48	2	0.5	115	1	0.1	7	4	0.3	35	6.6	3.3
XV. Certain diseases of early infancy	0	0.0	0	0	0.0	0	1	0.1	7	1	0.1	9	---	---
XVI. Senility & ill-defined conditions	64	12.8	3075	65	14.9	3738	96	7.1	700	119	9.2	1038	4.4	3.6
XVII. Accidents, poisonings, violence (nature of injury)	252	51.2	12110	117	26.9	6728	850	62.7	6196	472	36.3	4118	1.9	1.6
Y Supplementary classification for special admissions, live births and still-borns	11	2.2	529	28	6.4	1610	43	3.2	313	63	4.8	550	1.7	2.9
TOTAL ALL DIAGNOSES	502	100.	24123	435	100.	25359	1355	100.	9877	1299	100.	11334	2.4	2.2



medical district of Yellowknife is composed of persons living within approximately a 15-mile radius of the town of Yellowknife giving the population a greater accessibility to out-patient services. It is quite probable also that there are services which can be provided in Yellowknife due to greater availability of equipment and staff than it is possible to provide at other out-patient treatment centres. Whether these reasons alone are sufficient to account for a usage of out-patient services more than twice as frequently as in the remainder of the Northwest Territories is a matter for conjecture.

Considering the disease classes by numbers of visits, one sees that Class XVII, Accidents, Poisonings and Violence, accounts for the largest percentage of visits for both sexes in both populations. The overall ratio of the visit rates is 1.9 for males and 1.6 for females and while this class forms 51% and 26% of the male and female visits respectively in Yellowknife, it forms 63% and 36% of the visits in the Northwest Territories less Yellowknife. This higher percentage in the Northwest Territories less Yellowknife coupled with the elevated visit ratios, indicate that this is, in all probability, a significant difference. Within this class, most visits are for Canadian List No. 94, Other Unspecified Effects of Accidents, Poisonings and Violence, followed by Fracture of Upper Limb, Canadian List No. 88. Both causes have visit ratios considerably above unity and both could be considered to be substantially higher in Yellowknife than in the rest of the Territories.

The second disease class treated most frequently on an out-patient basis in Yellowknife is Class XVI, Senility and Ill-defined Conditions, which appears to involve higher visit rates in Yellowknife for both males and females. Class XIII, Diseases of Bones and Organs of Movement, accounts for something in excess of 5% of the visits in Yellowknife and 2% or 3% of the visits outside Yellowknife. Within this group, the visit ratios are higher for Canadian List No. 80, Arthritis and Rheumatism Except Rheumatic Fever, and for Other Diseases of Bones and Organs of Movement, List No. 82.

Having considered the three classes having the highest ranking in respect of frequency of visits, perhaps the remainder of the out-patient data should be considered in conjunction with the hospital mortality data.



Class I, Infective and Parasitic Diseases, was discussed previously.

Class II, Neoplasms, contains nothing which would indicate abnormality on the basis of out-patient visits with the possible exception of List No. 17, Leukemia and Aleukemia.

Leukemia is a rare disease having, in Canada, in 1966 (34) a separation rate from Canadian hospitals of 27.6 and 18.3 separations per 100,000 population for males and females respectively. This is in contrast to the hospital separation rate of 144.2 and 115.0 per 100,000 males and females which were found in Yellowknife. There were three out-patient visits for leukemia and aleukemia in Yellowknife in contrast to no visits in the remainder of the Northwest Territories. The male visit was attributable to a person aged 10 to 14 who could possibly have also accounted for one or both of the separations attributable to males aged 10 in the hospital morbidity statistics. However, the two female visits were for a person (or persons) aged 40 to 44 and, therefore, could not possibly be the same person(s) who separated from hospital as the separations were attributable to a person aged 4 years. There were, therefore, in Yellowknife in 1967, at least one male and at least two females being treated for leukemia or aleukemia.

Classes III and IV and VII have overall visit ratios which are considerably higher than unity indicating a higher visit rate in Yellowknife than in the remainder of the Territories. However, in all cases, the numbers of visits involved are small and constitute a small percentage of all visits such that one may not derive any meaningful conclusions from this data.

Class V, Mental, Psychoneurotic and Personality Disorders, contains less than 1 per cent of all visits, the conditions described in this class being almost invariably treated on an in-patient basis.

Diseases of the Respiratory System, Class VIII, have visit ratios of 2.0 and 1.9 for males and females respectively. All conditions as described by the List No. 46-51 have ratios greater than unity with the exceptions of List No. 46, Acute Upper Respiratory Infections, and List No. 50, Hypertrophy of Tonsils and Adenoids. Regarding Diseases of the Respiratory System, it appears quite possible that the high visit rate in Yellowknife could be attributable to the proximity of the population to the out-patient services available.



Diseases of the Digestive System, Class IX have, consistently, where there is at least one visit in Yellowknife, higher rates of visits for all of the component diseases or disease conditions described within that class. However, no specific disease as described by the Canadian List would appear to have involved sufficient visits from the population at risk to be considered as a disease particular in Yellowknife.

Diseases described by Classes IX, X and XI were responsible for such small numbers of visits as not to warrant detailed consideration.

Disease Class XII, Diseases of the Skin and Cellular Tissues, required double the rates of visits in Yellowknife as in the remainder of the Northwest Territories.

## 5.2 Discussion and Summary

To a certain extent, the hospital in-patient and out-patient data may be expected to complement each other. For example, for equivalent conditions, depending upon the physical proximity of hospital facilities, persons from remote areas may tend to be hospitalized for certain conditions whereas persons living close to a hospital may tend to be treated on an out-patient basis. Perhaps this phenomenon is illustrated by the fact that the ratio for out-patient visits for Infective and Parasitic Diseases is double for Yellowknife with respect to the Northwest Territories for out-patient visits, whereas for hospital separations, it is only one-half.

While deaths and data on hospital in-patient separations may be expected to document almost completely the more serious disease patterns in a community, data on out-patient services, while not necessarily restricted to the less serious complaints, could possibly provide a better index of those conditions which may be attributable to long-term chronic or marginal insults to the human body.

Whereas, a death involves one person only, a separation from hospital, even in one year, cannot necessarily be attributed to a single person. This factor becomes more significant in the case of out-patient services where one person may be responsible for many visits. In assessing the data, there appears to be a need for a weighting factor based not only on the ratios of the visit rates in Yellowknife as compared to the Northwest Territories less Yellowknife, but also on



a consideration of the number of out-patient visits made during the year and the nature of the disease or condition. As with hospital separations, the differences in population age distributions, etc., between Yellowknife and the Northwest Territories should also be kept in mind.

With these qualifications, the following conditions should be noted:

- (a) the relatively large numbers of visits for the classes Accidents, Poisonings and Violence, Diseases of Bones and Joints, Diseases of the Respiratory System, Diseases of the Digestive System and, to a lesser extent, Diseases of the Skin and Cellular Tissues;
- (b) Other conditions of note are Neoplasms, Allergic and Metabolic Diseases including Diseases of the Thyroid and Diabetes Mellitis, Arterio Sclerotic Heart Disease, Ulcer and Leukemia, leukemia being a rare disease.

#### VI. UNATTENDED ILLNESSES:

##### 6.1 Reported Sickness: House-to-House Survey

Of the 3,741 inhabitants of Yellowknife in 1966, 2,664 or some 71% of the population participated in the house-to-house survey. The participating population is described by age, sex, and years of residence in Table A6.1.

Reported sicknesses are presented by disease class, age and sex in Table 8 and as rates for the population at risk in Table 9. As may be seen from these tables, the most common disease conditions found were Diseases of the Respiratory System followed by Symptoms, Senility and Ill-defined Conditions. The relative frequency of these two disease classes is as may have been expected. Also from Table 9, it is noted that the disease class, Allergic, Endocrine System, Metabolic and Nutritional Disease, contains a higher frequency of reported sicknesses among males than among females and that reported Mental Psychoneurotic and Personality Disorders occurred primarily among the female population. There are, unfortunately, no control data available with which to compare the Yellowknife information, but a beginning was made with an investigation into effect of socio-economic conditions on the conditions reported.



TABLE 8

YELLOWKNIFE REPORTED ILLNESSES, BY SEX,  
DIAGNOSTIC GROUPING AND AGE GROUP

	ISC Code 1957	Sex	AGE GROUP							Unsp	Total
			0- 14	15- 24	25- 34	35- 44	45- 54	55- 64	65+		
Allergic, Endo- crine System, Metabolic & Nutritional Diseases	240- 289	M F	2 2	1 1	- 1	3 -	3 -	2 -	1 -	- -	12 4
Mental, Psycho- neurotic Dis- orders	300- 326	M F	3 5	- 2	- 4	2 7	- 4	- -	- -	- -	5 22
Diseases of the Nervous System & Sense Organs	330- 398	M F	11 4	2 -	2 2	4 2	5 3	1 1	- -	- -	25 12
Diseases of the Circulatory System	400- 468	M F	2 1	- -	- 3	- -	2 3	7 3	1 -	- -	12 10
Diseases of the Respiratory System	470- 527	M F	81 60	12 15	17 25	17 17	6 7	8 8	4 1	1 -	146 133
Diseases of the Digestive System	530- 587	M F	7 13	- 1	4 7	6 3	8 -	5 1	1 -	- -	31 25
Diseases of the Skin & Cellular Tissues	690- 716	M F	7 3	1 -	1 2	- 1	1 -	1 -	1 -	- -	12 6
Diseases of the Bones and Organs of Movement	720- 749	M F	- 1	- -	1 2	- 2	3 2	3 3	1 -	- -	8 10
Symptoms Refer- able to Limbs and Back	less 787	M F	- -	- 1	3 -	11 8	3 6	3 2	2 2	- -	22 19
Symptoms, Seni- lity & Ill- defined Con- ditions	780- 795	M F	9 18	7 6	4 6	8 9	3 7	5 -	- -	- 1	36 47
Accidents, Poi- sonings and Violence	800- 999	M F	- 2	1 -	2 -	2 -	2 1	1 1	1 -	- -	9 4
Other		M F	2 -	1 3	4 5	3 9	2 6	4 -	1 -	- -	17 23
Total		M F	124 109	25 29	38 57	56 58	38 39	40 19	13 3	1 1	335 315
Population at Risk		M F	586 501	176 192	196 213	214 163	122 108	97 41	34 13	3 5	1,428 1,236



TABLE 9

## YELLOWKNIFE REPORTED SICKNESSES, PER 1,000

## POPULATION AT RISK, BY SEX, DIAGNOSTIC

## GROUPING AND AGE GROUP

	ISC Code 1957	Sex	0- 14	15- 24	25- 34	AGE GROUP		55- 64	65+	Total
						35- 44	45- 54			
Allergic, Endo- crine System, Metabolic & Nutritional Diseases	240- 289	M F	3 4	6 5	- 5	14 -	25 -	21 -	29 -	8 3
Mental, Psycho- neurotic Dis- orders	300- 326	M F	5 10	- 10	- 19	9 43	- 37	- -	- -	3 18
Diseases of the Nervous System & Sense Organs	330- 398	M F	19 8	11 -	10 9	19 12	41 28	10 24	- -	17 10
Diseases of the Circulatory System	400- 468	M F	3 2	- -	- 14	- -	16 28	72 73	29 -	8 8
Diseases of the Respiratory System	470- 527	M F	138 120	68 78	87 117	79 104	49 65	82 195	118 77	102 107
Diseases of the Digestive System	530- 587	M F	12 26	- 5	20 33	28 18	65 -	51 24	29 -	22 20
Diseases of the Skin & Cellular Tissues	690- 716	M F	12 6	6 -	5 9	- 6	8 -	10 -	29 -	8 5
Diseases of the Bones and Organs of Movement	720- 749	M F	- 2	- -	5 9	- 12	25 19	31 73	29 -	6 8
Symptoms Refer- able to Limbs and Back	less 787	M F	- -	- 5	15 -	51 49	25 55	31 49	59 154	15 15
Symptoms, Seni- lity & Ill- defined Con- ditions	780- 795	M F	15 36	40 31	20 28	37 55	25 65	51 -	- -	25 38
Accidents, Poi- sonings and Violence	800- 999	M F	- 4	6 -	10 -	9 -	16 9	10 24	29 -	6 3
Other		M F	3 -	6 16	20 23	14 55	16 55	41 -	29 -	12 19
Total		M F	211 217	142 151	194 267	262 356	311 361	412 463	382 231	235 255

\* Detail may not add to total because of rounding.



In Tables A6.2 and A6.3, the data on reported sicknesses has been re-arranged and classified by the drinking water supply used and the sanitary facilities available. From this data, it is apparent that persons who used the town water supply have a lower reported rate of sickness than persons who have their water supply from a private well. Similarly, there is a higher sickness rate among persons using outdoor privies as opposed to flush toilets. These increases in the relative sickness rates are, in all probability, due to socio-economic factors, although transmission of disease through water-borne microbiological agents cannot be excluded.

#### VII. HEALTH QUESTIONNAIRE DATA:

As part of the community survey in Yellowknife, individuals were requested to complete a health questionnaire of the Cornell Medical Index type. These completed questionnaires were examined for answers, or preliminary combinations of answers indicating some 46 medical conditions. Prevalence rates for these conditions were calculated by standardizing the occurrences to a population of 1,000 distributed by age and sex as was the population of Canada in 1966.

Many of the conditions were found very infrequently and are not, therefore, reported here. Table 10 contains ten of those conditions which were reported relatively frequently or considered to be of interest. While there is no adequate control data against which the frequency of conditions as reported in Yellowknife may be compared, an almost identical field survey was carried out in the Newfoundland communities of Grand Bank, Burin, and St. Lawrence. The rates prevailing in those three communities have, therefore, been entered in Table 10 to give some basis of comparison. In this respect, however, it should be noted that Hypertension and Peptic Ulceration are known to be relatively high in the three Newfoundland communities.

Of particular note is the occurrence of non-specific respiratory disease as indicated by prevalence rates of 7.7 and 10.6\* per 1,000 in Yellowknife for Chronic Bronchitis and Obstructive Lung

\* Recorded symptoms and pulmonary function data (FEV 1.0) were used in the latter diagnostic category.



TABLE 10

CONDITIONS ACCORDING TO REPORTED SYMPTOMS WITH RATES PER 1,000  
IN YELLOWKNIFE AND THREE NEWFOUNDLAND COMMUNITIES

Condition	No. Cases Yellowknife	Rate Per 1,000 Yellowknife	Nfld
Chronic Bronchitis (Persons)	17	7.7	0.8
Obstructive Lung Disease	21	10.6	3.8
Hypertension	137	101.8	153.5
Peptic Ulceration	184	106.7	128.5
Diabetes	15	7.8	16.4
Allergies	242	137.5	115.9
Skin Disease	20	9.4	3.3
Use of Tranquilizers	55	24.5	7.1
Loss of Hearing	18	9.4	2.0
Defective Vision	66	35.9	20.1



Disease, respectively. The prevalence of 0.8 per 1,000 for Newfoundland is about the same as that reported for Persistent Cough and Phlegm in the Tecumseh study(24).

Other notable conditions include histories of Skin Disease, Allergies and Stress as indicated by the use of tranquilizers. In the latter case, however, it was not possible to discern differences in medical practice, if any, in the communities studied.

## VIII. FINDINGS OF CLINICAL STUDY

### 8.1 The Participants in the Clinical Study

Three hundred and sixty-nine male residents of Yellowknife were given a complete clinical examination. This group was comprised of:

- (a) individuals selected on the basis of a preliminary screening of completed health questionnaires; (Table A8.6)
- (b) individuals with periods of residence in Yellowknife in excess of ten years;
- (c) a number of other individuals with between five and ten years residence in Yellowknife;
- (d) individuals who were occupationally exposed to high levels of arsenic or who had had such exposure in the past.

### 8.2 Characteristics of Examined Population

The numbers of individuals examined are shown according to age group in Table A8.2; and by periods of residence in Yellowknife in Table A8.3. The current occupational status of the examined population is given in Table A8.4; their smoking history status is given in Table A8.5. An examination of their ethnic origin revealed:

Canadian and U.S. born	199
Foreign born (more than 20 countries)	134
Canadian Indian	29
Eskimo	6
Not stated	1

### 8.3 Main Clinical Findings

The main clinical findings are summarized in Tables 11 and 12.

8.3.1 Table 11 reflects information obtained by interview and questionnaire. In some cases, symptoms were grouped to form diagnostic



categories. In the case of chronic bronchitis, the M.R.C. questionnaire was used and three diagnostic groupings (Higgins, Dean and Fletcher) are reported. The W.H.O. questionnaire was used in the diagnostic grouping referred to as 'angina'. For other diagnoses, the Cornell Medical Index questions were used.

The prevalence of chronic bronchitis in Yellowknife as defined above appears to be much higher than in other populations studied(38). It is higher also than the prevalence of persistent cough and phlegm in the Tecumseh study(24) in which only 8.4% of men were found to have chronic bronchitis compared with 37% of the men examined in the Yellowknife study. The differences reported here will be investigated further, when information pertaining to other communities in Canada becomes available for study. The differences in prevalence between the chronic bronchitis categories referred to in Table 11 reflect the increasing strictness of diagnostic criteria and, at the same time, the type or increasing degrees of severity of non-specific chronic respiratory disease among the individuals examined. Correlations of symptoms with physical findings and pulmonary function tests have not yet been made but a preliminary examination of the latter showed that good correlations existed between the presence of symptoms and abnormal findings.

The number of cases giving a history of skin disease is particularly notable. So, too, the number of cases with a history of 'angina' and a group of conditions which, as part of their etiology, includes significant psychosomatic components. Of special interest in this regard are the numbers of individuals with a history of thyroid dysfunction, migraine, history of hypertension and peptic ulceration and/or dyspepsia. The number of thyroid dysfunctions and cases with history of peptic ulceration and/or dyspepsia are higher than normally found on initial periodic medical examinations.

The prevalence of asthma, epilepsy and rheumatism do not appear to be excessive when compared with information pertaining to other populations. The prevalence of rheumatism, for example, has been given as between 10 and 20%(33). It should be noted also that the condition 'Peptic Ulcer and/or Dyspepsia' as referred to in this report, is comprised of a very broad grouping of symptoms including a history of either gastric or duodenal ulceration and that the large proportion of individuals



TABLE 11

## INDIVIDUALS WITH HISTORY OF SELECTED CONDITIONS BY AGE GROUP

(Information Obtained by Interview)

	Conditions by Age Group														All Ages	
	10-19		20-29		30-39		40-49		50-59		60-69		70+			
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Simple chronic bronchitis (Fletcher)	1	11.1	10	22.7	50	48.1	47	47.0	46	68.7	30	73.2	5	71.4	189	51.4
Chronic bronchitis: persistent cough and phlegm (Higgins)			7	15.9	31	29.8	36	37.5	35	52.2	23	56.1	5	71.4	137	37.2
Persistent cough and phlegm and chest illness (Higgins and Dean)					7	6.7	5	5.2	7	10.4	3	7.3	1	14.3	23	6.3
Asthma	2	22.2					3	3.1	2	3.0	4	9.8	1	14.3	12	3.3
Angina					1	1.0	1	1.0	6	9.0	4	9.8	1	14.3	13	3.5
Mention of hypertension	1	11.1	10	22.7	26	25.0	18	18.8	22	32.8	14	34.1	2	28.6	93	25.3
Peptic ulcer and/or Dyspepsia			4	9.1	25	24.0	26	27.1	23	34.3	10	24.4	2	28.6	90	24.5
Mention of thyroid condition	2	22.2	2	4.5	2	1.9	5	5.2	1	1.5	1	2.4			13	3.5
Epilepsy			1	2.3	2	1.9	1	1.0							4	1.1
Rheumatism					6	5.8	13	13.5	14	20.9	9	22.0	4	57.1	46	12.5
Allergies	3	33.3	7	15.9	17	16.3	19	19.8	14	20.9	8	19.5	1	14.3	69	18.8
History of skin complaints	4	55.6	19	43.2	53	51.9	38	40.6	42	62.7	21	51.2	5	71.4	182	49.3
History of cancer					1	1.0	2	2.0	2	3.0	3	7.3			8	2.2
History of migraine					10		4		1		1				16	



with this finding cannot be regarded as too significant without a further classification of symptoms and findings into more specific categories.

8.3.2 The most important clinical findings obtained by organ system examination are summarized in Table 12.

A comparatively large number of skin lesions were found on examination. These were notable for the number of cases of psoriasis (13), scaly dermatitic changes (12), exzematous dermatitis (8) and a number of rashes around the naso-labial folds, thought to be due to contact with arsenic in the mill environment. One basal cell carcinoma was reported.

A large number of neurological findings were reported in the survey. These include all observations such as demonstrable loss of sensation, weakness, etc., excluding only cases of simple 'Tremor' when unaccompanied by other findings. An increasing incidence of neurological findings with increasing age is well demonstrated. The exact significance of these findings is uncertain. Survey reports do not usually present findings in such detail. Data are, therefore, not available to allow comparisons to be made in this case. The number of neurological findings does, however, appear to be excessive.

The electrocardiographic findings are particularly notable. Electrocardiographic findings were classified according to the W.H.O. instructions (22). All abnormalities as well as other findings not considered definitely abnormal such as non-specific ST changes, have been included in the total of 173 cases with "notable ECG findings". "Abnormalities" referred to in the tables include all cases diagnosed by the particular examiner as definitely abnormal, regardless of whether the nature of the abnormal change was mild, early or severe. These abnormal electrocardiographic changes included 27 cases of right bundle branch block and 4 cases of left bundle branch block, or a total of 31 cases with ventricular conduction defects. The prevalence of these electrocardiographic findings is almost certainly in excess of those reported for other groups of males. In a study of 672 postal workers, for example (34), codable electrocardiographic changes were found in 157 or 24% of cases as opposed to 47% in the present study. In other studies (35, 36), the prevalence of notable ECG changes varied between 4 and 32% according to the standards used by the individual investigators and the particular populations involved.



TABLE 12

## INDIVIDUALS WITH SELECTED CONDITIONS BY AGE GROUP

(Information Obtained by Clinical Examination)

	Conditions by Age Group														All Ages	
	10-19		20-29		30-39		40-49		50-59		60-69		70+			
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Skin Lesions	2	20.0	6	13.6	36	34.6	20	20.8	28	41.8	10	24.4	-		102	27.6
Neurological Findings	-	-	4	9.1	9	8.7	15	15.6	24	35.8	22	53.7	5	71.4	79	21.4
Notable ECG Findings	3	30.0	10	22.7	35	33.7	42	43.8	42	62.7	35	85.4	6	85.7	173	46.9
Abnormal ECG Findings	2	20.0	4	9.1	12	11.5	21	21.9	19	28.4	17	41.5	5	71.4	80	21.7
Right Bundle Branch Block	2	20.0	1	2.3	6	5.8	7	7.3	6	9.0	3	7.3	2	28.6	27	7.3
Hypertension	-		1	2.3	8	7.7	10	10.4	10	14.9	6	14.6	1	14.3	36	9.8
Probable Hypertension (plus borderline cases)	-		1	2.3	13	12.5	14	14.6	13	19.4	8	19.5	2	28.6	51	13.8
Diabetes	-		1	2.3	1	1.0	4	4.2	1	1.5	-	-	-	-	7	1.9
1 hour blood sugar > 160 mg %	-		2	4.5	8	7.7	12	12.5	4	6.0	5	12.2	2	28.6	33	8.9
Cholesterol > 280 mg %	-		1	2.3	11	10.6	14	14.6	9	13.4	6	14.6	2	28.6	43	11.7
Suggestive evidence of thyroid dysfunction	2	20.0	1	2.3	3	2.9	6	6.3	1	1.5	1	2.4			14	3.8



Hypertension found at examination was defined as 160 mm Hg or over for the systolic reading or 95 mm Hg or over for the diastolic<sup>(23)</sup>. Hypertension was present in 36 cases. Borderline hypertension cases were defined as having systolic pressures below 160 mm Hg and diastolic pressure below 95 mm Hg but not simultaneously below both 140 systolic and 90 diastolic. Fifteen borderline cases were observed. The incidence of hypertension is below that reported for U. S. males<sup>(29)</sup>.

The frequently accepted criterion of 160 mg glucose/100 ml of blood, obtained under one-hour glucose tolerance test conditions was exceeded in 33 cases. However, the fact that carbohydrate tolerance diminishes progressively with age has now been well established<sup>(27)</sup>. Under these circumstances, the interpretation of what constitutes a diabetic blood sugar level must be somewhat arbitrary without long-term follow-up. Using the criterion described above, the blood glucose values could not, therefore, be interpreted realistically in terms of possible diabetic disease. An attempt was made to assess the possible diabetic status of the Yellowknife group by using as a criterion, an interpretation of the relationship between glucose levels and age suggested by the data of the Tecumseh study. The line representing a possible diabetic status was placed by the investigators at 2 SD above the regression line obtained in that study. Using this criterion, 7 cases of possible diabetes were found representing a total prevalence of 19 per thousand -- slightly in excess of previously reported rates of 14 per thousand or less for Canada, the U. S. and elsewhere<sup>(28)</sup>.

Blood cholesterol in excess of 280 mg % was found in 43 cases or 11.7%. In the U. S. health survey, 17.6% of men had serum cholesterol values of 260 mg/100 ml or more and 9.4% of men had values of 280 mg/100 ml or more, the standard used for the present study. There appears to be a slight increase in the number of individuals with increased blood cholesterol values. Since it was not possible to control for inter-laboratory and method differences, the increased prevalence of high blood cholesterol may not be significant.

Possible thyroid dysfunction was documented by the examining physicians in 14 cases. These included three cases of known dysfunction, two with thyroid enlargement, six with apparent exophthalmos and three cases of tremor with tachycardia. Confirming laboratory evidence was



not available but the number must be considered significant for a male population of this size, despite the fact that a similar proportion of cases have been reported in the Tecumseh, Michigan, Study. Thyroid dysfunction is, however, prevalent in the Michigan survey area, while lower incidences have been reported in other studies<sup>(38)</sup>. It is, perhaps, of interest that most cases were in the age group 30 to 39 years, with 12 of the 14 having periods of residence in Yellowknife of more than ten years. Six of the cases were in the high exposure group with an average residence period of 5.9 years and a range of 0.66 to 18 years.

In the age group 30 to 39, a preponderance of diagnosed cases of migraine based upon a history of severe headache accompanied by visual disturbances, was noted. Further, at least three individuals had sought psychiatric aid, two others appeared to suffer from endogenous depressions; while one individual had attempted suicide, others suffered from noticeable nervousness or hypochondriasis.

The radiological findings reviewed in Table 13 reveal four cases of arrested tuberculosis, two dissecting aneurysms, four diaphragmatic hernias, and one case of silicosis. To some extent, these findings are unusual but they cannot be correlated with arsenic contamination or factors associated with the northern environment. The number of cases of non-specific fibroses, ill-defined pulmonary shadows, and the large number of persons displaying pleural thickening, would appear to attest to the vulnerability of the pulmonary system to a diversity of environmental factors presumed operative in the Yellowknife area.

#### 8.3.3 Summary

The clinical findings are notable, particularly because of

- (a) the high prevalence of:
  - skin lesions
  - chronic non-specific respiratory disease
  - neurological findings, and
  - codable electrocardiographic changes
- (b) there appears to be a marginally excessive prevalence of a group of conditions which have in common, typically, a multiple factor etiology including a variety of non-specific stress factors, e.g. psychological stress and



TABLE 13

## INDIVIDUALS WITH SELECTED CONDITIONS BY AGE GROUP

(Information Obtained by Radiological Examination)

(Information obtained by \_\_\_\_\_)

Condition	Conditions by Age Group														All Ages	
	10-19		20-29		30-39		40-49		50-59		60-69		70+			
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Increased arborization bronchial markings	-	-	1	2.3	7	6.8	12	12.6	14	21.2	7	17.1	-	-	41	11.2
Silicosis	-	-	-	-	-	-	-	-	1	1.5	-	-	-	-	1	.3
Arrested tuberculous disease	-		1	2.3	-	-	-	-	1	1.5	1	2.4	1	14.3	4	1.1
Ill-defined shadows uncertain etiology	-		1	2.3	2	1.9	2	2.1	2	3.0	1	2.4	1	14.3	9	2.5
Pleural thickening	1	11.1	5	11.4	8	7.8	10	10.5	16	24.2	8	19.5	2	28.6	50	13.7
Enlarged heart	-		2	4.5	3	2.9	5	5.3	3	4.5	5	12.2	3	42.9	21	5.8
Widening aorta	-		-	-	1	1.0	1	1.1	5	7.6	7	17.1	4	57.1	18	4.9
Aortic aneurism	-		1	2.3	6	5.8	6	6.3	10	15.2	9	22.0	2	28.6	34	9.3
Diaphragmatic hernia	-		1	2.3	1	1.0					2	4.8			4	1.1
Non-specific fibroses							1	1.1			2	4.8	1	14.3	4	1.1



stress induced by, for example, cold climate. These conditions include thyroid dysfunction, peptic ulceration and dyspepsia, migraine and evidence of mental and psycho-neurotic disturbances.

It should be noted, however, that the population under study is a specially selected group of individuals and that this may account for the magnitude of some of the differences reported. It would be necessary to examine the clinical findings in further detail to determine the significance of the factors used as criteria in the selection of the study population.

#### 8.4 Clinical Findings Among a Group of 'Responders'

Because of the sampling technique employed, the group of questionnaire responders may not be considered to be representative of any particular portion of the Yellowknife population. Systematic examination of the distribution of main diagnostic categories was, therefore, not undertaken. Instead, a search was made for clear-cut evidence of arsenic intoxication and for leads to other factors of possible etiological significance.

Examination of the available medical data did not reveal any unequivocal evidence of arsenic intoxication, although there were a number of arsenic-attributable skin rashes and evidence of arsenic absorption as indicated by urinary arsenic excretion values.

With regard to other possible factors of importance, it was evident that 82 (68%) of the 121 responders (Table A8.6) had lived in Yellowknife for periods of ten years or more. This subgroup comprised 34% of the total in the ten-year or more residence group clinically examined; while 21% of the mill workers or 'high' exposure group examined in the study represented 23% of the high exposure group, individuals with more than ten years residence in the community. If either of these two factors were to be implicated in the complaints reported on the health questionnaire, length of residence would seem to be the more important.

#### 8.5 Significance of Periods of Residence

In assessing the possible effects of periods of residence, the examined population was divided into three subgroups, namely, those with less than ten years residence, those with ten to fourteen years residence and the remainder with fifteen or more years of residence in Yellowknife.



The persons examined with more than ten years' residence are considered to be representative of the male inhabitants in this category in Yellowknife because of the sampling procedures adopted in their selection. The group with less than ten years' residence, however, cannot be considered representative of the male population in that class as they were selected mainly on the basis of having a complaint or symptom. The fact that more conditions could be expected to be encountered in this group than among the rest of the male population with less than ten years' residence is, therefore, possible. The group was retained, however, for purposes of comparisons.

The prevalence of selected conditions by length of residence in Yellowknife and by age group is summarized in Table A8.7. Derived rates for selected conditions are summarized in Table A8.8.

Examination of the data suggests that there is a slight but consistent increase in the prevalence of chronic respiratory disease with increasing duration of residence in Yellowknife in the age groups 40 and over. A similar suggestion for a 'History of Skin Lesions' is less clear but more marked in the case of 'Abnormal Neurological Findings'. To explore the above possible relationships further, it would be necessary to examine the possible influence of occupation in the mill (high arsenic exposure).

#### 8.6 Findings Among Mill Workers (Individuals in the 'High' Exposure Group)

The distribution of the 'high' exposure individuals by age group and by duration of exposure and periods of residence, respectively, is given in Table A8.9. The distribution of diagnosable conditions is summarized by age group in Table A8.10 according to duration of exposure; prevalence rates by age group and duration of exposure is given in Table A8.11; diagnosable conditions are summarized by age group according to periods of residence in Table A8.12; prevalence rates by residence are given in Table A8.13.

The same general trends observed above with respect to periods of residence are again demonstrable. Notable is the strong relationship between a history of skin complaints and duration of mill exposure as well as the lesser relationship between chronic respiratory disease in the latter case. Slight correlations between prevalence



of respiratory disease and neurological findings are also suggested.

The above data suggest that occupation is more directly responsible for an augmentation in the incidence of skin lesions and that these lesions may, therefore, be considered to be associated with exposure to elemental arsenic. More general or non-specific factors appear to be involved in the respiratory, neurological and electrocardiographic changes observed.

#### 8.7 Relative Importance of Residence and High Exposure

The relative importance of residence and high exposure effects was examined by controlling for residence. Comparisons were made between the 22 high exposure individuals in the less than ten year residence group, the 76 'others' in the same residence group, the 48 individuals in the high exposure group and the 223 individuals in the long residence group of ten years or more. The population data are given in Table A8.14 and the main observations have been summarized in Figure 1. Distinct differences appear between mill workers and other residents for the conditions 'History of Skin Lesions' and 'Skin Lesions Found on Examination'. Smaller differences are found in the incidence of neurological findings. Only in the 10 to 14 year residence group are differences found in the incidence of simple chronic bronchitis.

Tests of statistical significance were applied to the data pertaining only to the residence periods 10 to 14 years, 15 years or more or totals of the latter two periods.

Significant excesses ( $p = 0.05$ ) were observed for a 'History of Skin Lesions' in the 10 to 14 years residence period among mill workers. Values were borderline for the 15 or more years residence period but were highly significant in the whole group comprising those with 10 to 14 and 15 or more years residence. In the case of 'Skin Lesions Found Upon Examination', similar statistical differences were found in the 10 to 14 years residence group and were borderline ( $\chi^2 = 3.5$ ) in the whole group with 10 or more years residence.

Although standardized for age, it was necessary to investigate the statistical significance of the observed incidence by age group. The data were, therefore, rearranged into the broad age groups 20-39,



40-59 and 60 years or more. Statistically significant excesses for skin lesions among mill workers were found in the age group 20-39 years with borderline values in the age group 40-59 years.

#### 8.8 Levels of Arsenic in Urine

Samples of urine were taken from mill workers and non-mill workers and tested for arsenic content, mill workers being assumed to have a higher level of arsenic exposure than non-mill workers.

The results of the analyses are given in Table 14. From this table, it may be seen that the distribution of arsenic contents of the samples is not symmetrical. From this data, it is immediately apparent that there is a substantial difference in the arsenic levels. The mean for mill workers is 0.0203 ppm as compared to 0.0110 for non-mill workers. Consistently, for each arsenic level, there is a higher percentage of non-mill workers than mill workers below each specified level of arsenic. For example, 57.1% of non-mill workers had an arsenic level less than 0.008 ppm in contrast to 26.4% of the mill workers.

It should be noted that although demonstrable differences are present here -- indicative of increased absorption and excretion of arsenic -- the values obtained are low and quite compatible with values in the suggested normal range of 0.003 to 0.150 mg/litre.

### IX. DISCUSSION AND SUMMARY

A summary of the principal findings resulting from this investigation is presented in Table 15. The outstanding findings are; excesses of deaths and out-patient visits due to accidents, poisonings and violence; excesses of deaths, hospital separations and out-patient visits due to acute respiratory diseases (males) in addition to a high prevalence of chronic non-specific respiratory disease; excesses of hospital separations due to mental, psycho-neurotic and personality disorders, a high prevalence of skin lesions and clinical findings such as neurological and electrocardiographic abnormalities.

While a high death rate from accidents, poisonings and violence prevails in the Northwest Territories, the excess of deaths due to this cause in the Yellowknife area is unexpectedly high. One possible non-etiological explanation for this could lie in the self-



TABLE 14

ARSENIC LEVELS (ppm) IN SAMPLES TAKEN  
FROM MILL WORKERS AND NON-MILL WORKERS

	Arsenic ppm	Mill Workers	Acc. %	Non-Mill Workers	Acc. %
Less than	.001	1	1.9	20	6.5
	.001	-	1.9	13	10.7
	.002	1	3.8	26	19.2
	.003	2	7.5	19	25.3
	.004	2	11.3	40	38.3
	.005	1	13.2	22	45.5
	.006	3	18.9	22	52.6
	.007	4	26.4	14	57.1
	.008	5	35.8	21	64.0
	.009	2	39.6	11	67.5
	.010	2	43.4	9	70.5
	.011	1	45.3	7	72.7
	.012	2	49.1	6	74.7
	.013	1	50.9	8	77.3
	.014	1	52.8	5	78.9
	.015	3	58.5	5	80.5
	.016	-	58.5	9	82.4
	.017	1	60.4	3	84.4
	.018	3	66.0	5	86.0
	.019	-	66.0	4	87.3
	.020-.024	7	79.2	12	91.2
	.025-.029	2	83.0	6	93.2
	.030-.034	2	86.6	8	95.8
	.035-.039	1	88.7	3	96.8
	.040-.044	1	90.6	2	97.4
	.045-.049	1	92.5	-	97.4
	.050-.099	3	98.1	8	100.
	.100+	1	100.	-	-
TOTAL PERSONS		53		308	
AVERAGE					
AS. ppm		0.0203		0.0110	



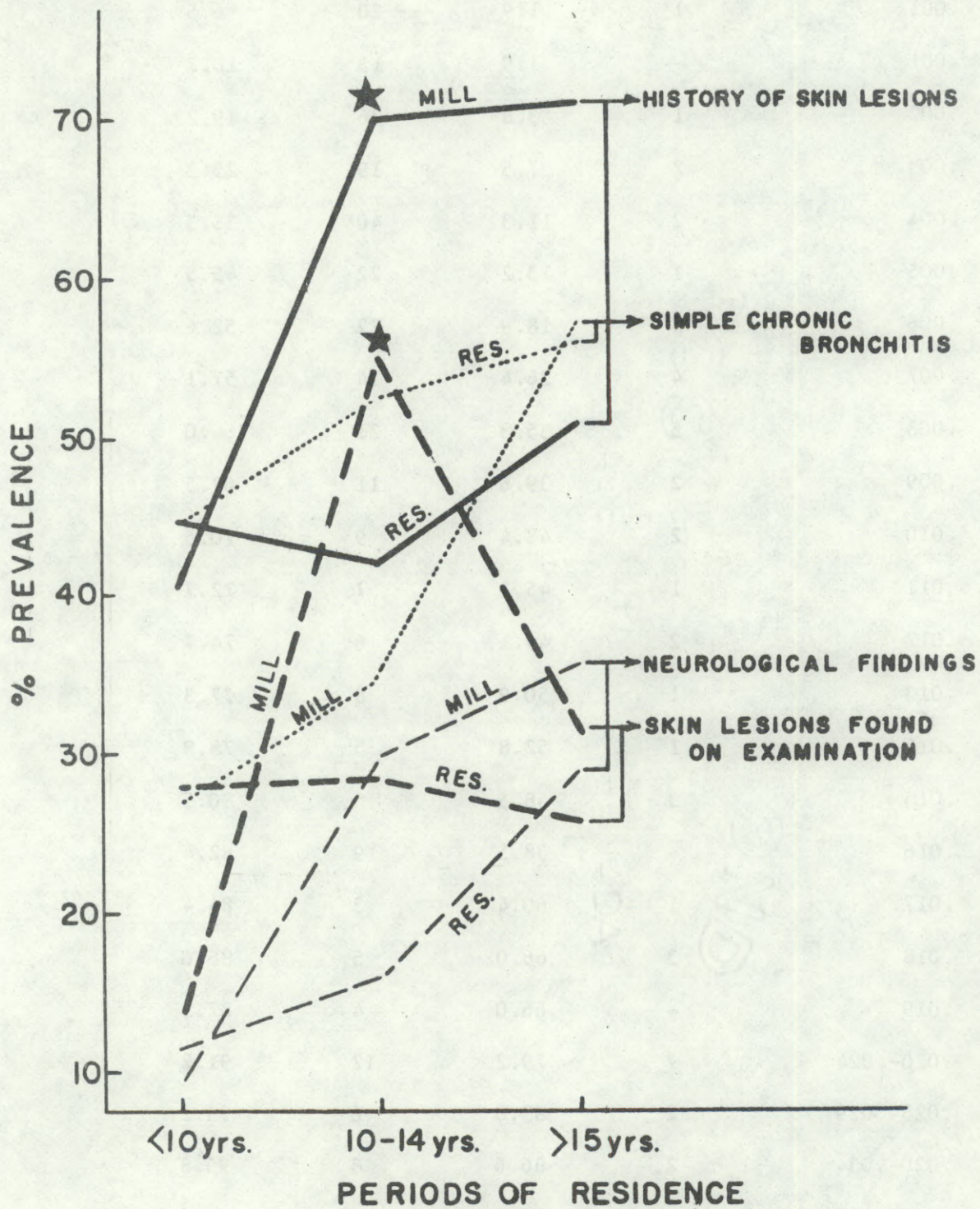


FIG. 1 COMPARISONS BETWEEN MILL WORKERS AND LONG-TERM RESIDENTS BY DIAGNOSTIC CATEGORY AND PERIODS OF RESIDENCE IN YELLOWKNIFE.

\* Proportion of mill workers with this disease significantly different from that of long-term residents.



TABLE 15

## SUMMARY OF MAIN FINDINGS OF INVESTIGATION

based on data obtained from

MORTALITY DATA	HOSPITAL STATISTICS	OUT-PATIENT VISITS	MORBIDITY SURVEY	HEALTH QUESTIONNAIRE	CLINICAL EXAMINATION
<u>Accidents, Poisonings and Violence</u>	<u>Mental Psychoneurotic &amp; Personality Disorders</u>	<u>Accidents, Poisonings and Violence</u>	<u>Respiratory Disease</u>	<u>Respiratory Disease</u>	<u>Skin Lesions</u>
<u>Respiratory Diseases</u>	<u>Acute Upper Respiratory Infect. (males)</u>	<u>Dis. of Bones &amp; Joints</u>	<u>Senility, Ill-defined Causes</u>	<u>Skin Lesions</u>	<u>Respiratory Disease (chronic bronchitis)</u>
	<u>Leukemia</u>	<u>Respiratory Disease</u>	<u>Allergies</u>	<u>Psychoneuroses</u>	Neurological findings
	<u>Allergies</u>	<u>Ulcers and Dyspepsia</u>			ECG changes
	<u>Diabetes</u>	<u>Skin Lesions</u>			Thyroid dysfunction
	<u>Ulcers and Dyspepsia</u>	. . .			Diabetes
	<u>Arterio sclerotic heart disease</u>	thyroid dysfunction			
		allergies			
		diabetes			
		arterio sclerotic h.d.			
		leukemia			



selection and ethnic origin of the persons who go to work and live in Yellowknife. Similarly, the incidence of mental, psycho-neurotic and personality disorders might be explained on this basis.

The most consistent observation made as a result of the analyses of the various mortality and hospital statistics is that of an excess of respiratory disease. This parallels the findings from the medical survey of 1952. The excess of deaths due to acute respiratory conditions when compared with the incidence in Canada as a whole is, perhaps, not unexpected. To what extent ethnic origin, occupation and the smoking habits of the Yellowknife population influence the occurrence of respiratory disease is a matter for conjecture. With regard to the prevalence of chronic non-specific respiratory disease (simple chronic bronchitis), it appears that individuals working in the mill environment suffer a higher prevalence than other residents of the community. These differences appeared to diminish, however, with lengthening periods of residence in Yellowknife and with increasing age. It is possible that arsenic exposure in the mill contributed to the prevalence of this condition among the younger mill workers. To what extent airborne arsenic contributed to the prevalence of chronic respiratory disease amongst the other long-term residents is uncertain.

The prevalence of skin lesions appear as a prominent finding in this investigation, particularly among workers occupationally exposed to arsenic in the mill. Skin lesions are seen in sufficient numbers among smelter workers and are not to be considered rare<sup>(25)</sup>. As chronic manifestations of arsenic exposure, they are also expected to occur more commonly than some of the other reported long-term effects.

Arsenic has been held responsible for outbreaks of dermatitis in industrial communities. In a recent study<sup>(26)</sup> of such an outbreak in a mining camp, 32 of 40 school children, together with almost half of the mill workers, were found to have skin lesions of various types. The immediate cause was assumed to be the contact of arsenic with moist, chafed or abraded areas of skin. The distribution of some of the skin lesions reported in the present study would seem to suggest a similar etiology through contact with environmental arsenic.



Ingestion of arsenic may play a minor role. Skin lesions considered typical of ingested arsenic include cancers and hyperkeratoses of the palms and soles. Assuming that the above conditions are, in fact, caused by arsenic ingestion as well as a sufficiently long latent period, the absence of skin cancers in this group suggests that ingestion of arsenic did not constitute a serious problem. In support of this contention is the fact that a comparatively large number of cases of psoriatic dermatitis were found, indicating that arsenic -- usually used in the treatment of this condition -- was not taken in sufficient quantities to suppress the lesions. This, of course, assumes that the rationale for the treatment of the above condition was correct.

A considerable number of scaly dermatitides and a few cases of hyperkeratosis were, however, found. It is possible that these could have been caused by other environmental factors, notably the cold climate, as low temperatures are known to aggravate psoriasis and similar lesions.

In conclusion:

- (1) Evidence of an association between arsenic exposure and a high prevalence of skin lesions among individuals occupationally exposed to contact with arsenical dusts was found. Ingestion of arsenic appeared to play only a minor role, if any. It is possible that environmental arsenic contributed to the prevalence of skin lesions among other residents in the community.
- (2) There is a high incidence of acute respiratory disease (in males) in the Yellowknife community together with a high prevalence of chronic non-specific respiratory disease. It is possible that the irritant action of inhaled arsenical dusts may have had a minor contributing role to play in the etiology of these conditions but this could be of less importance than other environmental factors, for example, the harsh climate in association with other insults on the respiratory system such as smoking. However, the smoking habits of the individuals examined in Yellowknife are not believed to have been atypical. The prevalence of chronic non-specific respiratory disease among Yellowknife inhabitants is higher than among other groups of males with similar smoking histories.



- (3) The high incidence of deaths and out-patient visits due to accidents, poisonings and violence and the high incidence of hospital admissions for mental, particularly psycho-neurotic disorders appear to reflect the severity of non-specific stress factors inherent in the transplantation of a sizeable European population to a new environment characterized by isolation, severities of climatic conditions and lack of accustomed facilities. The relatively-high incidence of conditions such as ulcers and dyspepsia and thyroid dysfunction supports this contention.
- (4) Abnormal electrocardiographic changes and certain other neurological findings were found more frequently than would have been expected and are of particular note even though the significance of the elevated frequencies of occurrence cannot be explained at this time.

The contribution of a large number of individuals to the design, conduct and completion of this study is acknowledged.



X. REFERENCES

1. Canadian Census 1966.
2. Water Pollution, Yellowknife Bay, Northwest Territories.  
J. W. Grainge, Report of Public Health Engineering Division, Department of National Health and Welfare, 1963.
3. The Arsenic Problem at Yellowknife. Report of Environmental and Medical Investigations.  
K. Kay, J. P. Windish, J. L. Monkman, D. L. Henderson, Occupational Health Division, Department of National Health and Welfare, 1955.
4. Environmental Arsenic Contamination and Control in Smelting Operations.  
K. Kay. Proceedings of International Clean Air Conference, 1959.
5. Arsenic Toxicology and Biochemistry.  
B. L. Vallee, D. D. Ulmer, W. E. C. Walker. American Medical Association Archives of Industrial Health, 21, 132-151, 1960.
6. Abnormal Trace Metals in Man: Arsenic.  
H. A. Schroeder, J. J. Balaska. J. Chron. Dis. 19, 85-100, 1966.
7. Urinary Arsenic Levels as an Index of Industrial Exposure.  
H. H. Schrenk, L. Schreibeis. Am. Industr. Hyg. Assoc. J., 19, 225-228, 1958.
8. Arsenic Trioxide Exposure in Industry.  
S. S. Pinto, C. M. McGill. Industr. Med. Surg., 22, 281-287, 1953.
9. Hematologic Aspects of Arsenic Intoxication.  
R. A. Kyle, G. L. Pease. New England J. Med., 273, 18-23, 1965.
10. Occupational Exposure to Arsenic.  
R. M. Watrous, M. B. McCaughey. Industr. Med. Surg., 14, 639-646, 1945.
11. An Outbreak of Arsenical Dermatoses in a Mining Community.  
D. J. Birmingham, M. M. Key, D. A. Holaday, U. B. Perone. Arch. Derm. 91, 457-464, 1965.
12. Current Status of Arsenic in American Cigarettes.  
R. H. Holland, A. R. Acevedo. Cancer, 19, 1248-1250, 1966.
13. Industrial Hygiene and Toxicology, Edited by Frank A. Patty. Interscience Publishers, Inc., New York, 1967.
14. The Chemistry of Industrial Toxicology.  
H. B. Elkins. John Wiley and Sons, Inc., New York, 1950.
15. Threshold Limit Values of Airborne Contaminants Adopted by the American Conference of Governmental Industrial Hygienists, January 1969.
16. Canadian Drinking Water Standards and Objectives 1968, Department of National Health and Welfare, Canada, October 1969.
17. The Lead and Arsenic Content of Urines from 46 Persons with No Known Exposure to Lead or Arsenic.
18. Lead and Arsenic Ingestion and Excretion in Man.  
S. H. Webster, U. S. Public Health Reports, 56, 1359-1368, 1941.
19. Chronic Arsine Poisoning Among Workers Employed in the Cyanide Extraction of Gold: A Report of 14 Cases.  
F. M. R. Bulmer, H. E. Rothwell, S. S. Polack, E. W. Stewart. J. Industr. Hyg. Toxicol., 22, 111-124, 1940.
20. Arsenic Content of Normal Hair in the Chicago Area.  
W. A. Camp, V. A. Gant. Fed. Proc., 8, 279, 1949.
21. Arsenic Values in Various Skin Diseases. Estimated by Activation Analysis.  
A. Girdwood Fergusson, W. A. Dewar, Hamilton Smith. A. M. A. Arch. Derm., 81, 931-935, 1960.



22. Cardiovascular Population Studies: Methods.  
G. A. Rose and H. Blackburn. World Health Organization, Geneva, 1966.
23. Heart Disease in Adults, United States, 1960-62.  
National Centre for Health Statistics, Series II, No. 6, U. S. Dept of Health, Education and Welfare, P.H.S., 1964.
24. Prevalence of Chronic Diseases and Distribution of Selected Physiologic Variables in a Total Community, Tecumseh, Michigan.  
F. H. Epstein, J. Francis, N. S. Hayner, B. C. Johnson, M. O. Kjelsberg, J. O. Napier, L. D. Ostrander, W. Payne and H. J. Dodge. Am. J. Epidemiol. 81, 307-322, 1965.
25. Occupational Diseases of the Skin.  
L. Schwartz, L. Tulipan and D. J. Birmingham, Philadelphia: Lea & Febiger, 1957.
26. An Outbreak of Arsenical Dermatitis in a Mining Community.  
D. J. Birmingham, M. M. Key, D. A. Holaday, U. B. Perone. Arch. Derm., 91, 457-464, 1965.
27. Carbohydrate Tolerance and Diabetes in a Total Community.  
N. S. Hayner, M. O. Kjelsberg, F. H. Epstein and T. Francis. Diabetes, 14, 413-423, 1965.
28. Glucose Tolerance of Adults, United States 1960-62.  
National Centre for Health Statistics Publication No. 2, Series II, U. S. Dept. Health, Education and Welfare, P.H.S., 1964.
29. Blood Pressure of Adults by Age and Sex: United States 1960-62.  
National Centre for Health Statistics Publication No. 4, Series II, U. S. Dept. Health, Education and Welfare, P.H.S., 1964.
30. Serum Cholesterol Levels of Adults, United States 1960-62.  
National Centre for Health Statistics Publication No. 22, Series II, U. S. Dept. Health, Education and Welfare, P.H.S., 1967.
31. A Cardiovascular Survey of British Postal Workers.  
D. D. Reid, W. W. Holland, S. Humerfelt and G. Rose. Lancet, 614-618, March 19, 1966.
32. Hospital Morbidity Statistics, Territorial Hospital Insurance Services 1967.  
Prepared by Biostatistics Division, Research and Statistics Directorate, Dept. National Health and Welfare.
33. The Value and Limitations of Periodic Health Examinations.  
N. J. Roberts, J. Chronic Dis., 9, 95-116, 1959.
34. Hospital Morbidity Statistics, Provincial Hospital Insurance Plans in Canada 1966.  
Biostatistics Division, Research and Statistics Directorate, Dept. National Health and Welfare.
35. The Periodic Evaluation of Health.  
N. J. Roberts. Industr. Med. and Surg., 153-158, 1957.
36. Electrocardiography in the Asymptomatic Middle Aged Male.  
G. H. Heidorn, Lancet, 82, 26C, 1962.
37. Heart Disease in Adults, United States 1960-62.  
National Centre for Health Statistics Publication No. 6, Series II, U. S. Dept. Health, Education and Welfare, P.H.S., 1964.
38. Current Estimates from the Health Interview Survey.  
National Centre for Health Statistics Publication No. 43, Series 10, U. S. Dept. Health, Education and Welfare, P.H.S., 1968.



TABLE A1.1

ARSENIC DISCHARGED INTO ATMOSPHERE (lbs/day)  
by the roaster stack of  
CONSOLIDATED MINING AND SMELTING CO. OF CANADA, LTD.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct.	Nov.	Dec.	Aver.
1954						260	148*	252	440	639	453	574	395
55	542	700	258	513	290	160	114*	426	287	348	647	768	421
56	710	669	471	307	368	413	172*	316	180	477	580	277	412
57	697	436	310	213	316	407	181	368	380	323	707	477	401
58	600	657	484	340	284	260	406	161	293	303	473	361	385
59	265	421	394	287	174	147	151*	484	607	555	627	1090	434
1960	871	1179	561	633	226	467	255*	452	387	574	627	806	586
61													
62													
63													
64	368	368	368			140	155		200	297	373	381	294
65	510	629	471	187	168	129	426	376	267	323	553	394	369
66	561	406	368	313	310	300	213	174	127	304	380	252	309
67	329	300	348	480	135	307	348	200	481		418	396	340
68	659	651	411	307	214	176	197	236	306		309	242	337
69	350	514	363	220	282						842		428

\* Determinations by the Department of National Health and Welfare, concurrently determinations were made by the Company. In chronological order, the estimates obtained by the Company were: 271(148), 245(114), 265(172), 116(151), 413(255).



TABLE A1.2

ARSENIC DISCHARGED INTO ATMOSPHERE (lbs/day)  
by the roaster stack of  
GIANT YELLOWKNIFE GOLD MINES LTD.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct.	Nov.	Dec.	Aver.
1950													
1951													
1952													
1953													
1954							11,980						11,980
1955					4,975		7,400	6,800					6,392
1956					6,166	6,306	5,115	6,797	5,605				5,998
1957	7,147		6,727	7,918	5,839	5,325	6,306						6,543
1958													
1959							115						115
1960							165						165
1961													
1962													
1963													
1964						436	499				552		496
1965													
1966					15	702			24				247
1967						10	29		332				124
1968						154	357						256
1969							353	579					466



TABLE A1.3

## ARSENIC FALL-OUT

Pounds of Elemental Arsenic per acre per year.  
Chronological Record of Estimates from Fall-  
out Pans Placed in the Eastern Corner of the  
New Township (Site No. 4) of Yellowknife.

E.C.	Nov. 23, 1951 - Apr. 10, 1952	0.80
"	Apr. 10, 1952 - Aug. 10, 1952	0.47
"	July 10, 1952 - Oct. 8, 1952	1.49
"	Oct. 8, 1952 - Jan. 1, 1953	2.00
"	Jan. 8, 1953 - Mar. 28, 1953	1.80
"	July 16, 1953 - Oct. 9, 1953	.85
"	Oct. 8, 1953 - Jan. 1, 1954	1.53
"	Jan. 16, 1954 - Apr. 14, 1954	.92
"	Apr. 14, 1954 - July 8, 1954	1.87
"	July 8, 1954 - Sept. 17, 1954	1.83
"	Sept 17, 1954 - Jan. 10, 1955	2.94
"	Jan. 10, 1955 - Mar. 30, 1955	4.48
"	Apr. 30, 1955 - July 15, 1955	2.44
"	July 15, 1955 - Oct. 15, 1955	.95
"	Jan. 10, 1956 - Mar. 19, 1956	3.56
"	Mar. 19, 1956 - July 11, 1956	1.37
"	Oct. 10, 1956 - Jan. 10, 1957	2.64
"	Jan. 1, 1957 - Mar. 3, 1957	2.14
"	Apr. 12, 1957 - July 10, 1957	1.72
"	July 10, 1957 - Oct. 4, 1957	1.68
"	Aug. 1, 1957 - Aug. 8, 1957	3.50
"	Aug. 22, 1957 - Sept. 27, 1957	2.46
"	Sept 22, 1957 - Sept. 27, 1957	4.58
"	Dec. 12, 1957 - Feb. 7, 1958	8.80
"	Feb. 7, 1958 - Apr. 15, 1958	6.58
"	Mar. 31, 1958 - July 11, 1958	1.66
"	Apr. 15, 1958 - June 26, 1958	3.62
"	July 11, 1958 - Oct. 3, 1958	1.84
"	Oct. 3, 1958 - Feb. 13, 1959	.94
"	Nov. 14, 1958 - Jan. 15, 1959	1.96
"	Jan. 15, 1959 - Apr. 14, 1959	2.98
"	Feb. 13, 1959 - Apr. 9, 1959	1.62
"	Apr. 9, 1959 - July 10, 1959	.54
"	July 10, 1959 - Oct. 9, 1959	2.34
"	Oct. 7, 1959 - Jan. 14, 1960	1.44
"	Jan. 9, 1960 - May 18, 1960	.32
"	Apr. 13, 1960 - July 19, 1960	.53
"	July 12, 1960 - Sept. 29, 1960	.36
"	Sept 29, 1960 - Feb. 2, 1961	.57
"	Oct. 14, 1960 - Dec. 13, 1960	.77
"	Dec. 13, 1960 - Feb. 6, 1961	.94
"	Feb. 2, 1961 - June 7, 1961	.86
"	Apr. 28, 1961 - Oct. 31, 1961	1.19
"	Oct. 31, 1961 - Apr. 3, 1962	1.44
"	Mar. 28, 1962 - June 13, 1962	.59
"	June 20, 1962 - Sept. 12, 1962	2.24
"	Dec. 12, 1962 - Mar. 12, 1963	3.57
"	June 12, 1963 - Sept. 12, 1963	.91



TABLE A1.4

ARSENIC CONTENT OF THE TOWN WATER SUPPLY  
AVERAGE MONTHLY VALUES 1951-69

YEAR	Average Arsenic Content (ppm) and Numbers of Samples Taken																	
	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.	
	Oct.		Nov.		Dec.		Total											
	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.
1951															.030	1	.020	5
52	.010	4	.090	5	.090	4	.018	4	.032	6	.023	4	.016	4	.030	5	.030	4
53	.015	5	.021	4	.011	4	.031	4	.007	5	.033	4	.025	5	.030	4	.028	3
54	.020	5	.013	3	.030	3	.017	3	.046	4	.058	3	.055	5	.035	3	.035	4
55	.015	1	.016	5	.008	2	.004	5	.016	4	.083	5	.054	4	.050	4	.030	5
56	.007	3	.015	2	.010	2	.025	2	.016	4	.075	5	.037	5	.031	5	.034	4
57	.016	5	.016	4	.020	5	.040	4	.028	5	.046	4	.050	4	.049	5	.037	5
58	.030	10	.029	4	.029	14	.017	13	.113	15	.047	4	.055	9	.036	5	.040	4
59	.016	5	.014	4	.014	4	.013	5	.032	7	.064	6	.041	6	.029	4	.020	4
1960	.027	3	.015	2	.018	2	.023	4	.008	6	.055	4	.050	6	.013	4	.014	5
61	.015	3	.015	1	.015	1	.015	1	.040	1	.040	1	.030	1	.020	1	.020	1
62			.010	1	.030	1	.025	2	.020	2	.090	1	.033	2	.120	1	.120	1
63	.028	6	.030	1	.026	2	.040	1	.054	3	.050	1			.040	1	.022	2
64	.012	1	.018	1	.023	1	.009	1	.077	3	.048	7	.026	5	.018	2		
65			.013	1			.070	1	.150	2	.110	2			.029	1		
66	.029	1	.022	2	.028	2	.010	2	.092	9	.263	18	.046	8	.013	7	.023	4
67	.058	3	.047	4	.030	3	.053	3	.065	3	.069	3	.027	5				
68	.020	1	.010	1			.044	1					.018	2			.016	1
1969	.004	5	.006	2	.006	5	.020	5	.033	4	.057	3	.022	5	.024	1	.023	4
Ave.	.021	61	.027	47	.026	55	.022	60	.055	84	.107	75	.039	76	.032	54	.029	55



TABLE A1.5

ARSENIC CONTENT (ppm) OF CON\* WATER SUPPLY  
AVERAGE MONTHLY VALUES, 1951-69

YEAR	AVERAGE ARSENIC CONTENT (ppm) AND NUMBERS OF SAMPLES TAKEN																								
	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.		TOTAL
	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	
1951																	.014	5	.007	4	.006	5	.010	4	
52	.005	2	.006	5	.005	4	.019	4	.030	5	.020	4	.016	4	.022	5	.024	4	.020	5	.010	4	.011	4	.016
53	.014	5	.011	4	.011	4	.027	4	.062	5	.034	4	.071	5	.022	4	.023	3	.019	5	.014	4	.004	4	.026
54	.018	5	.012	3	.016	4	.013	3	.054	4	.055	3	.044	6	.042	4	.027	4	.045	4	.025	4	.015	2	.030
55	.015	1	.014	5	.007	2	.039	5	.190	4	.085	5	.047	4	.032	4	.028	5	.019	4	.015	2	.015	3	.042
56	.006	3	.007	2	.012	2	.015	2	.120	4	.057	5	.037	5	.024	5	.021	4	.025	4	.016	5	.014	4	.030
57	.014	5	.014	4	.018	5	.035	4	.148	5	.107	4	.055	4	.044	5	.030	5	.017	4	.016	4	.014	4	.043
58	.028	10	.035	4	.043	16	.021	8	.121	7	.053	6	.046	7	.034	5	.037	4	.030	1	.029	4	.021	5	.042
59	.014	5	.014	4	.014	4	.016	5	.042	7	.215	6	.135	6	.077	4	.017	4	.019	5	.020	2	.145	2	.061
1960	.029	3	.012	2	.017	2	.034	4	.065	6	.027	4	.019	6	.014	4	.016	5	.012	3	.010	2			.022
61	.047	3	.015	1	.015	1	.015	1	.040	1	.040	1	.020	1	.020	1	.030	1					.001	1	.029
62			.015	1	.030	1	.019	2	.035	2	.060	1	.050	2	.120	1	.070	1	.055	2	.073	2	.035	5	.051
63	.023	6	.040	1	.027	2	.040	1	.035	3	.050	1			.040	1	.018	2	.005	2	.014	1	.033	1	.031
64	.013	1	.020	1	.021	1	.011	1	.071	3	.039	6	.023	5	.010	3			.015	1	.010	1			.024
65			.012	1			.050	1	.158	4	.075	2			.024	1			.024	1	.036	1	.024	1	.040
66	.024	1	.014	2	.030	2	.024	2	.066	3	.144	7	.032	6	.009	6	.016	4	.039	6	.039	5	.033	3	.039
67	.050	3	.043	4	.091	3	.134	3	.134	3	.109	3	.053	5					.010	1			.018	1	.059
68	.026	1	.002	1									.021	1					.008	1	.010	1	.005	5	.047
1969	.006	5	.006	1	.007	2	.021	6	.135	4	.055	2	.064	4					.012	3	.009	2	.004	1	.029
Ave.	.021	59	.017	46	.028	55	.030	56	.091	70	.081	64	.049	71	.031	53	.024	51	.022	56	.020	49	.021	53	.055

\* Consolidated Mining and Smelting Company of Canada Limited.



TABLE A1.6

## ARSENIC CONTENT (ppm) OF GIANT\* WATER SUPPLY

AVERAGE MONTHLY VALUES 1951-69

YEAR	Average Arsenic Content (ppm) and Numbers of Samples Taken																								
	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.		Total
	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	
1951																			.240	1					
52													.050	1									.005	1	
53																									
54																									
55													.030	1											
56																									
57	.002	1																					.010	1	
58	.010	5			.002	9	.009	3	.096	4	.050	2	.053	3											
59							.030	2	.055	2	.030	2	.250	1									.007	1	
1960									.020	2			.010	1									.140	1	
61	.020	1																					.021	3	
62					.002	1	.060	1			.040	1					.130	1	.072	3			.002	1	
63	.008	3			.003	1	.018	2							.207	3	.003	2	.006	1					
64	.001	1	.032	1	.005	1	.007	1	.023	3	.043	6	.102	5	.055	3	.022	1	.003	1				0.042	
65			.001	1			.110	1	.136	3	.285	2			.007	1	.022	1	.006	1			.010	1	
66	.007	1	.012	2	.038	2	.050	6	.193	17	.192	29	.093	16	.043	6	.044	4	.067	6	.051	5	.037	3	
67	.047	3	.103	4	.173	3	.151	4	.147	3	.160	3	.130	3			.151	2						0.103	
68	.012	1	.011	1									.013	1			.036	1	.004	1			.004	5	
1969	.003	5	.002	1	.008	2	.021	5	.152	4	.084	24	.185	26			.074	5	.007	2	.003	2	.010	1	
Ave.	.013	21	.048	10	.035	18	.053	23	.133	41	.133	68	.131	59	.043	10	.097	12	.069	17	.035	14	.021	18	0.068

\* Giant Yellowknife Gold Mines Limited



TABLE A1.7

## ARSENIC CONTENT (ppm) OF FRAME LAKE WATER

AVERAGE MONTHLY VALUES, 1951-69

YEAR	Average Arsenic Content (ppm) and Numbers of Samples Taken													
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.		
	Av. No.	Av. No.	Av. No.	Av. No.	Av. No.	Av. No.	Av. No.	Av. No.	Av. No.	Av. No.	Av. No.	Av. No.	Av. No.	Av. No.
1951										.375 2	.375 2	.483 3	.625	
52	.90 2	1.0 2	1.3 2	.75 1	.235 2	.34 2	.375 2	.410 2	.360 2	.350 3	.425 2	.700 2	.55	.660
53	.775 2	.700 2	.750 2	.725 2	.425 2	.450 2	.567 3	.475 2	.425 2	.525 2	.500 3	.600 2		
54	1.2 2				.45 1	.525 2	.553 3	.500 2	.365 2	.500 3	.800 1			
55	.600 1				.800 1	.775 2	.925 2	.900 2	.900 3	.800 1				
56	1.130 1				.300 1	.975 2	.623 2	1.000 2	.600 2	1.45 2				
57					.750 1	.875 2	1.05 2	.950 2	.916 3	.875 2				
58	1.16 1					1.10 1	1.08 3	.875 2	.875 2	.950 2			1.35	
59						.575 2	.775 4	.700 2	.550 2	.600 1				
1960	1.45 1					.425 2	.416 3	.400 2	.500 3				1.66	
61	1.45 1					.400 1	.400 1	.300 1	.500 1	.500 1			1.400	
62						.750 1	.700 1	.600 1	.800 1					
63						.381 2	.300 1	.400 1	.600 1					
64														
65							.730 1	.599 1						
66														
67							.532 1							
68							.531 4							
1969														
Ave.	1.049 11	0.85 4	1.025 4	.733 3	.435 11	.621 20	.665 32	.660 22	.613 26	.683 18	.544 9	.894		



TABLE A1.8

YELLOWKNIFE: PARTICULATE CONTENTS OF AIR SAMPLES  
USING FIBREGLASS FILTERS

<u>No.</u>	<u>Date</u> <u>1966</u>	<u>Wt Sample</u>	<u>Time</u>	<u>Air flow</u>	<u>Parti- culates</u>
1	June 23-24	0.387 g	24.4 hr	2.15 m <sup>3</sup> /min	123 r/m <sup>3</sup>
2	27-28	.350	25.2	2.07	112
3	July 4-5	.524	28.3	1.63	190
4	8-9	.234	24.9	1.84	85
5	11-12	.239	23.6	1.91	88
6	15-16	.303	23.8	1.98	108
7	18-19	.260	28.5	1.98	78
8	22-23	.591	24.5	1.91	210
9	26-27	.148	23.8	1.77	59
10	-	-	-	-	-
11	Aug 3-4	.307	23.5	1.91	114
12	8-9	.188	-	1.98	-
13	11-12	.293	26.4	1.84	99
14	15-16	.429	25.2	1.77	161
15	24-25	.312	24.5	1.84	115
16	29-30	.619	23.0	1.91	235
17	Sept 1-2	.300	23.8	1.91	110
18	6-7	.310	22.5	1.84	125
19	12-13	.131	27.0	1.98	41
20	15-16	.229	22.7	1.84	92

(Particulate load given in micrograms per cubic metre)



TABLE A1.9

YELLOWKNIFE SULPHATION RATES USING  
PEROXIDE CANDLES

			mg SO <sub>2</sub> /cm <sup>2</sup> /day
1.	Federal Building	June 17-July 18	0.0235
2.	Giant	" 17- " 18	.0366
3.	Con	" 17- " 18	.0014
4.	Radio Tower	" 17- " 18	.0030
5.	John Franklin School	" 17- " 18	.0038
6.	Airport	" 18- " 19	.0022
7.	Blank		.0004



TABLE A1.10

A. URINARY ARSENIC VALUES IN NON-EXPOSED INDIVIDUALS

<u>Author</u>	<u>Population tested</u>	<u>Value (mg/litre)</u>
Patty(13)		0.015-0.06
Schrenk, Schreiber(7)	ind. on sea food diet	0.01-1.68
Webster(17)	18 children	0-0.065 (ave 0.014)
	26 adults	0-0.060 (ave 0.015)
Watrous, McCaughey(10)	13 applicants for jobs	0.006-0.028 (ave 0.017)
Pinto, McGill(8)	147 determ., 124 men	0-2.06 (ave 0.13, med 0.10)
Kay et al(3)	47 school children	(ave 0.0058)

B. URINARY ARSENIC VALUES IN EXPOSED INDIVIDUALS

<u>Author</u>		
Watrous, McCaughey(10)	17 manufact'ing workers	0.006-0.5 (ave 0.037)
	10 packaging workers	0.003-0.037 (ave 0.014)
Pinto(8)	835 determ., 348 men	0.10-6.44 (ave 0.82, med 0.58)
Patty(13)	orchardists	0.22-0.24
Webster(18)	9 healthy orchardists	up to 2.43 per 24 hours
(19)		0.3-3.3



TABLE A3.1

POPULATION\* OF YELLOWKNIFE BY AGE AND SEX IN THE YEARS 1956, 1961 and 1966

Age Group	1956		1961		1966	
	M	F	M	F	M	F
0-4	245	217	267	249	253	272
5-9	153	142	224	190	281	248
10-14	95	86	134	128	203	195
15-19	105	81	102	65	148	151
20-24	254	130	149	123	143	121
25-29	267	128	377	270	318	266
30-34	209	123				
35-39	137	97	259	185	286	216
40-44	133	83				
45-49	83	43	170	120	178	148
50-54	74	40				
55-59	57	22	110	49	119	76
60-64	31	8				
65-69	22	8	23	12	32	17
70-74	7	2	(70+)25	14	(70+)55	15
75-79	9	3				
80-84	3	1				
85-89	1	0				
90+	0	1				
Total	1,885	1,215	1,840	1,405	2,016	1,725

\* Source: D.B.S.



TABLE A4.1

INDIAN AND ESKIMO POPULATIONS IN YELLOWKNIFE AND THE  
NORTHWEST TERRITORIES BY AGE AND SEX. JUNE 1961

AGE GROUP	INDIAN POPULATION				ESKIMO POPULATION			
	YELLOWKNIFE		N.W.T.		YELLOWKNIFE		N.W.T.	
	Male	Female	Male	Female	Male	Female	Male	Female
0-4	31	26	401	463	--	--	806	774
5-9	22	22	389	372	--	--	579	549
10-14	14	20	321	364	--	--	539	512
15-19	11	5	227	211	--	--	372	382
20-24	8	13	206	219	1	--	348	364
25-34	32	13	335	335	6	5	578	519
35-44	13	16	248	217	--	--	418	347
45-54	13	9	198	171	--	--	280	218
55-64	7	9	147	146	--	--	127	118
65-69	6	2	58	47	--	--	35	38
70 & over	6	8	89	92	--	--	41	33
TOTAL	163	143	2619	2637	7	5	4123	3854

Source of Information: DBS



TABLE A4.2

ESTIMATED POPULATIONS OF YELLOWKNIFE AND THE NORTHWEST TERRITORIES  
BY AGE AND SEX WITH PERCENTAGES

AGE	YELLOWKNIFE				NWT less YELLOWKNIFE			
	Males		Females		Males		Females	
	No.	%	No.	%	No.	%	No.	%
Under 1	48	2.3	55	3.2	434	3.2	434	3.8
1-4	213	10.2	219	12.6	1910	13.9	1737	15.2
5-9	289	13.9	250	14.4	1910	13.9	1824	15.9
10-14	210	10.1	197	11.3	1303	9.5	1303	11.4
15-19	153	7.3	152	8.7	1129	8.2	1042	9.1
20-24	148	7.1	122	7.0	1216	8.9	868	7.6
25-29	171	8.2	141	8.1	1129	8.2	868	7.6
30-34	157	7.5	127	7.3	1042	7.6	781	6.8
35-39	164	7.9	117	6.7	868	6.3	608	5.3
40-44	131	6.3	101	5.8	695	5.1	521	4.5
45-49	100	4.8	83	4.8	521	3.8	434	3.8
50-54	84	4.0	66	3.8	434	3.2	347	3.0
55-59	77	3.7	46	2.6	434	3.2	260	2.3
60-64	46	2.2	31	1.8	260	1.9	174	1.5
65-69	33	1.6	17	1.0	174	1.3	87	0.8
70-74	38	1.8	8	0.5	174	1.3	87	0.8
75-79	9	0.4	4	0.2	43	0.3	43	0.4
80-84	7	0.3	2	0.1	30	0.2	26	0.2
85 & over	3	0.1	1	0.1	13	0.1	17	0.1
	2081	100.	1739	100.	13719	100.	11461	100.



TABLE A4.3

HOSPITAL SEPARATIONS, SEPARATIONS, PERCENTAGE SEPARATIONS, AND SEPARATION RATES PER 100,000 POPULATION  
BY PRINCIPAL DIAGNOSIS FOR TERRITORIAL PLAN IN-PATIENTS FROM THE YELLOWKNIFE HEALTH DISTRICT AND THE N.W.T. LESS YELLOWKNIFE

	YELLOWKNIFE						N.W.T. LESS YK						RATIO SEP RATE YK TO N.W.T.	
	Male			Female			Male			Female			Male	Female
	Sep	%Sep	Rate	Sep	%Sep	Rate	Sep	%Sep	Rate	Sep	%Sep	Rate		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Tuberculosis, all forms	3	0.9	144.2	1	0.2	57.5	26	1.1	189.5	20	0.5	174.5	0.76	0.33
2. Poliomyelitis & encephalitis	0	0.0	0.0	0	0.0	0.0	5	0.2	36.4	7	0.2	61.1	---	---
3. Infectious hepatitis	1	0.3	48.1	0	0.0	0.0	6	0.3	43.7	11	0.3	96.0	1.10	---
4. Other diseases - viruses	4	1.1	192.2	6	1.1	345.0	23	1.0	167.7	35	0.9	305.4	1.15	1.13
5. Other diseases - infective	3	0.9	144.2	2	0.4	115.0	54	2.3	393.6	55	1.4	479.9	0.37	0.24
TOTAL CLASS I Infective and Parasitic diseases	11	3.1	528.6	9	1.7	517.5	114	4.8	831.0	128	3.4	1116.8	0.64	0.46
6. Malignant neoplasms of buccal cavity and pharynx	0	0.0	0.0	0	0.0	0.0	7	0.3	51.0	1	0.0	8.7	---	---
7. Malignant neoplasm of stomach	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	0.0	8.7	---	---
8. Malignant neoplasms of large intestine except rectum	2	0.6	96.1	0	0.0	0.0	0	0.0	0.0	4	0.1	34.9	---	---
9. Malignant neoplasms of rectum	0	0.0	0.0	0	0.0	0.0	3	0.1	21.9	1	0.0	8.7	---	---
10. Malignant neoplasms of bronchus, trachea and lung	1	0.3	48.1	0	0.0	0.0	11	0.5	80.2	2	0.1	17.5	0.60	---
11. Malignant neoplasms of breast	0	0.0	0.0	1	0.2	57.5	0	0.0	0.0	7	0.2	61.1	---	94



Table A4.3 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
12. Malignant neoplasms of cervix uteri	0	0.0	0.0	2	0.4	115.0	0	0.0	0.0	16	0.4	139.6	---	0.82
13. Malignant neoplasms of uterus other than cervix	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	2	0.1	17.5	---	---
14. Malignant neoplasms of fallopian tubes and broad ligament	0	0.0	0.0	1	0.2	57.5	0	0.0	0.0	0	0.0	0.0	---	---
15. Malignant neoplasms of prostate	0	0.0	0.0	0	0.0	0.0	1	0.0	7.3	0	0.0	0.0	---	---
16. Malignant neoplasms of kidney, bladder and other urinary organs	2	0.6	96.1	0	0.0	0.0	9	0.4	65.6	0	0.0	0.0	1.47	---
17. Leukemia and aleukemia	3	0.9	144.2	2	0.4	115.0	0	0.0	0.0	1	0.0	8.7	---	13.22
18. Other malignant neoplasms and neoplasm of the lymphatic and hematopoietic tissue	2	0.6	96.1	3	0.6	172.5	6	0.3	43.7	11	0.3	96.0	2.20	1.80
19. Benign neoplasm of uterus	0	0.0	0.0	5	0.9	287.5	0	0.0	0.0	10	0.3	87.3	---	3.29
20. Benign neoplasm of ovary	0	0.0	0.0	2	0.4	115.0	0	0.0	0.0	10	0.3	87.3	---	1.32
21. Benign neoplasm exclude uterus & ovary and neoplasms of unspecified nature	0	0.0	0.0	4	0.8	230.0	17	0.7	123.9	25	0.7	218.1	---	1.05
TOTAL CLASS II Neoplasms	10	2.8	480.5	20	3.8	1150.0	54	2.3	393.6	91	2.4	794.0	1.22	1.45
22. Asthma	1	0.3	48.1	1	0.2	57.5	11	0.5	80.2	6	0.2	52.4	0.60	1.10
23. Other allergic disorders excluding asthma	2	0.6	96.1	2	0.4	115.0	5	0.2	36.4	2	0.1	17.5	2.63	6.57
24. Diseases of thyroid gland	2	0.6	96.1	1	0.2	57.5	0	0.0	0.0	12	0.3	104.7	---	0.55
25. Diabetes Mellitus	1	0.3	48.1	5	0.9	287.5	8	0.3	58.3	4	0.1	34.9	0.82	8.24



Table A4.3 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
26. Diseases of other endocrine glands	0	0.0	0.0	0	0.0	0.0	2	0.1	14.6	10	0.3	87.3	---	---
27. Vitaminoses and other metabolic diseases	0	0.0	0.0	1	0.2	57.5	5	0.2	36.4	6	0.2	52.4	---	1.10
TOTAL CLASS III Allergic, Endocrine system, Metabolic and Nutritional Diseases	6	1.7	288.3	10	1.9	575.0	31	1.3	226.0	40	1.1	349.0	1.28	1.65
28. Disease of the blood and blood forming organs	2	0.6	96.1	2	0.4	115.0	8	0.34	58.3	6	0.2	52.4	1.63	2.19
TOTAL CLASS IV Disease of the blood and blood forming organs	2	0.6	96.1	2	0.4	115.0	8	0.34	58.3	6	0.2	52.4	1.63	2.19
29. Psychoses	12	3.4	576.6	12	2.2	690.0	31	1.31	226.0	29	0.8	253.0	2.55	2.73
30. Psychoneurotic disorders	14	4.0	672.8	32	6.0	1840.1	22	0.93	160.4	62	1.6	541.0	4.20	3.40
31. Disorder of character, behaviour and intelligence	2	0.6	96.1	2	0.4	115.0	17	0.72	123.9	13	0.3	113.4	0.78	1.01
TOTAL CLASS V Mental, Psychoneurotic and Personality Disorders	28	8.0	1345.5	46	8.6	2645.2	70	2.97	510.2	104	2.7	907.4	2.64	2.92
32. Vascular lesions affecting central nervous system	4	1.1	192.2	1	0.2	57.5	13	0.5	94.8	7	0.2	61.1	2.01	0.94
33. Inflammation and other diseases of central nervous system	5	1.4	240.3	8	1.5	460.0	51	2.2	371.7	57	1.5	497.3	0.63	1.13
34. Diseases of nerves and peripheral ganglia	2	0.6	96.1	1	0.2	57.5	1	0.0	7.3	1	0.0	8.7	13.17	6.6
35. Diseases and conditions of the eye	7	2.0	336.4	11	2.1	632.5	57	2.4	415.5	78	2.0	680.6	0.80	0.93
36. Diseases of ear and mastoid process	3	0.9	144.2	1	0.2	57.5	76	3.2	554.0	56	1.5	488.6	0.26	1.2



Table A4.3 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
TOTAL CLASS VI Diseases of the nervous system and sense organs	21	6.0	1009.1	22	4.1	1265.1	198	8.4	1443.3	199	5.2	1736.3	0.70	0.73
37. Rheumatic fever, chronic rheumatic heart disease	0	0.0	0.0	3	0.6	172.5	10	0.4	72.9	16	0.4	139.6	---	1.24
38. Arteriosclerotic, degenerative heart disease	6	1.7	288.3	4	0.7	230.0	22	0.9	160.4	17	0.4	148.3	1.80	1.55
39. Other diseases of the heart	4	1.1	192.2	2	0.4	115.0	17	0.7	123.9	35	0.9	305.4	1.54	0.38
40. Hypertensive heart disease and other hypertensive diseases	1	0.2	48.1	0	0.0	0.0	5	0.2	36.4	16	0.4	139.6	1.32	---
41. Diseases of arteries	1	0.3	48.1	0	0.0	0.0	3	0.1	21.9	2	0.0	17.5	2.20	---
42. Varicose veins in lower extremities	0	0.0	0.0	1	0.2	57.5	3	0.1	21.9	7	0.2	61.1	---	0.94
43. Haemorrhoids	0	0.0	0.0	2	0.4	115.0	7	0.3	51.0	2	0.0	17.5	---	6.57
44. Phlebitis and thrombophlebitis	0	0.0	0.0	2	0.4	115.0	6	0.2	43.7	7	0.2	61.1	---	1.88
45. Other diseases of the circulatory system	4	1.1	192.2	2	0.4	115.0	17	0.7	123.9	13	0.3	113.4	1.54	1.01
TOTAL CLASS VII Diseases of the circulatory system	16	4.6	768.9	16	3.0	920.1	90	3.8	656.0	115	3.0	1003.4	1.17	0.92
46. Acute upper respiratory infections	10	2.8	480.5	5	0.9	287.5	61	2.6	44.6	38	1.0	331.6	10.77	0.87
47. Influenza	0	0.0	0.0	1	0.2	57.5	4	0.2	29.2	6	0.2	52.4	---	1.10
48. Pneumonia	45	12.8	2162.4	22	4.1	1265.1	478	20.3	3484.2	445	11.7	3882.7	0.61	0.33
49. Bronchitis	19	5.4	913.0	12	2.2	690.1	74	3.1	539.4	63	1.6	549.7	1.70	1.26
50. Hypertrophy of tonsils and adenoids	27	7.7	1297.5	14	2.6	805.1	81	3.4	590.4	102	2.7	890.0	2.20	0.90



Table A4.3 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
51. Other diseases of the respiratory system	4	1.1	192.2	3	0.6	172.5	47	2.0	342.6	43	1.1	375.2	0.57	0.46
TOTAL CLASS VIII Diseases of respiratory system	105	29.9	5045.7	57	10.7	3277.7	745	31.6	5430.4	697	18.3	6081.5	0.93	0.54
52. Diseases of teeth and supporting structures	5	1.4	240.3	4	0.8	230.0	35	1.5	255.1	35	0.9	305.4	0.93	0.75
53. Ulcer of stomach, duodenum and jejunum	7	2.0	336.4	7	1.3	402.5	19	0.8	138.5	4	0.1	34.9	2.41	11.50
54. Gastritis, duodenitis, other disorders & diseases of the stomach and duodenum	5	1.4	240.3	2	0.4	115.0	16	0.7	116.6	15	0.4	130.9	2.06	0.88
55. Appendicitis	18	5.1	865.0	6	1.1	345.0	39	1.6	284.3	34	0.9	296.7	3.03	1.16
56. Hernia	4	1.1	192.2	3	0.6	172.5	37	1.6	269.7	38	1.0	331.6	0.71	0.52
57. Intestinal obstructions without mention of hernia	1	0.3	48.1	1	0.2	57.5	1	0.0	7.3	5	0.1	43.6	6.59	1.32
58. Gastroenteritis & cholitis except ulcerative age 4 weeks and over	5	1.4	240.5	12	2.2	690.0	87	3.7	634.2	66	1.7	575.9	0.38	1.20
59. Chronic enteritis and ulcerative cholitis	0	0.0	0.0	0	0.0	0.0	4	0.2	29.2	11	0.3	96.0	---	---
60. Cirrhosis	0	0.0	0.0	1	0.2	57.5	4	0.2	29.2	1	0.0	8.7	---	6.61
61. Diseases of gall bladder and pancreas	1	0.3	48.1	8	1.5	460.0	14	0.6	102.0	71	1.0	619.5	0.48	0.74
62. Other diseases of digestive system	3	0.8	144.2	4	0.8	230.0	32	1.4	233.3	34	0.9	296.7	0.62	0.78
TOTAL CLASS IX Diseases of the digestive system	49	14.0	2354.6	48	9.0	2760.2	288	12.2	2099.3	314	8.2	2739.7	1.12	1.01
63. Nephrositis and nephrosis	0	0.0	0.0	0	0.0	0.0	14	0.6	102.0	13	0.0	113.4	---	



Table A4.3 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
64. Infections of kidney	0	0.0	0.0	4	0.0	230.0	10	0.4	72.9	45	1.7	392.6	---	0.59
65. Calculi of kidney, ureter, and other parts of urinary system	1	0.3	48.1	0	0.0	0.0	6	0.2	43.7	2	0.0	17.5	1.10	---
66. Other diseases of urinary system	5	1.4	240.3	3	0.6	172.5	16	0.7	116.6	26	0.7	226.9	2.06	0.76
67. Hypoplasia of prostate	2	0.6	96.1	0	0.0	0.0	3	0.1	21.9	0	0.0	0.0	4.39	---
68. Redundant prepuce and phimosis	1	0.3	148.1	0	0.0	0.0	18	0.8	131.2	0	0.0	0.0	1.13	---
69. Diseases of ovary, fallopian tubes & parametrium and infective diseases of uterus, vagina and vulva	0	0.0	0.0	18	3.4	1035.0	0	0.0	0.0	71	1.9	619.5	---	1.67
70. Uteral vaginal prolapse	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	6	0.2	52.4	---	0.0
71. Disorders of menstruation	0	0.0	0.0	16	3.0	920.1	0	0.0	0.0	48	1.3	418.8	---	2.20
72. Other disorders of genital organs	3	0.8	144.2	11	2.1	632.5	16	0.7	116.6	39	1.0	340.3	1.24	1.86
TOTAL CLASS X Disorders of genital urinary system	12	3.4	576.6	52	9.8	2990.2	83	3.5	605.0	250	6.6	2181.3	0.95	1.37
73. Complications of pregnancy	0	0.0	0.0	34	6.4	1955.1	0	0.0	0.0	206	5.4	1797.4	---	1.09
74. Abortions	0	0.0	0.0	15	2.9	862.6	0	0.0	0.0	96	2.5	837.6	---	1.03
75. Delivery without complications	0	0.0	0.0	106	19.9	6095.5	0	0.0	0.0	822	21.6	717.2	---	8.50
76. Delivery with mention of complications	0	0.0	0.0	17	3.2	977.6	0	0.0	0.0	116	3.0	1012.1	---	0.97
77. Complications of the puerperium	0	0.0	0.0	1	0.2	57.5	0	0.0	0.0	9	0.2	78.5	---	0.73
TOTAL CLASS XI Deliveries and complications of pregnancy, childbirth and puerperium	0	0.0	0.0	173	32.5	9948.2	0	0.0	0.0	1249	32.8	10897.8	---	0.91



Table A4.3 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
78. Infection of skin and subcutaneous tissues	8	2.3	384.7	7	1.3	402.5	95	4.0	692.5	63	1.7	549.7	0.56	0.73
79. Other diseases of skin and subcutaneous tissues	4	1.1	192.2	2	0.4	115.0	21	0.9	153.1	23	0.6	200.7	1.26	0.57
TOTAL CLASS XII Diseases of the skin and cellular tissues	12	3.4	576.6	9	1.7	517.5	116	4.9	845.5	86	2.3	750.4	0.68	0.69
80. Arthritis and rheumatism except rheumatic fever	6	1.7	288.3	2	0.4	115.0	18	0.8	131.2	20	0.5	174.5	2.20	0.66
81. Displacements of intervertebral disc	1	0.3	48.1	0	0.0	0.0	7	0.3	51.0	6	0.2	52.4	0.94	---
82. Other diseases of bones and organs of movement	0	0.0	0.0	2	0.4	115.0	31	1.3	226.0	37	1.0	322.8	---	0.36
TOTAL CLASS XIII Diseases of bones and organs of movement	7	2.0	336.4	4	0.7	230.0	56	2.4	408.2	63	1.7	549.7	0.82	0.42
83. Congenital malformations	3	0.8	144.2	2	0.4	115.0	32	1.4	233.3	30	0.8	261.8	0.62	0.44
TOTAL CLASS XIV Congenital malformations	3	0.8	144.2	2	0.4	115.0	32	1.4	233.3	30	0.8	261.8	0.62	0.44
84. Certain diseases of early infancy	0	0.0	0.0	1	0.2	57.5	23	1.0	167.7	19	0.5	165.8	---	0.35
TOTAL CLASS XV Certain diseases of early infancy	0	0.0	0.0	1	0.2	57.5	23	1.0	167.7	19	0.5	165.8	---	0.35
85. Senility and ill-defined conditions	20	5.7	961.1	23	4.3	1322.6	113	4.8	823.7	157	4.1	1369.9	1.17	0.97
TOTAL CLASS XVI Senility and ill-defined conditions	20	5.7	961.1	23	4.3	1322.6	113	4.8	823.7	157	4.1	1369.9	1.17	0.97



Table A4.3 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
86. Fracture of/or involving skull, face bones, head injury except open wound, concussion and haematoma of scalp	11	3.1	528.6	8	1.5	460.0	51	2.2	371.7	31	0.8	270.5	1.41	1.70
87. Fracture of spine and trunk	1	0.3	48.1	2	0.4	115.0	3	0.1	21.9	6	0.2	52.4	2.20	2.19
88. Fracture of upper limb	7	2.0	337.0	3	0.6	172.5	26	1.1	189.5	24	0.6	209.4	1.78	0.82
89. Fracture of femur	1	0.3	48.1	1	0.2	57.5	12	0.5	87.5	10	0.3	87.3	0.55	0.66
90. Other fracture of lower limbs except femur	3	0.9	144.3	2	0.4	115.0	38	1.6	277.0	12	0.3	104.7	0.52	1.10
91. Dislocation without fracture & sprains and sprains of joints & adjacent muscles	3	0.9	144.3	4	0.7	230.0	30	1.3	218.7	19	0.5	165.8	0.66	1.39
92. Internal injury of chest, abdomen and pelvis	0	0.0	0.0	0	0.0	0.0	5	0.2	36.4	2	0.0	17.5	---	---
93. Burns	5	1.4	240.3	2	0.4	115.0	17	0.7	123.9	14	0.4	122.2	1.94	0.94
94. Other and unspecified effects of accidents, poisoning and violence	18	5.1	865.0	15	2.8	862.6	138	5.8	1005.9	103	2.7	898.7	0.86	0.90
TOTAL CLASS XVII Accidents, poisonings, violence (nature of injury)	49	14.0	2354.6	37	7.0	2127.7	320	13.6	2335.5	221	5.8	1928.3	1.01	1.01
95. Medical or special examinations without sickness	0	0.0	0.0	1	0.2	57.5	7	0.3	51.0	6	0.2	52.4	---	1.10
96. Mature newborn	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
97. Immature newborn	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
98. Other special admissions and examinations	0	0.0	0.0	1	0.2	57.5	9	0.4	65.6	31	0.8	270.5	---	0.21



Table A4.3 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
TOTAL CLASS Y Supplementary classification for special admissions, live births and still borns	0	0.0	0.0	2	0.4	115.6	16	0.7	116.6	37	1.0	322.8	---	0.36
TOTAL ALL DIAGNOSES	351	100	16866	533	100	16870	2357	100	17180	3806	100	33208	0.98	0.92



TABLE A5.1

OUT-PATIENT VISITS, PERCENTAGE VISITS, AND RATE OF VISITS PER 100,000 POPULATION BY  
PRINCIPAL DIAGNOSIS FROM THE YELLOWKNIFE HEALTH DISTRICT AND THE NORTHWEST TERRITORIES LESS YELLOWKNIFE, 1967

PRINCIPAL DIAGNOSIS	YELLOWKNIFE						N.W.T. LESS YELLOWKNIFE						RATIO VISIT RATE YK TO N.W.T.	
	Male			Female			Male			Female			Male	Female
	Visit	%	Rate	Visit	%	Rate	Visit	%	Rate	Visit	%	Rate		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Tuberculosis, all forms	2	0.4	96.1	2	0.5	115.0	6	0.4	43.7	7	0.5	61.1	2.2	1.9
2. Poliomyelitis & encephalitis	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
3. Infectious hepatitis	2	0.4	96.1	1	0.2	57.5	1	0.1	7.3	4	0.3	34.9	13.2	1.6
4. Other diseases - viruses	1	0.2	48.1	0	0.0	0.0	2	0.1	14.6	3	0.2	26.2	3.3	---
5. Other diseases - infective	1	0.2	48.1	4	0.9	230.0	6	0.4	43.7	11	0.8	96.0	1.1	2.4
TOTAL CLASS 1 Infective & parasitic diseases	6	1.2	288	7	1.6	402	15	1.1	109	25	1.9	218	2.6	1.8
6. Malignant neoplasms of buccal cavity & pharynx	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	0.1	8.7	---	---
7. Malignant neoplasm of stomach	0	0.0	0.0	1	0.2	57.5	0	0.0	0.0	0	0.0	0.0	---	---
8. Malignant neoplasms of large intestine except rectum	1	0.2	48.0	1	0.2	57.5	0	0.0	0.0	0	0.0	0.0	---	---
9. Malignant neoplasm of rectum	1	0.2	48.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---



Table A5.1 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
10. Malignant neoplasms of bronchus, trachea and lung	2	0.4	96.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
11. Malignant neoplasm of breast	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
12. Malignant neoplasm of cervix uteri	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
13. Malignant neoplasm of uterus other than cervix	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
14. Malignant neoplasm of fallopian tubes and broad ligament	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
15. Malignant neoplasm of prostate	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
16. Malignant neoplasm of kidney, bladder & other urinary organs	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
17. Leukemia & aleukemia	1	0.2	48.1	2	0.5	115.0	0	0.0	0.0	0	0.0	0.0	---	---
18. Other malignant neoplasms & neoplasm of lymphatic and poietic tissue	1	0.2	48.1	3	0.7	172.5	0	0.0	0.0	2	0.2	17.5	---	9.9
19. Benign neoplasm of uterus	0	0.0	0.0	1	0.2	57.5	1	0.1	7.3	2	0.2	17.5	---	---
20. Benign neoplasm of ovary	0	0.0	0.0	1	0.2	57.5	0	0.0	0.0	0	0.0	0.0	---	---
21. Benign neoplasms excluding uterus & ovary, and neoplasms of unspecified nature	4	0.8	192.2	2	0.5	115.0	12	0.9	87.5	18	1.4	157.1	2.2	0.7
TOTAL CLASS 11 Neoplasms	10	2.0	480	11	2.5	633	13	1.0	95	23	1.8	201	5.1	3.1
22. Asthma	1	0.2	48.1	0	0.0	0.0	1	0.1	7.3	1	0.1	8.7	6.6	---
23. Other allergic disorders excluding asthma	0	0.0	0.0	1	0.2	57.5	0	0.0	0.0	0	0.0	0.0	---	---



Table A5.1 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	12	13	
24. Diseases of thyroid gland	4	0.8	192.2	15	3.4	862.6	3	0.2	21.9	30	2.3	261.8	8.8	3.3
25. Diabetes mellitus	12	2.4	567.7	18	4.3	1035.1	16	1.2	116.7	26	2.0	226.9	4.9	4.5
26. Diseases of other endocrine glands	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
27. Vitaminoses and other metabolic diseases	1	0.2	48.1	3	0.7	172.5	4	0.3	29.2	4	0.3	34.9	1.6	4.9
TOTAL CLASS III Allergic, endocrine system, metabolic & nutritional diseases	18	3.6	865	37	8.5	212.8	24	1.7	175	61	4.7	532	3.6	4.0
28. Disease of the blood and blood-forming organs	3	0.6	144.2	8	1.8	460.0	1	0.1	7.3	4	0.3	34.9	19.7	13.2
TOTAL CLASS IV Disease of the blood and blood-forming organs	3	0.6	144	8	1.8	460	1	0.1	7	4	0.3	35	19.7	13.2
29. Psychoses	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
30. Psychoneurotic disorders	1	0.2	48.1	3	0.7	172.5	0	0.0	0.0	0	0.0	0.0	---	---
31. Disorder of character, behaviour & intelligence	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
TOTAL CLASS V Mental, psychoneurotic & personality disorders	1	0.2	48	3	0.7	172	0	0.0	0.0	0	0.0	0.0	---	---
32. Vascular lesions affecting central nervous system	0	0.0	0.0	1	0.2	57.5	1	0.1	7.3	0	0.0	0.0	---	---
33. Inflammation and other diseases of central nervous system	1	0.2	48.1	1	0.2	57.5	4	0.3	29.2	0	0.0	0.0	1.6	---



Table A5.1 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
34. Diseases of nerves & peripheral ganglia	1	0.2	48.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
35. Diseases and conditions of the eye	1	0.2	48.1	1	0.3	57.5	13	1.0	94.6	17	1.3	148.3	0.5	0.4
36. Diseases of the ear and mastoid process	0	0.0	0.0	2	0.5	115.0	22	1.6	160.4	19	1.5	165.8	---	0.7
TOTAL CLASS VI Diseases of the nervous system & sense organs	3	0.6	144	5	1.1	287	40	2.9	292	36	2.8	314	0.5	0.9
37. Rheumatic fever, chronic rheumatic heart disease	2	0.4	96.1	3	0.7	172.5	5	0.4	36.4	17	1.3	148.3	2.6	1.2
38. Arteriosclerotic degenerative heart disease	9	1.8	432.5	0	0.0	0.0	5	0.4	36.4	6	0.5	52.4	11.9	---
39. Other diseases of the heart	1	0.2	48.1	1	0.2	57.5	3	0.2	21.9	4	0.3	34.9	2.2	1.6
40. Hypertensive heart disease & other hypertensive diseases	3	0.6	144.2	3	0.7	172.5	4	0.3	29.2	7	0.5	61.1	4.9	2.8
41. Diseases of arteries	2	0.4	96.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
42. Varicose veins in lower extremities	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
43. Haemorrhoids	0	0.0	0.0	1	0.2	57.5	2	0.1	14.6	1	0.1	8.7	---	6.6
44. Phlebitis and thrombophlebitis	1	0.2	48.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
45. Other diseases of the circulatory system	0	0.0	0.0	3	0.7	172.5	0	0.0	0.0	3	0.2	26.2	---	6.6
TOTAL CLASS VII Diseases of the circulatory system	18	3.6	865	11	2.5	632	19	1.4	138	38	2.9	332	6.2	19.9



Table A5.1 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	12	13	
46. Acute upper respiratory infections	2	0.4	96.1	2	0.5	115.0	21	1.5	153.1	32	2.5	279.2	0.6	0.4
47. Influenza	1	0.2	48.1	1	0.3	57.5	1	0.1	7.3	1	0.1	8.7	6.6	6.6
48. Pneumonia	12	2.4	576.6	14	3.2	805.1	38	2.8	277.0	24	1.8	209.4	2.1	3.8
49. Bronchitis	7	1.4	336.4	10	2.3	575.0	9	0.6	65.6	14	1.1	122.2	5.1	4.7
50. Hypertrophy of tonsils and adenoids	1	0.2	48.1	0	0.0	0.0	4	0.3	29.2	2	0.2	17.5	1.6	---
51. Other diseases of the respiratory system	4	0.8	192.2	6	0.2	57.5	17	1.3	123.8	22	1.7	192.0	1.6	2.1
TOTAL CLASS VIII Diseases of respiratory system	27	5.4	1297	28	6.4	1610	90	6.6	656	95	7.3	829	2.0	1.9
52. Diseases of teeth & supporting structures	1	0.2	48.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
53. Ulcer of stomach, duodenum and jejunum	9	1.8	432.5	11	2.5	632.5	10	0.7	73.0	8	0.6	69.8	5.9	9.1
54. Gastritis, duodenitis, other disorders & diseases of the stomach and duodenum	3	0.6	144.2	2	0.5	115.0	3	0.2	21.9	3	0.2	26.2	6.6	4.4
55. Appendicitis	1	0.2	48.1	0	0.0	0.0	1	0.1	7.3	1	0.1	8.7	6.6	---
56. Hernia	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
57. Intestinal obstructions without mention of hernia	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
58. Gastroenteritis & cholitis except ulcerative - age 4 wks and over	2	0.4	96.1	1	0.2	57.5	4	0.3	29.2	7	0.5	61.1	3.3	0.9



Table A5.1 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
59. Chronic enteritis & ulcerative cholangitis	1	0.2	48.1	1	0.2	57.5	3	0.2	21.9	4	0.3	34.9	2.2	1.6
60. Cirrhosis	1	0.2	48.1	3	0.7	172.5	1	0.1	7.3	3	0.2	26.2	6.6	6.6
61. Diseases of gall bladder and pancreas	8	1.6	384.4	7	1.6	402.5	8	0.6	58.2	22	1.7	192.0	6.6	2.1
62. Other diseases of digestive system	0	0.0	0.0	5	1.1	287.5	9	0.7	65.6	4	0.3	34.9	---	8.2
TOTAL CLASS IX Diseases of digestive system	26	5.2	1250	30	6.9	1725	39	2.9	284	52	4.0	454	4.4	3.8
63. Nephrositis & nephrosis	1	0.2	48.1	3	0.7	172.5	0	0.0	0.0	4	0.3	34.9	---	4.9
64. Infections of kidney	3	0.6	144.2	8	1.8	460.0	13	1.0	948	51	3.9	445.0	1.5	1.0
65. Calculi of kidney, ureter & other parts of urinary system	1	0.2	48.1	3	0.7	172.5	4	0.3	29.2	1	0.1	8.7	1.6	19.8
66. Other diseases of urinary system	3	0.6	144.2	10	2.3	575.0	27	2.0	196.9	85	6.5	741.6	0.7	0.8
67. Hypoplasia of prostate	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
68. Redundant prepuce & phimosis	4	0.8	192.2	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
69. Diseases of ovary, fallopian tubes & parametrium & infective diseases of uterus, vagina & vulva	0	0.0	0.0	3	0.7	172.5	0	0.0	0.0	29	2.2	253.0	---	0.7
70. Uteral vaginal prolapse	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
71. Disorders of menstruation	0	0.0	0.0	8	1.8	460.0	0	0.0	0.0	2	0.2	17.5	---	26.4
72. Other disorders of genital organs	4	0.8	192.0	0	0.0	0.0	3	0.2	21.9	33	2.5	287.9	8.8	---



Table A5.1 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
TOTAL CLASS X														
Disorders of genital urinary system	16	3.2	769	35	8.0	2013	47	3.5	343	205	15.8	1789	2.2	1.1
73. Complications of pregnancy	0	0.0	0.0	9	2.1	517.5	0	0.0	0.0	12	0.9	104.7	---	5.0
74. Abortions	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	2	0.2	17.5	---	---
75. Delivery without complications	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	0.1	8.7	---	---
76. Delivery with mention of complications	0	0.0	0.0	1	0.2	57.5	0	0.0	0.0	0	0.0	0.0	---	---
77. Complications of puerperium	0	0.0	0.0	1	0.2	57.5	0	0.0	0.0	3	0.2	26.2	---	2.2
TOTAL CLASS XI														
Deliveries and complications of pregnancy, childbirth & puerperium	0	0.0	0	11	2.5	632	0	0.0	0	18	1.4	157	---	4.0
78. Infection of skin and subcutaneous tissues	10	2.0	480.5	7	1.6	402.5	41	3.0	298.9	34	2.6	296.7	1.6	1.4
79. Other diseases of skin and subcutaneous tissues	8	1.6	384.4	6	1.4	345.0	8	0.6	58.3	6	0.5	52.4	6.6	6.6
TOTAL CLASS XII														
Diseases of skin & cellular tissues	18	3.6	865	13	3.0	747	49	3.6	357	40	3.1	349	2.4	2.1
80. Arthritis and rheumatism except rheumatic fever	18	3.6	865.0	17	3.9	977.6	10	0.7	73.0	22	1.7	192.0	11.8	5.1
81. Displacements of intervertebral disc	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	0.1	8.7	---	---
82. Other diseases of bones and organs of movement	10	2.0	480.5	7	1.6	402.5	17	1.0	123.8	20	1.5	174.5	3.9	2.3



Table A5.1 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
TOTAL CLASS XIII Diseases of bones and organs of movement	28	5.6	1345	24	5.5	1380	27	2.0	197	43	3.3	375	6.8	3.7
83. Congenital malformations	1	0.2	48.1	2	0.5	115.0	1	0.1	7.3	4	0.3	34.9	6.6	3.3
TOTAL CLASS XIV Congenital malformations	1	0.2	48	2	0.5	115	1	0.1	7	4	0.3	35	6.6	3.3
84. Certain diseases of early infancy	0	0.0	0.0	0	0.0	0.0	1	0.1	7.3	1	0.1	8.7	---	---
TOTAL CLASS XV Certain diseases of early infancy	0	0.0	0	0	0.0	0	1	0.1	7	1	0.1	9	---	---
85. Senility and ill-defined conditions	64	12.8	3075.4	65	14.9	3738	96	7.1	699.8	119	9.2	1038.3	4.4	3.6
TOTAL CLASS XVI Senility and ill-defined conditions	64	12.8	3075	65	14.9	3738	96	7.1	700	119	9.2	1038	4.4	0.3
86. Fracture of/or involving skull, face bones, head injury except open wound, concussion and haematoma of scalp	6	1.2	288.3	3	0.7	172.5	13	1.0	94.8	4	0.3	34.9	3.0	4.9
87. Fracture of spine and trunk	8	1.6	384.4	2	0.5	115.0	13	1.0	94.8	8	0.6	69.8	4.0	1.6
88. Fracture of upper limb	27	5.4	1297.4	18	4.1	1035.1	72	5.3	534.9	40	3.1	349.0	2.5	3.0
89. Fracture of femur	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	0.1	8.7	---	---
90. Other fractures of lower limbs except femur	10	2.0	480.5	9	2.1	517.5	31	2.3	226.0	30	2.3	261.8	2.1	2.0
91. Dislocations without fracture & sprains, and sprains of joints and adjacent muscles	11	2.2	528.6	7	1.6	402.5	51	3.8	371.7	37	2.8	322.8	1.4	1.2
92. Internal injury of chest, abdomen and pelvis	0	0.0	0.0	0	0.0	0.0	2	0.1	14.6	1	0.1	8.7	---	---



Table A5.1 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
93. Burns	12	2.4	576.6	2	0.5	115.0	50	3.7	364.5	47	3.6	410.1	1.6	0.3
94. Other unspecified effects of accidents, poisonings & violence	178	35.5	8553.6	76	17.2	4370.3	618	45.6	4504.7	304	23.4	2652.5	1.9	1.6
TOTAL CLASS XVII Accidents, poisonings, violence (nature of injury)	252	51.2	12110	117	26.9	6728	850	62.7	6196	472	36.3	4118	1.9	1.6
95. Medical or special examinations without sickness	3	0.6	144.1	17	3.9	977.6	16	1.2	116.7	22	1.7	192.0	1.2	5.1
96. Mature newborn	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
97. Immature newborn	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	---	---
98. Other special admissions and examinations, live births & still borns	8	1.6	384.4	11	2.5	632.5	27	2.0	196.8	41	3.2	357.7	1.9	1.8
TOTAL CLASS Y Supplementary classification for special admissions, live births and still borns	11	2.2	529	28	6.4	1610	43	3.2	313	63	4.8	550	1.7	2.9
TOTAL ALL DIAGNOSES	502	100	24123	435	100	25359	1355	100	9877	1299	100	11334	2.4	2.2



TABLE A6.1

YELLOWKNIFE SURVEYED POPULATION BY SEX, AGE GROUP AND YEARS OF RESIDENCE IN THE COMMUNITY

Age Group	Males				Total	Females				Total	Total Both Sexes
	Years of Residence					Years of Residence					
	< 5	5-9	10+	Not Reported		< 5	5-9	10+	Not Reported		
0-14	255	150	75	106	586	222	121	62	96	501	1,087
15-24	67	22	55	32	176	63	25	63	41	192	368
25-34	79	44	26	47	196	70	46	35	62	213	409
35-44	55	33	71	55	214	28	32	52	51	163	377
45-54	15	19	63	25	122	16	17	55	20	108	230
55-64	12	15	50	20	97	5	9	18	9	41	138
65+	3	1	26	4	34	1	-	8	4	13	47
Not reported	-	-	-	3	3	1	-	-	4	5	8
Total	486	284	366	292	1428	406	250	293	287	1236	2664



TABLE A6.2

## YELLOWKNIFE REPORTED SICKNESSES BY DRINKING WATER SUPPLY AND SANITARY FACILITIES AND DIAGNOSTIC GROUPING

Disease Conditions	I.C.D. No.	Drinking water supply from				Total	Sanitary Facilities			
		Town	Private Well	Other	Not Reported		Flush Toilet	Chemical Toilet	Outdoor Privy	Not Reported
Allergic, endocrine system, metabolic and nutritional diseases	240-289	15	1	-	-	16	15	1	-	-
Mental, psychoneurotic & personality disorders	300-326	26	-	-	1	27	23	-	3	1
Diseases of the nervous system & sense organs	330-398	30	2	5	-	37	37	-	-	-
Diseases of the circulatory system	400-468	20	1	1	-	22	21	1	-	-
Diseases of the respiratory system	470-527	250	20	8	1	279	211	52	15	1
Diseases of the digestive system	530-587	50	2	4	-	56	50	5	1	-
Diseases of the skin & cellular tissue	690-716	18	-	-	-	18	14	1	3	-
Diseases of the bones & organs of movement	720-749	16	1	1	-	18	14	2	2	-
Symptoms referable to limbs and back	Less 787	38	1	1	1	41	36	2	2	1
Symptoms, senility and ill-defined conditions	780-795	77	-	5	1	83	75	6	1	1
Accidents, poisonings and violence	800-999	10	1	-	2	13	8	2	1	2
Other		31	5	2	2	40	31	4	3	2
Total		581	34	27	8	650	535	76	31	8
Population at risk		2,389	61	196	18	2,664	2,239	295	91	39



TABLE A6.3

YELLOWKNIFE REPORTED SICKNESSES PER 1,000 POPULATION AT RISK, BY DRINKING WATER SUPPLY  
AND SANITARY FACILITIES AND DIAGNOSTIC GROUPING

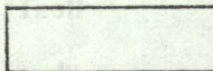
Disease Conditions	I.C.D. No.	Drinking water supply from			Sanitary Facilities		
		Town	Private Well	Other	Flush Toilet	Chemical Toilet	Outdoor Privy
Allergic, endocrine system, metabolic & nutritional diseases	240-289	6	16	-	7	3	-
Mental, psychoneurotic and personality disorders	300-326	11	-	-	10	-	33
Diseases of the nervous system & sense organs	330-398	13	33	25	17	-	-
Diseases of the circulatory system	400-468	8	16	5	9	3	-
Diseases of the respiratory system	470-527	105	328	41	94	176	165
Diseases of the digestive system	530-587	21	33	20	22	17	11
Diseases of the skin & cellular tissue	690-716	7	-	-	6	3	33
Diseases of the bones and organs of movement	720-749	7	16	5	6	7	22
Symptoms referable to limbs and back	Less 787	16	16	5	16	7	22
Symptoms, senility & ill-defined conditions	780-795	32	-	25	33	20	11
Accidents, poisonings & violence	800-999	4	16	-	3	7	11
Other		13	82	10	14	13	33
Total*		243	556	136	237	256	341

\* Detail may not add to total because of rounding



APPENDIX A8.1

MEDICAL CONFIDENTIAL



YELLOWKNIFE, N.W.T., CLINICAL SURVEY

Name \_\_\_\_\_ Age \_\_\_\_\_

A. Out-patient record (preceding two years)

Date	Diagnosis	Remarks
.....		
.....		
.....		
.....		
.....		

B. Hospital Admissions (preceding two years)

Date	Diagnosis
.....	
.....	

C. Summary of health questionnaire



Table A8.1 (Cont'd)

2

For Office  
Use Only

## D. MEDICAL EXAMINATION

Date:

- |                |  | Good  | Moderate | Poor |
|----------------|--|-------|----------|------|
| 1. Appearance: |  |       |          |      |
|                | Health                                       | ..... |          |      |
|                | Physical Development                         | ..... |          |      |
|                | Nutritional Status                           | ..... |          |      |
|                | Pallor                                       |       |          |      |
|                | Jaundice                                     |       |          |      |
|                | Cyanosis                                     |       |          |      |
| 2. Build:      | Standing height..... Sitting Height.....     |       |          |      |
|                | Weight.....                                  |       |          |      |
|                | Mesomorph..... Endomorph..... Ectomorph..... |       |          |      |
| 3. Eyes:       | Vision - Right eye.....                      |       |          |      |
|                | Left eye.....                                |       |          |      |
|                | Lens.....                                    |       |          |      |
|                | Conjunctiva, sclera, cornea.....             |       |          |      |
|                | Strabismus.....                              |       |          |      |
|                | Other.....                                   |       |          |      |
|                | Pupils - shape and size - R..... L.....      |       |          |      |
|                | reaction to light - R..... L.....            |       |          |      |
|                | accommodation - R..... L.....                |       |          |      |
|                | Fundi - R..... L.....                        |       |          |      |
| 4. Ears:       | Hearing - R..... L.....                      |       |          |      |
|                | External ear and canal - R..... L.....       |       |          |      |
|                | Drums - R..... L.....                        |       |          |      |



Table A8.1 (Cont'd)

3

5. Nose: Septum.....  
Mucosa.....
6. Mouth: Tongue, etc.....
7. Throat: Pharynx.....  
Tonsils.....
8. Neck: Thyroid.....  
Other.....
9. Chest and Axillae: Adenopathy.....  
Other.....  
.....
10. Abdomen: Scars, masses, tenderness.....  
.....  
Liver.....  
Spleen.....  
Kidneys.....
11. Inguinal region.....
12. Musculo-skeletal - upper limbs.....  
lower limbs.....  
joints.....  
spine: Scoliosis.....  
Kyphosis, Lordosis.....  
Range of motion.....  
gait.....



Table A8.1 (Cont'd)

13. Integument - Scalp and Hair.....

.....

.....

.....

Skin.....

.....

.....

.....

Nails.....

.....

.....

.....

14. Comments:



Table A8.1 (Cont'd)

5

## 15. CNS: Mental

- (a) 1. General behaviour (speech, appearance, co-operation, etc.).....  
 2. Mood (anxiety, depression, apathy).....  
 3. Sensorium (memory orientation, etc.).....  
 4. Level of intelligence (vocabulary judgement).....  
 .....  
 .....  
 .....
- (b) Co-ordination, Gait, Equilibrium
1. Posture, gait, co-ordinated automatic movements.....  
 2. Romberg.....  
 3. Finger to nose, heel to knee test.....  
 4. Rapidly alternating movements of hands.....
- (c) Sensation
1. Pain.....  
 2. Temperature.....  
 3. Touch.....  
 4. Vibration.....  
 5. Sense of position.....



Table A8.1 (Cont'd)

6

## (d) Reflexes

## 1. (i) Deep: biceps.....

triceps.....

quadriceps.....

achilles.....

## (ii) Superficial: abdominal.....

cremasteric.....

## 2. Clonus: ankle, patellar.....

extensor plantar reflex.....

## (e) Motor Power

Extremities.....

Neck and trunk.....

## (f) Cranial Nerves.....

.....

.....

.....

## (g) Eye Grands.....

.....

## (h) Miscellaneous

Abnormalities of muscle tone, atrophy of muscles, involuntary  
movements, stiff neck etc.....

.....

.....

## (i) Comments



Table A8.1 (Cont'd)

7

16. Respiratory System


Chest: Shape: Normal..... Flat..... Funnel.....  
 Barrel..... Grooved.....  
 Asymmetrical.....  
 Circumference: after insp..... after exp.....  
 Movement: Chest as a whole..... Accessory muscles.....  
 Supraclavicular fossae..... Diaphragm.....  
 Intercostal recession..... Abdominal breathing.....  
 Dyspnoea:.....


Respiratory Cycle:

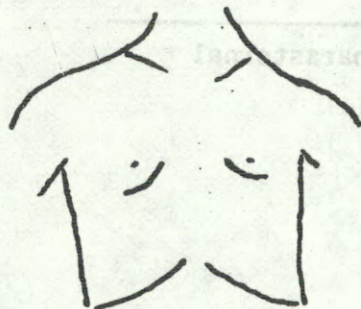


Palpation, movement - R..... L.....

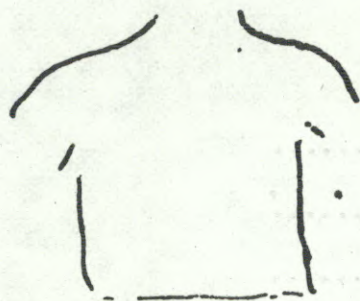
Fremitis: - R..... L.....

Percussion, Auscultation: Rhonchi = ; Crepitations = xxxx

Consolidation (dullness to percussion, absent breath sounds) = 



Front



Back

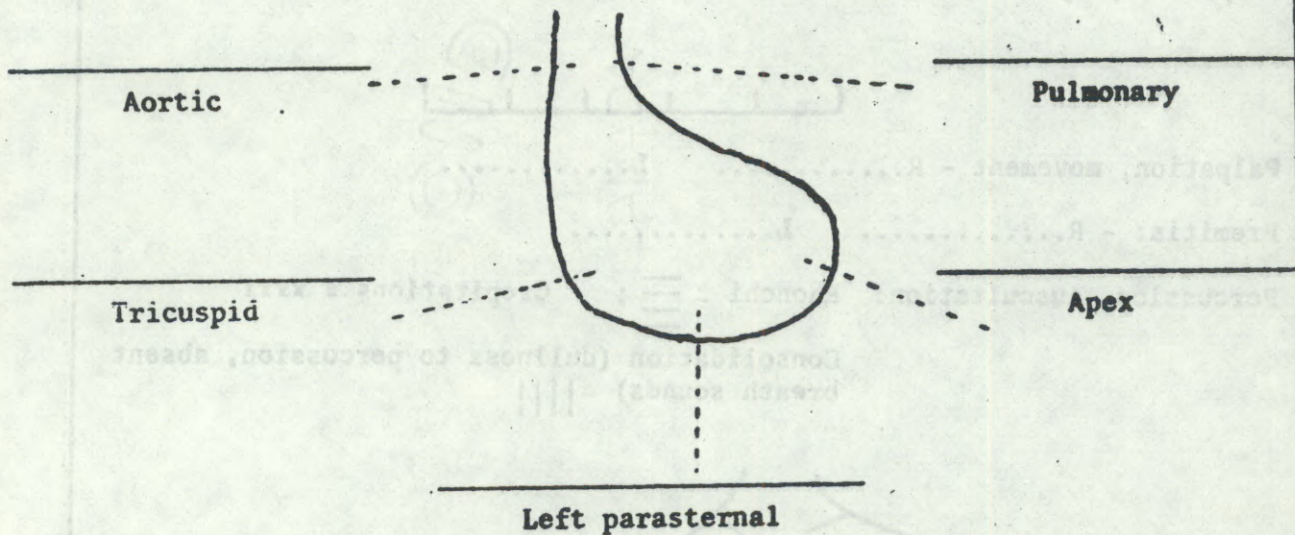


Table A8.1 (Cont'd)

8

17. Circulatory System: Venous Distension: Neck.....  
 Trunk.....  
 Lower limbs.....  
 Apical impulse: Within M.C.L.....  
 At M.C.L.....  
 Beyond M.C.L.....  
 Interspace.....  
 Heart size.....

Murmurs (e.g. M,P,A,Tr); Thrills(Thr); Sounds: Intensity(eg M<sub>1</sub>,M<sub>2</sub>) Split(+;-)



B.P.: Initial...../.....;  
 After rest...../.....;  
 Pulse rates (at rest)...../min.  
 Condition of arteries.....  
 Edema: Ankles.....  
 Sacral.....  
 Clubbing: (fingers, toes) minimal.....  
 moderate.....  
 marked.....

18. Comments:



Table A8.1 (Cont'd)

**E. SPECIAL INVESTIGATIONS****1. X-Ray**

**First Reading:**      **Read by**..... **Date**.....

**Second Reading:**

**(i)**    **Read by**..... **Date**.....

**(ii)**   **Read by**..... **Date**.....

**(iii)**   **Read by**..... **Date**.....

**Comments:**



Table A8.1 (Cont'd)

10

## 2. E.C.G. Report:

Name:..... Date:.....

## 3. Ventilatory Capacity

Date:..... Bar. Pres..... Temp.....

(a) FVC.....

.....

.....

.....

(b) MMEF.....

(c) FEV 1.0.....

FEV %.....

(d) PFR.....

.....

.....

.....

.....

.....

Comments:



Table A8.1 (Cont'd)

11

4. Creatinine.....	
Uric acid.....	
Total proteins.....	
A/G ratio.....	
Cholesterol.....	
Calcium.....	
Total lipids.....	
Vitamin A.....	
Carotene.....	
Ascorbic acid.....	
SGOT.....	
Alkaline phosphatase.....	
Hb.....	
Glucose (1 hr/75 gm).....	
Sialic acid.....	
VDRL.....	
Bentonite Flocculation.....	
Electrophoresis.....	
.....	



Table A8.1 (Cont'd)

5. Hematology: Hb.....

ESR.....

Hematocrit.....

Differential: Polymorphonuclears.....

Stab.....

Metamyelocytes.....

Lymphocytes.....

Eosinophils.....

Basophils.....

Monocytes.....

Comments: RBC's.....Normochromic.....Normocytic.....

Hyperchromic.....Microcytic.....

Macrocytic.....

WBC's.....

6. Urinalysis - Occult blood.....

Ketones.....

Glucose.....

Protein.....

pH.....

Comments.....



TABLE A8.2

NUMBERS AND PERCENTAGES OF MALES EXAMINED BY POPULATION GROUP AND AGE

Population Group	Numbers and Percentages by Age Group												All Ages			
	10-19		20-29		30-39		40-49		50-59		60-69				70+	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
RESPONDERS	3	2.48	16	13.22	36	29.75	28	23.14	19	15.70	16	13.22	3	2.48	121	32.79
MILL WORKERS	2	2.86	15	21.43	18	25.71	13	18.57	16	22.86	6	8.57			70	18.97
LONG RESIDENTS	8	2.95	8	2.95	65	23.99	81	29.89	64	23.62	38	14.02	7	2.58	271	73.44
TOTAL EXAMINED	10	2.71	44	11.92	104	28.18	96	26.02	67	18.16	41	11.11	7	1.90	369	100



TABLE A8.3

## MALES EXAMINED, ALL GROUPS, BY AGE AND LENGTH OF RESIDENCE IN YELLOWKNIFE

MALES EXAMINED, ALL GROUPS, BY AGE AND LENGTH OF RESIDENCE IN YELLOWKNIFE																
Residence in Yellowknife (yrs)	Males Examined by Age												All Ages			
	10-19		20-29		30-39		40-49		50-59		60-69				70+	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Less than 5	-	-	16	36.4	20	19.2	9	9.4	2	3.0	1	2.4			48	13.0
5 to 9	2	20.0	20	45.5	19	18.3	6	6.3	1	1.5	2	4.9			50	13.6
10 to 14	5	50.0	2	4.5	49	47.1	38	39.6	20	30.0	5	12.2			119	32.2
15 and more	3	30.0	6	13.6	16	15.4	43	44.8	44	65.7	33	80.5	7	100.0	152	41.2
Total	10	100.0	44	100.0	104	100.0	96	100.0	67	100.0	41	100.0	7	100.0	369	100.0



TABLE A8.4

## MALES EXAMINED BY CURRENT OCCUPATION AND AGE GROUP

MALES EXAMINED BY CURRENT OCCUPATION																
Current Occupation	Males Examined by Age Group												All Ages			
	10-19		20-29		30-39		40-49		50-59		60-69				70+	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Mill and assay labs	2	20.0	14	31.8	14	13.5	8	8.3	15	22.4	7	17.1	-		60	16.3
Underground mining	1	10.0	12	27.3	38	36.5	27	28.1	18	26.9	-		-		96	26.0
Outdoor (labourer)	-		7	15.9	23	22.1	33	34.4	18	26.9	18	43.9	4	57.1	103	27.9
Office (clerical)	-		3	6.8	11	10.6	9	9.4	8	11.9	2	4.9	-		33	8.9
Other	7	70.0	8	18.2	18	17.3	19	19.8	8	11.7	14	34.1	3	42.9	77	20.9
Total	10		44		104		96		67		41		7		369	



TABLE A8.5

## MALES EXAMINED BY CIGARETTE SMOKING CATEGORY AND AGE GROUP

Smoking Habit	Males by Age Group												All Ages No %	
	10-19 No %	20-29 No %	30-39 No %	40-49 No %	50-59 No %	60-69 No %	70+ No %							
Never smoked	6 60.0	7 15.9	10 9.6	7 7.4	5 7.5	4 9.8	1 14.3	39 10.6						
Stopped smoking	-	7 15.9	20 19.2	15 17.9	16 23.9	7 17.1	2 28.6	67 19.9						
Cigar & pipe only	-	2 4.5	3 2.9	6 6.3	3 4.8	2 4.9	1 14.3							
Current smoker														
less than 10	1 10.0	2 4.5	10 9.6	7 7.3	5 7.5	6 14.6	1 14.3	33 8.4						
10 to 19	2 20.0	12 27.3	13 12.5	9 8.4	5 7.5	8 18.5	1 14.3	50 11.7						
20 and more	1 10.0	14 31.8	48 46.2	52 54.2	33 49.3	14 34.1	1 14.3	163 46.0						
Total	10	44	104	96	67	41	7	369						



TABLE A8.6

MALES WHO RESPONDED TO THE HEALTH QUESTIONNAIRE  
AND WHO WERE ALSO EXAMINED CLINICALLY BY LENGTH OF YELLOWKNIFE RESIDENCE AND AGE GROUP

Yellowknife Residence	Males by Age Group							All Ages No.
	10-19	20-29	30-39	40-49	50-59	60-69	70+	
Less than 5 years		8	5	5	1			19
5 to 9 years	1	6	7	5	1			20
10 to 14 years	1		21	9	2	3		36
15 years and more	1	2	3	9	15	13	3	46
TOTAL	3	16	36	28	19	16	3	121



TABLE A8.7

PREVALENCE OF SELECTED CONDITIONS BY LENGTHS OF RESIDENCE  
IN YELLOWKNIFE AND AGE

Condition	Length of Residence in Yellowknife	Conditions and Percentage Prevalence by Age Group														All Ages	
		10-19		20-29		30-39		40-49		50-59		60-69		70+			
		No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
A. <u>CHRONIC RES-PIRATORY DISEASE</u>	Less than 10 yrs	1		8	22.2	20	51.3	8	53.3	2		1		-		40	40.8
	10 - 14 yrs	-		1		24	49.0	15	39.5	16	80.0	3		-		59	49.6
	15 yrs or more	-		2		3	18.8	23	53.5	27	61.4	26	78.8	5		86	56.6
	TOTAL	1	10.0	11	25.0	47	45.9	46	47.1	45	67.2	30	73.2	5	71.4	185	50.1
B. <u>HISTORY OF SKIN LESIONS</u>	Less than 10 yrs	1		14	38.9	20	51.3	5	3.3	3		-				43	43.9
	10 - 14 yrs	1		1		25	51.0	15	39.5	11	55.0	3				56	47.1
	15 yrs or more	2		4		9	50.	18	41.9	28	63.6	18	54.5	5		83	54.6
	TOTAL	4	40.0	19	43.2	53	51.0	38	39.6	42	62.7	21	51.2	5	71.4	182	49.3
C. <u>NEUROLOGICAL FINDINGS</u>	Less than 10 yrs	-		4	11.1	3	7.7	1		1		2		-		11	11.2
	10 - 14 yrs	-		-		6	12.2	9	23.7	5	25.0	2		-		22	18.5
	15 yrs or more	-		-		-	-	5	11.6	18	40.9	18	54.5	5		46	30.3
	TOTAL	-		4	9.1	9	8.7	15	15.6	24	35.8	22	53.7	5	71.4	79	21.4



Table A8.7 (Cont'd)

		10-19		20-29		30-39		40-49		50-59		60-69		70+		All Ages		
		No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	
D.	<u>SKIN LESIONS ON EXAMINATION</u>	Less than 10 yrs	2	100.0	5	13.9	12	30.8	2	13.3	2	66.7	1	33.3			24	24.5
		10 - 14 yrs	0	-	1	50.0	18	36.7	11	28.9	7	35.0	2	40.0			39	32.8
		15 yrs or more	1	33.3	1	16.7	6	37.5	7	16.3	19	43.2	7	21.2	0		41	27.0
		TOTAL	3	60.0	7	15.9	36	34.6	20	20.8	28	41.8	10	24.4			104	28.2
E.	<u>ECG: NO CODABLE FINDINGS</u>	Less than 10 yrs	2	100	28	77.8	30	76.9	10	66.7	2	66.7	0	0	0		72	73.5
		10 - 14 yrs	3	60	1	50	27	55.1	24	63.2	7	35	0	0	0		62	52.1
		15 yrs or more	2	66.7	5	83.3	12	75	20	46.5	16	36.4	6	18.2	1	14.3	62	40.8
		TOTAL	7	70	34	77.3	69	66.3	54	56.3	25	37.3	6	14.6	1	14.3	196	53.1
F.	<u>ECG: CODABLE BUT NON-SPECIFIC ITEMS</u>	Less than 10 yrs	0	0	5	13.9	6	15.4	4	26.7	0	0	2	66.7	0		17	17.3
		10 - 14 yrs	0	0	0	0	16	32.7	6	15.8	7	35	2	40	0		31	26.1
		15 yrs or more	1	33.3	1	16.7	1	6.3	11	25.6	16	36.4	14	42.4	1	14.3	45	29.6
		TOTAL	1	10	6	13.6	23	22.1	21	21.9	23	34.3	18	43.9	1	14.3	93	25.2
G.	<u>ECG: ABNORMALITIES</u>	Less than 10 yrs	0	0	3	8.3	3	7.7	1	6.7	1	33.3	1	33.3	0		9	9.2
		10 - 14 yrs	2	40	1	50	6	12.2	8	21.1	6	30	3	60	0		26	21.8
		15 yrs or more	0	0	0	0	3	18.8	12	27.9	12	27.3	13	39.4	5	71.4	45	29.6
		TOTAL	2	20	4	9.1	12	11.5	21	21.9	19	28.4	17	41.5	5	71.4	80	21.7



Table A8.7 (Cont'd)

		10-19		20-29		30-39		40-49		50-59		60-69		70+		All Ages	
		No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
H.	<u>HYPERTENSION</u>																
	Less than 10 yrs	0	-	1	2.8	4	10.3	1	6.7	0	-	0				6	6.1
	10 - 14 yrs	0	-	0	-	3	6.1	9	23.7	4	20.0	0				16	13.4
	15 yrs or more	0	-	0	-	1	6.2	0	-	6	13.6	6	18.2	1	14.3	14	9.2
	TOTAL	0	-	1	2.3	8	7.7	10	10.4	10	10.4	6	14.6	1	14.3	36	9.8
I.	<u>HYPERTENSION</u> <u>PLUS PROBABLE</u> <u>HYPERTENSION</u>																
	Less than 10 yrs	0	-	1	2.8	6	15.4	2	13.3	0	-	0				9	9.2
	10 - 14 yrs	0	-	0	-	4	8.2	9	23.7	4	20.0	0				17	14.3
	15 yrs or more	0	-	0	-	3	18.8	3	7.0	9	20.5	8	24.2	2	28.6	25	16.4
	TOTAL	0	-	1	2.3	13	12.5	14	14.6	13	19.4	8	19.5	2		51	13.8
J.	<u>GLUCOSE LEVEL</u> <u>GREATER THAN</u> <u>160 mg %</u>																
	Less than 10 yrs	0	-	1	2.8	1	2.6	1	6.7	0	-	0				3	3.1
	10 - 14 yrs	0	-	0	-	5	10.2	5	13.2	0	-	1				11	9.2
	15 yrs or more	0	-	1	16.7	2	12.5	6	14.0	4	9.1	4	12.1	2	28.6	19	12.5
	TOTAL	0	-	2	4.5	8	7.7	12	12.5	4	6.0	5	12.2	2		33	8.9
K.	<u>POSSIBLE</u> <u>'DIABETICS'</u>																
	Less than 10 yrs	0	-	0	-	0	-	1	6.7	0	-	0				1	1.0
	10 - 14 yrs	0	-	0	-	1	2.0	2	5.3	0	-	0				3	2.5
	15 yrs or more	0	-	1	16.7	0	-	1	2.3	1	2.3	0		0		3	2.0
	TOTAL	0	-	1	2.3	1	1.0	4	4.2	1	1.5	0		0		7	1.9



TABLE A8.8

PROPORTION OF MALES WITH SELECTED CONDITIONS BY LENGTH OF RESIDENCE IN YELLOWKNIFE AND AGE GROUP

Condition	Length of Residence in Yellowknife	Rates by twenty-year age groups			
		20-39	40-59	60+	All Ages
CHRONIC RES- PIRATORY DISEASE	10 to 14 years	.49	.53	.60	.50
	15 years or more	.23	.57	.78	.57
	x <sup>2</sup>	3.37	.09	2.32	1.05
HISTORY OF SKIN LESIONS	10 to 14 years	.51	.45	.60	.47
	15 years or more	.55	.53	.58	.55
	x <sup>2</sup>	.00	.608	.1	1.23
NEUROLOGICAL FINDINGS	10 to 14 years	.12	.24	.40	.18
	15 years or more	-	.26	.58	.30
	x <sup>2</sup>	1.48	.01	.6	<u>4.32</u>
ECG: CODABLE BUT NON-SPECIAL ITEMS	10 to 14 years	.31	.22	.40	.26
	15 years or more	.09	.31	.38	.30
	x <sup>2</sup>	3.0	.9	.14	.26
ECG: ABNOR- MALITIES	10 to 14 years	.14	.24	.60	.22
	15 years or more	.14	.28	.45	.30
	x <sup>2</sup>	.13	.07	.03	1.70
HYPERTENSION	10 to 14 years	.06	.22	-	.13
	15 years or more	.05	.07	.18	.09
	x <sup>2</sup>	.11	<u>6.06</u>	-	.82
GLUCOSE LEVEL GREATER THAN 160 mg %	10 to 14 years	.10	.09	.20	.09
	15 years or more	.14	.11	.15	.13
	x <sup>2</sup>	.01	.08	.13	.46



TABLE A8.9

MALES EXAMINED BY AGE GROUP, MILL EXPOSURE  
AND LENGTH OF RESIDENCE IN YELLOWKNIFE

Exposure	Years	Males Examined by Age Group							All Ages
		10-19	20-29	30-39	40-49	50-59	60-69	70+	
<u>MILL EXPOSURE</u>	Less than 5 yrs	2	10	10	7	1	3		33 )
	5 to 9 years		5	2	2	1	2		12 )
	10 to 14 years			6	3	5	1		15 )
	15 years and more				1	9			10 )
	TOTALS	2	15	18	13	16	6		70 )
<u>RESIDENCE IN YK</u>	Less than 5 yrs		5	2			1		8 )
	5 to 9 years	1	8	3	1	1			14 )
	10 to 14 years		1	10	4	4	1		20 )
	15 years and more	1	1	3	8	11	4		28 )
	TOTALS	2	15	18	13	16	6		70 )



TABLE A8.10

PREVALENCE OF CONDITIONS AMONG MILL WORKERS  
BY DURATION OF MILL EXPOSURE AND AGE GROUPS

		10-19 No.	20-29 No.	30-39 No.	40-49 No.	50-59 No.	60-69 No.	70+ No.	All Ages No.	
<u>SIMPLE</u> <u>CHRONIC</u> <u>BRONCHITIS</u>	Less than 10 years	1	2	3	4	2	2	-	14	31.1
	10 to 14 years	-	-	1	3	4	1	-	9	60.0
	15 years or more	-	-	-	1	5	-	-	6	60.0
	TOTAL	1	2	4	8	11	3	-	29	41.4
<u>HISTORY OF</u> <u>SKIN LESIONS</u>	Less than 10 years	2	4	9	4	1	2	-	22	48.8
	10 to 14 years	-	-	5	1	5	1	-	12	80.0
	15 years or more	-	-	-	1	8	-	-	9	90.0
	TOTAL	2	4	14	6	14	3	-	43	61.4
<u>NEUROLOGICAL</u> <u>FINDINGS</u>	Less than 10 years	-	1	-	3	2	4	-	10	22.2
	10 to 14 years	-	-	1	1	1	1	-	4	26.6
	15 years or more	-	-	-	-	4	-	-	4	40.0
	TOTAL	-	1	1	4	7	5	-	18	25.7
<u>HYPERTENSION</u>	Less than 10 years	-	1	-	2	-	2	-	5	11.1
	10 to 14 years	-	-	1	-	2	-	-	3	20.0
	15 years or more	-	-	-	-	-	-	-	-	-
	TOTAL	-	1	1	2	2	2	-	8	11.4



TABLE A8.10 (Cont'd)

		10-19 No.	20-29 No.	30-39 No.	40-49 No.	50-59 No.	60-69 No.	70+ No.	All Ages No.	%
<u>NO CODABLE FINDINGS</u>	Less than 10 years	2	13	9	3	1	-	-	28	62.2
	10 to 14 years	-	-	4	3	1	-	-	8	53.3
	15 years or more	-	-	-	1	4	-	-	5	50.0
	TOTALS	2	13	13	7	6	-	-	41	58.6
<u>NON-SPECIFIC CODABLE ITEMS</u>	Less than 10 years	-	1	2	4	1	1	-	9	20.0
	10 to 14 years	-	-	1	-	2	1	-	4	26.7
	15 years or more	-	-	-	-	3	-	-	3	50.0
	TOTALS	-	1	3	4	6	2	-	16	22.9
<u>ECG ABNOR- MALITIES</u>	Less than 10 years	-	1	1	2	-	1	-	5	15.6
	10 to 14 years	-	-	1	-	2	2	-	5	20.0
	15 years or more	-	-	-	-	2	-	-	2	50.0
	TOTALS	-	1	2	2	4	3	-	12	17.1
<u>BLOOD GLUCOSE ≥ 160 mg %</u>	Less than 10 years	-	1	2	-	-	-	-	3	8.9
	10 to 14 years	-	-	3	-	1	-	-	4	20.0
	15 years or more	-	-	-	-	-	-	-	-	-
	TOTALS	-	1	5	-	1	-	-	7	10.0
<u>CHOLESTEROL ≥ 280 mg %</u>	Less than 10 years	-	-	1	1	-	-	-	2	4.4
	10 to 14 years	-	-	1	2	-	-	-	3	20.0
	15 years or more	-	-	-	-	1	-	-	1	10.0
	TOTALS	-	-	2	3	1	-	-	6	8.6



TABLE A8.11

PREVALENCE RATES FOR SELECTED CONDITIONS AMONG MILL WORKERS BY DURATION OF MILL EXPOSURE AND AGE GROUPS

Condition	Length of Exposure	Age Groups			
		20-39	40-59	60+	All Ages
CHRONIC RES- PIRATORY DISEASE	Less than 10 yrs	.19	.55	.40	.31
	More than 10 yrs	.17	.73	1.00	.60
	x <sup>2</sup>	.23	.3		<u>4.4</u>
HISTORY OF SKIN LESIONS	Less than 10 yrs	.48	.45	.40	.49
	More than 10 yrs	.83	.83	1.00	.89
	x <sup>2</sup>	1.2	2.98		<u>6.95</u>
NEUROLOGICAL FINDINGS	Less than 10 yrs	.04	.45	.80	.22
	More than 10 yrs	.17	.33	1.00	.32
	x <sup>2</sup>	.07	.07		.4
ECG: CODABLE BUT NON SPECIFIC ITEMS	Less than 10 yrs	.11	.45	.20	.20
	More than 10 yrs	.17	.28	1.00	.28
	x <sup>2</sup>	.10	.3		.2
ECG: ABNOR- MALITIES	Less than 10 yrs	.07	.18	.20	.11
	More than 10 yrs	.17	.22	1.00	.24
	x <sup>2</sup>	.01	.04		2.1
HYPERTENSION	Less than 10 yrs	.04	.18	.40	.11
	More than 10 yrs	.17	.11	-	.11
	x <sup>2</sup>	.17	0		.08
GLUCOSE LEVEL GREATER THAN 160 mg %	Less than 10 yrs	.11	-	-	.07
	More than 10 yrs	.50	.06	-	.16
	x <sup>2</sup>	2.72			.69



TABLE A8.12

PREVALENCE OF CONDITIONS AMONG MILL WORKERS  
BY PERIODS OF RESIDENCE IN YELLOWKNIFE AND AGE GROUPS

		10-19 No.	20-29 No.	30-39 No.	40-49 No.	50-59 No.	60-69 No.	70+ No.	All Ages No.	Ages %
<u>SIMPLE CHRONIC BRONCHITIS</u>	Less than 10 years	1	2	1	1	1	-	-	6	27.3
	10 to 14 years	-	-	2	1	3	1	-	7	35.0
	15 years or more	-	-	1	6	7	2	-	16	57.1
	TOTALS	1	2	4	8	11	3	-	29	41.5
<u>HISTORY OF SKIN LESIONS</u>	Less than 10 years	1	3	3	1	1	-	-	9	40.9
	10 to 14 years	-	-	8	2	3	1	-	14	70.0
	15 years or more	1	1	3	3	10	2	-	20	71.4
	TOTALS	2	4	14	6	14	3	-	43	61.5
<u>NEUROLOGICAL FINDINGS</u>	Less than 10 years	-	1	-	-	-	1	-	2	9.1
	10 to 14 years	-	-	1	2	2	1	-	6	30.0
	15 years or more	-	-	-	2	5	3	-	10	35.7
	TOTAL	-	1	1	4	7	5	-	18	25.7
<u>HYPER- TENSION</u>	Less than 10 years	-	1	-	-	-	-	-	1	4.6
	10 to 14 years	-	-	-	2	-	-	-	2	10.0
	15 years or more	-	-	1	-	2	2	-	5	17.9
	TOTALS	-	1	1	2	2	2	-	8	11.4
<u>NO CODABLE FINDINGS</u>	Less than 10 years	1	11	5	1	1	-	-	19	86.4
	10 to 14 years	-	1	6	2	1	-	-	10	50.0
	15 years or more	1	1	2	4	4	-	-	12	42.9
	TOTAL	2	13	13	7	6	-	-	41	58.6



TABLE A8.12 (Cont'd)

		10-19	20-29	30-39	40-49	50-59	60-69	70+	All Ages	
		No.	No.	No.	No.	No.	No.	No.	No.	%
<u>NON-SPECIFIC</u> <u>CODABLE ITEMS</u>	Less than 10 years	-	1	-	-	-	1	-	2	9.1
	10 to 14 years	-	-	2	1	2	1	-	6	30.0
	15 years or more	-	-	1	3	4	-	-	8	28.5
	TOTAL	-	1	3	4	6	2	-	16	22.9
<u>ECG ABNOR-</u> <u>MALITIES</u>	Less than 10 years	-	1	-	-	-	-	-	1	4.5
	10 to 14 years	-	-	2	1	1	-	-	4	20.0
	15 years or more	-	-	-	1	3	3	-	7	25.0
	TOTAL	-	1	2	2	4	3	-	12	17.1
<u>BLOOD GLUCOSE</u> <u>&gt; 160 mg %</u>	Less than 10 years	-	1	1	-	-	-	-	2	9.1
	10 to 14 years	-	-	3	-	-	-	-	3	15.0
	15 years or more	-	-	1	-	1	-	-	2	7.1
	TOTAL	-	1	5	-	1	-	-	7	10.0
<u>CHOLESTEROL</u> <u>&gt; 280 mg %</u>	Less than 10 years	-	-	-	-	-	-	-	-	-
	10 to 14 years	-	-	2	1	-	-	-	3	15.0
	15 years or more	-	-	-	2	1	-	-	3	10.7
	TOTAL	-	-	2	3	1	-	-	6	8.6



TABLE A8.13

PREVALENCE RATES FOR SELECTED CONDITIONS AMONG MILL WORKERS BY LENGTH OF RESIDENCE IN YELLOWKNIFE AND AGE GROUPS

Condition	Length of Exposure	Age Groups			
		20-39	40-59	60+	All Ages
CHRONIC RES- PIRATORY DISEASE	Less than 10 yrs	.17	1.00	-	.27
	More than 10 yrs	.20	.63	.60	.48
	x <sup>2</sup>	.04	.09		1.9
HISTORY OF SKIN LESIONS	Less than 10 yrs	.33	1.00	-	.41
	More than 10 yrs	.80	.67	.60	.71
	x <sup>2</sup>	<u>5.43</u>	.04		<u>4.51</u>
NEUROLOGICAL FINDINGS	Less than 10 yrs	.06	-	1.00	.09
	More than 10 yrs	.07	.41	.80	.33
	x <sup>2</sup>	.36			3.46
ECG: CODABLE BUT NON-SPECIFIC ITEMS	Less than 10 yrs	.06	-	1.00	.09
	More than 10 yrs	.20	.37	.20	.29
	x <sup>2</sup>	.53			2.4
ECG: ABNOR- MALITIES	Less than 10 yrs	.06	-	-	.05
	More than 10 yrs	.13	.22	.60	.23
	x <sup>2</sup>	.03			2.4
HYPERTENSION	Less than 10 yrs	.06	-	-	.05
	More than 10 yrs	.07	.15	.40	.15
	x <sup>2</sup>	.36	-		.67
GLUCOSE LEVEL GREATER THAN 160 mg %	Less than 10 yrs	.11	-	-	.09
	More than 10 yrs	.27	.04	-	.10
	x <sup>2</sup>	.49			.07



TABLE A8.14

	10-19 No.	20-29 No.	30-39 No.	40-49 No.	50-59 No.	60-69 No.	70+ No.	All Ages No.
MILL WORKERS WITH LESS THAN 10 YEARS' RESIDENCE	1	13	5	1	1	1	-	22
RESPONDERS WITH LESS THAN 10 YEARS' RESIDENCE	1	23	34	14	2	2	-	76
MILL WORKERS WITH 10 OR MORE YEARS RESIDENCE	1	2	13	12	15	5	-	48
10 YEARS OR MORE RESIDENCE LESS MILL WORKERS	7	6	52	69	49	33	7	223