

Enclosure Slip



To Mill Superintendent
Grant Yellowknife Mines Ltd
Yellowknife, N.W.S.

Please
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Discussion

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Necessary Action

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Remarks

From G. K. Gowans - Mill Supt. Date May 18/77
Con Operations

210-1510

Cominco Ltd.

Con Operations

Arsenic Survey 1976

In 1976, Cominco Ltd. conducted a survey to monitor the levels of arsenic in the air, soil, forage, garden vegetables, water and ambient air in the Yellowknife area. This survey is the same as previous arsenic surveys done in 1970 and 1975, with the ambient air survey being an addition in 1976. The 1970 and 1975 values are given for comparison wherever possible. All assays were performed by Trail Analytical Labs.

Soil

On September 29, 1976 soil samples were collected at the Con and Negus Mine properties, Con and town gardens, Rat Lake, Frame Lake, the Giant-Edmonton road junction and one mile south of the Giant operations stack.

The soil was sampled using a pipe sampler 3' long and 3/4" I.D. The sampler was inserted to a depth of 13" and then extracted. The soil was then carefully removed and separated into three sections, 0-1", 1"-7" and 7"-13". The exception is the garden soils where the whole section 0-13" was left together. The samples were taken at random intervals over an area 40' in diameter at each location. The soil samples were air dried before being sent for assay. The assay values are on a dry weight basis.

Normal levels of arsenic found in soils in Western Canada vary from 10-200 ppm depending on the mineralization of the area sampled. Generally a value of 1-40 ppm could be used as a normal level.

The soil samples taken at the Con property, near the new headframe, had elevated arsenic levels in the 0-1" depth. This level of arsenic is probably caused by past atmospheric emissions from the roasting operation at Con.

In 1975 the Negus Mine samples showed high arsenic levels in all three depths; it was concluded that the samples came from an emergency tailings area. The sampling location was changed in 1976 to 100 ft. east, out of the gulley and onto the hillside. Again elevated levels were found in the 0-1" and 1"-7" depths. These high levels were probably caused by atmospheric emissions from the Negus roasting operation.

The remainder of the locations sampled had levels ranging from 20-140 ppm. The arsenic levels above 40 ppm, in this group, Con gardens, Frame Lake and one mile south of the Giant operations stack are probably caused by atmospheric emissions from the three roasting operations. The remainder of this group of locations had arsenic levels which can be considered normal.

SOIL SURVEY 1976

<u>Location</u>	<u>Depth</u>	<u>Total Arsenic Metal ppm Arsenic (Dry Weight)</u>	
		<u>1975</u>	<u>1976</u>
Con Property (100 yds. north of Rob. H.F.)	0 - 1"	2,880	420
	1" - 7"	380	30
	7" - 13"	21	30
Negus Mine (100 yds Northeast of old shaft)	0 - 1"	3,680	1,210
	1" - 7"	4,280	250
	7" - 13"	3,600	60
Con Garden (D. White)	0 - 13"	64	80
Town Garden (D.H. Egli)	North end 0 - 13"	24	30
	South end 0 - 13"	21	40
Rat Lake (25 yds west of Lake)	0 - 1"	368	20
	1" - 7"	46	20
	7" - 13"	68	40
Frame Lake (50 yds north of Lake)	0 - 1"	68	140
	1" - 7"	92	20
	7" - 13"	12	80
Giant-Edmonton Road Junction (75 yds north of junction)	0 - 1"	74	30
	1" - 7"	33	40
	7" - 13"	24	40
Giant Operations Stack (1 mile South of Stack)	0 - 1"	392	140
	1" - 7"	157	110
	7" - 13"	40	20

Forage

On September 26, 1976, native grass samples were collected from Con and Negus properties, Rat Lake, Frame Lake, the Giant-Edmonton road junction and one mile south of the Giant operations stack.

The forage samples were collected using a grab sampling method cutting the grass about 1" above the roots using scissors. The sampling was done in an area about 40' in diameter at each location. The samples were air dried before being sent for assay. The assay values are on a dry weight basis.

Forage containing up to 10 ppm arsenic, on the dry weight, is considered normal for native plants on native soil.

The forage samples from Rat Lake and Frame Lake show arsenic levels in the normal range. The forage samples from Con and Negus mine properties, the Giant-Edmonton road junction, and one mile south of the Giant operations stack show levels higher than normal. The higher levels of arsenic from these areas are probably caused by atmospheric emissions from the three roasting operations, Con, Negus and Giant.

MID SUMMER FORAGE SURVEY 1976

<u>Location</u>	<u>Total Arsenic Metal</u> All values are p.p.m. Arsenic		
	<u>1970</u>	<u>1975</u>	<u>1976</u>
Con Property - (100 yds north of Robertson H.F.)	74.0	44.0	32.0
Negus Mine - (100 yds northeast of old shaft)	8.0	22.0	139.0
Con Gardens	8.0	12.0	-
Rat Lake - (25 yds west of Lake)	-	6.0	10.0
D.H. Egli - Residence (centre of YK)	-	10.0	-
Frame Lake (to yds north of Lake)	20.0	10.0	8.0
Giant-Edmonton road junction (75 yds. north)	6.0	28.0	16.0
One mile south of Giant Operations Stack	11.0	17.0	21.0

Vegetables

On September 9, 1976 and September 10, 1976 various vegetables were collected from gardens at Con, in Yellowknife and at the Giant property.

All garden vegetables were thoroughly cleaned and washed. The vegetables were weighed in the natural state then dried at 100°F until all the moisture was removed, then sent for assay. The assay values are calculated on the natural weight.

The Canadian Food and Drug Directorate permits 0.5 to 1.0 ppm of arsenic in major foods and 1.0 to 2.0 ppm in minor foods on a natural weight basis. The U.S. Food and Drug Administration has set a limit of 3.5 ppm of arsenic in major and minor foods. Potatoes are considered a major food.

All the garden vegetables sampled in 1970, 1975 and 1976 are within the acceptable limits.

VEGETABLE SURVEY 1976

<u>Location</u>	Total Arsenic Metal All values are p.p.m. Arsenic		
	<u>1970</u>	<u>1975</u>	<u>1976</u>
W.A. Case (residence Yellowknife) potatoes	-	-	<.02
D.H. Egli (residence Yellowknife)			
lettuce	0.64	0.28	0.21
rhubarb	0.05	0.13	0.04
carrots	-	0.17	0.07
potatoes	0.20	0.25	0.10
beets	0.42	0.26	-
cabbage	-	-	0.29
Con Gardens (garden draw)			
lettuce	1.28	0.26	0.29
rhubarb	0.10	0.10	0.11
carrots	0.05	0.45	0.11
potatoes	0.03	0.31	0.03
beets	0.09	0.20	-
turnips	-	0.27	-
cabbage	-	-	0.06
Giant (various gardens around the mine)			
lettuce	-	0.16	-
rhubarb	-	0.25	0.16
carrots	-	0.22	0.20
potatoes	-	0.24	0.08
beets	-	0.36	-
turnips	-	-	0.11
parsley	-	-	0.79

Water

The water samples taken from Long Lake, Stock Lake, Frame Lake and Kam Lake were taken from the shore on September 30, 1976. The water samples from Great Slave Lake, off Latham Island, off Mosher Island, in front of Detah village, off Kam Point and in Arden's Bay were all taken on the water using a canoe on October 14, 1976.

The Canadian Drinking Water Standards and Objectives of 1968, published by the Department of National Health and Welfare list the acceptable arsenic level at .01 ppm and the maximum permissible limit at .05 ppm.

The water samples from Long Lake, Stock Lake, and Frame Lake all showed arsenic levels above the permissible limits published by the National Health and Welfare Department. These levels would probably be caused by drainage from the surrounding areas which have been effected by atmospheric emissions from the three roasting operations.

The water sample taken from Kam Lake was elevated and indicates that drainage and seepage from Pud Lake from previous years is still affecting the quality of the water. The 1970, 1975 and 1976 water samples taken from Kam Lake show steadily decreasing levels of arsenic.

All the water samples taken from Great Slave Lake were within the permissible limits published by the Department of National Health and Welfare. The samples taken from Kam Point and in Arden's Bay show that there are no adverse effects on Great Slave Lake from the Con tailings system.

LAKE WATER SURVEY 1976

	Total Arsenic Metal		
	All values are ppm Arsenic		
	<u>1970</u>	<u>1975</u>	<u>1976</u>
Latham Island	0.04	0.02	0.04
Mosher Island	0.005	0.02	0.04
Detah Village	0.005	< 0.01	0.01
Kam Point	0.01	0.01	0.005
Arden's Bay	0.01	0.02	0.01
Long Lake	-	0.15	0.14
Stock Lake	0.16	0.09	0.15
Frame Lake	0.61	0.33	0.33
Kam Lake	3.50	2.60	1.70

Ambient Air

The ambient air survey was started on September 11, 1975 and ran through to November 30, 1976, with an interruption from July 29, 1976 to August 24, 1976 due to a labour dispute and a shortage of staff.

The ambient air testing station is a portable shed which houses a sprague meter and a small vacuum pump. The air is drawn through a tared millipore filter, on the outside of the shed, at a controlled rate of .25-.30 ft.³/min. catching any airborne particulates on the filter. The filters are changed every week and then sent to the Trail Lab each month where they are weighed to obtain the total particulate in the air and then assayed to obtain the arsenic value, if any, in the particulate.

Two locations were used for this survey; one was between the Con Mill and the Assay Office, the second was in Con Camp.

The limits of arsenic in the air set by the British Columbia Government Control Branch Objectives state that the annual geometric mean should not exceed .2 $\mu\text{g}/\text{m}^3$. The arsenic values that were recorded from the ambient air survey calculated on a monthly geometric mean ranged from .02 $\mu\text{g}/\text{m}^3$ to .38 $\mu\text{g}/\text{m}^3$. The high level arsenic level that was recorded for May 1976 can be attributed to spring winds which are funnelled between the Assay Office and the Mill picking up a winters accumulation of dust that is caught in the snow and left behind when the snow melts. The calculated geometric mean from these tests was .06 $\mu\text{g}/\text{m}^3$, well below the British Columbia Government limits.

AMBIENT AIR SURVEY 1976

	monthly geometric mean $\mu\text{g}/\text{m}^3$	Total Arsenic Metal	Location
September 1975	.16		Con Mill beside #5 door
October 1975	.09		Con Mill beside #5 door
November 1975	.02		Con Mill beside #5 door
December 1975	.02		Con Mill beside #5 door
January 1976	.07		Con Mill beside #5 door
February 1976	.04		Con Mill beside #5 door
March 1976	.05		Con Mill beside #5 door
April 1976	.05		Con Mill beside #5 door
May 1976	.38		Con Mill beside #5 door
June 1976	.12		June 18/76 Moved to Con Camp
July 1-28 1976	.03		Con Camp
July 29-August 24 1976	Test Suspended		
Aug 25-Sept 1 1976	.05		Con Camp
September 1976	.05		Con Camp
October 1976	.02		Con Camp
November 1976	.04		Con Camp

Annual geometric mean .06 $\mu\text{g}/\text{m}^3$ Arsenic.