



Public Health Engineering Division
541 Federal Public Building
Edmonton, Alberta

December 9, 1966

ARSENIC CONCENTRATIONS IN WATER SUPPLIES

YELLOWKNIFE, N.W.T.

SEASONAL FLUCTUATION

There is a definite relationship between time of year and arsenic content in the water supplies, with the highest concentrations occurring in May, June and July. Some of this was attributed to processing of stored calcine, however the fact that there was a recurrence during the corresponding period of 1966 when this processing was not being carried out is indicative of the extent of the arsenic contamination of the runoff. In addition, the fluctuation of arsenic levels corresponds somewhat with summer precipitation. See Graph No. 9.

FLUCTUATION WITH TIME

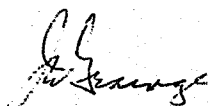
Average monthly values have increased during May, June and July, the critical months since the results in 1961 at the Town and Con Mine Supply. May and June averages have increased at Giant Mine.

1966 RESULTS

The most intensive study to date was carried out in 1966, with weekly samples analyzed. The frequency with which the arsenic concentration exceeded the U.S.P.H.S. levels of 0.01 and 0.05 ppm., and the P.H.E. emergency level of 0.3 ppm. are illustrated in the following table.

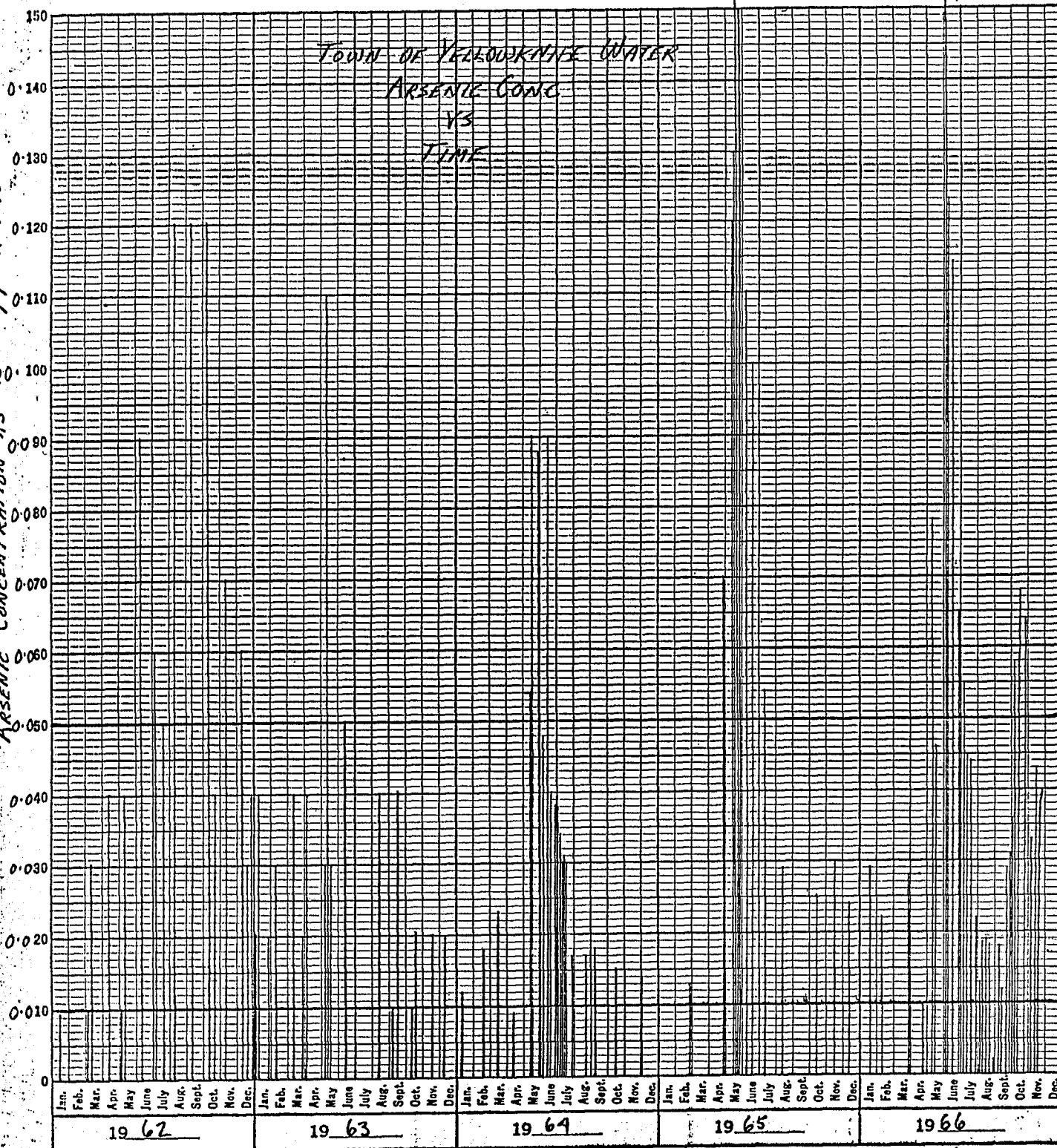
	<u>% Frequency</u> <u>>0.01 ppm.</u>	<u>% Frequency</u> <u>>0.05 ppm.</u>	<u>% Frequency</u> <u>>0.3 ppm.</u>
Town Water	93	34	3
Giant Water	96	60	6
Con Water	83	30	1

COST OF PIPELINE FROM UPSTREAM - approximately \$650,000, including six mile pipeline to new source, new water treatment and heating building.


J.W. Grainge, P. Eng.
Regional Engineer

5 YEARS BY MONTHS 358-190
X 150 DIVISIONS
KEUFFEL & ESSER CO.
MADE IN U.S.A.

ARSENIC CONCENTRATION AS IN PPM. $\times 10^{-3}$



0.01 mg/litre - recommended limit - USPHS
0.05 mg/litre - grounds for rejection

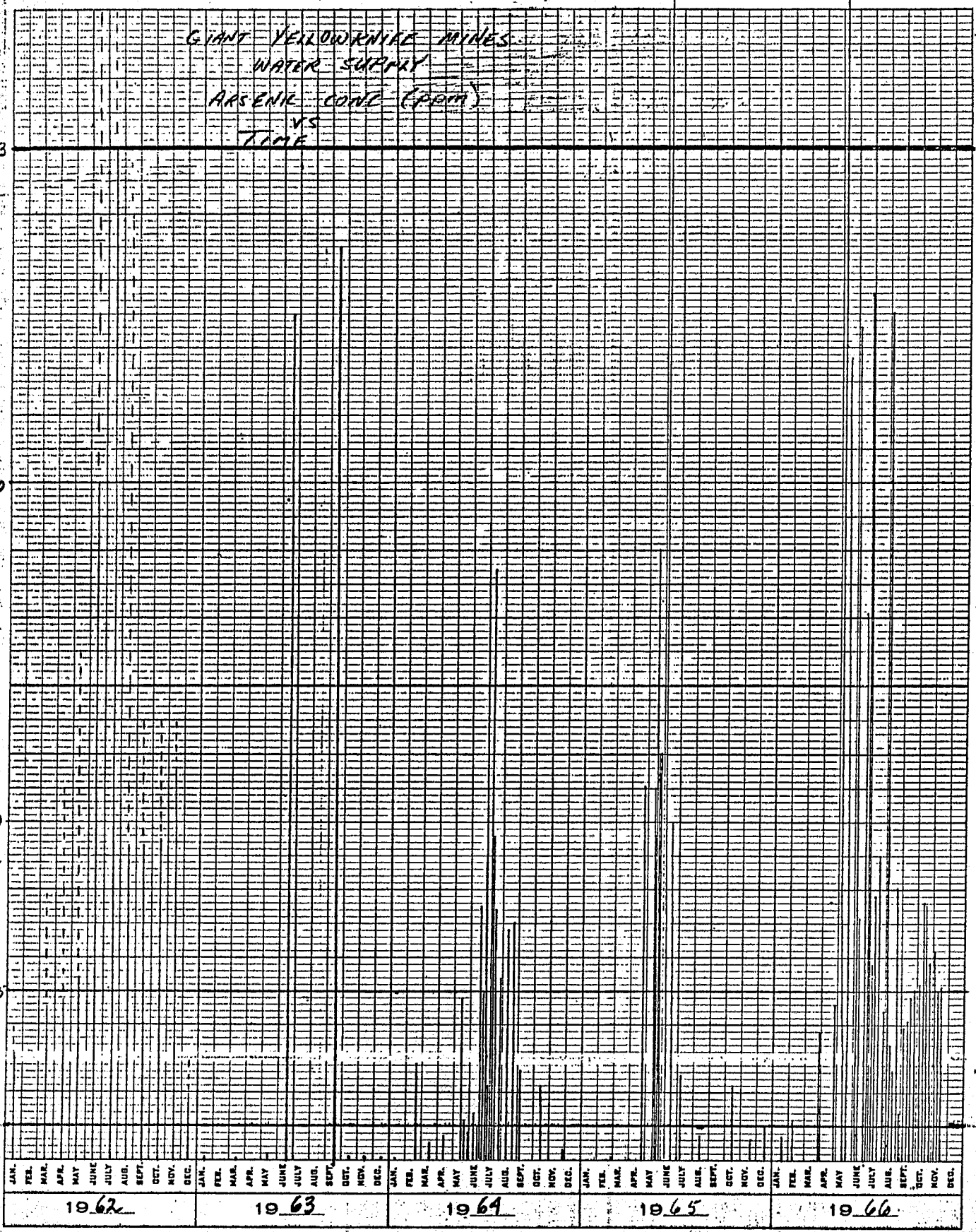
GRAPH #2

115

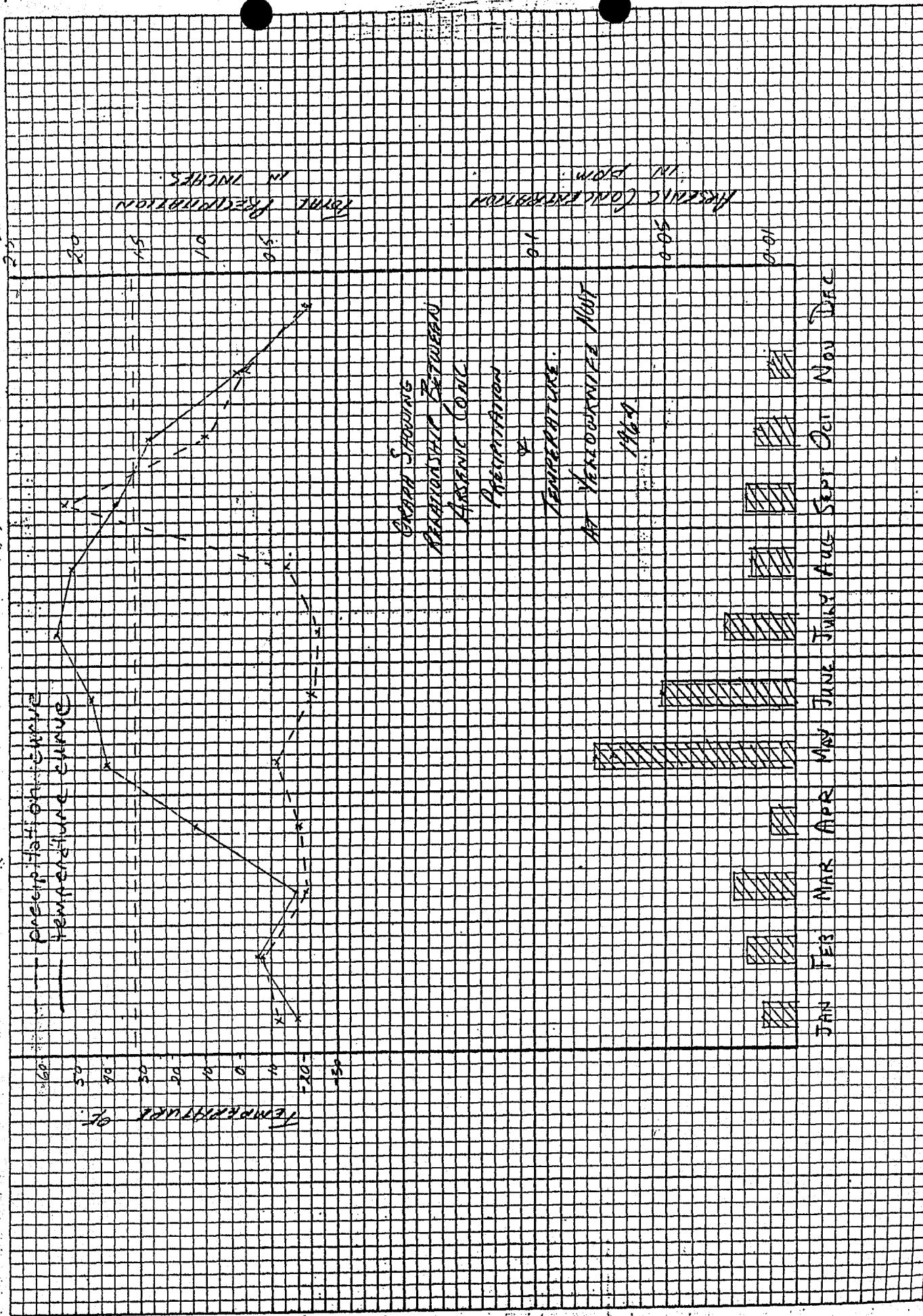
EUGENE DIETZGEN CO.
MADE IN U. S. A.

NO. 341-T33 DIETZGEN GRAPH PAPER
5 YEARS BY MONTHS

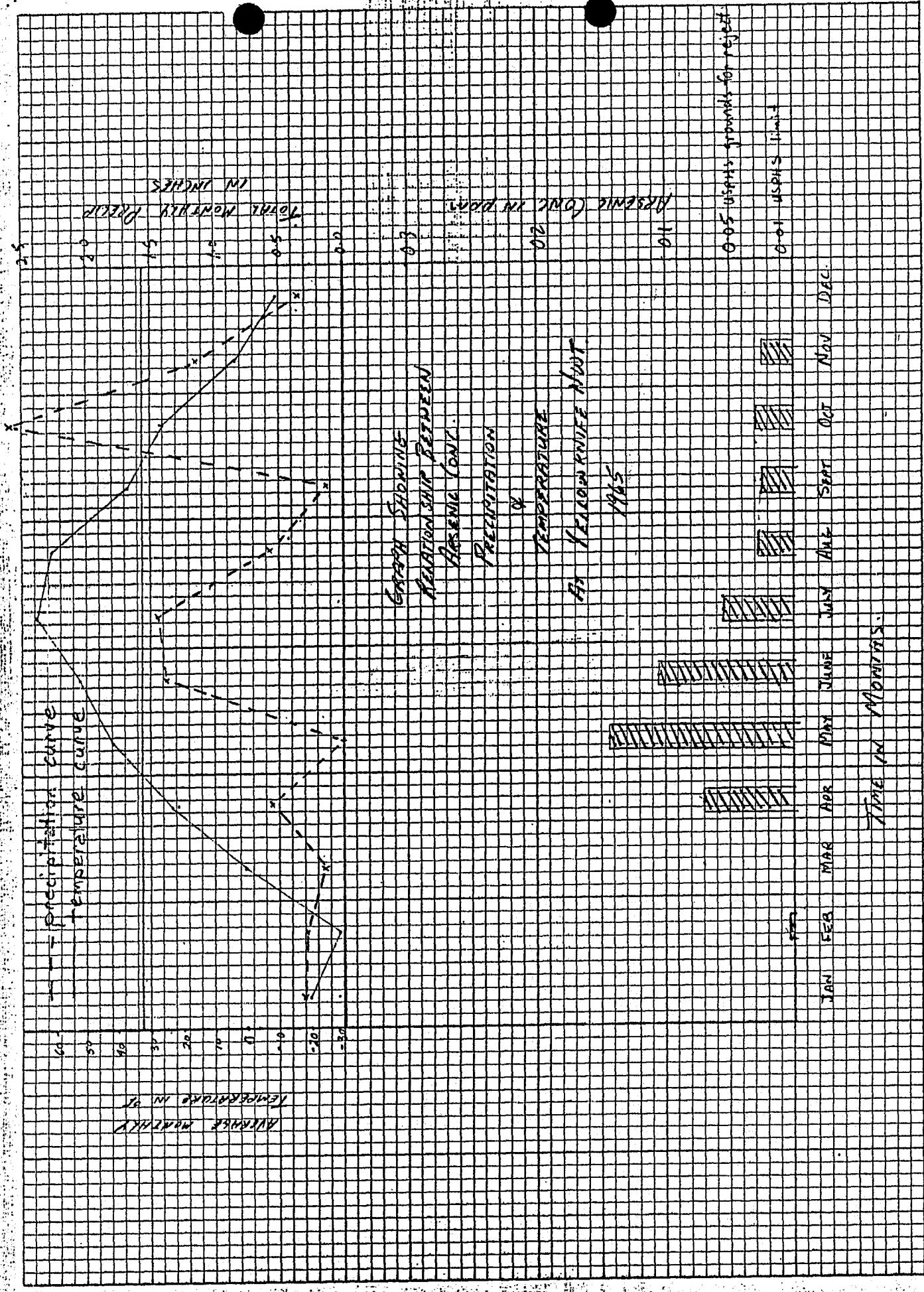
Arsenic Conc (ppm)



0.01 mg/litre - recommended limit USPHS
 0.05 mg/litre - grounds for rejection
 0.3 mg/litre - emergency level



GRAPH #A

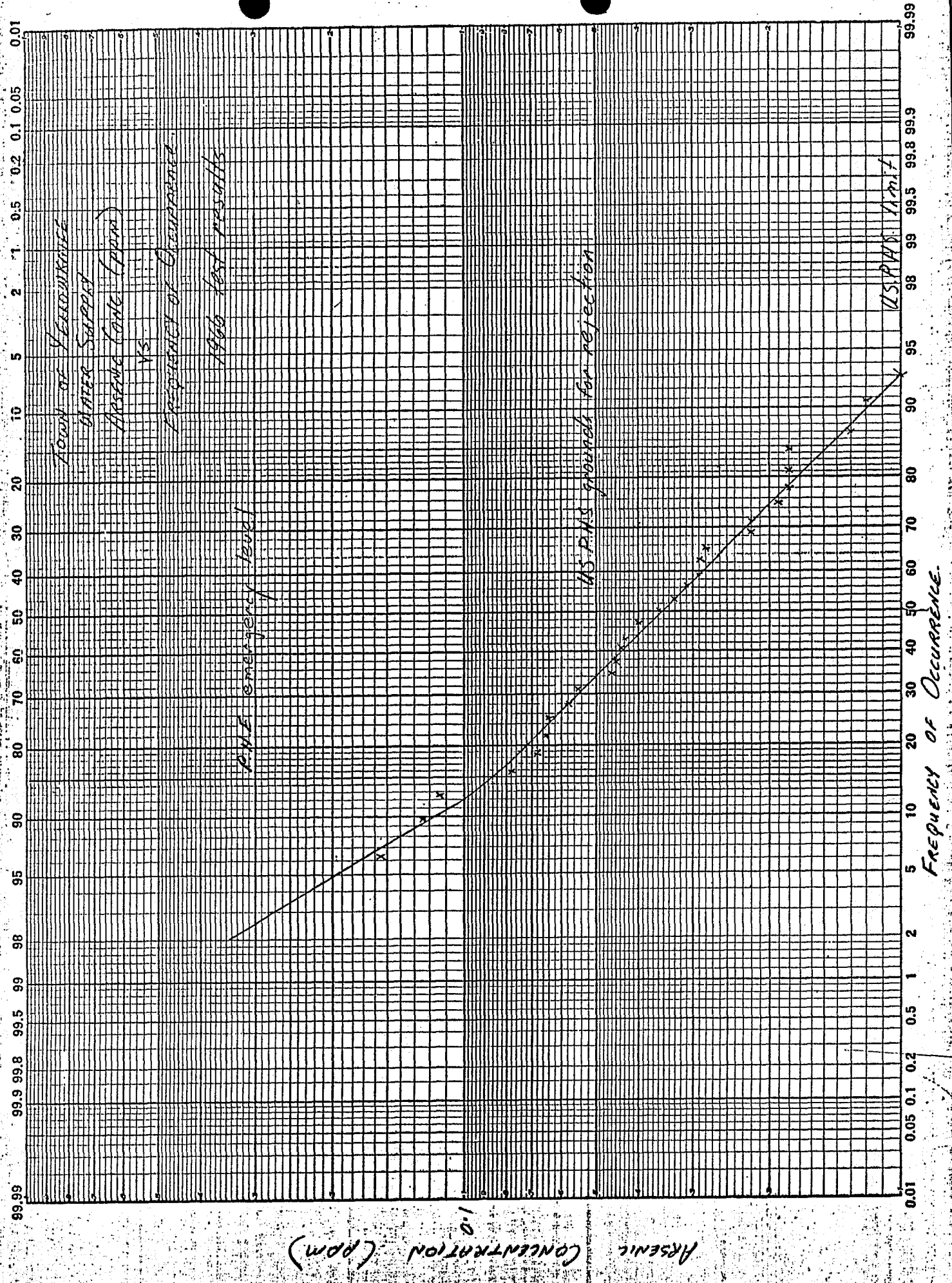


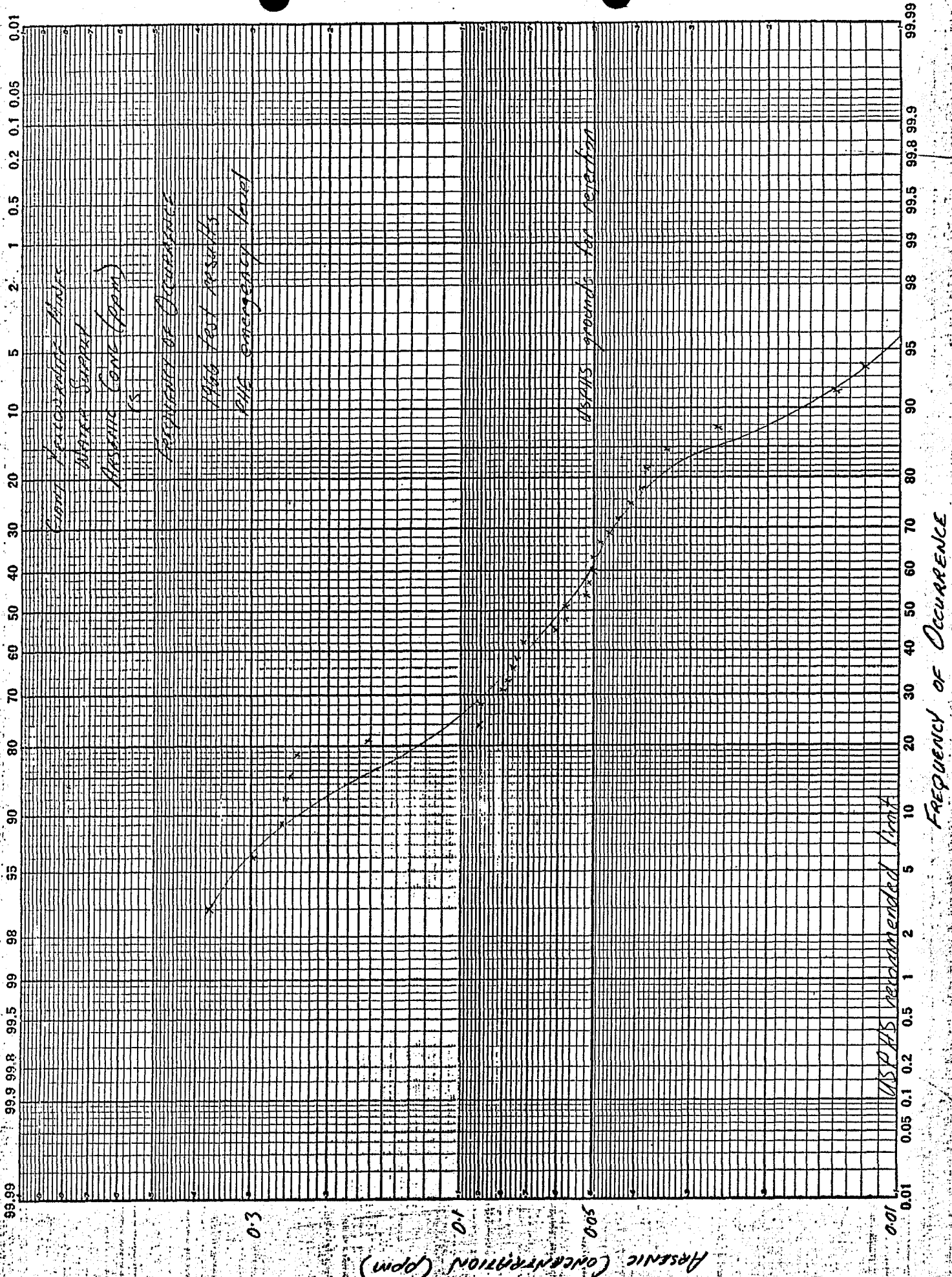
GRAPH #5

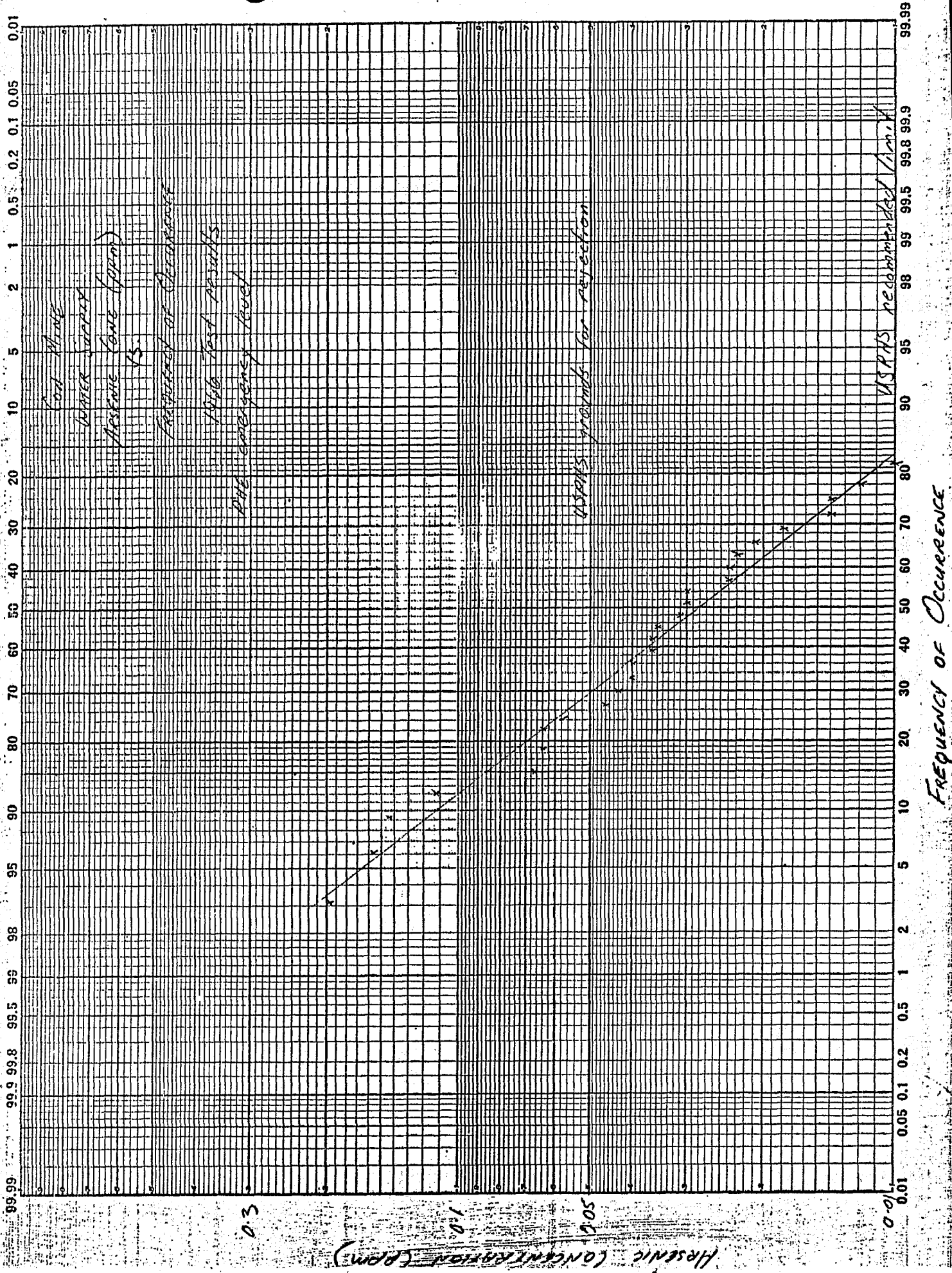
LOG-PROBABILITY PAPER
DESIGNED BY HAZEN, WHEELER & WILLIAMS
PRINTED IN U.S.A.

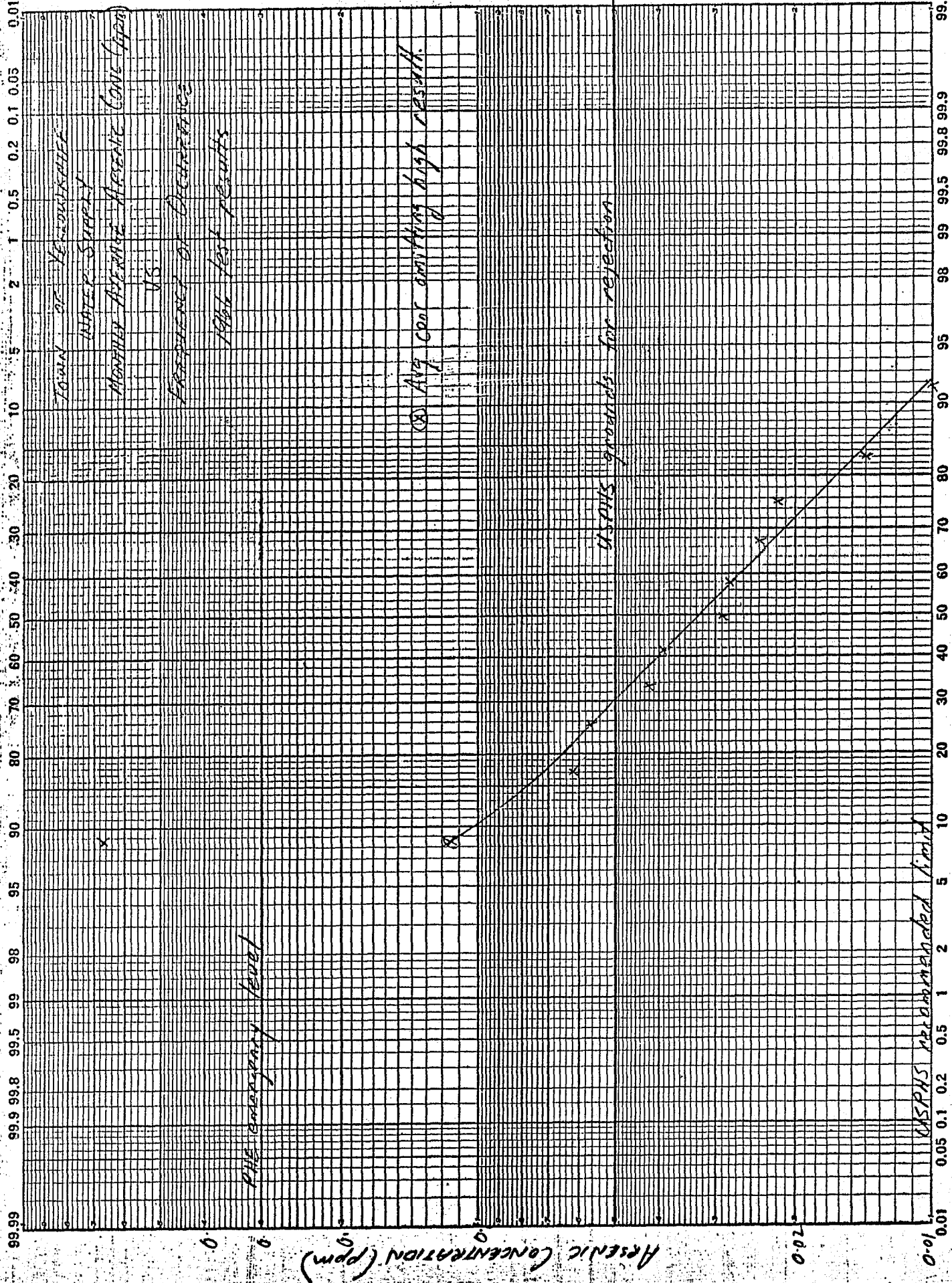


LOG-PROBABILITY PAPER
DESIGNED BY HAZEN, WHEELER & WILLIAMS
PRINTED IN U.S.A.









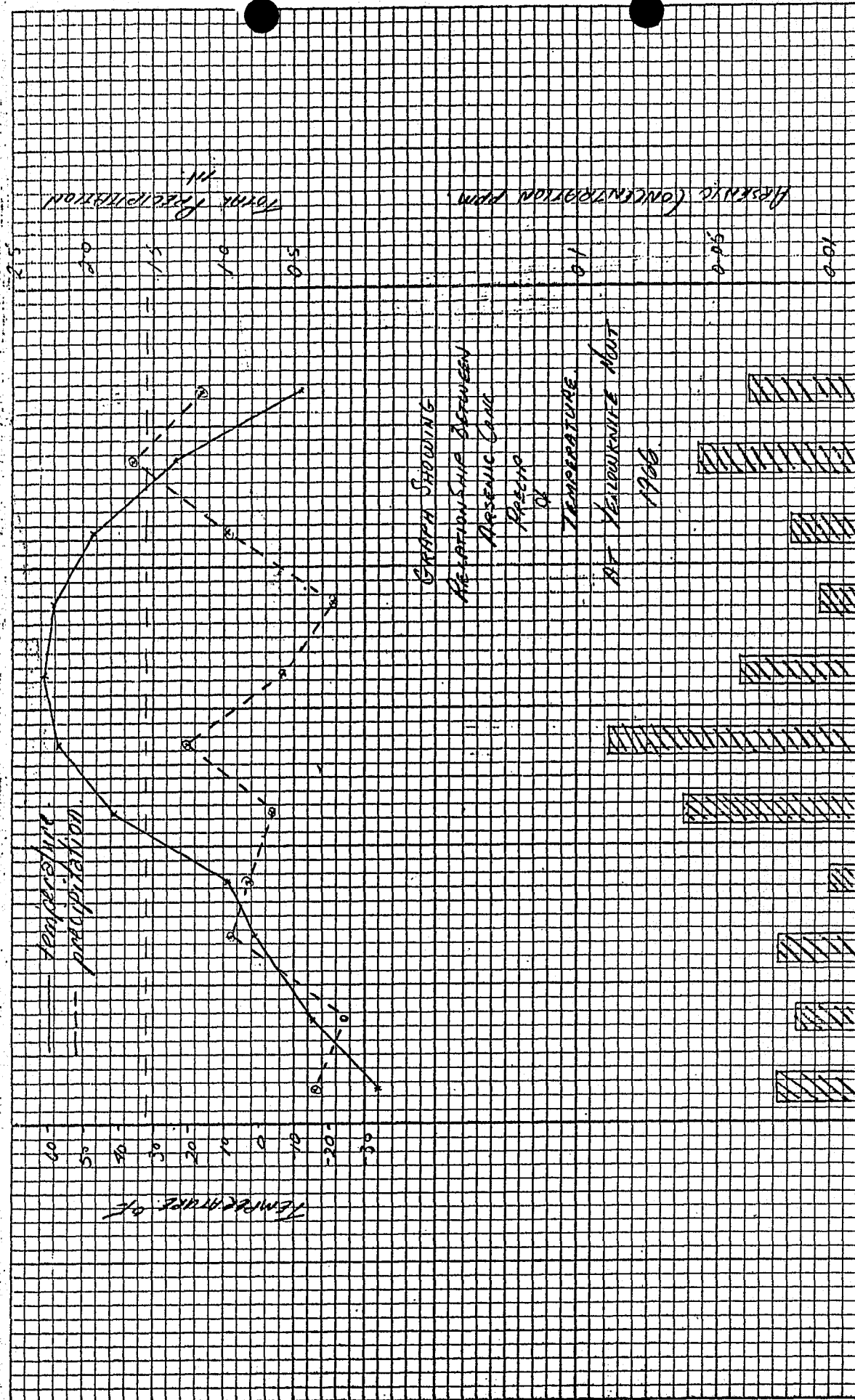
(8) Avg. conc. showing high result.

USPHS grounds for rejection

the emergency level

USPHS recommended limit

Frequency of Occurrence



JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

TEMPERATURE OF

PRECIPITATION

PRECIPITATION IN

RELATIONSHIP BETWEEN
TEMPERATURE
PRECIPITATION
AT YELLOWSTONE MOUNT
1966

TOWN OF YELLOWKNIFE

MONTHLY AVERAGE ARSENIC CONCENTRATIONS

<u>Month</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>
<u>Town Supply</u>						
January	0.015	<0.01	0.03	0.012	-	0.029
February	0.02	-	0.03	0.018	0.013	0.022
March	0.02	0.02	0.03	0.023	-	0.028
April	0.02	0.04	0.04	0.009	0.070	0.010
May	0.04	0.025	0.07	0.077	0.143	0.062
June	0.04	0.09	0.05	0.051	0.105	0.089
July	0.03	0.055	-	0.027	0.054	0.042
August	0.02	0.12	0.04	0.017	0.029	0.014
September	0.02	0.12	0.025	0.018	0.025	0.024
October	-	0.08	<0.015	0.015	0.030	0.057
November	-	0.07	0.02	0.010	0.024	0.039
December	-	0.04	0.02			
<u>Giant Mine</u>						
January	-	0.03	<0.01	<0.001	-	0.007
February	-	-	-	0.032	0.001	0.012
March	-	0.045	<0.01	0.005	-	0.038
April	<0.01	0.04	-	0.007	0.110	0.046
May	<0.018	0.0550	0.02	0.023	0.120	0.305
June	0.197	0.206	0.54	0.047	0.136	0.210
July	0.09	0.301	-	0.083	0.285	0.068
August	0.01	0.115	-	0.069	0.025	0.081
September	-	0.092	0.27	0.026	0.007	0.045
October	0.104	0.095	<0.015	0.022	0.027	0.067
November	0.077	0.116	0.01	0.003	0.006	0.054
December	0.032	<0.02	<0.01	-	0.010	-
<u>Con Mine</u>						
January	0.015	<0.01	0.025	0.013	-	0.024
February	0.02	-	0.04	0.020	0.012	0.014
March	0.02	0.025	0.03	0.021	-	0.030
April	0.02	0.02	0.04	0.011	0.05	0.024
May	0.04	0.03	0.04	0.071	0.16	0.066
June	0.02	0.06	0.05	0.040	0.075	0.134
July	0.02	0.05	-	0.024	0.048	0.029
August	0.02	0.12	0.04	0.009	0.024	0.0090
September	0.03	0.07	0.02	0.011	-	0.016
October	-	0.045	<0.01	0.015	0.024	0.039
November	-	0.08	0.01	0.010	0.036	0.038
December	-	0.056	0.03	-	0.024	-

ARSENIC RESULTS YELLOWKNIFE

Date	Giant Tap	Con Tap	Town Tap	Tailings Pond	Baker Creek Mouth	Baker Creek Above Tails.	Indian Village Lake	Frame Lake	Latham Island	Firehall	Yell. Bridge	Long Lake	Kam. Lake
<u>1964</u>													
Jan. 10	<0.001	0.013	0.012			0.272							
Feb. 20	0.032	0.020	0.018			0.218							
Mar. 18	0.005	0.021	0.023			0.198							
Apr. 13	0.007	0.011	0.009			0.550							
May 18	0.048	0.036	0.054	17.100	2.720								
May 21	0.012	0.098	0.090	18.800	1.700	0.272							
May 29	0.008	0.080	0.088	21.400	1.300	0.218							
June 9	0.014	0.058	0.048	23.800	0.820	0.198							
June 16	0.010	0.027	0.090	25.200	2.475	0.550							
June 24	0.075	0.040	0.040	50.000	2.760	0.300							
June 29	0.050	0.040	0.038		3.080	0.160							
June 30	0.088	0.038	0.038										
July 2	0.022	0.032	0.034										
July 13	0.080	0.026	0.021										
July 10	0.174	0.030	0.030										
July 13	0.096	0.026	0.031	39.000	4.160	0.161							
July 16	0.074	0.020	0.030	28.600	3.400	0.140							
July 27													
July 28	0.054	0.011	0.017	34.000	6.720	0.128		0.188	0.021				
July 23													
Aug. 10	0.068	0.011		31.200	1.250	0.106		0.480	0.016				
Aug. 25	0.070		0.017	30.800									
Aug. 20		0.008			4.520	0.074			0.010	0.052	N.D.		
Sept. 3	0.026	0.011	0.018	31.600		0.162			0.024		11.800		
Oct. 15	0.022	0.015	0.015		7.000								
Nov. 30	0.003	0.010	0.014										
<u>1965</u>													
Feb. 26	0.001	0.012	0.013										
Apr. 26	0.110	0.050	0.070		2.12								
May 26	0.120	0.120	0.120										
May 19	0.180	0.140	0.130	32.00	4.40	0.16		0.250	0.17		>0.01		

(cont.)

[illegible]

1966

Date	Giant Tap	Con Tap	Town Tap	Tailings Pond	Baker Creek Mouth	Baker Creek Above Tails.	Indian Village Lake	Latham Above Island Giant Intake	Below Mill Waste No. 3	Below Mill Waste No. 4
Sept. 12	0.041	0.006	0.012	37.500	12.500	0.270	0.012	0.028	0.029	
Sept. 19	0.048	0.020	0.029	58.000	12.400	0.200		0.038	0.048	
Sept. 26	0.050	0.023	0.031	47.500	5.50	0.068		0.040	0.054	
Oct. 3	0.052	0.018	0.036	47.000	1.750	0.183	0.006	0.048	0.064	
Oct. 11	0.076	0.064	0.058	42.500	14.250		0.009	2.400	0.070	0.60
Oct. 17	0.075	0.046		39.500	13.800		0.124	0.070		4.8
Oct. 17								2.400		
Oct. 18	0.072	0.030	0.068							
Oct. 24	0.058	0.040	0.064	46.000	15.900					
Nov. 1	0.061	0.031	0.033							
Nov. 10	0.050	0.043	0.043				0.006			
Nov. 14	0.051	0.040	0.040				0.010			