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MEDICAL SERVICES BRANCH

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850-5-X751

SEP - 8 1976

Mr. J.B. Seaborn,
Deputy Minister,
Environment Canada,
14th Floor,
Fortin Building,
OTTAWA, Ontario.
K1A 0L3

Dear Mr. Seaborn:

Sewage Disposal for the City of Yellowknife

Thank you for your recent letter and copy of the DOE brief to the Northwest Territories Water Board which was presented at a public hearing in Yellowknife on 24 June.

My departmental representative on the Water Board, Dr. W.H. Frost, has attended most of these deliberations and is generally of the view that sewage lagoons of adequate size work satisfactorily in the Northwest Territories and other systems can cause major engineering and maintenance problems. These include freezing, overflowing, prolonged mechanical breakdowns and the need to be heated in the winter. Our specific comments are as follows.

The recreational advantages of Kam Lake are recognized and if Kam Lake were the only lake with similar advantages in the vicinity of Yellowknife its preservation for recreational purposes would be of more importance but there are so many lakes in proximity to Yellowknife, some already partially developed for recreation, that Kam Lake's importance for recreation is diluted and the City gives it a low priority. Furthermore, as you are aware, Kam Lake has been contaminated over the years by frequent seepages of Con Mine tailings from Pud Lake and, in the past few years, by its use as a sewage lagoon by the City of Yellowknife to serve a nearby district of the city on a continuous basis and on occasion to take the city's total flow of sewage to prevent flooding from the city sewers when pumps to Nevin Lake were inoperative. No health problems have resulted from this. Drainage from Kam Lake is toward the southwest by way of Unnamed Lake and Mac Lake into swampland which is very suitable for the natural purification of sewage. No contamination of Great Slave Lake or other waters in close proximity to Yellowknife would occur.

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From a health standpoint there are no serious objections to disposal of sewage into Kam Lake. It would be as safe and as satisfactory as disposal into Nevin Lake has been over the years since 1948 until recently, when the latter lake became too small to accommodate the increased amounts of sewage from a rapidly expanding population. An excellent growth of green vegetation surrounds Nevin Lake which contrasts with the bare rock surrounding most other lakes.

On the other hand, disposal of comminuted sewage into Yellowknife Bay would not be acceptable from a health standpoint. It would be unacceptable even with chlorination, since this would not be adequate to make the water safe for use by Indians and others who live near the shores of the Bay. During fires and periods of high demand, water from the Bay is pumped into the water mains of the City of Yellowknife. Amoebic Dysentery has reached as far north as Snowdrift in the Northwest Territories. Amoebic cysts are known to be resistant to chlorination.

We do not favour the proposal to discharge sewage into Pud Lake. Pud Lake is used by the Con Mine for containment of tailings saturated with arsenic and cyanide salts. Minimal outflow is desirable. Increasing the inflow of liquid by adding water from the sewers would increase the outflow which ultimately reaches Great Slave Lake. Large amounts of sewage and the very large amounts of arsenic which have accumulated over the years are not a desirable combination especially if reduction of pentavalent arsenic to trivalent arsenic compounds occurs extensively. Large amounts of sewage could reduce the containment of arsenic.

With regard to secondary treatment of sewage with nutrient removal followed by chlorination and subsequent discharge into Kam Lake, we have no objections from a health standpoint. However, we do not wish to support this recommendation for several reasons. One would relate to the high cost as compared to the local government proposal which would be relatively inexpensive and adequate to protect health. Another relates to our doubts that the City of Yellowknife has the capability of operating secondary treatment facilities on a continuous basis under local conditions. Raw sewage would be dumped into the lake frequently.

The proposal to convert the Southern Third of Kam Lake into a sewage lagoon is a variation of the local government plan, the advantages and disadvantages of which are not entirely apparent at present. According to Reid, Crowther and Partners Limited Report (1976), the dam would have to be constructed from shot rock which appears to be the only practicable material available. Such a dam would be pervious, expensive and impracticable to render water-tight. The surface area of the lagoon would be reduced from 524 acres to 170 acres if Dam Site No. 3, which is recommended, is chosen. The average retention time would be reduced to 180 days. During May it could go as low as 46 days, whereas retention periods up to 365 days are desirable. A saving feature, however, is the swampland (Peter Baker Slough), southwest of Mac Lake, which would function well during the long daylight hours during May, June and July. The construction of a porous rockfill dam would not guarantee the recreational value of the northern two thirds of Kam Lake.

Mr. J.B. Seaborn

The deficiency of top soil over the irregular surface of the Precambrian Shield makes the installation of sewer extensions outside the city difficult and costly and the use of natural water courses in such rugged terrain is convenient and economically reasonable.

The location of Kam Lake is convenient for sewage disposal and for conveying the liquid to swampland for purification before it reaches Great Slave Lake. No lengthy pipelines need to be constructed through miles of solid rock. The sewers to Kam Lake have already been installed by the city at a cost of \$2,213,000.

There is a surplus of outstanding recreational lakes in the immediate vicinity of Yellowknife and the City has set its priorities with the support of the Territorial Government.

The persistent seepages of Con Mine tailings from Pud Lake to Kam Lake over the years have increased the arsenic content of Kam Lake and its marine life making the consumption of fish from Kam Lake undesirable, but the amount of arsenic in Kam Lake would be relatively unimportant in the presence of ever increasing amounts of sewage discharged directly into the lake.

There are methods of dealing with eutrophication in Kam Lake in future if this becomes a problem. The problem at Nevin Lake is chiefly due to overflow to Back Bay caused by the increase in population.

My department is responsible for the provision of advice to the Commissioner of the Northwest Territories in matters affecting the public health. Kam Lake was selected by our Public Health Engineers and Engineering Consultants as a suitable place for sewage disposal. Considerable planning and work took place before the Northern Inland Waters Act was passed. We have now reached the point where the Northwest Territories Water Board must reach a decision on the basis of the evidence presented by the public, by its technical committee and by the various government agencies.

I appreciate your bringing this matter to my attention and thank you for the opportunity of exchanging views.

Yours sincerely,

ORIGINAL SIGNED BY
ORIGINAL SIGNÉ PAR

Jean Lupien

Jean Lupien.

P.A.
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sent to DM
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Yours sincerely,

Jean Lupien.

sbm

Typed August 27, 1976
WHF/sbm