REPORT
on
ENVIRONMENTAL CONDITIONS
at
NORWAY HOUSE, ROSSVILLE, AND ADJACENT AREAS
MANITOBA

MARCH, 1969

WESTERN REGION

DIVISION OF PUBLIC HEALTH ENGINEERING

DEPARTMENT OF NATIONAL HEALTH AND WELFARE

REPORT

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S U M M A R Y

A physical summary of this report is embodied in the INDEX.

The scope of the report is presented in Part II.

Parts IV, VI, VII, and VIII describe in detail both general and specific aspects of the environmental conditions prevalent at Governmental and commercial establishments as well as individual residences. Emphasis has been placed on sanitary engineering and public health problems with the focus being on water supply and sewage disposal.

The reader's attention is directed to Part IX and Part X of the report which sum up the generally deplorable environmental conditions in the area.

It will suffice to stress here that immediate action is warranted in implementing both the general recommendations and the specific recommendations contained in Part VI of the report.

Two major contributors of water pollution have been pinpointed in the body of this report. It is hoped that these contributors set an example and a precedent by immediately upgrading their sanitary facilities.

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1966 Interim Report	- O. J. Storsater - D. R. Thompson - R. K. Rendall
1968 Final Report	- L. E. Garinger

I. ACKNOWLEDGMENTS

The persons responsible for the preparation of this report would like to acknowledge collectively the co-operation of the many residents, the Federal and Provincial agencies, and the commercial establishments of Norway House that were contacted during the field investigations and interviews pertaining to this report. Particular thanks is extended to Dr. J. D. Herman, Area Director, Medical Services, Department of National Health and Welfare at the time of the 1966 survey. Similar thanks is also extended to Dr. Ibrihim who held the same position when the 1968 survey was conducted. Extensive, invaluable assistance was afforded by Mr. Sam Anderson, the Community Health Worker, during both surveys. Mr. D. Mabey, the local Community Development Officer provided considerable assistance as well, in guiding and providing transportation and liaison.

II. SCOPE

The main purpose of this report is to describe and discuss the environmental sanitary conditions in Norway House, Rossville, and adjacent areas. An attempt is made to view specifically the individual water supply systems and waste disposal systems while appreciating the water pollution and associated water quality problems as a whole. Also included in this report is a look at population distribution. The sanitary facilities for Indian and Metis homes in the area are discussed.

It is hoped that this report will provoke both long and short term measures to improve the generally deplorable sanitary conditions prevalent at the present time.

III. INTRODUCTION

Two sanitary surveys, covering principally the areas known as Norway House, and Rossville, Manitoba, and the rivers and lakes adjacent thereto, form the basis for this report. The first survey was conducted from July 11, 1966 to July 15, 1966. The second survey was conducted from September 23, 1968 to September 27, 1968. Observations noted in the 1966 report were checked out in order to discover possible changes in the intervening 26 months. This report describes mainly conditions as found in the 1968 survey. However, background information obtained in the 1966 survey is incorporated into this report. Sample results from 1966, for example, are appended to this report.

A brief summary of the background, the vital statistics, and physical conditions of the area follows:

A. Location

Norway House is situated on the Nelson River at Little Playgreen Lake, approximately 20 miles north of the northeasterly corner of Lake Winnipeg and about 300 miles north of the City of Winnipeg.

B. History

The first trading post built in the vicinity of Norway House was constructed in 1773 by traders from Montreal. A rival fort by the North West Company was established in 1795 and shortly thereafter the Hudson's Bay Company established Jack River House on a small island on the southeast side of Playgreen Lake, opposite the mouth of the Gunisao

History (Continued)

River.

In 1814 a new post called Norway House was built by the Hudson's Bay Company at Mossy Point on the west bank of the Nelson River near the outlet of Lake Winnipeg. It was named after a party of Norwegians which was brought out to build a winter road from York Factory on Hudson's Bay to the Red River settlement. On the opening of this new fort the older Jack River House was abandoned. The first Norway House was destroyed by fire in 1824. Due to the danger of flooding, it was rebuilt on its present site, about 20 miles further north, in 1826.

Norway House became an important supply depot due to its strategic location at the junction of the routes from the west and from Red River to Hudson's Bay. Norway House is one of the oldest trading posts and Indian Missions in the west and is still an active Hudson's Bay Company centre.

C. Government

Norway House is located in the Local Government District of Consol, administered by the Provincial Municipal Commission through The Pas, Manitoba. Located within the community are many Federal, Provincial, and local Governmental agencies administering to the varied requirements of a large area of Northern Manitoba. These agencies are briefly enumerated as follows:

1.) Medical Services, Department of National Health and Welfare

A Zone Hospital and administration staff is based at Norway House.

2.) Department of Indian Affairs and Northern Development

The Norway House Agency, among its other functions, owns and operates the schools located on the Indian Reserve in the area.

3.) Royal Canadian Mounted Police

4.) Provincial Forestry Branch

The Northern Headquarters for the Provincial Forestry Branch are located in this community.

5.) Provincial Department of Education

This department owns and operates several schools located adjacent to the Indian Reserve.

6.) Provincial Community Development Service

This service of the Provincial Department of Health & Social Services works closely with other Provincial and Federal Departments in the development and operation of several local enterprises. These enterprises include the Fisherman's Co-op, the Consumers Co-op, and the Residents Association.

7.) Manitoba Hydro

Manitoba Hydro operates a generating station and maintains an operating staff in the community. The Department of Indian Affairs and Northern Development have evolved a programme of financial assistance for individual

7.) Manitoba Hydro (Continued)

house wiring on the reserve. It is estimated that there are more than 42 miles of power distribution line in the community.

8.) Manitoba Telephone System

A network of telephone communication has been developed in this community. A community dialing office and service lines are maintained by Manitoba Telephone System operating personnel.

D. General Population Distribution

The population distribution within the community is as indicated under section 'D' below and on the sketch appended to this report. It will be noted that the major developed area at Norway House is on the east channel of the Nelson River from approximately the Playgreen Inn to the District Hospital, a distance of about one mile. There is also a developed area at Rossville which is about one-third of a mile from the hospital, measured across a narrow stretch of the Little Playgreen Lake at the mouth of Mission Channel.

Indian and Metis homes are located along the shore line of both the East Channel and the Mission Channel for a distance of six to eight miles southerly from the hospital. Homes are also located along the east shore of Little Playgreen Lake for a distance of 1 1/2 miles northerly from the Indian Affairs establishment at Rossville.

E. Population Figures

The 1966 total population of Norway House and Rossville, from information provided by Mr. Sam Anderson, the Community Health Worker, is approximately 2,500. Of this total, about 1,800 are treaty Indians.

The distribution of this population is as follows:

TABLE 1

Location	Adults		Children		Total	
	N.T.	T.	N.T.	T.	N.T.	T.
Mission Island	37	77	44	106	81	183
Towers Island		36		114		150
Fort Island	128	86	48	206	176	292
Johnstone Island		17		26		43
West Shore (East Channel)	88	6	124	8	212	14
East Shore (Mission Channel)	13	137	7	260	20	397
Rossville (from O. Balfour North)	33	235	85	480	118	715
Forestry Island	8		12		20	
Long Island	17		34	2	51	2
T O T A L	324	594	354	1202	678	1796

Legend: N.T.-Non Treaty
T.-Treaty

918 + 1556 = 2474 2774 *

These population figures were compiled in 1966 and have not been revised since that time. It is conceivable that they have changed appreciably due to the high rate of natural increase.

* almost twice as many children as adults : (>2/1 ?)

IV. EXISTING SANITARY FACILITIES OF ESTABLISHMENTS

The majority of the individual homes in this area are occupied by Indian and Metis families. A discussion of the sanitary facilities associated with these homes is included in part VII of this report.

Establishments other than individual residences such as Government buildings, schools, the hospital complex, and commercial establishments have been investigated in considerable detail and individual appraisals were prepared. These are as follows:

A. FORT ISLAND

1. Playgreen Inn

Owner - John Low

Water Supply

The inn has full plumbing with a pressure system. Water is taken from the East Channel and is not treated prior to consumption. Two-2500 watt conductors in the intake conduit prevent freezing in the winter time. Water samples from this supply are not submitted on a routine basis.

Waste Disposal

The liquid wastes from this establishment are discharged to a septic tank, the effluent from which flows to an underground disposal field. This field has apparently ponded in the past but extension of the field tile and additional gravel rectified the problem. The field is located a considerable distance from the river and the possibility of water pollution from this source is very remote. The sewer

A. FORT ISLAND - Waste Disposal (Continued)

line to the septic tank is heated by two-2500 watt conductors to prevent freezing in the winter time.

2. North School

This is a two-classroom day school. The 1968 enrollment is 71 students who are supervised by two teachers.

Owner - Province of Manitoba

Water Supply

Water is carried as required from the East Channel and stored in a three-gallon container in each classroom. Disinfection is carried out by addition of Javex to these containers.

Waste Disposal

Two outdoor privies are presently being used for waste disposal. There are plans, however, for the installation of chemical indoor toilets. The location of the privies is well removed from the water courses and they are not considered to be a potential source of pollution to these waters.

3. Post Office

Owner - Government of Canada; Postmaster - John Henry

The usual complement of staff at this installation is one person, the Postmaster. Occasionally, casual help is hired.

3. Post Office - Water Supply (Continued)

A portable water supply line and pump are used to convey water from the East Channel to a 500 gallon insulated cistern located in the basement of the Post Office building. A pressure system delivers water to service outlets. Reportedly, this water supply is not used for drinking. Rather, it is used only for general cleaning purposes.

Waste Disposal

Human wastes from the Post Office are collected in a chemical "Destrol" toilet. Excess liquid flows to a soakage pit at the rear of the building. The basin in the washroom discharges to a tank and disposal field. In view of the minimal staff at this establishment, these waste disposal systems are considered adequate. There appears to be no water pollution emanating from the Post Office.

4. Hudson's Bay Company Store and Two Residences

Owner - Hudson's Bay Company Manager: S. Jessiman

Water Supply

Water is taken from about 75 feet offshore in the East Channel via an intake conduit which extends under the company dock.

The store utilizes a 500 gallon steel storage tank connected to a pressure system.

The residences each have a 3000 gallon cistern, one concrete and one wood stave. Both are plastic lined and connected to pressure systems for delivery of water to the various outlets.

4. Hudson's Bay Company Store and Two Residences

Water Supply (Continued)

The water used in the store and the residences is not treated and is not sampled on a routine basis.

Waste Disposal

The store is not equipped with modern plumbing facilities. Outdoor privies are used in the summer and the residence facilities are used in the winter. The wash basin in the store drains to a soakage pit.

The residences each have a septic tank and disposal field. Laundry and sump pit wastes discharge to a rock-filled soakage pit, approximately three feet deep. Sanitary waste disposal facilities are considered satisfactorily located with respect to existing surface water supplies and other water storage facilities used in the vicinity.

5. Norway House Hospital Complex

Owner - Government of Canada
Department of National Health
& Welfare

The hospital at Norway House has 38 beds and five bassinets. A staff of 95 people is maintained. There are an additional four people employed as a public health unit by Medical Services.

The housing complex includes 13 family units, 16 rooms in the nurses' residence, and six rooms in the single men's residence. There are 10 family units housed in the West Residence, the East Residence, and the Accommodation Building. There are three one-family dwellings

5. Norway House Hospital Complex (Continued)

which include the Zone Director's residence, the Hospital Administrator's residence, and the Engineer's residence. Also included in the "hospital complex" are two service buildings, namely the Garage-Workshop and the Pumphouse-Powerhouse, and a recreation centre containing a hall and curling rink.

The medical staff is normally composed of three doctors and twelve nurses. A relatively high turnover of staff causes these numbers to fluctuate considerably.

The hospital owns and operates both a water supply and waste water disposal system. All the buildings in the hospital complex, mentioned above, receive water from the hospital water supply system and discharge sewage to the hospital waste water disposal system. The sewage effluents from the single men's residence, the Engineer's residence, the minister's residence, and the recreation centre receive treatment in individual septic tanks prior to being discharged to the hospital sewerage system.

Water Supply

Raw water is drawn through a six-inch intake line from Little Playgreen Lake. The line extends out into approximately nine feet of water and is suspended approximately two feet off the lake bottom. In winter this line is covered with brush to prevent freezing. The intake is covered with a 1/4 inch mesh.

5. Norway House Hospital Complex

Water Supply (Continued)

Treatment consists of chlorination using a Wallace and Tiernan A745 hypochlorinator. A setting of 3.5 on the solution feeder introduced approximately 10 gallons of solution into the raw water per 24 hour period. The solution is replenished about every three days by mixing four pounds of sodium hypochlorite (70% available chlorine) with 30 gallons of water. This would represent a 0.93% stock solution of chlorine. The records kept of chlorine residual readings, taken once per eight-hour shift show a range of 0.0 to 0.5 p.p.m. The objective reportedly is 0.2 p.p.m. The chlorine residual observed at the time of the inspection was satisfactory at 0.4 p.p.m. after the standard 15-minute contact time. It was reported that a standby chlorinator is not available at this water treatment plant.

Two-five horsepower Jacuzzi pumps charge the pressure tank. The water pressure in the service lines ranges from 40 to 60 psi. It was noted that the pressure tank has an air leak. The operators reported that difficulty is periodically encountered in building up pressure in this tank.

The observation glass attached to the pressure tank showed evidence of small aquatic life and fine sediment in the treated water.

The rate of water consumption is not metered. There is neither a rate-of-flow meter nor a flow totalizer in operation. The only records kept at this water treatment

5. Norway House Hospital Complex

Water Supply (Continued)

plant are a summary of chlorine residual determinations.

The service water lines are housed along with the sewage and heating lines in above-ground insulated utilidors.

It appears that there are a number of dead ends in the water distribution system. There is no main flushing programme in effect.

Waste Disposal

The liquid wastes from the hospital complex flow to a septic tank, the chlorinated effluent from which is discharged to Little Playgreen Lake. The septic tank is the divided type, with each half containing a primary and secondary chamber. These two divisions operate in parallel. Each individual primary chamber has inside liquid dimensions of 7' x 20' x 6' deep, providing an effective capacity of 5,250 Imperial gallons. Each individual secondary chamber has inside liquid dimensions of 7' x 7' x 6' deep, providing an effective capacity of 1,850 Imperial gallons.

The septic tank discharges to a chlorine contact chamber. This chamber has inside liquid dimensions of 5' x 7' x 3 1/2' deep, providing an effective capacity of approximately 760 Imperial gallons. Chlorination is effected by a Wallace & Tiernan A417 hypochlorinator. This hypochlorinator has a maximum pumping capacity of 68 gallons per 24 hours.

5. Norway House Hospital Complex

Waste Disposal (Continued)

At the time of this inspection, only one side of the divided septic tank was being used. The unused half of the septic tank contained the remains of a dead dog and other debris. In fact, both primary and both secondary chambers were in dire need of cleaning. Reportedly, this septic tank is cleaned out once every three or four years.

Short circuiting was noted in the chlorine contact chamber. This was due to the fact that the second baffle was approximately three inches too low.

At the time of the inspection chlorine was being fed to the sewage at a rate of 27 pounds of sodium hypochlorite per 24 hour period. This powder, which is 70% available chlorine, is added in solution. A solution of nine pounds of powder in 30 gallons of water is prepared and consumed during every eight hour shift. The stock solution is therefore 2.1% chlorine. The hypochlorinator setting introduced a chlorine residual of 1.5 p.p.m. after the standard 15-minute contact time on September 24, 1968. The operator's objective is to maintain the residual at a minimum of 1.0 p.p.m.

A highly cloudy effluent with visible solids was discharging from the effluent pipe into Little Playgreen Lake. A foul odour prevailed in the vicinity of the outfall. The outfall conduit was in extremely dilapidated condition.

Solid garbage wastes from the hospital are burned in a double brick incinerator in the boiler room. All the garbage from the whole hospital complex is disposed of in this fashion. Therefore, no such wastes should pollute adjoining

waters to any degree.

6. Community Development Officer's Residence

Owner - Province of Manitoba

Water Supply

This residence is connected to the hospital water distribution system.

Waste Disposal

The sewage from this residence is discharged to a domestic septic tank. The effluent from this tank is discharged to an above-ground filter, owned and operated by Manitoba Hydro. This above-ground filter is further discussed under number '7', immediately below.

7. Two Manitoba Hydro Residences

Owner - Province of Manitoba

Water Supply

Both of these residences are connected to the hospital water system.

Waste Disposal

Each of these homes has an individual domestic septic tank. The effluent from each of these septic tanks is pumped to an above-ground filter. This above-ground filter is not functioning properly. Effluent has broken out at the periphery of the filter and is ponding. This effluent would eventually find its way to a low lying swampy area and does not pose a water pollution threat. However, it does produce a public health problem. The effluent is conducive to the attracting and breeding of flies. The odour in the immediate vicinity of the filter is highly objectionable.

7. Two Manitoba Hydro Residences

Waste Disposal (Continued)

It would appear that this system is not underdesigned; rather the construction procedures may have been substandard. Or perhaps the high rainfall and cool temperatures during the summer of 1968 caused the above-ground filter to become saturated. Saturation of the soil is not conducive to good effluent dispersal. In any case, this particular installation has proved to be unsatisfactory in the past two years.

8. Manitoba Telephone System Residence

Owner - Province of Manitoba

Water Supply - This residence is connected to the hospital water distribution system.

Waste Disposal -

The sewage from this home flows to a domestic septic tank, the effluent from which discharges to an underground disposal field. At the time of the 1968 survey this system was operating satisfactorily. However, during the 1966 survey, when the water level of Little Playgreen Lake was close to four feet higher than in 1968, the disposal field was inundated. During these periods the sewage from this residence could contribute to water pollution of Little Playgreen Lake.

9. R.C.M.P. Establishment

Owner - Government of Canada

This establishment contains a sergeant's residence, barracks for the constables, an office, and two

9. R.C.M.P. Establishment (Continued)

prisoner detention buildings. Included in the detachment are four special Indian constables, two regular R.C.M.P. constables, and the sergeant. The sergeant resides with his family of six in the sergeant's residence.

Water Supply

Water flows by gravity from Little Playgreen Lake through two two-inch intake pipes, located four feet below the lowest recorded water level, to a 10' x 10' x 47' deep collecting well. The 60 foot intake lines are fitted with electrical heat cables for frost protection. The inlets are screened with stainless steel mesh.

Two Monarch centrifugal pumps draw water from the well. One pump is at the 45 foot depth while the other is at the 10 foot depth. These pumps discharge to a 300 gallon pressure tank.

The water is chlorinated by means of a Wallace and Tiernan A745 hypochlorinator prior to its entry into the pressure tank. The distribution system provides water for the barracks, the sergeant's residence, and the office. At the time of the inspection the hypochlorinator was set at 'eight'. A satisfactory chlorine residual of 0.6 p.p.m. was detected in the treated water after the standard 15-minute contact time. A chlorine residual test kit is available at this installation.

Waste Disposal

The Sergeant's residence, the office, and the barracks discharge sewage to a two compartment 300 gallon septic tank. The effluent from this tank is pumped

9. R. C. M. P. Establishment

Waste Disposal (Continued)

to an above-ground filter bed. A heating coil has been installed in the sewer line to prevent freezing. This system was functioning satisfactorily at the time of this inspection. Although there was evidence of some leaking during the 1966 survey, the problem has been rectified since then. It does not appear that water pollution emanates from this source. There is approximately five feet of overburden in the vicinity of this establishment.

The prisoner detention buildings use outside privies for sewage disposal. These do not pose a threat of water pollution. Reportedly these buildings are to be permanently abandoned in the near future.

10. Roman Catholic Mission and Day School

Owner - Government of Canada
Department of Indian Affairs and
Northern Development

There are two classroom blocks at this location, accommodating 150 day students. There is a permanent operating staff of 11.

Water Supply

Raw water is pumped from Mission Channel. The inlet is approximately in the centre of the river, at a depth of 30 to 40 feet. An electric heating cable keeps this line from freezing in the winter. The water is pumped to a pressure tank in the boiler room. The water is not treated in any manner prior to consumption.

10. Roman Catholic Mission and Day School

Waste Disposal

The two classroom blocks discharge sewage to a septic tank, the effluent from which flows to a 60' x 20' above-ground filter. It was noted that the filter was ponding and that an open ditch drains the surface liquid to the river. This problem has been prevalent over the past two years.

The sewage from the Priest's residence flows to a septic tank. The effluent from this tank discharges to an underground disposal field. This system appears to be operating satisfactorily.

Sewage from a new 10-bedroom residence for the operating staff will be discharged to a fibreglass septic tank whence it is to be pumped to a new above-ground filter.

Laundry wastes are carried with storm water in a drainage ditch to the river.

11. Norway House Community Hall

Water Supply

Water is dipped by bucket from the East Channel. This water is not disinfected prior to consumption.

Waste Disposal

Waste disposal is achieved by means of outdoor privies. These privies are well located and do not pose a water pollution threat.

12. Northland Airlines Limited

Northland Airlines operates a base on the East Channel at Norway House. There is a small terminal and warehouse. A small residence is provided for employees.

Water Supply

Water is taken from the East Channel. This water is not chlorinated prior to consumption.

Waste Disposal

Privies are used for waste disposal. These are located far enough from the river to cause no concern regarding water pollution.

B. WEST SHORE OF EAST CHANNEL

1. South Schools

Owner - Province of Manitoba

Two small buildings are used as day classrooms for children in the vicinity. Approximately 60 pupils attend school in these two classrooms. One school has Grades 1 to 3 while the other accommodates Grades 4 to 8. There is a teacherage on the adjoining property.

Water Supply

Water for each school is carried by pail from the East Channel and stored in a three gallon metal container. Disinfection is carried out by adding Javex to the container. The teacher is provided with a chlorine residual test kit to check residual levels.

Waste Disposal

Sanitary facilities consist of two pit privies. These privies are well located and do not pose a

threat of water pollution.

2. Lamb Airways Limited

This company operates a small base located on the west shore of the East Channel. Operations are carried out from a single residence.

Water Supply

Water is pumped to a pressure system from the East Channel. This water is not chlorinated prior to consumption.

Waste Disposal

Waste disposal is achieved by means of a well located privy. It is not suspected that water pollution would emanate from this source.

C. EAST SHORE OF MISSION CHANNEL

1. Playgreen School

Owner - Government of Canada
Department of Indian Affairs
and Northern Development

This is a two classroom day school which accommodates approximately 45 students. A teacherage adjoins the classrooms.

Water Supply

River water is pumped to an 8' x 10' x 6' cistern. This cistern represents a capacity of approximately 3,000 Imperial gallons. Disinfection is carried out by hand chlorination into the cistern.

A hand pump in the teacherage draws water from this cistern. A sink in the school is also provided with a hand pump which also draws water from the cistern.

1. Playgreen School (Continued)

Waste Disposal

The school is provided with privies, located well back from the shore line. There is very little possibility that pollutants would seep to the river.

The teacherage utilizes a chemical toilet, the contents of which are emptied into one of the privies. The wash water from the sinks and bath tub is discharged to a subsurface field. This field was operating satisfactorily during the 1968 survey. However, in times of high water, as was the case during the 1966 survey, this field is inundated.

D. ROSSVILLE

1. Nickaway School

Owner - Government of Canada
Department of Indian Affairs and
Northern Development

This is a two-classroom day school with an adjoining teacherage.

Water Supply

An 8' x 10' x 6' uncovered cistern in the basement stores rain water for washing purposes.

River water for the drinking supply is hauled to a large closed cistern in which it is batch chlorinated.

Waste Disposal

The school is equipped with two privies, located on a high rocky area approximately 40 feet from Little Playgreen Lake. It is highly conceivable that pollution emanates from these privies.

1. Nickaway School

Waste Disposal (Continued)

The teacherage has indoor plumbing facilities. The wastes from the wash basin, tub, and toilet flow to a concrete tank. The effluent from this tank flows to a leaching pit. Kitchen sink wastes discharge through an open pipe onto the ground.

These types of waste disposal facilities are grossly unsatisfactory from both a public health and water pollution viewpoint. This undesirable situation becomes even more problematical in time of high water.

2. Indian Affairs and Northern Development

Owner - Government of Canada
Department of Indian Affairs and
Northern Development

This administrative establishment consists of an office and eleven residences.

Water Supply

Water flows by gravity from Little Playgreen Lake through a 700 foot line to a collection well. Two Fairbanks-Morse Ponoma Turbine pumps draw water from the well and discharge to a 50,000 gallon underground reservoir. Here the water is chlorinated with H.T.H. solution, fed by a Wallace & Tiernan A417 hypochlorinator. The H.T.H. is 70% available chlorine. Chlorinated water is pumped to a 1,000 gallon pressure tank prior to being released to the distribution system. The pressure of the water leaving the plant on September 25, 1968 was 40 psi. There is, in the plant, a standby gas pump for low lift purposes. There is also a

2. Indian Affairs and Northern Development

Water Supply (Continued)

standby pump for charging the pressure tank. There is, however, no standby chlorinator in existence at the Indian Affairs establishment.

The present chlorinator is in extremely dilapidated condition and should be replaced. This chlorinator does not always start automatically when the pumps start. It very frequently requires priming to start operating. At the time of this inspection the chlorine residual in the treated water was 0.1 p.p.m. after the standard 15-minute contact time. Apparently, this reading closely represents the average chlorine residual in the water leaving this plant. Reportedly the chlorine residual is checked once weekly. A stock chlorine solution of 0.5% was being used.

The average daily pumpage of this plant is in the neighborhood of 25,000 Imperial gallons. A record is kept of daily flows.

The housekeeping at this plant was judged to be satisfactory.

Waste Disposal

Sanitary wastes are discharged into two septic tanks. The effluent from these tanks flows to a single chlorine contact chamber from which it is discharged into a small bay in Little Playgreen Lake. The exact location of the outlet could not be determined. However, it is believed to be close to shore. A strong, unmistakable odour of sewage and visible solids in the water of the aforementioned bay testified to this conviction.

2. Indian Affairs and Northern Development

Waste Disposal (Continued)

Full details concerning the capacity of the septic tanks could not be obtained. It is nonetheless, obvious that this sewage treatment system is overloaded, both organically and hydraulically.

The sewage is chlorinated by a Wallace and Tiernan A417 hypochlorinator which feeds a stock solution of 0.87% chlorine. This chlorinator is desperately in need of replacement. To be kept operative, this machine is held together with wire and primed frequently. A 20 gallon solution of water and 40 ounces of hypochlorite (70% available chlorine) is fed into the chlorine contact chamber every 24 hours. It appeared that the sewage was short circuiting in the contact chamber and receiving very little retention time.

3. United Church School

Owner - Government of Canada
Department of Indian Affairs and
Northern Development

This is a 13-classroom day school with about 300 students in attendance. The operating staff numbers approximately 23.

Water Supply

The school is connected to the Indian Affairs water supply system.

Waste Disposal

The school wastes flow through the Indian Affairs waste water treatment system.

4. United Church Manse

Owner - United Church of Canada

Water Supply

This manse receives water from the Indian Affairs water supply system.

Waste Disposal

A septic tank, the effluent from which flows to an above-ground filter and a cess pit, services the manse, the Church hall and the Church. The above-ground filter was leaking at the time of the 1966 survey but has since been repaired. During the 1968 survey this waste disposal system was operating satisfactorily.

5. Hudson's Bay Company

Owner - Hudson's Bay Company

This establishment consists of a store with living quarters in the same building, above the store.

Water Supply

This establishment receives water from the Indian Affairs water supply system.

Waste Disposal

This building discharges sewage to the Indian Affairs sewerage system. Apparently the connection was made about two years prior to the 1968 survey.

6. Band Hall

Owner - Norway House Indian Band

Water Supply

The band hall receives water from the Indian Affairs water supply system.

6. Band Hall (Continued)

Waste Disposal

The hall is connected to the Indian Affairs sewerage system.

E. FORESTRY ISLAND

1. Air Service

Water Supply

At the time of 1966 survey there were two houses with a common pressure system drawing water from Little Playgreen Lake, through a short intake line. However, during the 1968 survey it was observed that the pressure system was not in use. The residents dip water from the lake for washing purposes. Drinking water is obtained from the Forestry Branch residence.

Waste Disposal

These houses are serviced by pit privies. Kitchen wastes are discharged via an open pipe to a rocky area with natural drainage to the lake.

2. Forestry Branch

Water Supply

Water is pumped from Little Playgreen Lake to a 1,000 gallon cistern in the basement of the house. The water is chlorinated by means of a Surechlor hypochlorinator which injects a solution of hypochlorite into the line leading to the cistern. The solution used is a 0.3% stock chlorine solution. The chlorinator reportedly has always operated satisfactorily. The chlorine residual in the treated water at the time of this inspection was 0.1 p.p.m. after the standard 15 minute contact time.

2. Forestry Branch (Continued)

Waste Disposal

The wastes from this residence flow to a septic tank, the effluent from which discharges to an underground disposal field. During the 1966 survey, the lake level was high and the disposal field was ponding. However, a new septic tank was installed prior to the 1968 survey. The field had been repaired and no operational problems were evident.

F. TOWERS ISLAND

1. Two Day Schools

Owner - Government of Canada
Department of Indian Affairs and Northern Development

There are two one-classroom day schools at this location.

Water Supply

Water is carried from Mission Channel and stored in two 45-gallon barrels.

The janitor is responsible for chlorinating the water supply by applying Javex to the barrels.

Waste Disposal

The schools are serviced by outdoor pit privies. These are located about 75 feet from the river in a low lying damp area. Seepage of wastes from these privies would be possible at times of high water level. At the time of the 1968 survey water pollution would not be emanating from these privies.

G. MISSION ISLAND

1. Jack River School

Owner - Government of Canada
Department of Indian Affairs and Northern Development

This establishment has a one-classroom day school and a mission house. It is operated by St. Mark's Anglican Mission.

Water Supply

The school has a three gallon container which is chlorinated by the addition of Javex.

The mission house has a cistern which is filled from Mission Channel with a portable pump. This cistern is hand chlorinated in Javex. The community health worker reported that the chlorine residual of the treated water is maintained at 0.2 p.p.m.

Waste Disposal

Waste disposal is achieved by means of outdoor pit privies. These privies are located several hundred feet from the river. It is highly unlikely that water pollution would emanate from this source.

V. SAMPLING AND ANALYTICAL DATA

1. 1966 SURVEY

During the period of the survey 42 sampling stations were selected and samples were secured for analyses on three different occasions. The tabulated results are attached as Appendix A. Bacteriological examinations of samples collected July 11-15th, 1966 are recorded in columns A and B, and are recorded as most probable number of coliforms per 100 ml of sample examined. Column C indicates samples analyzed for faecal coliforms. Fifteen samples were taken from the water course and analyzed for five day biochemical oxygen demand (BOD) and are also recorded opposite the appropriate sampling station. Seven chemical analyses were made from various stations on the river and lake. These appear in Appendix B. The station number and location of each of the above analyses are recorded and appear on the appended map for reference purposes. In this survey no samples were taken of actual sewage effluents but rather from the watercourse in the vicinity of submerged outfalls.

The results of Bacteriological examinations of samples taken from the watercourse subsequent to those listed above, and prior to the 1968 survey, are tabulated in Appendix A-1.

2. 1968 SURVEY

The 42 sampling stations, where bacteriological samples were collected during the 1966 survey, were resampled on September 25 and 26th, 1968, with the exception of sampling locations #6, #13 and #38. Sampling location #6 was omitted since the old school at the Roman Catholic Mission was no

V. SAMPLING AND ANALYTICAL DATA

2. 1968 SURVEY (Continued)

longer in use. Sampling point #13 was not sampled since the store was closed at the time of the investigation. Sampling location #38 was omitted since the water level during the 1968 survey was four feet lower than during the 1966 survey and the disposal field for the Manitoba Telephone System was not flooded. In addition to the 42 sampling locations of the 1966 survey, 11 new sampling points were selected. Nine of these samples were taken from drinking water systems. The remaining two samples are from Mission Channel. The same numbering system was used for the common 41 stations. The additional 11 stations are described in APPENDIX C, although they do not appear on the appended map. The results of the bacteriological examinations are shown in Appendix C. These bacteriological samples are analyzed for total coliforms only, by the most probable number method.

Seven stations were also sampled for BOD determinations on September 25, 1968 and September 26, 1968. The results of these determinations are also tabulated in Appendix C after the appropriate station number.

No samples were submitted during the 1968 survey for complete chemical analyses.

VI. SPECIFIC DISCUSSIONS AND RECOMMENDATIONS PERTAINING TO ESTABLISHMENTS

The qualitative aspect of the sanitary facilities serving 'establishments' in the Norway House - Rossville area was discussed in Part IV of this report. Also contained therein is some mention of the probability of particular establishments contributing to water pollution.

In Part VI of the report, the bacteriological examination results of samples taken of the water supply at each establishment will be discussed. In some cases the bacteriological quality of surface water receiving the effluent from particular locations will also be discussed. Recommendations pertaining to improving both the water supply and waste disposal facilities will be included.

There are a few general comments which will apply to all the establishments. These comments precede the specific discussions and recommendations.

The most common measure of water pollution is a bacteriological examination of a water supply for coliform organisms. These organisms may be of the faecal or non-faecal type. The faecal type (also called Escherichia coli or E. coli) originate from the intestinal discharges of humans and animals and the presence of this type in water is a good index of the occurrence of faecal contamination. The non-faecal type emanate from the decomposition of organic matter such as leaves, grass, or vegetable matter. The total coliform count is a count of faecal plus non-faecal coliforms. In order that a water supply be judged completely safe for drinking there must be an absence of total coliforms.

VI. SPECIFIC DISCUSSIONS AND RECOMMENDATIONS PERTAINING TO ESTABLISHMENTS (Continued)

Natural surface waters are very rarely completely free from coliform organisms. Surface runoff is responsible for carrying pollution from decaying organic material and animal excrement into the watercourse. When it is suspected that intestinal wastes or industrial wastes are being discharged to a watercourse, extreme precautions must be taken when drawing drinking water therefrom. The killing of coliform organisms, or disinfection, is commonly carried out by adding small dosages of a chlorine solution to the water supply. This is done on varying scales. A domestic supply is often treated by adding drops of a commercial bleach to a pail of water. For example, approximately five drops of 'Javex' per gallon of water is frequently sufficient to disinfect the supply. A positive disinfection may also be carried out by boiling the water for five minutes. Larger installations use machines, called hypochlorinators or gas chlorinators to inject a chlorine solution or chlorine gas into the water supply.

Chlorine is also used commonly to disinfect treated sewage prior to its entry to a watercourse.

Bacteriological water samples indicate the conditions of the water only at the time the sample was taken. The bacteriological quality of a surface water can fluctuate from season to season, from month to month, and even from day to day. The value of a routine bacteriological sampling programme at any establishment can thus be appreciated.

The following discussions will involve only the

VI. SPECIFIC DISCUSSIONS AND RECOMMENDATIONS PERTAINING TO ESTABLISHMENTS (Continued)

bacteriological and B.O.D. sample results from the 1968 survey. Use of the bacteriological and B.O.D. sample results from the 1966 survey is made in Part VIII of this report.

A. FORT ISLAND

1. Playgreen Inn

Discussion

The water sample taken at the inlet of the water supply showed a coliform count of 23 per 100 ml. A sample taken from a tap in the building showed a coliform count of nine per 100 ml. These are reasonable counts for a raw surface water supply. It is highly possible, however, that there are faecal coliforms in this supply.

Recommendations

(a) A small hypochlorinator should be installed in the basement of the inn to inject a chlorine solution into the raw water prior to its entry to the pressure tank. A chlorine residual range of 0.2 to 0.5 parts per million (ppm), after the standard 15-minute contact time, should be maintained in the water entering the pressure tank. This residual should be checked once daily and recorded.

(b) Monthly bacteriological samples of the raw and treated water should be submitted to assess raw water quality and the effectiveness of disinfection procedures. These results should be recorded.

A. FORT ISLAND (Continued)

2. North School

Discussion

The water sample taken from the container in the school showed a coliform count of 23 per 100 ml. It is obvious that this water has not received complete disinfection. It is highly conceivable that faecal coliforms are present in this water supply.

Recommendations

(a) The water in the drinking water container should receive adequate disinfection. This would be best accomplished by introducing a quantity of chlorine solution which would cause a chlorine residual of 0.2 p.p.m. to be present in the water after the standard 15-minute contact period.

(b) Periodic water samples of this supply should be submitted for bacteriological examination. A record should be kept of the results.

3. Post Office

Discussion

The water sample taken at the hand basin showed an absence of coliform organisms. There appears to be no immediate need of installing a chlorinator at this building since there is only one person employed here and the water is not consumed.

4. Hudson's Bay Store and Two Residences

The water near the intake and the water from a tap in the manager's residence was sampled. Both samples exhibited a coliform count of 23 per 100 ml. This count appears

4. Hudson's Bay Store and Two Residences (Continued)

to reflect the general bacteriological quality of the East Channel around this location. It is likely that faecal coliforms are present in this water supply.

Recommendations

(a) All water used for drinking at the store and residences should be chlorinated prior to consumption. This could be most feasibly effected by the use of hypochlorinators. A daily check should be made to ensure that the chlorine residual is maintained between 0.2 and 0.5 p.p.m. The reading should be regularly recorded.

(b) Routine monthly samples of the raw and treated water should be submitted to monitor bacteriological quality.

5. Norway House Hospital Complex

Water Supply

Discussion

The raw water was sampled as were three locations in the distribution system. The sampling points and bacteriological results were as follows:

SAMPLING POINT	COLIFORM GROUP
Hospital Intake	43
Tap in Hospital washroom	0
Tap in Accommodation Building Site	0
Tap in Community Development Officer's Residence	0

The absence of the coliform group in the treated water testifies to the adequacy of the disinfection carried out by the chlorination.

There are many uses in a hospital for water of the highest quality. Although the bacteriological quality

5. Norway House Hospital Complex

Water Supply - Discussion (Continued)

of the treated water is satisfactory, the physical condition of the treated water is not optimum. The samples submitted for chemical analyses exhibited both high colour and high turbidity.

It is suggested that these physical characteristics would be even more obnoxious at the time of the spring freshet. It is obvious that the 1/4 inch mesh on the intake is not adequate to remove finely suspended matter from the raw water.

The chemical quality of the raw water, generally speaking, is quite satisfactory.

Recommendations

(a) Serious consideration should be given to the installation of a filtration system to produce a more pleasing water supply. In the more distant future the installation of a coagulation and settling system may also be necessary.

(b) A rate-of-flow meter and a flow totalizer should be installed immediately. Flow measurements are essential to any planning of new water treatment or sewage treatment facilities and additions or alterations thereto. These metering devices would considerably aid the operating procedures in the plant.

(c) If and when the flow metering devices are installed, a complete set of daily plant records should be maintained.

(d) The air leak in the pressure tank should be repaired. If this leak cannot be repaired a new tank should be installed.

(e) Standby chlorination facilities should be provided. The consumers would be in extreme jeopardy if the present chlorinator were to fail and untreated water entered the mains.

5. Norway House Hospital Complex (Continued)

Water Supply

Recommendations (Continued)

(f) The water mains should be flushed out once per year to remove any sediment or rust buildup.

(g) The raw water and three points in the distribution system should be sampled once monthly for bacteriological examinations. An accurate record of the results should be maintained.

Waste Disposal

Discussion

Thirteen bacteriological samples of water, considered to be not directly influenced by sewage effluents, were taken in Little Playgreen Lake. That is, at these thirteen locations sewage effluents would have received the limit of possible dilution. The average coliform count for these sampling points is 136 per 100 ml. One sample taken from the middle of Robertson Bay, the bay to which the septic tank effluent discharges, exhibited a coliform count of 93. However, a sample collected close to the submerged sewage outfall showed a coliform count of 1,500+ per 100 ml. This would appear to be conclusive evidence that the sewage effluent from the hospital system is grossly polluting a portion of Little Playgreen Lake.

Septic tanks are generally designed to discharge to an underground disposal field. A high degree of bacteria removal is not accomplished in a septic tank. The primary purpose of a septic tank is to condition sewage so it will not clog a

5. Norway House Hospital Complex (Continued)

Waste Disposal

Discussion (Continued)

disposal field. Infectious agents are able to pass through a septic tank unharmed. Simple chlorination of the septic tank effluent is less than adequate. The high coliform count evident at the submerged outfall exhibits the disinfection impotency of chlorine with solids-laden effluent such as that which discharges from this septic tank.

Of the seven B.O.D. (Biochemical Oxygen Demand) samples taken, all show results less than 1.7 mg/l except the two samples taken in the vicinity of major sewage outfalls. The highest B.O.D. concentration was noted near the outfall from the hospital septic tank. This concentration was 11.0 mg/l. In the middle of Robertson Bay the B.O.D. concentration was 1.5 mg/l (sampling Point #24).

The degradatory effect of the effluent is obvious. In the new Water Pollution Control and Abatement Programme - Federal Facilities, primary treatment, such as that afforded by a septic tank, is considered adequate only when the waters receiving the effluent meet all of several objectives, which include the following two:-

Biochemical Oxygen Demand	-	4 mg/l maximum
Total Coliforms	-	not to exceed a median of 500 coliform bacteria per 100 ml.

The water receiving the septic tank effluent does not meet these objectives.

5. Norway House Hospital Complex (Continued)

Waste Disposal

Discussion (Continued)

If the full capacity of the septic tank were being used, it would be approximately 10% undersized. This is stated in terms of conventional septic tanks. However, only one side of the septic tank is being used and this capacity is approximately 50% undersized. Since this septic tank is unconventional and discharges to a watercourse instead of to an underground disposal field, this situation is totally undesirable. Good primary treatment cannot be attained when hydraulic overloading is prevalent.

In review, this septic tank, even if full capacity were available, is inadequate for treating hospital wastes entering a watercourse which is used extensively for domestic purposes.

Recommendations

Local conditions associated with the discharge of sewage effluent from this system and the added infectiveness of hospital wastes make it mandatory that the wastes be subjected to a higher, more sophisticated degree of treatment than that afforded by a septic tank with chlorination of the effluent.

It is therefore recommended that a study be commenced immediately to determine the type and degree of treatment required to produce an effluent which will meet the objectives outlined in the Objectives for Water and Waste Water Quality in the Objectives and Procedures, Water Pollution Control and Abatement Programme - Federal Facilities, dated August, 1968.

5. Norway House Hospital Complex (Continued)

Recommendations (Continued)

A final decision on the nature and degree of treatment required should be followed immediately by the planning and designing of the necessary treatment works with construction and installation of the facilities to proceed with no further delay if the Federal Government's stated policy of becoming a leader in the field of pollution control and of promoting abatement of existing pollution from its own establishment is to be met.

Since a work of this magnitude will ostensibly and of necessity require considerable time through the study, planning, detailed design and construction phases before the facilities become operational, it will be necessary to retain the present system in operation pending the installation of more adequate facilities.

Retention of the existing system on a temporary basis will, however, require repairs to improve the operating performance of the plant and these repairs are outlined as follows:

(i) Both sides of the septic tank should be pumped out and made free of debris. This operation should be carried out on a routine basis, once yearly or more often if conditions should warrant. The sludge should be disposed of in a flat location, distant from any watercourses.

(ii) The complete septic tank capacity should be used on a parallel operation.

5. Norway House Hospital Complex (Continued)

Recommendations (Continued)

(iii) The chlorine residual should be maintained at 0.75 p.p.m. after the standard 15-minute contact time. Chlorine residuals in this range will require dosage of 10-30 p.p.m. available chlorine.

(iv) Stand-by chlorination facilities should be provided.

(v) The second baffle in the chlorine contact chamber should be raised about three inches to prevent short circuiting.

(vi) Consideration should be given to repairing the outfall conduit.

6. Community Development Officer's Residence

Discussion

A water sample collected from a tap in this residence exhibited an absence of coliform organisms.

7. Two Manitoba Hydro Residences

Recommendations

(a) The above-ground filter receiving the effluent from the septic tanks should be repaired or replaced by a new disposal system.

(b) At such time as a new sewage treatment system is installed for the hospital complex, consideration should be given to negotiating the discharge of sewage to that system. This could possibly be done on a cost-sharing basis.

8. Manitoba Telephone System Residence - Recommendation

(a) Consideration should be given to discharging sewage to a new hospital complex system at such time as it is built. This could possibly be done on a cost-sharing basis.

9. R.C.M.P. Establishment

Discussion

A sample taken of the raw water in the intake well on August 25, 1968 showed an absence of coliform organisms. However, a sample of the treated water taken from a tap in the sergeant's residence showed a coliform count of 23 per 100 ml.

The water supply system is of good quality and should be capable of producing a satisfactory water supply.

Recommendations

(a) The dead-ends in the distribution system should be periodically flushed out to prevent stagnation and sediment deposits.

(b) The chlorine residual of the treated water should be maintained between a range of 0.2 to 0.5 p.p.m. This residual should be checked daily and recorded for future reference.

(c) The raw and treated water should be sampled for bacteriological examination once monthly. This would monitor the raw water quality and the effectiveness of the chlorination procedures. A record of the results should be maintained.

(d) The above-ground filter should be seeded with a heavy grass to aid transpiration of the liquid wastes.

10. Roman Catholic Mission and Day School

Three bacteriological samples were taken during the inspection of this mission and day school. The sampling locations and results are as follows:

10. Roman Catholic Mission and Day School (Continued)

Sampling Point	Coliform Group
Near water intake - Mission Channel	43
Near suspected outfall - Mission Channel	23
Tap in Father's Residence	23

While these grab samples do not provide conclusive evidence that water pollution is resulting from the operation of this mission and day school, it is considered probable, however that more extensive composite sampling would show that both the effluent from the above-ground filter and the laundry waste contribute to pollution of Mission Channel to some extent.

The BOD of a sample taken near the suspected filter effluent outfall was 1.4 mg/l. This does not appear to be abnormally high for a surface water in this area.

It appears that any effluent reaching the Mission Channel receives good dilution aided by the current of the river.

Recommendations

(a) The water supply serving this mission and day school should be chlorinated, since there is a good possibility that faecal coliforms are included in the total coliform count. Chlorination could be effected by means of a small hypochlorinator feeding a chlorine solution into the raw water line. The chlorine residual in the treated water should be maintained in the range of 0.2 to 0.5 p.p.m. A simple chlorine residual test kit should be provided to check the residual once daily and a record of these results should be maintained.

10. Roman Catholic Mission and Day School (Continued)

Recommendations (Continued)

(b) The raw and treated water should be sampled once per month for bacteriological examination after the chlorinator is installed. A record of the results should be maintained.

(c) Consideration should be given to installing a rate-of-flow meter and a flow totalizer to register water consumption. This device would be useful for planning new water supply and/or sewerage systems.

(d) Serious consideration should be given to the construction of a new waste water treatment system to receive flows from all the buildings. A small sewage lagoon or mechanical plant should adequately handle these wastes.

(e) Until such time as a new sewage treatment plant is installed, liquid wastes now entering the river should be collected and disinfected prior to their discharge to the watercourse. This would be best achieved by chlorinating the effluent to a residual of 0.75 p.p.m.

11. Norway House Community Hall.

Discussion

A sample was not taken of the water in the drinking container in the community hall. However samples from East Channel on either side of the hall indicate that the water contains coliform bacteria.

Recommendation

(a) The water supply in the community hall should be disinfected prior to consumption. Since this hall is used

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11. Norway House Community Hall (Continued)

Recommendation (Continued)

only on a periodic basis, the disinfection could most appropriately be carried out by the addition of a disinfecting agent, such as Javex, to provide a chlorine residual of 0.2 p.p.m. after 15 minutes contact in the water. One of the Community Health Workers could be responsible for this duty.

12. Northland Airlines Limited

Discussion

A water sample collected from the East Channel at Northland Airlines dock exhibited a coliform count of 43 per 100 ml. It is highly conceivable that faecal coliforms are present in this water supply.

Recommendation

(a) The water supply should be disinfected prior to consumption. One feasible way of accomplishing this is by adding a chlorine solution such as Javex to the water to provide a chlorine residual of 0.2 p.p.m. Another method which can be used is boiling the water for five minutes prior to consumption.

B. WEST SHORE OF EAST CHANNEL

1. South Schools

Discussion

A sample taken from the drinking container at one of the south schools exhibited a coliform count of 1500+ per 100 ml. It is obvious that there was gross pollution present in this water supply and it seems safe to

1. South Schools (Continued)

Discussion (Continued)

assume that a substantial number of faecal coliforms prevail in this water. It is evident that the requirement or necessity for chlorinating this water has been badly neglected.

Recommendations

(a) Closer attention should be given to disinfecting this water supply. Absolute cleanliness of the containers should be assured at all times. The chlorine residual of the water supply should be very strictly maintained at 0.2 p.p.m. and this residual should be checked daily and the reading should be recorded for future reference.

(b) Monthly bacteriological samples should be submitted for examination. A complete record of the results should be maintained.

2. Lamb Airways Limited

Discussion

Samples taken in the East Channel in the vicinity of the Lamb Airways Limited installation exhibit coliform counts. As stated previously, it is a definite possibility that faecal coliforms are present in this water.

Recommendation

(a) This water supply should be disinfected prior to consumption. This can be achieved by boiling the water for five minutes or introducing sufficient chlorine to produce a residual of 0.2 p.p.m. in the water after a contact period of 15 minutes. A common source of chlorine solution is Javex. Consideration may also be given

2. Lamb Airways Limited (Continued)

Recommendation (Continued)

to installing a small hypochlorinator which would inject a chlorine solution into the raw water line.

C. EAST SHORE OF MISSION CHANNEL

1. Playgreen School

Discussion

A water sample taken from the drinking container in Playgreen School exhibited a coliform count of 23 per 100 ml. There is a good possibility that faecal coliform organisms make up a portion of the total coliform count.

Recommendations

(a) Closer attention should be paid to maintaining a chlorine residual of between 0.2 and 0.5 p.p.m. in the cistern. Daily residual tests would be valuable until such time as the proper dosage of chlorine is attained. Chlorine residual tests done at the time of chlorine addition would suffice thereafter. Records should be kept of chlorine determinations.

(b) Monthly bacteriological samples should be submitted for examination. A complete record of the results should be maintained.

D. ROSSVILLE

1. Nickaway School

Discussion

No water samples were taken at this school. However, Little Playgreen Lake was sampled in two locations, namely off the point near Nickaway School and at the location where pollutants from the privies and domestic wastes would

D. ROSSVILLE - Nickaway School (Continued)

Discussion (Continued)

enter the lake. Total coliform counts were 43 per 100 ml., and 240 per 100 ml., respectively.

Recommendations

(a) It should be assured that a chlorine residual of between 0.2 and 0.5 p.p.m. be present in the drinking water at all times. This chlorine residual should be checked periodically and the results recorded.

(b) Samples should be collected for bacteriological examination on a routine, monthly basis. A record of the sample results should be maintained.

(c) The privies should be relocated at a site where overburden is available for pit construction.

(d) Every attempt should be made to prevent domestic wastes from entering the lake. If such is impossible, the wastes should be collected at a common point and chlorinated to a residual of 0.75 p.p.m. prior to their discharge.

2. Indian Affairs and Northern Development

Water Supply

Discussion

If the chlorinator were replaced in this water supply system, the system could be judged as satisfactory. The necessity of priming the chlorinator on frequent occasions is not a healthy situation. It is possible that a quantity of contaminated raw water could enter the distribution system without receiving disinfection. The raw water at the intake was sampled and showed a coliform count of 460 per 100 ml.

2. Indian Affairs and Northern Development (Continued)

Water Supply

Discussion (Continued)

Since a substantial portion of this total coliform count could be faecal coliform organisms, it is imperative that all the water entering the distribution system be adequately disinfected.

Two bacteriological samples were taken from the distribution system. Sampling points and the results of the examinations were as follows:

Sampling Point	Coliform Group
Tap in Indian Affairs office	0
Tap in United Church School	0

The absence of coliform organisms testifies to the adequacy of the disinfection procedures at the time of the inspection.

Recommendations

(a) Two new hypochlorinators similar in construction to the existing one should be obtained immediately. One hypochlorinator should be put into use immediately while the other would serve as a standby in case of break down.

(b) The chlorine residual should be maintained between 0.2 and 0.5 p.p.m. in the treated water entering the distribution system. This residual should be checked and recorded once on each eight hour operating shift. The results should be maintained in a daily operating log book along with pumpage figures.

(c) Samples of the raw and treated water should be submitted once monthly for bacteriological examination. A complete record of the results should be maintained.

2. Indian Affairs & Northern Development (Continued)

Waste Disposal

Discussion

As discussed earlier in this part of the report, a septic tank is not usually intended to discharge effluent to a watercourse. Rather, the effluent is generally discharged to an underground disposal field. Even if the septic tank is not hydraulically overloaded, its effluent is highly detrimental to a natural surface watercourse. This septic tank appears to be hydraulically overloaded. The gross presence of visible sewage solids in the bay into which the effluent discharges testify to this fact.

Samples taken in Little Playgreen Lake at locations a considerable distance from the sewage outfall and not directly influenced by other sewage effluents, show a coliform count range of 20 to 460 per 100 ml. The sampling points included are numbers 9, 17, 18, 19, 20, 21, 22, 37, 39, and 40. The average coliform count for these locations is 141 per 100 ml. However, at the point where the sewage discharges into Little Playgreen Lake, the coliform count was 1500+ per 100 ml. A similar coliform count was noted in Little Playgreen Lake at the Government dock at Albert's Point and south of Albert's Point. These two locations are directly and adversely affected by the effluent discharge.

A water sample collected near the sewage outfall exhibited a Biochemical Oxygen Demand of 5.0 mg/l. This concentration is more than three times greater than BOD concentrations

2. Indian Affairs & Northern Development (Continued)

Waste Disposal

Discussion (Continued)

observed in Little Playgreen Lake where undesirable effluents were not discharging to the watercourse.

In the new Federal Water Pollution Control and Abatement Programme - Federal Facilities, primary treatment, such as that afforded by a septic tank, is considered adequate only when the waters receiving the effluent meet all of several objectives, which include the following two:

Biochemical Oxygen Demand - 4 mg/l maximum
Total Coliforms - not to exceed a median of 500 coliforms per 100 ml.

These objectives have not been met. Hydraulic overloading will not allow even primary treatment to occur in the septic tank. Chlorination alone is not enough to disinfect these potent wastes, highly laden with solids.

In review, it appears that the effluent from this sewerage system is significantly contributing to water pollution in Little Playgreen Lake.

Recommendations

(a) In view of the fact that water pollution problems arising from the operation of this sewerage system cannot be solved by the operation of a septic tank and chlorine contact chamber, serious consideration must be given to the construction of a new system. This system would receive the flows from all the establishments served by the existing system. Although a more detailed engineering study would precede the actual choice of design,

2. Indian Affairs & Northern Development (Continued)

Waste Disposal

Recommendations (Continued)

the construction of a sewage lagoon appears to be feasible at the present time.

(b) Since considerable time and effort must be expended prior to the construction of a new system, several provisional measures should be taken to minimize the detrimental effects of the existing system. These are as follows:-

(i) Two new chlorinators should be obtained. One of these new machines should be installed immediately to replace the dilapidated machine now in operation while the other should be placed on stand-by service.

It should be realized that these new chlorinators could be used in the new sewage treatment system when the new system is installed.

(ii) The chlorine residual of the effluent should be maintained at a level of at least 0.75 p.p.m. The chlorinator should be able to achieve this residual while operating at approximately half of its discharge capacity. A stock solution of chlorine stronger than the present solution may be necessary. The chlorine residual should be checked daily and recorded in an operator's log book.

(iii) Consideration should be given to repairing and extending the existing outfall line. This would temporarily alleviate the deplorable environmental conditions prevalent at the public dock, close to the outfall.

3. United Church School

Discussion

A sample of water taken from a tap in this school showed an absence of coliform organisms.

4. United Church Manse

Discussion

No water samples were collected at this building.

Recommendation

(a) Consideration should be given to discharging sewage to the Indian Affairs sewerage system at such time that the proposed new system is constructed.

5. Hudson's Bay Company

Discussion

No water samples were collected from this establishment at the time of the 1968 survey.

6. Band Hall

Discussion

No water samples were taken from the Band Hall during the 1968 survey.

E. FORESTRY ISLAND

1. Air Service

Discussion

The drinking water should be bacteriologically safe since it is taken from the chlorinated supply in the Forestry Branch residence.

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E. FORESTRY ISLAND (Continued)

1. Air Service (Continued)

Recommendation

(a) Every effort should be made to prevent domestic wastes from entering Little Playgreen Lake. Kitchen wastes should be retained in a soakage pit in absorbent soil at least 100 feet from the lake.

2. Forestry Branch

Discussion

A sample of the raw water near the intake in Little Playgreen Lake exhibited a coliform count of 460 per 100 ml. A sample of the treated drinking water was free from coliform organisms. This reduction in coliform organisms is a good illustration of the disinfecting power of a chlorine solution. This compact and well maintained water supply system could serve as an example of good sanitary procedures for other such establishments in the Norway House-Rossville area.

Recommendation

(a) To further ensure the good bacteriological quality of this water supply, monthly samples of the raw and treated water could be submitted. It would be useful to maintain a record of the results of the bacteriological examinations.

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TOWERS ISLAND

1. Two Day Schools

Discussion

A water sample collected from one of the drinking containers exhibited a coliform count of 1500+ per 100 ml. This count suggests the presence of gross contamination. It would appear that neglect in chlorinating the supply has occurred. It is highly probable that faecal coliforms constitute a significant percentage of the total coliform count.

Recommendations

(a) Strict attention should be given to the adequate disinfection of this water supply. The chlorine residual should be maintained in a range of 0.2 to 0.5 p.p.m. at all times. This residual should be checked at each filling of the container. Immaculate cleanliness of the drinking containers should be assured at all times.

(b) Monthly bacteriological samples should be taken from these drinking containers and submitted for examination. A record should be kept of the results.

G. MISSION ISLAND

1. Jack River School

Discussion

A water sample taken from the drinking container at the school exhibited an absence of coliform organisms. It appears that the application of a chlorine solution to the raw water achieved good disinfection.

G. MISSION ISLAND (Continued)

1. Jack River School

Recommendation

(a) Monthly water samples from the school and the Mission house should be submitted to ensure continued good bacteriological quality. A record of the results should be kept.

VII. SANITARY FACILITIES SERVING INDIAN AND METIS HOMES

(a) Existing Facilities

Overcrowding, a complete evaluation of which is outside the scope of this report, is probably a contributing factor to the high incidence of infant illness in the Norway House - Rossville area.

A review of the population details was undertaken during the 1966 survey. This review indicated overcrowding. In most cases the Indian and Metis homes are small, one or two room shacks with occupancy as follows:

1) More than three people in one house - 73% of population
2) More than six people in one house - 43% of population
3) More than ten people in one house - 20% of population

The majority of the Indians and Metis obtain their water for domestic use by carrying pails of water as required, from either the Nelson River or Little Playgreen Lake. Most of the homes are located close to one of these bodies of water, chiefly because the watercourse supplies the only form of transportation in the area as well as providing a readily accessible water supply.

It is estimated that approximately 90% of the homes have outdoor pit privies. Although the scope of these investigations did not allow a detailed inspection of each home, it would appear that most of the privies are reasonably well maintained. However, the location of some privies with respect to houses or to watercourses should be examined.

The residents are continually reminded of the necessity of disinfecting their water supplies by the local community health workers. However, it is believed that some

VII. SANITARY FACILITIES SERVING INDIAN & METIS HOMES (Continued)

(a) Existing Facilities (Continued)

of the residents are not receptive to this recommendation. It can be therefore concluded that contaminated water is consumed by an appreciable number of residents in the Norway House - Rossville area.

A rapid perusal of the results of bacteriological examinations done on samples collected in various locations in both channels of the Nelson River and in Little Playgreen Lake strongly suggests that all water supplies taken from these sources should be adequately disinfected prior to consumption.

(b) Feasibility of Common Water and Sewerage Systems

A water distribution or sewage collection system to service the entire Norway House - Rossville community as it now exists, is not practical.

This statement is based on the following observations:-

(i) The developed area is presently divided by water into six small communities.

(ii) The homes extend for a distance of about six to eight miles south from the hospital and about 1 1/2 miles north from the Rossville settlement.

(iii) The terrain in most places has little earth cover. The laying of pipelines would therefore be a very difficult and costly procedure.

Rossville and Fort Island, in the vicinity of the hospital, are the only areas where population density would warrant consideration of water distribution and sewage collection systems.

VII. SANITARY FACILITIES SERVING INDIAN & METIS HOMES (Continued)

(c) Community Development

The population distribution of various segments of the community in terms of percentage of the overall population is as follows:

Location	Population	Percentage
Mission Island	264	11%
Towers Island	150	6%
Fort Island	468	19%
Johnstone Island	43	2%
West Shore (East Channel)	226	9%
East Shore (Mission Channel)	417 *	17%
Rossville (from O. Balfour north)	833 *	34%
Forestry Island	20	-
Long Island	53	2%
Totals	2474	100%

From these statistics it will be noted that one-half of the entire population (*) is located on the mainland stretching from the Gunisao River on the south to about 1 1/2 miles north of the Rossville business district. This stretch represents a total distance of about eight miles. A minimum of relocating would be necessary if a portion of this area were used as a base for a compact community development. The selection of this site, in lieu of others, is further strengthened by the existing Indian Affairs water and sewerage systems. Parts of these systems could possibly be utilized. Extensive clearing of rights-of-way for roads in this area has been completed.

The only alternate site that might be considered as a base for community development is Fort Island. Nineteen percent of the population is located on this island, on which is located the major business district in the area. The local

VII. SANITARY FACILITIES SERVING INDIAN & METIS HOMES (Continued)

(c) Community Development (Continued)

hospital is the focal point of the entire community. Another point in favour of this site is the presence of the hospital water supply and sewerage systems. Components of these systems could possibly be incorporated into a larger system. Fort Island, being approximately four miles long by 1 1/2 miles wide, is small enough to allow all residents easy access to the water, which is the principal mode of transportation. The selection of this site would also result in improved service to the community in that the hospital would be accessible by land to many of the residents.

There is need for a comprehensive plan for the orderly development of the community whereby residents may, in due course, be provided with modern facilities and services. The requirement for such services has become increasingly essential for any sizeable community.

It is therefore recommended that a residential development be instituted at either of the following two locations:

(i) On the mainland, at or near, Rossville.

(ii) On the northern portion of Fort Island near the mouth of Mission Channel.

Both of the aforementioned areas are reasonably near certain existing facilities such as power, shopping outlets, the hospital, and administrative establishments.

The selection of either of these sites would entail a reasonable degree of relocation of residents, in view of the present areal densities of population. Insofar as much

VII. SANITARY FACILITIES SERVING INDIAN & METIS HOMES (Continued)

(c) Community Development (Continued)

of the Norway House-Rossville area is swampland with rock outcrops generally occurring at or near the shorelines of the watercourses, the availability of good development sites is limited. Topographical features and the extent of overburden are important considerations. Both of the proposed sites appear to be relatively satisfactory in these respects.

The final selected location for such a development would require further detailed investigation. Planning of such a housing development would be tempered to a considerable degree by the planning of construction of other amenities, such as schools and roads.

VIII. COMPREHENSIVE REVIEW OF SAMPLE RESULTS

The sample results from both the 1966 and 1968 surveys indicate that there is a definite deterioration of the East Channel and Mission Channel of the Nelson River as the stream passes through the Norway House - Rossville area. Both the bacteriological examinations and the BOD results point out this fact. It is realized that the sampling programmes were somewhat limited and covered only short periods of time. However, the evidence garnered therefrom seems to be reasonably conclusive.

The degradation of stream quality was particularly noticeable in the 1966 survey when all the bacteriological samples collected downstream from the hospital complex, and analyzed for faecal coliforms, showed positive counts. Similar samples taken in the vicinity of the outfall of the Indian Affairs Branch sewerage system at Rossville, and analyzed for faecal coliforms, also proved positive. This is conclusive evidence that intestinal wastes were entering the watercourse.

The total coliform counts from both surveys also indicate the deleterious effect of sewage effluents on the bacteriological quality of the lake and the river.

Samples analyzed for BOD concentrations in both the 1966 and the 1968 surveys also bear out the fact that water pollution in the Nelson River is increased as it passes through the Norway House - Rossville area. Little Playgreen Lake also experiences unnatural BOD loadings from the effluent from the Indian Affairs Branch sewerage system.

VIII. COMPREHENSIVE REVIEW OF SAMPLE RESULTS (Continued)

Generally speaking, the pollution problem in the Norway House - Rossville area is not of an exorbitant nature. However, it should be appreciated that, if conditions are allowed to continue as they are at the present, the problem could eventually become obnoxious and long lasting. Preventative measures are excellent investments in water pollution control.

It should also be realized that the biological quality of the watercourses is a serious matter to be considered. With the excessive discharge of sewage to a watercourse, a build-up of aquatic nutrients in the form of nitrates and phosphates is generally the result. These nutrients, even when present in seemingly minute quantities, are conducive to supporting algal blooms. Algae can pile up on beaches, clog water intakes, cause unsightly conditions, and create extremely obnoxious tastes and odors in the water. Early attention to, and prevention of, this over-enrichment problem should be of prime concern to the people of Norway House since water is essentially the life blood of the community.

Reference should be made to Appendix B where it is seen that phosphates and nitrates are present, in appreciable quantities, at all seven locations sampled for chemical analyses.

A complete review of the bacteriological and BOD results with reference to the appended map and sampling point descriptions will afford a good idea of the process of water pollution in the Norway House - Rossville area. It would appear that the general bacteriological quality of the watercourses has deteriorated in the period between the 1966 and 1968 surveys.

IX. GENERAL CONCLUSIONS AND RECOMMENDATIONS

The sanitary facilities serving every 'establishment' in the Norway House - Rossville area have been discussed in some detail in Parts IV and VI of this report. Part VII discussed the sanitary facilities of Indian and Metis homes. In Part VIII a look was taken at the overall problem of water pollution in the area. Many of the sanitary engineering problems encountered in an area such as this are common to a large number of 'establishments' and private homes. Repititious, but necessary, recommendations for improvement of sanitary facilities at particular locations are the result. A few general conclusions and recommendations follow:

(a) Some major improvements are needed to render the larger water supply systems completely satisfactory. These large installations are Indian Affairs Branch at Rossville, the hospital complex, and the Roman Catholic Mission. At most of the smaller installations more attention must be paid to disinfecting water supplies and submitting samples on a routine basis for bacteriological examinations. At the smaller installations the improvements can be implemented at minimal cost and should be carried out immediately. A longer period of planning and design is required at the larger installations where appreciable capital expenditure is required.

(b) Most of the sewage disposal systems in the area can be improved upon at little cost. These improvements would reduce the volume of pollutants entering the adjacent watercourses. The repairs to the smaller installations recommended in Part VI of this report should be effected immediately.

IX. GENERAL CONCLUSIONS AND RECOMMENDATIONS (Continued)

The two major contributors of water pollution in the area are the Norway House Hospital Complex and the Indian Affairs Branch at Rossville. Minor, but appreciable contributors, include the Roman Catholic Mission, Nickaway School, and Air Services on Forestry Island. Wastes seeping into watercourses from the privies serving individual homes are lesser contributors. The wastes from the hospital complex and Indian Affairs Branch sewerage systems warrant a higher degree of treatment than that afforded by septic tanks and chlorine contact chambers. The design of proper sewage treatment facilities for such installations will entail considerable time and investigatory work. It will therefore be necessary to implement the stated temporary repairs to improve the present operating performance of the existing plants.

(c) Every effort should be made to co-ordinate this anti-water pollution drive. Liaison and co-operation among Federal agencies, Provincial agencies, local Government District agencies, commercial establishments, and citizens is of paramount importance in solving the water pollution problem, which affects all people in the area.

(d) Generally speaking, the housekeeping at many of the water supply systems and waste disposal systems was less than optimum. It is stressed that cleanliness is a fundamental requirement at both water and sewage treatment plants. It is a known fact that operators are more successful in achieving good plant performance when working in an immaculate plant.

(e) There are a number of people in the Norway House-Rossville area who hold responsible positions with regard to

IX. GENERAL CONCLUSIONS AND RECOMMENDATIONS (Continued)

operating water treatment and sewage treatment plants or merely disinfecting a small water container. In many cases the responsible people do not realize the importance of their respective positions. Consideration should be given to sending Community Health Workers and operators of the larger systems to a course in water supply and waste disposal. It would seem feasible then, that these trained people, aided by an engineer from the Public Health Engineering Division of the Department of National Health and Welfare in Winnipeg, could share their knowledge with the persons responsible for the smaller systems.

(f) A strict delegation of duty, with regard to disinfecting water supplies at schools, should be laid down. In some cases there was confusion as to who was responsible for chlorinating a water supply. People responsible for this duty ranged from the Community Health Workers to the janitors and to the teachers. A lack of real concern as to the disinfection of water supplies seemed to prevail at many installations. The simple responsibility of submitting water samples from schools on a monthly basis should be delegated to a definite person at each school.

X. ABSTRACT COMMENTS

(a) Introduction

There are numerous noteworthy items observed during the field work, which forms the framework for a report such as this, which do not strictly have sanitary engineering significance. Some of these items are briefly discussed below.

(b) Comments

This report describes conditions as observed at the time of the 1966 survey and the 1968 survey. It is understood that, subsequent to the 1968 survey, the Province of Manitoba assumed responsibility for the operation of all the schools in the Norway House-Rossville area. However, as long as these same schools remain in operation, all the comments contained in this report apply. Other environmental aspects may also change between the time of the survey and the day the report is released. However, it seems likely to assume that no major changes will have occurred from the sanitary engineering viewpoint. This viewpoint forms the core of the report.

Some inconsistencies in the sense of values regarding public utilities seemed to prevail in the Norway House-Rossville area. Many modern facilities are in existence at the present time in this community. Electric power is widely distributed; local dial telephones are available; a good hospital is in operation; two airlines serve the community; shopping outlets serve the community; substantial schools are in existence; a system of roads and ferries is said to be planned for the near future; recreational facilities are available; and churches

X. ABSTRACT COMMENTS (Continued)

abound in the community. All these amenities, along with others unmentioned, represent a phenomenal capital investment. Why are a very high percentage of the sanitary facilities in the area substandard or obsolete? Why are relatively luxurious amenities such as those mentioned above, provided while little attention is paid to a commodity vital to life itself -- water? To solve the water supply and water pollution problem in the Norway House - Rossville area these two questions must be seriously considered by every Governmental agency, commercial establishment, and citizen in the community.

L E Garinger

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LEG/HF

A P P E N D I C E S

APPENDIX A

Summary of Sample Results

Samples Collected July 12, 1966 - July 18, 1966

Station	Description	Bacteriological Results A	B	C	B.O.D. mg/l
1.	East Channel at southern limit of community	460			1.4
2.	Junction of East Channel and Mission Channel	460			
3.	Mission Channel	150	3.6	0	1.2
4.	Junction of Gunisao River & Mission Channel	15			
5.	Mission Channel below confluence of Gunisao River (water temperature 72°F)	23	23	0	1.6
6.	Old school near Roman Catholic Mission	9			
7.	Near water intake to Roman Catholic Mission	140	23	0	24.0
8.	Near suspected outfall from Roman Catholic Mission	2400			2.0
9.	Little Playgreen Lake - Off point near Nickaway School	240			
10.	Little Playgreen Lake - Near suspected outfall from Nickaway School	230			2.5
11.	Little Playgreen Lake - Indian Affairs intake (8 1/2 feet deep)	28	93	0	1.8
12.	Tap in Indian Affairs office	43			
13.	Tap in Hudson's Bay Company (Rossville)	93			
14.	Little Playgreen Lake - near outfall from Indian Affairs sewerage system	930		2400+	2.0
15.	Little Playgreen Lake - South of Albert's Point	460			
16.	Little Playgreen Lake - Government dock at Albert's Point (water temperature 71°F)	120	1100	23	
17.	Little Playgreen Lake - Bay north of Albert's Point (4.2 feet deep)	150	240	23	2.8
18.	Little Playgreen Lake - Moore's Point	43		23	
19.	Little Playgreen Lake - Chubb's Point	240			
20.	Little Playgreen Lake - 20 feet of Towers Point	75			
21.	Little Playgreen Lake - Midway between Moore's Point and Long Island (Depth 8 feet; temperature 73°F)	43	43	23	
22.	Little Playgreen Lake - Near Forestry Intake	460	2400+	23	
23.	Robertson Bay - Little Playgreen Lake - Near hospital sewage outfall	1500+		2400+	5.1
24.	Robertson Bay - Little Playgreen Lake	43			
25.	Little Playgreen Lake - Hospital intake	240		150	3.0
26.	Tap in R.C.M.P. Barracks	0			
27.	R.C.M.P. collection well - Raw water	21			1.3
28.	Little Playgreen Lake - Near R.C.M.P. intake	23			
29.	Tap - Forestry Branch residence	21			
30.	Tap - Hudson's Bay Store (Norway House)	0			
31.	East Channel - Near Hudson's Bay Company intake (water temperature 71°F)	15			
32.	Tap - Post Office	0			
33.	East Channel - Northland Airlines Dock	43			
34.	Tap - St. Mark's Anglican Church Manse	0			
34A.	East Channel - Playgreen Inn Inlet	20			

APPENDIX A (Continued)

Summary of Sample Results

Samples Collected July 12, 1966 - July 18, 1966

Station	Description	Bacteriological Results			B.O.D. mg/l
		A	B	C	
34B.	Tap - Playgreen Inn	0			
35.	Nelson River - Crooked turn between Fort and Mission Islands		9.1	0	2.0
36.	East Channel - Above Playgreen Inn		43	0	
37.	Little Playgreen Lake - Bay at Rossville		290	23	
38.	Floodwater covering disposal field at Manitoba Telephone System residence		39	0	2.1
39.	Mouth of Mission Channel at Little Playgreen Lake		150	0	1.4
40.	Little Playgreen Lake - Bay opposite Rossville		150	0	

Note: Columns A and B - Most Probable Number of Coliform Organisms per 100 ml. of sample examined.

Column C - Most Probable Number of Faecal Coliform Organisms per 100 ml. of sample examined.

APPENDIX A-1

Summary of additional sampling results (1967 & 1968)

Date	Station	Remarks	M.P.N. Coliform organisms per 100 ml.
June 26, 1967	14	Near outfall from I.A.B. Rossville sewerage system (chlorinated effluent)	1,500+
Dec. 27, 1967	14		150,000+
Jan. 24, 1968	14		< 240
Feb. 6, 1968	14		110,000
Feb. 7, 1968	14		150,000
Dec. 26, 1967	15	South of Albert's Point Rossville	240
" 26, 1967	15		1,100
" 26, 1967	15		460
May 29, 1967	23	Near outfall from Hospital Sewerage system	1,500+
June 26, 1967	23		1,500+
Aug. 23, 1967	23		1,500+
June 26, 1967	24	Robertson Bay	93
May 29, 1967	24		150
" 29, 1967	24		210
May 29, 1967	25	Hospital Intake	460
May 29, 1967	34A	Playgreen Inn	27
May 29, 1967	34A	Inlet	460

APPENDIX B

Description of Sampling Stations for Chemical Analyses

Sample #5 - Mission Channel below confluence of Gunisao River.

Sample #11 - Little Playgreen Lake - Indian Affairs intake.

Sample #23 - Little Playgreen Lake - Robertson Bay - Near hospital sewage outfall.

Sample #25 - Little Playgreen Lake - Hospital intake.

Sample #35 - Nelson River - Crooked turn between Fort and Mission Islands.

Sample #36 - East Channel - Above Playgreen Inn.

Sample #40 - Little Playgreen Lake - Bay at Rossville.

CHEMICAL ANALYSIS OF WATER (APPENDIX B)

Location - Norway House, Manitoba Submitted by: K.A. Mellish
Date received in lab: Aug. 8/66

Ions, etc.	Parts per million			
	Sample No. 5	Sample No. 11	Sample No. 23	Sample No. 25
pH	-	7.6	-	7.4
Hardness (Calculated) as $CaCO_3$	50.0	88.0	-	94.0
Phenolphthalein Alkalinity as $CaCO_3$	-	Nil	-	Nil
Total Alkalinity as $CaCO_3$	-	72.0	-	76.0
Iron (Fe) (Total)	-	0.18	-	0.35
Colour (Hazen)	65.0	10.0	-	10.0
Turbidity (Turbidimeter)	-	3.0	-	4.8
Calcium (Ca)	14.1	24.9	-	24.8
Magnesium (Mg)	3.6	3.9	-	7.7
Sodium (Na) calculated	-	21.8	-	2.2
Bicarbonate as CO_3	-	43.2	-	45.6
Sulphate (SO_4)	-	61.8	-	20.0
Chloride (Cl)	7.0	3.0	2.0	8.0
Nitrate (NO_3)	1.0	0.6	0.6	0.6
Silica (SiO_2)	-	4.2	-	3.8
Filtrable Residue on Drying at 105°C	98.0	155.0	-	143.0
Nitrate Nitrogen (N)	0.23	0.14	0.14	0.14
Nitrite Nitrogen (N)	N.D.	N.D.	N.D.	N.D.
Free Ammonia Nitrogen (N)	0.02	0.02	0.04	0.02
Albuminoid Nitrogen (N)	0.23	0.19	0.16	0.16
Phosphate (PO_4)	0.01	0.02	0.08	0.02
Alkyl Benzene Sulphonate (A.B.S.)	Less 0.1	Less 0.1	0.1	Less 0.01

Remarks: N.D. - None Detected

Date: - August 15, 1966 Analysed by: R. Holowaty

CHEMICAL ANALYSIS OF WATER (APPENDIX B)
(Continued)

Location: Norway House, Manitoba
Date received in lab:- Aug. 8/66

Submitted by: K.A. Mellish

Ions, etc.	Parts per million		
	Sample No. 35	Sample No. 36.	Sample No. 40
pH	-	7.6	-
Hardness (Calculated) as $CaCO_3$	104.0	94.0	88.0
Total Alkalinity as $CaCO_3$		78.0	
Iron (Fe) (Total)		0.36	
Colour (Hazen)	25.0	20.0	10.0
Turbidity (Turbidimeter)	-	4.5	-
Calcium (Ca)	22.4	25.8	24.1
Magnesium (Mg)	11.6	7.2	4.3
Sodium (Na) calculated	-	14.1	-
Bicarbonate as CO_3	-	46.8	-
Sulphate (SO_4)	-	36.6	-
Chloride (Cl)	10.0	6.0	5.5
Nitrate (NO_3)	1.4	0.9	0.7
Silica (SiO_2)	-	4.2	-
Filtrable Residue on Drying at 105°C	152.0	144.0	147.0
Nitrate Nitrogen (N)	0.31	0.20	0.16
Nitrite Nitrogen (N)	N.D.	N.D.	N.D.
Free Ammonia Nitrogen (N)	0.05	0.03	0.02
Albuminoid Nitrogen (N)	0.20	0.16	0.20
Phosphate (PO_4)	0.05	0.04	0.03
Alkyl Benzene Sulphonate (A.B.S.)	Less 0.1	Less 0.1	0.2

Date: August 15, 1966

N.D. - None detected.

Analysed by: R. Holowaty

APPENDIX C

Summary of Sample Results

Samples Collected September 25, 1968 and September 26, 1968

Station	Description	Coliform Group (per 100 ml)	B.O.D. mg/l
1.	East Channel at southern limit of community	15	
2.	Junction of East Channel and Mission Channel	23	1.0
3.	Mission Channel	23	
4.	Junction of Gunisao River & Mission Channel	64	
5.	Mission Channel below confluence of Gunisao River	1100	
7.	Near water intake to Roman Catholic Mission	43	1.4
8.	Near suspected outfall from Roman Catholic Mission	23	
9.	Little Playgreen Lake - Off point near Nickaway School	43	
10.	Little Playgreen Lake - Near suspected outfall from Nickaway School	240	
11.	Little Playgreen Lake - Indian Affairs intake	460	1.2
12.	Tap in Indian Affairs office	0	
14.	Little Playgreen Lake - near outfall from Indian Affairs sewerage system	1500+	5.0
15.	Little Playgreen Lake - South of Albert's Point	1500+	
16.	Little Playgreen Lake - Government dock at Albert's Point	1500+	
17.	Little Playgreen Lake - Bay north of Albert's Point	64	
18.	Little Playgreen Lake - Moore's Point	240	
19.	Little Playgreen Lake - Chubb's Point	150	
20.	Little Playgreen Lake - 20 feet off Towers Point	23	
21.	Little Playgreen Lake - Midway between Moore's Point and Long Island	93	
22.	Little Playgreen Lake - Near Forestry Intake	460	
23.	Robertson Bay - Little Playgreen Lake - Near hospital sewage outfall	1500+	11.0
24.	Robertson Bay - Little Playgreen Lake	93	1.5
25.	Little Playgreen Lake - Hospital intake	43	
26.	Tap in R.C.M.P. Barracks	23	
27.	R.C.M.P. collection well - Raw water	0	
28.	Little Playgreen Lake - near R.C.M.P. intake	460	
29.	Tap - Forestry Branch residence	0	
30.	Tap - Hudson's Bay Store (Norway House)	23	
31.	East Channel - Near Hudson's Bay Company intake	23	
32.	Tap - Post Office	0	
33.	East Channel - Northland Airlines Dock	43	
34.	Tap - St. Mark's Anglican Church Manse	0	
34A.	East Channel - Playgreen Inn Inlet	23	

APPENDIX C (Continued)

Summary of Sample Results

Samples Collected September 25, 1968 and September 26, 1968

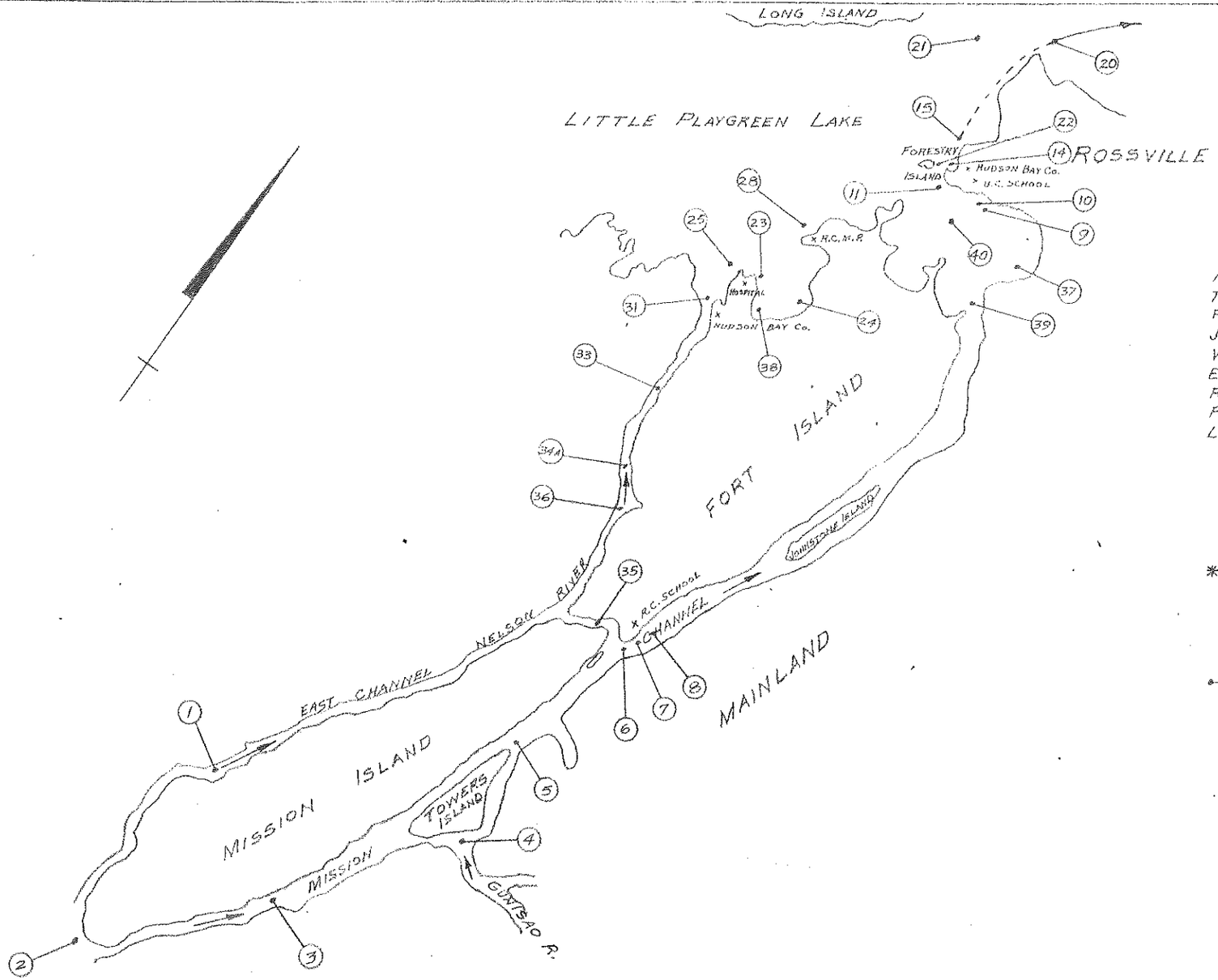
Station	Description	Coliform Group (per 100 ml)	B.O.D. mg/l
34B.	Tap - Playgreen Inn	9	
35.	Nelson River - Crooked turn between Fort and Mission Islands	240	1.7
36.	East Channel - Above Playgreen Inn	23	
37.	Little Playgreen Lake - Bay at Rossville	75	
39.	Mouth of Mission Channel at Little Playgreen Lake	240	
40.	Little Playgreen Lake - Bay opposite Rossville	20	
41.	Tap in hospital	0	
42.	Tap in Accommodation Building	0	
[illegible]	Tap in Community Development Officer's Residence	0	
44.	Tap in Father's residence - Roman Catholic Mission	23	
45.	Drinking container in North School	23	
46.	Drinking container in south School	1500+	
47.	Drinking container in Playgreen School	23	
48.	Drinking container in Towers Island School	1500+	
49.	Drinking fountain in United Church School at Rossville	0	
50.	Mission Channel - 500 feet south of south end of Johnstone Island	75	
51.	Mission Channel - 300 feet north of north end of Johnstone Island	9	

APPENDIX D

Samples Collected Since August, 1968 Investigations

Date	Sampling Location	MPN coliforms per 100 ml.
January 15, 1969	Kitchen tap - Nickaway School	0
February 4, 1969	Nelson River - W. Swanson domestic supply	1500+
February 4, 1969	Nelson River - H. Swanson domestic supply	0
February 4, 1969	Nelson River - G. Swanson domestic supply	43
March 14, 1969	Nelson River - R. Balfour domestic supply	93
March 13, 1969	Nelson River - S. Osborne domestic supply	1500+
March 13, 1969	Community tap - Nickaway School	0
March 14, 1969	Nelson River - T. Clark domestic supply	9
March 14, 1969	Nelson River - G. Budd domestic supply	1500+
March 14, 1969	Nelson River - W. Keam domestic supply	1100
[illegible]rch 3, 1969	Rossville United Church School tap	23
[illegible]arch 20, 1969	Nelson River - W. Swanson domestic supply	1500+
March 20, 1969	Nelson River - C. Wesley domestic supply	0
March 20, 1969	Nelson River - T.C. Anderson domestic supply	460
March 20, 1969	Nelson River - S. Anderson domestic supply	1500+
March 20, 1969	Nelson River - D. York domestic supply	240
March 13, 1969	Nelson River - M. Osborne domestic supply	1100
March 14, 1969	Little Playgreen Lake - A. Throof domestic supply	4
March 14, 1969	Little Playgreen Lake - A Throof water hole	9
March 14, 1969	Nelson River - H. Budd domestic supply	75
March 14, 1969	Nelson River - W. Keam water hole	15
March 14, 1969	Nelson River - G. Budd water hole	23
March 14, 1969	Nelson River - A. Saunders water hole	43
March 13, 1969	Little Playgreen Lake - G. Scribe water hole	1100
March 13, 1969	Little Playgreen Lake - A. McKay & S. Osborne water hole	1100
[illegible]arch 13, 1969	Little Playgreen Lake - E. Moore & F. McKay water hole	1100
March 13, 1969	Little Playgreen Lake - M. Osborne water hole	460
March 24, 1969	Nelson River - K. Osborne domestic supply	1100
March 24, 1969	Little Playgreen Lake - W. Anderson domestic supply	1500+
March 24, 1969	Little Playgreen Lake - F. Moore and W. Anderson water hole	1500+
March 24, 1969	Nelson River - N. Queskekapow - domestic supply	1100

NOTE: All the samples described in APPENDIX D were collected by Mr. S. Anderson, the Community Health Worker at Norway House. Since these samples were taken either from drinking containers in individual native homes or from drinking water holes cut in the ice, no attempt has been made to correlate these sampling points with numbered stations in previous appendices.



LOCATION	HOUSES*	POP'N
MISSION ISLAND	36	264
TOWERS ISLAND	15	150
FORT ISLAND	53	468
JOHNSTONE ISLAND	8	43
WEST SHORE (EAST CHANNEL)	34	226
EAST SHORE (MISSION CHANNEL)	59	417
ROSSVILLE	23	833
FORESTRY ISLAND	-	20
LONG ISLAND	5	53
	233	2,474

* DOES NOT INCLUDE SCHOOLS, HOSPITALS, ETC.

—○— INDICATES SAMPLE POINTS

NORWAY HOUSE

SCALE: 1" = 1 MILE