CHAPTER 1

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DESCRIPTION OF WORKS
WATER INTAKE PUMP HOUSE FACILITY
AND
SOUTH LAKE PUMP HOUSE
1979/80
IGLOOLIK, N.W.T.

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CHAPTER 3

BACKGROUND DATA

LOCATION

The Hamlet of Igloolik is situated on Igloolik Island off the northeast corner of the Melville Peninsula at coordinates 69°22'N, 81°46'W. The island is bounded to the north by the Fury and Helca Straits and separated from the Melville Peninsula by Hooper Inlet.

SITE CONDITIONS

The Hamlet is located on the shores of Turton Bay, a large body of water that constitutes the "C" shape nature of the island. The settlement is located between two buttes to the north and west both some 60 metres higher than the shoreline. The airport reservoir and pump station are located on the westerly outcrop. The soils throughout the settlement and island consist of raised marine beaches, glacial drift, and rock outcrops of paleozoic dolomite and dolomitic limestone.

PREVIOUS WATER SUPPLY

In summer, water was obtained by truck haulage from various lakes (East Lake, North Lake and Airport Lake) depending on the ice or snow conditions at each site. After Airport Lake was no longer capable of being used, the truck haulage switched to North Lake then to East Lake when winter conditions dictated. This operation continued at East Lake until the roads became impassable and then resumed when an ice road was adequate for travel. Snow and ice melting was required during severe winter conditions.

Delivery of water is by means of a 1978 Ford truck with a 4,540 litre (1,000 gal.) tank.

Basic treatment of the water was by means of batch chlorination accomplished by the driver.

ALTERNATIVE SUPPLY

For complete details on the alternative water supplies considered, reference should be made to the report prepared for the Government of the Northwest Territories entitled "Report on Water Supply System, Hamlet of Igloolik" and

ALTERNATIVE SUPPLY (cont'd)

dated October 1978. This report is not included in this manual.

The report evaluated the following water supply alternatives:

1. Impounding of the two existing creeks within the Hamlet.

2. East Lake pumphouse complete with overland and submerged pipeline to a reservoir north of the Hamlet.

3. East Lake pumphouse with entire overland pipe line to a reservoir north of the Hamlet.

4. South Lake pumphouse and fill line to an Airport Lake reservoir complete with truck loading station.

Of the four alternatives the South Lake pumphouse and Airport Lake reservoir was selected; because it offers the best quantity and quality water for the next twenty years. This alternative was the most cost effective once the creek alternative was found unacceptable from a health point of view.

CHAPTER 3

DESIGN DATA - HAMLET OF IGLOOLIK

POPULATION

752 in 1978, projected to 1,389 in the year 1998.

CLIMATE

No data is available from Environment Canada for Igloolik but the following is recorded for Hall Beach some 100 km south:

Temperature: Mean Daily February - 31.6°C
August - 4.9°C
Mean Annual - 14.0°C

Precipitation: Mean annual total precipitation is 192.3 mm with 33% falling in the form of rain.

WATER CONSUMPTION

- March 1977 to March 1978 954,076 litres (210,149 I. gal.)
- Average daily per capita consumption for 1977 was 4.54 litres (1 I. gal.). This indicates the considerable amount of snow and ice melting and the conservative use of water.
- Population and water consumption projections.

Year	Population	Per Capita Daily Demand Litres	Total Annual Demand Cubic Metres
1983	865	90.8	28,622
1988	1,015	102.2	37,830
1993	1,185	113.5	49,034
1998	1,389	124.9	63,232

- Recommended storage capacity to meet the 1998 water demand is 65,000 m^3 (based on 9 months storage with 2.44 m ice cover).
- Required intake and pumping capacity with trucked water 455 l/m (100 IGPM) source.

DESIGN DATA - HAMLET OF IGLOOLIK

STORAGE RESERVOIR

For Stage 1 of development, a reservoir 35 m x 75 m x 10 m (26,250 m^3) was excavated in the rock beneath Airport Lake. Based on the anticipated demand for the Hamlet, this will provide adequate storage until 1983 (based on refilling during 3 months and storing 9 months of demand). An additional portion 35 m x 25 m x 10 m deep has been blasted at the south end. Removal of this rock will extend the storage capability to meet the demand until the year 1987. After 1987, the reservoir will require enlargement to the recommended size of 65 m x 100 m x 10 m of the anticipated demands to 1998 are to be met.

The reservoir will require annual refilling during June, July and August by utilizing the South Lake pumping station and the 150 mm fill line.

TYPE OF SYSTEM

(a) Truck Fill System

Single inclined shaft consisting of a 250 mm (10 inch) insulated pipe inside a 600 mm (24 inch corrugated metal pipe. This shaft extends to within 2 m of the bottom of the excavated reservoir.

A submersible pump at the end of the shaft provides complete submergence below reservoir level under all operating conditions. A heat trace cable is provided. The low temperature thermistor is placed just below high water level in this variable water level situation, to prevent freezing at all water levels.

An externally mounted start/stop station permits the truck operator to put a measured quantity of chlorinated water into the tank truck.

A system to withdraw the pump and a spare pump has been provided. Dual heat sources (electrical and oil) have been provided for the Airport Reservoir pumphouse.

(b) Reservoir Fill System

A diesel operated 150 mm (6") pump is positioned in the South Lake pumphouse. This unit can be manually operated to refill the Airport reservoir by means of a 2,100 m, 150 mm diameter fill line before freeze up. The intake for the

DESIGN DATA - HAMLET OF IGLOOLIK

TYPE OF SYSTEM (cont'd)

(b) Reservoir Fill System (cont'd)

pump must be placed in South Lake prior to pumping and removed upon completion. Upon completion of pumping, the fill line must be completely drained to prevent damage caused by freezing.

ELECTRICAL LOAD

Continuous use thermostatically controlled	5.0 kw
Intermittant use (pumps, heat trace)	5.0 kw
Total:	10.0 kw + surge allowance

Available power is single phase 220 volts.

CHAPTER 4

COMPONENT FUNCTIONS

I N D E X

CHAPTER 4

WATER SUPPLY SYSTEM

FOR

HAMLET OF IGLOOLIK - N.W.T.

TABLE OF COMPONENT FUNCTIONS

NOTES: 1. The numbers given are referenced to the "Flow Diagram" in Chapter 4.

2. The numbers in the brackets refer to the "Pump House Piping and Fitting" drawing given in Chapter 5 and 6.

NO.	ITEM	LOCATION	FUNCTION PERFORMED	REMARKS
1	Intake screen	Airport Reservoir	Removal of floating debris	Standard well screen. Length 450 mm.
2	Well Pump #1	Inclined shaft.	Pumps water on demand to fill tank truck.	455 ℓ/min. (100 IGPM) @ 375 KPa (125 ft. H_2O) 5 HP 3,450 RPM.
3	Well Pump #2	Pump House Building Floor	Spare Pump	455 ℓ/min. (100 IGPM) @ 375 KPa (125 ft. H_2O) 5 HP 3,450 RPM.
4	250 mm diam. inclined shaft.	Airport Reservoir Ramp	Prevents water and pumps from freezing in freeze zone.	Single shaft laid on ramp with antifloatation concrete weights and earth fill. Length 46.10 m
5	89 mm Diam. Pump Discharge Pipe	Inside inclined shaft.	To carry water from well pump to Pump House.	Pipes are heat trace protected in freeze zone. Length 45.95 m
6	Fire Hose Connectors (Fitting #2)	One on inclined shaft.	For backflushing intake screens or emergency fill point for trucks.	Complete with cap and chain.
7	Gate Valve (#13)	Pump House Piping	Isolation of pump and emergency truck fill point.	
8	Water meter (Fitting #8)	Pump House Piping	Record the vol. of water pumped.	Remote resettable readout in the "Exterior Pump Control Panel".
9	Truck Fill Pipe	On wall outside Pump House	Provides final fill point for trucks.	Swivel joint permits pipe to be swung out of way when not in service.
10	Chemical Mixer (#15)	On chloride solution tank.	Provides mixing when batching chlorine solution.	Manual On-Off operation from wall switch.
11	Chemical Feed Pump (#14)	On top of chlorine solution tank.	Pumps chlorine solution into pump discharge line during truck filling.	Operation is automatic with pump operation.
12	Chemical Feed Line	Pump House wall from Chemical Pump to point of injection.	Carries chlorine solution to raw water.	
13	Cold water line and Valve (#17)	Pump House wall	Provides mixing water for batching of chlorine solution.	Manual operation. Normally closed.
14	Sample Tap and hose bib (#21)	Pump House Discharge piping	Provides sample to treated water for testing and washing floor.	Normally closed. Use only when well pump is operating.
15	Pressure Gauge (#9)	Pump House Discharge piping	Indicate pump discharge pressure.	Normal operation 3-5 p.s.i.
16	Temperature Gauge (#10)	Pump House Discharge piping	Indicate pump discharge water temperature	Should always be above 0°C.
17	136 Litre Chemical Solution tank.	Pump House Floor	Provides storage for chlorine solution.	
18	600 mm Corrugated culvert.	Airport Reservoir Ramp	Protects insulated pipe from earth and ice pressure.	Length 46.1 m
19	Heat Trace Cable	Taped to 89 mm Discharge Line	Prevent discharge line from freezing.	Heat Sensorsat 1 m and 11 m Thermon Model EL-12 Cable. Length 45.5 m

SEE NEXT CHART FOR SOUTH LAKE PUMP HOUSE

(1) Intake Screen

(2) Pump No. 1

(3) Pump No. 2 (Spare)

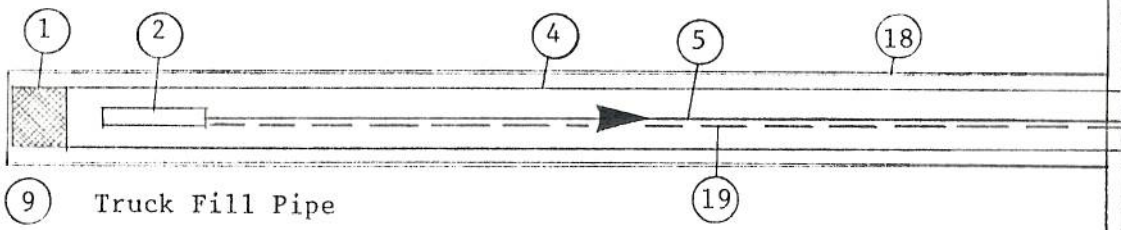
(4) 250 mm Dia. Insulated Inclined Shaft

(5) 86 mm Dia. Pump Discharge Pipe

(6) Fire Hose Connector

(7) 75 mm Gate Valves

(8) Water Meter



(9) Truck Fill Pipe

(10) Chemical Mixer

(11) Chemical Feed Pump

(12) Chemical Feed Line

(13) Cold Water Line

(14) Hose Bibb & Sample Tap

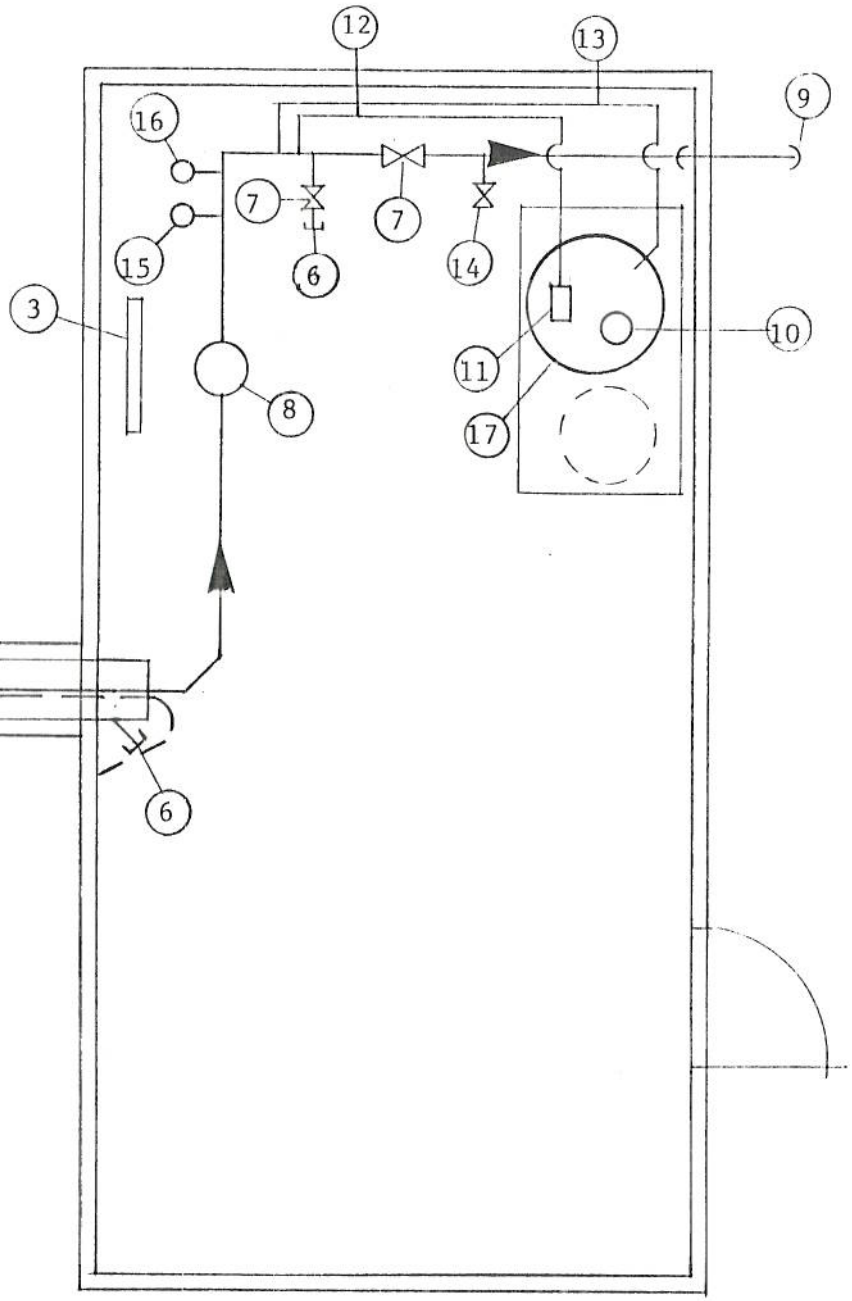
(15) Pressure Gauge

(16) Temperature Gauge

(17) 136 ℓ Chemical Solution Tank

(18) 600 mm Corrugated Culvert

(19) Heat Trace Cable



FLOW DIAGRAM - PUMP HOUSE