

Fred C. Morrison Building

Water-to-Air Heat Pump Installation

Sussex, N.B. Canada

Groundwater Source Heat Pump Provides Convenient, Cost Effective Heating /Cooling for Office /Warehouse

It was annual budget-making time and head office was checking figures prepared by company branches. The Sussex, N.B. branch was asked why its figures for electrical usage and cost appeared unusually low and why no figure was supplied for heating and air conditioning. The Sussex manager explained that heating and air conditioning were included in **electricity** and that the total was low because of the branch's energy-efficient groundwater-source heat pump system.

The Company Fred C. Morrison Ltd., Sussex, N.B. Branch

The Company was founded as an industrial components supplier in New Glasgow, N.S. in the mid 1950's, by Fred C. Morrison, an electrical/mechanical engineer. Today, Fred Morrison has expanded to 9 branch offices in Atlantic Canada, two of which are heated with a groundwater heat pump.

Fred Morrison personally designed and oversaw the building of the new Sussex office. A sales representative for "Nordic" groundwater heat pumps (manufactured by Maritime Geothermal Ltd., Petitcodiac, N.B.) learned of Fred Morrison's building plans and the two met. Based on heating requirements the representative recommended a "Nordic" 80 with heating output of 80,000 Btu/hr. and cooling Btu output of 38,000 Btu/hr.



The Sussex Project

The Sussex branch building is one-and-a-half storeys (20 ft, high) with a flat roof and measures 40 X 60 ft, and is built on a concrete slab. It is steel frame with steel cladding and brick veneer on the front elevation. Lighting is energy-efficient fluorescent. Insulation is R-40 ceiling and R-20 walls.

The "Nordic" 80 heat pump in use in Sussex is housed in a compact, steel cabinet (32 in. long, 28 in. wide and 48 in. high) located unobtrusively at the back and side of the branch building - in the

stockroom area. Ductwork (with vents) runs the length of the building (at ceiling level). Three ceiling fans augment the heating/cooling system by recirculating warm air which strays to ceiling height.

The heat pump system in Fred C. Morisson Ltd.'s Sussex branch has a 20 kW electric resistance plenum heater and two 9 kW auxiliary resistance heaters housed in the overhead ductwork. The three heaters are meant for backup but are rarely used because the heat pump has demonstrated it can meet heating needs even when the loading door is open. Hot water for employee washrooms is supplied by the heat pump and/or a conventional electric water heater (40 gallon tank) depending on the operating mode of the heat pump (heating or cooling).

Outdoors, close to the Sussex building but 100 ft. apart, are one source and one discharge water well. The former is equipped with a submersible pump which supplies groundwater to the heat pump; the latter handles ground water which has passed through the heat pump and is being returned below ground. A water flow of 12 gal. per minute is the required minimum and in Sussex the flow rate is 25 gal. per minute. The source well is 185 if. deep (with 40 if. of casing); the discharge or return well is sunk 143 if. (with 40 if. of casing). Water temperatures are typically a constant 46-47 degrees F in the source well. It is this constant temperature that allows the groundwater system to recover and transfer the heat at high efficiencies, even on the coldest winter days.

The earth is a natural heat source. Water is pumped from underground to the heat pump, where heat is extracted and upgraded for delivery as warm air at 110° F. The system is environmentally sound. The same well can be used for domestic water purposes and as a heat source for the heat pump.

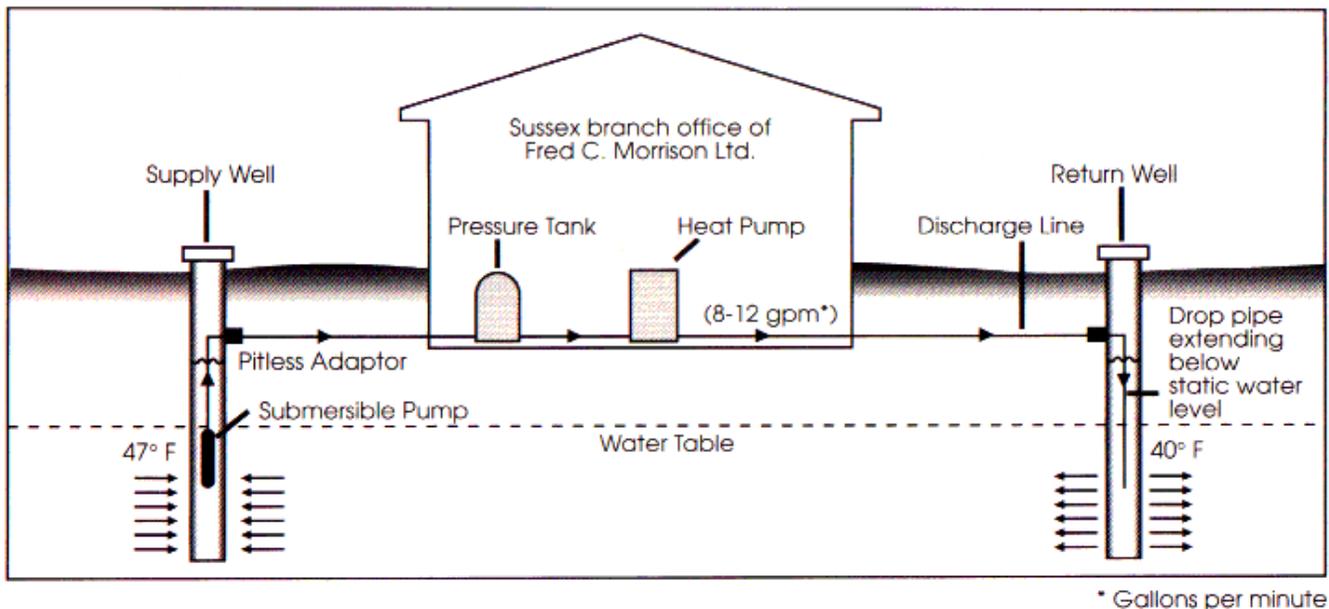


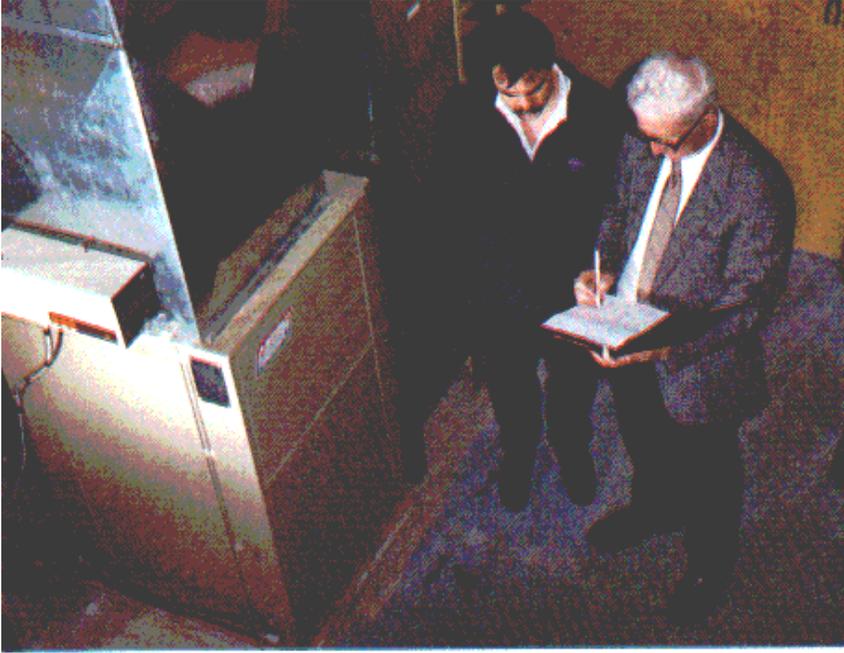
Diagram -Sussex Branch System

Operating Performance of the Groundwater Heat Pump System In Sussex

The heating coefficient-of-performance (COP) of the "Nordic" 80 in Sussex is approximately 3 which means three units of heat are available for every unit expended operating the system.

The heat pump in service in Sussex is easily switched from the heating to the cooling (air conditioning) mode by simply adjusting the thermostat. The Sussex branch manager says employees can be comfortably cool with the office door shut tight to keep out the noise and odors of Sussex's busy industrial park. For air conditioning a groundwater heat pump system is less expensive to operate than conventional air conditioning units and air-to-air heat pumps. Depending on the cooling needs of the building, airconditioning costs can often be further reduced by not operating the pump's compressor when airconditioning is desired. On this mode air-conditioning and dehumidifying is accomplished by circulating cold well water through the water-to-air heat exchanger. The result is "conditioned" air

with a minimum energy consumption. Even if heating is necessary nine months of the year, savings during the three months of air conditioning can be significant.



Rick Coleman, Branch Manager of Fred C. Morrison Ltd. discusses the system with Ross Urquhart of NB Power's Sussex district.

Experience with the Nordic® 80

Fred Morisson and the company's Sussex branch manager both say they are 100 per cent satisfied with the groundwater-source heat pump system in Sussex. They report that since the Sussex experience, a virtually identical system was installed in 1988 at the new company branch building in Sydney. This is a clear "vote of confidence" for the Groundwater Heat Pump system installed in 1987 in New Brunswick. Fred Morrison says a substantially larger building the company proposes to erect in Bathurst may utilize the energy-efficient heat pump systems operating in Sussex and Sydney.

Proper Installation

Ensures Performance

The sales representative for "Nordic" explains that only qualified tradesmen should be employed to install a heat pump system. He is referring to the well driller, electrician, sheet metal worker and plumber. He says that he and representatives of some companies making heat pumps regularly offer to coordinate the work of the several trades in order to ensure a thoroughly professional installation.





Staff of Fred C. Morrison Ltd. at their service desk.

NB Power Has Energy Edge Savings Suggestions

Since groundwater was readily available on the Sussex branch property, it was only natural that Fred C. Morrison Ltd. should investigate and install a heat pump system to heat/cool its office/warehouse building. Saving on energy costs is an understandable objective - a bottom line benefit.

Bill Date	KWH Usage	Energy Costs
89 03 09	4400	374.16
89 02 09	3920	334.37
89 01 10	4960	420.58
88 12 09	2960	254.78
88 11 09	2240	195.10
88 10 11	1120	102.25
88 09 09	1040	95.62
88 08 10	1120	102.25
88 07 12	1200	108.88
88 06 09	1120	102.25
88 05 10	2720	234.89
88 04 12	3280	281.31

Energy usage and cost for one year's operation, Fred C. Morrison Ltd., Sussex

For information about commercial and residential heat pump installations -original or retrofits - contact the nearest NB Power district office.

Technical Advisor: George Dashner

For more information, contact NB Power's Customer Service Division,
515 King Street, Fredericton, N. B. E3B 4X1 or call (506) 458-3285

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