# A CANADA-WIDE RELATIVE HUMIDITY DELIVERY SYSTEM: FEASIBILITY STUDY

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**Abstract** - A system is described for the distribution of humidity-controlled air to museums throughout Canada. Certain small mechanical and financial considerations are addressed. Use of existing facilities and adaptation of installments in current use are advocated as a way of expediting a perhaps otherwise possibly unfeasible project.

## *INTRODUCTION*

The distribution of humidity-controlled air to display enclosures from a centrally-located unit is a *fait accompli* (1). This system represents a quantum leap (2) in conservation science as it obviates the need for individual silica gel trays sealed into each display case, or other cumbersome and expensive solutions. A unit such as that described can be designed to supply the needs of an entire gallery or even a museum. There is no good reason (3) why a similar system could not be scaled up so that museums from Bonavista to Vancouver island, from the Arctic Circle to the Great Lake waters, could tap into a network and receive humidity-controlled air on demand. The following paper outlines the technical considerations for such a scheme and indicates methods for implementation.

## *SOME SUMS*

Efficiency of air flow through pipes is limited by friction on the walls of the pipes and is described by the following simple formula:

$$\frac{a}{v} + b = k$$

where: k = coefficient of friction
a = a constant
b = a nother constant
v = velocity in ft/sec

From the foregoing it can clearly be understood that the longer the pipe system is, the greater must be either the pipe diameter or the pressure required to cause air to flow. Thus, if a ½" diameter copper water pipe was used for distributing air from Ottawa, Ontario to Prince Rupert, British Columbia, the pressure necessary to accomplish this feat would be about equivalent to that produced in the centre of a 10 megaton hydrogen bomb. Conversely, an ordinary Canadian Tire store bicycle pump for air mattresses would be quite adequate if the pipe was in the order of 1.5 miles in diameter. (Flow rate would, however, be quite low.) Clearly, the above examples are extreme cases and the feasible

dimensions must fall within these two values. Nevertheless, before wasting time and brain power calculating the ideal dimensions for components it would be wise to examine existing installations for the possibility of adaptation.

## *EXISTING INSTALLATIONS*

Canadians have known for a decade or more that it will never be economically feasible to extract oil or natural gas from any well in the country without American money. It is only through the foresight of successive governments, who continue to pump money into the ground to displace fossil fuels therein, that a servicable pipeline is in place. Once a decision is taken by Cabinet to discontinue this farce, the pipeline network can be adapted for more useful service. The map reproduced in Figure 1 (Figure 1) shows the extent of

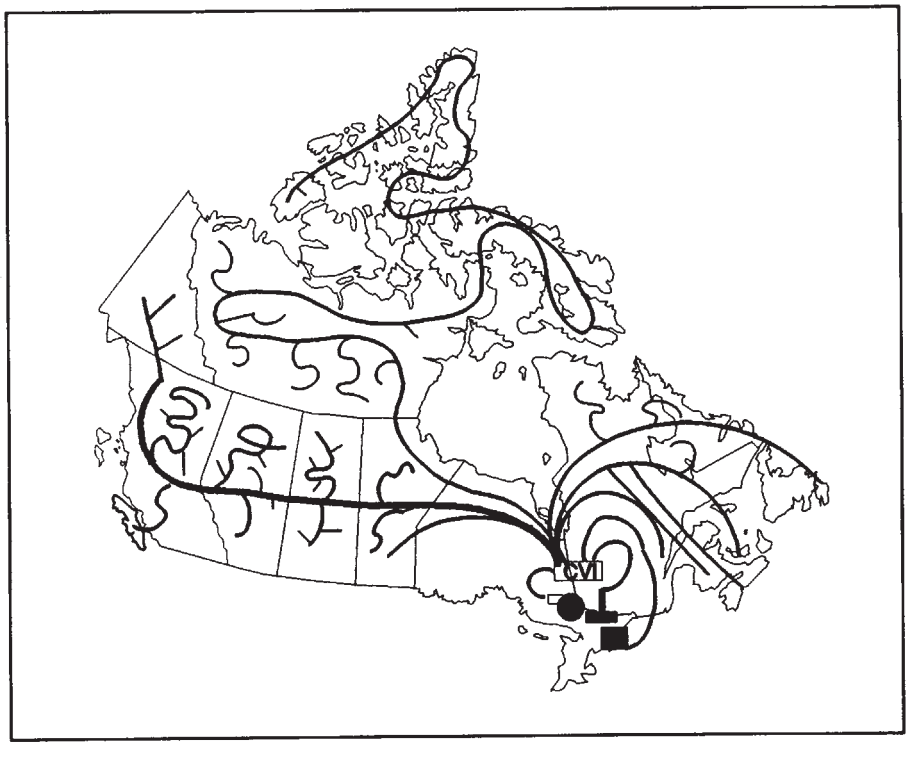


*Figure 1. A map of Canada showing major pipelines, and location of the CVI and support facilities. Note how poorly served Ontario is since turning NDP.*

the present system and additional feeders which could be connected. In view of the diameter of the majority of these pipes (approximately 3', 1,000,000,000$\mu$) calculations have shown that the pumping machinery needed to drive the air could be quite modest (4). A large, above-ground blower installation already exists on the outskirts of the Nation's Capital (Figure 2) which could easily be adapted for the purpose.

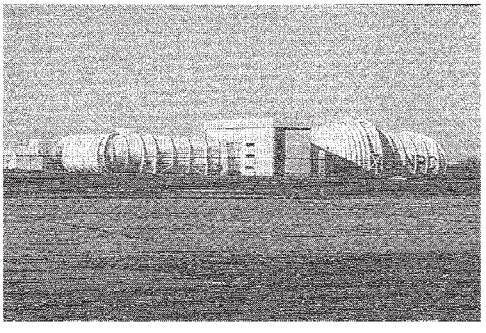

*Figure 2. A Large blower installation already in existence in the Ottawa region.*

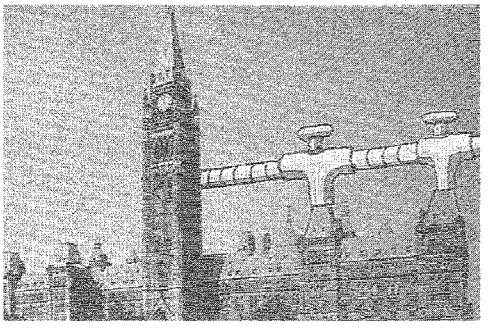

*Figure 3. A hot air-producing installation showing projected retrofit plumbing.*

Humidification for the system would best be achieved by first passing the air through a heating system. The installation shown in Figure 3 (with air duct attached schematically) actually serves this purpose at the present time and virtually no adaptation would be necessary. The air could then be passed to Southern Ontario for humidification by bubbling through the installation shown in Figure 4.

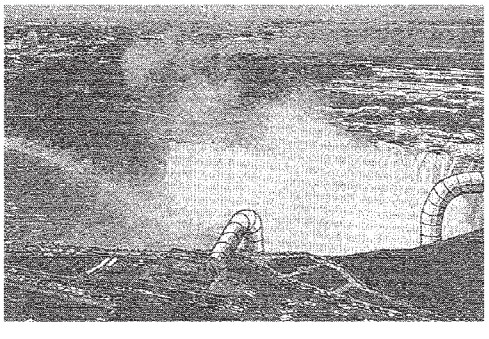

*Figure 4. A humidifying system with retro-fit plumbing shown in schematic.*

Many business and domestic premises have been encouraged to instal natural gas pipelines for heating. Once gas flow has ceased by Act of Parliament these pipes can immediately be retro-adapted at the museum/network interface for the conduction of humidity-controlled air.

## *OPERATION*

It would be necessary to create a central body to oversee operation of the proposed facility, and to ensure that air at the correct RH, temperature and pressure was delivered uniformly to museums that deserved the service. It is therefore proposed that a Canadian Ventilation Institute (CVI) be established by Order in Council to generate and maintain the necessary paper empire to support this project. This would be a centrally located body (in Montreal) operating all mechanical systems and having an extreme Outreach Programme to ensure expeditious delivery of product.

It is even possible that message capsules exhorting client installations to keep up the good work could be blasted along the pipelines. Routing of the capsules would be no problem if everybody received the same message. However, clients would need to be warned of the advent of messages to avoid display cases being suddenly filled with wads of shredded government paper.

## *CONCLUSION*

This paper has presented the mere skeleton of the idea. The blood, spleen, tripes, muscles, lungs, fat, connective tissue, gristle, tendons, etc. will be the subject of future research. It is quite obvious that great oaks could grow from the small chestnut planted here. This scheme has the potential of unifying the Nation; of making Canada what it could be today.

## *ACKNOWLEDGEMENT*

I would like to acknowledge the help of Bob Barclay who wrote this whole thing for me but still allowed me to put my name on the front.

## *REFERENCES*

1. Michalski, S., "A Control Nodule for Relative Humidity in Display Cases", *Science and Technology in the Service of Conservation*, IIC Washington Congress, IIC, London, 1982, 28-31.
2. Quantum leap - the smallest interval definable in physics.
3. But there are many bad reasons.
4. The calculations for this are just too complicated and besides I can't at the moment remember how they went. Why don't you go and look it up somewhere, Eh?