GOVERNMENT OF
NEWFOUNDLAND AND LABRADOR

# Export of Bulk Water from Newfoundland and Labrador

A Report of the Ministerial Committee

Examining the Export of Bulk Water

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# INTRODUCTION

In the fall of 1999, the Government of Newfoundland and Labrador passed legislation prohibiting bulk water removal.

*The Water Resources Protection Act* followed months of intense debate, both in this province and across the country. While the *Act* effectively ended the debate, it did not resolve many of the outstanding issues that were at the core of the controversy.

In March 2001, Government announced its intention to re-examine the decision to ban the export of bulk water and initiated a review of the current legal, trade, environmental and economic aspects of this issue.

A Ministerial Committee, chaired by the Minister of Justice, was formed to gather factual information on the bulk water export issue. Other members of the Committee include: the Minister of Finance, the Minister of Environment, and the Minister of Industry, Trade and Rural Development.

The Ministerial Committee worked with officials from the respective departments and also sought the advice of outside experts, including Memorial University Economics Professor James Feehan.

The result of that review and the Committee's conclusions with respect to these key issues is contained in this report.

## LEGISLATIVE ANALYSIS

Natural resources, including fresh water, fall within provincial jurisdiction. Consequently, any decision to sell and export bulk water is a matter for each province to decide under its legislation.

The federal government, under Section 91(2) of the *Constitution Act, 1967*, has jurisdiction with respect to "Trade and Commerce". However, the courts have viewed this as a power to regulate and govern, not to prohibit. Therefore, while the federal government may be able to impose grades or standards on the provincial export of bulk water, it is doubtful that Ottawa could impose an outright ban on that export.

The federal government might be able to invoke its criminal law jurisdiction to prevent the export of bulk water if there was a valid reason for the exercise of such power, such as environmental protection. However, the federal government cannot simply "criminalize" conduct where the underlying intent is to interfere with provincial property and civil rights authority.

The federal government's overriding authority under its "peace, order and good government" power could be invoked only if there is a strong national interest to be protected. It seems unlikely that the bulk export of water from this province would result in any threat to any matters which would invoke Ottawa's power to deal with overriding national interests.

In 1999, the province implemented the *Water Resources Protection Act*, which prohibited the export of water subject to certain exceptions. The most important of these exceptions permits the export of water in containers not more than 30 litres in volume. Effectively, these provisions prohibit the export of bulk water but do permit the export of bottled water. This *Act* will have to be amended if bulk water exports are to be permitted. Most other provinces have legislation similar to ours, which apply either province-wide or to major water basins.

A summary of applicable legislation in this and other provinces is contained in Appendix I.

## TRADE IMPLICATIONS

It has been argued that water in its natural state (ponds, lakes, etc.) does not constitute a "good" or "product" under the North American Free Trade Agreement (NAFTA) or the World Trade Organization (WTO). However, once bulk water is extracted from lakes and exported in bottles, containers or tankers, it would clearly be considered a good or product and subject to potential trade consequences under these agreements.

One of these consequences is that investors from other NAFTA countries could claim and receive rights of access on similar terms to that given to Canadian investors. Therefore, should the province decide to give a water export permit to a Canadian citizen, it may not be able to deny a permit to Mexican and American investors in "like circumstances" without being in breach of its NAFTA obligations.

The phrase "like circumstances" is an important limiting factor. If the initial access is subject to a series of conditions, like circumstances could limit access of NAFTA partners to the same conditions.

If the export of bulk water from a province has commenced, there are limited prospects for controlling subsequent exports. NAFTA and WTO generally disallow government measures, including legislation, which are designed to prohibit the export of goods or products. One exception that may be significant relates to the protection of the environment. NAFTA allows parties to take reasonable measures "to ensure that investment activity in its territory is undertaken in a manner sensitive to environmental concerns". While it is possible to restrict or prohibit the export of goods on this basis, objective criteria supported by properly documented scientific risk assessments should exist to justify environmental concerns as Canada's trading partners may argue that a specific environmental measure is, in fact, a disguised trade barrier. In such a case, a dispute resolution panel could be constituted to determine the precise nature of the measure.

In 1999, the Department of Justice sought the opinion of Mr. Gary Horlick of the Washington, D.C. firm of O'Melveny & Myers. He concluded that: "If the Province of Newfoundland allows the sale for export of bulk water, then Canada is responsible for ensuring that no other province deny the sale for export of bulk water, and that no other province afford treatment less favourable than the one afforded by the Province of Newfoundland."

Canadian lawyers Donald McRea and Geoffrey Kubrick have concluded that while approval of a bulk water project in Newfoundland and Labrador would create trade consequences for this province, it would not render all water resources in Canada a "good" under NAFTA and, therefore, would not create a "precedent" for the other provinces. In other words, other provinces would not be required to harmonize their practices with those of this province. They would simply have to offer to foreign nationals the best treatment available in that province with

respect to bulk water exports. If those provinces as a matter of policy do not export bulk water, they would not be required to start because that policy would be considered the best treatment available.

Professor Donald McRae, Faculty of Law, Common Law Section, University of Ottawa provided the following conclusions:

- Canada has no obligation to permit the sale of bulk water. It can do so if it chooses. Since natural resources, including fresh water, fall within provincial jurisdiction, any decision on the sale of bulk water is a matter for each province.

- However, should a province authorize the sale of bulk water, then the relevant rules of NAFTA and WTO would apply. This would mean that, unless there was a legitimate environmental justification for doing so, the sale of bulk water could not be restricted to the domestic market within Canada. Therefore, we would not be able to permit the sale of bulk water within Canada and prevent it from being exported.

- The second consequence of permitting the sale of bulk water would be that the obligations under NAFTA Chapter 11 regarding foreign investors from the other NAFTA parties would become relevant. This would mean that a foreign investor seeking to invest in bulk water sales would be entitled to treatment that is no less favourable than that accorded in like circumstances to domestic investors. However, a decision by one province to permit the sale of bulk water has no implications for other provinces.

- NAFTA, Article 1102 makes clear that within provincial jurisdictions, national treatment is treatment that is no less favourable than the best treatment accorded in like circumstances by that province to domestic investors or their investments. The fact that one province provides an opportunity for investors (including foreign investors), does not mean that other provinces have to provide the same opportunity.

Professor McRae concludes that: "The decision whether or not to exploit natural resources in one province is thus not dictated by decisions on the exploitation of natural resources in other provinces. The fact that one province permits logging of its forests does not mean that other provinces are required by trade agreements to permit logging of their forests. Equally, a province cannot be compelled to permit the sale of bulk water simply because another province decides to permit such sales."

The province received additional advice from Mr. Kubrick of the Ottawa law firm Flavell Kubrick & Lalonde. A recognized trade expert who agrees with all of Professor McRae's points, Mr. Kubrick has emphasized that the national treatment obligation of NAFTA and WTO requires non-discriminatory treatment "in like circumstances". Thus, if the province were to approve a bulk water export project and subject that project to rigid environmental, health and economic

conditions, any American or Mexican investor coming to Newfoundland and Labrador to undertake a similar project would be subject to similar conditions.

The full text of the three legal opinions cited here are contained in Appendix II.

The federal government currently has legislation before Parliament to amend the Boundary Waters Treaty Act to prohibit bulk water removal from water bodies on the US-Canada border, principally the Great Lakes. Consequently, these amendments would not have any applications to the bulk water issue in this province.

## ENVIRONMENTAL IMPACTS

An assessment of the environmental impacts of bulk water removal is wholly dependent on the location of any such project. Therefore, without referencing a specific project or site, discussion of the potential environmental impacts of a bulk water removal project must be general in nature.

Under natural conditions, whenever water is removed from a pond or lake there is a proportionate drop in water levels. If water is removed from a stream or river, downstream flows will decrease. If water is removed from groundwater, the water table will drop. The faster the rate of removal, the faster the decrease in water level or flow.

Water removal occurs naturally through outflow, infiltration or evaporation. Man-made removal adds to the balance of inflows and outflows or water surplus and deficits. The environmental questions are:

- Will such removal of water be large enough to be significant?
- Will there be environmental impacts?
- Will such impacts be adverse?

Bulk removals which contribute to a drop in water levels or flows may result in environmental impacts. Impacts could include a drop in the amount of water available for other beneficial uses such as downstream water supplies, power generation, recreation uses or supporting aquatic life. There could also be subtle ecological changes resulting from changes in the flow regime, such as changed rates of sedimentation and deposition or changes in water temperature or quality. The actual impact of all these possible changes depends entirely upon the magnitudes and locations involved.

Removal of water from a system that is already experiencing water deficits would not be acceptable if the bulk removal increased any problems already associated with low water levels or flows. Alternatively, bulk removals from a system that has a water surplus may have no impact at all.

All water eventually flows to the sea. While there are a few esturine environments where low water levels or flows would create an impact, most intertidal zones are relatively small and are not influenced by fresh water flows. Currents and tides overwhelmingly control the water quantity balance in the marine environment.

### Sustainability

Water truly is a renewable resource. Precipitation in Newfoundland ranges on average from more than 700 mm up to about 1,700 mm per year. Sustainability can be defined as a condition under which the removal of water is such that a surplus exists at all times. Sometimes, in the case of projects like hydro developments or large water supplies, sustainability cannot prudently be relied

on year round. For this reason dams are built to hold and store water for use later when natural weather fluctuations create periods of drought.
Unlike mineral resources, oil or many other resources, the water supply is eventually replenished as long as the removal of water is managed to create a surplus in the long run. Where water removal and surrounding conditions are properly managed, sustainability will be indefinite.

## Monitoring

Monitoring of water flows is currently being carried out at about 85 hydrometric stations throughout the province. Normal water levels and flows in all regions can be easily determined based on years of collected data. This information can then be used to predict where and when water surpluses exist.

Monitoring can also be used to determine appropriate rates of water removal for a specific project. If incoming flows are in surplus, the surplus can be beneficially used. If there is no surplus, water removal would have to stop until a surplus returns. Monitoring in this way can be used to ensure that no lake drops below a certain water level or that no river or stream diminishes to less than a sustainable flow. Monitoring would be a standard requirement for any water use permit or authorization.

## Protection Provided by the Environmental Assessment Process

Bulk water removal projects would be subject to the province's *Environmental Assessment Act* and other regulatory processes.

The environmental assessment process is designed to ensure that all relevant information about a project is obtained and evaluated in terms of predicted environmental impacts. Water removal can be a complex issue in terms of water resources engineering and management, and if needed, a consulting firm may be used by the proponent to evaluate the impacts. Government officials oversee the process, but all steps of the process are open to public review and comment. If a proposed project has adverse impacts, mitigation measures must be proposed and committed to or the project can be rejected.

Government release is required before any project can proceed. The decision to release a project from environmental assessment would be made on the basis of the facts presented for the particular case.

## Permits and Water Use Authorizations

If a water export project is released, the project would then be given appropriate permits and a water use authorization. Permits, through their relevant terms and conditions, are intended to

ensure that the project is carried out in compliance with all regulations and proper environmental protection practices. The Water Use Authorization is the key permit. It allows the operation to proceed, using the water from a source for a particular purpose for a specified period of time.

The terms and conditions of a typical Water Use Authorization issued by the Department of Environment are intended to address all the possible environmental, sustainability and monitoring issues. Terms and conditions include:

- Water use permission will be non-exclusive and the Crown retains ownership of water rights.
- Water rights cannot be sold or re-assigned without approval.
- Present and future water requirements of communities and other water users will be protected.
- Water use may not affect water quality or water required for fish and fish habitat.
- Water monitoring stations must be installed and operated as required; records must be kept and submitted annually.
- Operation may not cause erosion, deposition, flooding, water quality deterioration or groundwater depletion.
- Term of authorization may be 5 to 10 years and will be renewable.
- Water use can be allocated for higher priority requirements with 180 days notice.
- General provisions relating to pollution, marine interference, public safety of water users.
- Administrative provisions, fees, notification, and cancellation clauses.

**Conclusion**

Bulk water export, like any removal of water from a natural water source, is likely to have some impact on the environment. It would not be reasonable to expect otherwise. The true test, however, is whether the removal of water at a specific site would negatively affect other beneficial uses, including sustaining a healthy environment.

Monitoring of water use and flows will ensure quantitative evaluation of proposed and actual operations. Before a project may proceed, a rigorous environmental assessment must take place. The final decision regarding the project would be based on a sound study of all possible impacts. Any water removal project must abide by strict terms and conditions to ensure that all immediate and long-term interests of the province are protected.

## ECONOMIC ASSESSMENT

Government engaged Memorial University Economics Professor James Feehan to assess the economic feasibility of bulk water exports from Newfoundland and Labrador.

In his report, *Export of Bulk Water from Newfoundland and Labrador: A Preliminary Assessment of Economic Feasibility*, Professor Feehan concluded that: ". . . considering costs as well as potential markets, it is predicted that there would be only a limited number of commercially viable bulk water export operations, if any."

Following is the Executive Summary from Professor Feehan's report:

*This report is a preliminary assessment of the economic feasibility of bulk water exports from Newfoundland and Labrador. The focus is on the use of tanker vessels.*

*Bulk water export does take place around the world but on a very limited basis. There is no integrated world market as there is for oil, wheat etc. The transport of water in tanker vessels takes place within a few countries. There are no substantial international tanker shipments but there are some near-term prospects.*

*In Canada, the 1985 Inquiry on Federal Water Policy opposed large scale diversions of rivers and water basins as a means of exporting water. That Inquiry accepted the idea of small scale export, including export by tankers.*

*There does not appear to have been any export of water from Canada by tanker vessels. However, bulk export of water does take place. Water is exported by pipeline on a small scale in a few border areas. Fresh water has long been exported at Canadian ports through sales to foreign ships for on-board use.*

*Relative to its population, Newfoundland and Labrador is extremely well endowed with renewable fresh water resources. On a per capita basis, this province's water supply ranks more highly than Canada's as a whole and more highly than almost any other country in the world. Water is used in a variety of ways here and contributes to the provincial economy. There seems to be a large surplus potentially available for export.*

*The most important cost associated with export of water from this province is the delivery cost. Because of that factor, provincial water is not competitive with conventional supplies in the US or elsewhere.*

*Water from Newfoundland and Labrador is potentially competitive in those places that rely on desalinated water. Desalinization is expensive, energy-intensive, and waste-generating. Due to transport costs, the areas of any promise in this regard are limited to the US southeast,*

*particularly Florida and Texas, and the Caribbean. However, improving desalinization technology casts doubt on even this opportunity. Provincial water might also be competitive when shipped in bulk to countries, other than the US, for bottling there.*

*In 1992 Alaska enacted legislation to allow bulk water exports. Despite the on-going water shortages in southern California and reliance on desalinated water in some of its coastal cities, there has yet to be any water exports from Alaska of any significant note, either to California or elsewhere. There are some near-term prospects for export from one or two sites in that state to other countries but their success remains to be determined. Newfoundland and Labrador might have similar experience.*

*The fundamentals of the provincial government's now-suspended 1996 bulk-water export policy are sound. That policy set a priority for the allocation of water across uses; addressed environmental concerns, and established a royalty regime.*

*Bulk water export operations are capital intensive. The employment effects are small. The main benefit is as a source of royalty revenue. However, for this province, the potential amount of revenue is not large. That is because only a few sites, if any, may be commercially viable and even they may have very slim profit margins.*

*In conclusion, under the 1996 water export policy and considering costs as well as potential markets, it is predicted that there would be only a limited number of commercially viable bulk water export operations, if any. They would likely be located on the south coast of the Island. That area has the advantages of its proximity to the US southeast, its ice-free ports, and the fewer conflicts with alternate uses for the water.*

Professor Feehan's complete report is contained in Appendix III.

## CONCLUSION

Government's review of the current legal, trade, economic and environmental aspects of bulk water export has resulted in clear conclusions and provides answers to critical questions.

**Does the province have jurisdiction over its water resources?**

Yes. The province has jurisdiction over its water resources. The *Water Resources Protection Act, 1999* bans water export, except for containers less than 30 litres.

Most other provinces have similar legislation or policies prohibiting bulk water export. The federal government currently has legislation before Parliament to amend the *Boundary Waters Treaty Act.* These proposed amendments would have no application to the bulk water issue in this province.

**Would approval of a bulk water project in Newfoundland and Labrador render all water resources in Canada a "good" under NAFTA?**

No. Two of three legal opinions solicited by the province indicate that while approval of a bulk water project in Newfoundland and Labrador would create trade consequences for this province, it would not render all water resources in Canada a "good" under NAFTA and, therefore, would not create a precedent for the other provinces. In other words, other provinces would not be required to harmonize their best practices with those of this province. They would simply have to offer foreign nationals the best treatment available in that province with respect to bulk water exports. If those provinces, as a matter of policy, do not export bulk water, they would not be required to start, as that policy would be considered the best treatment available.

**Would approval of a bulk water project negatively impact the environment?**

It may or may not, depending on the circumstances. Much would depend on the proposed location for the project. Bulk water removals, like any removal of water from a natural water source, is likely to have some impact on the environment. The true test, however, is whether the removal of water at a specific site would negatively affect other beneficial uses, including sustaining a healthy environment and, if so, what quantity can be removed.

To date, the only water export project proposed for development has been for Gisbourne Lake. Government determined through its environmental assessment process that a water removal project at Gisbourne Lake would have no significant negative environmental impacts.

Provincial policy requires that water export projects meet the requirements of the Environmental Assessment process. The level of environmental study under the Environmental Assessment process would depend on the nature of the issues and would be project specific. Similarly,

appropriate terms and conditions of water use authorization and permits would ensure that only sustainable amounts of water removal would be permitted.

**Is the export of bulk water economically viable at this time?**

No. Professor James Feehan of Memorial University was engaged to assess the potential markets and economic feasibility of bulk water export from the province using tanker vessels. His report concludes:

- Most bulk water export operations are capital intensive.
- Tanker transport costs, at moderate or high rates, make bulk water export uneconomic.
- At "low" tanker costs, a few bulk export operations might be commercially viable, if aimed at displacing desalinated water in the U.S. southeast. Profit margins, however, would likely be very thin.
- Rationalized U.S. water policies (such as eliminating subsidies for agriculture) or further improvements in desalinization techniques would eliminate any chance of a U.S. market.
- There might be some opportunities for the supply of bulk water to bottling plants located outside North America. Competition there would be stiff.
- The potential employment and royalty benefits of a bulk water export project are relatively small.
- Only a few sites, if any, would be commercially viable.
- Alaskan bulk water ventures have been proposed over the past six or seven years, and there are still no exports.

In addition to Professor Feehan's conclusions, it should be noted that no proponent has come forward with a proposal for bulk water export.

**Is there a public policy reason not to proceed with bulk water export?**

Government has weighed the facts and considered the opinions put forward in this report and has determined the following:

- There is no public policy reason not to proceed with bulk water export.
- There is no legal impediment to a bulk water removal project.
- There is no compelling environmental reason not to allow such a project to proceed.
- The economic viability of such a project is marginal, according to one assessment.
- With respect to impacts on other jurisdictions, there are differing legal opinions.

**Conclusions:**

- The economic viability of any project would need to be determined on a case by case basis. Currently, no proponent has come forward with a proposal.

- Government will explore methods of clarifying the legal issue referred to in Point 5 above.

- Government will not rescind or amend the province's 1999 legislation banning the export of bulk water from the province at this time.

**APPENDICES**

## APPENDIX I

Bulk Water Removals: Status of Legislation and Regulations by Province

| | Legislation | Approach / Threshold |
|---|---|---|
| **P.E.I.** | Amendments to the PEI *Environmental Protection Act* | Prohibition of drilling for, extracting, taking, removing or withdrawing for the purpose of transfer or removal from the province from ground-water, water basin, watercourse, or surface water body. Threshold is 25 litres. Exceptions include:<br>• water used in the ordinary course of operating vehicles, vessels or aircraft;<br>• for use by persons or animals while in transit;<br>• for transport of food or products;<br>• with written permission of the Minister to meet short-term safety, security or humanitarian needs. |
| **Nfld. & Lab.** | *Water Resources Protection Act* (Dec. 1999) | Prohibition of bulk water removals from Newfoundland. Exemptions:<br>• water for operation or on-board requirements of a motor vehicle, vessel or aircraft;<br>• water used in the transport of food or an industrial product;<br>• water for non-commercial uses including safety or humanitarian purposes.<br>Threshold is 30 litres. |
| **N.S.** | *Water Resources Protection Act* (June 2000) | Prohibition of surface and groundwater removal from Nova Scotia portion of the Atlantic drainage basin. Threshold is 25 litres. |
| **N.B.** | | No legislation. |
| **Que.** | *Water Resources Preservation Act* (Nov. 1999) | Interim legislation, extended until January 1, 2002, prohibits the transfer of surface and groundwater outside of Quebec. Exemptions:<br>• water for hydro-electricity production;<br>• potable water for border communities;<br>• ballast water;<br>• humanitarian purposes.<br>Threshold is 20 litres. |
| **Ont.** | Water Transfer Regulation (*Water Resources Act, 1999*) | Watershed approach (3 major watersheds defined). Prohibition on the transfer of surface water out of defined Ontario water basins. Threshold is 20 litres. |

| | Legislation | Approach / Threshold |
|---|---|---|
| **Man.** | The *Water Resources* and *Conservation and Protection* and *Consequential Amendments Act* (Aug. 2000) | Prohibition of bulk water removal from Manitoba's portion of the Hudson Bay drainage basin. Threshold is 25 litres. Exemptions include:<br>• water used in vehicles, vessels or aircraft;<br>• short term humanitarian needs;<br>• water used to manufacture or produce a product.<br>Prohibition against water removal does not apply to water removed outside the basin. |
| **Sask.** | *Water Corporation Act* (2001) | Recent amendments provide that the water corporation shall not grant any approval for taking water from a watershed.<br>Exceptions:<br>• transferring water between watersheds within Sask.;<br>• packaged in containers with capacity of less than maximum capacity set out in the Regulations;<br>• used in ordinary course of carrying water in vehicle, vessel or aircraft for: use of persons or animals being transported; the ordinary operation of the vehicle, vessel or aircraft; or transportation of food or products in the vehicle, vessel or aircraft;<br>• or is removed in a manner or for purpose prescribed in the Regulations.<br>Regulations are not yet in effect. |
| **Alta.** | *Alberta Water Act* (1996; proclaimed Jan. 1999) | Watershed approach (7 major river basins defined). Prohibition on the licensing of water transfers between major river basins in the province AND for transfers outside of Canada unless authorized by a special Act of the Legislature. |
| **B.C.** | *Water Protection Act* (1995) | Prohibition on large-scale diversions between 9 major watersheds of the province. Prohibition on the removal of water out of province: threshold is 20 litres. |
| **Yukon, NWT Nunavut** | | The Department of Indian Affairs and Northern Development is implementing policy to prohibit bulk water removal in cooperation with territories. |
| **Canada** | Amendments to *International Boundary Waters Treaty Act* | Legislation will be before Parliament in the fall, which will prohibit bulk water removal from boundary waters, principally the Great Lakes. |

## APPENDIX II

Legal Opinions

*Following is the text of the April 12, 2001 opinion provided by Professor Donald M. McRae, Faculty of Law, Common Law Section, University of Ottawa in a letter to John C. McCarthy, Assistant Deputy Minister with the provincial Department of Justice:*

I am replying to your letter of April 6, 2001. I understand that last week a CBC Radio reporter ascribed to me the view that if the Government of Newfoundland and Labrador approved the sale of bulk water, this would grant foreign investors access to such water anywhere in Canada. This is not my view.

It may be helpful, therefore, if I set out the legal position in respect of bulk water sales under relevant trade agreements, that is the World Trade Organization (WTO) and the North American Free Trade Agreement (NAFTA).

NAFTA and the WTO place obligations on Canada in respect of trade in goods and in respect of investment by the investors of NAFTA parties. These obligations apply to bulk water only if the sale of bulk water is permitted and bulk water is placed into commerce. Nothing in NAFTA or the WTO requires a state to exploit its natural resources. There is, thus, no obligation on Canada to permit the sale of bulk water. It can do so if it chooses. Since natural resources, including fresh water, fall within provincial jurisdiction, any decision on the sale of bulk water is a matter for each province.

However, should a province authorize the sale of bulk water, then the relevant rules of NAFTA and the WTO would apply. This would mean that, unless there was a legitimate environmental jurisdiction for doing so, the sale of bulk water could not be restricted to the domestic market within Canada. Export restrictions are prohibited under GATT Article XI and NAFTA Article 309, unless they can be justified as an environmental measure under GATT Article XX or NAFTA Article 315. Thus, it would not be possible to permit the sale of bulk water within Canada but prevent it from being exported.

The second consequence of permitting the sale of bulk water would be that the obligations under NAFTA Chapter 11 relating to foreign investors from the other NAFTA parties would be relevant. This would mean that, in accordance with NAFTA Article 1102, a foreign investor seeking to invest in bulk water sales would be entitled to treatment that is no less favourable than that accorded in like circumstances to domestic investors. A foreign investor that did invest in bulk water sales would be entitled to such national treatment in respect of the operation of that investment, and the investment would be entitled to be treated in accordance with Articles 1105 and 1110 of NAFTA relating to the international minimum standard of treatment and expropriation. Thus, any decision to stop selling bulk water might involve liability to foreign investors whose investment would be taken away by such a decision.

A decision by a province to permit the sale of bulk water has implications for the Government of Canada. The obligations under NAFTA and under the WTO are obligations of Canada. Thus, any

prohibition on the export of bulk water, or any action that affected foreign investors or the investments in a manner that is contrary to NAFTA Chapter 11, would involve the responsibility of the Government of Canada.

However, a decision by one province to permit the sale of bulk water has no implications for other provinces. NAFTA Article 1102 makes clear that with respect to a province, national treatment is treatment that is no less favourable than the best treatment accorded in like circumstances by that province to domestic investors or their investments. The fact that one province provides an opportunity for investors, including foreign investors, does not mean that other provinces have to provide the same opportunity.

The decision whether or not to exploit natural resources in one province is thus not dictated by decisions on the exploitation of natural resources in other provinces. The fact that one province permits logging of its forests does not mean that other provinces are required by trade agreement to permit logging of their forests. Equally, a province cannot be compelled to permit the sale of bulk water simply because another province decides to permit such sales.

The result is that the CBC reporter was in error in suggesting that if the Newfoundland and Labrador government approved the sale of bulk water, this would grant foreign investors access to such water anywhere in Canada, and was equally in error in ascribing such a view to me.

I hope that this provides sufficient clarification. Please let me know if you require any further elaboration.

*Following is the text of the September 10, 1999 opinion of Geoffrey Kubrick of Flavell Kubrick & Lalonde in correspondence with provincial Department of Justice solicitor Paul Scott:*

Thank you for your letter of September 3, 1999. In your letter, you ask two questions. First, whether the national treatment provisions of the GATT 1994 could be construed to require other provinces to allow the sale for export of bulk water, should Newfoundland do so; and second, whether the proportional sharing provisions of Article 315 of NAFTA could permit an investor of another NAFTA party to assert a right to water resources from other provinces.

Do the national treatment provisions require that Canada ensure that no other province can refuse to allow a sale for export on terms as favourable than those given by Newfoundland? [1]

We do not believe that national treatment provisions of GATT Article III or NAFTA Article 301 would serve to compel the export of bulk water from any province under any circumstance. We have two reasons for expressing this view. First, the above noted national treatment provisions relate only to importations of goods. For example, the GATT panel on *United States - Measures Effecting Alcoholic and Malt Beverages*, DS 23/R (1992) dealt with discriminatory import regimes in American states. The Panel held that the best treatment available in a particular State must be conferred upon a GATT partner. In other words, if a State's own goods were accorded better treatment than those of another State, the GATT national treatment rules required that the State's own treatment be the standard for imports from other contracting parties. As noted on page 20 of our previous opinion, a Chapter 18 panel under the FTA reached the conclusion that GATT Article III provisions do not apply to exports (see Salmon and Herring CDA-89-1807-01, tab 9 of our opinion). Similarly, Professor John H. Jackson notes that "the national treatment clause attempts to impose the principle of nondiscrimination as between goods which are domestically produced, and goods which are imported."[1] Professor Jackson cites the GATT panel report in Italian Discrimination Against Imported Agricultural Machinery [2] which held that "[...] the intent of the drafters [in regards to Article III] was to provide equal conditions of competition once goods had been cleared through customs[...]."

We are further of the view that the provisions of GATT Article III and NAFTA Article 301 relate exclusively to products or goods (respectively). We feel that water, in its natural state, does not constitute a product or a good until prepared in some manner for commercial exploitation.

A more challenging proposition is that the national treatment rules of Chapter 11 of NAFTA might recognize creation of a right that is compensable upon being withdrawn. Article 1102 provides:

> "1. Each Party shall accord to investors of another Party treatment no less favourable than it accords, in like circumstances, to its own investors with respect to the establishment, acquisition, expansion, management, conduct, operation, and sale or other disposition of the investments."

Parallel provisions to GATT Article XXIV can be found in Article 1102.3:

> "The treatment accorded by a Party under paragraphs 1 and 2 means, with respect to a state or province, treatment no less favourable than the most favourable treatment accorded, in like circumstances, by that state or province to investors, and to investments of investors, of the Party of which it forms a part.

In our view, Article 1102.3 arguably recognizes the possibility of different regulation between provincial jurisdictions, and requires only that in Newfoundland an American or Mexican investor not be treated any differently than an investor from Newfoundland, or from any other Canadian Province (whichever is the better treatment). It creates an obligation of the Government of Canada to ensure that American or Mexican investors in Newfoundland are not given treatment less favourable than that accorded to any Canadian investor in Newfoundland. The threshold of equal treatment may differ from province to province as long as the NAFTA investor receives treatment no less favourable than the best treatment available to investors in that province. In this context, the *Alcoholic and Malt Beverages* case noted above, analyzed discriminatory treatment on a State-by-State basis, rather than imposing the most lenient treatment in any one State across all States.

In our legal opinion of August 20, we provide some views of the implications under Chapter 11 that might arise from an export of water from Gisbourne Lake. The more severe consequences would most likely arise in the case of actual participation of a NAFTA investor in the Gisbourne Lake project.

A final point worth making is that while Canada is responsible for Canada's international trade obligations, it may not have jurisdiction to resolve the matter in such a way as to meet those obligations. In such a case, Canada would be obliged to pay compensation (in the case of Chapter 11 of NAFTA) or withdrawal of benefits to Canada could be authorized by the WTO. As a result, even if it were asserted that a province was obliged to export water in bulk form, that province could simply refuse, and Canada would be without jurisdiction (and likely without political clout) to enforce access. Compensation or withdrawal of benefits of equal value would then constitute the only available remedy.

Could Article 315 of NAFTA be employed to impose access to Canadian water resources from other provinces? [2]

The provisions of Article 315 do bind Canada, and Canada would be answerable to another NAFTA Party for a breach of those obligations. We believe that the consequences of such a breach are the same as those discussed above in a previous paragraph. In other words, while having another province replace a Newfoundland source of supply might be an acceptable resolution to a complaining NAFTA Party, we are doubtful that the Government of Canada has the jurisdictional ability or political will to enforce the exportation of bulk water.

It is also noted that Article 315 expressly applies to pre-existing exports. In the absence of existing channels of supply, there is no enforceable obligation with respect to Article 315 (though export restrictions under Article 309 of NAFTA may be an issue).

While Article 315 of NAFTA can be invoked by a NAFTA Party, we are dubious about the potential success of a Chapter 11 investor claim of a denial of benefits under the Article. Section B of Chapter 11 of NAFTA provides the scope of enforceable investor rights. Article 1115 notes that the intention of Part B is to ensure "equal treatment among investors of the Parties". Article 1116 expressly limits arbitration to a breach of obligations under section A of Chapter 11 (and certain provisions of Chapter 15 which are applicable here), providing the investor has incurred loss or damage by reason of the breach. Thus, an American or Mexican investor might seek arbitration on the ground that it is being treated differently than a Canadian investor, or that an existing right has been expropriated, but it cannot claim a special right accruing from Article 315.

Even if an investor could successfully establish an existing right in bulk water exports, its right to compensation may be limited exclusively to monetary damages, at the sole discretion of a NAFTA Party (Article 1135.1). Specific performance cannot be forced upon an unwilling government.

Should you have any questions or comments, please do not hesitate to call.

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1 See J. H. Jackson and W. J. Davey, *Legal Principles of International Economic Relations*: *Cases, Materials and Text*, 2nd ed. (St. Paul, Minn.: West Publishing Co., 1986); J. H. Jackson, *The World Trading System Law and Policy of International Economic Relations* (Cambridge, Mass.: The MIT Press, 1989).

2 BISD 7 Supp. 60 (1959).

*Following is the text of the July 1, 1999 opinion provided by Gary Horlick of the firm O'Melveny & Myers:*

Introduction:

This memorandum provides an initial analysis to the questions presented by the Government of Newfoundland and Labrador on the implications of exporting water from Gisbourne Lake in the Province of Newfoundland in bottles and tankers. The issues raised are the following:

Questions Presented:

1. If the project to export bulk water from Gisbourne Lake is approved by the Newfoundland Province and subsequently a policy change occurs prohibiting such projects in the future, can Canada's trading partners ignore the policy change pursuant to NAFTA (or other trade obligations) and demand similar treatment?

2. If the policy change was effected by a change in provincial legislation, what would be the impact on the province's position with respect to Canada's trade obligations?

Analysis:

Article 309 of NAFTA provides for the treatment of import and export restrictions. It states that "no Party may adopt or maintain any prohibition or restriction on the importation of any good of another Party or on the *exportation or sale for export of any good*s destined for the territory of another Party, except in accordance with Article X1 of GATT 1994, including its interpretative notes." Article X1 of GATT 1994 states that parties to the Agreement may not place restrictions on export or sale for export of any product with exceptions listed in Article X1:2[1].

Of the exceptions listed in Article X1:2, the only applicable exception to this case would be paragraph 2 (a), where water would not only have to be classified as an essential product to Canada, but also there would have to be a critical shortage of it to temporarily restrict its export. For a more detailed analysis of the exceptions on the restriction of exports, please refer to our

[1] Article X1:2 of the GATT, "2. The provisions of paragraph 1 of this Article shall not extend to the following:
(a) Export prohibitions or restrictions temporarily applied to prevent or relieve critical shortages of foodstuffs or other products essential to the exporting contracting party;
(b) Import and export prohibitions or restrictions necessary to the application of standards or regulations for the classification, grading or marketing of commodities in international trade;
(c) Import restrictions on any agricultural or fisheries product, imported in any form, necessary to the enforcement of governmental measures which operate:(...)"

memorandum of June 1, 1998 on the subject of "Export of Water in Bulk from Canada".

Aside from the exceptions of the restriction of exports provided in NAFTA and GATT 1994, the issue of export restrictions can be examined under a different light: the nature of the measure adopting the ban. In this respect, the wording of Article X1:1[2] of GATT 1994 is very comprehensive: it applies to *all measures* instituted or maintained by a contracting Party prohibiting or restricting the importation, exportation or sale for export of products other than measures that take the form of duties, taxes or other charges. The scope of the term "other measures" that adversely affect exports is defined in part by the RIMS Agreement, Annex, Illustrative List, in paragraph 2:

"Trade related investment measures that are inconsistent with the obligation of general elimination of quantitative restrictions provided for in Paragraph 1 of Article X1 of GATT 1994 include those which are mandatory or enforceable under domestic law or under administrative rulings, or compliance with which is necessary to obtain an advantage, and which restrict:...(c) the exportation or sale for export by an enterprise of products, whether specified in terms of particular products, in terms of volume or value of products, or in terms of a proportion of volume or value of its local production".

An analysis of this provision combined with the wording of Article X1:1 of GATT 1994 leads to an understanding that a Government measure that is mandatory and legally binding, *i.e.:* legislation prohibiting the export of bulk water, which avoids or prohibits the exportation or the sale for export of a product falls under the scope of Article X1:1, and is, therefore, a violation of both NAFTA and GATT obligations.

The issue of the reach of the term "other measures" within the meaning of Article X1:1 of GATT 1994 was dealt in a pre-WTO GATT case[3], where the panel viewed the matter in the following way:

"106.(...) In this respect the Panel noted that Article X1:1, unlike other provisions of the General Agreement, did not refer to laws or regulations but more broadly to measures. This wording indicated clearly that any measure instituted or maintained by a contracting party which restricted the exportation or sale for export of products was covered by this provision, irrespective of the

[2] Article X1:1 of the GATT, "1. No prohibition or restriction other than duties, taxes or other charges, whether made effective through quotas, imports or export licenses or other measures, shall be instituted or maintained by any contracting party on the importation of any product of the territory of any other contracting party or on the exportation or sale for export of any product destined for the territory of any other contracting party."

[3] GATT Panel report adopted May, 1988, 35th Supp. BISD 116 (1989), "Japan - Trade in Semi-Conductors".

legal status of the measure".

The Panel recognized that mandatory and legally binding measures by the Government were included within the meaning of the term "other measures" of Article X1:1. The Panel also recognized that not all non-mandatory measures could be construed as measures within the meaning of Article X1:1. To discern between government measures that are and that aren't included within the meaning of Article X1:1 of GATT 1947, the Panel adopted two criteria that need to be satisfied in order to determine that a Government measure prohibiting the export or sale for export of any destined for the territory of any other contracting party, is, in fact, a violation of Article X1:1. The two criteria are: 1) reasonable grounds to believe that sufficient incentives or disincentives exist for non-mandatory measures to take effect; and 2) the operation of the measures to restrict exports is essentially dependent on government action or intervention.

Even though this panel analysis was made prior to the WTO Agreement and knowing that GATT precedents are not formally binding on WTO cases, the lack of differing subsequent cases and analysis on the subject matter leads us to believe that this analysis would be followed if this issue was raised in a WTO resolution panel.

In view of the above, an inference can be made from the provisions in NAFTA and GATT 1994 that if the prohibition of export of bulk water from Gisbourne Lake is undertaken through legislation, then there is a contravention of Article X1:1 and Canada's trading partners have a right to challenge such measure based on the fact that the particular law or policy constitutes a barrier to trade or is inconsistent with the agreement. The one possible "fig leaf" approach would be a prohibitive export tax (100 percent?), since Canada already claims (weakly) that the export tax on softwood lumber is not inconsistent with Article X1.

Moreover, if the Province of Newfoundland sets conditions on the sale of bulk water as a private enterprise would, then these conditions might not be considered "other measures" within the meaning of Article X1. For that to happen, the Province of Newfoundland would have to ascertain that the policy adopted does not satisfy the two criteria above.

Further concerns should be taken into consideration if the Province of Newfoundland is to act as a private enterprise in restricting the export of bulk water. With respect to these concerns, please refer to our memorandum of August 6, 1998 which summarizes what should be the nature of the conditions the Province sets on sale for export of bulk water and provides a broad overview of what the possible consequences of past-sale restrictions are, *i.e.*: the Province allows the sale of water for export but conditions it to be bottled only within the Province in order to generate jobs. In the event the Province of Newfoundland, acting as a private enterprise, decided to impose such a post-sale requirement restricting the exports of bulk water, Canada's trading partners would have grounds to challenge, and fair odds of winning, this export restriction as a violation of Article X1 of GATT.

Question Presented:

3. If the legislative changes only dealt with environmental concerns, could Canada avoid its trade obligations under NAFTA flowing from the approval of the Gisbourne Lake project?

Analysis:

The NAFTA Agreement is one of the few treaties of its kind to address the issue of environmental implications in trade relations. Nevertheless, no specific provision is provided with respect to environmental protection and the treatment of environmental standards set by federal and sub-federal jurisdictions. In the preamble of the NAFTA, the parties agree to carry out their obligations in a manner consistent with environmental protection and conservation and to strengthen the development and enforcement of environmental laws and regulations but no clear-cut provision is provided with respect to implementation.

Article 104 of NAFTA allows the obligations of the NAFTA countries under three specified environmental agreements to take precedence over NAFTA provisions. These international agreement are:

- Convention on International Trade in Endangered Species of Wild Fauna and Flora, done at Washington, March 3, 1973, as amended June 22, 1979;
- Montreal Protocol on Substances that Deplete the Ozone Layer, done at Montreal, September 16, 1987, as amended June 29, 1990;
- Basel Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal, done as Basel, March 22, 1989, on its entry into force for Canada, Mexico and the United States.

Aside from these agreements, the parties affirm their obligations with respect to each other under GATT[4].

The broad language of NAFTA's Environmental Cooperation side agreement recognizes in Article 3 the right of each Party to establish its own level of domestic environmental protection, development policies and priorities and to adopt or modify accordingly its environmental laws and regulations. Article 3 reaffirms the notion within the preamble of the side agreement that it is a sovereign right of each State to exploit their own resources pursuant to their own environmental and development policies. Further support to the idea that the adoption of environmental laws and policies is a sovereign right of each Party is found in Chapter 11: Investment, Article 1114 of

[4] This memorandum does not address any other international environmental agreement which may possibly cover the issue presented.

NAFTA:

"Nothing in this Chapter shall be construed to prevent a Party from adopting, maintaining or enforcing any measure otherwise consistent with this Chapter that it considers appropriate to ensure that investment activity in its territory is undertaken in a manner sensitive to environmental concerns".

Nonetheless, Article 1 of NAFTA's Environmental Cooperation side agreement sets out the objectives of this agreement by supporting the environmental goals and objectives of NAFTA as long as they do not create trade distortions or new trade barriers. With this in mind, if a Party prohibits the export or sale for export of a good to another Party based on an environmental standard that fails to meet the other Party's environmental standards, a dispute may arise between the Parties. Even though there is nothing in the Agreement that requires countries with a stricter environmental standard to harmonize those standards with more flexible standards of other contracting parties, disputes may arise over whether a specific environmental policy or measure is in fact a disguised trade barrier. In such a case, a dispute resolution panel would be empowered to make a determination that that particular law or policy constitutes a barrier to trade or is inconsistent with the Agreement. It is important to note that the complaining Party would bear the burden of proving that the other Party's environmental measure is inconsistent with NAFTA.

In sum, NAFTA provides contracting parties freedom to strengthen their environmental laws and enforcement efforts as long as legitimate environmental objectives are being pursued. Countries retain their sovereignty over their environmental standards although these standards can be challenged if it restrains the trade in goods, *i.e.*: prohibition of export or sale for export of bulk water, and does not reflect a genuine credible environmental concern. In such a scenario, a dispute resolution panel would be requested by the challenging Party to determine whether that particular law or policy is based on an authentic environmental concern or if it is a disguised trade barrier that violates the NAFTA Agreement.

Question Presented:

4. If the Gisbourne Lake project is approved, what is the scope of the trade implications and do these implications apply to other Provinces aside from the Province of Newfoundland and Labrador?

Analysis:

In a scenario in which a complete environmental assessment is made and the export of bulk water from the Gisbourne Lake in the Province of Newfoundland is approved, the trade implications are closely tied to the issues, and therefore the responses, presented in the prior questions of this memorandum. The options may vary according to the circumstance and the policy to be adopted by the Province but the general implications are underscored as follows.

The Province of Newfoundland may desire to export bulk water as it pleases without any limitation or prohibition. In case the Province re-evaluates its position and decides to prohibit the export or sale for export of bulk water, it has a greater chance of being successful if: 1) the ban falls within one of the exceptions to export restriction provided for in NAFTA and GATT; or 2) the measure taken is a consequence of the Province acting as a private enterprise; or 3) the ban derives from a valid environmental law restriction. If the circumstance is not one which qualifies for an exception to the restriction on exports provided in NAFTA and GATT, the Province should evaluate the two latter options. Please keep in mind that both measures are subject to challenge by a contracting Party if the ban is viewed as a restriction to the export of bulk water and not as commercial action taken by a private enterprise or a justified environmental concern.

With respect to the issue of whether a precedent is set for the other Provinces in Canada based on the measures taken by the Province of Newfoundland, the NAFTA Agreement does not provide for a distinction in the treatment in the trade of goods between a State and a province or state. Article 301.2 of NAFTA, which addresses the principle of national treatment, uses the term state or province to indicate that such sub-federal units of jurisdiction should provide treatment no less favorable than the most favorable treatment accorded to the entire Party (i.e. nation) of which it is part.

Greater guidance can be found under Article III of GATT 1994, which provides that the contracting Parties recognize that laws, regulations and requirements affecting the internal sale, offering for sale, purchase, transportation, distribution or use of products should not be applied to imported or domestic products to afford protection to domestic production. The note to Article III (ad Article III:1) of the GATT 1994, provides that the application of Article III is subject to the provisions of the final paragraph of Article XX1V, which states that:

"12. Each contracting Party shall take such *reasonable measures* as may be available to it to ensure observance of the provisions of the GATT Agreement by the regional and local governments and authorities within its territory."

From the wording of this provision, one might argue that if reasonable measures are not available to the contracting Party to ensure that the regional and local governments and authorities within its territory observe the provisions of the GATT, then the sub-federal unit's legislation would not be violating Article III of the GATT.

However, a 1992 GATT Panel Report[5] observed in some detail the application and the drafting

[5] GATT Panel Report adopted June 1992, DS23/R(1992), "United States - Measures Affecting Alcoholic and Malt Beverages".

history of Article XX1V:12 as follows:

"... this provision was designed to apply only to those measures by regional or local governments or authorities which the central government cannot control because they fall outside its jurisdiction under the constitutional distribution of powers. The Panel agreed with this interpretation in view of the general principle of international treaty law that a party to a treaty may not invoke the provisions of its internal law as justification for its failure to perform a treaty obligation... The above-mentioned interpretation - according to which Article XX1V:12 applies only to measures by regional or local authorities which the central government cannot control under the constitutional distribution of powers - meets the constitutional difficulties which the central governments may have in ensuring the observance of the provisions of the General Agreement by regional and local authorities, but minimizes the risk that such difficulties lead to imbalances in the rights and obligations of contracting parties".

Little is left to conclude from this 1992 GATT Panel Report but that if the Province of Newfoundland legislates restricting exports of bulk water and this legislation is found to be a violation of Article X1 of the GATT, then Canada, as the contracting Party to the GATT, will have to take reasonable measures to conform the Province's legislation to the provisions in the GATT unless the power to legislate on such matters falls outside of Canada's jurisdiction under the constitutional distribution of powers.

Further to providing the interpretation of the application of Article XX1V:12 of the GATT, the 1992 GATT Panel Report also observed how different provisions of different states should be treated in face of the national treatment principle.

"The Panel did not consider relevant the fact that many of the state provisions at issue in this dispute provide the same treatment to products of other states of the United States as that provided to foreign products. The national treatment provisions require contracting parties to accord to imported products treatment no less favorable than that accorded to any like domestic product, whatever the domestic origin. Article III consequently requires treatment of imported products no less favorable than that accorded to the most-favored domestic products."

In light of the above and in accordance with the principle of national treatment, if the Province of Newfoundland allows the sale for exports of bulk water, then Canada is responsible for ensuring that no other Province deny the sale for export of bulk water and that no other Province afford treatment less favorable than the one afforded by the Province of Newfoundland.

**APPENDIX III**

# EXPORT OF BULK WATER FROM NEWFOUNDLAND AND LABRADOR:

# A PRELIMINARY ASSESSMENT OF ECONOMIC FEASIBILITY

A Report prepared for the Government of Newfoundland and Labrador

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St. John's NF
September 2001

## EXECUTIVE SUMMARY

This report is a preliminary assessment of the economic feasibility of bulk water exports from Newfoundland and Labrador. The focus is on the use of tanker vessels.

Bulk water export does take place around the world but on a very limited basis. There is no integrated world market as there is for oil, wheat etc. The transport of water in tanker vessels takes place within a few countries. There are no substantial international tanker shipments but there are some near-term prospects.

In Canada, the 1985 Inquiry on Federal Water Policy opposed large scale diversions of rivers and water basins as a means of exporting water. That Inquiry accepted the idea of small scale export, including export by tankers.

There does not appear to have been any export of water from Canada by tanker vessels. However, bulk export of water does take place. Water is exported by pipeline on a small scale in a few border areas. Fresh water has long been exported at Canadian ports through sales to foreign ships for on-board use.

Relative to its population, Newfoundland and Labrador is extremely well endowed with renewable fresh water resources. On a per capita basis, this province's water supply ranks more highly than Canada's as a whole and more highly than almost any other country in the world. Water is used in a variety of ways here and contributes to the provincial economy. There seems to be a large surplus potentially available for export.

The most important cost associated with export of water from this province is the delivery cost. Because of that factor, provincial water is not competitive with conventional supplies in the US or elsewhere.

Water from Newfoundland and Labrador is potentially competitive in those places that rely on desalinated water. Desalinization is expensive, energy-intensive, and waste-generating. Due to transport costs, the areas of any promise in this regard are limited to the US southeast, particularly Florida and Texas, and the Caribbean. However, improving desalinization technology casts doubt on even this opportunity. Provincial water might also be competitive when shipped in bulk to countries, other than the US, for bottling there.

In 1992 Alaska enacted legislation to allow bulk water exports. Despite the on-going water shortages in southern California and reliance on desalinated water in some of its coastal cities, there has yet to be any water exports from Alaska of any significant note, either to California or elsewhere. There are some near-term prospects for export from one or two sites in that state to other countries but their success remains to be determined. Newfoundland and Labrador might have similar experience.

The fundamentals of the provincial government's now-suspended 1996 bulk-water export policy are sound. That policy set a priority for the allocation of water across uses; addressed environmental concerns, and established a royalty regime.

Bulk water export operations are capital intensive. The employment effects are small. The main benefit is as a source of royalty revenue. However, for this province, the potential amount of revenue is not large. That is because only a few sites, if any, may be commercially viable and even they may have very slim profit margins.

In conclusion, under the 1996 water export policy and considering costs as well as potential markets, it is predicted that there would be only a limited number of commercially viable bulk water export operations, if any. They would likely be located on the south coast of the Island. That area has the advantages of its proximity to the US southeast, its ice-free ports, and the fewer conflicts with alternate uses for the water.

## I. INTRODUCTION

The purpose of this report is to provide a preliminary assessment of the economic viability of bulk water export from Newfoundland and Labrador. In the process, it presents some perspective on the water export issue and on this province's water resources. As well, some commentary on related policy issues, including a brief assessment of the provincial government's 1996 water export policy, is given.

It should be emphasized that this is a preliminary assessment. There was insufficient time to undertake extensive research on all issues. Some of the figures in this report may not be the most up-to-date and some calculations are somewhat speculative. Nevertheless, this report provides a reasonable perspective on the major issues involved in evaluating the economic feasibility of export. In accordance with the Terms of Reference, the legal and trade law issues are not considered here.

The following two sections deal with water exports in general and with the fresh water resources of Newfoundland and Labrador. That is followed by sections dealing with the cost of exporting water and the prices that might be had in external markets, which are the bases for assessing the likelihood of economic viability. The report then discusses some relevant policy issues and presents a brief conclusion.

The overall conclusion is that, while there is some scope for commercially viable bulk exports in competition with desalination-plant supplies, developments, if any, would be few and probably limited to the province's south coast locations. The cost of transport of water is likely the most substantial single challenge, among many challenges, that bulk water export would face.

## II. BACKGROUND ON WATER EXPORTS

This section provides a very brief overview on international trade in water and on developments in Canada.

### International Developments

There are a number of instances of water imports/exports around the world. Some involve the sharing of boundary waters or of river flows that pass through two or more countries. Often the use of such waters is governed by international treaties or international law. To many people, these sorts of cooperative or treaty arrangements are not exports in the usual sense of the word.

Distinct from those water-sharing treaties, there are other instances of water exporting and importing. In southern Africa, the small landlocked nation of Lesotho is developing its water resources for hydroelectricity generation, with the run-off water to be exported by pipeline to the neighbouring Republic of South Africa.[6] Singapore imports water from neighbouring Malaysia by pipeline.[7] Tonga, a small nation in the Pacific, has had to import water by tanker in recent years, due to declining quality of domestic water supply. Israel and Turkey are negotiating over possible sales of water to Israel to be delivered by tankers starting in 2002. There are a number of proposals

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[6] See The Economist (1998) "Close to Heaven," May 28, 1998.

[7] See The Economist (1999) "Pass the salt," August 9.

for other export deals involving delivery by tankers. Tankers are also used for transport of bulk water within some countries. However, it has proven difficult to find documented evidence of any substantial amount of international bulk water deliveries by tankers.

At present, trade in bulk water, while it does occur, is quite limited. However, there are some interesting new developments. They will be elaborated on later in this report.

**Canadian Background**

In the late 1950s and in the 1960s a number of massive water diversion projects were proposed as means of exporting water from Canada to the United States. One of the better known of these is the GRAND Canal project, proposed by Canadian engineer Thomas Keirans. Among the others were the NAWAPA (North American Water and Power Alliance) project and the Kuiper Plan. Enormous volumes of water, from thousands to tens of thousands of cubic metres per second, were involved. Capital costs were in the tens or hundreds of billions of dollars, in 1960 prices.[8] The environmental implications of such diversion schemes were massive. Whether these megaprojects were ever economically feasible is an open question. In any case, none of these projects was acted on, the federal and provincial governments were not supportive, and public opinion was against them. It seems unimaginable that such schemes would ever be considered nowadays. Environmental protection measures in both the United States and Canada are far more thorough now than in the 1960s.

In the mid 1980s, the federal government launched an inquiry into federal water policy, the first of its kind. That report, see Pearse et al. (1985), was a thorough review of the spectrum of water related issues. Among the matters that it addressed was water export. It made a clear distinction between projects involving water diversions, such as the GRAND Canal project, and small scale export. Large scale export projects were those involving interbasin transfers by diversions. Essentially, small scale exports were those not involving diversions, and included tanker shipments. In this regard, Pearse et al. (1985; p.131) stated...

> "We conclude that there is no reason for the federal government to oppose tanker exports in general. The Government of Canada should regulate them, but in the absence of any significant adverse effects of particular proposals, it should not prohibit them.
>
> Interbasin transfers to the United States are an entirely different matter and require very careful consideration."

The Inquiry went on to suggest that the government resist pressures to support any large diversion scheme.

**Small Scale Exports from Canada**

No major diversions have taken place in Canada. The federal and provincial governments' water policies have apparently prohibited them; and the economics and environmental factors probably would have made them infeasible even if allowed. Also, the International Joint Commission, the bilateral commission governing the Great Lakes, has opposed large scale

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[8] See Day and Quinn (1992; pp.38-39).

diversions of Great Lake waters.[9]

Small scale export is a different matter. Some movements have taken place. Also, before some recent provincial government bans or moratoriums, there were several export proposals.

Day and Quinn (1992; p.32) identify four instances of cross-border movement of water by pipeline in the 1980s. These are carried out by neighbouring Canadian and American communities. St. Stephen, New Brunswick, exported to Calais, Maine; Coutts, Alberta to Sweetgrass, Montana; and Vancouver to Point Roberts, Washington. In addition, in the 1980s, Greta and Altona, Manitoba imported water from Neche, North Dakota. The amounts of water involved in these Canadian pipeline exports are small; in the early 1990s they were perhaps the equivalent of two to three tanker loads per year. These all involve cooperative arrangements for municipal water supply and it is understood that they are still in operation.

In the early 1990s there were several proposals to export water on a commercial basis from Canada. Day and Quinn (1992; p.36) report eight such proposals. Six of them are from British Columbia locations, all of which had received licences. For the other two proposals, one was for export from Sept Isles, Quebec and the other from Port Hawkesbury, Nova Scotia. Neither of these two had been licensed at the time; however, it is not clear whether licences were required.

Also, in the 1990s, British Columbia did, for a time, issue water export licenses. There are apparently still a few active "grand fathered" licenses, having been issued before the decision to have a moratorium on exports or prohibit exports from that province. Some of these licences are for tanker truck transport. To date, there have not been any export shipments in containerized vessels. There is some indication that a small amount of water from BC is crossing the border in tanker trucks.

There is one form of bulk water export that has been occurring for a very long time in Canada. That is the sale of water to foreign ships calling at Canadian ports. They acquire the water for their own on-board uses. Still, such sales are exports. Precise estimates of how much water is exported from the province in this way are not available. For instance, in the case of St. John's, some water is sold by private companies that have piers in the harbour, so that amount is not public information. The City of St. John's probably provides most of the water sold to vessels in port. The amount of water involved is unknown since the water is not metered. Payments to the City for water are according to the hours the vessel is connected to the loading hose; the fee in 2001 was $180 for the first four hours or less, and $75 an hour for any additional hours. The City water hydrant can deliver up to a maximum of approximately 5,500 litres a minute. In the year 2000, the City earned almost $40,000 in such water sales. With water being sold by
St. John's and other ports throughout the province, it is not inconceivable that the equivalent of several tanker loads is being sold each year. Some would be for local vessels, but any amount going to other vessels is really being exported from the province in bulk form.

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[9] In 1999, the United States and Canadian federal governments asked the IJC to address the issue of water exports from the Great Lakes. The ICJ's final report was released in March 2000.

## III. THE PROVINCE'S FRESHWATER RESOURCE

This section reviews how much water the province has (i.e., its resource endowment) and how that water is currently used. Based on that information, some suggestions are made regarding how much water might be exportable.

### The Endowment

Newfoundland and Labrador, like Canada generally, is well endowed with fresh water resources. There are many measures of fresh water resources. Pearse et al. (1985), in the Final Report of the *Inquiry on Federal Water Policy*, conclude that the flow of water in rivers is the single best measure. Using that basis, the water flows for Canada as a whole and for the province are given in the following table.

**TABLE 1**

**FRESH WATER RESOURCES**

| | Reliable Flow | Average Flow |
|---|---|---|
| Canada | 75,856 $m^3$ per second | 105,135 $m^3$ per second |
| Newfoundland and Labrador | 6,908 $m^3$ per second | 9,324 $m^3$ per second |

Source: Pearse et al. (1985; p.28)

Table Notes:

(i) $m^3$ denotes a cubic metre, which is 1000 litres or approximately 225 imperial gallons and about 265 US gallons.
(ii) Reliable flow refers to a flow that has been exceeded or equalled in the past 19 out of 20 years.

It is worthwhile to put the provincial figures in some context. If the province's average flow had to be delivered to the province then, on a daily basis, it would require more than 1,600 of the world's largest supertankers, ones with a capacity of 500,000 dwt, deadweight tons.[10] A less figurative perspective can be had by expressing the fresh water endowment in terms of the annual renewable amount per person, and comparing that to elsewhere in the world. The April 2, 1998 edition of *The Economist* provides a list of the top ten water-abundant countries. Table 2 below shows Newfoundland and Labrador's ranking when inserted into those country rankings.

[10] A cubic metre of water weighs one deadweight ton.

**TABLE 2**

**PROVINCIAL FRESHWATER RESOURCES COMPARED TO ELSEWHERE**

| | Annual renewable fresh water per capita; cubic metres |
|---|---|
| Iceland | 666667 |
| Newfoundland and Labrador | 544522 |
| Congo | 359803 |
| Canada | 108900 |
| Norway | 97268 |
| Equatorial Guinea | 85227 |
| Brazil | 46631 |
| United States | 9913 |
| Japan | 4428 |
| Mexico | 4226 |
| France | 3262 |

Table Notes:

(i) Figures for the ten countries are from *The Economist*, April 2, 1998.
(ii) The Newfoundland and Labrador figure was calculated by expressing the average flow, given in Table 1, in annual terms and dividing by a population estimate of 540,000 people.

**Current Allocation**

Much of the province's enormous fresh water resource remains in the environment, sustaining the local ecosystems. However, that resource also contributes significantly to the province's economy, the standard of living of its people, and its natural beauty.

In 1996 an assessment of the economic contribution of water was completed by ADI Nolan Davis and Gardner Pinfold That study identified the many ways that water is used in Newfoundland and Labrador, and it developed an assessment of the value of water to the province. The following table summarizes the ways water is used in the province and gives that study's estimates of the amount used, where applicable.

**TABLE 3**

**USES OF WATER IN NEWFOUNDLAND AND LABRADOR**

| Use | Total Use, millions of $m^3$ per year |
|---|---|
| Consumptive Uses: | |
| Municipal Residential | 94.76 |
| Municipal Commercial | 13.01 |
| Municipal Industrial | 12.2 |
| Fish Processing | 8.24 |
| Water Bottling | 0.015 |
| Mining | 557 |
| Non-Consumptive: | |
| Waste Water Discharge | 152.41 |
| Hydroelectric | 142480 |
| Aquaculture | N/A |
| Recreation and Tourism | N/A |
| Sport Fishery | N/A |

Source: ADI Nolan Davis and Gardner Pinfold (1996; Table 2-1)

Table Note:

For hydro-electric generation, 112,181 million $m^3$ are accounted for by the Churchill Falls hydro site; ADI Nolan Davis and Gardner Pinfold (1996, Table A2.2-2).

Table 3 indicates that the people of the province rely on water in many ways. The greatest volume use, by far, is for hydroelectricity generation. In value terms, the ranking is somewhat different. The same study found that water was most valuable in satisfying municipal water demand. Its results are reproduced in the following table.

**TABLE 4**

**THE ECONOMIC VALUE OF WATER IN NEWFOUNDLAND AND LABRADOR**

| Type of Value | Estimate Total Value (1995 dollars) |
|---|---|
| Direct Use Values: | |
| Municipal Water Demand | $142.08 million |
| Industrial (non-municipal) | $10.00 million |
| Rural Residential | $1.48 million |
| Electric Power Generation | $45.28 million |
| Sub-total Direct Use Values | $198.84 million |
| Indirect Use Values: | |
| Recreation | $14.74 million |
| Waste Assimilation | $4.84 million |
| Sub-total Indirect Use Values | $19.58 million |
| Option Value * | $24.18 million |
| Preservation Value ** | $5.68 million |
| TOTAL | $247.24 million |

Source: ADI Nolan Davis and Gardner Pinfold (1996; Table 6-25)

Table Notes:
* Option value refers to the amount people are prepared to pay for the right to use a resource at some later date.
** Preservation value refers to the amount people are prepared to pay to keep something available for future generations.

It is more useful to express these economic values in average and marginal terms; low values for these economic measures tend to indicate relative abundance. Average economic value is the total economic value, as given in the preceding table, divided by the amount of water used. Marginal value is a more subtle concept. It measures the value to the user of an extra cubic metre, given the amount that user already has. That study's estimates of both are given in the following table.

**TABLE 5**

**AVERAGE AND MARGINAL VALUES OF WATER IN NEWFOUNDLAND AND LABRADOR**

| Current Users | Average Economic Value, per $m^3$ | Marginal Economic Value, per $m^3$ |
|---|---|---|
| Municipal Commercial | $1.22 | $0.72 |
| Municipal Residential | $1.15 | $0.65 |
| Municipal Other | $1.17 | $0.66 |
| Other Municipal Industrial | $0.87 | $0.29 |
| Soft Drink | $1.05 | $0.23 |
| Fish Processing | $0.67 | $0.15 |
| Water Bottling | $0.67 | $0.14 |
| Brewing | $0.95 | $0.13 |
| Rural Residential | $0.17 | $0.03 |
| Mining | $0.014 | $0.006 |
| Pulp and Paper | $0.01 | $0.004 |
| Hydroelectric | $0.003 | 0 |
| Recreation | N/A | 0 |
| Aquaculture | N/A | 0 |

Source: ADI Nolan Davis and Gardner Pinfold (1996; Tables 7-2 and 7-3)

Table Note:
This table does not include waste assimilation, option value or preservation value.

The relatively low average and marginal values of water reflect the abundance of water available to current users. When a user has a huge amount of a resource then having a little more, a marginal increase, is not highly valued. However, if someone is very resource-short, then an extra, or marginal, unit would typically be valued very highly. To use an analogy: a person living in the desert and having only one litre of water a day would likely be willing to pay quite a lot for one more litre; however, if that person has 1000 litres a day to start with then that person would

probably value an extra litre very little.[11] In economics, the key determinant for efficient allocation of scarce resources is the marginal value.

**Export Availability**

The preceding statistics indicate that Newfoundland and Labrador has a great deal of water relative to its current uses, relative to most countries in the world, and even relative to the rest of Canada. Moreover, since water used to generate hydro-electricity remains in the environment and might be usable for other purposes, it appears that only a tiny fraction of the water currently used is actually taken out of the system. Day and Quinn (1992; p.5) note that, for the Canadian figure, only 10 per cent of what is withdrawn is unavailable for further use.

Yet, the quantity of the resource that is potentially available for export is difficult to determine. A large amount is inaccessible due to remoteness or blockage by ice and weather conditions for part of the year. Some of the water, while not being subject to direct human use, is essential for the maintenance of the environment. Some is close to or connected to water supplies used for human consumption. In cases where the water is not remote or in current human use, potential future use ought to be taken into account. Even where future use is unlikely, presumably only a portion of the water could be removed without having an adverse impact on the local ecosystem. Nevertheless, given the enormous quantity of renewable fresh water in this province, it seems highly unlikely that none of it would be potentially available for export. Even one-half of one per cent of the province's annual renewable fresh water amounts to 1,500 million $m^3$ a year, which would fill over 3,000 of the largest supertankers.

It is beyond the scope of this report to determine how much, and from which sources, fresh water, if any, ought to be exported from the province. That is equally true for the amount that can be exported from the province. A scientific assessment would be required for identifying the sources and ascertaining the ecological implications of removing various proportions from the many water systems of the province. The one-half-of-one-per-cent figure referred to above is purely illustrative. It may be wildly too high or too low.

In any case, whether any of the amount that can be exported would actually be exported depends on markets. The cost of harvesting and delivering high-quality water must be no higher than the selling price. These economic considerations are addressed in the next sections.

## IV. COST OF EXPORTING WATER

If some fresh water resources were designated as available for export from the province then whether such export would take place depends on the cost of harvesting the water and delivering it to market as well as the price that would be paid in that market. This section deals with the cost side of the equation.

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[11] Gibbons (1986) provides empirical evidence showing, for some US cities, how much the marginal value of water rises as availability declines.

**The Technology for Transport**

The cost of transporting water in part depends on the transport technology. There are four different ways that are currently being used to transport water overseas. They are:

barges;
bags;
undersea pipelines; and
tanker ships.

Barge transport is uncommon but apparently does occur. Water is carried in milk trucks on barges between Alaska and the west coast of the United States. The milk trucks contain milk when going to Alaska and they return with fresh water for a bottling plant.[12] Given the location of the province in the North Atlantic Ocean, this sort of transport does not appear feasible.

A second method is the use of huge bags, which are towed by tugs or other specialized towing vessels. Fresh water is lighter than seawater so the bags float just below or at sea level. This is a relatively recent technology but it is in use in the Mediterranean Sea. An Anglo-Greek firm, Aquarius Water Transport, uses its flexible polyurethane bags, with capacities of 720 metric tons to 2,000 metric tons, to deliver fresh water from the mainland of Greece to a number of water-short Greek islands.[13] A Norwegian firm, Nordic Water Supply, in 2000 began using its bags to deliver water from Turkey to the Turkish-speaking area of the island of Cyprus. Its modular water bags are recent innovations and the largest has a capacity of 30,000 metric tonnes (30,000 $m^3$), about the size of a small oil tanker. In a March 2001 press release, Nordic states that it signed a memorandum of understanding with a Caribbean water authority to transport water exports within that region.[14] In these cases, the ocean distance is not great, perhaps not exceeding much more than a hundred kilometres. Interestingly, there are more ambitious plans by at least two businesses, Medusa in Calgary and Spragg in the US, to develop much larger ocean-going bag technologies. Spragg's designs are for bags approximately 500 feet long with a 43-foot diameter, hold 17,000 $m^3$ of water, and are constructed so it is possible to link them in a train-like fashion to form a procession of up to 50 bags that travels at 3 knots.[15] De Villiers (1999; p.322) reports that Medusa plans to develop even larger bags. To date, however, these supertanker-equivalent bags seem not to have gone beyond the design or prototype stage. Therefore, this technology is probably still too immature for application, and, even if successfully developed, may not ever be suitable for North Atlantic conditions or this province's coastline.

A third option is an undersea pipeline. In the early 1990s, such a pipeline was suggested for connection between Alaska and California in order to transport water from Alaska. It was the subject of an American congressional study by the OTA, Office of Technology Assessment (1992). The OTA found a number of problems with that pipeline proposal including economic ones. The OTA (1992, p.6) concluded that, in addition to environmental and jurisdictional difficulties, the cost

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[12] This example is mentioned in Davidge (1994).

[13] See http://www.aquariuswater.com.

[14] The export would be from one Caribbean location to another. See http://www.nws.no.

[15] See http://www.waterbag.com.

of water delivery would be high relative to several alternatives: water marketing, waste water reclamation, water conservation, conventional reservoir development, canal lining, conjunctive use of ground water and surface water, water banking, system interconnection, desalination, and tanker imports. Newfoundland and Labrador circumstances seem to rule out pipelines.

The fourth option is the use of water tankers. It appears to be the most promising means of transport at the present and for the foreseeable future. Most, if not all, previous commercial proposals for small scale water exports from various provinces have been based on the use of tankers.

There have been only a few published analyses of the economic feasibility of bulk water transport by tankers. Ones that have been done in the 1990s are:

Birt (1992), which deals with tanker transport from British Columbia;
Davidge (1994), which deals with tanker transport from Alaska; and
Norwegian Institute for Water Studies, NIVA, (1995), which deals with tanker transport from Norway

The NIVA study, "Export of water - a feasibility study," was carried out in 1995. That report is not open to the public. It is written in Norwegian and was paid for by a private investor. NIVA's internet site reports that the Institute has studied and evaluated bulk fresh water export by tankers, by towing it in large containers, and by pipelines.[16] In its evaluation NIVA focussed on the quality of water and how it could vary with transport. Interestingly, its internet site also notes that the idea of exporting water from Norway arose as long ago as the 1950s. The other analyses, by Birt (1992) and Davidge (1994), are available and are drawn on, along with other information, for the discussion that follows.

**Infrastructure Requirements for Tankers**

Shipment facilities would vary with a number of factors, including the physical environment and climatic conditions, distance from the water source, volume of water being loaded and so forth. The facilities might be expected to include storage tanks, since the flow of the water available for harvest may not be enough to ensure loading of a tanker in a timely manner. Treatment facilities may be required to bring water up to the required quality. Pumping apparatus would be needed for loading tankers. Pipelines and/or tunnels might be required to take the water from the source to the loading facility. Depending on the size of tankers and the type of terminal, tugboats might be required for guiding the tankers in the port areas.

Birt (1992) identifies three alternative terminal facilities: fixed terminals, single point moorings, and spread moorings.

Fixed terminals consist of a loading platform connected to shore by a trestle, two or more berthing dolphins against which a vessel berths and two to four mooring dolphins to which a ship's mooring lines are attached. Water is delivered by pipeline over the access trestle to either flexible hoses or counter-weighted metal loading arms. Loading rates, in terms of cubic metres per hour, are high. Tug assistance is normally used for arrival and departure.

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[16] See http://www.niva.no

Spread moorings allow vessels to moor using their own anchors and running mooring lines to mooring buoys located off the ship's stern. A submarine pipeline runs to a pipeline-end- manifold, with a ship's hose connecting to that manifold for loading. Discharge and loading rates are lower than for fixed terminals.

Single point mooring, according to Birt (1992), consists of a buoy anchored offshore to which a tanker is moored utilizing a bow mooring line. A mooring vessel is used to deliver a loading hose to the tanker. The tanker is then free to weathervane. Loading and discharge rates can be as high as with fixed terminal facilities.

Birt (1992) suggests that fixed terminals are the type appropriate for British Columbia with its deep coastal fjords. Whether fixed terminals are generally desirable in the case of Newfoundland and Labrador is an engineering question. The choice may vary with the characteristics of individual sites. In the case of Gisbourne Lake, the development proposal had considered both a single buoy mooring system and a shore-based loading facility and opted for the shore-based terminal.[17]

In summary, the physical facilities needed for directing and loading water to tankers would vary considerably depending a great number of factors. However, these facilities, once installed, are largely fixed costs, which are amortized over many years. Commercial investors would tend to search for the sites that offered the desired water at the lowest infrastructure cost. Turning again to the Gisbourne Lake proposal, infrastructure costs there were estimated at $32 million.[18] On-going operational costs at export sites tend to be low, given the capital-intensive nature of the facilities. However, the single most important cost is for transport to market. Therefore, tanker costs are dealt with next.

**Tankers**

Proposals for commercial shipment of water typically require very large vessels. The analyses by Davidge (1994) and Birt (1992) assumed the use of Very Large Crude Carriers, VLCC, or Ultra Large Crude Carriers, (ULCC). VLCC have capacity of 250,000 dwt to 350,000 dwt, while ULCC range from over 350,000 dwt to 550,000 dwt. The Gisbourne Lake proposal include facilities to handle tankers of 300,000 dwt, which fall into the VLCC class.

Each dwt corresponds to a cubic metre of water. About 7 to 8 per cent of capacity is dedicated to fuel and ballast, leaving the rest for cargo. Thus, a 300,000 dwt tanker can take approximately 275,000 $m^3$ of water.

Birt (1992) notes that to maintain water quality, tankers would have to be dedicated to water transport and have their tanks appropriately cleaned and treated. This implies that return portion of the trip to the export sites might involve empty vessels; such return portions are not-revenue generating. Perhaps back-hauling would be possible if the tankers could have removable containers. This may have been the rationale for a reported proposal by Intertanko, an association of oil tanker

[17] See LGL Limited (1998).

[18] References are made to Gisbourne Lake for perspective only. An assessment of that specific proposal was not undertaken for this report.

owners, to bring water to Kuwait in oil tankers and return with oil.[19] It has not been possible to verify if this has been successfully done. Alternatively, and depending on the destination, there may be scope to have a non-hazardous back-haul cargo.

Tanker costs are in the tens of thousands of US dollars a day. Those costs are also highly volatile. For example, Intertanko, reports that the spot day rate for a VLCC vessel, on August 1, 2001 was US$22,322, down US$33,979 from a year earlier.[20] Tankers that could be intended to transport water can be switched to oil. Therefore, the oil tanker market prices are the key to determining the cost of water shipment.

Davidge (1994) uses US$30,460 as the daily cost of a tanker, although he does not clearly indicate whether that figure is for a VLCC or ULCC class vessel. Birt (1992) gives a range of daily costs for ships from 35,000 dwt up to 325,000 dwt. Those figures, for 1990, go from US $20,000 to US$50,000 for tankers when at sea. Since the early 1990s, rates have dropped and soared. BRS Shipbrokers reports that VLCC daily rates rose from lows of around US$20,000 a day in 1999 to peaks of US$85,000 or more by the following year.[21] Intertanko's internet site gives spot rates for a VLCC class vessel of approximately US$22,000 a day in August 2001, down about US$35,000 from a year earlier.

In order to illustrate the impact of tanker costs, some speculative calculations are presented in Table 6. The tanker cost per cubic metre is presented under a range of assumptions regarding the length of trip, size of tanker, and daily cost. The size of tanker was selected based on the analyses by Davidge (1994) and Birt (1992). The length of trip ranges from 15 days to 25 days. Birt (1992) suggests that a return voyage, including loading and unloading times, from Vancouver to Los Angeles takes 11 days. The province is further than that from its nearest potential markets: Florida, Texas, and the Caribbean, so 15 days was used as the minimum. A 25-day case was included in order to gauge the cost implications of more distant destinations. The tanker daily cost assumptions are based on Birt's 1990 figures as the middle case for the first four tanker sizes. Based on those numbers and reflecting the volatility in the market, lows and highs were assumed and included in the calculations. The low, middle and high daily costs for the largest tanker were assumed, based on Birt's figures.

The figures in Table 6, while speculative, do illustrate two fundamental points. First, cost per cubic rises with the distance from market. Secondly, cost per cubic metre declines with the size of the tanker. Distance from market appears to be the more important of the two; an extra day in a return trip adds approximately US$0.10 to US$0.30 to the cubic-metre cost. Thus, even slightly longer trips or weather delays could add significantly to cost.

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[19] This report was noted in a web site for irrigation specialists; see http://www.wiz.uni-kassel.de/kww/irrig_l/db/1998/01/msg00100.html.

[20] See http://www.intertanko.com/.

[21] See http://www.brs-paris.com/annual/tanker/tanker-a/tanker-a.html.

**TABLE 6**

**SENSITIVITY OF TANKER COSTS TO VOLUME AND DAY RATES**

| | Cost per day | 15 Day Return Trip | 25 Day Return Trip |
|---|---|---|---|
| 90,000 dwt carrying 83,000 $m^3$ | US $/$m^3$ | US $/$m^3$ | US $/$m^3$ |
| @ US $13,000 | 0.16 | 2.35 | 3.92 |
| @ US $27,500 | 0.33 | 4.97 | 8.28 |
| @ US $35,000 | 0.42 | 6.33 | 10.54 |
| 150,000 dwt carrying 140,000 $m^3$ | | | |
| @ US $15,000/day | 0.11 | 1.61 | 2.68 |
| @ US $33,500/day | 0.24 | 3.59 | 5.98 |
| @ US $42,000/day | 0.30 | 4.50 | 7.50 |
| 250,000 dwt carrying 230,000 $m^3$ | | | |
| @ US $20,000/day | 0.09 | 1.30 | 2.17 |
| @ US $37,250/day | 0.16 | 2.43 | 4.05 |
| @ US $55,000/day | 0.24 | 3.59 | 5.98 |
| 325,000 dwt carrying 300,000 $m^3$ | | | |
| @ US $25,000/day | 0.08 | 1.25 | 2.08 |
| @ US $50,000/day | 0.17 | 2.50 | 4.17 |
| @ US $65,000/day | 0.22 | 3.25 | 5.42 |
| 500,000 dwt carrying 460,000 $m^3$ | | | |
| @ US $35,000/day | 0.09 | 1.14 | 1.90 |
| @ US $55,000/day | 0.12 | 1.79 | 2.99 |
| @ US $70,000/day | 0.15 | 2.28 | 3.80 |

Again, the estimates in Table 6 are rough, being based on only a few information sources. More complete research is required to develop more precise figures but the range of figures does reflect the general characteristics of the tanker market. Also, it is possible that water transport might be carried out by cheaper single-hulled vessels, and costs might be also brought down if back-haul cargoes from the destination could be loaded for a port on the return route. Still, in light of the figures currently available, the tanker costs per cubic metre, assuming use of VLCC or ULCC tankers, would range from at least US$1.15 to as high as $3.60 per $m^3$ for potential markets that are within a 15 day return voyage. Even if tanker markets were soft and two or three days could be cut from the travel time, the delivery cost is very unlikely to go below US$1.00 per $m^3$. However, the volatility of the tanker market is such that delivery costs, while possibly falling at times, will rise substantially at times as well. Therefore, the average delivery cost, rather than the lows associated with soft tanker markets, is what matters.

**Other Costs**

Tankers are the key component of cost. The remaining costs are for the on-shore capital facilities and operations. Those costs, as suggested earlier, would vary with the circumstances. In some cases, existing facilities could be used, keeping costs very low. An example of using existing facilities can be found in Norway where a hydro-electricity company, A/S Tyssefaldene, is offering to sell run-off water from its generating site. In cases where entirely new structures must be put in place, strategic location can contain costs. Based on a cursory examination of the Gisbourne Lake proposal, the annual cost of a new facility, inclusive of amortization costs, might range from $3 million to $6 million. At an exchange rate of US$0.66 for a Canadian dollar, that range becomes US$2 million to US$4 million. In light of the large volumes of water involved, these costs are relatively low compared to the tanker costs. The table below gives some hypothetical figures to illustrate the point.

**TABLE 7**

**ESTIMATES OF ANNUAL NON-TANKER COSTS**

| | Non-tanker cost of US$2 million, expressed in US $ per $m^3$ | Non-tanker cost of US$4 million, expressed in US $ per $m^3$ |
|---|---|---|
| Withdrawals of 10 million $m^3$ | 0.2 | 0.4 |
| Withdrawals of 15 million $m^3$ | 0.13 | 0.27 |
| Withdrawals of 30 million $m^3$ | 0.07 | 0.13 |

As Table 7 implies, because the volume of water is very large relative to the non-tanker, the non-tanker costs add only modestly to the cost per cubic metre. Much higher annual non-tanker costs would have to occur to drive the associated per $m^3$ cost up to US$1.00. In the absence of more information, a US$0.10 to US$0.50 per $m^3$ range seems to be an adequate assumption for non-tanker costs. It is possible that some extra infrastructure costs must be required at the destination port as well.

**Overall Cost per Cubic Metre**

The preceding calculations can be drawn on to determine an overall "back-of-the-envelope" cost estimate. Assuming that relatively large tankers, 250,000 to 325,000 dwt, are used; that tanker day-rates tend to the middle and low ranges given in Table 6; and that the markets are about a 15-day return trip away; then the tanker costs would be US$1.25 to US$2.50 per $m^3$. Adding an allowance of US$0.10 to US$0.50 for non-tanker costs, gives US$1.35 to US$3.00 a cubic metre. Longer distances, delays due to weather or ice or technical conditions, or tight tanker markets could add substantially to those figures. On the other hand, a return to a slack tanker market, strategic

location of a facility or the possibility of some partial back-haul cargo could perhaps result in a somewhat lower cost.

For the remainder of this report, the estimates of US$1.35 to US$3.00 per $m^3$ is a reasonable point of reference for the cost of harvesting and shipping water from the province to Florida, Texas and the Caribbean.

## V. PRICES AND MARKETS

Given the cost of harvesting and delivering water, the key questions are: in what markets and under what circumstances would the price exceed or at least cover those costs. The following section is intended to provide a preliminary answer to those questions.

### The Current State of the Market

As far as containerized bulk shipments of water are concerned there is not a worldwide integrated market, as there is for other commodities such as oil and wheat. The few markets, where they exist, tend to be internal to a country or involve international trade on a bilateral basis.

There are some instances of internal national shipments of water, although it is not clear whether these are on a commercial basis. As mentioned previously, water is transported within Greece to various Greek islands. Also, while solid documentation is not available, apparently there are water shipments within the Philippines and within Indonesia. Both are nations composed of a very large number of islands. Shortages of fresh water are met by bringing in water by tanker. However, it is not clear whether these shipments are done on a commercial basis or as government policy. In Spain, the government's Ministry of Environment has used vessels, but not oil tankers, to ship fresh water from the mainland of Spain to the Balearic Islands in the Mediterranean Sea.[22] In the United States, and it varies by state, as well as in some other countries, there are instances of privately held water rights. Within the US there are some trades involving various public water authorities and private water rights holders. While there have been some calls for movement to a more market orientated approach to water management and allocation in the US, see Anderson and Synder (1997) and Anderson (1994), the US system is largely based on the decisions of local, state and federal government agencies.

International markets are the key when examining the prospects for future exports from Newfoundland and Labrador.[23]

Since perhaps the 1950s there have been periods where there have been signs of an international market developing. As mentioned earlier, NIVA claims that ideas for exporting water from Norway have been around since the 1950s. Holm (1988; p.40) reports that there were potential

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[22] These Spanish shipments are reported in the internet irrigation list maintained by T. Stein and located at http://www.wiz.uni-kassel/de/kww/irrig_l/db/1998/01/msg00100.html.

[23] Sales to other parts of Canada are highly unlikely in light of the abundance of fresh water throughout the country. However, the treatment of water exports from the province to foreign countries would, presumably, be the same as had those exports gone to other provinces, at least for the countries with which there are trade agreements.

developments involving exports of water by tanker from Holland and identifies markets in the US, the Philippines, the Middle East and Dominica in the Caribbean. Holm suggests that California is the main potential target market for water exports from British Columbia. In the early 1990s, there was enthusiastic support by Alaska's then Governor Hickel for the idea of exporting water from Alaska; legislation was passed to allow out-of-state exports and there were a number of prospective private developments.

Yet, in the course of preparing this report, it was not possible to verify any commercial export of fresh water in containerized vessels at the international level or even within a country.[24]

Nevertheless, there is evidence that some market transactions may be taking place in the near future. The most likely very near-term prospects are:

- Turkish Water to Israel

  Turkey is a water-abundant country. Israel has had on going water shortages for years and relies on treatment of waste water and desalination; see Sitton (2000). For several years, Turkey and Israel have discussed the idea of shipping water to Israel using tankers or even waterbags towed by tugs; see de Villiers (1998; p.324), Ersoy (1998) and Meixler (2000). In 2001, Israel experienced worsening water problems and there has been a number of reports that a deal with Turkey is imminent for the export of water from Manavgat area, on the south coast of that country, to Israel using water tankers. Media reports from CBC and other sources, see Blanche (2001) and Turner (2001), suggest that an agreement would be reached before the end of 2001. The distance across the Mediterranean Sea from Turkey to Israel is, very roughly, five hundred to six hundred kilometres so tanker costs would not be as high as for lengthy voyages.

- Alaskan Water

  Alaskan legislation has permitted out-of-state exports since 1992. Davidge (1994) suggests that there have been some small amounts of export, but there has not been any significant volume of exports in the 1990s. That may soon change. A private Vancouver-based company, Global H2O Resources Inc., has two Alaskan export developments under way.[25] The more significant of the two is an agreement with the community of Sitka to export water from that site. Existing port facilities can be used but Global was to have a loading-breasting pier completed there by July 2, 2001. However, in May 2001, Sitka officials approved an extension on that completion date to

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[24] As mentioned earlier, water is transported overseas from Turkey to the northern part of the nearby island of Cyprus. That part of Cyprus is controlled by a breakaway faction representing the Turkish speaking people of Cyprus. Troops from Turkey protect that regime. Thus, the shipments of water, while technically international, have more to do with the political situation rather than commercial exchange. Ersoy (1998) reports that North Cyprus pays only the transport cost, US$0.55 per cubic metre. Also, Associated Press reports that Tonga, a small Pacific Ocean nation consisting of many islands, has had to bring in water by tanker in recent years. There have been problems with Tonga's local water quality.

[25] See their web site at http://www.globalwatercorporation.com/.

July 6, 2002. Global states that it has acquired the rights to harvest 18.2 billion litres (18.2 million $m^3$) of glacier water a year, for up to 30 years, and will ship that water from Sitka on 50,000 dwt tankers. Its intent is to ship glacier water in bulk to foreign bottlers who would bottle and sell it in their respective markets in competition with imported bottled water. A second source for water by Global may be obtained through an agreement with Aleut Enterprise Corporation, an Alaskan native corporation, by which Global would obtain bulk water for ten years under a contract renewable for a second ten years.

Ž Norwegian Water

A Norwegian Hydroelectric Company, A/S Tyssefaldene, which is partially owned by the Norwegian government, is offering bulk water for sale. Tyessefalene has been in existence since 1908 as a hydro-electricity business. The source of the water for sale is from its hydro-electricity generation site. The waterflows come from a mountain area. The water is very clear and clean. It passes through hydro facilities as it flows through tunnels down the mountains and then into the ocean. Tyssefaldene is offering that water for sale. It already has a number of facilities in place, e.g., a pumping station, that are associated its generating plants.[26] Interestingly, Global H2O reports that in 2000 it entered into an exclusive ten-year water purchase agreement with Tyssefaldene. Global states that the agreement is for the bulk supply of glacier water, that the documented flow of glacier water is 56 $m^3$ per second (approximately 4.8 million $m^3$ a day), and that existing facilities are capable of loading 45 million litres (45,000 $m^3$) a day. Global apparently intends to deliver the water to European and Middle Eastern markets. As with Alaskan water, the plan is for the water to enter the bottled water market.

Another interesting development has been the appearance of WaterBank. It is a private American company that was formed in 1999. It offers its services as a facilitator/broker for the trading water assets.[27] Acting as a meeting place and brokerage site for bulk water sales is one of the services it offers. It describes bulk water sales as a developing activity, and identifies Indonesia, the United Arab Emirates, and Cyprus as among those countries exploring the idea of importing water. WaterBank is actively seeking governments willing to import bulk water. Also, it has a listing of bulk water for sale through it. A check of WaterBank's internet site in August 2001, found 15 listed, mostly US based. The list also includes two Canadian parties, (one in Quebec and one in British Columbia) and three New Zealand parties, as well as a potential seller in each of Chile, Sweden and Greenland. As of August 2001, there had been no bulk water sales arranged through WaterBank, although there is "lots of talk."[28]

In sum, while it is technically feasible to bulk ship water and the idea of doing so has been around for decades, there have not been any substantial market transactions up to 2001. Yet, recent developments suggest there is a good chance that some actual sales may take place as soon

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[26] See their web site at http://www.tyssefaldene.no/water.html.

[27] See their web site at http://www.waterbank.com.

[28] According to personal correspondence with William Turner, the founder of WaterBank.

as 2002. Whether or not any Newfoundland and Labrador water will be sold on these new markets, even if permitted by government policy, would depend on the price that can be obtained.

**Prices: Conventional Water**

Prices that other jurisdictions might be willing to pay for water vary widely, depending on water needs and abilities to pay. WaterBank's internet site gives the results of a survey of international water costs for 15 countries. Those countries are mostly European but also include Australia, South Africa, Canada and the US. The costs range from as low as US$0.41 per $m^3$ in Canada to a high of US$1.82 per $m^3$ in Germany, followed by Denmark at US$1.62 per $m^3$ and Belgium at US$1.22 per $m^3$, with the US cost put at US$0.50 per $m^3$. While it is not stated, from the context the figures appear to be for treated water from conventional sources -groundwater and surface water - delivered to consumers.[29]

Some additional information is available on water costs in the United States. WaterBank states that water for municipal use throughout the US has a cost ranging from US$300 to US$450 per acre foot.[30] Sources in California indicate that the wholesale cost of treated water ranges from US$400 to US$600 an acre foot.[31] New supplies from conventional sources in California can cost up to US$600 to US$700 per acre foot.[32] In certain areas such as in Texas and California, especially in drought times, costs for additional supplies can be higher, exceeding US$1,000 per acre foot on temporary basis. Anderson and Snyder (1997) cite similar figures for various US states that are typically in the hundreds of dollars per acre foot, but also argue that these prices are high due to poor US water policy, including the extensive subsidization of irrigation water for agriculture.

Drawing on these figures and allowing for a wide range, a reasonable assumption for costs of conventional treated water in the United States is US$200 to US$800 per acre foot. In metric terms, this is US$0.16 to US$0.65 per $m^3$. These figures are costs, which may be different the prices charged to end-users. However, to be competitive, imported water would have to match or be below those costs.

Another point of reference for pricing is the negotiations between Israel and Turkey. Firm figures are not available but Blanche (2001) reports that Turkey was asking US$0.23 per $m^3$, which, with tanker and other costs, would make the cost to Israel between US$0.55-$0.60 per $m^3$, but Israel was hoping for US$0.15 per $m^3$ with tanker and other costs bringing the full delivery cost to the US$0.50-0.55 per $m^3$ range.[33] In any case, it seems highly unlikely that the price would

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[29] These costs seem consistent with prices reported for various European cities by Lallana et al. (2001).

[30] A foot acre is the amount of water that could cover one acre to a height of 1 foot. It is equal to 1,234 $m^3$.

[31] Based on correspondence with the California Department of Water Resources.

[32] Source: California Coastal Commission (1997).

[33] The tanker costs in the Turkey-Israel case are low, reflecting the fact that Turkey is close to Israel. A return trip from Israel to the export site in Turkey would probably involve only

significantly exceed US$0.60 per $m^3$ if an agreement is actually finalized.

**Desalinated Water Prices**

In areas of the world without adequate access to conventional water supplies, desalinization is an alternate means of obtaining water. Desalinization is a process of removing salt as well as other minerals and impurities from sea water, brackish (slightly salty) groundwater, and waste water. According to the California Coastal Commission (1997), there are over 7,500 desalination plants worldwide, with most in the Middle East. The largest plant is in Saudi Arabia, having a capacity of about 500 million $m^3$ per day. There are a large number of plants in Saudi Arabia and other countries on the Arabian peninsula. Israel also relies heavily on desalinization, and it is a world leader in the technology. In the western hemisphere, most plants are in Florida, California, Texas and the Caribbean.

There are a number of desalinization processes. The most common are distillation and reverse osmosis. Distillation involves heating water to vapour and returning it to a liquid state, having removed the impurities when in vaporized form. Reverse osmosis involves forcing the water through membranes that screen out the impurities. Both technologies require a great deal of energy. Desalination plants typically require a large land area. Also, they emit brine, the residual water from the desalinization process. It is water mixed with high concentrates of salt and other dissolved minerals removed from the feedwaters. According to de Villiers (1999; p.340) brine can be up to two-thirds of the original feedwater, depending on the efficiency of the plant.

The cost of producing desalinated water is quite variable. It depends on the plant capacity, the impurity of the water, and, importantly, the cost of energy, as well as a number of other factors. De Villiers (1998; p.341) suggests that, for existing plants, US$2.00 to US$2.20 per $m^3$ is a good estimate but in some cases, as in Saudi Arabia, the cost is up to US$4 per $m^3$. The California Coastal Commission (1997) reports costs of desalinated water, on a 1992 basis, from 10 desalination plants in California. Those costs range from US$700 to US$6,000 an acre foot. Seven out of the ten fall in the US$1,100 to US$2,000 per acre foot range, which is equivalent to US$0.90 to US$1.62 per $m^3$. The Economist (1998) reports that in Spain's Canary Islands, distilled water costs about US$1.00 per $m^3$ but notes that reverse osmosis is cheaper.[34] WaterBank reports that a new plant in Cyprus produces water at US$1.26 per $m^3$ and that the International Desalination Association is predicting costs as low as US$0.50 per $m^3$ in the future.[35]

The technology for desalinization has improved substantially over the years, so it is more useful to examine costs associated with recently built or proposed plants. In Tampa Bay, Florida, approval was given in 2001 for the construction of a 25 million-gallon (about 95 million $m^3$) a day reverse-osmosis plant. According to the Tampa Bay authorities, this will be the largest plant in

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a few days.

[34] The Economist, "Squeezing water from the sea," April 2, 1998.

[35] See http://www.waterbank.com/bilksales.htm.

North America.[36] Covanta Energy, which will be the builder, states that the water will be the least expensive potable water of any desalination plant, at about US$2.00 per 1,000 US gallons, equivalent to just over US$0.53 a cubic metre.[37] A study of the cost of a Tampa-Bay design plant for two Texas communities has been carried out by Graves, Black and Dodson (2000); they chose the Tampa Bay design because of its low cost, which they describe as lower by a factor of 2 to 3 than previously observed. They find that conditions in the Texas communities are such that the cost would be higher than in Tampa Bay. For the two Texas sites, they estimate that the cost would vary from US$1,005 to US$1,162 per acre foot, or approximately US$0.80 to US$0.95 per $m^3$. According to Meixler (2000), Israeli experts claim that they can produce desalinated water for about US$0.60 per $m^3$. The Economist (1999) notes that a plan for a 36 million-gallon-a-day plant in Singapore is likely to produce water at about US$2.00 per cubic metre, but implying that to be rather expensive.[38]

In summary, while desalinated water from older plants can entail costs of up to US$4.00 per $m^3$, it appears that new technologies are substantially less costly. Under ideal conditions (e.g., location near a power plant, low salinity of water, plant capacity) the cost, as in Tampa Bay, can be as low as about US$0.55 per $m^3$. Still, in most circumstances, the cost for recently built and planned plants probably falls within a range from US$0.80 to US$1.50 per $m^3$, or US$2.00 per $m^3$ in more difficult conditions. However, there are drawbacks to desalination. Two important ones are (i) energy intensity, leaving it vulnerable to higher energy prices and disruptions and (ii) waste generation. In some cases, land costs can also be an important factor since plants take a lot of space.

**Potential Markets for Provincial Water**

Based on the prices noted earlier, water from Newfoundland and Labrador is not competitive with conventional supplies in North America. The US cost, while varying by region and state, is much less than US$1.00 per $m^3$, even for new conventional supplies.

Therefore, any water sales from the province would likely have to be targeted elsewhere. There are two possible ways by which bulk water from the province might be marketed: as a supply water for bottling plants, or as an alternative to desalinated water. Each is discussed below.

*As an Alternative to Desalinated Water.*

Desalinated water is more costly than water from conventional sources. With modern methods and reasonable conditions, desalinated water can cost as low as US$0.53 per $m^3$ but US$0.80 to US$1.50 range seems most likely for modern plants. If tanker costs are at the high end of the spectrum given in Table 6 then desalinated water is much less costly than tankered water from this province. However, if tanker costs are at the low points in the range given in that table, then the higher range of these desalinization costs is comparable to the estimated tanker costs for trips that

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[36] See http://www.tampabaywater.org/MWP/MWP_Projects/Desal/Desal/htm.

[37] See their press release at http://www.covantaenergy.com/news/20010601.php4.

[38] The Economist, “Pass the salt,” August 19, 1999.

are 15 days from the province via the largest tankers. Non-tanker costs would also have to be factored in but, as shown in Table 7, they may not add substantially more. Even in those favourable tanker-cost conditions, delivery to the Middle East, California, Europe and further would not compete with desalination there; in addition, in many cases, there are closer potential competitors, such as Norway and Turkey for the Middle Eastern and European market.

There is some chance for provincial water to be potentially competitive with desalinated water in nearer locations. Those areas are the coasts of Florida and Texas as well as some of the Caribbean island nations, such as Trinidad and Tobago.[39] In these locations, desalinated water might cost from US$0.55 to US$1.50 per $m^3$, depending on the salinity of the water and other factors. In the previous section, the reference range for provincial water export costs was from US$1.35 to US$3.00 per $m^3$. Thus, there is some room to compete with relatively high-cost desalinization if the provincial costs turns out to be at the lower end of that reference range. Also, there may be some scope to reduce that cost through the use of single-hull vessels, reduced voyage time, and back-haul arrangements. In addition, desalination plants' economics are vulnerable to higher energy prices and their effluent of brine can create serious environmental concerns. Both factors increase the attractiveness of bulk water imports. Desalination plants also require large capital investments; the Tampa Bay plant will cost approximately US$75.0 million to build. Tankered water sources avoid the risk associated with the large capital investment of desalination plants.

Given these considerations, in the Florida-Texas-Caribbean region there could be cases where tankered water is more attractive than desalinated water. Recent water shortages in the area have created a surge of interest in Florida and Texas in desalinization. If well-designed tanker-water proposals were made to their various water authorities, it is conceivable that some might choose that option. Canadian sources would be perceived to be dependable and of high quality. Presumably, long-term contracts would be needed for the agreed quantities and their timely delivery to ensure water supply security and regularity for the purchasers. If year-round delivery is required then that acts to limit export locations to the south coast of Newfoundland.

Nevertheless it is not easy to be very optimistic about these opportunities. There has been at least one case where Canadian water was in direct competition with desalinated water. Smith (1994) reports that in 1990, the city of Santa Barbara solicited bids to supply water to it, either by tankers or by building a desalination plant. A number of proposals were received. Among a short list of six proposals, three were for supplying water by tanker from British Columbia. At that time, water exports from BC were permitted by the BC provincial government. On cost considerations as well as on several other criterions, Santa Barbara opted for a new desalination plant. Depending on the volume of water, desalinization turned out to be approximately 30% to 50% cheaper than the most competitive of the three tankered-water proposals.

On another negative note, Alaska has allowed water export since the early 1990s, and Davidge (1994) had emphasized the opportunity to compete with desalinated water in California. Yet, tankered water from Alaska has not been used in California to date. Alaska is about as far from southern California as Newfoundland is from Florida.

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[39] Ionics Inc., a major water company, announced in October 2000, that it will be constructing a 28.8 million-gallon-per-day desalination plant in Trinidad, which would make that facility the largest in the western hemisphere.

Turning to the prospects for provincial water sales opportunities in the US southeast, another crucial factor is federal and state water policy. In states such as Texas and Florida, water for agriculture is highly subsidized and inefficiently used. The amount of water used in irrigation is greater than municipal use. A significant rationalization of agricultural water policy could free up large quantities of water. The result, in all likelihood, would make both desalinization and tankered water uneconomic.

*As Supply for Bottling Plants*

Global H2O Resources Inc. has focussed on a strategy of delivering in bulk to bottling plants and then selling the water to the upscale bottled water markets. The target markets apparently are not in the US. The cost of bottling water in other countries, such as in the Middle East and Asia, is lower than in the US. Because their plans are for the use of glacier water, either from Norway or Alaska, they also have the advantage of being able to offer water characterized by purity. This strategy seems quite sound.

Whether a provincially based business could emulate that sort of strategy is an open question. No water on the Island could be claimed to be glacier water but, presumably, some in Labrador could. There may also be sites on the Island which contain very clean pristine water. Such high quality water could potentially be bottled in lower cost environments and sold at a premium in those markets. In some countries, the delivery of bulk water may avoid tariffs that apply to bottled water, adding to the attractiveness of bulk shipping to bottling plants there.[40]

The US market is probably not an option for this approach since bottling costs are unlikely to be lower there than bottling costs in Newfoundland and Labrador.

**Market Outlook**

Considering both the costs and the potential markets, the opportunities for bulk export of provincial water are limited. As a substitute for desalinated water, there is some chance of competing with the US southeast coastal desalination plants and those in the Caribbean. Tanker costs are too high for provincial water to compete with desalination plants on the US west coast, in the eastern Mediterranean, in the Middle East or in Asia. Since regularity of supply may be an important consideration, as is tanker cost, the south coast of Newfoundland probably has the best prospect. That area is largely ice-free. It also has a low population so there are fewer alternate uses of the water in that area. Even there, however, moderate to high tanker costs could be detrimental to commercial viability.

Another alternative for the province arises where there might be local water sources that are especially high quality and have desirable characteristics, as does glacier water. That quality factor could be used to capture a market edge, especially if there is some scope to supply the water in bulk for bottling elsewhere. Bottled water tends to sell at a premium; the price of bottled water being

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[40] If there are no tariff barriers for bottled water then it is not evident that bulk shipment from the province would be more profitable than exporting bottled water. For this study, however, the focus is on bulk water exports. No assessment of the export of bottled water was attempted. In any case, bottled-water exports are permitted.

entirely different from what is paid for water supply for municipal, industrial and agricultural uses. Bulk shipping to foreign markets for bottling there might also allow entry at reduced tariffs, which would add to the commercial prospects. However, competition in international bottled water markets is probably quite stiff.

In short, if bulk water export were allowed then it is possible that a modest number of developments might take place, most likely on the south coast. Entrepreneurs would focus on finding the best sites in that region; sites that meet environmental requirements and offer the best quality water for least infrastructure costs. These businesspeople would face numerous market challenges: quality requirements, the need to maintain regular delivery, tanker costs, and competition from other Canadian sources if export from other provinces is permitted. Those risk factors would tend to make capital lenders very cautious about financing; this would act to restrict funding to only those best designed and realistic business plans. The number of commercial operations could end up ranging from none to a few. Ultimately, that number would be determined by the interaction of market forces and the ingenuity of entrepreneurs in developing low-cost, high-quality water for market niches.

## VI. POLICY ISSUES

Even if entrepreneurs are able to find markets for bulk shipments of Newfoundland water for bottling abroad or as alternatives to desalinization, then a number of important policy questions must be considered. In general terms, would the benefits to the province exceed any costs? That question is addressed briefly in this section.

### Resource Royalties and Other Benefits

Water is a provincial resource. If it contributes to the value of a commodity then it seems only fair that the owners of the resource should have an appropriate return. Also, as a matter of economic efficiency in resource allocation, the resource needs to be priced to reflect its marginal value in making a commodity.

It is beyond the scope of this report to determine a precise estimate of potential royalties but some commentary is called for. In light of the prices that provincial water might sell for on external markets, relative to the costs of harvesting and delivering it, economic rent per cubic metre might be a few cents or less. Since volumes are large, this still might translate into annual royalty revenue of a few million dollars or more, depending on how many sites could be commercially viable.

Turkey's proposal to sell water to Israel entails an asking price, before transport, of perhaps US$0.25 per $m^3$. Some of that price is needed to cover infrastructure and port costs in Turkey. That may leave only a few cents or less as the economic return to the water.

Alaska and British Columbia have developed fees for exported water in bulk. British Columbia does not currently permit the bulk export of water, although a number of permits to do so were issued in the early 1990s. According to British Columbia's fees and rental schedule of May 1999, there is a $10,000 one-time fee for bulk shipment of more than 1,000 acre feet per year; the fee is $5,000 for less than 1,000 acre feet a year. The annual fee is $1,350 for 100 acre feet whether used

or not, plus $13.50 for each additional acre foot beyond 100 acre feet.[41] $13.50 an acre foot amounts to about $0.01 per $m^3$.

Under Alaskan regulations, the charge per acre foot varies with the quantity to be removed per year. It can be as low as US$2 an acre foot, when the amount removed is less than 5,000 acre feet a year, up to US$30 per acre foot when the amount exceeds 1,000,000 acre feet a year.[42] That maximum fee of US$30 per acre foot is equivalent to just over US$0.02 per $m^3$. However, that is for the removal of more than 1 million acre feet from a hydrologic unit. To put this in some local perspective, the Gisbourne Lake proposal was for the removal of the equivalent of approximately 12,000 to 20,000 acre feet a year. Under Alaska's fee structure, the corresponding fee could be either US$6.00 or US$8.00 per acre foot, which is less than US$0.01 per $m^3$, perhaps Canadian $0.01.

Thus royalty revenue, like commercial profitability, is dependent on the volume of sales, given the small margins. Except in periods of extreme shortage, water is not a high value commodity per unit.

Nevertheless, royalties are probably the most significant benefit arising from bulk water export. Other benefits are not directly public benefits . They are private gains but still relevant to the province. Those other benefits are: profits to any local entrepreneurs who engage in export, and gains to any workers who find jobs in the export activity. These income gains cannot be expected to be large. The comparison of costs of harvest and delivery to potential prices, namely the desalination costs, indicates that profit margins may be slim. Also, the harvesting and on-site facilities are very capital intensive. For a bulk-export-only operation, the employment levels would be quite modest, perhaps in the tens of jobs, even in a moderately large operation.

**Environmental and Other Public Costs**

If bulk export from the province were permitted, and it actually occurred in some areas, then there could be some costs to the province or private parties. The chances of occurrence of such costs would depend on the regulatory regime.

One obvious concern is possible damage to the environment. If fresh water is withdrawn from a source in excess of the rate at which it replenishes itself or at a rate than damages the coastal or related ecosystems then the resulting cost must be weighed against any potential gains.

Another environmental risk factor is the possibility of tanker accidents. The implications would be much less serious than for tankers carrying hazardous products as cargo. Still, there could be costs to local fisheries and navigation if a tanker were to have an accident in the province's coastal waters or fishing grounds.

Finally, it would be important to consider the opportunity cost of any potential water withdrawal. Some water bodies might be required for future drinking water needs, for recreation

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[41] These fees may apply only to tanker transport within that province. The above analysis assumes that if out-of-province exports were permitted then the same fees would apply.

[42] The fees vary depending on use. For example, the fee for more than 1 million acre feet can be either US$20 or US$30. The higher fee was chosen for this illustration. Fee information from the State of Alaska is located at http://old-www.legis.state.ak.us/cgi-bin/folioisa.dll/acc.

or tourism development or hydro-electricity generation and so forth. Their values in those uses may well exceed the value for export. To preserve water for its higher value uses may require designation of certain areas as unavailable for bulk export or involve setting limits on withdrawals, where those limits are consistent with sustainability.

In principle, it seems that a sound policy could be designed that sets priorities in use and establishes appropriate ecological requirements in such a way so as to minimize these sorts of costs.

**Review of the 1996 Water Export Policy**

The provincial government's water export policy, as described in the policy directive dated September 6, 1996, does appear to address the issues raised above. While that policy is not operative at present, it is worthwhile to comment on it.

First, it sets priorities for allocation of water resources across various uses. Domestic and municipal uses are the highest priority uses. Following them, in order of precedence, are: commercial and industrial, hydropower, recreation, and other purposes. All forms of water export fall into the final category of "other purposes." Such a priority system is consistent with the notion of opportunity cost, namely, the value of water in alternate uses. The order of priority is also generally consistent with the ADI Nolan Davis and Gardner Pinfold study of the economic value of the province's water. One suggestion is to clarify what is meant by priority. If it is meant in absolute terms, then a few occasional recreational users might be able to forestall a project of far more considerable benefit. Similarly, one commercial user, other than an exporter, might be given priority over an exporter even in cases where the export of water might generate a substantially greater benefit.

Secondly, the province's policy appropriately addresses the environmental consequences. The policy requires that water export projects go through the province's Environmental Assessment Process. It also requires adherence to conditions that are set by the responsible minister for rates of withdrawal and monitoring of water quality. In addition, separate approvals must be obtained for construction of infrastructure related to export.

It is worthwhile to note that Goodman and Tristan (2001) highlight the manner by which environmental aspects of the Gisbourne Lake proposal were assessed. At one point they state

> " The single exception to this potential over-allocation problem is the Gisbourne Lake export proposal in Newfoundland. This proposal has demonstrated through a formal environmental impact assessment that a surplus exists for export."

Later, and again in reference to the environment impact assessment (EIA) of Gisbourne Lake, they state

> "...the EIA did represent a positive move in the incorporation of science into management and policy decisions on export proposals."

The third important issue addressed by the province's water export policy is royalty revenue. In addition to a $10,000 application fee for bulk export, the 1996 policy instituted a fee for the water resources. Known as the water use charge, it would have ranged from $0.02 to $0.20 per $m^3$. Presumably, the exact rate of the water use charge, within the stated range, would be set by the

responsible minister, taking into account the particular project. To put this in context, a Gisbourne-Lake-size operation would export from 14 million to 23 million $m^3$ a year, so the associated revenue to the provincial government treasury for the water would range from approximately $0.3 million to $4.6 million annually, depending on which rate were applied.

However, these provincial royalty rates are relatively high in comparison to the fees in place in Alaska for bulk water export. As illustrated earlier, the profit margins for export of water in competition with desalinated water in the US southeast and Caribbean are probably very small. If provincial water were destined for those markets, the fees may exceed these margins and thereby render that form of export unprofitable. Consequently, some fine tuning of the royalty regime may be desirable should the provincial government decide to permit bulk exports in the future.

Overall, however, the provincial government's 1996 water export policy addressed the important issues. It seems to have been solid with regard to environmental considerations and to ensuring any potential export water would have been surplus to local needs.

## VII. STUDY CONCLUSION

The cost of transporting water from Newfoundland and Labrador is high. That factor may make any bulk export operation uneconomic. However, under ideal conditions, it is conceivable that a few bulk export operations involving tanker shipments could be commercially viable. The most promising export sites are probably located on the south coast of the island; they are closer to the southeast US and Caribbean areas, and their ice-free ports offer year-round delivery. Also, the limited development and population of that part of the province minimize any adverse impacts or conflicts with other uses. Commercial success of these operations would depend primarily on the competitiveness with desalinated water in the US southeast and Caribbean and on tanker costs. Risks would be high and profit margins slim.

There may also be some market opportunities for supply bulk water to bottling plants located outside the US and Canada. Those opportunities seem very limited. However, shrewd entrepreneurs may be successful in finding some niches.

The main benefits of bulk water export would be in the royalty revenues generated for the provincial treasury. With at most a few bulk water operations likely, the revenue would not be large relative to other revenues.

To conclude, recall the Alaskan record. Exporting from there has been permitted since the early 1990s. There was some early enthusiasm and a number of attempted ventures there, including some that may come to fruition soon. Yet, to date, there have been no bulk exports from that state. There is no apparent reason to expect that this province's experience would be much different from Alaska's.

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