

An outline map of the Halifax Harbour region, showing the coastline and several islands. Two diagonal lines are drawn across the northern part of the harbour. The map is positioned on the left side of the page, partially overlapping the title and date.

Halifax Harbour Solutions Symposium

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Background

Chronology and Summary
of Pollution Control

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TABLE OF CONTENTS

INTRODUCTION	4
WHERE WE ARE NOW	4
Description of the Area	4
The Marine Environment	8
Harbour Uses and Activities	8
Discharges to the Harbour	9
Harbour Water Quality	9
HOW WE GOT HERE	10
1749 - 1759	10
EARLY 1800's	10
LATE 1800's/EARLY 1900's	10
1924	11
EARLY ACTIONS BY THE COUNTY OF HALIFAX	11
1956	11
1960	11

EARLY ACTIONS BY THE CITY OF DARTMOUTH	12
1969	12
EARLY ACTIONS BY THE CITY OF HALIFAX	13
1969	13
THE FIRST ACTIONS TO IMPLEMENT REGIONAL CONTROL	15
1971	15
1977	16
1978	17
Sewage Sludge	17
Special Waste	18
1981	18
1984-1987	19
The 1987 Regional Control Plan	19
Background	19
Phase 1	19
Phase 2	20
Phase 3	20

1988 - 1989	21
Halifax Harbour Cleanup Review Committee ...	22
Formation of the Committee	22
Committee Recommendations	23
The Canada-Nova Scotia Subsidiary Agreement	23
Objectives of the 1988 Agreement	24
Subsequent Funding Agreements	24
Interim Sludge Management	24
Halifax Harbour Cleanup Inc.	25
The Halifax Harbour Task Force	25
HHTF Principles	25
HHTF Recommended Environmental Quality Guidelines	26
HHTF Recommendations	27
1990	28
Joint Federal Provincial Environmental Assessment	28
Directions to the EA Panel	29
1992 - 1993	30
Panel Hearings	30
Panel Recommendations	30
Federal Government Response to the Panel Recommendations	31
Provincial Government Response to the Panel Recommendations	32

1994 [32](#)

1995 [32](#)

GLOSSARY [39](#)

REFERENCE DOCUMENTS [43](#)

INTRODUCTION

In early 1996, a decision was made by the Halifax Regional Municipal Council to convene a public workshop on Halifax Harbour to determine public priorities related to the problems of sewage discharges to the harbour and possible solutions to those problems. The history of activities associated with past cleanup efforts and proposed solutions to the sewage problems was viewed as an important element for the success of the workshop. Therefore, the Halifax Regional Municipality (HRM) commissioned a study to review all those significant events which most influenced and directed the efforts to manage the issue of domestic sewage discharge to the harbour. The results of this study are presented in this report.

The information provided in this report represents a summary of notable and relevant events, studies and actions dating from the early days of Halifax and Dartmouth (circa 1750) to March of 1995 when the Subsidiary Agreement on Halifax-Dartmouth Metropolitan Area Development expired. Those events and studies which were significant in shaping decisions and determining actions are summarized, but the reader is directed to the documents listed in the Reference section of the report for full technical details and discussions on the topics covered.

WHERE WE ARE NOW

Description of the Area

Halifax Harbour is an estuary which has been classified into six distinct regions: Bedford Basin; the Narrows; the inner harbour; the middle harbour; the outer harbour and the harbour approaches. Bedford Basin is 6 kilometers (km) long, 17 km² in area and is connected to the rest of the harbour by the Narrows. The Narrows is the area between the two harbour bridges, and consists of a channel about 20 meters (m) deep and 300 - 400 m wide. The inner harbour begins where the Narrows widens, and extends south to the northern end of McNab's Island. It is about 20 m deep and covers an area about 8 km long and from 500 m to 1500 m wide. The Northwest Arm is the western component of the inner harbour and is about 5 km long, about 200 m wide, and between 5 m and 10 m deep. The middle harbour includes those waters on either side of McNab's Island to Sandwich Point on the west, and includes Eastern Passage, a narrow channel between McNab's Island and the eastern shore of the harbour. The outer harbour comprises the seaward reaches of the harbour to Chebucto Head. The harbour approaches extend seaward of these areas out to the Scotian Shelf.

The Marine Environment

The Halifax Harbour ecosystem includes a wide variety of marine plants and animals. Seaweeds are common throughout the area, and many of the marine species found in other areas of eastern Canada are also found in the harbour areas where there are suitable surfaces on which the plants can attach. Phytoplankton production is high, and bottom dwelling organisms such as sea urchins, snails, mussels, starfish, clams, crabs and lobsters are abundant, especially in the outer areas. Cod, herring, haddock and mackerel are also present, generally in the outer harbour areas as well. Marine mammals, mainly fin whales, are frequently observed in the outer harbour areas, and occasionally other large marine species like leatherback turtles and basking sharks make their way to the harbour. The harbour also supports a large variety of birds, the most common being herring gulls. Cormorants, ducks, grebes and loons are regularly sighted and there have been reports of bald eagles in recent years.

In Halifax Harbour the benthic community is dominated by marine worms, the microbiological community has a higher than average population of bacteria, and contaminant levels are elevated. Healthier marine estuaries have a more diverse benthic community, lower bacterial populations and minimal contaminant levels.

Harbour Uses and Activities

The harbour is a very busy area and supports a diverse array of activities including shipping, military uses, commercial and recreational fishing, yachting and tourism. There are two container piers, two shipyards, one operating refinery, an Autoport, a gypsum loading facility and many other Port facilities for cruise ships, fishing boats and visiting yachtsmen. Halifax is also the site of the major federal defence facility on the east coast and is home to a large naval base. There is a number of yacht clubs and marinas in the harbour environs with numerous private boat launches; three principal beaches and several other, less used ones. The area also supports many other recreational uses, including scuba diving, boat tours and historical harbourside walks.

Commercial fishing is carried out by some seasonal lobster, herring, haddock, mackerel and cod fishermen, especially in the Eastern Passage and Herring Cove areas, where up to 100 people are employed in these activities. The harbour is also used extensively by local research institutions, including the Bedford Institute of Oceanography, the Defence Research Establishment Atlantic, the Halifax Fisheries Research Laboratory, the Atlantic Research Laboratory of the National Research Council, and Dalhousie University. Significant industrial use is made of harbour water as well. For example, a major power generating station

and a refinery draw large volumes of harbour water through their facilities for cooling purposes. The harbour also serves as a waterway for several ferries, which travel back and forth on a regular basis carrying passengers to and from Halifax, Dartmouth and Woodside.

Discharges to the Harbour

Estimates of the amount of raw sewage discharged into Halifax Harbour range from 25 to 38 million gallons per day, with 25 million being the more recent, and probably more accurate, figure. This sewage is discharged from more than 40 outfalls (30 municipal outfalls and 10 municipal overflow outflows which operate during storm events) located at various points around the harbour. There are also approximately 60 other private commercial and industrial outfalls to the harbour. These have not been characterized but represent only a small proportion of the total volumes discharged on a daily basis. All of these discharges contribute many types of undesirable materials to the harbour every day, including pathogenic bacteria and viruses; heavy metals; organic solvents; petroleum hydrocarbons; nutrients; silt; plastics and other floatable materials and organic matter. In addition, two sewage treatment plants release treated effluents to the harbour. The plant at Mill Cove discharges about 22,500 m³/day (about 5 million gallons per day) of sewage treated to a secondary level into Bedford Basin. The other plant, located at Eastern Passage discharges 17,300 m³/day (3.8 million gallons per day) of sewage treated to a primary level into the harbour.

Harbour Water Quality

The myriad uses and particularly the input of raw sewage have taken their toll on the water quality of Halifax Harbour.

Bacterial concentrations are high near sewer outfalls, and fecal coliforms frequently exceed safe levels for swimming at beaches around the Harbour. Fecal coliform levels are also too high for shellfish harvesting, and the entire area has been closed to the gathering of clams and mussels since the 1950's.

High concentrations of nutrients and depressed oxygen levels have also been observed in the vicinity of sewer outfalls. In addition, the accumulation of organic matter in the harbour sediments is higher than in other estuaries in Atlantic Canada. Trace heavy metals have increased over the years in the sediments, and there is evidence of accumulation of these metals in marine organisms such as mussels and lobsters. Organic contaminants including polynuclear aromatic hydrocarbons (PAH) and polychlorinated biphenyls (PCB) are also elevated in harbour sediments and some harbour organisms. Shoreline litter, mainly associated with sewage discharge, is a significant aesthetic problem and may be a hazard to marine animals. Other aesthetic problems are presented by the "boils" (areas of upwelling) visible at nearshore outfalls as well as the odors

associated with the boils.

Given these environmental conditions and the projected growth for the area, it is obvious that there is a great potential for increased adverse impacts if untreated sewage continues to be discharged to the harbour in the current manner.

HOW WE GOT HERE

1749 - 1759

1749
Halifax founded
1750
Dartmouth
founded

Significant development in the area began in June 1749, when the fortified settlement of Halifax was founded on the shore of the harbour. Development continued when the community of Dartmouth was founded across the Harbour in 1750. The area flourished as a military and shipping center and, as transportation improved, areas on the outskirts of the central settlements grew as well.

In "Warden of the North", a historical novel, Thomas H. Raddall describes the early days of Halifax, and provides a graphic picture of the problems of sewage and surface drainage in the years before collection systems were constructed: "...and all that seepage of that wallowing slum known as "the Hill" - enclosed by Brunswick, Albemarle (now called Market) and Grafton Streets - came down with the rains into the ornate gardens and spotless cellar kitchens of Argyle and Barrington and the busy countinghouses of Granville and Hollis, to mingle at last with the fetid mud of Water Street. The town was not so much a whited sepulcher as a gilded chamber pot."

EARLY 1800's

In the early 1800's, the old habit of flinging slops, domestic wastes and other garbage into the streets was banned by an Act which made it a crime to do so and imposed a fine on those caught breaking the law.

1800's
Bylaw prohibits the
"flinging of slops into
City Streets"

The Act stated "All persons in the town are bound to keep the gutters and streets before the houses and land occupied by them clear and free from nuisances, under a penalty of twenty shillings for each and every offence."

LATE 1800's/EARLY 1900's

By the late 1800's there was still no adequate water supply or sewage disposal system, and it was not until the early 1900's that the infrastructure began to be constructed to supply clean water and provide for collection of domestic sewage. During that period, Halifax was the major defence establishment on the east coast and enjoyed significant growth and prosperity associated with this status.

**1900's
Construction of
combined
(sanitary and
storm) sewers to
service area**

Most of the central sewage collection systems installed in the Halifax and Dartmouth areas were of the combined type, carrying both domestic sewage and stormwater runoff. These sewers were installed to service local drainage areas and discharged to the Harbour at the closest convenient point. This resulted in a significant number of individual outfalls along the waterfront on both sides of the Harbour, a situation which remains today.

1924

**1924
13 sewers
discharge to
Halifax
Harbour and
Huntsman
describes
water quality
and
circulation
patterns in
Halifax
Harbour**

Scientific studies of the pollution of Halifax Harbour date back to the early 1900's when there were at least 13 sewers discharging raw sewage into the Harbour. In 1924, a study conducted by A.G. Huntsman of the Atlantic Biological Station indicated that the sources of pollution to Halifax Harbour were restricted to the waterfront area from the Narrows to the Ocean Terminals on the Halifax side of the Harbour, and to a lesser extent, from Eastern Passage to the Narrows on the Dartmouth side. Huntsman also described the movement of water through the Harbour as being basically inward on the Eastern or Dartmouth side of the harbour and seaward on the Western or Halifax side. He also found that the deeper water throughout the harbour was relatively pure and the surface water was quite brackish and may have been considerably polluted.

EARLY ACTIONS BY THE COUNTY OF HALIFAX

1956

In 1956, because of significant growth in the Bedford area, a study was commissioned by the Municipality of the County of Halifax to evaluate zoning, highways, water supply and distribution, sewerage and sewage disposal. The study concluded that it was extremely important to provide treatment of any sewage discharged to Bedford Basin, and proposed that the sewage flow from Bedford be collected and treated at a plant to be constructed at Mill Cove.

**1956
Sewage treatment
considered a priority
for any discharges to
Bedford Basin**

1960

A further report in 1960 recommended that sewage from the Sackville area be collected and routed to the treatment plant at Mill Cove as well. In that period, the Nova Scotia Water Authority (the forerunner of the Nova Scotia Department of the Environment), recognizing the pollution of Bedford Basin from the numerous sewage outfalls, required complete treatment of sewage prior to discharge into the Basin. The County then commissioned the design of a treatment plant at Mill Cove to provide both primary and secondary treatment of the sewage collected from the Bedford and Sackville areas. (The recommended collection and treatment facilities were constructed in 1971).

**1960
Recommendation
made to treat Bedford
and Sackville sewage
in a secondary
treatment plant at Mill
Cove**

**1960
County
begins
design of
Mill Cove
secondary
treatment
plant**

EARLY ACTIONS BY THE CITY OF DARTMOUTH

1969

**1969
Relief sewers
and overflows
installed in
Dartmouth to
alleviate
flooding**

In 1969, a pollution control study completed for the City of Dartmouth recommended the installation of a number of relief sewers, overflow devices and stormwater retention tanks to alleviate flooding problems. These systems were subsequently installed. The study also recommended the construction of

**1969
Secondary
Treatment
Plant
recommended
for Eastern
Passage**

five sewage treatment plants, two discharging to salt water and three smaller ones discharging to freshwater lakes. The Nova Scotia Water Resources Commission provided criteria for sewage discharges, which in effect translated into secondary treatment for plants discharging to salt water and tertiary treatment for any plant discharging to fresh water lakes, an option which was extremely expensive. Subsequently, a decision was made to expand the study boundaries to include some areas of Halifax County and eliminate the three treatment plants which would discharge to lakes. The recommendations of the previous study were amended and four treatment plants, all discharging to salt water, were suggested. Concurrently, pollution control studies were being conducted by the County of Halifax for specified watershed areas. The Eastern Passage and Cole Harbour areas on the Dartmouth side of the Harbour were evaluated, and it was recommended that these areas be serviced by a series of

sewers and pumping stations, including a major pumping station at Bisset Lake, with all flow being directed to a treatment facility at Eastern Passage. (This recommendation was adopted and the Eastern Passage Plant was constructed as a secondary treatment facility in 1974). No action was taken to construct the recommended series of treatment plants to treat the remainder of Dartmouth's sewage.

EARLY ACTIONS BY THE CITY OF HALIFAX

1969

Installation of sewer services and water supply to mainland North and mainland South occurred in the mid-sixties.

In 1969, the Halifax city boundaries were significantly expanded by major annexations from the County. The annexed areas included Spryfield, Boulderwood and Purcell's Cove, to the south; Armdale and Fairview to the west, and Rockingham and Princes Lodge to the north, including the existing sewer and water services and the sewage outfall at Herring Cove. In light of this annexation, which increased the city area from 7 to more than 24 square miles, the City Council

**1969
City of Halifax
expands its
boundaries
considerably**

commissioned a study to evaluate the provision of sewage works and drainage to service the existing and future development in the city. At the time of this study, the city was serviced by approximately 127 miles of concrete and vitrified clay pipe, some of it more than 100 years old, and most of it carrying sewage, surface runoff and infiltration. The existing collection system included:

1. a northwestern district (805 acres) discharging waste from residential, industrial, commercial and DND lands to Fairview Cove;
2. a western district (1016 acres), along the eastern shore of the Northwest Arm from the Armdale Rotary to Chain Rock in Point Pleasant Park, discharging to the Arm at Chain Rock;
3. a central and southern district (1037 acres), comprised of park and university lands with some commercial and residential properties, discharging waste to the harbour at Pier A, and
4. an eastern district (1176 acres), containing all of the downtown area and some residential and light commercial areas, discharging waste to the harbour through more than 24 outlets.

The study considered the receiving waters for the sewage produced in the city, and estimated that 14 to 15 million gallons of raw sewage and industrial waste water was discharged to Halifax Harbour every day. It concluded that any sewage treatment scheme developed for Halifax would not involve the discharge of treated

**1969
Approximately 15
million gallons of raw
sewage is discharged
to Halifax Harbour by
the City of Halifax
daily**

effluent to any local fresh water lakes and streams, since they were not sufficiently large to assimilate the waste. Further, the study concluded that Bedford Basin should not be used to receive treated effluent over an extended period of time, since the assimilative capacity of the Basin was believed to be limited. After evaluating other discharge options, the study concluded that the logical point for disposal would be the Outer Harbour, which would protect Bedford Basin and the recreational uses of the Northwest Arm.

The study provided detailed recommendations for infrastructure construction and improvements, including:

1. separate sanitary and storm sewers in all future developments;
2. new storm sewers, and replacement of existing ones as necessary, in all areas of present development not currently served by storm or combined sewers, and
3. the institution of a by-law detailing suitable standards for sewer installation in new subdivisions.

The required level of sewage treatment was also evaluated in light of the requirements of the Nova Scotia Water Resources Commission and federal authorities with responsibilities for protection of the marine environment. A secondary treatment facility was suggested at Purcell's Cove. The plant was to be equipped with effluent disinfection, and an outfall to disperse the effluent at depth in the Outer Harbour was proposed. The total estimated cost of the facility was approximately \$35 million. It was suggested that the facility be financed under the provisions of the National Housing Act with contributions from the Central Mortgage and Housing Corporation, the provincial government and the City.

**1969
Secondary
Treatment Plant
recommended at
Purcell's Cove for
City of Halifax
sewage**

The city implemented many of the recommendations of the report relating to solving the significant infiltration problems in the sewerage systems. Consideration of the construction of the treatment system, however, was superseded by discussions of regional cooperation in managing this difficult issue.

THE FIRST ACTIONS TO IMPLEMENT REGIONAL CONTROL

1971

In 1971, the concept of regional treatment was developed by a Task Group on Water Supply and Waste Disposal, a regional committee reporting to the Metropolitan Area Planning Committee (a forerunner of the Metropolitan Area Planning Commission, MAPC). The Task Group prepared a report based primarily on the pollution control studies carried out by both cities and the county, as well as on additional, independent information from consultants and Task Group members. Inherent in the Task Group's evaluation was the assumption that the Eastern Passage and Cole Harbour areas would be serviced by the Eastern Passage Plant (built in 1974); that the Bedford - Sackville areas would continue to be serviced by the Mill Cove Plant (built in 1971), which would be upgraded to a tertiary plant if necessary; that provisions could be made to divert the flows from Mill Cove and Eastern Passage to a regional plant sometime in the future, as required, and that the Lakeside - Timberlea areas would be serviced by a plant discharging into the Nine Mile River system (built in 1983). The Task Group evaluated several sites where facilities could be built to treat varying proportions of the regional sewage flows and outlined a number of alternatives, including a single regional plant and several plants at different locations. It recommended that sewage from south Dartmouth be collected and transmitted to Dartmouth Cove; that sewage from Tuft's Cove be transmitted to the same collection point in Dartmouth Cove; that a tunnel be built from Dartmouth Cove across the Narrows to Duffus Street in Halifax; that the proposed harbour interceptor (recommended in an earlier pollution control study for the City of Halifax) from Duffus Street to Point Pleasant Park be sized to accommodate the added Dartmouth flow, and that details on collection from Purcell's Cove and the peninsula of Halifax be deferred until a treatment plant location was chosen. The Task Group report highlighted the need for additional harbour studies to more firmly establish the degree of treatment required; to evaluate the effects of sewage discharges on water quality; to assist in determining an optimum outfall location, and to provide data on water movement within the Harbour.

**1971
MAPC considers
regional treatment**

**1971
Secondary Treatment
Facility is constructed
at Mill Cove**

**1971
Regional plant
recommended at "Hen
and Chickens" site off
Point Pleasant Park**

Initial comparisons of the sites evaluated by the Task Group indicated that a regional facility at the "Hen and Chickens" site, a shoal off Point Pleasant Park, offered distinct advantages.

However, the Task Group recommended that before selecting a site, a Social Services Task Force should be established to determine the social implications of selecting a site.

The Municipalities all agreed, in principle, to the concept of a regional facility as described in the Task Group report, subject to the availability of funding from senior levels of government. However, such funding was not forthcoming and the regional concept received no further serious consideration until 1977.

1977

In 1977, the Metropolitan Area Planning Commission (MAPC) conducted another study for the Pollution Control Advisory Group. This study reviewed all the existing studies and filled in data gaps where necessary. It assessed the ecological effects of discharging sewage into Halifax Harbour; determined peak and average dry weather flows based on land use and population projections; identified alternative collection and treatment systems, and recommended a phased program for constructing and financing the required facilities.

MAPC presumed that the only rationale for treating domestic sewage would be to eliminate undesirable effects that untreated sewage could have or was having on Halifax Harbour. The following effects were documented:

1. sludge buildup in the vicinity of the major outfalls;
2. cloudy water in the vicinity of the major outfalls;
3. organic matter buildup in areas such as Fairview Cove;
4. silt deposits at the mouth of the Sackville River and in the vicinity of Melville Island in the Northwest Arm;
5. clouding of water by storm sewers, especially in the Northwest Arm, and
6. deposition of tissue shreds in the vicinity of the Mill Cove outfall.

The study concluded that these problems were not widespread, but that although drastic alterations in the marine environment had not occurred, there was evidence of nutrient loading and excessive oxygen demand in the Inner Harbour and Bedford Basin.

Primary treatment was recommended for the raw sewage, provided that the outfall would be to the ocean, on the western side of the Outer Harbour, in a location with general offshore drift. This would virtually eliminate all visible impacts of sewage disposal from the Inner Harbour Area. Secondary treatment was considered to be an absolute minimum if the outfall was to be located anywhere in the Inner Harbour.

**1977
Effects of raw
sewage discharge on
Halifax Harbour
documented**

Eighteen potential sites for the treatment plant were examined, including all those suggested in previous studies, and the list was narrowed to five for in-depth evaluation. These were a site adjacent to the Sugar Refinery in Woodside; lands north of the Nova Scotia Power Corporation Water Street Generating Station; Purcell's Cove; Sandwich Point, and McNab's Island. It was assumed that the secondary plants at Mill Cove and Eastern Passage would continue to operate. Various options for the location of a primary plant were considered (one involved the construction of two additional secondary plants, but it was not selected as the preferred option). Sandwich Point was recommended as the preferred location for a primary treatment plant. (See diagram on Page 13). This option required that the Halifax and Dartmouth collection systems be joined by a tunnel under the Narrows at Duffus Street. The total capital cost of the preferred system was estimated at \$151 million.

The study identified three critical issues which had to be resolved collectively by the municipal, provincial and federal authorities prior to proceeding with the proposed system. These were whether or not the three municipalities were willing to participate in a regional treatment scheme; whether the preferred site at Sandwich Point was available for use, and whether or not federal authorities would agree to integrate the DND Dockyard and Waterfront Development facilities into the regional system.

1978

Sewage Sludge

**1978
Sludge
management
study
recommends
disposal at sea**

In 1978, the Halifax County Municipal government operated two major sewage treatment plants, one at Mill Cove and the other at Eastern Passage, and disposal of the sludge generated was becoming a concern. Because the construction of another treatment plant at Nine Mile River was expected to

**1977
Regional primary
treatment plant at
Sandwich Point
recommended.
Proposed system
to include joining
Halifax and
Dartmouth
collection
systems by a
tunnel under the
Narrows near
Duffus Street**

make the problem worse, the County commissioned a sludge management study. This study found the County produced about 22,700 m³ (approximately 5 million gallons) of sludge per year, and that much of this material was disposed of in the harbour by private sludge haulers. The study recommended that the sludge be disposed of on agricultural or forested land as a viable and economically attractive alternative. Mechanical dewatering of the sludge and disposal in the County landfill was suggested as the most environmentally and socially acceptable option. On a regional basis, disposal at sea was recommended as the best overall option. No action was taken on any of the study recommendations.

Special Waste

A subsequent study concluded that significant amounts of “special waste” were also finding their way directly into Halifax Harbour. Special wastes are those of industrial or commercial origin which have the potential to pose a threat if not treated and disposed of properly.

It was becoming obvious that the harbour was receiving large volumes of various types of wastes on a daily basis, and that action was needed to determine the long term consequences of these wastes.

1981

**1981
Serious inflow
and infiltration
problems
identified in
County systems**

During the ten year period from 1971 to 1981, significant additions were made to the regional sewer and water supply systems with the construction of major trunk sanitary sewers and water systems in the County of Halifax. In 1981, as part of its regional development plan, the Nova Scotia Department of Municipal Affairs commissioned a series of studies on infrastructure requirements. The studies consisted mainly of an inventory of existing infrastructure and an identification of major opportunities for, and constraints to, development. They were managed by the Task Force on Water Supply, Sewerage and Storm Drainage (a committee comprised of representatives from the four municipal units and several provincial government departments). The studies identified excess sanitary sewage capacities in trunk facilities in all four municipalities but confirmed that severe inflow/infiltration problems were using most of that excess capacity. A comprehensive inflow/infiltration reduction program and improved future construction procedures were recommended to mitigate these problems.

The lack of a domestic waste pollution control policy was identified as a major constraint to development in the metropolitan area. Since neither Halifax nor Dartmouth had sewage treatment plants or any criteria for such facilities, these municipalities could not advise developers on the infrastructure necessary to accommodate sewage treatment. A major recommendation was that action should be initiated to determine the assimilative capacities of the receiving waters. Such studies were needed to establish criteria for sewage treatment plants and for the degree of treatment required.

**1981
The lack of a
pollution control
policy is identified
as a constraint to
development**

1984-1987

The 1987 Regional Control Plan

Background

In 1984, recognizing the lack of knowledge about the assimilative capacities and the degree of sewage treatment required in the region, MAPC undertook a three phase study to better understand Halifax Harbour. The study was managed by a Regional Pollution Control Advisory Group consisting of members from the four municipalities, the provincial government and the federal government.

**1984
MAPC initiates a
3 phase study to
better
understand the
current situation
and compile
data required to
design and build
a regional
treatment facility**

Initially, this study assessed the lack of action on the development of a regional system for sewage collection and treatment. Much of the problem was attributed to the high capital costs and the decline in available options for financial assistance; land use issues and public opposition to recommended sites; a lack of knowledge of the assimilative capacity of the harbour, and the fact that required treatment levels had traditionally been based on policy statements from the regulatory agencies and not on any scientific evaluation of the receiving environment. The Three Phase study was designed to avoid these earlier problems, to fill many of the existing information gaps, and to build the data base necessary to recommend and implement an effective regional sewage treatment scheme.

Phase 1

In Phase 1, all pertinent data related to physical oceanography, water quality, sewage loads and biological oceanography was reviewed, and used later in the development and refinement of a numerical model for the harbour. In support of this phase of the work, the Nova Scotia Department of the Environment conducted a sampling program to document harbour water quality. More than 4000 samples were collected at manholes, sewage outfalls and in the harbour and analyzed for a variety of parameters, including dissolved oxygen, pH, Chemical Oxygen Demand and fecal coliform levels. The results indicated that dissolved oxygen levels were generally acceptable in the harbour even though there were low levels in some areas during the summer months, and that fecal coliforms were relatively high throughout the harbour. Aesthetic conditions were very unpleasant at most outfall sites with sewage odours, sludge deposits and floating debris present in the vicinity of the outlets.

**1985
Survey shows
acceptable dissolved
oxygen but high fecal
coliforms in Halifax
Harbour**

Phase 2

Phase 2 involved the development of a water quality model for Halifax Harbour and the verification and field testing of the model. Phases 1 and 2 enabled the effects of sewage discharges on the water quality of the harbour to be determined. As well they allowed the future state of the water quality to be predicted if no changes were made to the existing system. The model was also used to evaluate the effectiveness of various improvements to the actual sewage disposal practices. Basically, the model simulated a number of natural processes which act on sewage effluents, such as transport, dispersion and decay, and predicted the impacts on receiving water quality. The model used estimates of sewage loads to the harbour and predicted the concentrations of contaminants in harbour waters. Phase 2 results indicated that the BOD load to the harbour was not sufficient to cause widespread oxygen depression but that fecal coliforms were at times considerably elevated in the Narrows and Inner Harbour areas. The model predicted that the area and severity of fecal coliform contamination would grow considerably by the year 2001 if no changes were made in sewage disposal practices. Aesthetic problems were also identified in the study, and a provision was made in the model to predict the movement of “floatables” normally associated with raw sewage.

**1986
Modelling studies predict increased problems if no action is taken regarding sewage discharges**

During this period, the County continued to operate the Mill Cove and Eastern Passage Sewage Treatment Plants as secondary treatment facilities, and the Lakeside-Timberlea plant as a secondary facility with nutrient reduction and post secondary aeration. The use of the Water Quality Model developed by MAPC, however, demonstrated that downgrading the Eastern Passage Plant to a primary treatment level would make little difference to Harbour water quality. The plant was subsequently expanded and treatment downgraded to a primary level in 1987.

Phase 3

In the final phase, preliminary designs and cost estimates for improvements to the existing system of sewage handling in the region were developed. The improvements assessed were those which would alleviate environmental as well as aesthetic concerns resulting from the discharge of raw sewage to the harbour. Specifically, in Phase 3, the following tasks were undertaken:

1. a review of all sewer systems discharging into the harbour;
2. an analysis of contemporary studies on various aspects of the harbour;
3. an identification of the major outfall sites, or groupings of outfall sites which offered the greatest potential for improving water quality in the

**1987
Based on modelling results, Eastern Passage plant is downgraded to a primary treatment facility**

harbour;

4. an analysis of these sites using the Phase 2 model, and a prediction of the impacts of outfall improvements, screening and primary treatment;
5. a review of the impacts of the regional collection system suggested in the MAPC 1977 work, and a comparison with the analysis in 4 above;
6. an analysis of the options for improving conditions at the major outfall sites;
7. a review of costs for each option, and
8. an assessment of funding options.

**1987
MAPC
recommends
single, primary
treatment plant
at Sandwich
Point**

A number of collection and treatment options were considered in the Phase 3 study, including regional treatment and a combination of multiple treatment plants at various locations. The model predictions indicated that the regional option with a treatment plant at Sandwich Point offered the greatest potential for improvement of overall water quality due to the increased flushing rate in the Outer Harbour. The study did, however, consider the construction of three plants, at Tufts Cove, Peninsula South and Herring Cove, and suggested that in the short term, these would offer the best overall cost advantage. In the long term, however, the single regional facility at Sandwich Point was more cost effective for the three municipalities. The report suggested that the final selection of the preferred alternative should be based on other important criteria such as impacts on receiving water quality.

The study therefore recommended that water quality or water use criteria be developed for the harbour, and if the criteria warranted, then the single regional plant should be built. If not, then preliminary screening outfall extensions were suggested to improve aesthetics.

1988 - 1989

In 1988, MAPC proposed that a single, regional treatment facility be considered. This proposal was based on the results of its 1987 study as well as elements of previous work. Essentially, the system would involve collection of the wastewater from

**1988
The four
municipalities
agree in principle
with a regional
treatment plan**

approximately 40 existing sewage outfalls (about 38 million gallons) and treatment at Sandwich Point. Other project details included:

1. Construction of a piped interceptor and associated pumping facilities to convey sewage from South Dartmouth to Dartmouth Cove;
2. Construction of an interceptor tunnel along the waterfront from Tuft's Cove to Dartmouth Cove;
3. Construction of a tunnel under the Narrows to a point near the intersection of

- Barrington and Duffus Streets on the Halifax side of the harbour;
4. Construction of an interceptor tunnel from Duffus Street, along the Halifax waterfront, across the Northwest Arm and through Purcell's Cove to Sandwich Point;
 5. Construction of a pumping station to convey sewage from Herring Cove to Sandwich Point;
 6. Construction of a 40 million gallon per day capacity treatment plant at Sandwich Point. The plant would include preliminary treatment to remove gross solids and floatables using mechanically raked bar screens and an aerated grit chamber; clarification to settle and remove sludge; effluent disinfection with chlorine; sludge treatment consisting of anaerobic digestion, mechanical dewatering and disposal, and an outfall pipe with a multiple port diffuser in deep water.

The initial capital cost of this scheme was projected to be \$156 million in 1987 dollars.

Halifax Harbour Cleanup Review Committee

Formation of the Committee

The four municipalities agreed in principle with the proposed scheme but indicated that an assessment of the environmental impacts of the outfall from the proposed Sandwich Point Treatment plant on the Herring Cove fishery would be required. On April 20, 1988 the Minister of the Environment referred the project to the Environmental Control Council, which then appointed the Halifax Harbour Cleanup Review Committee to conduct the study. The Review Committee was to provide an impartial third-party view of the project and offer the public an opportunity to voice their concerns. The Committee reviewed all the available literature on sewage treatment options in the Halifax Harbour environs and received submissions (both oral and written) from many individuals and interest groups on the issue of regional sewage treatment.

**1988
Halifax
Harbour
Cleanup
Review
Committee
established
to review
concerns
with
Sandwich
Point site**

The Committee evaluated technical and social concerns related to the project and categorized them as follows:

1. concerns about the planning process - the Committee noted significant public frustration with the lack of public involvement to date in the proposed sewage treatment system.
2. design considerations - the single treatment plant option was not favourably received by people living near the proposed location, and from a purely engineering and economic view, the Committee did not feel that a clear case had been made

for the single plant option. In other words, in the absence of water quality objectives and comprehensive oceanographic data for the Harbour, the advantages of a single plant were not clear.

3. construction concerns - the public identified concerns regarding property and well damage as a result of the tunneling associated with sewer construction and the possibility of acidic runoff associated with intrusive activities in pyritic shales.
4. operational concerns - the Committee identified the processing of sludge from the proposed treatment plant, as well as that from other treatment plants in the county and private systems, as a concern. The public also expressed concern about tunnel leakage in those areas where domestic water was drawn from wells; the discharge of hazardous wastes into the sewer system, and the adverse impacts of untreated stormwater overflows from the treatment system. The potential effects on the Herring Cove fisheries were extensively discussed, but no definitive conclusions could be made without additional information on the composition and fate of effluent from the proposed plant.

Committee Recommendations

The Committee made 30 separate recommendations as a result of its deliberations, and generally endorsed the concept of regional sewage treatment and the establishment of a funding arrangement for the project. It did, however, identify some fundamental data gaps, including an incomplete understanding of the biology and oceanography, and a lack of clearly stated objectives for the harbour. It also stressed the need for full public participation in the decision-making process.

The Environmental Control Council submitted the Halifax Harbour Cleanup Review Committee report to the Nova Scotia Minister of Environment, who agreed with the findings. The Province then commissioned the Halifax Harbour Task Force to review the proposed sewage treatment project, with an emphasis on the marine environment and objectives related to the projected uses of the Harbour waters.

The Canada-Nova Scotia Subsidiary Agreement

**1989
Halifax Harbour
Task Force
commissioned to
develop
environmental
quality guidelines
and objectives for
harbour use**

While the many discussions and studies relating to sewage treatment in the Halifax - Dartmouth region continued, provincial and federal officials were negotiating an overall agreement on funding arrangements for development initiatives. These

**1988
Canada Nova Scotia
Subsidiary Agreement signed
committing funds to sewage
treatment**

negotiations resulted in the signing of the Canada - Nova Scotia Subsidiary Agreement on Halifax - Dartmouth Metropolitan Area Development in July of 1988. The major elements of the Agreement were a commitment of \$195.7 million to the Halifax - Dartmouth Metropolitan Sewage Treatment Facility and an associated cost-sharing formula. The federal government was to contribute \$73.4 million to the project with the balance of the expense to be borne by the province, the City of Halifax, the City of Dartmouth and the County of Halifax. The federal commitment was conditional upon the construction of a demonstration plant to employ the sludge-to-oil technology developed by Environment Canada. Forty million of the federal share was to be allotted to this activity.

Objectives of the 1988 Agreement

The Agreement recognized that sewage treatment was basically a provincial responsibility but identified an “urgent” need for infrastructure development in the Halifax - Dartmouth area and justified the joint funding arrangement based on regional development priorities. The objectives of the Agreement were to provide economic benefits to the region and improve the climate for future economic development; to contribute to tourism and recreation; to assist in further development of the waterfront area, and to promote the application of new environmental technology in Nova Scotia for converting domestic sewage sludge to oil.

Subsequent Funding Agreements

Following the signing of the Subsidiary Agreement, a Memorandum of Agreement was developed and signed by the province of Nova Scotia, the City of Dartmouth, the City of Halifax and the County of Halifax committing the parties to regional sewage treatment as outlined in the Subsidiary Agreement, and establishing a final cost-sharing formula. The province was to match the federal contribution of \$73.4 million (bringing the federal/provincial share to 75% of the \$195.7 million total) with the remaining 25% or \$48.9 million apportioned between the City of Halifax (\$32.6 million or 66.6%); the City of Dartmouth (\$16 million or 32.8%), and the County of Halifax (\$0.3 million or 0.6%). At this point, the Province of Nova Scotia and the affected municipalities agreed to establish Halifax Harbour Cleanup Inc.(HHCI) to manage the design and construction of the regional treatment system.

**1988
Province, City of
Dartmouth, City
of Halifax and
County of
Halifax agree on
a cost sharing
formula for the
regional sewage
treatment facility**

Interim Sludge Management

In 1989, a sludge lagoon was constructed to serve the

Aerotech Industrial Park. In that same year, sludge from the existing sewage treatment facilities in Halifax County was directed to this lagoon, thus partially alleviating the problem of sludge disposal directly into Halifax Harbour.

Halifax Harbour Cleanup Inc.

Halifax Harbour Cleanup Inc. (HHCI) was incorporated under the Companies Act of Nova Scotia in July of 1989. The Corporation was formed to undertake all aspects of pre-design, design and construction of the regional sewage treatment facility in accordance with the Federal-Provincial Subsidiary Agreement, the subsequent Memorandum of Agreement between the province and the three

municipalities, and a Memorandum of Agreement between the province and the Corporation. HHCI was a Crown Corporation and was funded by the federal and provincial governments, the Cities of Dartmouth and Halifax and the County of Halifax. It reported to the Nova Scotia Department of the Environment and to a Management Committee co-chaired by one representative from the Atlantic Canada Opportunities Agency and one from the Nova Scotia Department of Economic Development. The Board of Directors of the HHCI were appointed from the various municipal, provincial and federal agencies with an interest in the project.

<p>1989 Halifax Harbour Cleanup Inc. established to undertake pre-design, design and construction of a regional sewage treatment plant</p>
--

The Halifax Harbour Task Force

During this period, the Halifax Harbour Task Force (HHTF) was undertaking activities related to its mandate from the provincial government, as well as addressing specific issues identified by the Environmental Control Council. The HHTF was charged with describing the existing conditions in the harbour and developing environmental quality guidelines and objectives based on the uses of the harbour waters. HHTF was then to make recommendations to HHCI on the preferred characteristics of the sewage treatment system for the region.

HHTF Principles

Consultation by HHTF with the public resulted in the identification of many concerns, questions and issues. These were evaluated and incorporated into the basic principles on which the HHTF conducted its work. These principles are noted below:

1. Halifax Harbour is a multi-use system which supports many diverse activities. The sewage management strategy must result in improving the environmental health of the Harbour.
2. The sewage management strategy must allow all existing uses of the harbour

to continue and even to expand, where possible.

3. The sewage management strategy must reflect a commitment to manage wastes in keeping with the containment approach to pollution control. This approach was formalized in the Guidelines for the Protection of the Marine Environment Against Pollution from Land Based Sources (the Montreal Guidelines) developed under the United Nations Environment Program.
4. The sewage management strategy must generally improve the environmental quality in the harbour and focus on protecting those areas of the harbour where the quality is currently good.
5. A source reduction strategy must be an integral part of any overall management scheme.
6. The sewage management strategy should provide for the control of combined sewer overflows (CSOs), which could occur during storm conditions.
7. The cost of the preferred strategy should not be more important than its effectiveness in meeting environmental quality objectives.
8. Sewage management should be one part of an overall harbour management strategy.

HHTF Recommended Environmental Quality Guidelines

The HHTF established environmental quality guidelines for the harbour based on an extensive review of existing environmental criteria and reported levels of contaminants in other urban harbours. The guidelines refer to the overall, long-term objectives for water, sediment and biota in the harbour. The HHTF also identified priority areas for environmental protection throughout the harbour and classified the harbour according to the uses and corresponding required levels of protection. They stipulated that the quality of the water in the Outer Harbour and Approaches should be high enough to support bathing and contact recreation, shellfish harvesting for direct human consumption, and fish and wildlife habitat. In the Middle Harbour and Bedford Basin, the water quality should support shellfish harvesting for human consumption after depuration, bathing and other primary contact recreational activities, and fish and wildlife habitat. The water quality in the Inner Harbour and the Narrows, the areas with the least stringent environmental quality requirements, should support boating and other recreational activities, fish and wildlife habitat, industrial cooling, and be of good aesthetic value. The diagram on page 3 illustrates the location of the harbour divisions noted above.

Considering these classifications for the harbour areas and the associated required water quality, the HHTF developed recommendations for the general outfall location and the diffuser site. Assumptions inherent in these recommendations were that the Mill Cove and Eastern Passage Plants would continue to operate, and that the

**1990
HHTF recommends
an effluent diffuser
in the Inner Harbour
in the vicinity of
George's Island**

containment approach to pollution was the responsible way to manage sewage discharges as opposed to the dispersion approach previously favoured. Using extensive modelling in different parts of the harbour, the HHTF ultimately recommended that the sewage outfall be located in the Inner Harbour and that a site northeast of George's Island be investigated for locating the diffuser.

The HHTF also evaluated the level of treatment required to protect the uses of the harbour and provide the required water quality to support those uses. It recommended primary treatment with the provision that the plant area should be of sufficient size to allow upgrading at a later date, if necessary. The HHTF did not evaluate sludge management options, but its report did identify concerns with the oil-from-sludge technology stipulated in the sub-agreement. Public comment on the technology was not favourable. Some felt that, since the federal funds were tied to the use of this technology, this could be a determining factor in the choice and location of treatment plants. The public was also concerned with the environmental impact of operating such a facility. The HHTF recommended that this issue be more fully explored in a formal environmental assessment review process.

**1990
HHTF
documents
public
concerns with
the oil-from-
sludge
technology**

HHTF Recommendations

The HHTF recommended a single, regional treatment facility but did not recommend a site. Instead, they developed site selection criteria which stipulated that:

1. the site had to be within 1.6 km of the shoreline or inside the watershed boundary.
2. the land had to be vacant or obviously underused.
3. the land area had to be at least 60 ha to accommodate a plant of at least 180,000m³/day capacity.
4. the site could be created by extending or infilling the water's edge to a maximum depth of 10 m.

**1990
HHTF
recommends
single,
regional
treatment
facility and
suggests
siting criteria**

It identified five viable sites which met the criteria: Oil Refinery Lands in Dartmouth; Woodside Industrial Park; Halifax Rail

Yards; Purcells Cove Backlands, and McNab's Island. It further recommended that HHCI provide specific information on the five sites and, in consultation with the municipalities and the public, identify criteria to be used in evaluating these sites. Also, with respect to the treatment plant, the HHTF recommended that the visual appearance of the site be given high priority and that the facility be designed, constructed and landscaped to fit with its surroundings.

1990

In all, the HHTF made eighteen separate recommendations to the provincial Minister of the Environment, one of which identified the need for a full federal-provincial environmental assessment of the entire project, including sludge management options. The provincial Minister accepted the recommendations when the report was submitted in 1990. In that same year, the Minister responsible for the Atlantic Canada Opportunities Agency (the federal funding agency and therefore the initiating department as defined in the federal Environmental Assessment and Review Process Guidelines Order) referred the project to the federal Minister of the Environment. As a result, a Joint Federal-Provincial Environmental Assessment Panel was appointed to satisfy the requirements of both the Nova Scotia Environmental Assessment Act and Regulations and the federal Environmental Assessment and Review Process. The Review Panel was mandated to conduct a public review of the proposed project to collect and treat sewage from the Halifax-Dartmouth-Halifax County areas in a regional facility. The scope of the review included all issues relating to the environmental and community impacts of the design, construction and operation of the proposed facility, the tunnels, the sewage treatment and sludge handling plant, and other ancillary structures.

Joint Federal Provincial Environmental Assessment

For the purpose of the Environmental Assessment, HHCI was identified as the Proponent. The Project was described as the construction of a single, regional sewage treatment plant on an artificial island in Ives Cove off McNab's Island, which would provide primary treatment and disinfection of treatment plant effluent.

Raw sewage would be delivered to the site by a tunnel under the harbour. The effluent would be discharged at a minimum dilution rate of 66:1 from a diffuser located west of McNab's Island. The Project also called for the diversion of overflows in the collection system to a series of approximately 16 combined sewer overflows (CSOs). These would receive preliminary treatment to remove floatables and some solids prior to discharge. The discharges from two of the CSOs, one at the Northwest Arm and another at Roach's Pond, would also be disinfected prior to release into the Northwest Arm. The Project incorporated the oil-from-sludge technology for sludge management.

In keeping with the recommendations of the HHTF, and prior to the completion of the Environmental Assessment report, the HHCI commissioned several studies to assess the suitability of the five candidate sites for locating the regional treatment plant. The studies were designed to address the technical, financial, social and environmental aspects of each site. The HHCI site assessment

1990
Project to undergo
a joint
federal/provincial
environmental
assessment

studies indicated that while the Ives Cove plant would be expensive to construct, in the long term it offered advantages over the other four because of lower operating and maintenance costs. The other sites (Woodside Industrial Park, the Oil Refinery Lands, Purcells Cove Backlands and the Halifax Rail Yards) would all involve increased pumping costs because of the need to lift the raw sewage to a higher elevation than would a plant at Ives Cove. A public opinion survey, however, indicated that a plant constructed at the Oil Refinery Lands would be acceptable.

In another study, HHCI evaluated environmental criteria for each of the five sites. These criteria addressed many aspects of site development including cost; the biophysical environment (eg. the terrestrial ecology, the marine ecology, the freshwater ecology, air quality); the socioeconomic environment (eg. land use, fisheries, historical, archaeological and cultural heritage resources, community issues, odour), and public perception. The importance of each of the components was integrated into the evaluation using weighting criteria developed primarily through public opinion surveys. This analysis also recommended the use of the Ives Cove site on McNab's Island. The Environmental Assessment report therefore focused on this site.

Directions to the EA Panel

**1990
EA Panel given
specific directions
to evaluate
environmental
and socio-
economic aspects
of the project**

The Environmental Assessment Panel (the Panel) was directed by the federal and provincial Ministers of the Environment to evaluate the environmental and socio-economic aspects of the project, focussing on the following areas:

1. a comparison of the reasonable alternatives to the proposed project, such as: no project; collection, screening and discharge to deep, offshore marine water; primary versus secondary and tertiary treatment, and outfalls in Bedford Basin, the Narrows, middle or outer Harbour or Harbour approaches;
2. community impacts associated with construction and operation of the collection system related to alteration of traffic patterns, enhanced noise levels, public safety and property protection, dust, property values, employment and maintenance;
3. community impacts associated with the construction and operation of the treatment system related to visual impact, odour, noise, aesthetics, land use, property values, public acceptance and employment;
4. implications of the Inner Harbour outfall on water quality, fish resources and current water uses;
5. the environmental effects of sludge management using the sludge-to-oil technology.

The Panel was further instructed to assess the issues of “control at source” and stormwater runoff, as well as monitoring and cultural and heritage implications.

The Review process included provisions for public involvement at a number of different stages. For example, funding was made available to three different interest groups to allow them to participate more fully in the process. In addition, the Guidelines for the preparation of Terms of Reference for the Environmental Assessment Report were developed in consultation with the public. This process was to ensure that all expressed public concerns were addressed by the proponent in its Environmental Assessment Report.

1992 - 1993

For the purposes of the Environmental Assessment, HHCI commissioned 24 separate component studies to document existing conditions and predict impacts on the terrestrial biophysical environment, the marine biophysical environment, the socioeconomic environment, and archeological and heritage resources. These studies, along with a two volume report describing the project, the existing conditions, impacts and mitigation measures were made available to the Panel and the public for comment and review on August 7, 1992. The review of the adequacy of the Report by the Panel and the technical review by the Nova Scotia Environmental Assessment Administrator began at that time. The Panel received comments from the public, government agencies and other technical specialists and, on two separate occasions asked the proponent, HHCI, to supply supplementary information before initiating the public hearings process. The information was supplied by HHCI and the Panel proceeded with scheduling the Public Hearings

Panel Hearings

The hearings were held in Herring Cove, Eastern Passage, Dartmouth and Halifax from March 22 to April 3, 1993. During this period, the Panel heard presentations from private individuals, community groups, special interest groups, and representatives from local businesses and government agencies. A public file, available for public review, was maintained throughout the process.

<p>1993 EA Panel holds public hearings</p>

Panel Recommendations

After evaluating the myriad technical and social issues, the Panel made 73 separate recommendations to the Ministers of the Environment, essentially

suggesting approval of the project subject to a number of specific conditions. One of the major considerations of the Panel dealt with the site selection process which it determined to be imperfect since the Ives Cove site was chosen by the Board of HHCI with little public involvement. Through the course of the review, the Panel asked HHCI to consider three alternative sites. It did so but came up with the same conclusion, that Ives Cove was the best choice. The Panel agreed that this site was suitable subject to certain conditions, but recommended that alternative sites be given more consideration before a final site was selected.

Project costs were another item of considerable concern to the Panel and the public. The cost of the project at that time, according to HHCI, was \$385.2 million and the available funds under the terms of the 1988 Sub-Agreement were \$195.7 million. An additional \$47.1 million could be made available from the Halifax and Dartmouth Pollution Funds accumulated from the surcharges on water consumption. This still left an estimated shortfall of \$142.4 million. The Panel therefore recommended an amendment to the funding agreement to provide adequate funds for the project.

**1993
EA Panel
identifies project
costs as a
significant
concern**

Other significant recommendations included a comprehensive controls-at-source program; cost-benefit studies for reduction in inflows and infiltration; monitoring of all private outfalls and eventual elimination of any untreated discharges; an evaluation of alternate means of effluent disinfection; sludge management using the oil-from-sludge technology, and monitoring programs to be instituted during construction and operation of the facility.

**1993
EA Panel recommends
project proceed, with
conditions**

The Panel submitted its report to the federal and provincial Ministers of the Environment and the Minister Responsible for the Atlantic Canada Opportunities Agency in July of 1993.

Federal Government Response to the Panel Recommendations

The Minister Responsible for the Atlantic Canada Opportunities Agency was tasked with preparing the federal response to the Panel report, and examined the recommendations in the context of federal responsibilities in this area. In its response, the federal government reaffirmed its commitment of \$73.4 million to the project, but stated that no more federal funds would be committed to cover the estimated cost overruns.

In summary, the federal government accepted the recommendations of the Panel and agreed to

**1993
Federal government
accepts EA Panel
recommendations**

participate in some of the initiatives suggested. For example, the federal government was prepared to participate in the development of a regional harbour management strategy; it supported and agreed to provide input to the development of comprehensive controls-at-source program; it committed to participating in a long-term monitoring and public reporting program; it agreed to participate in initiatives related to surcharges on usage; it agreed to support a review of the regulatory instruments to be applied to the project; it committed to participate fully in identifying requirements for further oceanographic work at the selected diffuser site, and it agreed to cooperate fully in an environmental effects monitoring program.

Provincial Government Response to the Panel Recommendations

1993
Provincial government accepts Panel recommendations but indicates the project will not proceed until adequate funds are committed

In the provincial Conditions of Release for the proposed sewage treatment facility, the Nova Scotia Department of the Environment stipulated that the project would not proceed until adequate funds had been committed. The province further identified a number of items which required immediate attention in order to properly implement the project once funds had been committed. These key elements included the development of a comprehensive controls-at-source program in the Halifax Harbour sewersheds; the development of a regional harbour management strategy; additional archaeological research and surveys in the Ives Cove area; subsea archaeological surveys at the diffuser location, and additional current and other physical oceanographic work at the diffuser site to refine predictions of plume behaviour and dispersal.

1994

In 1994, HHCI initiated a number of activities related to the implementation of the project, including the construction of some of the components of the proposed new system. Outfall consolidation in Halifax and Dartmouth, for example, was undertaken.

In addition, the provincial department of Municipal Affairs commissioned a study to assess privatization of the whole project. Proposals from a number of groups interested in building and operating the sewage treatment system were received but no further action was taken.

Also in 1994, a project to expand the Mill Cove Treatment Plant was initiated.

1995

In March 1995, the Subsidiary Agreement on Halifax-Dartmouth Metropolitan

Area Development expired. Consequently, there was no further possibility of accessing the funds previously committed to the sewage treatment facility, and the Project ended without the construction of the collection sewers, the treatment facility, or the sludge management plant. Later that same year, HHCI was dissolved.

1995
Subsidiary Agreement expires
and project does not proceed

SUMMARY

1749 to 1759

- Halifax and Dartmouth are founded and the area grows as a military and shipping center.

Early 1800's

- A bylaw is introduced to prohibit direct discharge of "slops" to city streets.

Late 1880's to early 1900's

- Combined sewers are constructed to service some areas.

1924

- Scientific studies identify pollution discharges to the harbour in the waterfront area from the Narrows to the Ocean Terminals on the Halifax side of the harbour and from Eastern Passage to the Narrows on the Dartmouth side.
- Thirteen sewers are discharging raw sewage to the harbour.

1956

- Halifax County stipulates that sewage to be discharged to Bedford Basin should be treated to protect the Basin water quality.
- A treatment plant at Mill Cove is recommended to treat Bedford sewage.

1960

- Halifax County recommends that sewage from the Sackville area be collected and also treated in a treatment facility at Mill Cove.
- The provincial government requires complete treatment of any discharges to Bedford Basin.
- The County begins design of a secondary facility for Mill Cove.

1969

- The city of Dartmouth installs a number of relief sewers and overflow devices to alleviate flooding problems, and recommends the construction of five sewage treatment plants for the city sewage, some to discharge to freshwater lakes.
- The provincial government stipulates tertiary treatment for any sewage discharges to fresh water lakes, and the city reconsiders its plan in conjunction with Halifax County, which was evaluating treatment options for the Eastern Passage/Cole Harbour areas.
- A secondary treatment facility is recommended for Eastern Passage.

- The City of Halifax significantly expands its boundaries and commissions a study to evaluate sewage treatment requirements.
- A secondary treatment plant to be located at Purcell's Cove is recommended.

1971

- A secondary treatment plant at Mill Cove is constructed.
- The Metropolitan Area Planning Committee considers a regional treatment facility and proposes a single, regional facility at "Hen and Chickens", a shoal off Point Pleasant Park.
- The Committee also identifies a need for additional harbour studies to establish the degree of treatment required and to evaluate the impacts of sewage discharges on water quality.

1973

- The Metropolitan Area Planning Commission is established as a corporate body pursuant to the Planning Act of Nova Scotia. MAPC includes the Minister of Municipal Affairs, the Chief Magistrates of the four municipalities and one additional elected representative appointed by each municipality.
- The mandate of MAPC is to advise the Minister of Municipal Affairs; to prepare and revise the Regional Development plan; to facilitate consultation; to assess opportunities for collective action, and to provide input to long range planning activities.

1974

- A secondary treatment plant is constructed at Eastern Passage.

1977

- The Metropolitan Area Planning Commission commissions another study on regional treatment options.
- The adverse impacts of raw sewage discharges to the harbour are documented.
- A regional primary treatment plant is recommended with an outfall to the ocean, in a location with general offshore drift.

1978

- A sludge management study determines that significant volumes of sewage sludge are being discharged to the harbour daily and recommends more economical and environmentally acceptable sludge disposal options.
- A separate study reveals that large volumes of "special waste" are also being discharged to the harbour on a regular basis.

1981

- Serious inflow and infiltration problems are identified in the sewer systems in the county of Halifax.
- The lack of a domestic waste pollution control policy is identified as a major

constraint to development in the cities of Dartmouth and Halifax and in Halifax county.

1984

- MAPC commissions a three- phase study to assess conditions in Halifax Harbour, to identify and fill data gaps, and to assemble the data necessary to design a regional sewage treatment facility.

1985

- Phase 1 of the MAPC study is undertaken to review all pertinent data related to physical oceanography, water quality, and sewage loading to the harbour.
- A water quality survey shows high fecal coliforms in the harbour, and acceptable levels of dissolved oxygen, except near sewage outfalls.

1986

- Phase 2 of the MAPC study is completed with the development of a water quality model and field testing of the model.
- Modelling studies show that there will be increased problems in the harbour if no action is taken regarding the discharge of raw sewage.

1987

- Based on the predictions of the model developed in Phase 2 of the MAPC study, the Eastern Passage treatment plant is downgraded to a primary level of treatment.
- Phase 3 of the study is completed and a single, regional primary sewage treatment plant is recommended at Sandwich Point.

1988

- The four municipalities agree in principle with the concept of a single, regional sewage treatment plant and also agree that an assessment of the environmental impacts of the effluent from the proposed plant on the Herring Cove fishery must be conducted.
- The Halifax Harbour Cleanup Review Committee is established to review public concerns with the Sandwich Point site.
- The Canada-Nova Scotia Subsidiary Agreement on Halifax-Dartmouth Metropolitan Area Development is signed, committing funds to the construction of a regional sewage treatment facility incorporating an oil-from-sludge plant.

1989

- The Halifax Harbour Task Force is commissioned to develop environmental quality guidelines and objectives for uses of Halifax Harbour.
- Halifax Harbour Cleanup Inc. is established to undertake all activities related to the pre-design, design and construction of the regional sewage treatment

facility.

- A sludge lagoon is constructed at the Aerotech Industrial Park and sewage sludge from the existing treatment plants in Halifax County is disposed of there.

1990

- Halifax Harbour Task Force (HHTF) recommends a containment approach to sewage management and suggests that the outfall from any regional plant be located in the Inner Harbour.
- The HHTF documents significant public concerns with the recommended Sandwich Point site and with the oil-from-sludge technology.
- The HHTF recommends a single, regional treatment facility, and puts forth siting criteria to be used in the selection of the site for the facility.
- The Project to construct a regional sewage treatment facility is referred to a joint federal/provincial environmental assessment panel.
- The Panel is given specific instructions to evaluate environmental and socio-economic aspects of the construction and operation of a primary sewage treatment facility to be located on an artificial island in Ives Cove off McNab's Island.

1991 to 1993

- The Project Proponent, Halifax Harbour Cleanup Inc. (HHCI) documents the existing conditions, predicted project impacts, and mitigation measures associated with project construction and operation.

1992

- HHCI submits its Environmental Impact assessment reports to the EA Panel.

1993

- The Panel convenes public hearings on the Project.
- The Panel prepares its report after evaluating all project documentation and assessing public input.
- The Panel recommends that the Project proceed, with conditions.
- The federal and provincial governments accept the Panel report and agree with its recommendations.
- The provincial government stipulates that the Project will not proceed until adequate funds are committed. (The Subsidiary Agreement committed \$195.7 million to the Project. Another \$47.1 million was available from the Halifax and Dartmouth Pollution Funds. The estimated cost of the Project was, however, \$385.2 million.)

1994

- HHCI undertakes consolidation of outfalls in Halifax and Dartmouth.

- The provincial government commissions a study into privatization options for the project.

1995

- The Subsidiary Agreement expires and the Project does not proceed.
- HHCI is dissolved.

GLOSSARY

Aerobic - life or processes that depend on the presence of oxygen

Anaerobic - life or processes that can occur without free oxygen

Anaerobic Digestion - the biochemical decomposition of organic matter in the absence of oxygen. Digestion of sewage sludge occurs in tanks where it breaks down into gas, liquid and mineral matter

Bacteria - single-celled microorganisms, some of which assist in pollution control by breaking down organic matter in air and water

Biochemical Oxygen Demand (BOD) - the dissolved oxygen required to decompose organic matter in water. It is a measure of pollution because heavy waste loads have a high demand for oxygen

Chemical Oxygen Demand (COD) - a measure of the oxygen required to oxidize all compounds in water, organic and inorganic

Clarification - the clearing that occurs during waste water treatment when solids settle out. The process can be aided by centrifugal action and chemical coagulants

Clarifier - a settling tank where solids are mechanically removed from wastewater

Coliform index - a rating of the purity of water based on a count of fecal bacteria

Coliform organism - organisms found in the intestinal tract of humans and animals. Their presence in water indicates pollution and potentially dangerous bacterial contamination

Combined Sewer - a sewer that carries both sewage and stormwater runoff

Depuration - the process of cleansing or purifying

Dilution ratio - the relationship between the volume of water in a stream and the

volume of incoming waste. It can affect the ability of a stream to assimilate waste

Disinfection - a chemical or physical process that kills organisms that cause infectious diseases. For example, some form of chlorine is often used to disinfect sewage treatment effluent. Other methods such as ozone or ultraviolet treatment are available but are more expensive than straight chlorination

Dissolved Oxygen - a measure of the amount of oxygen in a given amount of water. Adequate levels of dissolved oxygen are necessary to support aquatic life. Low dissolved oxygen can result from inadequate waste treatment

Ecosystem - the interacting system of a biological community and its nonliving surroundings

Effluent - waste material discharged into the environment, treated or untreated

Estuary - an area where freshwater meets salt water (bays, mouths of rivers, salt marshes, lagoons)

Fecal coliform bacteria - organisms associated with the intestines of warm-blooded animals that are commonly used to indicate the presence of fecal material and the potential presence of organisms capable of causing human disease

Floatables - materials such as household fats and oils, soaps, industrial wastes, plastics and so on. These materials will collect at outfall locations and form aesthetically unpleasant scums on the water and nearby objects

Heavy metals - metallic elements such as mercury, chromium, cadmium, arsenic and lead, with high molecular weights. They may damage living organisms at low concentrations and tend to accumulate in the food chain

Infiltration - entry of groundwater into a sewer system from outside sources through defective pipes, pipe joints, connections or manhole walls

Interceptor sewers - collection system connecting main and trunk sewers with the wastewater treatment plant. In a combined sewer system, interceptor sewers may permit some untreated sewage to flow directly into receiving waters to prevent overloading of the plant during high flows

Microorganism - microscopic plants or animals invisible to the naked eye, e.g., bacteria, viruses, and some fungi

Monitoring - periodic or continuous sampling to determine the level of pollution

Nutrients - elements or compounds essential to growth and development of living things

Organic - referring to or derived from living organisms. In chemistry, any compound containing carbon

Outfall - the place where effluent is discharged into receiving waters

Pathogen - any virus or other microorganism such as bacteria, which cause disease

pH - a measure of the acidity or alkalinity of a material. pH is represented on a scale of 0 to 14, with 7 being neutral, 0 most acid and 14 most alkaline

Plankton - tiny plants or animals that live in water

Plume - the rising discharge of treated effluent from a treatment plant outfall pipe

Pretreatment - the reduction of pollutants in wastewater prior to discharge and treatment in a municipal system

Primary treatment - the first stage of waste water treatment in which floating debris and solids are removed by screening, flocculation and sedimentation

Pumping station - a machine installed on sewers to force the sewage uphill. In most sewer systems waste water flows by gravity to the treatment plant

Receiving waters - waterways such as streams, rivers, lakes or oceans into which wastewaters or other effluents are discharged

Secondary treatment - biochemical treatment of wastewater after primary treatment. Secondary treatment can be accomplished by a wide variety of mechanical, chemical and biological processes, and results in the removal of up to 90% of suspended solids and oxygen demanding substances

Sewage - human body wastes and the wastewater produced by residential, commercial and industrial establishments

Sewage sludge - the solids and precipitates separated from municipal sewage and liquid industrial wastes

Sewer - a channel or pipe that carries waste water and stormwater runoff from the source to a treatment plant or receiving water. Sanitary sewers carry household and commercial waste, while storm sewers carry runoff from rain and snow. Combined sewers are used for both purposes

Sewershed - the area served by a sewer system

Tertiary Treatment - advanced cleaning of wastewater that goes beyond the secondary stage. It removes nutrients such as phosphorus and nitrogen and most suspended solids

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