



Compendium of Monitoring Activities Conducted at Disposal at Sea Sites in 1999

Disposal at Sea Program

Environment Canada
Marine Environment Division

June 2000

Summary

This compendium provides an overview of monitoring results which became available by the end of 1999.

On the Atlantic Coast, a geophysical study at a site near Liverpool Harbour provided information on sediment transport and site stability. As well a review of the historical bathymetry data of Depot D was conducted to examine that site's stability.

On the Pacific Coast, sediment characterisation work examined the presence of contaminants at the Point Grey disposal site. Video and side-scan sonar examined the deposition of sediments at Point Grey.

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Introduction

Canada is a maritime nation. It possesses 243,790 km of coastline, the longest of any nation in the world, and has a vital interest in preserving a healthy marine environment. Though by world standards the Canadian maritime environment is relatively uncontaminated, Canada's territorial waters do have some problems, especially in harbours, estuaries and near shore areas.

Canada regulates disposal at sea through a permit system under the *Canadian Environmental Protection Act*. This is one of the measures in place to protect Canada's marine environment and meet our international obligations on preventing of marine pollution by disposal at sea, set out in the *London Convention 1972* and the *1996 Protocol to the London Convention*.

Each year, long-term monitoring is conducted at representative disposal sites. In order to respond to Canada's national and international reporting obligations, this National Compendium of Monitoring Activities, based on regional reports, is produced annually.

The Role of Monitoring

Disposal site monitoring allows clients continued access to suitable disposal sites by helping to ensure that the permit conditions were met. It verifies that assumptions made during the permit review and site selection process were correct and sufficient to protect the marine environment and human health.

Monitoring also plays a critical role in reviewing the overall adequacy of controls. Information compiled nationally or regionally over time provides the basis to assess whether the disposal at sea regulatory controls, guidelines and permit conditions are adequate to protect the marine environment and human health.

Experience gained with monitoring may also point to the need for research to develop better monitoring tools, or to refine the monitoring program, on specific environmental, health or public concerns. It is also expected that monitoring will uncover gaps in our understanding of impacts, particularly in the area of cause and effect relationships.

Disposal Site Monitoring provides for:

- *Maintaining access to suitable sites*
- *Assessing permit decisions*
- *Reviewing adequacy of controls*
- *Identifying research and development needs*

Annual meetings with clients and other interested parties will provide additional comments on past monitoring and better indication of Regional priorities for future assessments.

Conducting Monitoring Studies

Monitoring a disposal at sea site involves an assessment of its physical, chemical and biological features. The impact hypotheses of permit reviews form the basis of subsequent monitoring.

Physical monitoring relates to the collection of relevant geological information for determining the area of deposition, delineating the disposal site boundaries, studying the accumulation of dredged material within the area of deposition, and documenting evidence of sediment transport from the disposal site.

Biological and chemical assessments are undertaken concurrently and the monitoring design for these parameters takes into account the size and dispersal characteristics of the site. Chemical monitoring is aimed at measuring the levels of chemicals in sediments. Biological monitoring is primarily centred on biological testing in the laboratory and benthic community surveys.

Data interpretation of chemical and ecotoxicological data relies primarily on criteria employed during the permit assessment phase. When possible, data interpretation also takes into account comparisons with spatial and temporal controls, however baseline data at historical sites is generally lacking. Core parameters also include total organic carbon (TOC) and grain size to support data interpretation.

Sediment Chemistry

Determination of sediment quality currently uses national screening levels presented in Table 1. Environment Canada is

Table 1. National screening levels for chemicals in sediments (mg/kg, dry weight)

Chemical	Current Level	Interim SQG
Cadmium	0.6	0.7
Mercury	0.75	0.13
total	0.1	0.021
PCBs		
total	2.5	by PAH
PAHs		

considering a proposal to replace the current screening levels with sediment quality guidelines or SQGs. In either case, the following rules are applied for any contaminant concurrently with bioassays:

- if the observed values are below the national screening level, the disposal site sediments are considered harmless for the parameter measured,
- if the observed values are above the national screening level, further determination of sediment quality is based on the concurrent biological measurements,
- if there are clear spatial patterns of contamination or biological responses, or both, stratification of the study area can be considered for further monitoring and making further determinations of sediment quality.

For any specific contaminant, if some values are above and some below the national level, the upper 95% one-sided confidence limit on the mean concentration is calculated and the sediments are considered clean of the contaminant, if this 95% upper confidence limit is less than the national screening level. Given this, sediment chemistry concentrations are recommended to be presented as the upper 95% one-sided confidence limit or 95% U.C.L.

Biological Testing

Protocols currently used for sediment assessment include:

- an acute toxicity test using marine or estuarine amphipods (the end point is lethality);
- a fertilization assay using echinoids (the endpoint is significant reduction in fertilization);
- a toxicity test using a photoluminescent bacteria, the *Microtox*® solid-phase test (the end point is significant reduction in bioluminescence);

- a bedded sediment bioaccumulation test using the US-EPA guidance manual (the end point is significant bioaccumulation).

Table 2. Interim Pass - Fail criteria for Biological Testing

Test	Failure	Survival in reference sediment	Survival in control sediment
Amphipod 10 day acute test	Species		
	<i>Amphiporeia virginiana</i>	≥ 70 %	≥ 80 %
	<i>Eohaustorius washingtonianus</i>	≥ 75 %	≥ 85 %
	<i>Eohaustorius estuarius</i>	≥ 80 %	≥ 90 %
	<i>Rhepoxynius abronius</i>	≥ 80 %	≥ 90 %
	The mean 10 day survival is more than 20 percent lower than that in the reference sediment.* If there is no acceptable reference sediment, the test will fail if the mean 10 day survival is more than 30 percent lower than that in the control sediment.*		
Microtox® solid-phase	The concentration of sample that is estimated to cause 50% inhibition of light production by the bacteria after 5 minutes of exposure is less than 1000 ppm .		
Echinoid fertilizaion	A decrease in fertilization of at least 25% is observed between the test sediment and control water. *		
Bioaccumulation	A statistically significant difference in the tissue concentrations of a toxicant is observed between the organisms exposed to the test sediment and the organisms exposed to the reference sediment.		
* The observed difference must be statistically significant.			

Integrative Assessment

If sediments are below national screening levels for contaminants and pass all bioassays, no further action is required. However, if levels of contaminants or bioassay results demonstrate cause for concern then the first step is to verify compliance with the terms of the permits issued since the site was last monitored.

The second step will generally involve checking potential sources of pollutants and conducting further site characterization. After considering this information, the following hierarchy of interpretation guidance can be applied to the concurrent chemical and toxicological data:

1. if sediments at the disposal site contain substances in excess of national screening levels, pass the acute toxicity test, but fail one sublethal or bioaccumulation test: consideration could be given to modifying further use of the

site and investigating the long term stability of the material onsite;

2. if the sediments contain substances below the national screening levels, yet fail any of the biological tests, then further investigation would be required to determine if this is the result of either a confounding factor such as laboratory anomaly, or the presence of a contaminant not included in the chemical screening; or
3. if the sediments contain substances in excess of the national screening levels and either fail the acute test or fail two (or more) additional tests including the sublethal tests and the bioaccumulation test: further monitoring, site closure or remediation could be considered.

As well, cursory benthic community surveys can be used as a general sediment quality indicator. The overall assessment of the disposal site considers all available information from physical, chemical and biological monitoring.

Intensity of Monitoring

Monitoring at every disposal site is not considered necessary, as current knowledge of impacts related to disposal of dredged material allow for good assessments to be drawn from representative disposal sites. In addition, the program attempts to ensure that the major sites (>100 000 m³ of dredged materials) are monitored on at least a five year cycle. For other material types, the need and planning for monitoring are established on a case-by-case basis.

Reporting

Canada's Disposal at Sea Program is administered through regional offices which

Environment Canada's Regional Offices

Atlantic Region

Disposal at Sea Program
Environmental Protection Branch
Environment Canada
Queen Square, 45 Alderney Drive, 4th floor
Dartmouth, Nova Scotia B2Y 2N6

Quebec Region

Disposal at Sea Program
Environmental Protection Branch
Environment Canada
105 McGill Street, 4th Floor
Montreal, Quebec H2Y 2E7

Prairie and Northern Region

Disposal at Sea Program
Environmental Protection Branch
Environment Canada
5204 - 50th Avenue, Suite 301
Yellowknife, Northwest Territories X1A 1E2

Pacific and Yukon Region

Disposal at Sea Program
Environmental Protection Branch
Environment Canada
224 W. Esplanade Avenue
North Vancouver, British Columbia V7M 3H7

Impact hypotheses derived during the permit application review constitute the logical foundation for any subsequent monitoring. Monitoring of disposal sites receiving dredged materials generally relates to the same concerns:

- ▶ acute and chronic effects on biota,
- ▶ habitat destruction and unacceptable impacts on invertebrates and fisheries,
- ▶ contamination of edible fish and shellfish,
- ▶ protection of sensitive areas, conflicts with other legitimate uses of the sea

A tiered monitoring scheme and core parameters allow for addressing these concerns in a cost-effective fashion, while taking into account site-specific and permit-specific information.

are largely responsible for the permit review process, as well as for planning, conducting and reporting on monitoring studies undertaken in their administrative areas.

This compendium, based on regional detailed reports, is now produced annually to respond to Canada's national and international reporting obligations. Readers may request detailed information on any of the monitoring activities in this compendium, from the appropriate regional office.

Guidelines and Guidance

In 1998, the *National Guidelines for Monitoring Dredged and Excavated Material at Ocean Disposal Sites* were finalised by the Disposal at Sea Program. These guidelines, which incorporate physical, chemical, biological testing and data interpretation, replace the 1993 interim guidelines and reflect the outcomes of expert workshops and field testing at the Point Grey and Cap-aux-Muels disposal sites. Monitoring studies will be carried out in accordance

with the guidelines.

To support the National Guidelines, two technical guidance documents are available. The *Technical Guidance for Physical Monitoring at Ocean Disposal Sites* provides detailed information on geological surveying methods and sediment transport models. The *Technical Guidance for Biological Monitoring* covers tools for biological monitoring at disposal sites. The guidance on chemical and toxicological characterisation of sediments developed for assessment of sediments at dredged sites is also employed at disposal sites.

Canada is implementing guidelines so that monitoring activities are:

- cost-effective and nationally-consistent,
- get comparable results, and
- have fair and consistent information

Monitoring at Disposal at Sea Sites in 1999

This compendium concentrates on monitoring results which became available by the end of 1999. In some cases, only preliminary data were available and an expected completion date is provided. Regional offices should be contacted for final site monitoring reports.

Details on previous monitoring studies are provided in historical compendia.

Overview of 1999 Activities

The activities undertaken in 1999 reflect both national and regional issues. While monitoring at these sites sought to address site specific concerns, the insights applied to similar situations elsewhere.

On the Atlantic Coast, a geophysical survey for a major site near of Black Point, New Brunswick, was undertaken to look at the stability of the site and determine if there is any risk to nearby resources. As well, historical bathymetric data from Depot D in Quebec was examined to determine the site's long-term stability.

On the Pacific Coast, sediment characterisation work was conducted at Point Grey in British Columbia which receives the largest volume in Canada. As well, a side-scan sonar survey of the wider area surrounding the Point Grey disposal site (100 km²) was conducted.

Findings of 1999 Activities

Monitoring disposal at sea sites in 1999 has allowed sites to be managed so that disposal at sea continues to be an environmentally acceptable and practical management option. Highlights of new information from 1999 activities include.

Atlantic Region

- *The net deposition at the Black Point Disposal Site between the 1959 and 1999 surveys was calculated to be 4,330,962 m³.*
- *There are indications of mobilization at Black Point, data has shown that some material has moved forming a series of slumps that extend about 1.5 km south of the disposal site.*

Quebec Region

- *Bathymetric measurements at Depot D in the Magdelan Islands from 1982 to 1998 indicate that the sediments are very mobile because of a wider process in the area.*
- *This material appears to have migrated to the west of Depot D into an area of known lobster habitat.*
- *Future disposal activity at Depot D would be permitted only if the permit applicant demonstrates that the sediment resuspension has no significant impacts on the near-by environment.*

Pacific and Yukon Region

- *At Point Grey, there is evidence of material being deposited outside of the site boundaries but no indications of sediment transport.*
- *The issue should be addressed by examining (1) the accuracy of positioning procedures and equipment and (2) effects of water column currents during the descent of the material.*

Future Directions

The questions raised in from 1999's work will need to be addressed in succeeding years. Work is planned to further examine sediment mobility patterns at Blackpoint and Point Grey.

New emerging issues are driven by both public concern and questions raised by research. Future activities will also consider the incidence of new contaminants of concern such as tributyl tin (antifouling paints) and nonylphenols (a class of endocrine disruptors).

Geophysical Assessment of Black Point Disposal Site, Saint-John Harbour, New Brunswick

Previous studies

A three-year disposal site monitoring program was conducted by Environment Canada between 1992 and 1994 to assess the physical, chemical, and biological impacts of dredged spoil disposal activities at the Black Point Disposal at Sea Site located off Saint John Harbour, New Brunswick. The results of the study indicated that, in spite of the high energy environment, past disposal activities had resulted in a significant build-up of dredged material within a 1.5 kilometre radius of the disposal site buoy. Chemical and biological impacts were determined to be at acceptable levels and it was concluded that the continued use of the Black Point site for future dredge disposal operations was warranted.

Following completion of the above study Environment Canada received complaints from local fishers who believed, based on their observations, that disposal activities at Black Point were altering fish habitat in areas outside the disposal site boundaries. The fishers wanted studies conducted to supplement the 92-94 study and specifically wanted to address off-site impacts. To address this issue Environment Canada initiated a second multi-year study at the site. The first phase conducted in 1999 was designed to collect historical information on physical changes at the site, to collect additional geophysical data to complement that collected during the 1992-94 study, and to collect seafloor photographs to assess the presence/absence of benthic macrofauna. The primary objective of the surveys was to test the hypothesis that:

There has been no significant accumulation of dumped material outside the footprint of the disposal site as defined by the 1992 - 1994 study.

Recent Data

Geophysical equipment used during the survey consisted of a Simrad MS992 dual frequency (120 and 330 kHz) sidescan sonar system using a neutrally buoyant towbody, a IKB Seistec sub-bottom profiler, and a 13 channel Navitronics sweep bathymetry system. A multibeam bathymetry survey was performed over the centre of the dumpsite. Sediment samples were taken with a vanVeen sampler and a small gravity corer to provide groundtruth for the interpretation of the sidescan sonar and sub-bottom profiler data.

Data from several previous bathymetry surveys and one multi-beam survey were obtained and imported into a GIS system. A sidescan sonar mosaic generated from data collected during the 1992-94 study was scanned digitally, geographically referenced, and imported into the GIS system to allow direct comparison with other geophysical data.

Approximately 200 photographs were taken with an "Icehole" camera developed by the Geological Survey of Canada-Atlantic. Images were digitized and analyzed to determine the abundance and type of marine life in the area, in particular infauna and suspension feeders.

Conclusions

Preliminary analysis of geophysical and multibeam bathymetry data from the disposal site has shown that material dumped at the site has moved forming a series of slumps that extend about 1.5 km south of the disposal site. (Figure 1.) The footprint of the disposal site as defined by the 1992-94 study has remained basically the same. The results of the 1999/2000 study also indicated that prominent small scale features, such as evidence of dredged spoils present in the 1992-94 study, were no longer visible and that these features may have been buried by recent sediment deposition. Detailed analysis of the sidescan sonar data from the base of the disposal site footprint showed active bedforms suggesting sediment transport in the area.

Analysis of the data from the bathymetric survey collected for this study and from four previous surveys indicated continuous accumulation of dredged material at the disposal site. The data from bathymetry surveys in 1999 and 1959 were used to calculate the changes that have occurred on the seafloor at the disposal site over the 40 year period. The 1999 data show an accumulation of 5,801,231 m³ of material with a maximum height, relative to the 1959 surface, of approximately 13.7 metres. A small amount of erosion--1,470,268 m³ of material with a maximum height difference of -2.7 metres--has occurred in areas around the disposal site centre. Net deposition

between the 1959 and 1999 surveys was calculated to be 4,330,962 m³.

Follow Up

A preliminary analysis of the seafloor photographs collected at the disposal site, and at control sites in deeper water, show a decrease in turbidity and increase in the diversity and abundance of fauna with an increase in water depth. Bioturbation features and megafauna are more abundant at control sites outside the disposal site than near the disposal site. The significance of these observations will be addressed in subsequent work at the site.

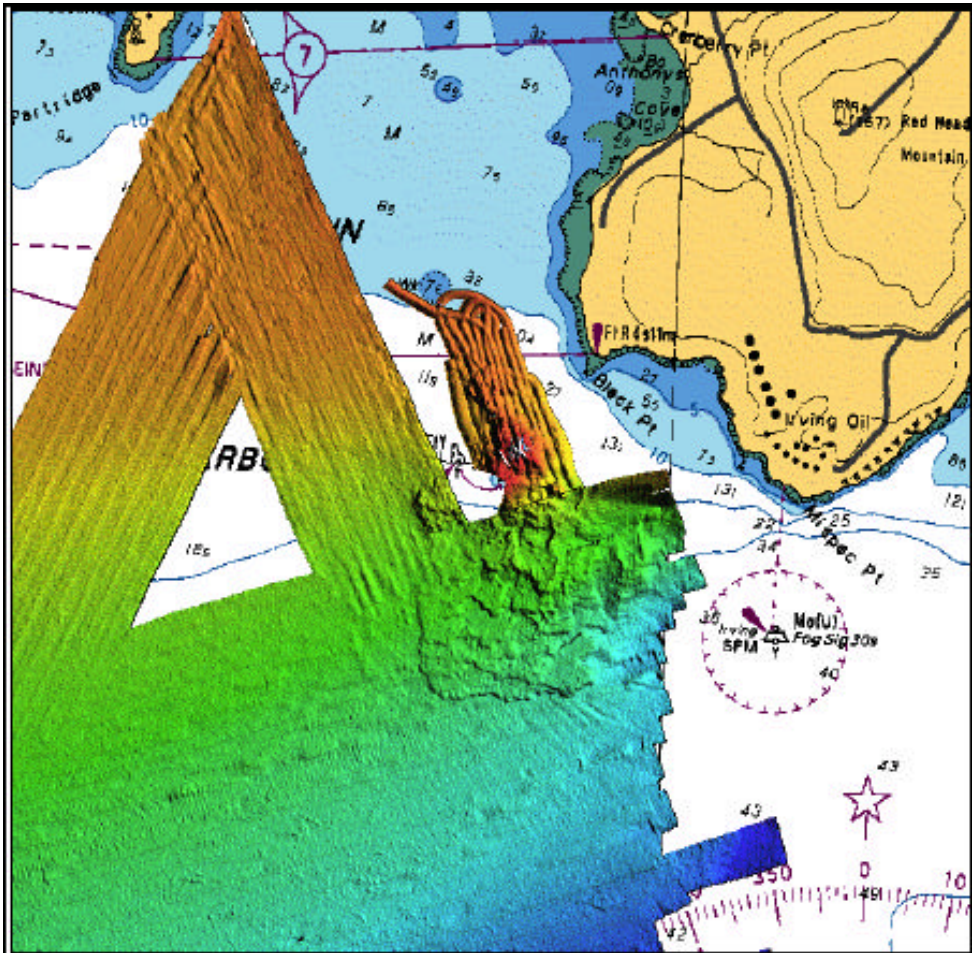
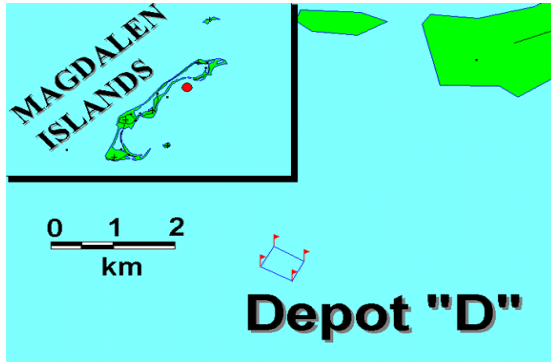


Figure 1. Coloured shaded relief image generated from multibeam bathymetry data collected in 1994 with a small section of data collected in 1999 from directly over the disposal site. The disposal site is visible near the centre of the image. The heavily textured area south of the site has been interpreted as a slump failure of the disposal mound.

Physical Assessment of Depot D, Magdalen Islands.



Depot "D" Disposal Site Quick Facts

- Type of material disposed: **Dredged Material**
- Location: **region bound by:**
 47°31.17' N, 61°36.29' W
 47°31.37' N, 61°36.12' W
 47°31.22' N, 61°35.73' W
 47°31.02' N, 61°35.89' W
- Depth: **12 m**
- Reason for monitoring: **The site is near lobster habitat and concern has been expressed about its stability and contribution to observed sedimentation of lobster habitat.**
- Hypothesis: **Bathymetry data from 1982 to 1998 was expected to indicate that (1) the disposed dredged material is remaining within the site boundaries and thereby (2) poses no risk to lobster habitat.**
- Use: **Received quantities in 1980-1982 totalling 565,000 m³, in 1992 totalling 610,000 m³, and in 1997 totalling 192,487 m³ from channel dredging operations.**

Previous Studies

Physical monitoring was conducted in 1979, 1989, 1990, and 1991 to examine sediment deposition, delineate the boundaries of the site and compile geological data. Sediment chemistry of the Grande-Entrée channel, the source of the dredged material, from 1979 to 1997 found contaminants to be below screening levels and were acceptable for disposal at sea.

In 1997, monitoring examined sediment chemistry and biological responses from the

sea urchin test, the Microtox[®] test and the *in situ* exoenzyme activity test. As well the benthic community structure was studied for evidence of pollution related impacts. The results found that contaminants were below screening levels, there was no attributable toxicity, and the benthic community appeared unaltered.

Although the sediment quality was found to be acceptable, concerns have been expressed regarding the stability of the site and its effect on local sedimentation processes that were impacting lobster habitat.

Recent Data

In 1999, historical bathymetric data from surveys completed from 1982 to 1998 were compiled and converted to a common coordinate system (NAD 83, Transverse Mercator Projection). Computer analysis with "Land Development Desktop" software examined the differences in the bathymetric data over time.

Conclusions

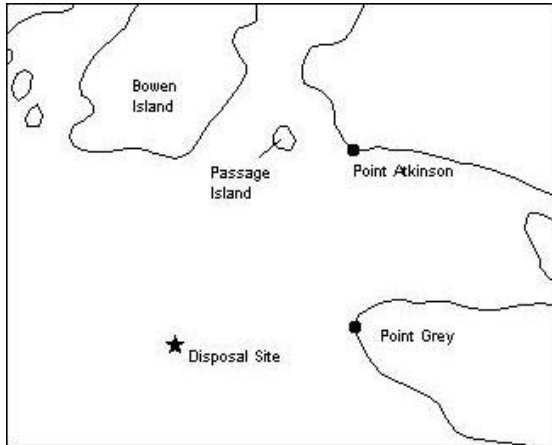
The available data from 1982 to 1998 indicate that sediments at Depot D are very mobile. Although the data do not permit precise quantification of transported sediment, most of the disposed sediment does not appear to have remained within the site boundaries over the long term -refuting the first impact hypothesis.

The material appears to have migrated to the west of Depot D into an area of known lobster habitat. The data indicate that the entire site is under constant erosion from 1982 to 1998 as part of a wider process occurring throughout the surrounding area. As the precise amount of material is not known relative to the natural process, the question of impact of Depot D remains inconclusive.

Follow Up

Given the possible impact to nearby lobster habitat, future disposal activity at the site would be permitted only if the permit applicant demonstrates that the sediment resuspension has no significant impacts on the near-by environment. To achieve this, the applicant has two options (1) quantify the impacts or (2) select a new site.

Physical Assessment and Sediment Chemistry at Point Grey Disposal Site



Point Grey Disposal Site Quick Facts

- ** Type of material disposed: **Dredged and excavated material**
- ** Location: **49°15.40'N, 123°22.10'W**
- ** Depth: **210 m**
- ** Reason for monitoring: **Assess conditions at the largest disposal at sea site in Canada.**
- ** Hypotheses: **(1) Disposal of dredged and excavated material does not result in a significant increase in trace contaminant levels in the sediments on site and (2) transport of material outside the disposal site boundary is not occurring.**
- ** Use: **Multi-user site receiving over 450,000 m³ each year. In 1999, this amounted to 460,000 m³ of woodwaste and river silt from channels in the Port of Vancouver and forest industry ports in the Fraser River, as well as clean excavation materials from the British Columbia lower mainland.**

Previous Studies

Each year, Point Grey receives more disposed material than any other site in Canada. Given this it has been examined in various studies since 1988 to date. Chemical concentrations in sediments found in these studies did not exceed screening levels.

Monitoring was conducted in 1996 to determine if disposal at sea activities were influencing the disposal site area. Side scan sonar images of the entire Point Grey disposal

site were recorded to determine the relationship between the material disposed on site and the bathymetry of the site floor, as well as to confirm that the disposed material remained within the site boundaries.

In 1997, video images of the Point Grey disposal site were recorded using a remotely operated submersible, ROPOS (Remotely Operated Platform for Ocean Science). As well, a comprehensive sidescan survey was completed encompassing the Point Grey disposal site and surrounding area, which goes beyond the 1996 work. Analysis of surface sediment samples collected in 1997 found no chemical concentrations in excess of screening levels.

In 1998, through a partnership with the Pacific Geoscience Centre, side-scan sonar work at Point Grey was conducted to delineate over 100 km² area. As well, 41 stations of mudgrabs taken and video was recorded with computer-captured still images of benthic conditions at disposal site using ROPOS. No exceedances of national screening limits were found.

A major difference was found in grain size between the Point Grey disposal site and its surrounding area. While video records confirm that material sent for disposal is remaining in place, the side scan sonar indicates that some of the material is being deposited outside of the defined disposal site boundaries.

Recent Data

In September 1999, an acoustic seabed classification system was tested. The survey included the disposal site and surrounding area, covering approximately 36 square nautical miles.

Following processing, the data will be overlaid on the sidescan mosaics of the same area. Initial observations indicate that the method may provide cheaper, quicker and less cumbersome physical sediment characterization than sidescan.

As part of a physical monitoring program, ROPOS was deployed at the Point Grey disposal site. The remotely operated vehicle (ROV) is used to observe the benthic condition of the disposal site

and surrounding area. In addition, information on the area of deposition of materials, and physical characteristics of sediment in and around the disposal site boundary can be gathered from ROPOS video. Predetermined track lines were plotted over the disposal site and continuous video images were recorded. Computer-captured still images (transferred to slide and CD ROM) were also collected.

In September 1999, surface sediment samples were collected from 17 stations within Point Grey disposal site and 8 stations in the surrounding area, outside the disposal site boundary. The samples were analysed for trace metal concentrations and particle size distribution. No chemical concentrations exceeded the national screening limits. This data will also be used to supplement the acoustic profiling.

Conclusions

The evidence supports the impact hypothesis that there is no sediment transport. The issue of material being deposited outside of the site boundaries should be addressed by examining (1) the accuracy of positioning procedures and equipment and (2) effects of water column currents during the decent of the

material. Both of these issues should be considered in future permit evaluations.

Alternatively, as no significant chemical impact is evident for the general area, redefining a larger site boundary on the sea floor could be considered. If a larger site boundary is adopted, existing sampling stations would need to be redistributed and further sampling stations may need to be considered. The current site boundary on the water surface would remain in place, for vessel traffic safety reasons.

Follow up

A report from the Pacific Geoscience Centre is being prepared. As well, a technical report is being prepared that presents sidescan sonar data with the chemical data. The pictures and video from the ROPOS surveys will be edited and compiled for technical and general presentations.

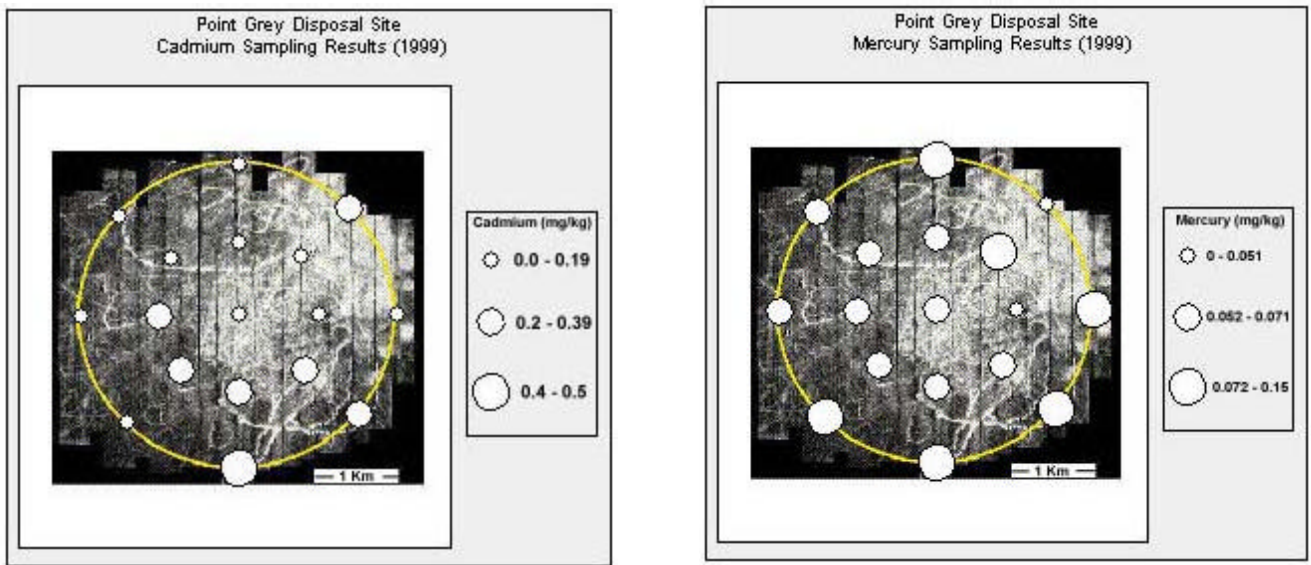


Figure 2. Distribution of sediment concentrations (mg/kg) of cadmium and mercury at the Point Grey Disposal Site overlaid over its sidescan sonar mosaic. No concentrations exceeded national screening limits

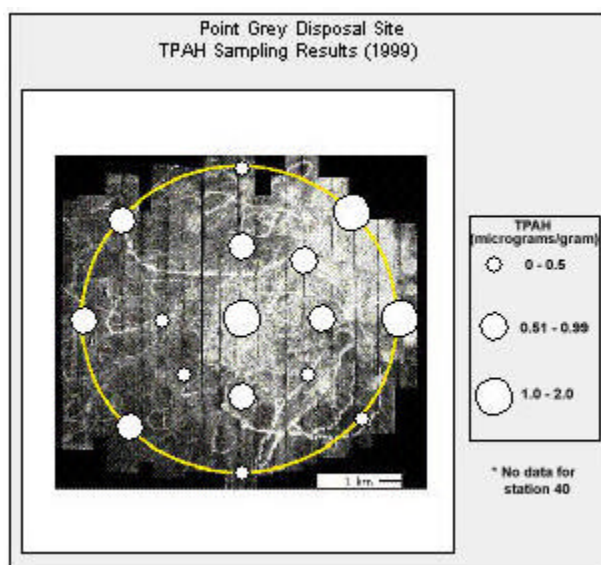


Figure 3. Distribution of sediment concentrations (mg/kg) of total Polynuclear Aromatic Hydrocarbons (tPAH) at the Point Grey Disposal Site overlaid over its sidescan sonar mosaic. No concentrations exceeded national screening limits

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Appendix 1. 1999-2000 Monitoring Costs for the Disposal at Sea Program

In March 1999, pursuant to Treasury Board policy on cost recovery, Environment Canada introduced a monitoring fee of \$470 per 1000m³ of dredged or excavated material. This was to cover the cost of disposal site monitoring. Part of Environment Canada's commitment to the regulated community was to provide an annual summary of revenues and expenditures related to disposal site monitoring. The figures below represent the first year of cost recovery and show a net cost to the government of \$629,000, largely due to permittees undertaking their disposal before the fees were put in place. It is anticipated that future revenues will more closely match expenditures. It should be noted that the figures below represent direct costs only and do not include indirect costs of government.

Regional Expenditures 1999-2000	
Atlantic	\$ 187,000
Quebec	\$ 124,000
Pacific and Yukon	\$ 192,000
Sub Total	\$503,000
In-kind support from OGDs	\$ 361,000
Total monitoring costs	\$864,000

Resources Recovered 1999-2000	
Monitoring Fees	\$ 235,000
Net cost to government	\$629,000
Net cost to Disposal at Sea Program	\$268,000
