

Burrard Inlet Sediment Core Contaminant Profiles

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Burrard Inlet Environmental Action Program (BIEAP)

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Abstract

Analyzing contaminant levels in sediment cores provides a cost-effective method to assess historical trends where limited or no surface sediment trend data exists. *Contaminant* refers to the United Nations Joint Group of Experts on Scientific Aspects of Marine Pollution (GESAMP) definition: an artificial increase above background (not necessarily harmful). Given limited surface sediment monitoring data for Burrard Inlet, sediment core samples were taken from 4 of 6 sub-basins in Burrard Inlet (Outer Harbour, Inner Harbour, Port Moody Arm and Indian Arm) to show temporal changes in selected contaminants. A station within each sub-basin was located where previous sediment transport studies identified total depositional areas. Two types of sediment coring devices were used to obtain samples. A box corer was used to obtain up to a 50 cm core sample. A benthos gravity corer was used to obtain the deepest sample possible to try to estimate background levels.

Full box core samples were obtained at the stations in the Outer Harbour, Port Moody Arm and Indian Arm (i.e. 46-51 cm cores). Benthos gravity core sample depths ranged from 152-185 cm for these three areas. By comparison, the Inner Harbour was the most difficult area to sample and full samples could not be obtained by either corer (i.e. 22 cm for the box corer; 52 cm for the gravity corer). Several coring attempts emphasized the more dynamic nature of this basin relative to the other sites.

Sediment samples were extracted at regular intervals along the core profile to date the sediments and estimate sedimentation rates (^{210}Pb and ^{137}Cs). Samples were also taken to analyze for metals, hydrocarbons, stable lead isotopes, organic carbon, C/N ratio, stable carbon isotope composition ($\delta^{13}\text{C}$) and particles size at each core interval.

Sedimentation rates at the four Burrard Inlet core stations ranged from 0.08-0.52 g/cm²/yr. The Outer Harbour station showed a distinct enrichment of Cu along the core profile. Organic carbon levels were similar but terrestrial sources decreased in more recent sediments. The Inner Harbour core was difficult to interpret because the expected lowest ^{210}Pb activity did not occur at depth which therefore suggested an influx of older sediments e.g. dredged material. Particle size distribution also varied throughout the core. Overall, Cu levels showed enrichment. Ag, Cu, Pb, Zn, Hg and organic carbon from terrestrial sources increased in the Port Moody Arm core. A sudden drop in ^{210}Pb activity at depth suggested a dump of old material (e.g. dredged material) to this site also. The Indian Arm core recorded enrichment then decline in Pb and Zn. It also showed a period where slumping may have occurred.

This study provides insight on temporal changes in contaminant levels at four areas of Burrard Inlet. Knowledge on location, quantity and quality of contaminant and sediment sources to the system is also required to interpret changes in contaminant levels observed in the cores.

TABLE OF CONTENTS

Abstract	ii
Table of Contents	iii
List of Tables	iv
List of Figures	iv
Acknowledgments	iv
1. INTRODUCTION	1
2. METHODS.....	1
2.1 Field Collections	1
2.2 ²¹⁰ Pb and ¹³⁷ Cs	4
2.3 Metals and Stable Pb Isotopes	4
2.4 C/N and Stable C Isotope	5
2.5 Particle Size	5
3. RESULTS AND DISCUSSION	6
3.1 Stn PEI (Outer Harbour)	6
3.2 Stn CH-I (Inner Harbour)	12
3.3 Stn PM-V (Port Moody Arm)	12
3.1 Stn IND-VI (Indian Arm)	13
4. REFERENCES	14
APPENDICES	
Appendix A: ²¹⁰ Pb and ¹³⁷ Cs Analyses - Flett Research	
Appendix B: Metals and Stable Pb Isotope Analyses - Elemental Research	
Appendix C: C/N, Stable Carbon Isotope ($\delta^{13}\text{C}$) Analyses - UBC Dept. of Oceanography	
Appendix D: Particle Size Analyses - GeoSea Consulting	
Appendix E: Sediment Core Data - Environment Canada 1988 Vancouver Harbour Survey	
Appendix F: Hydrocarbon and Organochlorine Analyses - AXYS Analytical Services (for IOS)	

LIST OF TABLES

Table 1: Station Coordinates and Depths - October 1994.....	3
Table 2: Sediment Core Sample Depths - October 1994.....	3
Table 3: Summary of Parameters Measured in Sediment Core Profiles - October 1994.....	7
Table 4: Particle Size Distribution of Sediment Core Profiles - October 1994.....	10

LIST OF FIGURES

Figure 1: Burrard Inlet Sediment Core Stations - October 1994.....	2
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**The complete document is available at the BIEAP office. Contact 604.775.5756 for more information.