

**CAPITAL REGIONAL DISTRICT  
CORE AREA LIQUID WASTE MANAGEMENT PLAN**

**CHAPTER 9**

**WASTEWATER AND MARINE ASSESSMENT:  
CLOVER AND MACAULAY POINT OUTFALLS**

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**GOALS**

The goals of the CRD Marine Assessment program for the Clover and Macaulay Point outfall are to:

1. ensure that the wastewater discharges do not cause adverse effects to the receiving environment either now or in the future, by providing an early warning of the potential for adverse environmental effects which will allow the timely development and implementation of appropriate source control and/or treatment alternatives;
2. assess the effects of the wastewater discharges on the marine environment and human health risk;
3. determine waste loads;
4. provide information to the CRD source control program; and
5. provide scientific guidance to wastewater managers regarding the use of the marine environment for the disposal of municipal wastewater.

These goals will be met by the implementation of the trigger process and a monitoring program.

**COMMITMENTS**

The **Capital Regional District (CRD)** commits:

- to the implementation of the trigger process upon approval of the plan by the minister of environment, lands and parks
- to a wastewater and marine monitoring program to support the trigger process and to document effluent quality and the state of the receiving environment
- to revise the monitoring program to accommodate the trigger process within one year following plan approval
- to review the wastewater and marine assessment program at six year intervals following plan approval
- to report on the trigger process and on the wastewater and marine assessment program to the Ministry of Environment, Lands and Parks (MELP) and the CRD Board, annually following plan approval
- to develop an early warning process for surface water levels of indicator bacteria within two years of plan approval
- subject to approval of this Liquid Waste Management Plan by the minister of environment, lands and parks, to enhance the effluent monitoring program to better assess the effectiveness of the source control program, at an additional annual cost of approximately \$60,000

**BACKGROUND**

The CRD currently holds provincial waste management permits for the Clover and Macaulay Point outfalls. These permits stipulate the effluent and receiving environment monitoring that the CRD must carry out for the two outfalls. Since 1990 the CRD has supplemented this permit monitoring by increasing the number of monitoring stations and expanding the monitored parameters. In addition, special investigations have been undertaken to define more clearly the effects of the outfalls on the receiving environment.

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In 1987, the CRD formed the Marine Monitoring Advisory group (MMAG) to advise on and provide an independent assessment of the CRD's marine programs. The MMAG consists of university and government scientists with expertise in the field of marine science (MMAG terms of reference are contained in Appendix 9-A). Since 1987, the MMAG has worked with the CRD to develop a comprehensive marine monitoring program for the Clover and Macaulay Point outfalls.

In the March 31, 1998 letter from the minister of environment, lands and parks responding to the CRD's Core Area Liquid Waste Management Plan Stage 2 report, the minister advised the CRD that "Ministry staff will work with your staff to establish a monitoring program and trigger points that both the CRD and the Ministry can support." Ministry and CRD staff have cooperatively developed a trigger process. This process is summarized below and fully described in Appendix 9-B.

### **WASTEWATER AND MARINE ASSESSMENT PROGRAM**

The CRD will implement a wastewater and marine assessment program for the Clover and Macaulay Point outfalls. This program will consist of:

- the trigger process (which includes seafloor monitoring)
- effluent monitoring and analysis
- surface water monitoring and analysis for human health risk
- water column investigations

The monitoring components of this program are shown in Table 9.1.

In addition, within one year of plan approval by the minister of environment, lands and parks, the CRD will ask the Marine Monitoring Advisory group to review and advise on the scientific feasibility and usefulness of the investigations listed below. Inclusion of these investigations is subject to budget approval and MMAG recommendation.

- analysis of deep sea mussels or other suitable organisms for fecal coliforms to determine the influence of wastewater discharges on the epibenthic zone
- a one-time assessment of public use in the vicinity of the Clover Point and Macaulay Point outfalls and of possible modes of public exposure to health risks
- a one-time assessment of sediment transport, deposition and re-suspension in the vicinity of the outfalls

### **Trigger Process Summary (see Appendix 9-B for full description)**

The trigger process is the process that determines when the development of treatment facilities or source control measures are necessary to protect the receiving environment. The overall objective of this process is to ensure that wastewater discharged through the Clover and Macaulay Point outfalls does not cause adverse effects to the receiving environment either now or in the future.

**TABLE 9.1**

**WASTEWATER AND MARINE MONITORING PROGRAM  
CLOVER AND MACAULAY POINT OUTFALLS**

<b>Macaulay Point Outfall</b>	<b>Parameter<sup>1</sup></b>	<b>Minimum Frequency<sup>2</sup></b>
Effluent	Flow TSS, BOD, Indicator Bacteria, Nitrogen Priority Pollutants <sup>3</sup> , oil and grease, COD, TOC	Daily 12 x year 4 x year
Receiving Environment Human Health	Indicator Bacteria	12 x year
Trigger Process	Sediment Grain Size, TOC, AVS Sediment Priority Pollutants <sup>3</sup> Benthic Community Structure	To be determined by the MMAG
Data Management	Data	Ongoing
<b>Clover Point Outfall</b>	<b>Parameter</b>	<b>Frequency</b>
Effluent	Flow TSS, BOD, Indicator Bacteria, Nitrogen Priority Pollutants <sup>3</sup> oil and grease, COD, TOC	Daily 12 x year 4 x year
Receiving Environment Human Health	Indicator Bacteria	12 x year
Trigger Process	Sediment Grain Size, TOC, AVS Sediment Priority Pollutants <sup>3</sup> Deep-sea Mussel ( <i>Modiolus modiolus</i> ) - Tissue Weight, Shell Length, Age Structure, Reproductive State Deep-sea Mussel ( <i>Modiolus modiolus</i> ) - Tissue Chemistry	To be determined by the MMAG
Data Management	Data	Ongoing
<sup>1</sup> TSS – Total Suspended Solids BOD – Biological Oxygen Demand COD – Chemical Oxygen Demand TOC – Total Organic Carbon AVS – Acid Volatile Sulphide <sup>2</sup> The number of stations will depend on the parameter to be measured and relevant scientific protocol. <sup>3</sup> See Appendix 9-C for the list of priority pollutants measured.		

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The trigger process was developed cooperatively by a work group of MELP and CRD staff and consensus was reached on all aspects of the trigger process. The Marine Monitoring Advisory group, with the exception of the Environment Canada member, has made the following endorsement of the trigger process:

*As an independent scientific advisory body to the CRD, the MMAG endorses the trigger process as a way to make a science based decision in the CRD Core Area Liquid Waste Management Plan.*

It is the MMAG Environment Canada member's position that Environment Canada cannot endorse the trigger process as a means of determining the level of sewage treatment in the absence of any reference to the need for effluent to be in compliance with the Fisheries Act at the point of discharge.

The trigger process is a decision framework that considers monitoring results, compares these results to warning and adverse effects levels, analyses contaminant sources and trends and develops, recommends and implements protective action. Figure 9.1 shows each step in, and the timing of, the trigger process. These steps are outlined below.

### Annual Monitoring

Annual monitoring will be conducted to assess the health of the receiving environment. The monitoring program will be revised to accommodate the trigger process in consultation with the MMAG within one year following the approval of this Liquid Waste Management plan. One-time investigations to fill in information gaps will also be carried out. These investigations will be identified and prioritized in consultation with the MMAG.

Trigger process monitoring will include (Table 9.1):

- at Macaulay Point - sediment chemistry and benthic community structure
- at Clover Point - sediment chemistry and deep-sea mussel health and tissue chemistry

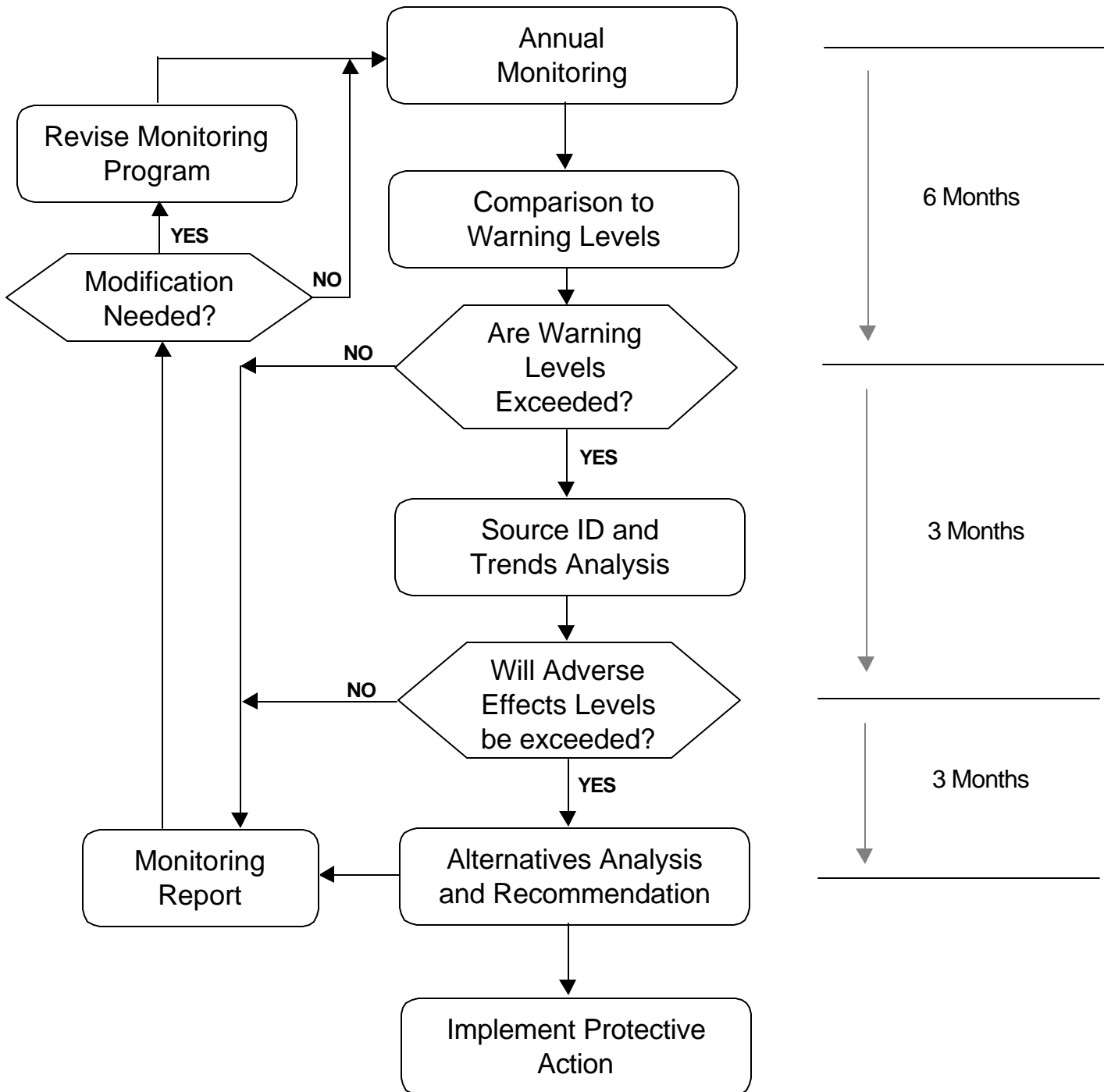
### Comparison to Warning Levels

Monitoring data will be compared to warning levels to determine if these levels have been exceeded. Warning levels are numeric biological and chemical levels that provide a margin of safety. Their purpose is to provide sufficient early warning of adverse effects so that measures can be taken to prevent adverse effects from occurring in the future. If warning levels are not exceeded, then no action will be required beyond reporting and continuation of the monitoring program. The MMAG will make the final determination of warning level exceedences.

### Source Identification and Trends Analysis

If warning levels are exceeded, source identification and trends analysis will be carried out to aid in the determination of the most appropriate course of action. First the chemicals of concern and their sources will be identified. Then a trends analysis will be carried out (i.e., are the chemicals of concern increasing, decreasing or showing no trend) to determine if adverse effects levels are likely to be exceeded in the next seven to 10 years.

Figure 9.1: Overview of the Trigger Process



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### Potential for Future Exceedence of Adverse Effects Levels

At this point, a decision will be made about whether adverse effects levels are predicted to be exceeded in the next seven to 10 years. The MMAG will make the final determination of the potential for future exceedence of adverse effects levels. If adverse effects levels are not predicted to be exceeded, then a program report will be prepared and the annual monitoring and analysis will continue. If adverse effects levels are predicted to be exceeded, then the process proceeds to the next step – alternatives analysis and recommendation.

### Alternatives Analysis and Recommendation

If adverse effects levels are predicted to be exceeded in the next seven to 10 years, then source control and treatment alternatives will be evaluated to determine which alternatives best meet the goal of preventing future adverse effects. From among the alternatives that are expected to be effective, the alternative will be selected that is the most cost-effective and a recommendation that the CRD implement the selected alternative made to MELP. Upon approval by MELP, the selected alternative will be implemented.

### **Effluent Monitoring**

For each outfall, effluent quality will be monitored to provide information on loadings of effluent components to the marine environment. Loading data provide an indication of which components may be of concern in the receiving environment, and hence can be used to direct the efforts of the trigger process, monitoring and source control programs.

### **Surface Water Monitoring**

Surface water levels of indicator bacteria will be measured monthly at each outfall to assess human health risk and as indicators of plume dispersion.

An early warning process for surface water levels of indicator bacteria will be developed in consultation with the MMAG within two years of plan approval. The Capital Health Region will be consulted regarding criteria for surface water indicator bacteria. This process will be designed to provide an early warning of criteria exceedence so that timely action can be taken.

### **Water Column Investigations**

The effects of the discharge of wastewater on the water column will be investigated using a three-dimensional oceanographic model. Modelling of present and future conditions will be carried out to assess current and future compliance with water quality criteria. In addition, the model will be used to establish water column warning levels that would trigger further water column investigations. These water column warning levels will be developed in consultation with the MMAG and will be established within two years of plan approval.

### **Review and Reporting**

Wastewater and Marine Assessment program results will be reviewed by CRD staff and the MMAG. Every six years the Wastewater and Marine Assessment program will be reviewed and a new six-year plan developed. Program reports on the trigger process and the Wastewater and Marine Assessment program will be submitted to the CRD Board and the MELP.