

Integrated Solid Waste and Resource Management

a Solid Waste Management Plan
*for the Greater Vancouver Regional District
and Member Municipalities*



**metro
vancouver**

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Vision Statement

Metro Vancouver has a vision to achieve what humanity aspires to on a global basis – the highest quality of life embracing cultural vitality, economic prosperity, social justice and compassion, all nurtured by a beautiful and healthy natural environment.

We will achieve this vision by embracing the principles of sustainability, not least of which is an unshakeable commitment to the well-being of current and future generations and the health of our planet, in everything we do.

As we share our efforts in achieving this vision, we are confident that the inspiration and mutual learning we gain will become vital ingredients in our hopes for a sustainable common future.

Building a Sustainable Livable Region

Building a sustainable, livable region is the overarching regional vision. Social, environmental and economic sustainability is, therefore, a fundamental objective in all Metro Vancouver activities: from the services we deliver through the management and strategic plans we develop and administer, to the various outreach activities we engage in pursuit of collaborative governance.

As we build and facilitate collaborative processes, including those that engage citizens, and enhance understanding of other levels of government, we are confident that the inspiration and mutual learning we gain will become vital ingredients in our hopes for a sustainable common future.

Goals and Targets

Goals

The overriding principle of the Integrated Solid Waste and Resource Management Plan is the avoidance of waste through an aggressive waste reduction campaign and through the recovery of materials and energy from the waste that remains. In line with this principle, the Integrated Solid Waste and Resource Management Plan (ISWRMP) has four goals:

Goal 1: Minimize waste generation

Goal 2: Maximize reuse, recycling and material recovery

Goal 3: Recover energy from the waste stream after material recycling

Goal 4: Dispose of all remaining waste in landfill, after material recycling and energy recovery

The key strategies and actions to achieve the goals of the ISWRMP are set out in Part B, Goals, Strategies, Actions and Measures.

Targets

Reaching the primary goal of waste avoidance requires a reduction in the generation of waste. Metro Vancouver has few levers to directly control the volume of waste generated. So the target for waste reduction is one for the community as a whole to aspire to, rather than one the Greater Vancouver Sewerage & Drainage District (GVS&DD) can be held wholly responsible for achieving. This Plan therefore sets a target for the Metro Vancouver region to reduce the quantity of waste generated per capita within the region, calculated on a rolling 5 year average, to 90% or less of 2010 volumes by 2020.

To reach the second goal of waste reuse, recycling and material recovery, as much as possible must be diverted away from the waste disposal stream and into programs aimed at reuse, recycling and material recovery. The second target of the ISWRMP is to increase the regional diversion rate from an average of 55% to a minimum of 70% by 2015 and an aspirational target of achieving 80% by 2020 assuming there will be sustained markets for all diverted material.

The overall 70% diversion target implies the following approximate diversion rates by sector:

- Multi-family 30%
- Single-family 65%
- Institutional, commercial and industrial 70%
- Demolition, land clearing and construction 80%

Conventionally it has been assumed that the 5Rs hierarchy approximates the sequence of processes in waste management and the goal of reducing, reusing or recycling waste to the maximum extent possible has been measured as the rate of 'diversion' of waste from reaching the fifth step in the hierarchy – the disposal of residues. Modern reality is more complex. As a result, using the conventionally defined 'diversion rate' includes some source separated material utilized as fuel being considered 'recycled' while some material that is recycled after incineration is still considered 'disposed'.

This Plan is driven by the underlying principles of sustainability but, for the sake of historic comparability, continues to use the conventional definition of 'diversion rate'.

A. Integrated Solid Waste and Resource Management Plan

Guiding Principles

The Plan follows the sustainability principles set out in Metro Vancouver's Sustainability Framework, the principles of Integrated Resource Recovery and the 5R hierarchy of resource management.

Sustainability

Sustainability encompasses a long-term commitment to economic prosperity, community well-being and environmental integrity. It is at the core of Metro Vancouver's vision for the future, and provides the foundation for the development of the region's management plans.

The Metro Vancouver Sustainability Framework identifies three overarching principles which state that decision making must:

- Have regard for both local and global consequences, and long-term impacts
- Recognize and reflect the interconnectedness and interdependence of systems
- Be collaborative

These provide the foundation for the three operating principles that guide Metro Vancouver:

- Protect and enhance the natural environment (Conserve and develop natural capital)
- Provide for ongoing prosperity (Conserve and develop economic capital)
- Build community capacity and social cohesion (Conserve and develop social capital)

A solid waste management plan which follows these principles will seek to ensure our individual and collective behaviour does not generate avoidable or unnecessary material waste and will seek systems and technologies which recover and recycle materials and recover energy.

Where investment or reinvestment in infrastructure is required, that infrastructure will be resilient, be adaptable to climate change, lessen the region's dependence on non-renewable energy sources, and protect the environment.

Integrated Resource Recovery

Integrated Resource Recovery is an approach to designing and managing urban systems, particularly utilities, to generate synergies which enable the 'waste' from one system to become 'resources' for another.

These traditional wastes are untapped resources. If accessed and used appropriately, they can help preserve non-renewable resources, stretch the capacity of existing infrastructure, save energy, generate revenue, protect the environment and reduce greenhouse gas (GHG) emissions.

Resource Management Principles: The 5Rs

The principles of the internationally recognized 5R hierarchy also emphasize the value of waste as a resource. The hierarchy sets out the relative value of different methods of waste management:

- **Reduce** waste at source
- **Reuse** where possible
- **Recycle** products at the end of their useful life
- **Recover** energy or materials from the waste stream
- **Manage Residuals** in an environmentally sound manner

Public Health Principles

- Emphasis on investing in upstream preventative solutions as opposed to downstream problem management. In the case of managing the waste stream, this principle requires increasing investment towards reducing waste generation.
- Fairness and equity. The costs and benefits of the Plan will be distributed fairly among population groups.
- Transparency. Decisions are made through processes that enable meaningful public input throughout the planning and implementation phases, including final decisions on waste management facility, technology and site selections.

- **Sustainability.** The Plan will sustain population health and wellness not only for residents of Metro Vancouver but also for all British Columbians and globally.

Process and Consultation

All actions included in this Plan will be undertaken in consultation and cooperation with municipalities, senior government, First Nations, health authorities, the business community, and the public.

As the population grows and circumstances change, the ISWRMP will be reviewed and revised. An ISWRMP progress report will be made every two years and a comprehensive performance review of the Plan undertaken every five years, with a full plan review and update every ten years.

Aligning With Provincial Initiatives

This is a provincially mandated plan. The objectives set out in the 1995 Greater Vancouver Regional District Solid Waste Management Plan were set by the Provincial Government. These objectives were:

- To reduce per capita garbage disposal in the year 1995 by at least 30% from 1990 levels.
- To similarly reduce per capita garbage disposal in the year 2000 by at least 50% from 1990 levels.
- To responsibly manage residuals.

These objectives have been met.

The updated ISWRMP is guided by principles that are aligned with current provincial policies and positions, ensuring that Metro Vancouver's and senior governments' environmental and fiscal objectives and actions are mutually supportive and successful.

Key provincial plans and policies supported by the ISWRMP include the:

- **BC Air Action Plan** The Air Action Plan seeks to improve air quality across British Columbia by promoting clean transportation, clean industry and clean communities.

The ISWRMP will contribute to meeting the goals of this program by managing waste locally, imposing the strictest air quality standards on all facilities and reducing emissions in the community through district energy systems.

- **BC Climate Action Plan** This Plan sets a provincial target of 33% less greenhouse gas emissions by 2020, and 80% fewer by 2050.

The ISWRMP will contribute to meeting these targets by facilitating waste reduction and by treating waste as a resource to be reused, recycled or recovered.

- **BC Energy Plan – A Vision for Clean Energy Leadership** The Energy Plan sets goals for clean, self-sufficient electricity production including “clean energy leadership” and energy self-sufficiency by 2016.

The ISWRMP seeks to expand the generation of electricity and biofuels from municipal solid waste as well as the recovery of heat for use in industrial or district heating systems.

- **BC Recycling Regulation** This regulation provides a legal framework for establishing extended producer responsibility (EPR) programs managed by industry to promote product stewardship within the province of British Columbia. The underlying goal of this regulation is for producers to accept full life-cycle cost accounting for their products. This would see costs of the end-of-life management of products treated similarly to other factors of production and incorporated into product prices. Successful EPR shifts the expenses associated with product end-of-life management from taxpayers to producers and consumers.

The ISWRMP supports the principles of EPR and includes numerous actions to accelerate EPR program development and implementation.

- **A Guide to Green Choices – Ideas and Practical Advice for Land Use Decisions in BC Communities** This guide expressed the need for “sustainable infrastructure”. The long-term sustainable management of existing and future infrastructure investments requires integrated, innovative solutions.

The ISWRMP contains actions that support sustainable infrastructure, such as clean energy from district energy systems.

- **BC Bioenergy Strategy** The Strategy encourages the production of fuel from biomass.

The ISWRMP builds upon existing efforts involving the recovery of methane from landfills. It also promotes additional diversion of biomass, such as food residuals and treated wood, for use as renewable sources of energy. Opportunities to integrate liquid and solid waste management also support the BC Bioenergy Strategy.

- **Landfill Gas Management Regulation** This regulation requires landfills to consider designs that optimize methane capture, reducing greenhouse gas emissions.

Existing and any future Metro Vancouver landfills under the ISWRMP will follow this regulation, contributing to the climate change solution.

In partnership with municipalities and the private sector, Metro Vancouver's initiatives in all of these areas will reduce greenhouse gas emissions, diversify the region's sources of energy, increase renewable energy sources, and increase the region's energy independence.

Aligning with Federal Initiatives

- **CCME Canada-wide Action Plan for Extended Producer Responsibility** The Canadian Council of Ministers of the Environment (CCME) have adopted a waste management approach which extends the responsibility of producers for management of products to the end of the product life. Through the Canada-wide Action Plan for EPR, the CCME and the province of British Columbia are working towards the development and implementation of additional EPR programs intended to have producers accept full life-cycle cost accounting for their products. This would see the costs of the end-of-life management of products treated similarly to other factors of production and incorporated into product prices.

The draft ISWRMP supports the principles of EPR and includes numerous actions to accelerate EPR program development and implementation.

Coordinating with other Metro Vancouver Plans

The Sustainable Region Initiative provides a framework for linking the ISWRMP with the region's other plans, as shown in Figure 1. It also establishes links across regionally mandated plans and with initiatives that are executed by other partners.

The ISWRMP identifies synergies with Metro Vancouver's other utilities and plans, to make the best use of society's resources, and to minimize the region's impact on the environment. Figure 2 shows the connections between the ISWRMP and other regional plans.

The ISWRMP includes coordinated actions with the Integrated Liquid Waste and Resource Management Plan, chosen to identify opportunities to make best use of the resources generated from the two waste streams. For example, organic municipal solid waste, like waste food, can potentially be co-digested with sewage sludge.

The principles guiding the ISWRMP and the connected goals and actions will also help achieve objectives in the Air Quality Management Plan and Metro Vancouver 2040, the region's Regional Growth Strategy. The ISWRMP will minimize Metro Vancouver's contribution to climate change by reducing the disposal of untreated waste in landfills, by recovering energy in the form of heat for district heating, and by reducing the use of fossil fuels for space heating. These steps will assist in building compact, complete communities using clean energy for district heating.

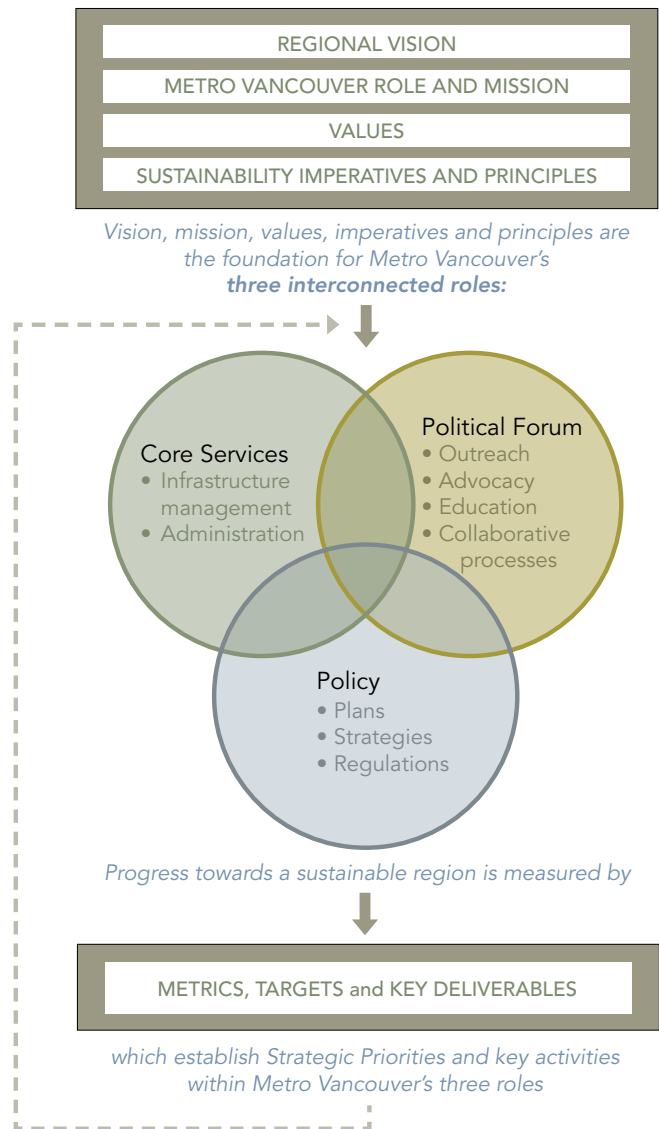
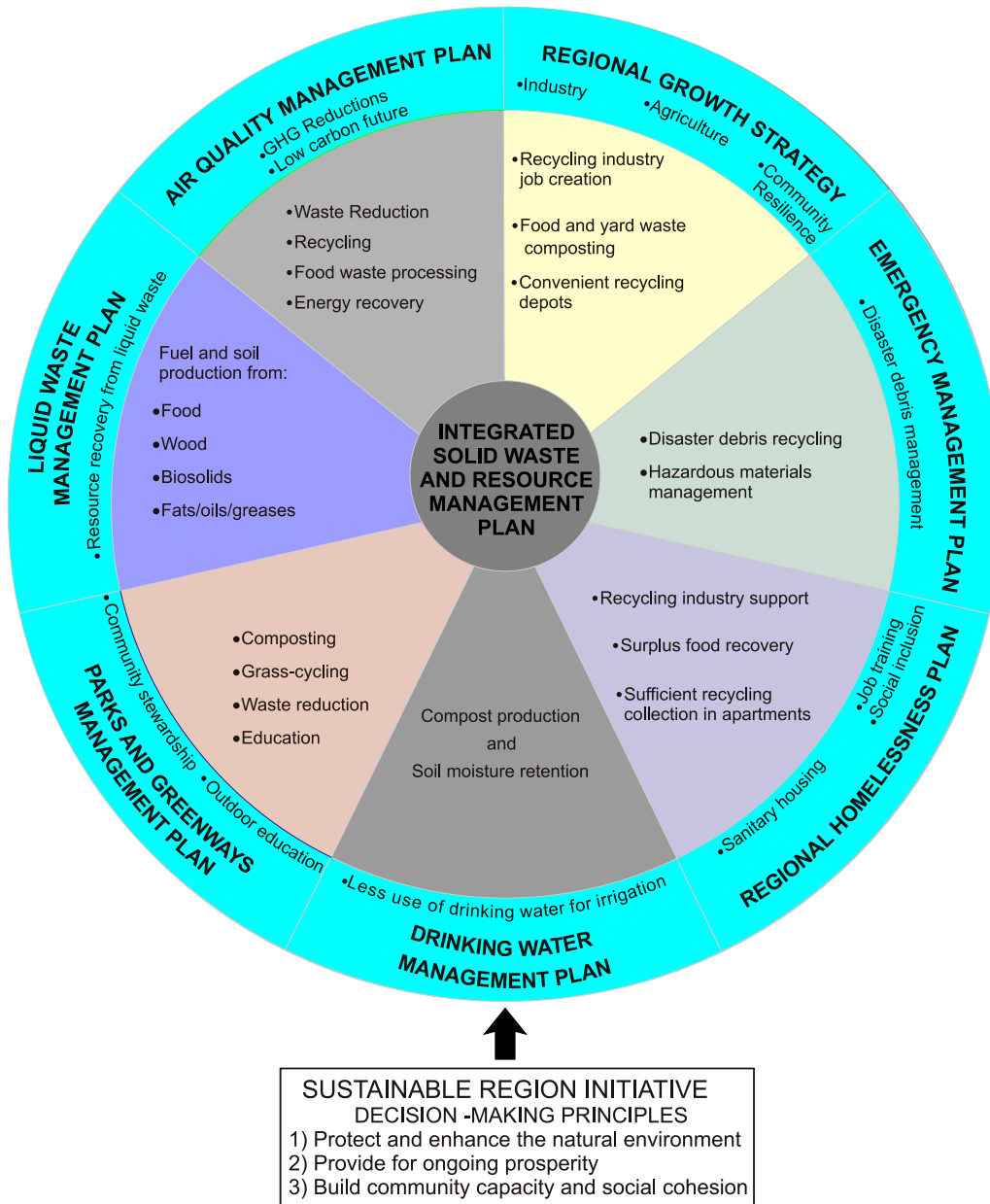


FIGURE 1: METRO VANCOUVER SUSTAINABILITY FRAMEWORK

FIGURE 2: KEY CONNECTIONS BETWEEN METRO VANCOUVER'S INTEGRATED SOLID WASTE AND RESOURCE MANAGEMENT PLAN AND OTHER METRO VANCOUVER PLANS



Governance, Roles and Responsibilities

Solid waste management plans are authorized and regulated through the BC Environmental Management Act. Once each updated plan is approved, it becomes a regulatory document for solid waste management.

Metro Vancouver and member municipalities work collaboratively to provide waste management services to the region. Metro Vancouver coordinates the long-range planning process for recycling and disposing of solid waste in the region. Metro Vancouver also funds and manages the operating contracts for the transfer stations, waste-to-energy facility and landfill (with the exception of the Vancouver South Transfer Station and the Vancouver Landfill which are owned and operated by the City of Vancouver) that make up the region's integrated solid waste management system.

In conjunction with regulations and operational certificates that may apply, this Plan regulates the operation of these facilities. Where conflicts may exist between agreements related to such facilities and this Plan, including the Tri-Partite Agreement between Delta, Vancouver and Metro Vancouver, this Plan takes precedence.

Municipal solid waste (MSW) includes refuse that originates from residential, commercial, institutional, demolition, land clearing or construction sources as outlined in the Environmental Management Act.

For management purposes, waste is generated from three sectors: residential (from both single-family units and multi-family units); industrial, commercial and institutional (ICI); and demolition, land clearing and construction (DLC). Member municipalities operate or coordinate the collection of recyclables and garbage and in some cases yard and garden waste from the single-family residential sector and some ICI and multi-family residential sources. Recycling from multi-family residences is also collected by municipalities, but much of the ICI and multi-family residential garbage collection services are provided by the private sector. ICI recycling is collected almost exclusively by private haulers. The third sector, DLC,

is primarily self-managed with businesses and non-profit societies providing recycling, transferring and/or disposal services.

The management of household hazardous wastes is carried out by the Province primarily through Extended Producer Responsibility (EPR) programs and the Hazardous Waste Regulation. Provided financial and liability issues are satisfied, Metro Vancouver and member municipalities will cooperate with the Province and industry groups to provide a comprehensive household hazardous waste management program.

Recycling processing facilities in the region are primarily privately run businesses, as are the brokers who facilitate the movement of recyclables to end markets inside and outside of the region.

The extent and complexity of the solid waste systems require close coordination among the following groups:

FEDERAL GOVERNMENT

- The Federal Government regulates waste management facilities under federal jurisdiction

PROVINCIAL GOVERNMENT

- Various ministries have regulatory authority related to waste management

FIRST NATIONS

- First Nations are an order of government with rights and responsibilities

LOCAL HEALTH AUTHORITIES

- Local health authorities have various interests and responsibilities related to the waste management process

LOCAL GOVERNMENT

- Metro Vancouver is responsible for developing and ensuring that the ISWRMP is implemented and is required to report on ISWRMP progress
- Member municipalities provide local waste management services and implement municipal actions in the ISWRMP

PRIVATE SECTOR

- Private sector businesses generate waste which requires management under the ISWRMP
- Private sector haulers, material brokers, recyclers and others provide services which make the implementation of an integrated waste management system possible

NON-PROFIT SECTOR

- Provides voluntary services to segments of the waste generating public

RESIDENTS

- Generate waste either as private individuals or as contributors to institutional, commercial, industrial, demolition, land clearing or construction activities
- Responsible for carrying out proper waste reduction, recycling and disposal activities

Geographic Scope

The ISWRMP applies to the geographic area of Metro Vancouver (see Figure 3). All strategies and actions in the ISWRMP apply to the following members of the Greater Vancouver Regional District.

Village of Anmore

Village of Belcarra

Bowen Island Municipality

City of Burnaby

City of Coquitlam

Corporation of Delta

City of Langley

Township of Langley

Village of Lions Bay

District of Maple Ridge

City of New Westminster

City of North Vancouver

District of North Vancouver

City of Pitt Meadows

City of Port Coquitlam

City of Port Moody

City of Richmond

City of Surrey

Tsawwassen First Nation

City of Vancouver

District of West Vancouver

City of White Rock

Electoral Area A – which includes the west side of Pitt Lake, the northern portion of Indian Arm, a portion of land between the District of West Vancouver and Squamish Lillooet Regional District, Bowyer, Passage and Barnston islands, the University Endowment Lands (including Pacific Spirit Regional Park), and the University of British Columbia

In addition, solid waste management services are provided to the City of Abbotsford through contract.

FIGURE 3: MAP OF PLAN AREA



Approved Facilities

Municipal solid waste in the region can be directed for management to any approved disposal facility identified in the ISWRMP.

Approved disposal facilities include the:

- Waste-to-Energy facility in Burnaby
- Vancouver Landfill
- Cache Creek Landfill
- Any disposal facility licensed by Metro Vancouver under the Greater Vancouver Sewerage and Drainage District Municipal Solid Waste and Recyclable Material Regulatory Bylaw No. 181, 1996 as amended by Bylaw No. 183, 1996.

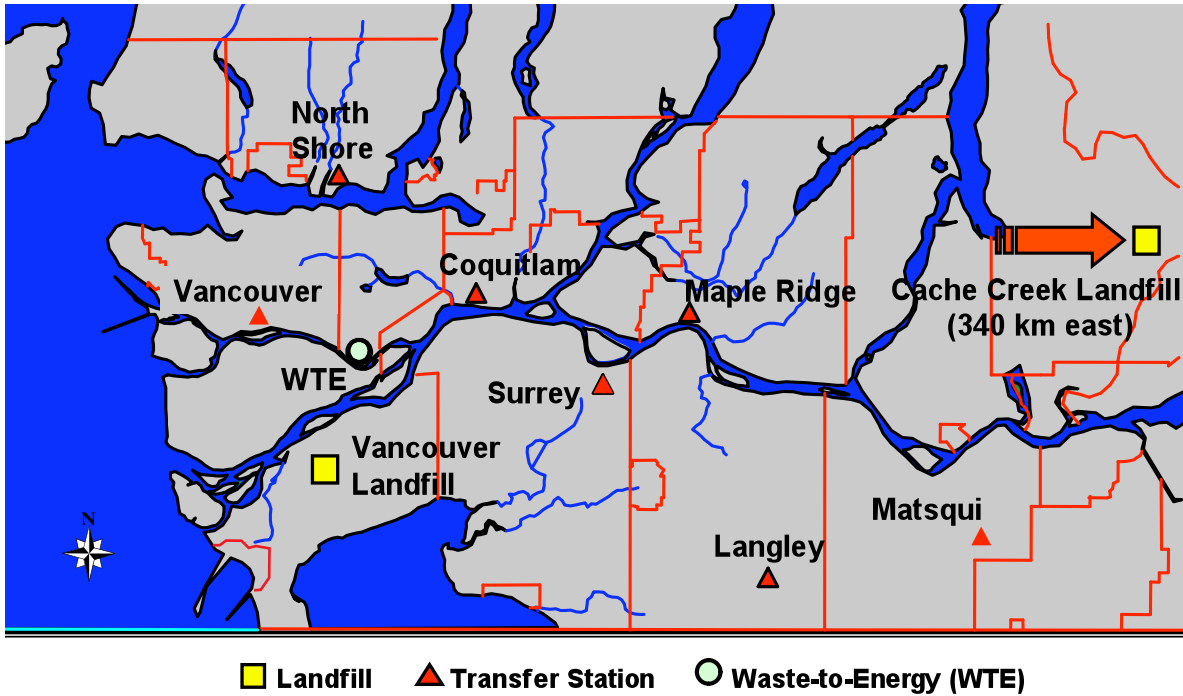
Metro Vancouver will work with the Province to map and catalogue both operating and closed, private and public landfills in the Metro Vancouver region.

In addition to the approved disposal facilities, the following publicly owned transfer stations are an integral part of the Metro Vancouver integrated waste management system:

- North Shore Transfer Station
- Vancouver South Transfer Station
- Coquitlam Transfer Station
- Surrey Transfer Station
- Langley Residential Transfer Station
- Maple Ridge Residential Transfer Station
- Matsqui Transfer Station

The locations of the Metro Vancouver and City of Vancouver facilities are shown in Figure 4.

FIGURE 4: MAP OF APPROVED FACILITIES



New Facilities

Municipal solid waste in the region may be directed for management to any new facility contemplated by this Plan provided the new facility follows the process for development as outlined herein.

New facilities specifically contemplated in this Plan include:

- Any new organics processing facility established pursuant to Goal 2 of this Plan.
- Any new waste-to-energy facility located within the region established pursuant to Goal 3 of this Plan.
- Any new waste-to-energy facility located outside the region established pursuant to Goal 3 of this Plan.
- Any additional landfill pursuant to Goal 4 of this Plan.

Process for development of new facilities shall include but not be limited to:

- Appropriate procurement process.
- Environmental assessment, including an assessment of human health risk acceptable to the applicable health authority, as may be required by provincial and federal regulations.
- Suitable public consultation program as may be required by environmental assessment process.

The Ministry of Environment and health authorities will be informed and consulted as appropriate regarding the addition of new waste management facilities.

Establishment of new facilities may also be performed with consideration for provincial requirements in addition to Metro Vancouver's regional needs. If new facilities are established to service Metro Vancouver and any other regional district, references in this Plan to waste flows and contingency plans, refer only to quantities of waste from Metro Vancouver. The Ministry of Environment may vary these provisions

to accommodate, and only accommodate, waste management requirements of other regional districts.

The addition of new disposal facilities not contemplated in this Plan will require an amendment to the Plan. The addition of new facilities which are not disposal facilities will not necessitate an amendment to this Plan.

Flow Control

To ensure the sustainability principles embodied within this Plan are fulfilled, Metro Vancouver will retain management control of regional disposal facilities. By retaining management control, all waste reduction and diversion goals can be applied uniformly at all regional disposal facilities to ensure equity for all residents and businesses within the region while attaining the goals of this Plan.

In addition to the requirement for waste to be directed to facilities approved under this Plan, Metro Vancouver may choose to act to reduce the flow of waste to unauthorized facilities which may undermine the waste reduction and diversion goals of this Plan. These flow control initiatives include but are not limited to:

- Split fee bylaw
- Franchising of waste collection services
- Licensing of waste collection service providers

If total waste flows are below the capacity of existing and planned facilities, waste disposal facilities will be utilized as follows:

- Total waste flows in excess of 780,000 tonnes per year: the Vancouver Landfill will be operated to absorb flows in excess of 780,000 tonnes;
- Waste flows in excess of 500,000 tonnes per year but less than 780,000 tonnes per year: the Vancouver Landfill be operated only to absorb residuals from the waste-to-energy plants and as an emergency system in the event that the waste-to-energy plants cannot absorb waste flows, and the Burnaby facility would have the three furnace lines progressively shut down or converted to alternate fuels as waste flows declined;

- Waste flows below 500,000 tonnes per year: the Vancouver Landfill would continue to operate to absorb residuals from the waste-to-energy plants and as an emergency system in the event that the waste-to-energy plants cannot absorb waste flows, the waste-to-energy facility in Burnaby would be decommissioned or converted to alternate fuels and the new waste-to-energy facilities would be progressively downscaled or converted to alternate fuels as waste flows decline.

First Nations Lands

Unknown quantities of waste from Metro Vancouver, primarily from the DLC sector, are disposed in landfills located on First Nations lands both outside and inside the Metro Vancouver geographical area. Metro Vancouver has no jurisdiction for these landfills.

B. Goals, Strategies, Actions and Measures

Goal 1: Minimize Waste Generation

The following strategies and actions are proposed to achieve this goal:

STRATEGY 1.1

Advocate that senior governments transfer additional waste management responsibilities to producers and consumers

The costs and responsibilities of waste management have historically been borne by local governments and taxpayers. The responsibility for the costs and risks to manage end-of-life products should progressively transfer to the manufacturers of goods and the consumers that use them to provide the appropriate market mechanism to encourage more sustainable manufacturing and consumer choices.

METRO VANCOUVER WILL:

- 1.1.1 Advocate that senior governments progressively move towards the prohibition of the manufacture and distribution of non-essential, non-recyclable materials and products. *2011*
- 1.1.2 Advocate that senior governments prohibit the manufacture and distribution of non-recyclable packaging. *2011*
- 1.1.3 Strongly advocate for EPR programs to reduce waste disposal through implementation of design-for-environment principles, and best management practices that focus on waste reduction, reuse, and recycling. Offer staffing support for and partnership with Ministry of Environment to help accelerate EPR. *2011*

- 1.1.4 Work with other municipalities and regions across BC, Canada, and internationally, to advocate for more development by senior governments in encouraging and developing incentives, including regulation, that promote design of products with an emphasis on reuse and recycling (cradle-to-cradle design). *2011*
- 1.1.5 Participate on Federal EPR initiatives such as the Canadian Council of Ministers of Environment (CCME) Extended Producer Responsibility Task Force, to develop national guidelines for sustainable packaging. *Ongoing*
- 1.1.6 Participate on industry stewardship advisory committees. *Ongoing*
- 1.1.7 Participate on the BC Product Stewardship Council to assist in evaluating existing and developing new EPR programs. *Ongoing*
- 1.1.8 Waste projections will consider future trends in population, generation, and management, including EPR. *Ongoing*

MUNICIPALITIES WILL:

- 1.1.9 Partner with Metro Vancouver in support of actions 1.1.1 through 1.1.8. *2011 and Ongoing*

ACTIONS REQUESTED OF OTHER GOVERNMENTS AND AGENCIES:

- 1.1.10 Ministry of Environment to accelerate EPR program development and implementation. *Ongoing*
- 1.1.11 Include Metro Vancouver and its member municipalities in the negotiations with producers regarding future EPR programs to ensure that appropriate consideration is given to the existing convenient curbside collection systems. *2010*
- 1.1.12 Ensure that the waste recovered under EPR programs will be properly managed in the region and that such materials will not be exported without adequate knowledge of and control over its eventual destination. *Ongoing*

STRATEGY 1.2

Reduce or eliminate materials entering the solid waste system which hinder or limit the opportunities to achieve reuse, recycling, or energy recovery, or that may exacerbate environmental impacts of disposed residuals

Some inputs to the solid waste stream may hinder or limit the opportunities to achieve reuse, recycling, or energy recovery, or may exacerbate environmental impacts of disposed residuals. These inputs will be identified and programs developed to reduce or eliminate them. This strategy also applies to Goal 2.

METRO VANCOUVER WILL:

- 1.2.1 Work with facility operators, local municipalities and the recycling industry to introduce material bans after alternatives are identified and suitable public information programs. *Ongoing*

STRATEGY 1.3

Provide information and education on options to reduce waste

The amount of waste we produce is directly linked to the amount and type of goods and services we consume. Providing the public and businesses with an awareness of the consequences of unsustainable behaviour and tools and incentives to change will assist in reducing the generation of waste. Information and education will seek forms of communication which address the barriers created by multiple languages.

METRO VANCOUVER WILL:

- 1.3.1 Develop and deliver a community-based social marketing program to inform and educate citizens on waste reduction opportunities including schools. *Ongoing*
 - (a) Target a minimum of 70% diversion goal by 2015 over all sectors and an aspirational goal of 80% by 2020 to be featured in communication materials. *Ongoing*
- 1.3.2 Develop and deliver a community-based social marketing business education plan, including business guides and other outreach programs to inform and educate businesses on waste reduction opportunities. *2011*
- 1.3.3 Develop a national zero waste marketing council so that cities across Canada can pool resources and develop common messaging, with national impact, on the need to reduce waste, resulting in informed and educated citizens on waste reduction opportunities. *2011*

MUNICIPALITIES WILL:

- 1.3.4 Partner with and assist Metro Vancouver in the development and delivery of public and business information and education programs. *Ongoing*

Goal 2: Maximize Reuse, Recycling and Material Recovery

Strategies to achieve this goal focus on proactive approaches to reuse, increased recycling effort and implementation of a region-wide food waste composting program.

STRATEGY 2.1

Increase the opportunities for reuse

Increasing the opportunities for individuals to reuse more materials involves increasing convenience and reducing impediments.

METRO VANCOUVER WILL:

- 2.1.1 Investigate financial and regulatory barriers which prevent or discourage the reuse of Materials. *2011*
- 2.1.2 Investigate the effectiveness and adequacy of existing material exchange networks. *2011*
- 2.1.3 Bring forward appropriate measures which respond to the findings of 2.1.1 and 2.1.2. *2011*
- 2.1.4 Enhance partnerships with the Province, industry, academia and community groups to research and develop solutions to overcome barriers to reuse and recycling and new opportunities to re-engineer recycled material. *2011*

MUNICIPALITIES WILL:

- 2.1.5 Work with Metro Vancouver to give effect to Strategy 2.1. *Ongoing*

STRATEGY 2.2

Increase the effectiveness of existing recycling programs

Use the existing infrastructure effectively to achieve higher recycling rates.

METRO VANCOUVER WILL:

- 2.2.1 Implement disposal bans on materials that limit opportunities to achieve reuse, recycling, or energy recovery. *Ongoing*
 - (a) Work with facility operators, local municipalities, senior governments and the recycling industry to determine the impact and source of components of the waste stream, the consequence and feasibility of banning the disposal of materials with the most negative impacts and the most suitable recycling options for those materials. *Ongoing*
 - (b) Expand the monitoring and enforcement of disposal bans and enhance with effective communications to raise awareness of the bans. *2011*
 - (c) Analyze the effectiveness of disposal bans and possible alternative enforcement models including enforcement at source. *2010*
 - (d) After suitable public information programs, expand disposal bans to include materials encompassed by new EPR programs and material for which new recycling markets are developed. *Ongoing*
- 2.2.2 Provide ongoing information for businesses and residents of recycling opportunities. *Ongoing*
 - (a) Continue and upgrade a regional web-based source of information on recycling opportunities for businesses and residents. *Ongoing*
 - (b) Keep municipalities fully informed as to recycling collection and drop-off facilities and changes to policies and facilities. *Ongoing*
 - (c) Provide outreach services. *Ongoing*

-
- (d) Work with other information sources to achieve maximum harmonization possible. *Ongoing*
- 2.2.3 Increase the efficiency and consistency of recycling collection services across the region. *2012*
- (a) Work with municipalities to review materials accepted for recycling from residential and ICI sources. *2012*
 - (b) In collaboration with municipalities, undertake a business case review of the residential and ICI waste and recycling collection services over the region to determine and implement the appropriate level of consistency between municipalities. Where appropriate, Metro Vancouver will develop model policies or bylaws to assist municipalities in achieving consistency. *2012*
 - (c) Analyze the effectiveness of pricing strategies and other economic instruments to encourage additional recycling. *2012*
- 2.2.4 Establish Eco-Centres. *Ongoing*
- (a) Establish a stakeholder and municipal work group to determine the scope, terms and conditions including the responsibility for funding and operating, and the relationship to existing and planned EPR programs and municipal recycling depots for participating municipalities and industries. *2010*
 - (b) Develop the model of Eco-Centres to include numerous, small scale, one-stop-drop centres for recycling and small quantity drop-off disposal. *Ongoing*
 - (c) With municipalities, determine the terms and conditions for participating municipalities and industries and develop appropriate business cases. *Ongoing*
 - (d) After determining terms and conditions, including the responsibility for funding and operating, establish the first Eco-Centre in Surrey to replace commitment for residential drop-off facility in the 1995 Plan. *2011*
- (e) Progressively expand the Eco-Centre system across the region as municipal business cases determine. *Ongoing*
- 2.2.5 Promote recycling at festivals and events. *Ongoing*
- (a) Develop a Zero Waste toolkit for festivals and events. *Ongoing*
 - (b) Continue to work with municipalities, EPR groups and local community groups to implement waste minimization and recycling at community festivals and events, including conferences and tradeshow. *Ongoing*
 - (c) Provide outreach services. *Ongoing*
- 2.2.6 Work with school districts and individual schools to promote waste reduction and recycling. *Ongoing*
- (a) Develop instructional programs that encourage waste reduction and recycling both within the schools and at home. *Ongoing*
- MUNICIPALITIES WILL:**
- 2.2.7 Work with Metro Vancouver on actions designed to:
- (a) Implement effective disposal bans for collection of municipal waste at source. *Ongoing*
 - (b) Inform businesses and residents of recycling opportunities. *Ongoing*
 - (c) Increase the efficiency and consistency of recycling collection services across the region. *Ongoing*
 - (d) Establish Eco-Centres. *Ongoing*
 - (e) Promote recycling at community events and festivals. *Ongoing*
 - (f) Work with school districts and individual schools to promote waste reduction and recycling. *Ongoing*

STRATEGY 2.3

Provide opportunities to increase private sector recycling

There is a shortage of recycling processing capacity for many materials within the region. Metro Vancouver and member municipalities can assist in addressing this shortage by using tools at their disposal to change the business environment so that the private sector can increase capacity.

METRO VANCOUVER WILL:

- 2.3.1 Facilitate the siting of private sector recycling activities. *2012*
 - (a) Review the GVS&DD Solid Waste Regulatory Bylaw to facilitate the siting of municipal solid waste facilities that meet municipal bylaws. *2012*
- 2.3.2 Foster research and market development for recycled materials. *Ongoing*
 - (a) Evaluate a business case for a regional scale recyclable service delivery model. *2010*
 - (b) Review desirability, feasibility and opportunity for establishing a non-profit organization to facilitate the development of recycling businesses and markets, along the lines of the 'London Remade' model in the U.K. *2012*
 - (c) Subject to the results of 2.3.2 (a) and (b), establish a regional role in processing and marketing of recycled materials, a land acquisition strategy for required recycling facilities, and enhanced policy-based initiatives to promote local recycled content in consumer goods. *Ongoing*

MUNICIPALITIES WILL:

- 2.3.3 Facilitate the siting of private sector recycling activities. *2012*
 - (a) Review zoning bylaws to remove unnecessary impediments and encourage recycling and material recovery activities in appropriately zoned areas. *2012*

- 2.3.4 Work with Metro Vancouver on the evaluation of regional scale recycling facilities and development of recycling markets. *Ongoing*

ACTIONS REQUESTED OF OTHER GOVERNMENTS AND AGENCIES:

- 2.3.5 Provincial and Federal Governments to identify and establish minimum post-consumer recycled content requirements for consumer goods. *2012*

STRATEGY 2.4

Target demolition, land clearing and construction (DLC) sector for increased reuse and recycling

Although the DLC sector has very high recycling rates due to high levels of concrete and asphalt recycling, there are significant opportunities to improve with respect to a variety of other materials such as wood and roofing.

METRO VANCOUVER WILL:

- 2.4.1 In collaboration with municipalities and industry groups, develop a process to require DLC recycling at construction/demolition sites. *2011*
- 2.4.2 Implement waste diversion strategies directed toward diverting DLC waste from disposal while supporting opportunities for beneficial use. *Ongoing*
 - (a) Encourage the role of building supply retailers and producers in the collection of DLC material for recycling. *Ongoing*
 - (b) Provide areas for separated recyclable DLC materials at Eco-Centres and at transfer stations as they are upgraded. *Ongoing*
- 2.4.3 Review existing DLC recycling and processing capacity, project future needs and develop a strategy to address any identified gaps. *2012*

MUNICIPALITIES WILL:

- 2.4.4 Work with Metro Vancouver to develop a process to require DLC recycling at construction/demolition sites. *Ongoing*
- (a) Review municipal DLC permitting processes with a view to requiring waste management plans as a condition of such permits. *Ongoing*
 - (b) Review the desirability and feasibility of deposit systems or other financial incentives to increase enforcement of DLC waste management plans. *Ongoing*

STRATEGY 2.5

Reduce paper and paperboard being disposed

Paper and paperboard make up 19% of the disposed waste stream, and much of it should be included in the existing recycling programs. Food contaminated paper, which cannot be recycled, can be composted along with other organics to produce a reusable and beneficial product.

METRO VANCOUVER WILL:

- 2.5.1 In collaboration with municipalities, businesses and non-profit organizations, conduct pilot programs to determine the most effective method of reducing unwanted junk mail and other publications and act accordingly on the results. *Ongoing*
- 2.5.2 Promote reduced paper use and increase paper recycling opportunities in the community and businesses. *Ongoing*
- (a) Carry out a community-based social marketing campaign to determine and overcome barriers to reducing the use of and increasing the recycling of paper in schools and community facilities. *Ongoing*
 - (b) Carry out a targeted outreach campaign to business to determine and overcome barriers to reducing the use of and increasing the recycling of paper. *Ongoing*

MUNICIPALITIES WILL:

- 2.5.3 Collaborate with Metro Vancouver in junk mail reduction pilot programs and community-based social marketing programs in community facilities. *Ongoing*

STRATEGY 2.6

Target organics for recycling and energy recovery

Food waste comprises 21% of the waste disposed. This, along with yard and garden waste and some paper and paperboard, can be composted together in a source separated stream to produce a beneficial and marketable product which includes compost and bio-fuel.

METRO VANCOUVER WILL:

- 2.6.1 Evaluate options for processing of organics with biosolids and other utility residuals. *2011*
- 2.6.2 Divert organics from the waste stream. *2015*
- (a) Establish additional organics processing facilities. *2011 and ongoing*
 - i. establish a system for monitoring emissions from organics processing facilities including bioaerosols. *2011 and ongoing*
 - (b) Determine which paper and paperboard products are suitable for processing at an organics management facility. *2011*
 - (c) In collaboration with municipalities, develop and implement a work plan for the diversion of organic waste, including food waste, from:
 - i. single-family residences *2012*
 - ii. multi-family residences *2015*
 - iii. the ICI sector *2015*
 - (d) Develop and implement supporting communication programs for 2.6.2 (c). *Ongoing*
 - (e) Ban all compostable organics allowed in residential green bins from disposal to landfills and all forms of waste-to-energy, except anaerobic digestion. *2015*

MUNICIPALITIES WILL:

2.6.3 In collaboration with Metro Vancouver, develop and implement a work plan, including appropriate communication programs for the diversion of organic waste from:

- i. single-family residences *2012*
- ii. multi-family residences *2015*
- iii. the ICI sector *2015*

- (a) Municipalities will divert organics from the waste stream to a Metro Vancouver or alternative licensed organics processing facility. *2015*
- (b) Municipalities will report the tonnage of diverted organic waste to Metro Vancouver in the event that organics are delivered to licensed non-regional processing facilities. *Annually*

STRATEGY 2.7

Target wood for reuse, recycle, and energy recovery

Encouraging the reuse, recycling and energy recovery from wood should follow the waste management hierarchy to ensure highest and best use of wood.

METRO VANCOUVER WILL:

2.7.1 Encourage reuse of wood. *2010*

- (a) Examine and, where feasible, implement incentives for reuse and remove barriers to re-use of wood waste. *2010*
- (b) Develop and implement information and education programs on the reuse and effective recycling of wood and other DLC waste. *2010*

2.7.2 Collect wood for reuse, recycling, and energy recovery at regional transfer stations and Eco-Centres. *Ongoing*

2.7.3 Encourage highest and best use for wood following the waste management hierarchy in the following priority: *Ongoing*

- (a) Reuse wood for comparable structural and non-structural applications.
- (b) Recycle wood fibre into other fibre based products.
- (c) Compost wood with other organic materials.
- (d) Digest wood to produce biofuels.
- (e) Process wood as a fuel for energy production.

2.7.4 Pass by-laws as required to support highest and best use of wood as outlined in 2.7.3. *Ongoing (as required).*

2.7.5 Ban all wood from disposal. *2015*

ACTIONS REQUESTED OF OTHER GOVERNMENTS AND AGENCIES:

2.7.6 Provincial Government to expand the inclusion of the reuse of wood in building codes. *Ongoing*

STRATEGY 2.8

Target plastics for increased recycling

Many plastics can be used to create new products. Recycling plastics reduces the amount of waste that must be transported, treated, and landfilled and conserves a non-renewable resource.

METRO VANCOUVER WILL:

2.8.1 Expand the recycling of plastics in the residential and commercial sectors. *2011*

- (a) Establish a standard for municipal programs for collection of plastics based on market strength. *2011*
- (b) In cooperation with retail partners and municipalities, undertake social marketing pilot programs to reduce the use of disposable take-out food and beverage packaging including plastic and other disposable bags. *2011*

MUNICIPALITIES WILL:

- 2.8.2 Work with Metro Vancouver on programs to reduce the use of disposable take-out food and beverage packaging including plastic and other disposable bags. *2011*

ACTIONS REQUESTED OF OTHER GOVERNMENTS AND AGENCIES:

- 2.8.3 The Provincial Government to develop EPR programs for all plastics, that provide incentives for alternatives to non-recyclable plastics. *Ongoing*
- 2.8.4 The Provincial and Federal Governments to require all plastic material sold in BC to have a material code identifying its composition. *Ongoing*

STRATEGY 2.9

Target multi-family and industrial, commercial and institutional (ICI) sectors to improve diversion rates

Multi-family residences and the commercial sector have relatively low diversion rates, in part because many premises do not have adequate facilities to accommodate recycling.

METRO VANCOUVER WILL:

- 2.9.1 Develop bylaws to require recycling in all multi-family and commercial buildings and complexes. *2011*
- (a) Develop a model bylaw and enforcement model to require recycling in multi-family and commercial buildings. *2011*
 - (b) Create an advisory service for recycling programs for multi-family and commercial buildings. *2011*

MUNICIPALITIES WILL:

- 2.9.2 Work with Metro Vancouver to implement recycling in multi-family and commercial buildings. *2011*

ACTIONS REQUESTED OF OTHER GOVERNMENTS AND AGENCIES:

- 2.9.3 The Provincial Government to modify the BC Building Code to require that space be provided for recycling collection, sorting and pick-up in multi-family residential and commercial buildings. *2014*

STRATEGY 2.10

Develop contingency plans for the loss of recycling markets

Changes in the local and global economies occasionally affect the demand for recovered and recycled materials.

METRO VANCOUVER WILL:

- 2.10.1 Manage diverted materials in accordance with the requirements of the Environmental Management Act and regulations in that materials will not be disposed unless all feasible opportunities for higher uses of the materials have been taken. *2011*

MUNICIPALITIES WILL:

- 2.10.2 Manage diverted materials in accordance with the requirements of the Environmental Management Act and regulations in that materials will not be disposed unless all feasible opportunities for higher uses of the materials have been taken. *2011*

STRATEGY 2.11

Integrated Utility Management Advisory Committee

An interagency committee would advise Metro Vancouver on the integration of utility systems.

METRO VANCOUVER WILL:

- 2.11.1 Establish a new overarching committee, the Integrated Utility Management Advisory Committee (IUMAC), to advise Metro Vancouver on plan implementation, particularly from the perspectives of integrated planning and resource recovery across utility systems. *2011*

Goal 3: Recover energy from the waste stream after material recycling

The following strategies will increase processing of the waste remaining after recycling in order to provide the highest beneficial use to society.

STRATEGY 3.1

Use waste-to-energy to provide electricity and district heating

Waste-to-energy facilities most effectively and efficiently extract energy from the waste stream remaining after recycling and when combined with district heating can reduce the environmental impacts of energy use. The planned capacity of such facilities should be compatible with waste diversion targets and initiatives, and projected waste flows which remain after such diversion.

All waste-to-energy facilities must meet or exceed the minimum energy efficiency required to be classified under the 4th R - Recovery as outlined in European Union standard (PE-CONS 3646/08) and accepted by the Province of BC.

METRO VANCOUVER WILL:

3.1.1 Continue use of existing waste-to-energy facility in Burnaby.

- (a) Subject to the limitations established in the section titled "Flow Control", use the facility at its current usage and capacity of 280,000 tonnes per year to recover available energy in the waste remaining after recycling for district energy and electricity generation. *Ongoing*
- (b) Continue to meet the monitoring and emission requirements in Appendix A. *Ongoing*
- (c) Continue to improve environmental performance of the facility with improved technologies and monitor performance to ensure compliance with applicable legislation and regulations. *Ongoing*

- (d) Operating performance will continue to be reported on a regular and timely basis and will also be available on the Metro Vancouver web site. *Ongoing*
- (e) The waste-to-energy facility in Burnaby will comply with applicable legislation and operating contracts may include penalties for any violations of performance criteria. *Ongoing*

3.1.2 Expand the use of waste-to-energy. *2015*

Waste-to-energy means any process that converts waste material to energy and heat, including the production of fuel which is subsequently combusted for these purposes. All options will be considered and evaluated fairly and transparently including a public health cost/benefit lens.

- (a) Establish up to 500,000 tonnes per year of new waste-to-energy capacity in one or more facilities.
- (b) Ensure implementation of new waste-to-energy capacity maximizes energy recovery for use in district heating, production of alternative fuels, industrial applications and electricity generation.
- (c) Monitor trends in waste reduction, recycling and waste flows and implement additional waste-to-energy capacity if, and only if, justified on the basis of these trends.
- (d) Scale any additional waste-to-energy capacity so that total waste-to-energy capacity does not exceed the most probable minimum waste flow projected over the economic life of those facilities.
- (e) Operating performance will be reported on a regular and timely basis and will also be available on the Metro Vancouver web site. Any new waste-to-energy facility will comply with applicable legislation and operating contracts may include penalties for any violations of performance criteria.

-
- 3.1.3 Locate new waste-to-energy capacity on the basis of: site availability; suitability of site for providing district heating from recovered energy; potential for site to optimize network of transfer stations; results of local screening level impact assessment and triple bottom line analysis; and results of community consultation process for each potential site.
- 3.1.4 Ensure that new waste-to-energy facilities are designed to maximize the environmental, financial and social benefits of facilities.
- (a) Evaluate cost/benefits of proposed new facilities over their lifetime, including construction, commissioning, operation and maintenance, future retrofits and decommissioning impacts, and ownership structure.
 - (b) Conduct an environmental impact assessment of a waste-to-energy facility(ies), based on applicable provincial and federal government requirements, including an assessment of human health risk acceptable to the applicable health authority.
 - (c) Evaluation criteria will include: cost; use of best available commercial technology; air emission and health impacts; GHG emissions; alignment with sustainability principles; electricity, district heating and alternative fuel production; beneficial use of ash; metals recovery; potential local job creation; and opportunities for research and education.
- 3.1.5 Recover metals, ash or other residues from new and existing waste-to-energy facilities for beneficial use. *Ongoing*
- (a) Work with regulatory agencies to identify and remove barriers to beneficial use of ash.
 - (b) Maximize metal recovery from the waste stream after recycling.
 - (c) Process bottom and fly ash to generate products for beneficial use.
 - (d) Use processed bottom and fly ash beneficially for highest value applications available.

- (e) If beneficial use of a residue is not reasonably available, dispose of the residue in accordance with applicable legislation.

- 3.1.6 Recover energy from regional utility materials that cannot be recycled, including liquid waste and water utilities. *Ongoing*
- (a) Recover energy from drinking water treatment processes, such as organic filter media that cannot be recycled.
 - (b) Use waste-to-energy to process grit and screenings from wastewater treatment for beneficial uses, where appropriate.
 - (c) Use reclaimed water from wastewater treatment plants in waste-to-energy steam generation or district heating, if viable.

STRATEGY 3.2

Recover energy from other solid waste management facilities

Valuable methane in landfill gas will be captured and used to generate clean electricity or heat.

MUNICIPALITIES (CITY OF VANCOUVER) WILL:

- 3.2.1 Recover landfill gas from Vancouver Landfill and strive to maximize the beneficial use of the recovered gas. *Ongoing*

STRATEGY 3.3

Utilize non-recyclable material as fuel

Some materials cannot be recycled. However, such materials can provide a valuable source of fuel, replacing virgin fossil fuels.

METRO VANCOUVER WILL:

- 3.3.1 Direct recoverable loads of combustible material received at transfer stations to public or private energy recovery facilities. *2012*

MUNICIPALITIES (CITY OF VANCOUVER) WILL:

- 3.3.2 Collaborate with Metro Vancouver in ensuring action 3.3.1 is carried out at solid waste management facilities operated by the City of Vancouver. *2012*

ACTIONS REQUESTED OF OTHER GOVERNMENTS AND AGENCIES:

- 3.3.3 Provincial Government to develop material and energy requirements for existing and future stewardship programs to use the non-recyclable portion of returned material as fuel rather than landfilling. *2012*

Goal 4: Dispose of all remaining waste in landfill, after material recycling and energy recovery

STRATEGY 4.1

Utilize the Vancouver Landfill as a disposal site

Waste will remain after recycling and energy recovery. Additionally, as a result of ensuring that waste-to-energy facilities are sized to be compatible with waste reduction and diversion objectives, there will be residual (post recycling) waste flows which exceed the aggregate capacity of the region's waste-to-energy facilities. Such waste must be disposed of in an environmentally sound and economically efficient manner. The Vancouver Landfill provides a local solution for remaining waste.

METRO VANCOUVER WILL:

- 4.1.1 Use the Vancouver Landfill to dispose of any remaining waste not directed to waste-to-energy facilities. *Ongoing*
 - (a) Metro Vancouver will work with the City of Vancouver and Corporation of Delta to reduce the quantity of waste going to the Vancouver Landfill to a maximum of 100,000 tonnes annually, exclusive of waste-to-energy residuals, by 2020. Should these reductions not be achieved because overall waste flows exceed the combined capacity of disposal options, Metro Vancouver will evaluate cost effective alternatives and if appropriate seek an amendment to this Plan to expand waste-to-energy capacity to further reduce waste flows to the Vancouver Landfill.
 - (b) Monitor the Vancouver Landfill to ensure compliance.
- 4.1.2 Report annually on the remaining capacity of the waste management system and prior to the closure of Vancouver Landfill, reassess the region's waste-to-energy and disposal options. *Ongoing*

MUNICIPALITIES (CITY OF VANCOUVER AND THE CORPORATION OF DELTA) WILL:

- 4.1.3 Work with Metro Vancouver to accommodate residual waste flows at the Vancouver Landfill.
- 4.1.4 Where limits in the Operational Certificate, contracts, agreements and regulations appear to conflict with the Plan, review the particular provisions in good faith with the Province, Metro Vancouver and any other involved party to determine if there is a solution acceptable to all affected parties. *Ongoing*

STRATEGY 4.2

Ensure a disposal site is available for DLC waste

Notwithstanding efforts to increase recycling, local public and private disposal sites for DLC waste are expected to reach their capacity in the near future. Collaboration with local and out-of-region stakeholders is necessary to anticipate DLC waste flows and identify future disposal sites.

METRO VANCOUVER WILL:

- 4.2.1 Assess long-term disposal of demolition, landclearing, and construction (DLC) waste remaining after recycling in collaboration with the private sector, neighbouring regional districts and First Nations communities. *Ongoing*
- 4.2.2 Identify disposal sites for DLC waste remaining after recycling that will be available when existing disposal facilities reach their capacity. *Ongoing*

STRATEGY 4.3

Establish contingency disposal sites

During the implementation of, or, following the implementation of Goal 3, if waste-to-energy capacity and/or local landfill capacity do not provide adequate disposal capacity, Metro Vancouver will need to use out-of-region landfill(s) for disposing of non-recyclable waste.

METRO VANCOUVER WILL:

- 4.3.1 Ensure adequate landfill capacity for:
- (a) non-combustible and non-recyclable material; and
 - (b) municipal solid waste in excess of waste-to-energy and in-region landfill capacity (including allowances for variability in waste flows and short-term operational disruption), and non-recyclable ash. *Ongoing as required*
- 4.3.2. If sufficient waste-to-energy or in-region landfill capacity is not available, this Plan explicitly permits Metro Vancouver to seek, through an appropriate procurement process, the best available out-of-region landfill(s) for the disposal of remaining waste, subject to that facility having appropriate permits, from the local permitting jurisdiction in which it is located, to accept such waste. *Ongoing as required*
- (a) Categories of evaluation for a contingency landfill will include, but not necessarily be limited to cost, air emissions, GHG emissions, energy benefit and, where appropriate, completion of a satisfactory human health impact assessment.
 - (b) Monitor contingency disposal site(s) for performance and compliance. *Ongoing*

Performance Measures and Adaptive Management

PERFORMANCE MEASURES

Metro Vancouver will develop a waste accounting system for the entire solid waste management system, identifying the quantities generated, recycled, composted, used for energy recovery, and disposed in landfill. Comparison of per capita disposal values will provide the most accurate assessment of progress of the Plan.

The following performance measures will monitor progress in achieving the specific goals. Performance should be considered in the context of 2008 waste management data.

PERFORMANCE MEASURES FOR EACH GOAL ARE:

Goal 1: Minimize waste generation

- Waste generation quantities for all sectors tracked year-over-year and on a rolling five-year basis.
- Increase of product stewardship initiatives by senior governments to more than two initiatives every three years.
- Monitor performance of EPR programs to ensure shift in responsibility from public to private sector achieves a reduction in total waste generated.

Goal 2: Maximize reuse, recycling and material recovery

- Overall diversion rate tracked year-over-year.
- Diversion rate per-capita tracked year-over-year.
- Waste disposed per-capita tracked year-over-year.
- Tracking of material recycling tonnage.
- Monitor performance of EPR programs to ensure shift in responsibility from public to private sector achieves an increase in materials reused, recycled, and recovered.

Goal 3: Recover energy from the waste stream after material recycling

- Energy outputs from solid waste and its beneficial use tracked year-over-year.
- Energy outputs recovered from materials that cannot be recycled through recycling efforts and stewardship programs.
- Greenhouse gas production tracked year-over-year.

Goal 4: Dispose of all remaining waste in landfill, after material recycling and energy recovery

- Quantity of treated and untreated waste per capita going to landfill is tracked year-over-year.

In addition, Metro Vancouver will carry out periodic waste composition audits.

ADAPTIVE MANAGEMENT

A key feature of the Plan is adaptive management – monitoring progress, identifying challenges, and finding solutions to overcome challenges. Through monitoring, assessment, and collaboration, Metro Vancouver and its members will continue to adapt and evolve their solid waste management operations and infrastructure and create more resilient and adaptable systems. Adaptive management will include the following initiatives:

- In the event of circumstances such as an operational disruption or closure at a facility identified in the Plan, the region will be prepared to send surplus waste to an out-of-region landfill until sufficient processing or disposal capacity becomes available in the region. Permitted landfill(s) will be selected based on:
 - (a) ability to provide service on a short-term or interim basis;
 - (b) sustainability principles.
- Continue to assess the success of initiatives outlined in the Plan against the overall trends in waste generation and the performance of waste-to-energy facilities to determine the need for an emphasis of future resource allocations to the various strategies and actions.
- Continue to receive advice from the Waste Management Committee.
- In collaboration with municipalities, biennially produce a progress report on plan implementation for distribution to the Ministry of Environment that:
 - (a) summarizes progress from the previous two years on regional and municipal plan implementation, the status of performance measures, and relevant education and outreach programs;
 - (b) includes summaries and budget estimates for proposed Metro Vancouver and municipal ISWRMP implementation programs for the subsequent two calendar years.
- Will obtain public feedback on the report by making the report available through Metro Vancouver's website and by holding a special meeting of the Metro Vancouver Waste Management Committee to receive public comments and input on the report.
- In collaboration with members and the Ministry of Environment, produce an ISWRMP progress report every two years, a comprehensive performance review every five years, and a full plan review and update every ten years.
- Municipalities will work with Metro Vancouver to give effect to the adaptive management initiatives.

Financial Implications

ROLES AND RESPONSIBILITIES

Solid waste management services are provided for the region collaboratively by Metro Vancouver, member municipalities, and the private sector. While the roles of each party may overlap, primary roles for recycling include: Metro Vancouver establishes policy for waste diversion initiatives, member municipalities implement recycling programs including collection within their municipalities, and the private sector provides collection services, manages material brokerage and physical recycling of materials including provision of infrastructure for recycling facilities.

Responsibilities for disposal of the remaining solid waste includes: Metro Vancouver establishes policy for waste disposal, and manages infrastructure and operations of transfer and disposal facilities; member municipalities manage solid waste collection services; and the private sector may provide services for collection, and operation of transfer and disposal facilities. The main exception to these roles is the ownership and operation of the Vancouver Transfer Station and Landfill by the City of Vancouver.

COST OF SOLID WASTE MANAGEMENT

Funding for material recycling is provided by residents and businesses through one of two mechanisms. Materials with no associated industry stewardship program, such as paper, are funded from businesses and residents to recycling collectors (municipalities, or private sector contractors) either through municipal taxes or through direct contracts with collectors. Materials covered by Extended Producer Responsibility programs, such as beverage containers, are typically funded through deposits paid by consumers to the industry association which then carries responsibility for collection and recycling of the materials.

As outlined in Table 1, within Metro Vancouver, net expenditures associated with recycling activities are currently estimated to be \$190 million annually. This reflects the cost paid to contractors for collection, transportation, and processing of recyclable materials. Following implementation of actions within this Plan, regional recycling net expenditures are

projected to increase by 42% to \$270 million annually – an increase of \$80 million each year. The increase in economic activity will result in a corresponding increase in the diversion rate from 55% to 70% - a 27% increase. The cost increase of 42% producing a 27% increase in recycling reflects diminishing returns with respect to recycling materials with lower value, or more expensive processes and infrastructure. This trend of diminishing returns is anticipated to continue as the 70% diversion target is approached since the remaining materials become more challenging and costly to recycle.

Funding for management of the materials remaining after recycling is provided by residents and businesses to solid waste collectors (municipalities or private sector contractors) either through municipal taxes or through direct contracts with the private sector collectors.

Within Metro Vancouver, net expenditures associated with solid waste disposal are currently estimated to be \$360 million annually. This reflects the cost for collection, transportation, and disposal of solid waste remaining after recycling. Following implementation of actions within this Plan, regional solid waste disposal net expenditures are projected to decrease by 39% to \$220 million annually – a decrease of \$140 million each year. This decrease is due to the reduction in waste quantities, and increased revenues from energy recovery through actions outlined in Goal 3 of the Plan.

The system costs for both recycling and disposal are also expressed in Table 1 on a per-capita basis. The per-capita cost for recycling will be higher than disposal, reflecting the greater quantities of recyclable materials. However, pricing will be established to ensure a financial incentive to encourage recycling and waste diversion.

The costs identified in Table 1 reflect expenditures based upon the actions identified in the Plan which includes additional waste-to-energy capacity provided within the region. Alternately, if waste-to-energy capacity is provided out-of-region, net costs are anticipated to increase by \$1.5 billion dollars over 35 years, or, \$43 million annually. Similarly, if out-of-region landfill capacity is pursued, net costs are anticipated to increase by \$1.5 billion over the same

time frame, or \$43 million annually compared to the proposed plan. It is expected that the cost to export waste to the U.S. would be similar to those presented for out-of-region landfill.

While Table 1 identifies the net regional expenditures on waste management, it does not account for the regional economy associated with recycling and disposal. There is considerable economic activity that takes place in the process of recycling the collected materials into new goods as an alternative to virgin feedstocks. Although difficult to estimate, the economy associated with remanufacturing recycled materials into new products exceeds the costs for collection, transportation and processing. Net expenditures associated with disposal more closely reflect the entire disposal economy since there is little economic activity that occurs following disposal. While this Plan places much greater emphasis on waste reduction and recycling, and shifts regional net expenditures in alignment with this emphasis, there is an even greater shift in the overall regional economy from disposal to waste reduction and recycling. As a result, the regional economy for waste reduction and recycling far exceeds that for waste disposal and therefore is reflective of the priority placed upon waste reduction, reuse and recycling as outlined in this Plan.

PRICING STRATEGIES

The costs of operating the integrated solid waste and resource recovery system, including initiatives to encourage waste reduction, reuse and recycling, will be funded from revenues from users of the system (principally the tipping fee) and from revenues from recovered resources (recycled materials and recovered energy).

Residents and businesses will have an economic incentive to invest in waste diversion initiatives, arising primarily from the difference between the cost of recycling and the tipping fee for waste disposal at public facilities. The regional tipping fee will continue to be set at a rate to recover Metro Vancouver's cost to manage the solid waste system. The tipping fee for many recyclable materials will be reduced or waived at regional facilities to encourage participation.

By utilizing this economic incentive of reducing or waiving the tipping fee for recyclable materials, positive behaviour will be encouraged thereby driving an increase in the material diverted from the disposal stream and helping to achieve the 70 percent diversion target. Pricing will be established so that the most expensive choice for residents and businesses will be to place materials in garbage cans and dumpsters for disposal.

OWNERSHIP AND FINANCING

There are options to be considered for facility ownership and the related business model for all new facilities contemplated in this Plan. Currently, the existing waste-to-energy facility in Burnaby is owned by Metro Vancouver and operated by a contractor under a long-term operating agreement. The benefits of facility ownership include the accrual to Metro Vancouver of debt reduction once debt has been fully serviced, full control of all upgrades associated with the facility, no need for put-or-pay contracts, the ability to fully maximize revenues to offset costs, the control of all indirect costs including royalty payments, the control and negotiation of all operating certificates and the ability to further minimize cost by not requiring a profit margin. The consideration of the benefits of ownership was paramount when the decision was made in 2000 by the Board to purchase the Ashcroft Ranch and pursue the development of a Metro Vancouver owned landfill. In selecting the ownership and business model for new facilities Metro Vancouver will choose the option that results in the best available financial position for the residents and businesses of the region.

Where capital needs to be raised and debt financed, the least expensive alternative is Metro Vancouver ownership with financing provided through the Municipal Finance Authority. In addition to this financing structure, Metro Vancouver will explore other structures including Public Private Partnerships (3P) on a facility specific basis, where capital financing may be provided by the private sector partner.

TABLE 1 REGIONAL WASTE MANAGEMENT – NET EXPENDITURES

| | 35 Year Net Cost (\$ billion) | Annual Net Cost (\$ million) | Per Capita Cost (\$) |
|--------------------------|----------------------------------|---------------------------------|-------------------------|
| Total Current SWMP | \$20 | \$550 | \$247 |
| Total Proposed ISWRMP | \$18 | \$490 | \$220 |
| Difference | (\$2) | (\$60) | (\$27) |
| Current Recycling (55%) | \$7 | \$190 | \$85 |
| Proposed Recycling (70%) | \$10 | \$270 | \$121 |
| Difference | \$3 | \$80 | \$36 |
| Current Disposal | \$13 | \$360 | \$162 |
| Proposed Disposal | \$8 | \$220 | \$99 |
| Difference | (\$5) | (\$140) | (\$63) |

As the outcomes of this Plan contribute to the achievement of provincial and federal environmental and energy goals, and as regional and municipal financial resources are limited, and as public investment in the actions set out in this Plan will assist in achieving the goals of this Plan and are in the public interest, financial support from provincial and federal sources will be sought to implement waste diversion programs and develop facilities identified in the Plan.

FINANCIAL DETAILS

Direct expenditures by Metro Vancouver and member municipalities for Goals 1 and 2 of the draft Plan are estimated to cost \$170 million in one-time capital costs, and \$40 million in annual operating costs. Significant initiatives provided through these expenditures (action number provided for reference) include: establish and progressively expand a network of Eco-Centres (2.2.4); divert organics from the waste stream through separated collection from residential and industrial, commercial and institutional sectors, and establishing one or more organics processing facilities (2.6.2, 2.6.3); provide information and education including social marketing programs (1.2.1, 1.3.1, 1.3.2, 1.3.3, 2.2.2, 2.2.5, 2.2.6, 2.2.7, 2.5.2, 2.5.3, 2.6.2, 2.6.3, 2.7.1); regionally mandate DLC

recycling at jobsites (2.4.4); and regionally mandate recycling in all multifamily and commercial buildings (2.9.1, 2.9.2).

Expenditures for actions identified in Goals 1 and 2 will be funded through tipping fees received for waste disposal and from revenues associated with actions. For example, expenditures for Eco-Centres will be partially offset by compensation from industry stewards for EPR material collection at the Eco-Centres and from private sector partners operating at Eco-Centres Revenue from compost or energy sales at organics processing facilities will offset the costs associated with operating these proposed facilities.

Direct expenditures by Metro Vancouver and member municipalities for Goals 3 and 4 of the draft Plan are dependent upon the financing and ownership structure for new facilities. If new disposal facilities are provided by and owned by Metro Vancouver, costs for Goals 3 and 4 are estimated to be \$440 million in one-time capital costs. Annual operating costs are projected to be approximately \$15 million lower than current costs under this financing and ownership structure, tipping fees for waste disposal will increase initially during the 15 year amortization period. Following debt retirement, net expenditures will decrease considerably reflecting the revenue

from new waste-to-energy capacity and no debt repayment costs. Over a 30 year operating period, total revenues for new waste-to-energy facilities are projected to exceed the total expenditures resulting in a net revenue. Profit will continue to increase each subsequent year as revenues are accrued in the absence of any capital repayment costs. This is favourable over a 30 year operating period when compared to a \$3.1 billion expenditure for an option emphasizing mechanical biological-treatment processing or a \$1.5 billion expenditure for an option emphasizing landfilling.

Provision of waste-to-energy capacity is estimated on the basis of a single new facility providing 500,000 tonnes capacity annually. Distributed systems of waste-to-energy using several smaller facilities will provide social and environmental benefits in the form of additional facilities and the corresponding increased convenience to customers, and reduced emissions and congestion from transportation of waste from regional transfer stations. Financially, a distributed system would reduce the need for transfer stations and associated costs, but would also reduce economies of scale provided by a larger capacity facility and result in higher costs.

If new waste-to-energy facilities are owned and financed by the private sector, costs for Goals 3 and 4 may be recovered over a longer time frame and the regional tipping fees could increase gradually over time due to inflated contract costs. Over a 30 year operating period, privately owned facilities could cost hundreds of millions of dollars more than public ownership if increasing energy revenues accrue to the private sector owner. Accordingly, Metro Vancouver will pursue the ownership and financing model that is in the best interest of member municipalities, residents, and businesses within the region.

Appendix A

Long Term Monitoring Requirements for the Waste-to-Energy Facility in Burnaby

This appendix outlines the long term monitoring requirement for Metro Vancouver's Waste-to-Energy Facility in Burnaby as originally outlined in Metro Vancouver's (formerly Greater Vancouver Regional District) 1995 Solid Waste Management Plan (SWMP).

1.0 AIR DISCHARGE LIMITS AND MONITORING METHODS

Where applicable, all contaminant concentrations are stated at standard conditions of 293 K, 101.3 kilopascals (1 atmosphere), corrected to 11% oxygen and dry basis unless otherwise noted. Discharge specifications apply to each incinerator unit separately. A continuous time-shared analyzing system is used for monitoring emissions from all three incineration units.

1.1 OPACITY

Opacity shall not exceed 5% based on 1-hour averaging of continuous monitoring.

1.2 PARTICULATE MATTER

Particulate matter from each incinerator stack shall not exceed 20 mg/m³ based on manual stack testing methods approved by the Regional Waste Manager.

1.3 CARBON MONOXIDE (CO)

Carbon monoxide emissions shall not exceed 55 mg/m³ for steady state incinerator operation based on a 4-hour rolling average of continuous monitoring.

1.4 SULPHUR DIOXIDE (SO₂)

Sulphur dioxide emissions shall not exceed 200 mg/m³ based on a 24-hour average of continuous monitoring. This shall be verified by manual stack testing.

1.5 NITROGEN OXIDES (NO_x)

The GVRD will implement a NO_x reduction strategy by July 1996 as required by the BC Ministry of Environment to meet or exceed the BC MSW Criteria limit of 350 mg/m³, expressed as NO₂ on a 24-hour average of continuous monitoring.

1.6 HYDROGEN CHLORIDE (HCl)

Hydrogen chloride emissions shall not exceed 55 mg/m³ (wet basis), based on manual stack testing methods approved by the Regional Waste Manager. Continuous monitoring of SO₂ shall be used as a surrogate for emission monitoring of acid gases, such as HCl and HF. Continuous monitoring of HCl (using a 24 hour average) shall be conducted for reporting purposes until the end of the useful life of the HCl analyzer.

1.7 HYDROGEN FLUORIDE (HF)

Hydrogen fluoride emissions shall not exceed 3 mg/m³ based on manual stack testing methods approved by the Regional Waste Manager.

1.8 TOTAL HYDROCARBONS (THC)

Total hydrocarbon emissions (measured as methane, CH₄) shall not exceed 40 mg/m³ based on manual stack testing methods approved by the Regional Waste Manager. Continuous monitoring of carbon monoxide emissions shall be used as a surrogate indicator to monitor combustion efficiencies and the discharge of combustibles, such as total hydrocarbons.

1.9 TRACE METALS

Trace metal emissions shall not exceed the following limits based on manual stack testing methods approved by the Regional Waste Manager:

METALS LIMIT

| METALS | LIMIT |
|---|------------------------|
| Total of Cadmium, Mercury, and Thallium | 200 µg/m ³ |
| Total of Arsenic, Cobalt, Nickel, Selenium, and Tellurium | 1000 µg/m ³ |
| Total of Antimony, Lead, Chromium, Copper, Manganese, Vanadium and Zinc | 5000 µg/m ³ |
| Mercury | 200 µg/m ³ |
| Cadmium | 100 µg/m ³ |
| Lead | 50 µg/m ³ |

Continuous monitoring of opacity shall be used as a surrogate indicator for trace metal discharges.

1.10 TRACE ORGANICS

Trace organic emissions shall not exceed 0.5 ng/m³ for the sum of PCDD and PCDF as toxicity equivalents, and 5 µg/m³ for polyaromatic hydrocarbons based on manual stack testing methods approved by the Regional Waste Manager. Frequency of manual stack testing shall be as required by the Regional Waste Manager.

1.11 FREQUENCY OF MANUAL STACK TESTING

Manual stack testing for trace organics shall be performed as required by the Regional Waste Manager. HF and THC testing shall be conducted annually. SO₂, HCl, particulates and trace metals shall be conducted three times in both 1995 and 1996. If the results of these tests are satisfactory, frequency will be reduced to annual testing.

2.0 ADDITIONAL MONITORING AND REPORTING

2.1 FURNACE TEMPERATURE

Furnace reference temperature for each incinerator unit shall be monitored and reported with a minimum of 800°C based on a 1-hour averaging time during normal operating conditions.

2.2 EMISSION CONTROL DEVICE TEMPERATURE

Emission control device temperature shall not exceed a temperature of 190°C based on a 1-hour averaging time.

2.3 MONITORING OF OXYGEN

Oxygen shall be continuously monitored and reported as a percentage of stack gas on a 1-hour averaging basis.

2.4 FLOWRATE AND OPERATING PERIOD

The flue gas flow rate for each incinerator unit shall not exceed 1200 m³/minute for a continuous operating period.

2.5 AVAILABILITY

The monthly availability of the SO₂ continuous monitor shall be at least 90%. Opacity, oxygen, carbon monoxide, reference furnace temperature, and emission control device outlet temperature shall have a monthly availability of at least 95%.

The Regional Waste Manager shall be notified of any continuous monitor failure for a period which may result in non-attainment of the recommended availability. If immediate corrective action was taken to return the monitor to service, compliance shall be granted providing the District can supply evidence (operating and emission data) indicating that the facility was in normal continuous operation.

2.7 MONTHLY REPORTING

Monthly reports shall include compliance summaries for all parameters with specified limits. Tabulated hourly averaged data and data based on required averaging periods of all continuously monitored parameters, including availability and data capture information, shall be available for inspection but not included in the monthly report. Raw data shall be maintained and available for inspection at the incinerator site for a minimum period of two years.

2.8 ANNUAL REPORTING

An annual report shall be provided within 90 days following the end of the calendar year. The report shall consolidate and summarize the monthly data as well as briefly summarize the topics itemized in Section 6.3 of the BC MSW Criteria.

2.9 START-UP, SHUTDOWN AND UPSET CONDITIONS

During start-up, shutdown, equipment malfunction and operating upsets requiring shutdown (i.e. ash discharge or feed chute plugging), emission data recorded by the CEMS shall be excluded from the regulatory emission averaging calculations. When required, the time, duration, and reason for an occurrence during transient conditions shall be reported to the Ministry. The corrective action taken by the operator in attempting to return the operation to steady-state conditions shall be included in the report.



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