Newfoundland Labrador

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GUIDANCE DOCUMENT

Title: **Environmental Standards for Construction and Demolition Waste Disposal Sites**

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ENVIRONMENTAL STANDARDS FOR CONSTRUCTION AND DEMOLITION WASTE DISPOSAL SITES
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List of Appendices (posted as separate documents on the Departmental website)

1.0 PURPOSE

The purpose of these standards is to outline the requirements for the construction, operation and decommissioning of a Construction and Demolition (C&D) Waste Disposal Site, to minimize nuisance and provide a high level of environmental protection. This version supercedes the April 9, 2008 Environmental Standards for Construction and Demolition Waste Disposal Sites as amended by B. Rowe.

This document is intended to serve as guidance in applying for a Certificate of Approval for the Construct and Operation of a Waste Management system from the Department.

2.0 BACKGROUND

The construction and demolition (C&D) waste portion of the waste stream can be diverted from disposal at an engineered containment landfill. C & D wastes typically include solid waste materials from the construction, renovation, and demolition of buildings and structures. Although much of this material can be reused or recycled, a small percentage may have to be disposed to a C & D landfill, and in some cases to a municipal solid waste landfill, or another approved treatment or final disposal facility.

Only the non-hazardous C & D wastes shall be accepted for disposal at these sites. The hazardous waste component would normally be identified and safely removed prior to demolition of a structure. Such hazardous materials may include lead-based paint, asbestos containing shingles and insulation, and PCB-containing fluorescent light ballasts in older buildings. Newer structures may generate quantities of treated lumber and small quantities of heavy metals and radioactive materials contained in items like smoke detectors. Appropriate disposal of hazardous materials is required to reduce the risk environmental contamination, and any risk to worker and public health and safety. Further information is available from the Department.

A list of materials not commonly accepted for disposal at C & D landfills is provided at the end (page 20) of this document Proposals for additional activities at a C & D Waste Disposal Site such as re-use and/or recycling operations, also require approval from the Department.

3.0 APPLICATION OF ENVIRONMENTAL STANDARDS

These standards apply to all aspects in the life cycle of a Construction and Demolition Waste Disposal Site: siting, design, construction, disposal of waste and decommissioning They do not apply to:

- reuse or reclamation of construction and demolition wastes, unless they are stockpiled on the site
- transfer and/or transportation of C&D waste from one location to another; or,
- disposal of "clean fill".

These standards do not specifically address guidelines that may be in place, or approvals that may be required from other agencies or municipalities.

The General Environmental Standards for Municipal Solid Waste Management Facilities also apply to Construction and Demolition Debris Landfills.

For all facilities, alternative environmentally sound designs and technology may be approved, in keeping with advancements in landfill and waste management science, and any resultant changes in regional waste composition or management practices. It is the responsibility of the owner/operator (proponent) to demonstrate, to the satisfaction of the Department, that the proposed alternate design is capable of achieving an equivalent or higher level of environmental protection than the standards. Alternative designs and technology will be assessed on technical merit and evaluated on a case by case basis.

4.0 LEGISLATION AND APPROVALS

The requirements outlined in Sections 4.1 through to 4.5 of the General standards for Municipal Solid Waste Management Facilities apply to Construction and Demolition Debris waste disposal sites within the context of a Regional Waste Management System. These sections address the legislative authority, the Certificate of Approval process, approval of other on-site activities; public notification / information and requirements for financial assurance / environmental impairment liability insurance.

The Department may permit the construction and operation of more than one (1) construction and demolition debris waste disposal site per waste management region if the site is co- located with a component of the regional waste management system such as a transfer station.

At this time C & D waste disposal sites that are not associated with a Regional Waste Management System are not being considered.

5.0 ENVIRONMENTAL STANDARDS

5.1 Site Selection

Table 1 provides a brief summary of siting criteria for a C&D landfill /waste disposal site. Applicants are advised to exceed these recommendations where possible to reduce potential conflict with other land users. The Department may alter setback requirements based on site specific information, provided that the proposed design and setback distance continues to achieve an equivalent or higher level of environmental protection.

5.2 Site Investigation: Hydrology, Surface Water and Groundwater

Site investigations are undertaken to provide an environmental baseline on regional and local hydrogeology, surface water and groundwater quality/conditions for the proposed site. A summary of site characteristics as it relates to potential transport of contaminants in the environment is required prior to any approval for construction. The factors addressed include: soil and bedrock composition, the hydraulic conductivity, depth to groundwater, direction of groundwater flow, and use of the aquifer for drinking water supplies. Surface water resources are also discussed where relevant and include: the location of on-site and off-site surface water bodies and the use of surface water for drinking water and other purposes. The presence of wetlands, floodplains and sensitive environmental features is also addressed.

Further detail on the content of a site investigation is contained in Section 5.2 of the General Environmental Standards for Municipal Solid Waste Management Facilities.

Table 1: Recommended separation distances for Construction and Demolition Debris Landfills	
Land Use	C & D Waste Disposal Sites shall not be sited in environmentally sensitive areas (parks, nature reserves, areas where there may be endangered species of plants or animals, wildlife migration corridors, wetlands, etc). C & D Waste Disposal Sites shall be established in accordance with municipal zoning requirements.

Access and Road Restrictions	Access roads shall be accessible year round by the weight and type of vehicles anticipated.	
Flood Plain	The site shall not be located within a 100 year flood plain or in any area which has greater than 1% chance of flooding in any year. Flood risk mapping shall be consulted if available.	
Watersheds	A C&D Waste Disposal Site shall not be located in a protected water supply area or a protected well field.	
Hydrogeology	Areas where there is a reasonable depth of native soils and no useful groundwater resources are preferred.	
Separation Distances from C&D Waste Disposal Site Property Boundary	**Feature**	**Recommended Separation Distances (m)**
	Active disposal area (the 15 m closest to the property boundary must be reserved for natural or landscaped screening (berms or vegetative screens))	50
	Residential and Institutional Properties (Examples: public schools, hospitals, churches, public parks and playgrounds)	300
	Industrial and Commercial Property	150
	Right-of Way of a Public Road	100
	The High Water Mark of a significant waterbody as defined under the Water Resources Act and/or as assessed by the Department.	100
	Drinking Water Supply (Well or Surface Water)	300
Unstable Area	Landfills are not to be located within 100 metres of an unstable area	
Airports	The Landfill site shall be located a minimum of 8 km from airports that are used by commercial aircraft. This distance may be reduced if bird control measures, that are approved by both Transport Canada and the Department, are implemented or if the potential for birds causing hazard to aircraft is minimal.	
Fire Break	Distance to be Approved by the Dept. of Natural Resources and/or local Fire Department	

5.3 Construction & Demolition Waste Disposal Site Location

The general information required regarding the location and design of a C&D waste disposal site is set out in Section 5.3 of the General Environmental Standards for Municipal Solid Waste Management Facilities.

In all cases waste disposal sites shall be designed and constructed to provide environmental protection for surface water and groundwater resources, to control nuisance and risk, to facilitate site operations, decommissioning and future use of the site (i.e. post-decommissioning).

Information requirements specific to the design of a C&D landfill shall also include:

- ✓ A surveyed plot plan indicating the respective permeability and construction materials used for the landfill area(s), and the location of permanent markers to visually indicate proposed cell boundaries.
- ✓ A description of the layout, horizontal and vertical dimensions, elevations of the bottom of disposal cells, final contours to be achieved at the conclusion of filling, overall volumetric capacity (cubic metres) of the disposal site, and expected lifespan.

5.4 C & D Landfill Design

The following landfill design/construction standards shall apply :

- The dimensions of the disposal area(s) shall be sufficient to contain the waste accepted and provide environmental protection over the life of the facility.
- The base of the filled areas shall be sloped for gravity drainage to a point outside the filled areas, at a grade of no less than 2% and no more than 6%.
- Side slopes of excavations for construction and demolition waste shall not exceed 1 vertical to 2 horizontal.
- Side slopes of finished surfaces intended to be the final elevations shall not exceed 1 vertical to 3 horizontal.
- The base layer, located between the lowest elevation of any of the C& D waste and the highest elevation of the groundwater or bedrock, shall be at least1 metre of soil with a hydraulic conductivity of $1x10^{-5}$ cm/sec.
- The cell walls must be constructed with a 1 metre layer of soil to function as a fire break
- A surveyed plot plan indicating the area that is to be lined (soil of minimum hydraulic conductivity of $1x10^{-5}$ cm/sec) shall be provided with the application. After construction, permanent markers are required to be installed which visually indicate the boundaries of the cells.

6.0 CONSTRUCTION

The standard for construction of a Construction and Demolition Debris waste disposal site / landfill and any associated facility (ies), shall be consistent with the General Environmental Standards for Muncipal Solid Waste Management Facilities. The standard requires: an approved design and Quality Assurance and Quality Control protocol; and environmentally sound construction practices. A Certificate of Completion shall be submitted to the Department prior to commencing operations.

7.0 QUALITY CONTROL / QUALITY ASSURANCE

Quality control/assurance (QC/QA) is defined as a planned system of inspections and activities that provide assurances that the design, manufacture and installation of systems and materials used in the construction and operation of the facility meet the purposes for which the systems and materials are intended. Appendix B provides an example of a Typical Quality Control/Assurance program for a MSW landfill. However, a quality control/assurance program shall be specific to the type of facility / system that is being constructed and operated.

In all cases, manufacturers' specifications for the installation and operation of equipment/components shall be adhered and compliance documented. Operating instructions and maintenance procedures shall also be adhered and documented daily to ensure that installations function safely and as specified by the manufacturer. Directives of regulating agencies shall also be adhered.

A description of the quality control/assurance program to be carried out on all aspects of the waste management facility/system that are integral to environmentally sound design and performance is required.

8.0 RECEPTION OF MATERIAL

8.1 Receiving Areas

The proponent shall provide a detailed description of material receiving and storage areas including the infrastructure such as weigh scales, roadway, parking areas, and any facilities for temporary on-site storage. Access to the waste receiving area shall be constructed to accommodate waste transport vehicles and facilitate operations.

8.2 Inspection and Monitoring

A trained operator shall oversee the unloading of all waste that is delivered to the receiving area and identify any unacceptable materials. Unacceptable materials shall be immediately segregated and removed from the site.

The operator shall ensure:

- only C& D waste is accepted at the site;
- industrial waste is not accepted unless approved by the Department or in the Certificate of Approval to operate;
- municipal solid waste is not accepted at the site; and
- liquid wastes are not accepted at the site;

The use of a pre-demolition audit could serve to greatly improve the probability that materials associated with construction and demolition activities will be managed appropriately. Through municipal licensing or Departmental Certificate of Approval stipulations, the requirement for pre-demolition audits for larger projects may assist in reaching material diversion and disposal specifications.

8.3 Measurement of Waste

Weigh scales shall be approved and functioning pursuant to Weights and Measures Canada Standards. Further information on this subject is provided in the General Environmental Standards for Muncipal Solid Waste Management Facilities.

8.4 Acceptable Material

Types of materials to be accepted at the site shall not be broader in scope than the definition of construction and demolition waste stated in this Standard and/or as defined in the facility specific Certificate of Approval to Operate. A list of materials not commonly accepted at C & D landfills is provided at the end of this document (following reference page).

8.5 Hazardous or Suspect Waste/Material

A waste transport vehicle shall be refused access to the site if it is known to contain hazardous/suspect waste intended for disposal at the facility.

The design of the facility must include a designated holding and inspection area in the event that any waste material accepted at the site is suspected or found to be hazardous, ('hot loads').

The proponent shall store this material in a designated holding and inspection area to facilitate storage, handling, removal and disposal according to all regulations.

Details of non-compliant material brought to the facility shall be recorded, including date, type and quantity of non-compliant material, identity of the haulage vehicle, reported origin of the material, and contact information to enable further contact with the hauler or owner.

9.0 C & D Landfill Operations

9.1 Landfill Site Equipment

Details on the proposed earth moving equipment associated materials management, and C & D landfill site operations shall be provided to the Department.

9.2 Waste Placement, Compaction and Covering

A plan is required for placing and covering the construction and demolition material to conserve air space, to minimize litter and dust, and to reduce water infiltration to limit the generation of leachate. The plan shall address the type and depth of intermediate and final cover material, and specifications for vegetative cover.

Regular — Construction and demolition waste shall be compacted in cells separated by layers of cover material, at least once every three months, or on the accumulation of 1000 cubic metres of material, whichever occurs first. Waste placement and covering shall take place such that the exposed surface area of construction and demolition debris does not exceed 2000 square metres at any one time.

Intermediate — Intermediate cover is placed when a landfill cell is filled and shall consist of at least 300 mm depth of soil. Intermediate cover shall be enhanced to the standard for final cover if it is not overfilled within one year of placement. The volume of individual cells shall not exceed 5,000 cubic metres.

Final — Final cover material is placed upon permanent closure of a landfill, and shall consist of at least 600 mm depth of soil with a maximum permeability of 1×10^{-5} cm/sec. The final cover depth shall be made up of a compacted soil layer to minimize infiltration, planted with natural vegetation to minimize soil erosion by water and wind. The cross slope shall be between 2% and 6% to facilitate drainage of surface water. Re-grading of the site may be required if uneven settling occurs.

Alternatives to the soil cover layer, such as a combination of geosynthetic clay liners (GCL) and soil may be acceptable, provided they can demonstrate equivalent performance.

Drainage ditches, if not already in place, shall be constructed up gradient of the site to divert surface water away from the disposal area and reduce the potential for erosion and infiltration of the final cover.

9.3 Securing Material for Recycling

Construction and Demolition debris that is suitable for reuse or recycling may be safely stored on-site as long as the material remains in usable condition and no nuisance or safety hazard is created. Details of the storage area are to be provided to the Department and a regular inventory of on-site storage/ waste transfer maintained.

9.4 On-Site Processing

Details of any processing facilities for volume reduction, materials recovery, such as the generic type, size, and location of equipment, sorting pads, and temporary facilities shall be provided to the Department. The Department will address the regulatory requirements for such facilities separately from those of the C & D waste disposal area requirements.

10.0 OPERATIONS PLANS

10.1 Operations and Maintenance

A facility Operations Manual is required for all waste management facilities and systems.

The following shall be addressed in detail and as applicable:

a. Site security, manpower, supervision, access and signage
b. Unacceptable/prohibited activities e.g. no open burning or smoking on-site
c. Control of nuisance factors including vectors, rodents, scavenging, illegal dumping, malodour, dust and litter.
d. Inspection of waste prior to landfilling.
e. Acceptable and unacceptable waste material/waste streams
f. Contingency and Environmental Emergency plans
g. Environmental monitoring program(s)
h. Landfill and associated facility day-to-day operations protocol
i. Site and equipment maintenance schedule / regime
j. Staff/operator training
k. Record keeping procedures and document list
l. Copy of Certificate of Approval
m. Contact information for site owner / operator.

The Operation Manual shall be prepared by the owner/operator and approved by the Department.

The operation of the facility shall be in compliance with the provisions of the Certificate of Approval and a copy of the Operations Manual is to be kept on site and readily available to staff and regulators.

10.2 Contingency Plans

A contingency plan is required to ensure that mitigation measures will be taken as soon as possible to minimize adverse effects to the operation and or surroundings caused by unforeseen situations or emergencies. This includes dealing with non-compliant individuals; releases or spills of gases and liquids; explosions; fires; personal injuries; unusual odors, leachate problems, severe weather, flood, power outages, delivery of hazardous or unacceptable waste, or other environmental emergencies or issues.

A site attendant shall be equipped with a reliable means of communication in order to contact environmental emergency responders and or fire, police, and medical personnel. The contingency plan will include information on the appropriate personal protective equipment (PPE) for potential incidents. Appropriate emergency equipment shall be kept on site and in good working condition.

A fire safety program shall be developed in consultation with the local fire department and with the Department of Natural Resources as required. Fire safety plans, including the comments of the first responder fire department as to the adequacy of the fire safety program, are to be provided.

The owner and/or operator shall review the contingency plan annually and revise it as required.

11.0 Records and Reporting Requirements

The use of electronic records and reporting in a compatible format shall be considered as a means to reduce excessive use of paper. However, retaining limited hardcopies of reports, financial transactions, correspondence, and contingency plan implementation that are considered significant are recommended.

Records shall be kept on site for a minimum of two years and remain available for review/inspection by the Department. Reports shall be retained and submitted to the Department as required in the Certificate of Approval, and at least annually.

11.1 The Certificate of Completion report including as- built drawings and quality control/ assurance records for construction period shall be submitted to the Department prior to commencing operations, and copies retained for future reference if needed.

11.2 Operations Management and Maintenance / Routine Inspections

A standard form for recording completion of operational tasks and maintenance on a daily, weekly, or as appropriate basis; and routine inspection reports shall be maintained as part of operations records. These records shall be kept at the facility and made available to regulatory agencies upon request.

11.3 Complaints

Records of complaints regarding operational, environmental, nuisance or other issues shall be kept and include: the contact information for the complainant, a description of the complaint, and the action taken / how the complaint was responded. The date and time of the complaint, a description of facility activities and related atmospheric conditions at the time, and the employee(s) on duty shall also be recorded

The Department shall be copied in accordance with the Operations Plan, on correspondence related to complaints received at the facility. Records of complaints shall be made available to the Department upon request.

11.4 Staff training

Certification and training records are required to ensure that staff are appropriately trained for the assigned work and that training is current as per applicable legislation and guidelines and recommended industry practices.

11.5 Contingency Plan Implementation / Emergency Response and Safety Equipment

Records of all incidents of contingency plan implementation shall be kept on file and reported to the Department as set out in the plan. The contingency plan shall be updated annually or as required, and an up to date inventory of emergency response and safety equipment shall be maintained to ensure that supply is adequate.

11.6 Environmental monitoring

Requirements and reporting for C & D landfills will be determined on a site/ facility specific basis and set out in the Certificate of Approval to Operate. The parameters, monitoring and reporting frequency shall be determined in consultation with the Department, and would be related to site activities including the volume and type of waste streams disposed. Monitoring and reporting is conducted to establish the effectiveness of mitigation measures, and wastewater/leachate treatment systems where applicable, to prevent adverse environmental impact due to facility operations. The Departments reporting requirements may be more intensive during the first year of operation and if problems occur or are suspected. However, exceedance of criteria limits for leachate, surface or groundwater quality parameters, as set out in the approval shall to be reported immediately to the Department.

11.7 Annual Report

The annual report will summarize landfill activity over the past year, present an evaluation of environmental monitoring data, and highlight any proposed changes to operations or monitoring.

Information contained in the annual report shall include:

- changes to facility or systems operations;
- problems or complaints and the resolution;
- a materials flow summary i.e. type, origin and quantities received, recycled /landfilled;
- an estimate of remaining facility operating life or landfill capacity.
- description of any environmental incidents / contingency plan implementation;
- the inspection reports and summary of findings/recommendations;
- updates to operations plans, contingency plans, and decommissioning plans
- a summary and evaluation of environmental monitoring data/reports and facility performance in terms of regulatory compliance and environmental protection

NOTE: Regional Service Boards may opt to submit one annual report providing summary information for all facilities/sites within the Regional Waste Management System.

11.8 Decommissioning and Post-decommissioning Reports

A decommissioning summary report describing the condition of the facility/ site following closure/decommissioning, and describing any future environmental concerns relating to leachate, groundwater and surface water and gas generation is to be provided. The report shall describe any current problems on the site and/or off-site impacts, and provide an assessment of the future impacts.

Annual post-decommissioning reports shall be submitted to the Department of Environment & Conservation updating the on-going maintenance and monitoring and activities, and summarizing inspections results. Any problems and corrective actions taken shall be noted.

12.0 Site Safety and and Security

A more explicative, but non-exhaustive list of factors important to safe and secure operation of a waste management facility/site is provided in the General Environmental Standards for MSW Management Facilities.

12.1 Site Access

C& D Waste Disposal Sites shall be designed to accommodate the type and volume of vehicle traffic anticipated such as heavy equipment, trucks and public vehicles that deliver waste and other on-site activities. Sites shall have controlled access (lockable gates and/or fencing) and a sufficient number of well trained personnel in place when the site/facility is open to the public. The entrance of the site shall be closed and locked during non-operating hours to prevent access.

12.2 Signage

Signage shall be posted to direct the flow of on-site traffic, to warn of dangers and to identify access restrictions. Legible and appropriate signs shall be provided at the entry to the site indicating the name and purpose of the facility, hours of operation, instructions for visitors, emergency contacts and general contact information.

12.3 Prohibited Activities

Open burning, scavenging, smoking and hazardous activities are prohibited on-site. Unsafe practices, and practices that are inconsistent with Occupational Health and Safety Guidelines and Industry Standards are considered to be hazardous activities.

12.4 Staff Training and Certification

Key personnel shall be trained in operations of the waste management facility and be certified through the Solid Waste Association of North America (SWANA) or an accepted equivalent.

On-site operators shall be trained to identify hazardous and unacceptable materials. Maintaining the appropriate level of training/certification will help ensure C & D waste is disposed of properly, and that hazardous and unacceptable materials are disposed safely and appropriately.

The facility specific training requirements and schedule shall be included in the operations manual.

12.5 Employee Facilities

Secure workspace and storage areas shall be provided for administrative records, personal protective equipment, tools and combustible fuels and lubricants.

12.6 Site Safety and Personal Protective Equipment

Working conditions shall always meet or exceed Occupational Health and Safety Guidelines/Standards, and sufficient good quality personal protective equipment shall be provided. The Operations and Maintenance Manual and Environmental Health and Safety Emergency Contingency Plans shall be well known and practiced by employees.

12.7 Public Education and Awareness

Ongoing public education and increased awareness is required to improve facility safety and efficiency, and decrease overall risk.

13.0 ENVIRONMENTAL MONITORING

An appropriate environmental monitoring program shall be developed as part of the Certificate of Approval process for the C&D Waste Disposal Site. Environmental monitoring for Regional Waste Management Sites may be designed to maximize the benefit of sampling locations and monitoring results. The requirements shall be based on an assessment of site investigations, including the hydrogeologic and surface water investigation, and proposed facility operations. A program to address surface water, leachate and groundwater quality monitoring shall be designed and conducted by a suitably Qualified Professional and approved by the Department prior to implementation. Sampling locations, frequency and parameters to be analyzed are to be detailed in the Environmental Monitoring Program. The Department may develop or adjust the list of parameters and/or monitoring schedule on a site-specific basis.

All surface water (storm water runoff, or leachate) discharged from the site shall comply with the *Environmental Control Water and Sewage Regulations*, 2003. Additionally, liquid effluents shall not be acutely lethal as determined by the suite of biological Test Methods developed by Environment Canada for this purpose. The Department of Environment and Conservation Policy PD:PP2001-01: *Use of Accredited and Certified Laboratories* applies for sampling analysis.

13.1 Surface/ Storm Water Management

Surface/Storm water management and control systems shall be provided and designed to:

- divert storm water and run-on away from working areas;
- collect and control run-off waters from the site to remove sediment prior to discharge; and to reduce erosion impact to the intermediate and final cover.

Storm water management systems shall be designed to handle a 100 year storm event for a duration appropriate to the size of the drainage basin. Sedimentation pond construction specifications shall be provided to the Department.

Surface water management systems should be hydraulically separate from the facility's leachate management system(s).

13.2 Leachate management

The accumulation of surface/storm water in an active cell may result in the generation of leachate that must be discharged appropriately. A leachate management system consists of leachate collection and treatment to remove contaminants prior to discharge to the receiving environment. The system must be designed to accommodate the local hydrogeology and climate, and protect the environment. Detailed information about the engineering design, the components and construction materials to effectively manage the volume and composition of leachate for the life of the facility/site shall be provided to and approved by the Department. A suitably designed QC/QA program shall also be approved.

All leachate shall be sampled and tested to meet criteria limits set out in the Environmental Control Water and Sewage Regulations; and/or the CCME water quality guidelines where applicable. Results of leachate analyses shall be submitted to the Department for approval prior to discharge.

13.3 Surface Water Quality Monitoring

A regular program of surface water monitoring may be required for all waste management facilities/ sites and shall include a program to:

- measure baseline surface water quality upstream of the site;
- a sufficient number of monitoring stations to accurately detect and track mobile contaminants in surface water;
- a program to measure the extent and magnitude of any leachate contamination,
- a suitably designed QC/QA program; and
- as a minimum, semi-annual (mid-season Spring and Fall) sampling of water discharged from the site and water sampling from any water body (including upstream control locations) which may be affected by leachate, storm water runoff or sediment from the site.

The surface water monitoring program shall include a combination of visual inspection for leachate seeps, along with surface water sampling. Refer to Appendix C for a typical surface and groundwater monitoring program.

Annual monitoring of biological features may also be required.

All surface water sampled and tested shall meet CCME Water Quality Guidelines for the Protection of Freshwater Aquatic Life. Discharge water must always comply with the *Environmental Control Water and Sewage Regulations*, 2003. Results of surface water quality analyses shall be submitted to the Department for approval prior to discharge.

13.4 Groundwater Monitoring

A groundwater monitoring program, designed by a Qualified Professional shall include an appropriate number and configuration of monitoring wells around the perimeter of the site, both up and down gradient, to allow accurate evaluation of the impact of the operation and assessment of any migration pathway.

The groundwater monitoring program shall include:

- a program to establish comprehensive baseline groundwater chemistry;
- a program for detection of leachate in the groundwater;
- a program to measure the extent and magnitude of any leachate contamination;
- determination of horizontal and vertical gradients, flow directions and groundwater velocities;
- measurement/determination of groundwater levels and general hydrogeological conditions on the site; and
- a suitably designed QC/QA program.

Monitoring wells shall be installed to a depth which will span the anticipated high and low water table levels and be appropriately sized to allow proper well development, purging and sampling. Semi-annual sampling (mid-season Spring and Fall) is recommended.

The groundwater monitoring system for a waste management facility such as a landfill or composting in open windrows should consist of the following:

(1) groundwater monitoring wells installed hydraulically above and below the gradient direction of the facility.
(2) monitoring wells located sufficiently close to the active disposal area to allow early detection of contamination and implementation of mitigation measures;
(3) give specifications for well drilling methods, casing, screens, filter packs, annular space seals, ground surface seals, grout, caps, development and purging; and
(4) the monitoring wells are to be retained throughout the lifespan of the facility.

Groundwater monitoring results shall be consistent with baseline data and meet the appropriate CCME Water Quality Guidelines based on use in the area.

The person conducting the groundwater monitoring program must be a suitably Qualified Professional.

The Department of Environment and Conservation Policy PD:PP2001-01: *Use of Accredited and Certified Laboratories* applies. (separate document)

13.5 Landfill Gas /Odour Management

Construction and demolition debris containing drywall is not to be used for landfill cover to avoid the production of hydrogen sulfide gas which may be produced when gypsum is exposed to wet anaerobic conditions. This gas is characterized by the smell of rotten eggs, and can be an irritant to eyes and skin. Odour complaints that may indicate the production of hydrogen sulfide shall be investigated, and measures taken to reduce worker exposure and mitigate gas production. An Odour Management Program, as described in the General Standards for MSW Management Facilities could be required if odour problems develop and persist.

Recycling and other management options may be considered for gypsum, as well as for other C & D debris, to reduce this risk.

13.6 Air Quality, Dust and Noise

Roads shall be maintained to avoid nuisance complaints regarding dust. Dust control measures shall be implemented as required. Dust and noise control measures and systems shall be included in the design and operation of the site. The Department may require that a dust and noise monitoring program be implemented at the site.

13.7 Litter Control and Housekeeping

A litter control program shall be implemented at the facility to ensure regular litter collection and that house keeping is conducted on and around the entire site. Waste transported to and from the site shall be covered by a tarpaulin, or a similar material, to prevent loss of waste at the site and during delivery. The area between property line and disposal face is to be a treed or bermed buffer zone.

13.8 Vector Control

A program to control disease vectors (flies, rodents, birds, animals) shall be in place during the lifespan of the facility. The control program shall be approved by the Department.

14.0 DECOMMISSIONING

A preliminary decommissioning plan shall be submitted to the Department when applying for a Certificate of Approval. The requirements to be addressed include site cleanup, repair and rehabilitation; removal or securing of infrastructure and equipment; and removal/restriction of access. More detailed information including a schedule for decommissioning activities; waste volume/location records; and details of engineering works and equipment to remain in place would be required in the decommissioning plan to be submitted at least six months prior to closure. Post-closure environmental monitoring and reporting, contingency plans and proposed future use of the site shall also be addressed.

The general requirement for 180 days advance notice of closure to regulators and site users applies to construction and demolition debris landfills.

The design and operation of the C & D landfill shall take into consideration the requirements of progressive closure and decommissioning, and future use of the facility/ site of the site. In the event of significant changes, an updated plan shall be submitted to the Department for approval.

A decommissioning report and final inspection by the Department is required. A post-decommissioning monitoring, maintenance and reporting program shall be developed, and implemented for a period of time appropriate to site condition and any environmental impacts of concern.

14.1 Site Rehabilitation

Upon termination of operations the site must be rehabilitated to the satisfaction of the Department. Termination is defined as out of use, by the owner and/or operator, for any consecutive 12 month period or when the owner and/or operator indicates there will be no further activity at the site.

14.2 Post-Decommissioning Monitoring and Maintenance

An environmental monitoring program shall be prepared and conducted by a qualified professional for a time period that is sufficient to address potential adverse impacts due to erosion and seepage of surface/storm water, leachate. The production of landfill gas (methane) would not normally be associated with a C & D landfill, although production of hydrogen sulphide gas may result in odour during site operation and could require measures to address if a problem persists at closure. The environmental monitoring plan shall be approved by the Department prior to implementation, and inspection/annual reports submitted to the Department for review.

Post-closure care requirements may vary depending upon the site condition and issues, but will generally consist of maintaining the integrity and effectiveness of the:

- Final cover system

- Leachate collection system
- Surface and groundwater monitoring programs/systems

The owner/operator is required to submit a written post-closure care plan to the Department providing:

- A description and proposed schedule of all required monitoring and maintenance ;
- Addressing potential appropriate future use of the site; and
- Providing contact information in the event of an incident or environmental emergency.

Any use of the land during this period must not disturb the integrity or operation of any of the waste containment systems or the monitoring systems. At the end of the post-closure care period, the completion of post-closure care in accordance with the plan must be certified by a qualified professional, the owner/operator and the Department. Permanent records are to be kept on file with the GSC.

REFERENCES

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- *Construction and Demolition Alberta Recycling Market Profile*, Alberta Department of Environmental Protection.
- *Construction and Demolition Waste Landfills*, US Environmental Protection Agency, Office of Solid Waste, February, 1995.
- *Construction Waste and Demolition Debris Recycling, SWANA Home Study Package*, Solid Waste Association of North America, October 1996.
- *Construction and Demolition Debris Management Study, Final Report, June 2006*, Nova Scotia Environment and Labour, Resources Recovery Fund Board, by Dillon Consulting Limited.
- *Construction/Demolition Waste Recycling and Disposal*, Background Sheet, Saskatchewan Environment and Resource Management, Environmental Protection Branch.
- Demolition Materials Diversion Symposium Proceedings, Prepared for the British Columbia DMDS Steering Committee by Dovetail Consulting Inc. and SALASAN Associates Inc.
- *Guidance Document GD-PPD-031: Asbestos Waste Disposal*, October 6, 2004, Department of Environment and Conservation.
- Halifax Regional Municipality C&D Materials Recycling and Disposal Licensing By-law, By-law L200, July 2001.
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- *New Brunswick Guidelines for the Siting and Disposal of Construction and Demolition Waste*, Department of Environment and Local Government, June 1998.
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Guidelines, Nova Scotia Department of Environment and Labour, 1997.

- Prince Edward Island Environmental Protection Act, Waste Resource Management Regulations Sections 59 - 64 - C&D Disposal Sites

- *Quebec Action Plan for Waste Management, 1998-2008, Fact Sheet, Construction and Demolition Waste, E*nvironment Quebec, 1998.

- *Recommendations for the Regulation of Construction and Demolition Debris Sites in Prince Edward Island, Report of the Environmental Advisory Council to the Honourable Jamie Ballam, Minister Environment, Energy and Forestry, February 28, 2005.*

- Sperling, Tony, and J. Paul Henderson, "Understanding and Controlling Landfill Fires", *Proceedings of the 6th Annual Landfill Symposium*, Solid Waste Association of North America (SWANA), in San Diego, California, June 18-20, 2001.

- Subsurface Assessment Handbook for Contaminated Sites, Report CCME EPC-NCSRP-48E, March 1994, Canadian Council of Ministers of the Environment.

- Waste Minimization Manual, Construction and Demolition Industry, Alberta Department of the Environment.

- Tchobanoglous, George, Hilary Theisen and Samuel Vigil, "Integrated Solid Waste Management, Engineering Principles and Management Issues", McGraw-Hill Inc, 1993.

LIST OF MATERIALS NOT COMMONLY ACCEPTED AT C & D LANDFILLS

Specific wastes that are not commonly accepted for disposal at a C&D Waste Disposal Site include, but are not necessarily limited to the following (unless specifically approved in writing by the Director of Pollution Prevention Division, Department of Environment and Conservation):

a) municipal solid wastes;
b) liquid, putrescible or bulky items;
c) petroleum contaminated soil or products;
d) electrical fixtures containing hazardous liquids such as fluorescent light ballasts or transformers containing PCBs, fluorescent lights;
e) asbestos waste;
f) office or business wastes;
g) lunchroom wastes;
h) industrial wastes;
i) carpets and other sheet flooring, either new or used, other than flooring that is attached to a building during demolition;
j) paint cans;
k) items subject to the Transport of Dangerous Goods Regulation or the Halocarbon Regulations under the *Environmental Protection Act*;
l) snow containing road salt and/or debris;
m) vehicles, tires or batteries;
n) asphalt;
o) rope, buoys, netting, plastic furniture, fibreglass scrap and empty caulking tubes;
p) appliances;
q) hazardous waste or materials;
r) drums containing any liquid;
s) recyclable metal;
t) dredged spoils;
u) solid waste resulting from any processing C& D facility, that renders the individual waste components unrecognizable, such as pulverizing or shredding;
v) material from the demolition of any building which has the potential to contain contaminated materials associated with its former use (such as, but not limited to, a pesticide storage warehouse);
w) debris remaining following destruction by fire; and
x) materials banned from landfill disposal (*Guidance Document: GD-PPD- 022.1 Municipal Landfill & Incinerator Ban & Diversion Program Summary*, January 6, 2003, Department of Environment and Conservation).

As alternate uses and markets are found for the reuse and recycling of C & D debris, various items presently defined as C & D debris, may be banned from disposal at these waste disposal sites.