Executive Summary

Purpose of the Guideline

The Ministry of Environment, in conjunction with the Ministry of Agriculture and Lands, has developed this guideline to assist on-farm anaerobic digestion proponents in applying for a waste discharge authorization under the *Environmental Management Act* and Waste Discharge Regulation. The guideline includes an introduction to the anaerobic digestion technology, the waste discharge authorization (permitting) process, and guidance on the waste streams to be identified in the application package. The guideline also provides a list of acceptable feedstocks for on-farm anaerobic digestion and recommendations for nutrient management planning, sampling, analysis and best management practices. In addition to a Ministry of Environment waste discharge authorization, on-farm anaerobic digestion facilities may also require authorization from local governments and the Agricultural Land Commission, if located within the Agricultural Land Reserve. These additional processes are briefly outlined in the guideline.

What is Anaerobic Digestion?

Anaerobic digestion is the biological process by which organic matter (e.g., manure), is broken down in the absence of oxygen, producing raw biogas and other by-products. The raw biogas is most commonly used to generate electricity through cogeneration or upgraded to natural gas. Other benefits of anaerobic digestion include reductions in manure-related odours, pathogens, and greenhouse gas (GHG) emissions. The process also produces by-products (liquid and solid digestate), which can be utilized on the farm or further processed (e.g., composted), and sold as an additional revenue source for the farm.

Waste Discharge Authorization Types

As biogas production from anaerobic digestion facilities may involve numerous waste streams and different process technologies, a site specific waste discharge authorization from the Ministry of Environment is required for most projects. The following is an overview of the three most common waste discharge authorization types pertaining to anaerobic digestion:

- **Solid or Liquid Waste Management Plan and subsequent Operational Certificate** - for facilities using mixed feedstock (agricultural and non-agricultural waste) or non-agricultural waste exclusively, and in an area that requires amendment to the local government's solid or liquid waste management plan.

- **Permit** - for facilities using mixed feedstock (agricultural and non-agricultural waste) or non-agricultural waste exclusively and in an area that *does not* require amendment to the solid or liquid waste management plan.

- **Agricultural Waste Control Regulation** - for facilities using 100% agricultural waste feedstock (defined as manure, used mushroom medium and agricultural vegetation waste).

How to Obtain a Waste Discharge Authorization

In addition to providing information on the different types of waste discharge authorizations (regulation, waste management plan or permit), the guideline also provides information on the process involved in obtaining the waste discharge authorization and the documentation required for submission. This includes guidance on preparing the Consultation and Technical Assessment Reports. The Technical Assessment Report must describe all aspects of waste discharged to the environment from the facility. To aid in the preparation of this report, typical anaerobic digestion facility waste discharges have been identified, e.g., emissions from the biogas cleaning and upgrading equipment, co-generation, boilers, flares, etc. A summary checklist of the project details to include in the Technical Assessment Report is included in the appendices to the guideline and are summarized at the end of each chapter.

Acceptable Feedstocks

The Ministry has established a list of acceptable feedstocks for the purposes of on-farm anaerobic digestion. The items in the list have been evaluated for their appropriateness in an on-farm anaerobic digester and their placement within Schedule A, B or C provides increased safeguards for the protection of the environment and human health, as well as on-farm biosecurity. The feedstock list is provided in Appendix 1 and is divided into three schedules:

- **Schedule A:** Acceptable (acceptable "as is" for digestion),
- **Schedule B:** Limited (requires pasteurization, e.g., 70^{o} C for 1 hour), and
- **Schedule C:** Unacceptable (prohibited material, such as hazardous waste).

Digestate Land Application Requirements

The use of different feedstock material and the volume of non-agricultural waste feedstock imported onto the farm affect the feedstock testing and digestate land application requirements for an on-farm anaerobic digestion facility. Three tiers of anaerobic digestion facilities have been established based on these parameters, as follows:

- **Tier 1:** On-farm anaerobic digestion facility using 100% agricultural waste.
  Requirements: Follow the provisions of the Agricultural Waste Control Regulation, practice due diligence and adhere to best management practices.

- **Tier 2:** On-farm anaerobic digestion facility importing up to 25% non-agricultural waste.
  Requirements: Sample the imported, non-agricultural feedstock for heavy metals,

develop a Nutrient Management Plan (NMP), and follow the Tier 2 provisions for nutrient sampling, analysis, and digestate land application.

- **Tier 3:** On-farm anaerobic digestion facility importing more than 25% non-agricultural waste. *Requirements:* Sample the imported, non-agricultural feedstock for heavy metals, develop a Nutrient Management Plan, and follow the Tier 3 provisions for nutrient and pathogen sampling, analysis, and digestate land application.

The flowchart on the following page provides a summary of the facility categorization, feedstock pre-treatment requirements, and digestate management requirements.

Best Management Practices

Best management practices (BMPs) and monitoring and reporting requirements are outlined in the final chapters of the guideline. These include recommended BMPs for feedstock collection, handling, and storage, as well as recommendations for digestate storage, and strategies for the reduction of odours and fugitive dust.