

The Department of Environment and Local Government

Guidelines For The Beneficial Use of
Industrial By-Products as Soil Amendments

Prepared by

The Interdepartmental Committee of Environment and Local Government and
Agriculture, Aquaculture and Fisheries

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1.0 Purpose

The purpose of these Guidelines is to facilitate the beneficial use of industrial by-products as soil amendments while protecting the environment and the public from adverse effects. These **materials** must be recognized as having an **agronomic value** (MAV) for use on land as a soil amendment. Land application of industrial by-products is not a waste disposal option.

The Guidelines are intended to simplify the requirements for generators whose products meet the standards allowed under the Canadian Council of the Ministers of the Environment (CCME) *Guidelines for Compost Quality* Category A products, while maintaining or enhancing the requirements used for products meeting CCME Category B standards.

These Guidelines contain the criteria for acceptable land application practices and are intended to control the quantity of heavy metals, pathogens and other potential contaminants applied to land, in order to preserve the quality of agricultural land and to protect the environment.

These Guidelines also provide for land application of materials deemed unfit for agricultural land, but which still can provide a benefit to the soil when applied to non agricultural land.

The Guidelines are authorized under the Water Quality Regulation of the *Clean Environment Act* and have been prepared by the Provincial Interdepartmental Beneficial Use Guidelines Committee, comprised of members of the New Brunswick Departments of the Environment and Local Government (DELG) and Agriculture, Aquaculture and Fisheries (DAAF), in consultation with the Department of Health (DH).

Three classes of industrial by-products have been identified and are described under Section 3.

2.0 Definitions

For the purposes of these Guidelines, the following definitions are used:

“**agricultural land**” means land that is used to produce food for human consumption or crops grown for livestock feed.

“**biosolids**” means an organic product obtained from the physical-chemical and/ or biological treatment of wastewater. Biosolids result from primary wastewater treatment (primary biosolids), or from secondary wastewater treatment (secondary biosolids), and these two types of biosolids are often combined (mixed biosolids). These biosolids can be derived from the treatment of either municipal wastewater or industrial wastewater.

“**designated watershed protected area**” means the surface drainage area contained within legally prescribed boundaries with the intention of protecting a source of water for human consumption.

“**designated wellfield protected area**” means an aquifer or groundwater recharge area contained within legally prescribed boundaries that is used as a source of water for a public water supply system.

“**end user**” means the land owner where the material is spread, including a tenant farmer if different than the land owner.

“**generator**” means the entity which produces the by-product. In the event that the entity which produced the by-product is no longer in business, it shall mean the party that is responsible for the distribution of the by-product.

“**high levels of pathogens**” means bacterium, viruses, or other microorganism that can cause disease. It includes, but is not limited to, levels of fecal coliforms >1000 and <2,000,000 MPN/g of total solids calculated on a dry weight basis. Any industrial by-products testing greater than these levels will not be approved for land application.

“**lab**” means a laboratory that is accredited by a recognized laboratory accreditation body, such as the Standards Council of Canada (SCC) or the Canadian Association for Laboratory Accreditation Inc. (CALA).

“**low levels of pathogens**” means bacterium, viruses, or other microorganisms found in stabilized materials that meet the CCME Guideline levels. It includes, but is not limited to, levels of fecal coliforms <1000 MPN/g of total solids calculated on a dry weight basis, AND no *Salmonella* sp. with a detection level <3 MPN/ 4g total solids calculated on a dry weight basis. Stabilized biosolids are allowed in this category, provided the pathogen levels meet this standard.

“**MAV**” means industrial by-product **Materials** that possess an **Agronomic Value** that can be used to maintain or improve, separately or simultaneously, plant nutrition, as well as the physical and chemical properties and biological activity of soils.

“**municipal biosolids**” means organic, stabilized material produced during the treatment of domestic sewage and septic sludge, which have undergone secondary treatment to reduce pathogen content.

“**non agricultural land**” means land that is not used to produce food for human consumption or crops grown for livestock feed.

“**nutrient management plan**” (**NMP**) means a plan produced by a Professional Agrologist to balance a crop’s nutritional requirements supplied by the MAV while respecting the potential buildup of metals, pathogens, etc in the soil.

“**stabilized biosolids**” means biosolids, which have undergone lime stabilization or stabilization through aerobic or anaerobic digestion. It includes municipal biosolids, which meet the definitions of low levels of pathogens as found in these Guidelines.

3.0 Product Classification

The following two classes of industrial by-products may be used on agricultural land.

- 1) Class A: Materials which meet CCME Category A standards for heavy metals. Low levels of pathogens are acceptable in this class of product.

Class AD: Class A materials that have high levels of pathogens, but do not contain any municipal biosolids. *Examples of Class A/AD materials would be lime mud from the pulp and paper, wood ash, potato waste.*

- 2) Class B: Materials which meet CCME Category B standards for heavy metals. Low levels of pathogens are acceptable in this class of product.

Class BD: Class B materials that have high levels of pathogens, but do not contain any municipal biosolids. *Examples of Class B/BD materials would be wood ash, but with higher heavy metal levels.*

Please Note that for Class AD and BD materials, the “D” stands for delay. Since these materials contain high levels of pathogens, a time delay is required between the application of the product and when harvest may occur. The waiting period or delay between application and harvest is indicated in Table 3.

The following class of industrial by-products may NOT be used on agriculture land, but may be permitted for use on some non-agricultural land, such as sod, nursery production or landfill cover.

- 3) Class C: Materials derived from municipal biosolids, which have high levels of pathogens. Heavy metal levels must not exceed CCME Category B standards. There is an automatic time delay between application of these products and when access to them by the public is allowed. See Table 3 for details.

4.0 Products exempt from these Guidelines

The products that are exempt from the guidelines include:

- All products generated on the farm, including manure, compost, bedding, straw, silage, hay, fish and other aquaculture related by-products;
- Compost that may include industrial by-products being composted at sites having Approvals to Operate by DELG;
- Any products licensed/ approved under the *Fertilizers Act* by CFIA; or
- Agricultural amendments (quarried lime products, gypsum, etc.).

5.0 Procedural & Permitting Requirements

5.1 Application for Approval

Prior to completing an application, the following tests are required by the generator. Based on the information provided from these tests, the generator will choose which application to fill out. Applications are found in Appendix II.

- 1) The last two (2) lab analyses for the heavy metals (Appendix I – Test 1) (*note: there must be at least a 2 week gap between each test and more tests may be required depending upon the heavy metal levels shown in the first two tests*);
- 2) One (1) lab analysis proving the agronomic value of the product (Appendix I – Test 2);
and
- 3) One (1) lab analysis proving the pathogen levels (if any) – (Appendix I – Test 3).

Once DELG has received the application, together with all test data required, they will determine:

- a. If more information is required;
- b. If the correct category of MAV was chosen;
- c. The number, type and frequency of tests required on an on-going basis; and
- d. Additional conditions as deemed necessary.

5.2 Suitability of the Industrial By-Product

Industrial by-products may be approved for use on land provided the applicant can:

- 1) Demonstrate that the material is suitable for land application;
- 2) Show that it will benefit the land or crop production; and
- 3) Ensure that the product meets the standards of the *CCME Guidelines for Compost Quality* in regards to heavy metals, pathogens and foreign matter.

5.2.1 Heavy Metal Restrictions

The use of Class B and C MAV as a soil amendment requires that a NMP be developed by a Professional Agrolgist. The plan must adhere to the allowable heavy metals shown in Table 1 that utilizes the current *CCME Guidelines for Compost Quality* and Heavy Metals in the soil.

See Section 8.1 for soil testing requirements.

<i>Metal</i>	<i>In the Soil₂</i>	<i>CCME Category A</i>	<i>CCME Category B</i>
Arsenic	12	13	75
Cadmium	1.4	3	20
Cobalt	40	34	150
Chromium	64	210	1060
Copper	63	400	757
Mercury	6.6	0.8	5
Molybdenum	5	5	20
Nickel	50	62	180

Lead	70	150	500
Selenium ₃	1	2	14
Zinc	200	700	1850

Footnote:

- (1) All numbers indicate, mg/kg on a dry weight basis
- (2) These numbers are for agricultural land. Other values may apply for non agricultural land – consult CCME Guidelines
- (3) Selenium levels in the soil and MAV may under certain circumstances be allowed to exceed those in this chart, given the known deficiencies of Selenium in both the soils and crops found in NB

5.2.2 Pathogen Restrictions

Class A and B MAV may have both low and high levels of pathogens in them. However, no municipal biosolids are allowed in Class AD or BD products.

Class C contains municipal biosolids and has high levels of pathogens in them. Fecal coliforms to be >1000 but <2,000,000 MPN/g of total solids calculated on a dry weight basis.

5.3 Permitted Uses and Conditions

1. Class A products:
 - a. Land application allowed without further permits, field identification or soil sampling.
 - b. Generator must maintain required testing to ensure product remains as a class A MAV.
 - c. It is advised to use these materials at the recommended agronomic rates.
2. Class B products:
 - a. Restricted land application allowed:
 - i. Application rates to be determined by a nutrient management plan produced by a Professional Agrologist.
 - ii. Soil testing on application sites as required in Approval to Operate.
 - iii. Fields to be identified on application.
 - b. Generator must maintain required testing to ensure product continues to qualify as a Class B MAV.
3. Class C products:
 - a. **MAY ONLY BE USED ON NON-AGRICULTURAL LAND**
 - i. Application rates to be determined by a nutrient management plan produced by a Professional Agrologist.
 - ii. Soil testing on application sites as required in Approval to Operate.
 - iii. Fields to be identified on application.

- b. Waiting periods outlined in Table 3 shall apply.
- c. Generator must maintain required testing to ensure product continues to stay within Class C standards.

NOTE: Any product containing high levels of pathogens from whatever source is subject to the waiting period outlined in Table 3.

See Appendix III for a flow chart of all product categories.

6.0 Land Application Requirements

6.1 Application Rates

Class A:

- No application rates stipulated. However, it is advised to use these materials at the recommended agronomic rates, which may require nutrient testing of the product and soil testing to determine rates needed for a particular crop.

Class B & C:

- Application rates to be determined by a nutrient management plan developed by a Professional Agrologist.
- The application rate will be the lesser of rates based on metal levels or agronomic need.

General requirements and notes:

- The application of MAV on land must be in conformance with all applicable local regulations, acts, by-laws, etc.

6.2 Acceptable Application & Time of Year Methods

The land application of MAV should be done in such a manner that minimizes the risk of odours and bioaerosol release.

It is important that care must be taken to prevent runoff of MAV. To help ensure this requirement, land application of all classes of MAV may not occur:

- When the ground is frozen, snow covered, or saturated;
- During or immediately following heavy rains or when heavy precipitation is forecasted, which may adversely affect the environment through surface runoff and/ or the ability to effectively spread and incorporate the MAV on land; or
- When and where there is a risk of flooding.

6.3 Lands with Slopes

The setback from a watercourse or wetland per Table 2 applies to lands with slopes less than 3%. Lands with slopes of 3 to 6% require a setback of 90 meters. Slopes of 6 to 9% require a setback of 200 meters. No applications are allowed on slopes greater than 9%. It should be

noted that where slopes do not drain directly into waterways, there may be some additional allowances.

6.4 Setbacks and Buffers

Table 2 shows the setbacks required for Class B and C MAV. The same buffers and setbacks are recommended for Class A.

TABLE 2 – Setbacks & Buffers	Distance (m):
Private potable water wells	90
Depth to groundwater	0.75
Depth to bedrock	0.75
Dwellings	50 – 100 ⁽¹⁾
Property lines	10
Property lines of public facilities	50 – 100 ⁽¹⁾
Watercourses and wetlands	30 ⁽²⁾
Farm drainage ditch	5
Public Highways and road ROW	5 – 10 ⁽¹⁾

NOTES:

- 1) Where there is a range of distances given, the lower range is the setback required if the MAV is immediately incorporated into the soil. The higher figure is for normal land application methods.
- 2) To ensure the protection of water quality, the separation distances in Floodplains may be increased in the Approval. Also depending upon the slope, these distances may be increased to between 90 and 200 meters (section 6.3).

6.5 Other Buffer Requirements

Application and storage of MAV must not occur in:

1. A designated watershed protected area;
2. A designated wellfield protected area; or
3. Other wellfield that supplies drinking water to a municipality.

Separation distances will be significantly increased for wastes that are susceptible to blowing and/ or odors.

7.0 Waiting Periods for Products containing high levels of Pathogens

TABLE 3 – Waiting Periods between application & harvest/ public access

Category	Waiting Period (months)
<i>Agricultural Land application of Class AD and BD products</i>	
Crops that come in contact with the soil	4
All other crops grown for food	3
Pasture crops	2
Forage harvest	1
<i>Non-Agricultural Land applications of Class C products</i>	
Nursery production	8

Sod	8
Initial development of golf courses/ recreational lands	8
Reclaimed land	8

8.0 Responsibilities of the Generator

The Generator of the MAV remains the person responsible to the Minister of Environment and Local Government for ensuring that all the requirements of these Guidelines are met. This includes, but is not limited to, the gathering and submitting of the required MAV samples for testing, soil samples as needed and all other information necessary to be in compliance with these guidelines.

8.1 Soil Testing of Agricultural Land

Class A MAV:

- No soil testing is required for the use of MAV class A products.

Class B and C MAV:

- DELG will determine the frequency that soil testing is required, based on the latest soil test data and the most recent averages of heavy metal lab data.

The purpose of testing the soil when applying MAV Class B and C is to ensure that the heavy metal buildup does not exceed the levels as recommended by CCME and shown in Table 1.

8.2 Transportation

Appropriate equipment must be used to transport the MAV from the point of origin to the application or storage site. Transportation must be conducted in such a manner as to ensure there is no public nuisance, including spillage on private roads and/ or odour.

8.3 Storage

- Specific requirements may be included in the Approval to Operate, both at the Generator's site and the End User's site.

General Terms and Conditions

Class A MAV:

- a) Care must be taken that the environment is protected from any runoff, which may contaminate water.
- b) If odours are an issue with the MAV, storage must be in a location such that odours will not negatively impact the neighbors.
- c) The maximum volume of MAV allowed at the End Users site is what will be used in one growing season.
- d) Storage site must be on sites with a slope of 3% or less.

Class B & C MAV:

- a) Storage requirements will be part of the Approval to Operate.
- b) Care must be taken that the environment is protected from any runoff, which may contaminate water.
- c) If odours are an issue with the MAV, storage must be in a location such that odours will not negatively impact the neighbors.
- d) The maximum volume of MAV allowed at the End Users site is what will be used in one growing season.
- e) If the MAV is stored on End User's site for more than 30 days, it must be covered to prevent runoff or blowing. The maximum time a MAV may be stored at the End User's site is 8 months.
- f) The Generator is responsible for the integrity of the temporary storage at the End Users site, unless otherwise stated in the Approval to Operate.
- g) Storage site must be on sites with a slope of 3% or less.

Minimum set back requirements for storage of all MAV products:

- a) 1 meter above seasonal high water table and above bedrock;
- b) 30 meters from floodplain or nearest buried drain tile;
- c) 30 meters from adjacent properties;
- d) 300 meters from nearest well, or residence; and
- e) 100 meters from wetlands/ water courses.

8.4 Record Keeping Requirements

The Generator must collect, record and make available the information specified in the Approval, which can include the following:

1. Analyses of the MAV on a sampling schedule determined by the Minister of DELG;
2. Soil analyses and sample locations for each site as specified in the Approval;
3. Dates and amounts of MAV delivered to each site;
4. Proposed dates of application & methods of application for each site;
5. Crops being grown on each site;
6. Record of complaints; and
7. Any other information as required.

Subsections (2, 4, and 5) do not apply to MAV Class A.

8.5 Responsibilities of the End User

In the event that the End User applies to their land any MAV material, the End User is responsible to follow these Guidelines. It is also advised that the End User request from the Generator, a copy of their latest test data, which shows the quality they are receiving.

9.0 APPENDIX I – Testing and Analysis

TEST 1: Heavy Metals Analysis of the MAV

Metals to be tested (mg/kg dry weight)

- Arsenic
- Cadmium
- Cobalt
- Copper
- Chromium
- Lead
- Mercury
- Molybdenum
- Nickel
- Selenium
- Zinc

TEST 2: Agronomic value and Nutrients analysis

- % Total Solids
- % Total Volatile Solids
- Moisture content
- pH
- Liming value (calcium carbonate equivalent, neutralizing value) if used as a liming agent
- Carbon content

(Nutrients - mg/kg dry weight)

- Total Kjeldahl Nitrogen (TKN)
- Ammonium (NH₄⁺)
- Nitrate and Nitrite (NO₃ and NO₂)
- Phosphorus
- Potassium
- Calcium
- Magnesium
- Sodium

TEST 3: Pathogens

- Fecal coliforms
- Salmonella

TEST 4: Analysis for soil fertility and cumulative build up of heavy metals in the soil

pH

Buffer pH (if by-product is to be used as a liming agent)

Electrical Conductivity (ECe)

Phosphorus and Potassium (Mehlich III extraction)

(Metals – mg/kg dry weight)

Arsenic

Cadmium

Cobalt

Copper

Chromium

Lead

Mercury

Molybdenum

Nickel

Selenium

Zinc

APPENDIX III

Categories of Products

Legend:

- Lo HM – category A heavy metals
- Hi HM – category B heavy metals
- LP – low pathogen levels – includes stabilized biosolids
- HiP No MB – high pathogen levels but contains no municipal biosolids
- HiP MB – high pathogen levels from municipal biosolids

