Drafting Instructions - Additions to Sewage Regulations – Sewage Sludge

Purpose

The sewage sludge regulations are intended to allow the safe management, treatment and disposal of sewage sludge.

The regulations establish strict pathogen and heavy metal content limits for treated domestic sewage sludge (called National Treated Sewage Sludge/Biosolids Standard) that is suitable for land application.

Treated sewage sludge/Biosolids that meet strict standards are rich in plant nutrients and organic matter and their application to land improve soil fertility and stability and enhance the growth of agricultural, silvicultural and horticultural crops and will reduce fertiliser costs.

The regulations provide guidelines for the management and disposal of treated sewage sludge that does **not** meet the National Treated Sewage Sludge/Biosolids Standard.

The regulations are designed to encourage the land application of biosolids and biosolids derived products in a manner that protects the public health and maintains or improves environmental quality.

The regulations:

- Ban the disposal of domestic septage to land or the any area other than a sewage treatment plant.
- Ban the application of untreated sewage and untreated sewage sludge to land or any other area.
- Establish general requirements, management practices and operational standards including vector control, for the treatment of sewage sludge
- Management practices are to include restriction of access by livestock, other animals and (unauthorised) humans to sludge treatment and storage areas (as well as to other areas of sewage treatment plants).
- Require producers of sewage sludge to monitor, sample and analyse the sludge produced, keep records on the operation and performance of the treatment process and final product quality before it leaves the plant
- Establish standards for treated sewage sludge (including pollutant and pathogens limits and land application rates) that can be applied to agricultural soils.
- Untreated sludge or treated sludge that does not satisfy the National Treated Sewage Sludge/Biosolids Standard for application to agricultural land must be disposed of in a landfill or other locations approved by the Authority.
- Establish requirements for the frequency of monitoring (sampling and testing) and recordkeeping requirements when sewage sludge is applied to the land, placed on a surface disposal site
- Require sludge producers to make annual reports to the Authority on the amount of sludge produced and its disposition;
- Establish requirements for persons transporting domestic septage and for persons requiring the services of persons that transport domestic septage

Summary of the additional Features of the Sewage Regulations

1. Definitions
2 Scope and applicability
3. Prohibitions
4. Management practices for persons who generate sewage sludge
5. Monitoring, sampling and analysis requirements
6. Standards for treated sewage sludge that can be applied to agricultural land
7. Disposal of untreated sewage sludge of treated sewage sludge that do not meet standards in regulation 6.
8. Reporting requirements
9. Licence requirements for persons transporting domestic septage
10. Offences

1. Definitions

"Domestic Septage" means the domestic liquid and solid sewage pumped from septic tanks, cesspools, holding tanks, vault toilets, chemical toilets or other similar domestic sewage treatment components or systems and other sewage sludge not derived at sewage treatment plants.

"Sewage treatment plant" means any facility or any collection system which is intended to receive sewage and change the quality of such sewage whether by natural or imposed means.

"Sewage" means wastewater comprised primarily of water and organic waste, produced from domestic sources including residences, institutions, offices, commercial and industrial facilities. It shall not include trade effluent.

“Fully Treated Sewage Sludge/Biosolids” means treated sewage sludge or biosolids that meet the National Treated Sewage Sludge/Biosolids Standards that are set out in these regulations.

“Partially treated sewage sludge” means treated sewage sludge or biosolids that does **not** meet the National Treated Sewage Sludge/Biosolids Standards that are set out in these regulations.

“Sewage sludge” means residual sludge from sewage treatment plants treating domestic or urban waste waters and from other sewage plants treating waste waters of a composition similar to domestic and urban waste waters; it includes scum or solids removed in primary, secondary, or advanced wastewater treatment processes. Sewage sludge does not include the ash produced from an incinerator or the grit and screenings produced during the initial treatment of sewage.

“Vector attraction” is the characteristic of sewage sludge that attracts rodents, flies, mosquitos, or other organisms capable of transporting infectious agents.

2. Scope and applicability

a) These regulations apply to:

i. Any person who generates, stores or treats sewage sludge in a sewage treatment plant or other facility *[Conceivably there could be dedicated facilities to treat sewage sludge produced in sewage treatment plants]*
ii. Any person who applies treated sewage sludge to the agricultural land
iii. Any person who transports domestic septage or treated sewage sludge that does not meet the National Treated Sewage Sludge/Biosolids Standards
iv. The owner/operator of a surface disposal site for treated sewage sludge not suitable for application to agricultural land.

3. Prohibitions

b) No person my dispose of domestic septage to land or the any area other than a sewage treatment plant.
c) No person may apply or discharge untreated sewage or untreated sewage sludge to land or to any water body or any other area.
d) No person may give away, sell or distribute treated sewage that does not meet the National Treated Sewage Sludge/Biosolids Standards indicated in Regulation 6 and Schedule A.

4. Management practices for persons who generate sewage sludge

a) Persons who produce sewage sludge and/or intend to dispose of sewage sludge must provide the information specified in Schedule B
b) Persons who operate sewage treatment plants must treat sewage sludge in accordance with the management practices set out in Schedule C.

5. Monitoring, sampling and analysis requirements for sewage sludge

a) Any person who produces sewage sludge must monitor, sample and analyse the sludge produced, keep records on the operation and performance of the treatment process and final product quality before it leaves the plant
b) Testing of sludge according to Schedule D
Every producer of treated sludge shall ensure that sludge produced by him and supplied for the purpose of use in agriculture is tested according to Schedule D not less than every six months or when any changes in the characteristics of the treated sludge occur as a result of changes in the treatment process or in the sewage being treated.

6. Standards for treated sewage sludge that can be applied to agricultural land

[This regulation establishes standards for treated sewage sludge (including pollutant and pathogens limits and land application rates) that can be applied to agricultural soils.]

a) Any person the provides or uses treated sewage sludge that is to be applied to agricultural soils must ensure that the treated sewage sludge meets the National Treated Sewage Sludge/Biosolids Standards set out in Schedule A.

7. Disposal of treated sewage sludge that does not meet National Treated Sewage Sludge/Biosolids Standards in Schedule A.

Untreated sewage sludge or treated sewage sludge that does not satisfy the National Treated Sewage Sludge/Biosolids Standards for application to agricultural land must be disposed of in a licensed landfill or other locations approved by the Authority. Application for the disposal of such partially treated sludge to areas other than a licensed landfill shall be made in accordance with the provisions in Schedule E.

8. Reporting requirements *[Add to reporting under sewage regulations. All sludge data to be reported on dry basis. Septage amounts are to be by volume]*

a) Monthly reports [Add amount of sludge produced and removed to drying beds; add amounts of septage received]
b) Annual (calendar year) reporting [Add amounts of sewage sludge produced, amount of treated sludge stored on site, amount of treated sludge transferred off site as Fully treated and as partially treated, analytical data to support transfers; destinations for treated sludge and how transported, total amount of septage received over year; Add list of new industrial customers that were connected to the sewage treatment plant in the previous calendar year] *[The last item will facilitate the Trade Effluent Regulations]*

9. Licence requirements for persons transporting domestic septage

a) Persons who transport domestic septage
   i. No person shall be engaged in the business of septic tank cleaning or the transportation of septage or sewage for compensation, unless they are in compliance with these regulations.
   ii. Persons who own or operate vehicles that transport domestic septage are required to have a Domestic Septage licence. Application for a licence shall be made using the form in Schedule ** and upon payment of the application fee. *[The application form and fee would be the same as for haulers of industrial sludge and is not repeated here. Consider a single licence for transportation of both industrial and domestic septage]*
   iii. Domestic Septage Licences are valid as long as vehicle has a valid road traffic licence unless revoked by the Authority for a violation of these licence requirements.
   iv. Applications for a licence must be made on the form in Schedule F.
b) Requirements of haulers
   i. Maintain record of each load from licensed sewage treatment plants and from persons with a Trade Effluent and Industrial Sludge Licence for a period of two years. [Records from householder and others without a Trade Effluent and Industrial Sludge Licence is not required – but see below]
   ii. Haulers must possess an agreement with a sewage treatment plant to accept domestic septage

10. Offences *[Add to offences section of Sewage regulations]*

It will be an offence to:

discharge sludge that do not meet the National Treated Sewage Sludge/Biosolids Standards to agricultural land

discharge sludge that does not meet the sludge National Treated Sewage Sludge/Biosolids Standards to land without a licence

transport untreated or partially treated domestic sewage sludge without a licence

….

11. Schedule A - National Treated Sewage Sludge/Biosolids Standards for Fully Treated Sewage Sludge that can be applied to agricultural land

Note: Basis for Ceiling concentrations. The maximum permissible levels of metals in soils are close to the Jamaican 'background' levels (i,e., levels that occur naturally in Jamaican soil).

Pathogens

Treated sewage sludge must undergo biological, chemical or heat treatment process, long term storage or any other appropriate process so as significantly to reduce its fermentability and the health hazards resulting from its use, being a process of such a character that:

the quantity of faecal coliforms must be < 1,000 MPN/g of total solids (oven dried mass); and
there can be no salmonellae present.

Metals

Ceiling concentrations, annual loading rates and cumulative loading rates for metals in treated sewage sludge when applied to agricultural land

[The last 3 columns are provided for information only]

Pollutant	Jamaican Ceiling Concentration #	Jamaican Annual Pollutant Loading Rates	Jamaican Cumulative loading rates%	*US EPA Ceiling concentration^*	*Jamaican soil levels (range)^**	*Annual Pollutant Loading Rates U.S. EPA*
	Mg/kg (dry weight basis)		kg/ha	*mg/kg (dry weight basis)*		*kg/ha*
Arsenic	65	1.75	15	*75*	*35 – 373*	*12.0*
Cadmium	75	1.7	15	*85*	*03 – 94*	*1.9*
Copper	230	4.0	50	*4,300*	*53 – 657*	*75*
Lead	90	1.6	20	*840*	*21 – 897*	*15*
Mercury	0.045		01	*57*	*.004 – .083*	*0.85*
Molybdenum	9		2	*75*	*10 – 12*	
Nickel	180##	21	40	*420*		*21*
Selenium	14##	5	5	*100*		*5.0*
Zinc	400	6.3	80	*7,500*	*75 – 936*	*140*
Cr	830	42	165	*3,000*	*31 – 1,063*	*150*

^ Included for information; columns will not appear in the regulations
* A Geochemical Atlas of Jamaica, Page 77
# Based on the 95th percentile (rounded to 5 mg/kg) of the level of occurrence in Jamaican soils except as noted
Based on US EPA limits
% Based on 4,400 kg dry weight compost per ha for 45 years[1]

[1] Based on the maximum acceptable cumulative limits for metal additions to soil, the maximum acceptable trace element concentrations in compost were calculated by assuming an annual application rate of 4,400 kg/ha of dry-weight compost, which may contain up to 5 percent of nitrogen (by dry weight) and *50* percent humidity, based on a 45 year-period. From Support Document for Compost Quality Criteria National Standard Of Canada (CAN/BNQ 0413-200) The Canadian Council Of Ministers Of The Environment (CCME) Guidelines Agriculture And Agri-Food Canada (AAFC) Criteria

12. Schedule B Information requirements or generation or disposal of sewage sludge [and licence application for STPs].

Licence Application Form – Sewage Treatment Plants

Natural Resources Conservation Authority

Application Form: Sewage Treatment and Sewage Sludge Disposal Licence

1. APPLICATION FOR:	YES	NO	DATE OF RECEIPT:	____/__/__
INITIAL LICENCE	□	□		(yyyy/mm/dd)
MODIFICATION OF EXISTING LICENCE	□	□		
CHANGE IN OWNERSHIP	□	□	COMPLETION DATE	____/__/__
RENEWAL	□	□		(yyyy/mm/dd)
APPLICATION FEE ENCLOSED	□			

Applications for a Sewage Treatment and Sewage Sludge Disposal Licence must be submitted by owners or operators of existing or proposed facilities as specified in the regulations.

Applications for licence renewals must be submitted not later than the 3 months prior to the expiration date.

Please print or type all information requested. A completeness review will be made utilising a Completeness Checklist. The completed licence application form must be submitted to:

Natural Resources Conservation Authority

10 Caledonia Avenue

Kingston 5

GENERAL OWNER AND PLANT INFORMATION

2. **Company' legal name and address**	
Company name:	
Company mailing addressLine1:	
Company mailing addressLine2:	
Company mailing addressLine3:	
Company Phone No.:	( )
Company FAX No.:	( )
Company email address:	
3. **Owner name and address**	
Owner's name:	
Owner's mailing addressLine1:	
Owner's mailing addressLine2:	
Owner's mailing addressLine3:	
Owner's Phone no.:	( )
Owner's FAX no.:	( )
Owner's electronic mail address:	
4. **Plant name and address**	
Plant name:	

Plant mailing addressLine1:	
Plant mailing addressLine2:	
Plant mailing addressLine3:	
Plant Phone no.:	( )
Plant FAX no.:	( )
Electronic mail address:	

5. **Plant Operator:**	
Contact name:	
Title:	
Phone no.:	( )
FAX no.:	( )
Electronic mail address:	
Date of last plant operator training	
Type or name of training course	

6. Plant History Began operating on (mm/yyyy) Previous plant name1: _____ Previous plant name2: _____ Previous plant name3: _____ Previous plant name4: _____ Previous plant name5: _____	 (Use yyyy/mm/dd format) Date of name change1: _____ Date of name change2: _____ Date of name change3: _____ Date of name change4: _____ Date of name change5: _____

7. Current permits for the facility issued by NRCA

Identify all current required Permits to Operate for this and any other plants owned by the owner.

Use yyyy/mm/dd format for dates

AO#_____ Date ____/____/____ AO#_____ Date ____/____/____

AO#_____ Date ____/____/____ AO#_____ Date ____/____/____

AO#_____ Date ____/____/____ AO#_____ Date ____/____/____

GENERAL OWNER AND PLANT INFORMATION (Continued)

8. Current licence(s) for the facility issued by NRCA
Identify all current required Trade Effluent and Sewage Sludge Disposal Licences for this and any other plants owned by the owner. (Provide separate list if necessary)

		yyyy/mm/dd	dd/mm/yyy
NRCA #______________	DATE GRANTED:	____/__/__	EXPIRY DATE: ____/__/__
NRCA #______________	DATE GRANTED:	____/__/__	EXPIRY DATE: ____/__/__
NRCA #______________	DATE GRANTED:	____/__/__	EXPIRY DATE: ____/__/__
NRCA #______________	DATE GRANTED:	____/__/__	EXPIRY DATE: ____/__/__
NRCA #______________	DATE GRANTED:	____/__/__	EXPIRY DATE: ____/__/__
NRCA #______________	DATE GRANTED:	____/__/__	EXPIRY DATE: ____/__/__
NRCA #______________	DATE GRANTED:	____/__/__	EXPIRY DATE: ____/__/__
NRCA #______________	DATE GRANTED:	____/__/__	EXPIRY DATE: ____/__/__

9. Type of business at this plant: Domestic Sewage Treatment

10. General and non-confidential description of plant activities:
Treatment of domestic sewage

11. Standard Industrial Classification (SIC) Codes (Four digit code(s) (See Instructions):

ISIC1 ____ Description

ISIC2 ____ Description

ISIC3 ____ Description

ISIC4 ____ Description

12. Description of treatment units at the plant.
    Give a detailed description of the treatment processes. Include the type of treatment plant, mode of operation, and all treatment units. Start with the plant's headworks and finish with the point of discharge. Include all sludge processing and drying units.
    a) Date constructed
    b) Design Capacity
    c) 2-hour peak flow
    d) Type of plant
    e) Treatment Units (Number and capacity of each unit)

[Provide list of units from which units present are picked]

Inlet, Outlet and Overflow structures
Storm Water Tanks
Screening system
Grit Chamber
Fats, Oil and Grease Traps
Imhoff Tank
Pre-sedimentation Tanks
Sedimentation Tank – Secondary Clarifier
Aeration Basin
Trickling Filter
Reed Beds
Lagoons (Pond systems)
Plants for Chemical Treatment and Disinfecting
Filters
Sludge Thickeners
Sludge Drying Beds

13. Diagrams and Maps
    a) Plant process flow diagram
    b) Map showing plant location and area 5 km from plant boundaries in all directions
    c) Indicate on map the effluent discharge point and trace to 5 km or nearest stream
    d) Indicate all wells, surface drinking water supply intakes
    e)

    f)

Sewage Sludge Information

14. Information for Sewage Sludge

    a) Existing Sludge Generating Units (check all that apply)

    □ Aerated Grit Chamber

    □ Aerated Lagoon When was sludge last removed? __ __/__ __/__ __

    □ Chemical Precipitation

    □ Coagulation/Flocculation

☐ Comminution	
☐ Contact Stabilization	When was sludge last removed? __ __/__ __/__ __
☐ Conventional-Activated Sludge	When was sludge last removed? __ __/__ __/__ __
☐ Extended Aeration	
☐ Fill and Draw	
☐ Flow Equalization	
☐ Grit Chamber	
☐ Oxidation Ditch	When was sludge last removed? __ __/__ __/__ __
☐ Phosphorous Removal-Alum	When was sludge last removed? __ __/__ __/__ __
☐ Phosphorous Removal-Biological	When was sludge last removed? __ __/__ __/__ __
☐ Phosphorous Removal-Ferric Chloride	When was sludge last removed? __ __/__ __/__ __
☐ Phosphorous Removal-Ferric Sulphate	When was sludge last removed? __ __/__ __/__ __
☐ Polishing Pond	When was sludge last removed? __ __/__ __/__ __
☐ Primary Clarification	
☐ Pure Oxygen	
☐ Rotating Biological Contactors	
☐ Screening	
☐ Secondary Clarification	
☐ Septic Tank	When was septage last removed? __ __/__ __/__ __
☐ Sequencing Batch Reactor	
☐ Stabilization Pond	When was sludge last removed? __ __/__ __/__ __
☐ Two Stage-Activated Sludge	
☐ Other (Specify)	

b) Sludge Production

Estimate annual sludge production in dry tonnes. (See instructions for conversion formulas, if necessary)

	Annual amounts
Total sludge to be generated	
to be landfilled	
to be land applied to be hauled to another facility	
to be distributed, sold or land applied as Exceptional Quality (EQ) sludge	

other (please specify)	

c) Screenings and Grit Disposal

Will screenings and grit be disposed at a sanitary landfill?

□ No screenings or grit are generated (continue to 4)

□ No. Screenings and grit are not disposed of at a sanitary landfill. Explain why not in the space below.

□ Yes. If yes, identify the landfill and provide the license number below:

Landfill Name

License Number

d) Sludge Storage

a. How is sludge storage provided?

□ On-Site

□ Off-Site - Self Owned

□ Off-Site - Contracted (provide the information requested below)

Name

Contact

Mailing Address

P.O. Box, Street Address or Route

City or Village, Parish

Telephone Number (___ ___ ___) ___ ___ ___ - ___ ___ ___ ___

b. How many days of sludge storage are provided? Days.

c. Estimate the capacity of all sludge storage facilities. (Answer at least one)

cubic metres dry metric tons

d. Select each sludge type that is being stored.

□ Liquid

□ Cake

e. If no storage is provided or if less than 180 days of storage is provided, please indicate why:

□ Sludge storage is in planning or construction stage

□ Have treatment lagoon system

□ Sludge is landfilled

□ Sludge is incinerated

□ Sludge is hauled to another licensed facility (provide the information requested below)

Facility Name

NEPA Licence No. ___ ___ ___ ___ ___ ___ ___ - ___

□ Other (explain)

e) Sludge Transportation

Who will haul the sludge to the disposal site? (Check all that apply)

□ Plant Personnel

□ Contract Hauler (provide the information requested below)

Business Name

Contact person

License Number (if certified)

□ Other (specify)

f) Sludge Treatment & Thickening Prior to Final Disposition

a. Treatment (check all that apply)

□ Aerobic Digestion

□ Composting w/msn or other (class A)

□ Anaerobic Digestion □ Heat Drying

□ Air Drying (Drying Beds)

□ Heat Treatment

□ Composting w/yard waste (class B)

□ Autothermophilic Aerobic Digestion (ATAD)

□ Composting w/maw or other (class B)

□ Beta Ray irradiation

□ Alkaline Stabilization (class B)

□ Gamma Ray irradiation

□ PSRP Equivalent

□ Pasteurization

□ Temp/Time based on %Solids

□ PFRP Equivalent

□ Alkaline Stabilization (class A)

□ Hauled to other facility

□ Prior test for enteric virus/viable ova

□ Lagoon system

□ Post test for enteric virus/viable ova

□ Reed Beds

□ Composting w/yard waste (class A)

□ Other (please specify)

b. Thickening (check all that apply)

- □ Gravity Thickening Tank
- □ Dissolved air floatation (DAF or AFT)
- □ Pressure Filter
- □ Plate Press
- □ Belt Press
- □ Vacuum Filter
- □ Drying Beds
- □ None
- □ Gravity Belt Thickener
- □ Other (please specify)
- □ Centrifuge

g) Sludge/Biosolids Use and Disposal

How do you plan to use/dispose of your sludge/biosolids? (Check all that apply)

- □ Land Application
- □ Landfill
- □ Haul to other permitted facility
- □ Incinerate
- □ EQ Bulk
- □ Lagoon – Do not plan to disposal of sludge this permit term
- □ EQ Bag
- □ Other (please specify)

h) Pathogen Control

What level of pathogen control do you achieve?

- □ Class A
- □ Class B
- □ Do not land apply

If Class A, what organism do you test for compliance in addition to treatment?

- □ Fecal Coliform
- □ Salmonella

If Class B, how do you show compliance?

- □ Fecal Coliform
- □ Process control as indicated above in item 6a

i) Vector Control

What option do you use to satisfy vector control requirements?

- □ Volatile Solids Reduction
- □ Aerobic Composting Process
- □ Aerobic SOUR Test
- □ pH Adjustment of Sludge
- □ Aerobic Bench Scale
- □ Injection when land applied
- □ Anaerobic Bench Scale
- □ Incorporation when land applied
- □ Drying With Unstabilized Solids
- □ Approved Equivalent Process
- □ Drying With Stabilized Solids

j) Sludge Limits

Did you satisfy all high quality pollutant concentrations throughout your last permit term?

□ Yes □ No

If no, what pollutants exceeded the high quality limits and what, if any steps were taken to address the source?

13. Schedule C Management Practices for treatment of sewage sludge

14. Schedule D Testing of sludge

a) Sampling frequency and method

The sludge produced shall be sampled every month

A sample set shall consist of a set of five samples taken at random from a batch of sludge; each sample consisting of not less than 100 ml in the case of liquid sludge or 100 g in the case of dried sludge;

Where analysis of samples over a period of six consecutive months shows that none of them contain Salmonella spp. or more than 102 units of E. coli, the interval before the next sampling may be increased to three months.

b) Tests to be done

Each sample shall be analysed so as to determine:

i) (a) the presence of E. coli; and

ii) (b) the presence of Salmonella spp. where the batch of sludge in question has undergone a treatment process designed so as to reduce the amount of E. coli present in the sludge by not less than 99.9999 per cent,

iii) pH

iv) the percentage content of dry matter

v) the percentage organic matter on a dry weight basis

vi) the percentage of nitrogen on a dry weight basis

vii) the percentage of phosphorus on a dry weight basis

The concentrations in milligrams per kilogram of dry matter of-

viii) chromium;

ix) Zinc

x) Copper

xi) Nickel

xii) Cadmium

xiii) Lead

xiv) Mercury

c) Methods of analysis

Enteric viruses. ASTM Designation: D 4994-89, "Standard Practice for Recovery of Viruses From Wastewater Sludges", 1992 Annual Book of ASTM Standards: Section 11 -- Water and Environmental Technology, ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

Fecal coliform. Part 9221 E. or Part 9222 D., "Standard Methods for the Examination of Water and Wastewater", 18th Edition, 1992, American Public Health Association, 1015 15th Street, NW., Washington, DC 20005.

Helminth ova. Yanko, W.A., "Occurrence of Pathogens in Distribution and Marketing Municipal Sludges", EPA 600/1-87-014, 1987. National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161 (PB 88-154273/AS).

Inorganic pollutants. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", EPA Publication SW-846, Second Edition (1982) with Updates I (April 1984) and II (April 1985) and Third Edition (November 1986) with Revision I (December 1987). Second Edition and Updates I and II are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161 (PB-87-120-291). Third Edition and Revision I are available from Superintendent of Documents, Government Printing Office, 941 North Capitol Street, NE., Washington, DC 20002 (Document Number 955-001-00000-1).

(5) Salmonella sp. bacteria. Part 9260 D., "Standard Methods for the Examination of Water and Wastewater", 18th Edition, 1992, American Public Health Association, 1015 15th Street, NW., Washington, DC 20005; or

Kenner, B.A. and H.P. Clark, "Detection and enumeration of Salmonella and Pseudomonas aeruginosa", Journal of the Water Pollution Control Federation, Vol. 46, no. 9, September 1974, pp. 2163-2171. Water Environment Federation, 601 Wythe Street, Alexandria, Virginia 22314.

(6) Specific oxygen uptake rate. Part 2710 B., "Standard Methods for the Examination of Water and Wastewater", 18th Edition, 1992, American Public Health Association, 1015 15th Street, NW., Washington, DC 20005.

The analyses for metals referred to above shall be carried out following strong acid digestion; the reference method of analysis shall be that of atomic absorption spectrometry, and the limit of detection for each metal shall not exceed the appropriate limit value specified in column (3) of the sludge table or, in the case of chromium, 25 milligrams per kilogram of dry matter.

15. Schedule E Application for land disposal to sites of treated sewage sludge that does not meet the National Treated Sewage Sludge/Biosolids Standards

    All biosolids land application fields are to be approved by the Authority prior to use. This will enable the Authority maintain a record of such sites and to ensure that sludge is being spread on sites that meet Authority's criteria.

    The criteria for granting such approvals are as follows:

    a) Land application sites shall have minimum separation distances of:
        i. 300 m from a drinking water supply well
        ii. 100 m from any surface water except that this may be reduced to 50 m when a vegetative buffer strip at least 10 m wide is maintained between the site and the surface water.
        iii. 1 m between the ground surface and bedrock or groundwater. The Authority may allow a reduced separation distance to a minimum of 0.5 m on a case-by-case basis provided the rate of application is reduced.
        iv. 200m from an inhabited dwelling except that this distance may be reduced to 100 m if the sludge is incorporated with the soil and the resident owner and occupant gives their written consent

    b) Land application sites may not be located in wetlands or in channel of a river or stream, and those portions of the floodplain adjoining the channel. Land application sites may be located in the floodplain (land which has been or may covered by flood water during a flood) but the site may not be used when the floodplain is flooded.
    c) Land application sites shall be limited to cultivated cropland, tree plantations, pasture or hayland. Other sites may be reviewed and approved by the Authority in writing on a case-by-case basis.
    d) Land application sites shall be limited to a slope of 12% or less.