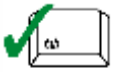
Massachusetts Department of Environmental Protection
Bureau of – Resource Protection – Residuals Management Program

BRP WP 28 Sampling and Analysis Plan Approval

Application for Approval of Sampling and Analysis Plan

Please do not mail.
Submit through ePlace.
See instructions.

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A. Instructions

As described in Regulations 310 CMR 32.00 “Land Application of Sludge and Septage,” any owner/operator applying for a permit for beneficial use of sludge and/or septage must conform to specified sampling and analytical requirements.

B. General Information

1. Facility:

Name

Street Address

City | State | Zip Code

2. Applicant:

Name of Applicant (if different)

Street Address

City | State | Zip Code

3. Contact Person:

Name

Street Address

City | State | Zip Code

4. Date of application:

Date

5. Volume of wastewater flow through the facility:

Gallons per day

B. General Information (cont.)

6. List of industries discharging to the facility. (If your facility has an approved pretreatment program please provide a copy of the EPA approval letter in place of the following. If the sludge is generated from an industrial process please proceed to item #7.)

   a. Gallons per day per source:

   b. Waste composition per source:

   c. Frequency of industrial discharges:

7. Industrial Sludges: (please provide a listing of all known chemicals utilized and/or created in the process which may be found in the sludge):

8. Sludge type classification requested:

   ☐ Type I (Duplicate copy of AOS application must be sent to the local board of health)
   ☐ Type II
   ☐ Type III

9. State the type of sludge stabilization process(es) utilized:

C. Sampling Requirements

1. Describe the intended sampling location(s) and the rationale for choosing such location(s):

2. Describe why the sample location(s) meet the requirements for representativeness set forth in 310 CMR 32.70(2a):

3. Frequency of sampling (refer to table 32.12, in 310 CMR 32.13):

   ☐ Every six months ☐ Every three months
   ☐ Every month ☐ Isolated pile(s)

4. Sampling equipment to be used (see "Table of Required Containers..")

   a. Sampling device | b. Container type | c. Container cover

5. Sampling method:

   a. Describe procedure to be used for cleaning sample containers prior to sampling:

   b. Describe the procedures to be used for cleaning / decontamination of sampling equipment:

C. Sampling Requirements (cont.)

c. Describe sampling method and number of samples to be taken per sampling event. Include at least one duplicate sample for analysis.

d. Sample size: _____ (weight/volume)

e. Describe preservation methods to be employed for each analyte (see Table of Required Containers, Preservation Techniques, and Holding Times):

f. Provide the name of the person(s) who will take the sample(s) and his/her qualifications:

D. Analytical Requirements

1. Provide the name and address of all laboratories to be employed, including sub-contracting laboratories; indicate those analyses to be performed by sub-contractors. According to 310 CMR 32.70(3), each sample must be analyzed by a laboratory deemed acceptable to the Department. At the present time, only analytical results submitted by laboratories certified by the Lawrence Experiment Station for the analytical parameters in question are acceptable for the purpose of complying with 310 CMR 32.00. The certification status of a laboratory can be obtained by contacting the DEP William X. Wall Experiment Station, 37 Shattuck Street, Lawrence, MA. (508) 682-5237:

D. Analytical Requirements (cont.)

2. Provide the analytical method to be used for each parameter listed in table 1 stating specific reference source and method number, and any deviations from the cited method. Include similar information for digestion/extraction procedures to be utilized that are not described in the analytical methods (please note that for initial approval at least one TCLP Toxicity Teest and three separate bulk analyses are required):

3. a. Will the sludge or septage be applied or stored voer an existing, planned or potential groundwater public water supply, or within ½ mile of a well used as a source of drinking water supply by a public water system, or within ½ mile of the high water mark of any Class A water?

   ☐ Yes ■ No

   b. Specify the U.S. Geological Coordinates of land application sites if known at this time:

4. 310 CMR 32.13(6) requires analysis of the sludge for a six month period before an Application for Approval of Suitability is approved. However, to determine sampling frequency see Table 32.13 of 310 CMR 32.00. A minimum of three independent samples is required for **initial** approval (also see "DEP Guidelines for Sampling and Analysis").

E. Certification

"I certify that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete."

Signed under the pains and penalties of perjury:

Print Name

Signature

Date

Date

Affiliation

Massachusetts Department of Environmental Protection
Bureau of – Resource Protection – Residuals Management Program

BRP WP 29 Approval of Suitability (AOS)

Application for Approval of Suitability (AOS) for Beneficial Use under 310 CMR 32.00 – Type I, II, or III

Transmittal Number

Facility ID# (if known)

A. General Information

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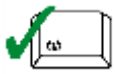

Date of Application:

Date of application

1. Application for the classification of: ☐ sludge ☐ septage ☐ compost ☐ other:

if other, please specify

2. Type of sludge generated: ☐ Domestic only ☐ Water Treatment ☐ Industrial ☐ other:

if other, please describe

3. Generator information – generator means: a) for sludge – the treatment facility; b) for septage – the first person whose action or intended action causes septage to be subject to Regulation for Land

Name

Address

City State Zip

4. Facility address (if different):

Name

Address

City State Zip

5. Operator's name or contact person:

Name

Telephone number FAX number

6. Owner's name and address:

Name

Address

City State Zip

7. NPDES Permit or Groundwater Discharge Permit Number:

8. Type of treatment provided: ☐ primary ☐ secondary ☒ advanced ☒ other:

if other, please specify

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B. Sludge

1. Average daily flow of wastewater or water: _____ gallons/day
2. Average daily quantity of sludge: _____ dry tons/day
3. Average daily quantity of septage treated: _____ gallons/day
4. List of industrial discharges to generator or if the sludge is non-domestic a list of all chemicals used in the process:

   a. Municipal – Does your facility have an approved pretreatment program? (If yes, please provide a copy of U.S. EPA approval letter.) ☐ Yes ☐ No

   If you do not have an approved pretreatment program please provide a list of all known industrial discharges to the system.

Name of Discharger	**Type of (Business)***	**Quantity (gals/day)**	**Quality (Constituents in discharge)**

   b. Other – List of all chemicals used in your process. (Attach separate sheet if necessary)

_____

_____

_____

_____

* Type of Business should indicate that process or those processes which could be of concern relative to the quality of the discharge (i.e. plating operation).

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Facility ID# (if known)

B. Sludge (cont.)

5. Description of stabilization process employed and explanation of how it complies with 310 CMR 32.12: pathogen and volatile solids reduction. (Please attach documentation to demonstrate compliance with the technical criteria in 310 CMR 32.80 and 32.81, i.e. temperature records from a compost operation, etc.):

6. Proposed use: ☐ Fertilizer
   ☐ Soil Amendment

7. Proposed classification:
   ☐ Type I (applicant must submit copy of the Application to the local Board of Health)
   ☐ Type II
   ☐ Type III

8. Proposed user and amount (if known):

   ☐ General Public — Amount

   ☐ Commercial Establishment — Amount

   ☐ Government — Amount

   ☐ Private Individual — Amount

C. Septage

1. List of industrial and Commercial Sources of Septage (additional names may be listed on separate attached sheet):

Name of Source	**Industrial/ Commercial**	**Quantity** (gal/month)	**Quality** (constituents in septage)

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Transmittal Number

Facility ID# (if known)

C. Septage (cont.)

2. Quantity of septage

   a. received by generator: _____ amount

   b. stored by generator: _____ amount

   c. disposed of by generator: _____ amount

3. Proposed use: ☐ Fertilizer
   ☐ Soil Amendment

4. Proposed classification: ☐ Type II
   ☐ Type III

5. Proposed user and amount (if known):

   ☐ Commercial establishment _____ amount

   ☐ Government _____ amount

   ☐ Private Individual _____ amount

D. Sampling and Analysis Plan

1. Prior to analytical work being conducted the applicant must submit for Department review and approval **parts A through D** of the "Format for Reporting Sludge Analysis Plans Pursuant to the Application for Approval of Suitability".

   Date of Department approval of the sampling and analysis plan: _____ Date

   Please note that failure to provide all information as required in part E will be cause for Department denial of an Approval of Suitability (AOS) or Land Application Certificate (LAC).

E. Report of Sludge Analysis

1. Specify the date(s) on which the stabilization of the sludge, which was sampled and analyzed, was completed: (records must be submitted with this section which documents compliance with the technical criteria for pathogen reduction pursuant to 310 CMR 32.80 and/or 32.81 i.e. for composting temperature records must be submitted as part of this application):

   _____ Date(s)

2. Date(s) of sample(s) collection (report in column 5 of tables 1 and 2):

   _____ Date(s)

3. Date(s) that sample(s) were received by the laboratory:

   _____ Date(s)

E. Report of Sludge Analysis (cont.)

4. Include with this report a copy of a completed Chain of Custody form documenting sample collection, transportation, and receipt by the laboratory.
5. Provide the name(s) of the person(s) who performed the sampling and his/her qualifications (if different from that listed in section C #5 f.):

section D #1.):

7. Provide the date of analysis of each analyte in column 7 of tables 1 and 2, and include date(s) of sample extraction for PCB's and pesticides in column 6 of tables 1 and 2.
8. Provide in column 8 of tables 1 and 2 the analytical method actually used for each parameter stating specific reference source and method number. Include similar information for digestion/extraction procedures utilized that are not described in the analytical methods. Explain any deviations taken from methods cited in the Sampling and Analysis Plan.
9. Provide in column 9 of tables 1 and 2 the detection limits for each parameter. (Note: in the event a parameter is reported as none detected, the detection limit must be equal to or less than the criteria listed in 310 CMR 32.12(2) for the classification requested. Detection limits greater than these values will be cause for a Department denial of an Approval of Suitability or Land Application Certificate).
10. Complete the information requested in columns 2, 3, and 4 of tables 1 and 2.
11. Provide certified copy(ies) of the lab(s) report(s) to the applicant for Approval of Suitability, including statement that lab has adhered to the requirements of its quality control/ quality assurance plan.

F. Sampling Results

Sampling results: Upon Department issuance of an Approval of Suitability (AOS) results of an on-going analysis performed in conformance with the Department approved Sampling and Analysis Plan must be sent to the Department immediately after completion of analysis; the owner or operator is also responsible for sending copies of the results to the Board of Health where the operator or owner is located.

G. Labeling

Each container in which Type I, II and III sludge is sold, distributed, or transported or offered for use, sale, or distribution shall itself prominently display or, if such display is not practicable, shall be accompanied by a shipping paper which shall prominently display the items listed in 310 CMR 32.51 for Type I sludge and the items listed in 310 CMR 32.52 (5) for Type II or Type III sludge.

Sludge containing molybdenum shall be accompanied by a written label or bill of lading according to the requirements of 310 CMR 32.40 (4). This requirement is for Type I sludge per 310 CMR 32.51 (d) and for Type II and III sludge per 310 CMR 32.52 (8). See Additional information regarding biosolids containing molybdenum can be found at Labeling Requirement and Additional Information Regarding Biosolids Containing Molybdenum.

BRP WP 29 Approval of Suitability (AOS)

Application for Approval of Suitability (AOS) for Beneficial Use under 310 CMR 32.00 – Type I, II, or III

Transmittal Number

Facility ID# (if known)

H. Certification

"I certify that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete."

Signed under the pains and penalties of perjury.

Name

Signature

Date

Title

Affiliation

For DEP Use Only

Date received: Date

Reviewed by: Name of reviewer

Date of final disposition: Date

Disposition:
a. ☐ Approved as submitted
b. ☐ Approved with modifications
c. ☐ Denied

Description of modifications or reasons for denial

1. Sampling and analysis plan review:

a. Is the laboratory acceptable?*

b. Is the plan acceptable? ◯ Yes ◉ No

c. Disposition: ◯ Yes ◉ No

◯ Approval ◉ Rejection, and reasons:

* Acceptable means a laboratory which has been fully certified for analysis of specific parameters required in sludge analysis.

Reasons for rejection

2. Are there additional constituents required to be analyzed for? ☐ Yes ■ No

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Transmittal Number

Facility ID# (if known)

For DEP Use Only (cont'd)

3. Department approved changes to analysis requirements:

   a. frequency: New frequency requirement

   b. constituents: New constituents requirement

   c. reason for change, and date: 1) Date

   2) Reason

   d. Date of Board of Health notification: Date

4. Analysis reports should be dated by receipt and attached to this application form.

Massachusetts Department of Environmental Protection
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BRP WP 30 **Certification of Land Application Projects Greater than or Equal to 0.5 Acres in Size**

BRP WP 31 **Certification of Land Application Projects Less than or Equal to 0.5 Acres in Size**

BRP WP 32 **Renewals or Modifications to Land Application Certifications**

Application for Land Application Certificate – Per Requirements of 310 CMR 32.00, Regulations for the Land Application of Sludge or Septage

Transmittal Number

Facility ID# (if known)

A. General Information

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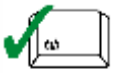

1. Which permit are you applying for? ☐ BRP WP 30 ☐ BRP WP 31 ☐ BRP WP 32

Approval Number | Date of Application

2. Applicant:

Name

Address

City | State | Zip code

3. Facility generating the sludge/septage:

Name of facility

Address

City | State | Zip code

4. Site owner:

Name

Address

City | State | Zip code

5. Contact person:

Name

Address

City | State | Zip code

Telephone number | FAX number

6. Date of DEP Approval of Suitability: Date

Classification: ☐ Type I ☐ Type II ☐ Type III

7. Stabilization Variance: ☐ Yes ■ No

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B. Site Information

1. Number of acres: a. Involved in total property ____ b. To be spread with sludge/septage ____

2. Type of zoning for: a. Proposed landspread site ____ b. Abutting Properties ____

3. What are the surrounding land uses?

4. Slope of site to be landspread: a. Maximum Percentage ____ b. Average Percentage ____

5. Soil Characteristics of Application Site (If SCS Soil Survey is not published, contact regional Soil Conservation Office for information):

a. USDA Soil Conservation Service Soil Name (map symbol) ____ b. USDA Soil Conservation Service Soil Texture Designation ____

c. USDA Soil Conservation Service Physical and Chemical Properties:

Depth ____ Permeability ____

Available water capacity ____ pH ____

Shrink-Swell potential ____ Erosion Factors ____

Hydrologic group ____ Depth to high water table ____

d. Soil Chroma using Munsell Color Notation (if known to applicant; otherwise to be determined by site investigation by DEP with applicant):

1) Mottles with chroma of two or less over five percent or more of soil within three feet of ground surface? ☐ Yes ■ No

2) Dominant color of soil matrix within three feet of ground surface has chroma of one or less and mottles cover less than five percent of surface area? ☐ Yes ■ No

e. Depth to bedrock: ____ feet

6. Distance to nearest municipal well(s): ____ feet

Distance to nearest private well(s): ____ feet

7. Distance to nearest surface water: ____ feet

Is the surface water(s) a public drinking water supply (class A water?) ☐Yes ■ No

C. Soil Analysis

Append copy of Soil Analysis which includes the following parameters:

- pH
- cation exchange capacity (CEC)
- total nitrogen (N)
- ammonium nitrogen (NH4)
- nitrate nitrogen (NO3), total phosphorus (P)
- potassium (K)
- total cadmium (Cd)
- total chromium (Cr)
- total copper (Cu)
- lead (Pb)
- mercury (Hg)
- nickel (Ni)
- zinc (Zn)
- PCB's (if sludge/septage contains ≥ 2 ppm)

D. Site Control Measures

1. Will erosion control or run-off prevention practices be necessary? ☐ Yes ■ No

   if so, describe practices

2. Are drainage practices necessary? ☐ Yes ■ No

   if so, describe measures

E. Crop Information

1. Type of crop to be grown: _____
2. Crop nitrogen needs: _____ lbs/acre
3. Approximate date of planting harvesting: _____
4. Intended use of crop: _____

F. Grazing Information

1. Type of animal: _____
2. Approximate size of herd: _____
3. Duration of grazing period: _____
4. Amount of time between land application and grazing: _____ number of days
5. Do grazing animals receive supplemental feed? ☐ Yes ■ No

   _____ if so, amount and type

G. Land Application Calculations

1. Please attach completed application rate worksheet attached in Appendix A (i.e., all calculations must be completed as part of this submittal).
2. Anticipated date of application: _____ month/day
3. Proposed method of application:

☐ Surface Spreading ☐ Surface Spreading followed by incorporation
☐ Subsurface Injection ☐ Other

_____ if other, please describe

H. Transportation

1. Transporter: _____ Telephone Number

_____ Name

_____ Address

_____ City _____ State _____ ZIP code

2. Approximate date(s) of transportation: _____ date
3. Estimated number of trips per date of transport: _____ number of trips
4. Method of transportation. Describe vehicle type (dump truck, tank truck, etc.) and measures taken to avoid leakage and spillage:

_____

_____

I. Certification

"I certify that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete."

_____ Print Name

_____ Signature

_____ Date

_____ Affiliation

Massachusetts Department of Environmental Protection
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Application for Land Application Certificate – Per Requirements of 310 CMR 32.00, Regulations for the Land Application of Sludge or Septage

Transmittal Number

Facility ID# (if known)

Approval Section (to be filled out by DEP)

Disposition: 1. ☐ Approved as submitted

2. ☐ Approved as Amended

Conditions

3. Source(s) of sludge or septage to be land applied:

Owner or operator

Location

Amount to be obtained

Type

Date of DEP approval

4. Approved annual rate of application

5. Approved total cumulative application limit

6. Site availability:

Number of years

7. Application denied? ☐ Yes ■ No

Reason for denial

8. Disposition by:

Name

Date

Date of Approval of Suitability

☐ Type I
☐ Type II

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BRP WP 32 **Renewals or Modifications to Land Application Certifications**

Transmittal Number

Facility ID# (if known)

Application for Land Application Certificate – Per Requirements of 310 CMR 32.00, Regulations for the Land Application of Sludge or Septage

Appendix A, Section A – Sludge and Soil Data

*Sludge reported on a dry weight basis (mg/kg)

Sludge Composition	Sludge* Our Example	Your Sludge
Total N	5%	%
Ammonium N	2%	%
Nitrate N	0%	%
P	2%	%
K	0.1%	%
Zn	3000 ppm	ppm
Pb	500 ppm	ppm
Cu	1000 ppm	ppm
Ni	50 ppm	ppm
Cd	20 ppm	ppm
PCB's	2 ppm	ppm

Appendix A, Section A – Soil Information

	Our Example	Your Soil
Texture	Loam	
Soil pH	6.5	
Cation Exchange Capacity (CEC)	12 meq/100g	meq/100g
Available P	25 lbs/A	lbs/A
Exchangeable K	50 lbs/A	lbs/A
Pb	33 ppm	ppm
PCB's	<0.5 ppm	ppm

Appendix A, Section C – Determine Annual Rate of Sludge Application

1. Amount of forms N in sludge:

   a. Percent organic N

      % total N – (% ammonium N (Sec A) + % nitrate N (Sec A)) = organic N

      Our example: 5 – (2 + 0) = 3% organic N

      Your sludge: _____ - (_____ + _____) = _____% organic N

   b. Pounds of available organic N per ton of sludge

      % organic N (1.a) x 4 = lbs available organic N/ton*

      *The conversion factor for NH_4-N and NO_3-N is calculated from:

      $$\frac{\text{Lbs N}}{\text{100 lbs sludge}} \times \frac{\text{2000 lbs}}{\text{ton}} = 20.0$$

      and for N_0 20 X 0.2 (only 20% available) = 4

      Our example: 3 x 4 = 12 lbs N/ton

      Your sludge: _____ x 4 = _____ lbs N/ton

   c. Pounds of ammonium N per ton of sludge

      % ammonium N (sec A) x 20 = lbs ammonium N/ton

      Our example: 2 x 20 = 40 lbs N/ton

      Your sludge: _____ x 20 = _____ lbs N/ton

   d. Pounds of nitrate N per ton of sludge

      % nitrate N (Sec. A) x 20 = lbs nitrate N/ton

      Our example: 0 x 20 = 0 lbs N/ton

      Your sludge: _____ x 20 = _____ lbs N/ton

Appendix A, Section C – Determine Annual Rate of Sludge Application (cont.)

2. Amount of plant-available N in sludge:

   a. Available organic N (1.b) + ammonium N (1.c) + nitrate N (1.d) = lbs N/ton incorporated

      Our example: 12 + 40 + 0 = 52 lbs N/ton

      Your sludge: _____ + _____ = _____ lbs N/ton

   b. Surface application of sludge (assumes half the ammonium N will be lost by volatilization)

      Available organic N (1.b) + [ammonium N (1.c) / 2] + nitrate N (1.d) = lbs N/ton

      Our example: 12 + [40 / 2] + 0 = 32 lbs N/ton surface applied

      Your sludge: _____ + [_____ / 2] + _____ = _____ lbs N/ton surface applied

3. Adjust N fertilizer recommendations to account for residual (N from sludge applications in 3 previous years):

   0.46 x % organic N x tons sludge/acre = lbs residual N/acre

   a. Sludge applied one year ago:

      Our example: 0.46 x 3 x 5 = 6.9 lbs residual N/acre

      Your sludge: 0.46 x _____ x _____ = _____ lbs residual N/acre

   b. Sludge applied two years ago:

      Our example: 0.46 x 3 x 5 = 6.9 lbs residual N/acre

      Your sludge: 0.46 x _____ x _____ = _____ lbs residual N/acre

   c. Sludge applied three years ago:

      Our example: 0.46 x 0 x 0 = 0 lbs residual N/acre

      Your sludge: 0.46 x _____ x _____ = _____ lbs residual N/acre

Appendix A, Section C – Determine Annual Rate of Sludge Application (cont.)

3. d. Total residual N.

   Step 3.a + Step 3.b + Step 3.c = total residual/acre

   Our example: 6.9 + 6.9 + 0 = 13.8 total lbs residual N/acre

   Your sludge: _____ + _____ + _____ = _____ total lbs residual N/acre

   e. Adjust N requirement

   Lbs. N needed by crop (Sec. B) – lbs residual N (3.d) = lbs required/acre

   Our example: 170 – 13.8 = 156.2 lbs N required/acre

   Your sludge: _____ - _____ = _____ lbs N required/acre

   Note: if no sludge was applied in the last three years, use lbs N from Section B as the final amount for lbs N required/acre

4. Annual sludge application rate based on amount of N needed by crop

   Adjusted N required (3.e) / lbs available N/ton of sludge (2.a or 2.b) = tons sludge/acre

   a. Incorporated Application

   Our example: 156.2 / 52 = 3.0 tons of sludge/acre

   Your sludge: _____ / _____ = _____ tons sludge/acre

   b. Surface application

   Our example: 156.2 / 32 = 4.9 tons sludge/acre

   Your sludge: _____ / _____ = _____ tons sludge/acre

5. Annual sludge application rate based on Cd addition limitation

   a. Calculate amount of Cd per ton of sludge: ppm Cd (Sec. A) x 0.002 = lbs Cd/ton of sludge

   Our example: 20 x 0.002 = 0.04 lbs Cd/ton

   Your sludge: _____ x 0.002 = _____ lbs Cd/ton

Appendix A, Section C – Determine Annual Rate of Sludge Application (cont.)

5. b. Calculate tons of sludge/acre to give .45 lbs Cd/acre

   0.45 lbs Cd/acre / lbs Cd/ton (5.a) = tons sludge/acre

   Our example: 0.45 / 0.04 = 11.25 tons sludge/acre

   Your sludge: 0.45 / _____ = _____ tons sludge/acre

6. Select proper annual sludge application rate per acre:

   a. Incorporated application: Step 4.a or Step 5.b, whichever is lower

   Our example: 3.0 tons sludge/acre

   Your sludge: _____ tons sludge/acre

   b. Surface application: Step 4.b or Step 5.b, whichever is lower

   Our example: 4.9 tons sludge/acre

   Your sludge: _____ tons sludge/acre

7. Additional fertilizer N needed if annual sludge application rate is based on Cd addition limitation:

   Adjusted N. required (3.e) – [lbs available N/ton (2.a or 2.b) x max. tons sludge/acre (5.b)] = lbs additional fertilizer N/acre

   Your sludge: _____ - (_____ x _____) = _____ lbs fertilizer N/acre

   Note: a negative answer means no fertilizer N is needed.

Appendix A, Section D

Determine Amount of Additional Fertilizer (Potassium and Phosphorus) Needed

1. Phosphorus:

   a. P_2O_5 added in sludge: Tons sludge/acre (6.a or 6.b) x % P (Sec A) x 45.8 = lbs P_2O_5/acre

      Our example: 3.0 x 2 x 45.8 = 275 lbs P_2O_5/acre

      Your Sludge: _____ x _____ x 45.8 = _____ lbs P_2O_5/acre

   b. Additional fertilizer P_2O_5 needed

      Total P_2O_5 needed (Sec B) – P_2O_5 in sludge (1.a) = lbs P_2O_5/acre

      Our example: 60 – 275 = -215 lbs/acre

      Your sludge: _____ - _____ = _____ lbs P_2O_5/acre

      Note: a negative answer means no additional P_2O_5 is needed

2. Potassium:

   a. K_2O added in sludge:

      Tons sludge/acre (6.a or 6.b) x %K (Sec A) x 24 = lbs K_2O /acre

      Our example: 3.0 x 0.1 x 24 = 7 lbs K_2O /acre

      Your sludge: _____ x _____ x 24 = _____ lbs K_2O /acre

   b. Additional Fertilizer needed

      Total K_2O needed (Sec B) – K_2O in sludge (2.a) = lbs K_2O /acre

      Our example: 70 – 7.0 = 63.0 lbs K_2O /acre

      Your sludge: _____ - _____ = _____ lbs K_2O /acre

      Note: A negative answer means no additional K_2O is needed

Appendix A, Section E

Determine Total Cumulative Amount of Sludge or Septage Allowed and Number of Years Sludge or Septage can be Applied

1. Calculate amounts of sludge or septage needed to reach limits of Zn, Cu, Ni, and Cd. Obtain from Table 5 the maximum amount of metal for the CEC of soil used:

   Maximum Amount of Metal Allowed = Maximum tons sludge or septage/acre
   [Concentrations in Sludge or Septage (Sec A) x 0.002*]

   Our example:

   Zinc 500 / (3000 x 0.002) = 83 tons sludge/acre

   Cadmium 4.5 / (20 x 0.002) = 112.5 tons sludge/acre

   Copper 250 / (1000 x 0.002) = 125 tons sludge/acre

   Nickel 100 / (50 x 0.002) = 1000 tons sludge/acre

   Your sludge:

   Zinc _____ / (_____ x 0.002) = _____ tons sludge/acre

   Cadmium _____ / (_____ x 0.002) = _____ tons sludge/acre

   Copper _____ / (_____ x 0.002) = _____ tons sludge/acre

   Nickel _____ / (_____ x 0.002) = _____ tons sludge/acre

2. Calculate amount of sludge or septage needed to reach limits of Pb and PCB's*. Obtain from Table 6 the maximum amount for the CEC of the soil used:

   (Max. Amount Allowed – [Soil Background Level (Sec A) x 2]) = Max. tons of sludge or septage/acre
   *[Concentrations In Sludge or Septage (Sec A) x 0.002]

* **Conversion factors:** ppm x 0.002 = lbs per dry ton; ppm x 2 = lbs per one acre of soil to plow layer depth.

Appendix A, Section E (cont.)

Determine Total Cumulative Amount of Sludge or Septage Allowed and Number of Years Sludge or Septage can be Applied

Our Example:

Lead 600 – (33 x 2) / (500 x 0.002) = 534 tons of sludge or septage/acre

PCB's 2 – (0.5 x 2) / (2 x 0.002) = 250 tons of sludge or septage/acre

Your sludge:

Lead _____ - (_____ x 2) / (_____ x 0.002) = _____ tons of sludge or septage/acre

PCB's _____ - (_____ x 2) / (_____ x 0.002) = _____ tons of sludge or septage/acre

3. Determine the maximum amount of sludge or septage which can be applied per acre by selecting the lowest tonnage figure calculated in 1 or 2 above:

   Our example: 83 tons/acre zinc limiting constituent

   Your sludge: _____ tons/acre _____ limiting constituent

4. Calculate number of years that sludge can be applied:

   Max. tons sludge allowed/acre (E3) / tons sludge applied/acre/year (Sec C 6.a or 6.b) = # of years

   a. Incorporation application

   Our example: 83 / 3.0 = 27 years

   Your sludge: _____ / _____ = _____ years

   b. Surface application

   Our example: 83 / 4.9 = 17 years

   Your sludge: _____ / _____ = _____ years