|  | Massachusetts Department of Environmental Protection Bureau of – Resource Protection – Residuals Management ProgramBRP WP 28 Sampling and Analysis Plan ApprovalApplication 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. These requirements are set forth in Sections 32.12, 32.13, 32.24 and 32.70 of 310 CMR 32.00. To ensure that these requirements are met in a complete and consistent manner the following reporting format has been developed and adopted by the Department. All applicants are required to complete this form as part of their application along with descriptive narrative of those items outlined in DEP Guidelines for Sludge Analysis. Actual sampling and analysis should be performed only after DEP approval of parts A through D of this form. Please print or type the requested information in the spaces provided. |
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|
|
| 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 |
|  |   |  |
|  |  |  |
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|  |  |  |
|  | 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:        |
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|  | 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): |
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|  |        |
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|  |
|  |  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: |
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|  | 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): |
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|  | 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 ProgramBRP WP 29 Approval of Suitability (AOS)Application for Approval of Suitability (AOS) forBeneficial Use under 310 CMR 32.00 – Type I, II, or III |       Transmittal Number      Facility ID# (if known) |
| --- | --- | --- |
|  | A. General Information |
| **Important:** When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key. |  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 Application 310 CMR 32.00: |
|  |       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 |
|  |  |
|  | 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)** |
|  |        |        |        |        |
|  |        |        |        |        |
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|  |        |        |        |       [[1]](#footnote-1)\* |
|  |  b. Other – List of all chemicals used in your process. (Attach separate sheet if necessary) |
|  |        |
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|  | 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.): |
|  |
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|  |        |
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|  |
|  | 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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|  |        |        |        |        |
|  | 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.): |
|  |        |
|  |
|  | 6. Provide the names and addresses of all contracted laboratories (if different from those listed in 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.  |
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|  | 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](http://www.mass.gov/eea/docs/dep/water/wastewater/a-thru-n/mobiosolids.pdf). |
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|  | 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 |
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|  | 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: |
| \* Acceptable means a laboratory which has been fully certified for analysis of specific parameters required in sludge analysis. |  a. Is the laboratory acceptable?\* [ ]  Yes [ ]  No |
|  b. Is the plan acceptable? [ ]  Yes [ ]  No |
|  c. Disposition: [ ]  Approval [ ]  Rejection, and reasons: |
|       Reasons for rejection |
|
| 2. Are there additional constituents required to be analyzed for? [ ]  Yes [ ]  No |
|  | 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 Bureau of – Resource Protection – Residuals Management ProgramBRP WP 30 Certification of Land Application Projects Greater than or Equal to 0.5 Acres in SizeBRP WP 31 Certification of Land Application Projects Less than or Equal to 0.5 Acres in SizeBRP 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 |
| **Important:** When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key. | 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 |
|  | 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 |
|  |  |
|  | 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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|  | Appendix A, Section A – Sludge and Soil Data |
|  |  **Sludge Composition** |  **Sludge\* Our Example** |  **Your Sludge** |
|  \*Sludge reported on a dry weight basis (mg/kg) |  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 NH4 -N and NO3 -N is calculated from: |
|  |  Lbs N X 2000 lbs = 20.0 100 lbs sludge ton and for N0 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 |
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|  | 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 |
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|  | 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. Incorportated 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. |
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|  | Appendix A, Section D  |
|  |  Determine Amount of Additional Fertilizer (Potassium and Phosphorus) Needed |
|  | 1. Phosphorus: |
|  |  a. P2O5 added in sludge: Tons sludge/acre (6.a or 6.b) x % P (Sec A) x 45.8 = lbs P2O5/acre |
|  |  **Our example:** 3.0 x 2 x 45.8 = 275 lbs P2O5/acre |
|  |  **Your Sludge:**       x       x 45.8 =       lbs P2O5/acre |
|  |  b. Additional fertilizer P2O5 needed |
|  |  Total P2O5 needed (Sec B) – P2O5 in sludge (1.a) = lbs P2O5/acre |
|  |   **Our example:** 60 – 275 = -215 lbs/acre |
|  |   **Your sludge:**       -       =       lbs P2O5/acre |
|  |  Note: a negative answer means no additional P2O5 is needed |
|  | 2. Potassium: |
|  |  a. K2O added in sludge: |
|  |  Tons sludge/acre (6.a or 6.b) x %K (Sec A) x 24 = lbs K2O /acre |
|  |  **Our example:** 3.0 x 0.1 x 24 = 7 lbs K2O /acre |
|  |  **Your sludge:**       x       x 24 =       lbs K2O /acre |
|  |  b. Additional Fertilizer needed |
|  |  Total K2O needed (Sec B) – K2O in sludge (2.a) = lbs K2O /acre |
|  |  **Our example:** 70 – 7.0 = 63.0 lbs K2O /acre |
|  |  **Your sludge:**       -       =       lbs K2O /acre |
|  |  Note: A negative answer means no additional K2O is needed |
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|  | 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 [[2]](#footnote-2)\*[Concentrations In Sludge or Septage (Sec A) x 0.002] |
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|  | 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 |

1. \* 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). [↑](#footnote-ref-1)
2. \* **Conversion factors:** ppm x 0.002 = lbs per dry ton; ppm x 2 = lbs per one acre of soil to plow layer depth. [↑](#footnote-ref-2)