



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Residuals Management Program
Residuals Land Application Approvals
BRP WP 28 Sampling and Analysis Plan Approval
BRP WP 29 Approval of Suitability (AOS)
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
Instructions and Supporting Materials

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Introduction

MassDEP *Permit Applications*, as well as *Instructions & Support Materials*, are available for download from the MassDEP Web site at mass.gov/dep in two file formats: Microsoft Word™ and Adobe Acrobat PDF™. Either format allows documents to be printed.

Instructions & Support Materials files in Microsoft Word™ format contain a series of documents that provide guidance on how to prepare a permit application. Although we recommend that you print out the entire package, you may choose to print specific documents by selecting the appropriate page numbers for printing.

Permit Applications in Microsoft Word™ format must be downloaded separately. Users with Microsoft Word™ 97 or later may complete these forms electronically.

Permitting packages in Adobe Acrobat PDF™ format combine *Permit Applications* and *Instructions & Support Materials* in a single document. Adobe Acrobat PDF™ files may only be viewed and printed without alteration. *Permit Applications* in this format may not be completed electronically.



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Permit Fact Sheet

1. What is the purpose of these approvals?

The categories identified above are all related to necessary approvals and permits leading to final approval for land application of residuals for beneficial purposes. BRP WP 28 and BRP WP 29 are required for all approvals. BRP WP 30, BRP WP 31 and BRP WP 32 are project specific and are only required if the product is classified as a Type II or III material. The following listing briefly summarizes all necessary submittals prior to land application of sludge (including sludge products) and septage. See 310 CMR 32.00 for further information about classification of sludge and septage.

BRP WP 28 Approval of sampling and analysis plan prior to land application of sludge and septage. This is required for all applications.

BRP WP 29 Determination of suitability for land application of sludge and septage (also referred to as sludge classification). This submittal is required for all applications. For renewals of Type I sludge products please use the BRPWP93 application.

BRP WP 30 Approval of land application certificate for Type II and Type III sludge and sludge products for projects of 0.5 acres or more.

BRP WP 31 Approval of land application certificate for Type II and Type III sludge and sludge products for projects of less than 0.5 acres.

BRP WP 32 Renewal or modification of a land application certificate.

These permits and approvals are intended to protect public health, safety and the environment by comprehensively regulating the land application of sludge, sludge products (such as compost and pellets), and septage. Land application of these materials must be conducted in a proper manner to prevent pollution of ground and surface waters, drinking water supplies, and protect public health from potential contamination and transport of heavy metals and pathogens.

Statutory authority is provided in MGL Chapter 21, s. 27(9), 27(12), and 43; Chapter 21A s. 2(28); and Chapter 111, s. 160. Regulatory authority is stated in 310 CMR 32.00.

2. Who must apply?

Any individual, business, organization or commercial establishment that wish to utilize sludge, sludge derived products, or septage as a fertilizer or soil conditioner by providing nutrients for growing vegetation or improving the quality of the soil for the purpose of growing vegetation. The applicant should carefully read all relevant guidance documents and MassDEP Guidelines for Sludge Analysis before filling out any application forms.



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3. What other requirements should be considered when applying for these approvals?

a. What prerequisites should be considered before applying for these approvals?

Some approvals of this type may require MEPA review and approval. Please carefully examine 301 CMR 11.00 to determine if your project exceeds the MEPA review thresholds, or for more information contact the MEPA Unit of the Executive Office of Environmental Affairs (100 Cambridge Street, Boston, MA 02202; (617) 727-5830). MassDEP cannot complete technical review of the permit application until the MEPA process has been concluded. Copies of MEPA filings should be sent to the appropriate program offices in Boston and the MEPA coordinator in the appropriate Regional Office.

b. What other requirements should be considered when applying for these approvals?

A copy of all completed applications must be submitted to the Local Board of Health for their concurrence. For Type I classification requests, applications should be submitted to the local Board of Health in the city or town where the treatment facility resides. Applications for a Land Application Certificate of Type II or III products must be submitted to the Local Board of Health where the land application is proposed to take place.

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). Additional information regarding biosolids containing molybdenum can be found at [Labeling Requirement and Additional Information Regarding Biosolids Containing Molybdenum](#).

Note: These additional requirements are intended to serve as a guide to the applicant. It does not necessarily include all requirements.

4. What is the application fee for this permit?

BRP WP 28	\$860
BRP WP 29	\$3,500
BRP WP 30	\$2,910
BRP WP 31	\$755
BRP WP 32	\$315



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5. What is the Primary Permit Location? What is the Reserve Copy Location?

PRIMARY PERMIT LOCATION:
Department of Environmental Protection
_____ * Regional Office

RESERVE COPY LOCATION:
None.

Wastewater Permitting

*Find your region: <http://www.mass.gov/eea/agencies/massdep/about/contacts/>

6. Where can I get a copy of the timelines?

The timelines are available on the MassDEP Website:

<http://www.mass.gov/eea/agencies/massdep/service/approvals/timely-action-fees-and-payments.html>

7. How long are these approvals in effect?

BRP WP 28 Indefinitely or until there is a change in location, type of treatment, and/or change in the quality of the waste stream. Revisions may also be necessary due to regulatory changes, or upon request from the local Board of Health with jurisdiction.

BRP WP 29: This approval is in effect for 5 years.

BRP WP 30: An annual renewal is required.

BRP WP 31: An annual renewal is required.

9. How can I avoid the most common mistakes made in applying for these approvals?

- a. Fill in all information requested on the application forms.
- b. Make sure all required project descriptions, maps, and site plans are included with both copies of the registration form.
- c. Submit all required reports and applications with sufficient detail and description.
- d. Make sure a copy of all documents are submitted to the local Board of Health, if applicable.
- e. Make sure the application is signed by a legally responsible official.
- f. Submit fee and one copy of the MassDEP Transmittal Form to: Department of Environmental Protection, P.O. Box 4062, Boston, MA 02201.



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10. What are the regulations and policies that apply to these approvals? Where can I get copies?

These regulations and policies include, but are not limited to:

- a. Regulations for the Land Application of Sludge and Septage, 310 CMR 32.00.
- b. Timely Action Schedule and Fee Provisions, 310 CMR 4.00.
- c. Administrative Penalty Regulations, 310 CMR 5.00.
- d. WPC, Wastewater Residuals Guidance Document No. 87-1, "Blending Policy".
- e. WPC, Wastewater Residuals Guidance Document No. 87-2, "Horticultural Use".
- f. WPC, Wastewater Residuals Guidance Document No. 87-3, "Multi-site/Single-ownership".
- g. WPC, Wastewater Residuals Guidance Document No. 87-4, "Pilot and Demonstration Program".

These may be purchased at:

State House Bookstore
Room 116
Boston, MA 02133
617-727-2834

State House West Bookstore
436 Dwight Street
Springfield, MA 01103
413-784-1376



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Application Completeness Checklist

- The MassDEP Transmittal Form has been completed:
<http://www.mass.gov/eea/agencies/massdep/service/approvals/transmittal-form-for-payment.html>
If municipality, "Fee Exempt" has been selected from among the Special Provisions under the Amount Due section of the Transmittal Form.

For BRP WP 28:

- Application for Sampling and Analysis Plan Approval is completed

For BRP WP 29:

- Application for Approval of Suitability (AOS), including Signature and Date, for Beneficial use is completed.

For BRP WP 30, BRP WP 31, BRP WP 32:

- Application for Land Application Certificate (LAC) is completed and signed.
 U.S.G.S. Topographic Map (Locus Map) is included.
 Descriptive narrative of the proposed application site and its surroundings pursuant to 310 CMR 32.2(3) is included.
 Identification of nearest receptors, public and private water supplies, surface water courses, and additional information required in the regulations.
 Plot Plan is included.
 Soil Conservation Service Map of the proposed application site is included.
 MEPA Determination, if required, is included.
 Identification of modification requested, if necessary.

To submit the application package:

- Checklist items above have been completed.
 Send a copy of the application package along with one copy of the MassDEP Transmittal Form to:

Department of Environmental Protection

_____ * Regional Office

Wastewater Permitting

* Find your region: <http://www.mass.gov/eea/agencies/massdep/about/contacts/>



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Application Completeness Checklist

Send fee of:

\$860 for BRP WP 28;
\$3,500 for BRP WP 29;
\$2,910 for BRP WP 30;
\$755 for BRP WP 31;
\$315 for BRP WP 32;

in the form of a check or money order made payable to Commonwealth of Massachusetts, along with one copy of the MassDEP Transmittal Form to:

Department of Environmental Protection
P.O. Box 4062
Boston, MA 02211



BRP WP 28 Sampling and Analysis Plan Approval DEP Guidelines for Sludge Analysis

1. Sampling and Analysis Plan.

Before analysis of sludge or septage is performed pursuant to 310 CMR 32.00, the wastewater treatment plant owner or operator must submit a sampling and analysis plan to MassDEP for review and approval. Such a plan usually can be prepared for the treatment plant by the laboratory under contract to perform the sludge or septage analysis. Acceptable laboratories are those which have been fully certified (not provisionally) by MassDEP to do water analysis for the same parameters as those required for sludge analysis or those which have been rated as acceptable under EPA's Quality Assurance Program.

The Sampling and Analysis Plan shall contain at a minimum a completed Application for Approval of Sampling and Analysis Plan (BRP WP 28) and a narrative describing the following:

1. The proposed sampling methods and frequency.
2. The proposed sampling locations.
3. The proposed procedure for handling samples.
4. The name and address of the laboratory performing the analysis.
5. The analytical procedure the laboratory proposes to use, including references and methodology numbers and quality assurance/quality control procedures.

2. Substances to be Analyzed.

- a. A minimum of one (1) TCLP Toxicity Test must be performed initially in order to demonstrate that the sludge, sludge product, or septage is not a hazardous waste as defined in 310 CMR 30.00.
- b. Bulk analysis for the following substances is required by 310 CMR 32.00, "Regulations for Land Application of Sludge and Septage" (a minimum of three separate analyses is required for initial approval). Appropriate test methods and required information are listed in Application for Approval of Sampling and Analysis Plan (BRP WP 28):
 - 1) For all sludge and septage, the minimum requirements (in all cases, except pH and percent solids, expressed in terms of dry weight, mg/kg) are:
 1. pH
 2. percent solids
 3. percent Nitrogen
 4. percent Ammonium Nitrogen (NH₄-N)
 5. percent Nitrogen Nitrate (NO₃-N)
 6. percent Phosphorus (P)
 7. percent Potassium (K)
 8. parts per million Cadmium (Cd)
 9. parts per million Total Chromium (Cr)
 10. parts per million Copper (Cu)
 11. parts per million Lead (Pb)
 12. parts per million Mercury (Hg)
 13. parts per million Nickel (Ni)
 14. parts per million Zinc (Zn)
 15. parts per million Molybdenum (Mo)
 16. parts per million Boron (B)
 17. parts per million PCB's



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DEP Guidelines for Sludge Analysis

- 2) Also, in order to properly evaluate the potential impact of proposed U.S. EPA regulations on beneficial use of sludge, sludge products and septage the Department requests that the following additional parameters be incorporated into the list of analytes noted above.
 1. Arsenic (As)
 2. Selenium (Se)

The Department reserves the right to revise the test parameters listed above dependent upon the characteristics of the individual product and/or waste stream in question.

MassDEP/DWPC, Wastewater Residuals
Guidance Document No. 87-1

Blending Policy

The Department needs to develop a position on the issue of how the existing land application regulations apply to the utilization of blended sludge compost products (compost mixed with sand, peat, or other materials).

The underlying assumption which forms the foundation for this clarification document is that the regulated materials for which a suitability classification is made, are those materials which are actually applied to the land and distributed. For example, if sludge compost is proposed to be mixed with some other materials (sand, peat etc.) after compost operations and then land applied, our land application regulations would apply to the final mixed material and not the original compost.

Simply, this means that the material that should be regulated, and for which the suitability classification is made, is that which is actually applied to the land.

Having made such a determination, there are various procedural and regulatory measures that should be included in a Blending Policy. It is important to stress that to blend for the sake of blending is not to be allowed. The POTW and/or the Distributor proposing the blending program must clearly show that the application of the Blending Policy is necessary for the particular market(s) attempting to be utilized, and further, that there are no reasonably viable alternative markets available which could be expected to be utilized for the non-blended sludge compost product. The underlying basis for these minimum requirements is to ensure that the application of the Blending Policy is not utilized to replace implementation of industrial pretreatment requirements. Application of the Blending Policy is to be limited to those POTW's which can prove, to the satisfaction of the Department, that they have taken "all reasonable measures" to control priority pollutants from entering their wastewater stream, and hence their sludge.

The determination of what the Department considers "all reasonable measures" should be assessed on a case-by-case basis, but that at a minimum the POTW must comply with the following:

If the POTW is required by EPA or MassDEP to implement a pretreatment program, the POTW must provide documentation that the program has been approved by EPA/MassDEP and also that it has been deemed by EPA/MassDEP to be fully implemented, or on an agreed-upon implementation schedule. In addition, the POTW should be required to substantiate that it has adequately attempted to find and eliminate, or mitigate, those pollutant(s) of concern which are responsible for the blending request.

Again the intent is to ensure that the Blending Policy is not being utilized as an alternative to industrial pretreatment.

The Blending Policy will also be restricted to those situations where the ultimate utilization of the blended material is for a beneficial use. The intent is not to allow application of the Blending Policy just to provide the POTW with an easier method of sludge disposal.

The Department can consider, but is not required to approve, blending procedures for all possible upgrading scenarios (i.e., Type III to II, Type III to I or Type II to I).

The term blending, in the context of this policy, only applies after the last point in the treatment process (i.e., sludge has been composted), and does not apply to the normal treatment operations of the POTW. The following sludge treatment processes are not considered blending: the addition of ferric chloride and lime to aid in dewatering, the addition of compost amendment (woodchips, sawdust, etc.) to the sludge prior to composting; and the addition of chemicals utilized in a chemical fixation process for sludge management. It would apply to the addition of materials to the final sludge material after it leaves the last treatment process, an example of this situation would be the adding of additional compost amendment to cured compost solely to reduce the concentrations of pollutants in the final material.

The policy also would not apply to the situation where a number of POTW's have an agreement to jointly process/treat/manage their respective sludges (either prior to, or after dewatering). An example is the situation where three POTW's, two of which produce a Type II sludge while the third produces a Type III sludge, prior to the final residuals management phase mix their sludges together producing a mix which is a Type II sludge. Under this scenario the mixing of the three sludges would not be considered blending. The blending policy would apply only if a proposal were presented to upgrade the sludge type of the final mixed matrix i.e., transforming the Type II combined sludge matrix to Type I.

Any sludge deemed to be a hazardous waste, even if proposed to be incorporated into a larger volume of non-hazardous sludge, is categorically eliminated from eligibility for blending.

There are also non-POTW sludges which emanate from certain food processing or agricultural processing wastewater treatment plants which have been shown to be appropriate for land application, and therefore will also be eligible for consideration by the Department for the Blending Policy. These determinations shall be made on a case-by-case basis, but only with the written concurrence of the Department's Residuals Program Manager.

SGL/sf (405)

MassDEP/DWPC, Wastewater Residuals
Guidance Document No. 87-2

Horticultural Use

Background

It has been determined that utilization of sludge materials for horticultural purposes is significantly different than "typical" land application projects and therefore the regulatory procedures to be followed require clarification. This document attempts to perform that function.

The utilization of wastewater treatment plant sludge (or sludge products) in horticultural products (turf, trees, shrubs, potted plants) is regulated, in general, by 310 CMR 32.00, and is controlled by the chemical classification, and approval of suitability requirements.

After an Approval of Suitability has been granted, Type I material may be used without further approval of the Department. Type II material may be used only with the prior approval of the Department. The Approval of Suitability and Land Application Certificate are needed to regulate the use of the material.

Because of the strict regulatory controls for Type III material, such as requirements for recording the application site in the registry of deeds, and the fact that the horticultural products will get wide distribution, it is the Task Force's opinion that such sludges should not be allowed for these purposes, unless the Department is convinced that for a specific project proposal, it can adequately control all eventual uses.

Therefore, Type I and Type II sludge materials are most suitable for horticultural utilization. In addition, commercial users will prefer the high quality sludge and less burdensome regulations, and buyers will have more confidence in the final product.

Where a POTW provides (either through sale or give-away) sludge to a commercial agent, there will be a jointly regulated party (POTW and commercial agent) with all process and product usage defined in the Land Application Certificate (LAC). The intent is that the product trail, from the POTW, to the commercial agent, to final use, is clearly articulated and agreed to by all parties. For example, the LAC would indicate that the POTW is authorized to transfer (blank) cubic yards of screened compost to Ajax gardening center where the compost will be utilized as an ingredient in a potting soil mix which will be used on-site by the agent for potted flowering plants, and the plants would then be sold on the retail market.

Once the Department approves this process, the regulatory trail ends and does not pass down to the individual purchaser of the potted plant. In other words the Department's regulatory control applies to both producer and commercial user but not the retail consumer.

While it may be difficult to monitor long-term impacts at "application sites" (either where a product is developed, grown or transplanted) due to the wide distribution of the final product, it is very unlikely that there will be any adverse impacts because these are basically one-time applications. Essentially, sludge is beneficially used once for growing a specific product (potted plant, tree root ball, or sod), as opposed to being used to fertilize a plot of land. Once the product is produced and sold, it is unlikely that there will be continued application of sludge to the product.

SGL/sf
(405)

MassDEP/DWPC, Wastewater Residuals
Guidance Document, No. 87-3

Multi-site/Single-ownership

This paper is intended to address the concern that the requirements of Regulations 310 CMR 32.00 are too cumbersome when a multi-site/single ownership land application project is contemplated. Therefore, this document is intended to provide an approach which is realistic yet conforms to the requirements of the regulations.

Sections 32.11 through 32.14 inclusive, of the land application regulations deal with the "Approval of Suitability" of sludge or septage generated by a specific treatment facility for beneficial use. Sections 32.20 through 32.26 inclusive, deal with "Approval of Sites for Land Application of Type II or Type III Sludge or Septage" generated by a facility that has obtained an "Approval of Suitability". Section 32.25 specifically requires a "Land Application Certificate" be obtained from the Department for each location prior to land application occurring and also outlines the minimum information to be provided for each site being contemplated for such use.

Therefore, taking the regulations at face value, if for example, a Town DPW wished to apply a type II sludge on 20 different Town-owned locations, 20 separate applications with supporting information for "Land Application Certificates" would be filed with the Department.

In order to avoid filing redundant materials for each application site the Task Force is of the opinion that the following approach is appropriate.

A single consolidated application can be submitted to MassDEP which contains a request for approval of a number of different sites. Certain types of information in the application would be generic to all sites while site specific information, for all sites proposed for use, would still need to be submitted. This information would need to be clearly delineated in the application. The applicant should also be instructed to indicate whether he/she wishes to request that MassDEP review and process the application as one non-segmentable plan or as an overall program proposal which can be considered as being comprised of a number of segmentable application proposals (sites). As long as the applicant is willing to allow a phased-approval, such a review and approval process can be accomplished by MassDEP.

Specifically, an application for such a segmentable process would include the following elements:

1. The multi-site application should be broken into three distinct parts - cover letter, information generic to every location, and site specific information.
2. The cover letter should list each location being sought, prioritize the review and processing order of the locations, and request or otherwise allow the Department to act on a portion of the locations in the event that a site specific problem prevents action on the entire request. (For the purpose of 32.25(5), the Department shall consider that it has received a fully completed application for each of the proposed sites and will proceed with action pursuant to 32.25(5).)
3. The generic information section would apply to each location and negate the need for filing redundant information. This generic section could address Application Management Requirements, Section 32.23 (application rate, public access, grazing animals, crops and seasonal restrictions), Soil Sampling Requirements, Section 32.24 (frequency, parameters, etc.), and any other information applicable to all sites.
4. The site specific section would provide information to address all the requirements of Section 32.25(3) which were not fulfilled by the generic section as well as any other site specific information required by the Department.

MassDEP/DWPC, Wastewater Residuals
Guidance Document No. 87-4

Pilot and Demonstration Program

Each application must be considered on a case-by-case basis and should be reviewed on its own particular merits. In the project request, the applicant should clearly indicate the elements of the regulations which it believes do not, or should not, apply to the proposal, and the reasons for such a statement or request. It would be up to the Regional Office, in consultation with the Central Office, to determine the acceptability of the proposal.

It appears that such approvals have been granted in the past, are an important method of obtaining system operations data, and that this procedure should continue to be utilized in future activities.

SL/sf

Reference Section

(To be retained by applicant)

List of Approved Test Procedures for Sludge Parameters (1)

Parameter	Standard Methods (17th Edition)	EPA SW-846	EPA 1979	ASTM	USGS	Other
pH	4500-H+		150.1	D1293-84(A) or D1293-84(B)	1-1586-94	(7)
Total Solids	2540		160.3		1-3750-84	
Total Nitrogen (N)	4500-N		351.1, 351.2, 351.3, 351.4	D3590-84	1-4551-78	(8) - 33.051
Ammonia Nitrogen (NH ₃ -N)	4500-NH ₃		350.1, 350.2, 350.3	D1426-79(A), (C), (D)	1-3520-84 1-4523-84	(8) - 33.057 (17)
Nitrate Nitrogen (NO ₃ -N)	4500-NO ₃		352.1	D992-71		(8) - 33.063 (9) - p. 28
Nitrite Nitrogen (NO ₂ -N)	4500-NO ₂		354.1	D1254-67	1-4540-84	(10)
Total Phosphorus (P)	4500-P		365.1, 365.2, 365.3, 365.4	D515-82(A)	1-4600-84	(8) - 33.III
Metals:⁽¹⁸⁾						
Potassium (K)	3500-K	7610	258.1	D1428-82(A)	1-3630-84	(8) - 33.103 (11) - Method 200.7
Arsenic (As)	3500-As	7060				

		7061				
Cadmium (Cd)	3500-Cd	7130 7131	213.1 213.2	D3557-84 (A), (C)	1-3135-84 1-3136-84	(8) - 33.089 (9) - p. 37 (11) - Met. 200.7

List of Approved Test Procedures for Sludge Parameters (1) - continued

Parameter	Standard Methods (17th Edition)	EPA SW-846	EPA 1979	ASTM	USGS	Other
Total Chromium (Cr)	3500-Cr	7190 7191	218.1, 218.2, 218.3	D1687-84 (A), (D)	1-3236-84	(8) - 33.089 (11) - Met. 200.7
Copper (Cu)	3500-Cu	7210	220.1, 220.2	D1688-84 (A), (D), (E)	1-3270-84 1-3271-84	(8) - 33.089 (9) - p. 37 (11) - Met. 200.7 (12)
Lead (Pb)	3500-Pb	7420 7421	239.1, 239.2	D3559-85 (A, B, & C)	1-3399-84	(8) - 33.089 (11) - Met. 200.7
Mercury (Hg)	3500-Hg	7470 7471	245.1, 245.2	D3223-80	1-3462-84	(8) - 33.095
Molybdenum (Mo)	3500-Mo	7480 7481	246.1, 246.2		1-3490-84	(11) - Met. 200.7
Nickel (Ni)	3500-Ni	7520	249.1, 249.2	D1886-84 (C), (D)	1-3499-84	(11) - Met. 200.7
Selenium (Se)	3500-Se	7740 7741				
Zinc (Zn)	3500-Zn	7950	289.1, 289.2	D1691-84 (C), (D)	1-3900-84	(8) - 33.089

						(9) - p. 37 (11) - Met. 200.7 (13)
Boron (B)	4500-B		212.3		1-3112-84	(11) - Met. 200.7
Polychlorinated Biphenyls (PCBs)	6431	8080	608, 625			(14) (15) - p. 43
TCLP		1311				(16) Met.1310

Analytical References:

- (1) Abstracted from the Code of Federal Regulations, 40 CFR Part 136, Revised as of July 1, 1986.
- (2) "Standard Methods for the Examination of Water and Wastewater", 17th edition (1989), American Public Health Association, 1015 Fifteenth St., N.W. Washington, D.C. 20036.
- (3) "Test Methods for Evaluating Solid Waste", U.S. Environmental Protection Agency, (EPA SW-846, November 1986), Office of Solid Waste and Emergency Response, Washington, D.C. 20460
- (4) "Methods for the Chemical Analysis of Water and Wastes", U.S. Environmental Protection Agency (EPA - 600/4-79-020 Revised March 1983) ORD Publications, CERL, U.S. EPA, Cincinnati, Ohio 45268.
- (5) "American Society for Testing and Materials (ASTM) Annual Book of Standards, Section 11, Water" ASTM, 1916 Race St., Philadelphia, PA 19103.
- (6) "Methods for Analysis of Inorganic Substances in Water and Fluvial Sediments", U.S. Department of the Interior, U.S. Geological Survey, Open - File Report 85-495 (1986), U.S.G.S., Branch of Distribution, 1200 South East Street, Arlington, VA 22202.
- (7) "Hydrogen Ion (pH) Automated Electrode Method, Industrial Method Number 378-75WA", October 1976, Technicon Auto - Analyzer II, Technicon Industrial Systems, Tarrytown, New York 10591.
- (8) "Official Methods of Analysis of the Association of Official Analytical Chemists", AOAC Methods Manual, 14th edition (1985); AOAC, 1111 North 19th Street, Suite 210, Arlington, VA 22209.
- (9) "American National Standard on Photographic Processing Effluents", April 2, 1975 - Available from American National Standards Institute, 1430 Broadway, New York, New York 10018.
- (10) "Nitrogen, Nitrite, Method 8507", Hach Chemical Company, P.O. Box 389; Loveland, Colorado 80537.
- (11) See Appendix C, 40 CFR Part 136, July 1, 1986 Federal Register: "Inductively Coupled Plasma Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes."
- (12) "Cooper, Bicinchoniate Method, Method 8506", Hach Handbook of Water Analysis, 1979, Hach Chemical Company, P.O. Box 389, Loveland, Colorado 80537.
- (13) "Zinc, Zincon Method, Method 8009", Hach Handbook of Water Analysis, 1979, pp. 2-231 and 2-333, Hach Chemical Company, Loveland, Colorado 80537.
- (14) The full texts of EPA Methods 608 and 625 are given at Appendix A, "Test Procedures for Analysis of Organic Pollutants", Federal Register, 40 CFR Part 136, July 1, 1986. The standardized test procedure to be used to determine the method detection limit (MDL) for these test procedures is given at Appendix B, "Definition and Procedure for the Determination of the Method Detection Limit", of this Part 136.
- (15) "Methods for Benzidine, Chlorinated Organic Compounds, Pentachlorophenol and Pesticides in Water and Wastewater", U.S. EPA, September, 1978- available from: ORD Publications, CERL, U.S. EPA, Cincinnati, Ohio 45268.
- (16) "Test Methods for Evaluating Solid Waste - Volume 10: Laboratory Manual - Physical/Chemical Methods", SW-846, Third Edition, U.S. EPA (1986).
- (17) "Ammonia, Automated Electrode Method", Industrial Method Number 379-75WE February 19, 1976, Technicon Auto Analyzer II, Technicon Industrial Systems, Tarrytown, New York 10591.

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- (18) For the determination of total metals the sample is not filtered before processing. A digestion procedure is required to solubilize suspended material and to destroy organic - metal complexes. Two digestion procedures are given in Reference (2), No. 4.1.3. and 4.1.4. In all cases the method write-up should be consulted for specific instructions and/or cautions.

Required Containers, Preservation Techniques, and Holding Times for Sludge Parameters ⁽¹⁾

Parameter	Container ⁽²⁾	Preservation ⁽³⁾	Holding Time ⁽⁴⁾
pH	P, G	None Required	Analyze immediately
Total Solids	P, G	Cool, 4 C	7 days
Total Nitrogen	P, G	Cool, 4 C, sulfuric acid to pH <2	28 days
Ammonium Nitrogen	P, G	Cool, 4 C, sulfuric acid to pH <2	28 days
Nitrate Nitrogen	P, G	Cool, 4 C	48 hours
Nitrite Nitrogen	P, G	Cool, 4 C	48 hours
Total Phosphorus	P, G	Cool, 4 C, sulfuric acid to pH <2	28 days
Metals⁽⁵⁾			
Arsenic	P, G	Nitric acid to pH < 2	6 months
Boron	P, G	Nitric acid to pH < 2	6 months
Cadmium	P, G	Nitric acid to pH < 2	6 months
Chromium (Total)	P, G	Nitric acid to pH < 2	6 months
Copper	P, G	Nitric acid to pH < 2	6 months
Lead	P, G	Nitric acid to pH < 2	6 months
Mercury	P, G	Nitric acid to pH < 2	28 days
Molybdenum	P, G	Nitric acid to pH < 2	6 months
Nickel	P, G	Nitric acid to pH < 2	6 months

Required Containers, Preservation Techniques, and Holding Times for Sludge Parameters ⁽¹⁾

Parameter	Container ⁽²⁾	Preservation ⁽³⁾	Holding Time ⁽⁴⁾
Potassium	P, G	Nitric acid to pH < 2	6 months
Selenium	P, G	Nitric acid to pH < 2	6 months
Polychlorinated Biphenyls	G, Teflon-lined cap or aluminum foil	Cool, 4 C	extract within 7 days, analyze within 40 days after extraction.
Purgeable Halocarbons	G, Teflon-lined septum	Cool, 4 C, 0.008% Na ₂ S ₂ O ₃ (8)	14 days
Purgeable Aromatic Hydrocarbons	G, Teflon-lined septum	Cool, 4 C, 0.008% Na ₂ S ₂ O ₃ HCL to pH 2 (8) (9)	14 days
Pesticides	G, Teflon-lined cap	Cool, 4 C, pH 5-9 (10)	7 days until extraction, 40 days after extraction

Sample Collection References:

- (1) Abstracted from the Code of Federal Regulations, 40 CFR Part 136, revised as of July 1986.
- (2) Polyethylene (P) or Glass (G).
- (3) Sample preservation should be performed immediately upon sample collection. For composite chemical samples each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then chemical samples may be preserved by maintaining at 4 C until composting and sample splitting is completed.
- (4) Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid. Some samples may not be stable for the maximum time period given in the table. A permittee or monitoring laboratory is obligated to hold the sample for a shorter time if knowledge exists to show that this is necessary to maintain sample stability.
- (5) Analyze sludge samples for the total metals listed.
- (6) When the extractable analytes of concern fall within a single chemical category, the specified preservative and maximum holding times should be observed for the optimum safeguard of sample integrity.
- (7) The following optional preservation may be used when the referenced categories are to be analyzed in a single sample: Cool to 4 C, add 0.008% Na₂S₂O₃ to reduce residual chlorine, only if present; store in dark; adjust pH 6.0-9.0. Samples preserved in this manner may be held for seven days before extraction and for forty days after extraction.
- (8) 0.008% Na₂S₂O₃ should only be used in the presence of residual chlorine.
- (9) Sampling receiving no pH adjustment must be analyzed within 7 days of sampling.
- (10) The pH adjustment may be performed upon receipt at the laboratory and may be omitted if the samples are within 72 hours of collection.

Table 1
**Required Data for Substances Specified in 310 CMR 32.12(2)(a) & (b)
 and new EPA Part 503 Regulations**
 (A minimum of 3 separate analyses are required for initial approval)

(1) Parameter	(2) Reporting Units	(3) Concentration (dry weight)	(4) Preservation Technique	(5) Date Sampled	(6) Date Extracted	(7) Date Analyzed	(8) Method Reference No.	(9) Detection Limits
1. pH	X	X						X
2. % Solids	%							X
3. % Total Nitrogen	%							
4. % NH ₄ -N	%							
5. % NO ₃ -N	%							
6. % Total Phosphorus	%							
7. % Potassium	%							
8. ppm Cadmium								
9. ppm Total Chromium								
10.ppm Copper								
11.ppm Lead								

Table 1 - Continued
Required Data for Substances Specified in 310 CMR 32.12(2)(a) & (b)
and new EPA Part 503 Regulations
 (A minimum of 3 separate analyses are required for initial approval)

(1) Parameter	(2) Reporting Units	(3) Concentration (dry weight)	(4) Preservation Technique	(5) Date Sampled	(6) Date Extracted	(7) Date Analyzed	(8) Method Reference No.	(9) Detection Limits
12. ppm Mercury								
13. ppm Nickel								
14. ppm Zinc								
15. ppm Molybdenum								
16. ppm Boron								
17. ppm PCBs								
18. ppm Arsenic								
19. ppm Selenium								

Table 2
Required Data for TCLP (Toxicity Characteristic Leaching Procedure)
 (A minimum of 1 analysis is required for initial approval)

(1) Parameter	(2) Reporting Units	(3) Concentration (wet weight)	(4) Preservation Technique	(5) Date Sampled	(6) Date Extracted	(7) Date Analyzed	(8) Method Reference No.	(9) Detection Limits
1. Arsenic	mg/l							
2. Barium	mg/l							
3. Cadmium	mg/l							
4. Chromium	mg/l							
5. Lead	mg/l							
6. Mercury	mg/l							
7. Selenium	mg/l							
8. Silver	mg/l							
9. Endrin	mg/l							
10. Lindane	mg/l							
11. Methoxychlor	mg/l							
12. Toxaphene	mg/l							
13. 2,4,-D	mg/l							
14. 2,4,5-TP	mg/l							
15. Benzene	mg/l							

Table 2 - continued
Required Data for TCLP (Toxicity Characteristic Leaching Procedure)
 (A minimum of 1 analysis is required for initial approval)

(1) Parameter	(2) Reporting Units	(3) Concentration (wet weight)	(4) Preservation Technique	(5) Date Sampled	(6) Date Extracted	(7) Date Analyzed	(8) Method Reference No.	(9) Detection Limits
16. Carbon Tetrachloride	mg/l							
17. Chlordane	mg/l							
18. Chlorobenzene	mg/l							
19. Chloroform	mg/l							
20. O-Creosol	mg/l							
21. M-Creosol	mg/l							
22. p-Creosol	mg/l							
23. Creosol	mg/l							
24. 1,4 Dichlorobenzene	mg/l							
25. 1,2 Dichloroethane	mg/l							
26. 1,1 Dichloroethylene	mg/l							
27. 2,4 Dinitrotoluene	mg/l							

Table 2 - continued
Required Data for TCLP (Toxicity Characteristic Leaching Procedure)
 (A minimum of 1 analysis is required for initial approval)

(1) Parameter	(2) Reporting Units	(3) Concentration (wet weight)	(4) Preservation Technique	(5) Date Sampled	(6) Date Extracted	(7) Date Analyzed	(8) Method Reference No.	(9) Detection Limits
28. Heptachlor	mg/l							
29. Hexachlorobenzene	mg/l							
30. Hexachlorobutadiene	mg/l							
31. Hexachloroethane	mg/l							
32. Methyl ethyl ketone	mg/l							
33. Nitrobenzene	mg/l							
34. Pentachlorophenol	mg/l							
35. Pyridine	mg/l							
36. Tetrachloroethylene	mg/l							
37. Trichloroethylene	mg/l							
38. 2,4,6 Trichlorophenol	mg/l							
39. 2,4,5 Trichlorophenol	mg/l							
40. Vinyl Chloride	mg/l							

Reference Section

(To be retained by applicant)

List of Approved Test Procedures for Sludge Parameters (1)

Parameter	Standard Methods (17th Edition)	EPA SW-846	EPA 1979	ASTM	USGS	Other
pH	4500-H+		150.1	D1293-84(A) or D1293-84(B)	1-1586-94	(7)
Total Solids	2540		160.3		1-3750-84	
Total Nitrogen (N)	4500-N		351.1, 351.2, 351.3, 351.4	D3590-84	1-4551-78	(8) - 33.051
Ammonia Nitrogen (NH ₃ -N)	4500-NH ₃		350.1, 350.2, 350.3	D1426-79(A), (C), (D)	1-3520-84 1-4523-84	(8) - 33.057 (17)
Nitrate Nitrogen (NO ₃ -N)	4500-NO ₃		352.1	D992-71		(8) - 33.063 (9) - p. 28
Nitrite Nitrogen (NO ₂ -N)	4500-NO ₂		354.1	D1254-67	1-4540-84	(10)
Total Phosphorus (P)	4500-P		365.1, 365.2, 365.3, 365.4	D515-82(A)	1-4600-84	(8) - 33.III
Metals:⁽¹⁸⁾						
Potassium (K)	3500-K	7610	258.1	D1428-82(A)	1-3630-84	(8) - 33.103 (11) - Method 200.7
Arsenic (As)	3500-As	7060 7061				

List of Approved Test Procedures for Sludge Parameters (1) - continued

Parameter	Standard Methods (17th Edition)	EPA SW-846	EPA 1979	ASTM	USGS	Other
Total Chromium (Cr)	3500-Cr	7190 7191	218.1, 218.2, 218.3	D1687-84 (A), (D)	1-3236-84	(8) - 33.089 (11) - Met. 200.7
Copper (Cu)	3500-Cu	7210	220.1, 220.2	D1688-84 (A), (D), (E)	1-3270-84 1-3271-84	(8) - 33.089 (9) - p. 37 (11) - Met. 200.7 (12)
Lead (Pb)	3500-Pb	7420 7421	239.1, 239.2	D3559-85 (A, B, & C)	1-3399-84	(8) - 33.089 (11) - Met. 200.7
Mercury (Hg)	3500-Hg	7470 7471	245.1, 245.2	D3223-80	1-3462-84	(8) - 33.095
Molybdenum (Mo)	3500-Mo	7480 7481	246.1, 246.2		1-3490-84	(11) - Met. 200.7
Nickel (Ni)	3500-Ni	7520	249.1, 249.2	D1886-84 (C), (D)	1-3499-84	(11) - Met. 200.7
Selenium (Se)	3500-Se	7740 7741				
Zinc (Zn)	3500-Zn	7950	289.1, 289.2	D1691-84 (C), (D)	1-3900-84	(8) - 33.089 (9) - p. 37 (11) - Met. 200.7 (13)
Boron (B)	4500-B		212.3		1-3112-84	(11) - Met. 200.7
Polychlorinated Biphenyls (PCBs)	6431	8080	608, 625			(14) (15) - p. 43
TCLP		1311				(16) Met.1310

Analytical References:

- (1) Abstracted from the Code of Federal Regulations, 40 CFR Part 136, Revised as of July 1, 1986.
- (2) "Standard Methods for the Examination of Water and Wastewater", 17th edition (1989), American Public Health Association, 1015 Fifteenth St., N.W. Washington, D.C. 20036.
- (3) "Test Methods for Evaluating Solid Waste", U.S. Environmental Protection Agency, (EPA SW-846, November 1986), Office of Solid Waste and Emergency Response, Washington, D.C. 20460
- (4) "Methods for the Chemical Analysis of Water and Wastes", U.S. Environmental Protection Agency (EPA - 600/4-79-020 Revised March 1983) ORD Publications, CERL, U.S. EPA, Cincinnati, Ohio 45268.
- (5) "American Society for Testing and Materials (ASTM) Annual Book of Standards, Section 11, Water" ASTM, 1916 Race St., Philadelphia, PA 19103.
- (6) "Methods for Analysis of Inorganic Substances in Water and Fluvial Sediments", U.S. Department of the Interior, U.S. Geological Survey, Open - File Report 85-495 (1986), U.S.G.S., Branch of Distribution, 1200 South East Street, Arlington, VA 22202.
- (7) "Hydrogen Ion (pH) Automated Electrode Method, Industrial Method Number 378-75WA", October 1976, Technicon Auto - Analyzer II, Technicon Industrial Systems, Tarrytown, New York 10591.
- (8) "Official Methods of Analysis of the Association of Official Analytical Chemists", AOAC Methods Manual, 14th edition (1985); AOAC, 1111 North 19th Street, Suite 210, Arlington, VA 22209.
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- (10) "Nitrogen, Nitrite, Method 8507", Hach Chemical Company, P.O. Box 389; Loveland, Colorado 80537.
- (11) See Appendix C, 40 CFR Part 136, July 1, 1986 Federal Register: "Inductively Coupled Plasma Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes."
- (12) "Cooper, Bicinchoniate Method, Method 8506", Hach Handbook of Water Analysis, 1979, Hach Chemical Company, P.O. Box 389, Loveland, Colorado 80537.
- (13) "Zinc, Zincon Method, Method 8009", Hach Handbook of Water Analysis, 1979, pages 2-231 and 2-333, Hach Chemical Company, Loveland, Colorado 80537.
- (14) The full texts of EPA Methods 608 and 625 are given at Appendix A, "Test Procedures for Analysis of Organic Pollutants", Federal Register, 40 CFR Part 136, July 1, 1986. The standardized test procedure to be used to determine the method detection limit (MDL) for these test procedures is given at Appendix B, "Definition and Procedure for the Determination of the Method Detection Limit", of this Part 136.

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- (15) "Methods for Benzidine, Chlorinated Organic Compounds, Pentachlorophenol and Pesticides in Water and Wastewater", U.S. EPA, September, 1978- available from: ORD Publications, CERL, U.S. EPA, Cincinnati, Ohio 45268.
 - (16) "Test Methods for Evaluating Solid Waste - Volume 10: Laboratory Manual - Physical/Chemical Methods", SW-846, Third Edition, U.S. EPA (1986).
 - (17) "Ammonia, Automated Electrode Method", Industrial Method Number 379-75WE February 19, 1976, Technicon Auto Analyzer II, Technicon Industrial Systems, Tarrytown, New York 10591.
 - (18) For the determination of total metals the sample is not filtered before processing. A digestion procedure is required to solubilize suspended material and to destroy organic - metal complexes. Two digestion procedures are given in Reference (2), No. 4.1.3. and 4.1.4. In all cases the method write-up should be consulted for specific instructions and/or cautions.

Required Containers, Preservation Techniques, and Holding Times for Sludge Parameters ⁽¹⁾

Parameter	Container ⁽²⁾	Preservation ⁽³⁾	Holding Time ⁽⁴⁾
pH	P, G	None Required	Analyze immediately
Total Solids	P, G	Cool, 4 C	7 days
Total Nitrogen	P, G	Cool, 4 C, sulfuric acid to pH <2	28 days
Ammonium Nitrogen	P, G	Cool, 4 C, sulfuric acid to pH <2	28 days
Nitrate Nitrogen	P, G	Cool, 4 C	48 hours
Nitrite Nitrogen	P, G	Cool, 4 C	48 hours
Total Phosphorus	P, G	Cool, 4 C, sulfuric acid to pH <2	28 days
Metals⁽⁵⁾			
Arsenic	P, G	Nitric acid to pH < 2	6 months
Boron	P, G	Nitric acid to pH < 2	6 months
Cadmium	P, G	Nitric acid to pH < 2	6 months
Chromium (Total)	P, G	Nitric acid to pH < 2	6 months
Copper	P, G	Nitric acid to pH < 2	6 months
Lead	P, G	Nitric acid to pH < 2	6 months
Mercury	P, G	Nitric acid to pH < 2	28 days
Molybdenum	P, G	Nitric acid to pH < 2	6 months
Nickel	P, G	Nitric acid to pH < 2	6 months

Required Containers, Preservation Techniques, and Holding Times for Sludge Parameters ⁽¹⁾

Parameter	Container ⁽²⁾	Preservation ⁽³⁾	Holding Time ⁽⁴⁾
Potassium	P, G	Nitric acid to pH < 2	6 months
Selenium	P, G	Nitric acid to pH < 2	6 months
Polychlorinated Biphenyls	G, Teflon-lined cap or aluminum foil	Cool, 4 C	extract within 7 days, analyze within 40 days after extraction.
Purgeable Halocarbons	G, Teflon-lined septum	Cool, 4 C, 0.008% Na ₂ S ₂ O ₃ (8)	14 days
Purgeable Aromatic Hydrocarbons	G, Teflon-lined septum	Cool, 4 C, 0.008% Na ₂ S ₂ O ₃ HCL to pH 2 (8) (9)	14 days
Pesticides	G, Teflon-lined cap	Cool, 4 C, pH 5-9 (10)	7 days until extraction, 40 days after extraction

Sample Collection References:

- (1) Abstracted from the Code of Federal Regulations, 40 CFR Part 136, revised as of July 1986.
- (2) Polyethylene (P) or Glass (G).
- (3) Sample preservation should be performed immediately upon sample collection. For composite chemical samples each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then chemical samples may be preserved by maintaining at 4 C until composting and sample splitting is completed.
- (4) Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid. Some samples may not be stable for the maximum time period given in the table. A permittee or monitoring laboratory is obligated to hold the sample for a shorter time if knowledge exists to show that this is necessary to maintain sample stability.
- (5) Analyze sludge samples for the total metals listed.
- (6) When the extractable analytes of concern fall within a single chemical category, the specified preservative and maximum holding times should be observed for the optimum safeguard of sample integrity.
- (7) The following optional preservation may be used when the referenced categories are to be analyzed in a single sample: Cool to 4 C, add 0.008% $\text{Na}_2\text{S}_2\text{O}_3$ to reduce residual chlorine, only if present; store in dark; adjust pH 6.0-9.0. Samples preserved in this manner may be held for seven days before extraction and for forty days after extraction.
- (8) 0.008% $\text{Na}_2\text{S}_2\text{O}_3$ should only be used in the presence of residual chlorine.
- (9) Sampling receiving no pH adjustment must be analyzed within 7 days of sampling.
- (10) The pH adjustment may be performed upon receipt at the laboratory and may be omitted if the samples are within 72 hours of collection.

Table 1. Soil Test Levels for Phosphorus and Potassium

Soil Test Level	Phosphorus Test (lbs./acre)	Potassium Test (lbs./acre)
Very low	0 - 10	0 - 80
Low	11 - 20	81 - 150
Medium	21 - 30	151 - 120
High	31 - 70	211 - 300
Very high	71+	300+

Table 2. Fertilizer Recommendations for Corn and Soybeans

Expected Yield (bu/A)	Nitrogen Needed (lbs/A)	K or P	P ₂ O ₅ and K ₂ O needed if soil test level* is				
			V. Low	Low	Medium	High	V. High
Corn			lbs/acre				
100-110	120	P ₂ O ₅	100	70	50	30	0
		K ₂ O	100	70	50	30	0
111-125	140	P ₂ O ₅	110	80	60	30	0
		K ₂ O	120	90	60	30	0
126-150	170	P ₂ O ₅	120	90	60	40	10
		K ₂ O	150	120	70	40	0
151-175	200	P ₂ O ₅	130	100	70	50	10
		K ₂ O	180	140	90	60	0
176-200	230	P ₂ O ₅	150	120	80	50	10
		K ₂ O	200	160	120	80	0
Soybeans							
30-40	140**	P ₂ O ₅	60	50	40	30	0
		K ₂ O	100	80	50	40	0
41-50	175	P ₂ O ₅	80	70	50	30	0
		K ₂ O	120	90	60	60	0
51-60	210	P ₂ O ₅	100	90	70	40	0
		K ₂ O	150	120	90	60	0
61-70	245	P ₂ O ₅	120	100	80	50	20
		K ₂ O	180	150	120	80	0
71+	300	P ₂ O ₅	120	100	80	50	20
		K ₂ O	200	170	130	80	20

* See Table 1 definition of soil test levels.

** Not recommended with conventional fertilization practices because of nitrogen fixation by soybeans.

Table 3. Fertilizer Recommendations for Small Grains and Forages

Expected Yield (bu/A)	Nitrogen Needed (lbs/A)	K or P	P ₂ O ₅ and K ₂ O needed if soil test level* is						
			V. Low	Low	Medium	High	V. High		
Wheat and Rye (WR) Oats & Barley (OB)			lbs/acre						
WR, 30-44 bu.	55	P ₂ O ₅	90	60	30	20	20		
OB, 70-85 bu.	55	K ₂ O	90	60	30	0	0		
WR,45-54 bu.			65	P ₂ O ₅	120	90	60	30	20
OB, 86-100 bu.	65	K ₂ O	120	90	60	30	0		
WR, 55-64 bu.			75	P ₂ O ₅	120	90	60	30	20
OB, 101-115 bu.	75	K ₂ O	120	90	60	30	0		
WR, 65-74 bu.			85	P ₂ O ₅	140	110	90	60	20
OB, 116-130 bu.	85	K ₂ O	120	90	60	30	0		
WR, 75+ bu.			95	P ₂ O ₅	140	110	90	60	20
OB, 131+ bu.	95	K ₂ O	120	90	60	30	0		
Forage Crops (FC)									
FC, 4 tons	100	P ₂ O ₅	100	80	50	30	20		
		K ₂ O	240	200	150	80	0		
FC, 6 tons	200	P ₂ O ₅	120	100	70	50	40		
		K ₂ O	360	300	240	180	120		
FC, 8 tons	350	P ₂ O ₅	140	120	90	70	50		
		K ₂ O	480	420	360	300	240		

* See Table 1 definition of soil test levels.

Table 4. Maximum Annual Application

Substance	CEC less than 5	CEC 5 or more
Cadmium	all soils	0.45 lbs/acre

Table 5. Maximum Cumulative Additions Limit

Substance	CEC less than 5	CEC 5 or more
Cadmium	4.5 lbs/acre	4.5 lbs/acre
Zinc	250.0 lbs/acre	500.0 lbs/acre
Copper	125.0 lbs/acre	250.0 lbs/acre
Nickel	50.0 lbs/acre	100.0 lbs/acre

Table 6. Maximum Cumulative Limit - Includes Background Level

Substance	CEC less than 5	CEC 5 or more
Lead	445 lbs/acre	600/lbs/acre
PCB's	2 lbs/acre	2 lbs/acre



BRP WP 28 Sampling and Analysis Plan Approval
Application for Approval of Sampling and Analysis Plan

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.

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



BRP WP 28 Sampling and Analysis Plan Approval
Application for Approval of Sampling and Analysis Plan

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:



BRP WP 28 Sampling and Analysis Plan Approval
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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:



BRP WP 28 Sampling and Analysis Plan Approval
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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:



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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):

- 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



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

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

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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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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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)



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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.

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](#).



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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

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



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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.



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

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BRP WP 32 Renewals or Modifications to Land Application
 Certifications

 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**

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



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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

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



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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



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 32.00, Regulations for the Land Application of Sludge or Septage**

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



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Approval Section (to be filled out by DEP)

Disposition: 1. Approved as submitted

Conditions

2. Approved as Amended

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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Facility ID# (if known) _____

Appendix A, Section A – Sludge and Soil Data

	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

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

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



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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:

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

and for N_o 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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Facility ID# (if known)

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



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

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

$$0.45 \text{ lbs Cd/acre} / \text{lbs Cd/ton (5.a)} = \text{tons sludge/acre}$$

Our example: $0.45 / 0.04 = 11.25 \text{ tons sludge/acre}$

Your sludge: $0.45 / \underline{\hspace{1cm}} = \underline{\hspace{1cm}} \text{ tons sludge/acre}$

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: $\underline{\hspace{1cm}}$ 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: $\underline{\hspace{1cm}}$ 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: $\underline{\hspace{1cm}} - (\underline{\hspace{1cm}} \times \underline{\hspace{1cm}}) = \underline{\hspace{1cm}} \text{ lbs fertilizer N/acre}$

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. 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: $3.0 \times 2 \times 45.8 = 275$ 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: $3.0 \times 0.1 \times 24 = 7$ 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



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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

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:

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

Our example:

Zinc $500 / (3000 \times 0.002) = 83 \text{ tons sludge/acre}$

Cadmium $4.5 / (20 \times 0.002) = 112.5 \text{ tons sludge/acre}$

Copper $250 / (1000 \times 0.002) = 125 \text{ tons sludge/acre}$

Nickel $100 / (50 \times 0.002) = 1000 \text{ tons sludge/acre}$

Your sludge:

Zinc $\text{_____} / (\text{_____} \times 0.002) = \text{_____} \text{ tons sludge/acre}$

Cadmium $\text{_____} / (\text{_____} \times 0.002) = \text{_____} \text{ tons sludge/acre}$

Copper $\text{_____} / (\text{_____} \times 0.002) = \text{_____} \text{ tons sludge/acre}$

Nickel $\text{_____} / (\text{_____} \times 0.002) = \text{_____} \text{ tons sludge/acre}$

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:

$$\frac{(\text{Max. Amount Allowed} - [\text{Soil Background Level (Sec A) x 2])}{[\text{Concentrations In Sludge or Septage (Sec A) x 0.002}]} = \text{Max. tons of sludge or septage/acre}$$

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



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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 $600 - (33 \times 2) / (500 \times 0.002) = 534$ tons of sludge or septage/acre

PCB's $2 - (0.5 \times 2) / (2 \times 0.002) = 250$ 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

- 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

- 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

- Incorporation application

Our example: $83 / 3.0 = 27$ years

Your sludge: _____ / _____ = _____ years

- Surface application

Our example: $83 / 4.9 = 17$ years

Your sludge: _____ / _____ = _____ years