

**SPECIAL CONDITIONS
GENERAL PERMIT WMGR069**

A. Description.

This general permit authorizes the beneficial use of wastewater treatment sludge generated by a meat processing facility as a soil additive for agricultural purposes by land application.

B. Determination of Applicability (DOA) Requirements.

A person or municipality that proposes to operate under the terms and conditions of this general permit after the date of permit issuance must apply for and obtain a DOA from the appropriate Department Regional Office (see attached list) prior to commencing authorized activities under this general permit. A completed Form 20 (Application For A Municipal or Residual Waste General Permit), along with a DOA application fee in the amount identified in Section A (General Information) of the Form 20 must be submitted to the appropriate Department Regional Office. Checks shall be made payable to the "Commonwealth of Pennsylvania". No activities shall commence unless authorized by the Department in writing.

C. Operating Conditions.

1. The wastewater treatment sludge generated may be beneficially used by land application on agricultural lands if, prior to its use, the quality criteria requirements in (a), (b) and (c) below are met.
 - a. Pollutant Limits - The concentration of any pollutant in the wastewater treatment sludge shall not exceed the chemical concentration limits specified in Table 1 below.

Table 1

**Chemical Concentration Limits
For Wastewater Treatment Sludge**

Pollutant	Limit (Dry Weight Basis)
Arsenic	41 mg/kg
Cadmium	39 mg/kg
Copper	1,500 mg/kg
Lead	300 mg/kg
Mercury	17 mg/kg
Molybdenum	75 mg/kg
Nickel	420 mg/kg
Selenium	100 mg/kg
Zinc	2,800 mg/kg

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The determination of compliance with Table 1 may be based on the 90 percent upper confidence level for each metal or the 80 percent confidence interval for pH using the Test Methods for Evaluating Solid Waste (EPA SW-946) as guidance for the statistical treatment of data.

- b. Pathogen Reduction – The geometric mean of the density of fecal coliform in the wastewater treatment sludge produced, from seven (7) individual samples collected, is less than either two million Most Probable Number (MPN) per gram of total solids on a dry weight basis or two million Colony Forming Units (CFU) per gram of total solids on a dry weight basis. Seven samples of the wastewater treatment sludge shall be collected at the time the wastewater treatment sludge is used and tested for fecal coliform. The geometric mean shall be estimated using the following equation where $S_1, S_2 \dots S_n$ is the fecal coliform density for sample n^{th} .

$$\text{Geometric Mean} = \sqrt[7]{S_1 \times S_2 \times S_3 \times S_4 \times S_5 \times S_6 \times S_7}$$

- c. Vector Attraction Reduction - The wastewater treatment sludge generated shall meet one of the vector attraction reduction requirements as indicated below.
- i. Wastewater treatment sludge applied to the land surface shall be incorporated into the soil within 6 hours after application to the land, or
 - ii. Wastewater treatment sludge shall be injected below the surface of the land. No significant amount of wastewater treatment sludge may be present on the land surface within 1 hour after the wastewater treatment sludge is injected.
2. Land application of wastewater treatment sludge conducted under the authorization granted in this general permit shall be performed in accordance with the permittee's application, except to the extent that there is a conflict with the regulations or governing statutes.
3. The wastewater treatment sludge that is beneficially used under this general permit shall not be mixed with other types of waste materials, including hazardous waste, municipal waste, special handling waste, or other residual waste, unless otherwise approved by the Department in writing.
4. The storage, transportation or use of the wastewater treatment sludge shall be in a manner, which will not create a nuisance or be harmful to the health, safety, or welfare of the people or the environment of this Commonwealth. The transportation and

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storage of wastewater treatment sludge shall comply with the requirements of 25 Pa Code Chapter 299 (relating to storage, collection and transportation of residual waste).

5. The permittee shall not cause or allow a point or non-point source discharge of any of the following: industrial or residual wastes; wastewater; combined storm water runoff and leachate, if generated; or runoff from the staging, processing, and storage areas where solid waste management activities are conducted to the surface waters of the Commonwealth, unless permitted by the Department.
6. The permittee shall comply with the fugitive emissions regulations under 25 Pa. Code, Chapter 123 (Standards for Contaminants) issued under the Air Pollution Control Act, the Act of January 8, 1960, P.L. 2119, 35 P.S. §4005 and shall comply with all the applicable provisions of the Fugitive Emissions §§123.1, 123.2, and 123.31.
7. Nothing in this general permit shall be construed to supersede, amend, or authorize a violation of any of the provisions of any valid and applicable law, ordinance, or regulations, providing that said local law, ordinance, or regulation is not preempted by the Solid Waste Management Act, 35 P.S. §§6018.101 - 6018.1003; Municipal Waste Planning, Recycling and Waste Reduction Act, 53 P.S. §§4000.101 - 4000.1904; Air Pollution Control Act, 35 P.S. §§4001 - 4005; Waste Transportation Safety Act, 27 Pa. C.S. §§6201 - 6209; Oil and Gas Act, §§58 P.S. 601.101 - 601.605; Radiation Protection Act, 35 P.S. §§7110.101 - 7110.703 and the Clean Streams Law, 35 P.S. §§691.1 - 691.1001.
8. As a condition of this permit and of the permittee's authority to conduct the activities authorized by this permit, the permittee hereby authorizes and consents to allow authorized employees or agents of the Department, without advance notice or search warrant, upon presentation of appropriate credentials and without delay, to have access to and to inspect all areas on which solid waste management activities required of the permittee are being, will be, or have been conducted. This authorization and consent shall include consent to collect samples of waste, soils, water, or gases; take photographs; to perform measurements, surveys, and other tests; inspect any monitoring equipment; to inspect the methods of operation; and to inspect and/or copy documents, books, and papers required by the Department to be maintained. This permit condition is referenced in accordance with §§608 and 610(7) of the Solid Waste Management Act, 35 P.S. §§6018.608 and 6018.610(7). This condition in no way limits any other powers granted under the Solid Waste Management Act.
9. Failure of measures herein approved to perform as intended, or as designed, or in compliance with the applicable laws, rules, and regulations and terms and conditions of this permit, for any reason, shall be grounds for the revocation or suspension of the permittee's approval to operate under this permit.
10. Any independent contractors or agents retained by the permittee in the completion of activities authorized under this permit shall be subject to compliance history review by

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the Department prior to performance of any activities, as specified by the Solid Waste Management Act of 1980 as amended.

11. The wastewater treatment sludge authorized by this permit shall not harm or present a threat of harm to the health, safety or welfare of the people or environment of this Commonwealth. The Department may modify, suspend, revoke or reissue the authorization granted in this permit if the permittee cannot comply with the conditions of this general permit or it deems necessary to prevent harm or the threat of harm to the public health, or the environment.
12. Upon completion of beneficial use activities or by the expiration date of this permit, unless extended by the Department, the permittee shall remove any remaining wastewater treatment sludge and any other wastes or other materials which contain or have been in contact with the wastewater treatment sludge, and shall provide for the processing and disposal of the waste or material in accordance with the Solid Waste Management Act, the environmental protection acts and the regulations promulgated thereunder.
13. The permittee shall comply with the terms and conditions of this general permit and with the environmental protection acts to the same extent as if activities were covered by an individual permit. The Department may require an individual permit if the permittee is not in compliance with the conditions of this general permit or is conducting an activity that harms or presents a threat of harm to the health, safety, or welfare of the people or the environment of this Commonwealth.
14. Routine inspections of equipment during wastewater treatment sludge application activities, collection and storage areas and their surrounding environs shall be conducted to determine compliance of the terms and conditions of this general permit, and for evidence of failure.
15. At a minimum, at least one person for the permittee with responsibility for the land application of wastewater treatment sludge is required to satisfactorily complete biosolids training, provided by the Department. This training requirement should be satisfied within six months of this permit issuance.
16. Food crops planted on the land where wastewater treatment sludge was land applied shall be complied with the harvesting restrictions below.
 - a. Food crops with harvested parts that touch the wastewater treatment sludge/soil mixture and are totally above the land surface may not be harvested for 14 months after application of wastewater treatment sludge.
 - b. Food crops with the harvested parts below the surface of the land may not be harvested for 20 months after application of wastewater treatment sludge when

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- the sludge remains on the land surface for 4 months or longer prior to incorporation into the soil.
- c. Food crops with the harvested parts below the surface of the land may not be harvested for 38 months after application of wastewater treatment sludge when the sludge remains on the land surface for less than 4 months prior to incorporation into the soil.
 - d. Food crops, feed crops and fiber crops may not be harvested for 30 days after application of wastewater treatment sludge.
 - e. Animals may not be allowed to graze on the land for 30 days after application of wastewater treatment sludge.
 - f. Turf grown on land where wastewater treatment sludge is applied may not be harvested for 1 year after application of wastewater treatment sludge when the harvested parts is on land with high potential for public exposure, unless otherwise specified by the Department.
 - g. Public access to land with a high potential for public exposure shall be restricted for 1 year after application of wastewater treatment sludge.
 - h. Public access to land with a low potential for public exposure shall be restricted for 30 days after application of wastewater treatment sludge.
17. A surface water and erosion and sedimentation (E&S) controls plan in accordance with 25 Pa. Code, Chapter 102 (relating to erosion and sediment control) shall be implemented at the field/site in which the wastewater treatment sludge is land applied for beneficial use purposes.
18. Wastewater treatment sludge may be stored, for a maximum of 7 days, on the field/site where land application is to take place. The total amount of wastewater treatment sludge that may be stored shall not exceed the annual whole sludge application rate as specified in Condition 20 of this Appendix. If storing wastewater treatment sludge in a pile, under no circumstances may free liquids be present in the sludge, as determined by Method 9095 (Paint Filter Liquids Test) "rest Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA SW846).
19. Wastewater treatment sludge shall not be stored in direct contact with, or applied directly into ground water or surface water.
20. Under no circumstances shall the wastewater treatment sludge be applied at a rate that is greater than the agronomic loading rate specified in Condition C (33) of the general permit.

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21. Prior to the first land application of wastewater treatment sludge at each new site, the permittee shall obtain, at a minimum, one background chemical analysis for each site on which the wastewater treatment sludge is to be land applied, for pH, arsenic, cadmium, copper, mercury, molybdenum, nickel, lead, selenium, and zinc. The procedure for soil sampling shall meet requirements as specified in Conditions D (4) and D (5) of this general permit. The results of these analyses shall be maintained by the permittee as required in Condition E (4) of the general permit.
22. During the first land application of waste water treatment sludge, soil pH on sites where wastewater treatment sludge is being applied shall be maintained within the range of 6.0 or greater. The soil pH may be adjusted by the addition of lime or other suitable material and maintenance of the soil pH at 6.0 or greater is required during the operational life of the site and for two years following the end of the sludge application.
23. Waste treatment sludge shall not be applied to slopes greater than 25%.
24. Wastewater treatment sludge shall not be applied to the land during periods of rain or to ground that is saturated, covered with snow, or frozen.
25. When land applying of wastewater treatment sludge, displaying the permit number of this general permit on the back and both sides of each application vehicle that is used in the land application of, in alphanumeric characters at least 3 inches high in a color contrasting to the background.
26. Wastewater treatment sludge shall not be applied or stored within these isolation distances:
 - a. 100 feet or less of a perennial stream or within 33 feet of an intermittent;
 - b. Within 300 feet of a water source, unless the current owner has provided a written waiver consenting to the activities closer than 300 feet;
 - c. Within 100 feet of an exceptional value wetland, as defined in 25 Pa Code §105.17 (relating to wetlands);
 - d. Within 100 feet of the edge of a sinkhole;
 - e. In an area without an implemented erosion and sedimentation control plan;
 - f. Within 11 inches of the seasonal high water table, nor within 3.3 feet of the regional ground water table. For purposes of this condition, the depths to seasonal high water table and regional ground water table shall be based on the most recent soil mapping as published by the United States Department of Agriculture (USDA) Natural Resources Conservation Service, or more detailed mapping data as mapped by an expert in soil science using standard and

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acceptable mapping procedures as developed by the USDA Natural Resources Conservation Service;

- g. In an area where the beneficial use activity is likely to adversely affect a federally endangered or threaten species or designated critical habitat.
27. Wastewater treatment sludge is to be spread or sprayed in thin layers to prevent ponding or standing accumulations of liquids or sludges.
 28. Wastewater treatment sludge is not to be applied which will result in runoff, vector or odor problems.
 29. Wastewater treatment sludge is not allowed to be land applied to agricultural land if any of the following cumulative pollutant loading rates (i.e., the maximum concentration of pollutants which may be in the soil) has been reached:

Cumulative Pollutant Loading Rates (CPLRs)

<u>Pollutants</u>	<u>(Kilograms per Hectare)</u>	<u>(Pounds per Acre)</u>
Arsenic	41	36
Cadmium	39	34
Copper	1,500	1,320
Lead	300	264
Mercury	17	15
Nickel	420	370
Selenium	100	88
Zinc	2,800	2,464

30. CPLRs shall be calculated using the following equation:

$$\text{CPLR} = \frac{\text{pollutant in sludge (mg/kg)}}{\text{application rate (dry ton/acre)}} \times 0.002 + \text{pollutant previously applied (lbs/acre)}$$
31. CPLRs shall be tracked using the "Worksheet 1 – Tracking Cumulative Pollutant Loading Rates (CPLRs) on Land Application Sites" as provided in the general permit. Tracking worksheets shall be maintained and submitted to the Department as part of the annual report required in Condition F (2) of the permit.
32. The annual whole sludge application rate or agronomic loading rate shall be estimated using "Worksheets 2, 3 and 4" as provided in the general permit and submitted to the Department as part of the annual report required in Condition F(2) of the permit.

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33. If the nitrogen available from the manure produced by animals at the farm satisfies the nutrient needs of the farm for realistic expected crop yields, the wastewater treatment sludge may not be applied at the farm, unless a management plan is implemented that allows for uses of the manure other than land application on that farm. The nitrogen available from manure shall be estimated using "Worksheet 5 – Farm Manure Estimate" as provided in the general permit and submitted to the Department as part of the annual report required in Condition F(2) of the permit.
34. Nitrogen from the manure that was applied to the fields which received wastewater treatment sludge shall be calculated using "Worksheet 4" as provided in the general permit and submitted to the Department as part of the annual report in Condition F(2) of the general permit.
35. A person or municipality that plans to continue the beneficial use of wastewater treatment sludge authorized under this general permit, after the expiration date indicated on the approval for coverage page, shall file a complete application for permit renewal at least 180 days before the expiration date of this general permit unless permission has been granted by the Department for submission at a later date. The renewal application shall be made using the "Form 20 (Application For a Municipal or Residual Waste General Permit)".

In the event that a timely and complete application for renewal has been submitted and the Department is unable, through no fault of the permittee, to reissue the general permit or approval for coverage before its current coverage expiration date, the terms and conditions of the approved coverage will automatically continue and will remain fully effective and enforceable pending the issuance or denial of the renewal for permit coverage provided the permittee is, and has been, operating in compliance with the terms and conditions of the general permit.

D. Sampling, Analysis and Frequency of Monitoring.

1. Prior to the first time a site is used for land application of wastewater treatment sludge for beneficial use, the permittee shall, at a minimum, obtain one representative sample soil chemical analysis for pH and those constituents listed in Table 1, Condition C(1)(a) of this general permit.
2. The frequency of monitoring for the constituents as required in Conditions C (1)(a), and C (1)(b) of this general permit shall be as follows:

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TABLE 2

Compliance Monitoring

Amount of Wastewater Treatment Sludge Produced (Dry Tons per 365 Day Period)	Frequency of Monitoring
Greater than 0 but less than 290	Once per year
Equal to or greater than 290 but less than 1,500	Once every 6 months
Equal to or greater than 1,500 but less than 15,000	Once per 90 days
Equal to or greater than 15,000	Once per month

3. Representative samples of the wastewater treatment sludge must be collected and analyzed as required in Condition C(1) to determine compliance with the chemical requirements as specified in Condition C(1) of this general permit. More than one sample is usually necessary to accurately represent the wastewater treatment sludge generated. Core samples at different locations and at various depths shall be collected and then composited to obtain a representative sample of the wastewater treatment sludge. The key is to obtain a representative sample. In general, the more samples taken, the greater the chance that the sampling results will be representative of the quality of the wastewater treatment sludge.
 - a. When sampling of the wastewater treatment sludge that is stored in a pile or a bin, core samples at different locations and at various depths shall be collected and then composited to obtain a representative sample of the wastewater treatment sludge generated.
 - b. When sampling of the wastewater treatment sludge in a batch process, samples from the discharge point of the wastewater treatment sludge generation and prior to storage or beneficial use shall be collected and then composited to obtain a representative sample of the wastewater treatment sludge generated.
4. The analyses required in Conditions C(1), C(18), C(21) and D(1) of this general permit shall be performed by a laboratory accredited or registered for accreditation under the act of June 29, 2002 (P.L. 596, No. 90)(27 Pa.C.S.A. §§ 4101-4113), known as the Environmental Laboratory Accreditation Act.

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5. The analytical methodologies used to meet the requirements as specified in Conditions C(1), C(18), C(21) and D(1) of this general permit shall be those in the most recent edition of the EPA's "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA SW-846), "Methods for Chemical Analysis of Water and Wastes" (EPA 600/4-79-020), "Standard Methods for Examination of Water and Wastewater" (prepared and published jointly by the American Public Health Association, American Waterworks Association, and Water Pollution Control Federation), the Department's "Sampling Manual for Pollutant Limits, Pathogens and Vector Attraction Reductions in Sewage Sludge" or a comparable method subsequently approved by the EPA or the Department.
6. After the chemical analysis of representative samples of the wastewater treatment sludge has been conducted as required in Conditions C(1)(a) and C(1)(b) at the frequency as specified in Condition D(2) of this general permit for a two-year period and has met the requirements and concentration limits as specified in Conditions C(1)(a) and C(1)(b) of the general permit, the Department may reduce the required frequency of monitoring if a written request for the reduction of sampling frequency is submitted by the permittee. However, the frequency of monitoring may not be less than twice per year. A written approval from the Department must be obtained before commencing a reduced sampling frequency.
7. Should knowledge of the wastewater treatment sludge generation, visual observations, or analytical results indicate variability in the quality of wastewater treatment sludge, more frequent testing shall be conducted.
8. Upon request by the Department, the permittee shall collect for analysis representative samples of the (i) wastewater treatment sludge, and/or (ii) soil material, as required in Conditions C(1) and D(1) of this general permit, within 48 hours of the request.

E. Recordkeeping.

1. The permittee shall develop and maintain records of volume or weight of the wastewater treatment sludge generated for beneficial use activities authorized in this general permit.
2. The permittee shall maintain records of (i) volume or weight ,and (ii) location of all sites where the wastewater treatment sludge was land applied for beneficial use purposes.
3. Any records pertaining to or any analytical evaluations conducted on the (i) soil material, and (ii) wastewater treatment sludge pursuant to the residual waste regulations shall be kept by the permittee at the permittee's place of business and shall be available to the Department for inspection. At a minimum, these records are to include information on the dates of testing, each parameter tested, the results, the laboratory used, sampling procedures, analytical methodologies, the volume or weight of the sample and person collecting the sample.

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4. All records required in this general permit shall be retained at the permittee's facility for a minimum of five years and shall be made available to the Department upon request.

F. Reporting Requirements.

1. Any person that operates under the provisions of this permit shall immediately notify, in writing, within 15 days the Solid Waste Manager of the appropriate regional office of the Department (See attached list) of any changes in: the company name, address, owners, operators and responsible officials; changes in the land ownership and the right to enter and operate on any land where the wastewater treatment sludge is generated or stockpiled; the physical or chemical characteristics of the wastewater treatment sludge generated; and the status of any permit issued by the Department or federal government under the environmental protection acts.
2. If request by the Department, the permittee shall submit an annual report that summarizes the information outlined in Conditions C(1) and D(1), and identifies the location of all sites where the wastewater treatment sludge was utilized for beneficial use purposes during the past 12 months ending thirty (30) days prior to the permit anniversary date. The annual report shall summarize the following information:
 - a. Weight or volume of the wastewater treatment sludge beneficially used authorized under the general permit during the last 12 months ending on the anniversary date of the permit.
 - b. Laboratory reports of the wastewater treatment sludge beneficially used for the constituents listed in Table 1 of Condition C(1)(a) of this general permit. The analysis data submitted in compliance with this requirement must be from samples of the wastewater treatment sludge collected within the past 12 months.
 - c. Laboratory reports of the wastewater treatment sludge beneficially used, for the "pathogen reduction" requirements, as required in Condition C(1)(b) of this general permit. The data submitted in compliance with this requirement must be from samples of the wastewater treatment sludge collected within the past 12 months.
 - d. Laboratory reports of the chemical soil analysis for the constituents as required in Condition D(1) of this general permit. The analysis data submitted in compliance with this requirement must be from soil samples collected within the past 12 months.
 - e. Volume or weight and location of all sites where the wastewater treatment sludge was land applied for beneficial use purposes authorized under the general permit.
3. The permittee shall immediately notify the Department's Emergency Hotline by telephone at (717) 787- 4343 or the appropriate DEP regional field office in the event of

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a discharge or spill of wastewater treatment sludge, and shall take appropriate immediate action to protect the health and safety of the people or the environment of this Commonwealth.

4. The permittee shall notify the county planning commission, county conservation district, and municipality in which wastewater treatment sludge application to agricultural lands as a soil additive is proposed, by delivering or causing to be delivered a copy of this permit, and identifying the location(s) onto which wastewater treatment sludge application is intended.

**WORKSHEET 1
TRACKING CUMULATIVE POLLUTANT LOADING RATES (CPLRs)
ON LAND APPLICATION SITES**

Year of Application _____ Field _____ Site _____

Application Rate _____ Dry Tons/Acre

Pollutant	CPLRs (lb/acre)		Calculation for Determining Cumulative Loading								
	100%	90% ²	Wastewater Sludge Pollutants (mg/kg) (from analyses)	x	Application Rates (dry ton/acre)	x	0.002 (lb/ton)	+	Pollutant ¹ Previously Applied (lbs/acre)	=	Amount To Date (lbs/acre)
Arsenic	36	32.4	_____	x	_____	x	0.002	+	_____	=	_____
Cadmium	34	30.6	_____	x	_____	x	0.002	+	_____	=	_____
Copper	1320	1188	_____	x	_____	x	0.002	+	_____	=	_____
Lead	264	237.6	_____	x	_____	x	0.002	+	_____	=	_____
Mercury	15	13.5	_____	x	_____	x	0.002	+	_____	=	_____
Nickel	370	333	_____	x	_____	x	0.002	+	_____	=	_____
Selenium	88	79.2	_____	x	_____	x	0.002	+	_____	=	_____
Zinc	2464	2217.6	_____	x	_____	x	0.002	+	_____	=	_____

¹ If the soil test is reported in mg/kg, then the results must be converted to lb/acre using the following conversion factor: mg/kg x 2 = lb/acre.

² When 90% of the CPLR is reached, the DEP must be notified.

Conversion from gallons or wet tons per acre to dry tons per acre:
(based on actual application rate applied on field)

$$\frac{\text{Gallons Applied}}{\text{Wet Tons Applied}} \times \frac{8.5}{2,000} = \frac{\text{Wet Tons Applied}}{\text{Application Rate (Dry Tons/Acre)}}$$

$$\frac{\text{Gallons Applied}}{\text{Wet Tons Applied}} \times \frac{\text{Percent Solids (Decimal)}}{1} = \frac{\text{Wet Tons Applied}}{\text{Application Rate (Dry Tons/Acre)}}$$

WORKSHEET 2 WASTEWATER TREATMENT SLUDGE ANNUAL AGRONOMIC RATE

Growing Season Year _____ Field _____ Site _____
 Crop _____ Yield Goal _____

1. Total crop nitrogen requirement
 (From soil analysis, historical data, or Penn State Agronomy Guide) 1. _____ Lb/acre

2. Nitrogen provided from other sources either added to or mineralized in the soil
 - a. Nitrogen contributions from previous year's activities
 1. N from previous legume crop (Penn State Agronomy Guide) _____ Lb/acre
 2. Estimated of mineralized organic N from **previous** wastewater treatment sludge applications _____ Lb/acre
 (Worksheet 3 from previous 2 years applications. This does not apply to residential septage previously applied)
 3. Estimate of available residual N from **historical** manure applications _____ Lb/acre
 (Worksheet 4, Part A)
 - Sum of (a.1. + a.2. + a.3.) 2.a. _____ Lb/acre
 - b. Nitrogen contributions from current year's activities
 1. Estimate of available N from **current** manure application _____ Lb/acre
 (Worksheet 4, Part B)
 2. N from chemical fertilizers _____ Lb/acre
 3. N from other sources (ex. food processing waste) _____ Lb/acre
 - Sum of (b.1. + b.2. + b.3.) 2.b. _____ Lb/acre
 - Total available Nitrogen from other sources (2.a. + 2.b.) 2. _____ Lb/acre

3. Adjusted crop Nitrogen requirement (**Subtract 2 from 1**) 3. _____ Lb/acre

4. Total available Nitrogen from wastewater treatment sludge (based on wastewater treatment sludge analysis)
 - a. $\text{NH}_4\text{-N}$ _____ % NH_4 x 2000 Lbs/ton = _____ Lb/ton $\text{NH}_4\text{-N}$
 (in decimal) _____ NH_4 Lb/ton x _____ K_{vol} (Vol. Rate Table) = _____ Lb/ton available NH_4
 - b. Org-N _____ % Org-N x 2000 Lbs/ton = _____ Lb/ton Org-N
 (in decimal) _____ Org Lb/ton x _____ K_{min} (Min. Rate Table) = _____ Lb/ton available Org-N

Total Plant Available Nitrogen (PAN) from wastewater treatment sludge (a + b): 4. _____ Lb/ton

5. Calculate the agronomic rate for wastewater sludge application (**Divide 3 by 4**) 5. _____ dry ton/acre

6. Calculate amount of wastewater treatment sludge to be applied 6. _____
 (wet tons/acre or gallons/acre)
 _____ Dry tons/acre ÷ _____ % Solids (In Decimal) = _____ Wet tons/acre
 _____ Wet tons/acre x 2,000 Lbs/ton ÷ 8.5 Lb/gallon = _____ Gallons/acre

7. P_2O_5 and K_2O fertilizer equivalent in wastewater treatment sludge (Nutrient management information for the farmer)
 - a. _____ % P in wastewater treatment sludge x 2.29 = _____ % P_2O_5 in wastewater treatment sludge
 (in decimal) _____ % P_2O_5 x 2000 Lb/ton = _____ Lb/ton P_2O_5
 - b. _____ % K in sludge x 1.2 = _____ % K_2O in wastewater treatment sludge
 (in decimal) _____ % K_2O x 2000 Lb/ton ÷ 100 = _____ Lb/ton K_2O

WORKSHEET 3 RESIDUAL ORGANIC NITROGEN FROM WASTEWATRE TREATMENT SLUDGE APPLICATION IN CURRENT YEAR

Growing Season Year _____ Field _____ Site _____

Step 1. Block 1.A. - The growing season year. In Blocks 2.A and 3.A enter the following 2 years.

Step 2. Block 1.B. - Obtain by the following equations:

- Conversion from gallons or wet tons per acre to dry tons per acre:

$$\frac{\text{_____}}{\text{(Gallons Applied)}} \times 8.5 \div 2,000 = \frac{\text{_____}}{\text{(Wet Tons Applied)}}$$

$$\frac{\text{_____}}{\text{(Wet Tons Applied)}} \times \frac{\text{_____}}{\text{(% Solids in decimal)}} \div 2,000 = \frac{\text{_____}}{\text{(insert into 1)}} \text{ Application Rate (Dry Tons/Acre)}$$

- Determination of organic nitrogen application rate in pounds per acre:

$$\frac{\text{_____}}{\text{(% Organic N in sludge in decimal)}} \times 2,000 \text{ lbs/ton} = \frac{\text{_____}}{\text{(insert into 2)}} \text{ Organic Nitrogen (Lbs/Ton)}$$

- $$\frac{\text{Application Rate Applied (Dry Tons/Acre)}}{1} \times \frac{\text{Organic Nitrogen (Lbs/Ton)}}{2} = \frac{\text{_____}}{\text{(Place in Block 1.B)}} \text{ Organic Nitrogen (Lbs/acre)}$$

Step 3. Column C - The mineralization rate for the wastewater treatment sludge for the respective Growing Season. See K_{min} Table (i.e., Table 2 of Worksheet 3)

Step 4. Block 1.D. = Block 1.B. x Block 1.C.

Step 5. Block 1. E. = Block 1.B. – Block 1.D.

Step 6. Block 2.B. = Block 1.E. Follow Steps 4 and 5 for Blocks 2.D. and 2.E.

Step 7. Block 3.B. = Block 2.E. Follow Steps 4 for Block 3.D.

	A Wastewater Treatment Sludge Applied For:	B Organic N (lb/acre)		C Mineralization Rate (Kmin) (Min. Rate Table)		D Mineralized Organic N in Lbs/Acre (PAN)	E Organic N Remaining (Lbs/Acre)
1	Growing Season 0 - 1 Year _____		X		=		(1.B. - 1.D.)
2	Growing Season 1 - 2 Year _____	(from 1.E)	X		=		(2.B. - 2.D.)
3	Growing Season 2 - 3 Year _____	(from 2.E)	X		=		/

WORKSHEET 3 (Continued)

VOLATILIZATION AND MINERALIZATION RATE (for use in Part 2.a.2. and Part 4 of Worksheet 2)

Table 1
Volatilization Rate¹ (K_{vol})

If Wastewater Treatment Sludge Is:	Factor K _{vol} Is:
Liquid and surface applied	0.50
Liquid and injected into the soil	1.0
Dewatered and applied in any matter	0.50

¹ Percentage of Ammonia Nitrogen applied that volatilization after application.

Table 2
Mineralization Rate² (K_{min})

Time After Wastewater Treatment Sludge Application (Year)	% ³ of Org-N Mineralized from Unstabilized Primary & Wastewater Treatment Activated Sludge	% ³ of Org-N Mineralized from Aerobically or Lime Stabilized Wastewater Treatment Sludge	% ³ of Org-N Mineralized from Anaerobically Digested Wastewater Treatment Sludge	% ³ of Org-N Mineralized from Composted Wastewater Treatment Sludge
0 – 1	0.4	0.3	0.2	0.1
1 – 2	0.2	0.15	0.10	0.05
2 – 3	0.10	0.08	0.05	0.03

² Percentage of Org-N mineralized during the time interval shown.

³ Expressed as a decimal.

**WORKSHEET 4
MANURE APPLICATION**

Growing Season Year _____ Field _____ Site _____

PART A

AVAILABLE RESIDUAL NITROGEN FROM HISTORICAL MANURE APPLICATIONS

	Residual Nitrogen (N) Available (Lbs N/Acre)
Rarely received manure in the past (< 2 out of 5 years)	0
Frequently received manure (2 – 3 out of 5 years)	20
Continuously received manure (4 – 5 out of 5 years)	35

PART B

AVAILABLE RESIDUAL NITROGEN FROM CURRENT MANURE APPLICATIONS

(Includes Previous Fall and Winter Applications For Spring Grain or Summer Annuals)

Expected Manure Application Rate <input type="checkbox"/> Tons/Acre Or <input type="checkbox"/> 1,000 Gallons/Acre	X	Manure Nitrogen (Lbs/Ton) or (Lbs/1,000 Gal) (Penn State Agronomy Guide or Manure Analysis)	X	Nitrogen Available Factor (Penn State Agronomy Guide or Manure Analysis)	=	Available Nitrogen (Lbs/Acre)
	X		X		=	

WORKSHEET 5

FARM MANURE ESTIMATE

Site Name _____

Date Completed _____

This worksheet should be used to help estimate farm crop nutrient needs versus manure nutrient available on the farm. This information will provide information to determine if the needs for additional nutrients are large enough to use wastewater treatment on the farm. Complete this worksheet to identify the number and kind of animals on the farm, the total nutrient value of the manure and location where manure is applied. You should refer to the latest publication of the *Pennsylvania State University Agronomy Guide* or the *DEP Agronomic Loading Rate Reference* for the following:

- weight per animal (step 1) (Table A)
- lbs or gallons / animal unit / day (step 3) (Table 1.2-13)
- manure nutrient content (step 4) (Table 1.2-13)
- manure nitrogen availability factor (step 4) (Table 1.2-14)
- crop yield / acre (calculation 2) (Table 1.1-1)
- crop nutrient requirement (calculation 2) (Table 1.2-6, 7 & 9)

Manure Nutrients (Table 1.2-13)

Total Acres Used _____ <small>(Includes fields specified in the 30-Day Notice)</small>	Full Days Confined _____	Nitrogen _____
Animal Type _____	Partial Days Confined _____	- Availability Factor _____ <small>(Table 1.2-14)</small>
Number of Animals _____	- Hours Confined _____	Phosphate _____
Weight per Animal _____ <small>(Table A)</small>	Lbs / Day / Animal Unit _____ <small>(Table 1.2-13)</small>	Potash _____

Calculation 1: Amount of manure nutrients available

Step 1: Number of 1000 pound animal units

- a. Number of animals _____ X weight per animal (Table A) _____ lbs _____ total weight
- b. Total weight / 1000 pounds _____ animal units

Step 2: Days confined

- a. Full days confined _____ days
- b. Partial days confined _____ X (hours confined _____ / 24 hours) _____ days
- c. Number of full days (step 2a) + number of partial days (step 2b) _____ total days

Step 3: Tons of manure generated during confinement period

lbs/day/animal unit (Table 1.2-13) _____ X animal units (step 1b) _____ X total days (step 2c) _____ / 2000 _____ tons

Step 4: Manure available nutrients

- a. Tons of manure (step 3) _____ X nitrogen content of manure (Table 1.2-13) _____ lbs/ton _____ lbs N
- b. Tons of manure (step 3) _____ X phosphate content of manure (Table 1.2-13) _____ lbs/ton _____ lbs P₂O₅
- c. Tons of manure (step 3) _____ X potash content of manure (Table 1.2-13) _____ lbs/ton _____ lbs K₂O

Calculation 2: Crop nutrient requirements for farm

Crop	Acres	Yield per Acre <small>(Table 1.1-1)</small>	Nutrient Requirement / Acre			Total Crop Nutrient Requirement		
			<small>Yield per Acre X Nutrient Uptake per Unit Yield (Table 1.2-6, 7 & 9)</small>			Nutrient Requirement / Acre X Acres		
			N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
TOTALS:								

Compare with:

4a

4b

4c

**Department of Environmental Protection
Regional Offices
(and Counties Served)**

- I. Bucks, Chester, Delaware, Montgomery, Philadelphia.

Southeast Regional Office

2 East Main Street
Norristown, PA 19401
Phone: (484) 250 - 5960

- II. Carbon, Lackawanna, Lehigh, Luzerne, Monroe, Northampton, Pike, Schuylkill, Susquehanna, Wayne, Wyoming.

Northeast Regional Office

2 Public Square
Wilkes-Barre, PA 18701-1915
Phone: (570) 826 – 2516

- III. Adams, Bedford, Berks, Blair, Cumberland, Dauphin, Franklin, Fulton, Huntingdon, Juniata, Lancaster, Lebanon, Mifflin, Perry, York.

Southcentral Regional Office

909 Elmerton Avenue
Harrisburg, PA 17110-8200
Phone: (717) 705 – 4706

- IV. Bradford, Cameron, Centre, Clearfield, Clinton, Columbia, Lycoming, Montour, Northumberland, Potter, Snyder, Sullivan, Tioga, Union.

Northcentral Regional Office

208 West 3rd Street - Suite 101
Williamsport, PA 17701
Phone: (570) 327 – 3653

- V. Allegheny, Armstrong, Beaver, Cambria, Fayette, Greene, Indiana, Somerset, Washington, Westmoreland.

Southwest Regional Office

400 Waterfront Drive
Pittsburgh, PA 15222-4745
Phone: (412) 442 – 4000

- VI. Butler, Clarion, Crawford, Elk, Erie, Forest, Jefferson, Lawrence, McKean, Mercer, Venango, Warren.

Northwest Regional Office

230 Chestnut Street
Meadville, PA 16335-3481
Phone: 814-332-6848