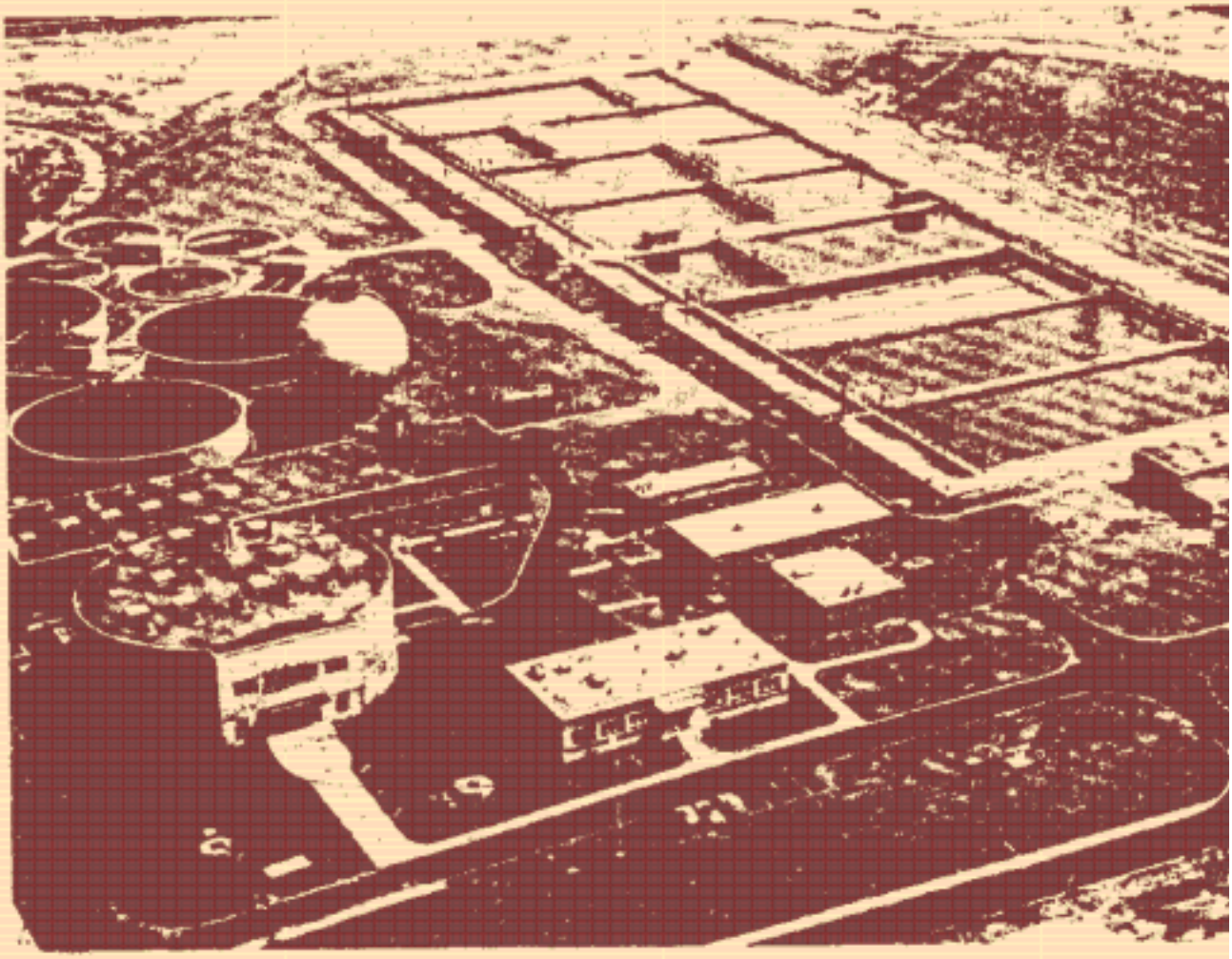
TECHNICAL MANUAL FOR

Division of Water Quality
Bureau Of Pretreatment and Residuals

Residuals Management

New Jersey Department of Environmental Protection



BUREAU OF PRETREATMENT AND RESIDUALS

TECHNICAL MANUAL
for
RESIDUALS MANAGEMENT

New Jersey Department of Environmental Protection
Division of Water Quality
Bureau of Pretreatment and Residuals
P.O. Box 029
Trenton, New Jersey 08625-0029
(609) 633-3823

July, 98

MISSION STATEMENT

Vision: The Department of Environmental Protection is committed to providing a high quality of life for the residents of New Jersey.

Mission: To assist the residents of New Jersey in preserving, sustaining, protecting and enhancing the environment to ensure the integration of high environmental quality, public health and economic vitality. We will accomplish our mission in partnership with the general public, business, environmental community and all levels of government by:

- Developing and integrating an environmental master plan to assist the Department and our partners in decision-making through increased availability of resource data on the Geographic Information System.
- Defining and publishing reasonable, clear and predictable scientifically-based standards.
- Achieving the Department's goals in a manner that encourages compliance and innovation.
- Employing a decision-making process that is open, comprehensive, timely, predictable and efficient.
- Providing residents and visitors with affordable access to safe and clean open space, historic and natural resources.
- Assuring that pollution is prevented in the most efficient and practical way possible.
- Assuring that the best technology is planned and applied to achieve long-term goals.
- Assuring that non-treatable wastes are isolated, managed and controlled.
- Enhancing environmental awareness and stewardship through education and communication.
- Fostering a work environment that attracts and retains dedicated and talented people.
- Committing to an ongoing evaluation of the Department's progress toward achieving our mission.

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Prologue

This manual has been produced by the Department of Environmental Protection (DEP) to make the permit process less complicated and time-consuming for you. This manual is one of a series of technical manuals produced by DEP under the requirements of the Environmental Management Accountability Plan (P. L. 1991, Chapter 422) with the goal of making the permit application process more consistent and predictable. In each technical manual, you will find summaries and explanations of policies that may not be fully described or explained in environmental laws or regulations. In addition, the manuals contain guidance on how the Department defines other standards, such as "state-of-the-art" control technologies or "best management practices."

Unless otherwise required by federal or state law, the policies and procedures contained in a technical manual on the date an application is filed will be binding on both the DEP and the applicant. The technical manuals may be updated every six months or whenever a regulatory change requires revisions. Any revision made to a technical manual will have no effect upon a permit application that was submitted to the department prior to adoption of the revision. This is a technical manual prepared pursuant to N.J.S.A. 13:ID-111 to ID-113. Because it by necessity condenses and summarizes statutes, regulations, and other documents, it may not always precisely reflect all the requirements set forth in same. In the case of any inconsistency between this technical manual and any statutes, regulations, or policy determinations based upon same, the requirements of the statutes, regulations, or policy determinations shall prevail. Accordingly, this technical manual should not be used as a substitute for a thorough analysis of the law and the facts as they apply to any specific project or proposal. The State of New Jersey, including its Department of Environmental Protection and all agents and employees thereof, hereby disclaims any warranties (express or implied) and any legal liability for the accuracy, completeness, usefulness of any of the information set forth in this technical manual.

DEP welcomes suggestions for improving its technical manuals. Please direct comments to the Director, Office of Pollution Prevention and Permit Coordination, NJDEP, P. 0. Box 423, Trenton, New Jersey 08625-0423.

You may request additional copies of this manual by sending a check or money order made payable to the Treasurer, State of New Jersey for $8.00 (includes first class mailing by the U. S. Postal Service) to: Map Sales & Publication Office, Bureau of Revenue, NJDEP, P. 0. Box 417, Trenton, New Jersey 08625-0417.

Also for information about other technical manuals offered by the department, contact the sales office by phone at (609) 777-1039.

As stated previously, these manuals may be updated every six months or whenever a regulatory change requires it. Therefore, if the publication date of the manual is more than six months old or if you are aware of a regulatory change, you should contact the Map Sales & Publication Office for a copy of the appropriate revision.

Notice: This manual contains forms and applications that are provided as a convience to the applicant. These forms are included for illustrative purposes only, are not subject to the limitations of N.J.S.A. 13:1D-112(b) and may be updated as often as necessary. Prior to submitting any forms to the department, an applicant should contact the appropriate bureau or make certain that he or she is using the most up-to-date version.

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APPENDICES

* Forms have not been included in this edition of the Technical Manual for Residuals Management. However, the indicated forms are available and are required to be used for residual permit applications and land application site approvals. For copies contact the Bureau of Pretreatment and Residuals at (609) 633-3823, or access the Division of Water Quality's Web site at "www.state.nj.us/dep/dwq/forms.htm".

SECTION 1 – OVERVIEW

The purpose of the New Jersey Pollutant Discharge Elimination System (NJPDES) permitting program is to restore, enhance, and maintain the quality of the water resources of the State of New Jersey. The NJPDES permit is the regulatory mechanism to achieve this purpose and by which the New Jersey Department of Environmental Protection (Department) requires permittees to comply and conform to laws, regulations, and standards.

Overall, the Bureau of Pretreatment and Residuals (BPR) within the Division of Water Quality, Department of Environmental Protection, regulates the discharge of contaminants to wastewater treatment facilities, regulates the management of residuals associated with wastewater treatment facilities, and oversees the implementation of approved pretreatment programs. The BPR issues NJPDES permits for discharge of contaminants to wastewater treatment facilities that do not have an approved pretreatment program and for various types of residuals management operations in conformance with the New Jersey Water Pollution Control Act and the NJPDES Regulations (N.J.A.C. 7:14A).

The New Jersey Water Pollution Control Act, N.J.S.A. 58:10A-1 et seq. (the Act), and the regulations promulgated thereto give the Department the authority to regulate the discharge of pollutants to the waters of New Jersey. The Act also provides the authority to establish the NJPDES permit program, to establish discharge limitations, to obtain information through reporting and inspections, and to take enforcement actions when violations of the Act are found.

This technical manual is intended to furnish guidance to applicants, permittees, permit writers, consultants, and other interested parties for the submission of a NJPDES permit application for the various types of residuals management operations regulated by the BPR. It does not cover discharge of contaminants to a wastewater treatment facility or associated pretreatment programs. This manual specifies information required for a complete NJPDES permit application and provides information on the documents and basis used in the development of permit conditions.

The regulations for residuals management are found at N.J.A.C. 7:14A-20 and were adopted May 5, 1997. These regulations, which are based on the federal rules at 40 CFR Part 503, reduce some of the regulatory burden of the previous rules on product movement due to the low risk associated with properly land applied residuals that meet certain quality thresholds. Under N.J.A.C. 7:14A-20, certain products that achieve the most stringent permit limitations will be considered a product in commerce and will not be subject to further regulation. Other products may be applied with some controls set forth in a letter of site approval. The Department's strategy in development of these regulations has been to provide a balanced approach that will not only protect the environment but also encourage recycling of residuals through land application.

As a consequence of the decreased regulation, the Department has placed an increased responsibility upon the permittee, the land applier, and the preparer for proper residual management. In the past, greater flexibility and greater variations were afforded due to multiple layers of monitoring controls (for example, controlling application rates as well as monitoring ground water and soil testing). With some of these monitoring controls removed, the Department

will not permit the same degree of flexibility. In addition, where the permittee or the preparer do not execute adequate oversight to maintain compliance with the Department's rules, the Department will be forced to reassert control over a site through the authority under N.J.A.C. 7:14A-20.5. Examples of noncompliance include the overapplication of nitrogen via residuals, nonreporting of residuals received, and application of residuals to a mature crop. Where these requirements are violated, the Department will require appropriate measures, such as the installation of ground water monitoring wells or the testing of soil, as well as significant penalties.

ESTABLISHING LIMITATIONS, STANDARDS, AND OTHER PERMIT CONDITIONS

All treatment works with a discharge regulated under N.J.A.C. 7:14A must have permits that implement applicable technical standards. Generally, the permit issued to the treatment works generating the residual will include standards applicable to residual quality as well as other general conditions required by N.J.A.C. 7:14A-6. In addition, the permit may include conditions related to any aspect of residual management developed on a case-by-case basis where the Department determines that such conditions are necessary to protect public health and the environment.

The permit may also include conditions establishing requirements for treatment works that send residual to other facilities for final use or disposal. For example, the permit for the generating treatment works would generally have standard conditions, while the permit issued to the treatment works deriving the material for land application would contain standard conditions and other specific conditions relating to land application (see Land Application Programs in Section 3). Thus, **ALL** residual preparers (that is, generators as well as persons who derive a material from residual) are required to submit basic information concerning their residual use and disposal practices. This information is submitted by completing Parts A and B of the Department's Application Form R. This form is attached as Appendix H.

N.J.S.A. 58:10A-6(f)7 authorizes the Department to issue permits in "conformance with land-based sludge management criteria established by the Department in the Statewide Sludge Management Plan... or established pursuant to the Federal Water Pollution Control Act... or any regulations adopted pursuant thereto." Consistent with this authority, the Department has adopted the requirements of 40 CFR 122.44 (Establishing limitations, standards, and other permit conditions) and 40 CFR 503.5 (Additional or more stringent requirements).

The provisions of 40 CFR 122.44 were promulgated to codify the requirements of Section 405(d)(4) of the Clean Water Act (formally the Federal Water Pollution Control Act). The USEPA has interpreted this authority to include, where necessary, the development of permit conditions to control residual use or disposal on a case-by-case or "best professional judgement" (BPJ) basis. This authority is in addition to the requirement to impose conditions in permits that implement the requirements of 40 CFR Part 503, and applies whenever a technical standard in 40 CFR Part 503 does not address a particular pollutant or management practice which is determined to be of concern. An example of how the Department could use this authority is in regulation of the maturity of marketable residual products.

It has been the Department's experience with the distribution of marketable residual products resulting from high pH/high temperature processes that there is a relationship between the maturity of the product and its potential to create an odor and a nuisance upon distribution. The Department had previously found such a relationship with sewage sludge composting processes, and has typically required a 30-day curing period following the active phase of the sewage sludge composting process. During this 30-day period, further decomposition, stabilization and degassing take place, which help to make the compost more marketable.

Excessive moisture and temperature are undesirable in a material that has otherwise met all Federal and State criteria for pathogen and vector attraction reduction. The proper maintenance and handling of marketable residual products resulting from high pH/high temperature processes subsequent to achievement of the Federal criteria will reduce product moisture and temperature, and will reduce the related release of undesirable odors. Thus, it is important for an applicant to demonstrate optimal sewage sludge to alkaline admixture ratios, and to provide a written proposal to optimize the characteristics of the marketable residual product produced, including temperature, total solids and odor characteristics.

A more stringent standard may also be imposed by the Department even if land applied bulk residual meets the ceiling concentrations in column 1 of Appendix A, the pollutant concentrations in column 2 of Appendix A, the Class A pathogen requirements in Appendix B, and one of the first eight vector attraction reduction requirements in Appendix C (that is, a residual which is Exceptional Quality). 40 CFR 503.10 and N.J.A.C. 7:14A-20.2(c) provide that the general requirements (Appendix E) and management practices (Appendix F) pertaining to land application do not apply when the bulk residual meets these three requirements. However, the Department may decide that, because of the nature of a particular product or the conditions at a particular site, it is necessary to assert control over the residual land application site to protect public health and the environment from nitrogen or other nutrients in the bulk residual. The Department may decide that the general requirements or management practices should apply for Exceptional Quality materials (for example, when the residual is applied as a liquid or if the residual presents nuisance qualities that rise to the level of noncompliance with Air Pollution Control Law). One of the management practices that always applies to bulk residual meeting Exceptional Quality requirements is the requirement to apply the residual at an agronomic rate.

A more stringent standard may also be imposed when a constituent is found in a residual that normally would not be expected to be present, or is present at levels not typically found. The Department will use information provided by sources including, but not limited to, the Sludge Quality Assurance Regulations, N.J.A.C. 7:14-4, and the USEPA Technical Support Documents for land application and surface disposal to determine if additional pollutant limits are necessary.

The Department will set forth the basis for permit conditions established above in the fact sheet issued as part of the draft permit. The Department may also modify or revoke and reissue a permit for existing facilities or activities when it determines those additional conditions are needed in the permit to protect public health or the environment.

SECTION 2 - ENVIRONMENTAL ASSESSMENT

The first step in preparing an application for a permit for residual use or disposal is to prepare an Environmental Assessment. This section provides guidance to comply with the Department's requirements for preparation and submission of the Environmental Assessment.

Residual land application sites, or those operations which are exempt from having to obtain a permit, are not in and of themselves considered treatment works treating domestic sewage or residual-only facilities. Therefore, the environmental assessment requirements do not extend to the residual land application site. In addition, the environmental assessment requirements do not extend to a blending operation which receives exceptional quality residuals (that is, a residual which meets the ceiling concentrations and pollutant concentrations in Appendix A, the Class A pathogen requirements in Appendix B, and one of the first eight treatment vector attraction reduction requirements in Appendix C). The controls imposed on the processing of the residual in order to meet the land application requirements, combined with any applicable general requirements or management practices that may be required, are sufficient to protect public health and the environment at the point where application to the land occurs. Therefore, the preparation and submittal of an Environmental Assessment is only required for the location where a residual will be prepared to be applied to the land, the location where a residual was placed on a surface disposal site, the location of a residual transfer station or as otherwise determined necessary by the Department in accordance with the procedures outlined in N.J.A.C. 7:14A-20.5.

The Department shall waive this requirement if no additional infrastructure or capacity is proposed. For example, if a domestic treatment works already operates anaerobic digesters and is applying for a permit to land apply the sewage sludge from the existing digesters, an environmental assessment is not required.

The first part of the environmental assessment is to provide an environmental impact evaluation. At a minimum, the regulations at N.J.A.C. 7:14A-20.6 require an analysis of the impact that the proposed operation will have on the following:

- **Local transportation patterns:** Describe the transportation facilities by identifying the network which will service the proposed facility, site access capability, and existing traffic flow patterns expressed in terms of daily peak hour volumes, off peak hour volumes, levels of service and average daily number of trips. Identify any proposed local, county, or State Department of Transportation traffic engineering plans for the network identified. In order to effectively apply the policy regarding traffic analysis, the following standards have been developed:
    - Project an hourly daily residual delivery schedule for the anticipated maximum capacity. Provide the database that supports the profile projections. Existing operating facilities shall utilize existing data. This schedule will determine the facilities peak hours.
    - Project an hourly daily transfer schedule that shows the amount of residual being hauled out of the facility. Off site traffic routes need to be identified for trucks entering and

exiting the facility. Critical intersections utilized by the facility's truck traffic need to be analyzed.

- Hourly existing traffic counts (without facility's truck traffic) shall be made at least for the number of hours of facility operations and the roadway capacity shall be explicitly defined. This will constitute the baseline.
- The traffic study shall analyze the following scenarios for each intersection under study:
  1. The existing roadway peak hour with and without facility truck traffic;
  2. The hour of peak facility deliveries with and without facility truck traffic;
  3. If the facility is proposing twenty-four hour operations, then additional peak hours may require analysis.
- The traffic analysis shall account for traffic growth in the area for the projected period of full-scale operations. Use recommended NJDOT factor for the area.

It is recommended that all applicants consult NJDOT's New Jersey State Highway Access Management Code during the preparation of any traffic assessment.

If the residual generated will come only from a treatment plant at the same site as the location where the residual will be processed for land application, transportation patterns do not have to be evaluated as part of the environmental assessment.

- **Drainage and soil characteristics**: Describe the soils by identifying major soil types and their characteristics including, but not limited to, drainage, erosion potential and sedimentation potential. Information shall be based on U.S. Soil Conservation Service Surveys. The description of the site specific soils shall include, but not be limited to, the texture and thickness of each horizon, observed mottling, taxonomic classification and, where applicable, the quality of the surface soils.
- **Surface and ground water quality**: Describe the subsurface hydrology for the aquifers located beneath the site, including, but not limited to, depth to groundwater during seasonal high and low flow, flow direction, existing uses and future supply capabilities.

  For water bodies which directly abut the site, exist on-site, or drain directly onto or off the site, identify all existing water classifications, designated uses and limitations of the surface water bodies in accordance with N.J.A.C. 7:9-4.
- **Endangered or threatened wildlife and vegetation**: Describe the plant or animal species on the Federal and State endangered, threatened or rare plant or animal species lists and identify, in a mapped format, the extent of utilization by such species, if present.
- **Storm water and wastewater collection/treatment capability**: Describe the sewage facilities by identifying the type of treatment system available, its existing treatment capacity, collection system capacity, average and peak flow data, and current committed capacity for treatment and collection system. Describe the stormwater management system by identifying the type of collection and treatment system available, and current collection and treatment capacity and utilization.

- **Water supply capability**: Describe the water supply by identifying the water supply system, water sources, level and type of existing pretreatment, capacity of the distribution system, current commitment of capacity, availability of additional supply, and peak and average demands.
- **Ambient acoustical conditions**: Provide an analysis of how the proposed operation will conform or conflict with the noise control provisions of N.J.A.C. 7:29. Identify sources of impulsive and continuous noise.

  In an effort to help applicants comply with the above noted regulations the Department has developed the following activities under which the noise impacts need to be analyzed. The activities that will take place at the facility need to be recreated, at a given instance, during peak hour operations for the proposed maximum capacity applied for. All noise shall be accounted for and at a minimum include:

  - Trucks queuing and those at the scale;
  - Loading and unloading activities occurring inside and outside the building;
  - Loaders pushing residual;
  - Any yard activity such as dropping off and picking up containers, loading marketable residual product, etc.;
  - Air pollution control equipment;
  - Processing equipment operating either inside and/or outside of the building.

  All the sources need to be compounded, logarithmically added and projected to the nearest sensitive receptors. If the projection shows exceedence of the noise level standards set forth at N.J.A.C. 7:29 for day time, then mitigation measures shall be proposed that ensure compliance with noise level standards at all times of the respective facilities operation. If the facility is expected to conduct night time operations, the applicant must show compliance with the night time noise level standards set forth at N.J.A.C. 7:29.
- **Air quality**: Provide a demonstration that the facility will be consistent with the New Jersey State Implementation Plan and related odor and air quality requirements established by the Division of Environmental Quality.

The second part of the environmental assessment requires a description of how the proposed operation will conform or conflict with the objectives of any applicable Federal, State, or local land use and/or environmental requirements. The magnitude and detail of the environmental assessment is relative to the nature, scale and location of the proposed project. As stated, where the project does not require the construction of additional infrastructure, the Department shall waive this requirement. Specifically, for areas within two miles of the perimeter of a proposed large facility (residual production equal to or greater than 15,000 metric tons per 365 day period), or within one mile of the perimeter of a proposed small facility (residual production less than 15,000 metric tons per 365 day period), the following areas must be identified and evaluated:

- The floodway and flood fringe areas of the State Flood Hazard Area Control Act, N.J.S.A. 58:16A-50 et seq., or areas identified under flood insurance studies prepared by the Federal Emergency Management Agency (FEMA);
- Areas designated as wild, scenic, recreational or developed recreational rivers pursuant to the Natural Wild and Scenic Rivers Act, 16 U.S.C.A. 1271 or the New Jersey Wild and Scenic River Act, N.J.S.A. 13:8-45;
- Critical habitat of endangered or threatened species of plants, fish or wildlife as defined by the Federal Endangered Species Act of 1973, P.L. 93-205, or the New Jersey Endangered and Non-game Species Conservation Act, N.J.S.A. 23:2A-1 et seq.;
- Wetlands, tidelands and coastal zone areas identifed by the Department pursuant to the Wetlands and Coastal Resource and Development Policies, N.J.A.C. 7:7E and as identified on the U.S. Fish and Wildlife Services National Wetlands Inventory Maps;
- The Preservation and Protection Areas established by N.J.S.A. 13:18A-11 of the Pinelands Protection Act;
- Lands that have been duly certified by the State Agriculture Development Committee as agriculture development areas pursuant to the Agricultural Retention and Development Act, N.J.S.A. 4:1C-11 et seq;
- Watershed areas for water classified by the Department as FW-1 waters or FW-2 Trout Production Waters pursuant to the Surface Water Quality Standards, N.J.A.C. 7:9-4;
- Areas over a sole source aquifer designated pursuant to Section 1424(e) of the Safe Drinking Water Act of 1974, P.L. 93-523;
- Areas within the critical supply areas as defined by the Water Supply Management Act, N.J.S.A. 58:1A-1 et seq.;
- Areas which will encroach upon, damage or destroy any area, site, structure or object included in the National or State register of Historic Places established by N.J.S.A. 13:1B-15.128;
- Areas within 10,000 feet of any airport runway which is equal to or greater than 3,000 feet in length or within 5,000 feet of any airport runway which is less than 3,000 feet in length;
- Areas dedicated to recreational or open space use including, but not limited to, national parks, national recreation areas, national forests, national wildlife refuges, state wildlife management areas, state parks, state forests, state designated natural areas and county or local parks, wildlife sanctuaries and recreational facilities.

Where a potential conflict with the objectives of land use and/or environmental requirements is identified above, a description of the mitigation efforts to be undertaken to minimize any such conflict must be provided as part of the environmental assessment.

For the preparation and submittal of an application for a major modification of an existing residual permit where additional infrastructure and/or capacity is proposed, a new environmental impact evaluation must be submitted. However, a new land use evaluation does not need to be performed.

For the preparation and submittal of an application for renewal of an existing residuals permit, a new land evaluation does not need to be performed. However, an updated environmental impact evaluation must be submitted if additional infrastructure or capacity is proposed.

Where required, this information must be submitted as an attachment to Part C of Form R.

SECTION 3 - LAND APPLICATION PROGRAM REQUIREMENTS

New Jersey's residual land application program closely mirrors the requirements of the federal regulations for the use or disposal of sewage sludge (40 CFR Part 503). New Jersey's "Standards for the Use or Disposal of Residuals" (N.J.A.C. 7:14A-20) provide six different programs for land application based on the level of quality, pathogen reduction, and vector attraction reduction achieved. These programs are described in more detail below.

Please note that the "person who prepares residual" for land application under any one of these programs is required to obtain a NJPDES permit. The definition of a "person who prepares residuals" means either the person who generates a residual during the treatment of domestic sewage and/or process wastewater in a treatment works, or the person who derives a material from this residual. Although a "person who prepares residual" is required to obtain a NJPDES permit, a NJPDES permit is not required for all residual land application sites.

Table A summarizes the requirements for quality, pathogen reduction, and vector attraction reduction for the six land application programs. Use this table to determine which land application program applies to your facility. Please note that land application under programs 2 through 6 requires a Letter of Land Application Management Approval (LLAMA) from the Department. The submission requirements for a LLAMA are detailed in Section 4.

TABLE A

	LLAMA Required	Quality Requirements (Appendix A)	Pathogen Reduction Requirements (Appendix B)	VAR Requirements 40 CFR 503.33(b) (Appendix C)	General Requirements (Appendix E)	Management Practices (Appendix F)	Site Restriction Requirements (Appendix D)
Program 1	No	Column 2	Class A	(1)-(8)	*	*	No
Program 2	Yes	Column 2	Class A	(9) or (10)	Yes	Yes	No
Program 3	Yes	Column 2	Class B	Any	Yes	Yes	Yes
Program 4	Yes	Column 1	Class A	(1)-(8)	Yes	Yes	No
Program 5	Yes	Column 1	Class A	(9) or (10)	Yes	Yes	No
Program 6	Yes	Column 1	Class B	Any	Yes	Yes	Yes

* For bulk Exceptional Quality residual, the Department may apply any or all of the general requirements in Appendix E and the management practices in Appendix F on a case-by-case basis after determining that the general requirements or management practices are needed to protect public health and the environment from any reasonably anticipated adverse effect that may occur from any pollutant in the bulk residual. Section 1 outlines some of the circumstances when the Department may use this authority.

LAND APPLICATION PROGRAMS

The following information explains the Department's six programs for land application. The programs have been developed based on the level of quality, pathogen reduction, and vector attraction reduction achieved.

Program 1 (Exceptional Quality)

This program applies to Exceptional Quality residuals which are applied to the land in bulk or which are sold or given away in a bag or other container. To be considered Exceptional Quality, a residual must meet the ceiling concentrations in column 1 of Appendix A, the pollutant concentrations in column 2 of Appendix A, the Class A pathogen reduction requirements in Appendix B, and one of the vector attraction reduction options 1 through 8 in Appendix C.

Persons preparing Exceptional Quality (EQ) residual must obtain a NJPDES permit from the Department which, at a minimum, will mandate quarterly monitoring, record keeping and reporting to demonstrate that residual is EQ, development of instructional literature for users, a general accounting of quantities of residual processed and distributed, and registration with the New Jersey Department of Agriculture where residual is sold, offered for sale, or intended for sale as a fertilizer, soil conditioner, or agricultural liming agent. Section 5 provides additional information for submission of applications under Program 1.

Program 2

This land application program is similar to Program 1 (meets the ceiling concentrations in column 1 of Appendix A, the pollutant concentrations in column 2 of Appendix A, and the Class A pathogen reduction requirements in Appendix B). However, the difference is that the residual does not meet one of the vector attraction reduction options 1 through 8 in Appendix C, but will meet the vector attraction reduction requirements of either option 9 or 10. Because one of the first eight vector attraction reduction requirements is not met, the residual may not be sold or given away in a bag or other container, and may not be applied to a lawn or home garden. Therefore, the general requirements in Appendix E and the management practices in Appendix F always apply.

Persons preparing Program 2 residual must obtain a NJPDES permit which, at a minimum, will mandate quarterly monitoring, record keeping and reporting to demonstrate that residual meets applicable standards, and a detailed accounting of quantities of residual processed and distributed. In addition, a LLAMA must be obtained prior to the application of residual to each residual land application site. Application to the Department for a LLAMA, at a minimum, will require inclusion of a United States Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS) farm conservation plan or Soil Erosion and Sediment Control (SESC) plan. A LLAMA will specify management practices and reporting requirements on a case-by-case basis. The person who applies residual to the land application site must meet the conditions of a LLAMA. The requirements for submission of an application for a LLAMA are detailed in Section 4.

Program 3

This land application program applies to residual which meets the ceiling concentrations in column 1 of Appendix A, the pollutant concentrations in column 2 of Appendix A, the Class B pathogen requirements in Appendix B, and any one of the vector attraction reduction options 1 through 10 in Appendix C. Since the Class A pathogen reduction requirements are not met, the residual may not be sold or given away in a bag or other

container, may not be applied to lawn or home garden, and the general requirements in Appendix E, and the management practices in Appendix F apply. In addition, the site restrictions in Appendix D apply to the land application of a Class B residual.

Persons preparing Program 3 residual must obtain a NJPDES permit which, at a minimum, will mandate quarterly monitoring, record keeping and reporting to demonstrate that residual meets standards, and a detailed accounting of quantities of residual processed and distributed. In addition, a LLAMA must be obtained prior to the application of residual to each residual land application site. Application to the Department for a LLAMA will require inclusion of a USDA-NRCS farm or SESC plan. A LLAMA will specify management practices, site restrictions, and reporting requirements on a case-by-case basis.

Program 4

This land application program describes the requirements for a residual which meets the Class A pathogen requirements in Appendix B and one of the first eight vector attraction reduction requirements in Appendix C, but not the pollutant limits in column 2 of Appendix A. Instead, under this program the residual must meet the ceiling concentrations for pollutants listed in column 1 of Appendix A. Essentially, these are products (like compost, pellets, and alkaline products) which have a higher concentration of pollutants than Exceptional Quality products.

Persons preparing Program 4 residual must obtain a NJPDES permit which, at a minimum, will mandate quarterly monitoring, record keeping and reporting to demonstrate that residual meets standards, and an accounting of quantities of residual processed and distributed. For residual sold or given away in a bag or other container, development of instructional literature for users, and registration with the New Jersey Department of Agriculture where residual is sold, offered for sale, or intended for sale as a fertilizer, soil conditioner, or agricultural liming agent is required. Thus, if sold or given away in a bag or other container, registration and literature requirements are similar to those required for an exceptional quality product (Program 1) and are further detailed in Section 5. However, additional requirements specific to a Program 4 residual include the following:

- Since the bulk residual is subject to a cumulative pollutant loading rate, residual may not be applied to lawn or home garden in bulk;
- The general requirements in Appendix E and the management practices in Appendix F apply.
- Where residual is applied in bulk, the permit will also require that a LLAMA must be obtained prior to the application of residual to each land application site and that cumulative pollutant loading to each residual land application site be tracked. Application to the Department for a LLAMA will require inclusion of a USDA-NRCS farm or SESC plan. A LLAMA will specify management practices, cumulative pollutant tracking, and reporting requirements on a case-by-case basis. The person who applies residual to a land application site must meet the conditions of a LLAMA.

- Residual that is sold or given away in a bag or other container must either have a label affixed to the bag or other container or be accompanied by an information sheet. The label or information sheet must contain the following additional information:

  (1) The name and address of the person who prepared the residual that is sold or given away in a bag or other container for application to the land;

  (2) A statement that application of the residual to the land is prohibited except in accordance with the instructions on the label or information sheet; and

  (3) The annual whole residual application rate for the residual that does not cause any of the annual pollutant loading rates in Table 4 of 40 CFR 503.13 to be exceeded.

- Residual applied in bulk may not exceed the cumulative pollutant loading rates in Table 2 of 40 CFR 503.13.

Program 5

This land application program describes requirements for a residual which meets the ceiling concentrations in column 1 of Appendix A, and the Class A pathogen requirements in 40 CFR 503.32(a), and which will meet one of the vector attraction reduction requirements in 40 CFR 503.33(b)9 or (b)10. This program is identical to that described under Program 2, with the exception that the pollutant limits in column 2 of Appendix A also are not met. Instead, under this program the residual must meet the ceiling concentrations for pollutants listed in column 1 of Appendix A. Therefore, residual applied to the land may not exceed the cumulative pollutant loading rates in Table 2 of 40 CFR 503.13. Because one of the first eight vector attraction reduction requirements is not met, the residual may not be sold or given away in a bag or other container, and may not be applied to a lawn or home garden. Therefore, the general requirements in Appendix E and the management practices in Appendix F always apply.

Persons preparing Program 5 residual must obtain a NJPDES permit which, at a minimum, will mandate quarterly monitoring, record keeping and reporting to demonstrate that residual meets standards, and a detailed accounting of quantities of residual processed and distributed. In addition, cumulative pollutant loadings must be tracked, and a LLAMA must be obtained prior to the application of residual to each land application site. Application to the Department for a LLAMA, at a minimum, will require inclusion of a USDA-NRCS farm or Soil Erosion and Sediment Control (SESC) plan. A LLAMA will specify management practices and reporting requirements on a case-by-case basis. The person who applies residual to the land application site must meet the conditions of a LLAMA. The requirements for submission of an application for a LLAMA are detailed in Section 4.

Program 6

This land application program describes the requirements for a residual which meets the ceiling concentrations for pollutants in column 1 of Appendix A, the Class B pathogen reduction requirements of Appendix B, and any one of the first ten vector attraction reduction requirements in Appendix C. Because the Class A pathogen reduction

requirements are not met, the residual may not be sold or given away in a bag or other container, the residual may not be applied to a lawn or home garden, and the site restrictions in Appendix D apply. In addition, the general requirements in Appendix E and the management practices in Appendix F apply.

Persons preparing Program 6 residual must obtain a NJPDES permit which, at a minimum, will mandate quarterly monitoring, record keeping and reporting to demonstrate that residual meets standards, and a detailed accounting of quantities of residual processed and distributed. In addition, cumulative pollutant loadings must be tracked, and a LLAMA must be obtained prior to the application of residual to each site. Application to the Department for a LLAMA, at a minimum, will require inclusion of a USDA-NRCS farm or SESC plan. A LLAMA will specify management practices and reporting requirements on a case-by-case basis. The person who applies residual to the land application site must meet the conditions of a LLAMA. The requirements for submission of an application for a LLAMA are detailed in Section 4.

In addition to the general application requirements of Parts A, B, and I of Form R, and the Environmental Assessment in Part C (where applicable) of Form R, information required above for the various land application programs is to be submitted by completing Part D of Form R.

LAND APPLICATION OF NON-SEWAGE SLUDGE RESIDUALS

The successful implementation of land application for residual other than sewage sludge requires an understanding of the impacts of the residual on soil fertility as well as its impact on soil physical properties. The physical characteristics of soil that determine whether it can support vegetative growth include cohesion, aggregation, and texture. These parameters directly affect the hydraulic properties of soil such as moisture-holding capacity, infiltration, permeability and drainage. Any adverse impact on these hydraulic soil characteristics from land-applied residual can ultimately degrade groundwater or surface water quality and affect crop growth. Therefore, as part of the application for residuals other than sewage sludge, the Department requires documentation that the land application program has been developed to the extent such that full-scale use will not result in negative impacts.

As the first step in this process, the Department will require land application of a particular residual be successfully tested or demonstrated in a field application or pilot program. Once this has been accomplished, the Department may permit its application on a limited basis. The Department's intent is to develop additional residual land application programs, through closely controlled applications, to evaluate their usefulness on a large scale. Two residuals that have already been approved for land application under this process are potable water treatment plant residuals and food processing residuals.

In order for the Department to approve a permit application for the land application of residuals other than sewage sludge, potable water treatment plant residuals, or food processing residuals, the applicant shall demonstrate the following:

- That the land application of the residual will benefit soil physical properties, soil fertility and/or cover vegetation;

- An understanding of the impacts of the residual on soil fertility, soil physical properties and plant growth; and
- That the land application of a particular residual has a scientific basis and has been successfully tested or demonstrated in a field application or pilot program.

ADDITIONAL REQUIREMENTS FOR RESIDUAL STABILIZATION OPERATIONS

All residual stabilization operations are required to obtain a Treatment Works Approval (TWA) in accordance with N.J.A.C. 7:14A-22 and –23 prior to construction. Although a TWA is not issued until after a final NJPDES permit has been issued, it is important to consider these design requirements in the overall operation of the residuals processing facility. Specifically, N.J.A.C. 7:14A-23.31 includes, but is not limited to, the following requirements:

- All residual stabilization and curing operations shall be enclosed and vented and shall be in compliance with the Department's air pollution control rules at N.J.A.C. 7:27. For residual stabilization operations which process less than one dry ton per day, the Department shall waive the requirement for enclosure of the residual stabilization operation, in full or in part, where the control of the effects of odor or climatic conditions are otherwise satisfactorily addressed as part of the Environmental Assessment.
- All transfer conveyors and associated equipment shall be constructed of fire resistant materials.
- Leachate collection and treatment shall be provided.
- The minimum time for compost curing shall be 30 days. Compost curing capacity shall be developed independent of finished compost storage capacity.
- For active composting, the maximum height of static pile shall not exceed seven feet.
- Compost curing pile designs shall provide for aeration either through the installation of aeration equipment, or through mechanical turning at least two times per week. For compost curing on pads, the maximum height of the curing piles shall not exceed 10 feet.

As previously discussed in Section 1, it has been the Department's experience with the marketing of marketable residual products resulting from high pH/high temperature processes that there is a relationship between the maturity of the product and its potential to create an odor and a nuisance upon marketing. The Department had previously found such a relationship with sewage sludge composting processes, and has typically required a 30 day curing period following the active phase of the sewage sludge composting process as noted above. Thus, it is important for an applicant to demonstrate optimal sewage sludge to alkaline admixture ratios, and to provide a written proposal to optimize the characteristics of the marketable residual product produced, including temperature, total solids and odor characteristics. Additional requirements for alkaline stabilization operations include:

- pH readings must be taken at 25 degree Celsius, or corrected to 25 degree Celsius. At other than 25 degree Celsius, a conversion calculation may be used to correct the pH reading to the standard temperature of 25-degree Celsius. Correction Factor (CF) = 0.03 pH units X (T mesa - 25°C); Actual pH = Measured pH +/- the Correction Factor.

- Temperature compensating devices on the pH meter **do not** correct for solution concentration due to solubility - vs. - temperature of samples. They only correct for variations in the probe conductance due to temperature changes.
- A high alkalinity pH probe must be used for all pH levels exceeding pH 11. Use of pH paper, as a measurement method is not acceptable. The pH meter must be calibrated to a known high pH standard solution, or to a fresh saturated solution of calcium hydroxide in distilled water to pH 12.454.
- As stated above, it is important for an applicant with an alkaline stabilization process to demonstrate optimal sewage sludge to alkaline admixture ratios, and to provide a written proposal to optimize the characteristics of the marketable residual product produced, including temperature, total solids and odor characteristics.

PUBLIC NOTICE REQUIREMENTS

Approvals for the residuals land application site will not be preceded by the same level of public review and comment as provided during the processing of a NJPDES permit to prepare residuals for land application. The regulatory standards in N.J.A.C. 7:14A-20 are protective of human health and the environment and represent a safe approach to recycling residuals as fertilizers and other soil amendments. Typically, sites that use prepared residual products are already active agricultural, horticulture or other agronomic enterprises that utilize various products to improve vegetative growth and overall soil productivity. Such operations do not change in fundamental activity, and therefore do not present an alteration of existing land use, when they replace use of commercial or on-farm products with recycled residuals products. N.J.A.C. 7:14A-20 retains full public notice and review procedures for NJPDES permits to prepare residuals and, as described below, provides for public notice of the land application of non-EQ residuals.

All sites that prepare residuals to meet a regulatory standard for land application must obtain a NJPDES permit. The procedures for issuance of a NJPDES permit include the opportunity to comment on a draft permit and an opportunity for a public hearing. NJPDES permits to prepare residuals will contain conditions regulating the subsequent distribution of prepared residuals. Once prepared, residuals must be land applied in conformance with either Scenario 1 or 2:

Scenario 1: EQ residuals available as products of commerce. EQ residuals meet pollutant, pathogen reduction and vector attraction reduction criteria (see Program 1 above) such that the risks of managing them are commensurate with those of managing other types of fertilizers or soil amendments. Therefore, the Department has determined that product literature, labeling and consumer awareness of common agronomic principles are adequate to protect human health and the environment. Under this scenario, approvals for the residual land application site are not required and additional public notice is not required other than the public review and comment procedures for the NJPDES permit issued to the person who prepares the EQ residuals.

Scenario 2: Non-EQ residuals applied to land that has been evaluated by the Department and approved by Letter of Land Application Management Approval (LLAMA). The use of non-EQ residuals (see Programs 2 through 6 above) at agronomic rates and under specific restrictions provides the benefits but does not exceed the risks of EQ residuals or other commercial

agricultural soil additives. The qualities of land applicable non-EQ residuals limit the potential for environmental harm when such residuals are used properly. The LLAMA will detail site-specific restrictions applicable to non-EQ residual and to the site where application will occur. The applicant for a NJPDES permit to prepare non-EQ residual must detail the geographic area of distribution of non-EQ residuals at the time of permit application and identify any specific land application sites known at that time. Under N.J.A.C. 7:14A-15.10(e)2, the Department will publish notice of the draft NJPDES permit to prepare residuals within the territorial scope identified by the applicant in a notification plan. The notification plan must also ensure advance public notice of land application sites not identified at the time of application for the NJPDES permit to prepare residuals. The Department will only approve notification plans that provide (prior to submission of a LLAMA request to the Department) advance public notice to all landowners and occupants adjacent to or abutting a proposed residual land application site. This requirement may be satisfied through public notice in a newspaper of local circulation. The Department also requires that a copy of all LLAMA applications be forwarded to the clerk of the municipality in which land application is proposed. The Department will not issue a LLAMA unless all the required public notices have been provided. By receiving notification before the Department receives a LLAMA application, local interests will have the opportunity to review the proposed activity prior to the Department's determination.

As stated above, the applicant for a NJPDES permit to prepare non-EQ residuals must detail the geographic area of distribution of non-EQ residuals at the time of permit application and identify any specific land application sites known at that time. Where proposed residual land application sites are not identified at the time of permit application, the applicant shall submit a notification plan for the Department's approval. The components of a notification plan are:

- Description of the geographical area covered by the plan.
- Description of the form of advance public notice which, at a minimum, will be supplied to all landowners and occupants adjacent to or abutting a proposed residual land application site. This requirement may be satisfied through public notice in a newspaper of local circulation. Notice shall include, at a minimum, the name and address of the permittee, the name and address of the proposed residual land application site, a description of the activities that are proposed to occur at the residual land application site, and the name and address of the Bureau within the Department to which the permittee must submit an application for a Letter of Land Application Management Approval (See LLAMA Requirements in Section 4).

STORAGE REQUIREMENTS

Storage in permanent storage installations is acceptable only to address short-term management requirements. Storage alone is not a method of ultimate management, but is intended to provide residuals management flexibility during periods of inclement weather, and to serve as a contingency plan if regular management is temporarily interrupted. Accordingly, consistent with N.J.A.C. 7:14A-20.8(a), all residuals must be removed from storage installations for ultimate management. Requirements for residual storage are addressed through permits issued to generators, transfer stations, or a person who prepares residual. Storage of marketable residual products is also addressed under NJPDES permits issued for residual processing and/or land

application. Storage of marketable residual products (which must meet all applicable pollutant, vector attraction reduction and pathogen reduction standards) is akin to storage of commercial and on-farm agricultural products. While care must be taken in the storage of agricultural products, a separate NJPDES permit will not typically be required for sites that store marketable residual products. Site-specific conditions applicable to short-term storage of non-EQ marketable residual products will be detailed in a "Letter of Land Application Management Approval". The applications for a NJPDES permit to prepare residuals and the application for a LLAMA require that the location of any residual storage installation be identified. If a residual land application site proposes to add or modify storage capacity, the submission and public notice procedures specified at N.J.A.C. 7:14A-20.7(a)3i(5) and 3ii(2) must be followed. If additional acreage is proposed at the land application site, or if new storage installations are proposed at the residual land application site, a new LLAMA application must be submitted. This includes the requirement for public notification. In general, the following factors need to be considered when siting residual storage facilities:

- Storage of residual that is not a marketable residual product requires a Treatment Works Approval in accordance with N.J.A.C. 7:14A-22 and -23.
- Only marketable residual products may be stored at the residual land application site.
- Residuals shall be stored in such a manner to prevent the discharge of substances out of residuals storage containment structures to the subsoil, groundwater, or surface water.
- Residuals storage containment structures shall be designed, constructed, maintained and operated to prevent overtopping resulting from normal or abnormal operations, overfilling, wind and wave action, precipitation, run-on and run-off, malfunctions of equipment and human error.
- Regular visual inspections of all visible portions of each storage containment structure shall be completed to ensure the storage containment structure has remained structurally sound, detect deterioration in banks, dikes, walls, joints, seals or other containment devices.
- A record shall be kept of the source and quantity of each residual placed in each residual storage containment structure.
- Transfer activities between the storage operations and transportation vehicles shall occur without spillage. All connections, valves and seals shall be secured prior to any transfer. Drippage shall be collected in containers and decanted back into the residual storage containment structure. All transfer operations shall be monitored by the permittee.

SECTION 4 - LETTER OF LAND APPLICATION MANAGEMENT APPROVAL (LLAMA)

The New Jersey Department of Environmental Protection permits land application of residuals under six types of programs. These programs are consistent with the federal Standards for the Use or Disposal of Sewage Sludge (40 CFR Part 503) and are outlined in Section 3. With the exception of the land application of "Exceptional Quality" residuals (see Section 3 - Program 1), the remaining five programs require written Department approval for each residual land application site prior to land application of residuals. This approval will be in the form of a Letter of Land Application Management Approval or "LLAMA." These guidelines outline the site criteria that determine a suitable site for land application, the required notification procedures, and the components of a complete application for a LLAMA.

When a new land application site is proposed, a permittee shall submit an application to the Department for a Letter of Land Application Management Approval. An additional copy of the complete application for a LLAMA must be simultaneously submitted to the municipal clerk of the municipality where the residual land application site is located. The application for a LLAMA shall include information necessary to determine if the proposed residual land application site is appropriate for land application and a description of how the site is or will be managed, including, but not limited to, the following:

- A residual land application site evaluation that includes, at a minimum, a description of easements, distances to surface water, distances to drinking water wells, distances to occupied dwellings, depth to ground water, depth to bedrock, slope, soil drainage class, pH, flooding, site soil texture and parent geologic material, and proposed buffer zones;
- A written analysis of operational considerations including, at a minimum, crop type, crop end use, residual application methods, whole residual application rates and seasonal limitations;
- An original or clear copy of the appropriate Soil Conservation Service Soil Survey Map showing the residual land application site;
- An original or clear copy of a 1:24,000 scale (7.5 minute Quadrangle) United States Geological Survey Topographic Map showing the exact location of the residual land application site and indicating the sheet name from which the map portion was taken; and
- An original or clear copy of the County Tax Map showing the location of the residual land application site and the location of any residual storage installations and indicating the sheet name from which the map portion was taken;

In addition to the above, a copy of the request for a LLAMA shall concurrently be forwarded to the appropriate Natural Resources Conservation Service District (NRCS) with the supporting

forms, maps and information. Prior to the commencement of application activities, the permittee shall submit to the Department a copy of one of the following for the land application site:

(1) NRCS Agricultural Conservation Plan filed with the appropriate NRCS District;

(2) NRCS certification of a Soil Erosion and Sediment Control Plan (SESCP) along with a copy of the plan; or

(3) Written determination from the NRCS that no Agricultural Conservation Plan or SESCP is required for the proposed site.

The Department has provided forms for the submittal of information required to receive a LLAMA. These forms are found in Appendix I.

SITE EVALUATION GUIDANCE

Each site proposed for land application requiring a LLAMA must be evaluated by the applicant. The site characteristics specified in this section shall be used to assess a site's suitability for land application. Any site on which a commercial crop can be produced using normal farming practices holds some potential for beneficial use of residuals. Distinguishing the better sites from the poorer sites is the purpose of these guidelines.

Soil and Site Limitations

The soil and site characteristics of each site proposed for land application of residuals under a LLAMA should be evaluated against the soil and site limitations noted in Table B below. These suitability ratings are not absolute, quantitative predictors of soil behavior for beneficial use of residuals. They are guides to the relative suitability of a soil and facilitate comparison among soils of alternative sites. Moderate or severe limitations do not mean that the site cannot be used in residual land application. They indicate that there are more problems to manage and that it will probably cost more to overcome the limitations.

TABLE B

	DEGREE OF LIMITATION		
Parameter	Slight	Moderate	Severe
Permeability of most restrictive layer between 0"-60"	Moderately Rapid and Moderate: 0.6 - 6.0 inches/hour	Rapid and moderately slow: 6-20 and 0.2-0.6 inches/hour	Very rapid, slow and very slow: >20 and <0.2 inches/hour
Infiltration Rate	Very rapid, rapid, moderately rapid, and moderate: >0.6 inches/hour	Moderately slow: 0.2 - 0.6 inches/hour	Slow and Very slow: <0.2 inches/hour
Soil Drainage Class	Well drained and moderately well drained	Somewhat excessively drained and somewhat poorly drained	Excessively drained, poorly drained, and very poorly drained
Runoff Class	None, very slow	Medium	Rapid and very rapid
Slope	Less than 6%	6% - 12%	>12%
Depth to Seasonal High Water Table	Greater than 4 feet	2 - 4 feet	< 2 feet
Flooding	None	Soils flooded only during non-growing season	Soils flooded during growing season
Depth to Bedrock	Greater than 4 feet	2 - 4 feet	< 2 feet

Very few soils qualify as ideal. Most depart in at least a small way, for at least one of the critical properties. The greater the number of properties that depart from the ideal and the greater the degree of departure, the more severely limited is the soil. Many of these soils can still be used for residual application, but very careful management is required, for these sites are much less forgiving than sites with more suitable soils. The number and degree of departures from ideal form the basis for rating soil suitability for residual application. Generally, proposed sites that have two (2) or more parameters rated as a severe limitation should not be utilized for land application. A single severe limitation or several moderate limitations represent increasing degrees of the severity of limitations that must be overcome with careful management. Best Management Practices, such as incorporation of residuals into the soil, contouring, strip cropping, terracing and diversions, can be used to mitigate many of these limitations.

Published soil surveys are excellent tools for generalized site evaluation and preliminary site screening. Soil surveys cannot be used for detailed site evaluations because of the scale of the map. The only solution to this problem is to make an on-site investigation, and, if necessary, have a more detailed soil map made by a professional soil scientist. This investigation will reveal exactly what kinds of inclusions are present, their location, and the extent to which they, or the pattern of admixture of other soils, may limit the use of the site. Detailed on-site studies are recommended for major projects and projects in

which liquid residuals are going to be applied. Where only dried residuals will be applied, or where residuals will be applied only once or at infrequent intervals, the information obtained from the soil survey may be adequate to assess site suitability.

Surface Runoff Control

The Department believes that appropriate management practices should be instituted to ensure the safe agricultural use of all fertilizers and soil conditioners - whether in the form of residuals, other organic amendments, or chemically based fertilizers. Therefore, the Department includes requirements to obtain Agricultural Conservation Plans or Soil Erosion and Sediment Control Plans, where applicable. In addition, to avoid ponding and runoff problems, the maximum daily application rate of liquid residuals should not exceed the rates specified in Table C below (assuming nitrogen requirements and heavy metals loading rates are not exceeded). Subsequent liquid residuals applications should not be made to an area of prior application without providing a minimum period of at least three (3) days from the time of last application.

TABLE C

SOIL TEXTURE	LIQUID RESIDUAL APPLICATION RATE
Coarse textured soils (sands and loamy sands)	25,000 gallons/acre (0.9 inches per acre)
Medium textured soils (sandy loams, silt loams, silts)	15,000 gallons/acre (0.55 inches per acre)
Fine textured soils (clay loams and clays)	10,000 gallons/acre (0.36 inches per acre)

Buffer Areas

The proposed residual land application site must be large enough to provide buffer zones surrounding application areas. The following buffer areas should be observed. However, the actual buffer areas may be made more or less stringent depending on the nature of the site, the recommendations of the NRCS, or the scope of the proposed project.

- Three hundred (300) feet from nonpublic and public noncommunity water supply wells and occupied residential and commercial buildings.
- Fifteen hundred (1500) feet from public community water supply wells.
- Ten (10) meters (approximately 33 feet) from permanent and intermittent surface water bodies including, but not limited to, water diversions or other man made waterways and drainage ditches.
- Fifty (50) feet from property boundaries which are not part of the user site.
- Ten (10) feet from a road or lane which is not a property boundary.

SITE MANAGEMENT GUIDELINES

Designing, implementing, or evaluating a plan for beneficial use of residuals requires working within the farmer's or site operator's existing management system. Residuals utilization should not alter decisions on the crops to grow, the crop rotations to use, and whether to drain, irrigate, or lime the soil. The crop management system dictates when a field is accessible, the frequency

of residual application, the expected amount of nutrients the residuals must deliver, and the application methods. Site operational considerations that bear directly on the design of a residuals utilization program include crop choice and crop end use, residual application methods, whole residual application rates and seasonal limitations.

Choice of crop and crop end use

Residuals can be applied to row, grain, pasture, horticulture, and tree crops. The crops most likely to be used in a residuals management program are pasture and forage, grain and grass seed, and row crops. Row crops include food crops (crops grown for direct human consumption or animal feeds) and non-food crops such as Christmas trees and ornamentals.

Whole residual application rates

For biosolids, application rates are typically based on one of two factors: lime equivalency or the recommended nitrogen requirement of the crop as supplied by the Rutgers Cooperative Extension. For residuals other than biosolids, the application rate may have to be limited according to other factors. For example, studies indicate that the application rate for water treatment plant sludge should be limited due to either its phosphorus binding and/or water retention properties. The Department will use such information where necessary to limit application rates on a case-by-case basis. Therefore, this manual will only address residual application rates based on lime equivalency or the recommended nitrogen requirement.

Fertilizer nutrients are expressed in terms of pounds N, pounds P_2O_5, and pounds K_2O. For example, a bag of fertilizer labeled 16-8-8 delivers 16% N, 8% P_2O_5, and 8% K_2O by weight. Residual data, by contrast, is expressed in terms of the elemental concentrations of N, P and K, not their oxide equivalents. Although residuals data and fertilizer conventions are the same for nitrogen, residuals P must be converted to P_2O_5, and residuals K to K_2O in order to accurately assess the nutrient value of a residuals product. To convert P to P_2O_5, multiply by 2.29, or to convert P_2O_5 to P, multiply by 0.44. Thus, adding 100 pounds of residuals P to soil is the same as adding 229 pounds of P_2O_5. Conversely, if a fertilizer recommendation calls for 100 pounds of P_2O_5, that would require only 44 pounds of residuals P. To convert K to K_2O, multiply by 1.20, or to convert K_2O to K, multiply by 0.83. Adding 50 pounds of residuals K to soil adds the equivalent of 60 pounds of K_2O, whereas a fertilizer recommendation calling for 50 pounds of K_2O would require 42 pounds of residuals K.

Nitrogen in residual occurs in both inorganic and organic forms. Residuals analytical data usually includes the amounts of inorganic ammonium nitrogen and inorganic nitrate nitrogen, and either the total Kjeldahl nitrogen or the total nitrogen. Use the following equations to determine the amount of organic and inorganic nitrogen:

% Inorganic N = % ammonium N + % nitrate N + % nitrite N

% Organic N = % TKN - % ammonium N; **or**

% Organic N = % Total N – (% ammonium N + % nitrate N)

For biosolids, inorganic forms of nitrogen are dissolved in the biosolids product and are readily available to plants. For this reason, ammonium nitrogen and nitrate nitrogen in the biosolids serve as short-term, or quick-release, fertilizers. In contrast, organic nitrogen in biosolids is a long-term, slow-release fertilizer. As organic matter decomposes in the soil, microorganisms convert the organic nitrogen to inorganic ammonium nitrogen. This process is called mineralization. Other organisms then convert the ammonium to nitrate. This process is called nitrification. Only after these conversions is the nitrogen in biosolids organic matter readily available to plants. Much of the fertilizer value in all biosolids products comes from the slow release of organic nitrogen through mineralization. The rate of this release depends on many factors, including the form of biosolids applied. In general, the highest rate of release during the year following application is obtained with liquid and dewatered biosolids. Dried and composted biosolids have slower release rates (see calculations below).

All residual samples collected for analysis must be representative of the residual to be land applied. In addition, all analyses must be expressed on a dry weight basis. For determining the value for use in all required calculations, the rolling average of the analyses obtained for the previous twelve-month period shall be used. (The frequency of analysis is based on the size of the facility and will be outlined in the NJPDES permit.) Additional factors that must be considered in determining residual application rates include the following:

- All plant available nitrogen applied via residuals and other carriers (i.e. manure or fertilizers) must be counted toward satisfying the nitrogen requirement of an approved crop and shall not exceed said nitrogen requirement.
- For grass-hay crops, establishment applications of plant-available nitrogen applied via residuals and other carriers shall precede crop seeding. The amount given for maintenance application shall be applied in portions (split) at discrete intervals during the year. Split applications may be made: a) more than 30 days prior to first harvest, and b) following each harvest. Split applications of nitrogen shall be made at rates that optimize yield and nutrient uptake, but may not cumulatively exceed the annual nitrogen requirement of that crop.
- Applications of available nitrogen to crops that will not be harvested (e.g. green manure crops) shall be limited to that rate recommended as the “establishment” rate for that crop, and shall be assumed to be available for the next crop grown.
- All crop management practices shall aim at attaining the expected yield goal (as described in the LLAMA application and as approved in the LLAMA).
- All crops shall be planted during the season of the year, which is most appropriate for the growth of that crop, such that crop growth and maturation, with consequent nitrogen uptake and utilization is maximized.
- An approved crop shall be sown on fallow fields within thirty days of the initiation of land application activities on said fields, provided field conditions permit or as soon thereafter as field conditions permit.

- In certain situations, the LLAMA may contain more stringent limitations on the amount of residual that may be applied to a given site. For example, limitations may be placed upon the actual amount (dry tons/acre) of residual that may be applied annually, or a more conservative crop nitrogen requirement may be used.
- Each field shall be a record keeping unit. The residual application rate for each field must be uniform over all sections of that field.
- Applications of nitrogen via residuals may be modified at the discretion of the Department through evaluation of monitoring reports, compliance inspection reports or other relevant information including, but not limited to, data concerning residual quality, soil and crop yield, expert research in the field, and recommendations by the County Agricultural Extension Agent.

Lime-stabilized residuals result from processes in which lime (calcium oxide, calcium hydroxide, calcium carbonate, or kiln dust) is used. The lime may be added to control odors, to improve the physical condition of the residual for dewatering, for pathogen kill, or other purposes. The amount of lime used may result in a significant neutralizing value (calcium carbonate equivalent) of the residual produced and in lower nitrogen content of the residual. The neutralizing value of the lime-stabilized residual must be taken into account in agricultural utilization and, if high enough, the residual must be used as a liming material rather than as a fertilizer. Generally, residuals containing more than 10% calcium should be applied based on which rate is lower: lime equivalency or nitrogen basis.

The procedure for determining the application rate is as follows:

Nitrogen basis: As stated, residuals must be applied at annual rates such that the nitrogen fertilizer requirement and the lime requirement of the crop to be grown are not exceeded. The rate of application based on nitrogen is determined by the nitrogen fertilizer equivalent (available nitrogen) of the sludge or compost and the nitrogen requirement for the specific crop and yield. The Production Recommendations for New Jersey Field Crops can be consulted to determine yield and crop nutrient requirements.

The nitrogen fertilizer equivalent of each residual should be determined by the formula given below based on the inorganic nitrogen plus 20% of the organic nitrogen content of the sludge. An additional 10% of the organic nitrogen applied in the first year is considered available the second year after application and an additional 5% the third year after application. Required calculations are as follows:

Sludge analysis example:	4%	total Kjeldahl nitrogen
	0.5%	ammonium nitrogen
	<0.01%	nitrate nitrogen
	therefore:	inorganic nitrogen = 0.5%
		organic nitrogen = 3.5 %

Available nitrogen during the first growing season after application:

Lbs available N/ton sludge = [(% Inorganic N) x (0.01 units/% x 2000 lbs/ton x 1.0 mineralization rate] + [(% Organic N) x (0.01 units/% x 2000 lbs/ton x 0.2 mineralization rate)]

Lbs available N/ton sludge = $(\%N_i \times 20) + (\%N_o \times 4)$ = 24 lbs/ton

Available nitrogen during subsequent growing seasons after application:

If residual has been applied to the site within the past three years, the residual N in the soil will need to be calculated from the following table:

MINERALIZATION OF SLUDGE ORGANIC NITROGEN

Year of Availability	Mineralization Rate (%)*	% Organic Nitrogen in Sludge (% by weight)							
		2.0	2.50	3.00	3.50	4.00	4.50	5.00	5.50
		Annual available N (lb. N/ton residual)							
Year of application	20%	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0
1 year later	10%	3.2	4.0	4.8	5.6	6.4	7.2	8.0	8.8
2 years later	5%	1.4	1.8	2.2	2.5	2.9	3.2	3.6	4.0

*For compost, the mineralization rate is 5% for the year of application and 2% for the remaining years

The availability of residual nitrogen during the second and third years after sludge application will result in a reduction in the application rate necessary to supply a constant amount of nitrogen to the crop. After the third year, the application rates necessary to fulfill a constant nitrogen requirement will remain relatively constant.

The nitrogen requirement of the crop to be grown should be obtained from Rutgers Cooperative Extension personnel in the county in which the residual is to be used. The nitrogen requirement will be based on values given in the "Production Recommendations for New Jersey Field Crops" published by the Rutgers Cooperative Extension. For field crops, the nitrogen requirement is determined by the yield of the specific crop. After the first year of sludge application, the yield produced with sludge application to the specific field for the previous year or average yields for that field for the period of sludge application should be used.

The maximum application rate for the first year of sludge application may be calculated from the following formula:

$$\text{Application rate (Dry ton/acre)} = \frac{\text{N requirement of crop(lbs/acre)}}{\text{lb. available N/ton sludge}}$$

After the first year of sludge application, the nitrogen requirement of the crop must be reduced by the amount of residual available nitrogen from the previous applications. The degree of reduction in nitrogen requirement of crops due to residual nitrogen for subsequent years is shown in the table above, and can be expressed using the following equation:

Application rate (AR) (Dry tons/acre) =

$$\frac{\text{crop N requirement (lb./acre) - residual N (lb./acre)}}{\text{lb. available N/ton sludge}}$$

Phosphorus and Potassium: After the application rate (AR) has been determined above, the amounts of P and K delivered annually can be calculated using the following equations:

Lb. P/acre = (% P in sludge x 20) x AR

Lb. K/acre = (% K in sludge x 20) x AR

After the nutrient loading for P and K have been determined, P must be converted to P_2O_5 and K must be converted to K_20 to compare nutrients delivered in the residual with fertilizer recommendations.

Lime equivalency basis: The application rate of lime-stabilized residual may be based on either the amount necessary to supply the nitrogen requirement of the crop or the amount necessary to fulfill the limestone requirement of the soil, whichever amount is smaller. The limestone requirement should be based on a soil test and interpretations in the Production Recommendation Guides published by the Rutgers Cooperative Extension

Residual Application Methods and Soil Conservation Practices

As previously stated, the Department believes that appropriate management practices should be instituted to ensure the safe agricultural use of **all** fertilizers and soil conditioners. Runoff and erosion controls are essential to sound management. Overland flow increases the potential for contamination of surface waters. Erosion decreases soil productivity and increases sediment loads in streams. Soil conservation practices are designed to promote infiltration and slow down the velocity of water that flows over the soil surface. The following methods and procedures of application are acceptable:

- Subsurface injection: Subsurface application shall be made by injecting the residual to an average depth of three (3) inches to eight (8) inches below the soil surface. No significant amount of the residuals shall be present on the land surface within one hour after the residuals have been injected.
- Surface application: Surface application shall only be made according to the following methods and procedures:
    1. Liquid residuals shall be surface applied by discharge from the rear of a slurry tank to which a fan (pressurized flow) or a splash pan (gravity flow) has been attached. Such a fan or splash pan shall be positioned so as to allow for uniform spray dispersion of residuals onto the ground. Liquid residuals applied to the surface shall be incorporated into the soil to an average depth of three to eight inches within six hours of application, unless one of the VAR options in 40 CFR 503.33(b)1 through (b)8 is met.

3. Dewatered residuals shall be surface applied by manure spreader such that uniform dispersion of residuals onto the ground occurs. Dewatered residuals which are surface applied shall be incorporated into the soil plow layer of the application area by conventional or conservation tillage, mixing the sludge with the surface soil to a maximum depth of eight inches within six hours of application, unless one of the VAR options in 40 CFR 503.33(b)1 through (b)8 is met.

- Other method of application as reviewed and approved in writing by the Department.

The characteristics of a specific residual (for example, liquid, dewatered, odor potential) and of the specific land application site (for example, slope, infiltration rate, and proximity of residences), must be evaluated to determine the most appropriate application method. The Department, where necessary, may limit the availability of a specific method of application where site specific factors warrant. (For example, a known odorous product at a land application site near a residential development may be required to be subsurface injected or surface applied and incorporated within six hours of application, regardless of the vector attraction reduction alternative.)

Seasonal limitations

Sometimes runoff is inevitable, even from pastures and well-protected fields. This is especially true during high-intensity storms and when the soil is frozen. Regardless of other conservation practices that might be in place, residuals should not be put on the soil at these times. In fact, N.J.A.C. 7:14A-20.7(b)2ii prohibits the application of bulk residual to flooded, frozen or snow-covered land if the bulk residual could enter surface waters or wetlands.

Generally, land is considered flooded when the soil at the surface of the land is saturated with water, regardless of whether water is visible on the ground. Such flooding conditions may be produced by heavy precipitation that occurs locally or at some distance from the site, the rise of any nearby surface waters, the rise of the groundwater table, the melting of snow and ice, or irrigation.

The site evaluation (particularly the required topographic map) may provide information enabling the applicant to determine if a designated site has potential to flood. In addition, the applicant should identify flood plains by contacting the local offices of the Army Corp of Engineers and the United States Geological Survey. Typically, these offices maintain data concerning lands that may be flooded in the event of precipitation. Particular attention should be paid to sites located adjacent to large water bodies because these have the greatest potential to flood.

The applicant must evaluate a land application site for all of the above factors that could cause the land to become flooded and determine if there are special operational considerations to be addressed. For example, land located in a flood plain that is often flooded may require more specific management practices, such as incorporation within a specific time period, than land that is well drained and becomes saturated for only a short period during local or seasonal precipitation.

In addition, many factors must be considered to determine if residual applied to frozen or snow-covered land could enter surface waters or wetlands. When residual is applied to frozen land, it lies frozen on the surface of the ground with little or no chance for its moisture content to seep into the ground. For this reason and because residual will thaw before the frozen ground beneath it, there is a greater chance that the residual will be washed off by any significant rainfall.

Several factors must be considered to determine if special operational considerations are necessary for a land application practice that could involve frozen and snow-covered land, including: (1) the distance to surface waters or wetlands, (2) the topography of the land, (3) the average precipitation, and (4) the average length of time that the land remains frozen. Generally, the Department will only allow residual application during the time when the ground is not snow-covered, frozen, or thawing.

PUBLIC NOTICE PROCEDURES

An application for a LLAMA must include public notification. The Department requires that all LLAMA applications are forwarded to the clerk of the municipality in which land application is proposed and that advanced public notice be given to all landowners and occupants adjacent to or abutting a proposed residual land application site (this requirement may be satisfied through public notice in a newspaper of local circulation). The Department will not issue a LLAMA unless this public notice has been provided. By receiving notification before the Department receives a LLAMA application, local interests will have the opportunity to review and comment on the proposed activity. The public notice procedures are fully discussed in Section 3.

SECTION 5 – EQ RESIDUAL & BAGGED NON-EQ RESIDUAL

In addition to the NJPDES permit application requirements described in this Technical Manual applicants for Exceptional Quality (Program 1) or Bagged Non-Exceptional Quality (Program 4) residual land application permits must demonstrate a program based on agronomic rate; must address product maturity; must develop Department approved instructional literature and package labeling; and must obtain appropriate licensing from the New Jersey Department of Agriculture where residual will be sold, offered for sale, or intended for sale as a fertilizer, soil conditioner, or agricultural liming agent.

When marketable residual product is recognized as a valuable product of commerce users have incentive to apply at the agronomic rate. Under such circumstances the Department will not require user site approval, or detailed reporting of distribution sites or application rates. However, the Department will intervene when a residual is poorly prepared and/or marketed, even if the material is Exceptional Quality (EQ).

Therefore, preparers of EQ and Bagged Non-EQ marketable residual product must stress agronomic rate; consider residual quality beyond the standards of pollutant concentration, pathogen reduction and vector attraction reduction; implement a strong program of user information and education; and adhere to the standards established in agricultural products law.

In the event that an EQ residual is poorly prepared and/or marketed, the Department will require compliance with any or all of the general requirements and the management practices in N.J.A.C. 7:14A-20.7(b)1 and (b)2; establish additional steps in the treatment of residual to control the release of air contaminants; and/or require a permit or a Letter of Land Application Management Approval for each site where residual will be land applied (see N.J.A.C. 7:14A-20.5(a)ii, iii, and iv).

In order to avoid Department imposition of N.J.A.C. 7:14A-20.5 oversight, NJPDES permit applicants must develop products with superior characteristics, and must promote strong user education through effective literature/label programs with appropriate levels of customer support, oversight and follow-up.

AGRONOMIC RATE

All residual must be applied at the agronomic rate (see N.J.A.C. 7:14A-1.2 and 20.7(g)). Agronomic rate is generally based on the most limiting of two factors: lime equivalency or the crop nutrient requirement. Program 1 and Program 4 residual may be applied to support any crop, as long as agronomic rate is not exceeded. Agronomic application rates for specific products and uses must be established in guidance documents at the time of permit application and may be revised thereafter through written request to the Department.

PRODUCT MATURITY

There is a relationship between the maturity of some marketable residual products and their potential to create an odor and a nuisance upon marketing. NJPDES permit applications must provide information that demonstrates optimal conditions which avoid the release of air contaminants in finished product. In order to improve product characteristics and reduce the related release of undesirable odors, the applicant must demonstrate adequate knowledge and control of the stabilization process, and of product maintenance and handling subsequent to achievement of EQ criteria.

For example, the Department has typically required a 30-day curing period following the active phase of sewage sludge composting (see N.J.A.C. 7:14A-23.31). During this 30-day period, further decomposition, stabilization and degassing take place, which help to make the compost more marketable. Another example involves sewage sludge alkaline stabilization processes; which generate products that release ammonia. In alkaline stabilization, the permit applicant must demonstrate optimal sewage sludge to alkaline admixture ratios and must develop a system that will minimize ammonia in the product by, at a minimum, reducing product moisture and/or temperature.

PRODUCT LITERATURE & CONTAINER LABELING

Applicants for NJPDES permits to prepare Program 1 residual and Program 4 residual must describe a program that informs all and oversees some users of their product. To meet the requirements of this Section, applicants must submit all information applicable to their anticipated marketing program. This may include all or part of the following: container labeling, literature and recommended management practices for direct users of bulk residual; and plans to engage bulk residual storage and blending operations. Documentation must be fully developed and will be evaluated by the Department during permit application review. Additional literature requirements may be required of the applicant based on the type of product intended to be prepared.

Applicants must submit a copy of the container label(s) and instructional literature conforming to the following labeling requirements, and to the New Jersey Commercial Fertilizer and Soil Conditioner Act and/or the New Jersey Agricultural Liming Materials Act.

I. Exceptional Quality Residual (Program 1) - Containers

All commercial fertilizers or soil conditioners sold or given away in a bag or other container must have a label affixed to the bag or other container (or have literature accompanying an unlabeled other container) and must have literature available at the container outlets setting forth certain information, including, but not limited to:

1. The net weight.
2. The brand and/or grade.
3. The name and address of the licensee.
4. Guaranteed analysis or statement of composition and purpose.
5. Recommended application rate which meets the agronomic rate for anticipated uses.

Note: Refer to the New Jersey Commercial Fertilizer and Soil Conditioner Act, N.J.S.A. 4:9-15.1 et seq., and the New Jersey Agricultural Liming Materials Act, N.J.S.A. 4:9-21.1 et seq., for specific definitions of terms used in items 1-4, above.

II. Exceptional Quality Residual (Program 1) – Direct Bulk Use

A written or printed statement shall accompany each bulk delivery and be supplied to the customer at the time of delivery setting forth certain information, including, but not limited to:

1. All of the information required in Part I, above.
2. Product must be applied at the agronomic rate.
3. Application rate should be calculated based on 1) composition and purpose of the product, 2) soil test results, and 3) reasonable yield goal. A Product which adjusts soil pH should not be applied if the tested soil pH is above the minimum recommended for the next crop to be established.
4. Product users should log the dates and volumes of all fertilizer and soil amendments applied to each field for the purpose of future nutrient management planning.
5. Nutrient management and soil conservation planning assistance is recommended and can be obtained from the USDA - Natural Resources Conservation Service.
6. Product should be applied at times which are most beneficial to the crop grown.
7. Product should be applied uniformly to avoid overloading in some spots and deficiency in others. Placement should maximize availability to the crop and minimize visible losses to surface water.
8. Product should not be applied to: a) frozen ground; b) ground covered with ice or snow; c) during and/or immediately after precipitation on ground where water is ponded; d) areas where soils are saturated with water to within 2 feet of the ground surface; e) areas that experience seasonal flooding; f) very shallow soils over fractured bedrock or limestone formations; g) within 33 feet of surface water or water diversions.
9. Product should not be applied or stockpiled: a) on land which lies within 300 feet of nonpublic and public non-community water supply wells; or b) within 1500 feet of public community supply wells.
10. Product should not be stockpiled: a) for greater than 30 days; b) where soils are saturated to within 2 feet of the ground surface; c) within 200 feet of surface water d) in such a manner that it enters waterways of the State; e) on ground which is susceptible to ponding (following precipitation) and/or seasonal flooding; or f) within 200 feet of property boundaries (unless with your neighbors permission).
11. Centralized stockpiling (especially on poorly drained heavy soils) contributes to poor seed bed in the stockpile and traffic areas. Multiple smaller stockpiles located uniformly around the field will reduce the amount of compaction from heavy

equipment at storage areas. After use, stockpile areas should be subsoiled and disked down.

12. Avoid using field stockpile areas during inclement weather to prevent off-site tracking.
13. The use of this product in the Pinelands region of New Jersey may be regulated by N.J.A.C. 7:50. Contact the Pinelands Commission at (609) 894-9342 for more information.

III. Exceptional Quality Residual (Program 1) – Bulk Storage and Blending Operations

Bulk storage and blending operations typically receive EQ residual as one component of a subsequent blend (e.g. topsoil) which is then marketed to end users. These operations may also serve as points of distribution for direct use of unblended marketable residual product. A written or printed statement shall accompany each bulk delivery of EQ residual and be supplied to the operator at the time of delivery setting forth certain information, including, but not limited to the information indicated below. Any subsequent re-delivery of unblended EQ residual must include the literature appropriate for its use (Section II above, or III below).

1. Use of EQ residual and mixtures as clean fill (i.e. to bring a site to grade; as material covered by another material; or at depths greater than 2 feet) is prohibited.
2. EQ residual mixtures shall refer to those blends which result in a topsoil or other product. Creation of mixtures which subsequently exhibit the characteristics of active composting is prohibited.
3. The compatibility of bulk storage and blending operations with local land use plans must be coordinated with local government agencies before start up.
4. Site selection criteria should include consideration of the traffic route and type and quality of roads. Site improvements and good housekeeping are necessary to minimize tracking of EQ residual and mixtures onto roads.
5. EQ residual and mixtures should not be stored: a) on land which lies within 300 feet of nonpublic and public non-community water supply wells; b) within 1500 feet of public community supply wells; c) where soils are saturated to within 2 feet of the ground surface; d) within 200 feet of surface water or water diversions; e) in such a manner that they enter waterways of the State; f) on ground which is susceptible to ponding (following precipitation) and/or seasonal flooding; or g) within 200 feet of property boundaries.
6. Storage piles must be constructed and maintained so that standing water does not form at the base of storage piles during precipitation.
7. Mixtures should be periodically sampled and analyzed to determine compatibility with the operator's mixture goal (e.g. "topsoil"). Composite samples should be formed so as to represent the mixture produced over time. Samples should be analyzed for goal oriented parameters (e.g. pH, organic content, and texture).

8. A log of the volumes of EQ residual delivered to, and EQ residual and mixtures removed from, storage and blending areas shall be kept by the storer/blender, provided to the preparer, and made available to the Department upon request.
9. The preparer must have access to inspect the operation to assure EQ residual and mixtures are stored and blended properly. A log of the inspection dates and observations taken must be kept by the preparer, provided to the storer/blender, and made available to the Department upon request.
10. The preparer will cease deliveries of EQ residual if the storer/blender fails to comply with these instructions or fails to market EQ residual and mixtures at a rate commensurate with unblended EQ residual delivery.
11. The storage of EQ residual and the use of EQ residual in the Pinelands region of New Jersey may be regulated by N.J.A.C. 7:50. Contact the Pinelands Commission at (609) 894-9342 for more information.
12. The use of this product pursuant to these instructions does not relieve the user from the requirement to comply with solid waste management rules (N.J.A.C. 7:26) as they apply to other materials used in the blending process.

IV. Bagged Non-Exceptional Quality Residual (Program 4) – Containers Only

All commercial fertilizers or soil conditioners sold or given away in a bag or other container must have a label affixed to the bag or other container (or have literature accompanying an unlabeled other container) and must have literature available at the container outlets setting forth certain information, including, but not limited to:

1. All of the information required in Part I, above.
2. The label or information sheet shall contain the annual whole residual application rate for the residual that does not cause any of the annual pollutant loading rates in Table 4 of 40 CFR 503.13 to be exceeded.

PRODUCT REGISTRATION

The NJPDES permit applicant must provide documentation that the residual has been, or will be, licensed by the New Jersey Department of Agriculture pursuant to the New Jersey Commercial Fertilizer and Soil Conditioner Act, N.J.S.A. 4:9-15.1 et seq., or the New Jersey Agricultural Liming Materials Act, N.J.S.A. 4:9-21.1 et seq. These acts require that material which is sold, offered for sale, or intended for sale as a fertilizer, soil conditioner or agricultural liming material be licensed by the New Jersey Department of Agriculture; and that every person who owns or operates a commercial fertilizer or soil conditioner manufacturing facility in this State, or under whose name commercial fertilizers or soil conditioners are distributed, to obtain a license to manufacture and distribute such products. License requests should be submitted to the New Jersey Department of Agriculture at the following address: State Chemist, Bureau of Agricultural Chemistry, P.O. Box 330, Trenton, New Jersey 08625.

SECTION 6 - OUT-OF-STATE PREPARERS

Every person who prepares residual out-of-state for transport into the State of New Jersey must provide written notice to the Department prior to initial application of residual to the land. In addition, any person who prepares residual out-of-state to be applied to the land in New Jersey must submit copies of those permits and approvals issued by the permitting authority for the state in which the residual was prepared. This requirement is necessary for the Department to ensure that the residual to be applied will be consistent with the Department's rules at N.J.A.C. 7:14A-20. This notice requirement is applicable to any person who prepares residual (including exceptional quality residual) out-of-state and intends to land apply the residual in New Jersey. This requirement is applicable to residual sold or given away in a bag or other container and to bulk residual.

As previously stated, it is not the Department's intention to require permits for each residual land application site. However, the Department must ensure that all residual land application activities are conducted in a manner consistent with its rules. In order for the Department to make this determination, the Department must first be aware of the activity. Therefore, the requirement to notify the Department is also applicable to exceptional quality residual. Upon receipt of this notification, the Department will notify the out-of-state preparer of the applicable requirements. Since preparers of exceptional quality residual will not be required to obtain approval for each residual land application site, the Department expects this to be a one-time notification requirement. However, the Department may require those records required to be kept to be submitted periodically. All other out-of-state preparers (that is, non-exceptional quality), in order to satisfy the full public notice requirements, will be required to obtain a NJPDES permit as a preparer, and to obtain a LLAMA for the residual land application site.

Every person who prepares residual out-of-state to be transported into the State of New Jersey for Land Application must complete Parts A, B, D, F, and I of Form R. The information required must be submitted at least 120 days prior to the date of commencement of residual land application activities.

SECTION 7 - RESIDUAL TRANSFER STATIONS

Residual transfer stations are not a method of ultimate residual management. However, they serve as a central regional depository for residual. In this way, trucks can be dispatched to collect residuals from small generators, and fewer large trucks are needed to haul residual to ultimate management sites. Such transfer programs can produce significant transportation cost savings, and eliminate unnecessary truck traffic.

Submission requirements for the NJPDES permit include site information including, but not limited to, topography, proximity to surface water, critical areas, proximity to neighboring development, roads and plot plans.

Those operations that transfer sealed residual transport containers directly from vehicle to vehicle, including truck to train are excluded from regulation as a residual transfer station.

The information required above for a residual transfer station is completed by submitting Parts A, B, C (where applicable), G and I of Form R.

SECTION 8 - SURFACE DISPOSAL

Operating surface disposal sites for the use in sewage sludge disposal is equivalent to landfilling, which is restricted under the New Jersey Solid Waste Management Act and the Statewide Sludge Management Plan. Therefore, the Department will not issue permits to allow the continued discharge of sewage sludge into surface disposal sites as would otherwise be provided under 40 CFR Part 503. Nevertheless, in recognition of the existence of several inactive surface disposal sites, the Department does accept in-situ closure applications and issue permits that provide for long-term monitoring and site restrictions as further explained below.

The Department considers the storage of any residual for more than six months to constitute disposal. The storage of residual for more than six months could classify the facility as a surface disposal site. However, this time frame is not intended to include the time necessary for treatment. In addition, where the person who prepares the residual can explain why the material is being held for longer than six months and can supply documentation of ultimate management, the site may not be considered a surface disposal site.

Based on the above, all sewage sludge surface disposal sites which have not implemented a Department approved closure plan were required to submit an application for closure by May 5, 1998. The Department will also use the criteria outlined in this section for closure of other residual surface disposal sites as well. The closure plan must provide (1) a discussion of how the leachate collection system will be maintained, if applicable; (2) a description of how the methane gas will be monitored, when applicable; and (3) an explanation of how public access will be controlled. In addition, a calculation of the surface run-off across the closed surface disposal site is required using a 24-hour, 25-year storm event. Thus, as part of the review of the closure plan, the applicant must evaluate the need for run-on and/or run-off controls to prevent overtopping or unpermitted discharges.

The Department also requires that a soil erosion and sediment control plan be implemented as part of the closure plan. The SESC plan will be of particular importance where site disruptions are proposed or where the slopes of surface disposal areas have been subjected to erosion.

The Department also requires implementation of the following management practices for a closed surface disposal site:

- A surface disposal site may not restrict the flow of a base flood. A base flood is a flood that has a one- percent chance of occurring in any given year (that is, a flood with a magnitude equaled once in 100 years.) Thus, a surface disposal site cannot restrict the flow in an area that carries the 100-year flood. This management practice reduces the potential for the area that carries the 100-year flood to experience problems related to the location of the surface disposal site (for example, restriction of the flow) in that area. It also protects the surface disposal site and residual placed on surface disposal sites from the impacts of a base flood.

  Flood insurance rate maps (FIRM) developed by the Federal Emergency Management Agency (FEMA) can be used to determine whether a surface disposal site is located in an area that carries the base flood (that is, the 100-year

floodplain.) FEMA has developed maps for approximately 99 percent of the flood-prone communities in the United States. Other sources of information on the 100-year floodplain include the U.S. Army Corps of Engineers, the Soil Conservation Service, the National Oceanic and Atmospheric Administration, the U.S. Geologic Survey, and the Department.

- A surface disposal site cannot be located in an unstable area. An unstable area is an area of land subject to natural or human-induced forces that may damage the structural components of the surface disposal site. The purpose of this management practice is to protect the structural components (for example, the foundation) of a surface disposal site from forces that could damage the components. For example, when the foundation of a surface disposal site fails, residual could be released to the environment.
- The leachate from a surface disposal site that has a liner and leachate collection system must be collected and disposed in accordance with applicable regulatory requirements after the surface disposal site closes. This management practice is intended to prevent damage to the liner caused by hydraulic pressure from the leachate. The pressure is reduced when the leachate is collected and removed from the surface disposal site. The Department will require the system to be maintained for, at a minimum, the entire five year permit term. The need to continue maintenance will be evaluated in each subsequent term.
- The explosive potential of methane gas generated in a surface disposal site must be addressed. Methane gas is generated in a surface disposal site because of the anaerobic conditions that result when the residual is covered. For this reason, the management practice concerning methane gas applies when a cover is placed on a surface disposal site (for example, to control vectors.) When a surface disposal site is not covered, the requirement to monitor methane gas does not apply.
- Written notification is required to subsequent owners of the surface disposal site regarding the placement of residual on the site. Therefore, the owners of a closed surface disposal site where residual is to remain must record the activity along with the deed which shall remain in the legal record of the property in perpetuity.
- Consistent with 40 CFR 503.24(k), a food crop, a feed crop, and a fiber crop cannot be grown on a surface disposal site. The grazing of animals and exposure of the public to residual placed on the surface disposal site (for example, ingestion of the residual/soil mixture) were not considered in the exposure assessment used to develop the pollutant limits for surface disposal in 40 CFR 503.23. Consequently, these management practices are necessary to protect public health and the environment.
- The owner/operator of a surface disposal site must demonstrate compliance with N.J.A.C. 7:9-6 through development and/or maintenance of a ground-water monitoring program.

In addition to the general application requirements of Parts A, B, and I of Form R, and the Environmental Assessment in Part C of Form R, information required above for a surface disposal site is submitted by completing Part E of Form R.

SECTION 9 - REED BEDS

This system of residual treatment combines the action of conventional drying beds with the effects of aquatic plants upon water-bearing substrates. While conventional drying beds are used to drain 20-25 percent of water content from sludge, the resultant residue must be hauled away for further treatment. By having the drying beds built in a specific manner, the beds can be planted with reeds, and further desiccation of the residual is accomplished through the plants voracious demand for water. To satisfy this demand, the plants extend their root systems continually into the residual deposits. The extended root system causes the establishment of a rich microflora that feeds upon the organic content of the sludge. Aerobic conditions needed by the microflora are created through the root action of the plants. Eventually substantial portions of the sludge solids are converted into carbon dioxide and water with a corresponding volume reduction. These drying beds can be operated for over five years before the remaining sludge residues have to be removed.

The heavy metal content of the final residual produced by this method determines how the remaining residual can be managed. If land application is the chosen option, additional screening would be required to remove the reed rhizomes prior to application to the land. The harvested plants are best managed by on-site composting.

In addition to the general application requirements of Parts A, B, and I of Form R, information required above for a reed bed is submitted by completing Part H of Form R.

SECTION 10 - CHECKLISTS

New Jersey Department of Environmental Protection - Division of Water Quality

APPLICATION COMPLETENESS CHECKLIST
NJPDES/Discharge of Residuals
Categories E, V, D, Z and 04

TO HELP US PROCESS YOUR APPLICATION MORE EFFICIENTLY, PLEASE PROVIDE ALL ITEMS LISTED BELOW.

This checklist is provided to you as guidance for completing an application for a new permit, renewal, revocation and reissuance, or modification under category E, V, D, Z and 04 . Should you have any questions, please contact the Bureau of Pretreatment and Residuals, at (609) 633-3823. Be sure to read all instructions and to answer all questions when filling out the application forms. If an item is not applicable, enter "N/A" or a similarly appropriate response.

ALL APPLICANTS SHALL SUBMIT THE FOLLOWING:

❑ **FORM NJPDES – 1**
Instructions are provided with the form.

❑ **FORM R (COMPLETE APPLICABLE PARTS)**
Part A - General Information (All Categories)
Part B - Generation or Preparation (All Categories)
Part C - Environmental Assessment (All Categories, as applicable. Refer to Technical Manual.)
Part D - Land Application of Residual (Categories E, V and D)
Part E - Surface Disposal (Category 04)
Part F - Out-of-State Generators (Applies only to out-of-state generators regardless of category)
Part G - Residual Transfer Station (Category Z)
Part H - Reed Beds (Category 04)
Part I - Certification (All Categories)

❑ **PINELANDS CERTIFICATE OF FILING (IF APPLICABLE)**

❑ **STATEMENT OF CONSISTENCY WITH DISTRICT SLUDGE OR SOLID WASTE MANAGEMENT PLAN (IF APPLICABLE)**

IN ADDITION TO THE ABOVE, APPLICANTS PROPOSING: **1) A NEW DISCHARGE; 2) AN INCREASE IN RESIDUALS, 3) A CHANGE IN LOCATION, 4) A CHANGE IN METHOD OF DISCHARGE , OR 5) A CHANGE IN STORAGE FOR AN EXISTING DISCHARGE** SHALL SUBMIT THE FOLLOWING:

❑ **EVIDENCE OF PERMIT APPLICATION SUBMISSION TO THE AFFECTED SEWERAGE ENTITY(IES) AND MUNICIPALITY**

Submit copies of the signed and dated notices that were sent along with the application to the affected sewerage entity(ies) and municipality via "Certified Mail-Return Receipt Requested" or by other means, and copies of the dated certified mail return receipts or other means of verification of receipt.

NOTE: Prior to submission of an application to the Department, the permittee shall submit the following to the affected sewerage entity(ies) and municipality in accordance with N.J.A.C. 7:14A-4.3(a)13:

1. A copy of the application.

2. A written notice (certified mail return receipt requested or by other means which allows verification of the fact and date of receipt) that the sewerage entity(ies) and municipality must submit to the

Department written comments regarding or objections to the proposed discharge or activity within 30 days of receipt of said notice. (These comments shall be considered by the Department in determining whether to issue a draft permit in accordance with N.J.A.C. 7:14A-15.6.)

NEW DISCHARGERS–PRE-APPLICATION MEETING

New dischargers should contact the Bureau of Pretreatment and Residuals at (609) 633-3823 to schedule **a pre-application meeting** to determine specific technical requirements.

MODIFICATION TO EXISTING PERMITS**:**

Applicants applying for a modification to their existing permits shall contact the Bureau of Pretreatment and Residuals at (609) 633-3823 to determine the appropriate application form requirements.

COMPLETE AND SUBMIT ONE ORIGINAL AND ONE COPY OF THE APPLICATION TO:

New Jersey Department of Environmental Protection
Division of Water Quality
Bureau of Permit Management
Attn: Administrative Review Unit
P.O. Box 029
Trenton, New Jersey 08625-0029

Please note that additional technical information based on site specific conditions may be required by the Department pursuant to N.J.A.C. 7:14A-2.12(b) and N.J.A.C. 7:14A-4.3(e).

APPENDIX A - RESIDUAL QUALITY LIMITS

	COLUMN 1	**COLUMN 2**
	Ceiling Quality Maximum (mg/kg)	Pollutant Concentrations Monthly Average (mg/kg)
Arsenic	**75**	**41**
Cadmium	**85**	**39**
Copper	**4300**	**1500**
Lead	**840**	**300**
Mercury	**57**	**17**
Molybdenum	**75**	**----**
Nickel	**420**	**420**
Selenium	**100**	**100**
Zinc	**7500**	**2800**

APPENDIX B - PATHOGEN REDUCTION REQUIREMENTS

CLASS A

The following requirements must be met for all six Class A pathogen reduction alternatives:

- The density of fecal coliform in the residual must be less than 1,000 most probable number (MPN) per gram total solids (dry weight basis);

or

- The density of *Salmonella* sp. bacteria in the residual must be less than 3 MPN per 4 grams of total solids (dry weight basis).

Note that the above requirements to determine Class A pathogen reduction are absolute. In other words, each individual grab sample analyzed for the above organisms must comply with the appropriate limit. This is in contrast to the Class B pathogen reduction requirements for fecal coliform which are based on a geometric mean of samples taken.

The 40 CFR Part 503 rule lists the following six alternatives for treating residuals to be classified Class A with respect to pathogens.

Alternative 1: *Thermally Treated Residuals*

Residuals must be subjected to one of the following time/temperature regimes:

Regime	Applies to:	Requirement	Time/Temp. Relationship (D=days, t=temp C)
A	Residuals with 7% solids or greater (except those covered by Regime B)	Temperature of residuals must be 50°C or higher for 20 minutes or longer.	$D = \frac{131{,}700{,}000}{10^{0.14t}}$
B	Residuals with 7% solids or greater in the form of small particles heated by contact with either warmed gases or an immiscible liquid.	Temperature of residuals must be 50°C or higher for 15 seconds or longer	$D = \frac{131{,}700{,}000}{10^{0.14t}}$
C	Residuals with less than 7% solids.	Heated for at least 15 seconds but less than 30 minutes.	$D = \frac{131{,}700{,}000}{10^{0.14t}}$
D	Residuals with less than 7% solids.	Temperature of residual is 50°C or higher with at least 30 minutes or longer of contact time.	$D = \frac{50{,}070{,}000}{10^{0.14t}}$

Alternative 2: *Residuals Treated in a High pH - High Temperature Process*

Residuals must meet the following requirements:

- Elevate the pH to greater than 12 (measured at 25°C) for 72 hours or longer.
- Maintain the temperature above 52°C for at least 12 hours during the period that the pH is greater than 12.
- Air drying to over 50% solids after the 72 hour period of elevated pH.

Alternative 3: *Residuals Treated in Other Known Processes*

This alternative requires comprehensive monitoring of enteric viruses and viable helminth ova during each monitoring episode until demonstration has shown that the process achieves adequate reduction of pathogens. If no enteric viruses or viable helminth ova are present before treatment, the residual is Class A with respect to pathogens until the next monitoring episode. Monitoring is continued until enteric viruses or viable helminth ova are detected in the feed residual, at which point the treated residual is analyzed to see if these organisms survived treatment. If enteric virus and viable helminth ova densities are below detection limits, the residual meets Class A requirements and will continue to do so as long as the treatment process is operated under the same conditions. The tests and requirements are:

- Once shown to be present prior to treatment, the density of enteric viruses in the residuals after pathogen treatment must be less than 1 plaque forming unit (PFU) per 4 grams of total solids (dry weight basis).

- The density of viable helminth ova in the residuals after the pathogen treatment must be less than 1 per 4 grams of total solids (dry weight basis).

Alternative 4: *Residuals Treated in Unknown Processes*

This alternative is used primarily for stored residual for which the history is unknown. It can also be used when a process is operating under less stringent conditions than those under which residuals could qualify as Class A under any of the other alternatives. This alternative requires that the residuals be analyzed for *Salmonella* sp. bacteria, enteric viruses, and viable helminth ova when the residuals are used or disposed; when residuals are prepared for sale or give-away in a bag or other container for application to the land; or when the residuals are prepared to meet the EQ requirements.

As in alternative 3, the required test results are:

- The density of viruses in the residuals must be less than 1 PFU per 4 grams of total solids (dry weight basis).

- The density of viable helminth ova in the residuals must be less than 1 per 4 grams of total solids (dry weight basis).

Alternative 5: *Residuals Treated in a PFRP*

Residuals are considered to be Class A if they are treated by one of the Process to Further Reduce Pathogens (PFRP) listed below:

Composting	Using either the within-vessel composting method or the static aerated pile composting method, the temperature of the residual is maintained at 55°C or higher for 3 days. Using the windrow composting method, the temperature of the residual is maintained at 55°C or higher for 15 days or longer. During the period when the compost is maintained at 55°C or higher, the windrow is turned a minimum of five times.
Heat Drying	Residuals are dried by direct or indirect contact with hot gases to reduce the moisture content of the residuals to 10% or lower. Either the temperature of the residual particles exceeds 80°C or the wet bulk temperature of the gas in contact with the residuals as the residuals leave the dryer exceeds 80°C.
Heat Treatment	Liquid residuals are heated to a temperature of 180°C or higher for 30 minutes.
Thermophilic Aerobic Digestion	Liquid residuals are agitated with air or oxygen to maintain aerobic conditions, and the mean cell residence time of the residuals is 10 days at 55°C or 60°C.
Beta Ray Irradiation	Residuals are irradiated with beta rays from an accelerator at dosages of at least 1.0 megarad at room temperature (20°C).
Gamma Ray Irradiation	Residuals are irradiated with gamma rays from certain isotopes, such as Cobalt 60 and Cesium 137, at dosages of at least 1.0 megarad at room temperature (20°C).
Pasteurization	The temperature of the residuals is maintained at 70°C or higher for 30 minutes or longer.

Alternative 6: *Residuals Treated in a Process Equivalent to a PFRP*

Residuals are considered to be Class A if they are treated by any process determined to be equivalent to a PFRP by the NJDEP.

CLASS B

Alternative 1: *Monitoring of Indicator Organisms*

Test for fecal coliform density as an indicator for all pathogens. The geometric mean of seven samples shall be less than 2 million MPN per gram of total solids or less than 2 million CFU per gram of total solids at the time of use or disposal.

Alternative 2: *Residuals Treated in a PSRP*

Residuals are considered to be Class B if they are treated by one of the Process to Significantly Reduce Pathogens (PSRP) listed below:

Aerobic Digestion	Residuals are agitated with air or oxygen to maintain aerobic conditions for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between 40 days at 20°C and 60 days at 15°C.
Air Drying	Residuals are dried on sand beds or on paved or unpaved basins. The residuals dry for a minimum of 3 months. During 2 of the 3 months, the average ambient daily temperature is above 0°C.
Anaerobic Digestion	Residuals are treated in the absence of air for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between 15 days at 35° C to 55°C and 60 days at 20°C.
Composting	Using either the within-vessel, static aerated pile, or windrow composting methods, the temperature of the residuals is raised to 40°C or higher and maintained for 5 days. For 4 hours during the 5-day period, the temperature in the compost pile exceeds 55°C.
Lime Stabilization	Sufficient lime is added to the residuals to raise the pH of the residuals to 12 after 2 hours of contact.

Alternative 3: *Residuals Treated in a Process Equivalent to PSRP*

Residuals are considered to be Class B if they are treated by any process determined to be equivalent to a PSRP by the NJDEP.

APPENDIX C - VECTOR ATTRACTION REDUCTION REQUIREMENTS

The Part 503 rule contains 11 options for demonstrating reduced vector attraction for biosolids. These requirements are designed to either reduce the attractiveness of biosolids to vectors or prevent vectors from coming in contact with biosolids. These options are summarized in the table below.

OPTION	DESCRIPTION	APPROPRIATE FOR:
Option 1: Reduction in Volatile Solids Content	Meet 38% reduction in volatile solids content.	Residual processed by anaerobic or aerobic biological treatment or chemical oxidation
Option 2: Additional Digestion of Anaerobically Digested Residuals	Demonstrate VAR with additional anaerobic digestion in a bench-scale unit. VAR is demonstrated if after anaerobic digestion for an additional 40 days at a temperature between 30°C and 37°C, the volatile solids are reduced by less than 17% from the beginning to the end of the bench test.	Only for anaerobically digested residuals
Option 3: Additional Digestion of Aerobically Digested Residuals	Demonstrate VAR with additional aerobic digestion in a bench-scale unit. Aerobically digested residuals with 2% or less solids are considered to have achieved VAR if, in the laboratory after 30 days of aerobic digestion in a batch test at 20°C, volatile solids are reduced by less than 15%.	Only for aerobically digested residuals with 2% or less solids (e.g. extended aeration plants)
Option 4: Specific Oxygen Uptake Rate (SOUR) for Aerobically Digested Residuals	VAR can be demonstrated if the SOUR of the residuals that are used or disposed, determined at 20°C, is equal to or less than 1.5 milligrams of oxygen per hour per gram of total solids (dry weight basis).	Residual from aerobic process (not for composting). Also for residual deprived of oxygen for longer than 1-2 hours.
Option 5: Aerobic Processes at Greater than 40°C	The residuals must be aerobically treated for 14 days or longer, during which time the temperature always must be over 40°C and the average temperature must be higher than 45°C.	Composted residual
Option 6: Addition of Alkaline Material	Residuals are considered to meet VAR if sufficient alkaline material is added to raise the pH to at least 12, measured at 25°C, and without the addition of more alkaline material, maintain a pH of at least 12 for 2 hours, and maintain a pH of least 11.5 for an additional 22 hours.	Alkali-treated residual (alkalies include lime, fly ash, kiln dust, and wood ash)
Option 7: Moisture Reduction of Residuals Containing No Unstabilized Solids	Residuals do not contain unstabilized solids generated during primary treatment and the solids content of the residual is at least 75% before the residuals are mixed with any other material.	Residual treated by an aerobic or anaerobic process
Option 8: Moisture Reduction of Residuals Containing Unstabilized Solids	Residual solids content is increased to 90% prior to mixing with other materials.	Residuals that contain unstabilized solids generated in primary wastewater treatment
Option 9: Residuals Injection	Residuals are injected beneath the soil surface. No significant amount of residuals can be present on the land surface within 1 hour of injection. If residuals are Class A with respect to pathogens, they must be injected within 8 hours after discharge from the pathogen reduction process.	Liquid residual applied to land
Option 10: Incorporation of Residuals into the Soil	Residuals must be incorporated into the soil within 6 hours of application to or placement on the land. If residuals are Class A with respect to pathogens, they must be applied to the land surface within 8 hours after the pathogen reduction process and must be incorporated within 6 hours after application.	Residual applied to land
Option 11: Covering Residuals	Residuals placed on a surface disposal site must be covered with soil or other material at the end of each operating day.	This option is for surface disposal only

APPENDIX D - SITE RESTRICTIONS

(from 40 CFR Part 503.32(b)(5))

The following site restrictions apply to residuals that are land applied under program #3 (N.J.A.C. 7:14A-20.7(h)3) and program #6 (N.J.A.C. 7:14A-20.7(h)6).

1. Food crops with harvested parts that touch the residual/soil mixture and are totally above the land surface shall not be harvested for fourteen (14) months after application of residual.

2. Food crops with harvested parts below the surface of the land shall not be harvested for twenty (20) months after application of residual when the residual remains on the land surface for four months or longer prior to incorporation into the soil.

3. Food crops with harvested parts below the surface of the land shall not be harvested for thirty-eight (38) months after application of residual when the residual remains on the land surface for less than four (4) months prior to incorporation into the soil.

4. Food crops, feed crops and fiber crops shall not be harvested for thirty (30) days after application of residual.

5. Animals shall not be allowed to graze on the land for thirty (30) days after application of residual.

6. Turf grown on land where residual is applied shall not be harvested for one year after application of the residual when the harvested turf is placed on either land with a high potential for public exposure or a lawn, unless otherwise specified by the permitting authority.

7. Public access to land with a high potential for public exposure shall be restricted for one (1) year after application of residual.

8. Public access to land with a low potential for public exposure shall be restricted for thirty (30) days after application of residual.

APPENDIX E - GENERAL REQUIREMENTS

(N.J.A.C. 7:14A-20.7(b)(1))

1. No person shall apply residual to the land except in accordance with the requirements of N.J.A.C. 7:14A-20.
2. No person shall apply bulk residual subject to the cumulative pollutant loading rates in 40 CFR 503.13(b)2 to agricultural land, forest, a public contact site, or a reclamation site if any of the cumulative pollutant loading rates in 40 CFR 503.13(b)2 have been reached.
3. No person shall apply domestic septage to agricultural land, forest, or a reclamation site except in accordance with N.J.A.C. 7:14A-20.7(f).
4. The person who prepares bulk residual that is applied to agricultural land, forest, a public contact site, or a reclamation site shall provide the person who applies the bulk residual written notification of information necessary to determine the agronomic rate pursuant to N.J.A.C. 7:14A-20.7(g).
5. The person who applies residual to the land shall obtain information needed to comply with the requirements in N.J.A.C. 7:14A-20. In addition, before bulk residual subject to the cumulative pollutant loading rates in 40 CFR 503.13(b)2 is applied to the land, the person who proposes to apply the bulk residual shall comply with the requirements in 40 CFR 503.12(e) and shall also contact the Department to determine whether bulk residual was applied to the site prior to July 20, 1993. The cumulative amount of each pollutant that was applied to the site in the bulk residual and that was required to be tracked by the Department prior to July 20, 1993, shall be used to determine the additional amount of each pollutant which can be applied to the site after July 20, 1993 pursuant to 40 CFR 503.13(a)2i.
6. When a person who prepares bulk residual provides the bulk residual to a person who applies the bulk residual to the land, the person who prepares the bulk residual shall provide the person who applies the bulk residual notice and necessary information to comply with the requirements of this subchapter.
7. When a person who prepares residual provides the residual to another person who prepares the residual, the person who provides the residual shall provide the person who receives the residual notice and necessary information to comply with the requirements of N.J.A.C. 7:14A-20.
8. The person who applies bulk residual to the land shall provide the owner or lease holder of the land on which the bulk residual is applied notice and necessary information to comply with the requirements of N.J.A.C. 7:14A-20.
9. Any person who prepares bulk residual in New Jersey that is applied to land in a State other than New Jersey shall provide written notice to the permitting authority for the State in which the bulk residual is proposed to be applied prior to the initial application of bulk residual to the residual land application site by the applier. Any person who prepares bulk residual out-of-state that is to be applied to land in New Jersey shall provide written notice to the Department prior to the initial application of bulk residual to the residual land application site by the applier. The notice shall include:

    (a) The location, by either street address or latitude and longitude, of each residual land application site;

    (b) The approximate time period during which bulk residual will be applied to each residual land application site;

(c) The name, address, telephone number, and New Jersey or National Pollutant Discharge Elimination System permit number (if applicable) for the person who prepares the bulk residual;

(d) The name, address, telephone number, and New Jersey or National Pollutant Discharge Elimination System permit number (if applicable) for the person who will apply the bulk residual; and

(e) out-of-state generators which transport residual into the State of New Jersey to be applied to the land shall also comply with the requirements of N.J.A.C. 7:14A-20.7(l)

10. Any person who prepares bulk residual in New Jersey and applies bulk residual subject to the cumulative pollutant loading rates in 40 CFR 503.13(b)(2) to the land outside of the State of New Jersey shall provide written notice to the permitting authority for the State in which the bulk residual will be applied prior to the initial application of bulk residual to a residual land application site by the applier. Any person who applies bulk residual subject to the cumulative pollutant loading rates in 40 CFR 503.13(b)2 to the land in New Jersey shall provide written notice to the Department prior to the initial application of bulk residual to a residual land application site by the applier. The permitting authority or Department shall retain and provide the public with access to the notice. The notice shall include:

(1) The location, by either street address or latitude and longitude, of the land application site; and

(2) The name, address, telephone number, and New Jersey or National Pollutant Discharge Elimination System permit number (if applicable) of the person who will apply the bulk residual.

APPENDIX F - MANAGEMENT PRACTICES

(from N.J.A.C. 7:14A-20.7(b)2)

1. Bulk residual shall not be applied to the land if it is likely to adversely affect a threatened or endangered species listed under section 4 of the federal Endangered Species Act or its designated critical habitat.

2. Bulk residual shall not be applied to agricultural land, forest, a public contact site, or a reclamation site that is flooded, frozen, or snow-covered so that the bulk residual enters a wetland or other waters of the United States, as defined in N.J.A.C. 7:14A-1.2, except as provided in a permit issued pursuant to section 402 or 404 of the Clean Water Act.

3. Bulk residual shall not be applied to agricultural land, forest, or a reclamation site that is ten (10) meters or less from the waters of the State, as defined in N.J.A.C. 7:14A-1.2, unless otherwise specified by the permitting authority.

4. Bulk residual shall be applied to agricultural land, forest, a public contact site, or a reclamation site at a whole residual application rate that is equal to or less than the agronomic rate for the bulk residual, unless, in the case of a reclamation site, otherwise specified by the permitting authority.

5. Either a label shall be affixed to the bag or other container in which residual that is sold or given away for application to the land, or an information sheet shall be provided to the person who receives residual sold or given away in an other container for application to the land. The label or information sheet shall contain the following information:

    1) The name and address of the person who prepared the residual that is sold or given away in a bag or other container for application to the land.

    2) A statement that application of the residual to the land is prohibited except in accordance with the instructions on the label or information sheet.

    3) The annual whole residual application rate for the residual that does not cause any of the annual pollutant loading rates in Table 4 of 40 CFR 503.13 to be exceeded.

APPENDIX G - SOURCES OF AGRICULTURAL EXPERTISE

(Contact the Bureau of Pretreatment and Residuals at (609) 633-3823)

APPENDIX H - FORM R
(Reserved)

FORM R **NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION**
DIVISION OF WATER QUALITY

R

Refer to Appropriate Completeness Checklist and Instructions. Provide All Applicable Information. Please Print or Type. (Attach additional sheets if necessary)

SUPPLEMENTAL APPLICATION FORM TO NJPDES-1 FOR NJPDES RESIDUAL PERMITS

PART A: GENERAL INFORMATION

APPLICATION OVERVIEW: Form R is divided into nine parts (A-I). All applicants for a NJPDES permit must complete Part A. The applicability of Parts B, C, D, E, F, G, H and I can be determined by reviewing section A4 of this form.

A1. Screening Information

1. Does/will the facility: (1) generate a residual or a hazardous waste as a by-product of wastewater treatment for which a NJPDES application is being made, (2) generate a residual from the treatment of water for public consumption, or (3) derive a material from residual?

   _____Yes _____No

   If you answered "yes", go to question 2. If you answered "no", this application does not need to be completed; however, submit this page as documentation that no residual is produced.

2. If you answered "yes" to question 1 above, is the by-product produced a hazardous waste or is the residual manifested as if it were a hazardous waste?

   _____ Yes _____No

   If yes, complete only Part A. If no, you must complete, at a minimum, Parts A, B and I.

A2. Facility Information.

a. Name of facility: _____

b. Facility contact. Name:_____

Title: _____ Phone: ( ) _____

c. Facility location:

Street or Route #: _____

County: _____

City or town: _____ State: _____ Zip: _____

d. Facility mailing address:

Street or Route #: _____

_____

City or town: _____ State: _____ Zip: _____

A3. Use and Disposal Sites.

a. **Amount of residual or hazardous waste**: Provide the total dry metric tons per latest 365-day period (calendar year) of residual or hazardous waste handled by the process/discharge for which the NJPDES application is being made.

Total amount generated on-site at the facility: _____

Total amount received from off-site: _____

b. Provide the following information for each site on which the residual or hazardous waste indicated above from this facility is treated, transferred, used or disposed (attach additional sheets as necessary):

Name of facility: _____

Facility contact: Name _____

Title _____ Phone ( ) _____

Facility mailing address:

Street or P.O. Box _____

City or town _____ State _____ Zip _____

A4. Additional Information.

Review the following outline to determine if Parts B through I of this form must be completed.

1. **PART B: GENERATION OR PREPARATION**
   Part B must be completed by applicants who either: 1) Generate a residual which is not being manifested as if it were a hazardous waste (for example, sewage sludge, water treatment residual, food processing residual); or 2) Derive a material from residual.

2. **PART C: ENVIRONMENTAL ASSESSMENT**
   Part C provides guidance for preparing and submitting an Environmental Assessment as required under N.J.A.C. 7:14A-20.6. An Environmental Assessment is required for: (1) the locations where residuals are prepared for land application, (2) the location where residuals are or were placed on a surface disposal site, or (3) the location for residual transfer stations, or as otherwise determined by the Department under N.J.A.C. 7:14A-20.5. An Environmental Assessment is not required for each individual residual land application site. This requirement may also be waived by the Department if no additional infrastructure is proposed. (For example, if a domestic treatment works already has approval to operate anaerobic digesters and is applying for a permit to land apply the residual already generated from the digesters, an environmental assessment is not required.) Contact the Bureau of Pretreatment and Residuals at (609) 633-3823 for specific guidance on whether an environmental assessment is required.

3. **PART D: LAND APPLICATION OF RESIDUAL**
   Part D must be completed by applicants who either: 1) Apply residual to the land; or 2) Prepare residual that is applied to the land by others. Applicants who meet either or both of the above criteria are exempted from this part if **all** of the residual generated is sent to another facility to be prepared for land application.

4. **PART E: SURFACE DISPOSAL**
   Part E must be completed by applicants who own or operate a residual surface disposal site.

5. **PART F: OUT-OF-STATE GENERATORS**
   Part F must be completed by out-of-state generators preparing residual for land application in the State of New Jersey.

6. **PART G: RESIDUAL TRANSFER STATION**
   Part G must be completed by applicants who own or operate a residual transfer station.

7. **PART H: REED BEDS**
   Part H must be completed by applicants who own or operate a residual reed bed management system.

8. **PART I: CERTIFICATION**
   Part I must be completed by all applicants required to complete information under Parts B through H above.

For copies of Parts B through I, contact the Bureau of Permits Management at (609) 984-4428. If you have specific questions or need assistance in completing application Form R, contact the Bureau of Pretreatment and Residuals at (609) 633-3823.

PART B. GENERATION OF RESIDUAL OR PREPARATION OF A MATERIAL DERIVED FROM RESIDUAL

Part B must be completed by applicants who generate a residual by a process and/or discharge for which the NJPDES application is being made (including, but not limited to, sewage sludge, water treatment plant residual, and food processing residual), or derive a material from residual.

B1. Facility Information.

a. Is this facility a Class 1 Sludge Management Facility? (Note: a domestic treatment works required to have an approved industrial pretreatment program is a Class 1 Sludge Management Facility. Other treatment works may be designated as Class 1 by the Department on a case-by-case basis.)

_____Yes _____No

b. Facility design influent flow (wastewater) rate, if applicable: _____mgd

c. Total population served, if applicable: _____

d. For residual management operations (e.g. incinerator, stabilization operation, etc.):

Maximum Daily Capacity: _____ (Dry Metric Tons/day)

Average Daily Capacity: _____ (Dry Metric Tons/day)

e. Indicate the type(s) of facility:

_____Publicly owned treatment works

_____Privately owned treatment works

_____Federally owned treatment works

_____Residual blending or treatment operation

_____Surface disposal site

_____Industrial treatment works

_____Other. If other, explain:_____

B2. Line Drawing.

a. Provide a line drawing of residual flow through the facility, and/or a narrative description that identifies all residual practices that will be employed during the term of the permit, including all processes used for collecting, dewatering, storing, or treating residual, the destination(s) of all liquids and solids leaving each unit, and all methods used for pathogen reduction and vector attraction reduction (attach additional sheets as necessary).

_____

_____

_____

b. Provide a description of residual use and disposal practices:

_____

_____

_____

B3. Plot Plan.

Where the following information is applicable, attach a Municipal Tax Map (clear copy or original) or equivalent plot plan as may be accepted by the Department drawn to scale depicting the following information:

1. The location of all sites at which residual is stored at the facility for which the NJPDES application is being made; and

2. The location of any sites where the applicant transfers or plans to transfer residuals for treatment and/or disposal.

B4. Contractor Information.

Are any operational or maintenance aspects of this facility related to residual generation, treatment, use or disposal the responsibility of a contractor?

_____ Yes _____ No

If yes, provide the following for each contractor (attach additional pages if necessary).

Name: _____

Street or P.O. Box: _____

City or Town: _____ State: _____ Zip: _____

Phone Number: (_____) _____

Responsibilities of contractor:

_____

_____

B5. Residual Quality Information

Provide a summary of all data submitted under the Sludge Quality Assurance Regulations (N.J.A.C. 7:14-4) for the previous 12-month period. If no data is available, a sample must be taken, analyzed and reported where required pursuant to the Sludge Quality Assurance Regulations (SQAR). For new facilities, a sample must be be taken and analyzed within 90 days of the start of operation as required by SQAR.

B6. Residual Amount Generated On Site.

a. Is domestic sewage included in the process where residual is generated?

_____ Yes _____ No (If yes, percent of total influent flow: _____%)

b. Volume and types of residual generated on-site:

Water treatment plant residual (dry metric tons per 365-day period): _____

Food processing residual (dry metric tons per 365-day period): _____

Sewage sludge (dry metric tons per 365-day period): _____

Other: (describe:_____) (dry metric tons per 365-day period): _____

B7. Amount Received from Off Site.

If your facility receives, or will receive, residual from another facility for treatment, use, or disposal, provide the following information for each facility from which residual is received. If you receive residual from more than one facility, attach additional pages as necessary.

a. Facility Name: _____

b. Contact Person: _____

Phone number: _____

c. Mailing address: _____

_____

_____

d. Facility address: _____

_____

_____

e. Total dry metric tons per 365-day period received from this facility: _____

f. Describe any treatment processes known to occur at the off-site facility, including dewatering, blending and treatment to reduce pathogens or vector attraction characteristics:

_____

_____

_____

B8. Treatment Provided at Your Facility.

a. What type of pathogen reduction is provided for residual at your facility?

_____Class A _____Class B _____ None or unknown

b. Describe any treatment processes used at your facility to reduce pathogens in residual:

_____

_____

_____

_____

c. Is vector attraction reduction provided for residual at your facility?

_____ Yes _____ No

B8. Treatment Provided at Your Facility (continued).

d. If yes, which vector attraction option is met for the residual at your facility?

_____ Option 1 (Minimum 38 percent reduction in volatile solids)

_____ Option 2 (Anaerobic process, with bench-scale demonstration)

_____ Option 3 (Aerobic process, with bench-scale demonstration)

_____ Option 4 (Specific oxygen uptake rate for aerobically digested residual)

_____ Option 5 (Aerobic processes plus raised temperature)

_____ Option 6 (Raise pH to 12 and retain at 11.5)

_____ Option 7 (75 percent solids with no unstabilized solids)

_____ Option 8 (90 percent solids with unstabilized solids)

_____ None or unknown

e. Describe any treatment processes used at your facility to reduce vector attraction properties of residual:

_____

_____

_____

f. Describe any other residual treatment or blending activities not identified above (including dewatering):

_____

_____

_____

_____

B9. Preparation of Exceptional Quality Residual.

Complete Part B9 if residual from <u>your</u> facility meets the ceiling concentrations in Table 1 of 40 CFR 503.13, the pollutant concentrations in Table 3 of 40 CFR 503.13, the Class A pathogen reduction requirements in 40 CFR 503.32(a), and one of the vector attraction reduction requirements in 40 CFR 503.33(b)(1)-(8) and is land applied. Skip this part if residual from your facility does not meet all of these criteria.

a. Total dry metric tons per 365-day period of residual subject to this part that is applied to the land:

_____

b. Is residual subject to this part placed in bags or other containers for sale or give-away for application to land?

_____ Yes _____ No

B10. Sale or Give-Away in a Bag or Other Container for Application to the Land.

Complete Part B10 if <u>you</u> place residual in a bag or other container for sale or give-away for land application.

a. Total dry metric tons per 365-day period of residual placed in a bag or other container at your facility for sale or give-away for application to the land:_____

B11. Shipment Off-Site for Treatment or Blending.

Complete Part B11 if residual from your facility is provided to another facility that provides treatment or blending. Skip this part if the residual is covered in Parts B9 or B10. If you provide residual to more than one facility, attach additional pages as necessary.

a. Name of receiving facility: _____

b. Facility Contact. Name: _____

Title: _____

Phone Number: (_____) _____

c. Facility mailing address:

Street or P.O. Box: _____

City or Town: _____ State: _____ Zip: _____

d. Total dry metric tons per 365-day period provided to this facility: _____

e. Does the receiving facility provide additional treatment to reduce pathogens in residual from your facility? _____Yes _____No

Which class of pathogen reduction is achieved for the residual at the receiving facility?

_____ Class A _____ Class B _____ Pathogen-free or none

f. Describe any treatment processes used at the receiving facility to reduce pathogens in residual:

_____

_____

_____

_____

g. Does the receiving facility provide additional treatment to reduce vector attraction characteristics of the residual? _____ Yes _____ No

B11. Shipment Off-Site for Treatment or Blending (continued).

h. Which vector attraction reduction option is met for the residual at the receiving facility?

_____ Option 1 (Minimum 38 percent reduction in volatile solids)

_____ Option 2 (Anaerobic process, with bench-scale demonstration)

_____ Option 3 (Aerobic process, with bench-scale demonstration)

_____ Option 4 (Specific oxygen uptake rate for aerobically digested residual)

_____ Option 5 (Aerobic processes plus raised temperature)

_____ Option 6 (Raise pH to 12 and retain at 11.5)

_____ Option 7 (75 percent solids with no unstabilized solids)

_____ Option 8 (90 percent solids with unstabilized solids)

_____ None or unknown

i. Describe any treatment processes used at the receiving facility to reduce vector attraction properties of residual:

_____

_____

_____

j. Describe any other residual treatment or blending activities not identified above:

_____

_____

_____

k. If you answered yes to any of the above, what information do you provide the receiving facility with to comply with the "notice and necessary information" requirement of 40 CFR 503.12(g).

_____

_____

_____

l. Does the receiving facility place residual from your facility in a bag or other container for sale or give-away for application to the land?

_____ Yes _____ No

If yes, provide a copy of all labels or notices that accompany the product being sold or given away.

B12. Land Application of Bulk Residual.

Complete Part B12 if residual from your facility is applied to the land, unless the residual is covered in Parts B9, B10 or B11 above.

a. Total dry metric tons per 365-day period of residual applied to all land application sites: _____

b. Did you identify all land application sites in Part D of this application?

_____ Yes _____ No

If no, submit a copy of the notification plan with this application (see Part D).

c. Are any land application sites located in States other than New Jersey?

_____ Yes _____ No

If yes, describe how you notify the permitting authority for the States where the land application sites are located. Provide a copy of the notification.

B13. Surface Disposal.

Complete Part B13 if residual from your facility is placed on a surface disposal site (monofill).

a. Total dry metric tons per 365-day period of residual placed on all surface disposal sites: _____

b. Do you own or operate all surface disposal sites to which you send residual?

_____ Yes _____ No

If no, answer the following for each surface disposal site that you do not own or operate (attach additional sheets as necessary).

c. Site Name: _____

d. Facility Contact. Name _____

Title: _____

Phone Number: (_____) _____

e. Facility mailing address:

Street or P.O. Box: _____

City or Town: _____ State: _____ Zip: _____

f. Total dry metric tons per 365-day period of residual from your facility placed on this surface disposal site: _____

B14. Incineration.

Complete Part B14 if residual from your facility is fired in an incinerator.

a. Total dry metric tons per 365-day period of residual fired in an incinerator: _____

b. Do you own or operate all incinerators to which you send residual?

_____ Yes _____ No

If no, answer the following for each incinerator that you do not own or operate (attach additional sheets as necessary).

c. Site Name: _____

b. Facility Contact. Name: _____

Title: _____

Phone Number: (_____) _____

c. Facility mailing address:

Street or P.O. Box: _____

City or Town: _____ State: _____ Zip: _____

d. Total dry metric tons per 365-day period of residual from your facility fired at this incinerator: _____

B15. Disposal in a Municipal Solid Waste Landfill.

Complete Part B15 if residual from your facility is placed in a municipal solid waste landfill.

a. Total dry metric tons per 365-day period of residual placed in a municipal solid waste landfill: _____

b. Do you own or operate all municipal solid waste landfills to which you send residual?

_____ Yes _____ No

If no, answer the following for each municipal solid waste landfill that you do not own or operate (attach additional sheets as necessary).

c. Site Name: _____

d. Facility Contact. Name: _____

Title: _____

Phone Number: (_____) _____

e. Facility mailing address:

Street or P.O. Box: _____

City or Town: _____ State: _____ Zip: _____

f. Total dry metric tons per 365-day period of residual from your facility placed in this municipal solid waste landfill: _____

g. Submit, with this application, information necessary to determine whether the residual meets applicable requirements for disposal of residual in a municipal solid waste landfill (for example, results of paint filter liquid test and TCLP test).

PART C: ENVIRONMENTAL ASSESSMENT

All applicants for a permit for residual use or disposal must submit an environmental assessment for the location where residual will be prepared to be applied to the land, the location where residual was placed on a surface disposal site, or the location of any other residual-only facility required to obtain a permit pursuant to N.J.A.C. 7:14A-20. The environmental assessment shall, at a minimum, address the following requirements:

C1. Facility Operations.

a. Provide a written description of facility operations, including methods of residual handling, facility layout (attach facility map), and use or disposal of any end products.

_____

_____

_____

_____

b. Volume and types of residual to be handled:

Sewage Sludge (dry metric tons per 365-day period): _____

Food processing residual (dry metric tons per 365-day period): _____

Water treatment residual (dry metric tons per 365-day period):_____

Other: (describe:_____)(dry metric tons per 365-day period): _____

C2. Environmental Impact and Local Land Use Evaluation.

1. Provide an analysis of the impact that the proposed treatment works treating domestic sewage or residual only facility will have on local transportation patterns, drainage and soil characteristics, surface and ground water quality, endangered or threatened wildlife and vegetation, storm water and wastewater collection/treatment capability, water supply capability, ambient acoustical conditions and air quality. Refer to Section 2 of the Bureau of Pretreatment and Residual's Technical Manual for Residual Permits for guidance on completion of the Environmental Assessment.
2. Attach a description on how the proposed operation will conform or conflict with the objectives of any applicable Federal, State, or local land use and/or environmental requirements for areas within two miles of the perimeter of a proposed large facility (residual production equal to or greater than 15,000 metric tons per 365 day period), or within one mile of the perimeter of a proposed small facility (residual production less than 15,000 metric tons per 365 day period). Refer to Section 2 of the Bureau of Pretreatment and Residual's Technical Manual for Residuals Permits for guidance on completion of the Environmental Assessment.

PART D: LAND APPLICATION

All applicants for a NJPDES permit to prepare residual for land application shall submit the following, unless the text clearly indicates otherwise.

D1. Residual Information.

Information on the characteristics of each residual proposed to be applied, to the extent known at the time that the permit application is submitted, including:

a. Is all residual to be prepared for land application generated on-site?

_____ Yes _____ No

If no, describe here the method for transporting the residual from the site of generation to the site of treatment. In addition, attach a map of transportation routes to be used in transporting residuals:

_____

_____

_____

b. List here the origin and quantity (in dry metric tons per 365 day period) of each residual to be processed. For each residual to be processed from off-site sources estimate the approximate number of round trips made per day:

ORIGIN	NJPDES #	QUANTITY	ROUND TRIPS

c. A dated analysis of each residual on a mg/kg dry weight basis (or other unit as specified), at a minimum, for the following constituents:

Total Solids (% by weight)	pH (standard units)
Total Kjeldahl Nitrogen (TKN)	Ammonia-Nitrogen (NH_4-N)
Nitrate-Nitrogen (NO_3-N)	Calcium (Ca)
Potassium (K)	Phosphorus (P)
Arsenic	Cadmium
Copper	Lead
Mercury	Molybdenum
Nickel	Selenium
Zinc	

d. A summary of all data submitted under the Sludge Quality Assurance Regulations (SQAR), N.J.A.C. 7:14-4, for the previous 12-month period;

e. Additional quality analyses (including characteristics pursuant to N.J.A.C. 7:26G) may be required by the Department after evaluation of past SQAR reports or other relevant information, such as information on industrial discharges which might contribute constituents not normally evaluated under the SQAR program or which may exceed levels identified in USEPA's Technical Support Document for Land Application of Sewage Sludge, EPA 822/R-93-001a and 001b, November 1992.

D1. Residual Information (continued).

f. For residuals generated at industrial treatment works, describe below all industrial processes which generate residual intended to be land applied, including a listing of all raw materials undergoing processing, and all physical and/or chemical additives introduced:

_____

_____

_____

_____

D2. Evaluation for non-domestic residual.

For the land application of residuals other than sewage sludge, water treatment plant residual, or food processing residual, the applicant must submit a detailed report which demonstrates the following:

a. That the land application of the residual will benefit soil physical properties, soil fertility and/or cover vegetation;

b. An understanding of the impacts of the residual on soil fertility, soil physical properties and plant growth; and

c. That the land application of a particular residual has a scientific basis and has been successfully tested or demonstrated in a field application or pilot program.

D3. Topographic Map.

Provide a topographic map that shows the following items of information. Map(s) must include the area one mile beyond all property boundaries of the facility.

a. Location of all residual treatment, storage, or disposal facilities, including land application sites and locations where residual is generated, treated or disposed in the map area;

b. Location of all surface water bodies in the map area;

c. Location of all wells used for drinking water listed in public records or otherwise known to the applicant in the map area.

D4. Land Application Program and Process Information.

Refer to Appendices A through C in the Bureau of Pretreatment and Residual's Technical Manual to determine the quality requirement, pathogen reduction requirement, and vector attraction reduction requirement applicable to your facility. Circle each of the applicable requirements in the table below. The program where all three requirements are circled is the one applicable for your facility. See the program description in the BPR's technical manual for further information.

PROGRAM	Quality Requirements Appendix A	Pathogen Reduction Requirements Appendix B	VAR Requirements Appendix C
Program 1	Column 2	Class A	(1)-(8)
Program 2	Column 2	Class A	(9) or (10)
Program 3	Column 2	Class B	Any
Program 4	Column 1	Class A	(1)-(8)
Program 5	Column 1	Class A	(9) or (10)
Program 6	Column 1	Class B	Any

a. Which pathogen reduction alternative is intended to be met for the residual at your facility?

_____ Class A/Alternative 1 (Thermally treated residual, specify 1A, 1B, 1C, or 1D from 40 CFR 503)

_____ Class A/Alternative 2 (Residuals treated in a High pH – High temperature process)

_____ Class A/Alternative 3 (Residuals treated in other known processes)

_____ Class A/Alternative 4 (Residuals treated in unknown processes)

_____ Class A/Alternative 5 (Residuals treated in a PFRP)

_____ Class A/Alternative 6 (Residuals treated in a process equivalent to a PFRP)

_____ Class B/Alternative 1 (Monitoring of indicator organisms)

_____ Class B/Alternative 2 (Residuals treated in PSRP)

_____ Class B/Alternative 3 (Residuals treated in a process equivalent to a PSRP)

_____ Pathogen-free, none or unknown

b. Describe, in detail, the treatment processes used at your facility to reduce pathogens in residual (attach additional sheets as necessary):

_____

_____

_____

D4. Land Application Program and Process Information (continued).

c. Describe how information to demonstrate compliance with pathogen reduction requirements will be obtained, where samples to demonstrate compliance will be taken, and how records will be kept (attach additional sheets as necessary):

_____

_____

_____

d. Are any vector attraction reduction requirements met when residual is applied to the land application site?

_____ Yes _____ No

If yes, indicate which vector attraction reduction option is met:

_____ Option 9 (injection below land surface)

_____ Option 10 (incorporation into soil within 6 hours)

e. Describe, in detail, the treatment processes used at your facility for vector attraction reduction (attach additional sheets as necessary):

_____

_____

_____

f. Describe how information to demonstrate compliance with vector attraction reduction requirements will be obtained, where samples to demonstrate compliance will be taken, and how records will be kept (attach additional sheets as necessary):

_____

_____

_____

g. Describe the mode of transporting the product to distribution sites:

_____

_____

_____

h. How long will the final product be stored on-site prior to ultimate management?

Average operation: _____ days

Peak operation: _____ days

For each new structure used to store marketable residual product at the processing facility, submit an "Engineer's Certification of Proper Design for Residual Storage Installations" (See the Bureau of Pretreatment and Residuals Technical Manual for Residuals Management - Appendix I). Note: storage installations used to store residual which has not been processed, or which is not a marketable residual product are required to receive a Treatment Works Approval pursuant to N.J.A.C. 7:14A-22 and –23.

D4. Land Application Program and Process Information (continued).

i. Describe all process additives, including quantity required, source, trade names, and chemical analysis where available (for example, wood chips, oil, alkaline source etc.):

_____

_____

_____

_____

j. Attach a descriptive statement of the process used and operation of the proposed facility. Within this format, provide a description and detailed specifications of all process steps (including but not limited to residual delivery, storage, mixing, stabilization method, curing, screening) and the related equipment, pollution control systems, instrumentation and monitoring mechanisms. Within the context of the system description, identify the mix ratio of additives to residual.

k. Provide a comprehensive materials balance for the proposed system/operation. The materials balance shall account for every handling and processing step starting from residual delivery to the facility and ending with final product removal from the site.

D5. Identification of Land Application Sites.

For bulk residual which does not satisfy the pollutant concentrations in 40 CFR 503.13(b)(3), the Class A pathogen requirements in 40 CFR 503.32(a), or one of the vector attraction reduction options in 40 CFR 503.33(b)(1) through (b)(8) (that is, a program 2 through 6 residual identified above), for each residual land application site identified at the time of permit application, the applicant shall, supply information necessary to determine if the site is appropriate for land application and a description of how the site is or will be managed. Identify each residual land application site known at the time of permit application below. In addition LLAMA application forms 1 through 4 must be submitted for each residual land application site.

a. Site name or number: _____

b. Site location:

Street or Route Number: _____

County: _____ Lot: _____ Block: _____

City or Town: _____ State: _____ Zip: _____

c. Are any groundwater monitoring data available for this land application site?

_____ Yes _____ No

If yes, submit a summary of the ground water monitoring data with this permit application. Also provide a written description of the well locations, approximate depth to groundwater, and the groundwater monitoring procedures used to obtain the data.

_____

_____

_____

D6. Notification Plan.

For bulk residual which does not satisfy the pollutant concentrations in 40 CFR 503.13(b)(3), the Class A pathogen requirements in 40 CFR 503.32(a), or one of the vector attraction reduction options in 40 CFR 503.33(b)(1) through (b)(8) (that is, a program 2 through 6 residual identified above), where proposed residual land application sites are not identified at the time of permit application, the applicant shall submit a notification plan for the Department's approval which at a minimum:

a. Describe the geographical area covered by the plan:

_____

_____

b. Describe the form of advance public notice which, at a minimum, will be supplied to all landowners and occupants adjacent to or abutting a proposed residual land application site. This requirement may be satisfied through public notice in a newspaper of local circulation. Notice shall include, at a minimum, the name and address of the permittee, the name and address of the proposed residual land application site, a description of the activities that are proposed to occur at the residual land application site, and the name and address of the Bureau within the Department to which the permittee must submit an application for a Letter of Land Application Management Approval (See LLAMA Application Forms):

_____

_____

_____

D7. Exceptional Quality or Residual Sold or Given Away In a Bag or Other Container.

For bulk residual which meets the ceiling concentrations in Table 1 of 40 CFR 503.13, the pollutant concentrations in Table 3 of 40 CFR 503.13, the Class A pathogen requirements in 40 CFR 503.32(a), and one of the vector attraction reduction options in 40 CFR 503.33(b)(1) through (b)(8), or for any residual which is sold or given away in a bag or other container, the applicant shall:

a. Provide documentation that the residual product has been, or will be, licensed by the New Jersey Department of Agriculture pursuant to the New Jersey Commercial Fertilizer and Soil Conditioner Act, N.J.S.A. 4:9-15.1 et seq., or the New Jersey Agricultural Liming Materials Act, N.J.S.A. 4:9-21.1 et seq.

b. Provide a copy of the label or instructional literature that will be used to conform to the labeling requirements established by the New Jersey Department of Agriculture pursuant to the New Jersey Commercial Fertilizer and Soil Conditioner Act, N.J.S.A. 4:9-15.1 et seq., the New Jersey Agricultural Liming Materials Act, N.J.S.A. 4:9-21.1 et seq., and/or the Bureau of Pretreatment and Residuals Technical Manual for Residuals Management (see Section 5).

c. Provide below, or attach additional sheets as necessary, information to demonstrate optimal marketable residual product characteristics, including temperature, total solids and odor characteristics. Include a listing of existing operational facilities of the type proposed:

_____

_____

_____

_____

PART E. SURFACE DISPOSAL

Complete this part only if you own or operate a residual surface disposal site.

E1. Information on Residual Units

a. Unit name or number: _____

b. Unit location: _____

_____

c. Total dry metric tons of residual placed on the active residual unit per 365-day period:

_____

d. Total dry metric tons of residual placed on the active unit over the life of the unit:

_____

e. Does the active residual unit have a liner with a maximum hydraulic conductivity of 1 X 10^{-7} cm/sec?

_____ Yes _____ No

f. If yes, describe the liner (or attach a description):

_____

_____

_____

g. Does the active residual unit have a leachate collection system?

_____ Yes _____ No

If yes, describe the leachate collection system. Also describe the method used for leachate disposal:

_____

_____

_____

h. If you answered no to either E.1.e or E.1.g., answer the following question:

Is the boundary of the residual unit less than 150 meters from the property line of the surface disposal site? _____ Yes _____ No

If yes, provide the actual distance in meters: _____

i. Remaining capacity of active residual unit in dry metric tons: _____

j. Anticipated or actual closure date for the residual unit: _____

k. Provide a copy of any closure plan that has been developed for this active residual unit. A surface disposal site closure plan shall include the information in E5 below.

E2. Topographic Map.

Provide a topographic map that shows the following items of information. Map(s) must include the area one mile beyond all property boundaries of the facility.

a. Location of all residual treatment, storage, or disposal facilities, including land application sites and locations where residual is generated, treated or disposed in the map area;

b. Location of all surface water bodies in the map area;

c. Location of all wells used for drinking water listed in public records or otherwise known to the applicant in the map area.

E3. Residual from other facilities

a. Is residual sent to this active residual unit from any other facilities other than your facility?

_____ Yes _____ No

If yes, provide the following information for each facility. If residual is sent to this active residual unit from more than one such facility, attach additional pages as necessary.

Facility Name: _____

Contact Person: _____ Phone number: (_____) _____

Mailing address: _____

_____

_____

b. Which class of pathogen reduction is achieved before residual leaves the other facility?

_____ Class A _____ Class B _____ Pathogen-free or none

c. Describe any treatment processes used at the other facility to reduce pathogens in residual:

_____

_____

_____

d. Which vector attraction option is achieved before residual leaves the other facility?

_____ Option 1 (Minimum 38 percent reduction in volatile solids)

_____ Option 2 (Anaerobic process, with bench-scale demonstration)

_____ Option 3 (Aerobic process, with bench-scale demonstration)

_____ Option 4 (Specific oxygen uptake rate for aerobically digested residual)

_____ Option 5 (Aerobic processes plus raised temperature)

_____ Option 6 (Raise pH to 12 and retain at 11.5)

_____ Option 7 (75 percent solids with no unstabilized solids)

_____ Option 8 (90 percent solids with unstabilized solids)

_____ None or unknown

E3. Residual from other facilities (continued).

e. Describe any treatment processes used at the other facility to reduce vector attraction properties of residual:

_____

_____

_____

f. Describe any other residual treatment activities performed by the other facility not identified above:

_____

_____

_____

E4. Vector Attraction Reduction.

a. Other than the vector attraction reduction options listed in Part B, which vector attraction reduction option below, if any, is met when residual is placed on the active residual unit?

_____ Option 9 (Injection below land surface)

_____ Option 10 (Incorporation into soil within 6 hours)

_____ Option 11 (Covering active residual unit daily)

b. Describe, on this form or another sheet of paper, any treatment processes used at the active residual unit to reduce vector attraction properties of residual:

_____

_____

_____

E5. Surface disposal site closure plan.

a. Approximate date discharge to the surface disposal site ceased: _____

b. A description of the surface disposal site including:

approximate acreage: _____

lateral and vertical extent: _____

The origin and volume of the residual remaining in the surface disposal site: _____

_____

_____

E5. Surface disposal site closure plan (continued).

c. Dated quality analyses of the residual on a mg/kg dry weight basis including analyses of all constituents required to be analyzed in accordance with the Sludge Quality Assurance Regulations (SQAR), N.J.A.C. 7:14-4. The number of samples required to be analyzed shall be based on a statistical method as described in the Department's Field Sampling Procedures Manual, or as otherwise approved by the Department.

Additional quality analyses may be required if deemed necessary by the Department through evaluation of past SQAR reports or other relevant information, such as information on industrial discharges which might contribute constituents not normally evaluated under the SQAR program.

d. Explain how pathogen requirements or vector attraction reduction requirements were achieved:

_____

_____

_____

e. Describe the proposed method of closure, including plans for the removal and/or in-situ closure of the residual remaining at the surface disposal site, and an implementation schedule for each component of the closure plan:

_____

_____

_____

For in-situ closure proposals, the following information:

a. Is the closed surface disposal site located in a floodplain, or can the closed surface disposal site restrict the flow of a base flood? If yes, describe:

_____

_____

_____

b. Is the closed surface disposal site located in an unstable area? If yes, describe:

_____

_____

_____

c. Does the surface disposal site have a liner and/or leachate collection system?

_____ Liner only _____ Leachate collection only _____ Both _____ None

If the surface disposal site has a liner and/or leachate collection system, describe how the leachate collection system will be operated and maintained for a minimum of five years and/or describe the liner:

_____

_____

_____

E5. Surface disposal site closure plan (continued).

d. If a cover is to be placed over the closed surface disposal site, provide a description of the system used to monitor for methane gas in the air in any structures within the surface disposal site and in the air at the property line of the surface disposal site for a minimum of five years:

_____

_____

_____

e. Describe how public access to the surface disposal site will be restricted for a minimum of five years:

_____

_____

_____

f. Provide a calculation of the surface run-off across the surface disposal site using a 24-hour, 25-year storm event with estimates of the effect of such run-off on treatment capacity, storage capacity, erosion, flooding, impacts on surface water quality and related details:

_____

_____

_____

g. Attach a copy of the detailed description of the surface disposal site recorded, along with the deed, with the appropriate county recording office.

h. Attach a Soil Erosion and Sediment Control Plan certified or approved in accordance with the Soil Erosion and Sediment Control Act (N.J.S.A. 4:24-39 et seq.), unless such planning is determined inapplicable by an agency with concurrent jurisdiction.

E6. Ground Water Monitoring.

a. Is ground water monitoring currently conducted at the active or closed residual unit?

_____ Yes _____ No

If yes, submit a summary of ground water monitoring data with this permit application. Also, submit information on well construction, a written description of the well locations, approximate depth to ground water, and the ground water monitoring procedures used to obtain these data.

b. Has a ground water monitoring program been prepared for the active or closed residual unit?

_____ Yes _____ No

If yes, submit a copy of the ground water monitoring program with this permit application.

PART F: OUT-OF-STATE GENERATORS

Please be advised that distribution or land application of an out-of-state Marketable Residual Product in New Jersey requires issuance of a NJDEP approval, which may include issuance of a NJPDES permit, in accordance with N.J.A.C. 7:14A-20.7(l). Out-of-state generators which transport residual into the State of New Jersey to be applied to the land shall, at a minimum, submit the following.

F1. Additional Information.

Out-of-state generators which transport residual into the State of New Jersey to be applied to the land shall, at a minimum, submit the following additional notice requirements:

a. Information as required to be submitted pursuant to Parts A, B and D above, and Part I below, as applicable.

b. Copies of those permits and approvals issued by the permitting authority for the state in which the residual is prepared.

c. Permitting authority information for the state in which the residual is prepared:

Name: _____

Title: _____

Phone: ( ) _____

d. List any brand names under which the marketable residual product will be distributed:
_____

e. The approximate time period during which bulk residual will be applied to each residual land application site identified in Part D above: _____

PART G: RESIDUAL TRANSFER STATIONS

Complete this part only if you own or operate a residual transfer station.

G1. Residual Information.

Information on the characteristics of each residual received, to the extent known at the time that the permit application is submitted, including:

a. Describe here the method for transporting the residual from the site of generation to the residual transfer station. In addition, attach a map of transportation routes to be used in transporting residuals:

_____

_____

_____

b. List here the origin and quantity (in dry metric tons per 365 day period) of each residual to be processed. For each residual to be processed estimate the approximate number of round trips made per day:

ORIGIN	NJPDES #	QUANTITY	ROUND TRIPS

c. A summary of all data submitted under the Sludge Quality Assurance Regulations (SQAR), N.J.A.C. 7:14-4, for the previous twelve month period;

d. Additional quality analyses (including characteristics pursuant to N.J.A.C. 7:26G) may be required by the Department after evaluation of past SQAR reports or other relevant information, such as information on industrial discharges which might contribute constituents not normally evaluated under the SQAR program or which may exceed levels identified in USEPA's Technical Support Document for the ultimate management alternative used by the transfer station.

e. Describe the mode of transporting residual from the transfer station to the ultimate management site:

_____

_____

_____

f. How long will residual be stored on-site prior to ultimate management?

Average operation: _____ days

Peak operation: _____ days

Note: storage installations used to store residual are required to obtain a Treatment Works Approval pursuant to N.J.A.C. 7:14A-22 and –23.

G1. Residual Information (continued).

g. Describe all process additives, including quantity required, source, trade names, and chemical analysis where available:

_____

_____

_____

_____

h. Attach a descriptive statement of the process used and operation of the proposed facility. Within this format, provide a description and detailed specifications of all process steps (including but not limited to residual delivery, storage, mixing, dewatering, and any stabilization method) and the related equipment, pollution control systems, instrumentation and monitoring mechanisms.

_____

_____

_____

_____

i. Provide a comprehensive materials balance for the proposed system/operation. The materials balance shall account for every handling and processing step starting from residual delivery to the facility and ending with final removal of residual from the site.

_____

_____

_____

_____

G2. Topographic Map.

Provide a topographic map that shows the following items of information. Map(s) must include the area one mile beyond all property boundaries of the facility.

a. Location of all residual treatment, storage, or disposal facilities, including land application sites and locations where residual is generated, treated or disposed in the map area;

b. Location of all surface water bodies in the map area;

c. Location of all wells used for drinking water listed in public records or otherwise known to the applicant in the map area.

PART H. REED BEDS

Complete this part only if you own or operate a reed bed.

H1. Information on Active Residual Units

a. Number of residual units or drying beds: _____

b. Unit name or number:
Bed # __ _____ size: _____ square feet
Bed # __ _____ size: _____ square feet
Bed # __ _____ size: _____ square feet
Bed # __ _____ size: _____ square feet
Bed # __ _____ size: _____ square feet
Bed # __ _____ size: _____ square feet
Bed # __ _____ size: _____ square feet
Bed # __ _____ size: _____ square feet
Bed # __ _____ size: _____ square feet
Bed # __ _____ size: _____ square feet
Bed # __ _____ size: _____ square feet

c. Total gallons of residual placed on the active residual units per 365-day period: _____

d. Average total solids of residual: _____%

e. Loading (divide item c by total square feet in item b): _____ gallons per sq. ft. per year

f. Type of residual(s) to be loaded: Aerobic _____ Anaerobic _____
Alum _____ Primary _____
Other _____ (describe:_____)

g. Does the active residual unit have a liner with a maximum hydraulic conductivity of 1 X 10^{-7} cm/sec?
_____ Yes _____ No

If yes, describe the liner (or attach a description):

_____

_____

_____

h. Does the active residual unit have a leachate collection system?

_____ Yes _____ No

If yes, describe the leachate collection system. Also describe the method used for leachate disposal:

_____

_____

_____

H1. Information on Active Residual Units (continued)

i. If you answered no to either H.1.f or H.1.g., answer the following question:

Is the boundary of the residual unit less than 150 meters from the property line of the surface disposal site? _____ Yes _____ No

If yes, provide the actual distance in meters: _____

j. Anticipated next evacuation or closure date for active residual unit, if known: _____

k. Provide a copy of any evacuation or closure plan that has been developed for this active residual unit.

H2. Topographic Map.

Provide a topographic map that shows the following items of information. Map(s) must include the area one mile beyond all property boundaries of the facility.

a. Location of all residual treatment, storage, or disposal facilities, including land application sites and locations where residual is generated, treated or disposed in the map area;

b. Location of all surface water bodies in the map area.

PART I: CERTIFICATION

Read and submit the following certification statement with this application.

Indicate which parts of Form R you have completed and are submitting:

☐ Part A (General Information)

☐ Part B (Generation of residual or preparation of a material derived from residual)

☐ Part C (Environmental Assessment)

☐ Part D (Land Application)

☐ Part E (Surface Disposal)

☐ Part F (Out-of-state Generators)

☐ Part G (Residual Transfer Stations)

☐ Part H (Reed Beds)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with the system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for purposely, knowingly, recklessly, or negligently submitting false information.

Signature of Officer: _____

Name of Officer: _____
(type or print)

Official Title: _____

Telephone Number: (____) _____

Date Signed: _____

APPENDIX I - LLAMA APPLICATION FORMS
(Reserved)

APPENDIX J - REFERENCES

1. United States Environmental Protection Agency "Standards for the use or disposal of sewage sludge" (40 CFR Part 503).
2. "New Jersey Pollutant Discharge Elimination System" (N.J.A.C. 7:14A).
3. Production Recommendations for New Jersey Field Crops, Cooperative Extension Service, Cook College, Rutgers, The State University of New Jersey.
4. Guide to Soil Suitability and Site Selection for Beneficial Use of Domestic Wastewater Biosolids, Oregon State University Extension Service, September 1995.
5. Technical Support Document for Land Application of Sewage Sludge, Volumes I and II, EPA 822/R-93-001a and 001b, November 1992.
6. USEPA Process Design Manual Land Application of Sewage Sludge and Domestic Septage, EPA/625/R-95/001, September 1995. This manual summarizes nationwide information concerning land application of sludges.
7. USEPA Environmental Regulations and Technology: Control of Pathogens and Vector Attraction in Sewage Sludge, EPA/625/R-92/013, December 1992.
8. USEPA Part 503 Implementation Guidance, EPA 833-R-95-001, October 1995. This document is a compilation of federal requirements, management practices and EPA recommended permit conditions for sewage sludge use and management practices.
9. USEPA Guide to the Biosolids Risk Assessments for the EPA Part 503 Rule, EPA-832-B-93-005, September 1995.
10. USEPA A Plain English Guide to the EPA Part 503 Biosolids Rule, EPA/832/R-93/003, September 1994.
11. New Jersey "Statewide Sludge Management Plan", November 1987.
12. New Jersey "Sludge Quality Assurance Regulations" (SQAR), N.J.A.C. 7:14-4.

APPENDIX K – UNIT CONVERSIONS

Analytical data on residuals characteristics and the standards established by regulatory agencies are usually expressed in metric units. Farmers and farm advisors, however, usually use English units for expressing nutrient requirements and the amounts of residuals to apply. Therefore, you will see the requirement to report information using metric units on Form 2R to comply with federal regulations; however, information required on the LLAMA application forms is typically expressed in English units. The following information is designed to help you convert from one unit to the other.

The following tips may be useful in simplifying your calculations and presenting information in terms understandable to your users:

1. Make all conversions at one time, either at the beginning or the end. Rounding errors in metric-English conversions can be very large, and the number of times units are converted should be minimized.
2. Milligrams per kilogram (mg/kg) is the same as parts per million (ppm). Thus, if residuals analysis data report 65,000 mg NH_4-N/kg, that is the same as 65,000 mg NH_4-N per 1,000,000 mg oven-dried residuals.
3. When the units are the same in the numerator and the denominator, the same fraction can be expressed in any unit. In this example, the equivalent English unit is 65,000 lb. NH_4-N per 1,000,000 lb oven-dried residuals. This can then be expressed as 65 lb NH_4-N per 1,000 lb oven-dried residuals, or 130 lb per ton of oven-dried residuals.

Metric Unit[1]	**Conversion factor**	**English unit**[2]
Centimeter	0.3937	Inch
Meter	3.2808	Foot
Kilometer	0.6214	Mile
Hectare	2.4711	Acre
Cubic Meter	35.3147	Cubic foot
	0.00081071	Acre-foot
	264.25	Gallon
Gram	0.002205	Pound
Kilogram	2.205	Pound
	0.0011	Tons
Metric ton	1.10	Tons
Kilograms per hectare	0.000446	Tons per acre
	0.892	Pounds per acre
Metric tons per hectare	0.892	Tons per acre

[1]To convert metric to English, *multiply* the metric unit by the conversion factor in the middle column.

[2]To convert English to metric, *divide* the English unit by the conversion factor in the middle column.