CITY OF ABERDEEN

CHAMBER OF COMMERCE

TRANSPORTATION TECHNOLOGY

ABERDEEN

ABERDEEN'S ABERGREEN COMPOST

ABERDEEN COMPOST
DISTRIBUTION BROCHURE / LABEL

Aerobic bacteria are used to decompose the sludge into a stable, humus-like product, which can be used as a soil conditioner and source of plant nutrients. As the sludge decomposes, it becomes heated to temperatures in the general range of 55-80 degrees C (130-190 degrees F) which destroys pathogens (bacteria, viruses, protozoans and helminthes which are harmful to man) and provides the compost with an earthy odor.

Handling / Distribution

Nutrients are present in the compost at an average concentration of:

Nutrients	Percentage
Total Nitrogen	2.00% <0.50 Water Soluble Nitrogen
Total Phosphate (P2O5)	1.00% >1.5% Water Insoluble Phosphate
Total Potash (K2O)	1.00%

Heavy metals in Aberdeen sludge have been found by analysis to be less than the following limits recommended by the U.S.D.A. on a dry weight basis. The nickel level identified is dictated by COMAR 26.04.06, MD. State, Department of the Environment, Division of Sewage Sludge Management.

The treated sludge meets guidelines for the limitation of heavy metals and other constituents as set by the Department of the Environment. The constituent's concentrations for sewage sludge compost containing less than 3 percent nitrogen to unlimited distribution to the general public to be used as a fertilizer or soil conditioner may not exceed the following values:

Metals	Parts Per Million (Dry Weight Basis)
Zinc	1,250
Copper	500
Cadmium	12.5
Nickel	100
Lead	500
Mercury	5
PCBs	5

Warning: Iron greater than 4% on a dry weight basis, compost cannot be used on pasture land.

Transportation

The treated sewage sludge shall only be transported from the facility to the distribution destination in accordance with the transportation requirement in COMAR 26.04.06.09E(1) and (3)-(6).

(1) For purpose of this section, sludge is divided into three types as shown in Table V below:

Table V

Sludge Type	*Percent Solids*
Liquid	Less than 15
Sludge cake	15 – 35
* Dried	Greater than 35

(2) * Note: Our facility only permits greater than 35 percent solids for compost distribution.

(3) If liquid sludge is transported by truck, closed water tight vessels shall be used as tank trucks.

(4) Sludge cake may be transported in watertight boxes, such as dump trucks properly sealed to prevent leaks, or cement type vehicles. When sludge cake is transported in dump trucks the following standards shall be met:

- The trucks shall be equipped with splash guards firmly attached horizontally at the front and rear of the trailer.
- Each splash guard shall cover at least 25 percent of the trailer's open area.
- A minimum 2 feet of freeboard shall be maintained between the sludge and the top of the trailer unless the top of the trailer is completely sealed.

(5) The Maryland Department of the Environment may require certain cake sludges to be transported as liquid sludge.

(6) Dried sludge greater than 35 percent solids may be transported in open boxes, such as dump trucks, which are properly sealed to prevent leakage.

Destination Site / Storage

(1) The treated sewage sludge shall only be transported from the facility to the distribution destination in accordance with the transportation requirement in COMAR 26.04.06.09E(1) and (3)-(6).

(2) The treated sewage sludge shall not be field stockpiled (staged) or land applied in a manner that will cause an undue risk to the environment, public health, or safety, or in a manner that causes or is likely to cause a discharge of constituents to the waters of the State.

(3) The treated sewage sludge shall not be field stockpiled (staged) on the receiving site for more than fourteen (14) calendar days provided that field stockpiling (staging) is appropriately placed as provided under items 2 and 6 of this label. This authorization shall not relieve the user of the obligation to comply with other State, federal and local laws and regulations.

(4) The treated sewage sludge may be field stockpiled (staged) up to ninety (90) calendar days provided that after fourteen (14) calendar days adequate separation from storm water is provided to prevent leaching or runoff of constituents through the use of a functional, intact plastic cover at least 6 mils thick, or other equivalent cover, arranged so

that no significant infiltration of water into the treated sewage sludge can occur during or following rain events.

(5) The treated sewage sludge shall not be field stockpiled (staged) on the receiving site for more than ninety (90) calendar days unless the receiving site has a separate Sewage Sludge Utilization Permit issued by the Maryland Department of the Environment for storage of sewage sludge.

(6) The treated sewage sludge shall not be field stockpiled (staged) within 10 feet from a field ditch, or 100 feet from a stream, a drainage system, or other surface water conveyance. Additionally unacceptable locations for field stockpiling (staging) includes areas where water is ponded or likely to be ponded during a rain event; low areas where surface water accumulates or is likely to accumulate during a rain event; areas where water from a stream that is swollen due to rain contacts or is likely to come in contact with the treated sewage sludge; or areas where the treated sewage sludge will block the natural surface drainage to the extent that it will cause ponding of surface water.

(7) The treated sewage sludge shall only be land applied on agricultural land in accordance with a nutrient management plan prepared by a certified and licensed nutrient management consultant or a certified operator in accordance with the Maryland Department of Agriculture requirements in COMAR 15.20.04 and in compliance with COMAR 15.20.07 and 15.20.08.

(8) If the treated sewage sludge stockpiled (staged) at a site is otherwise regulated by an individual or general NPDES Permit, the provisions of that permit will take precedence over items 2-6 of this label.

I. GENERAL USES, PROPERTIES AND PRECAUTIONS

A. The compost can be safely used as a fertilizer or soil conditioner where food chain, root and leafy vegetables crops are grown. If compost is to be utilized for leafy vegetables, a soil pH of 6.5 must be required for control of metals. Sludge compost can be utilized advantageously in potting mixes, for agronomic crops, on lawns, and as mulch. It can also be used as a topsoil substitute for land reclamation production of trees and ornamental plants, on golf courses and cemeteries, for re-vegetation of disturbed lands (e.g., from surface mining), and for landscaping of parks and around public buildings.

B. The application of sludge compost at fertilizer rates (i.e., the nitrogen requirement of the crop) to marginal soils can produce significantly higher yields than commercial fertilizers applied alone at the same nitrogen level. Higher yields are attributed to an improvement in soil physical properties by the compost. Sludge compost is known to improve soil physical properties, as evidenced by enhanced aggregation. Increase soil aeration. Lower bulk density, less surface crusting, increased water infiltration, water content, and water retention. Sludge compost added to sandy soil applied alone at the same nitrogen rate will increase the moisture available to the plant and reduce the need for irrigation. In heavy textured clay soils, the added organic matter will increase the soil's permeability of water and air, increase water infiltration into the profile, and thereby minimize surface runoff. The soil also will have a greater water storage

capacity. Addition of sludge compost to clay soils has also been shown to reduce compaction (i.e., lower the bulk density) and to increase root development.

C. Sludge compost, like composted manure, is hygienically and environmentally safe if it is used properly, however it can become a hazardous nuisance if mismanaged. Do not leave it in unprotected piles that might become a play area for children or where pets might wander. Keep it away from all surface water, and do not pile it near wells or other water supplies. It should be washed off all fruits and vegetables before they are consumed.
WARNING: IF IRON CONCENTRATION EXCEEDS 4 PERCENT ON A DRY WEIGHT BASIS COMPOST SHOULD NOT BE USED ON PASTURE LAND.

II. USE ON TURF GRASSES

A. Composted sewage sludge can be used economically and beneficially to turf grass production for various areas including: home lawns, parks, institutional grounds, athletic fields, golf courses, and roadsides. It can be used in the production of cultivated sod. The benefits from utilizing compost are derived from its content of plant nutrients, organic matter, and liming properties. On many soils with poor physical properties, compost used correctly will produce better turf grass than chemical fertilizers. Organic matter in the compost, (approximately 50 percent by weight) improves the physical condition of the soil, which in turn improves plant growth. The use of compost as a source of organic matter takes on added significance as more marginal lands are being used for construction of homes and other developments and as good topsoil becomes increasingly expensive.

B. The plant nutrient content of composted sludge, especially its nitrogen content and the rate of mineralization, are very important when compost is utilized in turf grass production. Nitrogen affects the rate of maximum growth or production of vegetative material in turf grass production and is generally undesirable. The desirable rate of growth is one that is sufficient to maintain a healthy, uniform turf during the growing season without excessive production of vegetation.

C. The chemical composition of composted sludge is variable. The nitrogen, phosphorous, and potassium content generally ranges from 1 to 4.0, 0.5 to 2.0 and less than 2.0 percent respectively. Mineralization is slow with nutrients being released and available for plant growth over a relatively long period. Application rates to supply the nitrogen requirement will also supply sufficient levels of all other essential nutrients for growth of turf grass with the exception of potassium and phosphorous. Supplemental potash and phosphorous should be added according to soil test results.

D. Composted sludge can be used in turf grass production as

- A soil amendment for the establishment of turf grass.
- A fertilizer source for maintenance of established turf grass.
- A soil amendment or growth medium for commercial turf grass production.

III. ESTABLISHMENT

A. Establishment of turf grass from seed or sod can be significantly increased on many soils by using composted sludge principally as a soil conditioner. When the compost is incorporated with the top 5-6 inches of the soil or is applied as a mulch to the soil surface before or after seeding, seedling establishment is more rapid than with conventional fertilizer practices. Best results for germination, establishment and initial growth rate of turf grass are obtained with application of 2,000 to 6,000 pounds per 1,000 square feet (wet weight equivalent to 40 percent moisture). The lower rate is generally used on fertile soils and the higher rate on sandy soils or subsoils low in organic matter. These rates will provide sufficient nitrogen for optimum plant growth. Potassium must be added if the soil is naturally low in this element. The potassium fertility level of a soil can be certified by a soil test. Additions of less than 2,000 pounds per 1,000 square feet are beneficial but should be supplemented with commercial nitrogen and potassium fertilizer. Where compost applications are based on the nutrient requirements of the turf grass, rather uniform and favorable growth rates can be expected for 5-6 months after seeding or sodding. Excessive growth occurs with additions greater than 6,000 pounds even on infertile soils.

B. Compost should be applied at a rate of 600-700 pounds per 1,000 square feet to the soil surface as a mulch before or after seeding season grasses. When used as a mulch with small seeded grasses, such as Kentucky bluegrass and bentgrass, the compost should be applied before seeding. With larger seeded grasses, such as tall fescue, red fescue, and perennial ryegrass, the compost mulch should be applied uniformly after seeding.

C. Root growth of conventionally produced sod is increased when the sod is laid on soil that is previously amended with compost. Applications of 2,000-4,000 pounds per 1,000 square feet, depending on the soil and incorporated to a depth of 4-6 inches, will significantly increase growth and development and provide near optimum growth for 2-4 months after the sod is laid. Root growth is not increased appreciably with higher compost rates, however, excessive grass growth can be expected with rates higher than 6,000 pounds per 1,000 square feet.

IV. MAINTENANCE

A. Composted sewage sludge can substitute for conventional fertilizer in the maintenance of established turf grass. The extent to which compost can be used to supply the total nitrogen requirement depends on the maintenance level desired. For turf under a low-to-moderate level, compost can be used to supply the total nitrogen. For higher maintained or a higher quality turf, compost can be used to supply a part of the nitrogen requirement, with the additional nitrogen supplied from other sources.

V. SOD PRODUCTION

A. The greatest potential use of compost in the turf grass industry is probably in commercial sod production. If compost is managed properly, large quantities could be used on a relatively small land area. It can be used in sod production as a soil amendment, as discussed under establishment of turf grasses, or as a growth medium.

B. When used as a soil amendment, 3,000-6,000 wet pounds per 1,000 square feet (approximately 65-130 wet tons per acre) incorporated to a depth of 4-6 inches will provide good plant growth. Incorporating the compost is essential if irrigation is not practiced. Further research is needed to evaluate the optimum usage of compost under different production practices.

C. Composted sewage sludge is an ideal growth medium for most turf grasses. The only essential plant nutrient that has to be added is potassium. Kentucky bluegrass- red fescue and tall fescue- Kentucky bluegrass mixtures seeded into a 2 to 6 inch layer (6,000-18,000 wet pounds per 1,000 square feet) of compost on the soil surface can produce a harvestable sod within seven months after fall seeding compared with 12-18 months normally required when compost is not used. When seeding into a layer of compost on the soil surface, irrigate to leach salts and prevent drying of the upper part. Although frequent mowing is required, the total number of mowings would be about the same as with conventional sod production because the sod can be harvested sooner. Other advantages of surface applications are that little or no herbicides and commercial fertilizers are required. Moreover, compost sod weighs about 30-40 percent less than mineral soil sod.

VI. USE ON VEGETABLE CROPS

A. The benefits of applying sewage sludge compost to vegetable cropland are derived from improved soil physical properties, such as enhanced aggregation, lower bulk and retention, and increased cation exchange capacity. Compost also provides P, micronutrients, and some slowly available nitrogen. However, because of the high N requirements in many vegetable crops, the application of sewage sludge compost as a N Fertilizer may not effect desired results. The greatest fertilizer value is obtained when compost is used in combination with other inorganic fertilizers.

B. Even though the high temperatures achieved during composting destroy enteric pathogens, there are recommendations from U.S.D.A. that in warm and humid climates vegetables eaten uncooked may be grown three years after the compost is applied. Cooked or blanched vegetables may be grown the same year as compost application. Since the compost of the distributed product is monitored to meet State Regulations, all types of crops may be grown safely for human consumption given proper preparation. As in other vegetable gardens, leafy vegetables should be washed to remove soil and any pesticide residues.

C. Compost should not be applied at rates in excess of the nitrogen requirement of the plants which are to be grown. Information on specific crop fertilizer requirements for gardens can be obtained through the local cooperative extension agent. The amount of 1,500 pounds per 1,000 square feet of compost will supply approximately 85 pounds of nitrogen. After application, the compost should be thoroughly mixed with the top 4-6 inches of soil. Compost should be applied 1-2 weeks before planting vegetable crops to prevent injury from soluble salts. One inch of compost or 3,000 pounds per 1,000 square feet tilled into most gardens will supply enough nitrogen for nearly any crop; excessive nitrogen from any source can delay and reduce the fruiting of tomato and

other crops. Compost contains organic nitrogen that becomes available over a period of time and acts like a slow release nitrogen fertilizer. Thus, the compost application should be reduced to a ½ inch in subsequent gardening years since some residual nitrogen is supplied from previous compost applications. If the nitrogen requirement cannot be obtained with the volume of compost you have available a commercial organic fertilizer should be added as a supplement.

D. Compost in sufficient volumes usually provides all the nitrogen and phosphorus that crops generally need. Many gardens are low in potassium. Supplementing compost with a potash fertilizer may increase the yield of fruit and root crops. If soil tests show the pH to be below 6.5-7.0 after applying the compost, some lime should be applied. Soil testing can be identify the need for supplemental potash and will specify the amount of lime to apply. Contact the County Cooperative Extension Service for information on obtaining a soil test. After several years of compost use, the benefits of additional organic matter are small, and regular fertilizers can be used since they are as effective as additions of compost for supplying plant nutrients.

VII. USE ON FIELD CROPS

A. Compost application in the field can be made by using a calibrated manure spreader. When sewage sludge compost is used as a fertilizer as well as a soil conditioner for agronomic row crops or pasture, yearly compost application rates should be determined by the nitrogen or phosphorous requirement of the specific crop to be grown. Compost application rates for field crops are given in Table 1. And this information can be obtained from a local cooperative extension agent. For example, an oat variety requiring only 40 pounds of nitrogen per acre would need 1,000 pounds per 1,000 square feet (21.5 tons per acre) of sludge compost as the soil amendment. A corn variety requiring 150 pounds of nitrogen per acre would need 3,800 pounds per 1,000 square feet (83 tons per acre) of sludge compost. A general rule of thumb to calculate the nitrogen supplying power of sludge compost containing 2.5 percent nitrogen is that one ton of compost contains about 1.9 pounds of available nitrogen on a wet weight basis. This assumes that ten percent of the nitrogen in the compost is available to the crop the first year. To plant legumes the same year the compost is applied is not considered a good practice, because the nitrogen released from the compost will initially reduce the quantity supplied by the legume. Moreover, since most legumes do not need nitrogen fertilizer, it is an inefficient use of the nitrogen.

B. Because the compost also contains less than one percent phosphorous, supplemental phosphorus fertilization may be necessary when compost is applied according to the nitrogen requirement of the crop. Since the compost contains 1.0 percent potassium, it may be necessary to apply supplemental potash to such crops as corn.

C. The best management practice is to maintain soil pH at 6.5-7.0. Periodic soil testing and pH monitoring are advisable to insure proper soil fertility. These services can be obtained through the Cooperative Extension Service.

VIII. USE ON FORAGE GRASSES

A. Compost can be used successfully to establish and maintain forage grasses. For establishment, 4,000-7,000 pounds per 1,000 square feet should be thoroughly incorporated with the top six inches of soil. The lower rate should be used on rather fertile or already productive soils and higher rates on unproductive soils. Additions of compost at the preceding rates should produce a rapid rate of growth. Later applications of ½ pound per 1,000 square feet (25 pounds per acre) of a soluble nitrogen fertilizer will be needed to maintain a high rate of growth.

B. To maintain the pasture after the first year, apply compost after the grass is mowed or cut. A rate of 1,000-1,300 pounds per 1,000 square feet should be sufficient to maintain and produce quality forage. Animals can be allowed to graze after re-growth has occurred. After repeated applications of sludge compost (5-10 years), a substantial amount of compost probably will have accumulated on the surface from top-dressing. If so, the pasture should be renovated by tilling the compost into the soil. Tilling and replanting best utilize the soil conditioning properties of the compost and minimize ingestion of the compost by the animals while grazing.

IX. USE ON NURSERY CROPS AND ORNAMENTALS

A. Mixing compost in nursery soil and soils where plantings of trees and shrubs are to be made can improve soil fertility, pH, soil structure, and water-holding capacity. Compost can be used very effectively for growing many nursery crops and ornamentals with the applications of 1,900-7,000 pounds per 1,000 square feet incorporated with the surface 6-9 inches of soil.

B. Compost used at rates of over 2,000 pounds per 1,000 square feet may temporarily injure plants and slow seed germination due to high soluble salt concentrations, if the soil is not thoroughly watered before planting or seeding.

C. In subsequent years, compost-amended soils may require supplemental applications of nitrogen and potassium. Nitrogen can be applied by using organic wastes or commercial fertilizers.

X. USE IN POTTING MIXES

A. Sludge compost can be used effectively in preparing potting mixes to grow transplants for ornamental, garden, or commercial purposes. Here, too, compost supplies organic matter, calcium, magnesium, phosphorus, potassium, and slow-release nitrogen, as well as fertilizer levels of microelements (boron, copper, iron, manganese, molybdenum and zinc) for plants. Effective potting mixes have been prepared, by volume, from sludge compost + peat moss + vermiculite (1:1:1), compost + peat + sand (1:1:1), and compost + infertile loamy subsoil (1:1).

XI. USE FOR RECLAMATION OF DISTURBED AND MARGINAL LANDS

A. Applying composted sludge can aid significantly in the re-vegetation and reclamation of lands disturbed by surface mining, removal of topsoil, and excavation of gravel deposits. On these lands the establishment and growth of plants are difficult because of

- Extremely low pH
- Extreme droughtiness from lack of organic matter
- Very high surface temperatures
- Lack of nutrients
- Very poor soil physical conditions

Research by the Department of Agriculture has shown that through the proper use of sludge compost and dolomitic limestone, a wide variety of agronomic crops can be grown on such lands. With proper management, disturbed lands can be reclaimed in a surprisingly short time. Often in reclamation, the use of compost is cheaper and plant growth better than with commercial fertilizers.

B. Compost applications for marginal lands should be based on soil characteristics and the cover crop to be grown. For disturbed soils, up to 9,200 pounds per 1,000 square feet (200 wet tons per acre) could be applied with even higher rates where the compost is mixed with more than six inches of surface soil and where groundwater contamination is not a potential problem (e.g., if the watershed has essentially no other nitrogen inputs and any resulting contamination would be small, temporary or both). Since compost functions as a slow release nitrogen fertilizer, a heavy single application of compost could supply the fertilizer requirements for several seasons. Research has shown that on very droughty or acid soils, the deeper the compost is incorporated with the soil, the better are the crop yields. Special equipment may be required for deep placement of the compost.

C. The establishment of grasses on disturbed or marginal lands have been best treated with a fall application of sludge compost and subsequent seeding. For both grassland and agronomic crops, the compost should be thoroughly plowed and disked into the soil before the crop is planted. On acid soils, with crops requiring less than 1,600 pounds per 1,000 square feet (36 wet tons per acre) of sludge compost for their nitrogen requirement, (1-2 tons per acre) of lime may be needed. On soils where the pH is lower than 4.5, more lime may be necessary for maximum crop yields.

TABLE 1
Various Uses and Application Rates of Sewage Sludge Compost to Achieve Fertilizer Benefits and Soil Improvement

USE	COMPOST PER 1,000 SQUARE FEET[1]	REMARKS
Turf grasses:		
Soil Incorporated	2,000-6,000 lbs.	Incorporate with top 4-6 inches of soil. Use lower rate on relatively fertile soil and higher rate on infertile soil.
Surface Mulch	600-700 lbs.	Broadcast uniformly on surface before seeding small seeded species (bluegrass) or after seeding large seeded species (fescues)[2].
Maintenance	400-800 lbs.	Broadcast uniformly on surface. On cool season grasses apply higher rate in fall or lower rate in fall and again in early spring.
Sod Protection when incorporated with soil	3,000-6,000 lbs.	Incorporate with top 4-6 inches of soil.
Vegetable Crops:		
Establishment	1,000-1,300 lbs.	Rototill into surface 1-2 weeks before planting or in the previous fall. Do not exceed recommended crop nitrogen rate.
Maintenance	1,000 lbs.	Rate is for years after initial garden establishment. Rototill into surface 1-2 weeks before planting or in previous fall.
Field Crops:		
Barley, Oats, Rye, Wheat	1,000-1,300 lbs.	Incorporate into soil 1-2 weeks before planting or in the previous fall.
Corn	3,000-3,800 lbs.	Incorporate into soil 1-2 weeks before planting. Supplemental potash may be required depending on the soil test.
Legumes[3]	----------	Legumes can be grown in rotation with corn, oats, or other nitrogen requiring crops.

[1] 1,500 pounds per 1,000 square feet is equal to ½ inch of compost per 1,000 square feet or 33 wet tons based on 40 percent moisture content and ½ inch mesh-screened material.

[2] See Sod Production.

[3] Legumes, such as alfalfa and soybeans, do not need all the nitrogen fertilizer supplied by the compost. Maximum benefit of compost can be realized by growing legumes in rotation.

TABLE 1 (Cont'd)
Various Uses and Application Rates of Sewage Sludge Compost to Achieve Fertilizer Benefits and Soil Improvement

USE	COMPOST PER 1,000 SQUARE FEET[4]	REMARKS
Forage Grasses:		
Establishment	4,000-7,000 lbs.	Incorporate with top 4-6 inches of soil. Use lower rate on relatively fertile soil and higher rate on infertile soil. Supplement during first year's growth with ½ pound per 1,000 square feet (25 pounds per acre) of soluble nitrogen fertilizer when needed.
Maintenance	1,000-1,300 lbs.	Broadcast uniformly on surface in fall or early spring one year after incorporated application.
Nursery Crops and Ornamental (Shrubs and Trees):		
Establishment	1,900-7,000 lbs.	Incorporate with top 6-8 inches of soil. Do not use where acid soil plants (azalea, rhododendron, etc.) are to be grown.
Maintenance	200-500 lbs.	Broadcast uniformly on surface soil. Can be worked into soil or used as a mulch.
Potting Mixes[5]	Equal Ratio	Thoroughly water and drain mixes several times before planting to prevent salt injury to plants.
Reclamation:		
Conservation Planting	Up to 9,200 lbs.	Incorporate with top six inches of soil. Use maximum rate only where excessive growth for several months following establishment is desirable. For each inch beyond six inches of incorporation, add 1,000 pounds per 1,000 square feet on soils where groundwater nitrogen will be.

Notes:
Aberdeen's concentrations of nitrogen, phosphorous, and potassium are averages used for application rates.

Specific quarterly analysis results are available upon request. The analytical data obtained each quarter will be transferred to an updated label in order to reflect any changes in the application rates of the material.

This brochure has been adapted from the U.S. Department of Agriculture Bulletin 464, Use of Sewage Sludge Compost for Soil Improvement and Plant Growth.

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[4] 1,500 pounds per 1,000 square feet is equal to ½ inch of compost per 1,000 square feet or 33 wet tons based on 40 percent moisture content and ½ inch mesh-screened material.

[5] See Potting Mixes.