Florida Department of Environmental Protection
Memorandum

To: Jerry Brooks, Assistant Director
Division of Water Resource Management

Through: Richard Drew, Chief
Bureau of Water Facilities Regulation

From: Elsa Potts, P.E., Administrator Office of Wastewater Management

DATE: August 9, 1999

SUBJECT: Residuals and Poultry Litter Loadings to the Lake Okeechobee Basin

This is in response to your request to conduct an initial review of potential loadings of domestic wastewater residuals and poultry litter in the Lake Okeechobee watershed following the watershed boundaries being used for TMDL development. This memo also includes preliminary recommendations which are based upon the information available at this time.

Overview

In 1998 in the Lake Okeechobee basin, approximately 15,386 dry tons of Class B residuals were land applied to approved agricultural sites and it is estimated that around 41,631 dry tons gf Class AA residuals were applied to land within the basin. This results in an estimated Total Phosphorus (TP) loading of 354 dry tons from Class B residuals and 749 dry tons from Class AA residuals. It is estimated that the Class B residuals were applied over approximately 5,000 acres and primarily used on pasture grasses such as bahia. Residuals are regulated by both the state and federal government.

Approximately 19,630 dry tons of poultry litter and manure is currently land applied in the basin. Application rates vary from 3 to 10 tons per acre per year which affects between 1,963 **and** 6,543 acres. The phosphorus (P205) loading associated with this source of nutrients was estimated to be 382 dry tons. Most of the poultry waste is used on

"organically grown" citrus while some is used on improved pasture. There is also increasing interest in use for sugar cane production. Poultry litter is currently not regulated by either the state or federal government.

1. Domestic Wastewater Residuals

Background

The Department encourages the beneficial use of residuals in accordance with Section 403.702, Florida Statutes, which directs the Department to promote the reduction, recycling, reuse, and treatment of solid waste, including residuals. Florida produces an estimated 253,000 dry tons of donaestic wastewater residuals annually of which approximately 75% is beneficially used either by being distributed and marketed as Class AA residuals products or directly land applied as Class A or Class B residuals. The remaining residuals are either landfilled or incinerated.

Residuals are rich in organic material and contain moderate amounts of nutrients. They are used as soil amendments and substitutes for commercial fertilizers. Residuals are considered to be a slow-release fertilizer that is less likely to leach or runoff than commercial fertilizers. If the use of residuals were to be restricted, residuals users may switch to the use of commercial fertilizers.

The treatment, management, and beneficial use of residuals is specifically regulated by Chapter 62-640, Florida Administrative Code, F.A.C., and Title 40 Code of Federal Regulations (CFR) Part 503. The wastewater facility permit includes requirements for pathogen reduction, vector attraction reduction, pollutant limitations, and record keeping and reporting. It further identifies sites where residuals can be land applied and identifies site management practices and site restrictions.

Treatment and land application of septage is primarily regulated by the Department of Health in accordance with Rule 64E-6.010**,** F.A.C. Only the largest septage management facilities (i.e. facilities treating more than 10'000 gallons per day on a monthly average basis) are regulated by DEP. These larger facilities are regulated by Chapter 62-640, F.A.C.

Class A and Class B

Land application of Class A or Class B residuals requires an approved Agricultural Use Plan (AUP), which is submitted with the wastewater facility permit application. A separate AUP is required for each land application site. This plan ensures that the setback distances of 200 feet to surface waters, 200 feet to conduits to ground water, and 1000 feet to Outstanding Florida Waters are met. The rule requires setback areas to be vegetated. Additionally, site slopes may not exceed 2% unless the permittee has a plan from the National Resources Conservation Service or a stormwater management plan that demonstrates that the site will retain runoff generated by the 10 year, 1 hour storm.

Land application rates of residuals are calculated on the basis of the amount of nitrogen needed by the crop. This prevents leaching of nitrogen to ground waters. There has been concern that application rates based on nitrogen result in overapplications of phosphorus. There is generally a 2.5 to 1 nitrogen to phosphorus ratio in residuals while the

phosphorus demand for bahia grass, the most common crop to which Class B residuals are applied in Florida, is about one-fourth that of nitrogen. The phosphorus is believed to accumulate on-site and potentially result in increased levels of phosphorus in the site runoff.

The March 30, 1998 revisions to Chapter 62-640, F.A.C., contain provisions that require a wastewater facility permittee "to address the potential for the movement of phosphorus" from the site if the site is located in a geographic area that the Legislature or Department rule have identified as being restrictive of phosphorus loadings. The Lake Okeechobee basin has been designated as a site identified as being restrictive of phosphorus loading and is mentioned as an example in the rule.

When addressing the potential for phosphorus movement, the permittee must consider the current concentration of phosphorus in the soil and annual soil tests are required to be conducted. Additionally, other sources of phosphorus, the crop phosphorus needs, measures that will be used to minimize or prevent water quality impacts from sediment transport, and the capacity of the soil to hold phosphorus should be addressed. However, the rule does not mandate specific restrictions on phosphorus loadings.

Permittees who land apply Class A or Class B residuals must report their annual loading rates of nutrients for each site they use to the appropriate DEP district office.

Loadings from Class A and Class B Residuals

Based on past inventories, about 96% of residuals produced are generated by Type I (flows of 500,000 gpd or more) wastewater facilities. It appears that 40 of the 47 Type I wastewater treatment facilities in the Southeast District land Apply Class B residuals,. No Class A residuals applications were reported in the basin. The quantity of residuals generated by these 40 facilities are estimated in the range of 25,000 to 40,000 dry tons. All land application by these facilities occurs in the counties located within and surrounding the Lake Okeechobee and Everglades basins. Facilities from Broward County appear to contribute the most to the Lake Okeechobee basin. It does not appear that many facilities from the South, Central, or Southwest District apply a significant amount of residuals within the Lake Okeechobee basin. It is possible there may be some applied in areas that drain to the Kissimmee River.

The 1997 Residuals Inventory indicated that the Total Phosphorus (TP) concentration of residuals averaged 2.3% on a dry weight basis. Based on data reported from the Southeast District, the annual loadings of Class B residuals during the past year in the Lake Okeechobee basin are as follows:

- Glades - none reported
- Hendry - none reported
- Highlands - none reported
- Martin - 7958 dry tons of residuals (183 dry tons of TP)

- Okeechobee - 6435 dry tons of residuals (148 dry tons of TP)
- Palm Beach - none reported
- St. Lucie - 993 dry tons of residuals (23 dry tons of TP)

Distribution and Marketing

Distribution and marketing of Class AA residuals is a common practice within the Lake Okeechobee basin. Class AA residuals meet Class A pathogen reduction as well as stricter metals limits. Class AA residuals are considered safe for unrestricted use and-are treated similar to commercial fertilizers. In some cases, Class AA residuals are blended into commercial fertilizers. While Chapter 62-640, F.A.C., regulates the facilities that generate, treat, and distribute and market Class AA residuals, the use of these residuals is unregulated. The generator is required to inform the user of the nutrient concentrations and recommend that the residuals be applied at an agronomic rate.

Facilities that distribute and market Class AA residuals are required to submit shipping and sales reports to document the quantities and counties where the residuals are distributed and marketed. Note, these reports only document the distribution and marketing of the residuals and may or may not reflect the actual quantity or location of the residuals applied.

Loadings from Class AA Residuals

Based on 1998 shipping and sales reports, a significant quantity of Class AA pelletized residuals is distributed and marketed in Highlands and Okeechobee Counties from out-of-state sources. St. Lucie County also receives a large quantity of Class AA residuals. However, since only a very small portion of the county is located within the Lake Okeechobee basin, it is unlikely that very much of these residuals, if any, is applied in the basin. The Solid Waste Authority of Palm Beach County distributes and markets a significant quantity of its Class AA compost in Palm Beach County. Similar to St. Lucie County, it is questionable whether any this compost is applied within the basin. Smaller amounts of Class AA residuals are distributed and marketed in Glades, Hendry, and Marion Counties.

The database on Class AA residuals indicates that TP concentrations in Class AA residuals average about 1.8% on a dry weight basis. Distribution and marketing of Class AA residuals in the vicinity of the Lake Okeechobee basin are as follows:

Class AA quantities:

- Glades - 480.67 dry tons of residuals (9.6 dry tons of TP)
- Hendry - 2251.45 dry tons of residuals (40.5 dry tons of TP)
- Highlands - 16295.07 dry tons of residuals (293.31 dry tons of TP)
- Martin - 1776.07 dry tons of residuals (32 dry tons of TP)
- Okeechobee - 11074.83 dry tons of residuals (199.3 dry tons of TP)
- Palm Beach - 28565.24 dry tons (MSW and Biosolid compost, not likely

applied in basin)(514.2 dry tons of TP)

- St. Lucie - 9753.33 dry tons (again, majority not likely in basin)(175.6 dry tons of TP)

Recommendations

Currently, the SFWMD SWIM plan requires general permits for the land application of residuals and individual permits for improved pastures, where residuals are typically applied. These permits regulate phosphorus only. Since all the residuals application in the basin appears to occur on "improved pastures", land owners who have started accepting residuals since receiving their individual permit for improved pasture need to revise their permit with the SFWMD and submit a revised phosphorus management plan. They apparently have not been doing this. The improved pasture permit limits the runoff concentration of phosphorus to 0.35 mg/L. We may want to improve communication with the WMDs and let them know when and where land applications have been approved by DEP. One way to do this might be to ensure that a copy of each approved AUP is sent to the WMD.

The use of Class AA residuals is not regulated. It does not appear that there is anything significant DEP can do with respect to DEP permitted facilities that would significantly impact the use of Class AA materials in the basin. Additionally, much of the Class AA material distributed and marketed in the Lake Okeechobee basin comes from out-of-state, which limits the effectiveness of permitting changes and might raise issues relating to the interstate commerce clause. It would appear that, like fertilizers, the management of this material can be most appropriately handled by best management practices (BMPS) that apply to agricultural or ranching operations.

Department rules clearly require permittees to provide reasonable assurance that land application of residuals will not pose water quality problems. Once a TMDL is developed for the Okeechobee basin, these rules coupled with the TMDL will give the Department the authority to limit Class A and Class B residuals application based on phosphorus loading.

Considering that 40 out of 47 Type I wastewater treatment facilities land apply Class B residuals within either the Lake Okeechobee area or Everglades area, any changes fro& current practices will have a significant effect. Hauling to more northern sites, not located in either basin, is probably not economically feasible.

The relative loading of phosphorus from residuals to the Okeechobee bas4should be compared with the loading from other sources such as, fertilizers and agricultural activities. Note, in the middle Suwanee River basin, the relative loading of nitrogen from all human waste sources (including septic tanks) is about one percent of the total nitrogen loading to the basin. In addition, a comparison of the controls and restrictions already imposed through the Department's regulation of residuals should be compared to the controls and restrictions placed on other sources of phosphorus. It may be hard to justify

placing stricter requirements on the land application of residuals if the relative loading of residuals is low and if other sources of phosphorus are not being as strictly controlled as residuals.

II. Poultry Litter

Background

The magnitude of poultry litter and manure from layer operations that is currently being imported into the Lake Okeechobee watershed has been documented in a memo from Tom Greenhalgh with the Water Quality Analysis Section dated July 23, 1999. Most of the poultry waste imported into the Lake Okeechobee basin is associated with the production of "organically grown" citrus. Some is used on improved pasture. There is also increasing interest in use for sugar cane production. Approximately 19,630 dry tons of poultry litter and manure is currently being shipped into the basin and land applied. Application rates vary from 3 to 10 tons per acre per year. At these rates the amount of - acreage affected is between 1,963 and 6,543 acres. The phosphorus (P205) loading associated with this source of nutrients was estimated to be as much as 382 dry tons or 1.95%.

Land Application

The land application acreage, mentioned above, is insignificant compared to the entire watershed, which is over a million acres. However, the phosphorous provided by 3-10 tons of poultry manure per acre per year (i.e., 117 to 382 lbs/ac/yr.) is in excess of IFAS recommended agronomic rates for most commodities. The rate recommended would vary depending on the crop and the soil test results. However,--based on nutrient management guidelines, 80 to 100 lbs of phosphorus per acre per year would seem to be a high rate for the uses mentioned above (i.e., sugar cane, citrus and pasture or hayland).

Application rates of 10 tons per acre are needed to satisfy the crops nitrogen requirements. Unfortunately, most crops require much less P than N. The N:P ratio of chicken waste is approximately 1:1. The result may be excess P available for transport in runoff or drainage water. As noted in the Poultry Water Quality Handbook, applying poultry waste to the land at rates based on supplying the nitrogen needs of a crop can lead to phosphorus build up in the soil. Soil phosphate levels are an important consideration in calculating poultry litter application rates. An analysis or test should be conducted on each waste source prior to land application to determine proper phosphorus application rates.

Management Responsibilities

DEP rule 62-670 FAC pertaining to the management of feedlots and confined animal feeding operations addresses the proper storage and management of animal waste for a few of the operations that may be generating these waste by-products. However, all off site export is exempt from our control. An operation that receives and uses these organic

sources as a soil amendment to grow crops is considered to be engaging in agriculture. As such this activity, like fertilizer use, in and of itself is exempt from most DEP or WMD permitting authority. Until such an operation is identified, as a specific source of pollution by the SFWMD in accordance with the 40E-61 F.A.C. SWIM rule, there is very little that either agency can do.

Recommendations

The build up of organic material in the soil increases water and nutrient holding capacity. DEP staff visited the Tampa Farms application site in Martin County in October of 1998. The operator reported a decline in P concentration measured in nearby canal waters since they began using poultry manure as their primary source of soil amendments on sugar cane. In this case, the operator is reported to be following an older NRCS farm plan. Nitrogen is the basis for the application of animal waste at this site. With this exception, very good nutrient management techniques and attention to conservation practices characterize this operation and its manager. The approach seems to be working to maintain nutrients on site.

Implementation of the Comprehensive Nutrient Management Plans (CNMPs) by the agricultural operations that receive poultry litter may not be an easy task. More rules will sway producers to use mineral fertilizer as a substitute to avoid regulation. Discharges from operations that switch to a fertilizer like 8-8-8 or I 0- I 0- I 0 to avoid scrutiny would remain unchanged or worsen as a result of such policy. Similarly, stopping the import of organic soil amendments will not eliminate the P contribution associated with the operations involved.

We suggest that DEP and SFWMD coordinate with the industry and other stakeholders (i.e., the Florida Poultry Federation and Southeastern Poultry and Egg Association) to help contact those operations that are using poultry litter and manure in the Lake Okeechobee watershed. All operations should be encouraged to develop and follow a CNMP where the limiting nutrient is identified for the application area. The SFWMD may be able to conduct spot checks to insure that the phosphorus discharge allocations outlined in 4OE61 are not being exceeded and that the voluntary effort is effective. The ongoing TMDL process may provide an excellent opportunity to implement the CNMPS recommendations by the agricultural operations in Lake Okeechobee.

Please let me know if you have any questions or require further assistance. You may also contact Maurice Barker on residuals issues or John Cox on chicken litter issues.

EAP/mb

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