

# **Alternative Drainfield Products in Florida: A Statewide and Regional Analysis of Frequency, Distribution, and Density**

**Elke Ursin and Kara Loewe**

## **Introduction**

A properly sized and constructed drainfield provides an area for temporary storage and dispersal of wastewater effluent into the surrounding soils. In the State of Florida, mineral aggregate has historically been used as the dispersal material for effluent coming from a septic tank. Chapter 64E-6 of the Florida Administrative Code (F.A.C.) specifically references mineral aggregate for drainfield sizing and construction. After a soil evaluation has been performed at the site, the soil texture and estimated seasonal high water table are used to determine the loading rate from Table III or 64E-6.009 (d), F.A.C. The loading rate and the estimated daily sewage load of the structure are used to determine the square footage required for the drainfield.

There are several state-approved alternatives to using mineral aggregate. The three main types of alternative drainfield products are chamber systems, multi-pipe systems, and alternative aggregate systems. Each of these types has several specific products that are approved for use in Florida. These approved products and their specific sizing criteria are listed on the departments website (<http://MyFloridaEH.com>) under Sewage and then under Product Listings.

There are many benefits to choosing an alternative drainfield product. Aggregate appears to be more difficult and expensive to purchase than in the past. Many of these alternative products are lightweight and can be easily brought to the job site without heavy machinery. When a drainfield fails, it is easier to remove the spoil material with alternative products. In a repair situation, this allows for the new drainfield to be placed in the same location as the old drainfield, reducing the amount of disturbance to the property owner's yard.

## **Collecting the Data**

Data for the period 2007 – 2008 were extracted from the Department of Health's Environmental Health Database to perform various assessments of alternative drainfield products in the State of Florida. Individual new and repair permits that have received final system approval were pulled from the database and summarized by the listed alternative drainfield product type. Out of approximately 65,000 systems, 25% of the records had no information listed for the drainfield product, or were listed as an unknown product, and these records were removed from the data assessment. Another 2% were removed due to the data entered in the field not being applicable to this assessment.

Data for the period 1995 – 2006 was extracted from the Department of Health's CENTRAX database in 2007. This database is currently no longer in use. Individual permits with information on the installed drainfield type were extracted. In this database, the information on the drainfield material was input from a standardized list of product names, or information could be manually entered. Due to inconsistencies between the county health departments' methods

for recording drainfield material, the data was manipulated to group records with similar drainfield products together. Reports were created for the time periods 1995 – 2006, 2004 – 2006, and just 2006.

### Analyzing the Data

Several assessments were performed on the data, which are outlined below.

#### Alternative Drainfield Products vs. Mineral Aggregate

First the data were grouped to examine the proportion of systems installed with an alternative drainfield product versus mineral aggregate. When looking at all records from 1995 – 2006, approximately 37% of the installed drainfields were constructed with alternative drainfield products. From 2004 – 2006 the percentage of alternative drainfield products went to 70%, in 2006 it was 80%, and in 2007 – 2008 the proportion jumped to 90%. It appears there is a strong trend toward an increase in the use of alternative drainfield products and a corresponding decrease in the use of mineral aggregate.

#### Comparison between Alternative Drainfield Product Types

The records were then analyzed by grouping all the manufacturers together by product type (chamber, multi-pipe, or alternative aggregate) to see which had the highest counts.

The data revealed a slight increase in the number of chamber products over the timeframes analyzed, the use of multi-pipe products stayed about the same, and there was a slight decrease in the use of alternative aggregate products. The chamber products were used about twice as often as the other two types.

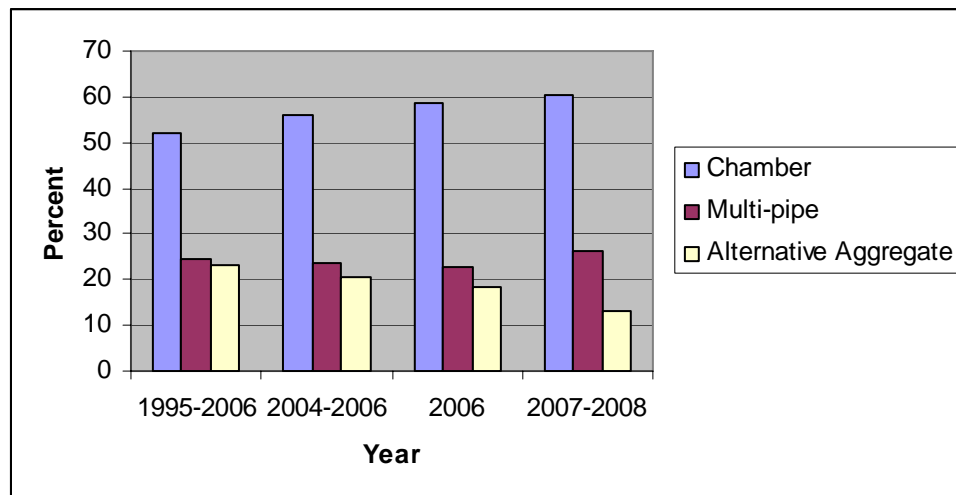
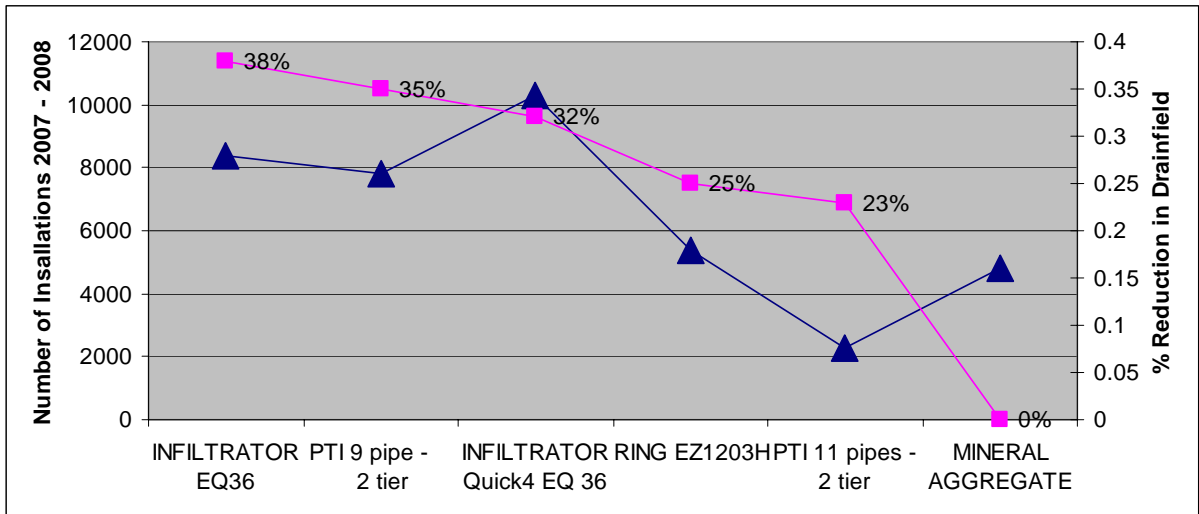


Figure 1. Percentage of Total Final Inspections by Product Type

## Market Share vs. Percent Reduction

The data were analyzed by ranking the most installed alternative drainfield products and comparing that to the allowed drainfield size reduction. On Figure 2 below, the line with the triangles shows the number of installations of various top ranked alternative drainfield products. The line with the squares shows the percent reduction in drainfield size that drainfield products are allowed. There appears to be a general trend showing that as the percent reduction goes down, the number of installations of a particular product also goes down. Infiltrator Quick 4 EQ 36 and mineral aggregate seem to be the two exceptions to this trend showing that there may be other reasons for selecting either of these two drainfield options.



**Figure 2.** Comparison of the Total Number of Installed Alternative Drainfield Products (Triangles) and the Products Percent Reduction in Drainfield Size (Squares)

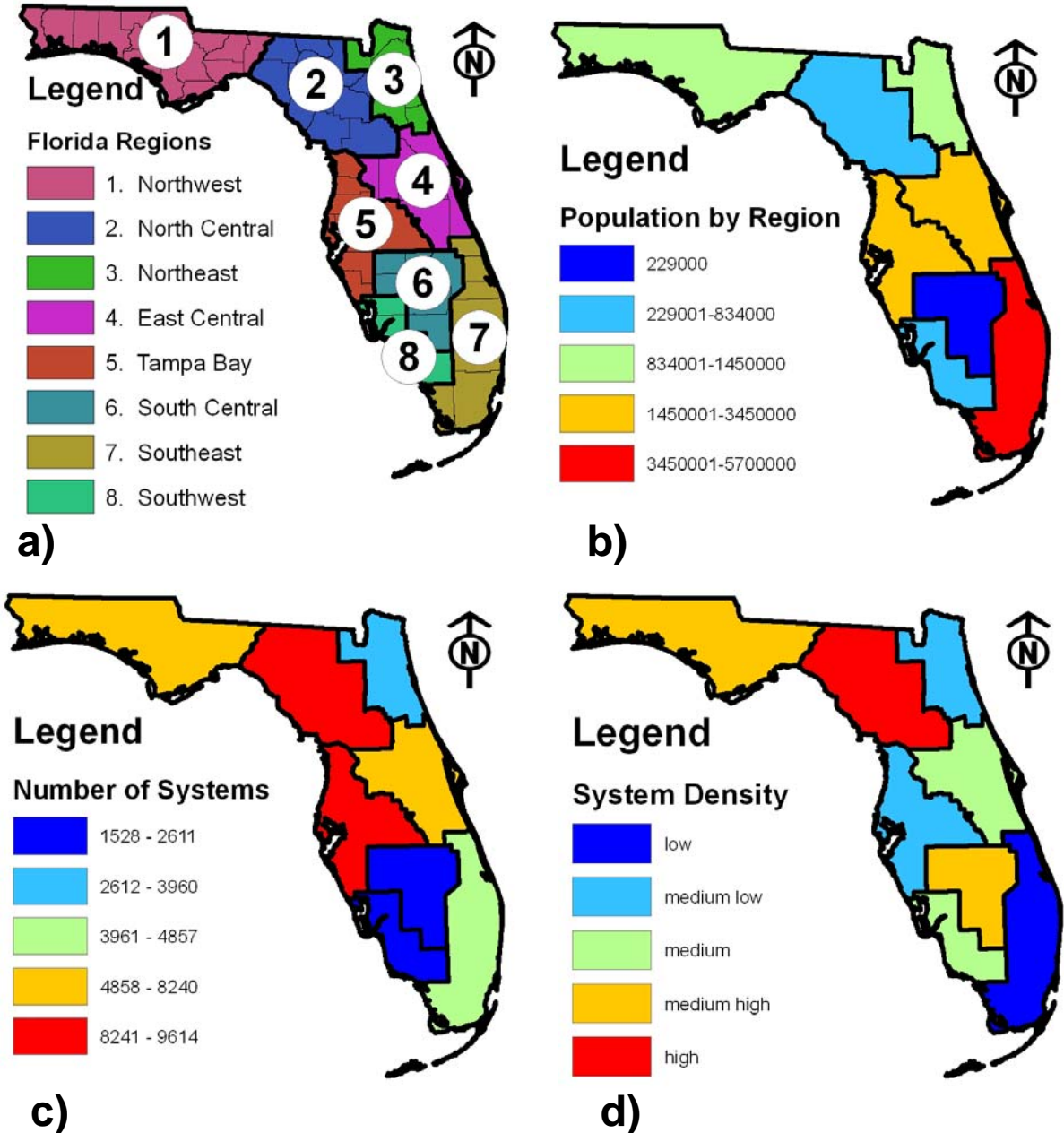
## New Systems vs. Repair Systems

The records were analyzed by looking at the trends in new systems vs. repair systems to see if there is a correlation between type of installation and use of alternative drainfield products. The trend for 2007 – 2008 shows that the number of new installations is higher than number of repairs and that there does not seem to be a difference between new or repair installations in the use of alternative drainfield products.

## Spatial Analysis

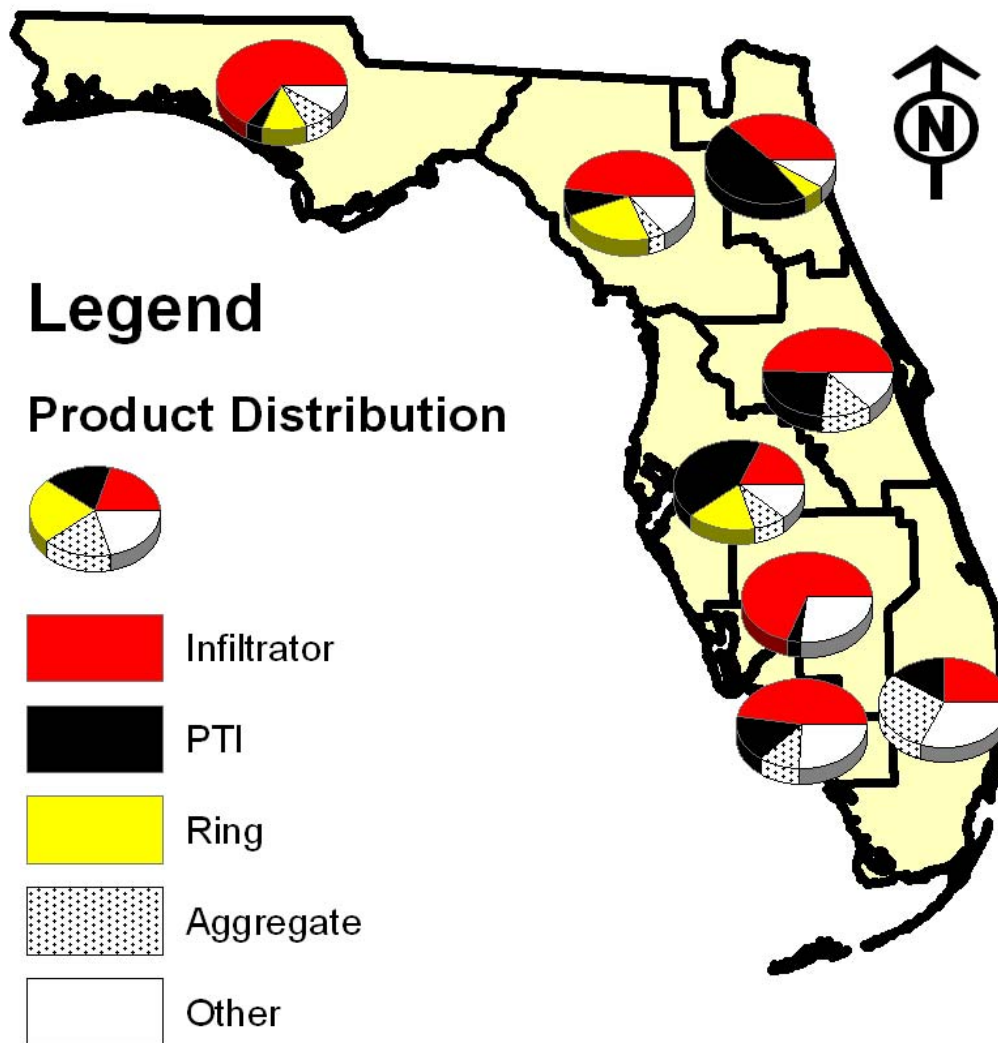
The records were analyzed by looking at spatial differences in the data to see if certain regions of Florida utilize alternative drainfield products more than other areas. Florida's counties were grouped into regions, as shown in Figure 3a. The population of each region is shown in Figure 3b, showing that Southeast Florida, as well as the central band of Florida have the highest populations. The total number of new and repair systems,

including both alternative systems and conventional systems, that received final system approval in 2007 – 2008 are shown in Figure 3c with the Northern Panhandle and Central Florida areas experiencing the highest numbers. Figure 3d shows the ratio of approved systems relative to population. This shows that some of the more rural areas of Florida tend to have higher numbers of installations, which is in line with the thought that areas that are more urban are more likely to utilize central sewer.



**Figure 3.** a) Regions of Florida b) Population by Region c) Number of Final System Approvals from 2007 – 2008 by Region d) Density of Systems Relative to Population

The data were further analyzed to examine any regional variations among the three most installed alternative drainfield manufacturers and mineral aggregate, and the results are shown in Figure 4. All other manufacturers were grouped together in an "Other" category. This analysis revealed that there are regional differences in which manufacturers dominate the market. Systems installed with Infiltrator products dominate the panhandle of Florida as well as East and South Central and Southwest Florida. Products installed utilizing PTI dominate the Northeast and Tampa Bay areas. Ring products seem to be restricted to the northern portions of the state and the Tampa Bay area. Southeast Florida, which is the area with the highest population but also the lowest density of installed systems, seems to have the most equal distribution among manufacturers.



**Figure 4.** Comparison of the Product Distribution of Various Manufacturers over Florida

## **Future Study**

There are many opportunities for future study of the information presented here.

Comparing the results with information on early failures could prove revealing. An early failure is defined as a system that has gone into failure less than two years after construction. An analysis of this could help answer the question of whether alternative drainfield products tend to fail quicker than mineral aggregate, and if so, do these failures increase as the drainfield size reduction increases?

There is also a possibility for a research study to measure the performance of these systems in the field. In 2008 the department's Research Review and Advisory Committee voted this project as one of several research priorities. A new research project approach may be developed in the near future. Prior to beginning a new study, there will be further review of current research in other locations throughout the United States, as well as further analysis of the information presented in this article.