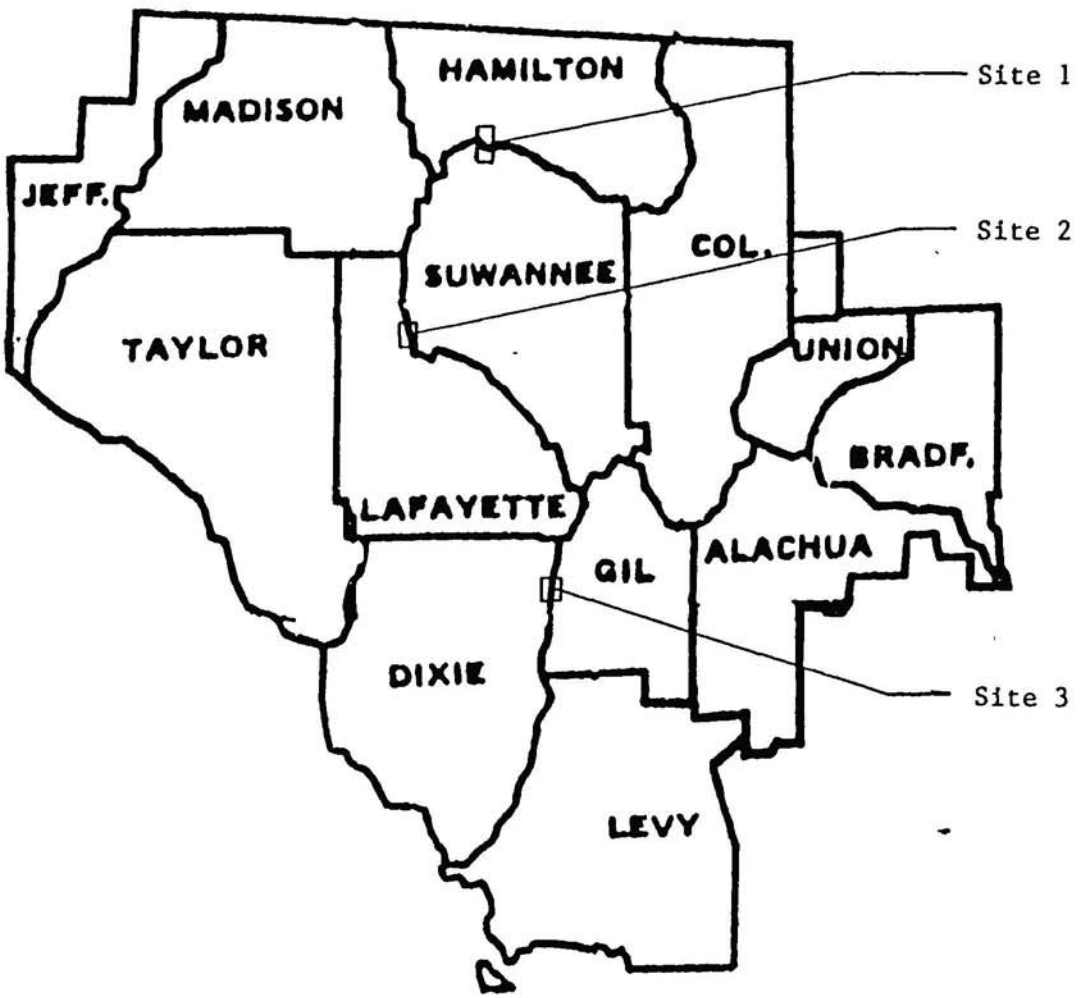

Figure 7. General location map of example sites

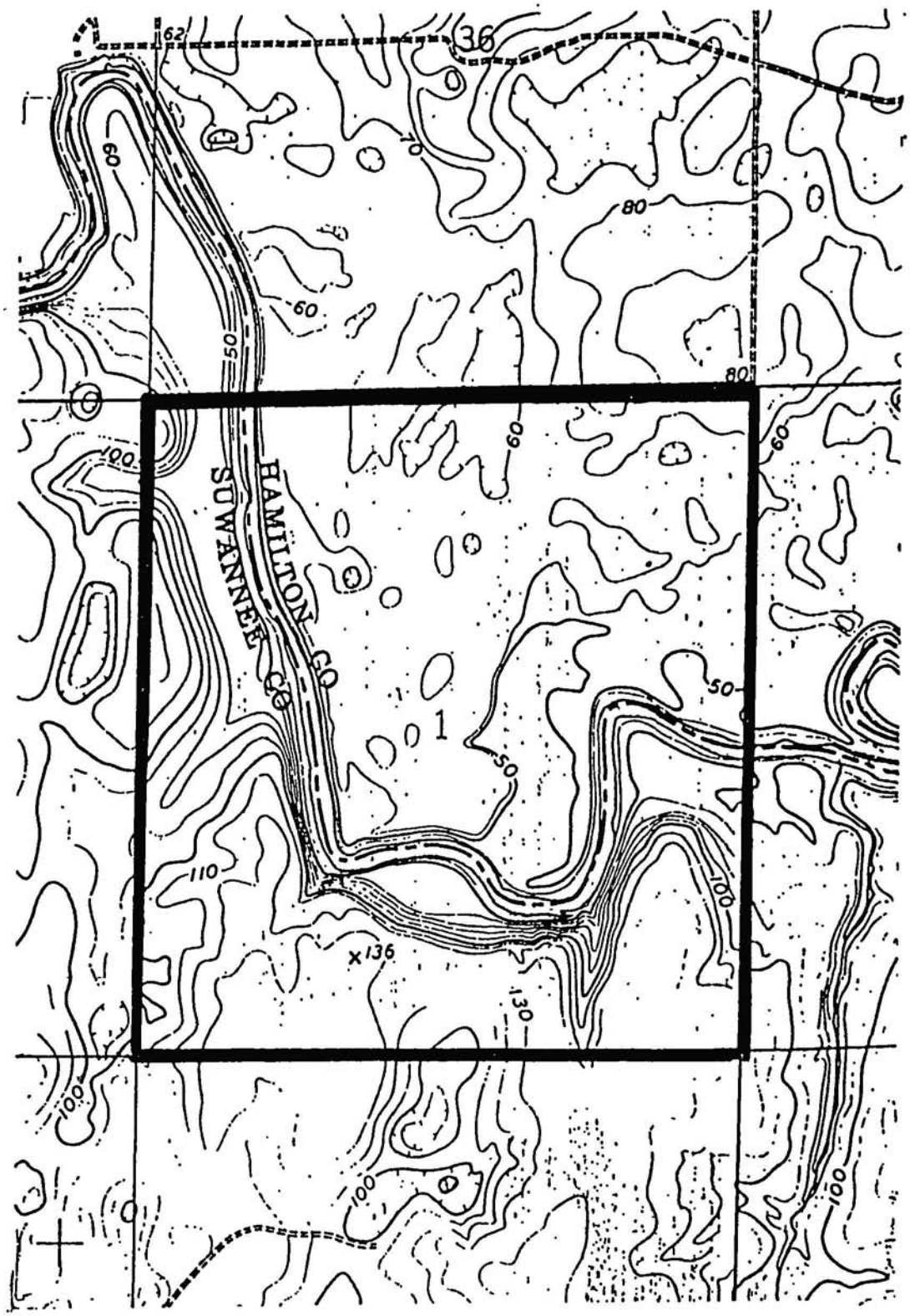

Figure 8. Upper Suwannee River Site
(Site 1)

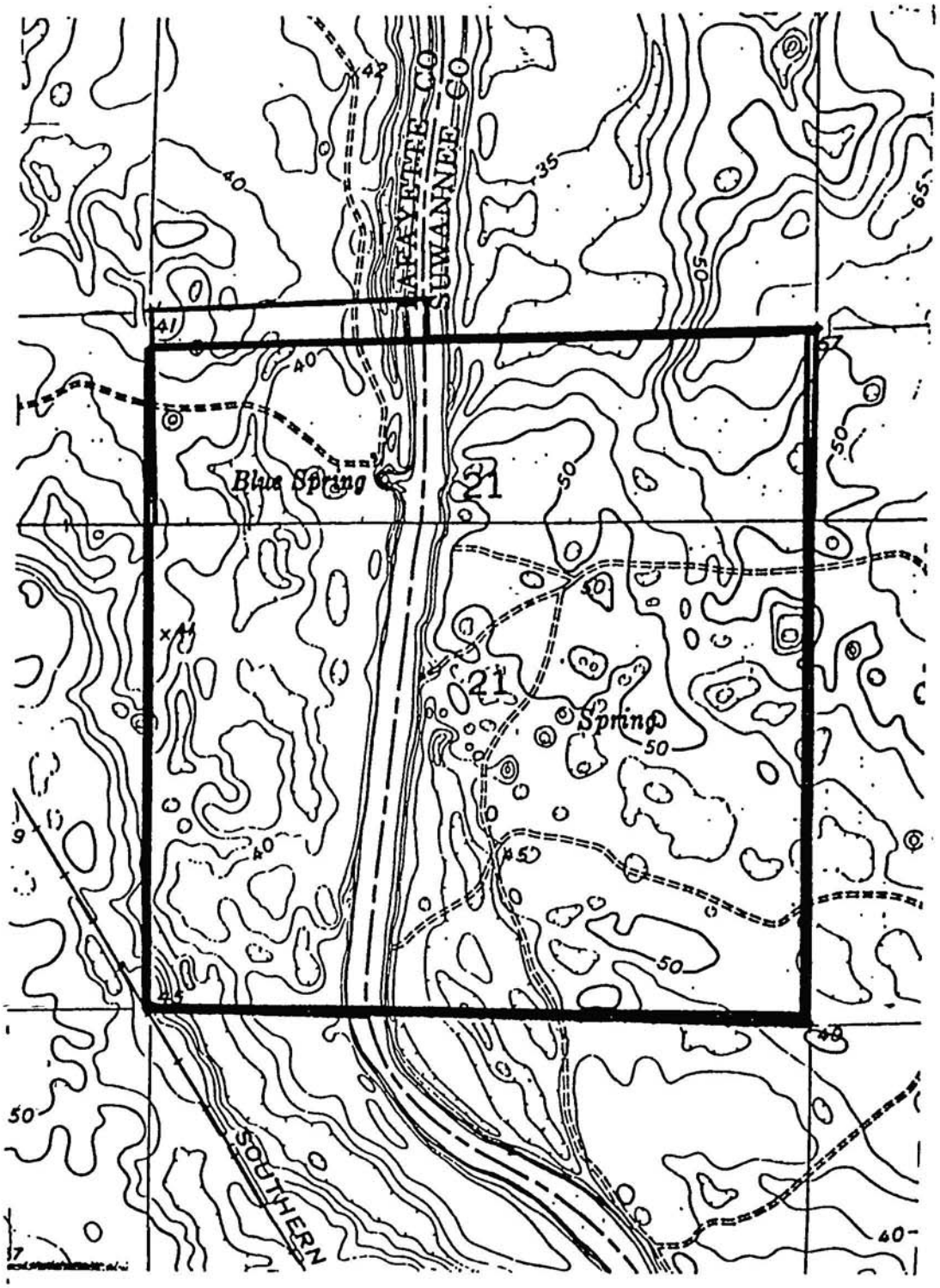

Figure 9. Middle Suwannee River Site
(Site 2)

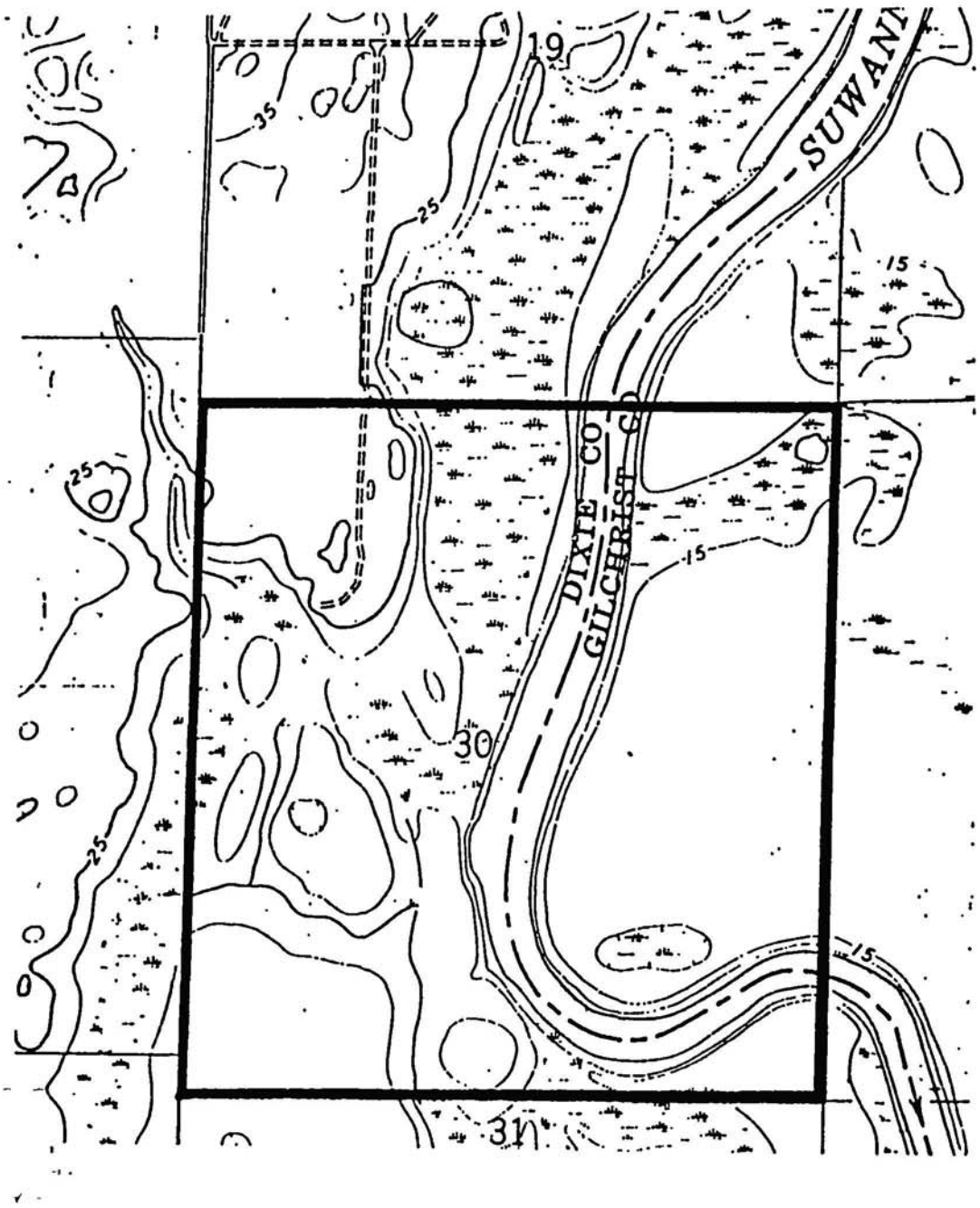

Figure 10. Lower Suwannee River Site
(Site 3)

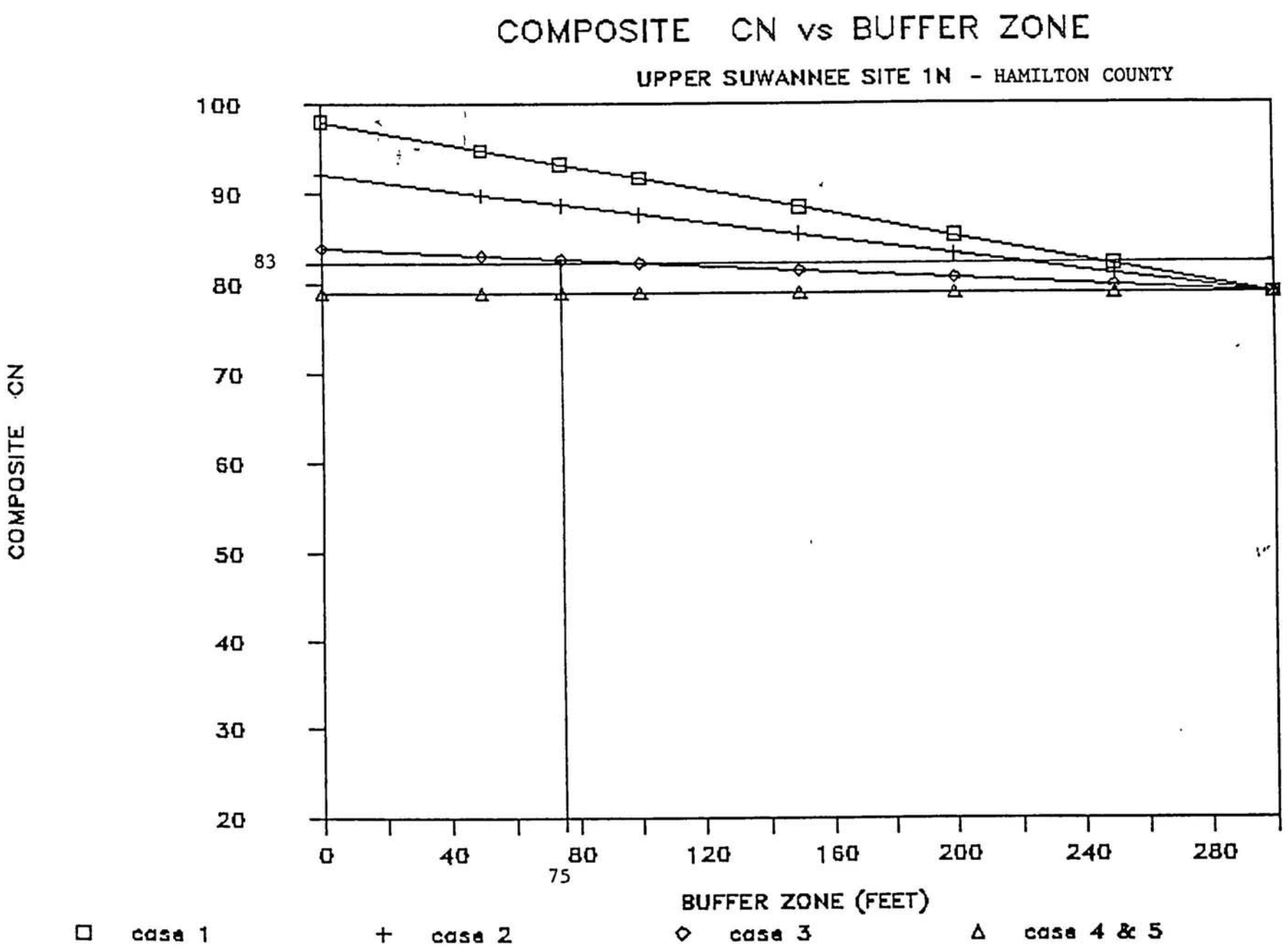
COMPOSITE CN vs BUFFER ZONE
UPPER SUWANNEE SITE 1N - HAMILTON COUNTY
COMPOSITE CN
100
90
83
80
70
60
50
40
30
20
0
40
80
120
160
200
240
280
75
BUFFER ZONE (FEET)
case 1
case 2
case 3
case 4 & 5

Figure 11.

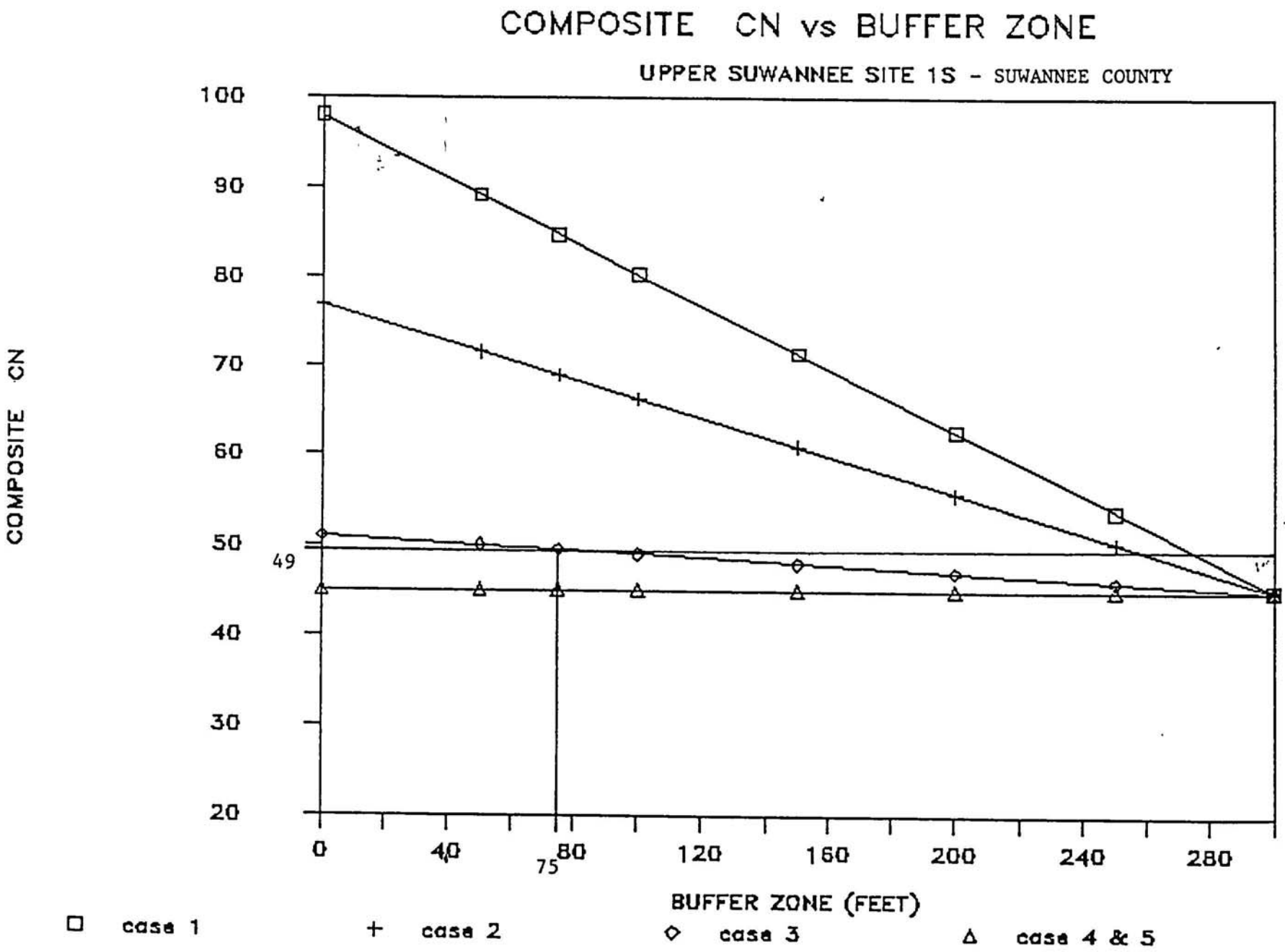
COMPOSITE CN vs BUFFER ZONE
UPPER SUWANNEE SITE 1S - SUWANNEE COUNTY
COMPOSITE CN
100
90
80
70
60
50
40
30
20
49
0
40
75
80
120
160
200
240
280
BUFFER ZONE (FEET)
case 1
case 2
case 3
case 4 & 5

Figure 12.

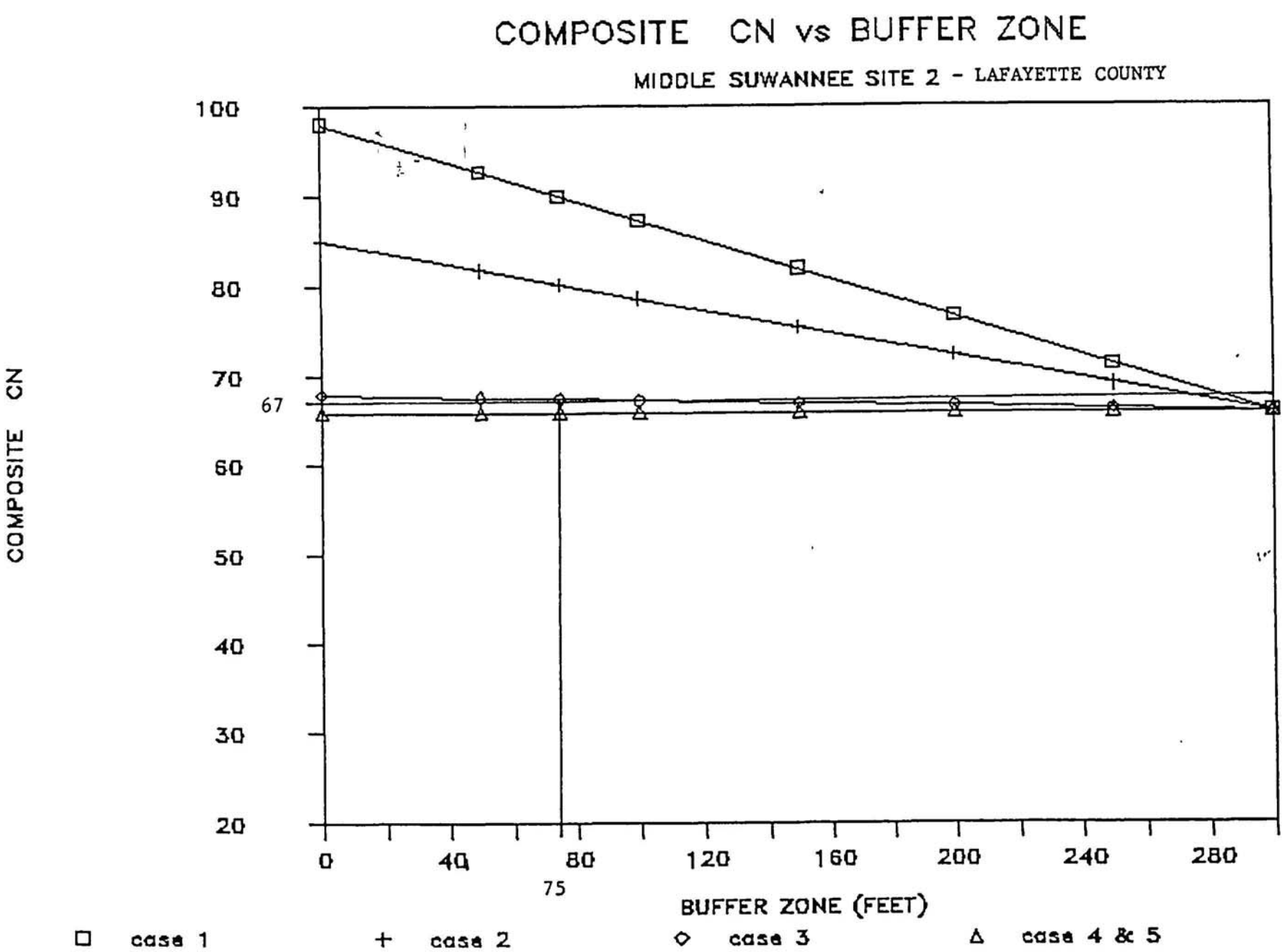
COMPOSITE CN vs BUFFER ZONE
MIDDLE SUWANNEE SITE 2 - LAFAYETTE COUNTY
COMPOSITE CN
100
90
80
70
67
60
50
40
30
20
0
40
80
75
120
160
200
240
280
BUFFER ZONE (FEET)
case 1
case 2
case 3
case 4 & 5

Figure 13.

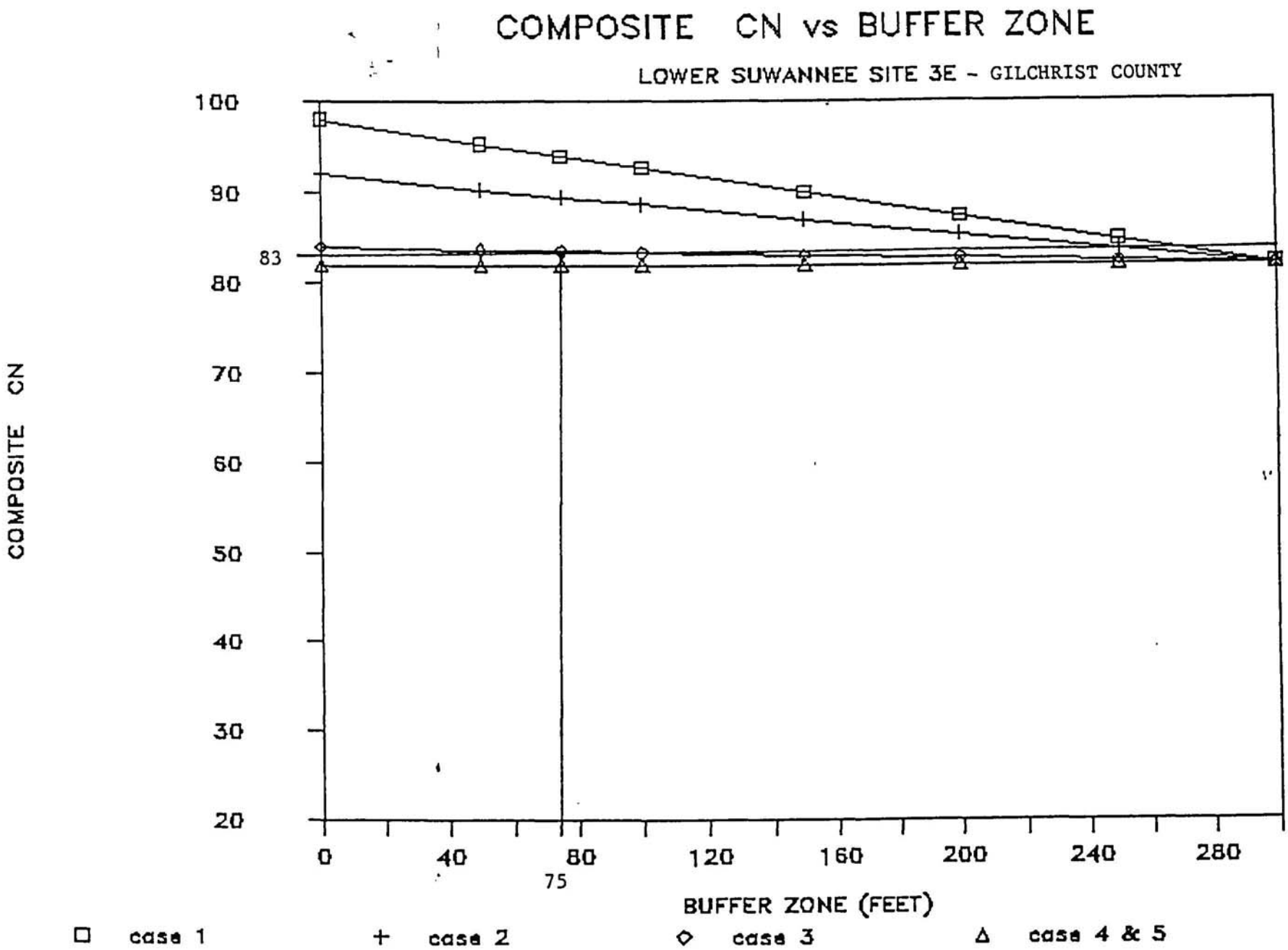
COMPOSITE CN vs BUFFER ZONE
LOWER SUWANNEE SITE 3E - GILCHRIST COUNTY
COMPOSITE CN
100
90
83
80
70
60
50
40
30
20
0
40
75
80
120
160
200
240
280
BUFFER ZONE (FEET)
case 1
case 2
case 3
case 4 & 5

Figure 14.

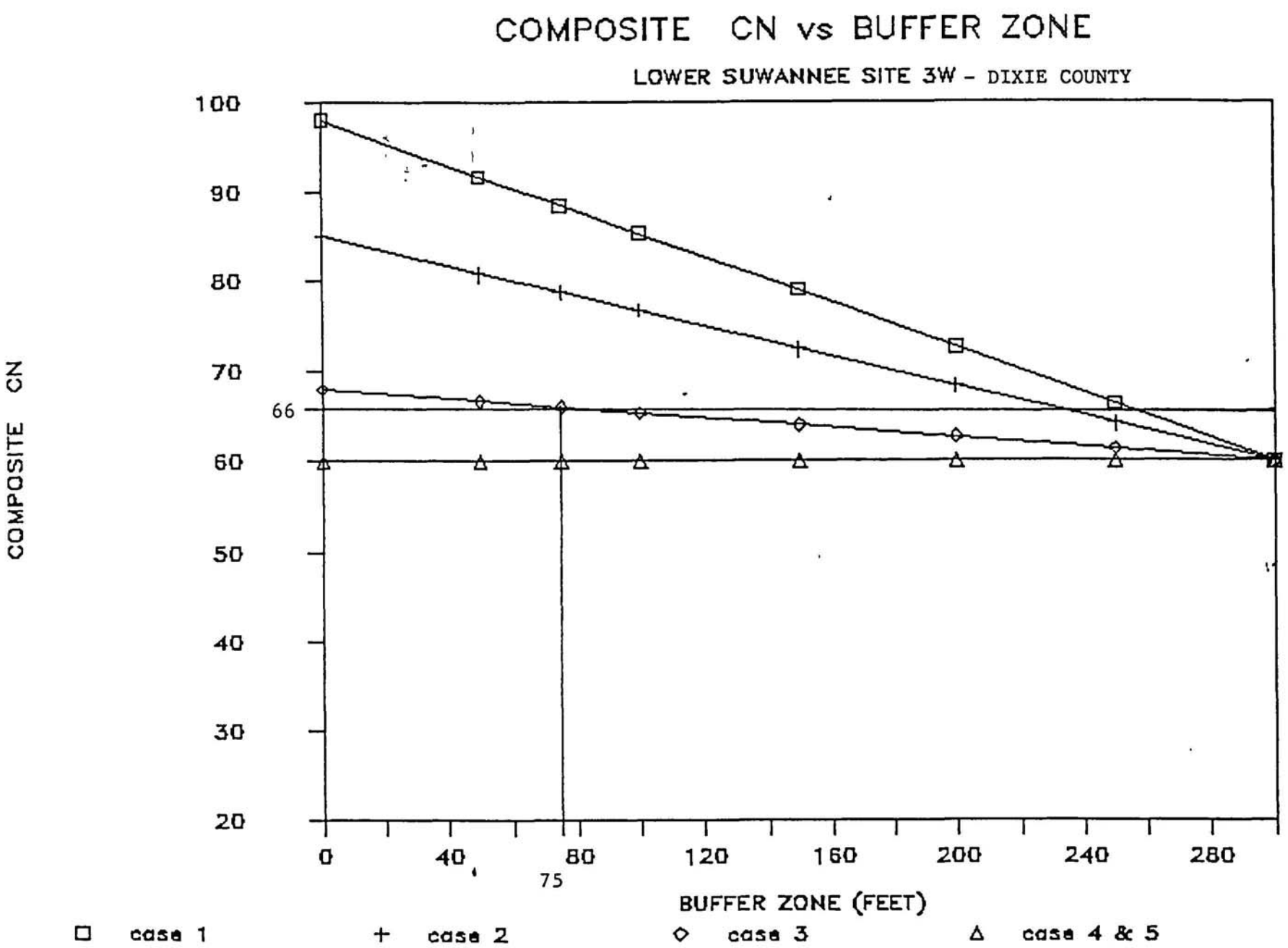
COMPOSITE CN vs BUFFER ZONE
LOWER SUWANNEE SITE 3W - DIXIE COUNTY
COMPOSITE CN
100
90
80
70
66
60
50
40
30
20
0
40
75
80
120
160
200
240
280
BUFFER ZONE (FEET)
case 1
case 2
case 3
case 4 & 5

Figure 15.

zones can be applied to any activity which results in a change to the land surface, whether it is a permanent or a transitory change and the result of development of a residential or commercial nature, agricultural activity or industrial activity. The concept is simple and the necessary input parameters are readily available to the public, making the use of this technique relatively easy to administer by the district staff. It can be as easily applied to lakes and to streams, also.

It is recommended that this technique be combined with the SRWMD's existing surface water management regulatory techniques to provide district staff with a flexible approach to determining appropriate buffer zones. Although varying buffer zones have been calculated at specific sites using this technique, additional trials should be run by the SRWMD staff to determine the efficacy of the method for their particular regulation needs. Additional research may be desired in order to more fully explore the potential for using the TR-55 (or perhaps another similar model) in determining buffer zone dimensions.

Dames & Moore wants to emphasize that this buffer zone model is designed to be used in conjunction with the district's existing regulations and water management policies. As explained above, there will be instances where the buffer zone model by itself would be inadequate. The examples described earlier illustrate this issue: if the property is unsuitable to accept the proposed level of development, the model would indicate a huge, unworkable buffer zone. Similarly, the district's rule currently states that wetlands cannot be eliminated. Therefore, applying only the buffer model to a site that has a wide band of wetlands would result in another large, perhaps untenable buffer zone. However, in such instances the district staff has the flexibility to augment the buffer zone or supplant it with other non-structural or structural solutions. For example, to increase development on a lot that has unsuitable soils, the district could recommend the use of swales, retention basins, clustering, etc. The buffer zone methodology described in this section sets a baseline for natural resource protection. In combination with other regulatory tools available in the district, this methodology should offer greater flexibility to the permitting district staff.

IV. EVALUATION OF SEPTIC TANK REGULATIONS THAT AFFECT THE SUWANNEE RIVER

1. Introduction

As part of the contract to evaluate buffer zones for surface waters, Dames & Moore was requested to conduct a brief review of the effectiveness of the state septic tanks regulations within the SRWMD, particularly in those counties bordering the Suwannee River. We reviewed Chapter 10D-6, F.A.C., the current Department of Health and Rehabilitative Services (DHRS)

regulations governing Onsite Sewage Disposal Systems (OSDS's), and interviewed representatives of DHRS or DER. Public health officials in the counties that border the Suwannee River were interviewed to learn how the septic tank rules were actually applied and what, if any, problems they were experiencing. Finally, this section of the report discusses changes DHRS is proposing for 10D-6.

2. Existing Rule Criteria and Proposed Changes

The state's setback requirement for septic tanks from surface waterbodies is currently a minimum of 75 feet away from the mean high water line of tidal waterbodies or 75 feet from the ordinary high water line of lakes, streams, canals, or other non-tidal surface waters. The setbacks apply to all lots platted during or after 1972. All lots platted prior to 1972 have a minimum setback requirement of only 50 feet. All of existing setbacks remain unchanged in the proposed revision of 10D-6.

The district also uses similar setback requirements under F.A.C. 40B-4 as DHRS does in FAC 10D-6. Both rules employ a 75 foot minimum setback from surface waters. The district's setback pertains to lands subdivided after January 1, 1985.

10D-6 sets forth site evaluation criteria in 10D-6.047. These criteria include effective soil depth, water table evaluation, vehicular traffic restrictions, saturation of soil from other than natural sources and lot elevations. Of these items, water table elevation and lot elevation are the most pertinent to Dames & Moore's investigation into surface waterbody setbacks.

10D-6 requires that the depth to the water table during the wettest season of the year be a minimum of 24 inches below the bottom surface of the drainfield trench or absorption bed. HRS is proposing to revise this provision of the rule by further requiring that systems shall not be approved for sites which have a seasonal high water table above the ground or where hydric soils exist, as defined by the U.S.D.A. Soil Conservation Service. The proposed rule would provide an exception to this requirement when the area's water table is artificially lowered through drainage structures and this impact is certified by a registered engineer with soils training.

10D-6.46(7)(b) limits septic tank densities based on lots per acre and the effluent applied per acre. The current limits are four lots per acre and a projected daily domestic sewage flow that does not exceed an average of 2500 gallons per acre per day. This does not directly limit the number of dwelling units, however. There are no proposed changes to this section of the rule.

The last section of relevance is 10D-6.049, Alternative Systems; paragraph 3 of this section deals with mound systems. Currently, this type of system may be used to overcome such limiting factors as seasonally high water tables and unsuitable soils. Under the current rule, the maximum allowable height of the mound system is 36 inches. This is somewhat irrelevant, however, because the existing 10D-6 allows for all or part of the lot to be filled prior to construction of the system. Essentially, the existing rule allows an unrestricted height of the mound system, within certain engineering constraints. The proposed rule changes will restrict this existing practice. The maximum height of the mound would be increased to 45 inches, but the section of the paragraph allowing partial or total fill of the lot prior to construction would be stricken. In effect, this restriction on total fill will hold the height of the mound to 45 inches.

F.A.C. 40B-4.3030 is the current district regulation pertaining to OSDS installation within Works of the District. Section 40B-4.3030(2)(e) exempts minor amounts of fill associated with mounded OSDS's which have been approved by the DHRS. The district's exemption only covers the current 10D-6 situation, which allows for a maximum 36 inch ("less than 3 feet" under 40B-4.3030). If the proposed revisions to 10D-6 are adopted, the district's rule will have to be modified to exempt a 45 inch high fill area. This assumes, of course, that the district would want to remain consistent with DHRS and allow the increased mound height.

3. Other Studies

There is a wealth of documentation and data available throughout the country dealing with effects of OSDS's on ground water. Less data is available for the effects on surface waters. Dames & Moore conducted a brief literature search to learn what, if any, approaches to septic tank controls would be relevant to the SRWMD buffer zone study.

A. <u>Soils</u> -

The DHRS is administering a three year grant to explore the impacts of OSDS's on Florida's water resources. The firm of Ayres Associates is conducting the study with the assistance of Kirkner and Associates, Inc. In this study, preliminary results have shown that areas with higher hydraulic conductivity have more rapid and widespread contamination potentials, but generally have lower levels of contamination due to dilution factors. Conversely, areas with low hydraulic conductivity have generally smaller areas of contamination but higher levels of contaminants.

The first report in this study by Kirkner and Associates, has made several observations about soil characteristics and their relation to contamination. Soils with a high hydraulic conductivity and high average seepage velocity have a higher

contamination risk than do other soils. Soil particle size is a factor in seepage rates. In general, there is a decrease in soil particle size moving from north to south in the state. Coarse grained sands and gravels predominate in the western panhandle, medium to fine-grained sands dominate in the peninsular areas becoming increasingly finer and less predominant progressing south, with limestone predominating in the extreme south. Variations to this pattern do, of course, occur. One example of this are the sand ridges of the Central Florida Ridge. Generally, these coarse sands have higher average seepage velocities than do finer materials. This would lead to a higher risk of potential contamination. When these sands occupy the higher areas of the state, such as the sand ridges, they have a greater depth to the water table. The greater depth allows for a larger treatment zone, which tends to balance for the increased seepage velocity thereby lowering the risk for these areas. Conversely, finer grained materials have slower velocities but are subject to shallower depth to the water table.

In a study conducted recently by the Lake County Department of Pollution Control (Wicks and Erickson, 1982), two lakes were studied for the effects of OSDS's on surface waters. This study confirmed that sandy soils overlying clay strata tend to promote down gradient movement of water. A three percent slope in a sand layer over clay can result in a 50 foot per day subsurface water velocity. At the interface of the sand/clay layers, however, velocities decrease to less than 0.05 inches per day.

The second report of the current DHRS study conducted by Ayres Associates explores in more detail soils of the state and the demographics of Florida which dictate OSDS placement. The researchers found that eight soil series predominate in the high growth areas studied. These are the Paola, Candler, Astatula, Tavares, Basinger, Myakka, Immokalee and Apopka series. Of these, the Basinger, Immokalee and Myakka are listed by the SCS as hydric soils. Nearly all of the eight soil series are very sandy with very wet conditions or high seasonal water tables.

Florida has only 21 percent of its land comprised of soils suited to OSDS. These are the "slightly limited" soils. By contrast 74 percent of the state has soils which are classed as "severely limiting" soils. A survey of all the county environmental health units revealed that soils with severe limitations for proper operation of OSDS's are currently being developed without central sewage systems. The survey also indicated that most areas of high growth have already developed all or most of the soils suitable for septic tanks.

Only three counties in the Suwannee River Water Management District (SRWMD); Suwannee, Gilchrist and Madison, have as little as 50 to 60 percent of their soils significantly limited for OSDS development. The rest of the counties have 60 to 100 percent of their soils significantly limited for the installation of OSDS.

This shows that most of the district is not suited for OSDS's.

The Ayres report also explored demographics and projected growth data. The report estimates that each of the counties within the SRWMD will have less than 5000 new OSDS's between the years of 1986 and 2005, with the exception of Alachua. Alachua is predicted to have between 5000 and 15,000 new OSDS's installed within the same time period. Because most of the new OSDS's are expected to be constructed in the unsewered fringes of Florida's metropolitan areas, it would be safe to assume the portions of Alachua County within the SRWMD will have new OSDS's near the lower end of the predicted range.

According to the DHRS survey results, approximately 44 percent of all OSDS's constructed in Florida since 1984 are of the mound or fill type design. By contrast, the most commonly used OSDS design in the SRWMD is the conventional trench type. However, this design with bed systems represents less than 55 percent of all OSDS's installed statewide (Ayres Associates, 1987).

B. Water Quality

Nitrogen, phosphorous and bacteriological/viral pathogens have been documented to leach from OSDS's into surface waterbodies. The National Eutrophication Survey staff surveyed 41 lakes in Florida over a one year period (Bicki, et. al., 1984). The estimated nitrogen input to these lakes from OSDS's was shown to be significantly related to the numbers of OSDS's within 100 feet of the lakes. It also was shown through algal assays that nitrogen was the rate-limiting nutrient in 40 of the 41 lakes during at least two-thirds of the sampling periods.

Phosphorous has been documented as a surface water contaminant from OSDS leachate. Documented cases have shown this to occur when OSDS's are in close proximity (less than 100 to 150 feet) to the surface waterbody (Bicki, et. al., 1984). In the Lake County study, Wicks, et. al., suggested that a deep clay confining layer (>6 feet deep) appeared to be beneficial in retarding leachate movement and promoting phosphorous absorption.

This same study looked at bacteriological contamination of two lakes with adjacent mixed land use, including pastures and residential. The data suggested that the runoff from livestock and the associated pasture lands have a localized effect on the water quality; residential uses, on the other hand, have the most adverse impact on water quality. Other reports also have shown pathogen contamination associated with OSDS. It should also be pointed out that the pathogens reported are only "indicator species." Many other pathogens are present, depending upon users of the OSDS's and their health over time.

Leachate components from OSDS's obtain varying degrees of treatment from soils. Some water soluble components, such as nitrate, travel virtually uninhibited through the soil, while others, such as phosphorous and pathogenic bacterial/viral agents, have relatively good absorption rates in unsaturated soils. The literature reviewed indicates 36 inches of unsaturated soil is an adequate layer for the treatment of OSDS leachate. Currently, 10D-6 only requires 24 inches. This is a minimum standard, but some counties, such as Sarasota, are currently requiring a 36 inch unsaturated zone below the system (pers. comm. Gary Schneider, 1988).

In the Wicks study (1982), the data showed that residential OSDS's impact the ground water quality, and to a lesser extent, the water quality in adjacent surface waterbodies occurring down slope. One conclusion of their study in respect to septic tank densities is to limit residential dwelling units to less than four per acre and encourage densities of 2 units per acre in new developments. As stated earlier, 10D-6 currently allows 4 lots per acre with no direct limit on the number of dwelling units.

4. Interviews Regarding the Effectiveness of the Septic Tank Rule along the Suwannee River

Dames & Moore interviewed representatives of the Health and Rehabilitative Service (HRS), Department of Environmental Regulation (DER), and the local County Public Health Units (CPHU) along the Suwannee River to get their comments and opinions on the current septic tank regulations. All agencies had high praise for the cooperation they receive from the SRWMD staff. However, opinions did differ on how the district reviews requests for variances for septic tanks installed in the floodway. The following are summaries of the interviews:

Gary Schneider - HRS, Tallahassee

The county health departments are responsible for ensuring compliance with the septic tank rules. About one year ago, HRS started investigating the level of compliance. According to Mr. Schneider, compliance appears to vary depending upon the county; some counties are more stringent than others. The septic tank permitting system has improved in the last couple of years. The result is that more permits are being denied for lots on the river.

Mr. Schneider feels the SRWMD has changed their attitude in the last year. He said they used to "hard line it", but because of public involvement and increased workload on the water management district staff, they now are more reasonable. They are encouraging subsurface treatment systems and limiting the amount of fill in the floodway.

Mr. Schneider has high praise for the SRWMD. The water management district has "a good handle" on the septic tank regulations and works well with HRS. Mr. Schneider is in favor of granting variances for the installation of septic tanks provided the circumstances would not compromise ground water or surface water quality, or endanger public health. He said it is easier to obtain variances in the SRWMD because they have much better data, (i.e., floodway maps) than the other water management districts.

Emily Wilson - HRS, Field office in Gainesville

HRS keeps records of every septic tank installed. The CPHU representative inspects installation of the septic tanks. CPHU representatives receive training from HRS, the county and the Florida Septic Tank Association. HRS keeps records of the training each individual receives.

According to Ms. Wilson, the SRWMD has changed rules twice in the last four years. This has confused people. The SRWMD "claims to get tougher" but they never back this claim up with any enforcement. Ms. Wilson states that issuing variances for septic tanks in the floodway is not good policy, and the SRWMD should make critical comments when asked in order to provide input to the Variance Board. HRS seriously weighs the water management district comments. Ms. Wilson reports that the SRWMD staff are very helpful when called upon to answer questions about the rules.

Ms. Wilson feels that central sewage systems are needed for subdivisions; this should be a requirement along the river.

Patti Sanzone - DER, Tallahassee

According to Ms. Sanzone, there is inconsistency in the way septic tank variances are granted. The HRS rule 10D-6 says the bottom of the drainfield must be 2 ft. above the 10 year flood elevation. The rule also has a maximum limit of three feet of mounding. The Variance Board has been approving variances if the septic tank is in a regulatory floodway and if it meets all other conditions. Occasionally, this conflicts with the rule.

Ms. Sanzone said the Board looks to SRWMD for critical reviews; however, Ms. Sanzone claims that the SRWMD hardly ever makes any objections. The district tends to use the two year flood elevation as the minimum. Ms. Sanzone also stated that septic tanks are typically placed between the house and the river. The water management district should, according to Ms. Sanzone, require the septic tanks be moved to a higher spot on the property. The lots are usually long enough to move the septic as far from the floodway as possible.

DER is also concerned about the use of fill for septic tank mounding and the applicants using fill to meet the rule requirements. Ms. Sanzone would like to see a written policy between the agencies (HRS, DER, WMD) to resolve these discrepancies in rule interpretation and implementation.

The Septic Tank Variance Board receives requests for 2-3 variances per month. It is much easier for people to get variances on the Suwannee River than any other place in the state, according to Ms. Sanzone. So far there is no evidence of negative effects on the river from the installation and operation of septic tanks. But as more and more such systems are permitted, cumulative effects could occur. DER believes that to prevent future problems, higher levels of treatment than can be provided by septic tanks is needed for the floodway areas and a lesser number of variances or stricter requirements for variances (like moving the septic tank to a higher area on the property) should be the norm. According to Ms. Sanzone, the SRWMD could make a difference in overall rule implementation by strengthening their input to the Variance Board.

O. J. Baker - Suwannee and Lafayette CPHU

Mr. Baker is satisfied with the septic tank rules and the way they are implemented. Mr. Baker claims they haven't had any septic tank problems or complaints in his area, and they also don't receive many variance requests. The soil in Baker's area is acceptable for septic tanks. Mr. Baker states the rules are adequate and do not need to be changed. Mr. Baker feels changing the rules is the cause of the problems.

Finally, Mr. Baker said, the real problem with septic tanks is along the Santa Fe because of the "bad" soils in that area.

Marvin Rogers - Hamilton CPHU

Mr. Rogers feels the septic tank regulations are adequate and effectively implemented. The HRS could be more lenient about the 10 year flood criteria, according to Mr. Rogers. If everything else is acceptable, Mr. Rogers is in favor of using the two year flood instead of the 10 year flood, since, according to Rogers, the Variance Board always approves this lesser standard.

Hamilton County has had no complaints about septic tank malfunctions. The county has a good working relationship with the SRWMD on this issue.

Jerome Blake - Dixie CPHU

Mr. Blake feels the rules on septic tanks are strict enough. His office gets complaints about once every six months, but they can never get any specifics, because people refuse to give their names. Mr. Blake states the mounded septic tanks are more likely

to fail in a high velocity flood, but slopping and sodding help alleviate this problem.

Mr. Blake points out some of the older lots are not deep enough to move the septic tanks back out of the floodway. The Variance Board is sympathetic to these circumstances and responds accordingly. Finally, Dixie County has a good relationship with the SRWMD.

Dan Fulton - Gilchrist CPHU

According to Mr. Fulton, no one is paying attention to the 10 year flood rule. All variances are approved. Gilchrist County is now requiring individual aerobic wastewater treatment units. This requirement is new in the county. The first system went to the Board in July, 1988. The SRWMD has approved this system on an experimental basis. Gilchrist County will now approve only this method of treatment in areas 2 1/2 feet above the two year flood.

Mr. Fulton believes, mounding is inappropriate and will just wash away. Mr. Fulton feels something needs to be done to force the other counties into requiring aerobic treatment systems. According to Mr. Fulton, several homeowners are installing the aerobic systems (approximately 6-8 units) in Gilchrist County, on his recommendation.

5. Conclusions

At the present time, both the SRWMD rule 40B-4 and HRS', 10D-6 require a minimum setback of 75 feet from surface waterbodies. Both setbacks were arrived at independently, and both are supported by a reasonable base of data. HRS is proposing a few changes to 10D-6 which would affect Works of the District. Specifically, one change will increase the height of septic tank mound systems to 45 inches. This proposed rule change would conflict with the district's rule. We suggest the district participate in the rule workshops in an attempt to reconcile this difference.

Additionally, HRS is currently administering a three year research program being conducted by Ayres Associates and Kirkner and Associates to gather data which will be used to evaluate 10D-6 and its minimum requirements relative to conditions within the state. When this project is over, it is likely additional changes will be proposed within several sections of 10D-6.

After reviewing all of the available material on septic tank usage along the Suwannee River and interviewing the state and local officials responsible for the regulation of septic tanks, Dames & Moore concludes that the implementation of septic tank regulatory systems in the SRWMD is basically sound. Some criticism was directed at the district's approach to approving

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variances for the placement of septic tanks too close to the river's floodway. It is our understanding that the district is currently reviewing its practices for approving variances from 10D-6. It might be advisable for the district to review its policy for the installation of septic tanks and to promulgate any new policy direction. Finally, the district setback policy for the installation of septic tanks should be consistent with any buffer zone that might be adopted for use within the district.

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