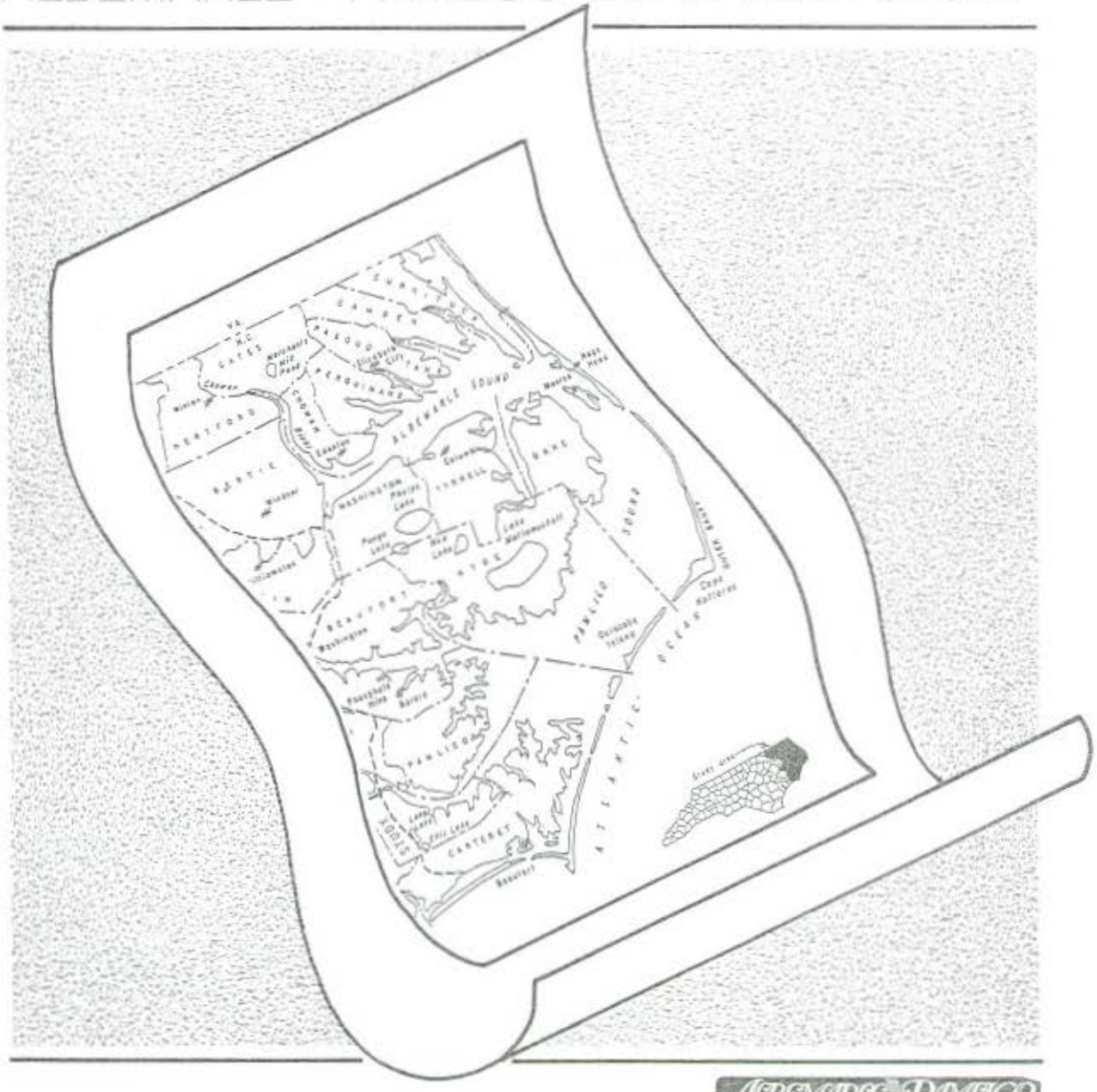
October, 1990

Project No. 90-23

Virginia Animal Waste Management Project

ALBEMARLE - PAMLICO ESTUARINE STUDY



Funding Provided By
North Carolina Department of Natural Resources and Community Development
Environmental Protection Agency National Estuary Program

ALBEMARLE-PAMLICO

Virginia Animal Waste Management Project

by

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The work on which the report is based was financed in part by the United States Environmental Protection Agency and the North Carolina Department of Environment, Health and Natural Resources through the Albemarle-Pamlico Estuarine Study.

Project No. 90-23 April, 1990

ABSTRACT

A portion of the waters of the Chowan River drainage basin within the state of Virginia has been classified as "nutrient enriched". Ultimately this nutrient enrichment has negative impacts upon water quality within the Albemarle-Pamlico estuary. One source of nutrients in surface waters in this region is the prevalence of swine production operations with little or no waste utilization planning. The purpose of this project was to demonstrate the benefits of waste management to the program participants and their community. Five new animal waste storage systems were constructed in six southeastern counties at a 75% cost-share rate. Seventeen existing storage systems received cost-share assistance to encourage the proper land application of the wastes to adjacent cropland. Nutrient management plans were developed for all participants and management agreements signed to insure proper maintenance of the new systems. These plans resulted in the management of 48,037 tons of manure. This represents approximately 240,185 lbs. of nitrogen and 288,222 lbs. of phosphate being more efficiently utilized. In addition, thirteen demonstration and test plots were established with the cooperators in the program. These will be used for tours and other educational activities. The uncertainty of the future market for hogs and high installation costs discouraged many producers from constructing a system, even with 75% cost-sharing. Providing cost-share for the construction of new storage systems is felt to be a more important step in improving waste management than providing funds for its application to the land. The waste application, however, was important for the demonstration of nutrient management and the economic value of the effluent from storage systems. More work is needed in the region to promote proper application of the wastes in existing storage facilities.

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Additional recognition is deserved by those individuals and field staff who made this project both possible and successful. Most of the credit goes to Harry O. Dalton, regional Nutrient Management Specialist for the Division of Soil and Water Conservation (DSWC). He was responsible for most of the coordination of projects, field reporting and the development of the necessary nutrient management plans. DSWC managers Mike Skinner and Sam Bailey also provided essential assistance in monitoring and reporting on project activities. Finally, the work could not have been completed without the assistance of the personnel of the other water quality agencies working in the region. Our thanks to the staff of the Peanut and J. R. Horsley Soil and Water Conservation Districts, the Soil Conservation Service and Virginia Cooperative Extension Service. Without their combined cooperation, this project would not have been possible.

Introduction

Water quality within the Albemarle-Pamlico Sound drainage area has become of increasing concern as the general health of this ecosystem has steadily declined. Among the many factors contributing to this deterioration are nutrient enrichment and pathogenic contamination.

The tributaries of northeastern North Carolina contributing fresh water to the sound also carry substantial nutrient loads. Under certain conditions, this can lead to explosive algal blooms. In addition to blocking sunlight for submerged aquatic vegetation, these blooms cause significant reductions in the concentration of dissolved oxygen in the water when the algae die and begin to decompose. Bacteria responsible for this decomposition utilize the available oxygen leaving little if any for other desirable inhabitants of the sound. The entire food chain of this system is affected by these blooms, which can have severe adverse affects, particularly on non-mobile creatures such as clams, oysters and mussels. These inhabitants of the sound are unable, when faced with anoxic conditions, to move to an area more favorable to their survival.

The nutrient enriched conditions also are strongly suspected to contribute to generally elevated environmental stress upon both finfish and shellfish populations. The development of the "red sore" and ulcerative mycosis diseases in menhaden and the shell lesions of blue crabs are believed related to the overall state of water quality in the sound. The occurrences of MSX and Dermosystidium in oysters also seem to be linked to environmental quality.

In order to improve water quality within the sound, it is necessary to identify the source of water quality problems in each of its tributaries. Among these tributaries is the Chowan River drainage area. Its headwaters originate in Virginia with the Meherrin, Nottoway and Blackwater rivers (Fig. 1). These waters have been designated as "nutrient enriched" by the Virginia State Water Control Board (VSWCB). Work has been done by the VSWCB to characterize land use within the Chowan drainage area and the possible sources of its water quality problems.

In a study published by the VSWCB in 1986[1], it was shown that 75% of the Chowan drainage's 4900 square miles lies within the state of Virginia. At that time, this area was characterized as being 83.2% forest and wetland, 16.2% agricultural and only 0.6% urban (Fig. 2). The VSWCB project reported several significant findings. In the small watersheds studied, those areas with greater concentrations of livestock had significantly higher levels of both nitrogen and phosphorous measured in surface water samples. Though the presence of other agricultural activities was associated with higher nutrient levels above that observed in a watershed with

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[1] Virginia State Water Control Board. 1986. Chowan River Basin 205j Project, Information Bulletin 566, pp. 63.

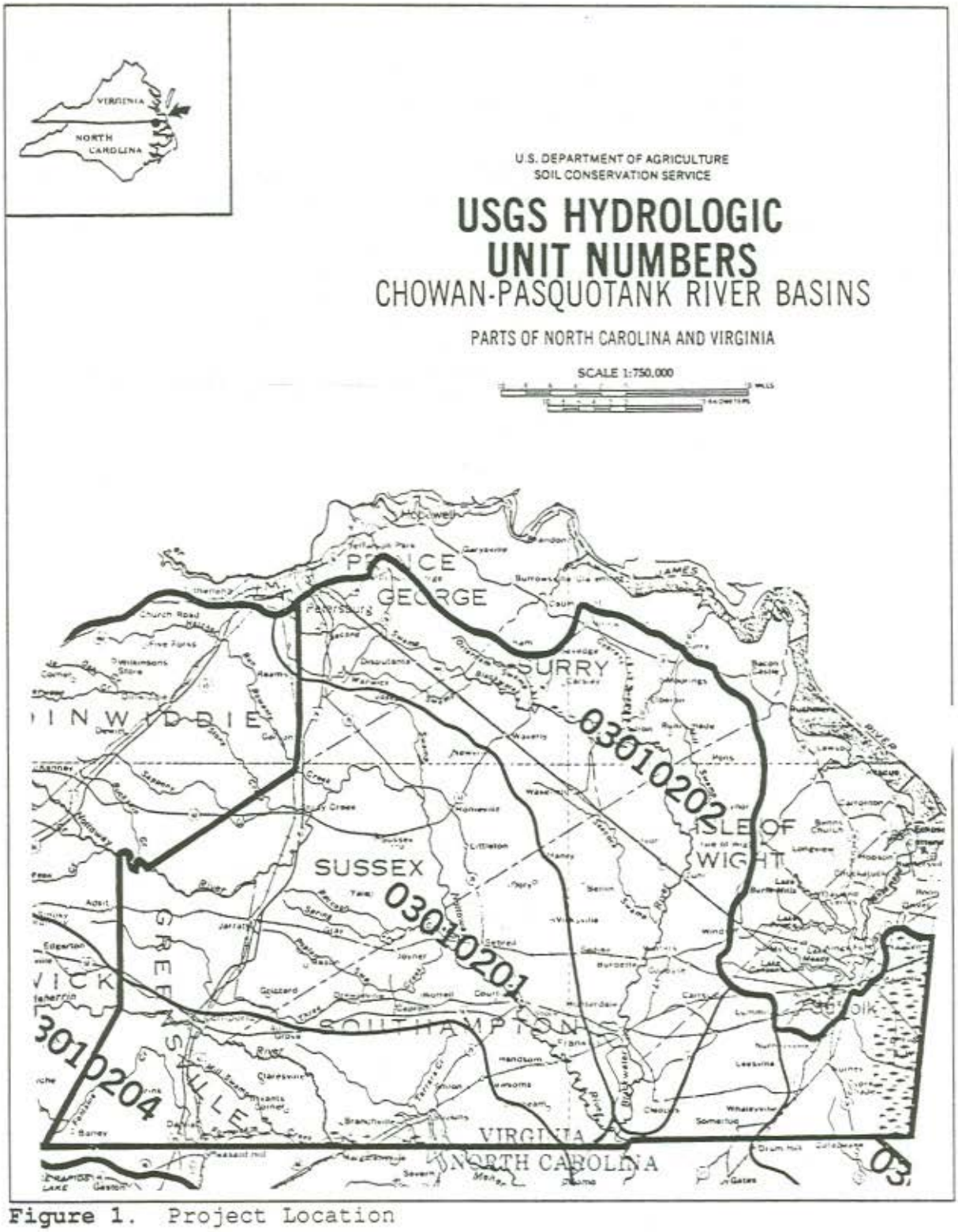

Figure 1. Project Location

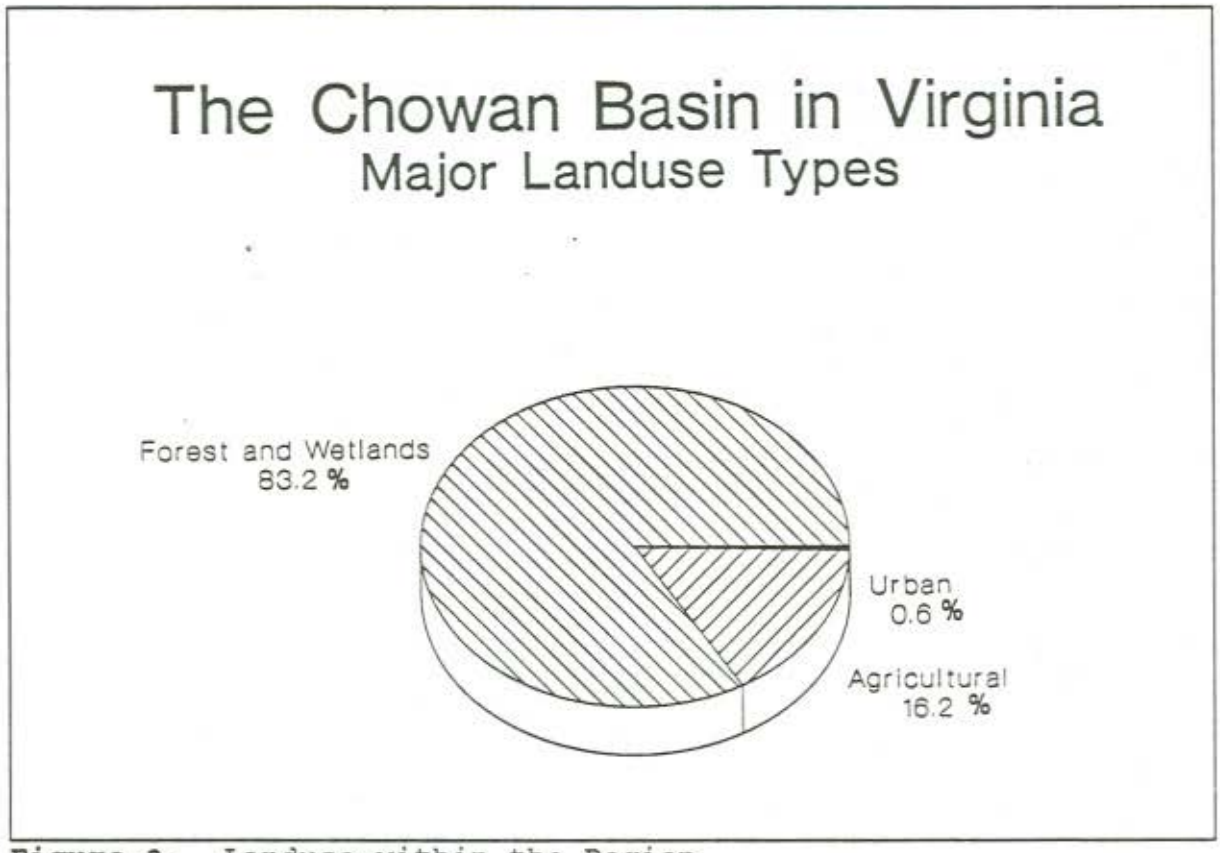

Figure 2. Landuse within the Region

Table 1. Impacts of landuse on water quality in a VSWCB watershed study.

Watershed	% Agriculture Land	Livestock Density (animals/acre)	N Concentration (mg/liter)
Upper Buckthorn Swamp	54%	.90	1.64
Lower Buckthorn Swamp	45%	.60	1.31
Nottoway Swamp	40%	.19	1.32
Assamoosic Swamp	12%	.08	0.85

little agricultural activity, the density of livestock was also correlated with significantly higher nutrient loads (Table 1). Since livestock concentrations seem to be significant contributors to elevated nutrient levels in the region's waters, efforts to improve animal waste management may reasonably be expected to improve water quality in the Chowan tributaries.

Based upon the Virginia agricultural census data[2], the Commonwealth of Virginia produced a total of 380,000 hogs in 1987. Of this total, approximately 159,700 (or 42%) were produced within the Chowan river basin. Following a decline in the early 1980s, the total number of hogs produced in the state has nearly returned to a 1983 high of 550,000, with 450,000 reported produced in 1989. During this time the size of the operations involved has grown significantly. The livestock produced in 1983 were raised on 15,000 individual farms. In 1989, that figure had been reduced to only 5,500 farms. The trend is clearly toward larger, more concentrated production facilities which will have even greater potential impacts upon water quality.

To a limited degree, state water quality regulations are already beginning to address this trend. The VSWCB has enacted regulations requiring all confined animal production operations of over 300 animal units to have a Virginia Pollution Abatement (VPA) permit. An approved nutrient management plan is an enforceable portion of that permit for those over 1,000. Smaller facilities, however, and those not using a confinement system are not currently required to have a permit and thus are not subject to its regulatory requirements.

Observations by field staff of various resource management agencies in the Chowan region indicate two types of problems in animal waste management which need to be addressed. The first is the lack of manure collection and storage systems in many swine production operations. Hogs are still commonly run on bare ground with no attempt to manage the manure produced. This condition can result in significant movements of nutrient laden runoff during storm events. Some form of storage is essential to effective management. Such operations also are often subject to high soil loss rates due to a lack of adequate ground cover in the hog lots. This may further contribute to the elevated nutrient level in surface waters.

The other significant water quality problem observed in animal manure management was the poor utilization of manure, even where storage facilities do exist. There is a generally poor understanding of the nutrient value of lagoon and pit effluent. Most producers feel it has no value and treat it accordingly. This results in the over application of nutrients to cropland receiving treatment with animal manures.

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[2]Virginia Agricultural Statistics Service. 1990. Virginia Agricultural Statistics 1989. Richmond, Virginia, Bulletin #60, September 1990, pp. 154.

In some extreme cases, it has been observed that manure storage systems are pumped out infrequently if ever. This usually leads, in time, to an overflow condition of the system. When that occurs, little water quality benefit has been gained by storing the waste products.

The Virginia Animal Waste Management Project (Project) was designed to try to address these specific areas of concern. By providing funds to assist farmers with proper animal manure management, two goals were pursued. The first was to improve the management practices of those actual recipients of cost-share funds. The second was to use these practices as local demonstration opportunities to educate other producers in the region and influence them to improve their level of management.

Project Design

Location

To implement this demonstration project, the Chowan river portions of the J. R. Horsley and Peanut Soil and Water Conservation Districts (SWCDs) were chosen as the geographical area to be covered. These two districts encompass Greensville, Sussex, Southampton, parts of Surry and Isle of Wight counties and the city of Suffolk. These counties and city constitute most of the headwaters of the Chowan River and much of that area in Virginia involved in intensive hog production. In 1987, these counties produced 137,500 hogs which was 36% of the total for the state. The Commonwealth of Virginia currently is supporting a state cost-share program in this area through the SWCDs. The options offered in this demonstration project were planned to complement those found in the state program.

Manure Storage

Two key practices were offered as a part of this demonstration. The first was the animal manure storage facility (WP-4). The storage facility is an essential and often expensive component of a manure management system. Without storage, proper utilization of manure for its full nutrient value is extremely difficult. In the Project proposal $65,000 was allocated for the construction of five new storage systems at a 75% cost-share rate. The 75% rate is the standard for the current state wide cost-share program. The 25% funding commitment by the landowner is felt to be an important investment that insures future maintenance of the facility. It was hoped that this high rate with no set ceiling on the cost-share assistance provided would be an effective incentive for producers to participate.

Two types of storage facility are normally used in hog production. The least expensive is an earthen lagoon. Where conditions permit, these are excavated to be gravity fed (or pumped) systems for the storage of manure generated by the confined production facility (see Fig. 3.). Available space, height of the water table and other considerations may make an earthen lagoon unfeasible. Under such conditions, concrete pits must be

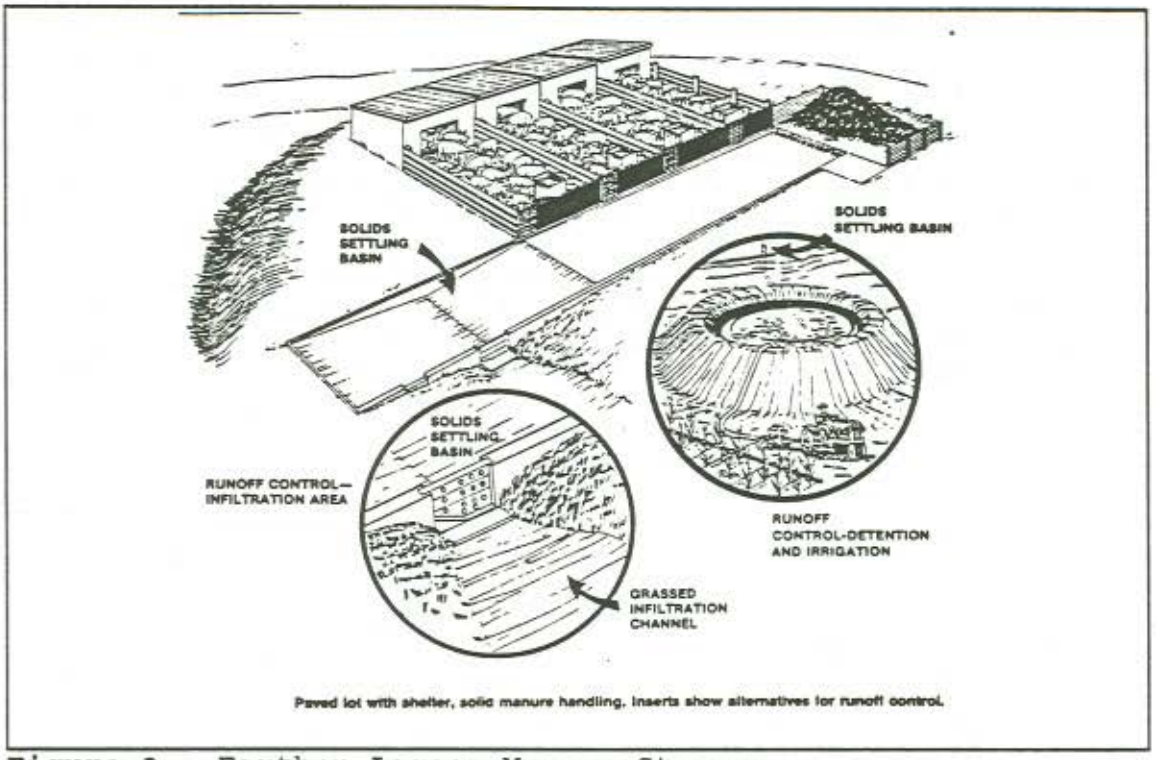


Figure 3. Earthen Lagoon Manure Storage

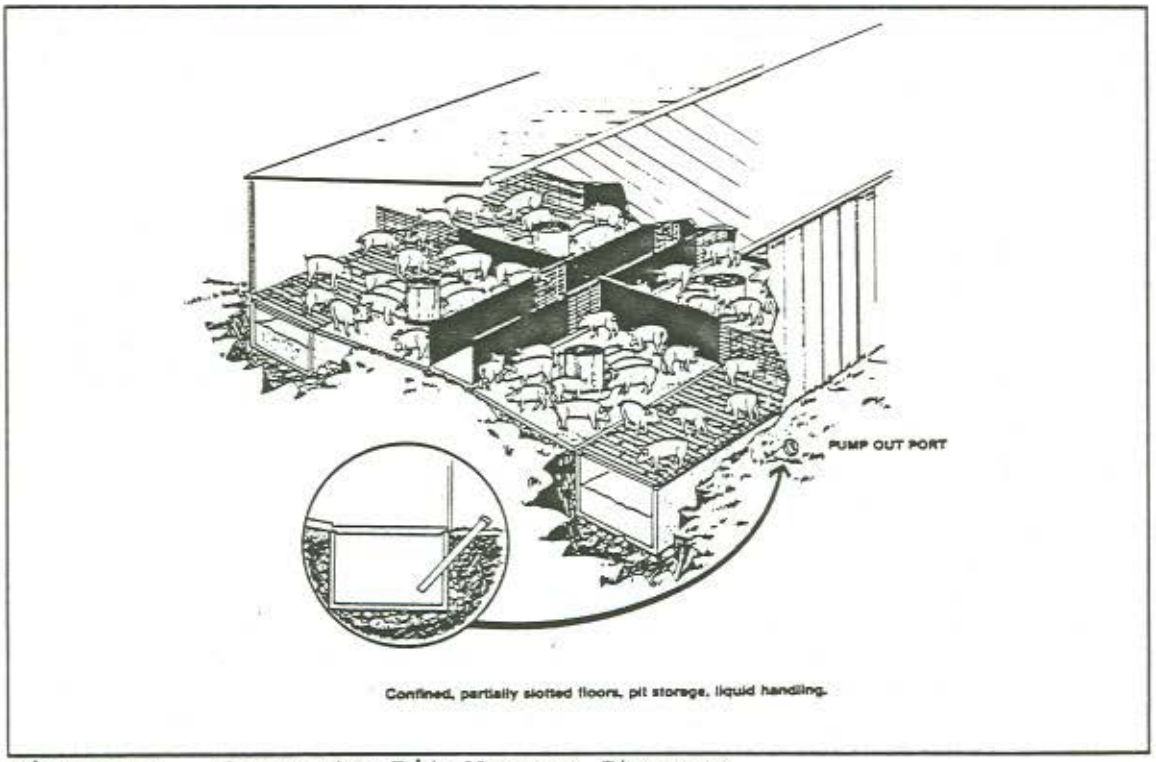


Figure 4. Concrete Pit Manure Storage

constructed underneath the facility to store the manure (see Fig 4.). Such a facility may cost 5-10 times the investment for an earthen lagoon of the same storage volume.

Manure Application

The second key element of this project was to provide cost-share assistance for the land application of lagoon and pit wastes. Farmers could receive cost-share funds at the rate of $4.00/1,000 gallons of manure applied by tractor drawn equipment (see Fig. 5.) or $2.00/1,000 for manure applied with a traveling gun irrigation system (see Fig. 6.). Hauling the manure one tank load at a time with a tractor is a slow and time consuming business, especially considering the relatively low nutrient content of lagoon wastes. Manure from pit storage systems usually has a higher nutrient content but a travelling gun system is still the most cost effective means of application currently available

Project plans called for pumping twenty five manure systems using cost-sharing. The objective of these pump downs was to demonstrate the fertilizer value of this effluent when properly applied. While many farmers empty their pits and lagoons periodically, few give proper consideration to timing and application rates. Their application of the manure is more a waste disposal effort than for nutrient utilization. The cost-sharing was intended to offset the costs of better managing the cropland application of the manure.

In addition to these two central practices, other best management practices needed for the support of these activities were also available. Each of these are currently supported by the statewide Virginia Agricultural BMP Cost-Share Program. The full list of practices offered for this project is found in Table 2.

Table. 2. Practices offered in the Virginia Animal Waste Demonstration Project

Best Management Practice	Unit	Cost-Share Rate
Waste Storage Facility	System	75%
Land Application - Reel system	1,000 gal.	$2.00
- Honey Wagons	1,000 gal.	$4.00
Legume Cover Crop	Acres	$25/A
Grazing Land Protection	Acres	75%
Stream Protection	Feet	75%
Water Control Structure	Structure	75%
Sod Waterways	Acres	75%

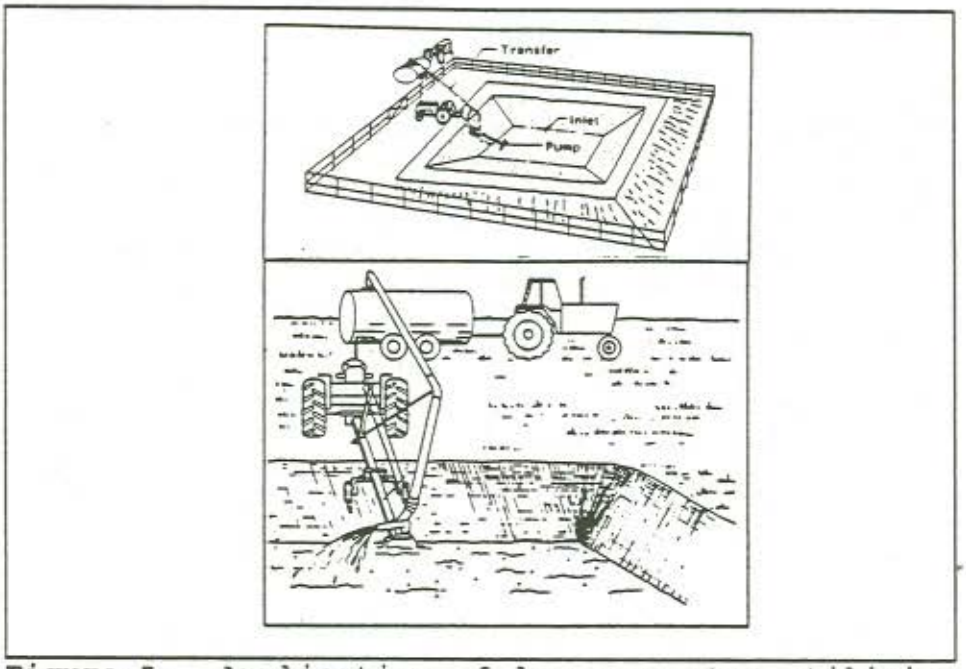


Figure 5. Application of lagoon wastes utilizing a pulled tank or honeywagon.

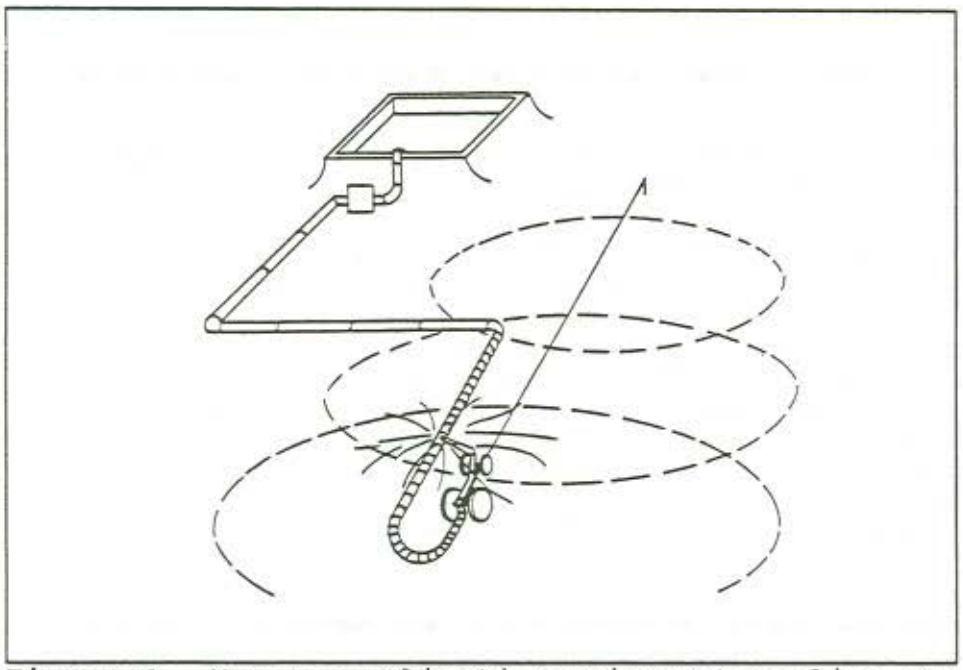


Figure 6. Manure application using a traveling gun irrigation system.

Nutrient Management Plans

All options in the Program required the development of a nutrient management plan. Components of a nutrient management plan are generally farm maps, soil productivity information, field specific recommendations and a plan narrative explaining its use. An example plan is provided in Appendix 7. All plans were authored by the DSWC's nutrient management specialist for that region. Assistance with the necessary field work was provided by the SWCDs and the other cooperating agencies.

The process of plan development required first determining the crop rotations being used and the specific fields they would be grown upon. Yield potentials for the soils present were determined by using a combination of field history, Soil Conservation Service soils information and university accepted yields for the soil productivity groups involved. Knowing these values, the nutrient needs for that level of production could be determined. How those needs were met was decided only after sampling both the cropland soils being farmed and the manure being produced for the nutrients present. This provided information on available plant nutrients. Based on these, recommendations were made for application rates to the fields receiving manure. The rates recommended were designed to meet plant needs without leaving excessive amounts of nitrogen or phosphorous which could be lost from the field and enter surface or ground waters. Any remaining crop nutrient deficiencies were compensated for by the recommendation of appropriate amounts of mineral fertilizer.

As a component of each demonstration, the nutrient management plan was extremely important. To receive assistance, cooperators were required to sign an agreement to both maintain the practice and follow the management plan (Example in Appendix 3). These assured a long term beneficial effect on those farms cooperating in the Project.

To maximize the demonstration benefits of the Project, six test plots also were planned on sites where the lagoon wastes were applied to cropland. These would allow the comparison of fields receiving manure to those without, showing its efficiency and value as a fertilizer. Utilizing these test plots, field days were to be planned to show both the new storage systems and the test plot results to other area producers. The hope was that these tours would encourage increased local adoption of both manure storage and proper land application techniques.

Project Implementation

Participant Selection

The first phase of the project was the selection of program participants. An initial meeting was held of government agency personnel involved in agriculture. The meeting, held on July 17, 1989 included the Virginia Cooperative Extension Service (VCES), USDA Soil Conservation Service (SCS), Agricultural Stabilization and Conservation Service (ASCS), the Division of Soil and Water Conservation (DSWC) and representatives of the two SWCDs. During

this meeting a list of potential candidates from each locality was developed. These were individuals with a recognized need for assistance who also were believed to be willing to cooperate.

Following this initial effort, further field work was done to assess the actual needs of the individuals on the list. Factors considered were the presence of live streams in the existing feed lot, the number of animals, proximity to water supplies, presence of erosion problems and total acres of cropland farmed. This information was used to compare the potential water quality benefits of the competing projects in each county. A point system originally developed for servicing Rural Clean Water Project (RCWP) requests was adopted for this task (Appendix 5.). The scores provided by this point system helped determine who was contacted first in each county for possible participation in the program.

Once a relative ranking was determined, the landowners were contacted to request their participation. Those indicated as being the highest priority did not always wish to participate. It was necessary to move down the list contacting more individuals until interested participants could be found. This resulted in an initial group of applicants being established by October 1989. All of these individuals signed a Nutrient Management Agreement at that time as well as a cost-share request form (Appendix 4.). The list of participants was completed by December 1st with six signed up for construction of new storage systems and twenty requesting pump downs.

Practice Installation

After program participants were identified, the first task was to develop nutrient management plans for each. In addition to the DSWC nutrient management specialist, technical assistance was also rendered by SCS, VCES and District personnel. In support of this effort, $3750 of the Project's funds were used by the J. R. Horsley District to hire a part time technical employee. This assistance was particularly critical in collecting the necessary soil and manure samples. Without the information these provide, effective plans could not have been written. Following this field work, twenty seven actual plans were authored by the DSWC nutrient management specialist.

While management plans were being written during the fall of 1989, designs also were being drawn up for the new storage systems. Due to the time required for design and the late start in the year, little of the actual construction was able to begin until the spring of 1990. At that time the new constructions were begun. Completion of the final system occurred in September 1990.

Initial plans had also called for some of the first pump downs to be completed in the fall of 1989. An early freeze and heavy snows, however, prevented these applications from being made. The first pump downs were not begun until March of 1990, and were carried out through the spring and summer on various crops. The final application was completed in August 1990.

To support the timely reimbursement of cooperators, the DSWC advanced the necessary funds to the districts based upon the

estimated costs reported on the request forms. This amount was then reimbursed by the State of North Carolina to the Commonwealth. A total of $71,934.72 was spent in cost-share for storage systems and $18,064.52 for pump downs. Including the funds used for technical assistance, the total A/P Study funds provided for the Project came to $93,749.24.

During the course of the project, efforts were made to promote the Project activities within the local agricultural community. To maximize the educational impact of the project, thirteen demonstration and test plots were established on fields where the lagoon or pit nutrients were applied. These applications involved such crops as corn, grain sorghum, peanuts, soybeans, cotton, small grain and also pasture and hay land. The plots allowed the comparison of fields receiving various types and amounts of manure nutrients to those without manure and with various fertilizer treatments. These plots demonstrated the efficiency of properly applied manure effluent as a nutrient resource and its economic value in producing crops and forages. Follow up will continue on these plots with deep soil testing for residual nutrients and also study of the next crop in the rotation. Also, field trips will be conducted next year to demonstrate the new storage facilities after they are operational. It is felt that these demonstrations will encourage increased interest, participation, use of manure storage and proper land application as a nutrient resource (see Appendix 8. for Demonstration and Test Plot descriptions). News releases are also being used to further publicize the project (Appendix 6.).

Summary and Conclusions

The perceived instability of the future in the hog market made the commitment of cooperators very difficult to obtain. Many were interested in participating but reluctant to commit the necessary funds, particularly for new constructions. Of the original six cooperators who signed up to build new storage systems, only five actually completed construction. An additional seven also cancelled out after initially expressing some degree of interest. Reasons included changes in future business plans, lack of an environmentally acceptable site and personal health problems. The two final cooperators recruited for the Project were not secured until well into the spring of 1990. Their late entry into the program resulted in their projects not being completed until early in the fall. This also resulted in significant extra work in developing nutrient management plans for those additional farms. Ultimately, two lagoons, one holding pond and four pits were constructed as components of five storage systems.

The pump downs proceeded more smoothly with the limiting factors being the weather, expense and number of available contractors. Snow and freezing weather prevented beginning the pump downs in the fall as originally planned. This caused scheduling problems getting all the work done the following spring. These were exacerbated by a general lack of contractors to do the

work. The cost of the pump downs and the total volumes involved were also higher than originally expected. All these factors worked together to reduce the actual number of pump downs completed. Instead of the planned twenty five we were only able to complete seventeen system pump downs. Specifically, eight pit storage facilities were pumped and twenty four lagoons with a total storage of 8,717,179 gallons. While still a success, this was somewhat fewer than hoped for when the project was planned.

A suggestion often made in the past for the Virginia Agricultural BMP program has been the inclusion of manure application as a cost-share option. The philosophy has always been to provide assistance for the construction of the storage system only. The problem made obvious in this region was that even those producers with storage systems weren't managing them efficiently. Having storage would seem to commit one to application but it was not a guarantee of good management.

The most significant shortcoming discovered during this project was the lack of local contractors or equipment for the proper application of the liquid manure. Even producers interested in doing so had limited opportunities if they did not own the equipment. The lack of equipment is likely to remain a limiting factor in proper manure management in the region and needs to be addressed further.

It was also discovered that some of the older lagoons had sludge accumulations to near the minimum operating level. This has both reduced their storage volume and the anaerobic treatment. This material is very difficult to remove without special and expensive agitation and pumping equipment.

A significant finding in this project was that the real need of the producer with animal manure is a nutrient management plan to show him the fertilizer value of his manure and how to best utilize it. Given that information, the producer has a much greater incentive to utilize that resource. Demonstration plots are one very effective tool for helping to reinforce that point. Of the thirteen plots installed for this Project, eight involved corn production. Crop failure prevented the collection of useable yield data on three of these but on the other five, manure applications demonstrated the ability to effectively replace mineral fertilizer (Appendix 8). In some cases this represented a potential savings of $43-53/acre without a reduction in crop yield.

This demonstration project also provided experience in considering several of the issues being addressed in the evaluation of the current state wide cost-share program. Changes and additions which have been previously suggested for the state program were evaluated in this demonstration.

One of these was the method by which cost-share funds are allocated. The state program has a computerized signup process which uses the soil loss rates or tons of manure managed by potential practices to determine the relative cost effectiveness of each. Funds are then allocated strictly upon this basis. Very little allowance is made for local judgement. Though not perfect,

this mechanism makes it possible to objectively compare all practices in the program for their potential benefit.

The approach taken in the demonstration was different. Because of the limited size and scope of the project, it was believed it might be possible to allow the selection process to be driven more by the judgement of the local technical agencies. Using their professional opinion, we had hoped to quickly develop a list of cooperators most in need of assistance and with the greatest possible water quality benefits. Selective recruitment would also eliminate the need for some type of formal signup period.

This proved to be a far more unwieldy process than originally thought. To differing degrees, individuals were either unwilling or unable to provide this type of information. There was considerable concern expressed about showing favoritism to particular producers. Most of the agencies represented preferred to have a more objective set of criteria for selecting cooperators. Though the actual methods used were different, the general technique was analogous to that employed in the state program.

The nature of the sign-up also worked to simulate a continuous sign-up for the program. This also has often been requested. What was discovered was that the lack of firm dates for program commitment contributed to excessive participant turnover. Getting all the available funds obligated this way was much more difficult than expected. While continuous sign up is of benefit to the applicants, it poses significant administration problems, particularly with projects having funding for a limited period of time.

Contributing to this management difficulty was the elimination of individual caps in the demonstrations. This made it very difficult to project available funds until near the completion of a specific practice. Both the storage systems and pump downs cost more on average than was expected. In some cases, both the existing and needed storage facilities in that region were larger than anticipated. Generally, the cost of new constructions was also greater than originally expected. The average cost-share paid was $14,386 versus the $13,000 budgeted per construction.

While this administrative difficulty was a real one, it is balanced by the needs of the producer. For many operations, the current state cost-share limit of $7,500 is too small an incentive. This is particularly true for those livestock facilities operating in areas with shallow water tables. In such a case, an earthen lagoon is not a viable option. In these cases, hog houses must be constructed with pits underneath. The cost for such buildings can easily exceed $50,000. The economic benefits of an enclosed confinement system are not generally adequate to justify this large an expense.

Demonstration projects of this type provide opportunities to have both immediate and long term positive water quality impacts. The individual practices installed in themselves have considerable water quality benefits in the year they are implemented. Probably of more importance, however, is the educational impact they have

upon the agricultural community. By instituting improvements in farm management, over time, nutrient loadings originating with agriculture can be substantially reduced. The project was successful in helping to move that educational process forward.

As an outcome of the demonstrations completed an additional 48,037 tons of swine manure were brought under management. The nutrient management plans implemented on these farms will help assure that the manure is properly stored and applied only in amounts which can be utilized by the crops. Based upon typical values for swine lagoon waste, this represents 240,185 lbs. of nitrogen brought under management and 288,222 lbs. of phosphate. With improved management, these nutrients will not be lost to ground and surface waters to contribute to the region's nutrient loading problems.

Recommendations

The cost of installing waste storage facilities and the weak agricultural economy indicates a continuing need to provide cost-share assistance for their construction. Producers should be provided an ongoing opportunity for assistance where they are willing to share in the cost of the necessary improvements. The construction of storage facilities is generally the greatest single expense of a manure management system. Because storage seems most often to be the limiting factor in achieving good management, it should continue to be the first priority for the utilization of the state's limited cost-share dollars.

Despite that conclusion, it is recognized that further support needs to be developed to promote the proper application of lagoon effluent. Though not as high a priority as providing storage, proper application is still a vital part of the management of these nutrients. A significant problem seems to exist in the region in getting all of these wastes properly applied. The shortage of necessary equipment or contractors to do the work indicates that additional avenues to promote proper application should be evaluated. Some alternatives to explore might include encouragement of SWCD's to provide the needed equipment on a rental basis. Similar services are already provided by some districts renting no-till cultivators and dry manure spreaders. General promotional activities in association with local rental might also help in developing a market which would attract other independent contractors to do this type of work.

Part of the promotion of better application of the wastes must continue to include a strong support for nutrient management planning. The information contained in a nutrient management plan is a significant incentive to better utilize an existing manure resource. Demonstration plots will need to continue to be a selling tool used in encouraging full adoption of the plan. They illustrate the reality of potential financial benefits of manure management outlined in the plan. The training of additional personnel in other agencies to provide this planning assistance should also be pursued. District employees in particular should

be given the necessary training to be able to render this type of service.

In administering this type of program, a compromise in participant selection is needed between using pure cost-effectiveness and recruitment based upon subjective opinions. A clear set of water quality objectives will be necessary in any future programs to guide the process of identifying candidates for program recruitment. Basic elements of these guidelines should probably begin with the designation of high priority areas which are already known to exist. Factors to then be considered should be the size and severity of the individual problem, its proximity to surface (or ground) water and the potential benefits of the project being considered. The actions then taken should be guided by a comprehensive conservation plan for the site. Without proper planning, there is little assurance that the appropriated practices are being implemented.

The benefits of the continuous sign up evaluated in this program are significant. To be workable, it requires close monitoring of ongoing projects. As a beginning, definite completion dates need to be set for all projects. Commitments to provide project funding cannot extend beyond the calendar limits of the funding for the larger program. Management of the money under these conditions also requires that there be understood practice funding limits before any work commences. While project cost estimates do often come in too low, making full utilization of the funds without established caps is virtually impossible. Given that these controls can be instituted, some form of continuous sign up or recruitment should be pursued for the state cost-share program.

APPENDIX

Appendix 1. Final Budget Summary
Virginia Animal Waste Management Project

Practice	# Systems	Tons Manure Managed	Total Cost
Use of Albemarle-Pamlico Estuarine Study Funds			
A. Land Application of Existing Lagoon Wastes	(18)	30,063	$18,064.52
B. New Animal Manure Storage Systems	(5)	2113	$71,934.72
C. Technical Assistance	N/A	N/A	$3,750.00
Total A/P Study Funds.....			$93,749.24
State Matching Funds Applied in J. R. Horsley SWCD			
A. BMP Allocation	N/A	N/A	$29,167.00
B. Technical Assistance	N/A	N/A	$2,081.00
Virginia Total Matching Funds....			$31,250.00
Total Project Funds.....			$124,999.24

Appendix 2. List of Participants

Name	Practice	County	Tons Manure Managed	Cost-Share $
W. Young	Pit	Southampton	550	$11,770.00
J. Lowe	Lagoon	Southampton	3054	$14,100.00
W. Carr	Lagoon	Isle of Wight	1045	$15,089.72
C. Fowler	Pits	Suffolk	1045	$17,100.00
R. Parson	Lagoon	Surry	1341	$13,875.00
	Subtotal.....		7035	$71,934.72
P. Roberts	Pump down	Greensville	2537	$1,203.79
Fajna Brothers	Pump down	Greensville	2155	$1,053.51
G. Hawkins	Pump down	Greensville	4255	$1,660.00
C. Allen	Pump down	Greensville	984	$ 472.00
J. Clements	Pump down	Greensville	3217	$1,543.15
D. Wheeler	Pump down	Sussex	632	$ 510.00
W. Young	Pump down	Southampton	772	$ 306.58
R. Drake	Pump down	Southampton	4136	$ 820.79
H. Vincent	Pump down	Southampton	4612	$1,958.26
P. Branch	Pump down	Southampton	526	$ 504.44
L. Whitley	Pump down	Southampton	3219	$1,544.00
J. Newsom	Pump down	Southampton	3096	$1,485.00
R. Holland	Pump down	Isle of Wight	3110	$1,492.00
W. Daniels	Pump down	Suffolk	3000	$1,439.00
E. Felton	Pump down	Suffolk	715	$ 320.00
H. King	Pump down	Surry	2667	$1,135.00
J. Appel	Pump down	Surry	1366	$ 617.00
	Subtotal.....		41,002	$18,064.52
	Total for all C-S		48,037	$89,999.24

Appendix 3. Nutrient Management Agreements

The following agreement was signed by all participants in the project. This statement establishes the necessity of now applying the nutrient management plans which were developed for each farm. It is understood that changes in cropping practices will require adjustments in this nutrient management plan. The intent is that the principles applied, particularly in the utilization of swine manure, be consistently continued. This aspect represents one of the most significant accomplishments of the Project.

Nutrient Management Agreement

The Undersigned hereby agrees to comply with the animal waste nutrient management plan developed for this farm with necessary revisions reflecting changes in crop rotations and manure compostition. Failure to comply will result in the reimbursement of the cost-share funds awarded.

William B. Daniel — 8-23-89

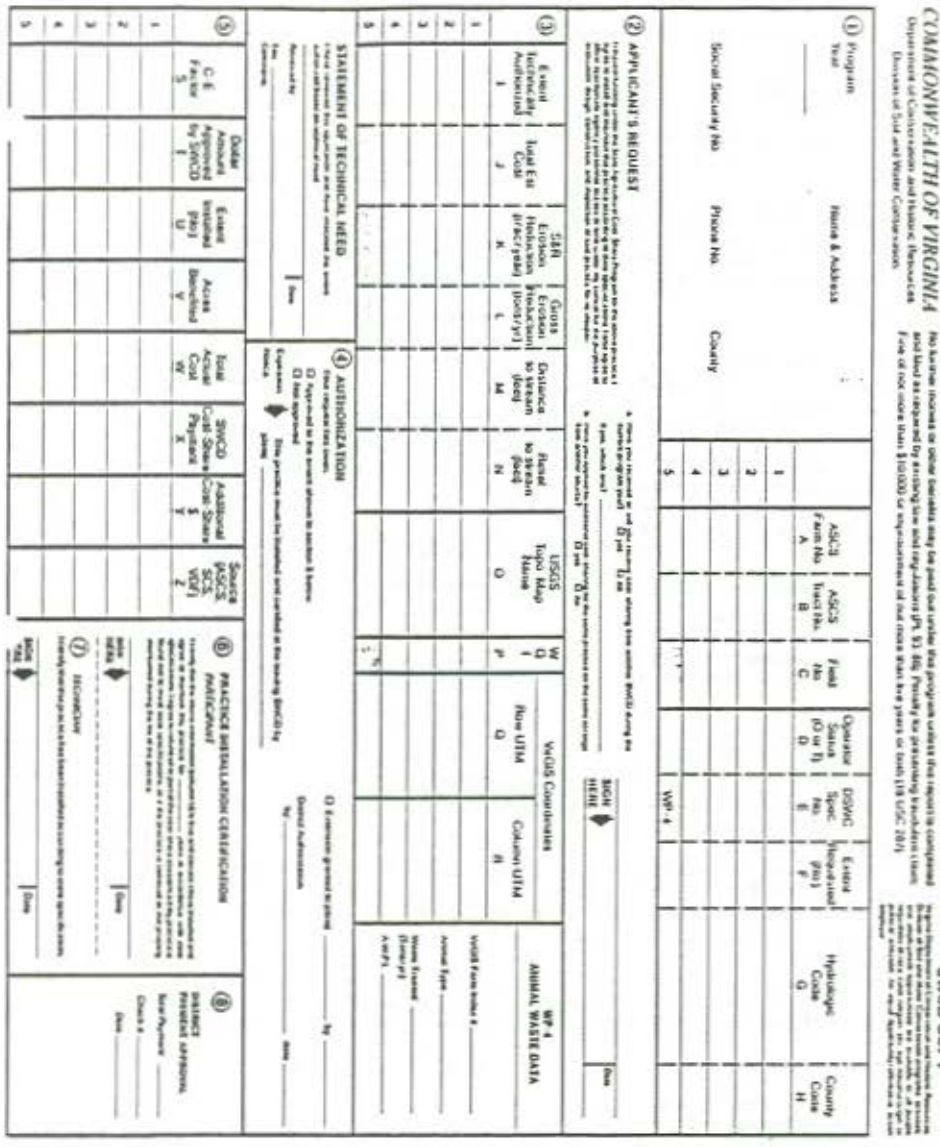
Signature of Applicant — Date

Gary M. Cyrulnik — Chairman — 10-26-89

SWCD Representative — Title — Date

Appendix 4. Cost-Share Agreements

The following agreement form used represents a contractual understanding between the landowners participating in the project and the two Soil and Water Conservation Districts handling the applications to receive cost-share assistance. These obligate those individuals receiving funds for the construction of new storage facilities for their proper maintenance for a period of ten years.



VIRGINIA AGRICULTURAL BMP COST-SHARE REQUEST FORM

SWCD COPY

COMMONWEALTH OF VIRGINIA

Department of Conservation and Historic Resources
Division of Soil and Water Conservation

ANIMAL WASTE MANAGEMENT
DEMONSTRATION

Appendix 5. Example Priority System Sheet

The following sheet was used as a means of objectively assessing the relative water quality impact of the potential projects being considered. This provided a means to choose between alternative projects within a county that would favor those providing the greatest water quality benefits.

RANKING SYSTEM FOR CHOWAN PROJECT CANDIDATES

LANDOWNER _____

	50 points max.	Score Assigned
ANIMAL WASTE		
Live stream in feedlot	20	
Number hogs or cows 0-100	10	
100 +	15	
Distance to water supply lake or receiving blue line stream		
Less than 1000 feet	15	
1000 feet - 2500 feet	10	
More than 2500 feet	5	
EROSION	25 points max.	
Gulleys present	10	
Distance to water supply lake or blue line stream		
Less than 1000 feet	5	
1000 feet - 2500 feet	4	
More than 2500 feet	3	
Cover crop presently used Yes - 0 No -	5	
No-till farming presently used Yes - 0 No -	5	
PESTICIDES AND FERTILIZERS	25 points max.	
A. Crop Rotation		
Corn (yes or no) _____ Ac.		
Soybeans (yes or no) _____ Ac.		
Peanuts (yes or no) _____ Ac.		
More than 200 Ac.	5	
150 - 200	4	
100 - 150	3	
50 - 100	2	
B. Distance to lake or receiving blue line stream.		
Less than 1000 feet	15	
1000 feet - 2500 feet	7	
More than 2500 feet	5	
C. Distance to non-blue line stream		
Less than 1000 feet	5	
1000 feet - 2500 feet	3	
More than 2500 feet	1	
	TOTAL SCORE =	

High 60 - 100 points
Low Less than 60

Appendix 6. News Release Used

The following news release was provided to papers commonly subscribed to within the Project area. These included:

The Suffolk News-Herald	The Tidewater News
The Smithfield Times	The Sussex-Surry Dispatch
The Independent Messenger	The Southside Sun

NEWS RELEASE

Date Sent: August 8, 1989
Release Date: Immediately
Contact: Mike Skinner
Tele: (804) 925-2470

DEMONSTRATION SEEKS TO ABATE ANIMAL WASTE POLLUTION

SUFFOLK - The safe storage and disposal of animal waste, particularly that of swine, has become a major concern of state officials and environmental groups in recent years. Such wastes, which include nutrients, have been linked to water quality decline in rivers and in the Chesapeake Bay.

A demonstration project initiated by the Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation (DSWC) seeks to help farmers find better ways of using animal waste. DSWC Environmental Planner Jim B. Lewis heads the project which features 30 sites.

"The most serious problem is waste storage. In a lot of swine operations, animals aren't confined so storage of the animals' waste is impossible," said Lewis. The demonstration project enables the Peanut and J. R. Horsley Soil and Water Conservation Districts to fund construction of animal waste lagoons in which waste is stored. The two districts

- more -

encompass Greensville, Sussex, Southampton, Surry, and Isle of Wight Counties and Suffolk. The DSWC will pay 75 percent of the lagoons' construction costs.

The project also stresses the use of animal waste on cropland to supplement commercial fertilizer. Up to 25 farmers in these counties will be paid from $2 to $4 per acre to apply the swine waste, which includes nutrients vital to crop production but harmful to aquatic life.

The demonstration project requires a nutrient management plan from each participating farmer. According to Lewis, "The plan determines the fertilizer value of the animal waste and it insures that the waste is applied in proper amounts and at the proper time for crop uptake. This assures large crop yields while minimizing the chance that excess nutrients find their way into streams and groundwater."

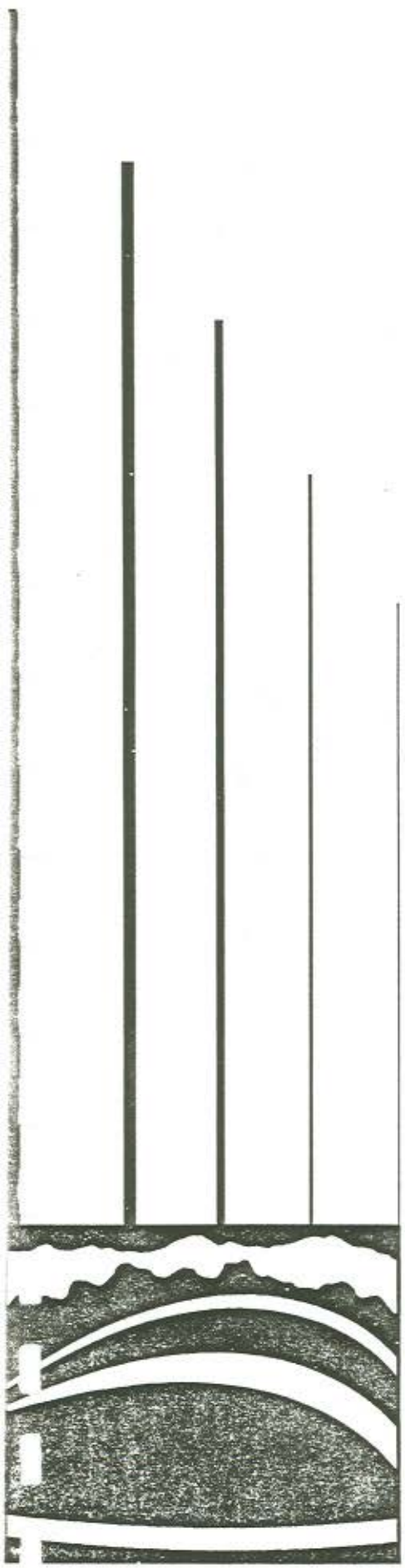
The USDA Soil Conservation Service, the DWSC, the Virginia Cooperative Extension Service and local soil and water conservation districts help develop the plans. For more information, contact either district or call the DSWC at (804) 925-2470.

Appendix 7. Sample Nutrient Management Plan

The nutrient management plan provided here as an example is representative of the type of work done for all participants in the Project. Detailed plans of this type to direct the proper use of the swine manure produced on each farm are key to assuring a water quality benefit from each BMP installed.

JOHN APPEL

SURRY



Nutrient Management Plan

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION
DIVISION OF SOIL AND WATER CONSERVATION

REGIONAL OFFICE
1548 Holland Road
Suffolk, VA 23434

June 11, 1990

Dear Mr. Appel,

It is my pleasure to provide you with the enclosed Nutrient Managment Plan. This Plan represents your decision to manage the farm's nutrient resource in the most economically and environmentally sound manner. The Plan is designed to meet your needs and current farming practices. If for any reason your operation should change please contact this office so the necessary revisions can be made. If I can be of any help with the implementation of this plan or if you have any questions please do not hesitate to call (tel. 804-925-2469).

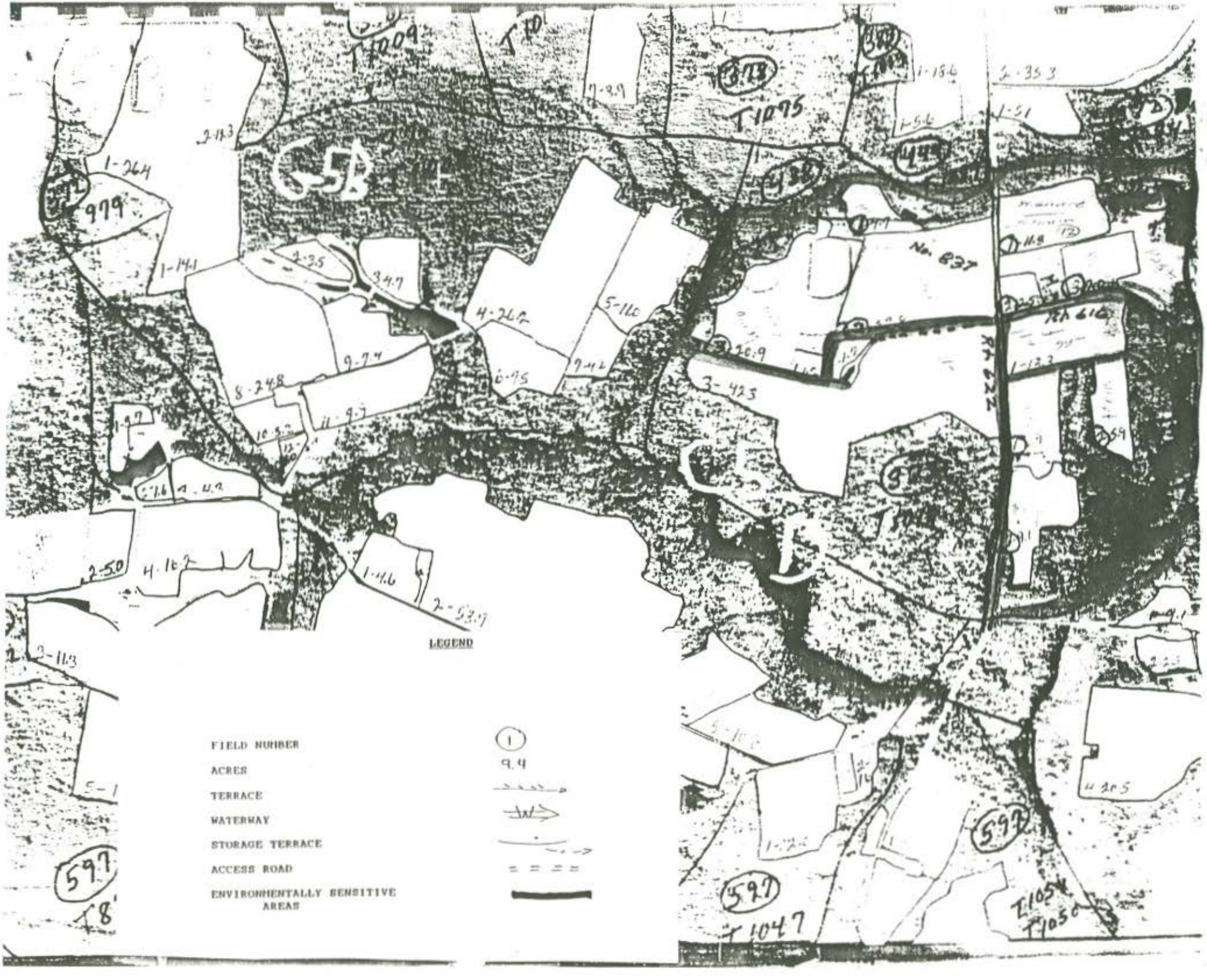
Sincerely,

Harry O. Dalton

Harry O. Dalton
Nutrient Management Specialist

ma

Enclosure


LEGEND
FIELD NUMBER
ACRES
TERRACE
WATERWAY
STORAGE TERRACE
ACCESS ROAD
ENVIRONMENTALLY SENSITIVE AREAS
T1009
T1095
T1047
T1050
No. 837
RT 622
RT 616

SOIL DESCRIPTIONS

Name: John Appel

Soil Name (Include modifiers)	Productivity Group	Yields for Common Crops				
		Corn	Peanuts	Wheat	Soybeans	Pasture
Slagle (10)	2W	125 Bu.	3500 lbs.	45 Bu.	40 Bu.	9 Aum.
Yamassee (82)	2W	120	3000	40	45	8
Craven (83)	2W	115	2900	55	45	10
B	3E	105	2800	50	40	10

Yield Potential from:

* X SCS Soils 5
* Soil Survey
* Farm History


Cox
Pocosin
90
80
60

Nutrient Management Job Sheet

Name: John Appel Tract #: 837 County: Surry

Field	Acres	Crop Rotation	Yield Potential	Nutrient Needs (Soil Test) N - P - K	Manure (Nutrients Per/Loads) N - P - K	Other Sources (legume, etc.) N - P - K	N - P - K (Surplus) vs. Needed	Commercial N - P - K	*
1,2,3 3 tract	85	small grain	60 Bu.	100-60-60	Lagoon .5 in. 65-48-45	45-0-0 following peanuts	(10)-12-15	0-0-0	1
					Pits 3000 gal (3) 56-32-38		(1)-28-22	0-0-0	2
		grain sorghum	100 Bu.	125-60-60	Lagoon 1 inch 131-96-90	0-0-0	(6)-(36)-(30)	0-0-0	3
					Pits 6000 gal 49-59-70		76-(1)-(10)	75-0-0	4
		peanuts	3000 lbs.	0-0-0	0-0-0	0-0-0	0-0-0	0-0-0	

*Notes 1. Based on application of lagoon effluent at planting or early growth stage on small grain at .5 inch / acre by irrigation following peanut rotation. If not following peanuts, can use .75 in. / acre
2. Same as #1 except application of 3000 gals. / acre from pits immediately incorporated.
3. Based on application of lagoon effluent at planting or early growth stage for grain sorghum at rate of 1" per acre following small grain.
4. Same as #3 except application of 6000 gals. per acre from pits for no-till sorghum, with no incorporation. Pit manure is based on average values - test when ready to pump.
5. When no manure is used, follow soil or tissue test.

Name: John Appel

Nutrient Management Plan Narrative

ANIMAL NUTRIENTS

This is a swine operation with 80 sows, farrow to finish. The confinement facilities consist of: a cargill floor and lagoon to accommodate 600 finish hogs; a farrow house with pit to accommodate 20 sows; a nursery with pit to accommodate 350 pigs. The lagoon and pits are designed for 180 days storage of 308,286 gallons between the minimum and maximum operating levels, and 47,932 gallons in the pits.

Twice per year the facilities will need pumping. The lagoon will be pumped by irrigation, and the pits with a honey wagon, in the fall on small grain and in the late spring on grain sorghum. The fall application can be incorporated but the spring application is applied to no-till sorghum. (See Manure Utilization Worksheet pages 1 and 2, Manure Composition and Values, and the Job Sheet.) Since the storage pits are new, the values used are averages. Manure samples should be taken and analyzed when ready to pump.

LEGUME RESIDUE

A credit for nitrogen should be given following the harvest of legume crops such as soybeans and peanuts. (See sheet on Legume Residue.)

COMMERCIAL FERTILIZER

Commercial fertilizer should be used to supplement manure and legume residue sources of plant nutrients. Split applications of commercial fertilizers, side dressing, top dressing, and timing applications to meet plant needs are practices which should be used whenever possible.

ADDITIONAL CONSIDERATIONS

Some important factors in the management of this system are:

1. Utilize manure, soil and tissue test recommendations to guide management decisions.
2. Avoid or reduce nutrient applications near streams, wells, or environmentally sensitive areas.
3. Control erosion in fields receiving nutrient application.
4. Maintain proper pH levels for maximum plant utilization of applied nutrients.

Additional help can be obtained on erosion and other farm management objectives from your local SCS or Extension Service office.

Manure Composition and Values

Name: John Appel

Number of Animals: 1000	Type: swine
Total Manure Volume Produce per year: 712,500 gals. (L. 616572+P.95864	

Manure Composition and Value

Nutrient Availability per: 1000 gals. (Tons or 1000 gal.)

Year 1 Content			Residual N		
N	4.85	lbs.	YR 2	0.55	lbs.
P2O5	3.54	lbs.	YR 3	0.23	lbs.
K2O	3.31	lbs.	YR 4	0.09	lbs.

Values from - Manure test: X Average Value:

Value per: 1000 gals. (Tons or 1000 gal.)

Nutrient		$/lb.	Total value / Nutrient
N	4.85	.24	1.16
P2O5	3.54	.26	0.92
K2O	3.31	.16	0.53
Total value of Manure:			$ 2.61 / 1000 gals.

27,150 gals. x $2.61 = $70.86/acre

Manure Utilization

Crop	Yield Potential	Acres	Quantity Manure/acre	Total Manure Used
SEE MANURE UTILIZATION WORKSHEETS				

Potential Utilization of Manure:	2,375,500
Total Manure Produce:	712,500
Remainder (if any):	(-1,663,000)

MANURE UTILIZATION WORKSHEET

CHOWAN PROJECT

I AMOUNT OF MANURE 308,286 (gallons) / 180 days 1 time ~~(tons)~~(lagoon)

II MANURE ANALYSIS lbs/1000 gals.

9.70 N	5.14 NH4-N	5.06 P2O5
4.73 K2O	2.05 Ca	0.81 Mg

III NUTRIENT AVAILABILITY

A. Immediate Incorporation

N = (_____ * inorganic N) + (0.5 * organic N) + (residual)
(_____) + (_____) + (_____) =

P = _____ * total P2O5 =

K = _____ * total K2O =

B. Delayed Incoporation (> 7 days) Irrigated

N = (.50 * inorganic N) + (0.5 * organic N) + (residual)
(.50 x 5.14) + (.5(9.70-5.14)) + (_____) = 4.85 lbs/1000 gal

P = .70 * total P2O5 5.06 = 3.54 lbs/1000 gal

K = .70 * total K2O 4.73 = 3.31 lbs/1000 gal

IV RESIDUAL N

Second Year .12 x (9.70 - 5.14) = 0.55 lbs/1000 gal.
Third Year .05 x " " = 0.23 lbs/1000 gal.
Fourth Year .02 x " " = 0.09 lbs/1000 gal.

V APPLICATION

Type of applicator Irrigation
Size of applicator _____
Nutrients per load N 131 lbs P 96 lbs K 90 lbs / 1"

Amount/Acre 1" or 27,150 gals.
Acres Needed 308,286 ÷ 27150 = 11.4 acre
Acres Available 50 small grain and grain sorghum

MANURE UTILIZATION WORKSHEET

I AMOUNT OF MANURE 95,864 (gallons) / year (~~tons~~) new pits

II MANURE ANALYSIS lbs/1000 gals. (average)

26.8	N	21.2	NH4-N	14.0	P2O5
16.7	K2O	8.6	Ca	5.1	Mg

III NUTRIENT AVAILABILITY

A. Immediate Incorporation

N = (.75 * inorganic N) + (0.5 * organic N) + (residual)
(.75 x 21.2) + (.5(26.8-21.2) + ( ) =18.7 lbs/1000G first year

P = .75 * total P2O5 14.0 =10.5 lbs/1000G

K = .75 * total K2O 16.7 =12.5 lbs/1000G

B. Delayed Incoporation (> 7 days)

N = (.25 * inorganic N) + (0.5 * organic N) + (residual)
(.25 x 21.2) + (.5(26.8-21.2) + ( ) =8.1 lbs/1000G

P = .70 * total P2O5 14.0 =9.8 lbs/1000G

K = .70 * total K2O 16.7 =11.7 lbs/1000G

IV RESIDUAL N

Second Year	.12 x	(26.8-21.2)	= 0.67 lbs/1000 gals.
Third Year	.05 x	"	= 0.28 lbs/1000 gals.
Fourth Year	.02 x	"	= 0.11 lbs/1000 gals.

V APPLICATION

Type of applicator Honeywagon
Size of applicator 1000 gals.

Immediate	Nutrients per load	N	18.7 lbs	P	10.5 lbs	K	12.5 lbs /1000 gals.
Delayed Incorp.			8.1 lbs		9.8 lbs		11.7 lbs /1000 gals.

Amount/Acre 5000 gals. (N= 94 lbs, P= 53 lbs, K= 63 lbs.)
Acres Needed 95,864 ÷ 5000 = 20 acres
Acres Available 50 small grain and grain sorghum

LEGUME RESIDUE

Fertilizer applications on crops following a legume crop, or grass/legume mixture, should reflect the nitrogen fixing ability of the legume. The following are some standard guidelines for determining the amount of nitrogen provided by a legume;

Alfalfa - 40 lbs for grass/alfalfa stand plus 1 lb. for each percent of alfalfa (i.e. a 50% stand would contribute 90 lbs. of N).

Clover - 40 lbs. for grass/clover stand plus 3/4 lb. for each percent of clover.

Soybeans - 1 lb. per bushel of soybean yield (not to exceed 40 lbs.).

Peanuts - 30 lbs. per ton of peanut yield (full credit is given to small grain and 55% credit is given to corn).

The Management Plan Table reflects this N credit by reducing other nitrogen applications.

COMMERCIAL

Commercial fertilizer should be used to supplement manure and legume supplied nutrients (see Management Plan Table for recommendations). Split applications of commercial fertilizer, side dressing, and timing applications to meet plant needs are practices which should be used when ever possible.

ADDITIONAL CONSIDERATIONS

Some important factors in the management of this system are:

(1) Utilize manure, soil and tissue test recommendations to guide management decisions.
(2) Avoid or reduce fertilization near streams, wells or environmentally sensitive areas (see plan map).
(3) Control erosion on all fields receiving any type of fertilizer (contact the local Conservation District Office for assistance with erosion control needs).
(4) Maintain proper ph levels for maximum plant utilization of applied nutrients.

Appendix 8. Demonstration and Test Plots

The following list describes the types and locations of test plots and demonstrations established as a part of the Virginia Animal Waste Management Project. The summary table is followed by a brief report on each individual demonstration.

Crop	County	Cooperator	Test	Results
Corn	Greensville	Clements	Manure/Fertilizer combinations	Comparable yields
Corn	Greensville	Fajna	Manure/Fertilizer combinations	(no yield data due to crop failure)
Corn	Southampton	Drake	Manure/Fertilizer combinations	Same yield for $43.60/A less.
Corn	Southampton	Branch	Manure/Fertilizer combinations	(no yield data due to crop failure)
Corn	Sussex	Wheeler	Manure/Fertilizer combinations	Comparable yields
Corn	Surry	King	Manure/Fertilizer combinations	(no yield data available)
Corn	Suffolk	Felton	Manure/Fertilizer combinations	Comparable yields. Manure value $47.68/A
Corn (no-till)	Suffolk	Daniel	Manure/Fertilizer combinations	Comparable yields. Manure saved $53.70/A
Peanuts	Greensville	Roberts	Manure only	No yield response.
Peanuts	Isle of Wight	Holland	Manure only	No yield response.
Cotton	Greensville	Hawkins	Manure/Fertilizer combinations	No yields available.
Grain sorghum	Surry	Roberts	Manure/Fertilizer	No yields available.
Bermuda grass	Southampton	Whitley	Manure only	No yields available.

COWAN DEMONSTRATION PROJECT

Department of Conservation and Recreation
Division of Soil and Water Conservation

NUTRIENT MANAGEMENT TEST PLOT

STUDY: Application of lagoon effluent for nutrients on no-till corn comparing to fertilizer.

SUMMARY: Response to lagoon effluent is apparent but the water content is also obvious. Next year compare the effluent with clean water irrigation.

YEAR: 1990 **CROP:** Corn

DESCRIPTION: 2 fields adjacent to lagoon. Field 6 (4 acres) received 3" effluent @ 1" applications. Field 5 received 1" application with various fertilizer application along with check plot.

TREATMENT	AVERAGE YIELD	FERT$
1. Starter, sidedress, manure (3") (265N)	127.4 bu	25.64
2. Starter + manure (3") (205 N)	109.1 bu	11.24
3. Sidedress + manure (1") 107 N)	93.5 bu	10.08
4. Starter, sidedress, manure (1") (177N)	81.7 bu	35.72
5. Starter, sidedress, no manure (112 N)	46.4 bu	35.72

PHYSIOGRAPHIC REGION: Coastal Plains Chowan watershed

SOIL TYPE/PRODUCTIVITY LEVEL: Slagle II

CLIMATIC FACTORS: Average except dry and hot in July

DATA COLLECTED BY: H. Dalton 9-12-90

COOPERATOR/COUNTY: Jeffrey Clements Greensville

COMMENTS: Plot 1 & 2 received lagoon effluent in three 1" applications at planting, at 18" high and early July. Plots 3 & 4 received 1" applications in early July.

BACKUP DATA AVAILABLE: Soil samples, manure samples

AUDIENCE: Inviduals and community farmers

CHOWAN DEMONSTRATION PROJECT

Department of Conservation and Recreation
Division of Soil and Water Conservation

NUTRIENT MANAGEMENT TEST PLOT

STUDY: Application of swine manure from pits at pre-plant and injected at 18" high with starter fertilizer and without starter. Also with sidedressing and without, and also with regular fertilizer application with no manure.

SUMMARY: Yields from various treatments were comparable but treatment costs were variable.

YEAR: 1990 **CROP:** Corn (Pioneer 3389)

DESCRIPTION: (36 Rows with 36 inch width) 4 rows with starter and manure; 8 rows with manure only; 12 rows with sidedressing and manure, and balance with no manure with regular application of starter and sidedress nitrogen. Each manure treatment had 4000 gals. broadcast at pre-plant and 2000 gals. injected at 18" high.

TREATMENT	AVERAGE YIELD	COMM FERT COST
A. Manure + starter 79-29-41 + 27-69-120 + 30-0-0 from vines Total N = 136 lbs.	125.2 bu/ac	$43.60
B. Manure only Total N = 109 lbs.	120 bu/ac	$ 0.00
C Manure + sidedress 79-29-41 + 45-0-0 + 30 0-0 Total N=154 lbs.	118 bu/ac	$10.80
~~27-69-120 = 100-0-0 + 30-0-0 vines~~ D. Starter + sidedress Total N=157 lbs.	124 bu/ac	$67.62

PHYSIOGRAPHIC REGION: Coastal plain Chowan watershed

SOIL TYPE/PRODUCTIVITY LEVEL: Slagle Class IIW Prod-Level 2

CLIMATIC FACTORS: Average rainfall for growing season

DATA COLLECTED BY: Harry Dalton

COOPERATOR/COUNTY: Roger Drake Southampton Co.

COMMENTS: 6000 gallons of manure gave comparable yield at less cost per acre.

BACKUP DATA AVAILABLE: Soil and manure test analysis

AUDIENCE Individuals and community farmers.

CHOWAN DEMONSTRATION PROJECT

Department of Conservation and Recreation
Division of Soil and Water Conservation

NUTRIENT MANAGEMENT TEST PLOT

STUDY: Application of lagoon effluent from swine lagoon to supply nutrients for no-till corn and compare to regular fertilizer use.

SUMMARY: Yield was somewhat better from the effluent application, but the additional water probably made the difference at a very hot and dry period.

YEAR: 1990 **CROP:** Corn (no-till)

DESCRIPTION: A total of 2 inches of lagoon effluent was irrigated on corn with no commercial fertilizer applied on half of field; compared to balance of field with no manure and regular fertilizer treatment.

	TREATMENT	AVERAGE YIELD	FERT COST/AC
Plot 1	All lagoon effluent Total N=132 lbs. 102-54-163 + 30-0-0 from vines	98.3 bu/ac	0.00
Plot 2	Starter 250 lbs 6-18-36 + 100 lbs N sidedressed + 30-0-0 from vines Total N=145 lbs	93.7 bu/ac	$53 70

PHYSIOGRAPHIC REGION: Coastal Plain Chowan watershed

SOIL TYPE/PRODUCTIVITY LEVEL: Eunola, Suffolk Prod Level 2

CLIMATIC FACTORS: Average except hot and dry in July

DATA COLLECTED BY: Harry Dalton

COOPERATOR/COUNTY: William Daniel Suffolk

COMMENTS: Yield was reduced due to dry and extremely hot in July. Second inch of effluent ~~was~~ applied in July helped.

BACKUP DATA AVAILABLE: Soil and manure test analysis

AUDIENCE: Individuals and community farmers.

CHOWAN DEMONSTRATION PROJECT

Department of Conservation and Recreation
Division of Soil and Water Conservation

NUTRIENT MANAGEMENT TEST PLOT

STUDY: Application of swine manure from Farrow Nursery Pit and anaerobic lagoon on corn.

SUMMARY: The 3 plots were about the same yeild comparing effluent from the lagoon or pit to check plot with only fetilizer.

YEAR: 1990 CROP: Corn

DESCRIPTION: 36 row plots had: (1) applied 7000 gals. effluent from pit, (2) 7000 gals. from lagoon, (3) no manure-fert (Manure plots received 25 lbs. N. sidedressing)

TREATMENT	AVERAGE YIELD	FERT. COST
1. 7000 gals. manure lagoon 79-84-43 N=104 lbs. + 25 lbs. N	116.5 bu/ac	$ 6.00
2. 7000 gals. manure pit 80-100-18 N=105 lbs. + 25 lbs. N	122.9 bu/ac	$ 6.00
3. No manure, 130 N, 60P, 60 K N=130 lbs.	121.3 bu/ac	$56.40
Approximately 30 lbs. N for peanut vines	(Manure Value	$47.68/ac.)

PHYSIOGRAPHIC REGION: Coastal Plain Chowan watershed

SOIL TYPE/PRODUCTIVITY LEVEL: Eunola II

CLIMATIC FACTORS: Average rain for growing season (Short dry period July)

DATA COLLECTED BY: H. O. Dalton Suffolk

COOPERATOR/COUNTY: E. L. Felton Suffolk

COMMENTS: Manure was applied and incorporated prior to planting. Previous crop peanuts (30 lbs. N)

BACKUP DATA AVAILABLE: Soil tests, manure tests

AUDIENCE: Individuals and community farmers

COWAN DEMONSTRATION PROJECT

Department of Conservation and Recreation
Division of Soil and Water Conservation

NUTRIENT MANAGEMENT TEST PLOT

STUDY: Application of swine lagoon effluent for cotton as nutrient source at rate of 1" or 27,150 gals /ac. compared to commercial fertilizer.

SUMMARY: Lagoon effluent was applied by commercial applicator later than desired (late July). No apparent yield difference in treatment.

YEAR: 1990 **CROP:** Cotton

DESCRIPTION: Approximately half of field (14 acres) received 1" of effluent in late July along with starter fertilizer at planting. The balance of field received normal fertilizer application.

TREATMENT	AVERAGE YIELD
1. Starter + sidedress Total = 80-54-108 (no manure)	(Unable to check yields)
2. Starter + 1" manure Total = 78-74-123	

PHYSIOGRAPHIC REGION: Coastal plain Chowan watershed

SOIL TYPE/PRODUCTIVITY LEVEL: Emporia Group 2

CLIMATIC FACTORS: Average rain except dry period in August

DATA COLLECTED BY: Harry Dalton

COOPERATOR/COUNTY: Glen Hawkins Greensville Co.

COMMENTS: Interested in trying test next year with early application to plot with no commercial fertilizer.

BACKUP DATA AVAILABLE: Soil and manure test analysis

AUDIENCE: Individual and community farmers (Farm supply dealer)

COWAN DEMONSTRATION PROJECT

Department of Conservation and Recreation
Division of Soil and Water Conservation

NUTRIENT MANAGEMENT TEST PLOT

STUDY: Application of swine lagoon effluent to grain sorghum following barley compared to plot with sidedresss nitrogen.

SUMMARY: Yield looked good but no apparent response to ~~response~~ to additional N.

YEAR: 1990 **CROP:** Grain Sorghum

DESCRIPTION: 12 rows with manure and 30 lbs. N sidedressed. Balance of field received 1" application of manure only.

TREATMENT	AVERAGE YIELD
1. 12 rows with 30 lbs. nitrogen Total N = 161 lbs. Sidedress + 1" manure (131-96-90)	No yield data
2. Manure 1" application (131-96-90) with no fertilizer Total N=131 lbs.	

PHYSIOGRAPHIC REGION: Coastal Plains Chowan watershed

SOIL TYPE/PRODUCTIVITY LEVEL: Slagle, Yamassee Level 2

CLIMATIC FACTORS: Average season

DATA COLLECTED BY: H. Dalton

COOPERATOR/COUNTY: John Appel Surry

COMMENTS: Will check for residual N on next crop in rotation

BACKUP DATA AVAILABLE: Soil and manure test analysis

AUDIENCE: Inviduals and community farmers

COWAN DEMONSTRATION PROJECT

Department of Conservation and Recreation
Division of Soil and Water Conservation

NUTRIENT MANAGEMENT TEST PLOT

STUDY: Application of swine lagoon effluent on peanuts to determine yield response.

SUMMARY: No yield response was apparent.

YEAR: 1990 **CROP:** Peanuts

DESCRIPTION: Long rows in field received .5" of effluent with remainder of field normal treatment.

	TREATMENT	AVERAGE YIELD
1.	10 ac. with .5 effluent (41-17-39)	No yield data
2.	Balance of field no fertilizer	

PHYSIOGRAPHIC REGION: Coastal Plains Chowan watershed

SOIL TYPE/PRODUCTIVITY LEVEL: Slagle Level 1 Peanuts

CLIMATIC FACTORS: Average

DATA COLLECTED BY: H. Dalton

COOPERATOR/COUNTY: Perry Roberts Greensville Co

COMMENTS: Treatment B is standard practice for peanuts with P & K applied to previous crop. (Corn)

BACKUP DATA AVAILABLE: Soil and manure analysis

AUDIENCE: Inviduals and community farmers

COWAN DEMONSTRATION PROJECT

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NUTRIENT MANAGEMENT TEST PLOT

STUDY: Application of 3000 gallons swine manure from farrow-nursery pit vs. chemical fertilizer.

SUMMARY: Same yield from both plots. No response to manure

YEAR: 1990 **CROP:** Corn

DESCRIPTION: Application of manure and without manure. Each received 400 lbs. 6-18-36 starter plus 80lbs. sidedress N.

TREATMENT	AVERAGE YIELD	FERT$
1. 104 lbs. N fert + 29 lbs. from manure + 30 lbs. N from bean vines. 163 lbs.N	112.3 bu.	66.72
2. 104 lbs. N fert + 30 lbs. N (soybean vines) 134 N	112.3 bu.	66.72
3.		
4.		

PHYSIOGRAPHIC REGION: Coastal Plains Chowan watershed

SOIL TYPE/PRODUCTIVITY LEVEL: Mattaponi II

CLIMATIC FACTORS: Average rain except dry in July

DATA COLLECTED BY: H. Dalton

COOPERATOR/COUNTY: David Wheeler Sussex

COMMENTS: Given time would like to use more manure and less fertilizer for plots. (Maybe next year)

BACKUP DATA AVAILABLE: Soil Samples, manure samples

AUDIENCE: Inviduals and community farmers

COWAN DEMONSTRATION PROJECT

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NUTRIENT MANAGEMENT TEST PLOT

STUDY: Apply manure to corn plots from lagoon, farrow pit and finish pit at various rates to compare each and with commercial fertilizer.

SUMMARY: Corn looked good until July when very hot and dry period at critical time reduced yields to failure status on entire field.

YEAR: 1990 **CROP:** Corn

DESCRIPTION: (13 rows = 1 ac) 1 plot with 5000 gallons effluent from finish pit, 1 plot with 5000 gallons from farrow pit and 1 plot using 1" lagoon irrigated on (Balance of field).

TREATMENT	AVERAGE YIELD
1. Finish Pit Manure + 30-0-0 (vines) Total N = 132 lbs. 102-79-42	No yield data
2. Farrow Pit manure + 30-0-0 (vines) Total N =132 lbs. 102-79-42	
3. Lagoon manure + 30-0-0 + 20 lbs. N sidedress Total N = 126 lbs. 76-93-132	

PHYSIOGRAPHIC REGION: Coastal Plains Chowan watershed

SOIL TYPE/PRODUCTIVITY LEVEL: Emporia Level 2

CLIMATIC FACTORS: Very dry and hot July critical period

DATA COLLECTED BY: H. Dalton

COOPERATOR/COUNTY: Fajna Brothers Greensville

COMMENTS: Dry weather at critical period reduced yields in entire field. Too poor to check yields.

BACKUP DATA AVAILABLE: Soil and manure test analysis

AUDIENCE: Inviduals and community farmers

COWAN DEMONSTRATION PROJECT

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NUTRIENT MANAGEMENT TEST PLOT

STUDY: Application of swine effluent from lagoon, farrow pit and finish pit at different rates on no-till corn to compare yields with normal fertilizer program.

SUMMARY: Due to extreme dry and hot weather at critical growth period, the corn was very poor, therefore, no yield check was done.

YEAR: 1990 **CROP:** Corn

DESCRIPTION: (See Treatments)

TREATMENT	AVERAGE YIELD
1. Lagoon at 6600 gals/ac 32-42-29 +90 lbs Sidedress N Total N=122 lbs.	No yield data
2. Farrow pit at 6600 gals/ac 37-15-41 + 55 lbs. Sidedress N + 30 lb vines Total N = 122 lbs.	
3. Finish pit at 3300 gas/ac 71-145-53 + 50 lbs. Sidedress N. Total N = 121 lbs	
4. Balance field at normal fert. Total N = 120 lbs. (120-25-50)	

PHYSIOGRAPHIC REGION: Coastal Plains Chowan watershed

SOIL TYPE/PRODUCTIVITY LEVEL: Slagle Level 2 Rumford Level 4

CLIMATIC FACTORS: Very dry and hot July

DATA COLLECTED BY: H. Dalton

COOPERATOR/COUNTY: Branch Brothers Southampton

COMMENTS: With adequate rainfall this would have been a good demonstration utilizing various types and rates of manure.

BACKUP DATA AVAILABLE: Soil and manure analysis

AUDIENCE: Inviduals and community farmers

COWAN DEMONSTRATION PROJECT

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NUTRIENT MANAGEMENT TEST PLOT

STUDY: Application of swine lagoon effluent to peanuts to ~~no-till corn comparing to fertilizer~~ test for yield response.

SUMMARY: For this test, there was no noticeable yield response to effluent and no apparent detrimental effect.

YEAR: 1990 **CROP:** Peanuts

DESCRIPTION: Half of field received .5 inch of lagoon effluent compared to half of field with no effluent and no fertilizer.

TREATMENT	AVERAGE YIELD
1. With manure .5" 14-3-38	No yield data
2. Without manure (no fertilizer	

PHYSIOGRAPHIC REGION: Coastal Plains Chowan watershed

SOIL TYPE/PRODUCTIVITY LEVEL: Slagle Prod Level 2

CLIMATIC FACTORS: Average

DATA COLLECTED BY: H. Dalton

COOPERATOR/COUNTY: Ray Holland Isle of Wight

COMMENTS: Will check the response to residual nitrogen to the following corn rotation.

BACKUP DATA AVAILABLE: Soil samples, manure test analysis

AUDIENCE: Inviduals and community farmers

CHOWAN DEMONSTRATION PROJECT

Department of Conservation and Recreation
Division of Soil and Water Conservation

NUTRIENT MANAGEMENT TEST PLOT

STUDY: Application of swine lagoon effluent to Tifton 44 Bermuda grass with solid set irrigation system for intensive grazing program.

SUMMARY: Bermuda was planted in early June and irrigation system was installed in May, prior to planting. Lagoon effluent was irrigation applied at .25 inch rate for a total of 2.5 inches/ year to supply nutrients and supplemental water for establishment of the grass. A stand was established and looked good at the end of summer.

YEAR: 1990 **CROP:** Bermuda Grass (Tifton 44)

DESCRIPTION: 10.5 acre field on Highway 642. 2.5 inches applied per year equals approximately 400 lbs. of N per acre.

TREATMENT	AVERAGE YIELD
10.5 acre field	N/A this year

PHYSIOGRAPHIC REGION: Coastal plain Chowan watershed

SOIL TYPE/PRODUCTIVITY LEVEL: Tetotum, Suffolk Level 1 (Bermuda)

CLIMATIC FACTORS: Below normal rainfall for summer

DATA COLLECTED BY: Harry Dalton

COOPERATOR/COUNTY: Larry Whitley Southhampton Co

COMMENTS: This field will be cross-fenced and intensively grazed next year with surplus cut for hay.

BACKUP DATA AVAILABLE: Soil and manure test analysis.

AUDIENCE: Individuals, community farmers and field day