REPORT OF THE
INTERAGENCY PLASTICULTURE TASK FORCE

THE STUDY OF PLASTICULTURE AND RELATED WATER QUALITY MANAGEMENT ISSUES

TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA

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J. Carlton Courter, III
Commissioner

COMMONWEALTH of VIRGINIA

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TO: The Honorable George Allen
Governor of the Commonwealth of Virginia

The Members of the General Assembly of Virginia

It is my privilege, as chairman of the Interagency Plasticulture Task Force, to present this report constituting the response of the interagency task force to House Resolution No. 40, agreed to by the House of Delegates during the 1997 General Assembly Session.

The resolution requested that an interagency task force be established to determine: (1) whether existing programs and policies are sufficient to ensure adequate water quality management when the practice of plasticulture is utilized; (2) whether additional research and development of best management practices relating to plasticulture should be undertaken by the Commonwealth; and (3) whether existing state programs are consistently applied and coordinated between agencies with regard to the practice of plasticulture.

J. Carlton Courter, III

Enclosure

PREFACE

This study was undertaken in response to House Resolution No. 40, requesting that an interagency task force be established to review the water quality management measures utilized in the practice of plasticulture. We wish to recognize the individuals of the task force who contributed their time and expertise to this effort. Task force members are as follows:

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EXECUTIVE SUMMARY

As requested by the 1997 General Assembly, the Plasticulture Task Force, established pursuant to House Resolution No. 40, conducted a study to determine: (1) whether existing programs and policies are sufficient to ensure adequate water quality management when the practice of plasticulture is utilized; (2) whether additional research and development of best management practices relating to plasticulture should be undertaken by the Commonwealth; and (3) whether existing state programs are consistently applied and coordinated between agencies with regard to the practice of plasticulture.

To conduct this study, the task force reviewed existing programs and policies for water quality management, and reviewed the recommendations made by the two subcommittees -- Scientific Research and Conservation/Best Management Practices (BMPs) -- of the Eastern Shore Vegetable and Shellfish Growers Advisory Committee, established by the Commissioner of Agriculture and Consumer Services to address the issues associated with runoff from plasticulture fields on the Eastern Shore. In addition, the task force considered proposals for future research and BMP development and implementation, and solicited public comment.

Findings

As a result of the study conducted by the Plasticulture Task Force, we report the following findings

1. Based on the information and plasticulture research data available at this time, we find that existing statutory authorities appear to be sufficient to protect water quality when plasticulture is utilized. However, additional scientific research is needed to determine whether existing programs and policies, including incentive and other non-regulatory programs, need to be modified in order to provide sound science-based public policy.

2. Additional research is needed on the usage of pesticides in plasticulture, types of BMPs, the effectiveness of BMPs and agricultural practices in vegetable production plasticulture fields. Research is also needed to determine what is causing the high clam mortality rate found at some clam hatcheries on the Eastern Shore.

3. Agencies responsible for water quality management have been coordinating their activities regarding the plasticulture issue. Continued and improved coordination is needed and is addressed in the recommendations by the Plasticulture Task Force.

4. The Eastern Shore Soil and Water Conservation District (SWCD) is coordinating the development and installation of conservation/best management practices for vegetable fields under plasticulture on the Eastern Shore. In addition, the Eastern Shore SWCD has identified, and the producers have taken out of production, several acres of the

more erodible farmland adjacent to streams.

5. Existing scientific research is continuing and some funding has been authorized for future research regarding pesticide usage on vegetable production plasticulture fields. The Virginia Institute of Marine Science and Virginia Tech are engaged in scientific research which will provide data to further our understanding of the effects of plasticulture on water quality. Also, the Pesticide Control Board has authorized expenditures of up to $250,000 to support research involving plasticulture fields (pesticide usage and BMPs) and integrated pest management in schools.

Recommendations

Based on its findings, the Interagency Plasticulture Task Force submits the following recommendations for consideration by the Governor and the General Assembly:

1. The coordination by agencies with responsibility for water quality management related to plasticulture should be continued and improved through the formation of a group similar to the interagency task force established by H.R. 40. This group would work to ensure that state programs are consistently applied; evaluate the effectiveness of BMPs and conservation measures recommended to address the plasticulture issue; review and make recommendations for plasticulture research; and, determine, based on data from continuing and future scientific investigations, whether existing programs and policies, including incentives and other non-regulatory programs, need to be modified to address water quality management when plasticulture is utilized.

2. Vegetable growers utilizing plasticulture on the Eastern Shore should continue, in coordination with the Eastern Shore Soil and Water Conservation District, the implementation of BMPs in their operations.

3. The Department of Environmental Quality, in cooperation with the Virginia Institute of Marine Sciences, should implement a water quality monitoring and testing program to evaluate the impact of plasticulture activities on the Eastern Shore. The General Assembly should consider appropriating sufficient funding for the monitoring and testing program.

4. The General Assembly should consider funding the soil scientist position at the Eastern Shore Agriculture Experiment Station to study plasticulture-related soil issues. Soils research and knowledge is essential in water quality and vegetable production issues.

5. The General Assembly should consider additional funding for the Virginia Institute of Marine Sciences for research on clam aquaculture.

BACKGROUND AND AUTHORITY

Plasticulture, a non-traditional form of agriculture which employs plastic ground cover to protect crops against weeds, pests, and diseases, was utilized on approximately 11,724 acres of Virginia's 8,600,000 acres of farmland in 1996, 9,100 acres (78%) of which are located in Accomack (6,700 acres) and Northampton (2,400 acres) counties on the Eastern Shore (Appendix A). Only three other localities have more than 200 acres in plasticulture -- Westmoreland County (600 acres), Hanover County (500 acres), and Richmond County (210 acres).

The benefits the producer derives from the practice of plasticulture include yields up to three times higher and twenty-one days sooner than those of traditional agricultural methods. Plasticulture also reduces nutrient leaching and "puffy" fruit development under high rainfall. However, runoff from plasticulture fields has been blamed for contributing to the degradation of water quality in nearby tidal creeks on the Eastern Shore.

While plasticulture has been used in other areas of the Commonwealth, it is on the Eastern Shore that members of the aquaculture industry have expressed concerns about the use of plasticulture and its relationship to clam mortality. Because of its work with both the aquaculture and vegetable industries, the Virginia Department of Agriculture and Consumer Services took the leadership in organizing the Eastern Shore Vegetable and Shellfish Growers Advisory Committee in the summer of 1996 to address this issue. Since that time, environmentalists have raised water quality issues concerning plasticulture utilization and the protection of aquatic life in estuarine environments, as well as issues concerning economic development and prosperity in commercial and recreational fisheries and tourism.

The 1997 General Assembly requested that an interagency task force be established to review the water quality management measures utilized in the practice of plasticulture. The task force member agencies, each having some responsibility for water quality management, are as follows: Department of Environmental Quality, Chesapeake Bay Local Assistance Department, Department of Conservation and Recreation, Department of Agriculture and Consumer Services, Pesticide Control Board and the Eastern Shore Soil and Water Conservation District. The study resolution requests the interagency task force to determine the following: (1) whether existing programs and policies are sufficient to ensure adequate water quality management when the practice of plasticulture is utilized; (2) whether additional research and development of best management practices relating to plasticulture should be undertaken by the Commonwealth; and (3) whether existing state programs are consistently applied and coordinated between agencies with regard to the practice of plasticulture.

This report to the Governor and General Assembly presents the methods used by the task force to study the issues, and summarizes the findings and recommendations. Several appendices to this report present more extensive information to augment the report.

STUDY METHODS

The following methods were utilized in studying the plasticulture and associated water quality issues:

1. Review of existing statutory authority, programs and policies of task force member agencies concerning water quality management as it relates to plasticulture practices;

2. Review of research on conservation/best management practices and proposals for future BMP development, implementation and funding mechanisms;

3. Review of existing scientific research and proposals for future research and funding mechanisms; and

4. Solicitation of public comments.

EXISTING STATUTORY AUTHORITIES, PROGRAMS AND POLICIES

Recognizing that management responsibilities for plasticulture and related water quality issues are shared by several agencies, the task force reviewed existing programs and policies for water quality management related to plasticulture utilization. Written reports outlining the programs and policies, as well as plasticulture-related complaints received by the agencies can be found in Appendix E. Existing authorities, programs and policies are summarized below.

Chesapeake Bay Local Assistance Department

The Chesapeake Bay Local Assistance Department administers the Chesapeake Bay Preservation Act ("Bay Act"), enacted by the Virginia General Assembly in 1988 to establish a cooperative program between state and local government aimed at reducing nonpoint source pollution. This program is designed to improve water quality in the Chesapeake Bay and its tributaries. Section 10.-2107 A. of the Bay Act gives the Chesapeake Bay Local Assistance Board the authority to promulgate regulations for local governments to use in determining ecological and geographic extent of Chesapeake Bay Preservation Areas. The Board can also establish criteria for use by the local governments in granting, denying, or modifying requests to rezone, subdivide, or to use and develop land in these areas.

Section 4.2.9 of the Chesapeake Bay Preservation Area Designation and Management Regulations states:

> Land upon which agricultural activities are being conducted, including but not limited to crop production, pasture, and dairy and feedlot operations, shall have a soil and

water quality conservation plan. Such a plan shall be based upon the Field Office Technical Guide of the U.S. Department of Agriculture Soil Conservation Service (now the USDA-Natural Resource Conservation Service) and accomplish water quality protection consistent with the Act and these regulations. Such a plan will be approved by the local Soil and Water Conservation District by January 1, 1995.

Section 4.3.B. of the regulations specifies that a 100-foot buffer area of vegetation that is effective in slowing runoff, preventing erosion and filtering nonpoint source pollution from runoff be retained if already present and established where it does not exist. This buffer area shall be deemed to reduce sediments by 75% and nutrients by 40%. In lieu of the 100-foot buffer area, a 50-foot buffer along with appropriate best management practices may be used to collectively achieve water quality protection, pollutant removal, and water resource conservation. Furthermore, the buffer may be modified to a width of 25 feet if the entire conservation plan is implemented on the adjacent field.

CBLAD has not received any written complaints pertaining to plasticulture and has not conducted any formal investigations. The agency informally became involved with plasticulture by tracking one specific pollution accusation, but the pollution was eventually determined to have resulted from a source other than plasticulture.

Department of Agriculture and Consumer Services

§ 3.1-4 of the Code of Virginia authorizes the Board of Agriculture and Consumer Services to promote the agricultural interests of the Commonwealth. § 3.1-14 of the Code assigns to the Commissioner of Agriculture and Consumer Services the duty of promoting improvements for agriculture and disseminating information about Virginia's agricultural markets and resources and economic opportunities. VDACS therefore has a major role in the development and marketing of aquaculture and agricultural products (e.g., vegetables produced by plasticulture methods).

VDACS also has responsibility for the Agricultural Stewardship Act ("ASA") (§ 10.1-559.1-10.1-559.11 of the Code of Virginia), enacted by the 1996 General Assembly with a delayed implementation date of April 1, 1997. The ASA is the product of the joint efforts of representatives of Virginia's agricultural community, environmental community, Virginia Association of Soil and Water Conservation Districts, and state agencies.

The ASA covers agricultural activities that are causing or will cause water pollution by sedimentation, nutrients or toxins (e.g., pesticides and petroleum products), with one exception — agricultural activity already permitted by the State Water Control Board through DEQ. The permits are usually VPA or VPDES. Excluded from the ASA are forestry activities, air pollution, odor concerns, landfills or waste problems that do not involve agricultural products, and water pollution caused by non-agricultural activities.

The ASA is complaint driven, meaning there can be no investigation of an agricultural activity until the Commissioner of Agriculture and Consumer Services receives a complaint regarding the activity. Upon receipt of a complaint, the Commissioner or the local Soil and Water Conservation District can investigate to determine whether the activity is causing or will cause pollution. (The District has the option to investigate; if it chooses not to, the Commissioner must investigate.) If it is determined that the activity is indeed a problem, the producer will be asked to develop an agricultural stewardship plan to correct the problem and then to implement the plan over a specified period of time. If a plan is not developed, or developed and not implemented, then and only then can enforcement action be taken against the producer.

During the first six months of implementation of the ASA, VDACS received 51 calls or letters alleging pollution problems resulting from agricultural operations, of which 31 resulted in the filing of official complaints. To date, VDACS has received no complaints relating to plasticulture.

Department of Conservation and Recreation

Under § 10.1-104.1 of the Code of Virginia, the Department of Conservation and Recreation and the Virginia Soil and Water Conservation Board are delegated the lead responsibility for managing the Commonwealth's nonpoint source pollution program. Their responsibilities include distribution of funding, identification and establishment of priorities of nonpoint source related water quality problems, and the administration of the Statewide Nonpoint Source Advisory Committee.

DCR manages the Virginia Agricultural Best Management Practices Cost-Share Program which encourages voluntary installation of BMPs that will address nonpoint source pollution water quality objectives. The program, funded with both state and federal monies, is administered through the local Soil and Water Conservation District. Cost-shared BMPs that could apply to plasticulture include filter strips; protective cover for specialty cropland; sediment retention, erosion or water control structures; and sod waterways.

Section 319 of the Clean Water Act Amendments of 1987, required states to assess their state waters and identify those adversely affected by nonpoint sources of pollution. In addition, it requires management programs to control nonpoint source pollution. DCR's assessment ranks the state's 494 watersheds, based on land use, livestock population, forest harvesting, disturbed acreage, best management practices implementation and erosion rates, for potential nonpoint source pollution. The rankings are used to direct the implementation of Virginia's nonpoint source pollution control programs, as well as cost-share and Section 319 funding, to the highest priority watersheds (watersheds with greatest pollution potential).

Virginia receives approximately $2 million per year, with about $500,000 going to the core program, $1 million to watershed projects, and approximately $500,000 going to

"programs of statewide importance" (POSIs). Currently, no Section 319 funded watershed project exists on the Eastern Shore. Projects are funded as watershed projects in high to medium priority hydrologic units or as POSIs.

The 1997 General Assembly expanded the authority of the Board of Conservation and Recreation pertaining to nonpoint source pollution by enacting the Water Quality Improvement Act of 1997 (§§ 10.1-2117 of the Code of Virginia). Among other duties prescribed by the act, the Board has the power to:

> 1. Encourage and promote nonpoint source pollution control and prevention, including nutrient control and prevention, for the: (i) protection of public drinking water supplies; (ii) promotion of water resource conservation; (iii) protection of existing high quality state waters and restoration of all other state waters to a condition or quality that will permit all reasonable beneficial uses and will support the propagation and growth of all aquatic life, including finfish and shellfish, which might reasonably be expected to inhabit them; (iv) protection of all state waters from nonpoint source pollution; (v) prevention of any increase in nonpoint source pollution; (vi) reduction of existing nonpoint source pollution; (vii) attainment and maintenance of water quality standards established under subdivisions (3a) and (3b) of § 62.1-44.15; and (viii) attainment of commitments made by the Commonwealth to water quality restoration, protection and enhancement including the goals of the Chesapeake Bay Agreement, as amended, all in order to provide for the health, safety and welfare of the present and future citizens of the Commonwealth.

Department of Environmental Quality

The Department of Environmental Quality, through the State Water Control Law, has primary responsibility for the protection of the state's waters. § 62.1-44.2 of the Code gives DEQ the authority to:

> . . .(1) protect existing high quality state waters and restore all other state waters to such condition of quality that any such waters will permit all reasonable public uses and will support the propagation and growth of all aquatic life, including game fish, which might reasonably be expected to inhabit them, (2) safeguard the clean waters of the Commonwealth from pollution, (3) prevent any increase in pollution, (4) reduce existing pollution, and (5) promote water resource conservation, management and distribution, and encourage water consumption reduction in order to provide for the health, safety, and welfare of the present and future citizens of the Commonwealth.

§ 62.1-44.5 of the State Water Control Law makes it unlawful to ". . .(i) discharge into state waters sewage, industrial wastes, other wastes, or any noxious or deleterious substances, or (ii) to alter the physical chemical or biological properties of such state waters and make them detrimental to the public health, or to animal or aquatic life, or to the uses of such waters

for domestic or industrial consumption, or for recreation, or for other uses."

The State Water Control Board has statutory authority to study and investigate problems concerned with the quality of state waters; to establish standards of quality and policies for any state waters; to conduct or have conducted scientific experiments, investigations, studies, and research to discover methods for maintaining water quality; to issue certificates for the discharge of sewage, industrial wastes and other wastes into or adjacent to or for the alteration otherwise of the physical, chemical or biological properties of state waters; to make inspection and investigations to ensure compliance with certificates, standards, policies, rules, regulations, etc.; and to investigate any large scale killing of fish.

DEQ, through regulations, issues several water permits to ensure compliance with water quality standards, two of which may be germane to this discussion. The Virginia Pollutant Discharge Elimination System permit (VPDES) is required of any person who discharges or proposes to discharge any pollutant into surface waters of the Commonwealth from any pipe or ditch. Included are storm water discharges from certain industrial facilities and from certain local storm water collection systems. An exclusion is provided for vessels, runoff from fields and orchards, return flows from irrigation, land disposal of pollutants otherwise permitted, and discharges into other permitted treatment systems. The Virginia Pollution Abatement permit is required of any person who proposes to manage pollutants without resulting in a point source discharge to surface waters. This permit provides the same exclusions with one exception -- concentrated and confined animal feeding operations are not excluded.

Other programs administered by DEQ which may be relevant to this issue include, but are not limited to, Ambient Water Quality Monitoring, Biological Monitoring/Benthic Studies, Fish Tissue and Sediment Monitoring and Water Quality Planning and Assessment.

In July 1996, DEQ received four plasticulture-related complaints, one alleging a fish kill due to runoff from nearby agricultural fields and three alleging high clam mortality in two nursery operations (one nursery complained twice within eight days) due to runoff from nearby agricultural fields. In each case an inspector visited the site. In the first case water conditions appeared normal; in the second, the inspector found no evidence of a fish kill; in the third, the inspector was unable to determine an obvious cause of the kill; and in the fourth case the inspector found a foam that was not normal to the operation but could not determine the cause of the excess foam.

Eastern Shore Soil and Water Conservation District

The Soil and Water Conservation Districts help deliver programs aimed at controlling and preventing nonpoint source pollution. The Eastern Shore Soil and Water Conservation District has primary responsibility for the implementation of the Virginia Agricultural BMP Cost-Share Assistance Program for farmers on the Shore. The District provides technical

expertise for design and installation of farm conservation practices which are implemented by Eastern Shore farmers on a voluntary basis. This includes assisting in the conservation plan development required by CBLAD.

Coordination and delivery of services that support implementation of nutrient management ordinances on the Shore and the agricultural provisions of the local Chesapeake Bay Preservation Act ordinances are also responsibilities of the Eastern Shore SWCD. In addition, under the Agricultural Stewardship Act, local Soil and Water Conservation Districts have statutory authority to investigate complaints of water pollution caused by agricultural activities not already permitted by DEQ, as well as to make recommendations to the Commissioner of Agriculture and Consumer Services regarding agricultural stewardship plans which the Commissioner may ask the farmer to develop.

Activities performed by the Eastern Shore SWCD that are specific to plasticulture utilization include visiting fields to inventory BMP needs, gathering information for a conservation plan, discussing alternatives with growers, making engineering surveys, and documenting the implementation of BMPs.

The Eastern Shore SWCD has investigated two complaints regarding runoff from plasticulture fields and is working to resolve them.

Pesticide Control Board

The Pesticide Control Board has the authority to administer the provisions of the Virginia Pesticide Control Act (§§ 3.1-249.27 et seq. of the Code of Virginia). With regard to plasticulture related issues, the Board is authorized to contract for research projects and establish priorities; require that pesticides used in Virginia are adequately tested and are safe for use under local conditions; require that persons who sell, store or apply pesticides are adequately trained and observe appropriate safety practices; investigate complaints of pesticide misuse; and cooperate, receive grants-in-aid, and enter into agreements with any agency of the federal government, of the commonwealth or political subdivisions, or with an agency of another state, in order to promote the purposes of the act.

In addition to the above authority, the Board may promulgate regulations pertaining to licensing of pesticide businesses; registration of pesticides; establishing training, testing and standards for certification of pesticide applicators, registered technicians and private applicators; revoking, suspending or denying licenses, registration, and certification. The Board can receive and investigate complaints relating to the sale, use, storage handling or disposal of any pesticide and can impose civil penalties, refer certain violations for criminal prosecution, and suspend, modify or revoke a license, or certificate.

Aquaculture producers, appearing before the Board in February 1996, alleged that pesticide runoff from tomato fields employing plasticulture was responsible for the high

mortality of larval clams over the past several years. Lacking data to substantiate their claim, the shellfish growers were told to come back to the Board if they obtained evidence to show a definitive relationship between clam mortality and pesticides or if the issue remained unresolved.

The Southern Environmental Law Center presented the Board with a letter of complaint on behalf of the Chesapeake Bay Foundation, the Virginia Shellfish Growers Association and the Southern Environmental Law Center in January 1997, regarding the potential misuse of pesticides in plasticulture on the Eastern Shore. The Board requested staff to conduct an investigation during the 1997 growing season involving pesticide use monitoring. The SELC was asked to be more specific in their charge of misuse so that use monitoring could be better focused. The report of inspections of pesticide applications in tomato fields under plasticulture on the Eastern Shore can be found in Appendix F. The report findings indicate, among other things, that: (1) pesticide applications that were observed were made in accordance with federal and state laws and regulations and label instructions; (2) two water samples collected at an aquaculture facility reporting clam mortality did not reveal any pesticide residues; and (3) further research, beyond the scope of these inspections, is needed to draw conclusions concerning the environmental fate and effect of pesticides applied.

At its meeting in April 1997, the Board requested staff to develop requests for proposals (RFPs) to solicit research proposals for plasticulture research.

EASTERN SHORE VEGETABLE AND SHELLFISH GROWERS ADVISORY COMMITTEE

In 1996 some members of the Eastern Shore aquaculture industry expressed concerns about the use of plasticulture by vegetable growers on the Shore and its relationship to clam mortality. After consultation with the Secretary of Natural Resources and because VDACS promotes both the aquaculture and vegetable industries, it was decided that VDACS would assume the lead role in helping these client groups address and resolve this issue.

To enhance cooperation and understanding between the Eastern Shore vegetable and shellfish growers and to insure the vitality of the Eastern Shore agriculture and aquaculture industries, VDACS organized the Eastern Shore Vegetable and Shellfish Growers Advisory Committee in the summer of 1996. The committee has the following objectives:

- Increase understanding of the plasticulture and clam mortality issue;
- Keep both the agriculture and the aquaculture industries informed of VIMS research on the plasticulture and clam mortality issue;
- Promote industry cooperation in resolving the plasticulture and clam mortality issue;
- Improve communication and discussion of the issues which affect the agriculture and aquaculture industries on the Eastern Shore; and

- Promote and pursue policies and decision making on production practices for the Eastern Shore agriculture and aquaculture industries based on sound scientific research and analysis.

During the Vegetable and Shellfish Growers Advisory Committee's first three meetings, the group heard presentations from VIMS and Virginia Tech researchers regarding their research on water quality and the impact on clam mortality. The committee also received presentations from clam growers and tomato growers about the plasticulture/shellfish industries and their concerns. Several agencies, including the Eastern Shore Soil and Water Conservation District, the Department of Conservation and Recreation, and the Natural Resources Conservation Service (NRCS) of USDA gave presentations to the committee on soil and water conservation issues which result from plasticulture. Chemical company representatives presented the committee with information on agricultural crop protectant products used on the Shore in plasticulture.

Through the dialogue that the advisory committee has begun, progress has been seen in dealing with the issues as the committee focuses on what is really known and what information needs to be obtained. The advisory committee has not turned up scientific cause and effect data that would single out pesticide use as the source of the clam mortality problem. In its conferences, the committee has identified the need for additional research to provide scientific data on cause and effect that would address questions and industry concerns. The committee has also identified the need for conservation actions -- best management practices -- that would address concerns about water runoff.

As a result of the advisory committee meetings, vegetable growers have agreed to develop and install BMP's on farms that use plasticulture. Also, the Natural Resources Conservation Service and the Eastern Shore Soil and Water Conservation District will be working together on an erosion and sedimentation control project. In addition, the advisory committee established two subcommittees, one to address research needs and the other to pursue soil and water conservation initiatives. (Copies of the reports of these two subcommittees are attached as Appendices C and D, respectively.) At its most recent meeting (March 18), tomato growers reiterated that they would work on installing BMP conservation measures on their fields and also would discontinue use of endosulfan as a crop protectant.

Overall, the advisory committee is providing an important mechanism for local and state cooperation in addressing the issues regarding plasticulture and clam larvae mortality and has been very successful in opening channels of communication between the agriculture and aquaculture industries on the Shore. The work of the advisory committee has been endorsed by the Virginia Aquaculture Advisory Board and other organizations that have a vested interest in resolving the plasticulture and clam mortality issue. Members of the advisory committee agreed to meet again after the growing season in October to assess what has happened during 1997.

CONSERVATION/BEST MANAGEMENT PRACTICES

In considering conservation/best management practices that would mitigate the effect of runoff from plasticulture fields, the task force reviewed the research by the Conservation/Best Management Practices Subcommittee of the Eastern Shore Shellfish and Vegetable Growers Advisory Committee. The subcommittee was established to recommend conservation practices and BMPs to control and improve the quality of water leaving plasticulture fields as runoff. Although the subcommittee made several recommendations, it recognized, and the task force concurs, that in order to determine which practices will manage water quality most effectively, additional research is needed to determine whether the pollutants being transported are in water solution or adsorbed to sediments suspended in the water.

It is indisputable, however, that the plastic increases surface runoff and causes rain water to drain more rapidly from the fields. This drainage can carry sediments, as well as insecticides and fungicides, to tidal creeks in coastal areas. Conservation/management practices to mitigate the effect of this runoff were recommended by the subcommittee.

BMPs to reduce pollutants leaving the fields were divided into three categories: short term, intermediate term, and long term, which refers to the length of time it would take to install the BMPs, not the longevity of the practice. Short-term practices, which can be installed rather quickly and inexpensively and which are probably not effective when used alone, include: filter strips; critical area plantings; minimizing pesticide use at the end of rows; improving infiltration between the beds; investigating the use of soil amendments; increasing worker training to avoid pesticide spills; and grass waterways.

Intermediate-term practices recommended by the subcommittee include: changing the width of plastic used to increase infiltration; using summer crop cover in lieu of plastic for fall tomatoes; using soil amendments to reduce the amount of soil erosion that may have pollutants adsorbed to sediment; reusing runoff as irrigation water; using sediment basins to settle sediments; developing plasticulture design standards for filter strips; and integrated pest management for more efficient use of pesticides.

Long-term practices, recommended by the subcommittee and which may be more appropriate to reduce runoff, include: constructed treatment wetlands for the breakdown of pesticides; incorporating several practices into a comprehensive conservation system; and monitoring and evaluating the effectiveness and benefits of practices previously installed for the purpose of making adjustments, if necessary, to increase their effectiveness.

BMP Installation

The Eastern Shore Soil and Water Conservation District is taking the lead in coordinating BMP development and installation at the local level. The District is in the process of assembling a technical team, including engineers, persons with pesticide expertise,

etc., to develop and test BMPs for installation during the next growing season. Several producers installed short-term BMPs such as filter strips and silt fencing during the last growing season, but did not effectively reduce runoff in the form of concentrated flows. A number of highly sensitive areas adjacent to tidal creeks were taken out of production. Other BMPs such as sediment traps have been installed to test their applicability. In addition, sites are being identified for the location of sediment basins, if needed. The task force supports coordination at the local level.

Funding Mechanisms

Several cost-share and incentive programs are available which provide sources of funding for BMP implementation. The Virginia Agricultural BMP Cost-Share Program, administered by DCR and the local soil and water conservation district, supports using 22 practices for conservation planning which are paid for at a straight per-acre rate or on a percentage basis up to 75 percent. In addition, DCR has authorized three BMPs for a 25% tax credit in the Virginia Agricultural BMP Manual. The three BMPs — irrigation water recycling system, surface water runoff impoundment, and stormwater retention pond — were added to the tax credit list as an incentive for producers who use plastic cover on their fields. (For BMP specifications, see Appendix J.)

Funding for BMP installation is also available through the Environmental Quality Incentive Program (EQIP), established by the 1996 Federal Farm Bill to provide a voluntary conservation program for farmers and ranchers who face serious threats to soil, water and related natural resources. It works mainly in areas designated as priority areas — watersheds, regions, or areas having special environmental sensitivity or significant water, soil or related natural resource concerns. Eligibility is limited to persons engaged in livestock or agricultural production. Cost sharing up to 75 percent may be made for conservation practices that improve and maintain the health of natural resources in the area. Incentive payments may also be made to encourage farmers to carry out management practices not otherwise used without the program incentive. Under the program, four watersheds in Virginia were designated priority areas. The Eastern Shore is one of them. As such, $360,000 has been appropriated for an incentive-based BMP implementation effort.

The Eastern Shore Soil and Water Conservation District submitted two applications for funding under the Virginia Water Quality Improvement Act (WQIA), one for cost-share for BMP implementation and the second for nutrient management plans. Cost-share for BMP implementation on the Eastern Shore will be funded at approximately $48,600, and nutrient management plans will be funded at approximately $14,000.

The Chesapeake Bay Foundation, private industries, and other granting agencies are also possible sources of funding for BMP development and implementation.

SCIENTIFIC RESEARCH

The Scientific Research Subcommittee, established by the Commissioner's Advisory Committee spent a considerable amount of time reviewing and evaluating existing research on plasticulture and water quality issues and identifying and recommending specific research issues and projects which need to be accomplished relative to the plasticulture and the clam mortality issue on the Eastern Shore in order to provide conclusive scientific data. Although their work was aimed at determining what, if any, relationship exists between plasticulture runoff and the high mortality of clam larvae, their findings are especially relevant to the broader issue of plasticulture and associated water quality issues.

While their review of scientific data does not show a direct relationship between plasticulture and high clam mortality, the research data from South Carolina and preliminary work by Dr. Luckenbach of VIMS and Dr. Dietrich of Virginia Tech indicate a potential environmental problem when runoff from plasticulture enters tidal creeks. Virginia Tech data indicate that high concentrations of toxic compounds such as copper, azinphosmethyl, fenvalerate, endosulfan and chlorothalonil are found in runoff from plasticulture fields and water in adjacent creeks following a rain event. It is also important to note that the subcommittee reviewed literature indicating certain types of BMPs can reduce the impacts of plasticulture on water quality in tidal creeks.

In an effort to influence the direction of future plasticulture research, the task force established research priorities beneficial in determining the effects the practice of plasticulture might have on the environment. These priorities include research on what is causing the high clam mortality rate; conservation/BMPs; and alternative forms of plasticulture for vegetable/tomato fields.

Future Research and Funding Mechanisms

Pesticide Control Board

On September 19, 1997, the Pesticide Control Board issued a request for research proposals for two major areas: (1) to evaluate plasticulture practices on the fate and transport of pesticides applied to agricultural crops and (2) to evaluate best management practices aimed at reducing the impact of pesticide runoff from agricultural fields under plasticulture. The Board has authorized expenditures of up to $250,000 to support this research, as well as research involving integrated pest management in schools. It is not unreasonable, however, to assume that as much as 75 percent of the total will be spent on plasticulture research.

Section 319 Project

A project proposal for "Demonstration of Polyacrylamide (PAM) Treatment for Erosion Control" was submitted to the Statewide Nonpoint Source Advisory Committee for

funding under Section 319 of the Clean Water Act. The project received approval at the state level in the "programs of statewide importance" (POSIs) category and has been recommended to the Environmental Protection Agency for funding. Polyacrylamide is a synthetic compound that fights soil erosion by anchoring topsoil that might otherwise be swept away by irrigation water. Data from experiments by Rodrick Lentz and Robert Sojka at the USDA-Agriculture Research Service have proven that doses of PAM can boost infiltration by as much as 60 percent and that almost all of the PAM applied to the fields stays in place and eventually biodegrades. The project, costing approximately $45,000, is being sponsored by DCR and others.

Supplemental Environmental Project

As the result of a civil enforcement case brought by DEQ against an Eastern Shore operation, $13,000 will be awarded to Dr. Mark Luckenbach at the Virginia Institute of Marine Science Eastern Shore Laboratory to assist with research related to plasticulture and water quality. In the coming growing season VIMS will monitor water quality in some creeks downstream of tomato fields to evaluate the efficacy of modified farming practices (BMPs) implemented to reduce run-off.

VIMS will use a combination of field and laboratory bioassays to screen for water and sediment toxicity, and will conduct chemical analyses in those cases where toxicity is observed. Actual study sites will be selected after determining the modifications made by tomato growers on specific farms. VIMS will also map land use within several watersheds on the Eastern Shore and select sampling stations in tidal creeks draining those watersheds. They will seek to identify watersheds with (*i*) no plasticulture, (*ii*) plasticulture which lacks good run-off control and (*iii*) plasticulture operations which have implemented all or most of previously recommended BMPs. These findings should prove valuable to farmers and resource managers in evaluating the effectiveness of these management options. (For a more complete description of the project, refer to Appendix I.)

Note - VIMS is seeking additional funds from a variety of sources to fully fund this research. The funds mentioned above will supplement and enhance the investigation.

Water Quality Monitoring and Testing Program

The Virginia Institute of Marine Sciences will be provided funding via the Department of Environmental Quality (this is additional funding for DEQ beyond its base budget) for each year of the biennium to design and execute a water quality impact study related to plasticulture as follows:

Year 1 -- $225,000
Year 2 -- $200,000.

The water quality impact study will include ambient water column and sediment toxicity,

exposure concentrations for selected crop protectants, and evaluations of finfish and benthic communities in tidal creeks of the Eastern Shore. VIMS will provide an interim report on October 1, 1999, and a final report on October 1, 2000 to the Department of Environmental Quality.

Other possible sources of funding include Section 604B funding under the Clean Water Act, Virginia Sea Grant, and tomato and clam industries.

PUBLIC COMMENTS

The task force held a meeting on August 12, 1997, at the Eastern Shore Agricultural Experiment Station to receive public comments regarding the practice of plasticulture and related water quality management issues. The following persons presented testimony at that meeting:

1.	Robert Brumbaugh Norfolk, VA 23510	-	Read statement prepared by Katherine Slaughter, Staff Attorney, SELC
2.	Ann Jennings Richmond, VA 23219	-	Chesapeake Bay Foundation
3.	John Price Onancock, VA 23417	-	Assateague Coastal Trust
6.	Bob Baldwin Belle Haven, VA 23306	-	Citizens for a Better Eastern Shore
7.	Lynn R. Gayle Mappsville, VA	-	Vegetable Growers/Taylor & Fulton
8.	Yvonne Bagwell Eastville, VA	-	Owns and operates an aquaculture shellfish hatchery on Gulf Creek
9.	R. G. Parks Parksley, VA	-	Kegotank Bay Clam Co.
10.	Ken Kurkowski Mobjack, VA	-	Virginia Shellfish Growers Association
11.	Jim Belote P.O. Box 60 Accomac, VA 23301	-	Virginia Cooperative Extension

The task force solicited and received written comments (Appendix H) from the following through August 30, 1997:

1.	Ann Jennings Richmond, VA 23219	-	Chesapeake Bay Foundation
2.	P.W. Davis Accomac, VA 23301	-	Eastern Shore Soil & Water Conservation District

3.	Henry P. Wilson Painter, VA 23420	-	Eastern Shore Agricultural Experiment Station
4.	Richard & Ann Boonisar Cape Charles, VA 23310	-	Self

Summary of Presenters' Comments (For record of testimony, see Appendix G.)

Overall, the presenters recognize that vegetable growers derive great benefits from the practice of plasticulture, but also generally agree that runoff from plasticulture fields is a threat to water quality in adjacent streams. Their recommendations as to what should be done to mitigate its effect are as follows:

Southern Environmental Law Center recommends that the task force address the apparent lack of enforcement of water quality standards and develop and coordinate a plan to prevent pollution of surface waters resulting from plasticulture; and that DEQ and VDACS work together to protect water quality from the harmful effects of plasticulture.

Chesapeake Bay Foundation recommends implementation of BMPs to reduce and treat runoff prior to next growing season; monitoring for pesticides, herbicides and excessive sediments within plasticulture runoff should be carried out on a representative sample of such fields to determine any additional BMPs to be installed prior to second growing season. If voluntary BMPs are ineffective, they recommend that DEQ and VDACS establish a regulatory program for plasticulture.

Assateague Coastal Trust recommends that the task force focus on how plasticulture can be modified so that its benefits to the grower can be maintained while eliminating the threat to the adjacent marine ecology.

Citizens for a Better Eastern Shore recommends the use of management practices effective in mitigating pollution from plasticulture such as cover crops.

Lynn Gayle, a tomato grower for Taylor and Fulton, commented on BMP implementation during the last growing season such as polymer blocks, buffer strips and silk fencing, and feels that BMP implementation can mitigate runoff from plasticulture fields.

Yvonne Bagwell stated that existing programs are not sufficient to ensure adequate water quality management. She believes that DEQ must monitor and enforce regulations that ensure protection of water quality.

R.G. Parks recommends viewing plasticulture as an intense land use similar to an industrial use and that the land user must be willing to mitigate its impact through an

independently reviewed permitting process that plans and implements a procedure of surface water containment.

The Virginia Shellfish Growers Association recommends that the legislature direct DEQ to promulgate permit regulations for plasticulture, since it is different from traditional farming. VSGA also commented that farms employing good management practices of vegetated buffer strips, retention ponds and elimination of direct ditching are not the problem, but should be the standard.

Jim Belote of VA Cooperative Extension commented on the declining economic conditions on the Eastern Shore and what affect additional regulation would likely have on the farmers there. He referred to NAFTA and how uneven the playing field is right now for U.S. farmers because the other NAFTA countries have hardly any regulations at all.

Summary of Written Comments

The Chesapeake Bay Foundation submitted written comments that reflected its testimony at the public comment meeting.

The Chairman of the Eastern Shore Soil and Water Conservation District commented that no additional regulation is necessary and recommends more research on the soil aspects of the issue and therefore requests that the Soil Scientist position at the Research Station be filled.

The Director of the Eastern Shore Agriculture Experiment Station commented that existing programs and policies are adequate to ensure water quality management and recommends continued research of organic mulches to reduce the flow of water and refinement of pest management strategies. He further commented that programs are consistently applied and coordinated between agencies.

Mrs. & Mrs. Boonisar commented on the noise and exhaust pollution generated by the diesel irrigation pumps of farmers engaged in plasticulture.

FINDINGS

As a result of the study conducted by the Plasticulture Task Force, we report the following findings

1. Based on the information and plasticulture research data available at this time, we find that existing statutory authorities appear to be sufficient to protect water quality when plasticulture is utilized. However, additional scientific research is needed to determine whether existing programs and policies, including incentive and other non-regulatory programs, need to be modified in order to provide sound science-based public policy.

2. Additional research is needed on the usage of pesticides in plasticulture, types of BMPs, the effectiveness of BMPs and agricultural practices in vegetable production plasticulture fields. Research is also needed to determine what is causing the high clam mortality rate found at some clam hatcheries on the Eastern Shore.

3. Agencies responsible for water quality management have been coordinating their activities regarding the plasticulture issue. Continued and improved coordination is needed and is addressed in the recommendations by the Plasticulture Task Force.

4. The Eastern Shore Soil and Water Conservation District (SWCD) is coordinating the development and installation of conservation/best management practices for vegetable fields under plasticulture on the Eastern Shore. In addition, the Eastern Shore SWCD has identified, and the producers have taken out of production, several acres of the more erodible farmland adjacent to streams.

5. Existing scientific research is continuing and some funding has been authorized for future research regarding pesticide usage on vegetable production plasticulture fields. The Virginia Institute of Marine Science and Virginia Tech are engaged in scientific research which will provide data to further our understanding of the effects of plasticulture on water quality. Also, the Pesticide Control Board has authorized expenditures of up to $250,000 to support research involving plasticulture fields (pesticide usage and BMPs) and integrated pest management in schools.

RECOMMENDATIONS

Based on its findings, the Interagency Plasticulture Task Force submits the following recommendations for consideration by the Governor and the General Assembly:

1. The coordination by agencies with responsibility for water quality management related to plasticulture should be continued and improved through the formation of a group similar to the interagency task force established by H.R. 40. This group would work to ensure that state programs are consistently applied; evaluate the effectiveness of BMPs and conservation measures recommended to address the plasticulture issue; review and make recommendations for plasticulture research; and, determine, based on data from continuing and future scientific investigations, whether existing programs and policies, including incentives and other non-regulatory programs, need to be modified to address water quality management when plasticulture is utilized.

2. Vegetable growers utilizing plasticulture on the Eastern Shore should continue, in coordination with the Eastern Shore Soil and Water Conservation District, the implementation of BMPs in their operations.

3. The Department of Environmental Quality, in cooperation with the Virginia Institute of Marine Sciences, should implement a water quality monitoring and testing program to evaluate the impact of plasticulture activities on the Eastern Shore. The General Assembly should consider appropriating sufficient funding for the monitoring and testing program.

4. The General Assembly should consider funding the soil scientist position at the Eastern Shore Agriculture Experiment Station to study plasticulture-related soil issues. Soils research and knowledge is essential in water quality and vegetable production issues.

5. The General Assembly should consider additional funding for the Virginia Institute of Marine Sciences for research on clam aquaculture.

APPENDICES

APPENDIX A

HOUSE RESOLUTION NO. 40

Requesting that an interagency task force be established to review the water quality management measures utilized in the practice of plasti-culture.

Agreed to by the House of Delegates, February 20, 1997

WHEREAS, the practice of plasti-culture, defined as the production of crops in fields employing some plastic ground cover, increases the impervious surface area of agricultural land and encourages the runoff of water; and

WHEREAS, no state agency currently has a permitting program to provide for sufficient protection against water runoff from plasti-culture fields; and

WHEREAS, good water quality is closely linked to economic development and prosperity in Virginia, including, but not limited to, commercial and recreational fisheries, aquaculture, and tourism; and

WHEREAS, the shellfish aquaculture industry in the lower Chesapeake Bay and the tidal waters on the seaside of Virginia's Eastern Shore have experienced problems associated with poor water quality; and

WHEREAS, the Commissioner of Agriculture and Consumer Services has taken steps to convene a working group, the Eastern Shore Vegetable and Shellfish Growers Advisory Committee, to facilitate discussions between the shellfish aquaculture industry and the tomato growers using plasti-culture on the Eastern Shore; and

WHEREAS, the impact from and management responsibilities for plasti-culture and associated water-quality concerns may not be confined to the Eastern Shore or to a single state agency; now, therefore, be it

RESOLVED by the House of Delegates, That an interagency task force be established to review the water quality management measures utilized in the practice of plasti-culture. The interagency task force shall consist of 6 members as follows: the Directors of the Department of Environmental Quality, the Chesapeake Bay Local Assistance Department, and the Department of Conservation and Recreation, or their designees; the Commissioner of Agriculture and Consumer Services, or his designee; the Chairman of the Pesticide Control Board, or his designee; and a Director of the Eastern Shore Soil and Water Conservation District, or his designee. The interagency task force shall be chaired by the Commissioner of Agriculture and Consumer Services and shall hold at least one meeting to receive public comment. The interagency task force shall determine: (i) whether existing programs and policies are sufficient to ensure adequate water quality management when the practice of plasti-culture is utilized; (ii) whether additional research and development of best management practices relating to plasti-culture should be undertaken by the Commonwealth; and (iii) whether existing state programs are consistently applied and coordinated between agencies with regard to plasti-culture. The interagency task force shall be provided with the results of the efforts of the Commissioner's Eastern Shore Vegetable and Shellfish Growers Advisory Committee.

Technical assistance shall be provided to the interagency task force by research scientists from Virginia Polytechnic Institute and State University, the Virginia Institute of Marine Science, and the Eastern Shore Agricultural Research and Extension Center.

All agencies of the Commonwealth shall provide assistance to the interagency task force, upon request.

The interagency task force shall complete its work in time to submit its findings and recommendations to the Governor and the 1998 Session of the General Assembly as provided in the procedures of the Division of Legislative Automated Systems for the processing of legislative documents.

Virginia Cooperative Extension

Virginia Tech

A STUDY OF PLASTICULTURE IN THE STATE OF VIRGINIA

by

Jim Belote
Extension Agent, Agriculture and Natural Resources
Accomack County

April 9, 1997

Between February 28 and April 9, 1997, a study of the acreage of plasticulture used for agricultural purposes in the State of Virginia was conducted. All counties and cities in the State of Virginia were surveyed by the Extension Agent for number of acres of plasticulture in each county and/or city. The survey was conducted by using the new computer system recently funded by the Virginia General Assembly that allowed computers to be placed in all offices of Virginia Cooperative Extension.

Of the 107 counties and cities surveyed, all responded to the survey, thus giving a response level of 100%. The total acreage reported under plastic in 1996 was 11,859 acres. Of that total, 9,100 acres (77%) were located in just two counties, Accomack and Northampton. Accomack County had 6,700 acres (56% of the total) and Northampton had 2,400 acres (20% of the total). It should be noted that Extension Agents in both counties indicated that the number of acres of land with plastic in 1997 will decrease on the Eastern Shore due to a restructuring of agriculture caused by poor economic conditions in 1996. In Accomack, the acreage should decrease by 34% from 6,700 acres to 4,400 acres and in Northampton by 50% from 2,400 to 1,200 acres.

If one were to relate the significance of the amount of land in Virginia with plasticulture as compared to total number of acres of land in farms, the comparison would be as follows: total number of acres of land in farms - 8,600,000 acres (1996 Report - Virginia Agricultural Statistics)/total number of acres with plasticulture - 11,724. In the county with the most number of acres of plasticulture (Accomack), the 6,700 acres of plastic is 7.3% of the land in farms (91,568 acres). In 1997 that percentage will decrease to 4.8% (4,400 acres of 91,568 acres).

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Following is a listing of counties and number of acres of plastic per county:

County	# of Acres of Plastic	County	# Acres of Plastic
Accomack	6700	Lee	0
Albemarle	20	Loudoun	5
Alexandria	0	Louisa	5
Alleghany	0	Lunenburg	0
Amelia	0	Lynchburg, City	0
Amherst	3	Madison	0
Appomattox	25	Mathews	25
Arlington	0	Mecklenburg	45
Augusta	2	Middlesex	200
Bath	0	Montgomery	10
Bedford	5	Nelson	75
Bland	0	New Kent	100
Botetourt	0	Newport News	0
Brunswick	5	Norfolk, City	0
Buchanan	5	Northampton	2400
Buckingham	0	Northumberland	5
Campbell	15	Nottoway	0
Caroline	50	Orange	4
Carroll	15	Page	0
Charles City	0	Patrick	10
Charlotte	0	Petersburg, City	0
Chesapeake, City	25	Pittsylvania	3
Chesterfield	25	Powhatan	0
Clarke	0	Prince Edward	5
Craig	0	Prince William	0
Culpeper	0	Prince George	0
Cumberland	150	Pulaski	0
Danville, City	0	Rappahannock	10
Dickenson	2	Richmond	210
Dinwiddie	20	Richmond, City	0
Essex	10	Roanoke, City	0
Fairfax	0	Roanoke	0
Fauquier	20	Rockbridge	0
Floyd	2	Rockingham	35
Fluvanna	0	Russell	0
Franklin	10	Scott	20
Frederick	15	Shenandoah	3
Giles	0	Smyth	5
Gloucester	0	Southampton	5
Goochland	0	Spotsylvania	50
Grayson	0	Stafford	20
Greene	0	Suffolk, City	10
Greensville	0	Surry	0
Halifax	178	Sussex	52
Hampton, City	0	Tazewell	0
Hanover	500	Virginia Beach, City	45
Henrico	0	Warren	0
Henry	10	Washington	30
Highland	0	Westmoreland	600
Isle of Wight	5	Wise	0
James City	20	Wythe	0
King George	0	York	0
King William	15		
King & Queen	15	Total Acres: 11,859	
Lancaster	5		

Report of the Scientific/Research Subcommittee to the Eastern Shore Vegetable and Shellfish Growers Advisory Committee

FINAL VERSION
April 24, 1997

Co-Chairs

Dr. Henry Wilson
Director, Eastern Shore Agricultural Experiment Station
Dr. Russell Callender
Assistant Director, Virginia Graduate Marine Science Consortium

Members:

Dr. Morris Roberts
Chair, Department of Environmental Sciences
Virginia Institute of Marine Science
Dr. Mark Luckenbach
Scientist-in-Charge, Wachapreague Laboratory
Virginia Institute of Marine Science
Dr. Andrea Dietrich
Associate Professor, Department of Civil Engineering
Virginia Tech
Dr. George Simmons
Associate Head, Aquatic Ecology/Marine Biology
Virginia Tech
Dr. Robert Brumbaugh
Fisheries Scientist, Chesapeake Bay Foundation

1. Review and evaluate existing research on plasticulture and water quality issues.

The use of plastic mulch in agricultural production is not new. This technique was introduced fifty years ago and is now used on 8 to 10 millions acres worldwide (Abdul-Baki, 1996; Garnaud, 1994) of which 160,000 to 350,000 acres annually are in the United States (Aylsworth, 1997). According to grower estimates, the amount of acreage under tomato plasticulture on the Eastern Shore was approximately 3200 acres in 1996; approximately 2500 acres on Virginia's Eastern Shore will produce tomatoes using plasticulture in 1997.

In plasticulture systems, farmers build raised soil beds running the length of the field, lay drip irrigation systems along the beds, cover the beds with plastic and punch seedlings at intervals through the plastic. In plasticulture, half or more of the field's surface area is covered with plastic. Rainwater must drain and not accumulate on the field. Plastics are efficient tools in the protection of crops against weeds, pests and diseases (Garnaud, 1994). Plasticulture results in yields up to three times higher than those in conventional production systems and produces yields seven to twenty-one days earlier. The use of plastic mulch also reduces nutrient leaching and reduces "puffy" fruit development under high rainfall (Aylsworth, 1997, Hohlt, 1997).

Plastic increases surface run-off associated with rainfall (Scott, et al. 1990), though it may diminish irrigation run-off and may reduce the need for pesticide application. In plasticulture, surplus rainwater drains rapidly from the field rather than accumulating. Drainage from the fields can carry sediment, as well as insecticides and fungicides that were applied as crop protectants. Sediment loading is a major problem facing most estuarine habitats in the U. S. (Slade, 1996). In coastal areas, the drainage may be to tidal creeks and can adversely affect the health of salt water marsh ecosystems.

Good water quality is a fundamental need of any aquaculture operation. Two commercial clam growers in Virginia suspect that high mortalities in their hatcheries during the past four years are associated with increased plasticulture in their watersheds and decreased water quality from the

inputs of sediment and agricultural chemicals (presentations by Luckenbach, Dietrich, Volger at the Courter Committee Meetings of October 17, 1996, December 5, 1996, and January 6, 1997, respectively). To date, however, there has been no systematic and independent investigation of shellfish mortality in aquaculture facilities. Furthermore, the data are incomplete concerning the trends in acreage used for plasticulture and the application of agricultural chemicals throughout the watershed. Therefore it can be difficult to determine the exact source(s) of these compounds when they are observed in surface waters.

Laboratory data are available concerning the toxicity of crop protectants to both fresh water and salt water aquatic life (Verschueren, 1983; EPA, 1984; Farm Chemicals Handbook, 1996). These laboratory data are also referenced on manufacturer's product labels and can be found in EPA's pesticide data base, and other sources throughout the published literature. Certain crop protectants that control a variety of pests (e.g., fungi, bacteria, insects, weeds) can also kill aquatic life at low concentrations. For example, endosulfan and copper are known from laboratory tests to be toxic to aquatic life (Volger, 1997; Langston, 1990).

Although the plasticulture/water quality issue is perceived as a local problem, it is important to examine research results from outside Virginia. This is important because much of the plasticulture/water quality field-based research conducted to date (Dietrich et al. 1996, Luckenbach et al. 1996) on the Eastern Shore represents a preliminary evaluation of the problem. Nonetheless, the preliminary Virginia data show parallels to other regions where the research is more complete. Recent studies in Virginia and South Carolina demonstrated that runoff from plasticulture fields contained high (e.g., <1 to >100 µg/L) concentrations of azinphosmethyl, fenvalerate, endosulfan and chlorothalonil (Scott et al., 1990; Dietrich et al. 1996) (DEQ water quality standards for chronic exposure to: endosulfan in salt water is 0.0087 µg/L; azinphosmethyl in salt water is 0.01 µg/L)[1]. Runoff from selected plasticulture fields on Virginia's Eastern Shore

[1]The DEQ standards are derived from laboratory toxicity data. In simple terms, the average toxicity, acute and chronic, are calculated for the most sensitive species, and then "corrected" to provide a "safety" factor. If concentrations above these values are observed, that water containing such concentrations is considered to violate the water quality standard.

also contained high (1 to 1450 µg/L total copper) (Dietrich et al. 1996) DEQ water quality standards for chronic exposure to dissolved copper in salt water is 2.9 µg/L (Virginia DEQ, 1992). The reported LC50 (lethal concentration at which 50% of the test organisms die) is 16.4 µg/L added copper for larval clams (species *Mercenaria mercenaria*) (Calabrese et al., 1977). The Gargatha Creek watershed appeared especially impacted (Dietrich et al., 1996). Data from Dietrich et al. (1996) indicate that on Sept 9 and 10, 1996, during a rain storm, agricultural runoff into the Gargatha Creek watershed contained >1000 µg/L total copper and > 100 µg/L organic pesticides. In the receiving water, Gargatha Creek, 100 to 700 µg/L total copper were measured. A rain puddle and control site tested at the same time contained < 4.0 µg/L total copper and no pesticides. (The puddle sample was collected in a roadside ditch on Route 680 near Gargatha in Accomac County. The control site samples were collected at the public landing on Racoon Creek which is accessed via the Ramp Road in the Eastern Shore Wildlife Refuge in Kiptopeke.)

Bioassay studies showed that azinphosmethyl, fenvalerate and endosulfan are toxic to *P. pugio* (grass shrimp or ghost shrimp) a key component of the marsh ecosystem food chain (Scott et al., 1990). Bioassay testing in creeks on Virginia's Eastern Shore (Accomac and Northampton Counties) indicated that creek water following major rain events resulting in significant runoff from some plasticulture fields caused high mortalities (up to 100%) of grass shrimp and that metal toxicity was one possible cause of death (Luckenbach et al., 1996). Complicating the water quality issue is the notion that historical (e.g. within the last several decades) sources of contaminants sequestered within the soils of the watershed could potentially be eroded and transported into the adjacent tidal creeks. (For example, limited data on soil copper levels (R. Downing, ES-SWCD) within the Gargatha Creek watershed indicated that copper levels in soils varied from 0.5 to 5.7 mg/copper/kg soil).

Best Management Practices (BMPs) such as the combined use of retention ponds and vegetated buffer strips to reduce runoff have been shown to reduce the impacts of plasticulture on water quality in tidal creeks (Scott et al. 1990). In South Carolina, Scott and colleagues found that the addition of a retention pond, coupled with recycling water from the pond through the drip

irrigation system, reduced pesticide concentrations in an adjacent creek by > 90% (Scott et al. 1990) and greatly reduced the observed bioeffects compared to levels observed prior to the installation of the pond.

The available scientific data does not show a direct cause and effect relationship between plasticulture practices and clam mortality. Additional scientific research is clearly needed. However, research results from South Carolina (Scott et al., 1990) and preliminary work in Virginia (Luckenbach et al., 1996; Dietrich et al., 1996) does indicate there is the potential for environmental problems when storm water runoff from plasticulture fields enters tidal creeks. Specifically, the Virginia data indicate that runoff from selected plasticulture fields and the water in adjacent creeks contain high concentrations of toxic compounds (Dietrich et al., 1996) and that creek water near selected fields is toxic to sentinel species such as grass shrimp (Luckenbach et al., 1996). From this we can infer, but not necessarily prove, that pesticides may be a contributing factor in larval clam mortalities. Additional data by Scott et al. (1990) show that BMPs can reduce the impacts of plasticulture on water quality in tidal creeks.

2. Identify and recommend specific research issues and projects which need to be accomplished relative to the plasticulture and clam mortality issue on the Eastern Shore in order to provide conclusive scientific data.

A. Clam Mortality Research. Since the reason for high mortality rates in two hatcheries during 1996 is not known, research should identify what is killing the clams. In particular, several crop protection chemicals have been identified in water entering Gargatha Creek, concentrations of these chemicals during and following rainfall events should be measured in hatchery water. Samples should be collected periodically for chemical analysis as well as for determination of sediment load, water pH, salinity, dissolved oxygen, and temperature.

To establish independently that water entering the hatcheries is the source of clam mortalities, it

would be desirable to perform bivalve larval toxicity tests using a standardized and accepted protocol. The objective of this testing would be to determine if water drawn into the hatchery is toxic to clam larvae. Short duration tests would be appropriate here because (1) hatcheries draw water on daily or bi-daily schedules, (2) age dependent differences in sensitivity could confound results in long duration tests, and (3) overall low survival rates during the culture process would reduce the sensitivity of long duration tests.

The ASTM standard protocol for toxicity tests has a duration of 48 hr starting with newly fertilized embryos (ASTM designation E 724-94). The protocol specifies the procedures to follow, the test design, the statistical analysis of data, and the criteria for an acceptable test. To yield data acceptable to the scientific community, tests would have to be performed with embryos obtained from an independent hatchery with no reported source water problems. Clam larvae would have to be monitored for mortality, growth, and frequency of abnormality when cultured in the ambient water and compared to data for clam larvae grown in water from a reference (uncontaminated) site or another source of control water. In addition to the ASTM 48 hr toxicity test, other innovative toxicity tests could be designed that would evaluate the effect of water quality and chemical contaminants on survival and growth of the clam larvae through metamorphosis and into the young clam stage. Such tests have been attempted in the past with various degrees of success. At present there is no widely accepted approach to such tests because of high mortality among control larvae.

These protocols are labor intensive and require special expertise. Thus the culture experiments described represent a formidable task and may not be a feasible or realistic approach due to the large amount of time and resources required by both the hatcheries and the researchers.

Additional water quality sampling in the tidal creeks adjacent to plasticulture fields could include sampling during, after and between rainfall events, sampling over complete tidal cycles, evaluation of sediment transport and composition, identification of sediment sinks, nutrients, and crop protection chemicals including total and soluble metal concentrations. Routine water quality

parameters (salinity, temperature, oxygen, turbidity, pH) should be monitored during 'in situ' toxicity tests for at least one upstream station in each watershed. Bioindicators of water quality adjacent to clam hatcheries could be monitored through periodic 'in situ' bioassays using grass shrimp or other appropriate sentinel organisms. If runoff from plasticulture fields is determined to degrade water quality, Best Management Practices (BMPs) beyond those already in place such as improved runoff management or vegetative buffer strips should be assessed and recommended practices instituted. For tomato fields for which management changes are implemented in 1997, 'in situ' bioassay and chemical analysis similar to that conducted in 1996 should evaluate the effectiveness of these changes.

With the exception of the clam culture experiments, the research described above will essentially provide additional data of the types already collected. This approach can demonstrate if the water in selected hatcheries is toxic to clams but will not show what constituents are producing the toxicity. If we want to actually be able to say that "pesticides from plasticulture operations caused the mortalities" we would need a study to show 1) that when possibly toxic constituents are selectively removed from the water that is toxic to clams, the resultant clean water has no residual toxicity to clams, and 2) that when the water is reformulated (adding to clean, non-toxic water all of the constituents that when removed resulted in reduced toxicity) the water has toxicity to clams similar to that of the ambient hatchery water. This approach is the Toxic Identification Evaluation paradigm which can demonstrate clearly whether pesticides alone or with other materials are causing the observed mortality but at great expense of hatchery time and effort.

B. Research in Plasticulture Tomatoes. Research should evaluate methods of producing quality, high yielding tomatoes that could result in less runoff and runoff for which there are not concerns about water quality. This research could include but not be limited to the use of more narrow beds and plastic covers, the use of vegetative cover between rows to slow water movement, the use of finely ground organic matter on plastic covers or between rows (including near buffer strips), and research to identify alternative methods and alternative crop protection chemicals for disease and insect control.

3. Identify tasks to be accomplished and recommending appropriate areas of assignment of responsibilities among the various parties (farmers, clam growers, research scientists, VIMS, VA Tech, etc.) to carry out the needed research.

Since the funding for the research will come from various sources including granting agencies, it is unrealistic to think in terms of assigning responsibility for certain tasks. The research needs are diverse, and many research institutions and regulatory agencies in the area have the staff and facilities to address some of these questions; there is substantial overlap in capability. It would be presumptuous of this subcommittee to suggest that the work of one type or another is the domain of a particular group. No group is likely to have capabilities in all areas. Furthermore, requesting that clam growers and tomato farmers provide detailed information concerning their growing practices may be unrealistic because these businesses may not be willing to provide information that they consider to be proprietary.

The major tasks are to 1) identify what is killing the clams and 2) to investigate if alternative strategies in the plasticulture tomato fields can be followed that will result in high water quality in the tidal estuaries. Specific suggested tasks for the various parties include:

A) Cooperation of the tomato growers should be requested to facilitate an effective research effort. For example, this cooperation should include access to fields for sampling and non-proprietary records of crop protectant applications.

B) The aquacultural community should be requested to provide hatchery water for sampling and make available non-proprietary records on shellfish-spawning and survival.

C) The recommendations of the Best Management Plans Subcommittee should be adopted by tomato growers.

D) Through Agricultural Extension and Sea Grant Outreach, the results of research on

plasticulture and its potential effect on other water users, including clam aquaculture, should be conveyed to farmers, clam growers, regulatory agencies, and local citizens in order to improve management practices, enhance environmental quality, and reduce user conflicts.

4. Identifying funding sources through grants, agency budgets, etc.

Excluding general fund support to the universities (only a small proportion of which can, in most cases, be reprogrammed for this activity without jeopardizing other missions) the bulk of the funds will have to derive from various Commonwealth and federal agencies through grants and contracts. Unfortunately, the need for rapid funding support doesn't mesh well with federal funding schedules. Nonetheless, agencies that might contribute funds, directly or indirectly, to this issue include DEQ, CBLAD, VDACS, EPA, NOAA, DOI and the USDA. An effort must be made to stimulate the allocation of new moneys for the issue, particularly within the Commonwealth. There is Commonwealth-level interest in this issue (re: HR 40) that could be used as a starting point to generate state funds. Unfortunately, it is too late to go to the State Legislature this year.

The subcommittee has identified the following possibilities for funding:

- Department of Environmental Quality, Water Division, Office of Water Quality Assessment. Federal grant programs responsible for 604B funds through the Clean Water Act. At least 40% of funds must be issued to one or more of the Planning District Commission localities. Point of contact: David Lazarus (804-698-4299).

- Department of Conservation and Recreation, Division of Soil and Water Conservation through section 319 of the Clean Water Act has control of non-point source funds. FY98 request for proposals is expected in June 1997 (Programs of Statewide Importance - POSI). Point of contact: Charles Lunsford (804-371-8984).

- EPA Wetland Protection State Development Grants, EPA Region III. Supports activities designed to evaluate and improve wetland management at the state level, including the use of wetlands for runoff abatement. Contact: Dr. Art Springarn, 215-566-2719.

Another possibility for generating some support are the tomato and clam industries. It may be necessary to approach these two industries to fund at least part of a modest collaborative research project.

Virginia Sea Grant is currently funding a project by Dietrich, A.M., Hale, R., Gallagher, D, Reay, W. and G.E. Simmons for $40,000 titled: Investigation of toxicity to shellfish in aquaculture facilities on the Eastern Shore of Virginia from water quality and hydrological impacts. The duration of this project is February 1, 1997 to January 31, 1998. The timing is not optimum for additional Virginia Sea Grant funding. Virginia Sea Grant will not be issuing a call for proposals until early 1998 for funding that will commence in February 1999.

5. Recommending deadlines and time frames for implementation of scientific research, applying for grants, funding sources, etc.

The coming agricultural season and the stated commitment of tomato growers to implement BMPs in the coming year establishes a time line for some of the work which does not coincide particularly well with proposal deadlines and funding cycles. Any proposal submitted in the next 2-3 months to sources already programmed will be funded too late for work to be accomplished this year. To match the research to agricultural activity, and more importantly, to changes in present practice, the time frame is to some extent right now. VIMS and VA Tech will assuredly attempt to initiate studies coincident with the 1997 agricultural season, but extramural funding for this will not be available in time. This cannot be helped but it will limit the scope of what can be done, and the window of opportunity in some respects may never return.

By Spring 1997: Limited follow-up sampling should be done to compare to the data from 1996 and to compare to locations where BMPs have been implemented. However, funding constraints will place restrictions on the amount of follow-up sampling that can be accomplished.

By Fall, 1997, it is desirable to know the following information (although it can not be obtained without substantial funding). We need to:

- Determine the extent of the problem in tidal creeks where clam mortality has been reported.
- Monitor that BMPs are in place and the extent to which they protect the water quality in the discharge from plasticulture fields,
- Determine that the water quality in tidal creeks in question are adequate to support and nurture clams, under aquaculture conditions.

Water and land use conflicts are probably not a short-term issue. Even if we limit ourselves to the narrow issue of plasticulture and shellfish aquaculture, both are likely to be around for a while and both are dynamic enterprises which undergo changes in procedures. There will be a continuing need for water quality monitoring in tidal creeks coupled with current information about agricultural practices in the watershed.

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Eastern Shore Vegetable and Shellfish Growers Advisory Committee
Conservation/Best Management Practices Subcommittee

March 6, 1997

The subcommittee was charged with developing recommendations to use conservation practices and Best Management Practices (BMPs) to control and improve the quality of the waters leaving plastic-culture fields as runoff and thereby protecting the quality of nearby tidal marine waters receiving such runoff. We discussed the current conservation practices that are being applied to plastic-culture fields. We will suggest improvements to those practices and recommend additional practices. We also suggest a time frame for implementation of such practices.

The group also discussed the question of how the pollutants are being transported, ie. are the pollutants being transported in water solution or adsorbed to sediments suspended in the water. Current studies have not determined precisely what chemicals are at fault or how these chemicals are being transported into tidal marine waters. Answering this question will help determine what conservation practices will most effectively manage water quality problems resulting from waters leaving plastic-culture fields.

Present Conservation Practices

The practices that are installed on plastic-culture fields presently are: field borders, some grass waterways, small "critical areas" taken out of production and drainage into existing impoundments. The practices have varying results depending on the placement, condition and the amount of storm water pressure placed on these practices.

1) Field borders can be effective at filtering the sediments in the water leaving the field. field borders are not the same as filter strips (the names are incorrectly used interchangeably) and not as effective either. A filter strip is a level strip of land at the lower end of a field that water will uniformly have overland flow. These strip are normally in grass and need to be maintained to prevent concentrated flow that cause gullies. Any channeled flow will defeat their purpose. Field borders are strips planted to grass on the existing grade. The amount of machinery traffic, their width, type of vegetation present and mowing the grass on these buffers changes their effectiveness.

2) Grasswaterways are designed to transport water off the field without causing gully erosion. They are also effective at filtering sediments from the water but do not reduce the quantity of water (or pollutants in solution) to any measurable degree that leaves the field.

3) Impoundments are designed to hold water immediately after leaving the field. They allow sediments and any pollutants adsorbed to sediment that were transported by runoff to settle out. Most of the water soluble pollutants are still present. When storm events are larger than the impoundment can hold, they will overflow and are no longer effective at containing these soluble pollutants.

4) Taking "critical areas" with steeper slopes or other conditions that cause excessive amounts of erosion out of production is a practice that has gained favor. It can be an effective practice and is recommended.

Recommended Practices

We have divided our recommendations that we foresee as practices that can reduce the amount of pollutants leaving plastic-culture fields into three categories: short term, intermediate term and long term. Conservation practices were grouped into these categories to indicate when they could be implemented and not to imply the longevity of these practices. The short term practices can and should be implemented this growing season, the intermediate term practices are best suited for implementation between this growing season and the next, and the long term practices probably taking more than one year to implement. Each field will differ in the amount and types of practices needed. A combination of practices will be more effective than any individual practice. All efforts at improved practices need to be site specific.

Short Term Practices

1) Filter strips - this practice as stated earlier differs from buffer strips and needs to be carefully designed to be effective. Maintenance is needed to avoid concentrated flow including avoiding use as traffic lanes, maintaining a minimum grass height, etc.. For them to be effective all runoff water has to travel over the filter strip. The use of other grasses beside fescue that are more effective at filtering sediments is also recommended.

2) Critical area plantings - taking land out of production. Examples of these areas are the steeper sloped land, the lower ends of fields that are receiving large amounts of runoff waters and fields or parts of fields close to tidal marine waters.

3) Minimize pesticide use at the end of rows - careful attention when spraying to avoid drift and/or spraying land not in production such as the end of rows and particularly on any existing filter strips is strongly recommended.

4) Improve infiltration between the beds by breaking the hardpan caused by machinery and foot traffic.

5) Investigate the use of soil amendments - these are products applied to the soil that flocculate the soil particles and reduce the amount of sediment that is transported off the field by runoff. We would like these amendments to be tested this year on small acreage to test how they can be used effectively on tomato fields.

6) Increase worker training to avoid accidental spills of pollutants and other careless actions that may adversely impact waters leaving fields.

7) Grass waterways - especially if other grasses beside fescue can be used. Reducing the vehicular traffic over these grass waterways will increase their effectiveness by

increasing infiltration. Small check dams within the grass waterways will also increase infiltration and have sediments settle out.

Intermediate Term Practices

1) Investigate changing the width of plastic used to increase the amount of infiltration in the field.

2) Investigate the use of summer cover crops in leu of plastic for fall tomatoes.

3) Use of soil amendments to reduce the amount of soil erosion that may have pollutants adsorbed to the soil.

4) Tailwater recovery systems to reuse runoff as irrigation water.

5) Sediment Basin for settling of sediments.

6) Develop Plastic culture design standards for filter strips.

7) Integrated Pesticide Management (IPM) for more efficient use of pesticides. Plan spray applications based on observation and not on a calendar schedule, watch weather reports before spraying and increase the use of pesticides that may not be as toxic to shellfish.

Long term practices

1) Constructed treatment wetlands for the breakdown of pesticides. These treatment wetlands include sediment basins, wetlands and filter strips.

2) Incorporate of several practices into comprehensive conservation systems.

3) Monitor and evaluate the effectiveness and benefits of practices previously installed and make adjustments to increase their effectiveness. This should be an ongoing effort.

Responsibilities and Funding

The farmers are ultimately responsible for accomplishing these practices. The Soil and Water Conservation District (SWCD) and Natural Resources Conservation Service (NRCS) will provide technical support and one means to cost share the practices. Eastern Shore Experiment Station can test and demonstrate new practices and give technical advice. The agencies and farmers can work together to identify areas of fields that would require treatment. The SWCD has hired an individual, Ronnie Godwin specifically to work with farmers on these problems for as long as funding for his position is available.

The are several sources for funding of these practices. NRCS have several cost-share programs: Environmental Quality Incentive Program (EQIP), Wildlife Habitat Improvement Program (WHIP), Conservation Reserve Program (CRP) and others. Department of Conservation and Recreation has funds available. The SWCD and Resource Conservation and Development (RC and D) can apply for grants and other funding sources. Other potential sources could be foundations, like the Chesapeake Bay Foundation, and private industry are possibilities.

COMMONWEALTH of VIRGINIA

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May 20, 1997

Carlton Courter, Commissioner
VA Department of Agriculture & Consumer Services
1100 Bank Street
Richmond, VA 23219

Dear Commissioner Courter:

As requested in your memorandum dated May 1, 1997, the Chesapeake Bay Local Assistance Department (CBLAD) has prepared the following information to present at the initial meeting of the Interagency Task Force on Plasticulture.

Regarding CBLAD's authority and programs for water quality, Section 10.1-2107 A. of the ***Chesapeake Bay Preservation Act*** gives the Chesapeake Bay Local Assistance Board the authority to...

> *promulgate regulations which establish criteria for use by local governments to determine the ecological and geographic extent of Chesapeake Bay Preservation Areas. The Board shall also promulgate regulations which establish criteria for use by local governments in granting, denying, or modifying requests to rezone, subdivide, or to use and develop land in these areas.*

Section 4.2.9. of the ***Virginia Administrative Code 9VAC10-20 et seq. (formerly VR 173-02-01) entitled the Chesapeake Bay Preservation Area Designation and Management Regulations*** states...

> *Land upon which agricultural activities are being conducted, including but not limited to crop production, pasture, and dairy and feedlot operations, shall have a soil and water quality conservation plan. Such a plan shall be based upon the Field Office Technical Guide of the U.S. Department of Agriculture Soil Conservation Service (now the USDA-Natural Resource Conservation Service) and accomplish water quality protection consistent with the Act and these regulations. Such a plan will be approved by the local Soil and Water Conservation District by January 1, 1995.*

Section 4.3.B. of the regulations specifies the following buffer area requirements...

> *To minimize the adverse effects of human activities on the other components of the Resource Protection Area, state waters, and aquatic life, a 100-foot buffer area of vegetation that is effective in retarding run-off, preventing erosion, and filtering nonpoint source pollution from run-off shall be retained if present and established where it does not exist. The 100-foot buffer area shall be deemed to achieve a 75%*

reduction of sediments and a 40% reduction of nutrients. Except as noted in this subsection, a combination of a buffer area not less than 50 feet in width and appropriate best management practices located landward of the buffer area which collectively achieve water quality protection, pollutant removal, and water resource conservation at least the equivalent of the 100-foot buffer area may be employed in lieu of the 100-foot buffer. The following additional performance criteria shall apply:

1. In order to maintain the functional value of the buffer area, indigenous vegetation may be removed only to provide for reasonable sight lines, access paths, general woodlot management, and best management practices, as follows:

a. Trees may be pruned or removed as necessary to provide for sight lines and vistas, provided that where removed, they shall be replaced with other vegetation that is equally effective in retarding runoff, preventing erosion, and filtering nonpoint source pollution from runoff.

b. Any path shall be constructed and surfaced so as to effectively control erosion.

c. Dead, diseased, or dying trees or shrubbery may be removed at the discretion of the landowner, and silvicultural thinning may be conducted based upon the recommendation of a professional forester or arborist.

d. For shoreline erosion control projects, trees and woody vegetation may be removed, necessary control techniques employed, and appropriate vegetation established to protect or stabilize the shoreline in accordance with the best available technical advice and applicable permit conditions or requirements.

2. When the application of the buffer area would result in the loss of a buildable area on a lot or parcel recorded prior to October 1, 1989, modifications to the width of the buffer area may be allowed in accordance with the following criteria:

a. Modifications to the buffer area shall be the minimum necessary to achieve a reasonable buildable area for a principal structure and necessary utilities.

b. Where possible, an area equal to the area encroaching the buffer area shall be established elsewhere on the lot or parcel in a way to maximize water quality protection.

c. In no case shall the reduced portion of the buffer area be less than 50 feet in width.

Regarding CBLAD's involvement with plasticulture, CBLAD has not received any written complaints pertaining to plasticulture to date. Further, the Department has not conducted any formal investigations because we believe the issue is being addressed through other means. However, the Department has maintained continued interest in plasticulture operations as events have unfolded. Initially, comments

Relevant Excerpts from State Water Control Law

§ 62.1-44.2. Short title; purpose. - The short title of this chapter is State Water Control Law. It is the policy of the Commonwealth of Virginia and the purpose of this law is to: (1) protect existing high quality state waters and restore all other state waters to such condition of quality that any such waters will permit all reasonable public uses and will support the propagation and growth of all aquatic life, including game fish, which might reasonably be expected to inhabit them, (2) safeguard the clean waters of the Commonwealth from pollution, (3) prevent any increase in pollution, (4) reduce existing pollution, and (5) promote water resource conservation, management and distribution, and encourage water consumption reduction in order to provide for the health, safety, and welfare of the present and future citizens of the Commonwealth.

§ 62.1-44.5. Prohibition of waste discharges or other quality alterations of state waters except as authorized by permit. - A. Except in compliance with a certificate issued by the Board, it shall be unlawful for any person to (i) discharge into state waters sewage, industrial wastes, other wastes, or any noxious or deleterious substances, or (ii) otherwise alter the physical, chemical or biological properties of such state waters and make them detrimental to the public health, or to animal or aquatic life, or to the uses of such waters for domestic or industrial consumption, or for recreation, or for other uses.

B. Any person required to obtain a permit or certificate pursuant to this chapter, who discharges or causes or allows (i) a discharge of sewage, industrial waste, other wastes or any noxious or deleterious substance into or upon state waters or (ii) a discharge that may reasonably be expected to enter state waters, in violation of the provisions of subsection A shall, upon learning of the discharge, promptly notify, but in no case later than 24 hours the Board, the Director of the Department of Environmental Quality, or the coordinator of emergency services appointed pursuant to § 44-146.19 for the political subdivision reasonably expected to be affected by the discharge. Written notice to the Director of the Department of Environmental Quality shall follow initial notice within the time frame specified by the federal Clean Water Act.

§ 62.1-44.13. Inspections and investigations, etc. - The Board shall make such inspections, conduct such investigations and do such other things as are necessary to carry out the provisions of this chapter, within the limits of appropriation, funds, or personnel which are, or become, available from any source for this purpose.

§ 62.1-44.15. Powers and duties. - It shall be the duty of the Board and it shall have the authority:

(1) (Repealed.)

(2) To study and investigate all problems concerned with the quality of

state waters and to make reports and recommendations.

(3a) To establish such standards of quality and policies for any state waters consistent with the general policy set forth in this chapter, and to modify, amend or cancel any such standards or policies established and to take all appropriate steps to prevent quality alteration contrary to the public interest or to standards or policies thus established, except that a description of provisions of any proposed standard or policy adopted by regulation which are more restrictive than applicable federal requirements, together with the reason why the more restrictive provisions are needed, shall be provided to the standing committee of each house of the General Assembly to which matters relating to the content of the standard or policy are most properly referable. The Board shall, from time to time, but at least once every three years, hold public hearings pursuant to subsection B of § 9-6.14:7.1 but, upon the request of an affected person or upon its own motion, hold hearings pursuant to § 9-6.14:8, for the purpose of reviewing the standards of quality, and, as appropriate, adopting, modifying, or cancelling such standards. Whenever the Board considers the adoption, modification, amendment or cancellation of any standard, it shall give due consideration to, among other factors, the economic and social costs and benefits which can reasonably be expected to obtain as a consequence of the standards as adopted, modified, amended or cancelled. The Board shall also give due consideration to the public health standards issued by the Virginia Department of Health with respect to issues of public health policy and protection. If the Board does not follow the public health standards of the Virginia Department of Health, the Board's reason for any deviation shall be made in writing and published for any and all concerned parties.

(4) To conduct or have conducted scientific experiments, investigations, studies, and research to discover methods for maintaining water quality consistent with the purposes of this chapter. To this end the Board may cooperate with any public or private agency in the conduct of such experiments, investigations and research and may receive in behalf of the Commonwealth any moneys which any such agency may contribute as its share of the cost under any such cooperative agreement. Such moneys shall be used only for the purposes for which they are contributed and any balance remaining after the conclusion of the experiments, investigations, studies, and research, shall be returned to the contributors.

(5) To issue certificates for the discharge of sewage, industrial wastes and other wastes into or adjacent to or the alteration otherwise of the physical, chemical or biological properties of state waters under prescribed conditions and to revoke or amend such certificates.

(6) To make investigations and inspections, to ensure compliance with any certificates, standards, policies, rules, regulations, rulings and special orders which it may adopt, issue or establish and to furnish advice, recommendations, or instructions for the purpose of obtaining such compliance. In recognition of §§ 32.1-164 and 62.1-44.18, the Board and the State Department of Health shall enter into a memorandum of understanding establishing a common format to consolidate and simplify inspections of sewage treatment plants and coordinate the scheduling of the inspections. The new

format shall ensure that all sewage treatment plants are inspected at appropriate intervals in order to protect water quality and public health and at the same time avoid any unnecessary administrative burden on those being inspected.

(11) To investigate any large-scale killing of fish.

§ 62.1-44.20. Right to entry to obtain information, etc. - Any duly authorized agent of the Board may, at reasonable times and under reasonable circumstances, enter any establishment or upon any property, public or private, for the purpose of obtaining information or conducting surveys or investigations necessary in the enforcement of the provisions of this chapter.

§ 62.1-44.21. Information to be furnished to Board. - The Board may require every owner to furnish when requested such plans, specifications, and other pertinent information as may be necessary to determine the effect of the wastes from his discharge on the quality of state waters, or such other information as may be necessary to accomplish the purposes of this chapter.

The Board shall not at any time disclose to any person other than appropriate officials of the Environmental Protection Agency pursuant to the requirements of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500) any secret formulae, secret processes, or secret methods other than effluent data used by any owner or under that owner's direction.

Relevant Excerpts from DEQ Regulations

9 VAC 25-31-10 et seq. - VIRGINIA POLLUTANT DISCHARGE ELIMINATION SYSTEM (VPDES) PERMIT REGULATION

9 VAC 25-31-40. Exclusions.

The following discharges do not require VPDES permits:

E. Any introduction of pollutants from non point-source agricultural and silvicultural activities, including storm water runoff from orchards, cultivated crops, pastures, range lands, and forest lands, but not discharges from concentrated animal feeding operations, discharges from concentrated aquatic animal production facilities, discharges to aquaculture projects, and discharges from silvicultural point sources.

F. Return flows from irrigated agriculture.

9 VAC 25-32-10 et seq. VIRGINIA POLLUTION ABATEMENT (VPA) PERMIT REGULATION

9 VAC 25-32-40. Exclusions.

The following do not require a VPA permit:

B. Any introduction of pollutants from non-point source agricultural or silvicultural activities, including runoff from orchards, cultivated crops, pastures, range lands, and forest lands, except that this exclusion shall not apply to concentrated confined animal feeding operations;

C. Return flows from irrigated agricultural land;

Relevant DEQ Programs

Pollution Complaint Investigation - Response to and investigation of pollution reports received by the Agency (includes fish kill investigations).

Ambient Water Quality Monitoring - Collection and processing of data at surface water monitoring stations.

Biological Monitoring/Benthic Studies - Collection and processing of data at biological monitoring stations.

Fish Tissue and Sediment Monitoring - Collection and processing of fish tissue and sediment data from CORE stations.

Water Quality Standards - Development of new water quality standards, revision of existing standards, triennial review process, and guidance and implementation strategies for new standards.

Water Quality Planning and Assessments - Assessment of water quality data for 305(b) report.

VPDES Permit Program - Issuance of VPDES permits for point sources discharges as defined in the VPDES permit regulation.

Summary of Complaints Received

DEQ has received several calls through our Eastern Shore Office in Olney, Virginia, about runoff from agricultural fields. The plasticulture issue was also discussed at several Eastern Shore Water Quality Consortium meetings that DEQ staff attended. Mr. R.G. Parks of Kepotank Bay Clam Company led most of these discussions. DEQ has met with VIMS (Drs. Lukenbach and Roberts) and VPI (Dr. Wilson) about their work on the plasticulture issue. Below is a synopis of specific reports received in 1996.

July 11, 1996 - The Eastern Shore Office received a compliant from Mr. R.G. Parks of the Kegotank Bay Clam company. Mr. Parks stated his juvenile clams were dying in the raceways were they were being raised. He belived this was due to water quality problems in Gargathy Creek, which is the source for water for his aquaculture operation. Mr. Parks also stated he believed the clams were dying due to runoff of pesticides from nearby agricultural fields. The DEQ inspector could not determine if water quality related problems were the

cause of the clam mortality. The inspector indicated water conditions appeared normal when the inspector was on site.

July 15, 1996 - The Eastern Shore Office received a call from Avon Bagwell in Northampton Co. Ms. Bagwell stated there was a fish kill in a feeder creek that flows to Magothy Bay on 713/-7/14/96. Ms. Bagwell indicated this could possibly be due to runoff from nearby agricultural fields. There was no evidence of the fishkill on 7/15/96, presumably due to tides and gulls eating the dead fish.

July 17, 1996 - The Eastern Shore Office received a call from Mr. Mike Steelman of Accomack County. Mr. Steelman reported high mortality of clams in his nursery operation on Folleys Creek. Mr. Steelman thought this might be due to agricultural runoff from fields located upstream from his nursery location. The DEQ inspector visited the site and the creek, but was unable to determine an obvious cause of the kill.

July 22, 1996 - The Eastern Shore Office received a call from Mr. R.G. Parks concerning clam mortality in his nursery due to runoff from nearby agricultural fields. The inspector visited the site and did find foam in the raceways at the nursery. The foam had a rainbow sheen and an odor that was not normal to the operation. The inspector could not determine the cause of the excess foam.

VIRGINIA SOIL & WATER CONSERVATION

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Eastern Shore Soil and Water Conservation District
Plasticulture Report

The following is a summary of Eastern Shore Soil and Water Conservation District's activities regarding the progress on the Plasticulture Project:

* 140 field visits to 45 farm tracts have been completed. Several tracts have been visited a number of times to inventory BMP needs, gather information for a conservation plan, discuss alternatives with the grower, make engineering surveys, and document application of BMP's. More than 2,500 acres has been inventoried.

* 15 tracts will not be farmed in this rotation this year and are being placed in a low priority category. We are finding that it is difficult to determine resource needs before the fields are bedded. Runoff patterns are changed during the bedding process.

  Preliminary BMP recommendations were prepared for 30 tracts. Due to further investigations, most of these preliminary recommendations are in the process of being revised. We are finding that in many cases runoff from the fields concentrates before flowing over a filter area. Filters need sheet flow to be effective.

* We are developing an alternative system of sediment traps and filters to control the runoff. Approximately 10 small traps have already been installed to test their applicability. We are also identifying possible future sites for sediment basins if needed. Approximately 10+ acres of the more erodible land has been taken out of production and new filter strips have been planted on a number of tracts.

* We have investigated two specific complaints regarding runoff from plasticulture fields and are working to resolve them. Some producers are attempting to control runoff on their own by using silt fence and straw bales. Two engineering surveys have been completed for areas with severe erosion problems.

* We have obtained photo maps from the Farm Services Agency for 85-90% of the tracts being farmed using plasticulture. He has also obtained the soils maps for each tract and set up files for them.

* Nutrient management plans for at least two of the producers have begun.

* We have developed a basic conservation system for use as a starting point for the conservation plans to be developed.

* We have received some blocks of the polymer material to be used to settle out sediment particles. These will be tested for effectiveness under various field conditions.

* VDOT Drainage Program has implications to water quality and needs to be addressed.

of concern pertaining to the impacts of plasticulture operations on local water quality and shellfish operations were first expressed to the agency's former Director, Keith Bull. At that time, CBLAD began to informally become involved with plasticulture by tracking one specific pollution accusation which was eventually determined to have resulted from something other than pollution runoff from plasticulture.

At the direction of the Department's current Board Chairman, staff has been following events pertaining to plasticulture such as H.R. 40, media reports, and the study just completed by the VA Institute of Marine Science. CBLAD's Agricultural Program Coordinator also maintains communications and monitors the activities of the Agricultural Water Quality Specialist position employed at the Eastern Shore Soil and Water Conservation District. Most recently, our Agricultural Program Coordinator and Civil Engineer conducted a site investigation with District and USDA-Natural Resource Conservation Service staff to clarify questions regarding Resource Protection Area buffers and to assist with determining applicable best management practices.

CBLAD is glad to be a member of this Task Force and will continue to provide our assistance and expertise in water quality management.

Sincerely,

Michael D. Clower

MDC\slm

c: Interagency Task Force Members
D. Blenkenship, VDACS
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VIRGINIA SOIL & WATER CONSERVATION

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Eastern Shore Soil and Water Conservation District
Plasticulture Report

The following is a summary of Eastern Shore Soil and Water Conservation District's activities regarding the progress on the Plasticulture Project:

* 140 field visits to 45 farm tracts have been completed. Several tracts have been visited a number of times to inventory BMP needs, gather information for a conservation plan, discuss alternatives with the grower, make engineering surveys, and document application of BMP's. More than 2,500 acres has been inventoried.

* 15 tracts will not be farmed in this rotation this year and are being placed in a low priority category. We are finding that it is difficult to determine resource needs before the fields are bedded. Runoff patterns are changed during the bedding process.

  Preliminary BMP recommendations were prepared for 30 tracts. Due to further investigations, most of these preliminary recommendations are in the process of being revised. We are finding that in many cases runoff from the fields concentrates before flowing over a filter area. Filters need sheet flow to be effective.

* We are developing an alternative system of sediment traps and filters to control the runoff. Approximately 10 small traps have already been installed to test their applicability. We are also identifying possible future sites for sediment basins if needed. Approximately 10+ acres of the more erodible land has been taken out of production and new filter strips have been planted on a number of tracts.

* We have investigated two specific complaints regarding runoff from plasticulture fields and are working to resolve them. Some producers are attempting to control runoff on their own by using silt fence and straw bales. Two engineering surveys have been completed for areas with severe erosion problems.

* We have obtained photo maps from the Farm Services Agency for 85-90% of the tracts being farmed using plasticulture. He has also obtained the soils maps for each tract and set up files for them.

* Nutrient management plans for at least two of the producers have begun.

* We have developed a basic conservation system for use as a starting point for the conservation plans to be developed.

* We have received some blocks of the polymer material to be used to settle out sediment particles. These will be tested for effectiveness under various field conditions.

* VDOT Drainage Program has implications to water quality and needs to be addressed.

VIRGINIA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES
Report to Interagency Task Force on Plasticulture

VDACS' Overall Role in Agriculture, Promotion and Marketing

*As expressed in our agency mission statement, "We promote the economic growth and development of Virginia agriculture, encourage environmental stewardship and provide consumer protection."

*Our strategic plan identifies as one of our goals "Enhance opportunities for growth and profitability of the Virginia agriculture industry."

*This goal relates to the overall charge of the Board of Agriculture and Consumer Services (Section 3.1-4) to promote the agricultural interests of the Commonwealth.

*This goal also relates to the duties of the Commissioner of Agriculture and Consumer Services (Section 3.1-14) to promote improvements for agriculture and to disseminate information about Virginia's agricultural markets and resources and economic opportunities.

*VDACS has a major role in the development and marketing of aquaculture and agricultural products (vegetables produced by plasticulture methods).

VDACS Regulatory Programs Relating to Plasticulture

Pesticide Law

*Dr. Marvin Lawson will talk about the work of his Office of Pesticide Services and the Pesticide Control Board; therefore, I will only mention that the Department provides the staffing for the administration of state and federal laws relating to the use of pesticides.

Agricultural Stewardship Act

*A fairly new program of the Department that relates to agricultural production is the Agricultural Stewardship Act (Sections 10.1-559.1 through 10.1-559.11).

*This Act is a product of the joint efforts of representatives of the agricultural community, environmental organizations, state agencies, and the Virginia Association of Soil and Water Conservation Districts.

*The Ag Stewardship Act institutes a program that involves the cooperative efforts of the Department, local Soil and Water Conservation Districts, and the Virginia Soil and Water Conservation Board.

*Under the Act individual agricultural producers are made aware of aspects of their operations that *are causing* or *will cause* water pollution.

*The standard is not speculative; in other words, the Act does not apply to agricultural activities that *could have caused* or *might cause* water pollution.

*The Act addresses water pollution in the forms of sediments, nutrients and toxins emanating from agricultural operations that are not currently subject to a permit issued by the State Water Control Board.

*The Act is "complaint-driven"--there can be no investigation of an agricultural activity until the Commissioner of Agriculture and Consumer Services receives a complaint regarding that agricultural operation.

*Upon receipt of a complaint, either the Commissioner or the local Soil and Water Conservation District will investigate to determine whether the agricultural activity in question is causing or will cause water pollution by sedimentation, nutrient enrichment

or toxin delivery. (The District has the option to investigate if it chooses to do so; if it does not, then the Commissioner must investigate.)

*Upon a determination that the agricultural activity is causing or will cause water pollution, the producer will be asked to develop a plan to correct the problem and then to implement the plan over a period of time.

*These plans are to contain best management practices or other measures that will eliminate or prevent the pollution being caused by the agricultural activity.

*The local District will assist by reviewing the plan prior to its submittal to the Commissioner for approval.

*If the producer does not develop a plan, or if the producer develops a plan, but fails to implement it, then and only then can enforcement action be taken against the producer.

*Since the ASA's investigation process is complaint-driven, there is not yet any means of predicting with any accuracy the size of the contribution that the ASA may make to the reduction of pollutants in Virginia's waters.

*During the first month of implementing the Act, we received a total of 13 official complaints.

*During the two months since the Department began receiving complaints as required by the Act, we have not received any complaints relating to plasticulture.

AUTHORITY

I. DCR - Responsible for Commonwealth's Nonpoint Source Management Program

The Department of Conservation and Recreation (DCR) and the Virginia Soil and Water Conservation Board have been delegated to have the lead responsibility for the Commonwealth's nonpoint source pollution management program. This authority comes from the **Code of Virginia, Section 10.1-104.1**. Further responsibilities include the distribution of funding, the identification and establishment of priorities of nonpoint source related water quality problems, and the administration of the Statewide Nonpoint Source Advisory Committee.

II. Board of Conservation and Recreation - Authority and Duty to Encourage and Promote Nonpoint Source Pollution Control and Prevention

The Board's authority in reference to nonpoint source pollution has been recently expanded through the **Water Quality Improvement Act of 1997** which amends the **Code of Virginia by adding in Title 10.1 a chapter numbered 21.1.** As a result, the Board of Conservation and Recreation is authorized and has the duty to:

"Encourage and promote nonpoint source pollution control and prevention, including nutrient control and prevention for the: (i) protection of public drinking water supplies; (ii) promotion of water resources conservation; (iii) protection of existing high quality state waters and restoration of all other state waters to a condition or quality that will permit all reasonable beneficial uses and will support the propagation and growth of all aquatic life, including finfish and shellfish, which might be reasonably be expected to inhabit them; (iv) protection of all state waters from nonpoint source pollution; (v) prevention of any increase in nonpoint source pollution; (vi) reduction of existing nonpoint source pollution; (vii) attainment and maintenance of water quality standards established under subdivisions (3a) and (3b) of Section 62.1-44.15; and (viii) attainment of commitments made by the Commonwealth to water quality restoration, protection and enhancement including the goals of the Chesapeake Bay Agreement, as amended, all in order to provide for the health, safety and welfare of the present and future citizens of the Commonwealth."

The Act requires that by July 1, 1998, and biennially thereafter, that DCR shall evaluate and report on the impacts of nonpoint source pollution. DCR and a county, city, or town or any combinations of counties, cities and towns comprising all or part of any geographical region contributing to the impairment or degradation of state waters may develop a cooperative program to prevent nonpoint source pollution impairment or degradation. All state agencies shall cooperate and provide assistance in developing and implementing such programs.

DCR Programs on Water Quality Management Related to Plasticulture

I. NPS Management Program

In the "Virginia Nonpoint Source Management Program Update, Projected Activities for 1995-1996" there is a reportable milestone related to plasticulture. It calls for research, educational outreach, and demonstrations in order to promote alternative BMPs to address nonpoint source pollution from Eastern Shore vegetable growers.

II. Agricultural Best Management Practice Cost-Share Program

The Division of Soil and Water Conservation within DCR manages the Virginia Agricultural Best Management Practice Cost-Share Program. The goal of this program is to encourage voluntary installation of agricultural best management practices (BMPs) that will address Virginia's nonpoint source pollution water quality objectives. The cost-share program is funded with state and federal monies through local Soil and Water Conservation Districts. Districts, in turn, administer the incentive program to encourage landowners to apply BMPs to their land. BMPs that are cost-shared that could apply to plasticulture include: grass filter strips; protective cover for speciality cropland; sediment retention, erosion or water control structure; and sod waterways.

III. 319 Program

Section 319 of the 1987 amendments to the Clean Water Act established the basic principles for the protection from and control of nonpoint source (NPS) pollution. Currently, Virginia receives approximately $2 million dollars a year with about $500,000 going to the core program, $1 million to watershed projects, and approximately $500,000 going to "programs of statewide importance" (POSIs). Funds are provided to Soil and Water Conservation Districts, PDCs, colleges and universities, state agencies, and citizen groups. Projects are funded as watershed projects in high to medium priority hydrologic units or as POSIs.

Currently, there are no 319 funded watershed projects on the Eastern Shore. However, in the past several years DCR-DSWC has been contacted by two different groups on the Shore about 319 funding and plasticulture was a NPS concern in each of the watersheds. The Citizens for a Better Eastern Shore actually applied for funding but were unsuccessful in obtaining a grant.

Section 319 grant projects under the category "POSIs" address topics or issues related to NPS pollution. Examples of such projects include: Bayscapes, lawn care educational activities, Integrated Pest Management, promoting the use of native warm season grasses, etc. DCR is preparing a grant proposal, which will be coordinated with the District and NRCS, for the Spring of 1998, to demonstrate several innovative BMPs for plasticulture (i.e. sediment basin in conjunction with a constructed wetland and organic mulches). The plan is to work with several farm managers and to install such practices for the 1998 growing season.

VIRGINIA PESTICIDE CONTROL BOARD
Report to Interagency Task Force on Plasticulture

General Authority

The Pesticide Control Board (Board) is entrusted with the power and duty to carry out the provisions of the Virginia Pesticide Control Act. As related to the issues of concern to the Interagency Task Force on Plasticulture, the Board is authorized to do the following:

1) contract for research projects and establish priorities;

2) require that pesticides used in Virginia are adequately tested and are safe for use under local conditions;

3) require that individuals who sell, store or apply pesticides commercially are adequately trained and observe appropriate safety practices; and

4) cooperate, receive grants-in-aid, and enter into agreements with any agency of the federal government, of the commonwealth or political subdivisions, or with an agency of another state, in order to promote the purposes of the Act.

In addition to the powers identified above, the Board is authorized to promulgate regulations pursuant to the Administrative Process Act, including but not limited to the following:

1) licensing of businesses that manufacture, sell, store, recommend for use, mix or apply pesticides;

2) registration of pesticides for manufacture, distribution, sale, storage, or use in the Commonwealth;

3) establishing training, testing, and standards for certification of commercial applicators, registered technicians, and private applicators; and

4) revoking, suspending or denying licenses (business), registration (products), and certification or certificates (applicators or technicians).

The Board may prescribe regulations to restrict or prohibit the sale or use and disposal of any pesticide or pesticide container or residuals which:

1) undesirably persists in the environment or increases due to biological amplification or unreasonable adverse effects on the environment; or

2) because of toxicity or inordinate hazard to man, animal, bird or plant may be contrary to the public interest.

Complaints to Commissioner or Board. §3.1-249.32 provides that anyone may register a written complaint with the Commissioner or the Board relating to the sale, use, storage handling or disposal of any pesticide and the Commissioner or the Board shall institute an investigation of the alleged damage caused by such pesticide.

Enforcement. §3.1-249.58 authorizes the Commissioner to enter any public or private premise *operating as a pesticide business* at reasonable times, with the consent of the owner or tenant thereof ... in order: (i) to have access for the purpose of inspecting any equipment subject to the Act, (ii) to inspect storage or disposal areas, (iii) to inspect or investigate complaints of injury to humans, animals, birds, or property, (iv) to sample any pesticide being applied or to be applied, or (v) to enforce any other provision of the Act (emphasis added).

It should be noted that, by definition, private pesticide applicators are not pesticide businesses. Therefore, the Commissioner's authority to enter upon lands of private applicators (farmers) under the Pesticide Control Act, without their expressed permission, is limited.

The Act authorizes the Board to impose civil penalties, refer certain violations for criminal prosecution, and suspend, modify, or revoke a license, or certificate.

§3.1-249.64 states that it shall be unlawful for any person to use or cause to be used any pesticide in a manner inconsistent with its labeling or regulations of the Board.... Unfortunately, manufacturer labels frequently fail to state application restrictions clearly and unequivocally.

Research. §3.1-249.29 authorizes the Board to contract for research and establish priorities. Research proposals, submitted in response to a published RFP, are reviewed and evaluated for scientific merit by a Research Advisory Committee of selected scientists.

Education. VDACS staff works closely with the Virginia Cooperative Extension Service to administer training, testing and certification programs for private and commercial applicators. New information, such as recommendations for adoption of new best management practices, is frequently incorporated into certification training curricula.

Pesticide Board Actions Related to Agriculture Plasticulture on the Eastern Shore

In February 1996, members of the Virginia Shellfish Growers Association appeared before the Board to discuss their concern that some of their members had experienced unusually high mortality of larval clams over the past several years. Although the aquaculture producers suspected that pesticide runoff from tomato fields grown under plasticulture were responsible for the clam mortality, they did not have any direct data to show a cause and effect relationship. Tomato producers present at the meeting stated that they were willing to work with the aquaculture producers to resolve the problem.

Lacking data to show a definitive relationship between pesticides and the clam mortality, the Board asked both parties to work together to resolve their mutual problem. Shellfish growers were told that they should come back to the Board if they obtained evidence that pesticides were

the cause of the clam mortality and if the problem remained unresolved.

At the January, 1997 Board meeting, on behalf of the Chesapeake Bay Foundation, the Virginia Shellfish Growers Association and the Southern Environmental Law Center, the Southern Environmental Law Center presented a letter to the Board registering a complaint regarding the potential misuse of pesticides in agricultural plasticulture on the Eastern Shore and requested that the Board conduct an investigation of the matter. The Board directed staff to conduct investigations during the 1997 growing season. The pesticide investigator on the Eastern Shore is preparing to carry out pesticide use monitoring, however the Southern Environmental Law Center has been asked to be more specific in their charge of misuse in order that the use monitoring can be better focused. Approximately 50 % of the plasticulture growers have indicated that they would not participate in the use monitoring.

On April 17 the Pesticide Control Board directed staff to develop Request for Proposals (RFPs) to solicit research proposals in the following areas:

(1) an evaluation of plasticulture practices on the fate and transport of pesticides applied to agricultural crops;

(2) an evaluation of best management practices to reduce the impact of pesticide runoff from agricultural fields under plasticulture; and

(3) studies of the application of pesticides in schools, including studies to access the need for IPM in schools.

The first two areas of research will support studies which will provide information which will be directly applicable to furthering our understanding of what impact, if any, pesticides are having on shellfish production on the Eastern Shore and how the impact of pesticides can be mitigated by the adoption of best management practices. The RFPs will be published within the next few weeks. However, due to the lateness of the announcement, it is likely that significant research will not begin until the 1998 growing season.

REPORT ON INSPECTIONS OF PESTICIDE APPLICATIONS IN "PLASTICULTURE" TOMATO FIELDS ON THE EASTERN SHORE OF VIRGINIA DURING THE 1997 GROWING SEASON

October 6, 1997

Scope:

Agricultural use monitorings were conducted on three plasticulture tomato fields on the Eastern Shore, during the 1997 growing season, to determine if agricultural pesticides were applied in accordance with federal and state laws and regulations and the label instructions of the pesticides applied. Studies to evaluate the environmental fate and biological impact of pesticides in the various watersheds on the Eastern Shore, as a result of agriculture plasticulture, were beyond the scope of these inspections.

A routine "use observation" involves an on-site inspection of the mixing of the pesticides to be applied, a review of the labels of the pesticides being mixed, a determination if the mixer is wearing appropriate Personal Protective Equipment (e.g. rubber apron, gloves and boots, goggles, and respirator) required by the label, observing the transfer (if any) from the mixing tank to the application equipment (tractor equipped to spray, or specialized spray vehicle, both of which use lateral booms fitted with multiple spray nozzles attached along the length of each boom), and observing the actual application of the pesticides in the crop field. The wind direction and speed is measured during the application if there is any indication that drift is occurring or specific label instructions regarding wind speed are being ignored.

The use observation described above was conducted at two of the three application sites visited. The inspector arrived at the third site while spraying was in progress, therefore, the mixing and loading part of the process was discussed with the applicator but was not observed.

Because no misuse of pesticides was suspected, no samples were collected at either of the three use observation sites. Had a misuse been observed, samples would have been collected to document the misuse.

Background:

In response to a request from Ms. Katherine E. Slaughter, on behalf of the Chesapeake Bay Foundation, the Virginia Shellfish Growers Association and the Southern Environmental Law Center, that the Board conduct an investigation of the potential misuse of pesticides in agricultural plasticulture facilities on the Eastern Shore, the Board requested that staff investigate the application of pesticides on those Eastern Shore fields that employ plasticulture as a cultural practice. Ms. Slaughter's request was stimulated by reports of severe mortality in clams grown in clam hatcheries (aquaculture) on the Eastern Shore over several seasons and subsequent studies which showed high levels of soil erosion and high levels of certain pesticides during periods of

high rainfall. Staff undertook the charge from the Board with the understanding that, because its staff was not empowered by the Virginia Pesticide Control Act to enter onto farms without the consent of the owner or tenant, staff could possibly be limited in its attempts to monitor pesticide applications on plasticulture fields. In February 1997 OPS outlined a possible course of action for monitoring pesticide applications on plasticulture fields. In April 1997 OPS began surveying fields in anticipation of requesting permission to observe pesticide applications during the growing season.

Results of Investigation:

During the 1997 tomato production season, which runs from April 1 through October 15, the OPS Pesticide Investigator assigned to the Eastern Shore scouted Accomack and Northampton Counties for fields used for plasticulture tomato production. Approximately 3,000 acres were found in tomato production, farmed by four large commercial firms and several smaller grower operations. This represents a reduction in tomato acreage of approximately 2,000 acres compared to 1996 production. All of the tomato fields on the Eastern Shore were found to use plasticulture methods. Most of the tomato production acreage was found to border wetlands or flowing water; however, most of the acreage inspected was not in close proximity to flowing water used by clam producers.

Contact was made with the individual growers early in the season to obtain permission to observe routine pesticide applications in the field. Initially, over half of the tomato growers refused permission. Later a few agreed to allow OPS to observe one pesticide application on their fields, but, by the end of the growing season, OPS was only successful in observing three pesticide applications by two different growers. Two of the applications were made to fields in Accomack County, and one to a field in Northampton County. Two of the fields were bordering creeks or bays used by clam producers.

Of the three pesticide applications observed, all were done according to the instructions printed on the pesticide labels. A tank mix of *Kocide DF*, *Benlate*, and *Bravo Ultrex* to control tomato diseases was observed being ground-applied to a 20 acre field (Sandifer Farm) located along Seaside Road in Modest Town. This field, located at the headwaters of Gargatha Creek approximately 1 mile upstream from a commercial clam bed, was being farmed by Taylor & Fulton, Inc. of Mappsville, Virginia. A tank mix of these same pesticides was also observed being applied to a 20 acre field (Carroll Mathews Farm) located along Matthews Road in Metompkin. This field was also being farmed by Taylor & Fulton, Inc. Both applications were made on July 31, 1997. *Kocide DF* is a copper based fungicide; active ingredient in *Benlate* is benomyl, a systemic foliar fungicide; and the active ingredient in *Bravo Ultrex* is chlorothalonil, also a fungicide.

The third use inspection was an application of a tank mix of *Terranil 6L*, *Lannate*, and *Dipel 2X* to control pin worms, borer and diseases on tomatoes. It was ground-applied to a 43 acre field (Ballard Farm) located along Seaside Road in Exmore, on August 26, 1997. This field, which is

being farmed by Kuzzen's Inc. of Exmore, is upstream from Willis Wharf. Willis Wharf has a clam hatchery and clam growing beds. *Terranil 6L* is the fungicide containing chlorothalonil; the active ingredient in *Lannate* is methomyl, an insecticide; and *Dipel 2X* is a biological caterpillar larvicide which contains the spores and endotoxin of *Bacillus thuringiensis* as the active ingredient.

Observations:

There was approximately 3,000 acres of tomatoes grown using plasticulture on the Eastern Shore during the 1997 growing season. In addition, there was also between 500-800 acres of bell peppers, cucumbers, squash, watermelons, and eggplant grown using the same plasticulture. Because cucumbers, squash, and watermelons produce more foliage that covers the plastic beds and extends into the area between beds, runoff from these fields is less likely to occur during rain events.

Clam mortality experienced by the commercial growers in the past has been associated with rain events. Rainfall data was obtained from the Eastern Shore Agricultural Experiment Station in Painter, Virginia. Average rainfall per year is 42.7 inches (January - December). Average rainfall during the growing season, or April - September, is 21.5 inches. Rainfall during the 1997 growing season was 16.27 inches, with a total of 25.5 inches measured for the period from January to the end of September. Total rainfall in 1996 was 61.68 inches - a record (the last record was set in 1945 with 61.23 inches). Rainfall during the 1996 growing season (April - September) measured 35.62 inches. With rainfall being significantly less-than-average this season, opportunities for pesticide runoff from plasticulture fields has been minimal. There also appeared to be a reduction in incidences of clam mortality reported to OPS as well.

Some 1997 tomato fields incorporated grassy buffer strips between the field and the nearby waterways in an effort to slow any runoff and trap silt during rain events. Silt fences and staked straw bales were also seen in use to control silt movement into streams. One large field had a holding pond at the low end into which runoff water was channeled. However, most of the fields lacked these improvements. Many of the fields without buffer strips and other runoff control measures were found to have channels dug and, in some cases, pipes in place to promote water movement from the field into nearby waterways. Almost all of the tomato fields were contoured with a slope that would promote the drainage of water off of the fields.

Conclusions:

1. There was significantly less agricultural acreage under plasticulture in 1997 than in 1996.

2. With the exception of significant rainfall as a result of Tropical Storm Danny in July, the relatively dry conditions that prevailed during the 1997 growing season resulted in less runoff from plasticulture fields.

3. Many growers implemented BMPs, such as the installation of grassy strips or silt fences to reduce runoff from plasticulture fields.

4. The three pesticide applications that were observed were made in accordance with applicable federal and state laws and regulations and label instructions.

5. These findings apply only to the three pesticide applications observed and may or may not apply to other applications which were not observed.

6. Except for one report of some clam mortality from Mr. Steelman, there were no complaints of clam mortality. Mr. Steelman's "concern" was about an incidence of clam mortality that was not associated with any plasticulture fields or any rain event. Two water samples collected at Mr. Steelman's aquaculture facility did not reveal any pesticide residues.

7. No conclusions can be drawn from these inspections on the environmental fate or effect of the pesticides applied. Such conclusions require research studies which are beyond the scope of these inspections.

INTERAGENCY TASK FORCE ON PLASTICULTURE

Record of Public Comment

Eastern Shore Agricultural Research and Extension Center
Painter, Virginia
August 12, 1997, 7:00 p.m.

Commissioner Courter: I'd like to thank you for attending this hearing and particularly my appreciations to the Eastern Shore Ag Experiment Station for providing the venue. My name is Carlton Courter. I'm the Commissioner of the Virginia Department of Agriculture and Consumer Services. We are here tonight as an interagency task force assessing the practice of plasticulture. We are formed in accordance with the guidelines laid out by House Resolution No. 40 which passed the General Assembly in February of this year and I would like to clarify that particularly from the standpoint that some of you are familiar with a task force that I had named and structured as Commissioner of the Ag Department that worked throughout last year. This is a separate exercise tonight -- a resolution passed by the Assembly. And this interagency task force is essentially a separate entity charged with assessing and addressing the practice of plasticulture in providing comment and responding to the House Resolution prior to next year's General Assembly session. I hope that is clear to everyone. I did see a news account that suggested that this was the plasticulture committee under my direction which is not the case. This is essentially an extension (though we are not members of the legislature) of an exercise by the legislature and therefore we are here to respond to that resolution. The members of the task force are as follows: myself; Don Blankenship, who is the Deputy Commissioner of the Department of Agriculture and Consumer Services (I think we all have name plates here); Dr. Allen Anthony, with the Department of Environmental Quality; Frank Daniel, who is also from the Department of Environmental Quality and is a member of this interagency task force but could not be with us tonight; Charles Lunsford, with the Department of Conservation and Recreation, the Division of Soil and Water Conservation; Dr. Marvin Lawson, who is here on behalf of the Virginia Pesticide Control Board is senior staff reporting to that board; Steve Mallette, who is here to represent the Eastern Shore Soil and Water Conservation District; the Chesapeake Bay Local Assistance Authority was to have a representative as well, but Ms. Sheila McNamara, the staff individual assigned to this issue, has resigned and they do not have a replacement at this time. Ms. Perida Giles is here in the middle as staff and recording secretary in terms of her capacity to report back the testimony that we have tonight in response to the Assembly resolution. The study resolution directs the Task Force to review the water quality management measures utilized in the practice of plasticulture and to determine the following: (1) whether existing programs and policies are sufficient to ensure adequate water quality management when the practice of plasticulture is used; (2) whether additional research and development of best management practices relating to plasticulture should be undertaken by the Commonwealth and (3) whether existing state programs are consistently applied and coordinated between agencies with regard to the practice of plasticulture. The study resolution also directs the Task Force to hold at least one meeting to receive comment from the public on the issues which I have just outlined, which is what we intend to do tonight. We had through the help of the Cooperative Extension Service essentially done a state survey of the utilization of plasticulture in every locality in the Commonwealth and found that the large majority of utilization of plasticulture in significant volume or manner is based here on the Eastern Shore. So that was the basis of our coming to the Eastern Shore with this

Task Force to receive testimony tonight. We would like to receive comments until about 9:45 this evening. The practice generally surrounding these types of hearings is that we do limit the individuals on the time that they are able to speak. But I would like to see a show of hands of those who plan to testify. The Chair will take into consideration how many people are going to speak or testify and allocate the time accordingly. If there are a lot of people, we were considering limiting time frames to five minutes each. If there are not that many, with an eye on the clock, we can allow more time per speaker. Additionally, you need to know that if you would like to provide copies of your comments that they would certainly be taken into the record. If you would like to provide the comments and then add to those comments, ad lib, or otherwise, that would be fine as well. We also will take written comment until August 30 at our agency at Ms. Giles' address which we can provide for you. If you do leave them tonight and would like to provide additional written testimony -- maybe you felt like you were not heard from or you did not include what needed to be said -- you have got until August 30 to provide that testimony. We also ask for the sake of brevity that you only address as best as you can those issues which are outlined in the study resolution. And I can repeat those three directives from the resolution if we need to. Following the public comment period, the Task Force members assembled here at the front of the table will have a brief discussion period, and discussion will be reserved only for the Task Force members. And what we will attempt to do is summarize the comment tonight then look toward an additional meeting in terms of the interagency Task Force directive to provide information back to the General Assembly. We envision our meeting tonight to be a brief meeting of the Task Force members only in discussion. You are certainly welcome to stay and listen in. Are there any questions or comments relative to protocol. I guess, at this point, could I see a show of hands of the number that would like to speak? I only see eight. So I would think at least ten minutes per person. But we from Richmond will be spending the night, so speak as long as you care to. But we would like to conclude by 9:45, so we will put that limit on the back end and essentially start with ten minutes per presenter. Your name will be called in the order that you have signed up. When your name is called, please come forward. And I guess, unless there are no questions or clarifications, we will start the list. And the first name we have is Robert Brumbaugh, and I believe it is Dr. Brumbaugh, with the Chesapeake Bay Foundation.

Dr. Brumbaugh: That's right. Actually, this evening I am going to defer CBF comment to Ann Jennings, our staff scientist from Richmond. And instead, I have been asked and authorized to present a few words from Katherine Slaughter from the Southern Environmental Law Center. So this statement is being presented on their behalf.

Due to a schedule conflict, I am unable to attend the meeting of the Plasticulture Task Force this evening on the Eastern Shore. I wish to offer the following comments on behalf of the Southern Environmental Law Center (SELC). SELC continues to be concerned about the impacts of plasticulture methods used in farming on water quality of the Eastern Shore. We had expected that the interagency Task Force would address the questions addressed by House Resolution 40 mainly that (1) whether existing programs are sufficient to address water quality issues when plasticulture is utilized, (2) whether the Commonwealth should undertake additional research and development of best management practices and (3) whether existing state programs have been consistently applied and coordinated between agencies. We would hope that the Task Force would also identify for the General Assembly any issues that may need to be addressed with legislation. The initial concerns about plasticulture came from the clam producers. Upon investigation, the SELC along with the

Chesapeake Bay Foundation, came to share that view. However, we have also expressed concerns about the impacts of plasticulture on the natural ecology of the streams, creeks and bay on the Eastern Shore. In particular, Dr. Andrea Dietrich's study demonstrated that runoff from plasticulture fields contained very high levels of toxics so that instream water quality in nearby creeks greatly exceeded the state water quality criteria. For example, total copper concentrations, a significant component of the pesticides in use, were as high as 700 parts per billion (ppb) in Gargathy Creek following rain events in 1996; copper concentrations were as high as 1400 ppb in the field runoff itself. (The water quality standard for dissolved copper is 2.9 ppb.) And this is cited as Virginia Tech, Andrea Dietrich, et al, Evaluation of Pollutants in Source and Process Water Used in Shellfish Aquaculture (1996). This study and others also detected endosulfan, an organochlorine pesticide at concentrations exceeding state water quality standards. Same citation plus a report from the Stroud Water Research Center, the Academy of Natural Sciences, Philadelphia, PA (1966). SELC wrote about these concerns to the State Water Quality Control Board on 19 December 1996 as a follow up to the Board meeting on December 12 where we had requested the Board to investigate the water quality parameters and complaints arising from the runoff from plasticulture operations. Bidgood Wall, Chair, directed the Department of Environmental Quality to look into the matter. Early in the year, we spoke to the State Pesticide Control Board about misapplication of pesticides on fields on the Eastern Shore. On June 4, upon request of the Pesticide Control Board we sent a list of streams with apparent water quality problems that were adjacent to fields using plasticulture last year. These fields included were adjacent to Finney, Gargathy, and Nickawampus Creeks in Accomack County and Barlow's Gulf and Indian Town Creeks, Mockhorn Bay southwest area, Ramshorn Bay northern area in Northampton County. We believe that the Task Force should review the current practice of plasticulture; its impacts on instream water quality and the clam industry as expressed in existing studies by Virginia Tech and Virginia Institute of Marine Science (Preliminary Evaluation of Water Quality in Tidal Creek of Virginia's Eastern Shore in Relation to Vegetable Cultivation (1996)). We believe the Task Force should study literature about the use of buffered areas, including engineered wetlands, to determine how to prevent further pollution. We are in total agreement with the impacts this agricultural practice has on the economic interests of the Virginia Shellfish Growers Association, and we are also concerned about the negative impacts of plasticulture, as currently being utilized, is having on the natural aquatic life in the streams and creeks. Thus far, we have not seen any plan to ensure that the pesticide's applied properly in plasticulture operations so that runoff to surface water that violates water quality standards does not occur. Nor have we seen any efforts by the Department of Environmental Quality to enforce the water quality standards. We are concerned that the current Task Force is meeting without a definite agenda and without any direction to address the questions raised by the House Agriculture Committee. By contrast, we understand that a similar group that met in South Carolina was able to come up with voluntary measures, including buffered areas adjacent to waterways, to prevent the runoff of pesticides from plasticulture through culverts, drainage ditches, and roadways, and finally entering surface water in creeks, streams and rivers. We initially were optimistic that the Task Force could suggest such a plan for the Eastern Shore and work with the farmers and clam producers to implement such a program. To date, we have not seen evidence of either developing means of complying with the law or a commitment to enforce existing law. The Task Force should address this apparent lack of enforcement of water quality standards, should seek to develop and coordinate with the agencies a plan to prevent pollution of surface water, and should

find a permanent means of protecting water quality from deleterious impacts of plasticulture operations. (Excuse me for just one second please.) (Pause) Initially, we would recommend that DEQ act as the lead agency with the responsibility for testing and monitoring water quality and that it act in conjunction with the Virginia VDACS (Excuse me for just a moment please.)
Commissioner: Would you like a cup of water?
Dr. Brumbaugh: Yes, please.
Commissioner: Someone from the Experiment Station?
Dr. Brumbaugh: Okay, I think I can finish the last few lines.
Commissioner: Take your time.
Dr. Brumbaugh: We believe that the Task Force, DEQ and VDACS should seek technical assistance from Virginia Tech, Virginia Institute of Marine Science and Eastern Shore Ag Station and Extension Center, as stated in the House Resolution. Thank you for the opportunity to make these comments. And it is signed Sincerely, Katherine E. Slaughter, Staff Attorney, SELC..
Commissioner: Thank you, Dr. Brumbaugh, I believe it is. I suggest to the members of the Task Force while I can't dictate your actions, I guess taking the prerogative as Chair, we try not to get into a running debate here but if there are any specific questions relative to testimony that you certainly be allowed to ask those questions. So I would ask if there are any questions of Dr. Brumbaugh.
Dr. Anthony: I'd like to make one comment, if I could. On the report done by Dr. Dietrich. One of the problems we had with the report wasn't the design, but the metals came back total recoverable; the standards are dissolved. I have talked to her a couple of times about that and I haven't come up with a way to take the total recoverable and turn it to dissolve number. And so I'm not saying that that total recoverable did not represent a dissolved number. But I don't know. We are presently, under the requirements of SB 1122, taking a hard look at the surface water monitoring program and we have implemented clean metals which was a problem for a long time nationwide. I'm not sure if the salinity over here has been addressed yet in the clean metals protocol but the staff will be looking at especially copper analysis freely dissolved down the road but I can't tell you when.
Dr. Brumbaugh: Again, these comments were from the SELC and don't necessarily reflect CBF's comments.
Dr. Anthony: There may not be a copper water quality standards violation in the data that she collected.
Dr. Brumbaugh: We understand the nuances of that issue.
Commissioner: And again, Dr. Brumbaugh was presenting for the Southern Environmental Law Center. CBF will follow. You all sent in copies of your comments.. Next on the sign up sheet is Ms. Ann Jennings. I believe you are representing the Chesapeake Bay Foundation. Thank you.
Ann Jennings: Good evening. My name is Ann Jennings and I am the staff scientist with the Chesapeake Bay Foundation. The Foundation is an 84,000-member conservation organization working to save the Bay. I really appreciate this opportunity to express our concerns regarding the use of plastic ground cover in the production of agricultural crops. First, the Chesapeake Bay Foundation does agree with many of the concerns of the Virginia Shellfish Growers Association. Their calls for action after observing extremely high mortalities of sensitive clams and oyster larvae in hatcheries on the Eastern Shore have helped to focus attention on this issue and steer critical water quality and toxicity studies. However, CBF believes that previous efforts to investigate plasticulture operations have been inappropriately and narrowly focused almost solely on the impacts to

aquaculture operations. In fact, the critical issue of the health of the Chesapeake Bay and other Eastern Shore estuarine environments has been lost in attempts to identify the direct cause and effect relationship between plasticulture and clam mortality. Additional attempts to minimize the issue have arisen as a result of the reduced acreage in plasticulture during this growing season. The practice of plasticulture is a fundamentally different form of agriculture that functions in part to quickly and effectively drain rain waters. In the Eastern Shore of Virginia, storm water runoff from plasticulture fields is often diverted in a concentrated flow directly to streams and tidal creeks. Unfortunately, studies are demonstrating that storm water generated from these plasticulture fields can be laced with contaminants and can transport significant amounts of sediment. On each and every acre under plastic, this unique form of agriculture must be effectively managed either by reducing runoff volumes or by treating runoff prior to discharge into the aquatic environment. As a result of the Eastern Shore Vegetable and Shellfish Growers Advisory Committee, vegetable growers have initiated development of management plans with the local soil and water conservation district to identify and implement certain best management practices. CBF is also aware that a record number of landowners and farmers have applied for the USDA Environmental Quality Incentive Program. While these efforts will go a long way to address the issue of proper management of plasticulture fields, the Chesapeake Bay Foundation finds that without clear direction and oversight by the principally responsible state agencies, the long-term protection of aquatic life and water quality from plasticulture will suffer. Numerous agencies possess overlapping regulatory authority to address this issue. However, no regulatory agency involvement has progressed beyond reporting on the issue. We recommend that the Virginia Department of Environmental Quality and the Department of Agriculture and Consumer Services be charged with the joint responsibility of coordinating ongoing and future efforts to implement, maintain, and monitor best management practices for agricultural operations utilizing plasticulture. This joint responsibility, which recognizes that both economic and environmental interests are at risk, must ensure that voluntary efforts to install best management practices are protective of state waters. Agency action should result in the implementation of appropriate BMPs to reduce and treat runoff on all agricultural fields utilizing plastic prior to the next growing season. Monitoring for the presence of pesticides, herbicides and excessive sediments within plasticulture runoff should be carried on a representative sample of such fields and the results of the monitoring should identify the need for any additional management to be installed prior to the second growing season. And last, if efforts to monitor traditional voluntary best management practices for their effectiveness on plasticulture fields finds that such practices do not ensure protection of aquatic resources, DEQ and VDACS must consider establishing a regulatory program for this specific form of agriculture. Thank you. We have submitted written comments and I'd like to go ahead and submit these comments as well.

Commissioner: Fine, thank you. Any questions of Ms. Jennings by members of the Task Force? Okay, hearing none, next we have signed up to speak, Mr. John Price, with the Assateague Coastal Trust. Mr. Price.

Mr. Price: Good evening. I will be perhaps a lot less technical than preceding speakers, but would like to, as a member of the Board of Directors of the Assateague Coastal Trust, present our position on the issue as we now understand it. The trust is a twenty-five year old tax-exempt nonprofit organization, 800+ members, growing rapidly and it includes an appropriate number of scientists and attorneys skilled in environmental law. Briefly stated, one of our major goals is to preserve the

character, function, and ecology of the Delmarva coastal estuarine system. That's the reason why we are interested in this controversy of clam aquaculture and plasticulture. We commend the formation of your technical advisory committee and we need the light of science shone on this issue. However, as nonpartisan third party observers, we believe that the issue and therefore the charge that the advisory committee is pursuing has been too narrowly drawn. We don't think it is simply a question of the affect of plasticulture on clam mortality. The real issue that must be addressed is the broader issue of water quality and preservation of the critically estuarine ecology. The key question: Does plasticulture as presently practiced pose a danger of significant harm to this vital ecology? While the scientists work to cross the t's and dot the i's, our view is that what is commonly known about plasticulture and how it appears to an unbiased lay observer possessing just common sense ought to be considered. It is clear to us that one objective of plasticulture is to drain away excess water from rainfall as quickly as possible. This is achieved by covering more than fifty percent of the field in impermeable plastic sheeting, grading the field to accelerate runoff and sometimes also by ditching. The second objective is to protect the crop from its natural enemies -- weeds, insects, fungi, bacteria. This is accomplished by multiple applications -- often 25 or more -- of a variety of chemical agents or pesticides sprayed on the plants above the plastic sheeting. The approach seems to work very well from the grower's point of view. What are the side affects? When rain events inevitably occur, accelerated runoff over the 45% or so ferrous soil carries with it a heavy load of sediment as well as chemical residues washed off the plastic sheeting. There are two affects on adjacent marshland or surface water: siltation and chemical pollution. Does this pose a significant threat to marine life in the vicinity? The obvious affect of siltation is to suffocate and kill a variety of bottom-dwelling creatures. Chemical pollution has the further potential to harm both mobile and immobile forms of marine life. Some of the chemicals used carry labels warning that they are "extremely toxic to fish and aquatic invertebrate" and that "no runoff" can be permitted. Dilution may be thought to mitigate the danger but a study at Tulane University found that combinations of two or more pesticides which are frankly often used together in plasticulture can increase toxicity by 500 to 1000 times. Given this basic knowledge and ordinary common sense, our lay observer will likely conclude that plasticulture does indeed cause a significant risk to marine life in any body of water into which its runoff is allowed to drain. Our feeling is that for these reasons plasticulture is not traditional agriculture as we know it. And it does require separate and different rules. The Coastal Trust appreciates and supports traditional agriculture and its vital contribution to the economy of the Delmarva Peninsula. We recognize that plasticulture is a promising tool to improve productivity and profitability. Therefore, I'd like to return to the original premise and recommend that the charge to the advisory committee or any other group of scientists that are set up be focused on how the practice of plasticulture can best be modified so that its benefits to the grower can be maintained while eliminating the threat to the adjacent marine ecology. Thank you.

Commissioner: Thank you, sir. Mr. Price, if I could, while you are at the podium, clarify something again. It seems that you are directing some of your comments to the committee that I had formed under the purview of the responsibilities of my agency. This is a much broader group.

Mr. Price: I understand it. Well, I understand it now.

Commissioner: Well, and your testimony is appreciated because it is appropriate that all of us hear this. In addition, I will take it back to the separate entity that plans to go forward in the fall with another round of those discussions. Ms. Jennings, you mentioned that the authority be given to the

Department of Agriculture and Consumer Services and DEQ regarding, for example, best management practice implementation monitoring. I just want the audience and particularly you two individuals to realize that's currently structured in a separate state agency -- the Department of Conservation and Recreation -- which Mr. Lunsford represents tonight and another component of that is the local soil and water districts with which Mr. Mallette is involved. I apologize if that's busy but it is important to clarify it in this instance where you have a much broader set of state agencies who do have some involvement here.

Mr. Price: I appreciate that I have had the opportunity to help clarify the issue.

Commissioner: Certainly, but we do appreciate your testimony.

Ms. Jennings: If I could just make the comment -- we were concerned about where the regulatory part of this issue is and I felt it certainly lies with VDACS with the Agricultural Stewardship Act and with DEQ obviously with water quality control but recognizing that BMPs are handled by other agencies as well.

Commissioner: Fine, I knew you knew that. Next we have Mr. Bob Baldwin to speak.

Mr. Baldwin: I come as a representative of the Citizens for a Better Eastern Shore. I have a statement to read from their Natural Resources Committee and I am the former director here at the Research Station. I retired about a year ago and am enjoying the Eastern Shore at present. The Citizens for a Better Eastern Shore, an 800-member, multiracial group of concerned citizens wishes to comment on the Virginia management and protection of its agricultural resources and adjacent waterways. The general purpose of CBES is to promote balanced growth while enhancing the quality of life and conserving the natural resources of Virginia's two rural counties, that's Northampton and Accomack, on the Delmarva peninsula. In addressing the responsibilities of the Task Force, we would like to comment on: (1) The importance and needs of resource based industries. The Eastern Shore's principal industries are agriculture employing both traditional farming practices and intensely cultivated vegetables, virtually all within one mile of tidal waters, and the seafood industry of fishing, crabbing, and aquacultured clams which is now the second largest cash "crop" on the Shore. The Shore is utterly dependent on these natural resource bases. (2) The need for preservation and improvement of water quality. Good water quality upon which our seafood industry is so dependent is severely impacted by non-point source pollution. The waters of many tidal creeks are contaminated by pesticide runoff being studied by Tech, VIMS and others and suffer severe sediment accumulation from adjacent croplands. While we believe that there has been substantial improvement in some areas where best management practices have been implemented, generally the rate of runoff from heavily eroded farmland has, if anything, been increasing, from plasticultured cropland. And so we come to our concerns. This is the third point -- our last point. Evidence abounds that quantity, rate and rapidity of water flow and entrained sediment and pesticides from large tract plasticultured cropland exceeds anything ever experienced in the agricultural setting. The typical large plasticultured field has more impenetrable surface than five Superdomes, the world's largest indoor arena, while the lack of vegetative cover between the rows adds more to the quantity and speed of runoff. We are concerned both with the quantity of suspended sediments flowing from these fields into our waterways as well as the probability that pesticides are moving from field to tidal wetlands far faster than anticipated, and this happens in minutes rather than hours or days after a rain. In many ways plasticulture runoff is NOT typically non-point source pollution; its channeling is much more like an industrial outfall with an added sediment load. CBES applauds the efforts to understand and come

to grips with any negative impacts of the plasticulture practices employed on the Shore. We understand that the EPA-sponsored research has demonstrated that management practices exist which, if used, are very effective in mitigating pollution from plasticulture. We appeal to the Plasticulture Task Force to view this issue holistically, keeping in mind the serious consequences to our seafood industry, riparian landowners, and recreational use of our waters should the current level of pollution continue unabated. The Citizens for a Better Eastern Shore thanks the Plasticulture Task Force for this opportunity to comment on this important issue. And I do have a copy of this and I do have a chart or board with pictures on it if you want to take them with you. You're welcome to have them. I have them in the back of the room.

Commissioner: Thank you, sir. Questions?

Dr. Anthony: One quick question. You mentioned the EPA research of the BMPs that when they're applied they work pretty well. Do you think that eliminates the need to look at it as an industry and not just an agriculture practice that BMPs could control? The reason I'm asking is that if it's more like a continuous discharge it might well fall under the VPDES program as opposed to the BMP. Do you think those BMPs EPA has talked about put it back to an agriculturally controlled practice?

Mr. Baldwin: I think it could.

Mr. Lunsford: Which EPA study is this?

Mr. Baldwin: They've done some work I think with putting in mulch and planting through mulch rather than using plastic. Cover Crop.

Commissioner: Next we have Mr. Bennie Etheridge.

Mr. Etheridge: I pass, Carlton.

Commissioner: Okay. Mr. Etheridge declines to comment. Next we have Dave Roberts. Mr. Roberts would you care to speak?

Mr. Roberts: No.

Commissioner: Mr. Al Edmunds, Eastern Shore News.

Mr. Edmunds: I'm not speaking. I'm just here.

Commissioner: Okay. It maybe that we have a sign-in sheet and not a sign up to speak sheet. Mr. Lynn Gayle.

Mr. Gayle: Good evening. Thank you for coming here tonight and allowing me to speak before you. I haven't had the chance to prepare a statement and I fully intend to do so before the end of the month. I'm kind of uneasy here 'cause I am the only tomato farmer. I was on the Commissioner's committee -- Vegetable and Shellfish Growers Advisory Committee -- that met several times during the past year. Since that time we had several agreements which we have fulfilled and are working with the Soil and Water Conservation District and also working with Dick Downing here on the Shore and Ronnie Godwin looking at the farms and discussing things and trying some new things as far as improving on best management practices. Among those, we have tried implementing the use of these polymer blocks for running tailing water through runoff from the farm runs through and facilitates settling out of the sediment which we have had some success with that as far as preventing silt from leaving the farm. We also installed silt fencing around the perimeter of the farm at key locations and we increased buffer strips and planted buffer strips to create a buffer between there, plus combining with that any one of the combination of above things that I have mentioned. I think that's positive progress. Towards this past year we went for a long period of time this past summer without rain and then we had a three inch rain and then there are areas on the Eastern Shore that had ten

inches. We were fortunate we only had three inches but still had a chance to observe how these things work. So we are working and continuing to do so. I don't consider it over yet. We're still working in a positive direction. I would also like to say that I did last March go to USDA to look at their alternative mulch methods which include hairy vetch and planting through that which has some merit in certain aspects and maybe on smaller scales. There are a lot of features that I disagree with particularly using that. At this time I'd like to point out one of them in particular because you are going to hear more and more about it. It is gaining a lot of momentum. But one of the problems we have seen with this type of research is that the data collected doesn't do anything with the post-harvest handling and caring of the produce. We harvest all of our tomatoes green and a lot of the data collected on this is with red ripe tomatoes. So I'm going to caution you that when you start hearing more and more about this. The other thing about these mulches and the utilization of them, one of the reasons that the tomato industry went to plastic years ago which was when they had a lot of bear ground and tomatoes here on the shore if we would have had three inches of rain like we did a few weeks ago the next day all the buyers would be packed up and gone. That was the kiss of death, the end of the deal. So plastic mulch has alleviated that situation and the hairy vetch or living mulch does not. So I wanted to caution you about that so when you start hearing more and more about that. I did go up there and one of their scientist did come down here and spend a lot of time talking to me about the practicality and the practical aspects of this. I hope that we can resolve this issue in a manner that will allow all of us to be productive and continue to do what we want to do and enjoy doing which is farming. Thank you.

Commissioner: Thank you. Questions of Mr. Gayle, before he gets to his seat? Okay, thank you. Next we have Ms. Yvonne Bagwell. Ms. Bagwell, do you care to speak?

Ms. Bagwell: My name is Yvonne Bagwell and I own and operate an aquaculture shellfish hatchery on the Gulf Creek which is in Eastville on the Bay side of the Eastern Shore. Briefly, I want to emphasize that the issue here is the protection of the ecosystem and has little to do with the clam farmer who happens to be the messenger who sounded the alarm. On the question before you -- are existing programs and policies concerning plasticulture sufficient to ensure adequate water quality management? In my opinion, the answer is no. There are still this year large quantities of field runoff with some plasticulture farms. We must protect our creeks from this basically unregulated farming practice. We must not allow volunteer good stewardship to determine if the ecosystem is protected. The last point I want to make is that DEQ must be the agency to monitor and enforce regulations that ensure protection of this most valuable resource. DEQ is the agency that is charged with that duty. DEQ is the agency in the business of testing and protecting water quality. Thank you for allowing me to have my comments.

Commissioner: Thank you, ma'am. Questions of Ms. Bagwell? Thank you, ma'am. Mr. R. G. Parks. Mr. Parks?

Mr. Parks: Thank you for this opportunity. There is no need tonight to discuss whether or not unprecedented volumes and velocity of water often laced with toxic chemicals and sediment leaves plasticulture fields in the form of surface runoff. The existing studies conclusively prove that this is the case. Such practices violate both state and federal law. The question is what to do about it. I have three points tonight I will ask you to consider. The first point I wish to discuss concerns your information gathering and fact finding. I call this the corn pone factor. Mark Twain once said that if you tell me where a man gets his corn pone, I'll show you where he gets his opinion. Well you

know where I get my corn pone. You know where tomato growers get their corn pone. I can pretty well point to where you folks are getting your corn pone. I think if you really want to get to the heart of this issue, you have got to speak directly to the scientists who have sampled the water. Review personally the analysis of the water samples that show shocking doses of numerous organic and inorganic chemicals. Examine photographs of the problem during rain events and look at the tons of sediments that has left the fields and all of this is going to take a little work. But in this vein I would also suggest you make some other calls. I'd like to see you folks call Dr. Callender at the University of Virginia -- Russell Callender -- the co-chair of the Scientific Research Subcommittee of which you are familiar. He's in Wisconsin tonight I believe. But a couple of his comments I think need to be brought to your attention for relevance. They are not in your report and I am beginning to see a theme here. The charge for the subcommittee, he said, was carefully drafted in such a narrow fashion that it was impossible to address the real issue. It was a too narrow a charge to a group composed of some of the wrong folks. Dr. Callender had another interesting comment that he made on several occasions to me. He kept asking the question why won't the Department of Environmental Quality address this issue. Well, I gave him the explanation that they had given us for three years. Last Friday, he once again said, I still don't understand why DEQ won't act. He asked me to let you know that he awaits a call from anybody, any of you, with questions or verifications of these comments. In any case I would hope that you could do your own homework and not worry too much about what the spin doctors are gonna say, or the special interests, or to what I have to say. The work is out there. Secondly, please focus on the issue of water quality as it affects the marine environment. Do not be concerned with cultured clam or oyster mortality. Massive mortality in aquaculture is merely a warning signal or symptom. It is the marine resource that's being jeopardized. If it is adequately protected, shellfish will do just fine. We can not allow special interests to confuse the issue. Does plasticulture as it is practiced degrade our water quality? This is the problem and it needs to be addressed by the Department of Environmental Quality. Professionals in that agency know their responsibility and they want to do their job. Unfortunately, political appointees have injected a large dose of politics into clean water. Department of Environmental Quality must step forward and assume the role defined by its legislative mandate. It is no longer acceptable for Mr. Thomas Hopkins to serve up the solution dejour and hope the issue will go away. It is not going away. The final point I want to make is this. Plasticulture is a different agricultural technology. It is in itself not the problem, not if used in a responsible manner. It apparently brings better yields, more attractive produce and other benefits to the user. But associated with this technology's benefits are costs. Without restrictions, without containment, there is a cost -- a high cost to our streams, our creeks, bays, wetlands, animal and plant life within. That is, there is a cost to our Commonwealth that this committee needs to examine. Mother nature doesn't provide any free lunches. You can pay her now or you can pay her later. Plasticulture does not need to be an environmental nightmare. It's an intense land use similar to an industrial use and it needs to be viewed as such. In order to receive the many benefits of the techniques of applying impermeable plastic to raw land the user must be willing to mitigate its impact through an independently reviewed permitting process -- a process that plans and implements a procedure of surface water containment. If such were the case, all could prosper. Thank you for considering my comments.

Commissioner: Thank you Mr. Parks. Questions of Mr. Parks?

Dr. Anthony: When you talk about a permit process are you saying that plasticulture should have

a VPDES permit as opposed to a non-point source permit. I'm just asking for clarification.
Mr. Parks: Yes, I want to leave that to further study. But my observations stem from having lots of experience with surface hydrology but nothing with farming. I used to be a consultant before my present career and virtually worked under all these covenants and virtually everybody that I worked for had to have a permit to contain the water because they were putting on hard surface. Two miles down the road Mrs. Kirkwood put the shopping center in a while back. She had to contain that water and she had to get a permit and submit some extra drawings and plans and it showed where it was going and it was sized for a storm event.
Dr. Anthony: You are talking about land use permitting or that type of thing. The local government handles that.
Mr. Parks: That's exactly what I think. But then what I'm interested in is having it remain on the land. If you've got more creative ways then that's great.
Dr. Anthony: In one of the comments, you talk about talking to the people. I spent a lot of time talking to Dr. Morey Roberts. Have you met him?
Mr. Parks: Yes, I have.
Dr. Anthony: The stumbling block we have in getting anything going over here really is dollars right now. We would look at a real good proposal. I guess one of the things we will talk about tonight is what research needs to be done and how it can be funded. But dollars are just awfully rottenly tight, especially at DEQ right now in my opinion. It's hard to mount any massive sampling activity. I am not trying to beg off a solution, but it's frustrating.
Mr. Parks: I understand and maybe you can understand some of us who suffered massive losses when we went originally to your agency. And I understand you are not a political appointee and I knew that before.
Dr. Anthony: Thank you.
Mr. Parks: I have been working with DEQ for years and I have great relations with these people back here and they'll tell you that. We solved a problem here also on Harper's Creek after 25 years. It's cleaner now than it has been in 25 years. I know how to do that. But when I brought that to Steve's attention three years ago, he said that in Richmond they wouldn't do anything about it. In two years, in one year, finally we began to call him every time there was a fish kill. So maybe you can see perhaps that I am a little frustrated, too, because we think and we believe it's your job and that politics really has no place in that arena. We can clearly understand over here why the Environmental Protection Agency is threatening to take some of the agency's permitting responsibilities away because it is not in our judgement doing its job. And I know you want to do your job and so does every professional over there that I have met and by the way they are friends of mine and they call me all the time telling me what these politicians are doing. It soured me on the profession of politics.
Dr. Anthony: We do have one pot of money that's sort of semi-available now. The General Assembly processed a bill -- I'll call it for better purposes since its too long -- Senate Bill 1122. I think it was the Water Quality Monitoring Information Restoration Act. I never get that in the right order but there are $600,000 in that and six positions. The six positions when they are fully on board will probably suck up about $400,000 of that in fringes and equipment. But there is some money available for water quality type studies. I can not tell you that any of that money will end up over here but it will at least enter the discussion matrix about sampling programs that should be discussed.

Mr. Parks: I hope you will try to help us.
Dr. Anthony: The discussion will occur but I do not guarantee the input. Okay?
Mr. Parks: Thank you.
Commissioner: Thank you, Mr. Parks. Next, Ken Kunowski.
Mr. Kurkowski: It's Kurkowski.
Commissioner: I can't read the writing here.
Mr. Kurkowski: That's VSGA, Virginia Shellfish Growers Association. The Virginia Shellfish Growers Association is committed to maintaining good water for the farming of clams, oysters, scallops and other shellfish in our coastal waters. Good water quality is also essential for the wild fishery for shellfish and fin fish. This issue of toxics from tomato farms employing plasticulture is not a case of tomato farming versus clam farming, but of water quality. Tomato farms employing plasticulture that employ good management practices of vegetated buffer strips, elimination of direct ditching into waterways, and the use of retention ponds to contain storm water toxics are not the problem, but they should be the standard. Plasticulture is a different technique from the so-called traditional farming. As such, it should have special requirements and regulations. Because this is an issue of water quality, the legislature should direct the DEQ to promulgate regulations and enforce them. Thanks.
Commissioner: Thank you, sir. Questions of Mr. Kurkowski?
Dr. Anthony: One question. When you talk about promulgating regulations are you talking about additional water quality standards, permit regs — so I can go back and explain this, further define what you are talking about.
Mr. Kurkowski: Permit regulation.
Dr. Anthony: Okay, thank you.
Commissioner: The last person I have signed up is Jim Belote, Virginia Cooperative Extension Service. Anyone who has come in and signed up and we don't have your name will you please raise your hand. Okay. I believe Mr. Belote will be the last speaker.
Mr. Belote: My name's Jim Belote, Extension Agent. I would like to thank you for the opportunity to present just a few comments here. I don't have many to make. You alluded to the fact about the study on plasticulture in the state of Virginia and how you determined to have the meeting here earlier. I just wanted to make sure for the record that the study that was done becomes a part of the meeting's minutes. I have copies of that here. I might very quickly mention for the benefit of those here too. I know some of you all have seen this. We surveyed all the different counties in Virginia. We had a 100% response on the number of acres of plasticulture in the state of Virginia. The total acreage reported under plastic last year was 11,859 acres in the state. Of that total, 9,100 acres or 77% were located in the two counties here on the Eastern Shore, that was Accomack and Northampton. Accomack had the largest amount 6,700 acres or 56%, Northampton 2,400 acres or 20%. It should be noted that extension agents in both counties indicated that the number of acres of land with plastic in 1997 would decrease here on the Eastern Shore. In fact, in Accomack we predicted it would decrease by 34% from 6,700 to 4400 acres and at Northampton about 50% from 2400 to 1200 acres. If you were to correlate this with the amount of land in plasticulture in Virginia as compared to the total number of acres of land in farms, the comparison would be as follows: total number of acres of land in farms would be 8.6 million acres and the number of acres in plasticulture is 11,724. In Accomack the 6,700 acres is 7.3% of the land in farms. We have 91,568 acres of land

in farms according to the US Census. Of course we are predicting that will decrease in 1997. I might mention too since there's a lot of talk about tomato farms, we have approximately five tomato operations in Accomack County per year, not a large number. I mentioned too that the acreage would decrease. I'd like to say that it did. I think those figures are pretty close to that. I put together an update just to let you know what's happened here on the Eastern Shore since last year. We've had quite a bit of stuff happen. A short statement here I did actually present it to some legislators about some things we are trying to get changed on agriculture. Last year we had a disastrous year, plus we are finding out too that we are having a major problem, at least growers think so, with NAFTA. We're at a very competitive disadvantage with that situation here. Since last year we have lost on the Eastern Shore about 1900 jobs. This would include the migrants. And we estimate that most of that is from the vegetable area. Now the people that did lose plastic would account for the drop in that acreage. The 1900 jobs and the loss to area's economy was about $28.7 million or 33.4% of the farm gate was lost in one year. So our farm gate or the total number of dollars passing through the area from things sold from agriculture was cut by 33.4% or $28.7 million since last year, that's 1900 jobs I think they are gone we won't get them back. I think you're going be hearing a lot this winter about NAFTA. You're going to see some attempts to get things more even based. The big thing they're pushing for -- we all talk about regulation, but we are already heavily regulated and these companies in NAFTA we have to compete with have hardly any regulations at all. In fact, there has been an excellent video put together on that. I think that will be shown later on this year. If the committee wants a copy, we can get you a copy so you can see that. Anyhow, that's the situation here. I do have a copy of that paper I put together for you all and I would like for that to be part of the minutes too. Just one last comment. I know in the last four or five weeks there have been two trips to Congress by local growers to try to get some changes in NAFTA -- more level playing field with regard to the regulation situation. That's all of the comments I have.

Commissioner: Thank, you Mr. Belote. Thank you particularly for quantifying the amount of plasticulture across the Commonwealth. I know that question was raised by a number of legislators in Richmond who are not part of the Task Force so I particularly appreciate your providing that data. Any questions of Mr. Belote? For the benefit of the audience. NAFTA is the North American Free Trade Agreement that liberalized trade between Canada, the U.S. and Mexico. While the desires are that they level the playing field, the vegetable industry is quite concerned over the fairness of that document and whether or not particularly in terms of vegetables whether in some instances we are not being flooded from Mexico at an unfair economic impact on our U.S. growers. That's not just a phenomenon felt by the Eastern Shore of Virginia. There are no other presenters that I have on the list. Unless there is further comment or question, we will proceed with the brief meeting of the Task Force.

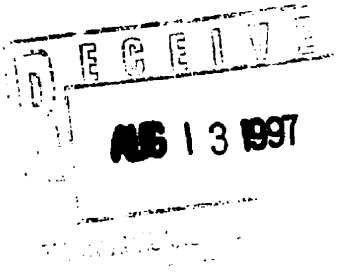
APPENDIX H

Chesapeake Bay Foundation

Environmental Defense - Environmental Education - Land Conservation

Suite 710, Heritage Building • 1001 E. Main Street • Richmond, Virginia 23219
(804) 780-1392 Fax (804) 648-4011

August 11, 1997



Ms. Perida Giles
Policy Analyst
Department of Agriculture and
Consumer Services
P.O. Box 1163
Richmond, VA 23218

Re: Interagency Task Force on Plasticulture

Dear Ms. Giles:

The Chesapeake Bay Foundation (CBF) wishes to submit the following comments to the interagency task force reviewing water quality management measures utilized in the practice of plasticulture, pursuant to House Resolution 40. The practice of plasticulture, employing plastic ground cover in agricultural production, has received increased attention centered primarily on degraded water quality in shellfish aquaculture operations. CBF recognizes the efforts of the Commissioner of Agriculture and Consumer Services and the members of the Eastern Shore Vegetable and Shellfish Growers Advisory Committee (Advisory Committee) in investigating the problem of increased clam mortalities at hatcheries on the Eastern Shore of Virginia. We have closely followed the work of this committee, and we have participated on its scientific/research and conservation/best management practices subcommittees.

The practice of plasticulture is a fundamentally different form of agriculture that functions, in part, to quickly and efficiently drain rain waters. On the Eastern Shore of Virginia, stormwater runoff from plasticulture fields is often diverted in a concentrated flow directly to streams and tidal creeks. Unfortunately, the stormwater generated from these plasticulture fields can be laced with contaminants and can transport significant amounts of sediment. On each and every acre under plastic, this unique form of agriculture must be effectively managed by either reducing runoff volumes or treating the runoff prior to discharge into the aquatic environment.

First, we agree with many of the concerns of the Virginia Shellfish Growers Association. However, CBF believes that previous efforts to investigate plasticulture operations have been inappropriately and narrowly focused almost solely on impacts to aquaculture operations. The "Report of the Scientific/Research Subcommittee to the Eastern Shore Vegetable and Shellfish Growers Advisory Committee" summarizes numerous studies demonstrating the presence of contaminants within aquatic environments receiving runoff waters from plasticulture fields. As noted in the subcommittee's report, runoff from plasticulture fields has been shown to contain high concentrations of azinphosmethyl, fenvalerate, endosulfan, chlorothalonil, and total copper (Scott et al. 1990, Dietrich et al. 1996). Bioassay tests demonstrated high mortalities of grass shrimp (*Palaemonetes pugio*) subjected to runoff from plasticulture fields (Luckenbach et al. 1996).

While the debate may continue on the direct cause and effect relationship between plasticulture and clam mortality, the significance of these findings with regard to the health of the Chesapeake Bay and other Eastern Shore estuarine environments must not be lost. Also noted in the scientific/research subcommittee report is the conclusion of laboratory data that certain pesticides can kill aquatic life at low concentrations. Endosulfan and copper are provided as examples of crop protectants known to be toxic to aquatic life. Increased sedimentation from plasticulture fields is also known to harm aquatic life by increasing turbidity, impairing respiration of fish and aquatic invertebrates, damaging submerged aquatic vegetation, and blanketing spawning grounds.

CBF, therefore, recommends that the interagency task force examine the wider natural resource impacts of plasticulture, as well as the impacts to shellfish aquaculture operations. Clearly, the intent of House Resolution 40 is to focus attention to the broader water quality issue.

Thus far, the Commissioner of Agriculture and Consumer Services has taken the lead in review of the vegetable industry and impacts of plasticulture to aquaculture operations. Under the Agricultural Stewardship Act (ASA), the Commissioner has the authority to investigate and correct agricultural activities that are creating or will create pollution, defined as any alteration of the physical, chemical or biological properties of any state waters resulting from sedimentation, nutrients, or toxins. Unfortunately, the ASA is reactive and complaint driven by design. Through his actions on the Advisory Committee, the Commissioner has not taken the steps necessary to ensure proper management of this unique form of agriculture and, thus, prevent future problems from occurring.

In addition, numerous state agencies possess overlapping regulatory authority with regard to this issue, but none have progressed beyond reporting on the issue. Of particular concern is the Department of Environmental Quality (DEQ), which through the State Water Control Law, is charged with the authority and responsibility to address water quality problems and protect the state's surface waters. This authority to protect the state's waters is not limited to point source discharges or to a particular land use. However, DEQ has not taken aggressive action to

investigate or resolve the presence of endosulfan at levels exceeding Virginia's water quality standard. In addition, the Chesapeake Bay Local Assistance Department is charged with ensuring effective and appropriate implementation of the Chesapeake Bay Preservation Act, which serves to protect water quality in the Bay and its tributaries. The Pesticide Control Board possesses the responsibility and authority to investigate the potential misuse of pesticides. Nonregulatory programs and agricultural funding sources germane to this issue are managed by the Virginia Department of Conservation and Recreation, Soil and Water Conservation Districts, Natural Resources Conservation Service, and the Farm Service Agency.

Given the number of agencies with overlapping regulatory authorities and nonregulatory involvement, CBF is concerned that the broader issues of plasticulture and its effects on the aquatic environment have not been comprehensively addressed by all agencies with jurisdiction. We are further concerned that the most difficult questions/concerns lie in the future, that is, long term protection of aquatic life and water quality from plasticulture, and identification, implementation, and funding of best management practices for reducing and treating runoff which will achieve such.

CBF, therefore, recommends that the DEQ and Department of Agriculture and Consumer Services (VDACS) be charged with the joint responsibility of coordinating ongoing and future efforts to implement, maintain, and monitor best management practices for agricultural operations utilizing plasticulture. This joint responsibility, which recognizes that both economic and environmental interests are at risk, must ensure that voluntary efforts to install best management practices are protective of state waters. DEQ and VDACS should actively engage other state and federal agencies to investigate opportunities to protect aquatic resources from plasticulture runoff through their authorities and funding programs. Agency action should result in the implementation of appropriate best management practices to reduce and treat runoff on all agricultural fields utilizing plasticulture prior to the next growing season. Monitoring for the presence of pesticides, herbicides, and excessive sediments within plasticulture runoff should be carried out on a representative sample of such fields. Results of the monitoring should identify the need for additional management to be installed prior to the second growing season. If these efforts to monitor traditional, voluntary best management practices for their effectiveness on plasticulture fields find that such practices do not ensure protection of aquatic resources, DEQ and VDACS must consider establishing a regulatory program for this specific form of agriculture.

CBF further recommends that the interagency task force established under House Resolution 40 publish the results of their review and any plans for future action. Published documents should provide the interagency task force's determinations with regard to 1) whether existing programs and policies are sufficient to ensure adequate water quality management when the practice of plasticulture is utilized; 2) whether additional research and development of best management practices relating to plasticulture should be undertaken by the Commonwealth; and 3) whether existing state programs are consistently applied and coordinated between agencies

with regard to plasticulture. The public should have adequate opportunity to comment on the plan before it is final.

We appreciate this opportunity to comment. If you have any questions regarding our recommendations, please contact Ann F. Jennings at (804) 780-1392 or Dr. Robert Brumbaugh at (757) 622-1964.

Sincerely,

Ann F. Jennings
Staff Scientist

Robert Brumbaugh
Fisheries Scientist

cc: Honorable Mitchell Van Yahres

VIRGINIA SOIL & WATER CONSERVATION

EASTERN SHORE
SOIL AND WATER CONSERVATION DISTRICT
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P.W. Davis, Chairman
Robin Rich-Coates, Vice Chairman
James N. Belote, III, Director

Richard F. Hall, III, Director
Stephen D. Mallette, Director
Denard C. Spady, Director

August 20, 1997

Perida Giles, Policy Analyst
Plasticulture Task Force
1100 Bank Street, Room 209
P. O. Box 1163
Richmond, VA 23218

Dear Members of the Plasticulture Task Force:

The following are comments by the Eastern Shore Soil and Water Conservation District in regards to the hearing on plasticulture held at the Research Station at Painter on August 12, 1997.

The Eastern Shore Soil and Water Conservation District feels that there is currently adequate regulation of agriculture in regards to this issue, and that no further regulation is needed.

We do, however, feel that more research on the soil aspects of this issue is needed. As a result, we request that the Soil Scientist position at the Research Station be filled as quickly as possible and that the position remain and be located at Painter.

Thank you for consideration of these comments.

Sincerely,

P. W. Davis
Chairman

cc: Commissioner Courter

Literature Cited

Dietrich, A. M., W. DaCosta, K. Klawiter, D. L. Gallagher, and G. E. Simmons. 1996. Evaluation of pollutants in source and process water used in shellfish aquaculture. Proceedings of the 2nd Eastern Shore Natural Resources Symposium, November 1, 1996. Pp 120-125.

Luckenbach, M. W., M. H. Roberts, and K. Boyd. 1996. Preliminary evaluation of water quality in tidal creeks of Virginia's Eastern Shore in relation to vegetable cultivation. Virginia Institute of Marine Science.

Scott, G. I., M. H. Fulton, D. W. Moore, G. T. Chandler, T. F. Bidleman, P. B. Key, T. W. Hampton, J. M. Marcus, K. L. Jackson, D. S. Baughman, A. H. Trim, L. Williams, C. J. Louden, and E. R. Patterson. 1990. Agricultural insecticide runoff effects on estuarine organisms: correlating laboratory and field toxicity testing with ecological biomonitoring. Final Project Report. U.S. Environmental Protection Agency, Gulf Breeze, FL.

Virginia Tech
VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY

Eastern Shore Agricultural Experiment Station
33446 Research Dr., Painter, Virginia 23420-2827
(804) 442-6411 Fax: ~~(804) 787-5824~~ (804).442-4773

August 19, 1997

AUG 21

The Honorable J. Carlton Courter III, Commissioner
Virginia Department of Agriculture and Consumer Services
P. O. Box 1163
Richmond, Virginia 23218

Dear Commissioner Courter:

In response to the interagency task force assembled to review water quality management measures utilized in the production of tomatoes grown by plasticulture technology and since I was unable to attend the public hearing held on August 12, 1997, at the Eastern Shore Agricultural Research and Extension Center, I am writing to address the three main questions asked by the task force. These questions will be addressed individually as follows:

I. **Whether existing programs and policies are sufficient to insure adequate water quality management when the practice of plasticulture is utilized.** Each agency that is charged with responsibilities that relate to plasticulture tomato production is actively engaged in developing and implementing programs to insure adequate water quality. These programs include but may not be limited to Virginia Cooperative Extension, the Eastern Shore Soil and Water Conservation District, the Eastern Shore Agricultural Research and Extension Center, Virginia Tech, and the Virginia Department of Agriculture and Consumer Services. Programs and policies conducted by these agencies are appropriate to insure adequate water quality management when plasticulture techniques are used.

II. **Whether additional research and development of best management practices relating to plasticulture should be undertaken by the Commonwealth.** Continued research could be conducted to update and extend the knowledge about the practice of plasticulture, the utilization of organic mulches to reduce the flow of water and refinement of pest management strategies including transgenic tomato cultivars to further reduce the need for crop protection chemicals. The Eastern Shore Agricultural Research and Extension Center will continue to explore ways to utilize various mulches, expand conservation practices and investigate additional management techniques to optimize the efficiency of crop production inputs.

III. **Whether existing state programs are consistently applied and coordinated between agencies with regard to plasticulture.** Existing state programs are consistently applied and coordinated. The Eastern Shore Soil and Water Conservation District and the Virginia Cooperative Extension Service are working with farmers to transfer technology and assist in further refinement of best management practices (BMP's). Virginia Institute of Marine Science is conducting research on aquaculture production technology and sharing results with aquaculture farmers. The Eastern Shore Agricultural Research and Extension Center is conducting research on alternative methods of producing tomato which could utilize less plastic and result in reductions in other inputs. The Virginia Department of Agriculture and Consumer Products monitors applications of crop protection chemicals and works with industry and faculty at this center on registration of products for the industry. It should be noted that producers work cooperatively with all of these agencies and further utilize scouting and other integrated pest management techniques to minimize chemical utilization.

Thank you for this opportunity to respond.

Sincerely Yours,

Henry P. Wilson

Henry P. Wilson
Director

Richard & Ann Boonisar
P. O. Box 107
Cape Charles, Virginia 23310

AUG 22 1997

August 19, 1997

Plasticulture Task Force
Virginia Department Of Agriculture
Washington Building
1100 Bank Street
P. O. Box 1163
Richmond, Virginia 23218

Attention: Ms. Perida Giles, Room 209

Dear Ms. Giles:

We recognize that water quality and runoff are the primary concerns in plasticulture management. However, another factor which is overlooked is the noise and exhaust pollution generated by the diesel irrigation pumps.

We live in an historic Virginia home on the seaside in Northampton County on the Eastern Shore. Our property borders a small lake which provides irrigation for 300 plus acres of so-called plasticulture. Two diesel engine powered pumps run for 10 to 15 hours daily, 7 days a week, rain or shine from mid-May through mid-September. Even after last year's record rainfall of 10 inches, the pumps were still running.

The noise which echoes off the lake is extremely annoying and actually has become a form of torture. There have been times during a northerly wind that we had to leave our home to regain our sanity. These pumps were not there when we purchased our home.

Both of us recognize that we live in farming country and that some crops require irrigation. As a matter of fact, we allow a local traditional farmer to run his pipes across our land. However, he pumps water only when absolutely necessary and for a few days at the most unlike the plasticulture farmers who water excessively and continuously.

We have written to the company in Florida and their response has been that the zoning permits unregulated use and those of us who live in the area will have to get "used to it". We do not believe it is morally right that the nuisance created by this type of unnatural farming can drive people from their homes. There was a point where we explored the possibility of moving but a local realtor told us he would have difficulty selling our home because of the noise pollution.

If this type of non-traditional farming is going to be permitted, not only should the pesticide runoff be contained, but all pumps should be required to be powered by electric motors, and all internal combustion engines should be banned.

We both hope that our particular problem will be given consideration as we are sure that many other people are also affected by the constant noise that is generated by plasticulture farming.

Very truly yours,

Richard & Ann Boonisar

Plasticulture and Water Quality: Evaluating the Effectiveness of Run-off Management

Mark W. Luckenbach
Director, Virginia Institute of Marine Science Eastern Shore Laboratory

Statement of the Problem - The practice of cultivating tomatoes and other vegetables using plastic ground covers (termed *plasticulture*) has been implicated in water quality problems in coastal environments.[1] In Virginia shellfish hatcheries first raised concerns related to run-off from plasticulture by suggesting that it was causing mortality of shellfish. In 1996 the Commissioner of the Virginia Department of Agriculture and Consumer Services established a task force comprised of tomato growers, shellfish aquaculturists, agency personnel and research scientists to address the issue. In that same year, we initiated a field study designed to better evaluate the relationship between plasticulture coverage within several watersheds on the Eastern Shore and water quality. Using *in situ* bioassays with grass shrimp *Paleomonetes pugio*, a laboratory microbial assay for metals toxicity (MetPad®) and chemical analyses, we concluded that the practice of plasticulture does not necessarily result in water quality problems, but that special care is often warranted in managing storm water run-off[2]. As a result of this work we offered four recommendations to vegetable farmers.

- Eliminate direct ditching to tidal creeks.
- Establish and maintain working buffer strips.
- Where practical, construct retention ponds for retaining run-off.
- Review pesticide use and eliminate or reduce use of unnecessary applications.

In the period since the release of this report the Eastern Shore Vegetable and Potato Growers Association has announced that all tomato growers in the area will be working with the Soil and Water Conservation District to develop and implement run-off management plans, including the first three points above. Further, they announced that all growers in the region would cease using Endosulfan, a pesticide with particularly adverse impacts on coastal living resources. Many of these modifications have already been put in place while others (especially the construction of retention ponds) is ongoing.

In the coming growing season (spring-summer 1998) it will be particularly important to monitor water quality in some creeks downstream of tomato fields to evaluate the efficacy of these modified farming practices.

Approach - As before we will use a combination of field and laboratory bioassays to screen for water and sediment toxicity, and we will conduct chemical analyses in those cases where toxicity is observed. Actual study sites will be selected after determining the modifications made by tomato growers on specific farms. Following the approach we have used previously, we will map land use within several watersheds on the Eastern Shore and select sampling stations in tidal creeks draining those watersheds. We will seek to identify watersheds with (*i*) no plasticulture, (*ii*) plasticulture which lacks good run-off control and (*iii*) plasticulture operations which have implemented all or most of the above recommendations. These findings should prove valuable to farmers and resource managers in evaluating the effectiveness of these mangement options.

Products and Deliverables - The project which is briefly outlined above will involve a significant effort from several researchers at VIMS. We have funded our preliminary efforts with state funds and are presently pursuing grant support from a variety of sources (EPA, VDACS and others) for this later phase. Ultimately the full scope of the work and the products which we produce is dependant upon which other funding sources we secure. In any event, we will submit a report to DEQ within 60 days of the completion of the tests (ca. Dec. 15, 1998) detailing our findings. (A copy of the report from our preliminary study in 1996 is appended.) Additionally, the findings from the study will be made available to the agriculture community through the report and an oral presentation (either to the existing Task Force or local farming organizations).

Time Schedule - The time frame for conducting this work is set by the growing season for tomatoes in the region which stretches from May through September. We will initiate our sampling one month prior to the season in 1998 and continue it into October of that year. Data analysis will be ongoing throughout the study and a report will be released in the fall.

Budget - As previously noted, completing the full scope of this work will require funding from several sources. We have proposals pending with some agencies and will be developing additional proposals to go to others; we are confident that we will secure support from some of these sources.

An important remaining budgetary need is the addition of field personnel to assist in the collection samples. Thus, with these funds I am proposing to support 6 months of a field technician. The remaining funds will be used to purchase field supplies for collecting our samples and vessel costs associated with getting to the field sites.

Category	Funds
Field Technician (6 mo.)	$8,283
Fringe (27%)	$2,236
Total Personnel	$10,519
Field supplies	$921
Vessel Charges	$1,560
TOTAL	$13,000

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[1]Scott, G. I., M. H. Fulton, M. C. Crosby, P. B. Key, J. Donaugomah, J. T. Waldren, E. Dstrozier, C. J. Louden, G. T. Chandler, T. F. Bidleman, K. L. Jackson, T. W. Hampton, T. Hofman, A. Shulz and M. Bradford. 1990. Agricultural insecticide runoff effects on estuarine organisms: correlating laboratory and field toxicity test, ecophysiology bioassays, and ecotoxicological biomonitoring. Report to U.S. EPA, Gulf Breeze, FL.

[2]Luckenbach, M. W., M. H. Roberts, Jr. and K. Boyd. 1996. Preliminary evaluation of water quality in tidal creeks of Virginia's Eastern Shore in relation to vegetable cultivation. VIMS Scientific Report #133, Gloucester Point, VA. 37 pp.

Name of Practice: STORMWATER RETENTION POND

DCR Specifications for No. WP-5

A. Description

A structure that will collect and retain stormwater and release the water at a rate that will reduce the amount of downstream erosion due to storm flow.

B. Purpose

To improve water quality by reducing the amount of erosion during storm events.

C. Policies

1. Tax Credit is authorized:

   a. For engineering and design assistance.

   b. For construction of structures that will reduce storm flows that will reduce the amount of downstream flow.

   c. For fencing where the structure needs to be protected from livestock.

   d. For filter strips and other sediment trapping devices to protect the structure from sediment.

   e. For seed and mulch to establish vegetation to protect the structure from erosion.

2. Tax Credit is not authorized for multipurpose structures.

3. The structure shall be maintained for a minimum of 10 years following the calender year of installation. By accepting credit, the recipient agrees to maintain the practice for the specified life. This practice is subject to spot check by the District throughout the practice life and failure to comply may result in forfeiture of credit.

D. Specifications

1. This practice is subject to the specifications of NRCS Specifications 382, 378 and 342.

2. Structure must be designed for storm water retention only.

E. Rate

The Tax Credit rate is 25% of the total eligible cost not to exceed $17,500.00. If a

Name of Practice: SURFACE WATER RUNOFF IMPOUNDMENT FOR WATER QUALITY

DCR Specification for No. WP-7

A. Description

A structure that will impound surface water runoff and allow sediment and nutrients to settle out.

B. Purpose

To improve water quality by impounding surface water and allowing sediments and nutrients to settle out.

C. Policies

1. Tax Credit is authorized:

   a. Earth moving to construct or develop impoundment.

   b. Vegetation establishment to protect structure from eroding.

   c. Fencing to protect the structure from livestock.

   d. For engineering and design assistance.

2. The structure shall be maintained for a minimum of 10 years following the calender year of installation. By accepting credit, the recipient agrees to maintain the practice for the specified life. This practice is subject to spot check by the District throughout the practice life and failure to comply may result in forfeiture of credit.

D. Specifications

1. This practice is subject to the specifications of NRCS Specifications 382, 378 and 342.

E. Rate

The Tax Credit rate is 25% of the total eligible cost not to exceed $17,500.00. If a cooperator receives cost-share, only the cooperator's share of the project is used to determine the tax credit.

F. Technical Responsibility

Technical responsibility is assigned to NRCS.

Name of Practice: PLASTICULTURE IRRIGATION WATER RECYCLING SYSTEM

DCR Specification for No. WQ-7

A. Description

A system designed to collect and reuse irrigation water from fields involved in the production of crops under plasticulture methods.

B. Purpose

To improve water quality by collecting and reusing nutrient and sediment laden irrigation water on crops grown by plasticulture methods.

C. Policies

1. Tax Credit is authorized:

   a. For the construction of reservoirs and/or other irrigation collection pits.

   b. For pipe and installation to make use of new facility.

   c. For pumping equipment to make use of new facility.

   d. For establishing vegetation to protect the structure from erosion.

2. The structure shall be maintained for a minimum of 10 years following the calender year of installation. By accepting credit, the recipient agrees to maintain the practice for the specified life. This practice is subject to spot check by the District throughout the practice life and failure to comply may result in forfeiture of credit.

D. Specifications

1. This practice is subject to the specifications of NRCS Specifications 552-A, 436, 449, 430DD, 442 and 441.

2. Volume of water treated must be calculated.

E. Rate

The Tax Credit rate is 25% of the total eligible cost not to exceed $17,500.00. If a cooperator receives cost-share, only the cooperator's share of the project is used to determine the tax credit.

F. Technical Responsibility

Technical responsibility is assigned to NRCS.

cooperator receives cost-share, only the cooperator's share of the project is used to determine the tax credit.

F. Technical Responsibility

Technical responsibility is assigned to NRCS.