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ACCOMACK - NORTHAMPTON

PLANNING DISTRICT COMMISION

ACCOMAC, VIRGINIA

PROJECT REPORT

COIN OPERATED LAUNDROMAT

WASTEWATER TREATMENT

This document was prepared under a United States Environmental Protection Agency 205(j) Water Quality Planning Grant for the Virginia State Water Control Board, and was funded, in part, by the Virginia Council on the Environment's Coastal Resources Management Program through grant #NA17020359-01 of the National Oceanic and Atmospheric Administration under the Coastal Zone Management Act of 1972 as amended.

MAY, 1992

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EXECUTIVE SUMMARY

CHAPTER I

I. EXECUTIVE SUMMARY

A. Background

This report reviews alternatives for treatment and disposal of wastewater from five Eastern Shore Virginia coin operated laundromats. This document is primarily the result of the Virginia State Water Control Board's VPDES permit compliance schedules. The schedules require four of the five laundromats to cease stream discharge by August, 1992. Consent orders have also been signed by the owners with a similar requirement.

Many alternatives for treatment and disposal have been evaluated. It became apparent, upon initiating this study, that the mode of disposal rather than treatment would be paramount and would need to be determined first. Treatment is considered a subset of each disposal option throughout this document. Alternatives considered and further addressed in this report are as follows:

Stream discharge
Spray irrigation
Subsurface disposal
Rapid infiltration
Evaporation
Recycle/reuse
Direct connection to a POTW
Hauling to a POTW

B. Recommended Disposal Alternatives

Conclusions made in this document suggest, except for the Onley laundromat, rapid infiltration is the most favorable disposal alternative to stream discharge. The one exception, the Onley facility, should first evaluate the opportunity of connecting directly to the Onancock publicly owned treatment works (POTW). The collection system is within one half mile of the facility. If this alternative proves to be too costly or

lacking in other respects, rapid infiltration is also an alternative for this location.

A rapid infiltration system is similar to a subsurface disposal or tile field system. The system would consist of screening, a septic tank, flow equalization, pump station and sand beds where the wastewater is applied and allowed to percolate to the groundwater. The advantage over conventional tile fields is the ability to provide maintenance to the beds thus reducing the likelihood of failure.

The capital cost of a rapid infiltration system will be in the range of $30,000 to $40,000 with operation and maintenance cost ranging as high as $5,000 per year. These costs are based on an average facility size and an assumption that all new system components are required. With most facilities, lower costs should be realized since there are existing pump systems and septic tanks, etc. Additionally, less expensive building materials may be utilized i.e. used underground storage tanks removed from service rather than block rapid infiltration units. Costs could possibly be reduced to between $25,000 to $30,000 as a result of individual facility adaptation. POTW connection for Onley, if collection and treatment capacity are adequate, requires a capital investment of $47,000 with an annual operation and maintenance cost of $4,000.

C. Economic Feasibility

Although rapid infiltration and POTW direct connection are considered better alternatives than stream discharge, they are not necessarily feasible. Economics must be evaluated on a case by case basis by each laundromat owner. Since capital and, in some instances, annualized costs are more than the owner's gross annual receipts, modification to user's fees will be required. Since this is the case, a major factor in determining financial feasibility will be the laundromat user's ability and/or willingness to pay the additional cost. Given the economy and the area demographics, it is entirely possible that closing may be the

only viable alternative, if a stream discharge is not permitted by the Board.

Based on discussions with the coin operated_laundromat wastewater committee, this latter alternative, terminating service because a discharge is not permitted by the Board, may be the only financially viable route. Without drastically increasing the prices charged at these facilities (at least 36%) these businesses cannot tolerate the annualized costs associated with the suggested improvements.

If owners cannot justify the suggested improvements, then consideration must be given to the impact that closing the facilities will have on the State's residents and visitors. An argument for socioeconomic impact must be evaluated in this instance.

D. Socioeconomic Impact

There are a few irrefutable facts about laundering services on the Eastern Shore. First, regardless of whether the five facilities stay in business laundry will be washed. This may mean that instead of having five permitted point source discharges, many unpermitted discharges will result. These new discharges will be from those individuals who can no longer use the laundromats and must find other means to wash clothes. Some of these discharges will undoubtedly be illegal. Second, the closing of laundromats on the Easter Shore will impact lower income individuals. These individuals are, in many if not most instances, at a disadvantage in finding alternative methods for washing their clothes. Finally, the lack of centralized sewer systems exacerbates the potential for entrepreneurs to build laundromats to replace those facilities that are forced to close.

Based on the aforementioned facts it is necessary to evaluate the option of no action by the owners. There is a social and economic need to keep the laundromats opened. A hardship will occur to the owners, their

employees, suppliers and especially the users. No action could be qualified in new permits by including clauses that require each facility to connect to a central sewer system when available. Wastewater Needs Assessment Surveys for 1992 have been submitted to the Board and these will affect some facilities.

The no action alternative does not comply with current Board policy regarding the Water Quality Standards and the application of stream models. Some question about the appropriateness of these models must be considered, especially since four of the five facilities discharge to dry ditches. These ditches may not have an eventual sustained flow but may actually infiltrate to the groundwater.

Regardless of water quality numeric concerns, if no action is taken, complaints from residents will most likely continue. Primarily Eastville and Exmore have been the center of the complaints filed. Most of the complaints are in the summer and range from odor to stream bed appearance.

E. Summary

In summary, laundromat owners must decide if a capital investment of the magnitude identified by this report is advisable. This decision will be primarily based on economics. If the owners decide that without a discharge their only option is to close, then serious consideration must be given by State and local authorities to the social implications that closing may cause. No action should be considered for the short term. New permits with language requiring POTW connection and possibly operation and maintenance improvements should be considered. This action, while not alleviating area resident complaints, may be the most appropriate solution to a difficult problem.

INTRODUCTION

CHAPTER II

II. INTRODUCTION

A. General

This report reviews alternatives for treatment and disposal of wastewater from coin operated laundromats. The Accomack-Northampton Planning District Commission (A-NPDC) established a committee made up of A-NPDC staff, Virginia State Water Control Board (SWCB) staff and owners of coin operated laundromats. The committee was to review available treatment and disposal options for facilities located on the Eastern Shore of Virginia. This study was performed under a United States Environmental Protection Agency 205(j) Water Quality Planning Grant for the Virginia State Water Control Board. Funding was, in part, by the Virginia Council on the Environment's Coastal Resources Management Program through grant #NA17020359-01 of the National Oceanic and Atmospheric Administration under the Coastal Zone Management Act of 1972 as amended.

The primary reason for the development of this report is a result of a SWCB Virginia Pollution Discharge Elimination System (VPDES) permit compliance schedule. The schedule requires four (4) Eastern Shore laundromat owners who discharge to surface waters to cease discharging by August 10, 1992. A fifth facility's permit does not expire until September 22, 1994. Consent orders have also been signed by five (5) facilities. This requirement impacts a majority of the coin operated establishments (5 of 8) on the Eastern Shore and thus will significantly impact those residents who depend on these facilities for laundering their clothes.

A brief history of this project prior to the receipt of the federal grant has been provided as Appendix A. This summary was drafted by the A-NPDC as part of a successful effort to obtain the aforementioned grant. The remaining narrative in this chapter discusses, the project and introduces many important issues that are addressed in greater detail throughout the remainder of the report.

B. Coin Operated Laundromats

Coin operated laundromats provide facilities to residents who do not have access to private laundry facilities. There are many reasons these individuals depend on coin operated laundromats. Some examples are as follows:

1. Unable to afford private facilities.
2. Do not have the space or the utilities (water supply and/or wastewater disposal) required to operate private facilities.
3. Vacationing or traveling through the area.
4. In area for short term or seasonal employment.
5. Do not desire to own private facilities.

A coin operated laundromat, as the term is used herein, consists of approximately equal numbers of washing machines and dryers that are similar in size and configuration to private in-the-home machines with the exception that a fee is required to operate the units. The cost is typically between $1.00 and $1.25 for each wash. A similar fee is charged for use of the dryers. This fee is designed to compensate the facility owner for the cost of operating the facility including purchase of machines, utilities, operation and maintenance, taxes, insurance and profit. Additionally, this compensation must pay all costs associated with wastewater treatment and disposal.

C. Relevance to the Eastern Shore

The Eastern Shore of Virginia is reported to have a total of eight (8) independently owned coin operated laundromats. These facilities are located in or near Cape Charles, Chincoteague, Eastville, Exmore, Lee Mont, Nelsonia, Onancock and Onley. These eight (8) operations are open seven (7) days per week and operate 12 to 24 hours per day. These facilities provide service to a large cross section of the individuals

identified by the general categories above. Based on data presented in this report for the five (5) facilities, it is estimated that between 175,000 and 275,000 loads of wash are processed annually by these establishments. The number of individuals utilizing these facilities is not available. Based on the five (5) facility's gross receipts and acknowledging the income status of many of the facility users it can be estimated that the population served might be 10,000.

All eight (8) laundry facilities are similar in layout and basic operation. There are, of course, minor differences in size, hours of operation, etc. The only major difference is the means by which wastewater generated by each facility is treated and disposed.

The Cape Charles and Onancock facilities are served by central sewer systems owned and operated by the Town of Cape Charles and Town of Onancock respectively. These central systems are the only two (2) on the entire Eastern Shore of Virginia. As a result of the availability of service the Cape Charles and Onancock facilities do not face the compliance schedule of those with stream discharges. Therefore these facilities are not further discussed in this report.

The Lee Mont facility is reportedly a small facility and is served by an on-site septic tank and tile field. This facility does not have a stream discharge, and therefore is not further considered in this report.

The remaining five (5) facilities Eastville, Exmore, Nelsonia, Onley, and Chincoteague treat their wastewater and then stream discharge it. This report is to investigate options available to these operations to meet water quality standards or more likely to derive other means to dispose of treated effluent.

Location maps for the five (5) affected facilities are shown on Exhibits II-1 through II-5. A summary of general information about the five (5) facilities is tabulated on Exhibit II-6. This summary is based on

questionnaires completed by the facility owners. The questionnaires are included with this report as Appendix B.

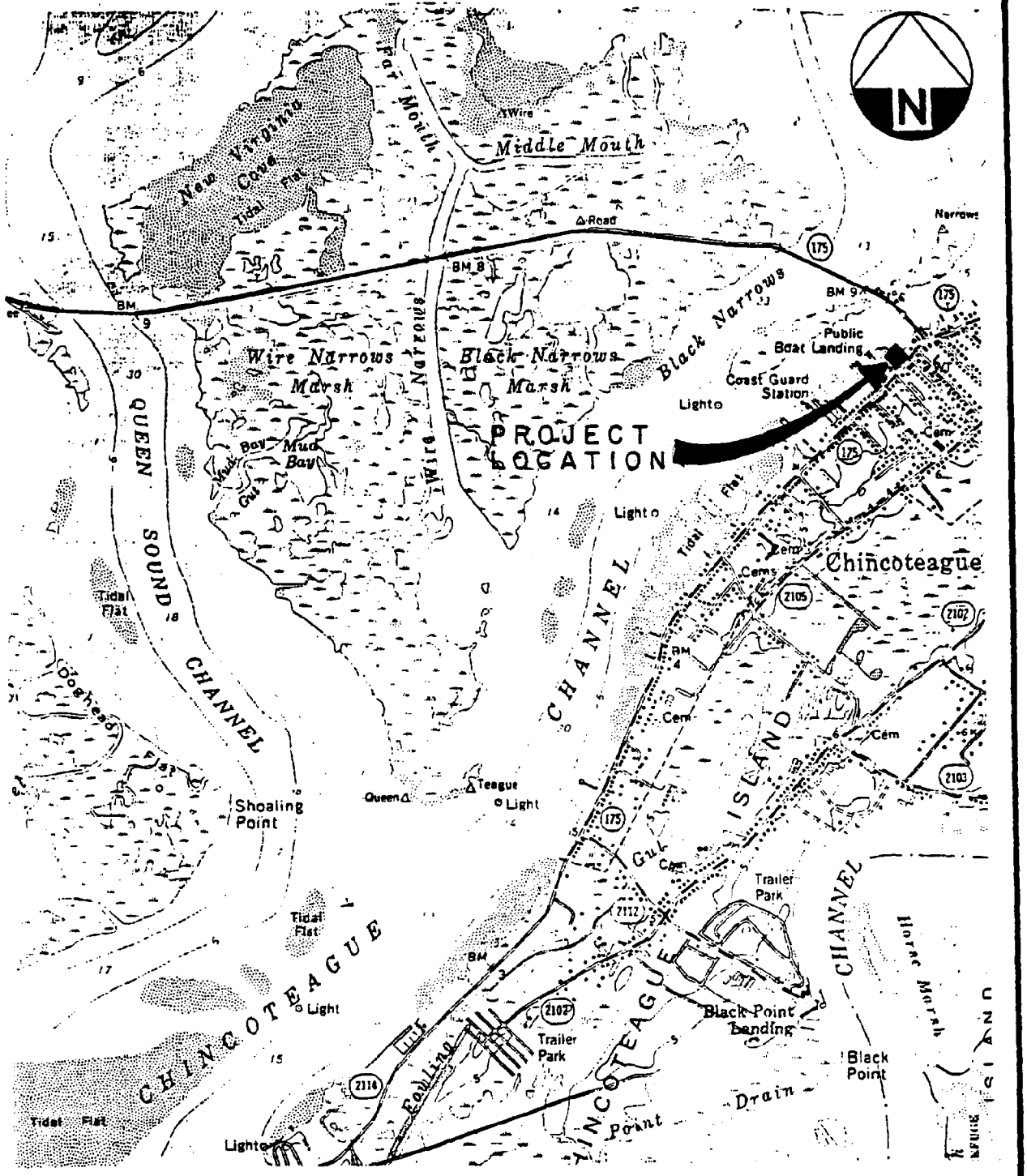
D. Project Development

The purpose of this project is to evaluate treatment and disposal options for the five coin operated laundromats. An alternative method for disposal of wastewater must be found and implemented if the facilities are to remain open. The committee met on several occasions to discuss the project and select an engineering firm to conduct the study. CABE Associates, Inc. of Dover, Delaware was selected by the committee to review the history of the problem and determine cost effective solutions.

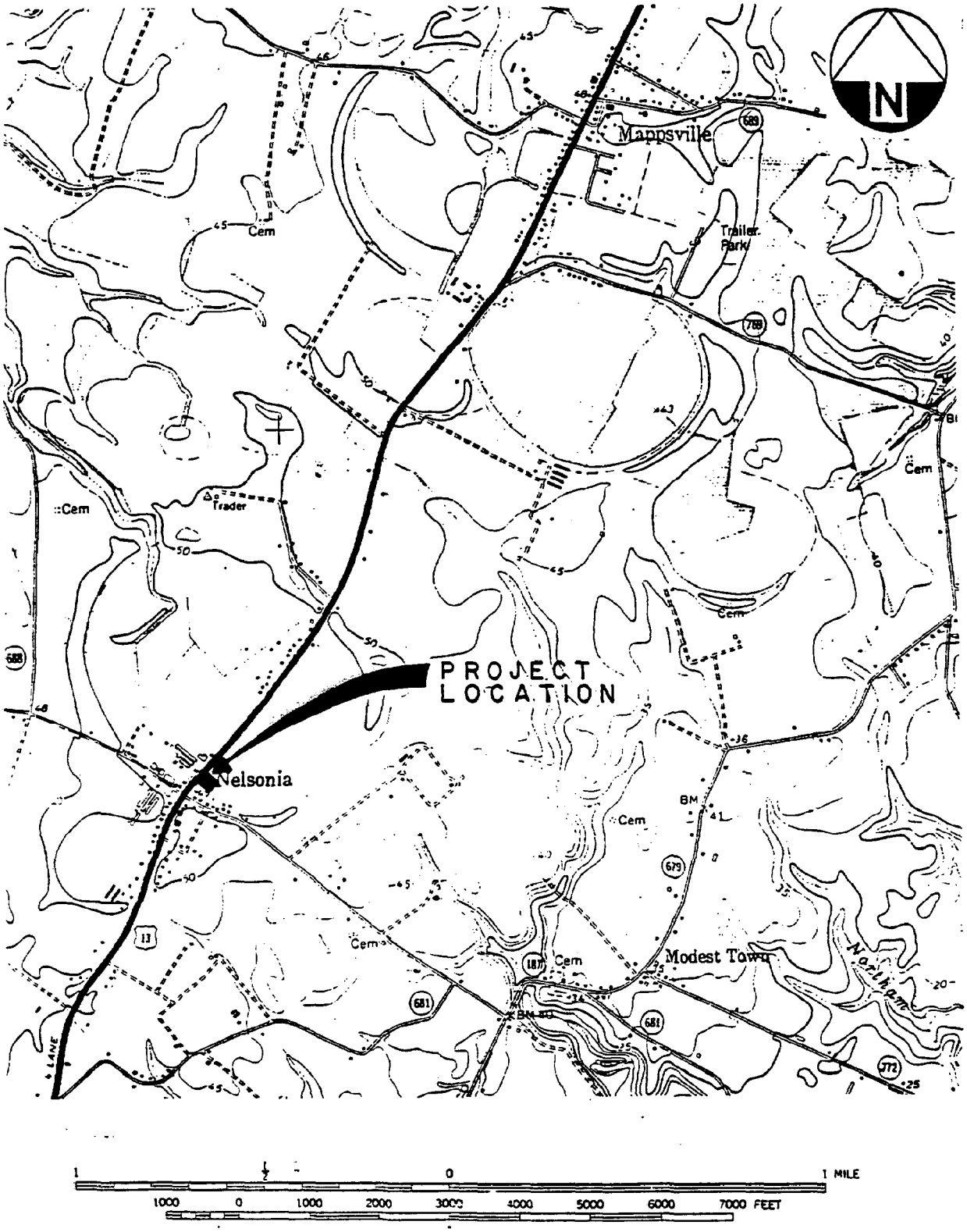
An initial meeting was held to review the objectives of the project and identify alternatives previously evaluated by the owners. Each site was visited to determine quantity of wastewater, availability of lands, how various treatment options may impact the environment and to conduct a soil boring. Questionnaires were sent to owners to obtain specific information about each facility. A literature search was conducted to determine the history of treatment and disposal alternatives. A list of the documents reviewed is included as Attachment C. Alternatives were then evaluated for their technical merit, ease of construction and operation, capital cost, operating cost, future use, and environmental impact. An interim report with matrices for disposal methods, on-site disposal and treatment were developed. An interim report was submitted for review by and discussion with the committee.

With additional input from the committee the alternatives were further assessed and evaluated. Cost estimates, economic feasibility and impacts were determined. The impact to the environment and future use of an alternative, if a central or regional collection and treatment system become available in the future, were studied.

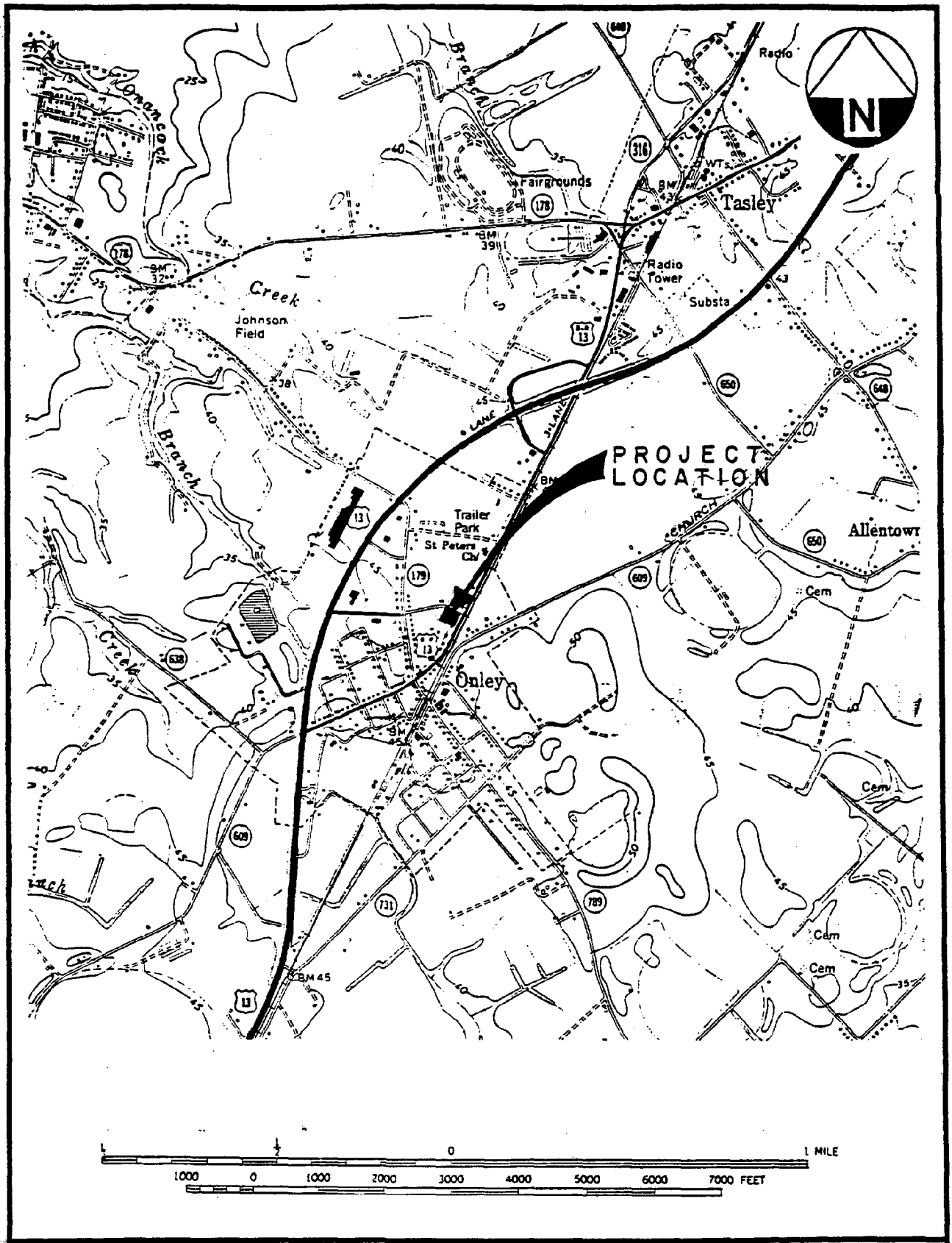
EXHIBITS



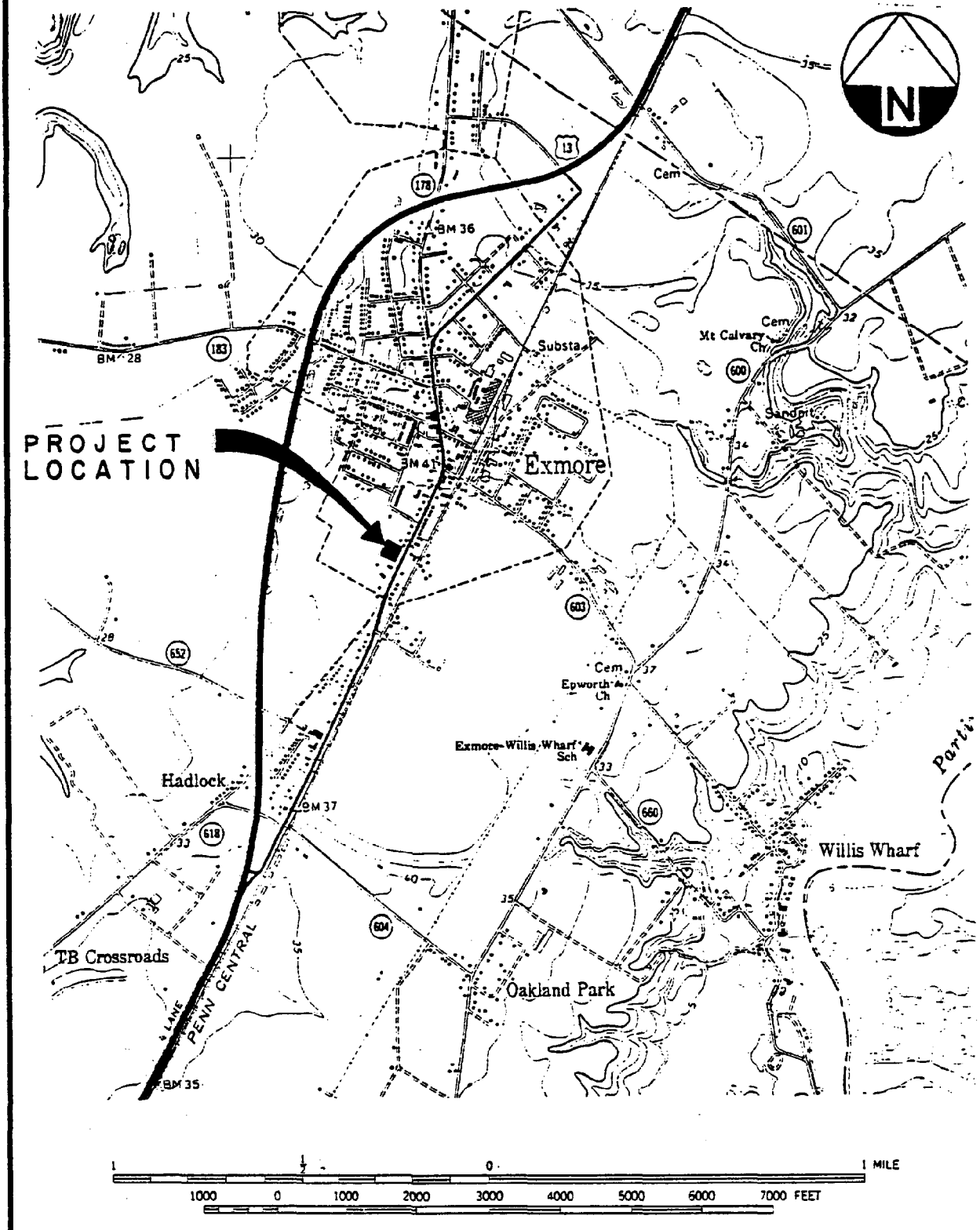
cape 100-363 MAY, 1992 100A073C	LOCATION MAP F & G LAUNDROMAT CHINCOTEAGUE, VIRGINIA	EXHIBIT II-1



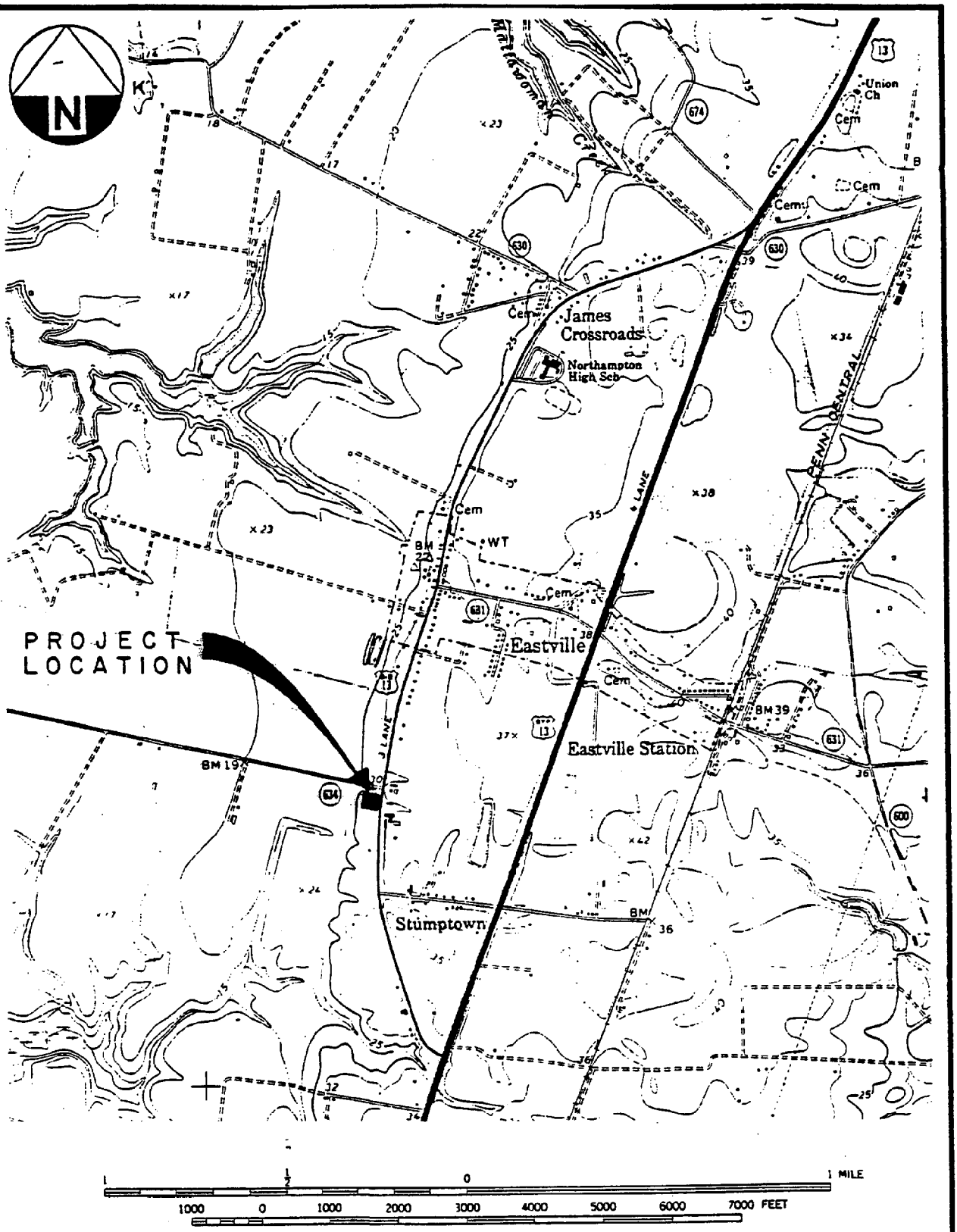
cabe 100-363 MAY, 1992 100A075C	LOCATION MAP NELSONIA – MESSICK AND WESSELLS NELSONIA, VIRGINIA	EXHIBIT II-2



cabe 100-363 MAY, 1992 100A074C	LOCATION MAP ONLEY – MESSICK AND WESSELLS ONLEY, VIRGINIA	EXHIBIT II–3



cabe 100-363 MAY, 1992 100A076C	LOCATION MAP BROAD STREET LAUNDRY EXMORE, VIRGINIA	EXHIBIT II-4



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LOCATION MAP
EASTVILLE LAUNDROMAT
EASTVILLE, VIRGINIA

EXHIBIT
II-5

GENERAL INFORMATION SUMMARY
LAUNDROMAT WASTEWATER PROJECT
ACCOMACK - NORTHAMPTON PLANNING DISTRICT COMMISSION

QUESTIONAIRE INFORMATION

FACILITY LOCATION :	CHINCOTEAGUE	NELSONIA	ONLEY	EXMORE	EASTVILLE
OWNER'S NAME :	Floyd O. Brasure	Howard C. Wessells II	Howard C. Wessells II	B. Sturgis & M. Freeze	Thomas Fox
NUMBER OF MACHINES :	23	26	32	38	18
OPEN AT :	7:00 AM	24 HOURS	24 HOURS	7:30 AM	7:30 AM
CLOSED AT :	9:30 PM	24 HOURS	24 HOURS	3:00-7:30 PM	8:00 PM
DAYS PER WEEK:	7	7	7	7	7
BUSIEST DAY :	SUNDAY	SATURDAY	SATURDAY	SATURDAY	SATURDAY
% BUSINESS ON BUSIEST DAY	22	-	-	30	25
BUSIEST SEASON :	SUMMER	SUMMER	SUMMER	SUMMER	SUMMER
AVG GALLONS PER LOAD :	34	34	34	34	34
MAX LOADS PER DAY :	250	100	75	150	140
AVG GALLONS PER DAY :	3,760	(1)	(1)	5,460	3,000
AVG GALLONS PER WEEK :	26,815	(1)	(1)	38,000	21,000
AVG GALLONS PER MONTH :	115,333	(1)	(1)	160,000	90,000
DO YOU OWN THE SITE ? :	YES	YES	YES	YES	NO
SITE SIZE (AC):	0.26	0.76	0.36	0.31	0.01
OWN NEARBY LAND ? :	NO	NO	NO	NO	NO
AVAILABLE LAND :	NO	NO	NO	POSSIBLY	POSSIBLY
LAND COST ($/AC):	-	2000	5000	-	-
MAX GPD BASED ON MAX LOAD	8,500	3,400	2,550	5,100	4,760

PERMIT INFORMATION

STREAM :	CHINCOTEAGUE CHANNEL	MUDDY CREEK	ONANCOCK CREEK	NASSAWADOX CREEK	OLD CASTLE CREEK
SECTION :	18	2A	2A	2A	2A
CLASS :	II	III	III	III	III
SPECIAL STANDARDS :	A	NONE	NONE	NONE	NONE
FLOW LIMIT (AVG/MAX) :	NL/NL	-/NL	-/NL	-/NL	NL/NL
BOD LIMIT mg/L(AVG/MAX) :	-/60	30/60	30/60	-/60	-/60
TSS LIMIT mg/L(AVG/MAX) :	-/45	30/60	30/60	-/60	-/60
CL2 RESIDUAL mg/L(MIN/MAX) :	1.5/2.5	-	-	1.5/2.5	1.5/2.5
TEMP LIMIT C(MAX) :	32	32	32	32	-
O+G LIMIT mg/L(MAX) :	-	15	15	15	15
PH LIMIT (MIN/MAX) :	6/9	6/9	6/9	6/9	6/9
FECAL LIMIT (MAX) :	400	-	-	-	-
CURRENT TREATMENT :	SEDIMENT	PACKAGE	PACKAGE	PACKAGE	SEDIMENT

NOTES: (1) NO WATER METER - VALUES PROVIDED WERE ESTIMATED

WASTEWATER CHARACTERISTICS

AND EXISTING TREATMENT AND DISPOSAL

CHAPTER III

III. WASTEWATER CHARACTERISTICS AND EXISTING TREATMENT AND DISPOSAL

A. Wastewater Characteristics

In 1980 the EPA published a four (4) part treatability manual for industrial wastewater. Volume II entitled Industrial Descriptions contains a section on "Auto and Other Laundries." Included in this industry group are coin operated laundromats (SIC Code 7215). The Auto and Other Laundries industrial category is further divided into four (4) subgroups. These include water wash (laundrying), dry cleaning, dual phase processing, and carpet upholstery cleaning.

The coin operated laundromats on the Eastern Shore apply only the water wash technology in their operations. The EPA description of water washing is as follows:

"In this portion of the industry, the primary cleaning is accomplished by water wash. The soiled materials are first sorted according to the processing required. If necessary, stains that may set during washing must be removed. This can involve a multiple cold water soak or the use of acids, bleaches and/or multiple organic solvents. Once laundry is loaded into a machine it undergoes a series of cleaning steps. These steps vary according to the different types and desired product in the range from wetting, sudsing, and rinsing the fabric, to souring (reducing pH to about 5 to remove yellowing, sodium bicarbonate), bluing, bleaching and finishing."

Based on a survey group established by EPA for coin operated laundromats, process wastewater discharge rates varied from 240 gallons per day (minimum) to 20,000 gallons per day (maximum). Average flow rate was reported at 3,600 gallons per day. Characterization of raw laundromat wastewater as identified by the EPA report is as follows:

PARAMETER	NUMBER ANALYZED	MAXIMUM	MEDIAN	MEAN
BOD_5, mg/l	31	500	120	140
COD, mg/l	18	930	270	340
TOC, mg/l	1	668	-	-
TSS, mg/l	28	630	85	140
Total Phosphorus, mg/l	2	18	9.8	9.8
Total Phenols, mg/l	3	.30	<.002	.10
Oil & Grease, mg/l	13	74	23	26
pH, S.U.	29	9.2	8.0	7.9

Influent data has not been collected for the Eastern Shore facilities. Effluent data was provided by the SWCB from discharge monitoring reports (DMR). Due to the relative similarity among laundering facilities it is believed that the data collected by EPA represents the affected operations. Additionally, flow data available for the subject facilities indicate that the size of these facilities are indeed similar to the EPA survey group.

B. Existing Disposal Methods

Currently, once wastewater is treated at the five (5) facilities it is discharged to local surface waters. Four (4) of the five (5) discharge to "dry ditches" which are identified by name and segment on Exhibit II-6. The fifth facility, Chincoteague, discharges to the tidal basin, Chincoteague Channel.

C. Existing Treatment Methods

Three (3) of the five (5) facilities utilize a package treatment plant designed by Clow Industries. These systems were placed on line several years ago and have been complemented by the use of chlorine for

disinfection at various times since their installation. The package plants have not been effective in treating the wastewater effluent from the three (3) operations. Exceedences of permit limits have been common place.

Each package plant consists of a wet well with submersible pumps that transfer the water to an aeration basin, clarifier and chlorine contact basin before gravity discharge. The most likely reasons why these systems have been ineffective are as follows:

1. The wastewater substrate from laundromats is nutrient deficient. Biological systems require nitrogen to operate effectively and laundromat wastewater is lacking in this nutrient.

2. The use of various laundry detergents, whiteners, despotters, etc. is not conducive to sustaining a healthy biomass.

3. Even if these systems could consistently meet current treatment limits, the point would be moot since much tighter limits must be met to meet water quality standards.

The other two (2) facilities that do not have package treatment plants are Chincoteague and Eastville. At the time of their coming under SWCB scrutiny the other three (3) systems were not providing a quality effluent and therefore were not advocated by the SWCB. Both facilities currently utilize a sedimentation tank before discharge. Eastville also employs a 10,000 gallon septic tank to provide additional treatment. It is reported by the owners that additional treatment has not been installed because no one, including the SWCB, has been able to suggest a plausible treatment system for these facilities.

ALTERNATIVE DISPOSAL AND TREATMENT

CHAPTER IV

IV. ALTERNATIVE DISPOSAL AND TREATMENT

A. Alternative Disposal Methods

In evaluating treatment and disposal methods for a project, the options available for the release or discharge of wastewater are first considered. Once the most appropriate method or methods of disposal are chosen, then the required degree of treatment of the wastewater can be determined. Treatment efficiency is dictated by the media to which the wastewater is released, i.e. stream discharges generally require a higher level of treatment than do subsurface discharges.

Exhibit IV-1 is a matrix which compares the various methods considered for disposal of wastewater. This matrix considers and rates many aspects ranging from owner liability to system cost for each option. In addition to the ranking process, a relative importance factor has been added to each attribute. Those attributes that are most critical to the success of the method have a higher value in the comparison to others of less importance. Although this matrix does not accomplish or reflect economic feasibility it does prioritize those options that can be considered for disposal. Economic feasibility is addressed in detail in Chapter V. The remaining narrative in this section details each disposal alternative.

1. Discharge to a Publicly Owned Treatment Works (POTW)

Only two (2) POTW's have been constructed on the Eastern Shore of Virginia. These facilities are located in Cape Charles and Onancock. Disposal of wastewater via a direct connection to a POTW is a very attractive option and is thus ranked first on the disposal matrix. The Coin-Operated Laundromat Association, when asked about disposal options, indicated that the only disposal alternative, other than recycle/reuse, they recommend is a POTW connection. They also indicated that recycle/reuse, which is discussed later in this

chapter, is only recommended at very large facilities because of economic feasibility. The term large capacity was tenuously defined as an establishment which produces gross receipts several times larger than the subject facilities. Gross receipts are affected by the number of available washing machines, the fees charged per wash and finally the frequency that the average washing machine is utilized each day.

POTW connection is severely limited in application to the five (5) subject facilities. Only the facility in Onley is close to one of the two (2) central systems. This laundromat is less than 3,000 feet from an existing sewage pump station. Therefore, this option should first be considered relative to economic feasibility at this one location. Prior to determining the economic feasibility, treatment capacity must first be evaluated at Onancock to determine if service can be provided. Also, the Industrial Development Authority, which owns the collection system at the potential point of connection, would need to approve the service.

All other facilities are at least several miles from POTW service areas. Therefore, this type of discharge is not feasible from an economic viewpoint.

2. Hauling

Hauling wastewater to a POTW is a viable solution for disposal. This alternative ranked second among the available alternatives. As is discussed in Item 1 above, treatment capacity must first be available at one of the POTW's before this option can be considered. The economics associated with storing and hauling several thousand gallons of wastewater per day from each facility is definitely the most negative aspect of this alternative. Cost aside, this method is acceptable for all facilities. Hauling also can be a temporary

method of disposal, if a central system will be available in a short time.

Hauling does require a POTW to accept and treat the wastewater. As a result, the two (2) POTW's were contacted (see Exhibit IV-2 and IV-3), as part of this project. Cape Charles indicated a tentative willingness to accept the wastewater. Onancock has tentatively rejected the concept. Responses from the Towns are provided as Exhibits IV-4 and IV-5.

The decisions are of course tentative in nature since sometimes area social and economic needs outweigh local desires.

3. No Discharge

No discharge is another alternative for disposal of wastewater. No discharge, for this report, is defined as a discharge to groundwater or to the air (evaporation) rather than to a surface water. Many alternatives are available for consideration in this category. These include recycle/reuse, evaporation, subsurface disposal, spray irrigation and rapid infiltration. A discussion of each of these disposal methods follows:

a. Recycle/Reuse

Reuse of laundry wastewater requires vigorous treatment. This alternative has been successfully utilized by many larger coin operated laundromats. The economics of treatment to the level required for reuse only appears to make sense if the water supply and/or disposal alternatives are either non-existent or are severely limited.

Reuse is normally accomplished by a physical chemical process that utilizes dissolved air flotation as the primary treatment

unit. Only 65 to 75 percent of the wastewater can be processed for reuse. The remaining 25 to 35 percent is in the form of sludge etc. that must then be disposed.

If reuse is considered, the most logical means for disposing of the remaining residues is by hauling to a POTW. This combination of reuse and hauling is used in evaluating economic feasibility later in Chapter V. A final consideration about reuse is there may be a problem with public perception in using water that is recycled. This perception problem must be evaluated in conjunction with basic economics.

b. Evaporation

Evaporation or vaporization is a concept rarely utilized in wastewater treatment. Natural evaporation is not feasible in this area of the Country due to excessive precipitation. Therefore, additional energy must be used. The energy requirements for this alternative are enormous. To evaporate one gallon of water requires approximately one quarter of a gallon of No. 2 fuel oil. This option is feasible, but not practical.

c. On-Site

On-site alternatives include subsurface disposal, spray irrigation and rapid infiltration. To evaluate these relatively low cost and viable treatment technologies a comparative matrix was developed for the five (5) subject sites and is included as Exhibit IV-6. This matrix summarizes the quality of soils at each site and area requirements for each disposal technology.

Soil quality for this report, was based on a preliminary review of Soil Conservation Service (SCS) maps and soil descriptions in the area of each site. Finally, a single soil boring constructed at each facility was used to correlate the site to the SCS data. Based on this limited evaluation, a soil type was chosen for each site and a conservative perk rate established. This perk rate was then used to approximate areas required for various on-site disposal methods. Finally, based on laundromat size, a determination of the percentage of available area is provided to indicate whether these sites could support the technology without purchasing additional land. The remaining narrative in this section details each option and its potential for use.

i. Subsurface Disposal

Two (2) types of subsurface disposal are routinely used for wastewater disposal. These are conventional subsurface systems and mound systems. Both systems are essentially the same relative to the required bed area and the disposal/treatment process. The major difference is in construction cost and configuration. Mound systems are elevated and are constructed when conventional subsurface systems are not possible due to high water table conditions.

Both types of subsurface disposal could prove to be viable for disposal of laundry waste. Pretreatment of the water would be required before disposal. The Chincoteague site may not be suited for on-site subsurface disposal. This facility has limited land and purchasing additional land does not appear to be feasible. Additionally, a high water table that appears to fluctuate with the tide, would also, inhibit the performance of an on-site system.

Nelsonia and Onley could potentially have enough available land for subsurface or mound construction. Exmore and Eastville would most definitely need to purchase additional land for these disposal methods.

ii. Irrigation

Spray irrigation does not appear to be a viable alternative for the subject sites although the disposal technology is proven and effective. Available land is not nearly sufficient to employ this technology. Including buffers approximately 2.5 to 4 acres would be required to spray irrigate the wastewater generated at one facility. The need for buffers and year round operation severely limits this potential disposal method.

iii. Rapid Infiltration

Of all on-site systems, rapid infiltration requires the least area. Rapid infiltration systems effectively remove BOD and suspended solids through filtration, absorption and bacterial decomposition. BOD removal of greater than 85% and very low levels of suspended solids are expected. These basins are dosed or flooded, then allowed to drain and dry. These systems have also proved effective in removing metals, pathogens and trace organics.

Rapid infiltration requires approximately one third the area of subsurface disposal for the same volume of wastewater. Should a problem develop with a rapid infiltration basin it can be observed and corrected much more effectively than with subsurface disposal. Basins are designed to be open topped. Whereas subsurface systems are completely covered with soil.

4. Stream Discharge

A stream or surface water discharge is the existing method used for the disposal of wastewater at all five (5) subject facilities. This alternative may or may not be feasible based on surface water modeling and the SWCB's interpretation of that model. It is reported that results of a model indicate current laundromat VPDES permit limits cause exceedences of Virginia Water Quality Standards. Comments from the SWCB, indicate a level of treatment of less than 10 mg/l BOD and 10 mg/l TSS are required to continue a stream discharge. If this is in fact true for all five (5) facilities, treatment is far too costly as is discussed in more detail in Chapter V.

B. Alternative Treatment Methods

To utilize any of the aforementioned disposal methods, treatment of the wastewater must also be considered. The level of treatment varies significantly from one disposal option to another. A matrix of treatment methods, Exhibit IV-7, was developed in the early stages of the project. This matrix was initially designed to consider what treatment alternatives could potentially be utilized in meeting anticipated stream discharge limits.

Each method was reviewed for its technical merit. If the method was found to be without merit, further evaluation was not performed. If merit did exist, then the matrix rates many factors used in determining effectiveness. A relative importance factor was applied to each attribute to assist in determining feasibility of each system. This matrix has become somewhat obsolete in the context of this document since stream discharge is not considered economically feasible (See Chapter V). Therefore, including this matrix serves more as an

informational summary to assist the reader in understanding the economic cost associated with meeting the State's Water Quality Standards.

The following items discuss each type of disposal option and the anticipated requirements for treatment to use the option.

1. POTW Disposal

To utilize either a direct discharge to a POTW or hauling to a POTW a minimal amount of treatment may be required. This treatment may include pH adjustment, oil and grease removal and possibly some initial screening of the waste (delinting). The degree to which pretreatment will be required will depend on the POTW and its pretreatment requirements. Hauling also will require a storage capacity of at least four (4) days of average flow.

2. Recycle/Reuse

Treating the wastewater to the degree necessary for recycling and reuse involves an extensive system. Physical-Chemical systems are primarily used by the industry for this purpose. As shown on Exhibit IV-8, wastewater is first screened, the pH adjusted and polymer fed. After coagulation, the flow enters a dissolved air flotation unit and then flows through a sand filter to remove more suspended solids and insoluble BOD. A carbon filter is then sometimes used to reduce the soluble BOD. The flow is then disinfected with chlorine and is ready for reuse.

The treatment system requires the use of chemicals and the disposal of sludge produced by the process. Approximately 25 to 35% of the flow will need to be disposed of as a sludge. Carbon filtration is not considered in the cost estimates in Chapter V. This optional unit is only needed if there are major problems with public perception.

3. Evaporation

As stated earlier, evaporation requires tremendous amounts of energy to be successful. A boiler or similar device is used to raise the temperature of the wastewater above the boiling point. Treatment before the boiler would include screening, a sedimentation or septic tank and flow equalization. Flow equalization is incorporated to reduce the size of the unit and allow it to handle the average flow rather than the maximum peak instantaneous demand. An air discharge permit would most likely be required for the boiler.

4. On-Site Disposal

Many of the treatment alternatives identified on Exhibit IV-7 can be used for on-site disposal. Because of the large land requirement for spray irrigation, treatment technologies prior to spray irrigation are not addressed in this report. Treatment alternatives using lagoons were also not further considered because of the large land area and construction cost.

The majority of on-site disposal systems utilize screening and septic treatment systems before actual disposal. Experience has shown that further treatment is required or the disposal system needs to be extremely oversized. Further treatment following the septic system can include intermittent sand filters with recirculation, slow sand filters, up-flow biofilters, anaerobic contactors with recirculation, pH adjustment and flow equalization.

A complete rapid infiltration system would consist of properly sized septic tanks for initial biological treatment and some solids separation. The septic tanks would be preceded by a mechanical screening device to remove a portion of the larger solids prior to disposal. The rapid infiltration bed itself would follow the septic

tanks and potentially consist of a four (4) cell concrete block structure approximately 30 feet by 30 feet in overall dimension. This structure would contain a sand bed with a depth of not more than 8 to 10 feet. The structure would most likely protrude above the ground surface especially at those facilities with high water tables. A pump system is required to transfer the wastewater from the septic tank to the rapid infiltration units.

A rapid infiltration system is similar in function to a septic/tile field disposal system. The advantage that rapid infiltration provides that standard systems do not, is serviceability. In a rapid infiltration system wastewater, after passing through septic tanks (required with both system types), is pumped on top of a sand bed where it percolates to the groundwater table. By utilizing an exposed sand surface, maintenance can be performed routinely on the sand bed. This maintenance will reduce the likelihood of system failure as a result of the sand bed becoming clogged with solids. Tile fields do not provide the operator with this solids removal opportunity. Failure via soil pore clogging, which is of paramount concern with laundry wastewater is much more likely.

As is the case with most technologies that have not been specifically utilized for a certain wastewater type, it is advisable that a pilot plant be constructed first before full size units are designed. If this alternative is selected, data also should be collected to determine if pH adjustment is necessary.

A rapid infiltration system could, in part, be utilized for pretreatment if and when a central sewer system becomes available. The screening, septic tanks and flow equalization basins provide wastewater effluent at or below typical POTW pretreatment ordinance requirements. The rapid infiltration beds themselves would not be utilized and the pump system that distributes wastewater onto

the rapid infiltration beds may need to be upgraded if a force main to the central collection system is required.

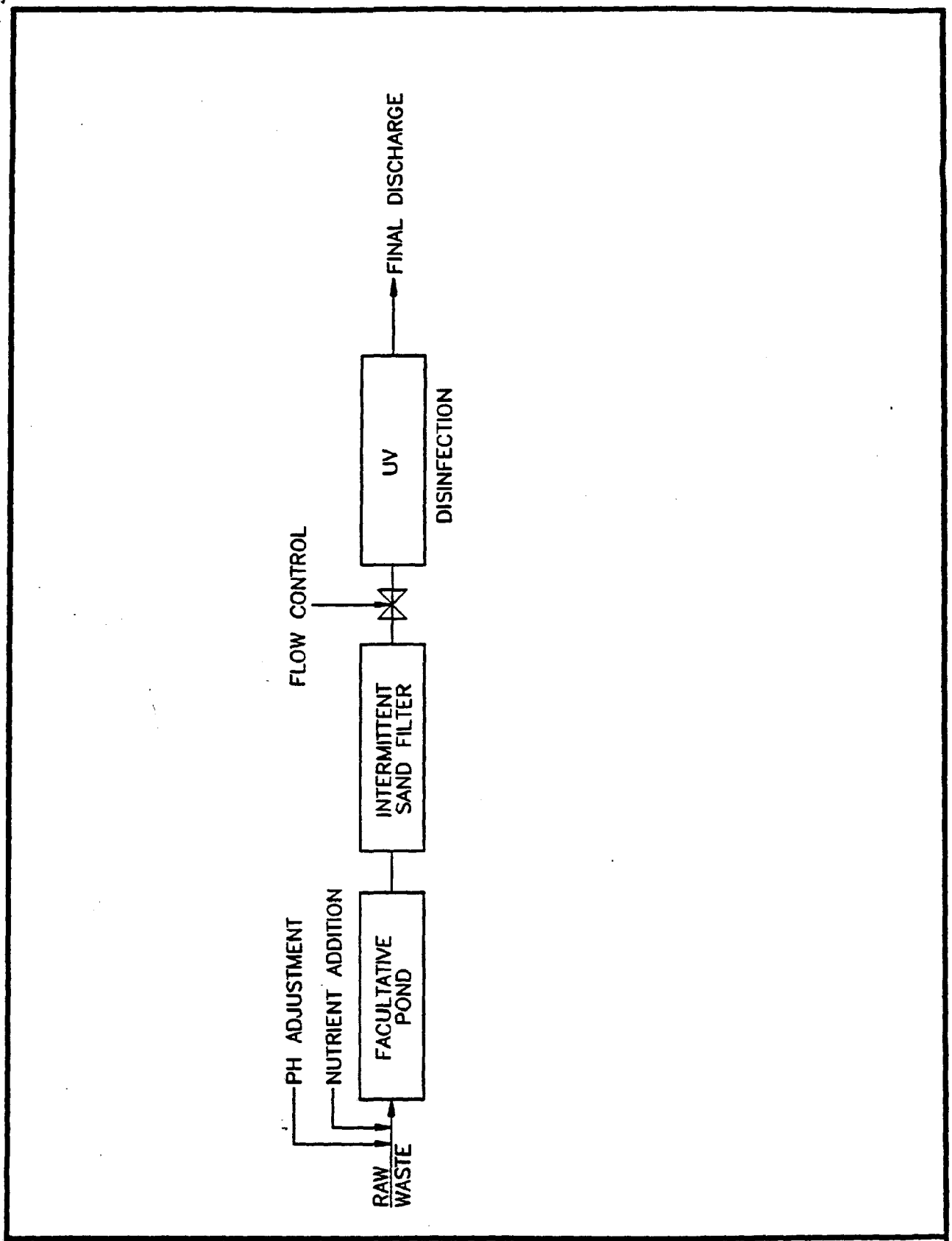
The environmental impact of a rapid infiltration system would be quite low. These systems remove a large majority of the pollutants prior to discharge to the groundwater table. Treatment would be very similar to standard septic/tile field systems.

5. Stream Discharge

Although the present VPDES permit requires discharge to be eliminated prior to expiration of the permit for four (4) of the facilities, an attempt was made to determine what treatment technology could be utilized to meet the expected permit limits. As stated earlier, the permits would be less than 10 mg/l for BOD_5 and TSS. A physical chemical process would appear to be the most reliable mean of meeting such strict limits. Screening, pH adjustment, chemical feed, coagulation, sedimentation, filtration, carbon adsorption and disinfection would most likely achieve the desired goals.

Chlorine would not be used as a disinfectant for a treatment alternative discharging to the streams. A UV system would be incorporated for disinfection. Other portions of the unit process would, in all likelihood, have to be sized larger to provide an additional consistent degree of treatment to meet the permit limits. Exhibit IV-10 shows the recommended unit processes that would be used. Exhibits IV-11 through IV-14 show other unit processes that were evaluated and found to be more expensive.

EXHIBITS



cabe 100-363 MAY, 1992 100A084C	STREAM DISCHARGE BIOLOGICAL – PHYSICAL	EXHIBIT IV-14

cape
100-363
MAY, 1992
100A086C

COMPARATIVE MATRIX DISPOSAL METHODS

EXHIBIT IV-1

COMPARATIVE MATRIX DISPOSAL METHODS
LAUNDROMAT WASTEWATER PROJECT
ACCOMACK-NORTHAMPTON PLANNING DISTRICT COMMISSION

DISPOSAL ALTERNATIVE	TECHNICAL MERIT (YES/NO)	POTENTIAL OWNER LIABILITY	CONSTR. COST	OPERAT. COST	LAND REQ.	ENVIRO IMPACT	FUTURE USE LIMITATION	OPERATION COMPLEXITY	CONSTR. COMPLEXITY	RELATIVE EFFECTIVENESS	RELATIVE RANKING
RELATIVE IMPORTANCE		15	20	15	20	7	5	5	3		
I. PUBLICLY OWNED TREATMENT WORK	YES (1)	1	6	5	1	1	1	2	3	261	1
II. HAULING	YES	1	2	10	1	2	2	5	2	280	2
III. NO DISCHARGE											
A. SUBSURFACE											
1. CONVENTIONAL	YES	3	4	3	4	4	5	3	4	330	3
2. ELEVATED MOUND	YES	3	5	4	5	4	5	3	4	385	4
B. RAPID INFILTRATION	YES	5	6	5	3	5	5	4	6	426	5
C. SPRAY IRRIGATION											
1. CROPLAND	YES	5	4	5	8	6	4	6	4	494	7
2. WOODLAND	YES	5	5	5	9	6	4	6	5	537	8
D. EVAPORATION	YES	6	9	8	3	5	6	6	8	569	9
E. RECYCLE/ REUSE	YES	9	9	7	2	3	5	9	7	572	10
IV. STREAM DISCHARGE	YES	10	8	6	2	8	5	8	7	582	11

NOTES : (1) WHERE POTW IS WITHIN RESONABLE DISTANCE

ACCOMACK-NORTHAMPTON PLANNING DISTRICT COMMISSION
P.O. BOX 417
ACCOMAC, VIRGINIA 23301
(804) 787-2936
FAX (804) 787-4221

MEMBERS

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THOMAS H. DIXON, III, VICE CHAIRMAN
T. STEWART BAKER
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N. W. TERRY
GWENDOLYN F. TURNER
H. C. WESSELLS II

COUNTIES
ACCOMACK
NORTHAMPTON

TOWNS
ACCOMAC
BELLE HAVEN
BLOXOM
CAPE CHARLES
CHERITON
CHINCOTEAGUE
EASTVILLE
EXMORE
HALLWOOD
KELLER
MELFA
NASSAWADOX
ONANCOCK
ONLEY
PAINTER
PARKSLEY
SAXIS
TANGIER
WACHAPREAGUE

May 22, 1992

EXECUTIVE DIRECTOR
PAUL F. BERGE, AICP

Robert W. Martin
Town Manager
Town of Onancock
15 North Street
Onancock, VA 23417

Dear Mr. Martin:

I am writing on behalf of the Accomack-Northampton Coin Operated Laundromat Waste Water Treatment Project Committee. The Committee is working to identify waste water treatment options for five coin-operated laundromats on the Eastern Shore. These laundromats are currently in violation of Virginia Water Control Board regulations and need to develop alternative treatment methods in order to remain in business.

One of the waste water treatment options the Committee is considering is to pump and haul the waste water from the laundromats to a municipal sewage treatment plant. The Committee would like to determine if the Town of Onancock would be able to accept this waste water and treat it at the Onancock Sewage Treatment Plant. The estimated number of gallons per day would vary from 3,000 to 20,000 gpd depending upon how many of the laundromats participated.

Could you please advise the Committee of the availability of the Onancock Sewage Treatment Plant for a pump and haul program?

Thank you for considering this request. If you have any questions, please call me.

Sincerely yours,

James M. McGowan
Director of Planning

cc: Bob Kerr, P.E.
Cabe Associates
Paul F. Berge, AICP
Executive Director

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EXHIBIT IV-2

ACCOMACK-NORTHAMPTON PLANNING DISTRICT COMMISSION
P.O. BOX 417
ACCOMAC, VIRGINIA 23301
(804) 787-2936
FAX (804) 787-4221

MEMBERS

JULIA E. MAJOR, CHAIRMAN
THOMAS H. DIXON, III, VICE CHAIRMAN
T. STEWART BAKER
CHARLES S. BELL
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COUNTIES
ACCOMACK
NORTHAMPTON

TOWNS
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BELLE HAVEN
BLOXOM
CAPE CHARLES
CHERITON
CHINCOTEAGUE
EASTVILLE
EXMORE
HALLWOOD
KELLER
MELFA
NASSAWADOX
ONANCOCK
ONLEY
PAINTER
PARKSLEY
SAXIS
TANGIER
WACHAPREAGUE

EXECUTIVE DIRECTOR
PAUL F. BERGE, AICP

May 22, 1992

Dick Barton
Town Manager
Town of Cape Charles
Box 391
Cape Charles, VA 23310

Dear Mr. Barton:

I am writing on behalf of the Accomack-Northampton Coin Operated Laundromat Waste Water Treatment Project Committee. The Committee is working to identify waste water treatment options for five coin-operated laundromats on the Eastern Shore. These laundromats are currently in violation of Virginia Water Control Board regulations and need to develop alternative treatment methods in order to remain in business.

One of the waste water treatment options the Committee is considering is to pump and haul the waste water from the laundromats to a municipal sewage treatment plant. The Committee would like to determine if the Town of Cape Charles would be able to accept this waste water and treat it at the Cape Charles Sewage Treatment Plant. The estimated number of gallons per day would vary from 3,000 to 20,000 gpd depending upon how many of the laundromats participated.

Could you please advise the Committee of the availability of the Cape Charles Sewage Treatment Plant for a pump and haul program?

Thank you for considering this request. If you have any questions, please call me.

Sincerely yours,

James M. McGowan
Director of Planning

cc: ✓ Bob Kerr, P.E.
Cabe Associates
Paul F. Berge, AICP
Executive Director

Recycled Paper

EXHIBIT IV-3

RECEIVED
JUN 01 1992
PLANNING DISTRICT COMMISSION

STARR S. MASON, Mayor

Town of Onancock

Municipal Building
15 North St.
Onancock, Virginia 23417
(804) 787-3363

Council
Ben F. Askew
Ben Byrd
E. Dean Edwards

Council
Reed Ennis
Ivan W. Gibb
Joan Recor

May 29, 1992

Mr. James M. McGowan
Director of Planning
Accomack-Northampton Planning District Commission
Post Office Box 417
Accomac, Virginia 23301

RE: Accomac-Northampton Laundromat Wastewater Treatment Project

Dear Jim:

In response to your May 22, 1992 letter, we wish to advise that the Onancock Wastewater Plant is being overloaded due to the strength of influent entering the plant ie, (B.O.D. & Phosphate). Therefore at this time, we will be unable to accept the wastewater from the coin-operator laundromats outside the corporate limits of Onancock.

We would strongly suggest that the referenced issue be addressed in the upcoming Central Accomack Sewage Study.

If you have any further questions, please feel free to call Steve Thomas or me.

Very truly yours,

Robert Wm. Martin
Town Manager

RWM/sd
cc: S. Thomas
DOC5\L592-29

EXHIBIT IV-4

Municipal Corp. of
Cape Charles
Office of the Town Manager

June 3, 1992

Mr. James M. McGowan
Director of Planning
Accomack-Northampton PDC
P.O. Box 417
ACCOMAC, VIRGINIA 23301

Dear Jim:

Sorry for the delay in responding to your letter of May 22, 1992. I have discussed the matter of waste disposal for the five coin operated laundromats on the Shore with Roy Furches, Director of Utilities, and we are agreeable to accepting it on a pump and haul basis.

Establishing an equitable rate creates a minor problem in that the Town should amend the sewer ordinance to establish a uniform class for this type service, but for the sake of discussion, please consider the following. Your estimate is a range from 3,000 to 20,000 gpd depending on the participation. Our existing sewer rate is based on the water consumed and is as follows:

0 to 2,000 gallons	$8.00 minimum
2,000 to 10,000 gallons	$3.42 per 1,000
over 10,000 gallons	$2.53 per 1,000

However, your proposal would require special handling and again that depends on volume and frequency of delivery. If that information was available possibly an annual rate with quarterly billing could be established. Although a grant is involved, I assume that the individuals laundromats will be responsible for the bill. All of this is negotiable.

Again for the sake of discussion consider the following laundromat rate:

0 to 2,000 gallons	$12.00 minimum
2,000 to 10,000 gallons	$5.25 per 1,000
over 10,000 gallons	$3.75 per 1,000

Therefore, based on your low estimate of 3,000 gpd, a bill would be $17.25 and your high estimate of 20,000 gpd a bill would be $91.50.

EXHIBIT IV-5

I hope this will be helpful in your deliberations.

Sincerely,

Richard Barton
Town Manager

RB/bs

cc: Mayor & Council
Town Attorney
Director of Utilities

cape
100-363
MAY, 1992
100A087C

COMPARATIVE MATRIX ON-SITE DISPOSAL

EXHIBIT
IV-6

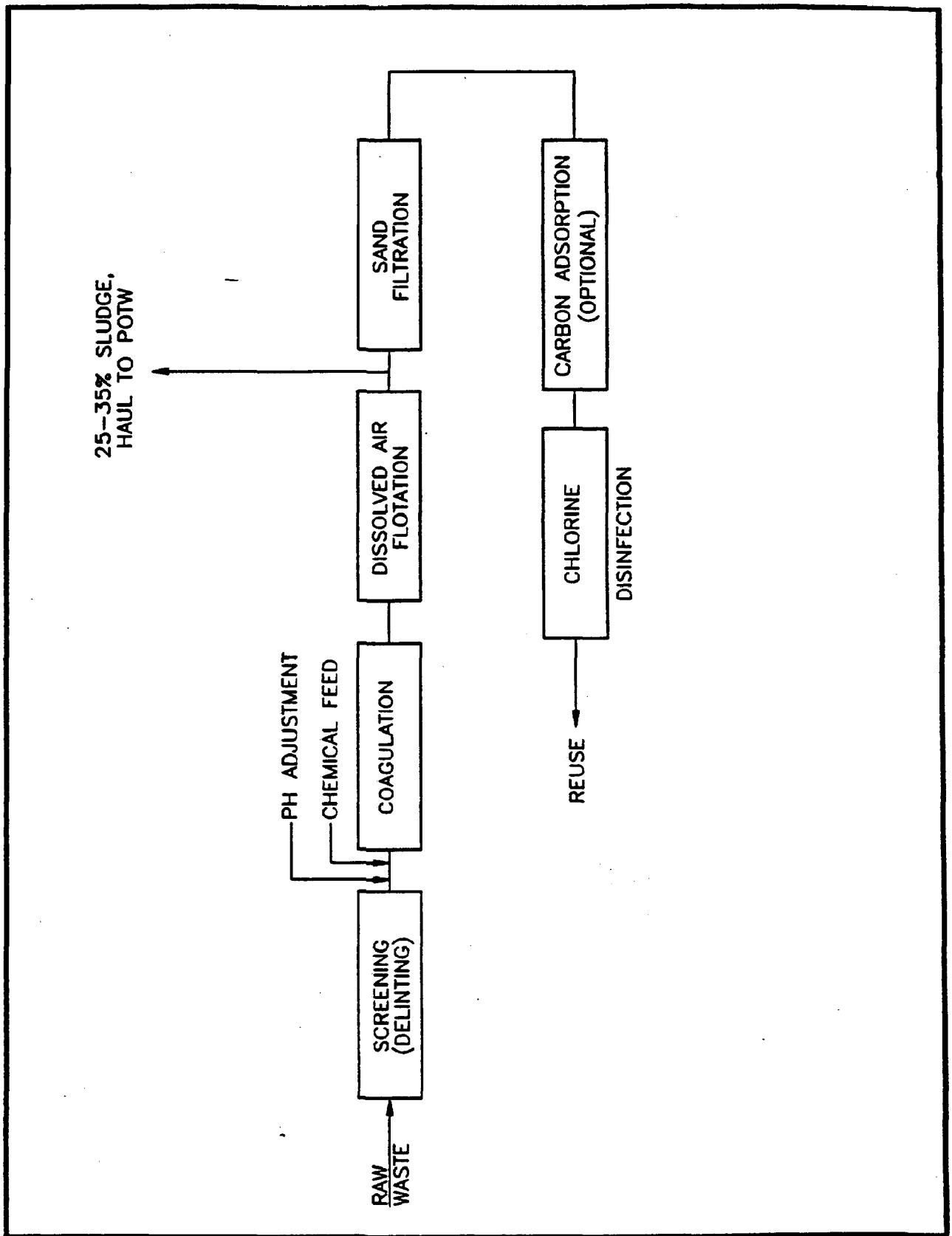
COMPARATIVE MATRIX ON-SITE DISPOSAL
LAUNDROMAT WASTEWATER PROJECT
ACCOMACK - NORTHAMPTON PLANNING DISTRICT COMMISSION

FACILITY LOCATION :	CHINCOTEAGUE	NELSONIA	ONLEY	EXMORE	EASTVILLE
SUITABILITY DATA					
MOST LIKELY SOIL TYPE :	ASSATEAGUE	DRAGSTON	DRAGSTON	NIMMO	BOJAC
OTHER LIKELY SOIL TYPES :	UDORTHENTS	NIMMO	MUNDEN		DRAGSTON
	FISHERMAN	BOJAC	NIMMO		MUNDEN
TYPICAL PERC. RATE (MIN/IN) :	3	20	20	85	20
DEPTH TO WATER TABLE (IN) * :	32	84	42	38	48
SCS SEPTIC SYSTEM LIMITATION :	SEVERE	SEVERE	SEVERE	SEVERE	MODERATE
APPROX. AVAILABLE SITE AREA (SF) ** :	3,400	9,900	4,700	4,000	200
SIZING BASED ON METERED FLOW DATA					
MAXIMUM FLOW BASED ON LOADS PER DAY (GPD)	8,500	3,400	2,550	5,100	4,760
EST. SEPTIC TANK CAPACITY (GAL) :	13,900	6,200	5,000	8,800	8,300
EST. DISPOSAL AREA SUBSURFACE (SF) :	9,000	4,900	3,700	16,900	6,900
EST. DISPOSAL AREA MOUNDS (SF) :	13,200	8,100	6,500	22,500	10,600
EST. DISPOSAL AREA SPRAY IRRIGATION (SF) :	47,700	19,100	14,300	28,600	28,700
EST. DISPOSAL AREA RAPID INFILTRATION (SF) :	3,200	1,300	900	6,200	1,800
CONCLUSION * **					
SUBSURFACE % OF AVAILABLE SITE AREA :	260%	50%	80%	420%	3450%
MOUND % OF AVAILABLE SITE AREA :	390%	80%	140%	560%	5300%
WOODED SPRAYING % OF AVAILABLE SITE AREA :	1400%	190%	300%	720%	13350%
RAPID INFILTRATION % OF AVAILABLE SITE AREA :	90%	10%	20%	160%	900%
ADDITIONAL MINIMUM AREA REQUIRED (ACRES) :	0.1 - 1.1	0.0 - 0.4	0.0 - 0.3	0.1 - 0.7	0.0 - 0.6

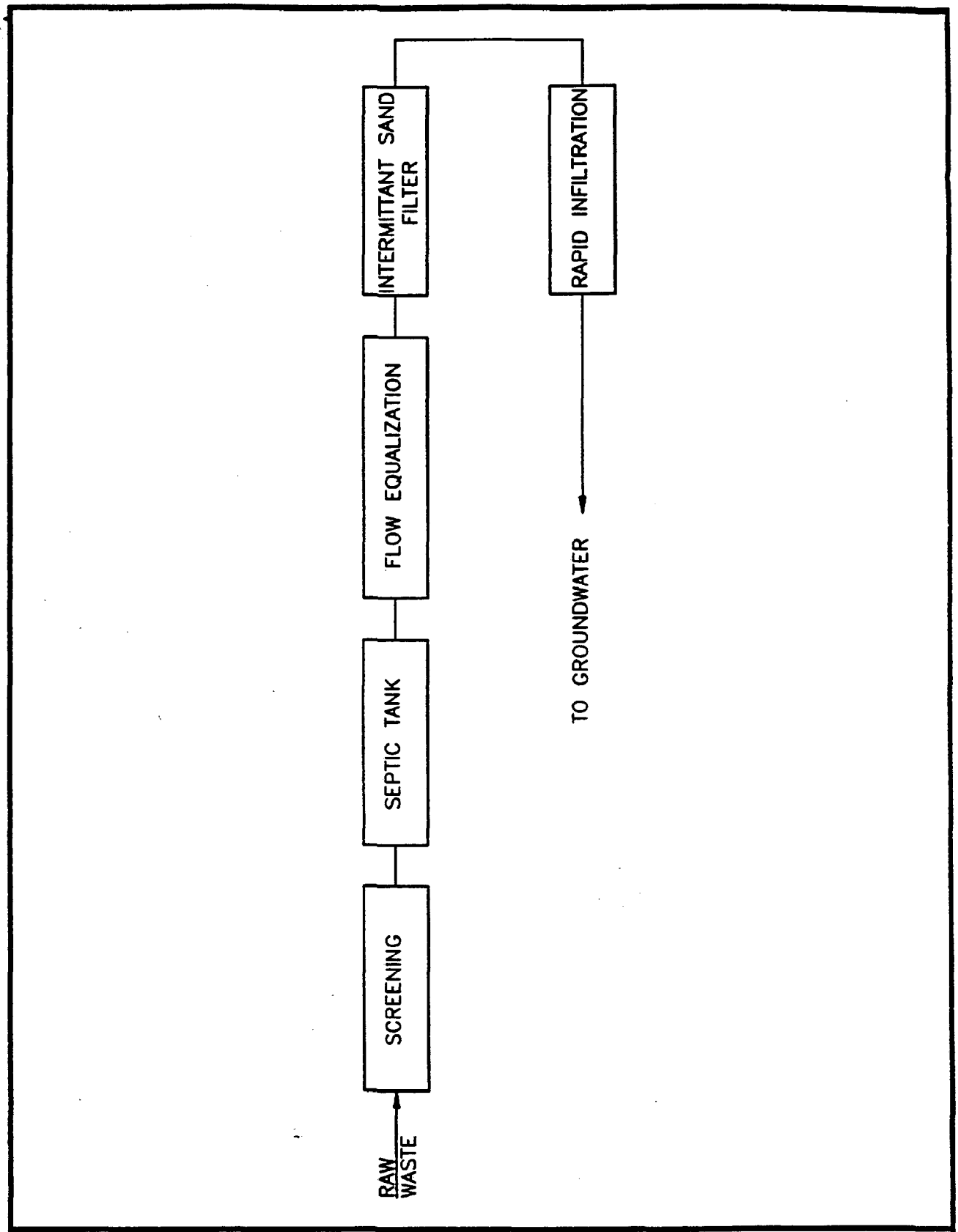
* DEPTH TO WATER TABLE MEASURED 4/2/92, SEASONAL HIGH MAY BE CLOSER TO GROUND SURFACE
** 30% OF TOTAL SITE AREA
*** BASED ON CALCULATED FLOW DATA

COMPARATIVE MATRIX TREATMENT
LAUNDROMAT WASTEWATER PROJECT
ACCOMACK-NORTHAMPTON PLANNING DISTRICT COMMISSION

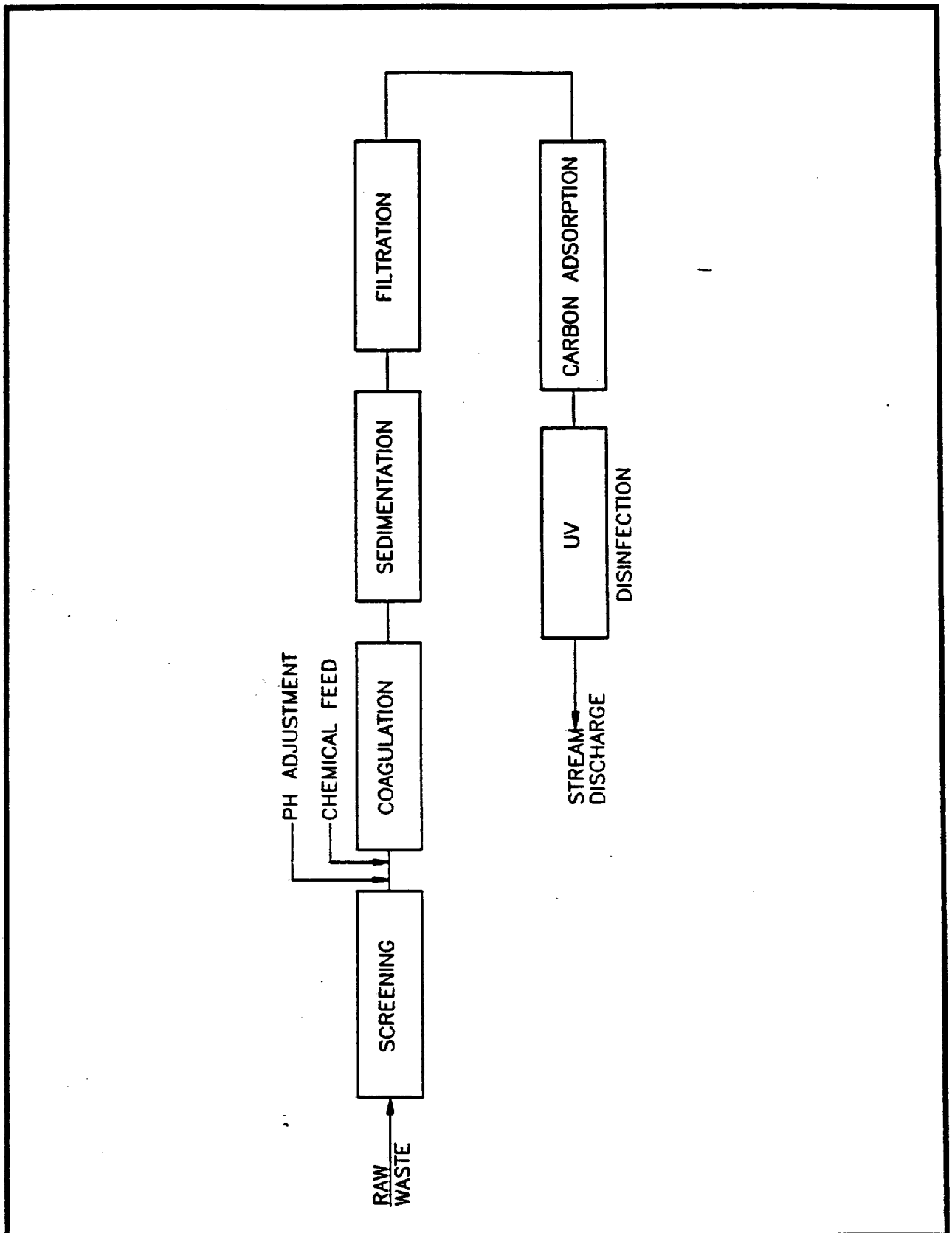
TREAMENT ALTERNATIVE	TECHNICAL MERIT YES/NO	MEETS LIMITS	CONSTR. COST	OPERAT. COST	LAND REQ.	ENVIRO IMPACT	FUTURE USE LIMITATION	OPERATION COMPLEXITY	CONSTR. COMPLEXITY	RELATIVE EFFECTIVENESS
RELATIVE IMPORTANCE		20	15	10	15	10	5	7	3	
SCREENING, SEPTIC, INTERMITTENT SAND FILTER W/ RECIR	YES	2	5	3	3	4	5	3	3	285
SCREENING, SEPTIC, SLOW SAND FILTER	YES	2	5	3	3	4	5	3	3	285
SCREENING, SEPTIC, UPFLOW BIOFILTER	YES	1	6	3	3	4	5	4	4	290
SCREENING, SEPTIC, ANAEROBIC CONTACTOR WITH RECIR	YES	4	5	2	3	4	5	4	5	328
SCREENING, SEPTIC, PLASTIC MEDIA TOWER W/HIGH RECIR	YES	2	6	5	3	4	5	5	5	340
SCREENING, SEPTIC, CONSTRUCTED WETLANDS	YES	2	4	1	8	5	8	2	4	346
SCREENING, SEPTIC, ROTATING DISK	YES	2	6	4	4	4	6	5	5	350
SCREENING, FACULTATIVE LAGOON	YES	2	5	2	8	6	3	3	5	366
SCREENING, SEPTIC, SEQUENCING BATCH REACTOR	YES	2	7	6	3	4	5	8	6	389
SCREENING, SEPTIC, ACTIVATED SLUDGE	YES	2	7	6	3	4	5	8	7	392
SCREENING, SAND FILTER, COAG./CLARIF./CARBON	YES	1	8	9	3	4	5	7	4	401
SCREENING, AERATED LAGOON	YES	2	7	4	8	5	3	4	5	413
SCREENING, SEPTIC, ULTRAFILTRATION/CARBON ADSORPT	YES	1	9	9	3	4	5	7	5	419
SCREENING, SEPTIC, SAND FILTER, CARBON/POLYMER	YES	2	8	9	3	4	6	7	5	429
DIRECT DISCHARGE (NO TREATMENT)	NO									
VACUUM DIATOMITE FILTERS	NO									
FOAM SEPARATION/FRACTIONATION	NO									
SCREENING, SEPTIC, FLOATATION	NO									
DIATOMACEOUS EARTH FILTRATION	NO									
ELECTROLITIC TREATMENT	NO									
REVERSE OSMOSIS	NO									
SOLAR AQUATICS	NO									
SCREENING, SEPTIC, CHEMICALS, FLOTATION	NO									



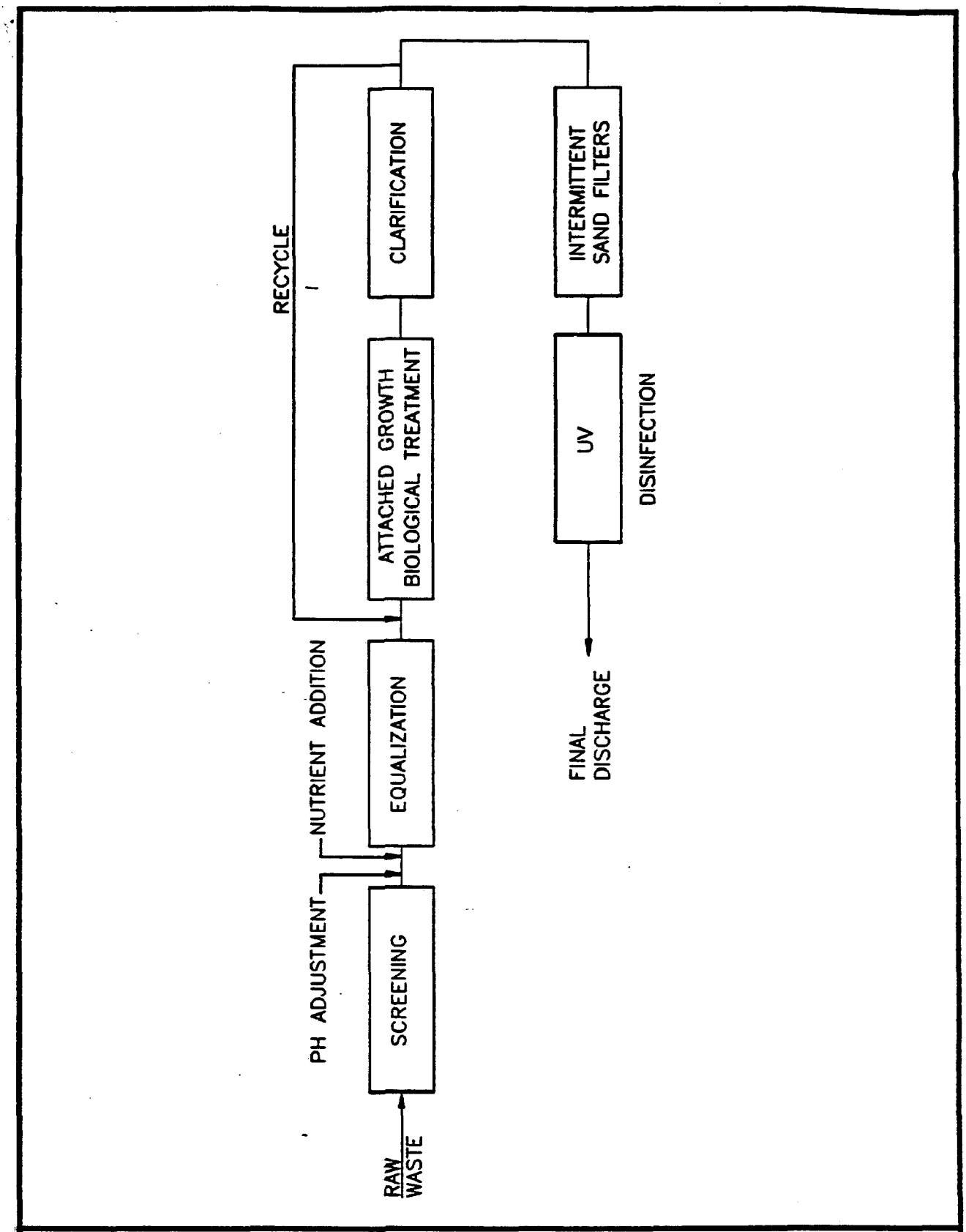
cabe 100-363 MAY, 1992 100A078C	UNIT PROCESS RECYCLE / REUSE	EXHIBIT IV-8



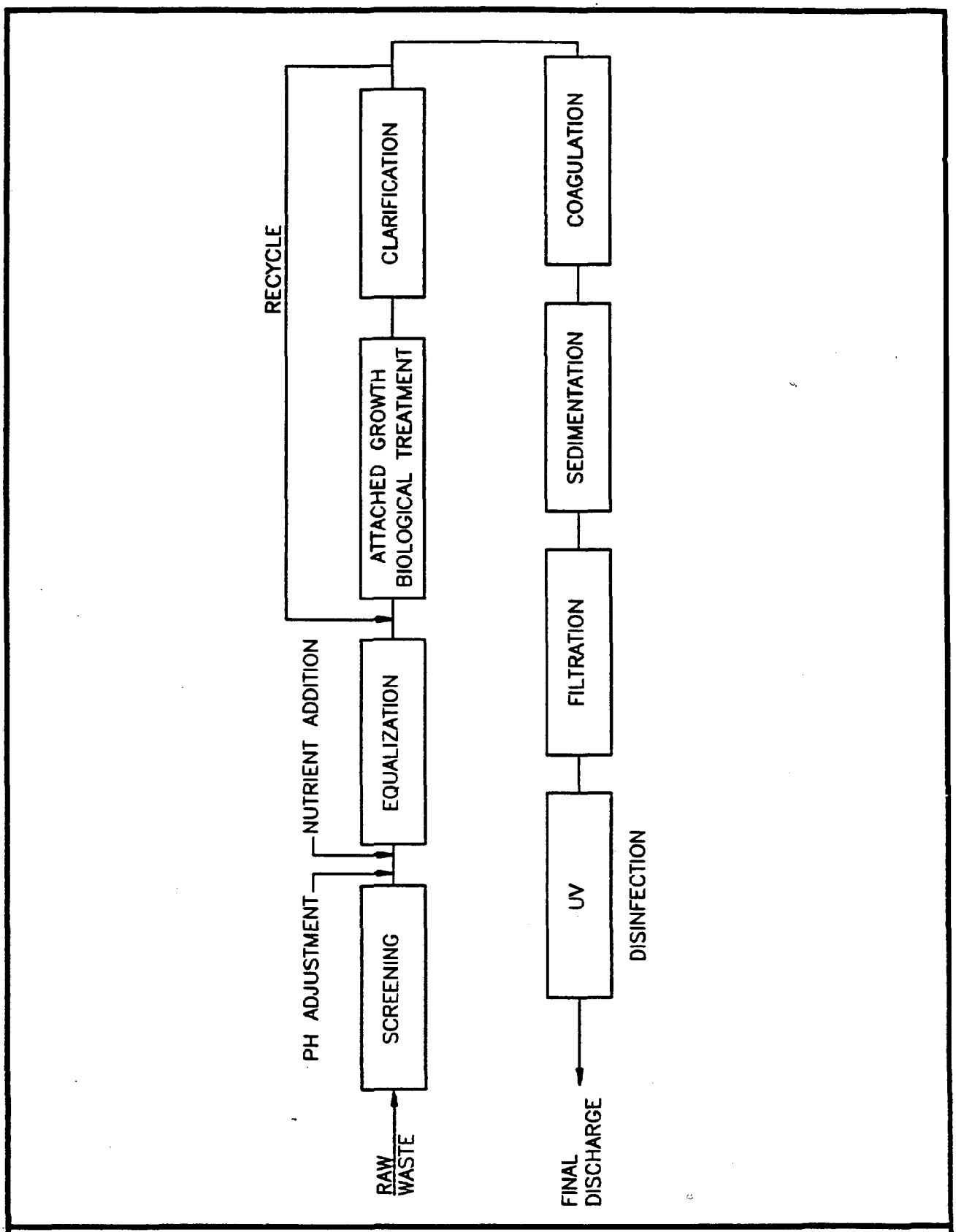
cape 100-363 MAY, 1992 100A079C	UNIT PROCESS ON-SITE	EXHIBIT IV-9



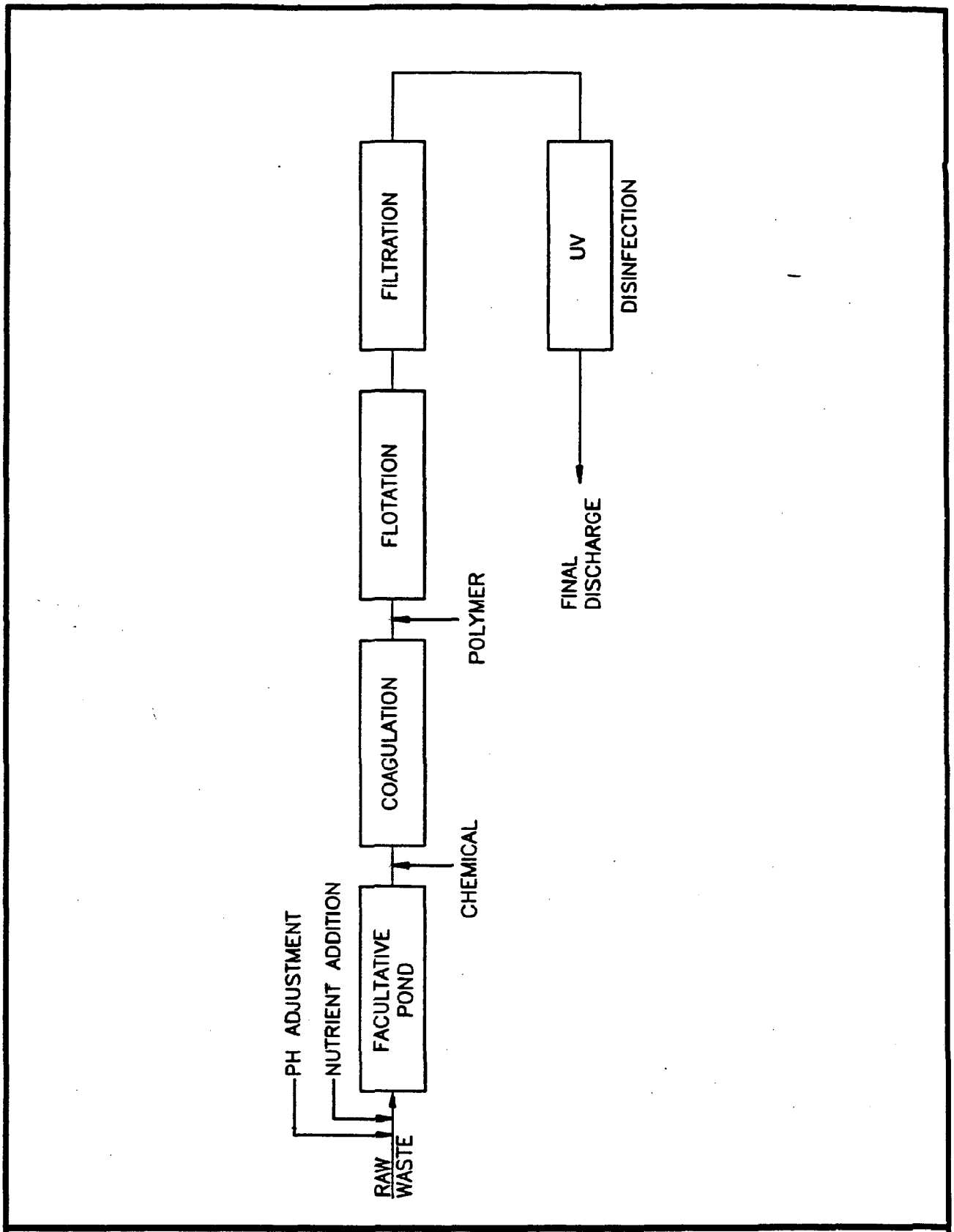
cape 100-363 MAY, 1992 100A080C	UNIT PROCESS STREAM DISCHARGE	EXHIBIT IV-10



cabe 100-363 MAY, 1992 100A081C	STREAM DISCHARGE PHYSICAL – BIOLOGICAL – PHYSICAL	EXHIBIT IV-11



cabe 100-363 MAY, 1992 100A082C	STREAM DISCHARGE PHYSICAL – BIOLOGICAL – PHYSICAL	EXHIBIT IV-12



cabe 100-363 MAY, 1992 100A083C	STREAM DISCHARGE BIOLOGICAL – CHEMICAL – PHYSICAL	EXHIBIT IV-13

ECONOMIC ANALYSIS

CHAPTER V

V. ECONOMIC ANALYSIS

A. Cost of Disposal and Treatment Alternatives

This report reviews treatment and disposal alternatives for five (5) facilities. Eight (8) methods of disposal have been considered in the evaluation and numerous methods of treatment. Each facility has unique features that must be factored into a final design regarding treatment and disposal.

A cost estimate has been prepared for the alternatives and is based on a generic facility. The facility is assumed to have 28 machines with each used 2.5 times per day. This results in a discharge of 2,380 GPD.

1. Capital Cost

The estimated capital cost for each of the treatment and disposal alternatives is shown on Exhibit V-1. Cost of evaporation was not evaluated. The fuel cost alone disqualified this alternative and, therefore, further evaluation was unnecessary. The capital cost estimates are based on 1992 dollars.

2. Operation and Maintenance Cost

The estimated operation and maintenance cost for the treatment alternatives and disposal alternatives are shown on Exhibit IV-2. The cost for operation and maintenance of the treatment and disposal system is also shown on a unit cost basis. This is the additional amount that must be charged to the user per wash load to cover operation and maintenance of the system. The operation and maintenance cost estimates are also based on 1992 dollars.

3. Annual Equivalent Cost of Alternatives

The total annual equivalent cost for each of the alternative treatment and disposal systems is shown on Exhibit V-3. This provides a means for comparison of the alternatives by reducing the cost associated with each alternative to an equivalent base of a uniform annual cost. The annual equivalent cost has been calculated based on a ten year life for the improvements at an annual interest rate of 12%. This rate and term is of course variable based on the lending institution. Loans may be available from the Farmer's Home Administration or from other agencies providing funds for economic development. Also included is the annual equivalent cost expressed as a cost per load of wash. This quickly shows the economic impact to the residents or consumers of the service.

Rapid infiltration has the least annualized cost at approximately $9,100 per year. This is followed closely by discharge to a POTW that is an option for only one (1) facility (Onley) and on-site subsurface. These are annualized at $10,600 and between $10,000 and $16,000 respectively. These alternatives all add between $0.36 and $0.72 to the cost of doing a single load of laundry.

These costs will, of course vary slightly for each facility depending on site specific requirements. Some facilities have existing equipment such as septic tanks and pumping stations that can be utilized in a new system. This will reduce the overall capital costs and potentially reduce additional operation and maintenance expenses. At some locations there is sufficient land for a rapid infiltration system and at others additional land may have to be purchased. This will, conversely, increase capital costs.

B. Laundromat Economic Profile

Coin operated laundromats on the Eastern Shore provide laundry service facilities to residences who are unable or do not desire to own individual laundry facilities. According to the 1990 census, the population of the Eastern Shore is 44,764. The census determined that approximately 21% of the population lives below the poverty level. It is also estimated that between 3,000 and 5,000 seasonal farm workers temporarily live on the Eastern Shore during the growing season. The majority of these temporary workers must rely on these facilities for their laundry needs.

Undoubtedly a major concern of any improvement is the ability of the owner's and ultimately the users to be able to afford the improvements. Information provided by the owner's for the last several years indicate that gross incomes have ranged from $20,000 to $70,000 for each of the five (5) facilities. Information was incomplete for profits but the range is from zero to $19,000 with an average of less than $6,000 annually. These figures are not reflect of the true profit. Most facilities do not show salary deductions which means that the profit figures contain the income of those individuals who own and also operate their facilities.

Owners indicated that the profits the last two (2) years are slightly above the average. This is because they have been hesitant to invest in new equipment or make other improvements due to the uncertainty of their permit status. The cost of a new wastewater treatment and disposal system may be more than can be economically justified. The owner of each facility must decide individually if the cost can be recouped. Based on comments from the owners, all alternatives suggested in this document exceed their financial capability.

Recouping the investment can only be done by increasing the cost of service which may price the service out of the reach of many of the

users. Owners will have to evaluate if this will be an acceptable increase to the users. An increase of $0.50 per load may be required to pay for the capital and operation and maintenance cost of a new system. Many of the users and certainly the seasonal farm workers are low income and have no other means available for washing clothes. The owners do not believe that an increases in the cost per wash will be tolerated by their clientele. Additionally, just to increase the price charged for a load of wash requires the owners make a large investment. Each machine must be modified to accept additional coins.

EXHIBITS

DISPOSAL METHOD	CAPITAL COST
DISCHARGE TO POTW	$46,600
HAUL TO POTW	15,000
RECYCLE/REUSE	57,225
SUBSURFACE	52,000 – 102,000
SUBSURFACE MOUND	58,400 – 118,300
RAPID INFILTRATION	31,500
STREAM	210,000

CAPITAL COST includes those costs necessary to design and construct the disposal method cited. Cost includes all labor, materials and services

DISPOSAL METHOD	ANNUAL O&M COST	ANNUAL O&M COST PER LOAD
DISCHARGE TO POTW	$4,000	$0.18
HAUL TO POTW	47,500	1.53
RECYCLE/REUSE	30,000	0.58
EVAPORATION	198,000	7.80
SUBSURFACE	3,000	0.12
SUBSURFACE MOUND	3,000	0.12
RAPID INFILTRATION	5,000	0.20
STREAM	30,000	1.19

ANNUAL O & M COST (operation and maintenance) includes labor, utilities, materials, outside services, expenses and replacement of equipment and parts to ensure effective and dependable operation on an annual basis.

DISPOSAL METHOD	ANNUALIZED COST	ANNUALIZED COST PER LOAD
DISCHARGE TO POTW	$10,600	$0.42
HAUL TO POTW	40,800	1.61
RECYCLE/REUSE	22,104	0.87
SUBSURFACE	10,000 – 16,000	0.39 – 0.63
SUBSURFACE MOUND	10,500 – 18,200	0.41 – 0.72
RAPID INFILTRATION	9,100	0.36
STREAM	57,010	2.24

ANNUALIZED COST is the expression of a nonuniform series of costs as a uniform annual amount. Annualized cost for the purpose of this exhibit is based on a 10 year term and a 12 percent interest rate for capital investment plus annual operation and maintenance cost.

CONCLUSIONS AND RECOMMENDATIONS

CHAPTER VI

VI. CONCLUSIONS AND RECOMMENDATIONS

The five (5) facilities have limited options for wastewater disposal. Site sizes, soil types, locations relative to POTW's, high water tables, and very limited expendable incomes all contribute to reducing the potential for effectively dealing with this opportunity. Many conclusions can be drawn from this document as it pertains to disposal and treatment. Several important items are as follows:

1. Stream discharge will become impractical, if not impossible, after August 1992 for all five (5) facilities. VPDES compliance schedules requires that four (4) of the five (5) operations cease discharge by that date. Chincoteague, although not identified in the current VPDES permit, faces a similar zero discharge based on conversations with the SWCB.

   It is also reported by the SWCB that if new VPDES permits were to be issued that limits of less than 10 mg/l BOD_5 and 10 mg/l TSS would be necessary to alleviate alleged water quality standard exceedences. A treatment system designed to meet such limits would necessitate an increase of at least $2.25 per wash in fees charged for laundering clothes. An increase of this magnitude could not be tolerated by the area's residents.

2. Hauling wastewater from the subject laundromats to a POTW as a disposal option is also impractical. The cost to haul and treat nearly 3,000 gallons of wastewater per day would require an increase of approximately $1.60 per wash in fees charged for laundering clothes. Again this increase would most likely not be tolerated.

3. Recycle/reuse of wastewater for washing clothes would require extensive treatment to almost the same degree as that required to stream discharge. This alternative is also impractical. The cost

of recycle/reuse would require an increase of at least $0.87 per wash in fees charged for laundering clothes.

4. Evaporation of wastewater is extremely impractical. The cost of fuel alone, not considering capital or maintenance of the system, far exceeds the cost of all other alternatives considered. Fuel costs would add approximately $8.00 to the fee charged for washing a single load of clothes.

5. Spray irrigation, due to a lack of available land at the facilities, is one of the least practical of on-site treatment and disposal options.

6. Subsurface/mound systems provide for reasonably cost effective disposal and treatment. Due to laundromat wastewater characteristics though, this method of disposal may be inappropriate from a long term prospectus. There is significant concern that these systems will fail as a result of suspended solids, BOD, detergent precipitation, etc.

7. Rapid infiltration as a disposal method is not a tried and proven method for laundromat wastewater. This alternative, when coupled with septic facilities and screening facilities may very well prove to be an economical, environmentally sound alternative to stream discharge. Rapid infiltration has been successfully used to treat and dispose of domestic wastewater on the Eastern Shore. A typical layout is shown on Exhibit VI-1. The increase required in per wash fees to cover this alternative would be more than $0.36.

Each coin operated laundromat has slightly differing operating constraints based on size, available land, geographic location, soil types, water table elevations, etc. Due to these minor differences, it is appropriate to provide recommendations on an individual facility

basis. The following identifies the suggested approach for serving each facility with alternative treatment technology.

1. The Chincoteague facility is not located close to a POTW and therefore direct connection is not possible. Space constraints for this facility rule out spray irrigation and subsurface/mound systems. Economically, recycle/reuse, stream discharge, evaporation, and most likely, hauling are beyond good business sense since annualized costs rival gross income for the facility.

   This leaves rapid infiltration as the most likely alternative for this site. This too, is most likely beyond the financial capability of the subject business. Another possibility is to determine what treatment requirements are necessary for a stream discharge. The limits of less than 10-10 have been volunteered as required for discharges to dry ditches by the SWCB. Obviously, the water body at Chincoteague would not be so classified and possibly higher limits with less treatment may be a practical solution. If a stream model yields more attainable limits, then treatment to meet these limits should be evaluated. Further, Chincoteague is in the discussion phase of providing central sewer. Near term connection is unlikely, but might prove to be a solution.

2. The Nelsonia facility is similar in most respects to the Chincoteague facility. One primary difference is that the site must discharge to a dry stream bed and, therefore, lesser limits of treatment for stream discharge are not a consideration. This facility is not located close enough to a POTW to be considered a viable option. Space constraints rule out spray irrigation and possibly subsurface/mound systems. As with Chincoteague recycle/reuse, evaporation, and most likely hauling are beyond the financial wherewithal of the operation. Rapid infiltration is again the least costly, effective technology and is most likely beyond the owner's justifiable cost.

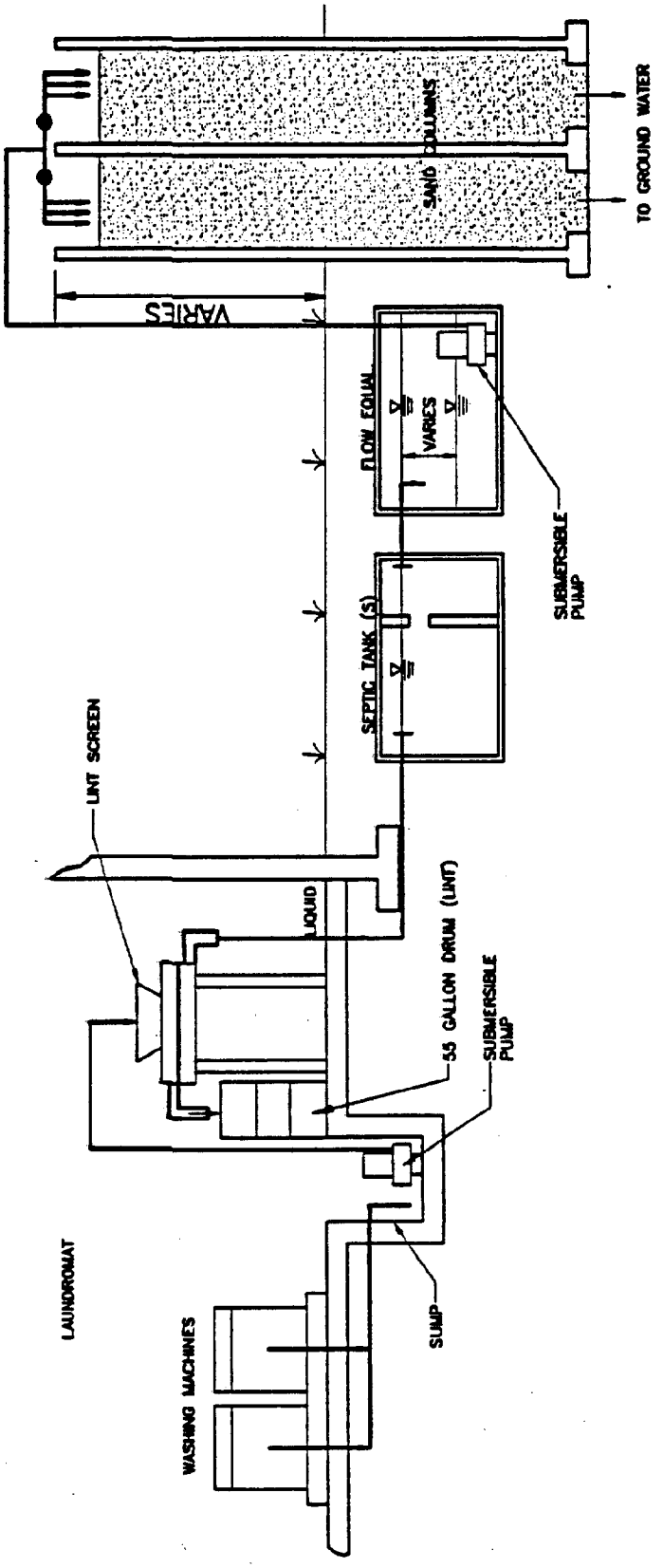
3. The Onley site is in most respects identical to Nelsonia. The only difference of consequence is that connection to a central sewer system may be possible. Based on a review of the current service area of the Onancock POTW, this facility is less than 3,000 feet from a potential connection point. Although not inexpensive, it is suggested that this approach be given priority followed by rapid infiltration if connection is not possible. Further, this facility is located in a planing area that is studying the need for a central sewage collection system. This may improve connection potential in the future.

4. The Exmore facility is in most respects almost identical in character to the Nelsonia facility. The only difference is that the area available for constructing an on-site system is less. Rapid infiltration would be the most feasible near term solution at this site. This facility too, is in a planning area where serious consideration is being given to central sewer service.

5. The Eastville facility is very similar again to Nelsonia. The one difference is that land availability, regardless of alternative treatment technology, will be an issue. This is because the property itself it not owned by the proprietor. If land is available, rapid infiltration should again be considered for this site.

The most cost effective means available to the facility owners, except for a POTW connection, is the technology of a rapid infiltration system. This technology should be tested prior to implementation via a pilot scale investigation. An investigation would range from $8,000 to $20,000 depending on the length and scale of the study. Piloting and further cost estimating are most likely moot issues though, since this technology is still beyond the facility owner's financial capabilities.

EXHIBITS



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MAY, 1992
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TYPICAL LAYOUT
RAPID INFILTRATION

EXHIBIT
VI-1

APPENDICES

ACCOMACK - NORTHAMPTON PLANNING

DISTRICT COMMISSION

COIN OPERATED LAUNDROMAT

WASTEWATER TREATMENT PROJECT

APPENDIX A

Accomack-Northampton Planning District Commission Coin Operated Laundromat Waste Water Treatment Project

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Virginia State Water Control Board
205(j) Water Quality Program
Grant Application

December 31, 1990

Accomack-Northampton Planning District Commission
P.O. Box 417
Accomac, VA 23301

Table of Contents

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II.	Problem to be Addressed	1
III.	Project Description	3
IV.	Final Expected Product	3
V.	Schedule for Completion of Project	4
VI.	Budget	5

Appendix

Exhibit A: Eastern Shore of Virginia
Exhibit B: Location of Coin Operated Laundromats
Exhibit C: Laundromat Effluent Guidelines (October 23, 1987)

Accomack-Northampton Planning District Commission
Coin Operated Laundromat Waste Water Treatment Project

I. Abstract

This grant proposal is to fund a project to develop affordable alternative waste water treatment systems for six coin operated laundromats on the Eastern Shore of Virginia. The proposal requests $15,000 in funding under the Virginia State Water Control Board 205(j) Water Quality Program. These funds will be matched by $5,000 in in-kind services provided by the Accomack-Northampton Planning District Commission and the owners of the six coin operated laundromats. The proposed project will be administered by the Accomack-Northampton Planning District Commission. The proposed project will be guided by a committee made up of Accomack-Northampton Planning District Commission staff, Virginia State Water Control Board staff and the owners of the six coin operated laundromats.

The proposed project will consist of a review of the existing historical research on the laundromat waste water discharge problem, a review of each of the six coin operated laundromat waste water treatment systems, a review of the permit requirements established by the Virginia State Water Control Board (VSWCB), and a detailed set of options for waste water treatment that will meet the VSWCB permit requirements for each of the six coin operated laundromats.

Outputs from the project will consist of a consultants report that will include a description of the identified options for waste water treatment at each of the six coin operated laundromats with the final recommendation or recommendations that will attain compliance with the VSWCB Water Quality requirements.

II. Problem to be Addressed

The Eastern Shore of Virginia includes Accomack and Northampton Counties, Exhibit A, and is the easternmost part of Virginia's Coastal Plain physiographic province. The peninsula is bounded on the east by the Atlantic Ocean, on the west and south by the Chesapeake Bay, and on the north by the State of Maryland.

Currently, there are a total of seven coin operated laundromats in operation on the Eastern Shore of Virginia. Of the seven, only one laundromat discharges its waste water into a municipal waste water treatment system. This laundromat is located in the Town of Onancock and is not included in this study as it is not subject to a VSWCB waste water discharge permit.

Coin operated laundromats provide laundry service facilities to those Eastern Shore residents who are either unable to afford or

do not desire to individually own laundry facilities. In addition, these facilities provide laundry service facilities to the 2,000 to 3,000 migrate farm workers who annually work from May to October on the Eastern Shore as well as tourist visiting the Eastern Shore.

The VSWCB has issued discharge permits to six coin operated laundromats on the Eastern Shore of Virginia. Three of the six coin operated laundromats are located in Northampton County, one each in the Towns of Cheriton, Eastville and Exmore and three laundromats are located in Accomack County, one each in the Towns of Onley, and Chincoteague and one in the Village of Nelsonia, Exhibit B. These privately owned facilities discharge to open drainage ditches which provide essentially zero mixing. Based on the VSWCB Office of Water Resource Management modeling and subsequent guidance to the Tidewater Regional Office, discharge permits which are two years in duration have been issued to the laundromats. These permits mandate that no discharge be attained upon permit expiration. The Tidewater Regional Office will not reissue these permits. Hydraulic models suggest that if treated to the limits of technology, and discharged to a "dry ditch", the receiving streams would not maintain compliance with the Water Quality Standards.

With only a "no discharge" option, these facilities will be forced to close within the next two years unless an affordable alternative can be developed. Both Northampton and Accomack Counties in conjunction with the Accomack-Northampton Planning District Commission are in the early stages of evaluating their future sewage treatment needs. Since expansion of Publicly Owned Treatment Works will require several years, an acceptable interim solution will need to be developed.

A research committee of VSWCB staff members was organized in 1987 to explore alternative treatment options which might achieve VPDES permit compliance. Using technology based limits (BOD 60 mg/1 and TSS 45 mg/1) as a guideline, the committee proposed the following treatment scheme, Exhibit C.

- lint screen
- settling
- aeration
- dosing tank
- alternating sand filters

Effluent quality produced from this treatment scheme would not be adequate to protect Water Quality Standards on the Eastern Shore of Virginia since discharges are to either low flow streams or dry ditches. Modelling of these receiving streams by Tidewater Regional Office personnel has documented standard violations.

III. Project Description

The purpose of the proposed project is to explore the interim or long term options which would allow the private owners of coin operated laundromats to meet the VSWCB permit requirements. In order that "no discharge" options and regional long range planning might be evaluated, the use of 205(j) grant funds are being requested. These funds would be used by the A-NPDC to contract with an engineering firm to develop options for the private owners of coin operated laundromats to utilize in meeting the VSWCB permit requirements. The engineering firm would be expected to provide research into the history of this problem and explore interim or long term options which might allow private owners of coin operated laundromats to continue this service. This proposal is outlined below:

Interim/Long Range Evaluation

- Detailed Description of the option (if technical, provide specifics).
- Financial analysis including costs to the owner and users.
- A discussion of how each option might interface with the construction of local or regional municipal treatment facilities.
- Interim environmental impacts.
- Regulatory community requirements.
- Geographical applicability of the options (county, town, community).
- Input from a Regional Committee including counties, municipalities, PDC, facility owners, the Water Control Board and Health Department.

IV. Final Expected Product

The final product will consist of a consultant report that will include a description of the identified options for waste water treatment, financial analysis, discussion of municipal treatment possibilities, interim environmental impacts, regulatory requirements, geographical applicability of options and the committees' input into the project. Each of the six coin operated laundromats will be provided with the final recommendation or recommendations that will attain compliance with the VSWCB Water Quality requirements.

The consultant report will be utilized by the six coin operated laundromats in order to develop waste water treatments that comply with the Commonwealth's Water Quality requirements and allow this needed service to continue operation in the communities of the Eastern Shore of Virginia.

V. Schedule for Completion

The work for the proposed project will be done on a consultant basis. The Accomack-Northampton Planning District Commission will select a consultant. A proposed work schedule is presented below:

Request for Proposals:	July 1, 1991
Deadline for Proposals:	July 30, 1991
Interviews:	August 10, 1991
Selection:	August 15, 1991
Contract Signed:	August 30, 1991
Plan Development Begins:	September 1, 1991
Progress Reports:	October 15, 1991 January 15, 1992 April 15, 1992 June 15, 1992
Final Report:	June 30, 1992

Estimated Time Frame for Completion. The proposed project will begin July 1, 1991 and end June 30, 1992.

VI. Budget

Below is the budget for the proposed project. The total budget for the proposed project is $20,000. The consultant contract will be for $15,000 and the A-NPDC will provide $5,000 in in-kind services for the administration of the project.

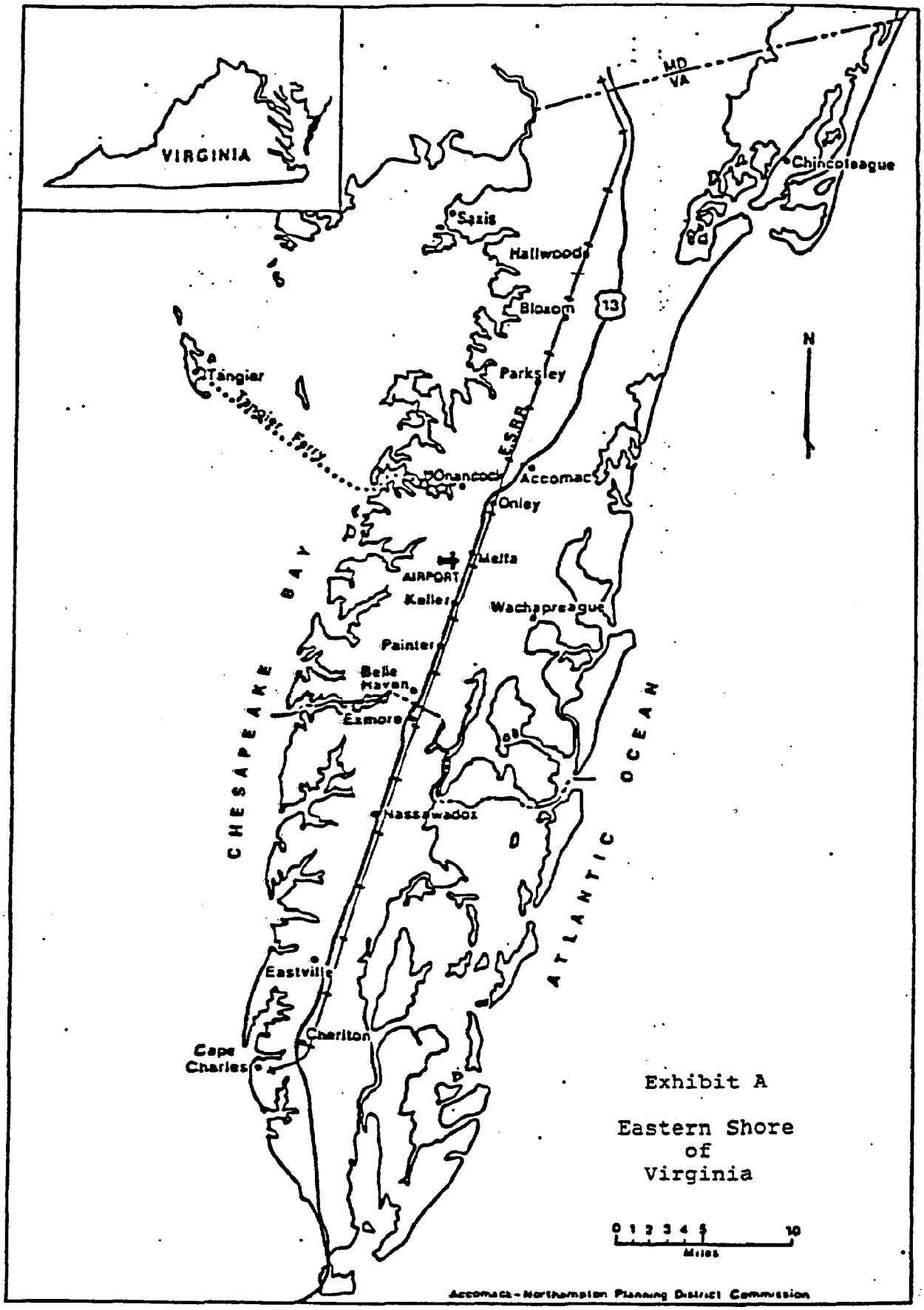
Funding Source	Expenditure
205(j) (cash)	$15,000
A-NPDC (in-kind services)	4,000
Laundromat Mat Owners (in-kind services)	1,000
Total Funding	$20,000

Budget Breakdown

Item	75% 205(j)	25% Local
Salary:		
Executive Director (35 hours)		$ 1,114
Director of Planning (105 hours)		2,302
Laundromat Owners (33 hours)		1,000
Benefits (16.47% of Salaries)		343
Travel		416
Equipment		-0-
Expendable Supplies		-0-
Contractual Services	$15,000	-0-
Indirect (46.32% of Salaries and Fringes)		1,225
Totals	$15,000	$ 5,000

Total Project Budget: $20,000

Appendix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Saxis
Hallwood
Bloxom
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Tangier
Parksley
Tangier Ferry
E.S.R.R.
Onancock
Accomac
Onley
Melfa
AIRPORT
Keller
Wachapreague
Painter
Belle Haven
Exmore
CHESAPEAKE BAY
ATLANTIC OCEAN
Nassawadox
Eastville
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Exhibit A
Eastern Shore
of
Virginia
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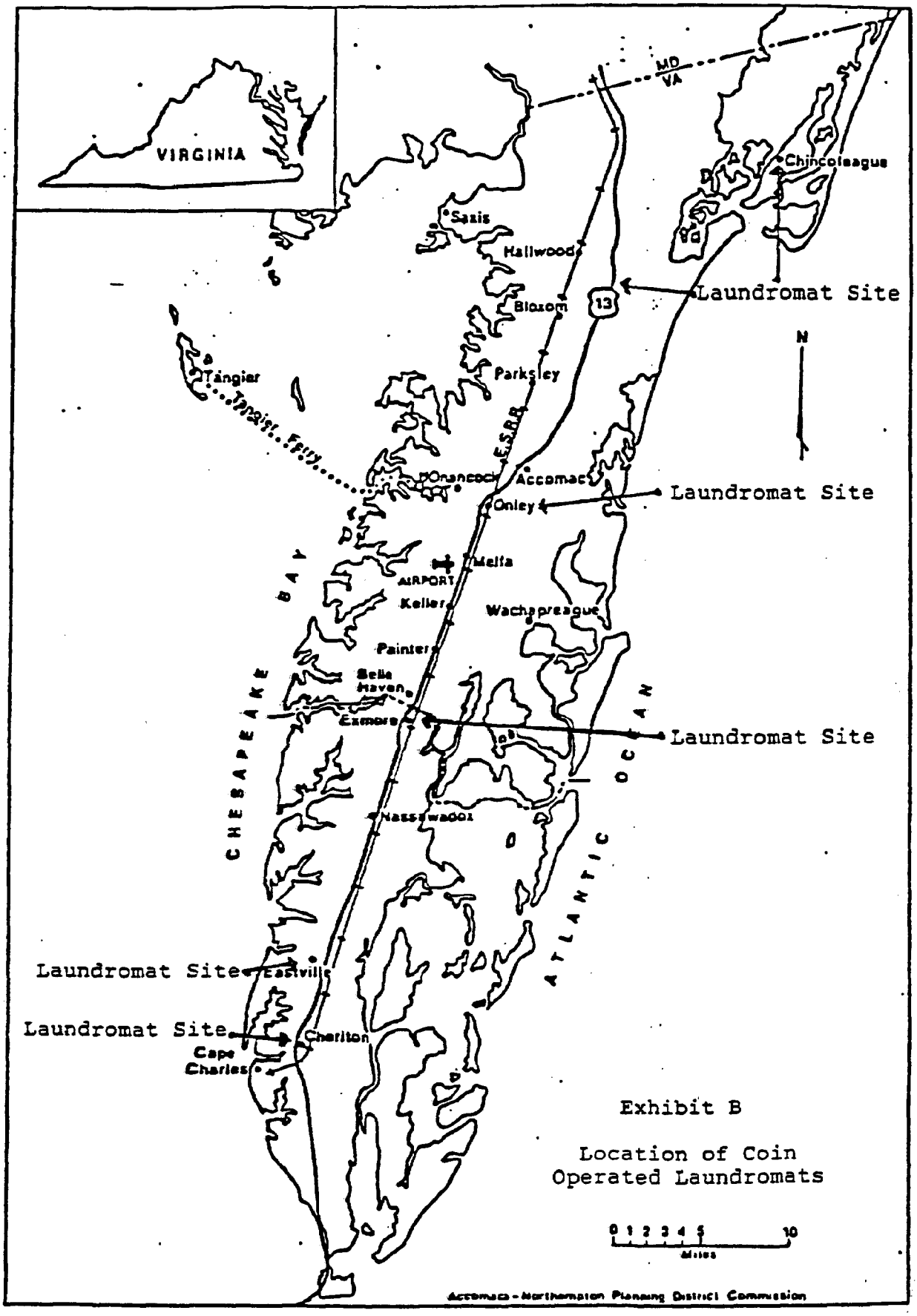
Accomack-Northampton Planning District Commission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Painter
Bells Haven
Exmore
Laundromat Site
Nassawadox
CHESAPEAKE BAY
ATLANTIC OCEAN
Laundromat Site
Eastville
Laundromat Site
Cheriton
Cape Charles
Exhibit B
Location of Coin Operated Laundromats
0 1 2 3 4 5 10
Miles
Accomack-Northampton Planning District Commission

M E M O R A N D U M

STATE WATER CONTROL BOARD—TIDEWATER REGIONAL OFFICE

R E G U L A T O R Y S E R V I C E S S E C T I O N

Pembroke Two - Suite 310 Virginia Beach, VA 23462

SUBJECT: Laundromat Effluent Guidelines - Committee Recommendations

TO: W. L. Woodfin, Jr.

FROM: R. P. Goode - Committee Chairman Bob Goode (RPG)

DATE: October 23, 1987

COPIES: Committee - (F. K. Cunningham, H. A. Donahue, D. L. Thompson)
L. G. Lawson, H. G. Ferguson, Jr., Regional Offices

Using the Laundromat Effluent Limitations - Draft Final Report as a strong base on which to further review laundromat discharges, the Committee which you established has final recommendations for laundromat effluent limitations. The limitations are almost identical to those proposed in the report prepared by Jack Vanderland and OERS.

In follow-up to the OERS draft report, the Committee has been in touch with two other states which require a similar treatment scheme to meet the recommended technology-based limitations. Tennessee, which has an approved septic tank/sandfilter design, noted that the system shows good compliance (ie. BOD_5 in the range of 25 - 30 mg/l) while Pennsylvania could not supply any information. In addition, based on a facility in the Southwest Regional Office area, we are recommending a system slightly modified from the OERS recommendation which should provide some improvement in removal efficiency.

I. FINAL RECOMMENDATIONS

All laundromat discharges will be required, as a minimum, to meet the technology-based limitations listed below. Any discharge where the technology limitations would not meet water quality (e.g. dry ditch discharge), a basic model would be utilized to determine limitations for BOD_5 with TSS following suit. Where chlorine limitations are required, a standard mass balance, as in the NPDES permit manual, would be conducted. If dechlorination is shown to be necessary (e.g. dry ditch discharge), the dechlorination language would be incorporated.

II. TECHNOLOGY LIMITATIONS

A. All Dischargers - exception shellfish and public water supply designations

Parameter	Limit	Frequency*	Type
Flow	NL**	1/month	estimate
BOD_5	60 mg/l (max)	1/month	grab
TSS	45 mg/l (max)	1/month	grab
pH	WQS	1/month	grab

* See Special Condition No. 3
** NL —No limit however, reporting is required.

B. Dischargers to Shellfish and Public Water Supply Designated Waters

Parameter	Limit	Frequency*	Type
Flow	NL**	1/month	estimate
BOD_5	60 mg/l (max)	1/month	grab
TSS	45 mg/l (max)	1/month	grab
Fecal Coliform	400 N/CML (max)	1/month	grab
Cl_2 Residual	see below	1/month	grab
pH	WQS	1/month	grab

* See Special Condition No. 3
** NL —No limit however, reporting is required.

Cl_2 Residual	1.5-2.5 mg/l	special standard waters
	1.0-2.0 mg/l	other waters

Omitted from the existing limitations are the following:

Oil and Grease - This parameter was omitted as it was believed that the proposed technology would remove some of the oil and grease and it would also prevent inaccurate values due to surfactants.

Temperature - This parameter was omitted as it would not be a problem after going through the proposed treatment system.

Fecal Coliform - As the wastewater is considered industrial waste, not sanitary, limitations would not routinely be incorporated. In addition, the potential for high fecal coliform is somewhat mitigated through the use of bleach. An exception for this parameter is noted for shellfish and public water supply designated waters.

Chlorine Residual - The proposed treatment system should strip out chlorine produced by the bleach. An exception for this parameter is noted for shellfish and public water supply designated waters.

C. Permit Special Conditions

1. Standard EPA reopener

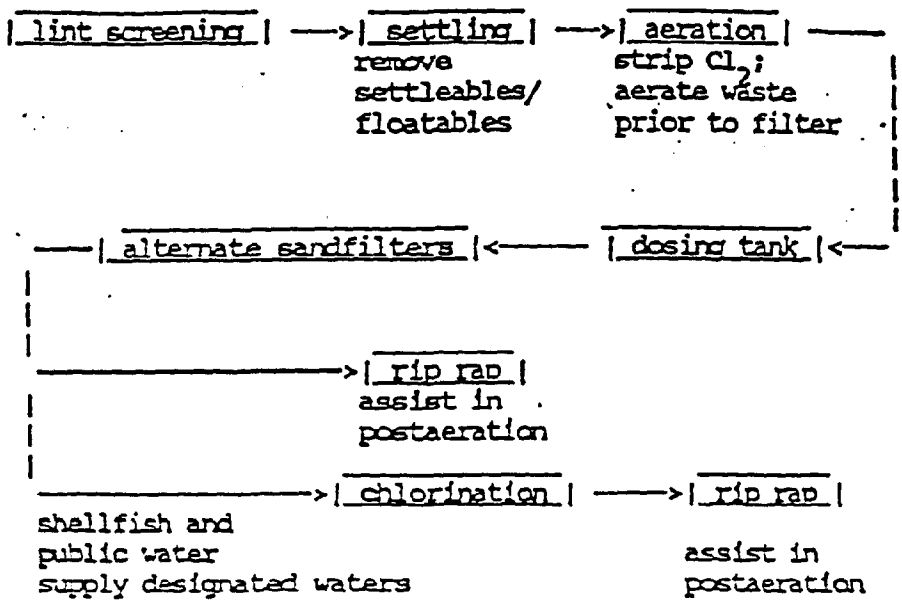
2. Operations and Maintenance Manual

The permittee will develop an operations and maintenance manual for the treatment system. This manual will address, as a minimum, treatment system design, treatment system operation, maintenance of each unit within the treatment system, critical spare parts inventory and recordkeeping. A copy of the manual will be submitted to the _____ Regional Office of the State Water Control Board for staff review and approval. Once approved, the permittee shall operate and maintain the treatment system in accordance with the manual.

3. Monitoring Frequency Reduction

If the permittee can demonstrate compliance with all limitations contained within this permit for a minimum of six (6) consecutive months, the staff may consider a permit amendment to reduce the monitoring frequency to once per quarter.

III. SUGGESTED TREATMENT SCHEME FOR TECHNOLOGY LIMITATIONS



IV. EXISTING DISCHARGES

Permits would be modified to incorporate final limitations and include a Consent Order which would incorporate a schedule for upgrade to meet the final limitations within two years.

Example Schedule:

1.	Submit plans and specifications for review and approval.	4 months after Order is issued
2.	Start construction	3 months after plans and specifications are approved
3.	Complete construction	12 months after no. 2
4.	Comply with all effluent limitations	3 months after no. 3

If an owner does not accept a Consent Order for upgrade, enforcement action for permit violations would be initiated.

V. NEW PROPOSALS

Recommend connection to central sewerage facilities if available, otherwise meet technology or water quality limitations upon issuance.

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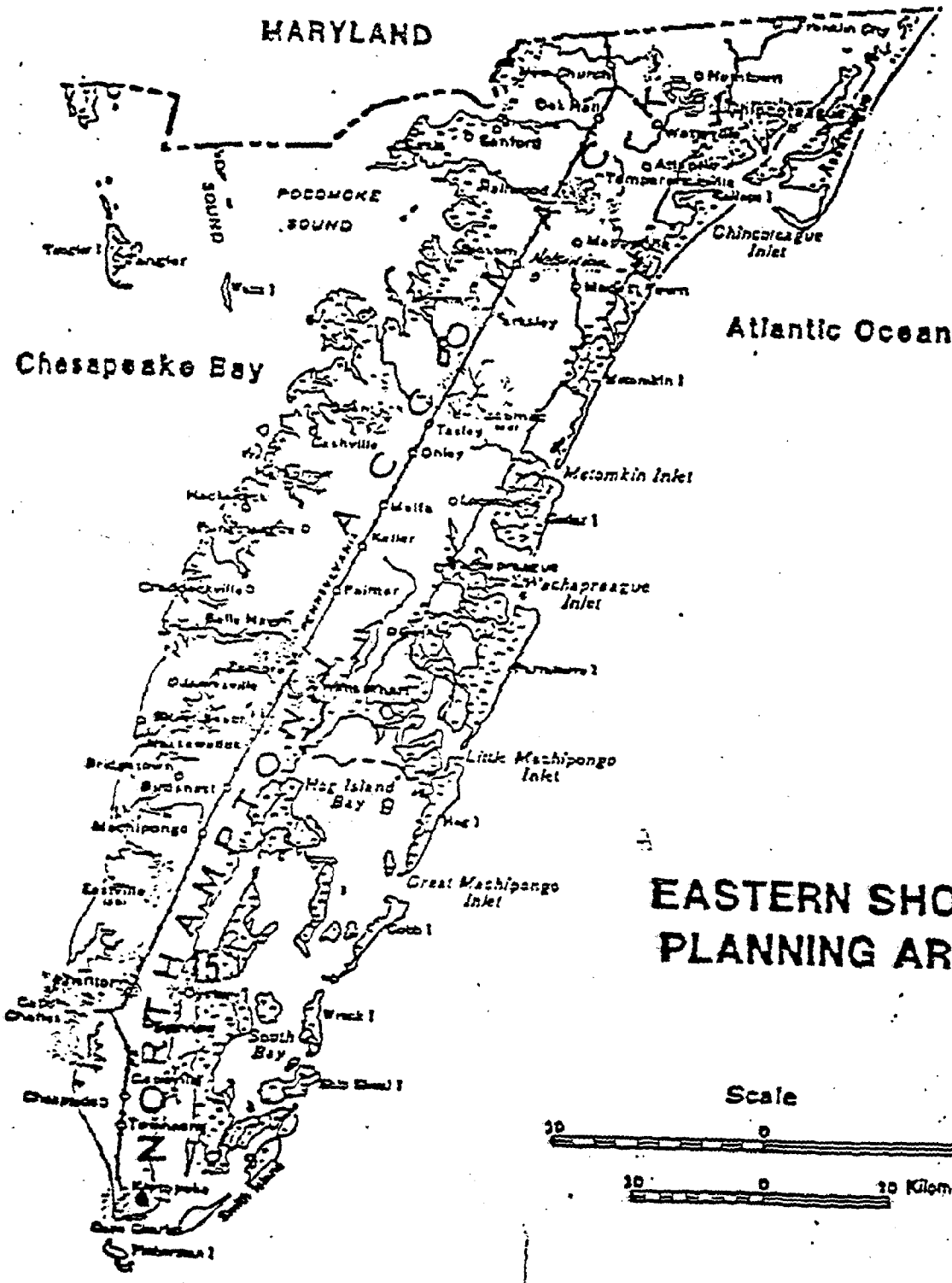

MARYLAND
POCOMOKE SOUND
Chesapeake Bay
Atlantic Ocean
Chincoteague Inlet
Metomkin Inlet
Wachapreague Inlet
Little Machipongo Inlet
Hog Island Bay
Great Machipongo Inlet
South Bay
ACCOMACK
NORTHAMPTON
EASTERN SHORE
PLANNING AREA
Scale
30 0 30 Miles
30 0 30 Kilometers

Source: SWCB

B. SCHEDULE OF COMPLIANCE

The permittee shall achieve compliance with the final limitations specified in this permit in accordance with the following schedule:

1.	Submit plans or letter of intent to achieve final effluent limitations	February 10, 1991
2.	Submit Status Reports	August 10, 1991
3.	Submit Status Reports	February 10, 1992
4.	Achieve Compliance with Final Effluent Limitations	August 10, 1992

No later than 14 calendar days following a date identified in the above schedule of compliance, the permittee shall submit to the Board, either a report of progress or, in the case of specific actions being required by identified dates, a written notice of compliance or noncompliance. In the latter case, the notice shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.

FACILITY QUESTIONAIRES

APPENDIX B

COIN OPERATED LAUNDROMAT WASTEWATER TREATMENT PROJECT

QUESTIONNAIRE - EASTVILLE LAUNDROMAT

OPERATIONS

1. How many washing machines do you have? 18

2. Are all of your machines normally working? yes If the answer is no, how many machines are routinely out of service? _____

3. What time do you open? 7^30 AM

4. What time do you close? 8 PM

5. How many days per week are you open? 7

6. What is your busiest day of the week? Saturday

7. What percentage of your business occurs on the busiest day? 25%

8. What is your busiest season? Summer

WASHING MACHINES

1. How many gallons of water are utilized, on an average, per wash cycle? 34

2. How many gallons of water do you use per day? 3,000 per week? 21,000 per month? 90,000 (during your busiest times of the year)

3. Please provide us with all monthly or quarterly water usage (water bills) summaries that are available.

100-3

4. On your busiest days of the year how many loads of wash do you estimate are done at your facility? 100 - 140

WASTEWATER

1. When the washing machines discharge from your building we believe that the treatment system is as follows:

   Wastewater exits the laundromat and discharges into a small settling tank which measures approximately 4 feet wide, 8 feet long and 4 feet deep. From this tank water spills over into a 10,000 gallon below grade concrete tank. Wastewater then exits the 10,000 gallon tank which has a submersible pump with a float to transfer the wastewater from this tank to the stream discharge point.

   Please review this last statement carefully and provide us with any additional information that you may have on the sheet of paper provided at the end of the questionnaire. Please add any underground tankage you may have that we were unable to identify on our site visit. Please provide sizes of all tanks if they are known and make any corrections to our narrative statement.

Additional Land

1. Do you own the land that your laundromat is situated on? no

2. What is the lot (or parcel) size in square feet or acres. 20'x20'

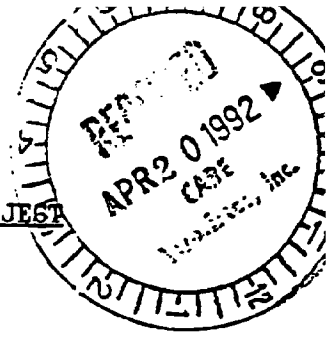
3. Do you own any more lots or parcels of land nearby? no

4. If you do own additional parcels how far are they from the laundromat?

5. Is it possible that you could purchase additional land? must be explored

6. If you could purchase additional land what would it cost per acre? ___
I have no idea

ADDITIONAL COMMENTS



COIN OPERATED LAUNDROMAT WASTEWATER TREATMENT PROJECT

QUESTIONNAIRE - F & G LAUNDROMAT

OPERATIONS

1. How many washing machines do you have? 23

2. Are all of your machines normally working? no If the answer is no, how many machines are routinely out of service? 1

3. What time do you open? 7:00 AM

4. What time do you close? 9:30 pM

5. How many days per week are you open? 7

6. What is your busiest day of the week? Sunday

7. What percentage of your business occurs on the busiest day? 22%

8. What is your busiest season? SUMMER (JULY)

WASHING MACHINES

1. How many gallons of water are utilized, on an average, per wash cycle? 34

2. How many gallons of water do you use per day? 3760 per week? 26,615 per month? 115,833 (during your busiest times of the year)

Average only

3. Please provide us with all monthly or quarterly water usage (water bills) summaries that are available.
information given to James Freiss during vis to facility on 4-2-92.

100-363

4. On your busiest days of the year how many loads of wash do you estimate are done at your facility? 300

WASTEWATER

1. When the washing machines discharge from your building we believe that the treatment system is as follows:

   Wastewater exits the laundromat and discharges into a 2 feet by 4 feet by 1.7 feet deep settling tank. This tank then overflows to a gravity sewer line which transmits the wastewater to a storm sewer which then discharges to the Chincoteague Channel.

   Please review this last statement sketch carefully and provide us with any additional information that you may have on the sheet of paper provided at the end of the questionnaire. Please add any underground tankage you may have that we were unable to identify on our site visit. Please provide sizes of all tanks if they are known and make any corrections to our narrative statement.

Additional Land

1. Do you own the land that your laundromat is situated on? yes

2. What is the lot (or parcel) size in square feet or acres. 11,326 sq. ft

3. Do you own any more lots or parcels of land nearby? no

4. If you do own additional parcels how far are they from the laundromat?

   _____

5. Is it possible that you could purchase additional land? no

6. If you could purchase additional land what would it cost per acre? ___

ADDITIONAL COMMENTS

COIN OPERATED LAUNDROMAT WASTEWATER TREATMENT PROJECT

QUESTIONNAIRE - MESSICK & WESSELLS - ONLEY, VIRGINIA

OPERATIONS

1. How many washing machines do you have? 32

2. Are all of your machines normally working? NO If the answer is no, how many machines are routinely out of service? 3-5

3. What time do you open? 24 HRS

4. What time do you close? _____

5. How many days per week are you open? 7

6. What is your busiest day of the week? SAT.

7. What percentage of your business occurs on the busiest day? ?

8. What is your busiest season? Summer

WASHING MACHINES

1. How many gallons of water are utilized, on an average, per wash cycle? 40

2. How many gallons of water do you use per day? 2000-3000 per week? 15,000 per month? 60,000 (during your busiest times of the year)

Rough Estimates
I am not sure of above Could. + or -

Provide us with all monthly or quarterly water usage (water bills that are available. none

4. On your busiest days of the year how many loads of wash do you estimate are done at your facility? 75 I

WASTEWATER

1. When the washing machines discharge from your building we believe that the treatment system is as follows:

3 septic tanks

Wastewater exits the laundromat and discharges into a (3) precast septic tanks measuring approximately 4 feet by 8 feet by 4 feet deep. One (1) submersible pump installed in this tank transfers the wastewater to an aboveground package treatment plant which was manufactured by Clow Aeroflow. The Clow system is operational at this time. Wastewater discharges from the Clow unit by gravity to the stream discharge point.

Please review this last statement sketch carefully and provide us with any additional information that you may have on the sheet of paper provided at the end of the questionnaire. Please add any underground tankage you may have that we were unable to identify on our site visit. Please provide sizes of all tanks if they are known and make any corrections to our narrative statement.

Additional Land

1. Do you own the land that your laundromat is situated on? Yes

2. What is the lot (or parcel) size in square feet or acres. 104' x 150' .35 ACRE

3. Do you own any more lots or parcels of land nearby? NO

COIN OPERATED LAUNDROMAT WASTEWATER TREATMENT PROJECT

QUESTIONNAIRE - MESSICK & WESSELLS - NELSONIA, VIRGINIA

OPERATIONS

1. How many washing machines do you have? 26

2. Are all of your machines normally working? NO If the answer is no, how many machines are routinely out of service? 2-4

3. What time do you open? 24 HRS.

4. What time do you close? _____

5. How many days per week are you open? 7

6. What is your busiest day of the week? SAT.

7. What percentage of your business occurs on the busiest day? ?

8. What is your busiest season? Summer

WASHING MACHINES

1. How many gallons of water are utilized, on an average, per wash cycle? 40

2. How many gallons of water do you use per day? 3000-5000 (based on permit limits) per week? 20,000 (based on permits limit) per month? 80,000 (during your busiest times of the year) ROUGH ESTIMATES I am not really sure. Could be + or -

3. Please provide us with all monthly or quarterly water usage (water bills) summaries that are available. None

4. If you do own additional parcels how far are they from the laundromat?

_____

5. Is it possible that you could purchase additional land? NO

6. If you could purchase additional land what would it cost per acre? $5000

NO COMMENTS

4. On your busiest days of the year how many loads of wash do you estimate are done at your facility? 100 ±

WASTEWATER

1. When the washing machines discharge from your building we believe that the treatment system is as follows:

Wastewater exits the laundromat and discharges into a precast septic tank measuring approximately 4 feet by 8 feet by 4 feet deep. Two (2) submersible pumps installed in this tank transfer the wastewater to an aboveground package treatment plant which was manufactured by Clow Aeroflow. The Clow system is not operational at this time. Wastewater discharges from the Clow unit by gravity to the stream discharge point.

Clow System is operational as far as I know -

Please review this last statement sketch carefully and provide us with any additional information that you may have on the sheet of paper provided at the end of the questionnaire. Please add any underground tankage you may have that we were unable to identify on our site visit. Please provide sizes of all tanks if they are known and make any corrections to our narrative statement.

Additional Land

1. Do you own the land that your laundromat is situated on? yes

2. What is the lot (or parcel) size in square feet or acres. 120 x 275' .75 Acre

3. Do you own any more lots or parcels of land nearby? NO

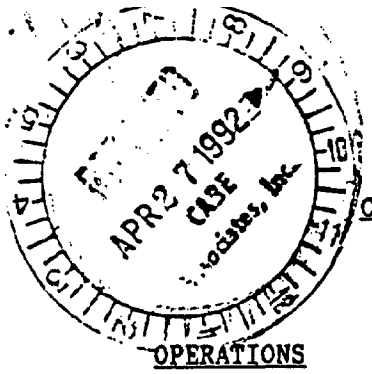
4. If you do own additional parcels how far are they from the laundromat?

_____

5. Is it possible that you could purchase additional land? probably not

6. If you could purchase additional land what would it cost per acre? ___
$2000

NO ADDITIONAL COMMENTS



COIN OPERATED LAUNDROMAT WASTEWATER TREATMENT PROJECT

QUESTIONNAIRE - BROAD STREET LAUNDRY

OPERATIONS

1. How many washing machines do you have? 38

2. Are all of your machines normally working? ~~NO~~ If the answer is no, how many machines are routinely out of service? 1 OR 2

3. What time do you open? 7:30 A.M

4. What time do you close? 7:00 P.M. M-Th 7:30 P.M. F-Sat 3:00 P.M. Sunday

5. How many days per week are you open? 7

6. What is your busiest day of the week? SATurday

7. What percentage of your business occurs on the busiest day? 30 %

8. What is your busiest season? Summer MAY - September

WASHING MACHINES

1. How many gallons of water are utilized, on an average, per wash cycle? 60

2. How many gallons of water do you use per day? 5460 per week? _____ per month? See Attached (during your busiest times of the year)

3. Please provide us with all monthly or quarterly water usage (water bills) summaries that are available. See Attached

100-3631
SKE

4. On your busiest days of the year how many loads of wash do you estimate are done at your facility? 150 Best Guess

WASTEWATER

1. When the washing machines discharge from your building we believe that the treatment system is as follows:

   Wastewater exits the laundromat and discharges into a precast septic tank measuring approximately 4 feet by 8 feet by 4 feet deep. Two (2) submersible pumps installed in this tank transfer the wastewater to an aboveground package treatment plant which was manufactured by Clow Aeroflow. The Clow system is not operational at this time. Wastewater discharges from the Clow unit by gravity to the stream discharge point.

   Please review this last statement sketch carefully and provide us with any additional information that you may have on the sheet of paper provided at the end of the questionnaire. Please add any underground tankage you may have that we were unable to identify on our site visit. Please provide sizes of all tanks if they are known and make any corrections to our narrative statement.

Additional Land

1. Do you own the land that your laundromat is situated on? Yes

2. What is the lot (or parcel) size in square feet or acres. 90x150 13,500.00 sq. ft

3. Do you own any more lots or parcels of land nearby? No

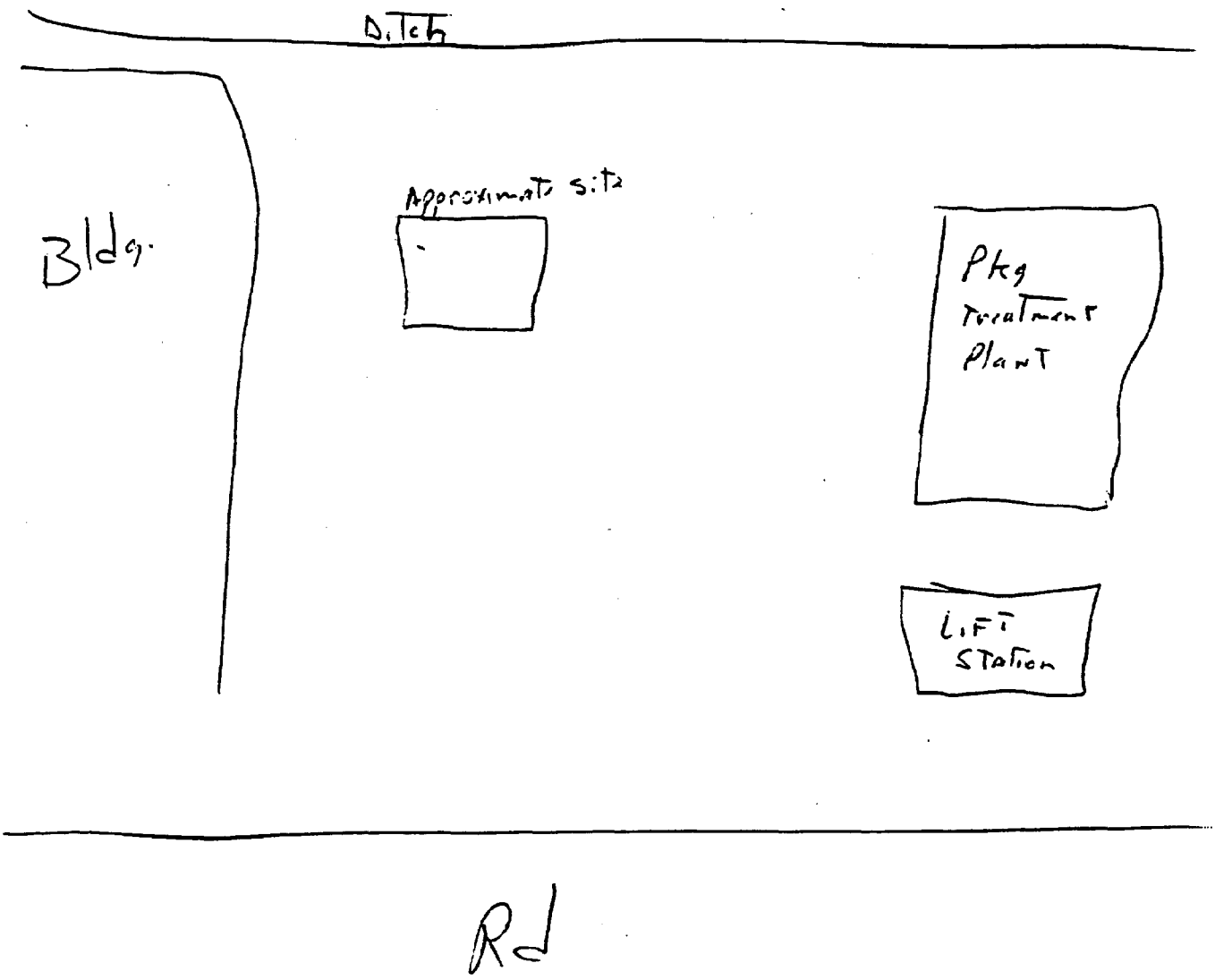
4. If you do own additional parcels how far are they from the laundromat?

5. Is it possible that you could purchase additional land? maybe

6. If you could purchase additional land what would it cost per acre? DON'T KNOW

ADDITIONAL COMMENTS

There may be ANother Septic TANK Buried between the Buildings & The Package treatment Plant



REFERENCE DOCUMENTS

APPENDIX C

REFERENCE DOCUMENTS

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SOIL CONSERVATION

EASTERN SHORE SOILS

APPENDIX D

EASTERN SHORE SOILS

The coastal plains soils of the Eastern Shore are generally very level soils that are considered to be prime farmland by the USDA and very suitable to the production of vegetables, small grains and soybeans. The dominant agricultural soils are high in sand content which results in a highly leached condition, an acid pH and a low natural fertility. The poorly drained soils are very productive when adequate artificial drainage is provided.

The two main soil associations are distinquished primarily by the topography of the land which affects the groundwater. The Bojac-Munden-Molena association is nearly level with minor areas of steep slope and moderately well drained to somewhat excessively drained. These loamy and sandy soils are primarily found on broad flats and occasionally on ridges. The second association is the Nimmo-Munden-Dragston association which is nearly level and primarily poorly drained except the Munden soil that is moderately well drained. These loamy soils are found on broad flats and in depressions. The groundwater during the winter months rises to within 0 to 1 feet from the surface, however, during the growing season it drops.

March 1988

A (0-2% slope)
B (2-6% slope)

ACCOMACK COUNTY

NORTHAMPTON COUNTY

SOIL DESCRIPTIONS

November, 1988

1 Polawana loamy sand is a nearly-level very deep and very poorly drained soil that is located in floodplains. Not suited for cultivated crops or nursery. This soil is mainly used for woodland and wildlife habitat. Capability subclass is VIw.

2 Chincoteague silt loam is a nearly-level very deep and very poorly drained soil that is located primarily in salt marshes on the barrier islands. This soil is used for wildlife habitat. Capability subclass is VIIIw.

3 Magotha fine sandy loam is a nearly-level very deep and poorly drained soil that is the fringe between the Chesapeake Bay and the low salt marsh. This soil is mainly used for wildlife habitat. Capability subclass is VIIw.

4 Beaches are nearly level to moderately sloping units of sand sediment located between the barrier islands and the Atlantic Ocean. This soil is mainly used for recreation and wildlife habitat.

6 Udorthents and Udipsamments are nearly level to steep soils that are very deep and may range from well drained to somewhat poorly drained. They consist of fill material and excavated borrow pits. They are in urban areas, around ponds and highways or dredged areas near marshes.

7 Assateague fine sand is a gently to steeply sloping, very deep and excessively drained soil that is primarily located on Assateague, Chincoteague, Wallops and Parramore Islands. This soil is used mainly for wildlife habitat and recreation.

9B Bojac loamy sand is a gently sloping very deep and well drained soil that is located on side slopes and rims of Carolina Bays. This soil is mainly used for cultivated crops. The main limitations are droughtiness, slope and erodibility. Capability subclass is IIe.

10B Bojac sandy loam is a nearly level, deep and well drained soil that is located on broad flats. These soils are prime farmland and used mostly for cultivated crops. Capability class is I.

11A Bojac fine sandy loam is a nearly level very deep and well drained soil located on broad flats. This soil is prime farmland and is used mainly for cultivated crops. Capability class is I.

11B Bojac loamy sand - see 9B

14 Bojac loamy sand - see 9B

16 Udorthents and Udipsamments - see 6

24 Fisherman fine sand is a nearly level to gently sloping soil that is very deep and moderately well drained. It is located in depressions and undulating areas associated with dunes and marshes on the barrier islands. This soil is used mainly for wildlife habitat and recreation. Capability subclass is VIIw.

26 Molena loamy sand is moderately sloping to very steep soil that is very deep and somewhat excessively drained. This soil is used mainly for woodland and wildlife. Cultivated crops are unsuited to this soil due to severe erosion hazard and low available water. Capability subclass is VIs.

28 Seabrook loamy sand is a nearly level very deep and moderately well drained soil that is located along the base of rims of Carolina bays and in depressions. This soil is used for cultivated crops and woodland. Crop production is limited by low available water. Capability subclass is IIw.

30 Munden sandy loam is a nearly level very deep and moderately well drained soil that is found on broad flats and in depressions. This soil is prime farmland and used mainly for cultivated crops and some areas are in woodland. Capability subclass is IIw.

32 Munden sandy loam - see number 30

45 Fisherman-Camocca fine sands complex is a combination of two soils that are so intermingled that it is not practical to map them separately. Fisherman soil is moderately well drained and the soil is very poorly drained. These soils are located in depressions and on undulating areas associated with dunes and salt marshes on the barrier islands. These soils are used mainly for wildlife and recreation. Capability subclass is VIIw and VIIIw.

50 Dragston fine sandy loam is a nearly level very deep and somewhat poorly drained soil that is located on flats and in depressions. When adequately drained this is prime farmland and is primarily used for cultivated crops and woodlands. The capability subclass is IIIw when undrained and IIw when drained.

52 Nimmo sandy loam - see number 55

55 Nimmo sandy loam is a nearly level very deep and poorly drained soil that is located on flats and in depressions of Carolina bays. The capability subclass is IVw when undrained and IIIw when drained. Undrained sections of this soil are poorly suited to cultivated crops. Drained sections are well suited to crops. The main use of this soil is cropland and woodland.

60 Arapahoe loam is a nearly level very deep and very poorly drained soil that is located on flats and in depressions of Carolina bays. This soil is used mostly for woodland and wildlife with a minimum of acreage devoted to cropland. When the soil is drained it is suitable for cropland. The capability subclass is VIw when undrained and IIIw when drained.

64 Camocca fine sand is a nearly level very deep and very poorly drained soil that is located in depressions and on flats associated with dunes and marshes on Assateague, Chincoteague, Wallops and Parramore Islands. This soil is used mainly for wildlife habitat and recreation. Crops are unsuited to this soil. The capability subclass is VIIIw.

88 Fisherman - Assateague fine sands complex is a nearly level to very steep soil that is very deep. The two soils are so intermingled that it was not practical to map them separately. The Fisherman soil is moderately well drained and the Assateague soil is excessively drained. The soil is used mainly for wildlife habitat and recreation. Crops are unsuited to this soil. The capability subclass is VIs and VIIs.

102 Chincoteague silt loam - see number 2

103 Magotha fine sandy loam - see number 3

110 Bojac fine sandy loam is a nearly level very deep and well drained soil located on broad flats in the southwestern and northeastern sections of Accomack County. This soil is prime farmland and used mainly for cultivated crops. The capability class is I.

114 Bojac sandy loam - see number 10

126 Molena loamy sand - see number 26

130 Munden sandy loam - see number 30

132 Munden sandy loam - see number 30

150 Dragston fine sandy loam - see number 50

160 Arapahoe loam - see number 60

410 Molena loamy sand - see number 26

230 is 30 Munden -
210 is 10 Bojac

DATE DUE

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