ARKANSAS REGISTER

Transmittal Sheet

W.J. "Bill" McCuen
Secretary of State
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Name of Agency ARKANSAS DEPARTMENT OF HEALTH

Department DIVISION OF ENVIRONMENTAL HEALTH PROTECTION

Contact Person TERRY BRUMBELOW Telephone 661-2171

Statutory Authority for Promulgating Rules Act 96 of 1913

Intended Effective Date

- ☐ Emergency
- ☑ 20 Days After Filing
- ☐ Other

	Date
Legal Notice Published	11/3/92
Final Date for Public Comment	12/17/92
Filed With Legislative Council	12/4/92
Reviewed by Legislative Council	1/7/93
Adopted by State Agency	1/28/93

CERTIFICATION OF AUTHORIZED OFFICER

I Hereby Certify That The Attached Rules Were Adopted In Compliance With Act 434 of 1967 As Amended.

SIGNATURE

Asst Director / DEHP
TITLE

March 11, 1993
DATE

ADMINISTRATIVE PROCEDURES
FOR
RULES/REGULATIONS

Rule/Regulation ALTERNATE SYSTEMS MANUAL 007.04.93--001

Step #	Procedure	Date
1.	Submit rule/reg to the Division Director and then to the Bureau Director for review.	9/17/92
2.	Upon approval by the Bureau Director, submit rule/reg to the Agency Attorney for review.	10/5/92
3.	Upon approval by the Agency Attorney, submit rule/reg to the Agency Director for review.	10/8/92
4.	Submit final draft to Board of Health or its Executive Committee for review. **Note:** Send 36 copies of draft rule/reg to Director's Office 10 working days before Board meeting at which rule/reg is to be presented.	10/22/92
5.	Appear before the Board of Health to present request to proceed with public hearing. If Board authorizes the Agency to proceed, complete the remaining steps.	10/22/92
6.	Set date for public hearing and send notice of hearing to the newspaper. **Note:** Notice should be mailed approximately 15 days prior to ad run.	11/3/92
7.	Mail notice to interested parties.	12/4/92
8.	Send Governor's Office a copy of hearing notice and proposed rule/reg. (10 days prior to public hearing)	12/4/92
9.	Send 3 copies of hearing notice and proposed rule/reg to Legislative Council. (10 days prior to hearing) **Note:** A copy of the completed Questionnaire on Proposed Administrative Rules (Form AS-13) must be attached to each proposed rule/reg. If any changes are made after the rule/reg has been filed, 3 revised copies must be filed with an explanation of changes.	12/4/92
10.	Hold public hearing.	12/17/92
11.	If hearing results in major change(s) in rule/reg, contact the Agency Attorney; or, if hearing does not result in major change(s) in rule/reg, proceed with remaining steps.	12/23/92
12.	Appear before Legislative Council Committee. **Note:** The Legislative Council notifies the Agency of: - the date when the rule/reg will appear on the agenda of the Rules and Regulations Subcommittee, and - the advice of the Subcommittee after rule/reg has been considered.	1/7/93
13.	Appear before full Board of Health at regular meeting for final rule adoption.	1/28/93
14.	Notify Legislative Council if any change is made after favorable advice is received.	N/A
15.	Have Agency Director certify copy of rule/reg. (date of hearing)	1/28/93
16.	Send two copies of certified rule/reg to Governor's Office for approval, signature, and filing.	3/4/93
17.	Hand carry 4 final, certified copies (with Agency Director's and Governor's signatures) to the Secretary of State's Office. **Note:** Arkansas Register - Transmittal Sheet (Form AS-14) is sent with each copy. The Secretary of State's Office stamps each copy. Two copies are left with the Secretary of State. Two copies are carried back to the Agency, one to be kept by the program and one sent to the Agency Attorney. Each rule/reg becomes effective 20 days after it is filed with the Secretary of State.	
18.	After the effective date, mail certified copies to the Agency Attorney and all interested parties.	

ARKANSAS DEPARTMENT OF HEALTH

ALTERNATE SYSTEMS MANUAL

ENVIRONMENTAL PROGRAM SERVICES

DIVISION OF ENVIRONMENTAL HEALTH PROTECTION

ALTERNATE SYSTEMS MANUAL

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GENERAL POLICY REGARDING ALTERNATE SEWAGE DISPOSAL SYSTEM CONSTRUCTION

As mandated by Act 402 of 1977, the Division of Environmental Health Protection, Arkansas Department of Health (ADH), encourages studies and submission of plans for alternative methods of treating and disposing of wastes generated by individual residences. However, the ADH is not obligated to accept or approve any system which would pose a threat to the health and safety of the citizens of Arkansas. The concept, applicability and construction requirements of each alternate system proposed will be reviewed on a case by case basis. All alternative systems are considered to be experimental and will not be approved as a uniform plan of development in any municipality, community, subdivision, or other developed area. The ADH's acceptance and approval of an alternative design does not release the homeowner from any obligation, responsibility or liability relating to the system's operation and maintenance or any discharge, planned or unplanned. Also, ADH approval in no way constitutes a guarantee that the system will function as designed.

No alternative or experimental project will be considered if site and soil conditions indicate a standard septic tank/soil absorption system is feasible. Systems using subsurface absorption are preferable to surface discharges except in situations where groundwater quality would be jeopardized.

When the permeability of the ground strata is such that subsurface disposal by a conventional septic tank system is absolutely unacceptable, consideration will be given to an individual home treatment scheme with a surface discharge. Sewage discharges, however, may not be approved in subdivisions, built-up areas, or other critical high-use areas. Only sites demonstrating sufficient isolation from the populace and providing an acceptable location for a surface discharge will be considered. For proposed or newly constructed residences, a minimum lot size of three (3) acres is required. This should allow enough area for the system's effluent to remain on-site. Off-site discharges will only be considered on residences with existing, failed sewage disposal systems. All off-site discharges will also require a National Point Discharge Elimination System (NPDES) Permit issued by the Arkansas Department of Pollution Control and Ecology (ADPC&E).

PLAN REVIEW PROCEDURE

All plans for alternative and experimental sewage treatment or disposal systems serving individual residences are reviewed by the Environmental Program Services (EPS), Division of Environmental Health Protection staff. All plan specifications and ancillary information must be submitted in triplicate and a $30 plan review fee is required. Only currently licensed Designated Representatives and Sanitarians, employed by the Arkansas Department of Health, may submit plans. Each application must be accompanied by a statement as to why a conventional septic tank/soil absorption system is not feasible and a site evaluation submitted by the Local Sanitarian or Program Specialist.

Guidelines for Plan Submissions are provided by EPS and are periodically updated. In addition to the plan review fee, the following items are required in triplicate:

1. Completed Application for Individual Sewage Disposal System
2. Plot plan and profile
3. Technical specifications
4. Vicinity map
5. Maintenance contract (Mechanical Treatment Plants only)
6. Memorandum of Agreement signed by the owner.

An outline of the alternate system review procedure is as follows:

1. After determining that a conventional system is not feasible, the Designated Representative and an Arkansas Department of Health representative decides which (if any) alternative system is most appropriate. Since the homeowner is responsible for paying for, operating, and maintaining the system, they should be included in this decision.

2. The Designated Representative then compiles the application package following the Guidelines for Submission of Plans for Alternate Sewage Disposal/Treatment Systems (R & R 70 Rev.). The application package along with the $30 permit fee is submitted to the local Health Unit. The County Sanitarian or Program Specialist provides a site evaluation form and a copy of the permit fee receipt to be included in the application package. The application package is mailed to:

   Environmental Program Services
   Division of Environmental Health Protection
   Arkansas Department of Health - Slot 29
   4815 West Markham
   Little Rock, Arkansas 72205

3. The EPS staff reviews the application package and either approves or rejects the submittal. If approved, the homeowner's set of plans is returned to the Designated Representative, the local Health Department copy is sent to the County Sanitarian, and one copy is retained for the Central Office file. If the submittal is rejected, all copies of the application package are returned to the Designated Representative along with a letter listing the reasons for rejection and the procedure for re-submitting the application.

All alternative/experimental sewage systems must be installed by a licensed septic tank installer. Homeowners may not install their own alternative/experimental system. Installers may be required to attend special training sessions (provided by the Health Department) before being allowed to install certain types of alternative/experimental systems.

The Health Department may require the Designated Representative to oversee the construction of projects with unusual or rarely used designs.

SOIL ABSORPTION SYSTEMS

Soil absorption systems are designed to infiltrate pretreated or conditioned sewage into the natural soil found at the disposal site. The pretreated or conditioned sewage then undergoes final renovation in the natural soil itself. The type of soil absorption system selected is determined by the limitations imposed by the soil, groundwater features and site location. Soil absorption systems are designed to have NO discharge of sewage to the ground surface. Protecting groundwater from sewage contamination is a prime concern with soil absorption systems. No disposal scheme that has the obvious potential to contaminate groundwater will be considered.

Soils vary in wetness and seasonal water tables vary during the year. Soil absorption designs must account for wet conditions normally encountered in the late winter and spring. Applications are expected to present data on the soil type, texture, slope, and depth to rock or the seasonal water table. The depth to the seasonal water table (perched or apparent) may be determined either by the presence (or absence) of chroma 2 mottling or by actual measurements conducted during the four wettest months of the year. Data from the Soil Conservation Service soil manuals is also helpful.

CAPPING FILL SYSTEMS

A capping fill is a modification to a soil absorption system used when the effective sidewall (gravel) of the disposal trench is installed within 6 inches of the natural soil surface. A capping fill consists of a layer or cap of permeable soil positioned above a shallow absorbtion bed. This maintains the separation between the absorption trench bottom and the limiting layer and provides an adequate cover over the absorption bed.

The limiting layer can be either bedrock or a seasonal water table. The soil separating the trench bottom and the limiting layer can be no finer than a silty clay loam. The slope of the absorption site cannot exceed 12 percent. Submitted plans must indicate both the original and the finished contours.

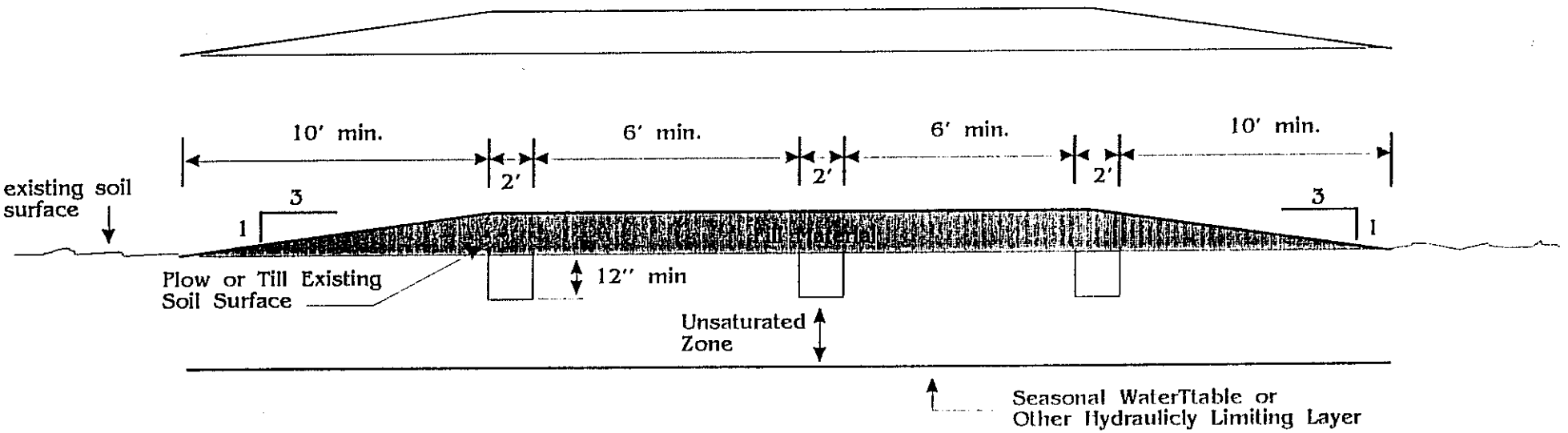
The disposal site and borrow site must be scarified to destroy the vegetative material. Stumps should be left in place at the disposal site to prevent extensive disruption of the soil.

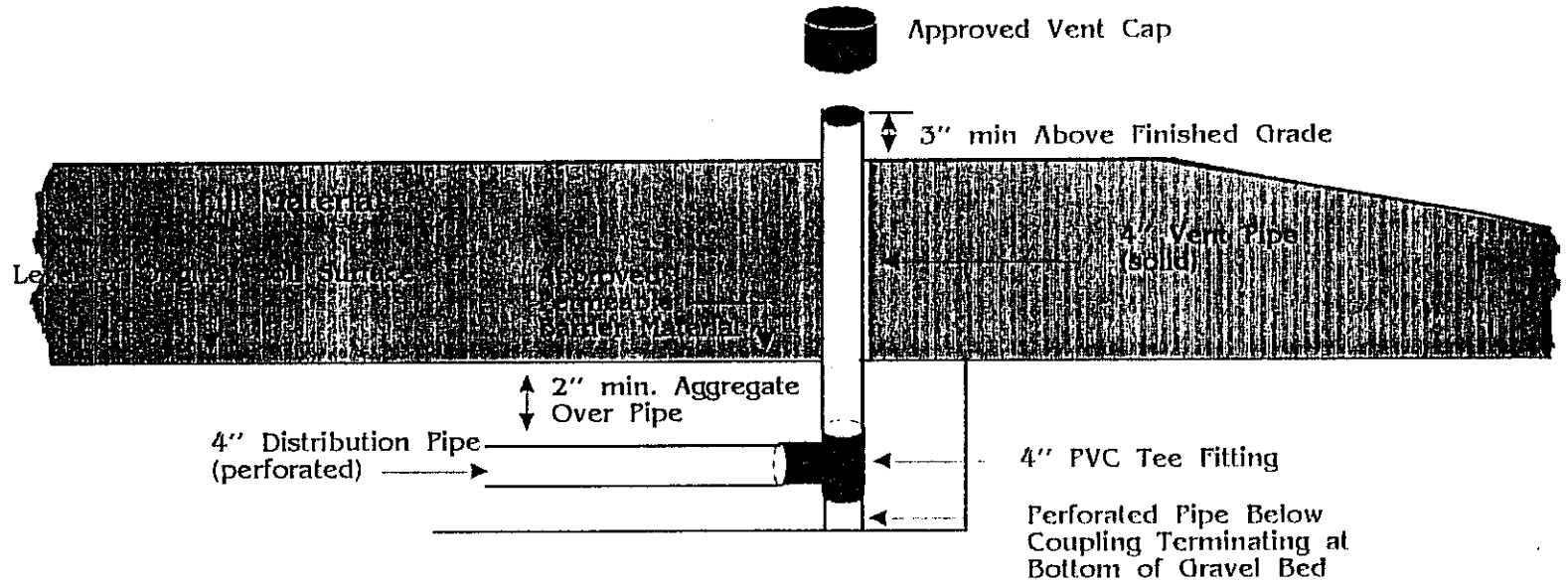
The fill must extend a minimum of 10 feet beyond the edge of the absorption field. The fill area must be seeded and watered regularly to prevent erosion.

The fill material used must be a uniform loam or sandy loam with a maximum clay content of 27 percent. A minimum of 10 inches of settled fill must cover the absorption area. The depth of fill above the original ground surface is measured after settling. Loam and sandy loam soils can be expected to settle from 20 to 25 percent.

Inspection ports must be provided at the end of the first and last absorbtion trenches on a level ground system and every other absorbtion trench on sloping ground systems.

Capping Fill System





SAND-LINED TRENCHES

Some soils encountered in Arkansas are limited in their use with conventional septic systems due to excessive permeability or poor filtration characteristics. The sand lined trench (SLT) concept is intended to enhance the renovation by filtering, slowing down, and spreading the septic tank effluent prior to introducing it into the natural soil. This should prevent a "spot loading" situation that could jeopardize groundwater quality. A SLT design should be considered on sites demonstrating a percolation rate of less than 10 minutes per inch or soils with a high stone content with little clay.

The basic components of an SLT system are the septic tank, the distribution system, and the filter bed. The septic tank requirements are the same as with a standard system though special care should be taken to insure that the tank has no holes, cracks, or other leaks that would allow the sewage to bypass the treatment scheme.

The distribution system consists of a properly constructed dose chamber, an acceptable pump or siphon, and either a distribution box or pressure manifold. Serial distribution is not acceptable for use with a SLT system. The dose pump or siphon must be capable of delivering a controlled dose of septic tank effluent at an application rate of from 0.25 to 0.5 gallons per linear foot of trench.

The filtration section of a SLT is illustrated in the accompanying drawing. Basically, it consists of a conventional gravel bed or gravel-less pipe surrounded by at least 12 inches of filter sand in all directions except the top. The gravel bed or gravel-less pipe should be covered with 2-4 inches of sand. The entire SLT is then covered with untreated building paper or soil fabric before the earth cover is added. At this time, the gravel bed design and the gravel-less design are considered equal. When using the gravel-less pipe, the drainfield connections and inspection ports designed for use with gravel-less pipe systems are required.

The size of the SLT is determined by the number of bedrooms in the residence. Each bedroom will require 95 feet of trench. Commercial establishments (domestic waste only) may be sized by using 0.75 linear feet of trench per gallon of septic tank effluent.

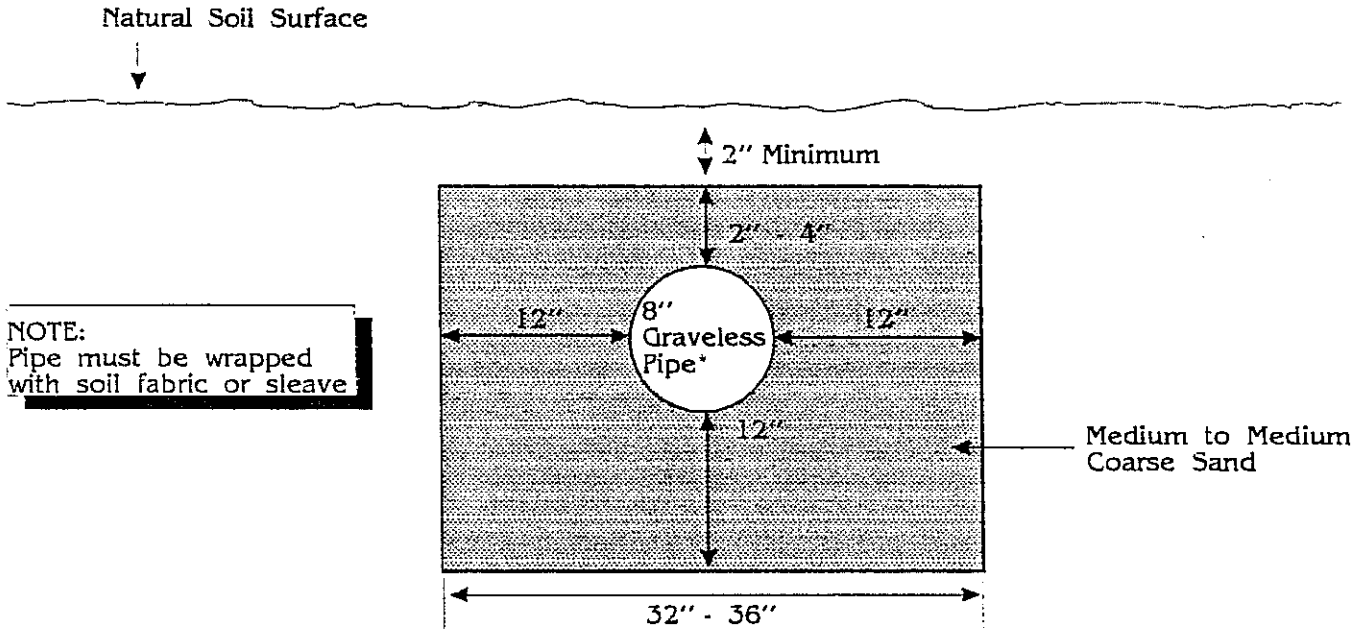
All SLT trenches must be installed on contour. An inspection port suitable for monitoring the water level must be provided for each trench in a SLT system.

SIZING A SAND-LINED TRENCH SYSTEM

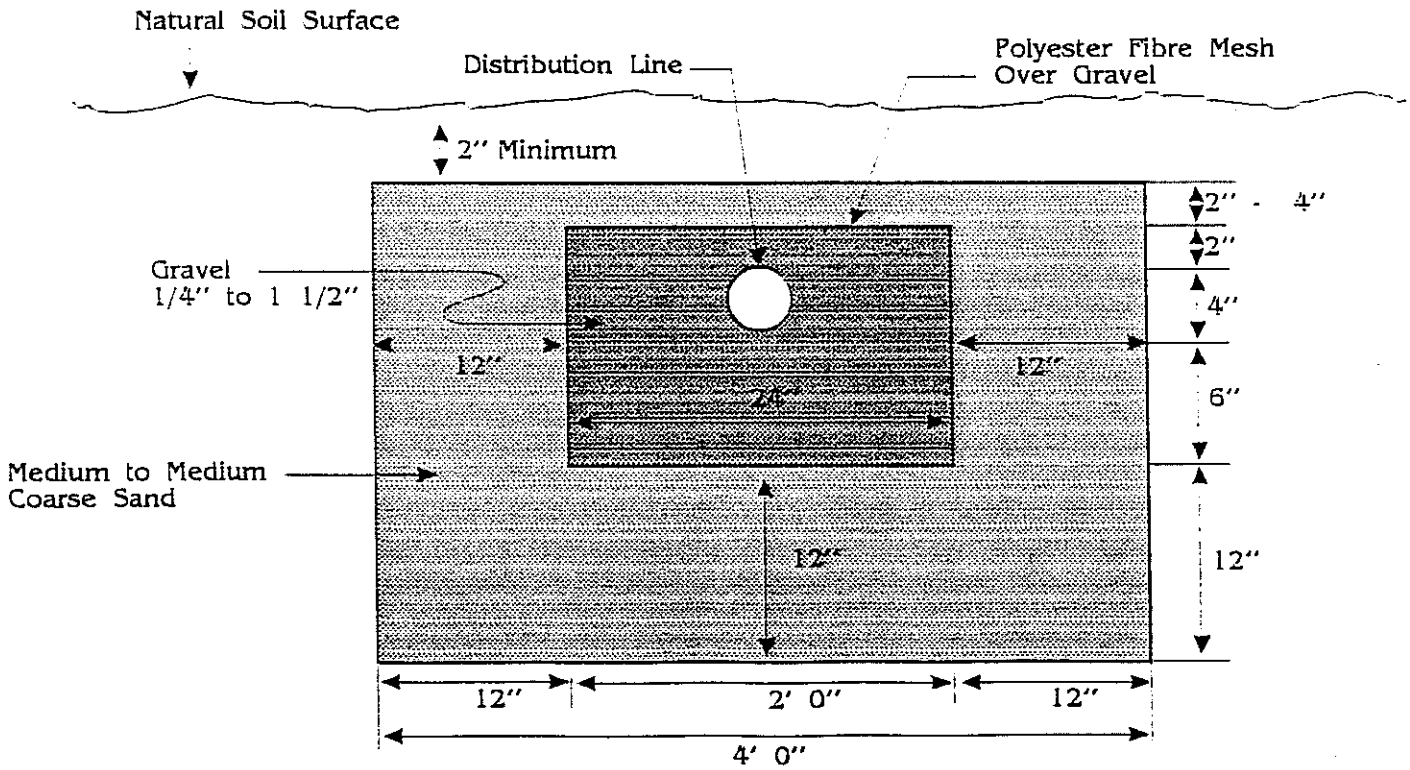
Residential		Non-Commercial
Number of Bedrooms	Linear Feet of Sand-Lined Trench	Multiply the Estimated Sewerage Flow (gallons/day) by 0.75
1	95	
2	190	
3	285	
4	380	

A list of sources for approved sand is provided in Attachment 1.

2 Sand-lined Trench Details
-Either is acceptable
-Both must be dosed
-Use 95 linear feet/bedroom



NOTE:
Pipe must be wrapped with soil fabric or sleave



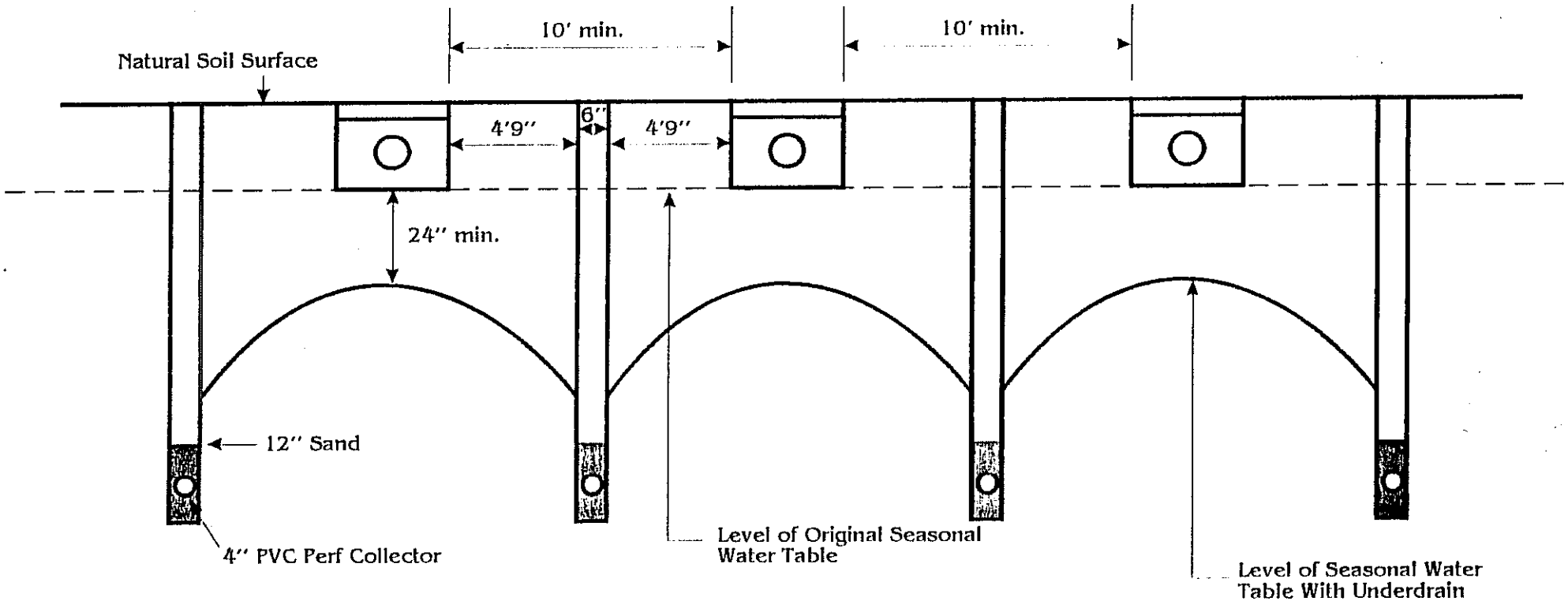
UNDERDRAIN SYSTEMS

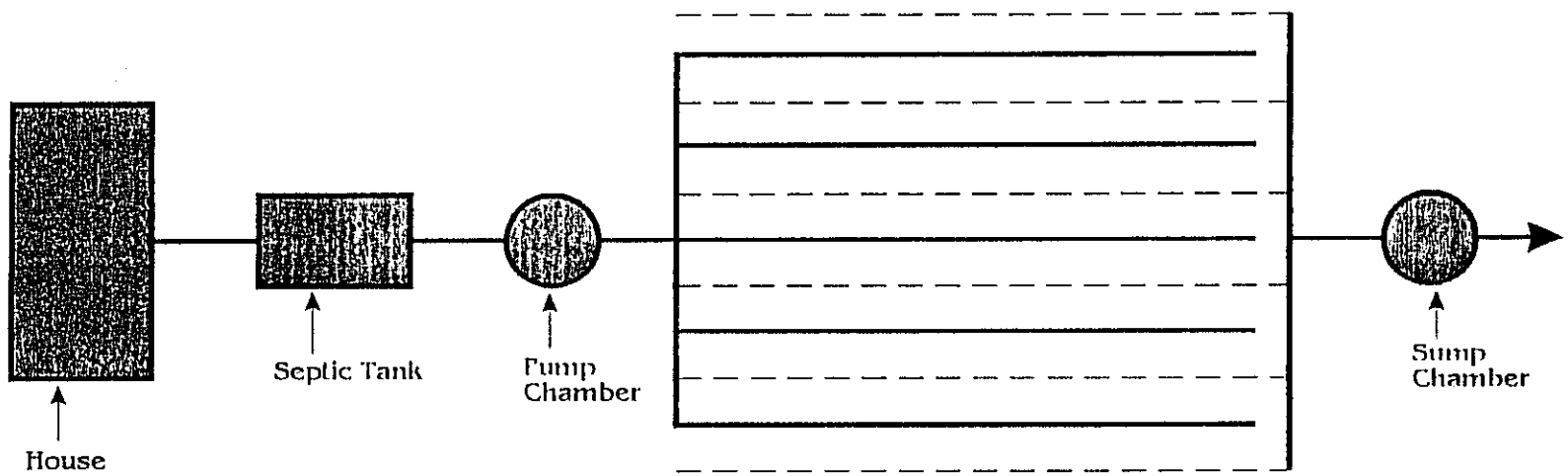
Underdrains may be used in relatively level areas to lower the seasonal water table in order to use standard absorption trenches or capping fill systems. Underdrain systems are intended to be used on soils that meet the hydraulic conductivity requirements for standard systems. The minimum separation of absorption trenches is 10 feet on underdrain systems. The underdrains are similar to curtain drains and are situated between the absorption trenches (see drawing).

The underdrains are from 6-12 inches wide and up to six feet deep. A four inch perforated PVC Pipe is placed in the bottom of each underdrain and covered with at least 12 inches of sand. The underdrains are backfilled with the original material. The ends of the PVC pipe are connected to the sump or discharge line.

The discharge from an underdrain systems is considered treated sewage and must be retained on-site or meet NPDES requirements for an off-site discharge. Road or highway ditches are not an acceptable route of discharge.

Underdrain System





WISCONSIN SAND MOUND SYSTEMS

Sand mounds are an alternate method of on-site sewage disposal pioneered by the University of Wisconsin. The state of Wisconsin has adopted this system as a standard means of soil absorption. Since the soils encountered in Arkansas are markedly different from those in Wisconsin, sand mounds are considered an experimental system. Since the requirements established by Wisconsin are as up to date as any available, all sand mound submissions must comply with the current site, design and construction requirements established by the Wisconsin Department of Industry, Labor and Human Relations. Information may be obtained through the Department's main offices in Madison.

The purpose of the sand mound is to renovate the septic tank effluent by passing it through an adequate sand fill (see Attachment 1) and introducing this renovated wastewater into the natural soil over a broad area. They may be used to overcome such soil/site limitations as permeable soils at sites with a high seasonal groundwater table, rapidly permeable soils over cracked or creviced bedrock, and slowly permeable soils at sites with or without a seasonal groundwater table near the surface. The minimum depth of a soil over cracked or creviced bedrock is two feet. The maximum elevation of seasonal groundwater at the proposed site is two feet from the natural soil surface. No sand mound installation will be approved in a flood plain or a filled site. They will not be approved for installation on top of a failed conventional system.

Wisconsin sand mounds have been evaluated for several years in Arkansas. The life expectancy of a properly constructed and maintained mound appears to be 7-10 years. Therefore, when mounds are utilized, a site for a second mound or alternative must be included in the proposal.

Most of the problems encountered with existing mounds were a result of:

1. The use of inappropriate fill material. Current specifications call for a clean sand from the list of approved sources in the appendix section of this document. Previous use of ungraded sand, concrete sand, and "river sand" have proven unsatisfactory. The source and a sample of the sand to be used should accompany the plan submittal.

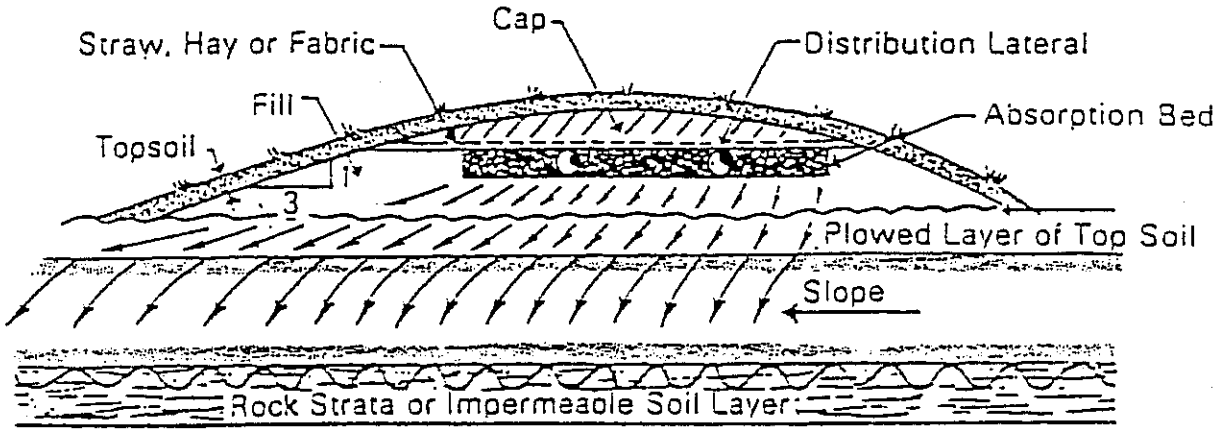
2. Construction errors have resulted in many sand mound failures. The most common construction error is in the assembly of the pressure distribution manifold. The pressure generated by the dose pump are generally greater than those normally encountered with residential water systems. The proper preparation, priming and gluing of the PVC pipe joints, is critical. Other construction errors observed include inadequate site preparation, the use of rubber tired vehicles in constructing the mound, too steep of a side slope, corrosion of electrical connectors made inside the dose chamber, and inadequate measures to prevent erosion of the newly constructed mound. Most of these errors were not intentional, but resulted from the installers lack of familiarity with this type of system.

3. The original Wisconsin design called for a single large dose of effluent to the sand mound. This resulted in overloading the gravel bed and a change to 3 to 4 doses per day was made.

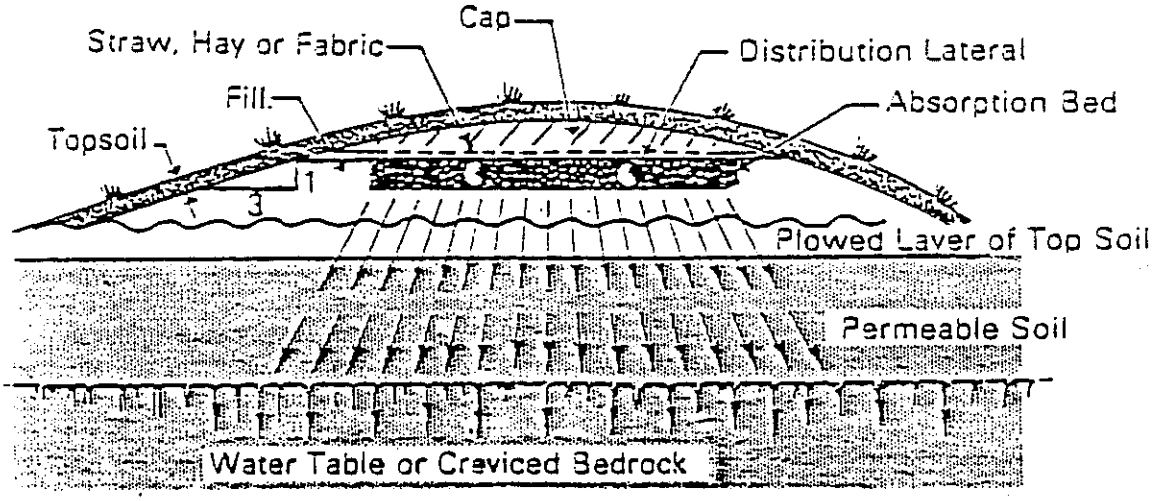
4. The placement of a mound on an unsuitable site has caused several failures. Areas that are too steep (over 8% slope), have rock-out crops or demonstrate an irregular terrain and should be avoided.

Due to the complex design and construction requirements of this type of system, the Designing Engineer or Designated Representative will be responsible for overseeing the construction.

Typical Sand Mounds



(a) Cross Section of a Mound System for Slowly Permeable Soil on a Sloping Site.



(b) Cross Section of a Mound System for a Permeable Soil, with High Groundwater or Shallow Creviced Bedrock

SURFACE DISCHARGING SYSTEMS

As of April 1, 1991, all off-site sewage discharges from individual homes are subject to National Pollutant Discharge Elimination System (NPDES) Permit requirements. Individual homes with discharges remaining on the owner's property are not subject to these requirements. All commercial operations are subject to NPDES permit requirements.

To insure on-site retention of sewage effluent, a minimum lot size of three acres is required on all proposals involving a surface discharge system. When a surface discharge system is proposed to replace an existing failed sewage disposal system, the three acre minimum lot size may be waived. This does not relieve the owner from meeting NPDES requirements.

When a surface discharge system fails to function properly or does not consistently meet the discharge requirements, the discharge of sewage must stop immediately. The owner will be allowed to use the septic tank or mechanical treatment plant as a holding facility until adequate repairs are made. The sewage from these holding facilities must be pumped by a licensed septic tank cleaner and disposed of at an NPDES permitted facility.

The current maximum pollutant levels are listed below. Some streams and drainages may have more stringent limits.

Effluent Characteristics	Effluent Limitations		Monitoring Requirement	
	30 Day Average	Daily Maximum	Measurement Frequency	Sample Type
Flow (must be monitored & reported)	Monitor	1,000gpd	2/year	estimate
5 Day Biochemical Oxygen Demand (BOD)	20 mg/l	30 mg/l	2/year	grab
Total Suspended Solids	20 mg/l	30 mg/l	2/year	grab
Fecal Coliform (colonies)	200/100ml	400/100ml	2/year	grab
pH	6.0 - 9.0	6.0 - 9.0	2/year	grab

All off-site discharges must be adequately disinfected prior to discharge. The requirements for disinfection are discussed at the end of this section.

It is the responsibility of the homeowner to adequately maintain the sewage treatment system and to insure that the effluent limits are met. The homeowner is also responsible for all costs relating to monitoring and record keeping. An approval by the Health Department is no guarantee that the design is capable of meeting the established limits. Sewage discharges into lakes used as a primary or secondary water supply or bodies of water used for body contact sports are not acceptable and will not be permitted.

Alternative/experimental systems are not intended and will not be approved as a uniform plan of development in any subdivision, residential area, or any developed or high use areas. Only sites demonstrating sufficient isolation from the populous will be considered. Any reduction in the approved lot size or any increase in the sewage load will void Health Department approval.

AEROBIC TREATMENT PLANTS

Commercially available aerobic package treatment plants designed for individual family dwellings are frequently used in place of site built treatment facilities. These provide a commercially designed and tested device along with a performance warranty and maintenance service. Being premanufactured, they can be installed in a relatively short time and weather delays are not common. A list of approved treatment plants is provided in Attachment 4 and the requirements for becoming approved are discussed in Appendix I of this manual.

Aerobic treatment plants are required to meet the same permitting and discharge requirements as other treatment schemes. Being a mechanical device, regular, routine, maintenance is absolutely necessary for continued performance. Owners of aerobic treatment plants must maintain a valid service contract with a certified individual or company. Licensed aerobic treatment plant distributors and sewage treatment plant operators certified through training provided by either the Arkansas Department of Pollution Control and Ecology or the Arkansas Environmental Academy meet this requirement. Licensed distributors must provide factory certified maintenance personnel and service. It is the responsibility of the homeowner to pay for all maintenance, effluent testing and records keeping.

Health Department surveys have noted a high malfunction rate for aerobic treatment plants. A lack of routine maintenance appears to be the major problem. It is very important for the homeowner to understand the maintenance requirements and the costs relating to those requirements before selecting an aerobic treatment plant.

INTERMITTENT SAND FILTER

Intermittent sand filters used with properly sized and maintained septic tanks or aerobic treatment plants are capable of producing a high quality effluent to meet state discharge requirements. Disinfection is required on all surface discharge systems. The disinfection requirements are stated in another section of this manual.

Following pretreatment (e.g. septic tank) the effluent is pumped through a distribution grid ponding the surface of the filter sand. The pretreated effluent is renovated as it percolates through the filter sand. The effluent is collected by 4 inch perforated PVC pipes located in a gravel bed under the sand filter. The effluent is then routed to the disinfection apparatus just prior to discharge.

The successful use of sand as a filter media is dependent on the chosen size and uniformity of the grains. Filter media size and uniformity are expressed in terms of "effective size" and "uniformity coefficient". The effective size of the sand media affects the quantity of sewage that may be filtered, the filtration rate, the depth particles penetrate, and the quality of the effluent. A sand media that is too coarse reduces the retention time to the point that adequate renovation is not attained.

Uniform application to the sand media is addressed by pumping the pretreated sewage through a pipe manifold system. This uniformly loads the filter with a relatively low volume of sewage that can be repeated several times during the day. This regime allows for maximum filter retention time and the use of small effluent pumps while optimizing treatment. The distribution apparatus normally consists of a 1¼ to 2 inch schedule 40 PVC manifold with 1¼ inch laterals with 3/16 inch holes drilled every 30 inches. The laterals are spaced from 30 to 36 inches apart. All joints and connections must be properly glued.

The filter bed is covered with 6 to 18 inches of earth to eliminate the nuisance odors associated with septic effluent. Based on normal operating conditions, life expectancy of these systems is seven to ten years. Costs to provide the required maintenance for the filter bed are extremely high due to the necessity of removing and replacing the earth cover. This factor should be considered by the designer when selecting a treatment scheme since the homeowner will be financially responsible for operation and maintenance.

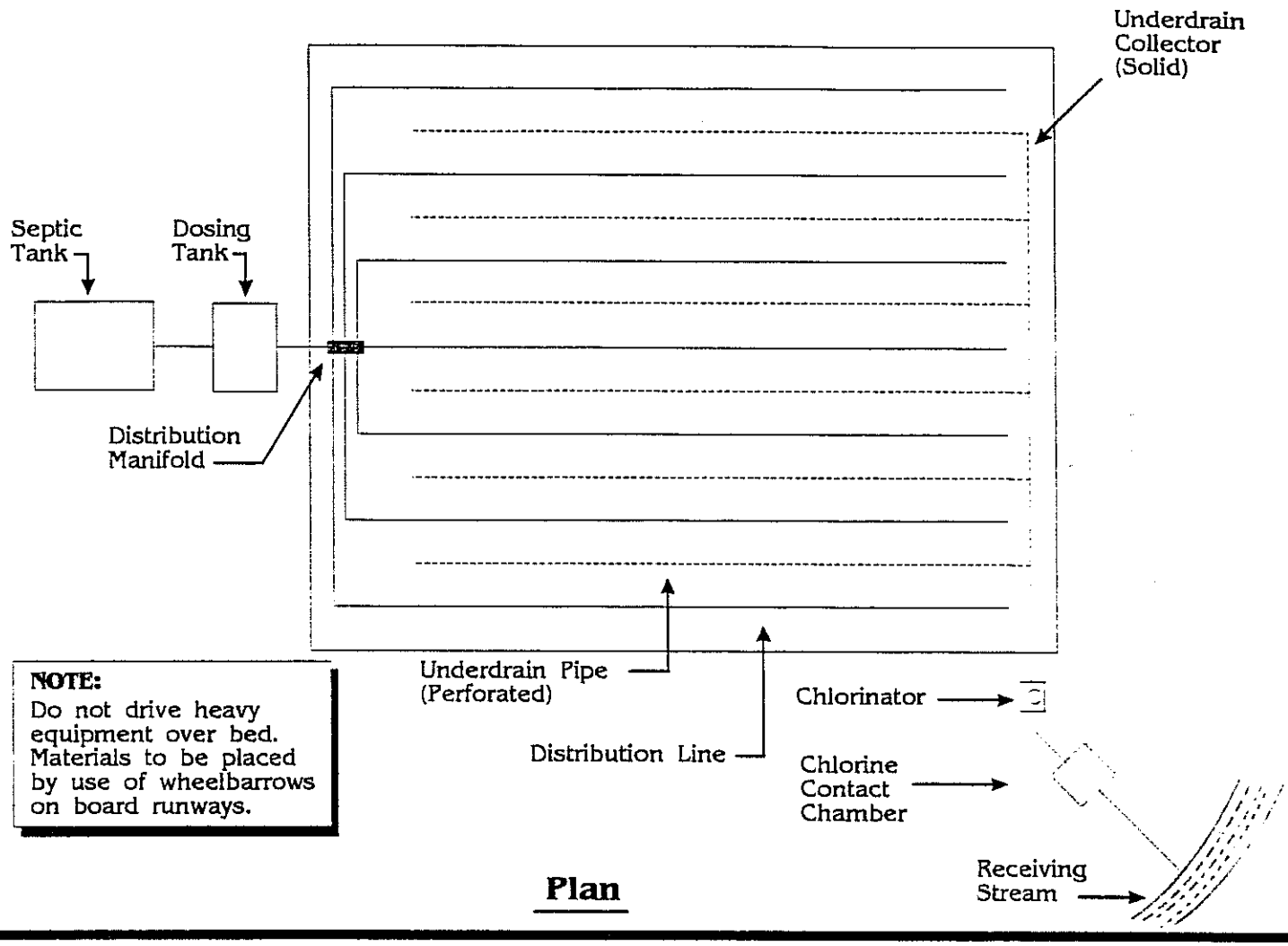
Dosing tanks equipped with a properly sized sewage effluent pump are essential for all sand filter beds. This will permit the proper distribution for the effluent over the entire sand filter area. Recommended dosage volumes and pump or siphon sizes can be determined from the design criteria presented in the tables provided below.

ISF's situated on sites where ground water contamination is possible will be required to use a 30 mil, or thicker, liner. A list of approved liners provided in Attachment 3.

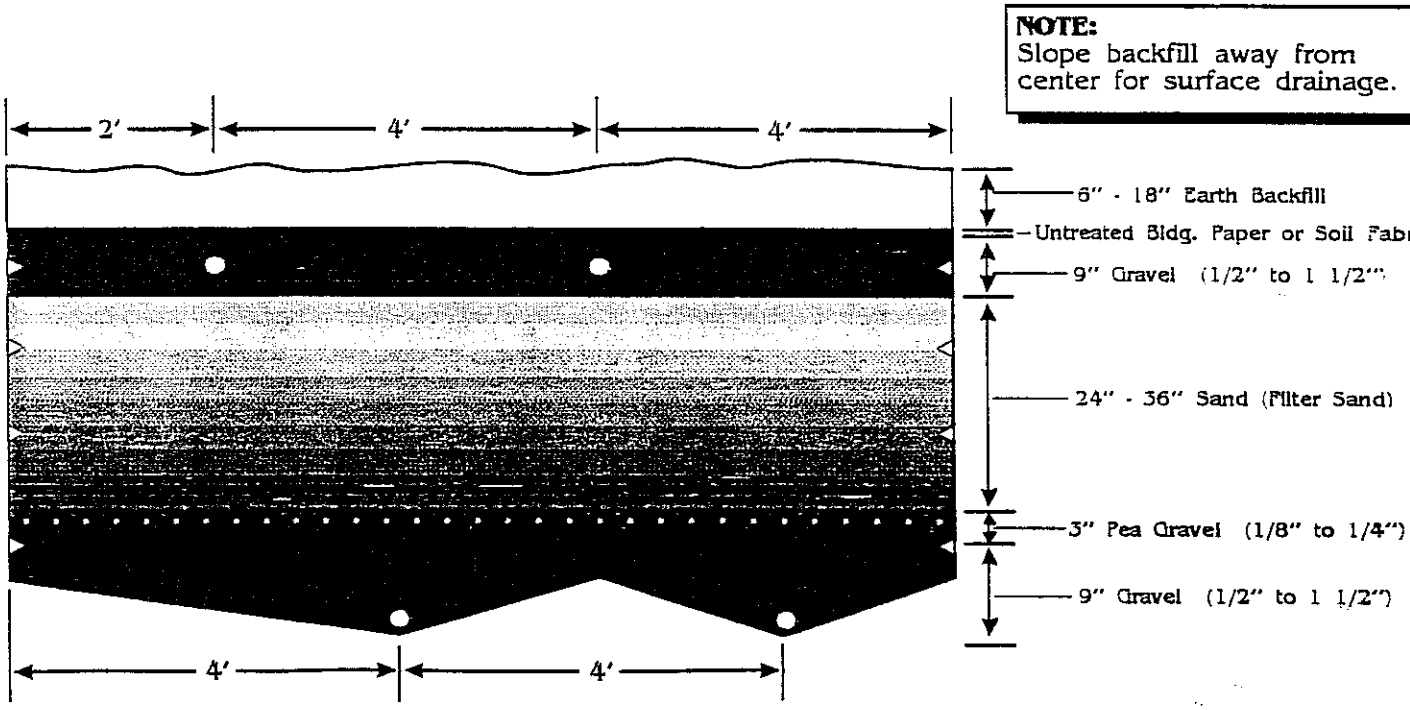
DESIGN CRITERIA FOR INTERMITTENT SAND FILTERS

Waste Water Volume	150 gallons/day/bedroom
Loading Rate	1.25 gallons/square foot/day
Dose Volume	From 20 to 25 percent of estimated gallons/day
Application Rate	10 gallons/minute/bedroom - minimum
Maximum Bed Length	50 feet
Distribution Manifold	
Distribution Laterals	1.50 inches diameter, 3/16 inch holes on 30 inch centers, laterals 30 to 36 inch center to center
Filter Sand	See Appendix IV

Septic Tank With Earth Covered Intermittent Sand Filter Bed



Plan



Cross Section

LAGOON SYSTEMS

Small, shallow sewage lagoons serving an individual residence will be considered on sites demonstrating a sufficient isolation. Like other surface discharge systems, lagoons are not for use in subdivisions or other densely populated areas. Lagoons must be located at least 100 feet from the owners house and at least 300 feet from any other residence or other high-use area. Sewage lagoons should not be situated where they would block a drainage area and create ponding in the surrounding area. Lagoons should be located at least 100 feet from property lines or other areas readily accessible to the public. All trees located within 100 feet of the lagoon must be removed and not allowed to re-establish. Sunlight and wind are vital for proper lagoon operation.

All treatment schemes utilizing lagoons must provide adequate pretreatment with either a conventional septic tank or an approved aerobic treatment unit. Filtration and chlorination are required on lagoons with an off-site discharge. Lagoon effluent discharged off-site must meet all NPDES requirements.

The following chart indicates the side length of lagoons required for various sized residences. For residences with more than four bedrooms, the formula below on the chart may be used to calculate the side length. Note that lagoons are not recommended for residences with less than 2 bedrooms or with an estimated daily flow less than 300 gallons per day.

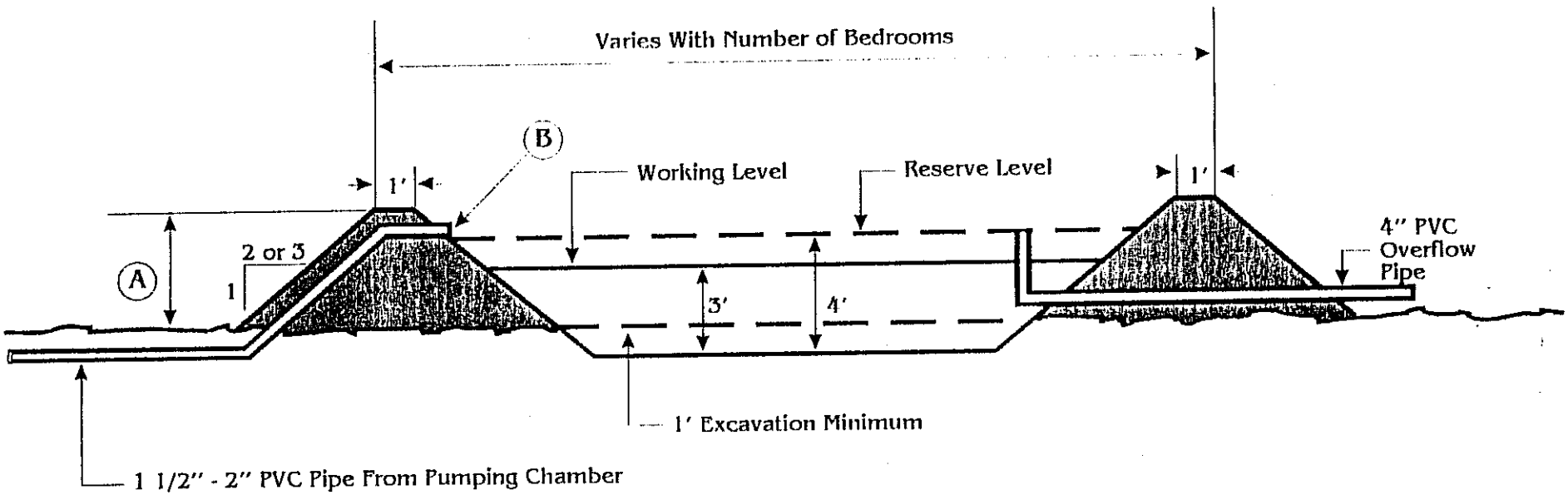
Lagoon Sizing Chart

Number of Bedrooms	Estimated Gallons/Day	Side Length 3' Working Depth	(Square Lagoon) 4' Working Depth
1	150	Not Recommended	
2	300	35'	30'
3	450	42'	37'
4	600	49'	42'

$$\text{Side Length} = \sqrt{\frac{\frac{(150 \text{ Gallons/Day/Bedroom})(\text{Number of Bedrooms})(90 \text{ Days})}{7.48 \text{ Gallons/Cubic Foot}}}{\text{Working Depth}}}$$

In general, the construction requirements for an individual sewage lagoon are similar to the Soil Conservation Service construction guidelines for stock ponds or tanks. The berm or levee should have a 2:1 or a 3:1 slope depending on the soil properties at the site. The berm should also have a relatively flat surface at the top approximately one foot wide. The height of the berm is determined by the difference in elevation between the natural ground surface and the bottom of the lagoon. The bottom of the lagoon should be above the wet seasons' groundwater level. This will prevent seasonal groundwater from occupying the working depth and thus overloading the system. The designed working depth on an individual home lagoon should be about three feet with a maximum (or overload) depth not to exceed five feet. On a typical installation, the bottom of the lagoon would be about two feet below the natural ground surface. This may vary allowing for different soil properties and lagoon size limitations.

Lagoon Profile



(A) Height of berm determined by difference in elevation between natural ground surface and the bottom of the lagoon.

(B) Discharge pipe must be at least 1" above the reserve level of the lagoon

After construction, the berm should be sodded or seeded with a suitable grass cover, and a fence must be constructed around the lagoon to prevent entry by children or pets. A gate providing access for maintenance and sampling is required.

At least two feet of water should be added to the lagoon before the initial use. This will establish aerobic conditions in the lagoon which will aid in proper operation. A properly operating Lagoon will be green in color and present no odor. When a lagoon goes septic, the water will turn dark and begin to stink. If the water level in the lagoon is below two feet, make-up water should be added to dilute the effluent and to reinstate an aerobic environment. If, after the addition of make-up water, the lagoon is still septic, add lime on a daily basis until the lagoon again becomes green and ceases to cause odors.

A sewage lagoon is not a maintenance free system. The area around the lagoon should be kept mowed and no trees or shrubs should be allowed to establish on the berm. Woody plants tend to block wind and sunlight and their roots cause leaks in the lagoon berm.

DESIGN FOR CRITERIA FOR ROCK PLANT FILTERS

The Rock Plant Filter (RPF) is a method of providing secondary treatment to septic tank effluent. A RPF is essentially an artificial marsh that relies on the action of microorganisms on the rock media, absorption by the roots of aquatic plants and microbes working together to achieve treatment. The top surface of the filter must be open to the air, but odor problems are not anticipated. A RPF system may be considered on sites where low soil permeability prohibits the use of a conventional residential septic system. Sites demonstrating a slope greater than 8% will not be considered. The characteristics and shape of the proposed RPF site will determine which of the two bed designs is most applicable. No variations from the bed designs shown below will be considered. A typical cross section has been included to better explain the design concept. Discharge from a RPF must be retained on this owner's property. This requires at least a 3 acre lot. This requirement may be waived on repairs to existing, failed septic systems. All off-site discharges must be chlorinated prior to discharge. All off-site discharges require an NPDES Permit from the Department of Pollution Control and Ecology.

Primary treatment for the RPF system is accomplished with a conventional septic tank. Residences with 1 or 2 bedrooms will require a 1,000 gallon tank (minimum) and residences with 3 or 4 bedrooms will require a 1,250 gallon tank. The septic tanks used must comply with all requirements outlined in Health Department regulations. When replacing an existing, failed septic system, the existing concrete septic tank may be used if it is in good repair, adequately baffled and meets the standard sizing criteria for subsurface absorption field systems. If the RPF is installed at an elevation higher than the outlet of the septic tank, an approved dose chamber and pump will be required.

The RPF itself is essentially a shallow, completely level, rectangular gravel bed with septic tank effluent ponded at a designed depth of one foot and with a total gravel depth of 18 inches. The gravel used must be clean, washed creek gravel and may range in size from 1/2 inch to 1 1/2 inches. Do not use crushed stone. Also, do not use pea gravel on the surface or any other part of the RPF. The RPF beds are to be installed on contour and level. The plants from the accompanying list are planted at regular intervals with the roots below the level of the ponded effluent. As suitable plants are determined, they will be added to the list. All soil must be washed from the plants' roots prior to planting in the RPF. All installations will require a plastic bed liner. A single layer, 30 mil plastic liner with inlet and outlet boots, is required. A list of suppliers for approved liner materials is provided in Attachment 3. Multiple layers of a liner material less than 30 mils is not acceptable. Roots projecting into the RPF trench must be trimmed even with the trench wall or bottom to prevent damage to the liner. The RPF must be constructed to prevent any surface water or groundwater from entering the filter bed. This would wash soil into the filter, thereby clogging the bed. This would also reduce the residence time of the sewage in the RPF.

The inlet and outlet devices for a RPF must be designed to insure even distribution and collection and to reduce the possibility of clogging. Both the inlet and outlet devices are to be installed at the same level to pond the septic tank effluent at a one foot depth. The inlet and outlet devices consist of a 10 foot, 4 inch perforated PVC Pipe with a standard "T" fitting in the center. These are installed within one foot of the ends of the bed. The ends of all pipes must be capped.

All RPF beds must have a border to exclude surface runoff and prevent loose soil from being washed into the filter bed. This border must extend at least 4 inches above the surface of the soil around the bed and extend at least 4 inches below the surface of the soil around the bed and extend at least 4 inches below the soil surface. The border may be constructed of either treated landscaping timbers nailed together or of treated lumber. Any other border material must be approved by the agency prior to use.

Before planting the plants, the filter must be ponded to the designed working depth to provide water for the roots. The filter may be ponded slightly deeper after planting to insure that water is available for the new plants. This is easily done by capping the outfall pipe. The minimum number of plants required is on the accompanying chart. The plants are to be planted on staggered, 18 inch intervals. All soil is to be removed from the root ball just prior to planting. It may be desirable to apply a water soluble fertilizer after planting to start plant growth. It may be necessary to either flood the bed or add water with a "soaker hose" for a period of time after the plants are installed. Aquatic plants need plenty of water to survive and grow. Yearly maintenance is accomplished by removing the dead plant material (not the roots) each spring and preventing grass or weeds from being established in the RPF.

Management practices to enhance on-retention of the sewage effluent are encouraged.

AQUATIC PLANTS CONSIDERED FOR USE IN ROCK PLANT FILTERS

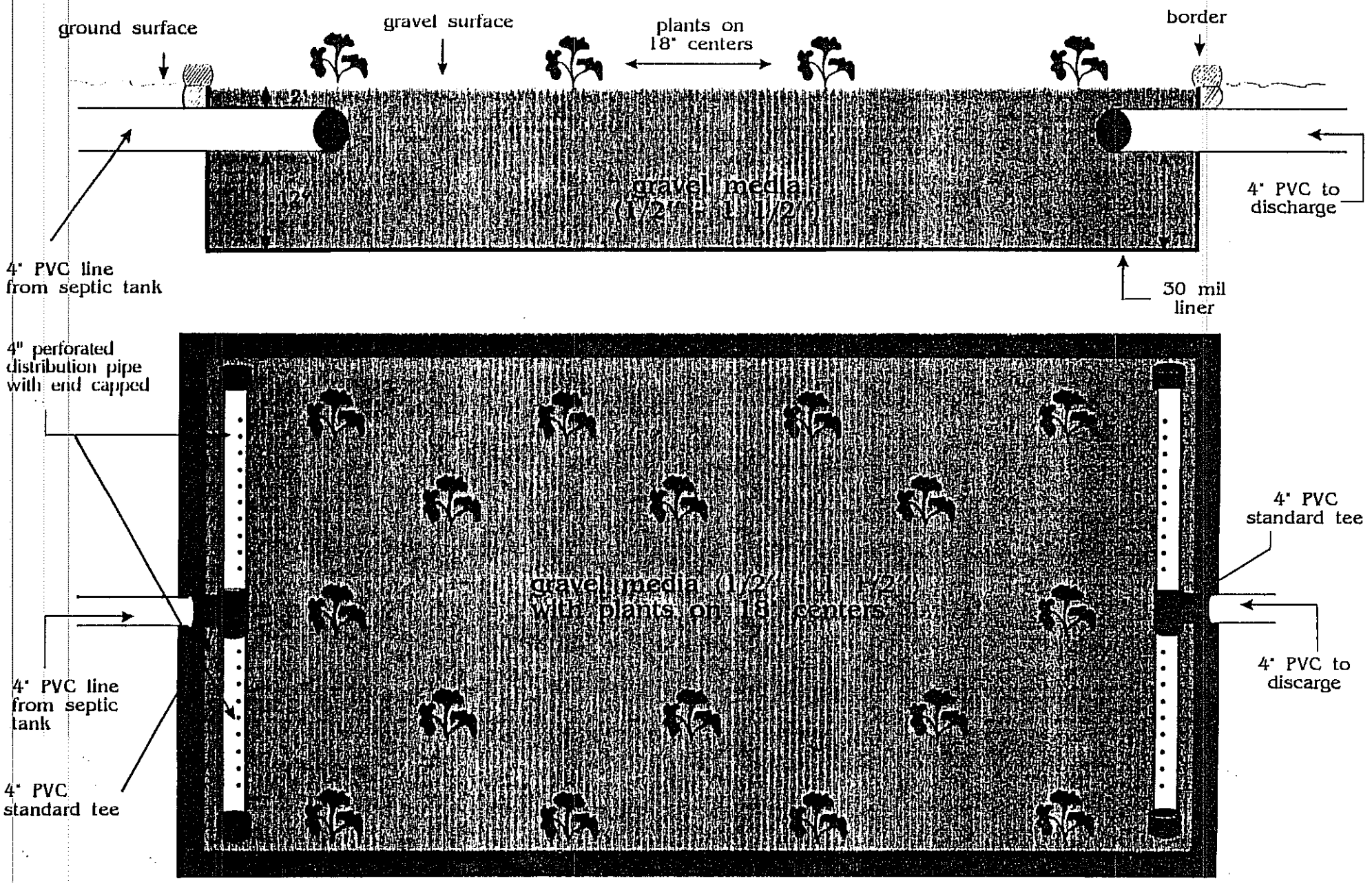
	Scientific Name
Arrow Arums	Peltrandra virginica
Arrowhead	Sagittarida latifolia
Cattail	Typha latifolia & T. angustifolia
Giant Reed	Phragmites australis & P. communic
Pickrelweed	Pontederia cordata
Canna Lily	Canna flaccida
Calla Lily	Zantedeschia aethiopica
Bull Rush	Scripus americannus
Elephant Ear	Calocafia esculentia
Ginger Lily	Hedychium coronatum
Sweet Flag (Calamus)	Acorus calamust & A. americanus
Spatterdock	Nuphar luteum
Lobelia	Lobelia siphilitics & L. cardinalis
Soft Rush	Juncus effusus
Water Plantain	Alisma plantago aquatica
Blue Water Iris	Iris versicolor
Yellow Water Iris	Iris pseudacorus

Sizing Criteria

Number of Bedrooms	Estimated Flow (150 gpd/bedroom)	Filter Size (ponded)	Dimensions	Minimum Number of Plants
2 (Min)	300	210 Ft.	10.25'x20.5'x1.5'	50
3	450	269 Ft.	11.4'x22.8'x1.5'	63
4	600	310 Ft.	12.4'x24.8'x1.5'	75

*For additional bedrooms, add 50 ft. to filter size and 12 plants.

Rock/Plant Filter



DISINFECTION OF SEWAGE EFFLUENT

All effluent from individual home treatment systems must be adequately disinfected prior to the point of surface discharge. Any proven conventional disinfection method will be given due consideration. Approved disinfection methods include:

1. Positive contact, dry feed chlorinators
2. Hypochlorinators
3. Ozone units
4. Ultraviolet light units

Tablet feed, erosion chlorinators are the most widely used. Only commercially available chlorinators will be considered. Design and/or performance data must be included in the plans submitted. Chlorinators proposed for installation must be capable of automatic operation and must provide a controlled chlorine dosage proportional to the effluent flow rate. A minimum dosage of 10 ppm chlorine and a contact time of at least 30 minutes during peak flow periods is required. When tube feed, tablet type chlorinators are proposed, they shall be designed to deliver a continuous, unhindered gravity feed of the tablets. Some tablet types have a tendency to wick and swell in the tubes. This results in a stoppage of the chlorine tablet feed.

A chlorine contact chamber must be provided following the chlorinator to insure adequate disinfection of the effluent. The chamber must be well baffled to prevent any direct path for flow between chamber inlet and outlet. The minimum acceptable size is 25 gallons for most residences. The sizing of the contact chamber for other types of establishments will be done on an individual basis. The point of discharge from the chamber must be well above the high water level of the receiving stream or ditch. The chamber discharge elevation must also be below its influent elevation to prevent filter flooding.

Proposals for ozone and ultraviolet light devices must be accompanied by installation, operation and performance data supplied by the manufacturer. This should include laboratory tests results demonstrating the capabilities of the units.

OTHER WASTEWATER DEVICES

The devices disussed in this section are neither soil absorption nor treatment systems. They are special use system designed for low use applications or to reduce the amount of sewage going into another type of system.

HOLDING TANKS

Holding tanks are only economically feasible on buildings with small daily flows. Examples are office buildings or small stores (not grocery or food service) with employee toilets and lavatories only. Holding tanks will not be considered for residences (full or part time) due to the quantity of wastes generated. Since all wastes will be stored on-site until pumping, a 1,000 gallon or ten day capacity whichever is larger, will be the minimum size allowed. Holding tank systems must be readily accessible for pumping in all seasons and weather conditions. A gravel or paved surface for the pumping truck must be adjacent to the tank. The pumper truck must be able to drive to within 10 feet of the service riser. To facilitate pumping, a 12 inch diameter riser will be required on all holding tanks.

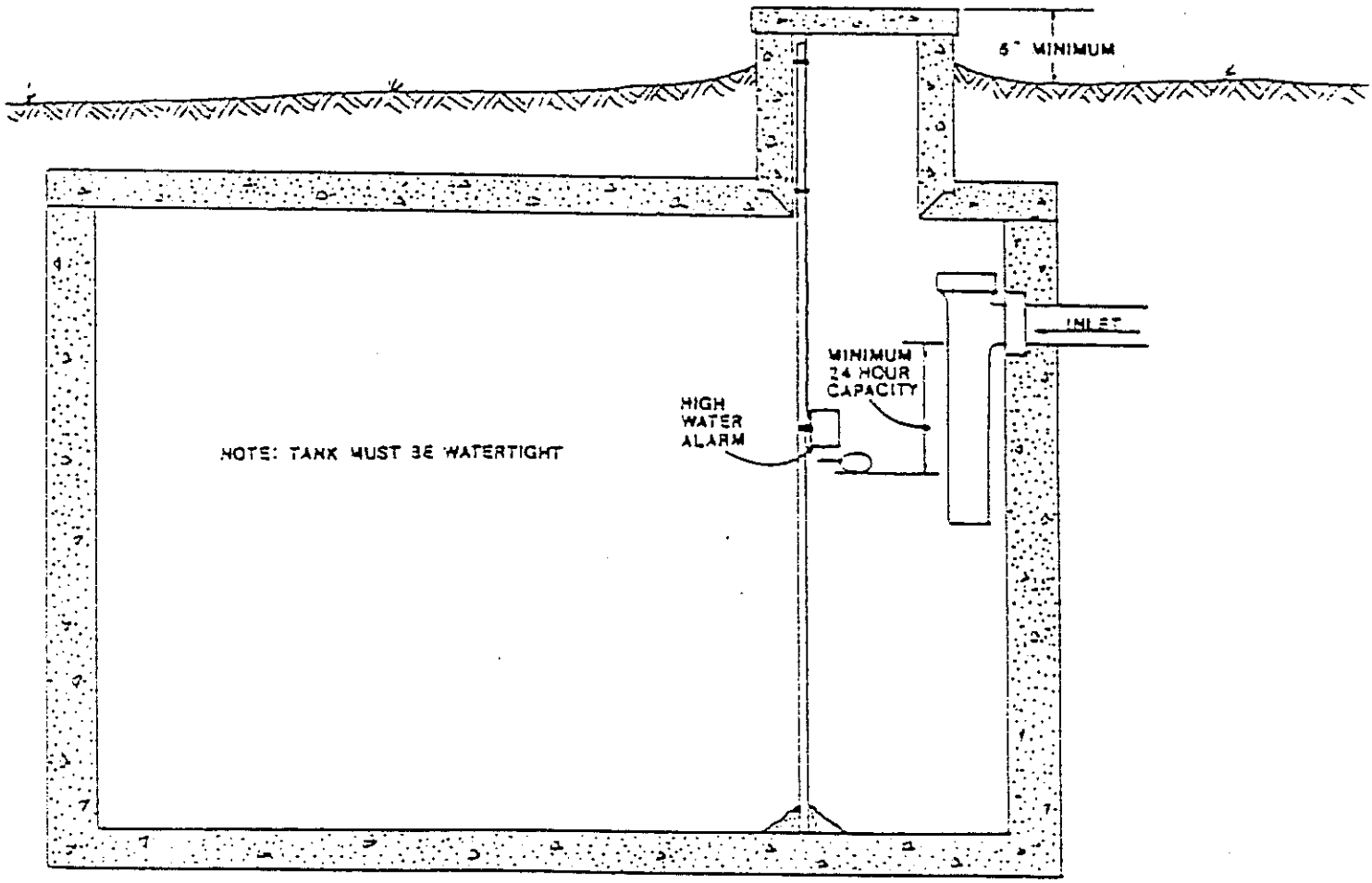
Proof of a notarized contract with a licensed septic tank pumper will be required before a permit to operate is issued. The contract must provide for pumping within 24 hours of notification and state where the sewage will be deposited. Unlike septage, holding tank contents cannot be land applied. The only acceptable method of disposal is deposition into a municipal sewage treatment plant with which the septic tank pumper has permission to dump. In some areas of the state, it is difficult to find a treatment plant willing to accept holding tank wastes. This should be explored before proposing this type of system. The owner of the structure being served by a holding tank is ultimately responsible for the proper disposal of the holding tank contents.

All holding tanks must be watertight. A Schedule 40 sanitary tee must be provided for the inlet. An alarm float must be installed in the holding tank to indicate when 75% of the capacity has been reached. Information on the float alarm system's brand name, manufacturer, use and installation must be provided at the time plans are submitted. The alarm itself, either audible, visual, or both, must be installed inside the structure being served and in a visible location. The name of the licensed pumper and his telephone number must be displayed on the alarm.

Since all waste from a holding tank system are pumped, water saving devices are strongly recommended. These can substantially reduce the daily volume of effluent produced and therefore will reduce the frequency and cost of pumping.

The use of holding tanks for establishments with a small daily waste flow have generally been successful. Some of the problems encountered have been the lack of a suitable disposal site, groundwater infiltration that greatly increased pumping frequency, alarm failure, failure of employees to respond to the alarm and the inability to pump the holding tank in very inclement weather. The owner of the building to be served should be aware of these potential problems.

Typical Holding Tank



HOLDING TANK
(MINIMUM 1000 GAL. CAP.)

COMPOSTING AND INCINERATING TOILETS

A composting toilet is a device specifically designed to retain and process body wastes and, in some cases, household garbage by biological degradation. The process may be either thermophilic or mesophilic depending on the design of the toilet. Thermophilic devices are normally smaller and require some type of energy input to maintain the desired temperature. Mesophilic devices rely on the heat produced by the biological process to maintain the required temperature. Whether or not a device can accept household garbage is dependent on it's design and intended use. An incinerating toilet is a device designed to reduce body wastes, both urine and feces, to an ash residue. Needless to say, a significant input of energy is required. The type of energy used is dependent on the design of the device used.

Only manufactured composting and incinerating toilets which have been tested and approved. Each application requesting approval of a composting or incinerating toilet must also provide for the disposal of the homes' greywater. Household greywater wastes, exclusive or urine and feces, must be handled and disposed of in a manner approved by the Arkansas Department of Health. The preferred method of handling greywater is through a conventional septic tank and absorption field. Since the use of a composting or incinerating device will reduce to volume of household wastes, a 35% reduction in the absorption field size will be granted. Other methods of treating and/or disposing of greywater will be reviewed on a case by case basis. Only those methods which adequately protect the health of the homeowner and the public will be considered. All methods utilizing a discharge of any type must be capable of producing an effluent meeting current discharge standards. When the discharge cannot be expected to be retained on-site, easements from affected property owners will be required.

Some manufacturers claim the stabilized compost is safe and may be used as a soil additive in gardens. The actual health risks associated with this composted material have not been adequately assessed. The stabilized compost from a composting toilet must be buried onsite or deposited in an approved sanitary landfill. The ash from incinerating toilets requires no special handling since any pathogen would be destroyed in the incineration process.

A list of approved composting and incinerating devices is provided in Attachment 2. All composting and incinerating devices must be evaluated by an ANSI approved laboratory under NSF standard 41.

APPENDIX I

Requirements for the Approval of Aerobic Treatment Plants For Distribution in Arkansas

Aerobic treatment units may be used for treating domestic sewage waste, provided that each unit is installed, operated and maintained in conformance with the following provisions:

1. Aerobic systems designed to treat up to 1,500 gallons of sewage waste per day shall be listed by a third party certifying program approved by the Arkansas Department of Health. Aerobic treatments units shall be in compliance with standards for Class I systems as defined by ANSI/NSF International Standard Number 40, revised July 1990. An approved third party certifying program shall comply with the following provisions in order for units which it has certified to be approved for use in Arkansas:

   (a) Be accredited by the American National Standards Institute.
   (b) Have established procedures which send representatives to distributors in Arkansas on a recurring basis to conduct evaluations to assure that distributors of certified aerobic units are providing proper maintenance, have sufficient replacement parts available, and are maintaining service records.
   (c) Notify the Arkansas Department of Health of the results of monitoring visits to manufacturers and distributors within 60 days of the conclusion of the monitoring. Approved distributors must be reported by the manufacturer to the certifying agency.
   (d) Submit completion reports on testing for review by the Arkansas Department of Health.
   (e) Provide a registered certification mark or seal which must be affixed in a conspicuous location on the units it has certified. This mark or seal will alert persons evaluating or maintaining the unit that the unit is in compliance with ANSI/NSF Standard 40.

2. The following additional requirements shall also apply to the construction, design, and operation of aerobic treatment units treating 1,500 gallons per day or less:

   (a) A visual and audio warning device shall be installed in a conspicuous location so that activation of such warning device will alert property occupants of aerobic unit malfunction or failure. All warning devices shall be wired separately from the aerobic unit so that disconnecting the aerobic unit from electricity will activate the warning device.
   (b) Each unit shall be designed or equipped so that regardless of unusual patterns or frequencies of sewage flow into the system effluent discharged will be in compliance with Class I effluent quality standards as defined by General NPDES Permit ARG550000, Discharges From Individual Home Treatment Facilities.
   (c) Minimum required treatment capacities for systems serving any structure, building or group of buildings shall be based on estimated daily sewage flows as determined by the Rules and Regulations Pertaining to Sewage Disposal Systems, Designated Representatives and Installers.

APPENDIX II

Requirements For Becoming An Aerobic Treatment Plant Distributor

The following items are required to become a distributor of aerobic treatment plants for residential use. Application is made to the Environmental Program Services Section, Environmental Health Protection Division, Arkansas Department of Health:

1. A current septic tank installer's license.

2. Factory trained installation and service personnel capable of providing service within 48 hours.

3. A statement from the National Office stating that in the event of the local franchise going out of business, the service contracts in Arkansas will be honored and renewed by another franchise in an adjoining state or region of Arkansas.

4. Provide orientation seminars and parts to septic tank installers certified to repair aerobic treatment plants.

5. Provide and maintain periodic reports to the Arkansas Department of Health on individuals failing to renew service contracts.

6. Provide a sampling service for individuals who are required to meet NPDES requirements.

7. Provide and maintain records on the disposal of sludge resulting from the servicing aerobic treatment plants. The records must reflect the name and license number of the individual pumping the sludge, how often the sludge is removed from the unit and the disposal point of the sludge.

APPENDIX III

Requirements For Personnel Certified To Repair Aerobic Treatment Plants

1. A current septic tank installer's license.

2. Completion of a course in waste water treatment provided by either the Arkansas Department of Pollution Control and Ecology or the Arkansas Environmental Academy.

3. Attend an orientation seminar by the local distributor of each brand of plant to be serviced. The seminar must cover the following:

   (a) The system process.
   (b) Component parts and their orientation.
   (c) Repair techniques.

4. Provide maintenance contracts to aerobic treatment plant owners and provide service within 48 hours of notification.

5. Provide and maintain periodic reports to the Arkansas Department of Health on individuals failing to renew maintenance contracts.

6. Provide a sampling service for individuals who are required to meet NPDES requirements.

7. Provide and maintain records on the disposal of sludge from servicing aerobic treatment plants. The records must reflect the name and license number of the individual pumping the sludge, how often the sludge is removed from the unit and the disposal point of the sludge.

ATTACHMENT 1

Sources Of Sand Acceptable For Use In Intermittent Sand Filters, Wisconsin Sand Mounds and Sand Lined Trenches

Company/Location	Description	Specifications	
		Effective Particle Size (D 10)	Uniformity Coefficient (C u)
Arkhola Sand & Gravel Van Buren, Arkansas	FCS Concrete Sand		
Crowley's Ridge Sand & Gravel Forrest City, Arkansas	Quarry Stockpile, Fine Aggregate For Structures	0.32	2.31
Gillam Brothers Little Rock, Arkansas	Concrete Sand	0.25	3.0
GS Roofing Products Glennwood, Arkansas	Granules	0.8	2.0
Jeffrey Sand & Gravel North Little Rock, Arkansas	Concrete Sand	0.30	2.90
Mobley Construction Co. Russellville	Concrete Sand	0.25	2.92
Ozark Material Company Ozark, Arkansas	Stockpile Fine Aggregate	0.32	3.13
Razorback Rock West Memphis, Arkansas	Whitehall Pit Sand	0.30	2.33
Rhone Poulene Little Rock, Arkansas	Alum Waste	0.34	1.97
Unimin Guion, Arkansas	Filter Sand	0.42	1.40

ATTACHMENT 2

Listed Wastewater Recycle/Reuse And Water Conservation Devices

Clivus Multrum, Inc.
21 Canal Street
Lawrence, MA 01840

Plant at: Lawrence, MA

Clivus Multrum Organic Waste Treatment System
Package 102 - Model 08
Package 103 - Model 08 with one midsection
Package 104 - Model 08 with two midsections
Model 08-0A
Model 08-A - with one midsection
Model 08-A - with two midsections
Model 202
Model 205

Sun-Mar Corporation
5035 N. Service Rd., Unit C2
Burlington, Ontario
Canada L7L 5V2

Plant at: Stoney Creek, Ontario

Sun-Mar Biological Composting Toilet
Sun-Mar-XL

Thetford Corporation
7101 Jackson Road
PO Box 1285
Ann Arbor, MI 48106

Plant At: Ann Arbor, MI

Cycle-Let Treatment & Water Recycling System(*)
SU-45 SU -120 HU-250

*Listed systems include the waste treatment module sump, ultrafiltration module, water polishing module, and remote monitor. System needs specialized accessories such as those recommended by the manufacturer.

ATTACHMENT 3

APPROVED LINERS
(30 mil thickness or greater)

This list of approved liners is divided into two categories, unconditionally approved and conditionally approved. Unconditionally approved liners are products developed, tested, and marketed as sewage lagoon and/or landfill liners. Conditionally approved liners are products developed for other uses (e.g. roofing material) but appear to provide adequate service in sewage treatment applications.

UNCONDITIONALLY APPROVED LINERS

GUNDLE LINING SYSTEMS INC.
19103 Gundle Road
Houston, TX 77073-3598
phone: 1-800-435-2008

* Inlet and outlet boot kit required

ORENCO SYSTEMS, INCORPORATED
2826 Colonial Road
Roseburg, OR 97470
phone: 1-503-673-0165

* Inlet and outlet boot kit required

CONDITIONALLY APPROVED LINERS

FIRESTONE BUILDING PRODUCTS CO.
Hwy 24 West
Prescott, AR 71857
phone: unk

* No inlet or outlet devices available.

SIPLAST TERANAP 331 TP
Hwy 67 South
Arkadelphia, AR 71923
phone: 1-800-922-8800

* Supplier will provide instructions for heat welding the liner and making the inlet and outlet connections.

ATTACHMENT 4

Approved Class I Home Aerobic Treatment Plants

Clearstream Wastewater Systems Inc.
P.O. Box 705
Silsbee, TX 77656

Model Number	Rated Capacity (gallons/day)
500N	500
600N	600
750N	750
1000N	1000
1500N	1500

Distributor
Maurice Short
Cardinal Engineering
P.O. Box 5488
Texarkana, TX 75505 phone: (903) 838-7024

Multi-Flo Waste Treatment Systems Inc.
1336 Stanley Ave.
Dayton, OH 45404

Model Number	Rated Capacity(gallons/day)
FTB-0.5	500
FTB-0.6	600
FTB-0.75	750
FTB-1.0	1000
FTB-1.5	1500

Distributor

Alan Stanich
DECS Inc.
P.O. Box 3322
Hot Springs, AR 71914 phone: 525-1136

Norweco, Inc.
Firelands Industrial Park
220 Republic Street
Norwalk, OH 44857

Model Number	Rated Capacity(gallons/day)
Singulair 900 System	500

Distributors

Peterson Concrete Products phone: 851-1955
18010 McArthur Drive
North Little Rock, AR 72118

Rawls Concrete Products phone: 325-6664
Rt. 2, Box 13

SEVERABILITY

If any provisions of these Rules and Regulations, or application thereof to any person is held invalid, such invalidity shall not affect other provisions or applications of these Rules and Regulations which can effect without the invalid provisions of applications, and to this end the provisions hereto are declared to be severable.

REPEAL

All Regulations and parts of Regulations in conflict herewith are hereby repealed.

CERTIFICATION

This will certify that the foregoing Rules and Regulations Pertaining to Alternate Systems were adopted by the Arkansas Board of Health at a regular executive session of said Board held in Little Rock, Arkansas, on the 28th day of January, 1993.

W. Joycelyn Elders

Joycelyn Elders, M.D., Director
Arkansas Department of Health

Dated at Little Rock, Arkansas, this 28th day of January, 1993.

The foregoing Rules and Regulations, copy having been filed in my office, are hereby approved this 4 day of March, 1993.

Jim Guy Tucker

Jim Guy Tucker
Govenor