Choosing the Correct System for the Site

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Selling the System to Fit the Site

- *Learning objectives*
  - *Get familiar with the site*
  - *Review gravity flow options*
  - *Review dosed flow options*
  - *Educate the homeowner*
  - *Learn the "Onsite Café Menu"*

Get Familiar With The Site

- *Soil Profile or ~~Perc Test~~ – The Price List*
  - *Horizions*
  - *Clay content*
  - *Mottles*
  - *Suggested loading rate*
  - *Limiting conditions*

Get Familiar With The Site

- *Site visit*
  - *Plot plan or survey*
  - *House location*
  - *Proposed future buildings*
    - *Garage, workshop or shed*
    - *Pool*
    - *Landscaping*
  - *Topography*

The "Onsite Café" Menu

- *Gravity flow using septic tank effluent*
- *Gravity flow using advanced treatment effluent*
- *Dosed Flow*
  - *LPP – septic effluent, demand dosed*
  - *LPP – septic effluent, time dosed*
  - *LPP - Advanced effluent, demand dosed*
  - *LPP – Advanced effluent, time dosed*
  - *Drip irrigation – demand dosed*
  - *Drip irrigation – time dosed*
  - *Mound system – Wisconsin Mound – septic / demand*
  - *Mound system – Wisconsin Mound – septic / timed*
  - *Mound system – Wisconsin Mound – adv / demand*
  - *Mound system – Wisconsin Mound – adv / timed*
  - *Mound system – Drip Mound*

Gravity Flow Distribution

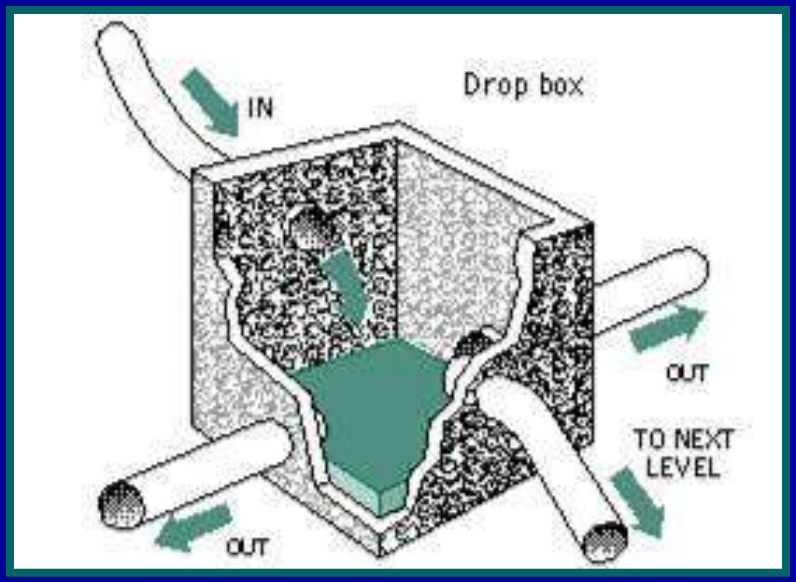
- *Simplest way to distribute effluent to the soil treatment area*
- *Two most popular methods are parallel or serial distribution*
- *Many choices of media types now available for the trenches*

Gravity-flow Distribution

- ***Serial distribution***
  - *Receives flow by gravity*
  - *Distributes flow by gravity*
  - *Sequentially loads laterals, forcing one to fully pond before a gravity flow to the next lateral*
  - *Typically uses 4 inch pipe*
  - *Needs device to force ponding and allow sequential loading of laterals*

Gravity-flow Distribution

- ***Serial distribution***
  - ***Drop box***
    - *A box that forces liquid in a trench to pond fully prior to allowing it to spill over to the next downstream trench – sequential loading*

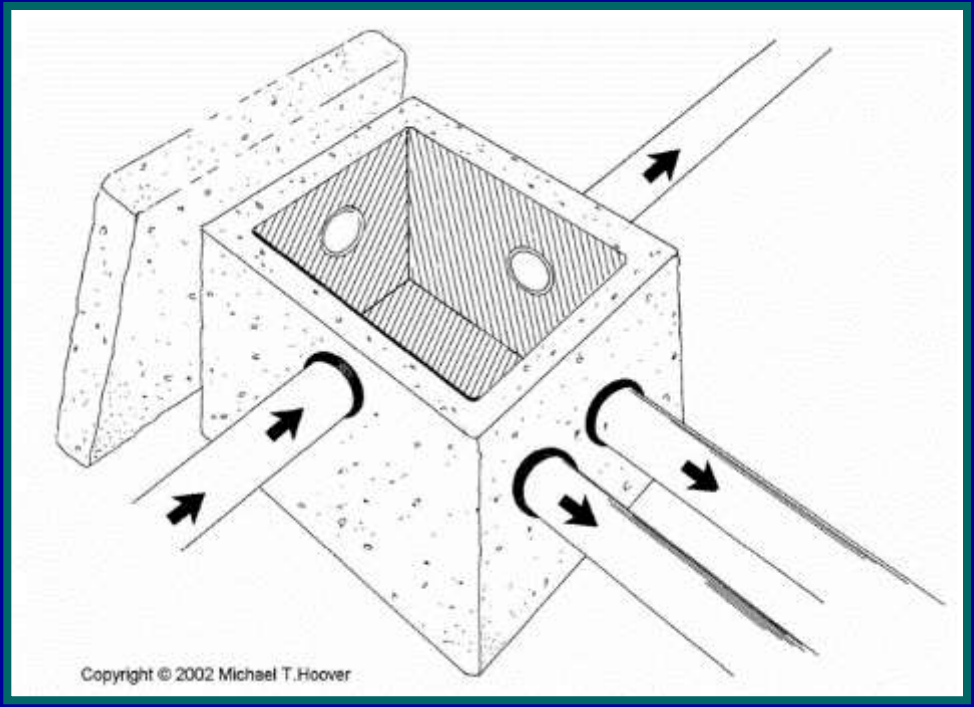


Gravity-flow Distribution

- ***Parallel distribution***
  - *Network of equal length laterals*
    - *Receive flow by gravity*
    - *Distribute flow by gravity*
  - *Typically 4-inch pipe*

Gravity-flow Distribution

- ***Parallel distribution***
  - ***Flow-splitting devices***



Gravity-flow Distribution

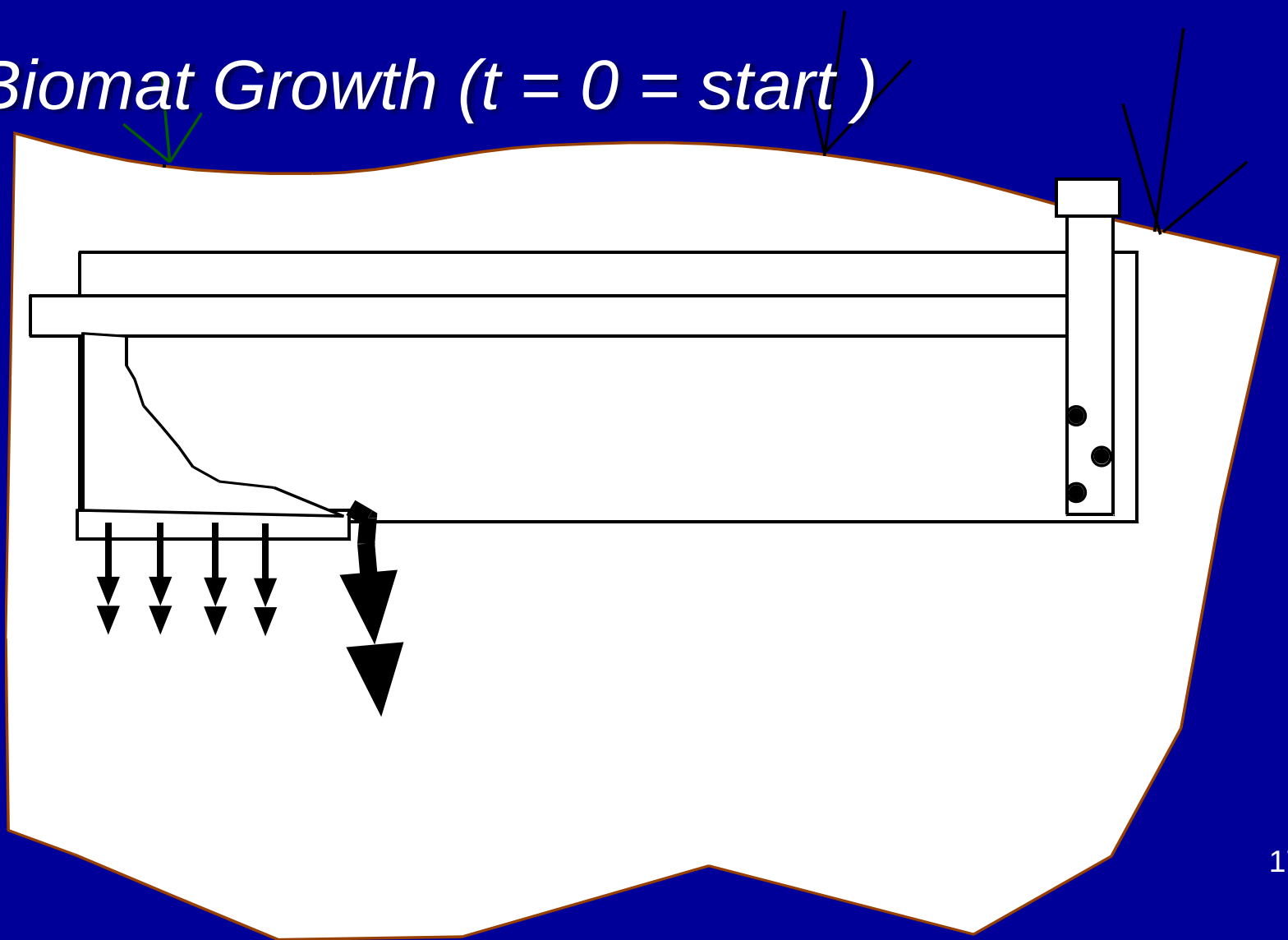
- ***Parallel distribution - Distribution box***
  - *Problem with assuring outlets stay at same level*
  - *Tools exist to help assure this*

Gravity-flow Distribution

- ***Parallel distribution***
  - *Distribution box needs to be watertight*
    - *Should be accessible from the surface for O&M*
  - *Individual lines can be closed off*
  - *Each lateral should be parallel to slope contour*
  - *Bottom of each lateral should be flat*
  - *Even if there are equal flows to each lateral, flows will not be uniform down length of laterals*

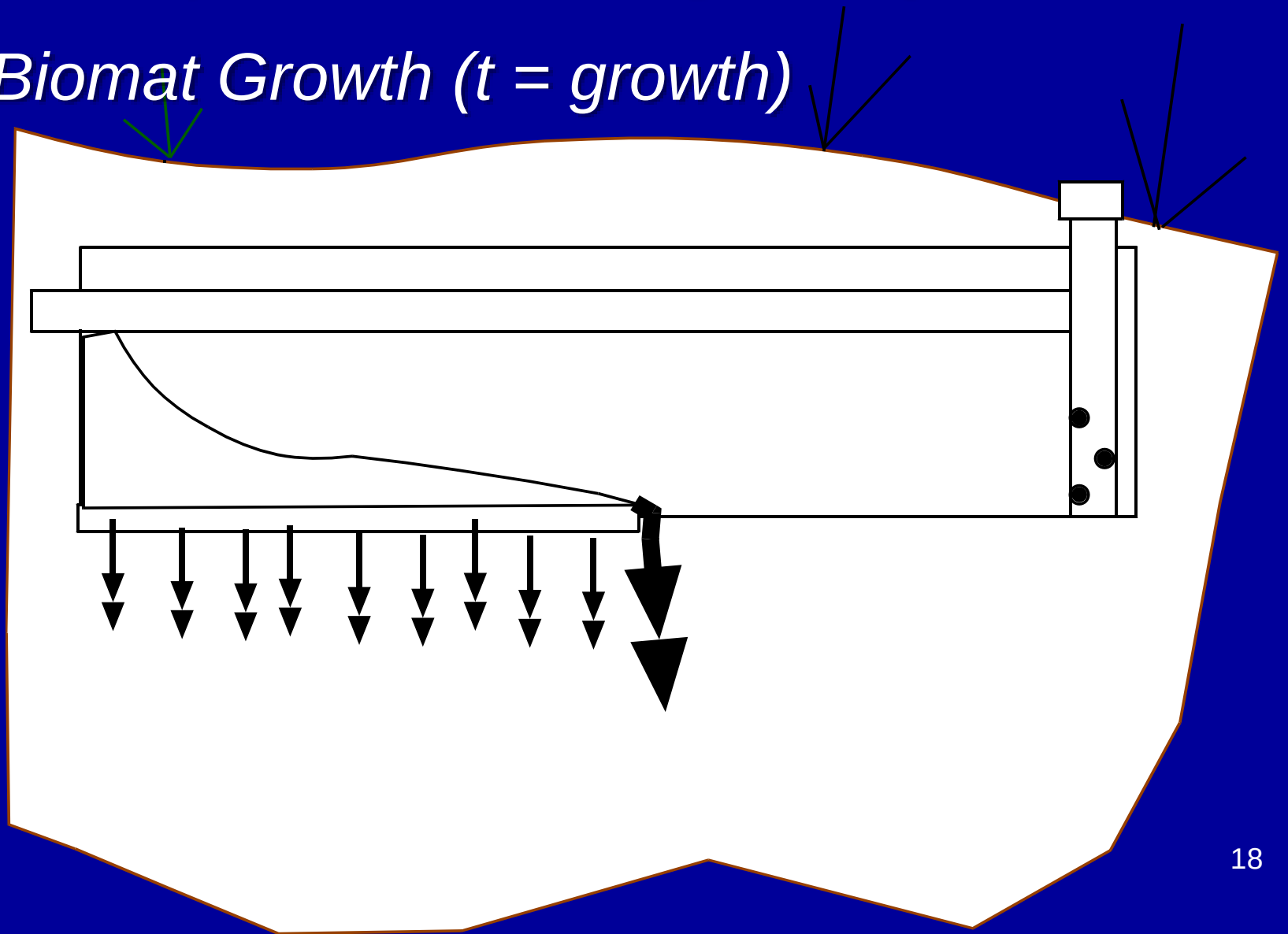
Flow pattern in a gravity trench

- *Biomat Growth (t = 0 = start)*



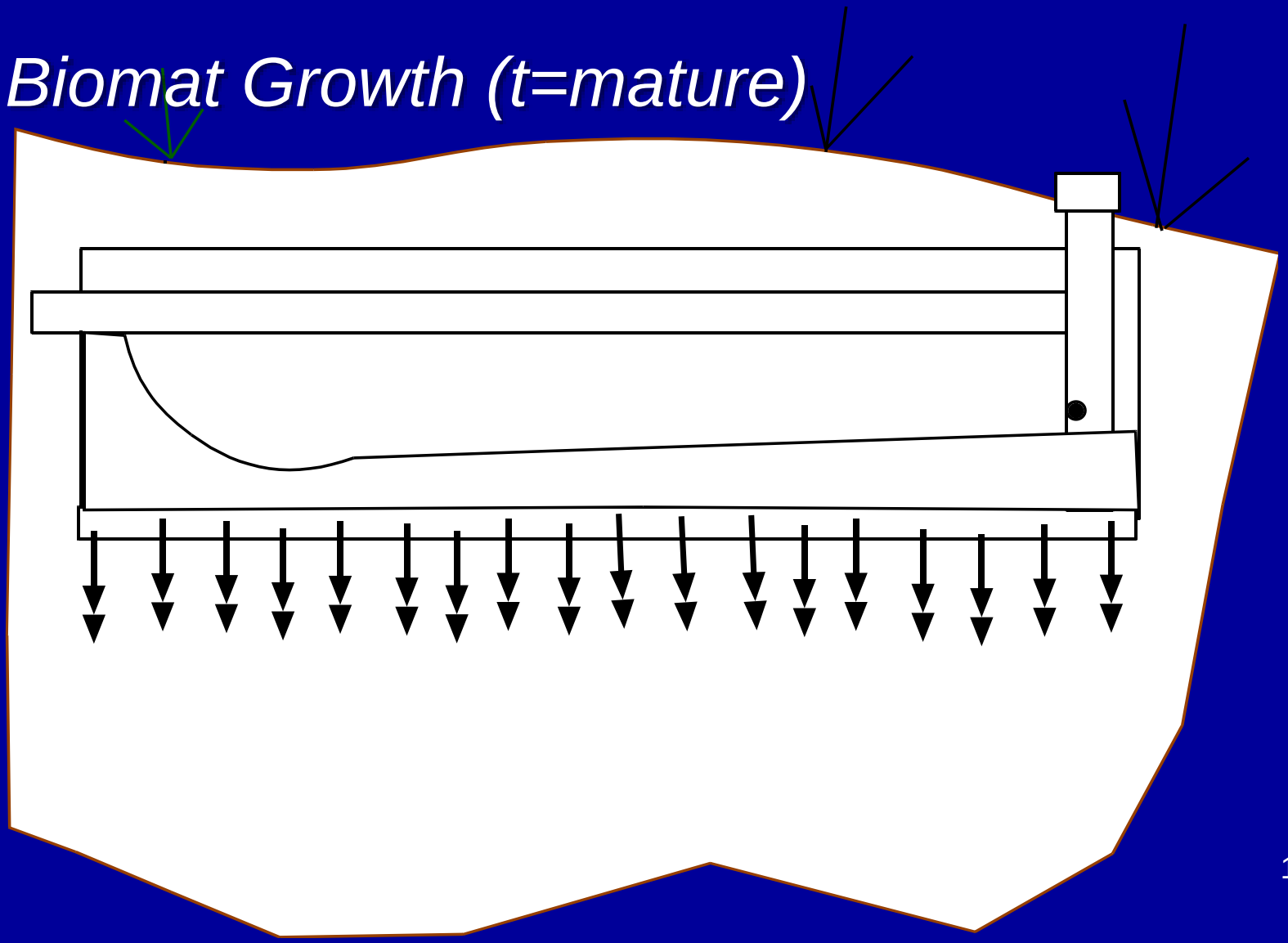
Flow pattern in a gravity trench

- *Biomat Growth (t = growth)*



Flow pattern in a gravity trench

- *Biomat Growth (t=mature)*



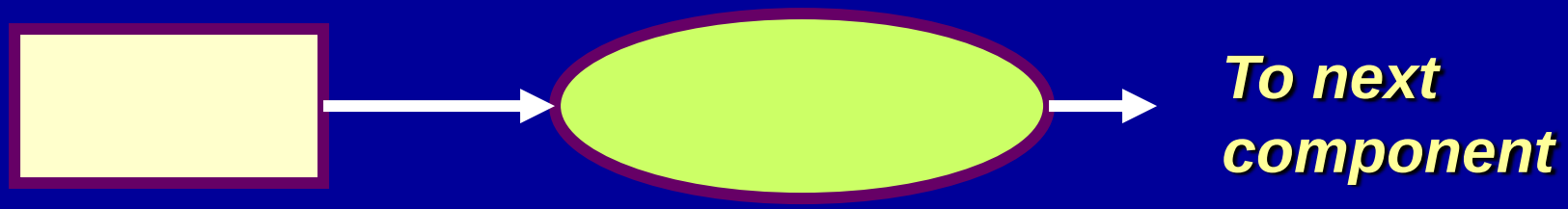
Distribution Media

- *What's the difference?*
  - *Choices*
  - *No 'Value Judgment'*
- *Rock*
- *Chamber*
- *Gravelless pipe*
- *Synthetic media*
- *Other*

Dosed Flow Distribution

Application/Distribution Options

- ***Dosed-flow distribution***
  - *Predetermined volumes of effluent are held in a chamber and dosed to the next component.*
  - *This provides:*
    - *More uniform loading to next component*
    - *Resting times between doses*



Dosed-flow Distribution

- ***Other pertinent information***
  - *Can be used to distribute effluent in almost any situation*
  - *Costs more and is more complex than gravity flow*
  - *For many has become the method of choice*
  - *On-going monitoring & maintenance are important*
  - *Alarms are needed*

Dosed-flow Distribution

- ***Dosing methods*** *- Demand*
  - *Dose occurs when sufficient volume of effluent has been collected.*
  - *Dosing frequency depends on how much wastewater is being generated.*
  - *There is no control on how much effluent is being dosed daily*

Dosed-flow Distribution

- ***Dosing methods*** *- Timed*
  - *Timer controls number of doses per day & dose volume*
  - *Will allow only certain amount of effluent to be dosed daily*
  - *Protects downstream components from overloading*
  - *Useful for controlling surges or big-flow days*

Dosed-flow Distribution

- ***Dosing methods*** *- Timed*
  - *A timer controls the dosing device.*

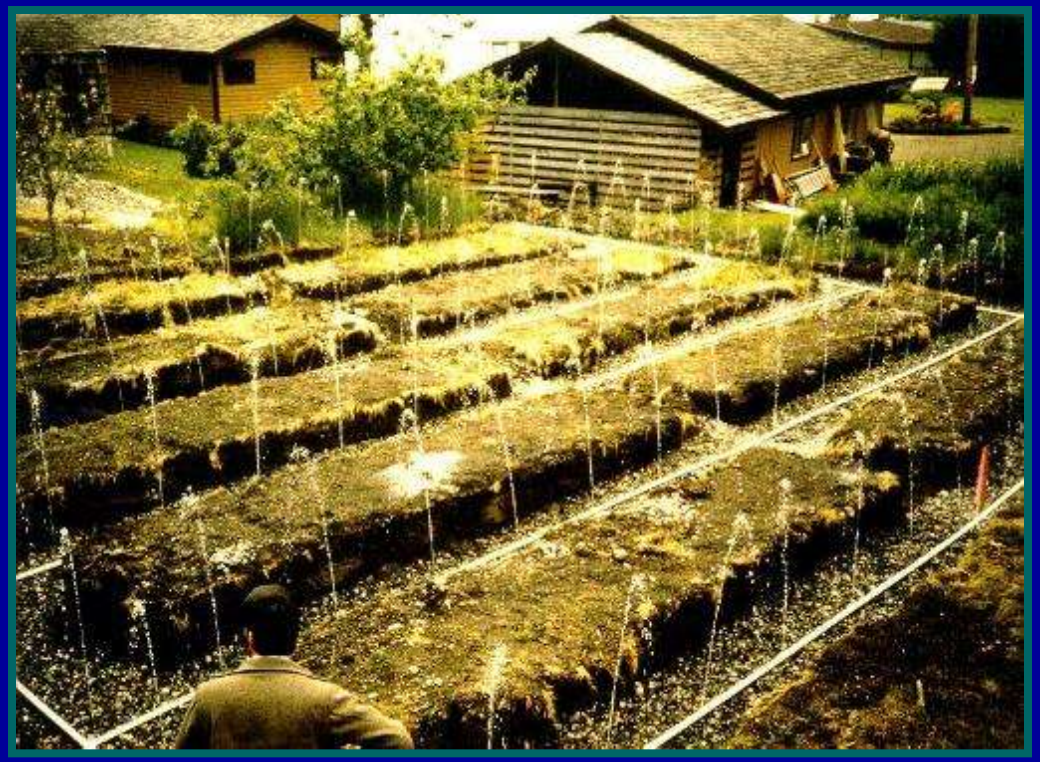
Pressure Distribution

- ***Objectives:***
  - *Quickly pressurize network*
  - *Be fully pressurized for most of dose*
  - *Minimize draining into lower laterals*
  - *Have about the same amount of effluent reach each square foot of infiltrative surface*

Low Pressure Distribution

Dosed-flow Distribution
Low Pressure Pipe System

- **Options – <u>Pressure distribution</u>**
  - *Designed to distribute effluent uniformly over infiltrative surface of receiving component.*



Pressure Distribution

Low Pressure Pipe System

- ***Design considerations***
  - *The smaller the orifice diameter: the greater the potential for plugging*
  - *The smaller the orifices and the greater their spacing:*
    - *The faster the network will pressurize*
    - *The smaller the pump must be (gpm)*
  - *Orifices at 12 o'clock will help network pressurize faster but are more subject to:*
    - *Plugging*
    - *Freezing in cold weather areas*

Low Pressure Pipe (LPP) system

End feed mainfold

LPP Trench Cross-section

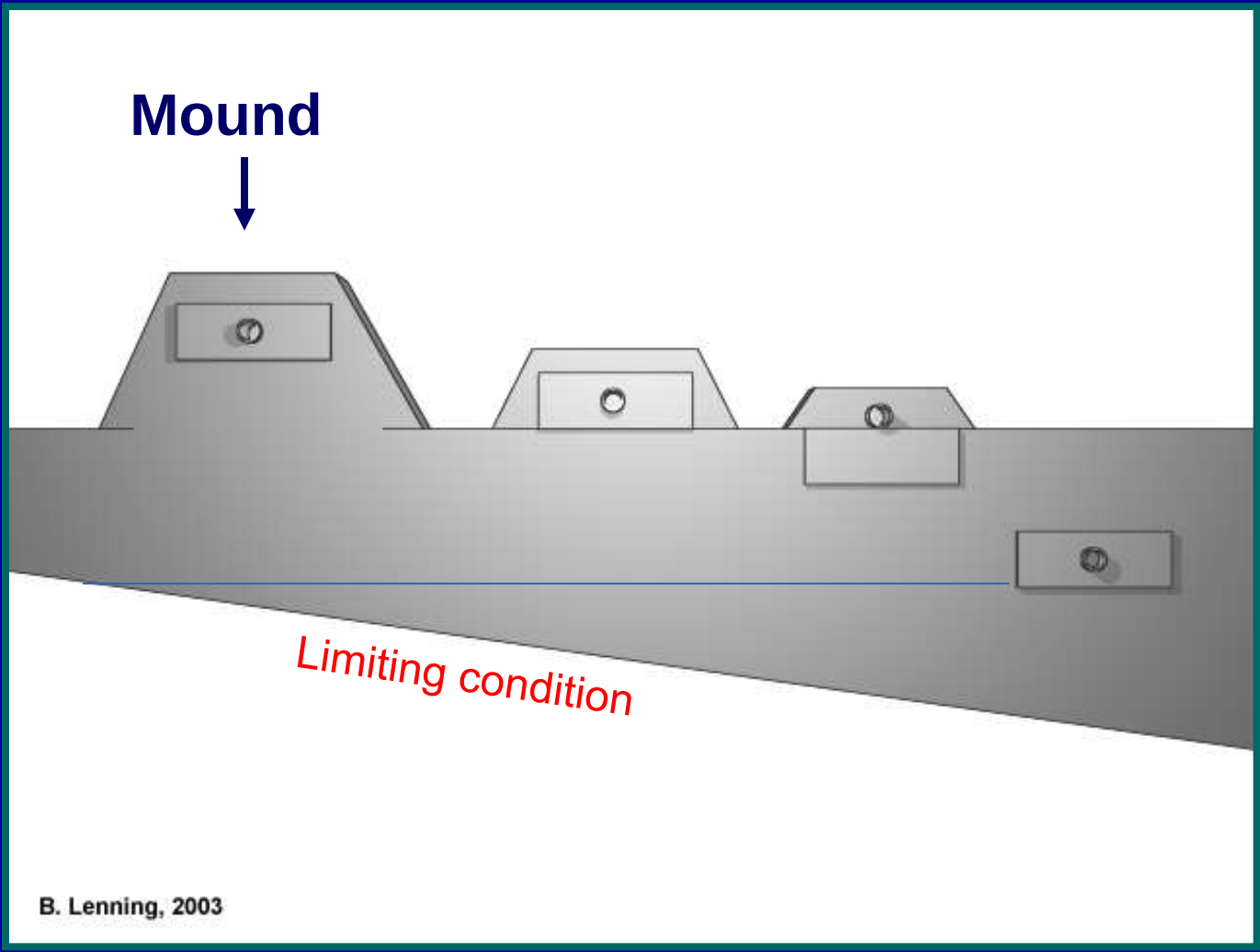
Lateral turn up showing EZ FLOW option – sleeved line shown at rear

Wisconsin Mound System

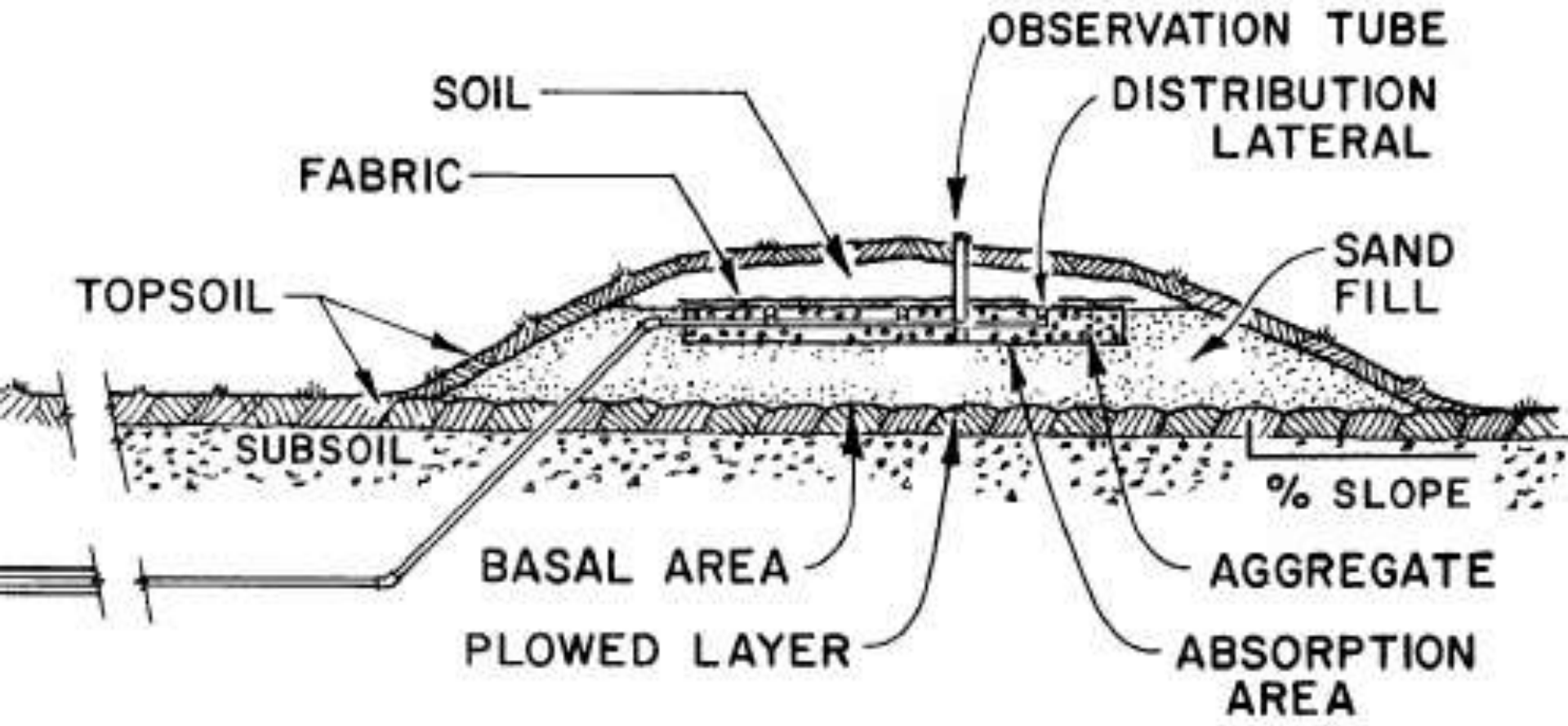
Subsurface Dispersal

- ***Mound system***
  - *Surface of original soil must be prepared properly*
  - *On sloping property, keep linear loading rate down*
    - *Long and narrow*
    - *Length parallel to the contour lines*

Mound System



Wisconsin Mound



Drip Irrigation

Dosed-flow Distribution

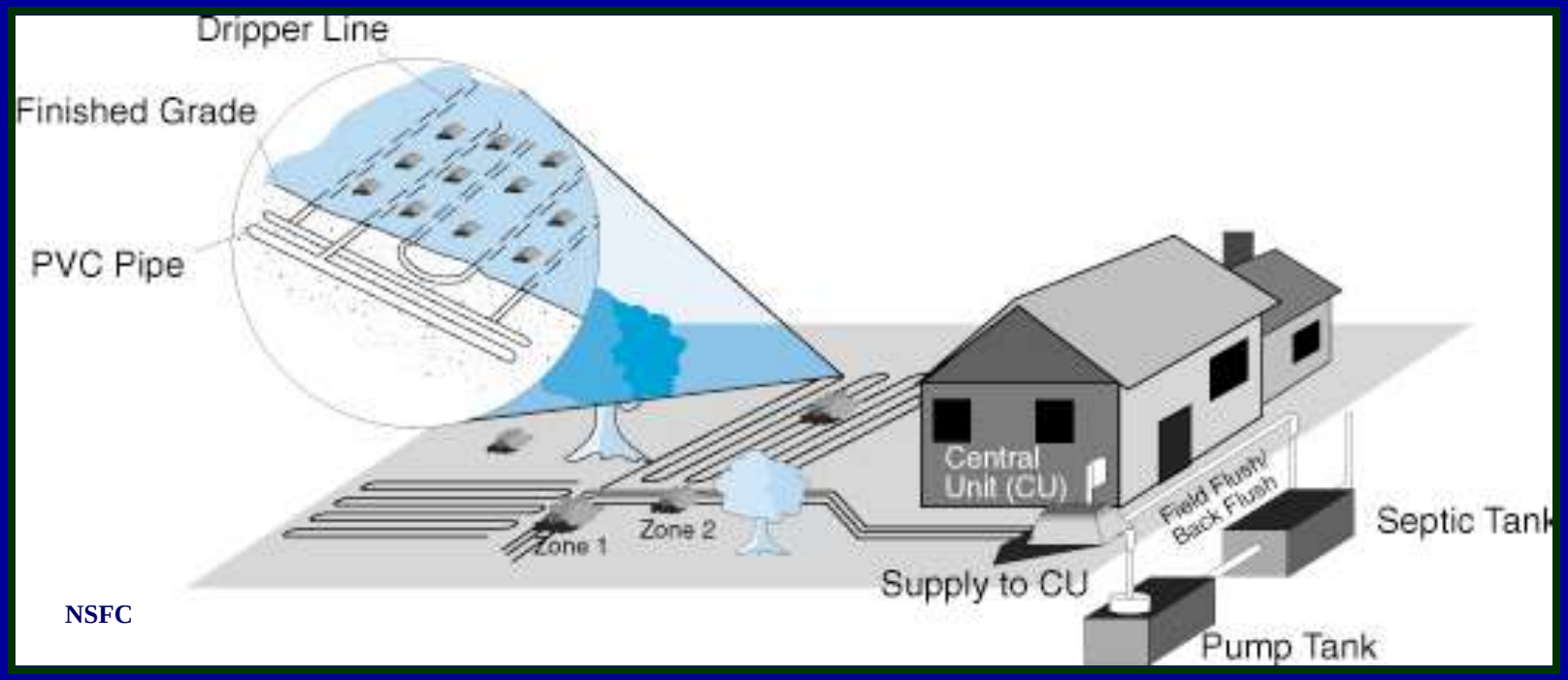
- ***Options – <u>Drip distribution</u>***
  - *A small diameter pressurized distribution network that delivers small, precise volumes of pretreated effluent at slow controlled rates.*

Drip Distribution

- *Like miniature version of pressure distribution*
- *Emitters instead of orifices*

Drip Distribution

- What it looks like



The Benefits of Drip Irrigation

Controlled & Uniform Dosing

Currently the most effective system known for

- *Even dosing over area*
- *Even dosing over time*

Drip Irrigation

- *Small doses of wastewater into the soil.*
- *Uniform distribution over the entire area.*
- *Wastewater moves through soil under unsaturated flow conditions, thus effectively treating the wastewater.*
- *Wastewater can be dosed into the active surface layer of the soil.*

Drip Mound

Mound History

- *The basic mound system in use today was developed at the University of Wisconsin-Madison in the early 1970's by Dr. Jim Converse*

- *The Wisconsin Mound has been widely accepted and incorporated in many state regulations today*

- *BUT….Why a mound ?????*

Why a Mound

- *The main purpose of a mound is to provide sufficient additional treatment capacity and vertical separation to a limiting condition and produce an effluent equivalent to, or better than, a conventional onsite disposal system*

- *But….Why a Missouri Mound ?????*

Why a (Missouri) Mound

- *Because of:*
  - *Chiles Airport*
  - *Charlene Weiss*
  - *Alan Thomas*
  - *Dr. Jim Converse*

Initial Wetting Front

Wetting Front Hits Course Sand

Wetting Front Stacks Up Above Boundary

Missouri Mound

- *What else is contributing the success of the Missouri Mound*
  - *Uniform distribution over area and time*
  - *A typical Wisconsin Mound would have 60 to 100 holes or emitter points*
  - *A typical Missouri Mound would have 900 emitter points*

The Onsite Café Menu

Advantages / Disadvantages

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Let me see that Onsite Café Menu !!

Never mind…..I know what you need…