4. Basic Trickle Irrigation System

a. Control station
   - contains all the components that link the water supply to the mainline
   - the next 5 figures illustrate the various configurations of trickle irrigation systems
   - components of a control station

(1) city water connection or engine or motor and pump
(2) backflow preventor (ex. check valve)
(3) fertilizer tank
(4) fertilizer injector
(5) water meter
(6) filter
(7) pressure gauges
(8) pressure regulator
(9) main shut off valve
(10) controller
(11) pressure relief valve

(2) Check VALVES
   - prevents reverse flow of water
   - prevents backflow from damaging pump
   - prevents suction lines from being drained (prime)
   - protects municipal water from contamination

(3) Fertilizer tank
   - simply to hold the fertilizer

(4) Fertilizer injector
   - injector pump
   - venturi
   - differential pressure tank
   - injector pump
     - type - piston or diaphragm
     - constant concentration
     - require power source
     - more costly than venturi or differential pressure tank
     - requires more maintenance
   - venturi
     - suction device
     - significant head loss
     - no power requirements
     - low cost
   - differential pressure tank
     - non-uniform concentration
     - good for some chemical application
     - no power requirements
Fig. 1.1.4 An example of a basic trickle irrigation system.
Fig. 3.4.1 Trickle irrigation system components.
FIGURE 51. Surface application by the trickle method. Water is applied very slowly onto the surface of the soil through special outlet emitters in plastic pipe.
FIGURE 10-1: COMPONENTS OF A TYPICAL MICRO-IRRIGATION SYSTEM
FIGURE 152. Basic units of a trickle irrigation system.
FIGURE 5-1: CHEMICAL INJECTION DEVICES

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(5) Water Meters
- determines the rate water is being applied
- determine the quantity of water used
- monitors continuing performance of the irrigation system
- assist in irrigation scheduling and cost analysis

(6) Filters
- selection based on:
  - flow rate (GPM)
  - contaminant (types, site, concentration)
  - required quality
- types of filters
  - screen filter
  - centrifugal separators
  - media filters

Screen Filters
- fine mesh screen enclosed within a cased housing
- primarily for filtering water containing inorganic materials i.e. sand, silt, scale
- remove small amounts of organic contaminants
- cannot trap and hold large amounts of organic material
  - without restricting the flow
Centrifugal Sand Separators
- remove sand, scale and other particles that are heavier than water
- often installed on suction side of pump
- self cleaning
- require minimum maintenance
- must be sized correctly

Media Filters
- filters water containing either organic or inorganic contaminants
- ability to hold and entrap large quantities of contaminants
- water is filtered through sand
  *Selection of sand type
    - too coarse sand will lead to poor filtration and system clogging
    - too fine sand will cause unnecessary and excessive backwashing of the filter
    - depends on type of emitters or strip tubing used in the system
  - must be cleaned by backwashing or reversing the direction of water flow through the bed

(7) Pressure Gauges
- used to measure pressure at critical locations, i.e. entrance of mains and submains
- may indicate pressure loss due to clogging before and after a filter
- may indicate leakage, line breaks, etc.

(8) Pressure Regulators
JRE 4-1: SCREEN MESH SIZES COMPARED TO 0.020-INCH ORIFICE