

# LOW PRESSURE SEWER DESIGN METHOD

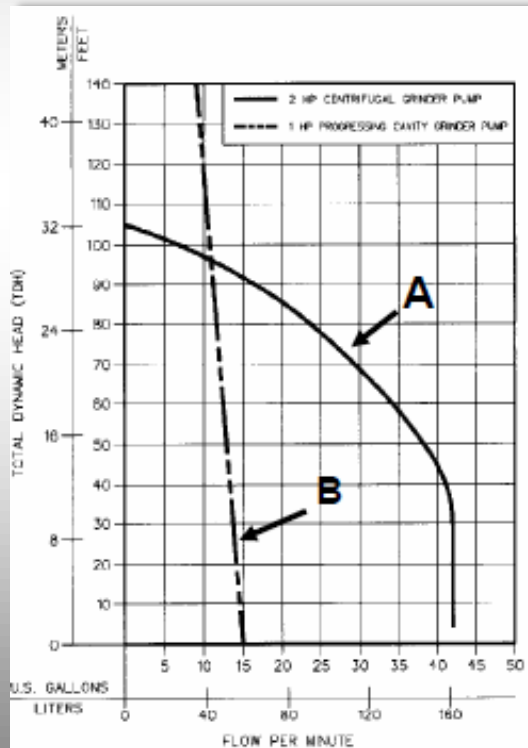


# Low Pressure Sewer is...

- Enclosed Sanitary Sewer – 75 PSI
  - Network of pumps transport wastewater through small diameter pipes to Collection/Treatment System
    - Grinders or Effluent Style Pumps
    - System Size?
      - As small as 1 Pump Station
      - As large as Thousands tied together

# Grinder Pump Types

- Centrifugal
- Semi-Positive Displacement “Progressing Cavity”

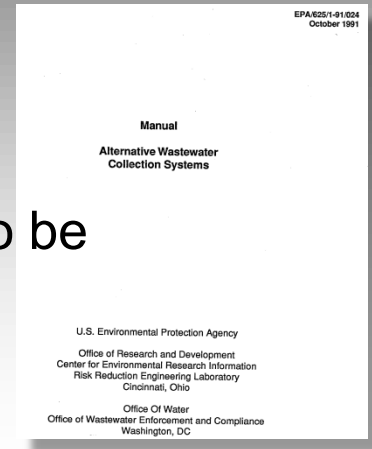


# KEEN PUMP Design Method

- Two Common Design Approaches in Industry
  - Probability Method
  - Rational Method
  
- Probability Method - Attempts to Predict Maximum No. to run Simultaneously
- Rational Method – Design flow which corresponds to Total number of homes served by pressure sewer

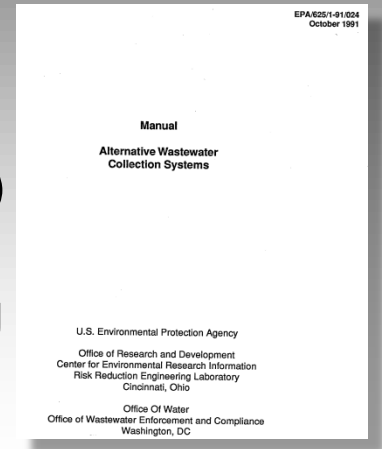
# Probability Method

- References Taken from:  
<http://nepis.epa.gov/Adobe/PDF/300046DW.pdf>
- “Maximum number of pumps theoretically expected to be running at any time.”
- Constant flow rate of each pump running consistent inflow pattern, (i.e. 250 gpd/edu).
  - Can only logically be applied to “Fixed Flow” or “Semi-Positive Displacement – Progressing Cavity” Pumps.
- One Pump manufacturer uses “constant” flow value as 11 GPM
- 11 GPM x Maximum Pumps expected to be running theoretically
- Pipes are sized to accommodate these flows



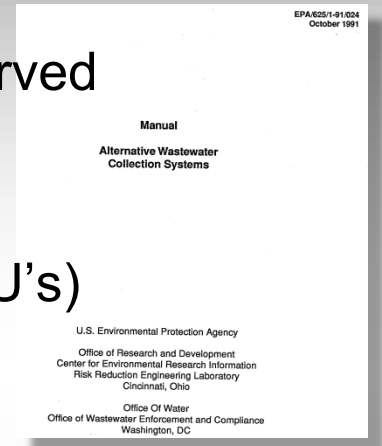
# Probability Method Cont.

- Pump Produces a Constant or FIXED Flow (11 GPM)
- Actual flows for progressing cavity grinders (including KEEN PUMP KPCG) vary from 7-15 GPM over a typical operating range.
- CONCLUSION: Progressing cavity grinder pumps curve “relatively vertical” – not CONSTANT FLOW.



# Rational Method

- References Taken from:  
<http://nepis.epa.gov/Adobe/PDF/300046DW.pdf>
- “A design flow corresponding to number of homes served by the pressure sewer.”
- A design flow which relates to number of homes (EDU's) being served.
- Flow not dependent on output from any pump producing constant flow or identical to others.
- “The rational method can be logically applied when either centrifugal pumps or semi-positive displacement pumps are used.”
- “ The rational design has almost exclusively become the accepted method of practice.”



# Peak Flow for Pipe Diameters

\*KEEN PUMP Design Method\*

$$Q = AN + B \text{ (Known as * Rational Method)}$$

Q = Total Design Flow

N = number connections (EDU's)

A = Coefficient selected by engineer, (Based on Avg. daily flow)  
typically 0.5

B = Baseline pump flow - typically Avg. to Max. flow

(Can be used for Centrifugal or Progressive Cavity Pumps)

\* <http://nepis.epa.gov/Adobe/PDF/300046DW.pdf>

