ES930 Timed dosing

Introduction to timed dosing of effluent

Concept

- To apply effluent in equal doses, spaced at equal intervals
- Dose volume (dosing time)
- Inter dose interval

Flow equalization

- As doses are equally spaced, peak flows must be equalized
- This requires a large reserve volume in the pump chamber or/and other flow equalization in the system

Is flow already equalized?

- Example, dosing of effluent to SWIS from a sand filter that is time dosed
  - This may allow demand dosing
- Or, example effluent from a collection system/treatment plant that is already equalized to a large extent
  - This may permit considerable reduction of reserve volume needed in pump chamber

Large systems

- Equalization will be designed per instructions in the EPA manual

Medium systems

- Pump chamber size guidelines are available, example Washington State guideline:

Daily Design flow (gpd)	Minimum pump chamber capacity (gallons)
< 1000	1000
1000 - 2000	1500
2000 - 3000	2500
3000 - 5000	3500
5000 - 7500	4000
7500 - 14500	5000

Small systems

- Guideline (SPM and others) for 2 x Design flow
- Allows sufficient space for simple control system, may require more volume with more complex control systems or with pumps that require a greater water depth in the tank

Dosing regimens

- Will the system or distribution network drain?
- If so, the dose will be restricted to one that addresses proper distribution
- At least 5x the draining volume (or more complex calculations for a drip system)
- For drip systems consider dose time plus pressurization time, try to ensure at least 80% of dose is well distributed

Not draining

- If possible, sand mound distribution network should not drain
- This allows for very small doses
- Consider that part of pipe may still drain
- Consider need for good scouring and more frequent flushing.

How often?

- 12x per day at design flow is a good target
- Some systems dose as many as 100x pd
- If draining/distribution concerns are involved, lower figures may be required.

Pump run time considerations

- Work with your manufacturer to select pumps that can tolerate short cycles
- Soft start turbine pumps may be applicable
- Smaller pumps may be more tolerant
- Keep pump well cooled.

Design or average flow

- Timed dose may be based on the design flow or the average flow
- Design flow allows for simple control system, average flow normally uses a control panel as there must be programming to increase the dose frequency as flow goes above average

Floats

- Timed systems may need several floats and a control panel
- Consider use of a pressure transducer/control panel combination or ultrasound sensor

Float setting

- System will have a low level alarm float
- May have a redundant pump off float (unless pump has run dry protection)
- Timer allow float
- Lag 1 float
- Alarm float
- Lag 2 float

Low level

- First, a low level redundant pump off float and low level alarm
- Low level alarm lets you know the dose volume is being exceeded during the on cycle
  - May have pipe leakage
  - May have defective control
  - Timer allow float may have slipped
- Should be installed even with pressure transducer or ultrasound systems

Timer allow

- Set at somewhat more than the dose volume above the low level off float
- Allows timer to start
- Will not result in dose-just in allowing the timer to work
- In simple systems directly controls supply to electromechanical timer

Lag 1

- In systems which are designed to dose based on average flow, this float switches system to dosing at design flow
- Normally by halving the inter dose interval
- For small systems, set at 2/3 design flow above the timer allow float

High level alarm

- Normally set at 1 (0.67 to 1.5) X the design flow
- May directly act as lag 2 float in simple systems
- Must not self reset

Lag 2

- Set slightly above the alarm float
- This activates override dosing, may act as demand dose float
- Consider potential impact on SWIS
- With twin pumps may activate both pumps
- In simple systems dosing based on design flow this is the lag 1 float

Alarm reserve volume

- As for demand dosed systems
- Guideline 0.5 x design flow
- May be more in some cases

Event logging

- Flow meters
- Logging of all events
- Allows for adjustment of timed dosing and troubleshooting

Timers

- To set dose time, base on

dose volume ÷ pump run time

- Set interval by calculating inter dose interval based on 24 hrs minus total dose time, divided by number of intervals
  - Round to sensible number

Simple control system

- Electromechanical timer, set to interval, triggers a
- Time down relay, set to dose time