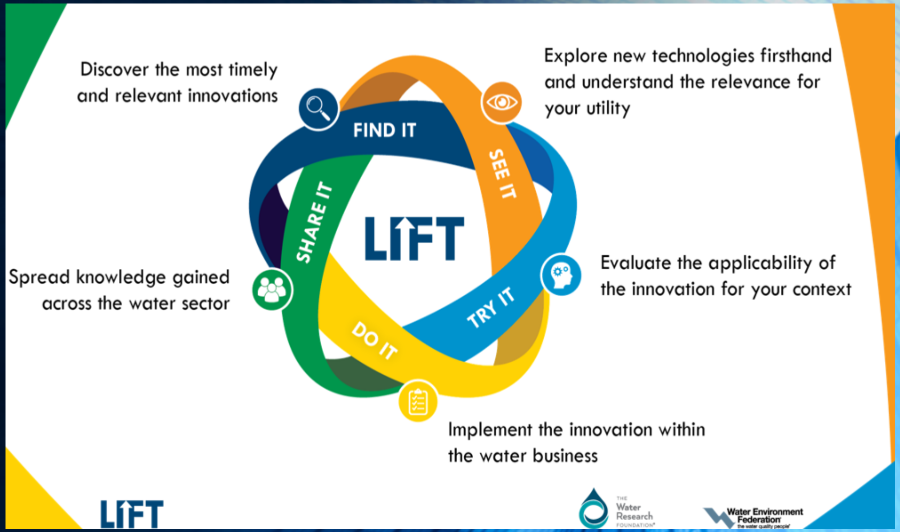
Cloud Based Applications & Courses With Predictive Analytics for Water & Wastewater Operations



Presentation at The Water Research Foundation Seminar on November 17, 2020

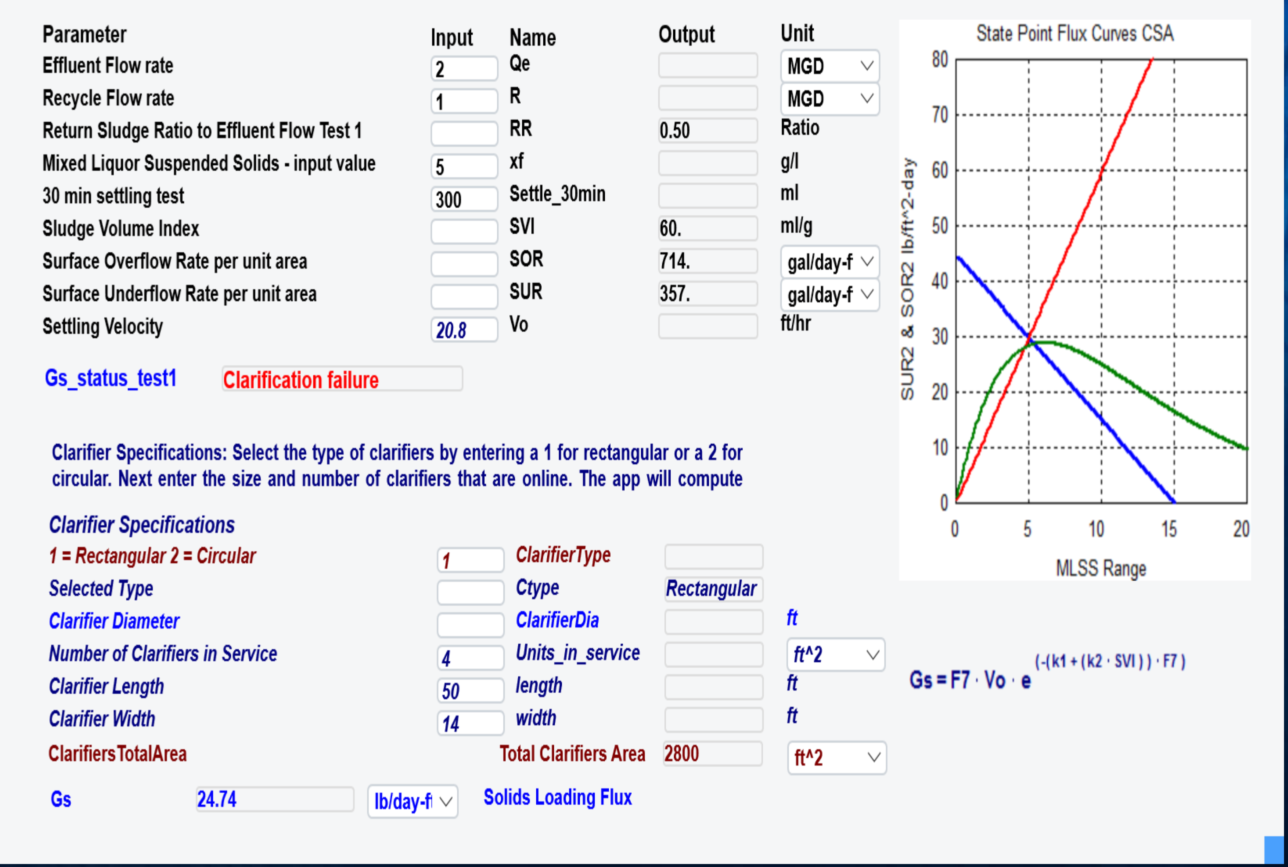
Applications & Beneficial Impacts

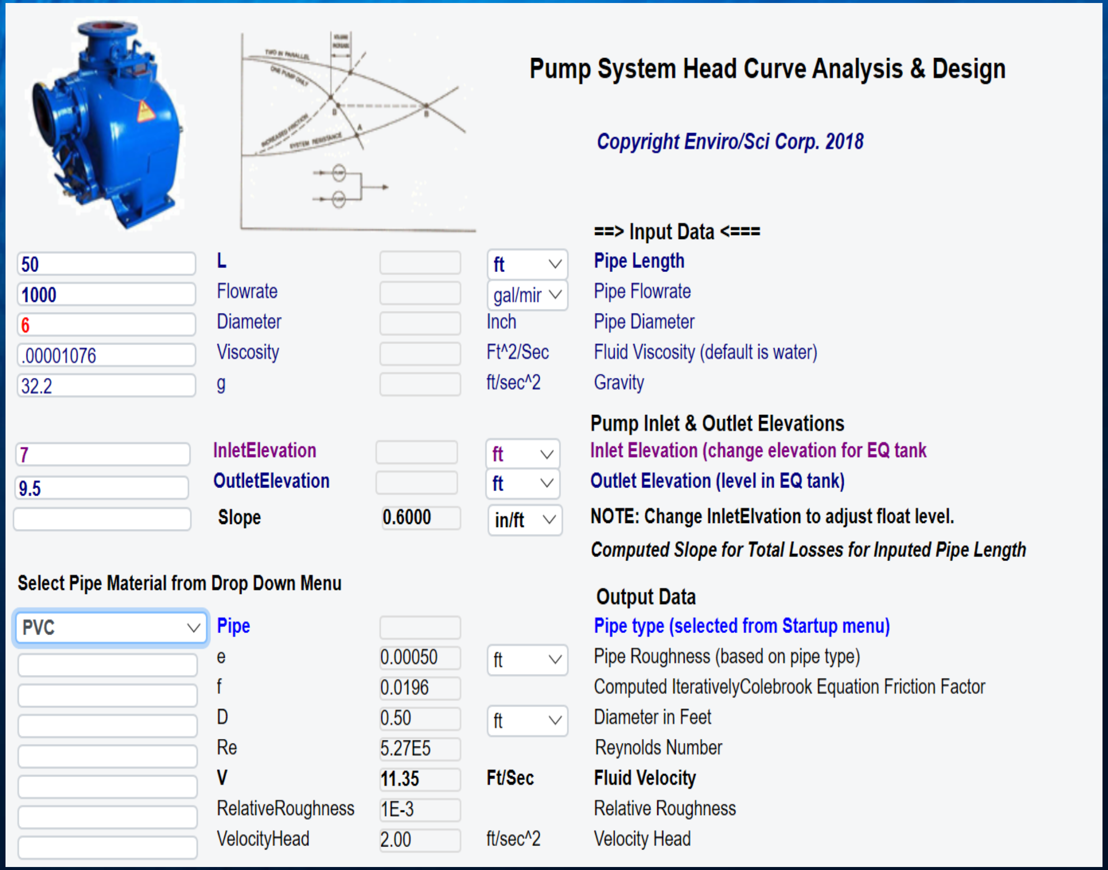
- Online applications for operation optimization & troubleshooting
- Energy conservation
- Process optimization
- Interactive staff training
- Cloud storage for each application
- Integrate Cloud Based Operator Training Courses

Development History

- Modeling of applications begun 1983 employing software platform
- 36 years of development of applications and use for water & wastewater operations
- Development of Cloud based modeling and deployment software enhancements
- 3 years of model adaptations to cloud based system
- 2 years of prototype testing in sewage & engineering arenas
- Presently developing AI and predictive analytics interfacing

Cloud Based Applications





State Point Analysis Course with Integrated Cloud Based Application

Auto Solve · Discussions · Settings · Report

State Point Analysis

Copyright Enviro/Sci Corp. 2019

CalcEdge

The State Point Analysis is a practical tool that can be used to perform a "what if" analysis based on site specific data. It enables Operators to examine clarifier behavior under various flow and loading scenarios. Utilizing the SPA Operators can predict impending problems early, implement corrective measures in a timely fashion, and adapt to upstream changes in the biological process. State point analysis can be used to determine if a secondary clarifier is overloaded, critically loaded, or underloaded with respect to both its clarification and thickening capacities

Instructions:
- Enter the Effluent Flow Rate “Qe”
- Enter the Return Activated Sludge Flow Rate “R”
- Enter the Mixed Liquor Suspended Solids value “xf”. Not the this is in g/l which is mg/l divided by 1,000.
- Enter the 30-minute settling test value in ml “Settle_30min”

Computed Values:
- The Return Sludge Flow Rate Ratio “RR” is computed.
- The Sludge Volume Index “SVI” is computed.
- The Clarifier Surface Overflow Rate “SOR” is computed.
- The Calrifer Surface Underflow Rate “SUR” is computed

Clarifier Specifications

1	ClarifierType			1 = Rectangular 2 = Circular
	Ctype	Rectangular		Selected Type
	ClarifierDia		ft	Clarifier Diameter
4	Units_in_service		# Online	Number of Clarifiers Online
50	length		ft	Clarifier Length
14	width		ft	Clarifier Width
	ClarifiersTotalArea	2800	ft^2	Total Clarifiers Area

Click Image to Left to access app; click image below to access course

Parameter	Input	Name	Output	Unit
Effluent Flow rate	3.000	Qe		MGD
Recycle Flow rate	1.170	R		MGD
Return Sludge Ratio to Effluent Flow Test 1		RR	0.39	Ratio
Mixed Liquor Suspended Solids - input value	2.75	xf		g/l
30 min settling test	300	Settle_30min		ml
Sludge Volume Index		SVI	109.	ml/g
Surface Overflow Rate per unit area		SOR	1,071.	gal/day-ft
Surface Underflow Rate per unit area		SUR	418.	gal/day-ft
Settling Velocity default value 20.8	20.8	Vo		ft/hr

Gs_statu... Clarification failure

SUR2 27.19

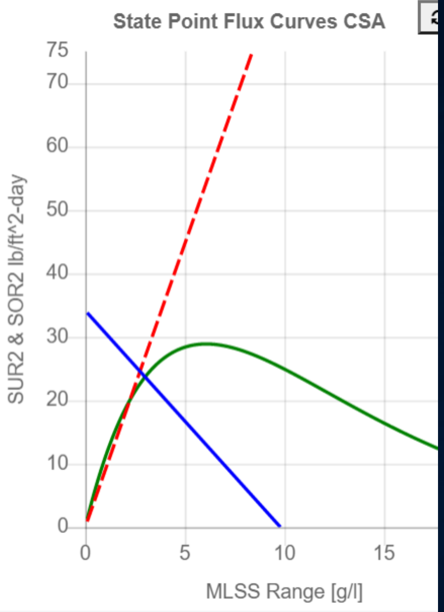
Gs status, te...

$$RAS\_TSSf = \left[\frac{Qe}{Rf+1} \cdot xf\right]$$

Return Sludge vs. RAS TSS comparison	Input	Name	Output	Unit
Gs_status_test1 *Clarification failure*		Gs status, test 1		
Based on measured MLSS value for GO1pb &...		G01pb	11.91	

The two variables in this comparison are invertible. Clear the RAS_TSSf value and enter a Rf value in the input cell

Clarifier Specifications: Select the type of clarifiers by entering a 1 for rectangular or a 2 for circular. Next enter the size and number of clarifiers that are online. The app will compute



CLARIFIER PERFORMA...

(In Development)

The State Point Analysis is a practical tool that can be used to perfo...

By: Bill Smith

0 (0) Protected

View Course

Use of State Point Application for Process Evaluations:

Chart Interpretation:

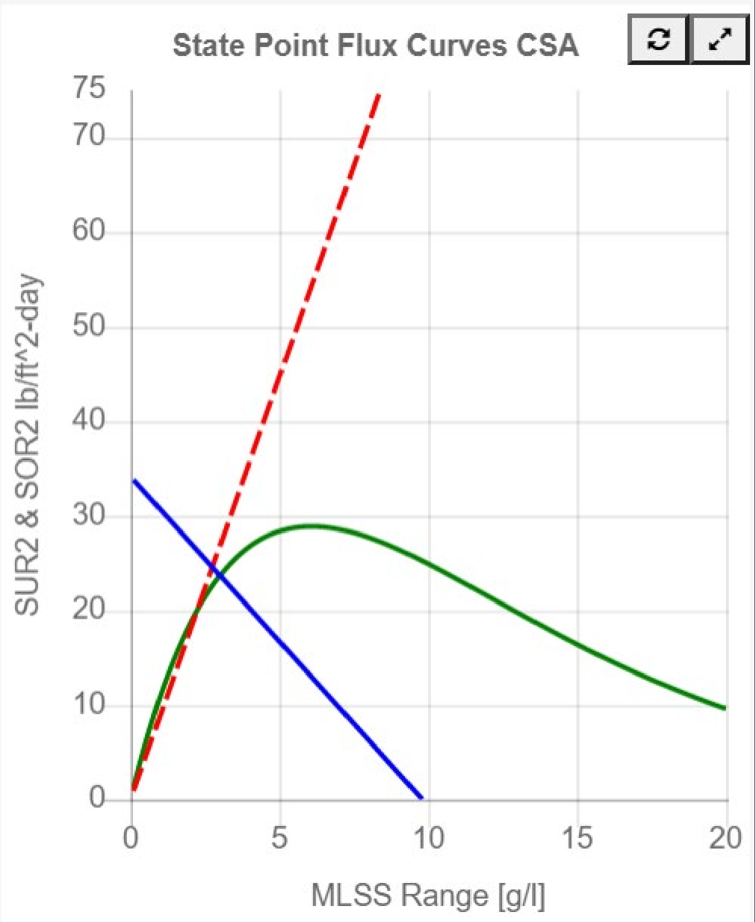
- The Chart has two straight lines and one curve.
  - The Curved line is the Flux Curve
  - The Blue Line is Underflow Flux Line – its slope represents the Clarifiers Return Sludge Flowrate.
  - The Red line is the Overflow Flux Line - its slope represents the Clarifiers Return Sludge Flowrate.
  - The Intersection of the Red Line and Blue Line represents the State Point.
- **Location of the State Point**
  - If the location of the State Point intersection is less than 90% of the curve value on the Y-Axis for an inputted MLSS value, the App will return a value of **"Ok".**
  - If the location of the State Point intersection is greater than 90% of the curve value and less than the curve value on the Y-Axis for an inputted MLSS value the App will return a value of **"Thickener Failure".**
  - If the location of the State Point intersection is greater than 100% of the curve value and less than the curve value on the Y-Axis for an inputted MLSS value the App will return a value of **"Clarifier Failure".**

- **Adjustments in Response to State Point location and Flux Curve change**
  - Increase in **"Qe":** The slope of the Red Line will get steeper with an increase in flow and less steep with a decrease in flow. This will move the **"State Point"** location, the intersection of the two straight lines. Changes in the **"Qe"** will relocate the **"State Point"** with respect to the Curved Flux Line and therefore change the condition of the clarifier condition and the respective performance notifications.
  - Increase in **"R":** The slope of the Blue Line will get steeper with an increase in flow and less steep with a decrease in flow. This will move the **"State Point"** location, the intersection of the two straight lines. Changes in the **"R"** will relocate the **"State Point"** with respect to the Curved Flux Line and therefore change the condition of the clarifier condition and the respective performance' notifications.
  - A change in the 30-minute settling test **"Settle_30min"** will change the Flux Curve Line. The larger the value the higher the "State Point" location is on the Y-axis. At some value of the **"Settle_30min"** the location of the **"State Point"** will cause the app to indicate **"Thickener Failure"** or **"Clarification Failure".** Under these circumstances either decreasing the **"Qe"** or improving the "Settle_30min" or decreasing the Mixed Liquor Suspended Solids **"xf"** are options for adjusting the performance of the clarifies.
  - A change in the Mixed Liquor Suspended Solids **"xf"** will change the location of the **"State Point"**. As **"xf"** increases while all other variables stay the same, the **"State Point"** will move closer to and/or above the Flux Curve Line.

Use of State Point Application for Process Evaluations:

Chart Interpretation:

- The Chart has two straight lines and one curve.
- The Curved line is the Flux Curve
- The Blue Line is Underflow Flux Line – its slope represents the Clarifiers Return Sludge Flowrate.
- The Red line is the Overflow Flux Line - its slope represents the Clarifiers Return Sludge Flowrate.
- The Intersection of the Red Line and Blue Line represents the State Point.
- Location of the State Point
- If the location of the State Point intersection is less than 90% of the curve value on the Y-Axis for an inputted MLSS value, the App will return a value of "Ok".
- If the location of the State Point intersection is greater than 90% of the curve value and less than the curve value on the Y-Axis for an inputted MLSS value the App will return a value of "Thickener Failure".
- If the location of the State Point intersection is greater than 100% of the curve value and less than the curve value on the Y-Axis for an inputted MLSS value the App will return a value of "Clarifier Failure".



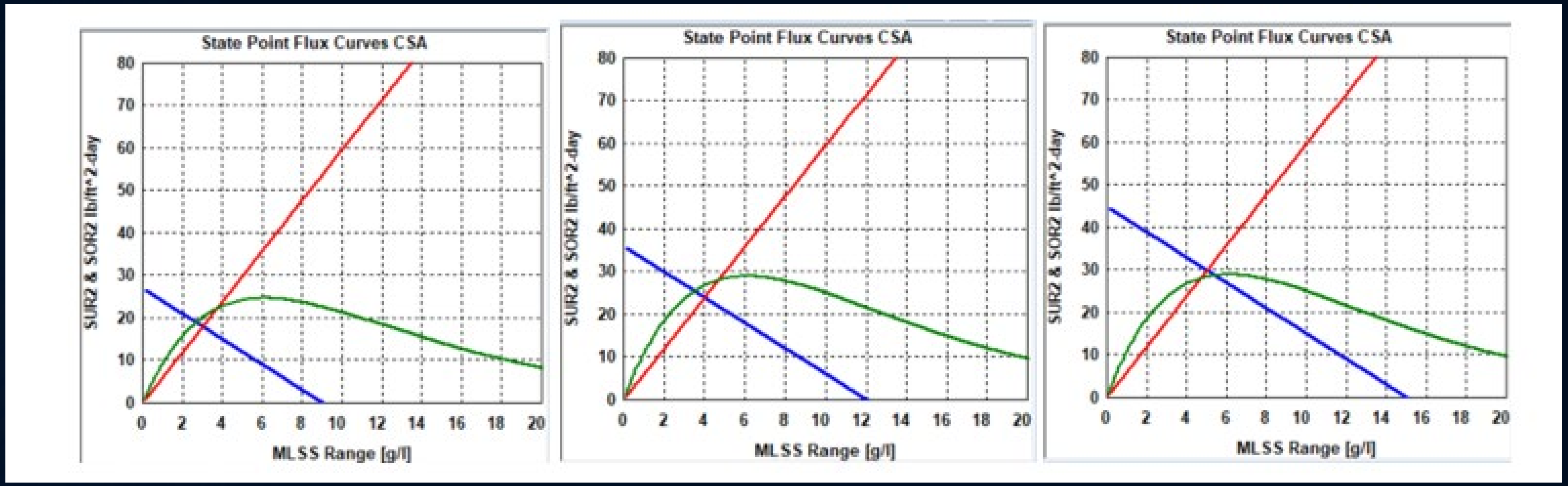
Use of State Point Application for Process Evaluations:

<u>Adjustments in Response to State Point location and Flux Curve change</u>

- Increase in "Qe": The slope of the Red Line will get steeper with an increase in flow and less steep with a decrease in flow. This will move the "State Point" location, the intersection of the two straight lines. Changes in the "Qe" will relocate the "State Point" with respect to the Curved Flux Line and therefore change the condition of the clarifier condition and the respective performance notifications.
- Increase in "R": The slope of the Blue Line will get steeper with an increase in flow and less steep with a decrease in flow. This will move the "State Point" location, the intersection of the two straight lines. Changes in the "R" will relocate the "State Point" with respect to the Curved Flux Line and therefore change the condition of the clarifier condition and the respective performance' notifications.
- A change in the 30-minute settling test "Settle_30min" will change the Flux Curve Line. The larger the value the higher the "State Point" location is on the Y-axis. At some value of the "Settle_30min" the location of the "State Point" will cause the app to indicate "Thickener Failure" or "Clarification Failure". Under these circumstances either decreasing the "Qe" or improving the "Settle_30min" or decreasing the Mixed Liquor Suspended Solids "xf" are options for adjusting the performance of the clarifies.
- A change in the Mixed Liquor Suspended Solids "xf" will change the location of the "State Point". As "xf" increases while all other variables stay the same, the "State Point" will move closer to and/or above the Flux Curve Line.

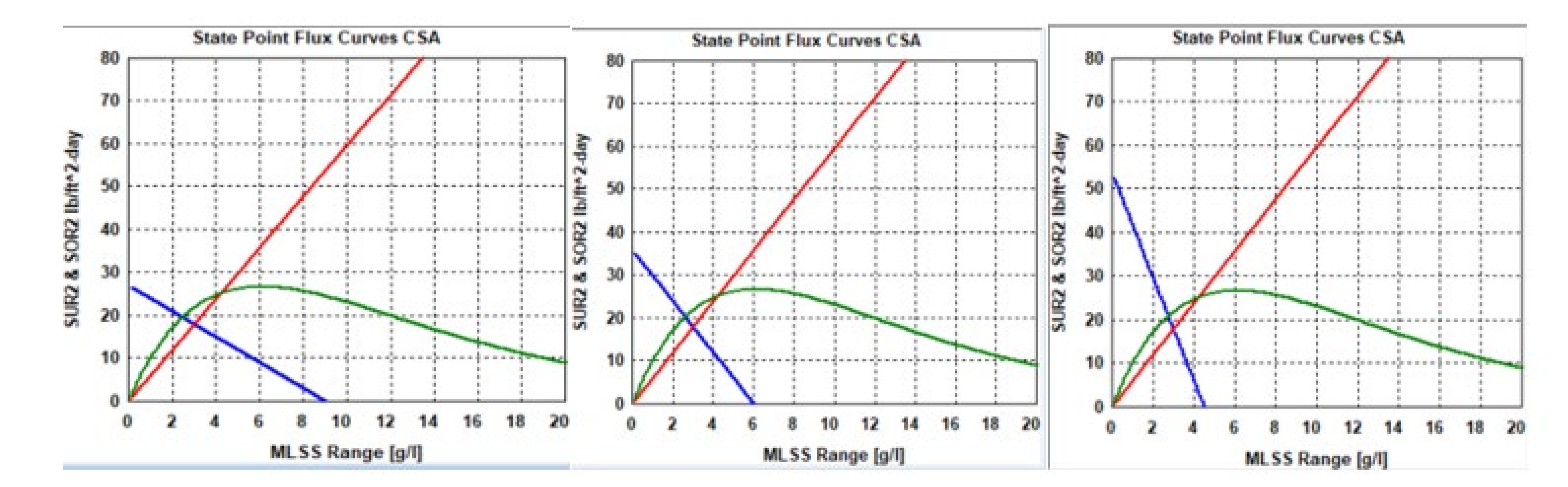
Use of State Point Application for Process Evaluations:

<u>Adjusting the MLSS concentration:</u> The adjustment of the **MLSS** concentration affects the clarifier performance. The State Point will move up towards the Flux Curve and past the Flux Curve creating Thickener for Clarifier failures. The increase in the MLSS values are reflected on the X-Axis.



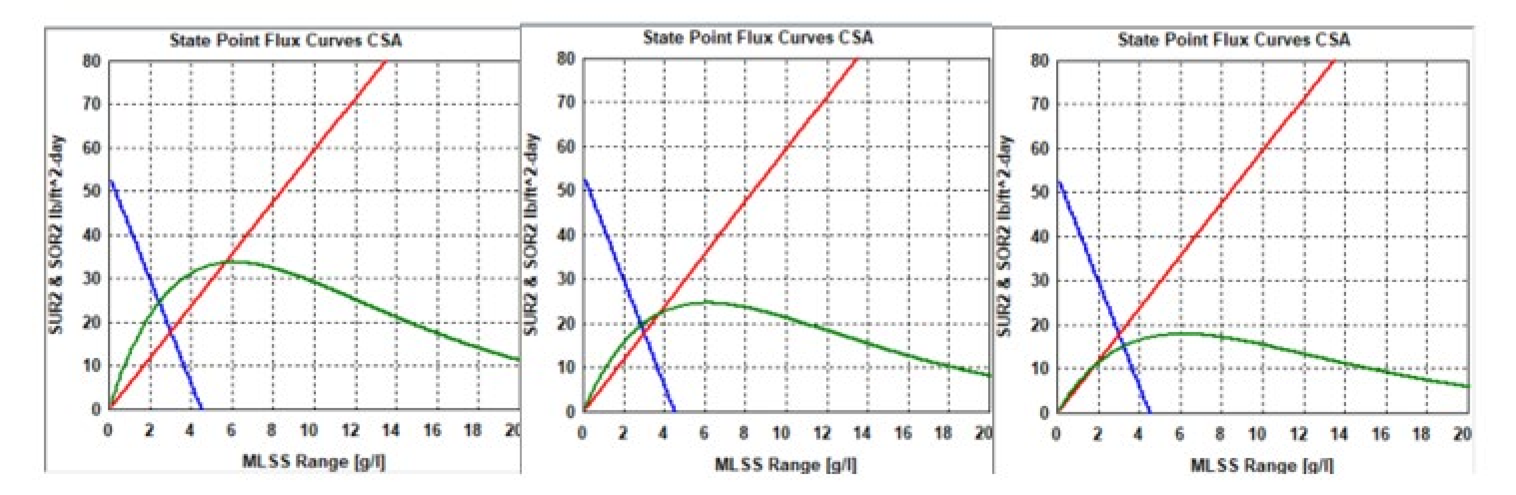
Use of State Point Application for Process Evaluations:

<u>Adjusting the Recycle Flow Rate:</u> The adjustment of the **Recycle Flow Rate** affects the clarifier performance by changing the slope of the Underflow Line but not the location of the State Point.



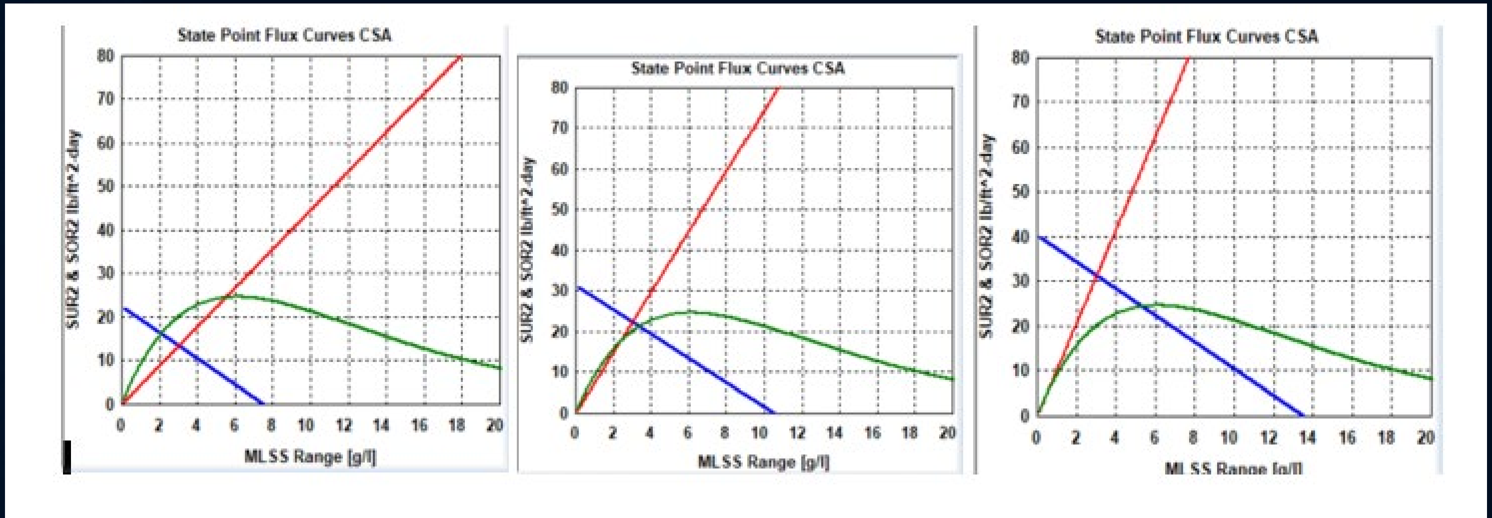
Use of State Point Application for Process Evaluations:

Changes in the Sludge Volume Index: SVI Changes in the value of the SVI creates the follow response in the Flux Curve affects the clarifier performance.

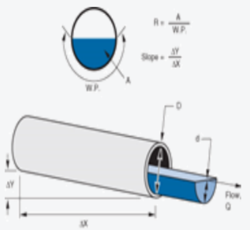


Use of State Point Application for Process Evaluations:

Changes in the Effluent Flow Rate: "Qe" Changes in the value of the "Qe" creates the follow response in the State Point location.



Pumps & Hydraulics Course with Integrated Cloud Based Application



$Q = V \cdot A$

Manning Equation Calculations for Circular Open Channel Flow

Copyright Enviro/Sci Corp 2017

INSTRUCTIONS: Enter the input values for the variables. Click the Input box for Pipe Material and select the type of pipe material employed. The roughness coefficient will be automatically chosen.

Manning Equation

Input Data	Variable	Output	Units	====> Input Data <====
1,200,000.	Q		gal/day	Flow (may be an input or output)
12.00	d		in	Diameter of Pipe (typically input unless y, r, or V are...
100.00	UpstreamElev		ft	Upstream Pipe Section Elevation
99.00	DownstreamElev		ft	Downstream Pipe Section Elevation
110.00	SectionLength		ft	Pipe Section Length
	g	32.18	ft/sec^2	Force of Gravity (defaults to 32.18 ft/sec^2)
Sanitary Sewers with slimes	type			Pipe Material Selected from list

Input Data	Variable	Output	Units	Roughness Coefficient
	S	*0.1091*	in/ft	Slope
	y	6.40	in	Depth of Flow
	r	**6.00**	**in**	**Radius of Pipe**
	V	4.36	ft/sec	Velocity
	Pipe_Flow_Status_Up	Supercritical		Flow & Depth Status
	F	1.0534	Froude	Froude Number - can only be an output value

Input Data	Variable	Output	Units	
	yopt	11.26	in	**Depth of flow for max. flow rate**
	Qmax	2,320,432.	gal/day	Max. flow rate for given geometry
	ymax	8.79	in	Max. possible depth for given flow rate

Input Data	Variable	Output	Units	====> Sediment Transport Data <====
	VelocityMSG	**Sediment Scour**		Sediment Scour or Deposit Status based on velocity
	PipeVol	350.	gal	Liquid Volume in Pipe Section
	PipeHydDtn	0.4202	min	Pipe Section Hydraulic Detention Time

WW-M09: Basics of Pumps and Hydraulics

★★★★★ 5 (1)

364

Authored By

Bill Smith

About This Course

Launch course

(Approved by PADEP)

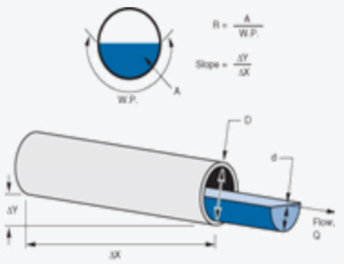
This course includes mathematical models, audio file, videos cloud based CalcEdge Applications developed by Enviro/Sci Corp. The enhancements have been added to a baseline course initially developed by the Pennsylvania Department of Environmental Protection in cooperation with its various contractors.

Associated Calculations

- **Learning Cent...** Manning Equation for Depth or Flow with ...
- **Hydraulic Cou...** Models for WW09 Course with Mathlook
- **rectangular w...** Rectangular Weir by two methods
- **clarifier lau...** Weir sizing and flows for rectangular or...
- **Hazen William...** Head losss or flow with pipe material se...
- **System Head C...** System Head Curve app for pumps includin...

Click Image to Left to access app; click image above to access course

Manning Equation Application



$Q = V \cdot A$

Manning Equation Calculations for Circular Open Channel Flow

Copyright Enviro/Sci Corp 2017

INSTRUCTIONS: Enter the input values for the variables. Click the Input box for Pipe Material and select the type of pipe material employed. The roughness coefficient will be automatically chosen.

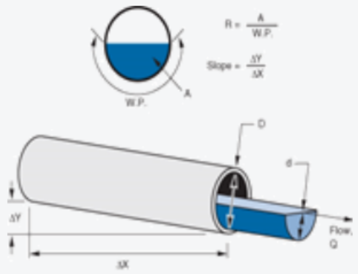
Manning Equation

Input Data	Variable	Output	Units	====> Input Data <====
1,200,000.	Q		gal/day	Flow (may be an input or output)
12.00	d		in	Diameter of Pipe (typically input unless y, r, or V are...
100.00	UpstreamElev		ft	Upstream Pipe Section Elevation
99.00	DownstreamElev		ft	Downstream Pipe Section Elevation
110.00	SectionLength		ft	Pipe Section Length
	g	32.18	ft/sec^2	Force of Gravity (defaults to 32.18 ft/sec^2)
Sanitary Sewers with slimes	type			Pipe Material Selected from list

Input Data	Variable	Output	Units	Roughness Coefficient
	S	*0.1091*	in/ft	Slope
	y	6.40	in	Depth of Flow
	r	**6.00**	**in**	**Radius of Pipe**
	V	4.36	ft/sec	Velocity
	Pipe_Flow_Status_Up	Supercritical		Flow & Depth Status
	F	1.0534	Froude	Froude Number - can only be an output value

Example with Flow, Pipe Diameter, Elevations, Section Length & Pipe Material Specified – Depth of Flow Determined

Manning Equation Application



$Q = V \cdot A$

Manning Equation Calculations for Circular Open Channel Flow

Copyright Enviro/Sci Corp 2017

INSTRUCTIONS: Enter the input values for the variables. Click the Input box for Pipe Material and select the type of pipe material employed. The roughness coefficient will be automatically chosen.

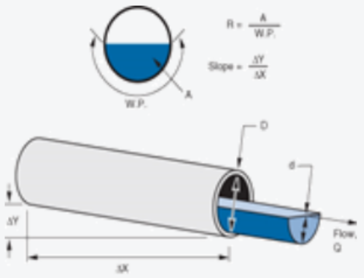
Manning Equation

Input Data	Variable	Output	Units	====> Input Data <====
	Q	1,464,635.	gal/day	Flow (may be an input or output)
12.00	d		in	Diameter of Pipe (typically input unless y, r, or V are…
100.00	UpstreamElev		ft	Upstream Pipe Section Elevation
99.00	DownstreamElev		ft	Downstream Pipe Section Elevation
110.00	SectionLength		ft	Pipe Section Length
	g	32.18	ft/sec^2	Force of Gravity (defaults to 32.18 ft/sec^2)
Sanitary Sewers with slimes	type			Pipe Material Selected from list

Input Data	Variable	Output	Units	Roughness Coefficient
	S	*0.1091*	in/ft	Slope
7.25	y		in	Depth of Flow
	r	**6.00**	**in**	**Radius of Pipe**
	V	4.57	ft/sec	Velocity
	Pipe_Flow_Status_Up	Supercritical		Flow & Depth Status
	F	**1.0359**	Froude	Froude Number - can only be an output value

Example with Pipe Diameter, Elevations, Section Length, Pipe Material, Depth of Flow Specified – Flow Determined

Manning Equation Application



$Q = V \cdot A$

Manning Equation Calculations for Circular Open Channel Flow

Copyright Enviro/Sci Corp 2017

INSTRUCTIONS: Enter the input values for the variables. Click the Input box for Pipe Material and select the type of pipe material employed. The roughness coefficient will be automatically chosen.

Manning Equation

Input Data	Variable	Output	Units	====> Input Data <====
1,300,000.	Q		gal/day	Flow (may be an input or output)
	d	10.87	in	Diameter of Pipe (typically input unless y, r, or V are...
100	UpstreamElev		ft	Upstream Pipe Section Elevation
99.00	DownstreamElev		ft	Downstream Pipe Section Elevation
110.00	SectionLength		ft	Pipe Section Length
	g	32.18	ft/sec^2	Force of Gravity (defaults to 32.18 ft/sec^2)
Sanitary Sewers with slimes	type			Pipe Material Selected from list

Input Data	Variable	Output	Units	Roughness Coefficient
	S	*0.1091*	in/ft	Slope
7.25	y		in	Depth of Flow
	r	**5.44**	**in**	**Radius of Pipe**
	V	4.40	ft/sec	Velocity
	Pipe_Flow_Status_Up	Subcritical		Flow & Depth Status
	F	0.9988	Froude	Froude Number - can only be an output value

Example with Flow, Elevations, Section Length, Pipe Material, Depth of Flow Specified - Pipe Diameter Determined

Application For Alkalinity Feed System

Instructions:

1. Enter the values for the Influent and Effluent Parameters
2. Select the type of Alkalinity from the drop-down menu to the right of
3. Enter the Volume of the Alkalinity Storage Tank
4. Enter the Mass of the Alkalinity added to the Storage Tank
5. The pertinent Output Data is displayed

Alkalinity for Nitrification
Copyright Enviro/Sci Corporation 2017

				Input Data
100.	**RawWasteAlk**		g/m^3	**Alkalinity of Raw Wastewater**
15,000.	Q		gal/day	Daily Flow of Wastewater
45.0	RawNH3		g/m^3	Applied Ammonia to wastewater treatment process
3.0	EffNH3		g/m^3	Effluent Ammonia concentration
100.0	EffAlk		g/m^3	Effluent Alkalinity
Magnesium Hydroxid	type			Selected Form of Alkalinity
				Alkalinity Feed System
100.00	**DayTankVol**		gal	**Volume of Day Tank**
75.	**DayTankMass**		lb	**Mass of Chemcial added to Day Tank**
				Output Data
	AlkChemMass	6,696.	g/day	Mass of Alkalinity Selected Required for Nitrifcation
	AlkChemEqv	1.68	g Alk Chem/g Alkalinity	Equivalent Alkalinity of Chemical Employed
	NitrificationAlk	17,028.	g/day	Mass of Alkalinity Consumed by Nitrification
	FeedSoln%	8.98	%	Percent Alkalinity Feed Soluditon
	AlkFeedSaturation	90.	g/l	Concentration of Alkalinity Chemical in Feed Tank
	FeedSolnStatus	Saturated		Alkalinity Feed Solution Saturation Status
	ChemFeedRate	20.	gal/day	Feed Rate of Alkalinity Chemical
	DayTankRunTime	5.08	day	**Time to empty day tank**
	saturation	1	g/l	Saturation point for Alkalinity Chemical Employed

In this example the flow, NH_3, Effluent NH_3 and Desired Effluent Alkalinity are input values.

The Tank Volume and Mass of Chemical as well as Alkalinity form were input values.

The Day Tank run time and Feed Rate were determined.

 Click Image above to access application

Application For Alkalinity Feed System

1.Enter the values for the Influent and Effluent Parameters

2.Select the type of Alkalinity from the drop-down menu to the right of

3.Enter the Volume of the Alkalinity Storage Tank

4.Enter the Mass of the Alkalinity added to the Storage Tank

5.The pertinent Output Data is displayed

Alkalinity for Nitrification

Copyright Enviro/Sci Corporation 2017

				Input Data
100.	**RawWasteAlk**		g/m^3	**Alkalinity of Raw Wastewater**
15,000.	Q		gal/day	Daily Flow of Wastewater
45.0	RawNH3		g/m^3	Applied Ammonia to wastewater treatment process
3.0	EffNH3		g/m^3	Effluent Ammonia concentration
100.0	EffAlk		g/m^3	Effluent Alkalinity
Sodium Hydroxide	type			Selected Form of Alkalinity
				Alkalinity Feed System
100.00	**DayTankVol**		gal	**Volume of Day Tank**
75.	**DayTankMass**		lb	**Mass of Chemcial added to Day Tank**
				Output Data
	AlkChemMass	9,000.	g/day	Mass of Alkalinity Selected Required for Nitrifcation
	AlkChemEqv	1.25	g Alk Chem/g Alkalinity	Equivalent Alkalinity of Chemical Employed
	NitrificationAlk	17,028.	g/day	Mass of Alkalinity Consumed by Nitrification
	FeedSoln%	8.98	%	Percent Alkalinity Feed Soluditon
	AlkFeedSaturation	90.	g/l	Concentration of Alkalinity Chemical in Feed Tank
	FeedSolnStatus	UnSatur…		Alkalinity Feed Solution Saturation Status
	ChemFeedRate	26.	gal/day	Feed Rate of Alkalinity Chemical
	DayTankRunTime	3.78	day	**Time to empty day tank**
	saturation	500	g/l	Saturation point for Alkalinity Chemical Employed

In this example the flow, NH3, Effluent NH3 and Desired Effluent Alkalinity are input values.

The Tank Volume and Mass of Chemical as well as a different Alkalinity form were input values.

The Day Tank run time and Feed Rate were determined.

 Click Image above to access application

Application For Alkalinity Feed System

1. Enter the values for the Influent and Effluent Parameters
2. Select the type of Alkalinity from the drop-down menu to the right of
3. Enter the Volume of the Alkalinity Storage Tank
4. Enter the Mass of the Alkalinity added to the Storage Tank
5. The pertinent Output Data is displayed

Alkalinity for Nitrification
Copyright Enviro/Sci Corporation 2017

				Input Data
100.	**RawWasteAlk**		g/m^3	**Alkalinity of Raw Wastewater**
15,000.	Q		gal/day	Daily Flow of Wastewater
45.0	RawNH3		g/m^3	Applied Ammonia to wastewater treatment process
3.0	EffNH3		g/m^3	Effluent Ammonia concentration
100.0	EffAlk		g/m^3	Effluent Alkalinity
Magnesium Hydroxid	type			Selected Form of Alkalinity
				Alkalinity Feed System
100.00	**DayTankVol**		gal	**Volume of Day Tank**
	DayTankMass	103.	lb	**Mass of Chemcial added to Day Tank**
				Output Data
	AlkChemMass	6,696.	g/day	Mass of Alkalinity Selected Required for Nitrifcation
	AlkChemEqv	1.68	g Alk Chem/g Alkalinity	Equivalent Alkalinity of Chemical Employed
	NitrificationAlk	17,028.	g/day	Mass of Alkalinity Consumed by Nitrification
	FeedSoln%	12.38	%	Percent Alkalinity Feed Soluditon
	AlkFeedSaturation	124.	g/l	Concentration of Alkalinity Chemical in Feed Tank
	FeedSolnStatus	Saturated		Alkalinity Feed Solution Saturation Status
	ChemFeedRate	14.	gal/day	Feed Rate of Alkalinity Chemical
7.00	**DayTankRunTime**		**day**	**Time to empty day tank**
	saturation	1	g/l	Saturation point for Alkalinity Chemical Employed

In this example the flow, NH_3, Effluent NH_3 and Desired Effluent Alkalinity are input values.

The Tank Volume and Mass of Chemical as well as Alkalinity form were input values.

The Day Tank run time was an Input, the Day Tank Mass determined.

 Click Image above to access application

Advantages - Cloud Based Modelling Applications

Plant operators will be provided assistance with process optimization and data management.

For specific problems and calculations, operators can use a diagnostic application to assess the process modification.

Engineers will benefit from plant modeling and input into design and redesign decisions.

Import and Export of data from Data Historians for Predictive Analytics.

Operators benefit from online training and certification.

The community benefits from energy savings, process optimization, and enhanced troubleshooting in the course of compliance with environmental discharge standards.

Additional Courses & Applications

Environmental Water and Waste Water Calculations

Universal Technical Systems in association with Enviro/Sci Corp. have develop a compendium of CalcEdge applications for the water and wastewater industry. These applications are specifically tailored to the operation and troubleshooting of water and wastewater operations as well as their operation personnel. A subscription service is available for storage of specifically configured applications as a data historian.

Registration & Disclaimer

There is a free trial available for these calculations. To get full access to the calculations you need to purchase the calculations or you can register for our course.

CalcEdge **Click CalcEdge Icon to access applications**

Environmental Water and Wastewater Courses

Universal Technical Systems in association with Enviro/Sci Corp. have developed a compendium of Water & Wastewater training courses with interactive CalcEdge applications for the water and wastewater industry. These courses are specifically tailored to the operation and troubleshooting of water and wastewater operations as well as the training of the operating personnel.

CalcEdge **Click CalcEdge Icon to access additional courses**

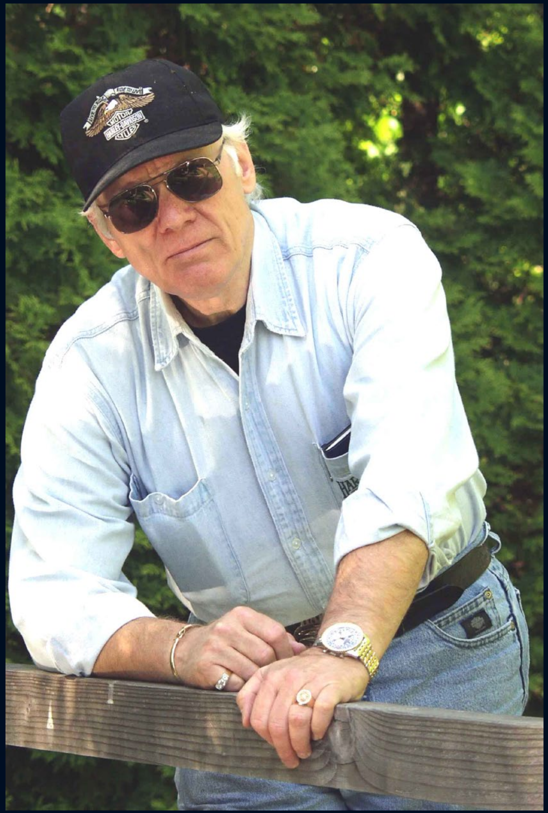
Please contact Bill Smith for more information - w.smith@enviroscicorp.com

WRF LIFT Advantages & Potential

- Expand exposure to Water & Wastewater Operators
- Expand Exposure to Environmental & Sanitary Engineering Firms
- Expand exposure to Operator Training Providers
- Expand exposure of State & Local Professional Associations
- Provide access to potential teaming partners
- Expand the use of the software platform
- Introduce software to e-Publishers
- Evaluate Joint Ventures and/or Sale of Application/Courses
- Coauthoring of similar type applications & course for other domains

Developer of Wastewater Software

- Bill Smith, an inventor and process consultant, has developed several interrelated technologies that optimize wastewater plant performance and provide a means to train and educate a new generation of plant operators.
- Bill is President and Founder of Enviro/Sci Corporation and holds a total of 8 patents in 3 countries for wastewater treatment methods. Organic memory and knowledge has been converted to digital memory and models.
- The software models and applications have been made available to particular plants and are available for installation at other plants.



Disclaimer: ***Neither this presentation, the courses nor the technology has been provided as a replacement for the following technology.***

Tobacco Smoke Enema (1750s-1810s)

CONTACT INFORMATION

Enviro/Sci Corporation

Internet: www.enviroscicorp.com
Bill Smith - The Shitective ©
P.O. Box 2063
Southeastern, PA 19399-2063
Mobile: 215-704-7448
Fax: 484-380-2161
Email: w.smith@enviroscicorp.com

If you think that experts are expensive, wait until you see what it costs to hire an amateur!