

From: Mark Southard
Sent: Tue, 31 Mar 2015 15:29:04 -0500
To: David Sloan
Cc: Russell Schreiber (Wichita Falls); Kerry D. Maroney; Daniel Nix (Wichita Falls); Shawn Garcia; Ray Longoria; David Jackson; Brad B. Castleberry (Lloyd, Gosselink)
Subject: Re: UV System Approval - TCEQ 3-10-15
Attachments: UV Shutdown SOP.pdf, UV Startup SOP.pdf, UV_UVT Verification SOP.pdf, UVT System Start-up SOP.pdf

David,

Please see the attached UV SOPs for submission.

On Mon, Mar 16, 2015 at 3:11 PM, David Sloan <DWS@freese.com> wrote:
Russell, Kerry, et al:

Today I received TCEQ's approval letter for the installed UV disinfection system, with extension of the Temporary DPR project through the end of February 2016. Please note the requirement for submission of a SOP as described in Item 5 within 30 days (April 9, 2015). Please contact me if you have any questions regarding the conditions, or if we can be of any assistance in preparing the SOP.

Best regards,

David W. Sloan, P.E., BCEE
Senior Process Engineer
Board Certified Environmental Engineer

[cid:image003.jpg@01CB1912.AEAE37F0]

WATER / WASTEWATER TREATMENT & REUSE
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reply email and delete all copies of the material from any computer. Thank you for your cooperation.

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Mark Southard
City of Wichita Falls
Water Source/Purification Superintendent
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Direct Potable Water Reuse Standard Operating Procedure

Wichita Falls, Texas

UV Reactor Shutdown

This SOP supersedes any previous SOP on this topic.

INTRODUCTION

In order to maintain a multiple barrier approach to disinfection through the Direct Potable Reuse Plant, the UV systems must be properly operated, and data logged for reporting purposes. Proper operation of the UV reactors will provide a minimum of 3.0 log removal for *Cryptosporidium*.

OBJECTIVE

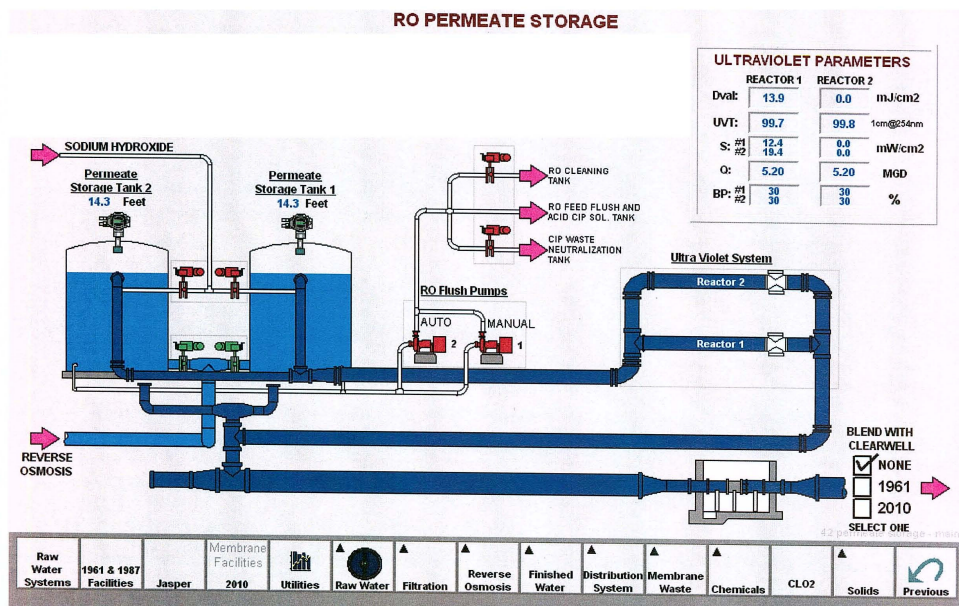
To ensure that the UV reactors are shut down in the proper sequence to maintain a minimum disinfection credit of 3.0 log removal for *Cryptosporidium* and to avoid damaging the UV bulbs and ballasts.

PROCEDURE

Following start-up of a UV Reactor, the following steps shall be followed to shut down the other reactor in use, see UV Reactor Start-up SOP.

This procedure also ensures ONLY one reactor is allowing water to flow through. In order to maintain the 3.0 *Cryptosporidium* log removal, only one of the two UV Reactors may be valved open while in use.

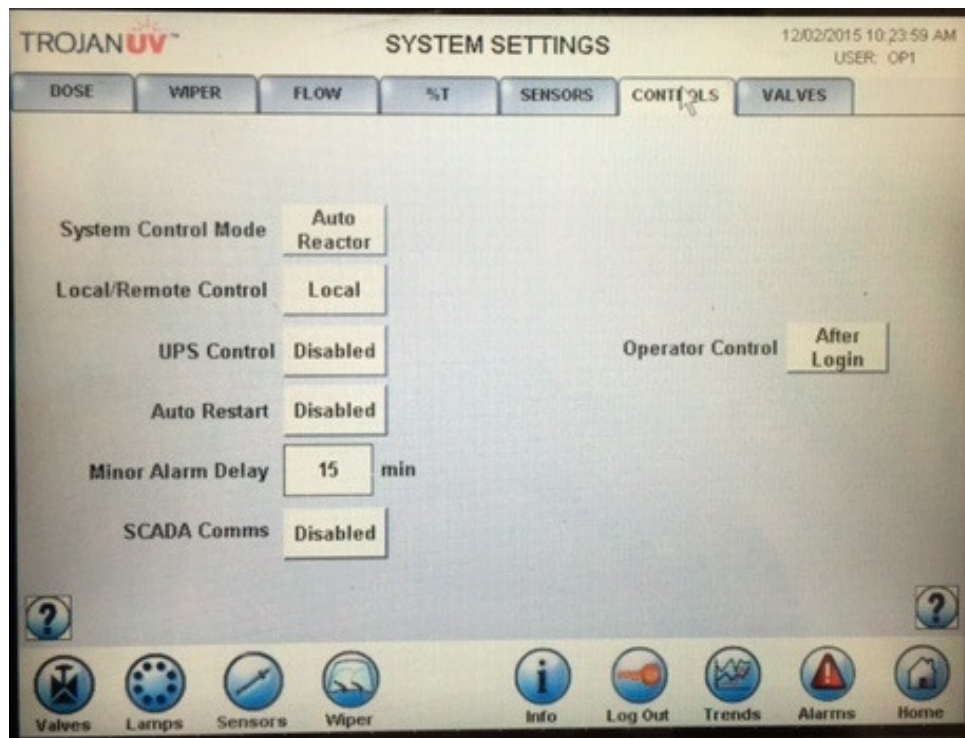
Select the UV Reactor that is to be shut down. Reactor 1 is closest to the East wall. Reactor 2 is farthest from the East wall.



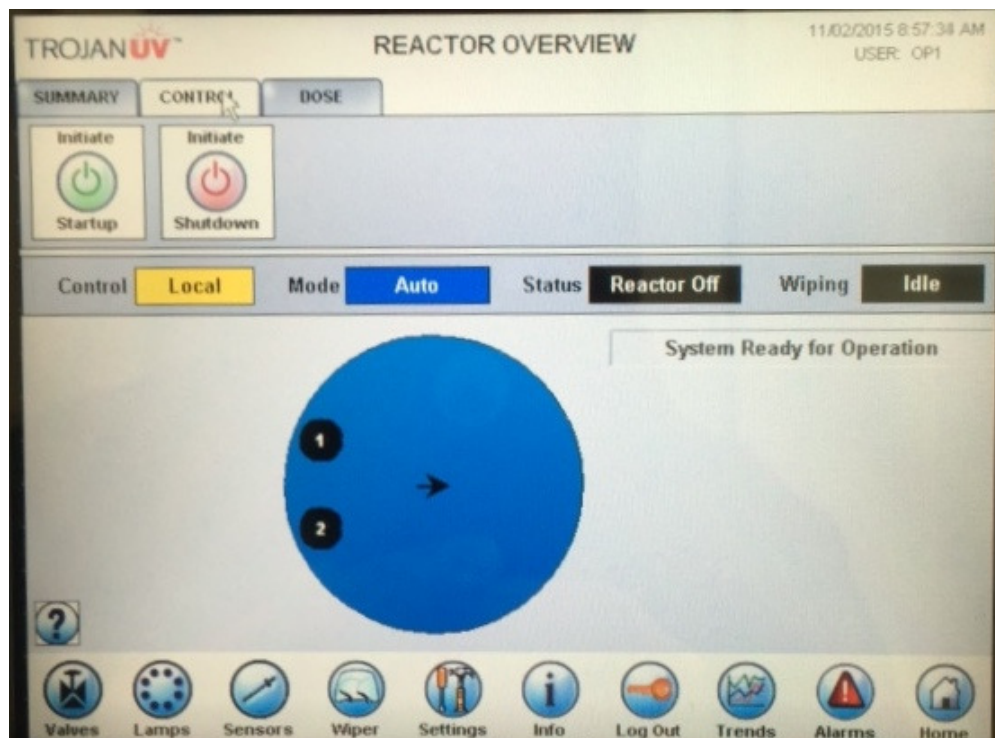
The UV Reactor should be shut down with the downstream valve CLOSED. Ensure the manual hand valve upstream of the Reactor is OPEN and CLOSE the downstream manual hand valve.

The next steps are performed at the UV Reactor Panel touch screen. The panel for Reactor 1 faces South (closest to the UV Reactors) and the panel for Reactor 2 faces North (farthest from the UV Reactors).

- Log in to the touch screen software by pressing the **Log In** button. The user name is “op1” and the password is “12345”.
- Press the **Settings** button and select the **Controls** tab.
 - Ensure the Local/Remote Control is set to **Local**



- Press the **Home** button and select the **Control** tab.
 - Press **Initiate Shutdown**. During the shutdown the lamps will then go through a cool down period. The entire process takes approximately 11 minutes.



- Following the 11 minute cool down, once again ensure the downstream valve is CLOSED on the Reactor that was just shut down. Check the Reactor that is in operation and ensure the downstream manual hand valve is OPEN.

See associated SOPs:

UV Reactor Start-up SOP

Prepared by:_____ Date:_____

Approved by:_____ Date:_____

*This SOP is considered effective on the date it is approved. SOP's are to be reviewed and/or updated annually or any time this process has changed.

Reviewed by:_____ Date:_____

Reviewed by:_____ Date:_____

Reviewed by:_____ Date:_____

Reviewed by:_____ Date:_____

Reviewed by:_____ Date:_____

Sign below and date that you have read this SOP. By signing you are stating that you understand and will defer to this SOP when applicable.

Printed Name	Signature	Date	Printed Name	Signature	Date

Direct Potable Water Reuse Standard Operating Procedure

Wichita Falls, Texas

UV Reactor Start-up

This SOP supersedes any previous SOP on this topic.

INTRODUCTION

In order to maintain a multiple barrier approach to disinfection through the Direct Potable Reuse Plant, the UV systems must be properly operated, and data logged for reporting purposes. Proper operation of the UV reactors will provide a minimum of 3.0 log removal for *Cryptosporidium*.

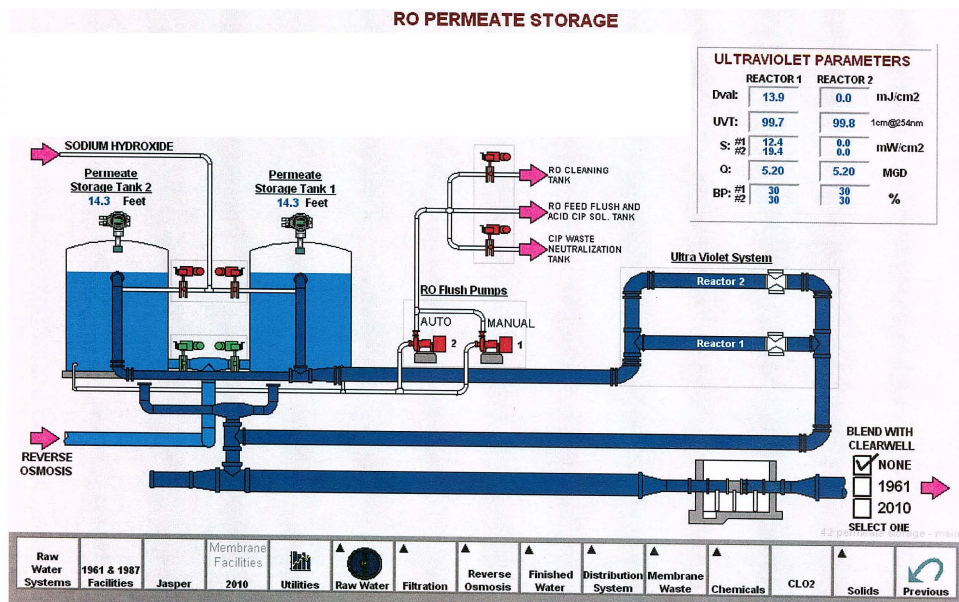
OBJECTIVE

To ensure that the UV reactors are started in the proper sequence to maintain a minimum disinfection credit of 3.0 log removal for *Cryptosporidium*.

PROCEDURE

Check the UVT system panel on the East wall to ensure the UVT system is ON and the feed water valve is open. See UVT Start-up SOP.

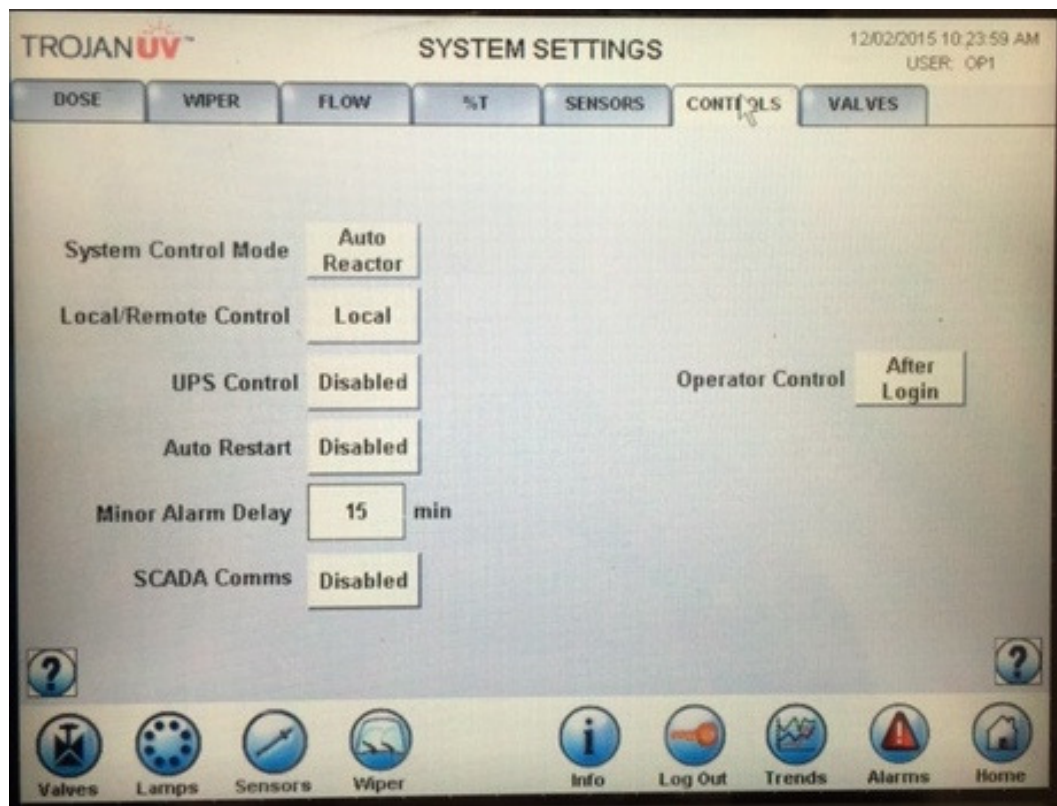
Select the UV Reactor that is to be started. Reactor 1 is closest to the East wall. Reactor 2 is farthest from the East wall.



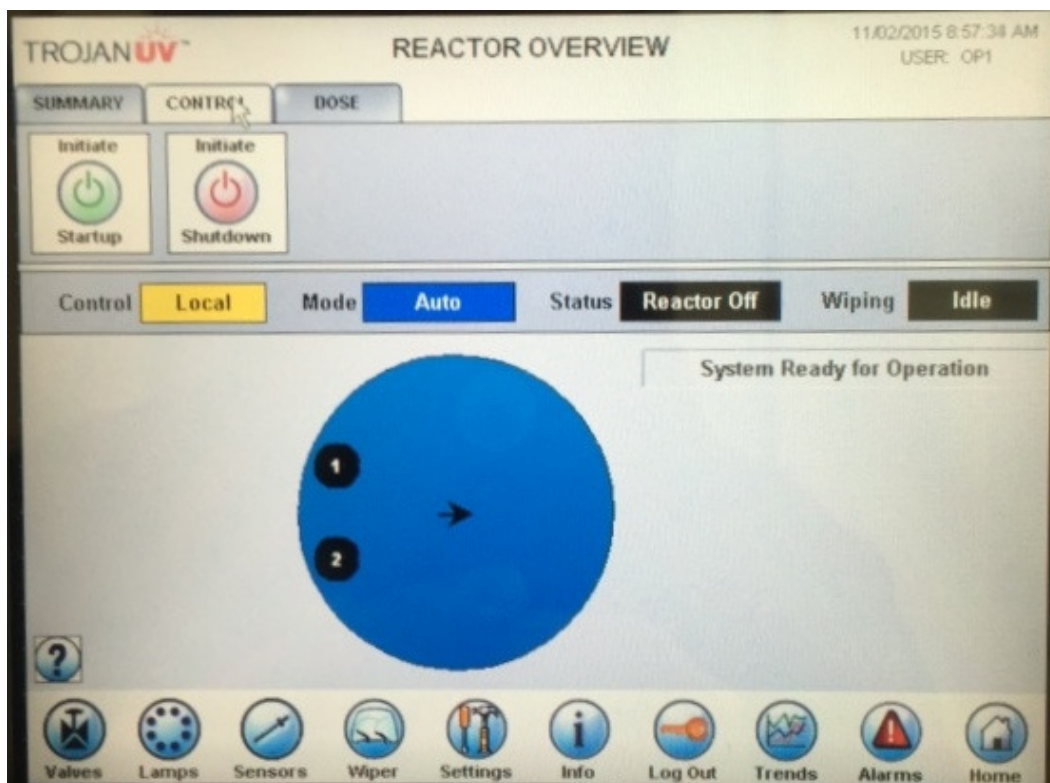
The UV Reactor should be started with the downstream valve CLOSED. Ensure the manual hand valve upstream of the Reactor is OPEN and the manual hand valve downstream is CLOSED.

The next steps are performed at the UV Reactor Panel touch screen. The panel for Reactor 1 faces South (closest to the UV Reactors) and the panel for Reactor 2 faces North (farthest from the UV Reactors).

- Log in to the touch screen software by pressing the **Log In** button. The user name is “op1” and the password is “12345”.
- Press the **Settings** button and select the **Controls** tab.
 - Ensure the Local/Remote Control is set to **Local**



- Press the **Home** button and select the **Control** tab.
 - Press **Initiate Startup**. During the start-up the wipers will extend and return to the home position. The lamps will then go through a warm-up period. The entire process takes approximately 7 minutes.



- Following the 7 minute warm-up, open the manual hand valve downstream of the Reactor that was just started. See the UV Reactor Shutdown SOP to deactivate the other UV Reactor and see valve orientation.

See associated SOPs:

UVT Start-up SOP

UV Reactor Shutdown SOP

Prepared by: _____ Date: _____

Approved by: _____ Date: _____

*This SOP is considered effective on the date it is approved. SOP's are to be reviewed and/or updated annually or any time this process has changed.

Reviewed by: _____ Date: _____

Reviewed by: _____ Date: _____

Reviewed by: _____ Date: _____

Reviewed by: _____ Date: _____

Reviewed by: _____ Date: _____

Sign below and date that you have read this SOP. By signing you are stating that you understand and will defer to this SOP when applicable.

Printed Name	Signature	Date	Printed Name	Signature	Date

Direct Potable Water Reuse Standard Operating Procedure

Wichita Falls, Texas

UV Sensor and UVT Analyzer Verification

This SOP supersedes any previous SOP on this topic.

INTRODUCTION

In order to maintain a multiple barrier approach to disinfection through the Direct Potable Reuse Plant, the UV systems must be properly operated, and data logged for reporting purposes. Proper operation of the UV reactors will provide a minimum of 3.0 log removal for *Cryptosporidium*. The UV Sensor and UVT system must be calibrated and/or verified at regular intervals to ensure the system is operating within specified parameters.

OBJECTIVE

To ensure that the UV Sensor and UVT Analyzer are calibrated and verified properly in order to maintain a minimum disinfection credit of 3.0 log removal for *Cryptosporidium*.

PROCEDURE- UV Sensor

The UV Sensor must be verified against a Reference Sensor every 30 days.

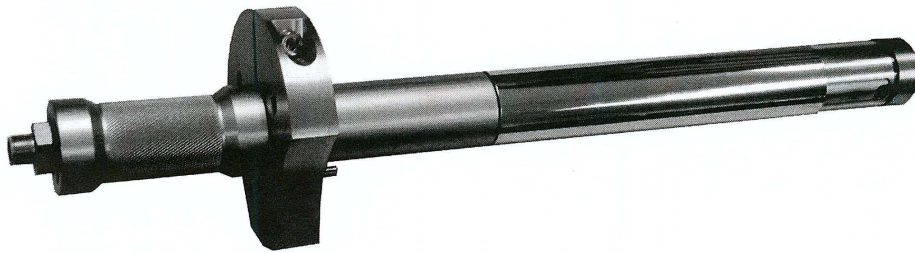
The process is explained in the Trojan UV Reference Sensor Operations & Maintenance instructions, as follows:

Chapter 8

REFERENCE SENSOR

ALLEN BRADLEY

TrojanUVSwift™24



Trojan Reference Sensor
2006-01-05

8-i

Operations & Maintenance

8	Reference Sensor	8-1
8.1	INTRODUCING THE REFERENCE SENSOR	8-1
8.2	REFERENCE SENSOR KIT	8-1
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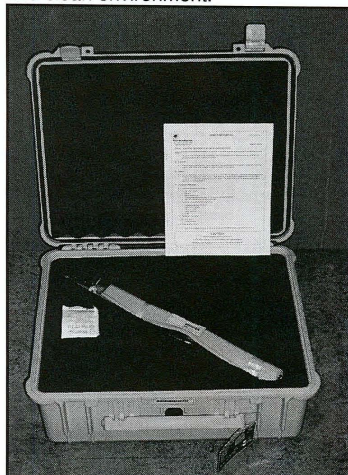
8 Reference Sensor

8.1 Introducing the Reference Sensor

One Reference Sensor is provided for each site. The Reference Sensor is used to periodically confirm satisfactory operation of the service sensors. The Reference Sensor is used to provide comparative values over time to demonstrate continued good (satisfactory) operation of the service sensor. The Reference Sensor is designed to be mounted into the same sensor port and sensor sleeve as the operational AccUVSensor™.

The Reference Sensor uses the same type of material and is identical in calibration to the installed AccUVSensor™. For further specification information please refer to the AccUVSensor™ section.

The Reference Sensor is provided with its' own protective case and is to be kept in a dry, warm, and clean environment.



8.2 Reference Sensor Kit

The Reference Sensor Kit includes the following:

- TrojanUVSwift™ Reference Sensor
- Desiccant pack
- Instruction Manual
- Case

8.3 Handling the Reference Sensor

If handling the Reference Sensor, watch for or avoid the following:

- Condensation (e.g. moving from a cold environment to a hot, humid environment),
- Dirt (dust particles or finger grease will contaminate the Reference Sensor)
- Wear clean, lint free cotton gloves



HOW TO INFO

8.4 Install/Remove a Reference Sensor

Required Tools:

- Reference Sensor Kit,
- Clean lint free cotton gloves,
- Kimwipes®,
- Alcohol wipes.
- Sensor Removal Tool (3/16" Allen Key)

8.5 Operation

The Reference Sensor communicates with the Control Power Panel (CPP).

The Sensor Overview Screen is accessible via the Lamp Overview Screen on the CPP. Prior to initiating this procedure, review the Install the Reference/Service Sensor, and Remove the Reference/Service Sensor sections.



WARNING

Wear UV Resistant Face Shield!

Unprotected exposure to ultraviolet light can cause severe burns to the eyes and skin. Face shield should be worn as the primary protection against such exposure. Never look directly at the energized lamps unless you are wearing ultraviolet resistant face shield or glasses (for short-term exposure)



WARNING

WEAR PROTECTIVE GLOVES!

Always wear protective gloves when working on equipment.

1. Before entering reference sensor procedure access lamp hours information from lamp overview screens and retain. This data should be recorded in the reference sensor data sheet once the procedure is started.
2. On the reference sensor data sheet record: Site Name, UVT, Date and operator name.
3. Thoroughly clean the Reference Sensor with alcohol and Kimwipes®
4. Record reactor ID.

5. Select the security button, followed by the login button from the toolbar.
6. You will be prompted to enter a password, and then press "OK".
7. Press the "Settings" button via any of the user screens.
8. Press the "Controls" tab in the reactor overview screen.
9. Select "Manual Reactor" in the System control mode setting.
10. Press the "Home" button in order to return to the reactor overview screen.
11. Set the Manual Reactor % Power to "100" at the Reactor Overview Screen.
12. Press the "Lamps" button to access the Lamp Overview screen.
13. Press the "Sensors" button at the bottom of the screen to access the Sensor Overview screen shown below.

TROJAN UV™ SENSOR OVERVIEW 06/01/2006 1:08:02 PM USER: OPERATOR

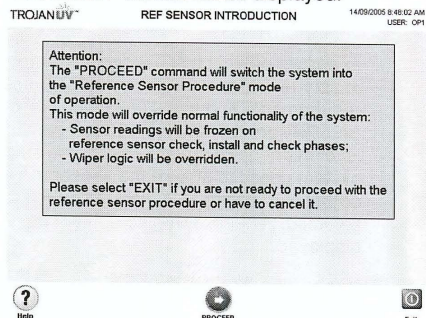
	Intensity mW/cm²	Current mAmps	Runtime Days	Reset Days
Sensor 1	72.48	17.50	0	0
Sensor 2	72.48	17.50	0	0
Sensor 3	72.48	17.50	0	0
Sensor 4	72.48	17.50	0	0
Sensor 5	72.48	17.50	0	0
Sensor 6	72.48	17.50	0	0
Sensor 7	72.48	17.50	0	0
Sensor 8	72.48	17.50	0	0

Reference Sensor Procedure Entry

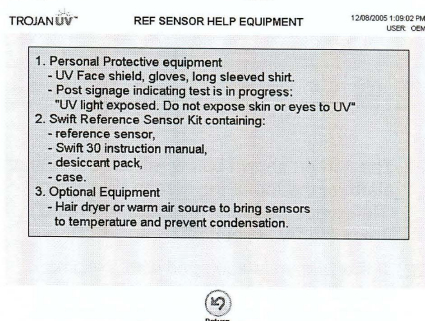
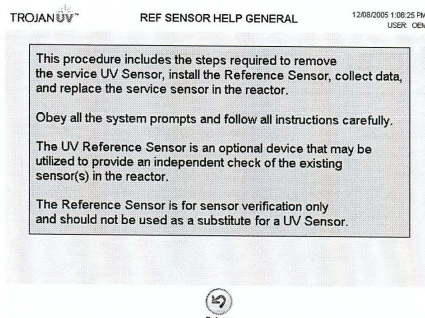
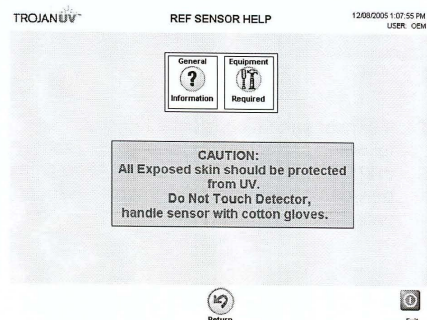
Help Valves Lamps Settings Info Security Trends Alarms Home

14. To enter into the reference sensor procedure press the "Entry" button.

15. The "Reference Sensor Procedure Introduction" Screen will be displayed.

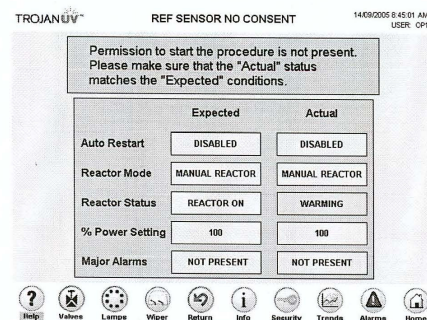


16. After reading this screen press the "?" button.
17. Select the "General" and "Equipment Required" buttons to display these screens. Read both screens to prepare for the procedure.



18. Press "Exit" to return to the Reference Sensor Procedure introduction Screen.
19. Press "Proceed" to begin the reference sensor procedure.
20. If the following screen is displayed, note the highlighted "Actual" conditions. The Actual conditions must be the same as the Expected conditions to enter into the reference sensor procedure mode. Press "EXIT" and proceed to correct the condition and return to the beginning of the procedure.

Note: Help screens are available by pressing "?".



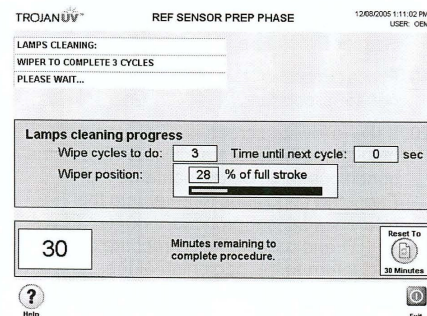
TROJAN UV REF SENSOR NO CONSENT 14/09/2005 8:45:01 AM USER: CPT

Permission to start the procedure is not present. Please make sure that the "Actual" status matches the "Expected" conditions.

	Expected	Actual
Auto Restart	DISABLED	DISABLED
Reactor Mode	MANUAL REACTOR	MANUAL REACTOR
Reactor Status	REACTOR ON	WARMING
% Power Setting	100	100
Major Alarms	NOT PRESENT	NOT PRESENT

Help Values Lamps Wiper Return Info Security Trends Alarms Home

21. The screen shown below will appear with an alarm at the top of the screen displaying "Reference Sensor Procedure Activated". Press the "ACK" button
22. If the system is equipped with a wiping system, the wiper will perform three wipe cycles and the following screen is shown.



TROJAN UV REF SENSOR PREP PHASE 12/09/2005 11:11:02 PM USER: CEM

LAMPS CLEANING:
WIPER TO COMPLETE 3 CYCLES
PLEASE WAIT...

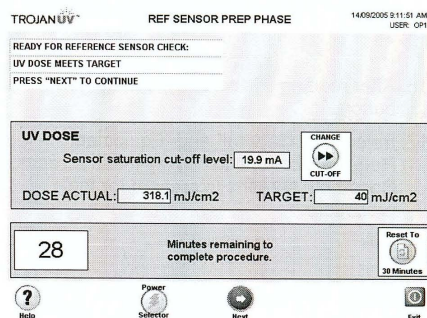
Lamps cleaning progress
Wipe cycles to do: 3 Time until next cycle: 0 sec
Wiper position: 28 % of full stroke

30 Minutes remaining to complete procedure. Reset To 30 Minutes

Help Exit

23. The screen also performs a sensor saturation check. The "Sensor saturation cutoff level can be set to either 18 or 19.9 mA by pressing the "CHANGE" button. The

recommended cut-off level is 18mA; however 19.9mA can be used if Low UV Dose alarms occur while using the 18mA cut-off level. The 18mA cutoff level is used to ensure optimal test conditions, however in very few instances where high UV dose requirements and high UV Transmittance (>95%T) are present the 19.9mA cutoff level might be required. During this step the system check to ensure the sensor mA output signals are less than the cut-off level selected. The following screen will be displayed:



TROJAN UV REF SENSOR PREP PHASE 14/09/2005 2:11:51 AM USER: CPT

READY FOR REFERENCE SENSOR CHECK:
UV DOSE MEETS TARGET
PRESS "NEXT" TO CONTINUE

UV DOSE
Sensor saturation cut-off level: 19.9 mA CHANGE CUT-OFF
DOSE ACTUAL: 318.1 mJ/cm2 TARGET: 40 mJ/cm2

28 Minutes remaining to complete procedure. Reset To 30 Minutes

Help Power Selector Next Exit

24. If sensor saturation is detected, the following prompt will be displayed. Press the "REDUCE BY 20%" button. Allow time between power level adjustments. Repeat until the condition is cleared.

TROJAN^{UV} REF SENSOR PREP PHASE 14092005 9:09:50 AM USER: CPT

SENSOR SATURATION CHECK:
ATTENTION!
SENSOR SATURATION DETECTED
Please reduce power level to avoid saturation.

REACTOR POWER LEVEL CONTROL

REDUCE BY 20% Decrease power by 20% steps: Current New Push To Accept

Or select the power level directly: 100 100

30 Minutes remaining to complete procedure. Reset To 30 Minutes

Help Display Exit

Note: The recommended cut-off level is 18mA to ensure optimal test conditions.

25. Once the PREP PHASE is complete press "NEXT" to continue.

TROJAN^{UV} REF SENSOR PREP PHASE 14092005 9:11:51 AM USER: CPT

READY FOR REFERENCE SENSOR CHECK:
UV DOSE MEETS TARGET
PRESS "NEXT" TO CONTINUE

UV DOSE

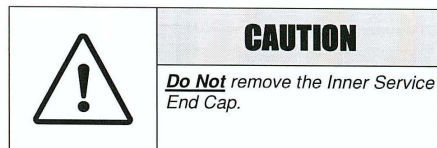
Sensor saturation cut-off level: 19.9 mA CHANGE CUT-OFF

DOSE ACTUAL: 318.1 mJ/cm2 TARGET: 40 mJ/cm2

28 Minutes remaining to complete procedure. Reset To 30 Minutes

Help Power Selector Next Exit

26. When the following screen is displayed, remove the Outer Service End Cap to expose the sensor ports. At the UVR, disconnect one of the system sensor plugs from its sensor harness receptacle. Do not remove the sensor from the UVR. Return to the panel. Follow screen instructions as displayed.



27. The disconnected sensor(s) will be highlighted as displayed in the following screen. Press the "NEXT" button as shown above.

TROJAN^{UV} REF SENSOR SELECT PHASE 12082006 1:19:59 PM USER: CEM

	SAVED VALUE	PRESENT VALUE
SENSOR 2	12.00 mA	0.00 mA
SENSOR 3	12.00 mA	0.00 mA
SENSOR 4	12.00 mA	12.00 mA
SENSOR 5	12.00 mA	12.00 mA
SENSOR 6	12.00 mA	12.00 mA
SENSOR 7	12.00 mA	12.00 mA
SENSOR 8	12.00 mA	12.00 mA

Sensors 1 & 2 disconnected

25 Minutes remaining to complete procedure. Reset To 30 Minutes

Help Next Exit

28. Prior to performing this step, review the Install the Reference/Service Sensor, and Remove the Reference/Service Sensor sections. Return to the UVR, loosen the AccUVSensorTM retaining bolts and remove the AccUVSensorTM from the UVR. Place in a clean, dry, warm environment, such as the Reference Sensor's protective case. Insert Reference Sensor into the UVR. Tighten the retaining bolts. Press "NEXT".

Note: The 30 minute timer on the bottom left corner of the screen can be reset to 30 minutes at any time by pressing the "Reset to 30 Minutes" button. Should the timer elapse the reference sensor procedure will terminate.

TROJAN UV™ REF SENSOR INSTALL/CHECK PHASE 12/08/2005 1:20:47 PM USER: OEM

Please proceed:
 - Install the reference UV sensor into the same port as the removed sensor;
 - Position sensor using locating pin and secure with Allen key tool;
 - Press "INSTALLED1&2" to proceed to next step once the reference sensor is in place and connected.

24 Minutes remaining to complete procedure. Reset To 30 Minutes

Help Installed1&2 Exit

29. With the reference sensor installed in the appropriate position, now connect the wire harness to the sensor. Press the "INSTALLED" button.

Note: *If the reference sensor plug is not connected properly to the sensor harness receptacle, the following screen will not appear, check the cable connection again to ensure it is tight.*

30. Once the sensor is connected this screen will appear:

TROJAN UV™ REF SENSOR INSTALL/CHECK PHASE 12/08/2005 1:21:53 PM USER: OEM

	SAVED VALUE	PRESENT VALUE
SENSOR 1	12.00 mA	13.46 mA
SENSOR 2	12.00 mA	14.68 mA

Please proceed:
 - Wait 30 seconds to get stable measurement value;
 - Record the saved value of the sensor under test and the present value of reference sensor;
 - Disconnect and remove reference sensor;
 - Replace and reconnect system sensor;
 - Record present values for system sensor then press "NEXT".

23 Minutes remaining to complete procedure. Reset To 30 Minutes

Help Next Exit

31. Allow the sensor reading to stabilize for 30 seconds and record the "saved" value for each sensor in the mA_{duty} column of the Reference Sensor Data Sheet. Record the displayed "Present" value for the sensor under test in the mA_{ref} column of the Reference Sensor Data Sheet. Press "Next" once this is complete.
32. Disconnect the Reference Sensor, remove the reference sensor from the UVR and place in a clean dry and warm environment, such as, the Reference Sensor's protective case.
33. Replace the duty AccUVSensor™ in the UVR and connect the wire harness to the AccUVSensor™.
34. Record the present value of the Service sensor that was just tested in the "Duty Sensor Reading After" column.

TROJAN UV™ REF SENSOR SELECT PHASE 06/01/2006 1:10:53 PM USER: OPERATOR

	SAVED VALUE	PRESENT VALUE
SENSOR 1	17.50 mA	17.35 mA
SENSOR 2	17.50 mA	17.35 mA
SENSOR 3	17.50 mA	17.35 mA
SENSOR 4	17.50 mA	17.35 mA
SENSOR 5	17.50 mA	17.35 mA
SENSOR 6	17.50 mA	17.35 mA
SENSOR 7	17.50 mA	17.35 mA
SENSOR 8	17.50 mA	17.35 mA

Please disconnect sensor(s) to be checked; "EXIT" to cancel

29 Minutes remaining to complete procedure. Reset To 30 Minutes

Help Exit

35. Repeat steps 26 through 34 for remaining AccUVSensor™(s). If all system sensors have been tested and are currently in operation in the reactor and the Outer Service End Cap has been re-installed, wait 30 seconds, then press "Done". Press "Return" to re-enter the procedure.

TROJAN UV™ REF SENSOR FINISH PHASE 12/08/2005 1:23:54 PM
USER: ODM

Please make sure that the reactor cover is in place and the screws are tight. All system sensors must be installed and connected properly at this moment.

WARNING: System could be shut down by a critical alarm if assembled incorrectly!

Press "DONE" to complete the procedure when ready.
Press "BACK" to continue the procedure.

21 Minutes remaining to complete procedure.

Reset To 30 Minutes

Return Done

36. Once the procedure is complete, reset the sensor run-time hours by pressing the appropriate refresh buttons in the Sensor Overview screen (shown below) to reset individual sensor counters.

TROJAN UV™ SENSOR OVERVIEW 13/09/2005 1:41:17 PM
USER: OPI

	Intensity mW/cm ²	Current mAmps	Runtime Days	Reset Days
Sensor 1	35.54	12.12	2	[Refresh]
Sensor 2	35.54	12.12	2	[Refresh]
Sensor 3	35.54	12.12	2	[Refresh]
Sensor 4	35.54	12.12	2	[Refresh]
Sensor 5	35.54	12.12	2	[Refresh]
Sensor 6	35.54	12.12	2	[Refresh]
Sensor 7	35.54	12.12	2	[Refresh]
Sensor 8	35.54	12.12	2	[Refresh]

Sensor Check Interval: 364 Days [Close]

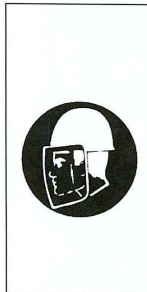
RESET INDIVIDUAL SENSOR HOURS ONCE COMPARED TO REFERENCE

Reference Sensor Procedure [Entry]

Help Values Lampset Wiper Settings Info Security Trends Alarms Home

8.5.1 Install the Reference/Service Sensor

	WARNING <i>Wear Protective Gloves!</i> <i>Always wear protective gloves when working on equipment.</i>
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	WARNING <i>Wear UV Resistant Face Shield!</i> <i>Unprotected exposure to ultraviolet light can cause severe burns to the eyes and skin. Face shield must be worn as the primary protection against such exposure. Never look directly at the energized lamps unless you are wearing ultraviolet resistant face shield or glasses (for short-term exposure)</i>
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1. Review procedures for Remove/Replace an AccUVSensor™ in the AccUVSensor™ section.
2. Review the Handling the Reference Sensor procedure.
3. Carefully slide the Reference Sensor inside the AccUVSensor™ port. Align the Sensor alignment pin with the alignment pin slot on the Sensor Gland Plate.
4. Once the alignment pin is in the slot it might be necessary to push the sensor with slightly more force than before, this is required to compress the o-ring used for sealing purposes.
5. Insert and tighten the Allen key screws in the sensor mounting flange with the Allen key tool (3/16" Allen key tool).

8.5.2 Remove the Reference/Service Sensor

1. Loosen and remove the three (3) Allen key screws located on the sensor mounting flange.
2. Remove the sensor by pulling straight back on the sensor handle (knurled). It is necessary to ensure that the sensor is pulled straight back and not at an angle. The sensor might be slightly difficult to remove at first as there is an o-ring seal retaining the sensor in place, once this seal is no longer retaining the sensor it will be much easier to fully remove the sensor.
3. If considerable resistance is met while removing the sensor and/or water is leaking out, discontinue the removal procedure. Refer to Remove /Replace the AccUVSensor™ Sleeve.
4. Plug the AccUVSensor™ sleeve with lint free towelling if there is any lag time between Reference Sensor removal and AccUVSensor™ replacement. Replacement time should not exceed 2 minutes.

8.6 References

Kimwipes® is a Registered Trade Mark of the Kimberly-Clark Company.

8.7 Troubleshooting

To resolve issues proceed through probable causes and suggested solution in order.

Symptom	Possible Cause(s)	Solution(s)
Calculated variance exceeds maximum	• Dirty duty or reference sensor. • Dirty lamps or sensor sleeves. • Damaged reference or duty sensor.	• Clean sensors with Alcohol and Kimwipes® and repeat procedure. • Move duty sensor to port with acceptable variance values and repeat procedure with sensor in new port. • Contact Trojan Service.
All or majority of duty sensors fail when tested with the same reference sensor.	• Dirty reference sensor. • Damaged reference sensor.	• Clean sensor with Alcohol and Kimwipes® and repeat procedure. • Contact Trojan Service.

[illegible]

[illegible]

PROCEDURE- UVT Analyzer

The UVT Analyzer must be verified once per week according to the following steps:

- A 100 mL sample should be collected from the discharge line (the top red tube on the left side of the analyzer).



- The UVT value currently displayed on the analyzer should be recorded by the sampler.



- The sample should then be tested for UV % Transmittance in the analytical laboratory, using the Hach DR 5000 bench-top spectrophotometer.
- Both UVT values are recorded in the *UV* tab of the *FSO Results* spreadsheet.
- The UVT Analyzer value must be $\pm 2\%$ of the bench-top value, or the UVT Analyzer must be recalibrated by Maintenance personnel.

See associated SOPs:

UV Reactor Start-up SOP

UV Startup SOP

Prepared by:_____ Date:_____

Approved by:_____ Date:_____

*This SOP is considered effective on the date it is approved. SOP's are to be reviewed and/or updated annually or any time this process has changed.

Reviewed by:_____ Date:_____

Reviewed by:_____ Date:_____

Reviewed by:_____ Date:_____

Reviewed by:_____ Date:_____

Reviewed by:_____ Date:_____

Sign below and date that you have read this SOP. By signing you are stating that you understand and will defer to this SOP when applicable.

Printed Name	Signature	Date	Printed Name	Signature	Date

Direct Potable Water Reuse Standard Operating Procedure

Wichita Falls, Texas

UVT System Start-up

This SOP supersedes any previous SOP on this topic.

INTRODUCTION

In order to maintain a multiple barrier approach to disinfection through the Direct Potable Reuse Plant, the UV systems must be properly operated, and data logged for reporting purposes. Proper operation of the UV reactors will provide a minimum of 3.0 log removal for *Cryptosporidium*. The UVT system is a critical component of the UV Reactor and provides data for the UV PLC to calculate required ballast power and dosage.

OBJECTIVE

To ensure that the UVT system is started properly in order to maintain a minimum disinfection credit of 3.0 log removal for *Cryptosporidium*.

PROCEDURE

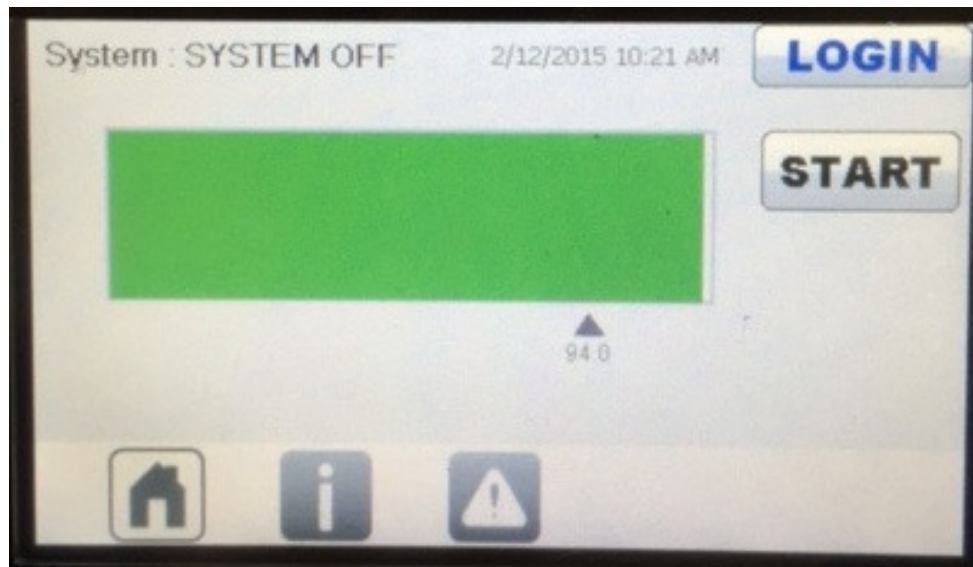
Prior to start-up of a UV Reactor, the following steps shall be followed to start the UVT system at the UVT panel, see UV Reactor Start-up SOP.

All steps are performed at the UVT system panel touch screen. The panel is located on the East wall, between the RO permeate tanks and the UV reactors.

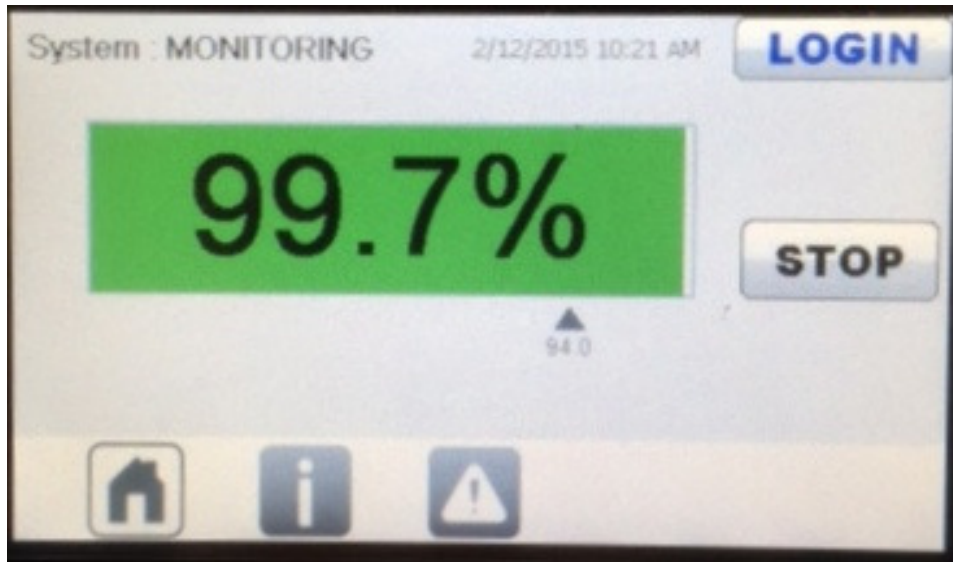
- First, ensure the feed water valve is open on the bottom left side of the panel box.



- If the touch screen is asleep, touch it to wake it up and see the system overview.
 - Press the **Start** button. This will initiate a lamp warm up inside the UVT panel. This process takes approximately 5 minutes. After the warm-up period, the UVT analyzer will begin to analyze the % Transmittance in the feed water.



- Once the UVT system has been started, the touch screen will read **System: MONITORING**. The UV Reactor may now be started. See UV Reactor Start-up SOP.



See associated SOPs:

UV Reactor Start-up SOP

Prepared by:_____ Date:_____

Approved by:_____ Date:_____

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