

## ESTUARINE FLOW

The estuarine water mixing vat can be found in room 110. The mixing vat mixes freshwater (FW) and saltwater (SW) to the desired salinity (chosen by the scientist).

To learn how the FW gets into the estuarine water mixing vat please go to the “EL-1 Freshwater Flow System” SOP and follow Figures 1 – 14. To learn how the SW gets into the estuarine water mixing vat, please go to the “EL-1 Salt Water Flow System” SOP and follow Figures 1-14 including X & Y figures.

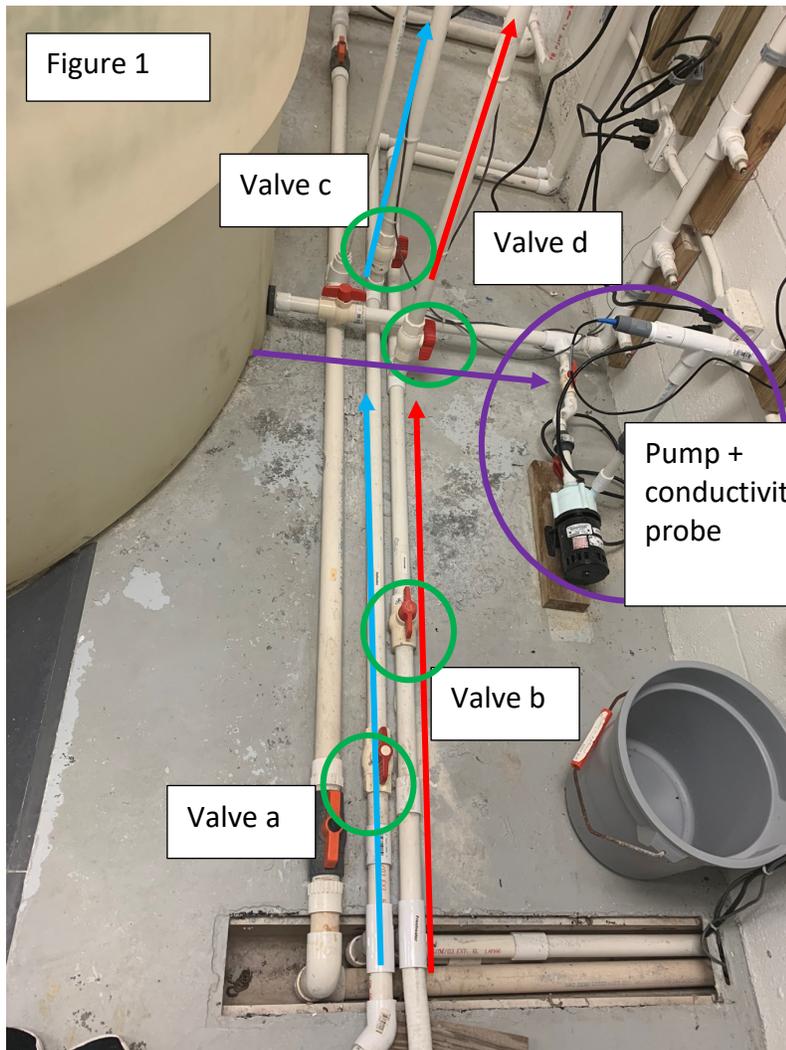


Figure 1

Valve c

Valve d

Pump +  
conductivity  
probe

Valve b

Valve a

Figure 1: Mixing vat  
Freshwater PVC pipe is on the  
right (red arrows) and saltwater  
PVC pipe is on the left (blue  
arrows). These pipes come from  
the front (outside) part of the  
building.

Valve a & b must always be  
opened in order for FW and  
SW to flow inside the  
laboratory.

Valve c & d must be opened  
just a tiny bit (see Figure 2).

The three blue lines should align.  
This will control the flow of the  
water into the mixing vat.

The pump in Figure 1 will help recirculate the water in the mixing vat by removing water from the bottom of the tank (see purple arrow) and shooting it through a PVC pipe to the top of the mixing vat (see Figure 3 – recirculating pipe). Conductivity probe: see Figure 5.

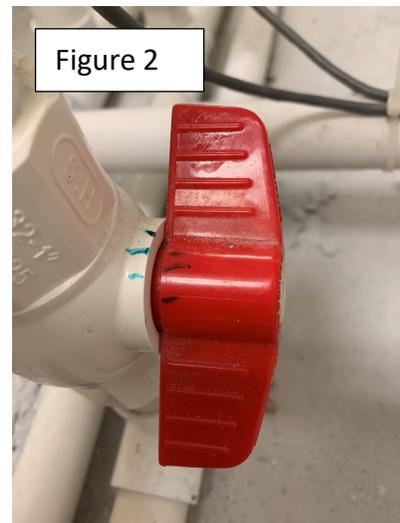


Figure 2

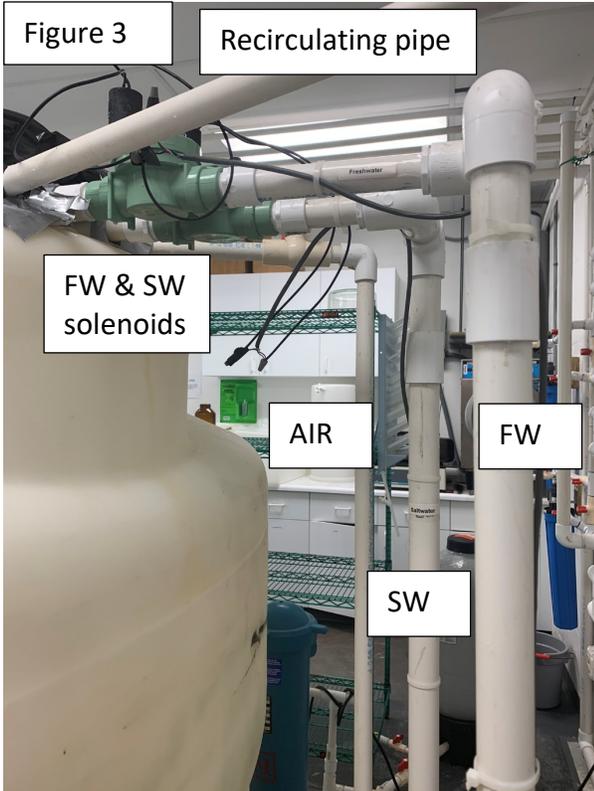


Figure 3 shows the pipes that go into the mixing vat to create estuarine water.

FW & SW solenoids will allow the FW and SW pipes to open depending on the information that the control box (Figure 5) is sending.

Figure 4. The mixing vat is designed so it never overflows. However, in order for this to work, valves c & d from Figure 2 cannot be open all the way, or the inflow will be faster than the outflow and the vat will overflow.

In case the vat needs to be emptied, you can open the valve circled in red. This will direct the water to the effluent system.



Figure 4

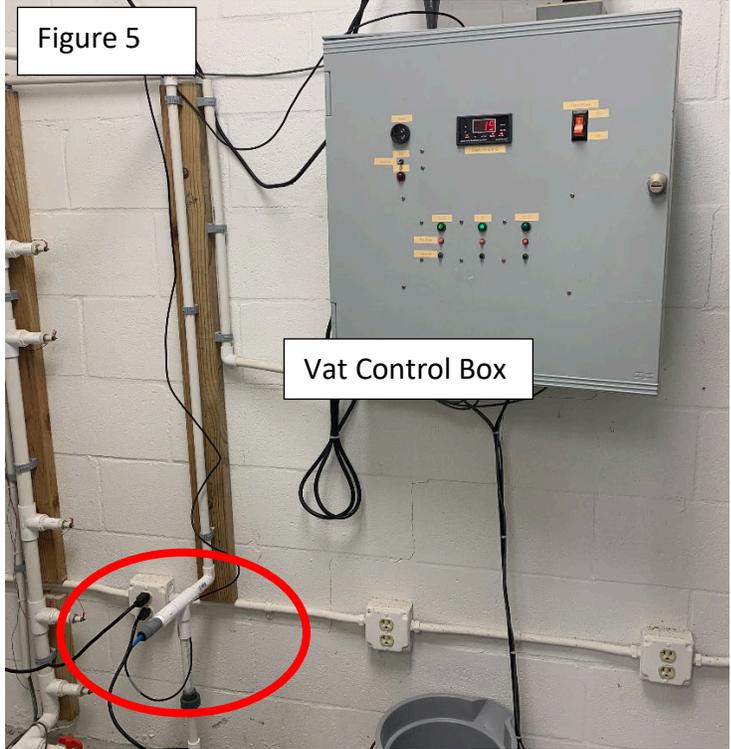


Figure 5

Vat Control Box

Figure 5. The conductivity probe reads the conductivity/salinity of the water in the mixing vat and provides the information to the control box.

You will program the control box to reach the desired estuarine salinity.

Figure 6. If the salinity is outside the salinity range, the alarm will kick on (red light + loud sound). To silence the alarm, flip the switch to off. A

The control box must always be on. This does not only influence the estuarine water but it also controls the sensor levels of the FW and SW vats outside the building.

The screen will show you the salinity of the water in the mixing vat.

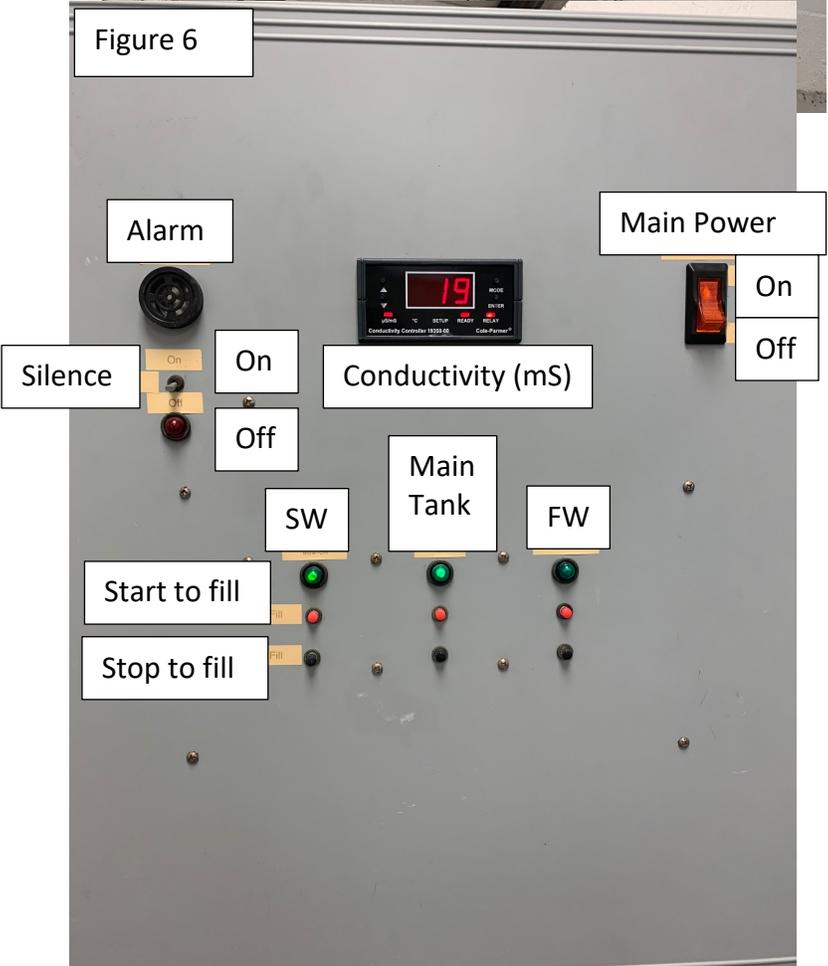


Figure 6

Alarm

Main Power

Silence

On

Conductivity (mS)

On

Off

Off

SW

Main Tank

FW

Start to fill

Stop to fill

When the light under SW and FW turn green, it means that the vats outside are being filled at that exact moment. When the light under the Main Tank is green, it means that the mixing vat is working.

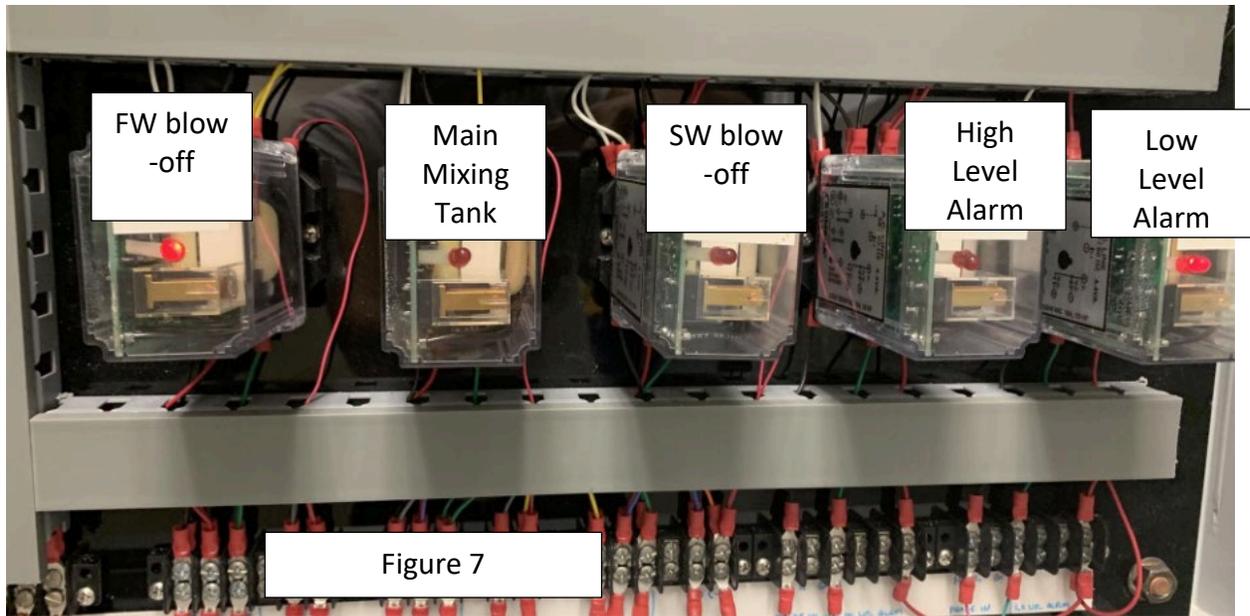


Figure 7. All these boxes need to be connected for the vat to work properly. The FW blow-off will allow the FW vat outside to fill when the level sensor senses the water low. Same with the SW blow off. The Main Mixing Tank box will allow the solenoids on Figure 3 to open allowing the FW and the SW to come in as indicated by the control box (Figure 5 & 6). The high- and low-level alarms will help you prevent an overflow.

## Setting up the desired salinity (15PPT)



Figure 8

Figure 8. This screen will be the only thing you will manually adjust to program the desired salinity.

The high and low set-point values established in this protocol will mix the water to 15ppt. You must play with the extremes and measure the water in the vat to determine if the number that appears on the screen is actually the salinity of the water.

In the past, the values on screen have shown to be approximations (not accurate); always, measure the salinity on the water in the estuarine vat by a second method to determine +/-.

FIRST, Select the conductivity measurement range:

- 1) Press the up AND down keys SIMULTANEOUSLY until the "CLr" display shows.
- 2) Press up OR down key to enter the range selection mode. The display will flash the range and cell constant previously selected (Default setting is "999" and "1.0").
- 3) YOU will press up OR down key to school to "200" (range) and "10" (cell constant).
- 4) Press ENTER key to confirm your selected range and cell constant.

SECOND, adjust the HIGH set-point values:

The Hi SET Menu (Hi; SET) – The Hi SET values cannot be lower than the Low SET value:

- 1) Enter this menu by pressing MODE twice to the "SET" display if you are in measurement mode.
- 2) Press ENTER key. You will see the "CAL" and "Con" display blinks alternatively.
- 3) Press down key TWICE until the display flashes "Hi" "SET" alternately
- 4) Press ENTER key to access the Hi SET menu. The display shows the last Hi SET value.
- 5) Adjust the Hi SET point using up and down keys until you reach 21.
- 6) Press ENTER to confirm the value of the Hi SET point.
- 7) Press up or down key to continue through Set-Up, or press MODE to return to Measurement Mode.
  - Note: You can press MODE key (as an ESCAPE key) to revert to the measurement value if ENTER is not pressed; any changes to your set value are then not stored into memory.

THIRD, adjust hysteresis values:

Hi HYS Menu (Hi; HYS)

- 1) Enter this menu by pressing the MODE key to the "SEt" display if you are in the measurement mode.
- 2) Press ENTER key. You will see the "CAL" and "Con" display blinks alternatively. Press down key THREE TIMES; the display will show "Hi" "HYS" blinking alternatively.
- 3) Press ENTER key to access the Hi HYS menu. The display shows the last Hi HYS value or default (2% of Full scale).
- 4) Adjust the value of the Hi HYS point using up and down keys. Adjust it to 2.
- 5) Press ENTER to confirm the value of the Hi HYS.
- 6) Press up OR down key to continue through Set-Up, or press MODE to return to Measurement Mode.

FOURTH, adjust the LOW set-point values:

The Lo SET Menu (Lo; SEt) – The Low SET values cannot be higher than the Hi SET value:

- 1) Enter this menu by pressing the MODE key to the "SEt" display if you are in the measurement mode.
- 2) Press ENTER key. You will see the "CAL" and "Con" display blinks alternatively. Press down key FOUR TIMES; the display will show "Lo" "SEt" blinking alternatively.
- 3) Press ENTER key to access the Lo SET menu and the display shows the last Lo SET value or default.
- 4) Use up and down keys to change the value of the Lo SET point. Adjust value to 19.
- 5) Press ENTER to confirm the value of the Hi HYS.
- 6) Press up OR down key to continue through Set-Up, or press MODE to return to Measurement Mode.

FIFTH, adjust hysteresis values:

Lo HYS Menu (Lo; HYS):

- 1) Enter this menu by pressing the MODE key to the "SEt" display if you are in the measurement mode.
- 2) Press ENTER key. You will see the "CAL" and "Con" display blinks alternatively. Press down key FIVE TIMES; the display will show "Lo" "HYS" blinking alternatively.
- 3) Press ENTER key to access the Lo HYS menu and the display shows the last Lo HYS value or default (2%). Use up and down keys to change the value of the Low HYS point. Adjust to 2.
- 7) Press ENTER to confirm the value of the Hi HYS.
- 8) Press up OR down key to continue through Set-Up, or press MODE to return to Measurement Mode.



Figure 9

Figure 9 & 10 show the flow of the estuarine water.

Figure 11: Connect the UV box to the electricity so the UV lights turn on.

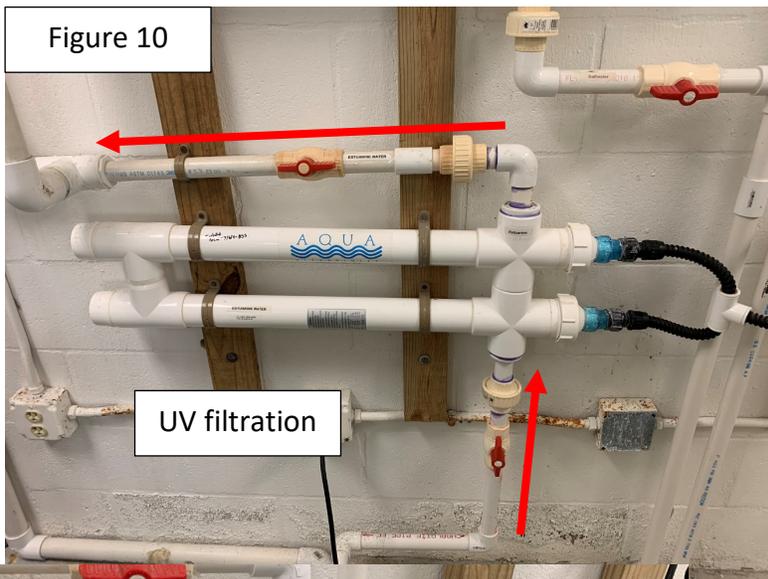


Figure 10

UV filtration

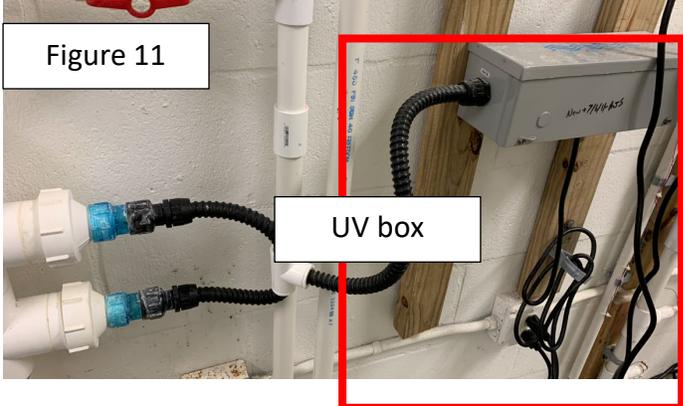


Figure 11

UV box

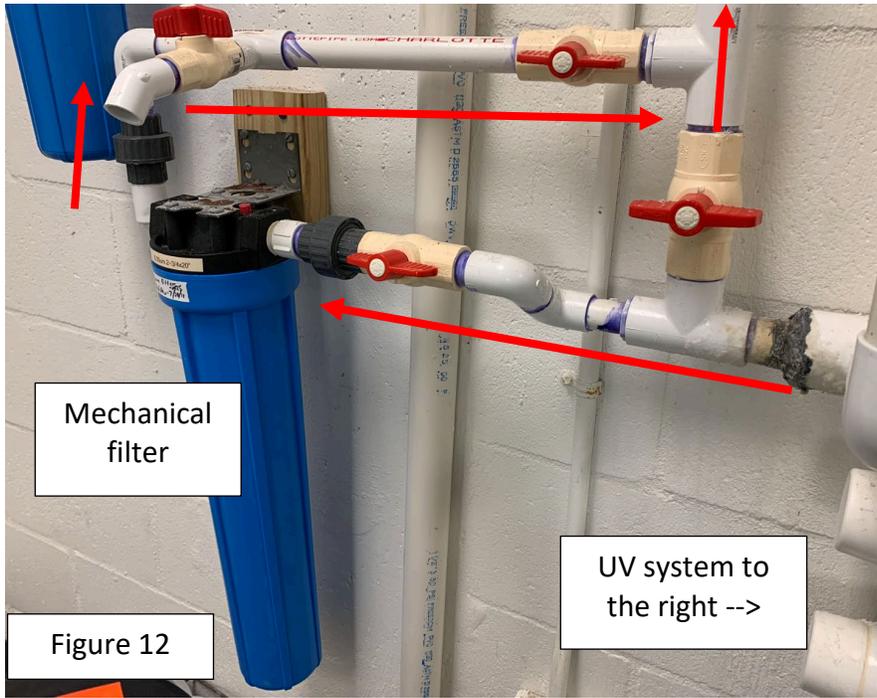
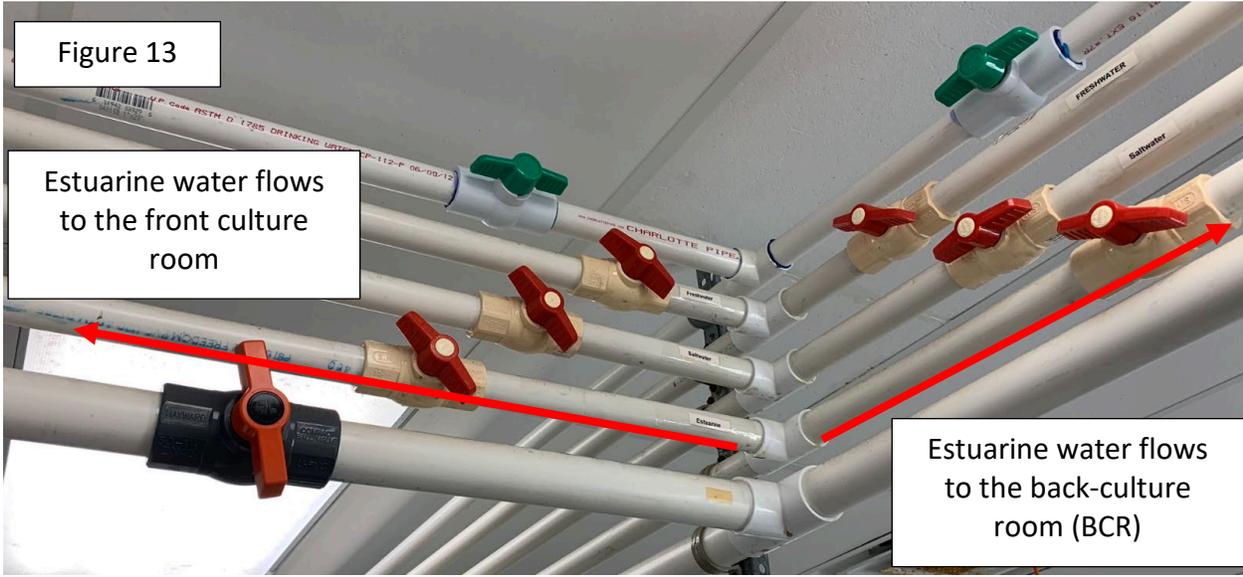


Figure 12 shows the flow of the water from the UV filtration system to the mechanical filtration.

Figure 13 shows the flow of the water towards the front culture room and the back-culture room (BCR).



## FRONT CULTURE ROOM (FCR)

Figure 14

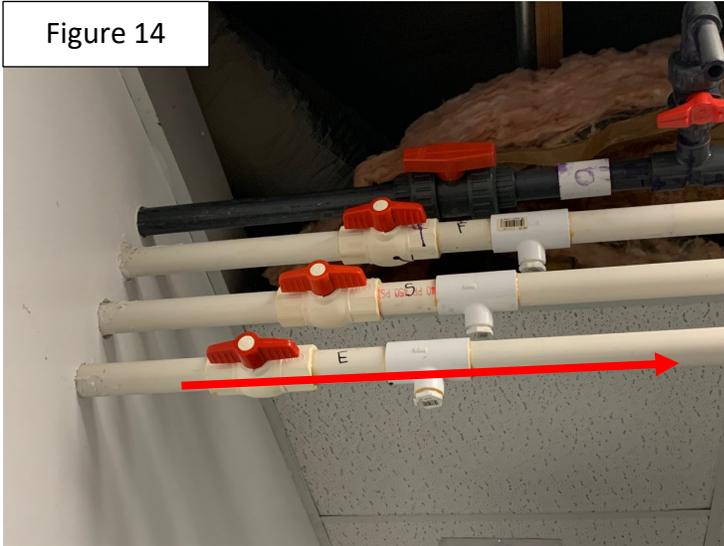
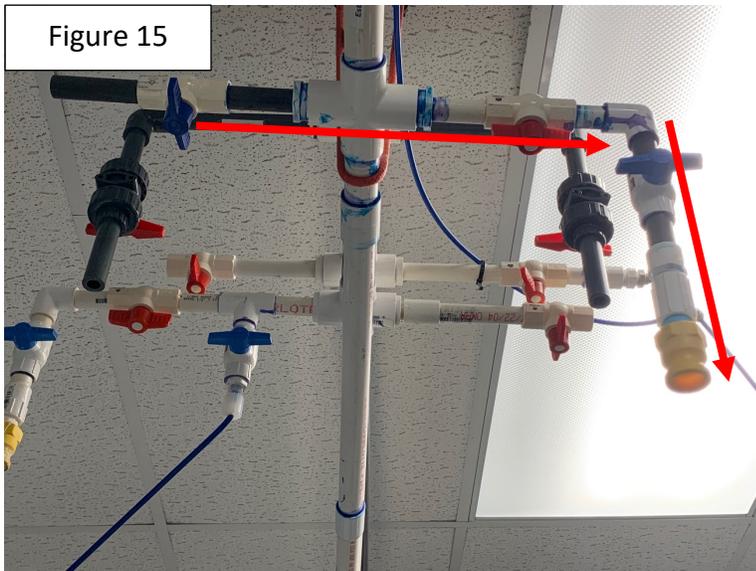


Figure 14 shows the pvc pipes that enter the FCR. The last pipe, as shown by the red arrows, transports estuarine water.

Figure 15 & 16 show the two pcvs that provide access to the estuarine water.

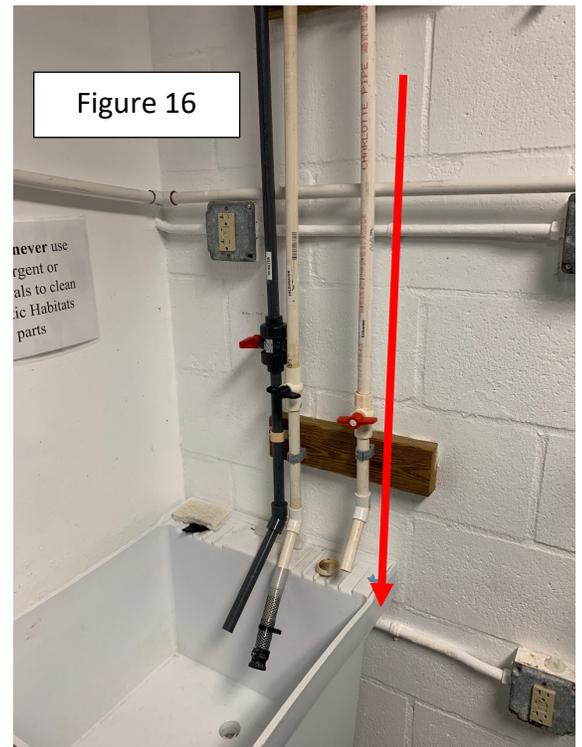
The pvc pipe in Figure 15 is on the ceiling, and the pvc pipe on Figure 16 is on top of the sink

Figure 15



For more information on how to fill the FCR recirculating systems, read document "Saltwater Flow" Figures 39 & 40.

Figure 16



## BACK CULTURE ROOM (BCR)

Figure 17

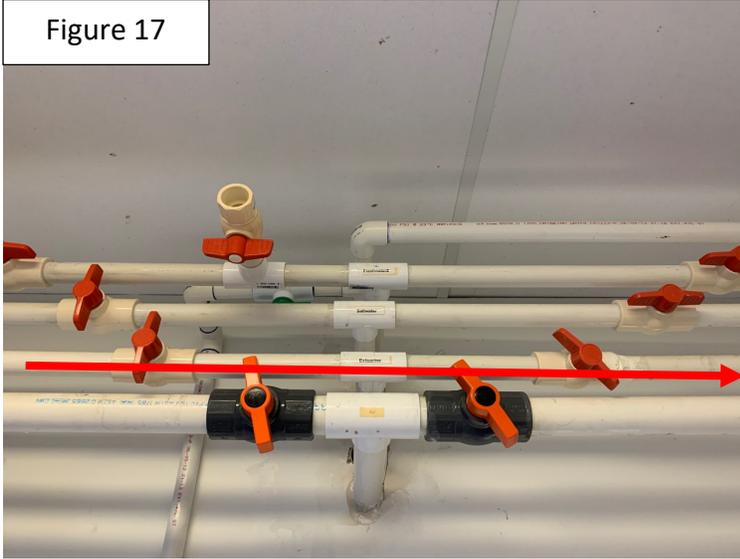
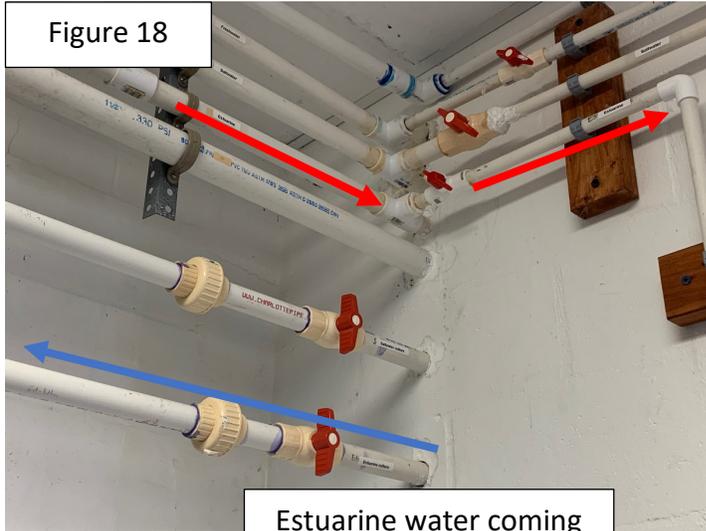


Figure 17. The 4<sup>th</sup> pipe brings in the estuarine water into the back-culture room.

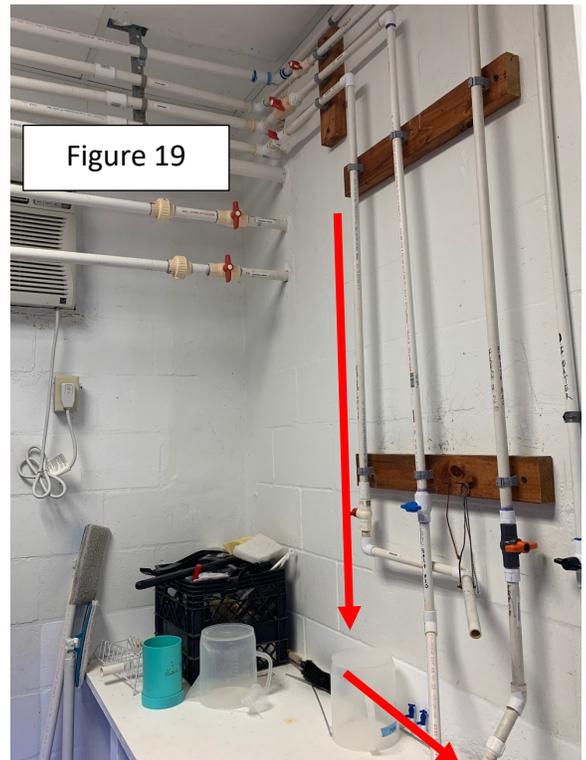
Figure 18: The pvc pipe from Figure 17, goes around the back-culture room into the sink (Figure 19), as well as outside to then be furthered filtered and eventually returned to the BCR by the pipe with a blue arrow.

Figure 18



Estuarine water coming back to the BCR after being furthered filtered outside

Figure 19



## **NORTH EAST Side of Building – OUTSIDE**

Please refer to the document “Saltwater flow” from Figure 21 to Figure 31.

Just a few changes.

Figure 21: It will be the third pipe, not the second pipe. The pipe on top is for FW, the middle pipe is for SW, and bottom pipe is for Estuarine water.

The system in use will be the furthest one to the right, by the fence.

Figure 29: The estuarine water will return to the BCR by the bottom pipe (see Figure 18 of this document – blue arrow).

## **How to Add City Water into the Estuarine System Throughs in the BCR to Regulate the Temperature in the Tanks**

Please refer to the document “Saltwater flow” page 19, 20, 21.

### **South East Side of the Building – 75 & 100 – gal recirculating tanks.**

To add SW: Please refer to the document “Saltwater flow” page 22,23 – Figures 33 – 36.

To add FW: Please refer to the document “Freshwater flow” page 16, 17, 18 – Figures 37 – 42.