Tropical Aquaculture System Restart

The general water flow in the facility is that water is pumped from the sump by the pumps, directed through the UV filtration system, out to the racks and then returns through the drum filter and back to the sump.

If we start in the sump, the pumps draw up water from a pipe at the bottom of the sump. This water comes into the pipe that is along the floor and is directed to each pump through a ball valve. The ball valves are OPEN when the red handle points along the pipe and CLOSED when the handle is perpendicular to the pipe. The water comes around to the front of the pumps and goes in the center and is pumped out of the top. The outlet pipes then go through another ball valve to the outlet pipe. This pipe then sends water to the UV filters.

There is a bank of 6 filters, with each bank having an inlet and outlet valve. One of them has had the UV bulbs removed and is currently closed off. This is handy as it can be used to purge air out of the system.
The most likely cause of a water failure is a problem with the drum filter. The nozzles in the spray bar can become clogged with debris. Also, after a few months, the filter clogs and water does not return to the sump fast enough. Debris builds up on the very fine mesh filter and this needs to be cleaned with muriatic acid. This can be compounded by a second problem. There is a spray bar that washes off the filter. If the pump driving this filter has too run too much, it may trip its relay (like a resettable fuse). If the relay trips, it needs to be reset inside the control box on the wall. Push the round blue button on the left relay, being careful NOT to touch any wires or electrical contacts.

Once the drum filter fails, the pumps typically suck up some air. With air in the inlet lines to the pumps, they will not pump any water. When this happens, the water in the return lines from the tanks will typically drain back into the sump such that you can’t tell that a failure has happened. However, there will be no water flowing to the tanks.

Once the drum filter failure has been solved, the system needs to be restarted by purging the air out of the inlet pump lines. Since you can’t be sure which pump has an airlock, all 5 pumps need to be purged. To purge the lines: shut off 4 of the pumps and close their inlet and outlet valves. These valves are hard to turn so you can use the strap wrench to get more leverage. But be careful not to break the handles!
To purge the pump that you left running, open the inlet valve for the stack of UV filters that has no tubes in it. This provides a low resistance path and should allow the pump to force the air out of its lines and start pumping. The path is clear when water is gushing out of the open black tubes. Often the first pump is the hardest to get going as it has to clear all the air that might be in the line coming from the sump.

At this point a couple of ways may work. The more cautious way is to repeat the purge procedure with each of the other pumps separately. Turn on the pump and then open their inlet and outlet valves. Open the inlet valve to the UV filter unit that is open to the air and leave it open till water is gushing out of the black tube. Close the UV valve, the inlet and outlet for the pump and turn off that pump. This leaves water in the pipes surrounding the pump and isolates it so no air gets into its lines while the other pumps are purged. When all 5 pumps have been purged, you can then add them one by one to the flowing system to get the water going. Tom’s quicker way is to just keep adding pumps, leaving the first one running and wide open as you add the second, etc. That will be far easier but if for some reason it doesn’t work, you can go back to Karen’s more cautious method.

In opening and closing the UV systems, be careful to always have as many UV systems open as you have pumps running. You don’t want to force too much water into too few UV systems. Too much pressure in the system can forcibly eject the quartz tubes from the UV filters, causing significant injury! So just open and close the empty UV rack and not any of the others. Confirm that water is reaching even the top tanks of all racks to make sure the system is truly purged.

One other useful purge point is the valve over by the behavior racks that drains to the return line. This is connected to the inlet line for all the racks and can be used to remove any remaining air from the lines leading to the racks. If you don’t have too much air in the system, this point can be used to purge it out and get the water flowing again. So it is worth trying to purge here first before tackling the full blown pump purging.
All of this purging can result in a lot of water being dumped onto the floor as well as used to refill the head space of all the tanks and the pipes leading to the tanks. As a result, as you turn on the system, the level in the sump may drop. You can make up for this loss in water by adding water from the green tanks near the tilapia racks. These should be kept full of dechlorinated water so that they are always ready to backfill the system. Each tank holds 125 gal and can be added to the sump by opening the ball valve at the bottom of the tank. To refill the tanks, open the top valve, which lets water in from the dechlorination system located in the closet in the hall (near Little Malawi).