Shallow Tray 3311/ Clearadon Trouble Shooting

The first part of this trouble shooting guide is aimed directly at solving a no water problem as this is the most common problem. The systems in general are very reliable but because of their design can shut down to protect themselves from damage. The customer although told how and why this occurs almost always forgets the first time it happens and calls us for help.

Causes for no water

The system is designed with a low pressure cut off switch on the repressurization pump. This type of switch shuts the repressurization pump (not their well pump) off when the water pressure in the system goes below a preset amount. The pump will not restart itself without assistance from the home owner. The most common reasons for this to happen are:

1. No water or lack of adequate flow of water being delivered to the Clearadon by the customer's well pump
2. The lack of adequate flow control from the repressurization pump.
3. No flow to the Clearadon because the solenoid valves have failed to open (a highly unlikely occurrence but possible).
4. Power failure at the house, from the circuit breaker in the customer’s electrical panel, or fuse failure in the Clearadon.

Each of these problems will be discussed in its own section below.

Lack of adequate flow from customer's pump

Before the Clearadon is put on line, the customers pump should be tested for output to determine if the well pump can deliver water at the rate the repressurization pump will use it. If it can not, the flow restrictor out of the Clearadon's repressurization pump should be changed to a lower value. The flow restrictor should not be reduced to less than 4 gpm as this may cause the shallow well repressurization pump switch to short cycle rapidly or hammer. If this design work is done (checking and changing flow restrictors when necessary), the likely hood of the customer having a problem within a short period of time (less than few days) because of inadequate flow from his pump is very unlikely. The only time this is likely to happen is if:

1. A power outage during which the customer used enough water to lower the pressure in the system below the low pressure switch cut out setting.
2. The well is a low yield well and the output from the customer's pump is dramatically affected by high water usage such as watering a lawn, lots of laundry, kids home from college etc...
3. The customer's pump fails.
4. The well has an unusual and intermittent sediment problem that prematurely plugs the cartridge filter in the line to the Clearadon.
5. Additional pretreatment equipment has been added and there is a loss of flow through the new equipment.

If the system has been on line for a long period of time (several months) without a shut downs, lack of flow is most likely the result of a plugged cartridge filter. If the filter is not plugged and all other systems check out then check the flow from the well pump. **To determine if flow is a problem on an existing system the flow into the Clearadon must be checked at the connection to the aeration tank to determine actual delivery rates to the Clearadon. This will confirm adequate flow through pre-fiters or pretreatment equipment.**

Lack of adequate flow control from the repressurization pump

Lack of adequate flow control can be the result of two different things.

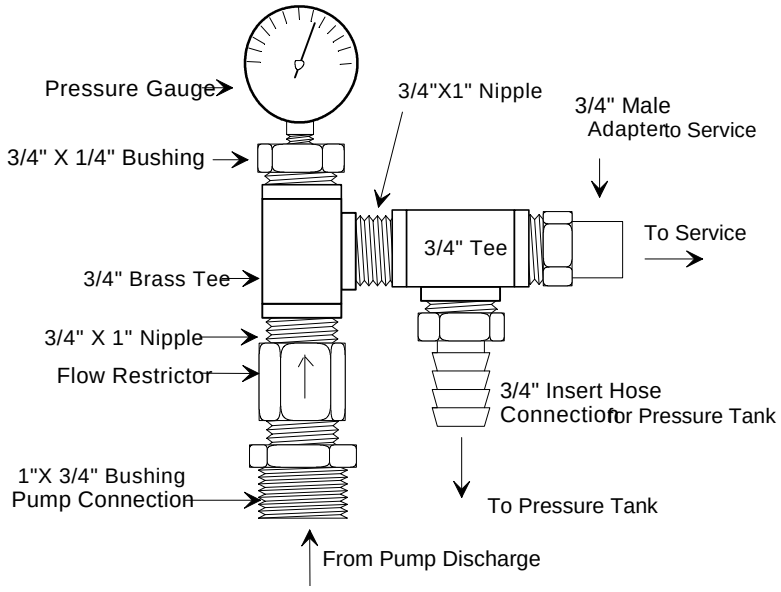
1. Improper site evaluation that results in an improperly sized flow restrictor on the pump.
2. Improper placement of the flow restrictor.

Lack of proper site evaluation is the most likely problem that will occur. There must be a pump test done at each site to determine the delivery rate of the well pump. This can be done as an average test as described in the pump test section of the installation manual provided by the manufacturer. If the well has a low recovery rate, a pump test done after little or no water usage will provide a flow higher than when the well's static level has been lowered during high water usage. If there is any question about the recovery rate of the well, allow water to run continuously for an amount that would be consistent with high usage (maybe 100 gallons in a half hour or less for a typical residential application) and then do a pump test.
The flow restrictor that controls the output from the repressurization pump should be chosen to be at least 1 gpm less than the flow measured from the well pump. This will make sure that any discrepancies in actual flows through the restrictors due to pressure difference will not allow water to be pumped from the aeration tank faster than it is pumped in.

If flow from the repressurization pump is to high, the repressurization pump will shut down because the flow into the bottom of the Clearadon is to slow to keep up with the demand. If the unit is bought from the manufacturer in its standard configuration and used with the pump provided from them you need not worry about proper flow restrictor placement. However, if you use a different pump or decide to build your own connections to the system, then flow restrictor placement is critical. The flow restrictor should be placed on the pump discharge so that no water can leave the pump and go to the **distribution system** or **pressure tank** without passing through the flow restrictor (see the diagram that follows). If you place the flow restrictor after the connection to the pressure tank, the repressurization pump can deliver water to the pressure tank and through the flow restrictor at the same time. This condition will allow the flow from the Clearadon (rate the through restrictor plus the rate to the pressure tank) to be much greater than that being delivered to it. If this condition occurs just when the Clearadon tank is ready to refill, then, the repressurization pump can run out of water. This condition (repressurization pump running out of water) will not occur every time the Clearadon aeration tank is starting to be filled and therefore will only show up as an intermittent problem.

If the flow is controlled at too low a rate, there is a possibility of short cycling the pressure switch. This occurs because the pump switch senses pump pressure not system pressure. In order to understand this phenomenon one must first understand the difference between pump pressure and system pressure. Pump pressure is the pressure the pump has to push against when it is running. This

Repressurization Pump Discharge Assembly for Clearador



pressure is measured at the point of discharge from the pump or at the pump head. The system pressure is the pressure in the delivery system. System pressure is typically measured at a gauge on the pressure tank. Pump pressure is always some higher than the system pressure because of friction in the pipes from the pump to the system storage (pressure) tank. In the case where the pump has a flow restrictor at its discharge and before the pressure tank, the pump pressure can be considerable higher than the system pressure because of the friction in the restrictor. For example, if the pump chosen can deliver 5 gpm at 50 pounds of pressure and the flow restrictor is rated a 5 gpm, then, when the pump comes on the pump pressure (pressure in the pump head) will be 50 pounds. If the pressure switch is connected to the pump head and sensing pump pressure (which is the typical case for a shallow well pump) and is set to cycle the pump between say 20 and 40 pounds, the instant the pump comes on the pressure will rise above the pressure switch setting and shut the pump off. Then, once the pump pressure falls back to the system pressure which is less than the cut in pressure (20 pounds) the pump comes on again immediately. This cycling will occur continuously until the pump shuts off because of thermal overload or the low pressure cut out condition on the pump switch is met. In either case, the customer will have no water.

To prevent this short cycling from happening make sure the cut out pressure on the repressurization pump switch is greater than the pump pressure at the flow chosen for the flow restrictor. For many 1/2 hp shallow well pumps, this problem is eliminated if the pressure switch is set to 40/60 and the flow restrictor is not less than 4 gpm. See the following example.

> Example: The pump test on the customer's well pump produces a flow of 5 gpm so a 4 gpm flow restrictor is chosen for the repressurization pump. Going to the pump curve of the repressurization pump it is found that at 4 gpm that the pump with have a pressure of 45 pounds. This means that the cut out pressure on the pressure switch needs to be at least 45 pounds and to be safe it should be set to 50 pounds.

Solenoids valves have failed to open

The solenoid valves installed on the system are normally closed. This means that if the solenoids are not energized(have no power), they will not allow water to flow through them. The solenoids run off individual float switches. One of the float switches is connected to the primary solenoid and also runs the circuit for the fans. The other float is only connected to the secondary solenoid. The secondary solenoid is strictly a backup to prevent the system overflowing if the primary float and solenoid fail. The only failure that we have seen with solenoids is a failure to open. This only occurred when there was a bad connection in the electrical block that plugs into the solenoid. This was an intermittent problem and was difficult to trace. It was only found after it was decided to change solenoids and the electrical connection block was taken apart to install a new one. **The testing of the failure of the solenoids should only be done after it is confirmed that there is water available to them and the level of the water in the aeration tank is low enough to cause them to open.** Possible reasons for failure are:

1. Solenoid not getting power.
2. Bad coil on the solenoid.
3. Valve fouled internally with water contaminants.

Determining the lack of power to the coils can be done a number of ways. **Check power to the coils only after it is confirmed there is power in the control box and that the switch to the Clearadon is on.** The most efficient order of checking for power to the coils is as follows:

1. Open the control box door and with a volt meter check the terminals that are connected directly to each solenoid. If there is no power to these terminals, start checking through the circuit starting at the floats. If it is determined that the floats have failed, then, before opening the aeration tank, remove the floats wires from their terminals and check to see that the float switch is closed with an ohm meter. If the float switch is not closed, open the aeration tank and see if the floats are in the down position, and, if they are not, put them in the down position and recheck the float switch. If the float switch is not closed with the float in the down position then the float has failed and needs to be replaced.
2. If it is determined that there is power to the solenoid's terminals in the control panel, remove the electrical terminal block from the solenoid and check the terminals in the block for power. If there is no power at the terminals, then there is a broken wire or bad connection to the terminal block.

Before checking coil failure, make sure there is power to them by using the above procedure. If there is power to each coil's electrical terminal block then unplug both coil terminal blocks and individually plug the block back into the coil. If the coil is okay you, should hear the clicking sound of the solenoid valve core moving. If you do not hear a click, try the coil on a solenoid valve body that you have confirmed operates properly. If the new solenoid valve core doesn't move you have a bad coil.

Before checking valve failure due to water contaminates makes sure the coil is energized and ok. If in the coil test above the new valve clicks with the old coil and the old valve doesn't, it is likely that the old valve is fouled with contaminants.

Power failure

Power failure at the house can usually be determined before arriving at the site. If there is or has been a power failure at the site, the customer should be instructed on how to restart the system once power has been restored and the well pump pressure has returned to normal . If the unit failure is due to a blown fuse in the unit, the fuse should be replaced and the circuit it is on checked for proper current readings. If the current readings are okay check all terminals for tightness and recommend running the unit as is. If the unit fails due to the same fuse a second time, try to identify the device in the unit that caused the failure and replace or repair it.

Blower failure

To confirm blower failure, run water at the house until the Clearadon floats fall and the solenoids allow water to flow into the unit. To confirm water is running into the unit, slightly kink the hose to the top of the unit and listen to the flow of water through the hose at the kink. If water is running through the hose, the blowers should be running. The blower on the unit can easily be heard but the auxiliary blower will not be heard. To confirm the operation of the auxiliary blower, you can either move to its location and listen to it or check for vacuum in the vent stack after the water has been running into the unit for at least on minute (time enough to fill the tray). There should be a vacuum in the vent stack with the auxiliary blower running. If there is no vacuum and the blower mounted on the Clearadon is running, either the auxiliary blower is not running or it is not properly sized to take care of the exhaust pipe run. If either blower is not running, confirm there is power to it. If a fuse has blown, confirm the correct fuse size, replace it and check for the rated current draw. If there is no abnormal current draw, recommend running the unit to see if it happens again. If the blower fails due to the same fuse a second time, replace or repair the blower.

Noisy auxiliary blower

A noisy auxiliary blower can occur for three reasons. They are:

1. Bad bearings
2. Foreign object in the blower
3. Ice in the blower

Before replacing a fan because of noise, confirm there is a noise and confirm that it is not due to a foreign object or ice. If ice is a persistent problem, the vent stack may need to be insulated.

Hammer from solenoid valves

This will be caused either by a failed hammer arrester, no hammer arrester on a long pipe run to the Clearadon or an improperly installer arrester. On pipe runs of over 5' shock arrester should be installed next to the solenoids on the inlet side.

System noisy while running

Noisy systems are caused either by bad fan bearings or solid pipe (copper or PVC) runs from the existing plumbing to the Clearadon. To correct this, you will have to replace at least a short section (2-3 feet) of solid pipe with flexible tubing (hose or polybutlylene works well). If hose is used, it should

be of the same type that comes with the Clearadon to make sure it will be safe for potable water and will withstand the system pressures.

Poor radon reductions

These systems when installed with properly sized auxiliary fans should provide approximately 99.7% reduction in radon concentrations. Large deviations from this performance will be caused either by improper installation (see installation manuals), fouled aeration trays, plugged air filters, failed blowers, failing blowers, failure or lack of delay off timers on the blowers. Visual inspection will confirm installation errors or fouled aeration trays. Failed or failing blowers are discussed in a previous section of this document.

Plugged air filters can be checked by checking the vacuum in the exhaust stack near the Clearadon with the filter on and with the filter removed. If there is a significant difference (more then a 0.1" W.C.) in the vacuum under these two conditions, the blower filter is plugged and needs to be changed.

The delay off timer allows the blowers to run for 1 minute after the water stops spraying into the unit. This allows the water that has not had a chance to travel the full path to be fully aerated. Some economy models do not have this and as a result are expected to have a lower percent reductions. If the unit is fitted with a delay off timer, check to make sure it runs the blowers for one minute after the water stops spraying in the unit. If the delay off timer does not do this, try adjusting the time. If the time can not be adjusted properly replace the timer.

Over the phone diagnosis and resolution

Problem	Possible Solution
No water	Check to see if there is pressure at their well pump and that the blower is not running. This should mean that there is water in the Clearadon tank. If these conditions are true then ask the customer to lift the pressure switch lever to start the repressurization pump.
Repressurization pump fails to start when lever is lifted (only on clearadon with pressure switch operated pumps not Jetpaqs)	Lever may have been lifted too far and the lever is now in the off position. There is no power to the Clearadon. Check the circuit breaker at the electrical panel of the house and be sure the power switch on the Clearadon is in the on position and retry. Fuse in the Clearadon has failed. Have service technician go to service.
Blower running continually	System put in by-pass before Clearadon tank was filled. Check to see that by-pass is in the service position. Well pump has failed before the Clearadon tank was filled. Check to see if there is pressure at the well pump tank. If there is no pressure at the well pump have customer check circuit breaker for well pump. If circuit breaker to well pump is okay, have customer check to see if they have a low pressure cut-off switch on the well pump. If there is a low pressure cut off switch on the well pump have customer try to restart the well pump by lifting the lever. If all of this fails, have the customer put the system in by-pass and check to see if there is water to the house. if there is no water to the house, ask customer to call the company that installed the pump. If well the pump is okay and all of this fails send a technician. Blower contractor has failed and is locked in the on position. Send service technician.
Inadequate Radon reductions	Lack of adequate air flow or fouling. Send technician to check the fan performance.