By Nevin Rudie, Aqua Systems

About the Author
Nevin Rudie has been in the water treatment business since 1976. He is product and applications manager at Aqua Systems, Avon, Ind. He holds a Bachelor's degree in business management from North Central College, Naperville, Ill., and can be reached by phone at 317-707-3163; Aqua2Solve@Aol.com.

RO Maintenance

Tending to System Maintenance is Necessary for Successful Operation

Understanding and reacting to the performance of a reverse osmosis (RO) system is necessary for continued successful operation. It is this interaction that allows us to quickly and correctly identify and correct issues that may arise. The following discussion is intended to explain the importance of RO maintenance.

First, we must understand why maintenance is needed. The following questions will answer some of these needs.

- Have you ever had a problem with an RO unit?
- Have you ever had the same problem occur more than once?
- Has anyone ever asked about the performance before the problem occurred?
- Has a problem seemed to happen suddenly or was it something that slowly occurred and was just ignored until it was too late?
- Did anyone have documentation illustrating past performance?

Understanding and performing routine RO maintenance can prevent most problems before they occur. RO maintenance is more than repairing and replacing parts. It means taking steps to reduce or prevent problems from occurring and being aware that a problem may be coming before it happens. Ensuring the RO is properly applied to the project and that feed water pretreatment (and the feed water itself) is checked on a regular basis also are instrumental. You also must check that normal scheduled maintenance occurs. If the system is large enough, daily log sheets are to be filled out. Maintenance is a combination of all these.

Project Care

An RO unit is only as good as the application allows. The first step in preventative care is to ensure the feed water is of satisfactory condition. Customers just don't want to pay for that all-important feed water analysis, yet it cannot be stressed strongly enough. The larger the system, the greater the importance. Be aware of your feed water source. Surface water can produce needs that groundwater does not and vice versa. If your community mixes the two, it can be a "double whammy." The point is to understand your feed water and install the proper pretreatment.

Understand both the amount of water and how the water will be used. Try to avoid traps such as knowing it needs to be 3,000 gallons per day and not knowing the day is eight hours. Make sure the unit is properly applied to the application and that any post treatment will allow proper flow and pressure.

Know the correct operating flows of the unit. Be sure to stay within manufacturer guidelines of pressure, product flow and recovery. Changes in feedwater temperature and total dissolved solids will change with the seasons. Expect these changes to cause minor adjustments to the unit.

Preventative Care

On initial installation, make sure all plumbing lines are flushed and any pretreatment is properly working before you run water into the RO. Double check for the lack of carbon fines and water hardness. Carbon fines from improperly rinsed carbon beds or cartridges will cause premature failure of the 5-micron prefilter used for particle protection just prior to the RO. Hardness leakage may lead to fouling of the membranes. Once installed be certain to set the unit flows to those recommended by the RO manufacturer and put these settings on a start-up sheet. Instruct the operating personnel on the importance of proper operation. Ensure it is understood to keep a watch on any pretreatment and check it on a regular basis. For instance, if carbon filters are used, periodically test for chlorine.

Water softeners should be tested for hardness and/or iron leakage. Don't test just the treated water; also test the incoming water. Remember the best time to test a water softener is just before it regenerates. Testing a freshly regenerated water softener (when regenerating properly) is of little use. Cities that have multiple sources of water will have varying amounts of constituents. The pretreatment must be capable of performing in the worst conditions. When checking pretreatment, be sure to check any regenerants such as salt in the brine tank. Do not let the brine tank run low or become empty. Salt on a skid next to a brine tank can cause problems.

Routine Maintenance

Regardless of system size certain tasks need to be performed on a regular basis. The most frequent maintenance is changing cartridge prefilters. These usually are nominally rated as 5 micron and are used to protect the RO membrane from particle fouling. Run length or time before changing is based on pressure drop. As these filters trap particles from the water supply, a reduction in pressure to the RO will occur. Most RO units include a low-pressure switch that prevents the RO from running if feed pressure drops too low. Check with your filter supplier to determine the allowable pressure drop across the cartridge and compare this to the incoming feed pressure. Applications with low feed pressure may not allow full use of these filters, requiring more frequent changes.

Carbon filters are commonly used for chlorine removal. Small systems may use carbon cartridges, while larger units may have backwashing carbon as well as other filter units. The time for carbon filter replacement is dependent on each application. Carbon cartridges should be replaced at least (if not before) every three months and backwashing filters should be changed annually if not before. Regardless of which type may exist, the change frequency is dependent on the application, size and type of cartridge and carbon as well as feed water make-up. Make certain the cartridges and any backwashing filters are well rinsed before sending any water to the RO. Back-washing filters should have an overnight presoak prior to use. It also is important to note that the use of some carbons can cause a rise in the treated water pH for some time. To avoid this, make sure the carbon is well-rinsed prior to placement online.

Check any RO pretreatment for correct operation. Check RO product water quality, system flows and pressures. Pressures include pre- and post-filters, RO pump discharge and waste and product water pressure. Keep a log sheet on this information and compare old data with new. Check the unit carefully for any leaks. Listen for any unusual noises. Pumps will exhibit a problem usually associated with a noise or leak prior to failure. Depending on size, the RO pump may be coupled to the motor and include an oil bowl reservoir. Be sure to check its level. Check to ensure that pressure switches and/or level controls are properly functioning.

Do not rush in and out. It is important to check the complete system both pre- and post-treatment. Make note of any deficiencies and take corrective action. Cleaning of the membranes usually is needed when the product flow rate falls 10 to 15 percent. When checking, it is necessary to ensure the loss of production is not caused by low feed water pressure, dirty prefilters or low feed water pressure. As a general rule, hardness scaling causes both a loss of water quality and flow rate. Biological fouling causes a loss of flow rate. If you are uncertain but believe a problem exists check with your RO supplier.

Data Log

Data log sheets are used to represent the past and present performance of an RO system. These sheets provide a window into expected future performance. Not all RO units need or have data logs. Some units are small enough that these sheets just do not make sense. You'll know if your RO is large enough to need one of these. Just check the unit manual. If it needs one you will find it there. Typically, log sheets include all available operating data such as date, time, run time in hours, pre- and post-filter pressures, feed, concentrate and permeate pressures, feed water quality, permeate water quality, SDI, feed water hardness (ppm), chlorine, pH and others. The size and options selected will affect the data required for logging.

Use of these sheets allows the operator to spot trouble ahead of time. Through filling out these sheets, the operator will see patterns developing indicating normal or abnormal operation. Abnormal operation will indicate the type of problem that is occurring, allowing corrective action to take place. For example, if pressure drop rises, product water decreases and quality is falling, the need for cleaning is indicated. In this example, the need for an acid cleaning to remove hardness scale is indicated. This is merely one example. A hardness fouling condition is described above for two reasons. The first one is that it indicates a problem is coming and how to correct it. The other is to illustrate that you now can go one step further. Hardness fouling indicates a possible failure in pretreatment or a change in raw water hardness level. This allows a correction of the problem and correction of the cause. WQP

For more information on this subject, write in 1013 on the reader service card.