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NEPHROLOGY PROGRAM
DEPARTMENT POLICIES AND PROCEDURES

Hemodialysis - Section 14 - Unit Specific - BCC Neph 14-01
Water Treatment Management
No.: 01390 (TOH Standardized Policy Number)

ISSUED BY:
Hemodialysis Clinical Practice

DATE OF APPROVAL:
N/A

APPROVED BY:
Program Clinical Director and Division Head

LAST REVIEW/REVISION DATE:
2016/03

CATEGORY:
Unit Specific – BCC Satellite

IMPLEMENTATION DATE:
2002/01

POLICY STATEMENT:

- To verify the feed water pre-treatment and Reverse Osmosis (RO) are functioning and producing water within CSA safety standards for hemodialysis
- To describe the start-up process of the Osmonics 23G Reverse Osmosis Unit
- To describe the shutdown process of the Osmonics 23G Reverse Osmosis Unit
- To describe basic troubleshooting steps of the reverse osmosis and water loop

BACKGROUND STATEMENT:

- The BCC dialysis clinical staff is responsible for starting up and shutting down the Osmonics 23G Reverse Osmosis water treatment system, and completing Section A, B, C and D of this procedure
- All gauges are lettered and need to be read in ***psi***
- Temperature is to be read in degrees Fahrenheit
- All valves are numbered
- Water flow is indicated by directional arrows
- The Biomedical Nephrology Technical Service Team oversees all water treatment operations and is responsible for monitoring the water softener and its brine tank levels
- Any abnormal conditions or variances with section A, B or C of this procedure shall be reported to the Biomedical Nephrology Technical Services at TOH – Riverside Campus @ 738-8400 ext.82825 or the On-Call Technologists @ 613-759-9229

SUPPLIES:

- Chlorine Test Strips
- 1 Bottle Hi Sense Chloramine Test Strips
- 1 Bottle Reagent Solution
- Sample Cup
- Reverse Osmosis and Water Loop Daily Log

DEFINITION(S): N/A

ALERTS: N/A

PROCEDURE:

Section A: Starting the (RO) Reverse Osmosis unit

1. Ensure the prefilter pressure displayed on the RO LCD front panel display is > 20psi
2. Press the Green START button on the RO Front Panel. The RO Unit should start after a delay of a few seconds
3. The RO will automatically go into a Permeate Divert Alarm – Red light on panel. This alarm will last for approximately 2 minutes
4. Once the alarm has cleared note: two green lights [Machine on] and [RO pump on] will be indicated. Start step #5 and then proceed to Section B
5. Start a 10min timer. This is the amount of time required before completing Section C: Testing for the Presence of Chloramine

Section B: Completing the SVH Water Pre-Treatment and RO Daily Log

1. Do not record the values on the daily log until the permeate Divert – red light is off and two green lights [Machine on] and [RO pump on] are indicated.
2. RO LCD display: Record pre/post RO filter pressure in PSI. Delta pressure should be <10psi
3. RO LCD display: Record Primary Pressure in PSI.
4. RO LCD display: Record Final Pressure in PSI.
5. Record the temperature from the gauge post blending valve. Pre-set to 75^{o} F. Temperature on RO Unit needs to be between 72^{o} - 77^{o} F. During winter temperature may drop no lower than 62 F.
6. RO LCD display: Record the permeate flow rate. Should be >1.0 gpm
7. RO LCD display: Record the concentrate flow rate.
8. RO LCD display: Record the permeate conductivity. Should be <10us
9. RO LCD display: Record the % rejection. Should be >90% however, a decrease of 4-5% from normal daily readings shall be reported to the Nephrology Technical Team.
10. RO LCD display: Record the PH value. Should be between 5.0 – 9.0

11. Pre/Post "Big Blue Filter" pressure gauge A and C readings: A delta pressure >10psi shall be reported to the Nephrology Technical Team.

12. Chloramine test results: To be completed in Section C once the 10 min timer has elapsed.

13. Verify that the UV light is on.

14. Verify Both DI lights are Green. Refer to the Policy BCC Neph 14-03 for more specific information regarding the DI's

15. Record your initials.

Section C: Testing for the presence of Chlorine/Chloramine

Before performing this testing, Section A step #5 shall be complete first. The sample is to be obtained from the sample port located between the two (2) Carbon Tanks. Obtain and discard first three (3) samples. The fourth sample will be tested for Chloramine/chlorine using the HiSense test strips

ALERTS

HiSense Test Strips/Reagent Solution:

- Do not allow the test strip to come in contact with liquids or with work surfaces which may be contaminated with interfering substances
- Do not use the test materials in areas where vapors from containers of bleach or other oxidizing solutions may be present
- Do not touch the reagent-containing Paper Flap on the test strip
- Do not use the Test strips/Reagent Solution after their expiry dates
- Write the date opened on the space provided on the test strip bottle label. Use test strips within 3 months after first opening the bottle
- Keep the test strips in their original bottle
- Replace the cap on the test strip bottle immediately and tightly after removing a strip; the strips must be protected from humidity and heat

1. Insert the test strip in the strip holder (with the paper facing up) until it meets the peg stop. Snap the strip holder closed

2. Remove a water sample from the medicine cup using the plastic dropper or clean syringe. Add the water sample drop-wise into the reservoir on the top of the test strip holder until the reservoir is just full (do not overfill)

3. Immediately add 1 drop of Reagent Solution to the sample in the reservoir. Note: the addition of more than 2 drops of Reagent Solution will adversely affect the sensitivity of the test

4. When the water sample has drained from the reservoir (approximately 5 minutes), remove the strip from the holder and interpret the results

Note: Do not interpret if more than 5 minutes has elapsed as it might become blue related to chlorine in the air (could be amuchina etc…)

INTERPRETATION

- If the circular Reaction Zone displays a distinct blue colour, darker than the surrounding Paper Flap, record as positive. Obtain a second sample from the sample port after the second carbon filter and perform another test for chlorine/chloramines
- If the second test is positive **the water should not be used** to prepare the dialysate. **If the test is positive**, it means that the water is over the CSA standard of .1ppm and therefore may cause hemolysis. **Technical services and Clinical Manager need to be notified**
- **If the first sample port test is positive and second port test is negative, than Dialysate can be prepared but Technical Services needs to be immediately notified**
- If the circular Reaction Zone is no darker that the rest of the Paper Flap, record as negative- the water has less than 0.1 ppm total chloramines/chlorine and is considered safe for dialysis

5. Record the results of the Chlorine/Chloramines test on the Water Loop Daily log.

Section D: Shutdown of the reverse osmosis unit

1. Press the Teal OFF button on the RO. The RO Unit should stop

2. Leave the water valves open, as the Water Softener regenerates at 0200 AM and will require water for this process

Section E: Troubleshooting

1. Water leaks:

- **a.** All water leaks minor (small drips) to major leaks shall be reported to Biomedical Nephrology Technical Services at the time when found.
- **b.** Any major water leak that could affect the operation of the RO must be isolated to prevent damage to the equipment and surrounding area. This should be done by turning the RO "Off" and then close the closest valves on both sides of the leak.
- **c.** If it is unclear as to which valve to close, than close the main hot and cold feed water valve #'s 26 and 27 located above the blending valve.
- **d.** It may be possible only under the direction of Biomedical Nephrology Technical Services to isolate the leak and continue with dialysis treatments.

2. All **alarm notification** displayed on the RO shall be recorded before pushing the "Off" button on the RO.

3. If any of the following troubleshooting steps below cannot resolve issues with the RO, then TOH policy **BCC NEPH 14-03 Responding to RO-DI Alarms; (section A: Using Di cylinders when the RO shuts down** may be used.

4. Pressure alarms:

    a. Push the ON button on the RO front panel
    b. Once the RO starts look at the pre / post filter pressure. If the delta pressure >10 psi or the pre-filter pressure is <12 psi the RO will not run. Proceed to using **BCC NEPH 14-03** for using back up Deionizers
    c. If the pre filter pressure is <12 psi check gauge A and C. The delta pressure should <10psi. If the delta pressure is to great (only under the direction of Biomedical Technical Services.) The big blue filter maybe by-passed temporarily to continue treatments by opening valve #2
    d. Gauge A should be > 30psi. If gauge A has low pressure, verify the pressure above the blending valve on the main hot and cold pipes. Both gauges should be > 40psi. If not call facilities and Biomedical Nephrology Technical Services
    e. If the pressure at step **(d)** is >40psi and Guage A is <20 psi, it is an indication the problem is with the Blending valve and step **(f.)** can be performed
    f. **By-passing the blending valve: shall only be performed under the direction of Biomedical Nephrology Technical Services.**

        i. Open valve #31
        ii. Close valve #26 and 28
        iii. Verify pressure at gauge A is now > 20psi
        iv. Restart the RO**. Note:** If section A of policy BCC Neph 14-03; Using DI's without the RO was used than the following valve sequence should be performed before starting the RO.

            1. Open Valve #'s 13 and 15
            2. Start the RO and wait for permeate divert to be completed
            3. Once the two green lights [Machine on] and [RO pump on] are visible, verify that all RO display values are normal and then close RO bypass Valve #14

Note: If the blending valve has been by-passed during cold weather months, low feed water temperatures may cause low permeate output and cause an alarm and stoppage of the RO. If this occurs the DI back up procedure in BCC NEPH 14-03 may be used.

5. No LCD Display:

    a. Check that the grey power cord is plugged into the GFI receptacle
    b. Unplug the power cord and push the reset on the GFI. Plug the cord back in
    c. Call facilities to verify electrical and breaker if the GFI was not the issue.
    d. Continue treatments using BCC Neph 14-03

DOCUMENTATION:

1. Record all values from Section B: Step 1-14 on the SVH Water Pre-Treatment and RO Daily Log.

RELATED POLICIES / LEGISLATION:

1. Nephrology Policies and Procedures - Hemodialysis - Section 14 - Unit Specific - BCC Neph 14-03 Responding to RO-DI Alarms

REFERENCES:

1. 23G Osmonics Reverse Osmosis Operating Manual and Video
2. Biomed Nephrology Technical Services
3. CAN/CSA-ISO 13959-11 Water for Hemodialysis and related therapies
4. Serim Guardian HiSense Test Strips, Product Information Insert

COMMENTS / SIGNIFICANT REVISIONS: N/A