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WORCESTER POLYTECHNIC INSTITUTE HEALTH PHYSICS PROCEDURE HP-02 POOL pH READING AND INSTRUMENT CALIBRATIONS

1. PURPOSE:

To ensure that the pool pH is within the Technical Specification limit, to ensure that the resistivity meter is in proper calibration, and to ensure that the resistivity probe is clean and operating properly.

2. FREQUENCY:

This procedure shall be performed semiannually.

3. <u>MATERIALS, TOOLS, AND EQUIPMENT:</u>

- 3.1. Form(s):
 - 3.1.1. Pool pH Readings and Instrument Calibrations (Form 04)
- 3.2. pH measurement:
 - 3.2.1. pH meter
 - 3.2.2. Three beakers
 - 3.2.3. Two pH buffer solutions
 - 3.2.3.1 One with a known pH of 7.0 + -0.05.
 - 3.2.3.2 The other with a known pH between 5 and 10, but outside the range of 7.0 + -0.5.
 - 3.2.4. Deionized/distilled water (obtained from Chemistry)
- 3.3. Resistivity Probe Check:
 - 3.3.1. Screwdriver
 - 3.3.2. Bucket
 - 3.3.3. Megohmmeter
 - 3.3.4. Ohmmeter

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4. <u>PRECAUTIONS</u>:

- 4.1. When measuring pool pH, ensure that cross-contamination does not occur between the buffer solutions and the sample.
- 4.2. While measuring the resistivity probe's electrode resistance, avoid shorts and mechanical damage to the automatic temperature compensator sensor (located in the probe) by keeping all leads clear of each other.
- 4.3. During the resistivity meter calibration check, do not adjust the Single Point Conductivity Calibration setting.

5. <u>INSTRUCTIONS</u>:

- 5.1. pH Meter Calibration
 - 5.1.1. Rinse the beakers with deionized/distilled water.
 - 5.1.2. Calibrate the meter using the buffer solution with the neutral pH of 7.
 - 5.1.3. Rinse the electrode with deionized/distilled water.
 - 5.1.4. Check the instrument response using the other buffer solution.
 - 5.1.5. Rinse the electrode with deionized/distilled water.
 - 5.1.6. Refer to the meter's instruction manual if adjustments are necessary.
- 5.2. Pool pH Reading
 - 5.2.1. Rinse a beaker with deionized/distilled water.
 - 5.2.2. Collect a sample of pool water in the beaker.
 - 5.2.3. Rinse the electrode with deionized/distilled water.
 - 5.2.4. Immerse the electrode into the sample and stir.
 - 5.2.5. Record the stabilized pH reading.
 - 5.2.6. Rinse the electrode with deionized/distilled water.
- 5.3. Resistivity Meter Calibration and Probe Maintenance Checks
 - 5.3.1. Probe Maintenance Check

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IOTE: This section (5.3.1.) is only required to be performed eriodically.		
5.3.1.1.	Turn the resistivity meter off at the reactor console (CB-1).	
5.3.1.2.	Disconnect the AC power supply behind the demineralizer.	
5.3.1.3.	Disconnect the probe cables. (Gently separate the connectors.)	
5.3.1.4.	Shut off the water purification pump.	
5.3.1.5.	Isolate the associated piping (close valves 22, 24, and 27).	
5.3.1.6.	Place a bucket under the probe to gather the water drained during its removal (approximately 50 cc).	
5.3.1.7.	Remove the probe from its piping.	
5.3.1.8.	Empty the bucket into the holdup tank.	
5.3.1.9.	Clean the probe with hot tap water. Allow the probe to dry completely.	

NOTE: If the probe electrodes have become extremely dirty or fouled, chemical cleaning may be necessary. Use a warm 10% solution of either hydrochloric acid or sodium hydroxide, depending upon the soil. Do not keep the probe in either of these electrolytes longer than 15 minutes. Ensure that the probe is not connected during this procedure.

After chemical cleaning, thoroughly rinse the probe in running tap water to remove any strong electrolytes which may have clung to the electrodes, to the insulators, or to the electrode holders. This rinsing should continue for approximately one half hour, and should be followed by washing in several changes of distilled or deionized water over a period of several hours.

Gentle brushing with a soft bristle brush (i.e.: a toothbrush) and cleaning in an ultrasonic cleaner are also suggested.

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- 5.3.1.10. Visually inspect the condition of the probe, the probe cable, and the probe connections for any of the following:
 - *Signs of corrosion
 - *Bends or dents
 - *Extraneous material lodged between the electrodes
 - *Physical damage
- 5.3.1.11. Measure the inner-electrode resistance by connecting a megohmmeter between the black and white probe leads.

 The measured resistance should be 1000 megohms or more.

 Record the measured resistance.

NOTE: Keep all leads clear of each other during this measurement to avoid shorts. This will ensure that no mechanical damage can occur to the automatic temperature compensator sensor located in the probe.

- 5.3.1.12. Measure the RTD temperature compensator element resistance by connecting an ohmmeter between the red and white probe leads. At 25 degrees C, the measured resistance should be approximately 1100 ohms. This value will be higher at higher temperatures and lower at lower temperatures. Record the measured resistance.
- 5.3.1.13. Reinstall the probe and reconnect the probe cables.
- 5.3.1.14. Refill the system (open valves 22 and 24).
- 5.3.1.15. Start the water purification pump.
- 5.3.1.16. Reconnect the AC power supply.
- 5.3.1.17. Turn on the conductivity meter.
- 5.3.2. Resistivity Meter Calibration Check
 - 5.3.2.1. Press and hold the "Calibrate" key on the instrument front panel until the display reads "CAL". Release the "Calibrate" key.
 - 5.3.2.2. Confirm the Alarm 1 Set point (1.00), make any necessary adjustments.
 - 5.3.2.3. Press and release the "Calibrate" key to step to each successive variable.

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5.3.2.4. Confirm each variable, making any necessary adjustments:

- * Alarm 1 Deadband Point (1.05)
- * Alarm 2 Setpoint (0.10)
- * Alarm 2 Deadband Point (.11)
- * Probe Calibration Constant (483)
- * Probe Temperature (approximately the same as Pool Temperature, however, if a discrepancy exists, confirm pool temperature using a mercury thermometer).

NOTE: Do not adjust the Single Point Conductivity Calibration setting (indicated by arrows pointing to M-cm, to RAW, and to CAL)!

5.3.2.6. Exit the Calibration Mode

- 5.3.2.6.1. To save the adjusted readings, depress the "Display" key.
- 5.3.2.6.2. To exit without saving, leave the instrument in the Calibration Mode for more than 10 minutes without pressing any of the front panel keys.

6. <u>RESTORATION</u>:

None

7. REFERENCES:

- 7.1. Rosemount Analytical, Inc. Instruction Manual
- 7.2. Worcester Polytechnic Institute's Technical Specifications
- 7.3. pH meter manual