Quarterly Maintenance Scope of Work 2014
For the
Reverse Osmosis Water Treatment System,
Backflow Preventer Valves,
and Waste Water Treatment Plant

Date: 12 February, 2015
Project: Djibouti NOB

INTRODUCTION

The United States Department of State (DOS) requires services at the unclassified clearance level, to provide water treatment maintenance services at the New Embassy Compound, U.S. Embassy Djibouti, Africa.

- The U.S. Embassy in Djibouti has a requirement to obtain water treatment maintenance services to execute this work, including logistics, customs, shipping, transportation, labor, water treatment chemicals, tools, water treatment testing kits/equipment, administrative and all associated management support functions. The water treatment service contract will include but not limited to combinations of physical methods, chemical methods, equipment servicing and testing to control water-related problems such as corrosion, scaling, general deposits, and microbiological fouling of the potable water and sewer processing water systems at the Embassy.

Operational Checks for RO System:

- Monitor the incoming and outgoing water pressures through the Multi-media Filters, Activated Carbon Filters, UV Systems, Prefilter to the RO Units to assure the there is adequate pressure to operate each piece of equipment as designed.
- This includes monitoring the filter unit during the backwash mode and while the other unit is on line to provide flow to the RO System.
- If necessary, adjust the separate source backwash pressure coming from the domestic water side in order for the diaphragm valves located on the filters to work properly.
- During the backwash phase take off the tubing to the valves, one at a time to verify that there is hydraulic pressure going to the valve in order for the valve to work properly.
- Monitor each control device during operation to include the controllers located on the Filters, the display panel on the UV units, the control panel on the RO unit, and the control panel located on the Chorine Monitoring Skid.
- Make any necessary adjustments to the operation of the equipment if there are changes to the incoming water that would include a change in water quality and temperature that would affect the operation of the RO Units and the chlorine feed system that chlorinates the product water going to the storage tanks.
- Make adjustments to the chemical feed system to assure that the compound is receiving potable water with at least 0.2 to 0.4 mg/l of free chlorine.
- The onsite chlorine test will be taken with a hand held calibrated DPD test kit to provide accurate analysis.
- Provide onsite water analysis of the incoming raw water, the reject water from the RO unit, and the product water from the RO unit with a hand held calibrated instrument to determine if the RO unit is performing in accordance with specifications.
- All services will be performed by a competent Stateside Licensed Water Treatment Plant Operator.

Maintenance of the RO System:
**Multi Media Filters and Activated Carbon Filters:**

1. Remove the control head from the top of the filter and inspect the condition of the media inside the filter.
2. Replace charcoal media the first year of the PM contract and after 3 years of continuous operation.
   a. Document replacement in report to COR
3. Replace all the tubing and fittings connected to the controller and the diaphragm valves every ONE year.
4. Change all diaphragm valve internals every ONE year.
5. Replace the seats on each diaphragm valve every TWO years.
6. Remove the backwash flow controller, clean, and inspect the internals for debris.
7. During regeneration, inspect the controller for proper operation.
8. Clean up the exterior of the Filter Skids to include the skid, vessels, piping, valves, and fittings, tubing and controller.
9. Backflow Devices: Semi-Annual inspection, testing and recertification of all

**UV Units**

1. Take the UV Unit completely apart and clean the exterior and interior of the unit, and the quarts sleeves.
2. Check the power connectors to the UV lamps to make sure that the power going to the lamp is as specified.
3. Verify that the parameters in the UV controller are as recommended by the manufacture.
4. Check the power output of the ballast for the correct voltage.
5. The UV performance for bacteria sterilization will be checked on site with a bacteria test kit and read after a 48 hour incubation period. A certified lab report of the sample will be supplied by a lab in the USA.
6. Rectify any leaks that are in the system.
7. Replace the UV lamp every ONE year.
8. Clean the skid and touch up paint as required.

**RO Units:**

1. Clean the exterior of the system to include the skid, pre filter housing, pumps, piping, tubing (plastic and stainless steel), RO panel, the inside and out of the flow indicators, the RO membranes filter housings, the pH probe installed in the product line.
2. Replace all plastic tubing and fittings every ONE year.
3. Install new end caps on the RO membrane pressure vessels every ONE year.
4. Tighten up all the fitting located on the RO to include tubing and connections to various pieces of equipment.
5. Remove the membrane from each vessel, inspect the rings, threaded connections to the end caps, and clean the inside of the pressure vessels.
6. Replace all membranes every SIX MONTHS unless a water softener system is in place.
7. Make adjustments to RO product water to calibrate the system for new membranes. Let the RO run at the new settings for a 48 hour period. Recheck RO production to insure that new membranes are performing correctly.
8. Take a part and clean the chemical feed pump head, foot valve, tubing, and chemical tank.
9. Replace the chemical feed pump tubing every TWO years.
10. Paint and touch-up, if required, the structural steel skid to include sanding, prime, and painting (supplies by owner).

**Chlorine Monitoring System:**
1. Remove and clean the chemical pump head, tubing, and foot valve for the chlorine feed unit.
2. Replace the chemical feed pump tubing and fittings every TWO years.
3. Clean the skid and equipment mounted the skid.
4. Touch up paint on skid.
5. Clean the inline chlorine and pH probe.
6. Inspect the tubing, piping, valves, and fittings for leaks.
7. If valves or piping need to be replaced, notify the COR immediately and provide a scope of work and cost. This work will be contracted separately from the preventive maintenance contract.
8. Install new probes every TWO years.
9. Monitor the operation of the control panel, to include alarm relays, motor starters, PLC, and switches.
10. Test the power to the control panel, motor starters, motors on the circulating pumps, and other electrical devices on the skid for correct voltage to the equipment and amperage draw.
11. Check the settings in the chlorine monitor and if required make adjustments to the settings.
12. Make adjustments to the chlorine feed if required to provide a 0.2 to 0.4 mg/l residual throughout the compound.
13. Certify that the water quality throughout the compound meets the above requirements.
14. Use a certified DPD test kit to verify the free chlorine residual going in the potable water storage tanks and calibrate the chlorine monitor to match the results.
15. Make necessary adjustments to the chlorine feed based on the water quality and the temperature of the water store in the potable water storage tanks.
16. Take bacteria samples of the water in the potable water storage tank and at the farthest point of use. If there is abnormal growth, send to a certified lab to get the final results.

Manufacturer’s recommended operational check list to be provided by Contractor after the maintenance has been performed. Embassy maintenance personnel will complete weekly operational check list and results can be sent to the Contractor via Email.

**Backflow Devices:** Backflow devices are tested semiannual by certified/ licensed Backflow Tester and Repairer by an accredited agency i.e. ASSE, IAPMO Backflow Prevention Institute or Stateside Certification Agency. Testing of the devices also will be conducted after unscheduled maintenance and re-certified. Tags will be used on each device and will have testing completion date, next scheduled test date and certifier/ tester ID Number.

**Laboratory Analysis:**

1. Laboratory testing will be conducted by a competent USA licensed Water Treatment Plant Operator. Testing will conducted on site and recorded accordingly. Parameters of the water quality standards will be in accordance with EPA (Environmental Protection Agency), AWWA (American Water Works Assc.), and NFS (National Sanitation Foundation).
2. Quarterly samples will analyzed at a certified laboratory in Dubai or the U.S. A Chain of Custody will accompany the samples and will be delivered to the Lab by a competent Stateside License Operator. Stateside guidelines will be properly adhered to while transporting the samples and will never exceed (20 degrees + - 2 Celsius). Results of the samples tested will be sent directly to the FM of the US Embassy in Djibouti as well as the contractor by the certified lab.

**Waste Water Treatment Plant:**

**Equalization Basin**
1. Check level sensor for proper operation and level settings
2. Check pump valves for proper setting on flow to splitter box and feed-back

**Aeration**

1. Visually check aeration system for even air distribution, with no dead spots
2. Check oil level in mechanical aerator gear cases
3. Check oil level in blower gear cases
4. Check for air leaks around base and fitting of blower
5. Check and inspect blower belts for wear and tension
6. Check oil level of commutator
7. Check the blower to make sure that belts and drives are free of obstruction and all electrical connection are complete including thermal protection if applicable.
8. Check the blower gear housing is filled with oil
9. Check that effluent weir trough and weir is level and set to the correct elevation and adjust if necessary
10. Check blowers at a minimum speed and listen for unusual noises
11. Check the airlift pumps operate continuously and the total pumping rate should be approximately equal to the incoming raw sewage average flow rate

**Pretreatment**

1. Check grit pump packing for leakage (20-30 drops per minute is
2. Inspect grit chamber
3. Sharpen /replace comminute blades when cutting edge Is worn

**Activated Sludge Volume Test**

1. Test a measure of the amount of activated sludge present to digest the solieds and the condition of sludge
2. Check the color of the aeration tank is black or gray

**Dissolving oxygen (D.O) TEST**

1. Check the normal operating plant dissolving oxygen content in the effluent

**PH Test**

1. Test Ph measures the acidity of causticity of the liquid in the aeration chamber

**Chlorine Test**

1. Check chlorination of sewage effluent is for disinfection

**Observation and Testing**

1. Check 1 - Flocculent characteristics
   
   A, flocculent masses are small to medium density with no scattered bacteria
   B, a toxic condition exists or a sudden increase in organic loading has taken place
   C, a low oxygen concentration of low pH condition
Typical Lab Test for Sludge Plants

COD .......... influent primary influent final influent
BOD............. influent primary influent final influent
SUSPENDED SOLDS ........ Influent primary influent mixed liquor return sludge final influent
DISSOLVED OXIGEN ...... mixed liquor return sludge final influent (out fall)
CLARITY (Sec chi DISC)........ final influent
PH.......... influent

**Work Requirements:**

The Contractor shall schedule, coordinate and arrange all work so as to cause the least interference with the normal occurrence of post operations. In those cases where some interference is unavoidable, the Contractor shall make every effort to minimize the impact of the interference and its effects on the occupants or users. All detailed work schedules required by this statement of work shall be electronically documented and updated and made available to the Contracting Officer’s Representative (COR) upon request, oral or written. If the COR determines that the Contractor’s schedule conflicts with critical post operations, the Contractor shall modify the schedule as required.

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