Appendix A - Technical Specifications
069-20 - Water Treatment Program for Chilled Water Plants

1. SCOPE OF WORK

The purpose of this five year Water Treatment Program is for providing a chemically based water treatment program to keep the JEA Chilled Water Plants in full operation and at top efficiency at the following sites/locations:

a. Downtown - 521 West Duval Street, Jacksonville
b. Hogan's Creek - 777 East Church Street, Jacksonville
c. Springfield - 2103 Boulevard Street, Jacksonville (by Shands Hospital)

NOTE: Equipment legends (component design schedules) are provided by location for each of the above listed locations.

Should the Contractor determine there are significant preexisting conditions outside the scope identified within this technical specification for routine water quality monitoring and the associated treatment program, they shall submit a report within the first 14 days detailing those issues. The Contractor shall include recommended corrective actions and cost estimates to mitigate each issue presented. Based upon a review and evaluation of the reported issues, JEA will provide a work scope to address these problem areas. The contractor shall not be held liable for those preexisting issues in this final work scope that are determined to present a significant impact to the contactor. Final determination of what is considered a significant impact will be at JEA's discretion. JEA reserves the right for independent evaluation of the issues to determination of validity of the claim and cost estimates."

The Water Treatment Program to be furnished by Contractor shall include, but not be limited to, Treatment Products, On-site Testing, Online Service Program, Online Real Time Monitoring, Testing Reagents and Supplies, Meters, Chemical Pumps, Control Equipment, and Scheduled and Emergency Visits. All necessary pumps, associated tubing, feed line protective sleeves/conduit, valves, injection fittings, secondary containment, etc. to connect each chemical container to the system recirculating pipe-work. Contractor shall be responsible for the supply, installation, commissioning, and full maintenance of all dosing control equipment. Contractor shall replace and repair any defective equipment at their cost. All chemical feed lines shall be enclosed in a protective sleeve that will direct leaking chemicals back to a catch device. The installation and maintenance of the protective sleeves is the responsibility of the Contractor. The sleeve material and design shall be approved by JEA.

In addition to providing the proper treatment, it shall be a contract requirement to furnish and deliver to each site all of the products required for treatment. The Contractor shall also provide the necessary service calls, including on-site water analysis, document the required treatment levels, inspect and adjust automatic feed and control equipment, and ensure the recommended treatment is achieving the required results. Field (hand written or electronic) reports, with test results, shall be submitted to the JEA Contract Administrator at the time of service. (Also included shall be follow up Electronic Reports). Weekly Reports from online monitoring system. In the event of an emergency, the Contractor shall be prepared to perform inspections and tests on an on-call basis with four (4) hours of notification at no additional cost to JEA.

The services shall include, but are not limited to:

Water Treatment

1. Contractor shall supply all necessary consultant services, chemicals, sampling feed equipment, controllers, testing, laboratory analysis, technician and management labor, and any other items or apparatus necessary to provide all service requirements as defined herein.

2. Contractor will provide an Administration Notebook for each location. At a minimum, this notebook must contain an outline of the chemical program, all chemical control test procedures, Log Sheets, Product Bulletins, Safety Data Sheets, Feed and Control Equipment Specifications and Service Reports. ***Please provide a two- (2) page maximum summary of how your firm plans to administer and manage the water treatment program. Summary, at a minimum, should contain list of chemicals to be used in program and their control points/ranges. Include a sample of your Administration Notebook and its contents.***

3. Services will be provided on a weekly basis for the first 90 days to ensure a smooth transition to the new program.

4. Contractor shall determine and provide the proper chemical treatment for meeting the industrial standard for JEA and its Chilled Water Plant systems. The Contractor shall be responsible for calibrating and adjusting chemical feed and control equipment as well as making all treatment additions. If the system develops slime, scale or corrosion or any other problem related to the treatment, or lack of treatment, the Contractor shall correct the problem promptly, at no additional cost to JEA.

5. The Contractor shall furnish and have delivered to the point of use all chemicals required for treatment. The Contractor shall provide monthly visits to each JEA Chilled Water Plant by qualified personnel for in-plant on-site analysis of water from pertinent points in the various systems, determine required treatment and chemical dosages, inspect and adjust feed and control equipment, and ensure the recommended treatment is achieving the required result. Additional service calls, as needed or requested, related to water treatment chemical issues and/or concerns shall be included at ***NO*** charge to JEA.

6. The water treatment program must prevent a build-up of scale or algae and adherent mineral deposits on the heat exchange equipment being treated. Periodic de-scaling with inhibited acids will not be considered as meeting this specification. If build-up occurs, the Contractor shall be responsible for cleaning of equipment and systems at the Contractor's expense.

7. The Contractor shall provide monthly written water management reports documenting analysis performed, results and changes of treatment dosages to the JEA Contract Administrator at the time of site service. In addition, Contractor shall perform quarterly laboratory analysis and provide the results to JEA. The analysis, at a minimum, shall include the following: routine water analysis, corrosion coupon evaluation, microbiological testing for legionella and HPC, microscopic photography, differential microbiological analysis, metal analysis, infrared analysis, ultraviolet analysis and atomic absorption analysis.

8. All equipment, supplies and chemicals needed to perform water analysis and treatment shall be provided by the Contractor. The Contractor shall maintain a thirty (30) day supply of required chemicals, testing reagents and other needed consumables on hand at all sites, at all times.

9. The delivery and handling of all water treatment chemicals and products will be the responsibility of the Contractor, which includes keeping chemical tanks full. JEA Staff will not handle any water treatment compounds/chemicals.

10. All products shall be delivered to JEA in sealed containers and to point of use at the time of delivery. The Contractor shall be responsible for the removal of all empty water treatment chemical containers for proper disposal or recycling off of JEA property.

11. All controls and related feed equipment shall be provided and maintained by the Contractor. The cooling tower treatment program, at a minimum, shall consist of corrosion and scale inhibitor, organic dispersants and environmentally friendly biocides. The treatment for the closed or chilled water system shall, at a minimum, treat for corrosion and deposit control (bio-film) in accordance with industry standards. Contractor shall sample the TES tank using a bacon bomb on a semi-annual basis to ensure there is not

microbiological activity on the floor of the tank. If microbiological activity is found above the limits described in this Agreement, Contractor shall take the necessary actions to remedy the situation.

12. The Contractor is required to comply with all city, state and federal regulations pertaining to water treatment. The Contractor is also required to adhere to best management practices with regards to environmental regulations. The Contractor is responsible for the action(s) of their employees or the use of its products.

13. JEA monitors the chiller approach temperatures and will open various pieces of equipment including evaporator and condenser tubes for inspection throughout the year. With ample notification, JEA will require the Contractor to have a Technician on site for the evaluation of the treatment process. A written report will be provided to JEA within 14 calendar days or 10 business days of the inspection.

14. Contractor to provide and maintain a Water Management Plan pursuant to ASHRAE 188-2018 or most recent version, as it pertains to the systems covered by this contract.

2. WATER TREATMENT PRODUCTS

All treatment products kept on site must be delivered in Department of Transportation (DOT) approved containers and stored in or on Occupational Safety and Health Administration (OSHA) and/or National Fire Protection Association (NFPA) approved containment apparatus. Products will be delivered on site to the point of use in sealed containers. All products require inside delivery by the Contractor.

A. Cooling Towers

All cooling tower treatment programs, at a minimum, shall consist of a corrosion and scale inhibitor, an organic dispersant, and at least one (2) Environmental Protection Agency (EPA) registered biocides. All products bid under this category must meet the following product specifications:

1. Scale and Corrosion Inhibitors: Any product bid under this classification must be compatible with the present systems. The product must be a dual purpose product, controlling both scale and corrosion. Chromate and Molybdate may not be used. Contractor will be responsible for compliance with all governmental regulations of discharged waters. Specific corrosion inhibitors for ferrous and non-ferrous metals must be provided in the cooling tower treatment.
2. Dispersant: To provide for maximum heat transfer efficiency, a liquid or dispersant shall be incorporated into the cooling water treatment program. This product shall be compatible with all other products used in the tower systems and be an effective bio-mass penetrant.
3. Tower Biocides: Oxidizing and Non-Oxidizing EPA-registered biocide labeled for use in cooling towers, and compatible with treatment being used may be proposed for the tower systems. All products bid must meet all State and Federal Regulations concerning its shipment and disposal use.
4. Antifoam: To decrease the presence of foam in the cooling tower basin.
5. The total heterotrophic bacteria count in the cooling tower water systems shall never exceed 10,000 organisms per liter. Algae growth must be controlled and no heavy accumulations allowed to form.

B. Closed Systems

The Contractor shall provide Water Treatment for all closed chilled water recirculating systems. If system needs to be drained for introducing new products, Contractor will have to pay overtime for JEA Contract Administrator and perform this work on a weekend. If the system is dumped for a non-routine or emergency situation, where Contractor is not at fault, extra treatment will be purchased by JEA to recharge the affected system.

The systems shall be adequately treated for corrosion and deposit control (bio-film). The treatment shall protect ferrous and non-ferrous metal from rust and corrosion.

3. EQUIPMENT

All treatments must be compatible with existing equipment. The Contractor must furnish, install and maintain, at no additional charge, all necessary equipment needed to perform their water treatment program.

The Contractor shall be responsible for ongoing corrosion monitoring of all open and closed systems under treatment. This includes real time corrosion monitoring and coupon racks with corrosion coupons with 90 day test intervals.

Web based service reporting will be utilized for water analysis, trending, chemical consumption and service reporting, as well as documenting all performance based results of the water treatment program. The Contractor shall maintain an online service Tracking/Data system with graphing capabilities for the term of the contract.

4. SERVICE

The Contractor will be responsible for and assist plant personnel in start-up procedures, instruct plant personnel in proper testing procedures and must also be available on a twenty-four (24) basis for system emergencies.
At least one (1) of the Contractor's personnel must be readily available in case of emergency. This person must supply his/her local phone numbers together with the names and phone numbers of the backup personnel who can be contacted by JEA Contract Administrator.

The Contractor shall provide a minimum of monthly service visits by qualified personnel for each of the systems covered by the contract. All systems being treated shall be tested on each service visit. At this time, the Contractor shall make such tests, analysis, etc. as are necessary to determine treatment needed and/or services required for the proper operation and balance of the systems.

It will be the responsibility of the Contractor to complete the scheduled water analysis onsite. If emergency conditions exist, proper corrective action must be taken promptly. Thereafter written confirmation of corrective action is to be furnished.

All JEA building personnel will be available to run spot checks on all systems under treatment. It will be the responsibility of the Contractor to furnish test equipment, supplies, and reagents. Step by step instructions, as well as ongoing training, shall be provided to JEA Contract Administer. The Contractor shall also furnish conductivity meters for each treatment location. JEA building personnel who are to make water tests are to be instructed by the Contractor's representative. Contractors must be thoroughly familiar with all City, State, and Federal laws pertaining to Water Treatment, and must keep the JEA Contract Administer informed, particularly with regard to environmental regulations. The Contractor will supply at no cost the necessary log forms for use in reporting daily test results. In addition, Online Service Tracking and Data Logging must be made available at all locations for Operators and JEA Contract Administrator.

The Contractor shall have in his employment a Technical Support Engineer who will be available to consult with JEA Contract Administrator. Such consultations will be at no additional charge and provided as deemed necessary by JEA Contract Administrator for purposes of evaluating the treatment program effectiveness.

Laboratory services with will be made available to JEA at any time to determine the effectiveness of the program in place and will be provided at no additional charge. The Contractor shall have access to or operate and staff its own full service laboratory. The laboratory shall be CDC ELITE Program and ISO 9001:2015 qualified. The laboratory shall have the capability of performing at least the following:

- Routine water analysis
- Corrosion coupon evaluations
- Metallurgical failure Analysis
- Ion Exchange Resin Analysis
- Microscopic Photography
- Microbiological Analysis
- Metal Analysis
- Ultraviolet Analysis
- Atomic Absorption Analysis
- Deposit Analysis

The Contractor shall maintain an office with a listed telephone number manned during normal working hours. The Contractor shall furnish JEA with a telephone number and/or numbers where he or his authorized representative may be reached outside normal working hours. Normal working hours are considered to be 8:00 A.M. to 5:00 P.M., Monday through Friday.

5. CONTRACT PERFORMANCE

The work required herein shall consist of the sampling, analyzing and testing of the water to be treated. It shall also be the Contractor's responsibility to determine, recommend, and provide the proper chemical treatment for the systems specified. The Contractor will also be responsible for calibrating and adjusting chemical feed and control equipment, as well as making all treatment additions. Product replenishment or other tasks involving handling of Water Treatment compounds will also be the Contractor's responsibility. Treatment of the water in the various systems shall be for the control of corrosion, scale and biological growth on a continuing basis for the duration of the contract. In order to meet those standards, the following guidelines are provided.

Performance Standards (KPI's – Key Performance Indicators):

The following acceptable performance shall be achieved using the products and services of your company. Each quarter, a summary of the test results will be compiled and reviewed as to how the KPI's were achieved. Chemical control ranges, as specified in the Water Treatment Plan, will be reviewed on a regular basis. Any deviation from the performance standards will require corrective action within the next quarter. Continued out of performance results will be grounds for termination of contract. Recommended deviations from the KPI's will be considered and approved by JEA. Below are additional KPI's that will be monitored and reviewed.

Cooling Tower Systems

Tower Water Cycles of Concentration	$\geq$ the number of cycles as proposed in Contractor's Plan
Total Aerobic Biological Level	< 10,000 cfu/ml
Legionella	< 100 cfu/ml
Corrosion rate mild steel	< 3 mpy
Corrosion rate copper	< 0.2 mpy

Chilled Systems

Corrosion rate mild steel	< 1 mpy

Corrosion rate copper	< 0.2 mpy
Total Aerobic Biological Level	< 1000 cfu/ml
Total Iron	< 1 ppm

In addition to their regularly scheduled visits, the Contractor will:

A. Periodically and no less than four times per year, forward water samples to their laboratory for complete analysis. Results of analysis shall be submitted to JEA Representative with written review/summary of systems under treatment.
B. Be available for phone consultation on an emergency basis within two (2) hours after receiving call.
C. Check all automatic equipment for proper operation and make any necessary adjustments including calibration, set point changes, pump setting changes, etc.
D. Make a personal inspection of water systems in operation and under treatment.
E. Make in-plant "spot" checks of water samples from pertinent points in the various systems including cooling towers and other process water systems.
F. Observe equipment and systems to determine the effectiveness of the Water Treatment program.
G. Make note of condenser approach temperatures. Dependent on load, temperatures should not exceed the design approach temperature of the chiller. A steady increase in temperature beyond this point will indicate possible fouling of the tubes.
H. Review and Monitor Web based Service Tracking and Operator Data Logging information.
I. Review previous reports and data entry to determine developing difficulties and recommend possible improvements.
J. Provide written recommendations for establishing practical methods of protection for equipment and systems as they are removed from or placed back into service. These include necessary test procedures and treatment methods based upon established control limits for each system.
K. On a quarterly basis, provide a written follow-up report listing accomplishments to date and any recommendations for improved future operations.
L. Maintain ongoing corrosion studies using Mild Steel and Copper Coupons as directed by the JEA Contract Administrator. Studies to be in accordance with American Society for Testing and Materials (ASTM) Standards. System to be maintained in such a manner to keep corrosion at not more than 3 mils per year for Mild Steel (Tower System), not more than 1 mil per year for Mild Steel (Chilled System) and not more than 0.2 mils per year of Copper for both systems. Testing shall be in accordance with ASTM D-2688.
M. Provide a minimum of two (2), four (4) hour training seminars each year. The training seminars are to train/retrain JEA employees in proper methods of Water Treatment and use of testing equipment. The seminars are to be held at a time convenient to employees' schedules as determined by JEA. Individual training must also be provided as needed.
N. The Contractor will make available to JEA at no charge, the use of a fiber-optic video image scope, and ultra-sonic flow measuring devices for purposes of verifying and documenting system conditions and operating parameters. The use of these devices will be provided if the JEA Contract Administrator deems it necessary to document actual internal conditions.

All products must be delivered "ready-to-use." A minimum thirty (30) day supply of products in use will be maintained at each facility. The Contractor must furnish, at no cost to JEA, containment vessels and basins for the purpose of utilizing and storing inventory. Containment will be sufficient to hold 115% of the volume of product being stored. All chemical feed lines shall be enclosed in a protective sleeve that will direct leaking chemicals back to a catch device. The installation and maintenance of the protective sleeves is the responsibility of the Contractor. The sleeve material and design shall be approved by JEA. The Contractor will be responsible for assuring containment is in accordance with the Local, State, and Federal regulations. In the event of any chemical spills,

contractor will be responsible for cleanup, remediation and repairs to equipment and JEA property. At no time will the contactor store more than sixty (60) days of chemical on any site.

The Contractor shall warrant, when used according to recommendations, the products used in the Water Treatment program shall have no detrimental effect on the ferrous or non-ferrous metals in the equipment being used. All products used shall meet the ecological and environmental requirements of City, State, and Federal regulating agencies. At no time, will chromates be used as an additive, in any system.

Down time in connection with the above will be deducted from monthly invoice.