



## Water Treatment / Hot Water Boiler and Closed Water Loop System

This solicitation is for Tennessee Dept of Correction to establish a five (5) Year Agency Term Contract for Water Treatment of Hot Water Boiler and Closed Water Loop Systems for Riverbend Maximum Security Institution, DeBerry Special Needs Facility and Debra K Johnson Rehabilitation Center all located in Nashville, Tennessee.

### Locations:

Riverbend Maximum Security Institute  
7475 Cockrill Bend Blvd.  
Nashville, Tennessee 37243

Contact: Chris Johnson – Facilities Manager  
[Chirs.L.Johnson@tn.gov](mailto:Chirs.L.Johnson@tn.gov)  
615-238-1725

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Debra K. Johnson Rehabilitation Center  
3881 Stewarts Lane  
Nashville, Tennessee 37218

Contact: Scott Breckenridge – Facilities Manager  
[Scott.A.Breckenridge@tn.gov](mailto:Scott.A.Breckenridge@tn.gov)  
615-238-1725

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DeBerry Special Needs Facility  
7575 Cockrill Bend Blvd.  
Nashville, Tennessee 37209

Contact: Ricky Adams – Facility Manager  
[Ricky.C.Adams@tn.gov](mailto:Ricky.C.Adams@tn.gov)  
629-238-0033

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Boiler Operator for all 3 Sites  
Rick Johnson  
[Van.R.Johnson@tn.gov](mailto:Van.R.Johnson@tn.gov)

## Specifications

### **Definitions:**

"Non-emergency"- refer to services of a non-emergency nature, during normal business hours of 7:00 am to 3:00 pm, Monday through Friday, excluding State holidays and charged at regular time rates.

"Emergency"- refers to conditions whereby "on-site" services is required at times other than the regularly scheduled annual inspections, and/or services required at times other than those defined as "non-emergency" above. These conditions may exist after normal business hours and/or on weekends and holidays.

"Regular time"- refers to those hours from 7:00 am to 3:00 pm Central Time, Monday through Friday and does not include any day declared to be a holiday by the State Commissioner of personnel.

"Premium time"- refers to those on-site hours after 3:00 pm Central Time prior to 7:00 am Central Time Monday through Friday and all Saturday, Sunday, and holidays as declared by the commissioner of personnel.

"Facility Manager(s)" – refers to either the Facility Manager or their designee.

### **Scope:**

Contractor shall provide monthly preventative maintenance service for water treatment to chillers, boilers, cooling tower(s), closed loop(s) and accessories, based on industry standard. Monthly service shall include cost of equipment, supplies, service, water treatment chemicals, testing, inspection, trip charge, labor, and monitoring the performance of the water treatment program. Contractor shall schedule on-site visits to each site a minimum of one (1) time per month and provide all services specified per this agreement at the price bid. Contractor is to coordinate all visits with the Facility Manager.

For each proposed water treatment chemical, Contractor shall propose a dosage rate with test control ranges for the trace parameter. Using these dosages, Contractors shall provide a documented calculation of the estimated consumption of each chemical, based on yearly consumption or consumption per 1000 gallons of system capacity or make up rate, as appropriate. Contractor shall send a report monthly to indicate cycles of concentration in calculating consumption of boiler treatment chemicals.

The Contractor shall on the initial first visit to the facility test the boilers, chillers, cooling tower(s), and mechanical closed water loop systems to make the determination of the amount of chemicals needed to bring the systems within the recommended and acceptable water treatment parameters.

All services shall be rendered and performed in accordance with requirements as defined by contract agreement and best commercial practices by the industry relating to water treatment of boiler and recommended procedures of the systems manufacturer.

The Contractor's water treatment program shall be administered for maximum energy efficiency and cycles of concentration to prevent scale formation; minimize corrosion of water systems, and to maintain the systems free of sludge build-up and foam.

**Contractor Requirements and Responsibilities:**

1. Contractor shall have the following:
  - a. A current, active, C14-Microbial Pest Control certification from the Tennessee Department of Agriculture
  - b. A current, active, Special (SPC) License and charter for control of pests from the Tennessee Department of Agriculture
2. The Contractor shall have an established and qualified full time service staff with the ability to receive and dispatch service technicians upon request of the Facility Manager.
3. The Contractor shall provide telephone numbers and pager numbers of personnel to contact on an as needed basis. An outside answering service and/or voice mail system (i.e., answering machine / recorder) shall not be acceptable to the State as a contact.
4. The Contractor shall have technical skills, materials, equipment with an inventory of materials, supplies and equipment necessary to operate, test and maintain boiler/ as referenced by this maintenance agreement.
5. The Contractor shall furnish a written report detailing results of chemical tests and inspection findings to the Facility Manager at the conclusion of each scheduled visit in the form of a service report which shall also include recommended control ranges and results of analysis by the service representative at the time of their visit and where applicable, shall be required to file a report with insurance and/or other authorities as directed by the Facility Manager.
6. All visitations by service technicians shall be logged on-site as to date and time (i.e., time and time out). This requirement shall be monitored by Facility Managers.
7. Each service technician shall personally sign-in and sign-out at the job site to verify their presence & length of stay. Lunch and other breaks are not eligible for hourly rate.
8. A service voucher/job ticket shall be left at job site with the Facility Manager documenting services rendered. This service voucher/job ticket shall be required as supporting documentation of services provided and to assist in expediting payment upon receipt of an invoice.
9. The Contractor shall be responsible for furnishing all materials, supplies, water treatment, chemicals, chemical analysis, on-site quarterly laboratory reports, and labor.
10. The Contractor shall furnish a written report within five (5) business days to the Facility Manager detailing the previous monthly results of his water treatment and monitoring program, including

average operating parameters: cycles of concentration, average ph., cooling tower water make up and bleed.

11. The Contractor shall furnish a written report to the Facility Manager detailing a yearly summary of results of the water treatment and monitoring program in the same format as the monthly reports per item #10 above.

### **General Specifications and Special Requirements:**

The omission of detailed specifications does not limit the quality of services to be provided and only the best commercial practices are acceptable.

All services shall be performed between 7:00 am and 3:00 pm Central Time, Monday through Friday to minimize disruption of tenant and visitor activities in the facility(s). All service activities shall be coordinated with the Facility Manager. The Contractor shall, in addition to their monthly inspection service, perform emergency maintenance and repair service as requested by the Facility Manager. All visitations by service technicians shall be logged on site as to date and time (i.e., time in and time out) by Facility Manager. All service technicians shall personally sign-in and sign-out to verify their presence and length of stay at the facility and all repairs shall have prior approval of the Facility Manager before beginning. After completion, the Contractor and the Facility Manager shall inspect the completed work.

Contractor shall be on call 24 hours a day, 365 days a year. The Contractor shall have a maximum on-site response time of 4 hours for an emergency request. The Contractor shall have a maximum on-site response time of 24 hours for non-emergency requests. The State shall determine and notify the Contractor if the request is an emergency or non-emergency.

Note: the State's normal working hours are from 7:00 am to 3:00 pm Central Time, Monday through Friday, excluding State holidays, proclaimed by the Commissioner of the department of personnel.

Labor rates begin when technician signs in at the facility.

Labor rates end when technician signs out at the facility.

Breaks and lunch are not covered by labor rates.

Use of more than one technician shall be pre-approved by Facility Manager in writing.

Trip charges shall be limited to a single trip charge per round trip per given work order. Return trips due to incomplete work and/or services shall not be subject to a trip charge. A trip charge is not allowable for the monthly inspection of the facility.

All parts, materials, supplies and equipment may be billed at Contractor's cost, minus any applicable sales or use tax pursuant to Tennessee code annotated section 67-6-209, plus fifteen percent (+15%). The Contractor shall submit a copy of the original purchase invoice(s) as proof of cost for parts, materials,

supplies & equipment. This documentation shall accompany the job invoice order for the agency to process payment for service performed.

During the performance of contracted service, Contractor shall maintain a clean work area. Upon completion of the work, Contractor shall remove all trash and debris from the job site.

The Contractor's technical service representative shall make scheduled service visits every thirty (30) days, making not less than twelve (12) visits per year. During these visits, the service representative shall inspect all equipment, including the agency's daily reports, and perform all analysis required at the site necessary to determine that the water treatment program is being administered properly that the analysis performed by the agency's personnel are accurate, and that the program is operating at optimum performance. The Contractor shall also check monthly, off-line boilers for sulphite, alkalinity, conductivity, and ph.

The Contractor shall perform on-site water analysis and provide written recommendations at the time of the service visit; however, the Contractor laboratory shall also perform quarterly verification of field analysis and recommendations an annual analysis performed at the central laboratory shall include analysis of fuel oil, internal scale, and fireside deposits, at the time of annual boiler teardown for inspection.

The Contractor shall provide all labor and material to service, repair, replace, and install any equipment required as part of the water treatment and monitoring service. This equipment shall remain the property of the State. Contractor shall be responsible for maintaining this equipment.

### **Service Specifications and Requirements:**

The Contractor shall provide to the Facility Manager complete written directions for applying all materials, including procedures to maintain all proper operating conditions within the equipment being treated. The Contractor shall instruct the agency's personnel, on-site, in the proper administration and analysis of the treatment program, to outline procedures necessary to ensure safe handling and to recommend safety equipment.

#### **1. Cooling Towers**

- Cooling tower control and system monitoring the treatment program shall provide corrosion, scale/deposit, and microbiological control.
- Treatment system shall maintain biological & bacteriological control, which shall maintain 2000 colony count or less; minimum maintain 4.5 cycles of concentration (based on makeup and bleed water meters) without scaling; maintain ph. level at a minimum 8.2; control general corrosion with all open systems to less than 2.0 mil/yr for carbon and .5 mil/yr. for yellow metal based on quarterly corrosion coupon tests; maintain water conservation and environmental compliance and for evaluation upon

annual water analysis report from laboratory. Treatment system shall monitor for water management, the ph, makeup water conductivity, system water conductivity, cycles of concentration, tower total water discharge (daily and monthly) evaporation credit. System shall monitor these points and status to maintain these requirements.

- The cooling towers shall be treated with a phosphonate corrosion inhibitor with azole for yellow metal corrosion control and a polymer dispersant for deposit control. Treatment shall be designed with a treatment rate of 1 gallon to 12000 gallons lost to bleed off to maintain a range of 5 - 15 ppm of phosphonate. The towers shall be treated with a sodium polyacrylate polymer dispersant-on-line descaler to actively remove existing scale deposits as tower operates. Treatment rate shall be half that of the phosphonate inhibitor. The cooling tower condenser water shall be treated weekly with a microbiocide, bactericide, fungicide, algacide, slimicide consisting of a 20% dibromonitrilo-propionamide solution designed to treat at a rate of 0.0095-0.095 gallon per 1000 gallons of system water. This chemical formula is deemed to be very environmentally friendly and is non- corrosive to metal.
- A biodispersant consisting of a sulfosuccinate solution shall be used in conjunction with biocide to penetrate and disperse microbiological slimes and assure maximum effectiveness of microbiocide. Product shall be designed to treat at a rate of 1 gallon per 50,000 gallons of system water.

## 2. Boiler Systems

### Scale and Deposit Control

Contractor shall perform the following:

- Note: All chemical products used in the boiler systems shall only contain ingredients found on the FDA approved list from 21 codes of federal regulations, part 173.310, boiler water additives.
- Boiler shall be treated with a solution of sodium polyphosphates and sodium polyacrylate for the prevention of scale and sludge. Product shall be designed to treat at an initial rate of 1 gallon to 400 gallons and a maintenance dosage of 1 gallon to 10,000 gallons of softened make-up water. This dosage rate maximizes efficiency and reduces the handling of chemicals by facility staff. Phosphate residual shall be maintained at 30 – 60 ppm.
- Additional products deemed necessary to maintain boiler efficiency such as iron dispersant, defoamer, ph. adjuster, chlorine-bromine biocide, inhibited acid based descaler, and nonacid online descaler shall be available on an as needed basis.
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- Automatic skimmer blow down controllers are required on each boiler to keep the total dissolved solids (monitored by conductivity tests) in line with the boiler's recommended control range.

- For systems that do not have skimmer blow down controllers or where this equipment is not functioning properly, the Contractor shall provide from a servicing water treatment company a cost to install, repair or replace this system. The skimmer blow down controllers shall become the property of the State.
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- One chemical tank (30- or 50-gallon) with a chemical pump (agitator optional) shall be installed to feed an oxygen scavenger to basin of the deaerator or feed water tank.
- The decision to repair, replace with new equipment, or buy additional equipment shall be made by the Facility Manager after evaluating his present servicing water treatment company's recommendations and/or the bidding water treatment company's recommendations.
- All chemical products used in the boiler systems shall only contain ingredients found on the FDA approved list from 21 code of federal regulations, part 173.310, boiler water additives. Water treatment company shall be responsible for delivery, unloading, and placement of chemicals in locations acceptable to the Facility Manager.
- To properly condition the boiler water, a liquid polymeric dispersant shall be used at 10 to 20 ppm active polymer in boiler water. If phosphate feed is required to counter hardness in the boiler, it may be supplied in a liquid, granular, or powder form: sodium tripolyphosphate that is 100% pure with 75% as po4, maintaining 20 to 40 ppm in the boiler water.
- To condition the boiler water for proper sludge conditioning and keep silica in solution, a phenolphthalein alkalinity level of 300 to 600 ppm shall be maintained by using a solution of sodium hydroxide or potassium hydroxide. For corrosion control in the boiler, liquid, or powder form
- Of product containing catalyzed sodium sulfite shall be used to maintain a sulfite residual of 30 to 50 ppm in the boiler water.
- For corrosion control in the condensate system, a chemical product consisting of a blend of morpholine and cyclo- hexylamine or diethylaminoethanol (deae) shall be used for condensate return line corrosion protection. The active ingredients shall not exceed 40%. A ph. level of 8.0 - 8.5 shall be maintained in the condensate water.
- To maintain the boiler water within the recommended conductivity control limits of 3000 to 3500 mmhos, for soft water, the automatic skimmer blow and daily manual bottom blow downs shall be conducted. B. Corrosion control

#### Blowdown control

Contractor shall perform the following:

- Contractor shall use a conductivity controller to maintain proper conductivity levels. Corrected conductivity levels in the boiler shall be maintained within a range greater than 3500 micromhos.

### 3. Closed loop systems - corrosion control

Contractor shall perform the following:

- Contractor shall determine the capacity (in gallons) of each system being treated along with the leak rate of each system. This information shall be provided to the owner in a report format within the first 60 days of the contract. For systems that do not have meters or where the meters are not functioning properly, the Contractor shall provide a cost to install, repair or replace these meters. These meters shall become the property of the State.
- The closed loop systems shall be treated with a non-chromate nitrite-based corrosion inhibitor with an approximate treatment rate of 1 gallon to 500 gallons of system water to maintain 800-1000 ppm sodium nitrite residual. This treatment rate maximizes efficiency while reducing the handling of chemicals by Tennessee State personnel. Must contain phenolphthalein ph. indicator and dye to ease testing and help in leak detection.

#### **Monthly Services:**

Contractor shall perform the following:

- Chemical tests shall be conducted on each system. Boiler systems: the feedwater, softeners and condensate systems shall be checked monthly.
- Chemical feed & control equipment checked, calibrated & cleaned.
- Inspect equipment, cooling towers, loop systems, , boiler systems, for cleanliness & proper operation.
- Contractor shall establish minimum levels/limits and reorder points for chemical inventory to be stocked at the facility. Contractor shall keep a 45-day supply of all necessary chemicals at the facility. Contractor shall carry an adequate stock to insure timely delivery and adequate inventory for the duration of the contract.
- Install and remove corrosion coupons from by-pass test racks a minimum of once per quarter where applicable.
- Submit a written service report detailing results of chemical tests and inspection findings to the Facility Managers.
- Contractor shall provide water analysis reports to the Facility Manager that measure relative effectiveness of the water treatment program upon each service visitation.
- Analyze water sample in a laboratory a quarterly and provide copy of laboratory results to Facility Manager. An analysis shall contain tests for ph. of the boiler water, condensate, total dissolved solids, p04, and hardness.
- Brine elution studies on the water softeners shall be conducted a minimum of once per year. Test results shall be provided to the Facility Managers.



- Deposit analysis & tests shall be conducted a minimum of once per year. Test results shall be provided to the Facility Managers.
- Shipping cost for chemicals is to be included in the monthly bid price, empty containers are to be returned to shipper at Contractor's expense.
- Test reagents and test kits for the following items shall be provided at no additional cost to the State for weekly tests.
  - a. Conductivity
  - b. Hardness
  - c. Alkalinity
  - d. PH
  - e. Sulfite.
- Test all closed loops for nitrite levels a minimum of once per quarter.

**Related Water Treatment Products:**

Contractors shall provide products including, but not limited to, the following:

- Non-acid concentrated coil cleaner shall dilute 100-150 square feet per gallon.
- Condensate pan tablets containing no chlorine which can cause rust and corrosion. Condensate pan tables shall be non-foaming and shall control mud, silt, and lint build-up in pans to prevent clogging drains.
- Self-rinsing evaporator coil cleaner shall contain no free caustics or acids and shall be suitable as a filter coating.
- De-foamer shall be silicone solution for use in controlling foam in boiler, cooling towers, and closed loops during cleaning, desaling, or normal operation.
- Closed loop cleaner shall be concentrated liquid cleaner specifically designed and labeled for cleaning of rust, mill scale, and sludge from closed loop systems.
- De-scaler shall be concentrated inhibited acid specifically designed and labeled for the aggressive removal of scale deposits from metal surfaces without harms to the protective galvanized coating.
- Socket or filters to be replaced as needed, if applicable.

**Label Instructions:**

All products used to treat water in boilers, condenser-cooling tower systems, and closed loops shall be clearly labeled as to primary ingredient, usage instructions, and concentration levels to be maintained in system. Initial treatment rate and testing parameters to be used shall be clearly noted on label to assure proper dosage and for safety of the facility's personnel.

## **Facility Equipment:**

### Riverbend Maximum Security Institute

- One (1) Cooling Tower - Marley
- One (1) Hot Loop piping
- One (1) Chilled Loop piping
- Two (2) York Chillers - 500 Ton ea.
- Three (3) York / Shipley - Firetube Boilers

### DeBerry Special Needs Facility

- Three (3) Low Pressure, Gas Fired, Water Heating Boilers as detailed below:
  - Two (2) Bryan – Water Tube Boiler
  - One (1) Cleaver Brooks – Water Tube Boiler
- Two (2) York Chillers - 500 Ton ea.
- Two (2) Cooling Towers – Marley
  
- One (1) Hot water Loop piping
- One (1) Chilled water loop piping

### Debra K Johnson Rehabilitation Center

- One (1) Weil McClain Low Pressure Steam Boiler
- One (1) Raypack Atmospheric Boiler
- One (1) Carrier Air Cooled Chiller

## **Test Equipment for Water Treatment Program:**

Contractor Shall utilize at minimum the following equipment to perform the work require in these specifications.

1. Sodium nitrite test kit: titrating, to test for ppm of corrosion inhibitor.
2. Corrosion test coupons: to check corrosion rate
  - a. Mild steel corrosion coupons
  - b. Copper corrosion coupons
3. Conductivity meter: to check conductivity of water and compare with the conductivity controller setting and determine cycles of concentration.
  - a. 0 to 5,000 mmhos or;
  - b. Triple range: 0 to 10,000 mmhos
4. Standard conductivity test solution: 2,000 mmhos: to check conductivity meter and calibrate, when necessary; usually once a month. Change battery in meter at least each 6 months.
5. Organo propionate test kit: to verify actual ph. of cooling tower water.

6. Ph colormetric test kit: to verify actual ph. of cooling tower water.
7. Total hardness test kit: titrating, to verify that the softener is removing the hardness from the make-up water.
8. Conductivity meter: to check conductivity of water to the softener against the conductivity of the soft water coming out if the final rinse is long enough to remove excess brine, the two conductivities shall be nearly the same.
  - a. 0 to 5,000 mmhos or;
  - b. Triple range: 0 to 10,000 mmhos
9. Total hardness test kit, titrating.
10. "p" alkalinity test kit, titrating.
11. "m" alkalinity test kit, titrating.  
(Two times the "p" value, minus the "m" value, shall be very close to the "oh" alkalinity of the boiler water.)
12. Sulfite test kit, titrating.
13. Phosphate test kit: 0 - 100 ppm, colormetric
14. Conductivity meter: to check conductivity of boiler water against skimmer blow down controller settings and the manual bottom blow down frequency and length of time.
  - a. 0 to 5,000 mmhos or;
  - b. Triple range: 0 to 10,000 mmhos
15. Standard conductivity test solution: 2,000 mmhos: to check conductivity meter and calibrate, when necessary, usually once a month, change battery in meter at least each 6 months.
16. Ph colormetric test kit: to verify actual ph. of the returning condensate. Various choices:
  - a. Meta cresol purple (ph. 7.6 - 9.2)
  - b. Thymol blue (ph. 8.0 - 9.6)
  - c. Thymol red (ph. 8.0 - 11.2)
  - d. Universal (ph. 4.0 - 11.0)
17. Conductivity meter: the conductivity of the condensate shall be very low, like distilled water, 50 mmhos or less. If conductivity is greater than 100 mmhos, check for other contaminants such as dissolved iron and/or hardness.
18. Total hardness test kit, titrating

**Invoicing:**

Invoices for monthly service shall be submitted monthly. All invoices are to be submitted in two (2) copies (i.e., "original" and a "copy") and itemized by facility. Invoice(s) to be directed to and as follows:

"original" and "copy" of invoice:

Submit to the attention of the Facility Manager for each delivery agency listed in this scope of work.

Supporting documentation shall include, but not be limited to, proof of purchase and proof of cost for all parts, sign-in logs, work orders and shall accompany each invoice submitted for payment.

Contact the solicitation coordinator to schedule a site visit.