



**SEDGWICK COUNTY, KANSAS**

**DIVISION OF FINANCE**

***Purchasing Department***

525 N. Main, Suite 823 ~ Wichita, KS 67203

Phone: 316 660-7255 Fax: 316 383-7055

[https://www.sedgwickcounty.org/finance/purchasing/  
requests-for-bid-and-proposal/](https://www.sedgwickcounty.org/finance/purchasing/requests-for-bid-and-proposal/)

**REQUEST FOR BID**

**RFB #21-0040**

**HOT WATER BOILER #2 TUBE REPLACEMENT AND BOIL-OUT PROCEDURE**

May 17, 2021

Sedgwick County, Kansas (hereinafter referred to as "county") is seeking bids for Hot Water Boiler #2 Tube Replacement and Boil-Out Procedure. If your firm is interested in submitting a response, please do so in accordance with the instructions contained within the attached Request for Bid. Responses are due no later than 1:45 pm CDT, June 15, 2021.

**All contact concerning this solicitation shall be made through the Purchasing Department.** Bidders shall not contact county employees, department heads, using agencies, evaluation committee members or elected officials with questions or any other concerns about the solicitation. Questions, clarifications and concerns shall be submitted to the Purchasing Department in writing. Failure to comply with these guidelines may disqualify the Bidder's response.

Sincerely,

**Josh Lauber**  
**Senior Purchasing Agent**

**JL/ch**

*RFB #21-0040*

*Sedgwick County....Working for You*

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## **I. Purpose**

Sedgwick County, located in south-central Kansas, is one of the most populous of Kansas' 105 counties with a population estimated at more than 514,000 persons. It is the sixteenth largest in area, with 1,008 square miles, and reportedly has the second highest per capita wealth among Kansas' counties. Organizationally, the County is a Commission/Manager entity, employs nearly 2,800 persons, and hosts or provides a full range of municipal services, e.g. – public safety, public works, criminal justice, recreation, entertainment, cultural, human/social, and education.

Sedgwick County is seeking bids for Hot Water Boiler #2 Tube Replacement and Boil-Out Procedure, in accordance with the specifications outlined, for Sedgwick County Facilities Maintenance.

## **II. Submittals**

Carefully review this Request for Bid. It provides specific technical information necessary to aid participating firms in formulating a thorough response. Should you elect to participate, submit one (1) original **AND** one (1) electronic copy (PDF/Word supplied on a flash drive) of the entire document with any supplementary materials to:

Josh Lauber  
Sedgwick County Purchasing Department  
525 N. Main, Suite 823  
Wichita, KS 67203

**SUBMITTALS are due NO LATER THAN 1:45 pm CDT, TUESDAY, June 15, 2021.** Responses must be sealed and marked on the lower left-hand corner with the firm name and address, bid number, and bid due date. Late or incomplete responses will not be accepted and will not receive consideration for final award. Bids/proposals that arrive late due to the fault of the U.S. Postal Service, United Parcel Service, DHL, FedEx, any delivery/courier service, or any other carrier of any sort are still considered late and shall not be accepted by the county.

Bid responses will be acknowledged and read into record at bid opening which will occur at 2:00 pm CDT, on the due date.

## **III. Scope of Work**

Hot Water Boiler #2 has developed leaks in a number of tubes and replacement of the tubes has become evident. This request for bids shall include full tube replacement and boil-out. Procedures and recommendations on start-up shall follow boiler manufacturer and ChemTreat Inc. (current contracted water treatment vendor) specifications. County shall provide proper amount of chemical for the boil-out procedure to be completed one time per ChemTreat Inc. recommendations.

ChemTreat Inc. boil-out procedures are attached to this RFB as Appendix A titled, "Technical Bulletin #8 - Boiler Boilout Procedure for Package and Field-Erected Boilers." Vendor is responsible for locating and following manufacturer tube replacement procedures.

Project shall be completed by October 1, 2021.

The boiler has a total of 172 tubes. Replacement tubes shall be 2.5" in diameter, 162" long, and made of the following material: SA178-A per boiler manufacturer specifications.

The installation shall consist of replacement tubes being seal rolled on front end, rolled, and seal welded on back end by a R stamp certified welder.

The boiler information is below:

- Manufacture: Superior
- Model: 5-5-1506:-GP
- Serial: 13489
- Year: 1998
- Burner: Gordon-Piatt
- Model: F16-GO-75
- Gas: MBH
  - Min 4200
  - Max 12,600
- Oil: GPH
  - Min 30
  - Max 90

Once repairs are complete, the equipment shall be hydrostatically tested per boiler manufacturer recommendations or at a pressure slightly less than the setting of the lowest safety valve. This test should be completed under the supervision of and witnessed by an Authorized Inspector. Boil-Out procedure shall be completed per boiler manufacturer procedure along with ChemTreat Inc. recommendations. Vendor shall remove all waste material from site and dispose of properly.

Normal operating hours are 8:00 am – 5:00 pm, Monday – Friday. All efforts should be made by the vendor to adhere to these hours. If hours outside of normal timeframe are needed, vendor shall coordinate with County Facilities Maintenance staff for approval and accommodations.

This is a no inmate contact area. Successful bidder will be required to submit names of staff that will be onsite for background check. If successful bidder is unable to provide staff to pass the background check, award will go to next lowest bidder who shall then follow above procedure for background check.

Successful bidder shall coordinate with County Facilities Maintenance staff when they plan to be onsite and will be escorted through the building, following direct route to the job area.

Successful bidder shall coordinate with Facilities Maintenance staff to utilize pit adjacent to boiler room to raise and lower the boiler tubes. All efforts should be made to limit how often this occurs. County is willing to provide a forklift and operator to assist in this process; however, county is not responsible for accidents to include but not be limited to vehicles, materials or personnel while assisting the contractor. Any damages caused by this practice will fall on the contractor.

#### IV. Sedgwick County's Responsibilities

- Provide information, as legally allowed, in possession of the county, which relates to the county's requirements or which is relevant to this project.
- Designate a person to act as the County Contract Manager with respect to the work to be performed under this contract.
- County reserves the right to make inspections at various points of the project. Contractor agrees to openly participate in said inspections and provide information to the county on the progress, expected completion date and any unforeseen or unexpected complications in the project.
- County shall provide enough boil-out chemical to be used per ChemTreat Inc. recommendations to complete one (1) boil-out. All other equipment, tools and supplies needed for the boil-out procedure shall be the contractor's responsibility to provide.

## V. Bid Terms

### A. Questions and Contact Information

Any questions regarding this document must be submitted in writing to Josh Lauber at [Josh.Lauber@sedgwick.gov](mailto:Josh.Lauber@sedgwick.gov) by 5:00 pm CDT, May 28, 2021. Any questions of a substantive nature will be answered in written form as an addendum and posted on the purchasing website at <https://www.sedgwickcounty.org/finance/purchasing/requests-for-bid-and-proposal/> under the Documents column associated with this bid number by 5:00 pm CDT, June 4, 2021. Firms are responsible for checking the website and acknowledging any addenda on their bid response form.

### B. Minimum Firm Qualifications

This section lists the criteria to be considered in evaluating the ability of firms interested in providing the service(s) and/or product(s) specified in this Request for Bid. Firms must meet or exceed these qualifications to be considered for award. Bids submitted must reflect in detail their inclusion as well as the degree to which they can be provided. Any exceptions to the requirements listed should be clearly detailed in proposer's response.

Bidders shall:

1. Have proper certification(s) or license(s) for the services/product specified in this document.
2. Ensure that project work meets all local, state and federal laws, regulations and ordinances.
3. Have the capacity to acquire all required permits, bonds, escrows or insurances.
4. Provide appropriate project supervision and quality control procedures.
5. Have appropriate material, equipment and labor to perform job safely and efficiently. *All costs associated with meeting this requirement will be the sole responsibility of the vendor.*

### C. Evaluation Criteria

An award will be made to the lowest responsible and responsive bidder.

### D. Request for Bid Timeline

The following dates are provided for information purposes and are subject to change without notice. Contact the Purchasing Department at (316) 660-7255 to confirm any and all dates.

Distribution of Request for Bid to interested parties	<b>May 17, 2021</b>
Clarification, Information and Questions submitted in writing by 5:00 pm CDT	<b>May 28, 2021</b>
Addendum Issued by 5:00 pm CDT	<b>June 4, 2021</b>
Sealed Bid due before 1:45 pm CDT	<b>June 15, 2021</b>
Board of Bids and Contracts Recommendation	<b>July 1, 2021</b>
Board of County Commission Award	<b>July 7, 2021</b>

### E. Contract Period and Payment Terms

A contractual period will begin following Board of County Commissioners (BoCC) approval of the successful firm(s) until final completion of the project and all work is approved by Sedgwick County.

County may cancel its obligations herein upon thirty-day (30) prior written notice to the other party. It is understood that funding may cease or be reduced at any time, and in the event that adequate funds are not available to meet the obligations hereunder, either party reserves the right to terminate this agreement upon thirty (30) days prior written notice to the other. Payment will be remitted following receipt of monthly detailed invoice.

Payment and Invoice Provisions

[https://www.sedgwickcounty.org/media/39239/payment\\_and\\_invoice\\_provisions.pdf](https://www.sedgwickcounty.org/media/39239/payment_and_invoice_provisions.pdf)

F. **Insurance Requirements**

Liability insurance coverage indicated below must be considered as primary and not as excess insurance. If required, Contractor’s professional liability/errors and omissions insurance shall (i) have a policy retroactive date prior to the date any professional services are provided for this project, and (ii) be maintained for a minimum of three (3) years past completion of the project. Contractor shall furnish a certificate evidencing such coverage, with County listed as an additional insured including both ongoing and completed operations, except for professional liability, workers’ compensation and employer’s liability. **Certificate shall be provided prior to award of contract.** Certificate shall remain in force during the duration of the project/services and will not be canceled, reduced, modified, limited, or restricted until thirty (30) days after county receives written notice of such change. All insurance must be with an insurance company with a minimum BEST rating of A-VIII and licensed to do business in the State of Kansas (**must be acknowledged on the bid/proposal response form**).

**NOTE:** If any insurance is subject to a deductible or self-insured retention, written disclosure must be included in your proposal response and also be noted on the certificate of insurance.

It is the responsibility of Contractor to require that any and all approved subcontractors meet the minimum insurance requirements.

<b>Workers’ Compensation:</b>	
Applicable coverage per State Statutes	
<b>Employer’s Liability Insurance:</b>	\$500,000.00
<b>Commercial General Liability Insurance (on form CG 00 01 04 13 or its equivalent):</b>	
Each Occurrence	\$1,000,000.00
General Aggregate, per project	\$2,000,000.00
Personal Injury	\$1,000,000.00
Products and Completed Operations Aggregate	\$2,000,000.00
<b>Automobile Liability:</b>	
Combined single limit	\$500,000.00
<b>Umbrella Liability:</b>	
Following form for both the general liability and automobile	
<input checked="" type="checkbox"/> <b>Required</b> / <input type="checkbox"/> <b>Not Required</b>	
Each Claim	\$1,000,000.00
Aggregate	\$1,000,000.00
<b>Professional Liability/ Errors &amp; Omissions Insurance:</b>	
<input type="checkbox"/> <b>Required</b> / <input checked="" type="checkbox"/> <b>Not Required</b>	
Each Claim	\$1,000,000.00
Aggregate	\$1,000,000.00
<b>Pollution Liability Insurance:</b>	
<input checked="" type="checkbox"/> <b>Required</b> / <input type="checkbox"/> <b>Not Required</b>	
Each Claim	\$1,000,000.00
Aggregate	\$1,000,000.00

**Special Risks or Circumstances:**

*Entity reserves the right to modify, by written contract, these requirements, including limits, based on the nature of the risk, prior experience, insurer, coverage, or other special circumstances.*

**IF CONTRACTOR IS PROVIDING CONSTRUCTION SERVICES:**

*In addition to the above coverages, Contractor shall also provide the following:*

<b>Installation Floater:</b>	Covering that portion of the work to be constructed, installed, altered, or repaired by Vendor the County shall be listed as a loss payee.
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G. Indemnification

To the fullest extent of the law, the provider, its subcontractor, agents, servants, officers or employees shall indemnify and hold harmless Sedgwick County, including, but not limited to, its elected and appointed officials, officers, employees and agents, from any and all claims brought by any person or entity whatsoever, arising from any act, error, or omission of the provider during the provider’s performance of the agreement or any other agreements of the provider entered into by reason thereof. The provider shall indemnify and defend Sedgwick County, including, but not limited to, its elected and appointed officials, officers, employees and agents, with respect to any claim arising, or alleged to have arisen from negligence, and/or willful, wanton or reckless acts or omissions of the provider, its subcontractor, agents, servants, officers, or employees and any and all losses or liabilities resulting from any such claims, including, but not limited to, damage awards, costs and reasonable attorney’s fees. This indemnification shall not be affected by any other portions of the agreement relating to insurance requirements. The provider agrees that it will procure and keep in force at all times at its own expense insurance in accordance with these specifications.

H. Confidential Matters and Data Ownership

The successful bidder agrees all data, records and information, which the bidder, its agents and employees, which is the subject of this bid, obtain access, remains at all times exclusively the property of Sedgwick County. The successful proposer agrees all such data, records, plans and information constitutes at all times proprietary information of Sedgwick County. The successful bidder agrees that it will not disclose, provide, or make available any of such proprietary information in any form to any person or entity. In addition, the successful proposer agrees it will not use any names or addresses contained in such data, records, plans and information for the purpose of selling or offering for sale any property or service to any person or entity who resides at any address in such data. In addition, the successful proposer agrees it will not sell, give or otherwise make available to any person or entity any names or addresses contained in or derived from such data, records and information for the purpose of allowing such person to sell or offer for sale any property or service to any person or entity named in such data. Successful bidder agrees it will take all reasonable steps and the same protective precautions to protect Sedgwick County's proprietary information from disclosure to third parties as with successful proposer's own proprietary and confidential information. Proposer agrees that all data, regardless of form that is generated as a result of this Request for Bid is the property of Sedgwick County.

I. Bid Conditions

<https://www.sedgwickcounty.org/media/31339/bid-terms-conditions.pdf>

General Contract Provisions

[http://www.sedgwickcounty.org/purchasing/pdf\\_files/General%20Contractual%20Provisions.pdf](http://www.sedgwickcounty.org/purchasing/pdf_files/General%20Contractual%20Provisions.pdf)

Mandatory Contract Provisions

<https://www.sedgwickcounty.org/media/31336/mandatory-contractual-provisions.pdf>

Independent Contractor

<https://www.sedgwickcounty.org/media/54780/independent-contractor-addendum.pdf>

Sample Contract

<https://www.sedgwickcounty.org/media/39236/sample-contract.pdf>

Federally Funded Expenditures (if applicable)

<https://www.sedgwickcounty.org/media/57479/additional-representations-for-fema-funded-projects.pdf>

<https://www.sedgwickcounty.org/media/57478/fema-certifications-addendum-sedgwick-county.pdf>

**VI. Required Response Content**

Bid response should include the following:

1. Any exclusions clearly delineated.
2. Sample invoice (where applicable).
3. Completed and signed Bid Response Form.
4. Those responses that do not include all required forms/items may be deemed non-responsive.



VII. Response Form

**REQUEST FOR BID**

**RFB #21-0040**

**HOT WATER BOILER #2 TUBE REPLACEMENT AND BOIL-OUT PROCEDURE**

The undersigned, on behalf of the Bidder, certifies that: (1) this offer is made without previous understanding, agreement or connection with any person, firm, or corporation submitting a bid on the same project; (2) is in all respects fair and without collusion or fraud; (3) the person whose signature appears below is legally empowered to bind the firm in whose name the bidder is entered; (4) they have read the complete Request for Bid and understands all provisions; (5) if accepted by the county, this bid is guaranteed as written and amended and will be implemented as stated; and (6) mistakes in writing of the submitted bid will be their responsibility.

NAME \_\_\_\_\_

DBA/SAME \_\_\_\_\_

CONTACT \_\_\_\_\_

ADDRESS \_\_\_\_\_ CITY/STATE \_\_\_\_\_ ZIP \_\_\_\_\_

PHONE \_\_\_\_\_ FAX \_\_\_\_\_ HOURS \_\_\_\_\_

STATE OF INCORPORATION or ORGANIZATION \_\_\_\_\_

COMPANY WEBSITE ADDRESS \_\_\_\_\_ E-MAIL \_\_\_\_\_

NUMBER OF LOCATIONS \_\_\_\_\_ NUMBER OF PERSONS EMPLOYED \_\_\_\_\_

TYPE OF ORGANIZATION: Public Corporation \_\_\_\_\_ Private Corporation \_\_\_\_\_ Sole Proprietorship \_\_\_\_\_

Partnership \_\_\_\_\_ Other (Describe): \_\_\_\_\_

BUSINESS MODEL: Small Business \_\_\_\_\_ Manufacturer \_\_\_\_\_ Distributor \_\_\_\_\_ Retail \_\_\_\_\_

Dealer \_\_\_\_\_ Other (Describe): \_\_\_\_\_

Not a Minority-Owned Business: \_\_\_\_\_ Minority-Owned Business: \_\_\_\_\_ (Specify Below)  
\_\_\_\_ African American (05) \_\_\_\_\_ Asian Pacific (10) \_\_\_\_\_ Subcontinent Asian (15) \_\_\_\_\_ Hispanic (20)  
\_\_\_\_ Native American (25) \_\_\_\_\_ Other (30) (Please specify \_\_\_\_\_)

Not a Woman-Owned Business: \_\_\_\_\_ Woman-Owned Business: \_\_\_\_\_ (Specify Below)  
\_\_\_\_ Not Minority -Woman Owned (50) \_\_\_\_\_ African American-Woman Owned (55)  
\_\_\_\_ Asian Pacific-Woman Owned (60) \_\_\_\_\_ Subcontinent Asian-Woman Owned (65) \_\_\_\_\_ Hispanic Woman Owned (70)  
\_\_\_\_ Native American-Woman Owned (75) \_\_\_\_\_ Other (Woman Owned) (80) Please specify \_\_\_\_\_

ARE YOU REGISTERED TO DO BUSINESS IN THE STATE OF KS: \_\_\_\_\_ Yes \_\_\_\_\_ No  
INSURANCE REGISTERED IN THE STATE OF KS WITH MINIMUM BEST RATING OF A-VIII: \_\_\_\_\_ Yes \_\_\_\_\_ No

- Yes, I would like to be on the emergency vendor list.
- No, I would not like to be on the emergency vendor list.

After Hours Phone #: \_\_\_\_\_ Emergency Contact Name: \_\_\_\_\_

After Hours Fax #: \_\_\_\_\_

**ACKNOWLEDGE RECEIPT OF ADDENDA:** All addendum(s) are posted to our RFB/RFP web page and it is the vendor's responsibility to check and confirm all addendum(s) related to this document by going to [www.sedgwickcounty.org/finance/purchasing.asp](http://www.sedgwickcounty.org/finance/purchasing.asp) .

NO. \_\_\_\_\_, DATED \_\_\_\_\_; NO. \_\_\_\_\_, DATED \_\_\_\_\_; NO. \_\_\_\_\_, DATED \_\_\_\_\_

In submitting a response to this document, vendor acknowledges acceptance of all sections of the entire document and has clearly delineated and detailed any exceptions.

Signature \_\_\_\_\_ Title \_\_\_\_\_

Print Name \_\_\_\_\_ Dated \_\_\_\_\_

**VIII. Pricing Sheet**

**Please do not leave any requested information blank. If any required information is incomplete, you will be deemed non-responsive. Use only this Pricing Sheet that is unaltered in any way.**

**Bid:**

To complete the Bid Work, in the time stipulated, in accordance with the Bidding Document for the lump sum price of:  
\_\_\_\_\_ **Dollars (\$\_\_\_\_\_)**.

Period of time work to be warranted against labor and materials under normal, expected usage \_\_\_\_\_.

**Calendar Days:**

The undersigned agrees to reach \*substantial completion of the work in \_\_\_\_\_ consecutive calendar days from the date of Notice to Proceed.

The Undersigned agrees to reach final completion of the Work in \_\_\_\_\_ consecutive calendars days from the date of Substantial Completion.

**Total Calendar Days:** \_\_\_\_\_

Signature: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_/\_\_\_/\_\_\_

*\*Substantial Completion refers to a stage of a construction or building project or a designated portion of the project that is sufficiently complete, in accordance with the construction contract documents, so that the owner may use or occupy the building project or designated portion thereof for the intended purpose.*



## Boiler Boilout Procedure for Package and Field-Erected Boilers

### Introduction

Before a new boiler is put into service, the waterside surfaces should be cleaned to remove fabrication oils, grease, dirt, and any protective coatings. Failure to remove these materials may cause these contaminants to bake onto boiler tube surfaces, resulting in overheating of critical system components. At a minimum, considerable boiler water foaming and steam contamination may be expected if oils and greases are not removed. For these reasons, it is recommended that an alkaline boilout be performed on new boilers prior to startup.

Many manufacturers provide a detailed precleaning procedure that should be followed to ensure any applicable warranties remain in effect. In the absence of such a document, the following procedure may be used for precleaning firetube, package, and field-erected boilers. It should be noted that rust and mill scale may not be completely removed by the alkaline boilout procedure. A separate cleaning approach may be needed to remove metal oxides. Such cleaning is not covered by these instructions. Contact your ChemTreat

technical representative to discuss neutral pH cleaning procedures that are available instead of using inhibited acid.

### Preliminary Recommendations

To minimize the amount of foreign matter and contamination that could be introduced into the boiler during startup, the preboiler system (condensate receivers, condensate return lines, deaerator storage tank, feedwater lines, etc.) should be flushed and rinsed as thoroughly as possible prior to boiler boilout.

Steam drum internals (cyclones, chevrons, baffles) should be mechanically-cleaned by brushing and/or rinsing before they are installed. Ensure all internal piping, drum manhole plates, and hand-hole plugs on headers are secured prior to boilout.

Temporary sight glasses should be installed since the original sight glasses may become coated, etched, or fouled during the alkaline boilout process. The original sight glasses should be carefully removed and then reinstalled prior to final boiler operation. With fragile mica shields on most flat sight glasses, new

material may be required and should be on-hand prior to re-installation of a sight glass assembly.

Boilout chemicals may be introduced directly into the deaerator storage tank, feedwater line, or the boiler steam drum. Provisions should be made to install temporary chemical fill lines for chemical feed during boilout if the designated chemical feed pumps, tanks, and lines are not yet installed or if the chemicals cannot be added manually.

Ensure all chemical feed pumps are properly operational prior to boilout. All chemical feed lines and sample lines should be flushed to ensure no pluggage exists.

All necessary hydrostatic tests should be performed first on the boiler prior to boilout. During the hydrostatic test, all blowdown, sampling, and drain valves must be checked to ensure they are opening, draining, and closing properly. All valves and drains should be identified and tagged prior to hydrostatic testing.

The feedwater pumps and the deaerator will also be needed during boilout and should be tested to ensure they are operational. Experienced boiler operators must be scheduled for boiler firing and blowdown operation during the boilout.

**Note:** Arrangements for dumping, sewerage, impounding, processing, or other disposal of the alkaline wastewater

from the boiler boilout process should be made well ahead of the anticipated boilout date. This wastewater may be hot and contain significant levels of oils and grease and will have a pH in excess of 10.0.

If the plant discharges waste into a POTW (publicly-owned treatment works), obtain permission to discharge the wastewater into the plant sewer outfall. Some surcharges, pH neutralization, etc., may be required.

This water is **not suitable** for direct stream discharge, discharge to a lake, land spreading, or unapproved release into any POTW. Severe penalties may be assessed if unauthorized disposal of this water is detected. If this water must be hauled off site, there will be a cost, depending on the water volume and hauling distance required. As with acid cleaning, the disposal of alkaline boiler boilout wastewater may constitute a significant portion of the total expense of the boilout program if it cannot be suitably disposed of or processed on site.

## Boilout Procedures

1. Both the boiler and the feedwater economizer must be filled to normal operating levels with the boilout solution. Steam headers, lines, and superheaters are excluded from chemical boilout, but are cleaned of rust and debris by steam blows during

startup. Backfilling the superheater with condensate or good quality feedwater is recommended to prevent them from receiving the boilout chemical solution.

2. The composition of the boilout solution is typically specified by the boiler manufacturer, depending on the design and operating pressure of the boiler; however, the following generic formulation consisting of TSP and NaOH is normally acceptable to most manufacturers:

- Trisodium phosphate (aka trisodium orthophosphate) at 21 pounds (2,500 ppm) anhydrous TSP per 1,000 gallons of system volume. Anhydrous (dry) TSP is generically available as a white powder, or as ChemTreat B145.
- and
- Sodium hydroxide (NaOH) at 21 pounds (2,500 ppm) active NaOH per 1,000 gallons of system volume. Liquid caustic, (50 percent NaOH or ChemTreat BL1301) can be substituted for pelleted or granular NaOH at a dosage of 3.3 gallons per 1,000 gallons of system volume.
- If desired, a nonionic surfactant (such as a nonionic, nonfoaming dishwasher detergent) may be added at 0.1 percent by volume.

- Care must be taken to prevent excessive foaming during an alkaline boilout. This may occur if excessive oils and/or grease are present in the boiler. ChemTreat BL197 antifoam (or equivalent) may be added if foaming occurs.

- Note: Sodium carbonate (soda ash,  $\text{Na}_2\text{CO}_3$ ) is not as strongly basic as trisodium phosphate and may be considered only if TSP is not available.

- As an alternative to the generic boilout formula, ChemTreat CT23 can be used for boilout of smaller boilers such as firetube boilers. CT23 should be used at 4 gallons of product per 100 gallons of boiler volume, for a boilout period of 24–48 hours.

3. After the boilout solution has been added, the drum level must be verified before firing can begin. Recommended procedures for purging the furnace and firing the boiler should be followed. The boilout procedure is normally sufficient for refractory drying, but this should be confirmed with the general contractor and/or boiler manufacturer. All firing equipment, controls, and relief valves should be confirmed to be operating normally.

4. Fire the boiler slowly, bringing the pressure up to 20 percent of design operating pressure over an 8-hour period. Do not exceed 300 psi unless specified by the manufacturer. Hold this pressure for 4–6 hours or longer and ensure adequate boiler circulation by measuring the temperature of the upper and lower boiler drums and headers.
  5. After 4 hours (or a time period necessary to ensure good circulation), shut down all of the firing equipment and allow the boiler pressure to decay. With the pressure reduced (see manufacturer's guidelines), blow down all bottom headers, drums, and gauge glasses in sequence. Continue blowdown procedures until the low-level alarm sounds; then discontinue the blowdown and refill the boiler to normal operating water level.
    - Note: Do not allow the water level to go above the upper sight glass range or to drop below the bottom mark on the sight glass.
  6. Re-fire the boiler using the procedure outlined in step 4 and hold the pressure for another 4-hour period. Blow down the boiler as outlined in step 5 and restore normal water level as needed.
  7. Frequent samples of the blowdown water should be taken and analyzed for phosphate ( $\text{PO}_4$ ) and alkalinity. Additional chemicals must be added after phosphate and/or alkalinity levels drop below half their original levels. Oil should be monitored in these samples as well.
  8. After alkalinity and phosphate levels have stabilized and no visible (or measurable) oil is detected, the boiler pressure should be dropped below 25 psig and all vents, headers, and drains should be opened.
  9. After the boiler metal temperature drops below safe limits (200°F, or the manufacturer's target), the boiler should be drained and refilled to aid in cooling. Once the boiler is cooled to near ambient temperature, it should be drained again, opened, and inspected. The boilout is successful when all oils and organic deposits have been removed and inspection confirms the boiler is clean and passivated.
  10. Refill the boiler with good-quality treated feedwater and add the prescribed boiler treatment chemicals if the boiler is to be returned to service. Add a neutralizing amine or ammonia if it is to be stored wet.
- If the boiler is to be out of service for an extended interval (weeks or months), dry storage is recommended instead of wet storage.