

N01 Air heater Inspection & Repair Specification

Revision 1

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Project Engineer: Jason Compton

Project Manager: Hans Connell

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1.1 Project Overview

Unit N01 is equipped with a parallel-path tubular air heater composed of more than 8,052 vertical tubes that transfer heat from flue gas to Primary Air (PA) and Secondary Air (SA). During the FY25 outage, approximately 75 SA B-Side tubes were found ruptured and were cut and plugged. Historical and recent observations indicate additional tubes—primarily within the lower 15 feet—are significantly thinned or at risk of failure.

JEA is requesting a Bid Proposal to perform complete air-heater tube inspection, leak-location testing, degradation mapping, up to 20 tube plugs, up to 20 tube sleeves, and replacement of up to 300 tube sections. Although the most severe degradation is anticipated within the lower 15 feet, bidders may propose alternate replacement lengths based on their repair methodology.

The Contractor shall provide all labor, equipment, tools, testing devices, materials, consumables, and supervision necessary to complete the work on a turnkey basis.

1.2 Codes, Standards and Regulations

Contractor shall perform work in accordance with established federal, state and local standards and regulations, using the latest revisions:

- American National Standards Institute (ANSI)
- American Society for Nondestructive Testing (ASNT)
- American Society of Mechanical Engineers (ASME)
- American Society for Testing and Materials (ASTM)
- American Welding Society (AWS)
- Occupational Safety and Health Administration (OSHA)
- Applicable Industry Standards

In case of a conflict between the above codes and regulations, Contractor will perform all work in accordance with the more stringent code or regulation.

2.1 Work to be Furnished by Contractor

2.1.1 Scope of Work:

Contractor shall perform a comprehensive inspection, leak-location assessment, and repair services for the Unit N01 Primary Air (PA) and Secondary Air (SA) tubular air-heater bundles, which contain a total of 8,052 tubes. At a minimum, the scope of work shall include the following:

A. Visual Inspection

1. Visually inspect all accessible air-heater gas-side and air-side areas including:
 - Tubesheets.
 - Tube roll joints.
 - Tube inlets and outlets.
 - Accessible casing, internal structures, and air/gas flow passages.
 - Tube rows and accessible bundle faces.
2. Tubes shall be evaluated for common defects including (but not limited to):
 - Acid dew-point corrosion.
 - Erosion.
 - Roll-joint leakage or failure.
 - Tubesheet deformations or defects.
 - Ash plugging/ flow restriction.
 - Swelling, blistering, mechanical damage, or deformation.

B. Recovery Sleeves

- Contractor to furnish 20 recovery sleeves suitable for repairing tubes with defects occurring within 10 inches of a tubesheet plate.
- Contractor shall install these sleeves where required and approved by JEA.

C. Mechanical Plugging

- Tubes determined non-repairable shall be mechanically plugged at the tubesheet(s).
- Contractor to provide 20 mechanical plugs and perform installation as needed.
- Plugging methods require JEA approval.

D. Leak Testing

- Contractor shall perform pneumatic leak-testing of all PA and SA tubes to identify potential plugs or breaches.
- Tubes demonstrating potential plug or breach shall undergo leak-location testing per Section 2.1.2.2.
- Leak testing shall follow ASME air-heater leak-testing principles for demonstrating leak-tightness and identifying breached tubes.

E. Ultrasonic Thickness (UT) Testing

- Air Side – three (3) UT readings shall be taken on every 5th tube along each combustion-air inlet access point tube row in the “cold section”; one reading to every 5th tube at other combustion air access points.
- Flue Gas Side – UT tubesheet readings shall be collected in a minimum 5 ft x 5 ft grid with areas showing >30% thickness loss receiving additional UT readings to fully define the affected region.

F. Degradation Criteria

Tubes shall be classified as exhibiting “significant degradation” if any of the following are observed:

- Wall-thickness loss $\geq 70\%$ of nominal.
- Deformation, blistering, cracking, or swelling.
- Any through-wall failure.

G. Repair Scope

- Contractor shall replace up to 300 tube sections meeting degradation criteria and approved by JEA. Specific tubes slated for replacement will be determined by the inspection and must receive approval from the JEA project manager prior to installation.
- Approximately 90 tubes currently have mechanical plugs installed on both the upper tubesheet (flue gas side) and on the top side of the lower tubesheet (air inlet duct). For any tube designated for replacement, the contractor shall remove the existing plugs prior to installing the new tube section. Plug removal shall be performed in a manner that does not damage the tubesheet, adjacent tubes, or existing tube coating.
- All repairs must be completed within the defined outage window.

H. Reporting

- Contractor shall provide daily progress updates to the JEA Project Manager.
- Contractor shall submit an Inspection Report within 1–2 business days of inspection completion.
- Contractor shall submit a Final Tube Map upon project completion showing repaired/replaced/ plugged tube locations.

2.1.2 Inspection and Tube Condition Assessment Requirements

2.1.2.1 Visual Assessment

Contractor shall inspect tubesheets, roll joints, tube entries, accessible gas-side surfaces, and air-side surfaces for defects including erosion, acid dew-point corrosion, mechanical damage, tubesheet defects, and ash plugging.

2.1.2.2 Leak Location and Tube Integrity Testing

Contractor shall perform leak-testing capable of:

- Detecting breached and/ or plugged tubes.
- Determining vertical defect location along full tube length.
- Providing location accuracy of +/- 12 inches.
- Supporting repair-planning requirements.

Testing shall follow applicable ASME air-heater leak-testing principles and shall be approved by JEA project manager prior to commencing with testing.

All PA and SA tubes shall undergo leak testing. Tubes failing leak testing shall have location of breach/ plug located, within +/- 12 inches, and documented as outlined in 2.1.2.4 below.

2.1.2.3 Tube Cleaning (if required)

If cleaning is required to perform accurate testing:

- Contractor shall perform required tube cleaning.
- Cleaning costs shall be included in the Lump Sum Bid.

2.1.2.4 Inspection Reporting Requirements

Contractor shall submit an Inspection Report within 1–2 business days of inspection completion including:

- Summary of inspection methods and findings.
- Table of all degraded, leaking, or plugged tubes.
- Vertical leak-location measurements.
- UT thickness data and identified thinning .
- Tubes recommended for replacement, recovery sleeve installation, or plugging.

Final Tube Map shall be provided upon completion of all repairs showing locations of all repaired, plugged, and sleeved tubes.

2.1.2.5 Proposed Repair Approach

The following repair approach shall be included as the baseline methodology for the Contractor's bid. This section defines the expected repair method; however, Contractor may expand upon or refine steps within this framework as part of their bid submittal.

- **Repair Location Determination**
The specific location of each tube repair will be determined after completion of the inspection and leak-location testing.

- **Tube Replacement Quantification**

The inspection shall identify up to 300 tube sections requiring replacement of the bottom 15 feet of tubing.

- **Tube Replacement and Coupler Installation**

Replacement tubing will be provided and joined to the existing tube using mechanical couplers. Specialty tooling shall be used to create an expansion at each tube-to-coupler interface to produce a structurally secure, leak-tight joint. Following coupler installation, tubes shall be mechanically rolled into the tubesheet plates.

- **Installation of Air-Tight Sleeves**

Contractor shall install up to 20 air-tight sleeves for tube failures located within 10 inches of the tubesheet plates.

- **Mechanical Plug Installation**

Contractor shall install up to 20 mechanical plugs to remove from service any tubes that cannot be recovered using sleeves or bottom section replacement.

2.1.2.6 Tube Replacement Requirements

Contractor shall replace up to 300 tube sections (as agreed by JEA project manager).

A. Tube Material

- 3" O.D. x 0.0083" A.W. x ~54.5' long ASTM A-513 steel.
- Current tubes are rifled but smooth replacement tubes are acceptable.

B. Tube Length

- Expected replacement length - bottom 15 feet of tubes.
- Alternate replacement length requires JEA approval.

C. Installation Requirements

- Tubes shall be installed such that they cannot fall/ shift after installation.
- Joining, welding, or mechanical connections shall conform to the approved repair method and meet industry standards.

D. Coating Requirements

All replacement tube sections shall be coated with:

- Rust-inhibitive epoxy primer Ameron-Amercoat 370 or equivalent.
- 3-5 mils DFT.

E. Leak Testing

All repaired tubes shall be leak-tested (as-applicable) per:

- Follow ASME air-heater leak-testing principles.

- JEA-approved pneumatic testing.
- Leak testing shall be performed in accordance with industry-standard air-heater leak-testing practices and shall follow ASME-consistent safety principles to prevent over-pressurization, deformation, or damage to tubes.

All inspection and repair activities shall be completed within the scheduled outage window.

2.2 General Requirements

- 2.2.1 Contractor shall demonstrate verifiable experience performing inspection and repair of vertical tubular air heaters of comparable size, configuration, and complexity. At minimum, the Contractor shall provide documentation showing:
1. Contractor shall have successfully completed at least two (2) inspection and repair contracts on industrial tubular air heaters within the past five (5) years, each of similar size and scope and with a contract value of \$250,000 or greater.
 2. Contractor shall demonstrate specific expertise with vertical tube air-heater inspection, testing, leak-location, and mechanical repair techniques, including coupler installation, tube expansion, and tubesheet roll-joint work.
 3. Contractor shall provide references for all projects submitted for qualification, including: Owner or plant name; Project description; Scope of work; Contract value; Completion date; Owner representative contact information.
- 2.2.2 Bidder shall furnish a detailed construction schedule and narrative of the construction plan in Bidder's proposal.
- 2.2.3 All work shall follow industry-standard practices.
- 2.2.4 Contractor shall comply with all Federal, State, and Local industrial safety rules, regulations, codes, and standards. Contractor shall also abide by all JEA Safety and Security Policies and Procedures, as a minimum requirement.
- 2.2.5 Contractor is advised that other projects will be in progress at the plant site during this agreement period. Coordination and cooperation with other Contractors, JEA personnel and others working in the plant area will be required to ensure the work will be completed safely and on schedule.
- 2.2.6 Contractor shall be responsible for all labor and material costs associated with the replacement or repair of any existing plant equipment, components, etc., that may be damaged by the Contractor during project work.

- 2.2.6.1 It is imperative that Contractor bring to the attention of the JEA Project/Construction Manager any damage that it discovers immediately following discovery. Determination of cause shall be at the sole discretion of JEA.
 - 2.2.6.2 No weld repairs to pressure containing parts or structural elements shall be made without written approval of JEA. Weld repairs shall be made only by certified welders qualified in the repair procedures to be utilized. If repair work is to be performed by a subcontractor, only JEA approved subcontractors shall be utilized.
 - 2.2.6.3 Final acceptance of repairs shall be at the sole discretion of JEA.
- 2.2.7 Contractor shall not initiate “out of scope” services without obtaining prior authorization from the JEA Project Manager. For example, if during project work, a potential problem or issue is identified by the contractor, the JEA Project Manager shall be notified immediately of the problem/ issue and may then initial an authorization to the Contractor for “out of scope” services.

2.3 Bid Structure and Pricing

2.3.1.1 General

Contractor shall submit a bid that includes both a fixed base price and unit-rate pricing as defined below. This structure ensures accurate compensation based solely on the number of tubes requiring repair.

2.3.1.2 Base Bid – Mobilization, Inspection, and Material Supply

The base bid shall be a lump sum price and shall include, at a minimum:

- Full mobilization & demobilization.
- Inspection (visual, UT, Leak testing, Leak-location testing, reporting).
- Labor, tools, equipment and consumables to support inspection & testing.
- Supply and staging of the following materials:
 - 300 replacement tube sections of 15 ft length
 - 20 tube sleeves
 - 20 mechanical plugs
- All safety, QA/QC, documentation, progress tracking, and admin costs

2.3.1.3 Installation Unit Pricing

Contractor to supply unit pricing for the following:

- Per-tube price – installation of one 15-ft tube section including couplers, expansion, rolling into tubesheet, leak testing, coating.
- Per-sleeve installation price – installation of repair sleeves near tubesheet.
- Per-plug installation price – installation of mechanical plug for tubes that cannot be repaired with a plug or replacement of bottom 15 ft of tube.

3.1 Special Requirements

- 3.1.1 The entire scope of work is to be constructed on a turnkey basis. Contractor shall provide all labor/materials/equipment/supplies, etc. within the scope of work to complete the scope of work.
- 3.1.2 JEA confined space entry requirements shall be followed at all times.
- 3.1.3 Contractor to prevent introduction of debris or dropped objects into tube bundles.
- 3.1.4 Contractor shall provide any necessary protective barriers, lighting and ventilation.
- 3.1.5 Contractor shall protect adjacent components from sparks, heat, or damage.
- 3.1.6 Contractor shall provide all required access equipment with the exception of scaffolding.

4.1 Contractor Responsibility

- 4.1.1 Contractor responsible for having all necessary JEA required safety training and personal protective equipment (PPE) prior to performing any work at plant site.
- 4.1.2 Contractor must become JEA Safety Qualified prior to commencement of work. Information on becoming a JEA Safety Qualified Contractor can be found at the following link: https://www.jea.com/About/Procurement/Contractor_Safety/
- 4.1.3 This is a turnkey project, and Contractor is to provide all labor, equipment, materials and supplies to complete the scope of work.
- 4.1.4 Contractor shall provide daily progress updates to JEA project manager.
- 4.1.5 All miscellaneous items necessary for safe project work.
- 4.1.6 Contractor shall provide all required drinking water, ice, sanitary facilities, and hand-washing/wash stations for their personnel.
- 4.1.7 Lighting for interior work and night shift work (if needed).
- 4.1.8 Only work trucks, with company identification logos on each side of vehicle, will be permitted on the plant site.
- 4.1.9 Contractor responsible for cleanup at completion of work scope activities.

5.1 JEA Responsibility

The following items will be furnished by JEA or JEA Contracted Services:

- 5.1.1 JEA will ensure Lock Out/Tag Out (LOTO) of equipment and clearances, as appropriate, are in place prior to commencement of work.
- 5.1.2 JEA to provide confined space attendants as needed.
- 5.1.3 JEA will provide limited compressed air and electrical power for Contractor's use.
- 5.1.4 JEA will provide service-water, as needed. Contractor to specify any water supply requirements in the bid proposal (psi, gpm, supply connections etc.).
- 5.1.5 JEA will provide scaffolding, as needed, through a separate service contract. Advanced notice will be required through the JEA Project Manager.
- 5.1.6 JEA to provide an initial cursory vacuum cleaning of flue-gas side tubesheets.
- 5.1.7 JEA will provide designated general trash dumpsters; JEA will empty the dumpsters as requested by the Contractor.