Architect of the Capitol
April 1997

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE OF PAGES
	1 5

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable)
M004	**August 21, 2008**		

6. ISSUED BY	7. ADDRESS AMENDMENT/MODIFICATION TO
ARCHITECT OF THE CAPITOL United States Capitol Washington, D.C. 20515	Architect of the Capitol Procurement Division Ford House Office Building Attn: Chris Lindsay Room H2-263 Second and "D" Streets, S.W. Washington, DC 20515

8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)		(X)	9A. AMENDMENT OF SOLICITATION NO. RFP No. 080016
			9B. DATED (See Item 11) April 23, 2008
			10A. MODIFICATION OF CONTRACT/ORDER NO.
CODE	FACILITY CODE		10B. DATED (See Item 13)

SUBJECT: **O&M OF THE UTILITY DISTRIBUTION SYSTEMS AT THE U.S. CAPITOL POWER PLANT, WASHINGTON, DC**

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of offers XX is extended, _ is not extended. **THE DUE DATE FOR BIDS IS EXTENDED TO SEPTEMBER 11, 2008 AT 4PM EST.**
Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and return ___copies of the amendment; (b) By acknowledging receipt of this amendment in Block 12 of Page 1 of the solicitation package, giving amendment number and its date; or ©) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. **FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER.** If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter make reference to the solicitation and this amendment, and is received prior to the opening/receipt hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT/ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor _____ is not, _____ is required to sign this document and return it to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION

1. SEE CONTINUATION PAGES.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
15B. CONTRACTOR/OFFEROR _____ (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA By _____ (Signature of Contracting Officer)	16C. DATE SIGNED

A. This Amendment No. M004 is issued to the above referenced Solicitation Number to include a list of attendees who were present at the pre-proposal meeting/site visit and answers questions that were submitted, and the due date for bids has been extended to **SEPTEMBER 11, 2008 at 4PM EST**.

Remove Page	Insert Page
Section J Attachments	Section J Attachments (included) Attachment J.11 - All Preventative Maintenance Tasks

Operation & Maintenance of the U.S. Capitol Power Plant Utility Distribution System, Washington, D.C.
RFP No. 080016

PRE-PROPOSAL MEETING & SITE VISIT
LIST OF ATTENDEES
Thursday, May 30, 2008- 10:00 a.m.

LIST OF ATTENDEES

Names	**Representing**	**Telephone & FAX Numbers**
Chuck Helm	Green Contracting, Co.	410-780-0500 410-780-0566
Jerry Franks	Elliot Lewis Corporation	215-698-4400
Frank Carbone	Elliot Lewis Corporation	215-671-1496
Ron Haas	Ross Infrastructure	410-229-0090
Scott Scherer	Ross Infrastructure	410-229-0091
Dwain Clark	Environmental Resources Corporation	619-867-7509
	Representing the Architect of the Capitol	
Chris Lindsay	Contract Specialist/Procurement Division	202-226-2172 866-221-4147
Brian Klein	Utility Systems Operator-CPP	202-226-2312
Kenneth Dayton	Tunnel Safety - CPP	202-226-7083
Ed Smolarsky	High Voltage Electrician Supv. - CPP	202-225-4559

1. **Who is currently performing this work? Please give any historical data that would be useful in calculating the number of man hours required to perform this project broken down by labor category.**

The PM schedule requires the following:

1,885 hours for maintenance mechanic

94 hours for instrument technician

414 hours for electrician

It should be noted that these hours do not account for the fact that two entrants are required during PM service or that a confined space entry is required.

2. **Why is only 4 gas air monitors needed for each tour group?**

Current AOC policy is to check for Carbon Monoxide, Hydrogen Sulfide, Methane (LEL) and Oxygen Levels.

The UDS system is typically well ventilated with approximately 7 air exchanges per hour via natural and/or mechanical means. The currently known airflow and historical air sampling data has proven the current protocols are adequate.

3. **C.2.1.1 states that all distribution lines are to be toured and inspected only once per week with 2 tour groups, one consisting of a 7 man team and the other consisting of a 10 man team but in section B it states that daily tours and inspections are to be performed. Please clarify.**

This question can be answered in two parts, the first addressing the reference to a crew of seven (7) and ten (10) individuals. The AOC anticipates the need for a group of only seven (7) individuals to perform the required preventative maintenance, minor repairs and inspections provided under this contract.

However, the AOC has requested pricing to effect a crew of seven (7) individuals, the AOC would like optional pricing for a crew consisting of ten (10) individuals in the event that the inspections, maintenance and repair work is overcome by other operational directives.

To be clear, this contract will only require a team of seven (7) or ten (10) individuals, not two separate teams. The AOC will award only a crew of seven (7) or a crew of ten (10), not both.

The second part of this question addresses a daily versus weekly inspection. Section C.2.1.1 infers that all tunnels, vaults, manholes and other areas covered by this contract will be inspected at a minimum of once per week.

Section B refers to daily maintenance and inspections as the contractor will be performing daily inspections and maintenance to complete the inspections as required in Section C. It is anticipated that the contractor will perform inspections of various areas each day to coordinate preventative maintenance and minor repair work in each section.

4. Is it the Government's intentions to have the inspection team identify major maintenance issues and perform preventive maintenance work, then upon each weekly inspection, issue an individual Task Order for major work that may be required?

That is correct; the intention is to have the inspection team perform inspections of the tunnel systems, while performing routine preventative maintenance and minor corrective maintenance. Major repairs will be handled under individual task orders dependant upon the nature and severity of the repair work in question. The government may issue a unilateral task order on a not to exceed basis for emergency repairs requiring immediate response.

5. Please provide the draft inspection sheets. - **Richard Edmonds**

Please see attachment J.11 – All Preventative Maintenance Tasks

6. What is ST Labor rate stand for in section B?

ST labor rates means Straight Time or Regular Time labor rate.

7. Please provide any information including background and assessment for the contract that was recently solicited on the steam distribution pipe wall assessment.

This information is not relevant to the work performed under this contract and any information regarding the current solicitation package for the distribution pipe condition assessment will not be distributed as part of the solicitation package.

8. Please provide a time line on Preventive Maintenance Schedule J.7 such as daily, weekly, monthly or annual requirements.

Please see attachment J.11 – All Preventative Maintenance Tasks

9. **Please rename Section B to attachment J.9 for clarification**.

See attachment.

10. **In section C.1.1, please rename attachment J.6 for proper training confined space listed on page 4**. -

See attached revised Section J – List of Attachments

11. **Page 96 starts the access control policy but is listed as Section J.6. Please clarify -**

Attachment J. 5 is the Access Control Policy

12. Please clarify the qualification requirement for personnel who are responsible for the 2 weekly tour groups.

As noted in the response to question number three (3), there will only be one core team consisting of either a crew of seven (7) or ten (10) individuals. The AOC has asked for pricing for a number of trades to address potential trades required to complete individual task orders issued for repair under this contract. However, it is up to the contractor to determine the appropriate mix of trades and personnel as to accomplish the weekly inspection and preventative maintenance tasks as required in Section C.

The AOC will evaluate the proposed trades to be included in the 'core' team, and use the proposed trades as an evaluation factor in determining award of the contract.

13. Please provide any useful history of this project (ie. historical man hours that the government has worked to perform tasks broken down by labor categories or job function and the amount of time to perform weekly tours in the last 12 months).

The AOC has been operating with an interim tunnel inspection team over the past year. Historically the tunnel team consisted of several trades including certified welders, insulators and electricians. There are no detailed maintenance records detailing tasks performed or trades used in the past 12 months.

14. Why is there a need for an instruments control technician?

It is not anticipated that an instrument and control technician would be required in the core inspection and preventative maintenance team. However, an instrument and control technician could be required to repair or maintain meters in the steam, condensate and chilled water distribution systems. Any maintenance or repairs to meters will be handled under individual task orders.

15. Are all the trades listed in section C.3.2 actually needed for steam distribution maintenance or are some of these trades only useful for power plant maintenance?

While it is not the intent of the AOC to provide for all of the trades listed in section C.3.2 in the 'core' inspection team, it is possible that certain repairs will require any and all of the trades listed in section C.3.2.

The contractor will determine the number of and type of trades in their 'core' inspection and preventative maintenance team, which will be used by the AOC as an evaluation factor in determining contract award.

Pricing for all other trades will be used to set firm fixed hourly rates for use in negotiating individual task orders for repair. The AOC could elect to use trades provided under this task order to perform maintenance and repair work in the plant under the rates provided in this contract.

16. I had planned to only submit resumes for the full time crew members not the other labor trades which will be subcontracted out. Is this sufficient?

While this is sufficient, it is highly recommended that the contractor submit resumes and past performance evaluations for all proposed subcontractors as this information will also be used to evaluate proposals in making a final determination and selection. A contractor that does not submit this information for subcontractors will not be excluded from selection.

17. Will you allow us to install alarm systems for the sump pumps on a task order? I believe this is crucial for the project which will allow us to promptly respond to flooding tunnels. This will relieve a lot of stress for this project?

The contractor should not bid this project assuming that a remote alarm system for sump monitoring will be installed. The AOC agrees that alarm systems for remote sumps will alleviate stress for this project and does not oppose this approach. However, installation of remote alarm systems will not be included in the award of this contract. It is likely that installation of a remote alarm system, if approved by the AOC, would be awarded as a separate task order under this contract.

18. Will the current scheduling office be made available to the contractor?

The individual responsible for scheduling and maintaining the TMA maintenance system will be available to work with the contractor during the performance period of this contract. This individual will provide training on the TMA system, including scheduling, updating and closing out work orders. However, it will be the contractor's responsibility to ultimately schedule work orders, preventative maintenance and inspection services under this contract.

19. Do you have a current route or inspection schedule that you would like for us to follow and if so please provide?

There is no formal route to be followed. The contractor will be required to provide weekly inspection and preventative maintenance schedules, ensuring that each section of tunnel, underground vault and manhole is inspected on a weekly basis. It is up to the contractor to provide a proposed inspection routing.

20. Please describe areas that are asbestos free and don't require PPE to work in and any future areas that are being abated that won't require PPE.

For bidding purposes, the contractor should consider all sections of CPP tunnels as asbestos contaminated for the duration of this contract.

21. Is the Government reimbursing or paying for the contractor's trailer?

The AOC is not reimbursing or paying for the contractor's trailer. This cost should be incorporated into the contractor's proposal.

22. In section C.2.1.3 a) b) c) please clarify "shall be noted for repair or replacement". Is this a task order that is a reimbursable expense?

Should the contractor find any deficiencies during preventative maintenance or tunnel inspections, they will note these deficiencies on the daily report. As outlined in the contract, these deficiencies will also be noted in new corrective work orders in the TMA maintenance systems entered in by the contractor's personnel.

The contractor will also provide a proposal to repair or replace the affected equipment to be negotiated under a new task order. The contractor will not affect repairs or replacement activities without a task order, any work done without a formal task order in place will be done at the risk of the contractor.

23. Will the government dispose of all asbestos contaminated PPE at no cost to the contractor?

The government will not dispose of all asbestos contaminated PPE. For bidding purposes, the contractor should include this cost in the base bid.

24. What equipment or tools will the government supply and clarify in Attachment J.7 tool groups basic, group B, and group C.

The AOC is amending the solicitation and will not supply radios for communication within the tunnel system. The contractor is responsible for providing and maintaining radios for each member of their team for use during performance of this contract. At the end of the contract, the contractor will turn over all radios to the AOC. All other tools and equipment required to perform the inspection services and preventative maintenance under this contract will be furnished by the contractor.

Tool basics group B and C were included in examples of generic preventative maintenance procedures to illustrate various tool groupings required by the work. For the purposes of the scope of this contract, the contractor can ignore references to tool groups in attachment J.7.

25. Will a CPAR review be sufficient for past performance reviews instead of questionnaires? In many cases, the air force contracting personnel have changed since we have worked and are not available to fill out the questionnaires.

A CPAR review will be acceptable providing that it provides all of the information contained in the AOC past performance review questionnaire.

Should the information contained in a CPAR submitted not address all of the questions contained on the AOC past performance review questionnaire, it could negatively impact the rating of that past performance review.

26. What is the anticipated start up date?

The contract start date is anticipated to be October 1, 2008, pending availability of government funding.

27. What is the estimated closing date since amendments and other information is forthcoming?

Closing date will be September 11, 2008.

28. **Can you send a copy of the sign in sheets to all vendors?**

Attendees list is included in this amendment.

29. During the meeting of 05-30-08 it was mentioned that a few questions have already been asked and that the answers were to follow. Can you provide those questions and answers?

All questions and answers have been included in this attached Amendment.

30. **During the presentation you used a drawing of the tunnels. Can you provide either a copy of the drawing or a redacted version for our use in bidding**?

Due to security concerns, drawings will not be released. However, if you would like to view drawings on site, please coordinate with Brian Klein, Utility Systems Operator to view drawings. He can be contacted at (202) 226-2312.

31. Is there a specific count of how many manholes there are and how many of those have ladders for entry exit?

The drawings of the tunnel system provide a count of manholes. It is unclear as to which manholes have ladders for entry and exit.

32. How many of the manholes are restricted access?

All manholes are considered to be restricted access, and require coordination with the US Capital Police for access. Additional coordination may be required with individual jurisdictions and the District of Columbia dependant upon their location.

33. **Are any of the manholes prohibited from any use**?

At this time, there are no manholes that are prohibited from use providing coordination of access is made with the AOC and the US Capital Police.

34. It was mentioned that tunnels must be under negative pressure. Does the AOC or Power Plant presently monitor this with any type of monitoring devices or sensors?

The tunnels are not currently monitored to ensure that the tunnels are maintained under negative pressure.

35. **An equipment list was distributed, can you send us the excel file electronically**?

Please contact Chris Lindsay at (202) 226-2172 or via email at clindsay@aoc.gov to request the equipment list.

36. Do cell phones work in the tunnels?

Cell phones do not work in the tunnels and are not an acceptable means of communication.

37. The G tunnel is presently being abated for lead paint. Are all other tunnels presently scheduled for lead paint abatement?

The Green tunnel is not currently being abated for lead paint, and at this time, there is not a comprehensive abatement plan in place for lead paint abatement.

38. Reference was made to the TMA computerized maintenance system. Do you require us to provide a data administrator to handle all input into the system along with daily work order issuance?

As outlined in Section C.2.1.4 the contractor is responsible for updating and maintaining maintenance and inspection records within the AOC TMA system. It should be noted that these records will be the basis for monthly payments, and should be updated and completed for payment to be made each month.

It is up to the contractor whether or not it wishes to dedicate one individual as a sole data administrator or to assign this task to various members of the seven (7) or ten (10) man team.

39. **Is all equipment entered into the TMA system along with all required tasks**?

At this time, all equipment is entered into TMA, however, required tasks are being finalized and it is anticipated that they will be fully developed and loaded into TMA prior to award of this contract.

40. What percentage of issued PM's are completed and what percentage presently goes to deferred maintenance?

At the start of this contract, the PM period will start as if all PM's are current and up to date. The contractor will provide a schedule for the performance period of this contract that ensures all PM's will be performed on time.

41. What was the make up of the government's maintenance team? Number of people and what trades?

Currently, the AOC does not have a staffed 'maintenance team', necessitating the need for this contract. Prior team levels have varied, however, it consisted of various trades including certified welders, asbestos and insulation workers and electricians. It will be up to each contractor to determine the make-up of its proposed 'core' team. The proposed trades incorporated into the core team will be evaluated and considered in the selection for this contract.

42. What is the power available in the tunnels? 110-220-480V?

Power available in the tunnels varies by location. There are sources of 110V and 220V throughout the tunnel systems, however, certain locations may require portable generators to supply power to equipment. For bidding purposes, it should be assumed that:

- 10% of the tunnels are supplied with power sources within 100 ft.
- 50% of the tunnels are supplied with power sources within 500 ft.
- 30% of the tunnels are supplied with power sources within 1,000 ft.
- 10% of the tunnels have no power source within 1000 ft.

43. When it becomes necessary to pump tunnels due to flooding, where is the water pumped to?

The contractor will discharge all water into the local DC combined system or separate storm drain. The contractor will be responsible for ensuring that discharges are within acceptable federal and local regulations for such discharges of storm water. For example the contractor will verify that the pH and temperature are within acceptable DC WASA limits, that it contains no visible oil sheen and that it has no unusual odors or discoloration prior to discharging from a tunnel or vault.

44. **What are the contractor's liabilities / responsibilities**?

The contractor will be ultimately responsible for completing the preventative maintenance and inspection requirements as outlined in this contract. Should the AOC dictate other repair or inspection activities that cause the contractor to deviate from the approved schedule and from performing the planned preventative maintenance and inspection services, it is the contractor's responsibility to demonstrate the cause of this deviation as outlined in the contract documents.

The contractor will also be liable for ensuring the quality of their work. Any system or component failures occur due negligent or substandard work performed by the contractor or one of their subcontractors, sole liability will rest with the contractor.

It should also be noted that due to the maintenance backlog and age of the system, the contractor will not be held liable for equipment or system failures. It is understood by the AOC that due to the age and condition of these systems, the contractor cannot be held liable for equipment or system failures.

Should the CPP require the contractor to assist in operation of the system, it is understood that this represents a shared liability in that ultimate direction for operation is given by the AOC. The contractor is responsible to supply qualified

individuals that meet the qualifications outlined in the contract documents and that all individuals are trained and knowledgeable of steam system operations.

PM Task Sheet

Task Code: P-PM517

P-PTDPTIA - Tunnel Differential Pressure Transmitter Annual Calibration

The Architect of the Capitol

1. PLANNING
1a. Prior to planned outages or when are required, check logs, CAFM work requests, and PM schedule to develop complete work list. Record all findings in equipment notes.
1b. Utility Distribution System technician will coordinate to remove applicable equipment from service.

2. SAFETY PRECAUTIONS
2a. Utility Tunnels are considered Permit Required Confined Spaces and have limited egress. Tunnel entry and work shall be performed in full accordance with the latest edition of AOC/CPP Utility Distribution System Access Control Policy.
2b. Concrete, heat stress, and other hazards exist.
2c. Assume pipe insulation and surfacing materials contain asbestos, unless proven otherwise.
2d. Tunnel entry is limited to trained individuals with appropriate respirators and personnel protective equipment (PPE).
2e. Never work on equipment when energized unless proper electrical safety precautions are taken to prevent shock hazards.
2f. Ensure all energy sources (air, steam, electrical and fluid) have been secured per LOTO Procedure.
2g. Ensure all pressures are vented off prior to removing or breaking any mechanical or piping connections.

3. REFERENCES
3a. ABB Hart 2600T Maintenance Manual

4. PURPOSE
4a. Describes the annual I&C calibration and inspection of the tunnel differential pressure transmitters

5. SCOPE
5a. This procedure covers annual calibration and inspection of the tunnel differential pressure transmitters

6. TOOLS
6a. Standard hand tools (screwdrivers, wrenches, ratchets, and sockets)
6b. Scaffolding or ladder
6c. Digital Multimeter
6d. Pressure calibrator

7. PARTS AND SUPPLIES
7a. N/A

8. PROCEDURE STEPS
9. Verify equipment has been properly isolated and tagged (if required)
10. Inspect transmitter before isolation
10a. Verify that electrical connections are intact and there are no exposed wires
10b. Verify that the pressure connections are not leaking and pressure sensing lines are tight
10c. Verify that the pressure transmitter casing is intact with cover installed
10d. If there is damage to the transmitter, issue demand work order for repair or replacement
11. If the transmitter is in an active control loop, place the control loop in MANUAL while conducting calibration
12. Isolate the differential pressure transmitter from process

CAUTION: When disconnecting sensing line, loosen sensing line connection slowly and verify that pressure decays - DO NOT loosen sensing line connection if it is evident that the isolation valve is leaking. Stop and notify the Supervisor to issue a corrective work order

13. Slowly loosen instrument pressure connection(s) to relieve pressure taking care not to spray water on other equipment
14. After verifying that the instrument sensing line(s) is (are) depressurized, disconnect the pressure sensing line(s)
15. Connect pressure calibrator
16. Remove covers and connect multimeter

16a. Remove terminal end pressure transmitter cover and unplug CoMeter
16b. Remove one screw from the transmitter nameplate, loosen the other screw and rotate the nameplate to allow access to the zero and span screws
16c. Measure input power supply voltage to verify that the pressure transmitter has power at the proper voltage (10.5 to 55 VDC)
16d. Connect the multimeter to the appropriate test connections (marked Test - and Test +) to measure current
16e. Remove the short circuit link (if applicable)
16f. Remove the pressure transmitter cover opposite terminal end
16g. Place the write protect link (link #5) in the OFF position to allow calibration

NOTE: The Upscale/Downscale link defines the fail safe output in the event of pressure transmitter failure - in the ON position the output is below 4 ma and in the OFF position the output is above 20 ma

16h. Place the Upscale/Downscale link (link #6) in the proper position - ON for downscale and OFF for upscale

NOTE: Span and zero pressures are not known at this time, the initial calibration will be the initial reference used

17. Calibrate pressure transmitter
17a. Apply the zero pressure differential to the transmitter and record the as found current output value from the multimeter in step 36a
17b. Apply the span pressure differential to the transmitter and record the as found current output value from the multimeter in step 36b
17c. Apply zero pressure differential to the transmitter and turn the zero screw and hold for at least one second - verify that the current output value on the multimeter is 4 mA and release the zero screw
17d. Apply span pressure differential to the transmitter and turn the span screw and hold for at least one second - verify that the current output value on the multimeter is 20 mA and release the span screw
17e. Check midpoint for linearity by adjusting pressure differential to mid-span (zero differential pressure plus 50% of span pressure minus zero pressure) and verify that the current output value on the multimeter is at midspan value (12 mA). Record actual value in step 37a. Actual current value must be within calculated midspan value within 0.5% (0.08 mA). If midspan reading is outside of this range, notify the Supervisor to issue a corrective work order
17f. Apply zero differential pressure to the transmitter and record the actual current output value from the multimeter in step 37b
17g. Apply Span pressure differential to the transmitter and record the actual current output value from the multimeter in step 37c
18. Disconnect multimeter
19. Reinstall the short circuit link if it was found installed in step
20. Verify that all terminals are tight
21. Reinstall the terminal end pressure transmitter cover
22. Place the write protect link (link #5) in the ON position to prevent tampering of the calibration
23. Record the position of the Upscale/Downscale link (#6) in step 38
24. Reinstall the pressure transmitter cover on the end opposite the terminal end
25. Reinstall transmitter nameplate
26. Verify control room instrument reading
26a. Apply zero pressure differential to the transmitter and verify that control room reading for pressure transmitter is at zero value - record actual value in step 39a
26b. Apply span pressure differential to the transmitter and verify that control room reading for pressure transmitter is at span value - record actual value in step 39b
26c. Calibrate control room instrument if necessary
27. Restore pressure transmitter
27a. Reinstall the terminal cover
27b. Remove pressure calibrator
27c. Connect sensing line(s) to pressure transmitter
28. Energize and test pressure transmitter for proper operation
29. Slowly open isolation valve(s)
30. When air is vented, tighten sensing line connection
31. If control loop for transmitter was placed in MANUAL in Step 11, return the controller to its normal mode of operation

32. Remove tags and restore equipment to service as required
33. Clean and store tools and test equipment

34. DATA
35. Pressure Transmitter Calibrated _____
36. Pressure transmitter as found calibration
36a. Zero pressure_____ Zero current reading_____
36b. Span pressure_____ Span current reading_____
37. Pressure transmitter final calibration
37a. Midpoint pressure _____ Midpoint current reading _____
37b. Zero pressure_____ Zero current reading_____
37c. Span pressure_____ Span current reading_____
38. Upscale/Downscale final switch position ON or OFF
39. Control room pressure/differential pressure indication
39a. Zero pressure_____ Zero pressure reading_____
39b. Span pressure_____ Span pressure reading_____
40. Notes:

P-PTEFAMA - Tunnel Axial Exhaust Fan Annual Inspection

1. PLANNING
1a. Prior to planned outages or when axial exhaust fan repairs are required, observe exhaust fan operation, check logs, CAFM work requests, and PM schedule to develop complete work list. Record all findings in equipment notes.
1b. Utility Distribution System technician will coordinate to remove applicable equipment from service.

2. SAFETY PRECAUTIONS
2a. Utility Tunnels are considered Permit Required Confined Spaces and have limited egress. Tunnel entry and work shall be performed in full accordance with the latest edition of AOC/CPP Utility Distribution System Access Control Policy.
2b. Concrete, heat stress, and other hazards exist.
2c. Assume pipe insulation and surfacing materials contain asbestos, unless proven otherwise.
2d. Tunnel entry is limited to trained individuals with appropriate respirators and personnel protective equipment (PPE).
2e. Never work on equipment when energized unless proper electrical safety precautions are taken to prevent shock hazards.
2f. Ensure all energy sources (air, steam, electrical and fluid) have been secured per LOTO Procedure.
2g. Ensure all pressures are vented off prior to removing or breaking any mechanical or piping connections.
2h. Observe proper Personnel Protective Equipment requirements.
2i. Keep hands and clothing clear of rotating components.

3. REFERENCES
3a. Improving Fan System Performance: A Sourcebook for Industry, DOE Industrial Technologies Program and the Air Movement and Control Association, International, Inc

4. PURPOSE
4a. Describes the annual axial exhaust fan inspections and maintenance required for system reliability.

5. SCOPE
5a. This procedure covers the annual preventative maintenance inspection for the axial exhaust fans.

6. TOOLS
6a. Standard hand tools (screwdrivers, wrenches, ratchets, and sockets)
6b. Soft wood wedge

7. PARTS AND SUPPLIES
7a. Approved non-flammable cleaner
7b. Rags (lint free)

8. PROCEDURE STEPS
9. Verify equipment has been properly isolated and tagged.
10. Clean fan housing
10a. Remove guard screen on fan outlet
10b Insert soft wood wedge to prevent fan from wind milling

WARNING: Windmilling is the involuntary movement of the fan blade caused from draft in the system. Use extreme caution to prevent getting body parts caught in the fan rotation

10c. Clean fan housing internal components with rags and approved cleaner as needed
11. Inspect fan housing for the following
11a. Loose fasteners
11b. Damage
11c. Corrosion
11d. Foreign objects
12. Clean and inspect fan blades
12a. Clean fan blades

12b. Measure clearances between blades and housing at four locations and record in step 26a
12c. If blade tip to housing clearances are not equal, submit a corrective work order to investigate and repair
12d. Inspect blades for damage to blades or cracked sections
12e. If blades are cracked, submit corrective work order to replace or repair
13. Remove wood wedge
14. Verify that fan is clear of tools and any other foreign objects
15. Clean outlet screen with rags and approved cleaner as needed
16. Reinstall outlet screen on fan housing
17. Inspect fan housing for damage or corrosion to exterior
18. Inspect the fan mounting bolts for signs of deterioration and looseness
18a. Tighten fasteners as necessary
18b. Replace fasteners that are damaged or will not tighten properly
19. Verify all parts are in place
20. Remove tags and restore equipment to service.
21. Clean up area and remove equipment and tools.
22. Place used cleaning solvent and contaminated rags in proper storage containers.
23. Clean and store tools and test equipment.
24. Record any notes or findings regarding fan in step 25
25. DATA
26. Blade to housing clearances
26a. 0 deg _____ 90 deg _____ 180 deg _____ 270 deg _____
27. Notes:

P-PTEFPMA - Tunnel Exhaust Fan Annual Inspection

1. PLANNING
1a. Prior to planned outages or when tunnel exhaust fan repairs are required, observe tunnel exhaust fan operation, check logs, CAFM work requests, and PM schedule to develop complete work list. Record all findings in equipment notes.
1b. Utility Distribution System technician will coordinate to remove applicable equipment from service.

2. SAFETY PRECAUTIONS
2a. Utility Tunnels are considered Permit Required Confined Spaces and have limited egress. Tunnel entry and work shall be performed in full accordance with the latest edition of AOC/CPP Utility Distribution System Access Control Policy.
2b. Concrete, heat stress, and other hazards exist.
2c. Assume pipe insulation and surfacing materials contain asbestos, unless proven otherwise.
2d. Tunnel entry is limited to trained individuals with appropriate respirators and Personnel Protective Equipment equipment.
2e. Never work on equipment when energized unless proper electrical safety precautions are taken to prevent shock hazards.
2f. Ensure all energy sources (air, steam, electrical and fluid) have been secured per LOTO Procedure.
2g. Ensure all pressures are vented off prior to removing or breaking any mechanical or piping connections.
2h. Keep hands and clothing clear of rotating components.

3. REFERENCES
3a. Greencheck Sidewall Propeller Fans, Belt Drive and Direct Drive Installation, Operating and Maintenance Manual, Part No. 455103
3b. Improving Fan System Performance: A Sourcebook for Industry, DOE Industrial Technologies Program and the Air Movement and Control Association, International, Inc

4. PURPOSE
4a. Describes the annual exhaust fan inspections and maintenance required for system reliability.

5. SCOPE
5a. This procedure covers the annual preventative maintenance inspection for the exhaust fans.

6. TOOLS
6a. Standard hand tools (screwdrivers, wrenches, ratchets, and sockets)
6b. Grease fun

7. PARTS AND SUPPLIES
7a. Approved non-flammable cleaner
7b. Militec-1 grease
7c. Dry Graphite
7d. Rags (lint free)

8. PROCEDURE STEPS
9. Verify equipment has been properly isolated and tagged
10. Clean tunnel inlet and outlet dampers (if installed)
10a. Manually operate the dampers to check for smooth operation
10b. Lubricate damper bearing surfaces with dry graphite
10c. If dampers do not close fully, submit corrective work order for repair
11. Remove fan inlet screen

NOTE: Use caution and do not allow water or other solvents to enter the motor or bearings. Under no circumstances should motors or bearings be sprayed with steam or water while cleaning.

12. Clean fan
12a. Clean the inlet screen
12b. Clean fan housing internals

12c. Clean fan blades
13. Inspect fan
13a. Inspect the inlet screen for breaks in wire and proper mounting
13b. Inspect fan housing interior for loose fasteners, damage, or corrosion
13c. Inspect fan blades for damage to blades or cracked sections
13d. Manually rotate the blades and verify the tips are even with each other (in the same plane)
13e. If blades are cracked or bent, submit corrective work order to replace or repair
13f. Check and tighten as necessary setscrews attaching propeller to the shaft and the shaft to the shaft pulley
13g. Check and tighten as necessary shaft bearings fasteners
13h. Inspect fan housing mounting bolts for signs of deterioration and looseness
13i. Tighten fasteners as necessary
13j. Replace fasteners that are damaged or will not tighten properly
13k. Inspect fan housing exterior for damage or corrosion to exterior
13l. Submit corrective work order to repair fan housing exterior
14. Lubricate fan shaft bearings

NOTE: Be careful not to unseat the bearing grease seal by over lubricating or using excessive pressure

NOTE: While adding grease to shaft bearings, periodically spin the propeller by hand to distribute the grease

14a. Add grease very slowly with a manual grease gun until a slight bead of grease forms at the grease seal
14b. Remove any excess grease to prevent collecting dust and debris on the shaft

NOTE: Verify P-MTRSEA - Less than 50 HP AC Electric Motor Annual Electrical Inspection and P-VBLTMQ - V-Belt Quarterly Inspection and Adjustment are complete prior to installing inlet screen

15. Reinstall fan inlet screen
16. Verify all parts are in place
17. Remove tags and restore equipment to service as required
18. Clean up area and remove equipment and tools.
19. Place used cleaning solvent and contaminated rags in proper storage containers.
20. Clean and store tools and test equipment.
21. Record any notes or findings regarding fan in step 22
22. DATA
23. Notes:

P-PTEFSMA - Tunnel Sturtevant Exhaust Fan Annual Inspection

1. PLANNING
1a. Prior to planned outages or when axial exhaust fan repairs are required, observe exhaust fan operation, check logs, CAFM work requests, and PM schedule to develop complete work list. Record all findings in equipment notes.
1b. Utility Distribution System technician will coordinate to remove applicable equipment from service.

2. SAFETY PRECAUTIONS
2a. Utility Tunnels are considered Permit Required Confined Spaces and have limited egress. Tunnel entry and work shall be performed in full accordance with the latest edition of AOC/CPP Utility Distribution System Access Control Policy.
2b. Concrete, heat stress, and other hazards exist.
2c. Assume pipe insulation and surfacing materials contain asbestos, unless proven otherwise.
2d. Tunnel entry is limited to trained individuals with appropriate respirators and personnel protective equipment (PPE).
2e. Never work on equipment when energized unless proper electrical safety precautions are taken to prevent shock hazards.
2f. Ensure all energy sources (air, steam, electrical and fluid) have been secured per LOTO Procedure.
2g. Ensure all pressures are vented off prior to removing or breaking any mechanical or piping connections.
2h. Keep hands and clothing clear of rotating components.

3. REFERENCES
3a. Improving Fan System Performance: A Sourcebook for Industry, DOE Industrial Technologies Program and the Air Movement and Control Association, International, Inc

4. PURPOSE
4a. Describes the annual axial exhaust fan inspections and maintenance required for system reliability.

5. SCOPE
5a. This procedure covers the annual preventative maintenance inspection for the axial exhaust fans.

6. TOOLS
6a. Standard hand tools (screwdrivers, wrenches, ratchets, and sockets)
6b. Soft wood wedge

7. PARTS AND SUPPLIES
7a. Approved non-flammable cleaner
7b. Rags (lint free)

8. PROCEDURE STEPS
9. Verify equipment has been properly isolated and tagged
10. Clean fan housing and wheel
10a. Open access covers on fan housing
10b. Open access doors on fan inlet housing
10c. Insert soft wood wedge to prevent fan from windmilling

WARNING: Windmilling is the involuntary movement of the fan blade caused from draft in the system. Use extreme caution to prevent getting body parts caught in the fan rotation

10d. Clean fan housing internals using rags and approved cleaner as needed
11. Inspect fan housing interior for following
11a. Loose fasteners
11b. Damage
11c. Corrosion
11d. Foreign objects
12. Measure clearances between wheel and housing at four locations and record in step 28a

12a. If wheel to housing clearances are not even, submit a corrective work order to investigate and repair
12b. Clean fan wheel
12c. Inspect fan wheel for damage to blades or cracked sections
12d. If wheel is cracked, submit corrective work order to replace or repair
13. Remove wood wedge
14. Verify that the fan is clear of tools and any other foreign objects
15. Reinstall access covers on fan housing and fan inlet housing
16. Inspect flexible joint between fan housing and ductwork for:
16a. Cracks
16b. Tears
16c. Other signs of damage
17. Inspect damper linkage for:
17a. Damage
17b. Loose fasteners
17c. Worn connections
18. Inspect Fan Belt Drive
18a. Check for belt damage
18b. Check for Belt deterioration
18c. Check belt deflection, should not deflect greater than the belts width
19. Inspect fan housing for:
19a. Damage
19b. Corrosion to exterior
20. Inspect the fan foundation bolts for signs of deterioration and looseness
20a. Tighten the fasteners as necessary
20b. Replace fasteners that are damaged or will not tighten properly
21. Verify all parts are properly in there place
22. Remove tags and restore equipment to service as required
23. Clean up area and remove equipment and tools.
24. Place used cleaning solvent and contaminated rags in proper storage containers.
25. Clean and store tools and test equipment.
26. Record any notes or findings regarding fan in step 29
27. DATA
28. Blade to housing clearances
28a. 0 deg _____ 90 deg _____ 180 deg _____ 270 deg _____
29. Notes:

PM Task Sheet

Task Code: P-PM521

P-PTEJMA - Tunnel Expansion Joint Annual Inspection

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P-PTEJMA - Tunnel Expansion Joint Annual Inspection

1. PLANNING
1a. Prior to planned outages or when expansion joint repairs are required, observe expansion joint during operation, check logs, CAFM work requests, and PM schedule to develop complete work list. Record all findings in equipment notes.
1b. Utility Distribution System technician will coordinate to remove applicable equipment from service.

2. SAFETY PRECAUTIONS
2a. Utility Tunnels are considered Permit Required Confined Spaces and have limited egress. Tunnel entry and work shall be performed in full accordance with the latest edition of AOC/CPP Utility Distribution System Access Control Policy.
2b. Concrete, heat stress, and other hazards exist.
2c. Assume pipe insulation and surfacing materials contain asbestos, unless proven otherwise.
2d. Tunnel entry is limited to trained individuals with appropriate respirators and personnel protective equipment (PPE).
2e. Never work on equipment when energized unless proper electrical safety precautions are taken to prevent shock hazards.
2f. Ensure all energy sources (air, steam, electrical and fluid) have been secured per LOTO Procedure.
2g. Ensure all pressures are vented off prior to removing or breaking any mechanical or piping connections.

3. REFERENCES
3a. None

4. PURPOSE
4a. Describes the annual expansion joint inspections and maintenance required for system reliability.

5. SCOPE
5a. This procedure covers the annual preventative maintenance inspection for the tunnel steam, condensate, and chill water expansion joints.

6. TOOLS
6a. Standard hand tools (screwdrivers, wrenches, ratchets, and sockets)
6b. Flashlight
6c. Wire brush

7. PARTS AND SUPPLIES
7a. Approved non-flammable cleaner
7b. Rags (lint free)

8. PROCEDURE STEPS
9. System must remain in service to perform inspection of expansion joints
10. For Slip Joint inspection refer to steps 11 through 12, for all other joints refer to step 11
11. Inspect Expansion Joint and adjacent piping
11a. Remove lagging pad if installed
11b. Check for mechanical degradation
11c. Check for leaks, indications of leakage
11d. Check for damaged fasteners
11e. Check for corrosion
11f. Record any adverse conditions in step 19
12. Slip Joint (Bullet joint) Inspection:
12a. Inspect the "slip" section for leakage
12b. Check for paint, corrosion, or debris build up
12c. If buildup is present, remove with wire brush
12d. If leakage is present, submit corrective work order to add injectable packing
12e. Record any adverse conditions in step 19
13. Verify all parts are in place
14. Reinstall lagging pad if removed
15. Clean up area and remove equipment and tools.

16. Place used cleaning solvent and contaminated rags in proper storage containers.
17. Clean and store tools and test equipment.
18. DATA
19. Adverse Conditions: _____

20. Notes:

P-PTFTCPPIA - Tunnel Rosemont Flow Meter Annual Calibration

1. PLANNING
1a. Prior to planned outages or when flow meter repairs are required, check logs, CAFM work requests, and PM schedule to develop complete work list. Record all findings in equipment notes.
1b. Utility Distribution System technician will coordinate to remove applicable equipment from service.

2. SAFETY PRECAUTIONS
2a. Utility Tunnels are considered Permit Required Confined Spaces and have limited egress. Tunnel entry and work shall be performed in full accordance with the latest edition of AOC/CPP Utility Distribution System Access Control Policy.
2b. Concrete, heat stress, and other hazards exist.
2c. Assume pipe insulation and surfacing materials contain asbestos, unless proven otherwise.
2d. Tunnel entry is limited to trained individuals with appropriate respirators and personnel protective equipment (PPE).
2e. Never work on equipment when energized unless proper electrical safety precautions are taken to prevent shock hazards.
2f. Ensure all energy sources (air, steam, electrical and fluid) have been secured per LOTO Procedure.
2g. Ensure all pressures are vented off prior to removing or breaking any mechanical or piping connections.

3. REFERENCES
3a. Rosemount Flow Transmitter Installation and Operation Manual

4. PURPOSE
4a. Describes the annual I&C calibration required for Rosemont flow meters.

5. SCOPE
5a. This procedure covers annual Rosemont flow meter inspection and calibration

6. TOOLS
6a. Standard hand tools (screwdrivers, wrenches, ratchets, and sockets)
6b. Digital Multimeter
6c. Pressure signal calibrator
6d. Disk containing user interface software
6e. Laptop computer
6f. Hart modem
6g. 9 pin to 9 pin cable
6h. BNC cable
6i. Mini-cable grabber
6j. Dead-weight tester
6k. Power supply
6l. Vacuum pump or barometer at least 4 times as accurate as the flow meter (Barometer preferred)

7. PARTS AND SUPPLIES
7a. N/A

8. PROCEDURE STEPS
9. Obtain access to flow meter
10. Inspect meter before isolation
10a. Verify that electrical connections are intact and there are no exposed wires
10b. Verify that the flow meter casing is intact with cover installed
10c. If there is damage to the meter, issue demand work order for repair or replacement
11. Isolate flow meter from process
12. Connect the laptop computer to the flow meter
12a. Connect one end of the 9-pin to 9-pin cable to the Hart communications port on the laptop
12b. Connect the other end of the 9-pin cable to the Hart modem
12c. Connect one end of the BNC cable to the Hart modem
12d. Connect the mini-grabber cable to the other end of the BNC cable

12e. Open the cover above the side marked "Field Terminals" and connect the mini-grabbers to the two terminals marked COMM
13. Power on the laptop computer
14. Type win return at the DOS prompt
15. Double click on the model flow meter User Interface icon
16. If password security is enabled, the User Interface Login menu appears, type in the password (System Administrator or Maintenance Level password required) and hit return
17. Field Calibration
17a. Place the transmitter into Off-line or On-line Maintenance
17b. Select User Interface Maintenance Modes screen
17c. Select Off-line Maintenance or On-line Maintenance (3 options)
18. Perform a Trim DP offset (zero)

NOTE: Technician will need to determine initial DP offset and AP offset values, record and update PM after this is complete

18a. Connect dead-weight testing device
18b. On the laptop, select Maintenance, Transmitter, Sensor trim to display the sensor trim select screen
18c. Select DP and Offset & Slope, then select Ok to display the "Sensor Trim: Enter Value" screen, record as found in step 28a
18d. Using the dead-weight tester, apply the desired low pressure value as the trim value, select the units, then click Ok

NOTE: If zero is the desired low value, do not use the dead weight tester, instead enter zero as the trim value, select the units and then click Ok.

18e. Wait for the Measured Value to stabilize, then click Ok, record final value in step 29a
19. Perform AP Offset
19a. On the laptop, select Maintenance, Transmitter, Sensor trim to display the sensor trim select screen
19b. Select SP and Offset only, then select Ok to display the "Sensor Trim: Enter Value" screen, record as found in step 28b
19c. Enter the barometric reading as the Trim Value, select the units, then click Ok
19d. Wait for the Measured Value to stabilize, then click Ok, record final value in step 29b
20. Exit menu, hit return
21. Disconnect the dead weight testing device
22. Disconnect the laptop and cables
23. Replace the meter cover into place
24. Place flow meter into process
25. Clean and store tools and test equipment.
26. DATA
27. Meter Calibrated: _____
28. Flow Meter as found calibration
28a. Zero Level_____ Zero current reading_____
28b. AP offset value_____ AP current reading_____
29. Level transmitter final calibration check (new level transmitter)
29a. Zero Level_____ Zero current reading_____
29b. AP offset value _____ AP current reading_____

30. Notes:

P-PTFTEMCSIA - Tunnel Annubar Flow Meter Annual Inspection

1. PLANNING
1a. Prior to planned outages or when tunnel flow meter repairs are required, check logs, CAFM work requests, and PM schedule to develop complete work list. Record all findings in equipment notes.
1b. Utility Distribution System technician will coordinate to remove applicable equipment from service.

2. SAFETY PRECAUTIONS
2a. Utility Tunnels are considered Permit Required Confined Spaces and have limited egress. Tunnel entry and work shall be performed in full accordance with the latest edition of AOC/CPP Utility Distribution System Access Control Policy.
2b. Concrete, heat stress, and other hazards exist.
2c. Assume pipe insulation and surfacing materials contain asbestos, unless proven otherwise.
2d. Tunnel entry is limited to trained individuals with appropriate respirators and personnel protective equipment (PPE).
2e. Never work on equipment when energized unless proper electrical safety precautions are taken to prevent shock hazards.
2f. Ensure all energy sources (air, steam, electrical and fluid) have been secured per LOTO Procedure.
2g. Ensure all pressures are vented off prior to removing or breaking any mechanical or piping connections.

3. REFERENCES
3a. Turbo-Bar(tm) Insertion Turbine Flow Meter

4. PURPOSE
4a. Describes the annual I&C inspection required for a annubar flow meter.

5. SCOPE
5a. This procedure covers annual annubar flow meter inspection.

6. TOOLS
6a. Standard hand tools (screwdrivers, wrenches, ratchets, and sockets)
6b. Soft wire brush
6c. Flashlight

7. PARTS AND SUPPLIES
7a. Rags (lint free)

8. PROCEDURE STEPS
9. Obtain access to flow meter
10. Inspect meter before isolation
10a. Verify that electrical connections are intact and there are no exposed wires
11. Verify that the flow meter body is intact with cover installed
11a. If there is damage to the meter, issue demand work order for repair or replacement
12. Retract the annubar element from the process flow
13. Close annubar isolation valve
13a. If there is leakage from annubar isolation valve that does not stop after closing valve, issue a demand work order for repair and do not attempt to inspect
14. Inspect annubar element
14a. Check the annubar for damage
14b. Check the annubar surface for any severe wear or degradation
14c. Clean annubar with water, use soft wire brush if necessary to remove build up
14d. Record any adverse conditions in step 20
15. Open annubar isolation valve
16. Replace annubar element into the process flow
17. If flow meter inspection is satisfactory, report to operations that flow meter inspection is complete and is returned to service
18. Clean and store tools and test equipment.
19. DATA
20. Meter Inspection: _____
_____

21. Notes:

P-PTPTIA - Tunnel Pressure Transmitter Annual Calibration

1. PLANNING
1a. Prior to planned outages check logs, CAFM work requests, and PM schedule to develop complete work list. Record all findings in equipment notes.
1b. Utility Distribution System technician will coordinate to remove applicable equipment from service.

2. SAFETY PRECAUTIONS
2a. Utility Tunnels are considered Permit Required Confined Spaces and have limited egress. Tunnel entry and work shall be performed in full accordance with the latest edition of AOC/CPP Utility Distribution System Access Control Policy.
2b. Concrete, heat stress, and other hazards exist.
2c. Assume pipe insulation and surfacing materials contain asbestos, unless proven otherwise.
2d. Tunnel entry is limited to trained individuals with appropriate respirators and personnel protective equipment (PPE).
2e. Never work on equipment when energized unless proper electrical safety precautions are taken to prevent shock hazards.
2f. Ensure all energy sources (air, steam, electrical and fluid) have been secured per LOTO Procedure.
2g. Ensure all pressures are vented off prior to removing or breaking any mechanical or piping connections.

3. REFERENCES
3a. ABB Hart 2600T Maintenance Manual

4. PURPOSE
4a. Describes the annual I&C inspection and calibration required for the pressure transmitters.

5. SCOPE
5a. This procedure covers annual pressure transmitter inspection and calibration

6. TOOLS
6a. Standard hand tools (screwdrivers, wrenches, ratchets, and sockets)
6b. Scaffolding or ladder
6c. Pressure calibrator
6d. Digital Multimeter

7. PARTS AND SUPPLIES
7a. N/A

8. PROCEDURE STEPS
9. Obtain access to pressure transmitter - ladder or scaffolding is generally required
10. Inspect transmitter before isolation
10a. Verify that electrical connections are intact and there are no exposed wires
10b. Verify that the pressure connections are not leaking and pressure sensing lines are tight
10c. Request operations remove differential pressure transducer from service and tag out in accordance with appropriate Lockout/Tagout /Tryout Procedure
10d. If there leakage that does not stop after isolation of pressure transmitter, issue a demand work order for repair and do not attempt to calibrate
10e. Verify that the pressure transmitter casing is intact with cover installed
10f. If there is damage to the transmitter, issue demand work order for repair or replacement
11. Isolate pressure transmitter from process and connect pressure calibrator
12. Close instrument isolation valve

CAUTION: When disc
verify that pressure decays as indicated by strength of water spraying from connection - DO NOT loosen sensing line connection if it is evident that the isolation valve is leaking.

12a. Slowly loosen instrument pressure connection(s) to relieve pressure taking care to

prevent steam or chill water leakage
12b. After verifying that the instrument sensing line(s) is (are) depressurized, disconnect the pressure sensing line(s)
13. Connect pressure calibrator
14. Remove cover and disconnect
14a. Remove pressure transmitter cover
14b. Measure input power supply voltage to verify that the pressure transmitter has power at the proper voltage
14c. Disconnect current signal wires and connect multimeter in place
15. Check pressure transmitter calibration

NOTE: Zero and span pressure must be determined after the first calibration, and this procedure should be updated after initial determination, record in step 22

15a. Determine "as found" calibration by recording current reading at zero and span values for the pressure transmitter and record in Step 23
15b. Check midpoint for linearity by adjusting pressure to mid-span (zero pressure plus 50% of span pressure minus zero pressure) and verify that current reading is at midspan value (zero current reading plus 50% of span current minus zero current)

NOTE: Actual current value must be within calculated midspan value within 0.5%.

15c. If linearity check is more than 0.5% different or the zero and span outputs are not correct, inform I&E Supervisor and replace the pressure transmitter
15d. If the pressure transmitter is replaced, perform a five-point calibration check at zero, 25%, 50%, 75% and span pressure and verify that current readings at each pressure are within 0.5% of calculated reading
15e. Record final calibration check readings in Step 24
15f. Disconnect multimeter
15g. Reconnect pressure transmitter output wires
15h. Reconnect current output wiring
15i. Verify that all terminals are tight
15j. Reinstall pressure transmitter cover
16. Verify control room instrument reading
16a. Adjust pressure to zero value and verify that control room reading for pressure transmitter is at zero value - record in Step 25
16b. Adjust pressure to span value and verify that control room reading for pressure transmitter is at span value - record in Step 25
16c. Calibrate control room instrument if necessary
17. Reconnect pressure transmitter to process
17a. Remove pressure calibrator
17b. Connect sensing line(s) hand tight to vent
17c. Slowly crack isolation valve(s) open to fill sensing line and vent air - use care not to spray fluid on other equipment
17d. When air is vented, tighten sensing line connection
17e. Request Shift Foreman to remove tags, energize, and test pressure transmitter for proper operation
17f. After tightening sensing line connection, open isolation valve fully
17g. If supply or vent valves fail to open and close at the appropriate pressures notify foreman and schedule corrective maintenance
18. If calibration is satisfactory, I&C Technician will report to Control Room that pressure transmitter is returned to normal
19. Clean and store tools and test equipment.
20. DATA
21. Pressure Transmitter Calibrated: _____
22. Initial Pressure Calibration:
22a. Zero: _____
22b. Span: _____
23. Pressure transmitter as found calibration
23a. Zero pressure_____ Zero current reading_____
23b. Span pressure_____ Span current reading_____
24. Pressure transmitter final calibration check (new pressure transmitter)
24a. Zero pressure_____ Zero current reading_____
24b. Midpoint pressure _____ Midpoint current reading _____
24c. Span pressure_____ Span current reading_____
25. Control room pressure/differential pressure indication

25a. Zero pressure_____ Zero current reading_____
25b. Span pressure_____ Span current reading_____
26. Notes:

P-PTSFTIA - Tunnel Steam Flow Transmitter Annual Calibration

1. PLANNING
1a. Prior to planned outages check logs, CAFM work requests, and PM schedule to develop complete work list. Record all findings in equipment notes.
1b. Utility Distribution System technician will coordinate to remove applicable equipment from service.

2. SAFETY PRECAUTIONS
2a. Utility Tunnels are considered Permit Required Confined Spaces and have limited egress. Tunnel entry and work shall be performed in full accordance with the latest edition of AOC/CPP Utility Distribution System Access Control Policy.
2b. Concrete, heat stress, and other hazards exist.
2c. Assume pipe insulation and surfacing materials contain asbestos, unless proven otherwise.
2d. Tunnel entry is limited to trained individuals with appropriate respirators and personnel protective equipment (PPE).
2e. Never work on equipment when energized unless proper electrical safety precautions are taken to prevent shock hazards.
2f. Ensure all energy sources (air, steam, electrical and fluid) have been secured per LOTO Procedure.
2g. Ensure all pressures are vented off prior to removing or breaking any mechanical or piping connections.

3. REFERENCES
3a. Rosemount 1151 Smart Pressure Transmitter Reference Manual

4. PURPOSE
4a. Describes the annual I&C inspection and calibration required for the steam flow transmitters.

5. SCOPE
5a. This procedure covers annual steam flow transmitter inspection and calibration

6. TOOLS
6a. Standard hand tools (screwdrivers, wrenches, ratchets, and sockets)
6b. Scaffolding or ladder
6c. Flow calibration device
6d. Hart communicator
6e. Power supply - 24V dc

7. PARTS AND SUPPLIES
7a. N/A

8. PROCEDURE STEPS
9. Obtain access to flow transmitter - ladder or scaffolding is generally required
10. Inspect transmitter before isolating it
10a. Verify that electrical connections are intact and there are no exposed wires
10b. Request operations remove flow transmitter from service and tag out in accordance with appropriate Lockout/Tagout /Tryout Procedure
10c. If there leakage that does not stop after isolation of flow transmitter, issue a demand work order for repair and do not attempt to calibrate
10d. Verify that the flow transmitter casing is intact with cover installed
10e. If there is damage to the transmitter, issue demand work order for repair or replacement
11. Isolate flow transmitter from process and connect flow calibration device

CAUTION: When disc
verify that pressure decays - DO NOT loosen sensing line connection if it is evident that the isolation valve is leaking.

11a. Close instrument isolation valve
11b. Slowly loosen instrument flow connection(s) to relieve pressure
11c. After verifying that the instrument sensing line(s) is (are) depressurized, disconnect the flow sensing line(s)

12. Remove cover and disconnect
12a. Remove flow transmitter cover
12b. Hook up voltage source to flow transmitter
12c. Attach Hart Communicator to the 1151
12d. Measure input power supply voltage to verify that the flow transmitter has power at the proper voltage
13. Check flow transmitter calibration using Hart Communicator

NOTE: Zero and span pressure must be determined after the first calibration, and this procedure should be updated after initial determination, record in step 22

13a. Determine "as found" calibration by recording current reading at zero and span values for the flow transmitter and record in Step 22
13b. Check midpoint for linearity by adjusting flow to mid-span (zero flow plus 50% of span flow minus zero flow) and verify that current reading is at midspan value (zero current reading plus 50% of span current minus zero current)

NOTE: Actual current value must be within calculated midspan value within 0.5%.

13c. If linearity check is more than 0.5% different or the zero and span outputs are not correct, inform I&E Supervisor and replace the flow transmitter
13d. If the flow transmitter is replaced, perform a five-point calibration check at zero, 25%, 50%, 75% and span flow and verify that current readings at each flow are within 0.5% of calculated reading
13e. Record final calibration check readings in Step 24
13f. Reconnect flow transmitter output wires
13g. Disconnect power supply
13h. Disconnect Hart Communicator
13i. Reconnect current output wiring
13j. Verify that all terminals are tight
13k. Reinstall flow transmitter cover
14. Verify control room instrument reading
14a. Adjust pressure to zero value and verify that control room reading for pressure transmitter is at zero value - record in Step
14b. Adjust pressure to span value and verify that control room reading for pressure transmitter is at span value - record in Step
14c. Calibrate control room instrument if necessary
14d. Record control room instrument calibration readings in step 25
15. Reconnect flow transmitter to process
15a. Remove flow calibration device
15b. Connect sensing line(s) hand tight to vent
15c. Slowly crack isolation valve(s) open to fill sensing line and vent air - use care not to spray fluid on other equipment
15d. When air is vented, tighten sensing line connection
16. Request Shift Foreman to remove tags, energize, and test flow transmitter for proper operation
17. After tightening sensing line connection, open isolation valve fully
18. If flow transmitter calibration is satisfactory, Meter technician will report to Control Room that flow transmitter is returned to normal
19. Clean and store tools and test equipment.
20. DATA
21. Flow Transmitter Calibrated: _____
22. Initial Flow Calibration:
22a. Zero: _____
22b. Span: _____
23. Flow transmitter as found calibration
23a. Zero Flow_____ Zero current reading_____
23b. Span Flow_____ Span current reading_____
24. Flow transmitter final calibration check (new flow transmitter)
24a. Zero flow_____ Zero current reading_____
24b. Midpoint flow _____ Midpoint current reading _____
24c. Span flow _____ Span current reading_____
25. Control room pressure/differential pressure indication
25a. Zero flow _____ Zero flow reading_____
25b. Span flow _____ Span flow reading_____
26. Notes:

P-PTTTIA - Tunnel Temperature Transmitter Annual Calibration

1. PLANNING
1a. Prior to planned outages or when are required, check logs, CAFM work requests, and PM schedule to develop complete work list. Record all findings in equipment notes.
1b. Utility Distribution System technician will coordinate to remove applicable equipment from service.

2. SAFETY PRECAUTIONS
2a. Utility Tunnels are considered Permit Required Confined Spaces and have limited egress. Tunnel entry and work shall be performed in full accordance with the latest edition of AOC/CPP Utility Distribution System Access Control Policy.
2b. Concrete, heat stress, and other hazards exist.
2c. Assume pipe insulation and surfacing materials contain asbestos, unless proven otherwise.
2d. Tunnel entry is limited to trained individuals with appropriate respirators and personnel protective equipment (PPE).
2e. Never work on equipment when energized unless proper electrical safety precautions are taken to prevent shock hazards.
2f. Ensure all energy sources (air, steam, electrical and fluid) have been secured per LOTO Procedure.
2g. Ensure all pressures are vented off prior to removing or breaking any mechanical or piping connections.

3. REFERENCES
3a. None

4. PURPOSE
4a. Describes the annual I&C calibration and inspection of the tunnel temperature transmitters

5. SCOPE
5a. This procedure covers annual calibration and inspection of the tunnel temperature transmitters

6. TOOLS
6a. Standard hand tools (screwdrivers, wrenches, ratchets, and sockets)
6b. Scaffolding or ladder
6c. Digitial Multimeter
6d. Temperature calibrator

7. PARTS AND SUPPLIES
7a. N/A

8. PROCEDURE STEPS
9. Inspect transmitter
9a. Verify that electrical connections are intact and there are no exposed wires
9b. Verify that the temperature thermowell is not leaking and temperature sensing lines are tight
9c. Verify that the temperature transmitter casing is intact with cover installed
9d. If there is damage to the transmitter, issue demand work order for repair or replacement
10. Disconnect the temperature probe from the transmitter
11. Calibrate temperature transmitter
11a. Remove transmitter cover
11b. Place digital multimeter in line for calibration
11c. Attach temperature calibrator to the transmitter
11d. Use temperature calibrator and determine as found zero (4 mA) and record in step 19a, establish baseline zero on first calibration
11e. Correct the zero as necessary and record final results in step 20a
11f. Use temperature calibrator and increase signal to determine as found span (20 mA) and record in step 19b, establish baseline span on first calibration
11g. Correct span as necessary and record final results in step 20b
12. Verify control room instrument reading
12a. Apply zero temperature to the transmitter using the temperature calibrator and

verify that control room reading for temperature transmitter is at zero value - record actual value in step 21a
12b. Apply span temperature to the transmitter using the temperature calibrator and verify that control room reading for temperature transmitter is at span value - record actual value in step 21b
12c. Calibrate control room instrument if necessary
13. Disconnect multimeter
14. Reinstall the temperature transmitter cover
15. Restore temperature probe connections to the temperature transmitter
16. Clean and store tools and test equipment
17. DATA
18. Temperature Transmitter Calibrated: _____
19. Temperature Transmitter as found calibration
19a. Zero temperature_____ Zero current reading_____
19b. Span temperature _____ Span current reading_____
20. Temperature Transmitter final calibration check (new temperature transmitter)
20a. Zero temperature _____ Zero current reading_____
20b. Span temperature_____ Span current reading_____
21. Control room temperature indication
21a. Zero temperature_____ Zero temperature reading_____
21b. Span temperature _____ Span temperature reading_____
22. Notes:

P-TCRUMA - Tunnel Condensate Return Unit Annual Inspection

1. PLANNING
1a. Prior to outages or when the Condensate Return Unit must be inspected or repaired, observe unit in operation for the following: operating conditions, proper cycling on and off in response to level changes, excessive seal or gasket leakage, unusual vibrations or noises or other abnormalities.
1b. Record all findings in equipment notes.
1c. Check logs, CAFM work requests, and PM schedule to develop a complete work list.
1d. Utility Distribution System technician will coordinate to remove applicable equipment from service.

2. SAFETY PRECAUTIONS
2a. Utility Tunnels are considered Permit Required Confined Spaces and have limited egress. Tunnel entry and work shall be performed in full accordance with the latest edition of AOC/CPP Utility Distribution System Access Control Policy.
2b. Concrete, heat stress, and other hazards exist.
2c. Assume pipe insulation and surfacing materials contain asbestos, unless proven otherwise.
2d. Tunnel entry is limited to trained individuals with appropriate respirators and personnel protective equipment (PPE).
2e. Never work on equipment when energized unless proper electrical safety precautions are taken to prevent shock hazards.
2f. Ensure all energy sources (air, steam, electrical and fluid) have been secured per LOTO Procedure.
2g. Ensure all pressures are vented off prior to removing or breaking any mechanical or piping connections.
2h. Keep hands and clothing clear of rotating components.

3. REFERENCES
3a. ITT Bell & Gossett Instruction Manual DN0158, Rev. C, for Domestic Vented Condensate Units Series CC, CS, CB, CBE, CHD, CED

4. PURPOSE
4a. Describes the annual tunnel condensate return unit maintenance and inspections required for system safety and reliability

5. SCOPE
5a. This procedure covers annual preventative maintenance for the Tunnel Condensate Return Units

6. TOOLS
6a. Standard tool kit
6b. Flashlight

7. PARTS AND SUPPLIES
7a. Rags
7b. Approved glass cleaner

8. PROCEDURE STEPS
9. Verify equipment has been properly isolated and tagged
10. Remove the bolts securing the top of the basket strainer and remove the screen
10a. Inspect the interior of the basket strainer and remove any debris from the dirt pocket
10b. Thoroughly clean the dirt pocket and screen
10c. Reinstall the screen and reattach the cover
11. Using the flashlight, inspect the exterior of the condensate return unit for signs of condensate leakage around the pumps, valves, fittings for the level switches, and the gauge glass.
12. If leakage is detected around the level switches, tighten the threaded fittings.
13. If leakage from the pump is detected, notify Supervisor and submit a corrective work order.
14. Inspect condensate inlet, vent, and drain fittings for signs of leakage and tighten if necessary.
15. Inspect the gauge glass with a bright flashlight

Note: Anything that glistens and catches a fingernail or any star-shaped or crescent-shaped mark which glistens is cause for replacement

15a. If the gauge glass is broken, cracked, chipped, scratched or otherwise damaged, notify Supervisor and submit a corrective work order to replace the gauge glass
16. Using an approved commercial glass cleaner, clean the outside of the gauge glass

Note: Never use wire brushes, scrapers, or harsh abrasives to clean the gauge glass. Dilute muriatic acid may be used if required, following appropriate safety precautions for handling corrosive compounds.

16a. If gauge glass will not respond to cleaning procedures, notify Supervisor and submit a corrective work order to replace the gauge glass
17. Inspect the pump inlet and outlet valves and the tank drain valve for signs of excessive stem leakage
17a. Repack any valves exhibiting excessive leakage
18. Check pump and motor mounting bolts and tighten if necessary
19. Clean any accumulated dirt and debris from the unit tank, motors and level switches
20. Visually inspect that all parts are in place
21. Remove tags and restore equipment to service as required
22. Observe operation of the unit in response to changing level in the tank, while observing the level in the gauge glass
22a. Pumps start when level switch float reaches preset high level
22b. Pumps shut off when level switch float reaches preset low level
23. If pump does not operate in response to level switch signals, submit corrective work order to replace affected level switch
24. Clean work area
25. Remove tools
26. Clean and store tools
27. Transfer all significant findings to Equipment Notes for the condensate return unit
28. DATA

P-TEPEA - Tunnel Electrical Panel Annual Maintenance

1. PLANNING
1a. Prior to planned outages or when electrical panel repairs are required, observe electrical panel operation, check logs, CAFM work requests, and PM schedule to develop complete work list. Record all findings in equipment notes.
1b. Utility Distribution System technician will coordinate to remove applicable equipment from service.

2. SAFETY PRECAUTIONS
2a. Utility Tunnels are considered Permit Required Confined Spaces and have limited egress. Tunnel entry and work shall be performed in full accordance with the latest edition of AOC/CPP Utility Distribution System Access Control Policy.
2b. Concrete, heat stress, and other hazards exist.
2c. Assume pipe insulation and surfacing materials contain asbestos, unless proven otherwise.
2d. Tunnel entry is limited to trained individuals with appropriate respirators and personnel protective equipment (PPE).
2e. Never work on equipment when energized unless proper electrical safety precautions are taken to prevent shock hazards.
2f. Ensure all energy sources (air, steam, electrical and fluid) have been secured per LOTO Procedure.

3. REFERENCES
3a. AOC - West Refrigeration Plant Expansion Project O&M Manuals Volume No. 33 of 35

4. PURPOSE
4a. Describes the annual inspection of the electrical panels.

5. SCOPE
5a. This procedure covers the maintenance procedure for the annual clean and inspect for the electrical panels in the Utility Tunnels.

6. TOOLS
6a. Standard hand tools (screwdrivers, wrenches, ratchets, and sockets)
6b. Flashlight
6c. Inspection mirror
6d. Standard digital multimeter
6e. Vacuum cleaner

7. PARTS AND SUPPLIES
7a. Approved nonflammable cleaning solvent
7b. Rags (lint free)
7c. Dry compressed air

8. PROCEDURE STEPS
9. Verify equipment has been properly isolated and tagged
10. Verify the electrical panel is de-energized with a standard digital multimeter.
11. Open electrical panel
12. Vacuum or wipe clean all exposed surfaces of the electrical panel and the inside of its enclosure.
12a. Equipment may be blown clean with compressed air that is dry and free from oil.
13. Tighten all electrical connections.
14. Inspect for signs of overheated joints, charred insulation, discolored terminals, etc. and record any findings in Step 24.
14a. Clean or replace discolored terminations.
15. Examine wires and cables for any chafing against metal edges caused by vibration, which could progress to an insulation failure.
16. Check the intended movement of mechanical parts, such as the armature and contacts of electromechanical contactors, and mechanical interlocks to verify freedom of motion and functional operation.
17. Check all indicating lamps, mechanical flags, doors, latches, and similar auxiliaries and repair, if required
18. Close electrical panel
19. Remove tags and restore equipment to service as required

20. Clean up area and remove equipment and tools.
21. Place used cleaning solvent and contaminated rags in proper storage containers.
22. Clean and store tools and test equipment.
23. DATA
24. Notes:

P-TFTMT - Tunnel Flash Tank Triennial Inspection

1. PLANNING
1a. Prior to outages or when the Flash Tank must be inspected or repaired, observe unit in operation for the following: operating conditions, steam or condensate leaks, unusual vibrations or noises or other abnormalities.
1b. Record all findings in equipment notes.
1c. Check logs, CAFM work requests, and PM schedule to develop a complete work list.
1d. Utility Distribution System technician will coordinate to remove applicable equipment from service.

2. SAFETY PRECAUTIONS
2a. Utility Tunnels are considered Permit Required Confined Spaces and have limited egress. Tunnel entry and work shall be performed in full accordance with the latest edition of AOC/CPP Utility Distribution System Access Control Policy.
2b. Concrete, heat stress, and other hazards exist.
2c. Assume pipe insulation and surfacing materials contain asbestos, unless proven otherwise.
2d. Tunnel entry is limited to trained individuals with appropriate respirators and personnel protective equipment (PPE).
2e. Never work on equipment when energized unless proper electrical safety precautions are taken to prevent shock hazards.
2f. Ensure all energy sources (air, steam, electrical and fluid) have been secured per LOTO Procedure.
2g. Ensure all pressures are vented off prior to removing or breaking any mechanical or piping connections.

3. REFERENCES
3a. Operations and Maintenance: Inspection and Certification of Boilers and Unfired Pressure Vessels, UFC 3-430-07 of 24 July 2003, including Change 1, Jan 2004 and Change 2, March 2005

4. PURPOSE
4a. Describes the triennial tunnel flash tank inspection required for system safety and reliability

5. SCOPE
5a. This procedure covers triennial preventative maintenance for the tunnel flash tanks

6. TOOLS
6a. Standard tool kit
6b. Flashlight
6c. Soft bristle wire brush

7. PARTS AND SUPPLIES
7a. Metal strapping and fasteners
7b. Gasket material
7c. Rags

8. PROCEDURE STEPS
9. Verify equipment has been properly isolated and tagged
10. Remove the tank relief valve and send it out for inspection and testing
10a. Record inspection/repair results in Step 27
10b. Record flash tank relief valve lifting pressure in Step 28
11. Inspect the flash tank gauge glasses; disassemble and clean as required
12. Remove the access cover plate to the flash tank
13. Inspect the inside of the flash tank for debris, other foreign material and signs of damage.
13a. Inspect the welds at each penetration into the flash tank for cracks or defective welds

NOTE: Wire brush weld areas before inspection to remove any dirt, corrosion, or deposits.

13b. Clean the inside of the flash tank.

13c. Record flash tank internal inspection results in Step 29
14. Visually inspect the accessible areas of the flash tank exterior
14a. Inspect condition of insulation and flashing
14b. Inspect accessible welds, fittings, and penetrations for evidence of leaks or corrosion
14c. Record results of the inspection in Step 30
14d. If any cracks in any welds or corrosion are detected, notify Supervisor and request that a corrective work order to make repairs or conduct further investigation be submitted
15. Replace the flash tank manhole cover plate using a new gasket cut from bulk gasket material and tighten the nuts on the strongback
16. Reinstall the flash tank relief valve using a new gasket when it has been returned following inspection and testing
17. Reinstall the gauge glasses on the flash tank
18. When job has been completed, take time to go over job
19. Visually inspect that all parts are in place
20. Remove tags and restore equipment to service as required
21. Observe operation of the flash tank after it has been placed in service for proper operation
22. Clean work area
23. Remove tools
24. Clean and store tools
25. Transfer all significant findings to Equipment Notes for the flash tank
26. DATA
27. Flash tank relief valve inspection results: _____
27a. _____
27b. _____
27c. _____
28. Flash tank relief valve lifting pressure: _____ psig (**LATER** setting)
29. Flash tank internal inspection results:
29a. _____
29b. _____
29c. _____
29d. _____
30. Flash tank external inspection results:
30a. _____
30b. _____
30c. _____
30d. _____

P-TMNLVLVMA - Manual Valve Annual Inspection

1. PLANNING
1a. Prior to outages or when the associated systems must be repaired, observe the valves during system operation for the following: operating condition, packing leaks, indications of seat/disc leak-by when closed, leaks at joints or other abnormalities.
1b. Record all findings in equipment notes.
1c. Check logs, CAFM work requests, and PM schedule to develop a complete work list.
1d. The first part of this PM requires the system to be in service at normal operating temperature and pressure. The second part of the PM should be performed in conjunction with a routine system or plant outage.
1e. Utility Distribution System technician will coordinate to perform applicable valve operations.

2. SAFETY PRECAUTIONS
2a. Exercise extreme caution when working around steam valves. High pressure steam is invisible and condensed water vapor may or may not be present. Exposure to high pressure steam will cause severe burns and other life-threatening injuries.

3. REFERENCES
3a. NUREG-0933, ISSUE 127: Maintenance And Testing Of Manual Valves In Safety-Related Systems

4. PURPOSE
4a. Describes the annual inspection of the manual valves required for system reliability

5. SCOPE
5a. This procedure covers annual preventative maintenance for the manual valves

6. TOOLS
6a. Standard tool set
6b. Ultrasonic leak detector
6c. Long handled mirror
6d. Brass bristle wire brush

7. PARTS AND SUPPLIES
7a. Mobil 28 or equivalent for steam valves
7b. Valve stem grease or equivalent for low temperature valves
7c. Rags

8. PROCEDURE STEPS
9. Perform operational valve inspection by completing Steps 9a thorough 9g
9a. Close the manual valve
9b. Using a long-handled mirror (if needed), inspect the area around the valve bonnet and body for evidence of leaks or mineral buildup
9c. Using the long-handled mirror (if needed), inspect the area around the valve gland for evidence of leakage or mineral buildup
9d. Using the ultrasonic leak detector, detect any leakage across the valve seat/disk and record results in Step Error! Reference source not found.
9e. If leakage is detected, notify Maintenance Supervisor and submit a corrective work order to repair valve
9f. Reopen the manual valve and notify the Shift Supervisor of the valve's status
9g. If valve is hard to operate, notify Maintenance Supervisor and submit a corrective work order to repair valve
10. Perform valve inspection while system is shut down by completing Steps 10a through Error! Reference source not found.
10a. Verify system is completely shut down, cooled down, depressurized, and vented to atmosphere
10b. Verify equipment has been properly isolated and tagged
10c. Clean valve exterior, packing gland, and valve stem including threads
11. Inspect the valve for the following:
11a. Body - damage, corrosion, cracks
11b. Bonnet - damage, corrosion, cracks
11c. Stem - straight, damaged threads, corrosion, debris in threads, cracks

11d. Yoke bushing - debris around threads, damage, corrosion
11e. Packing gland - damage, corrosion
11f. Gland bolts and gland bolt nuts - damaged threads, bent bolts, corrosion
11g. Lubricate valve stem threads with approved thread lubricant for valve operating temperature
12. Cycle the valve fully closed and then open again to lubricate the yoke bushing
13. When job is complete, review work and inspect work site
14. Visually inspect that all parts are in place
15. Remove tags and restore equipment to service as required
16. Submit a corrective maintenance work request for any discrepancies noted
17. Clean work area, equipment, and tools.
18. Discard oil and contaminated rags in proper containers
19. Return, clean, and store tools
20. DATA
21. Manual valve leakage:_____
22. Operational Inspection notes:
22a. _____
22b. _____
22c. _____
22d. _____
22e. _____
22f. _____
22g. _____
22h. _____
22i. _____
22j. _____
22k. _____
22l. _____
22m. _____
23. Shutdown Inspection notes:
23a. _____
23b. _____
23c. _____
23d. _____
23e. _____
23f. _____
23g. _____
23h. _____
23i. _____
23j. _____
23k. _____
23l. _____
23m. _____
23n. _____

P-TMTRSEA - Less than 50 Hp AC Electric Motor Annual Electrical Inspection

1. PLANNING
1a. Prior to planned outages or when motor repairs are required, observe motor operation for damage, excessive temperature, blocked/clogged air vents, loose foundation bolts, unusual noise, vibration, and oil/grease leakage
1b. Record all findings in equipment notes
1c. Utility Distribution System technician will coordinate to remove applicable equipment from service.

2. SAFETY PRECAUTIONS
2a. Utility Tunnels are considered Permit Required Confined Spaces and have limited egress. Tunnel entry and work shall be performed in full accordance with the latest edition of AOC/CPP Utility Distribution System Access Control Policy.
2b. Concrete, heat stress, and other hazards exist.
2c. Assume pipe insulation and surfacing materials contain asbestos, unless proven otherwise.
2d. Tunnel entry is limited to trained individuals with appropriate respirators and personnel protective equipment (PPE).
2e. Never work on equipment when energized unless proper electrical safety precautions are taken to prevent shock hazards.
2f. Ensure all energy sources (air, steam, electrical and fluid) have been secured per LOTO Procedure.
2g. Ensure all pressures are vented off prior to removing or breaking any mechanical or piping connections.
2h. Keep hands and clothing clear of rotating components.
2i. Do not to add too much grease to motor bearings or bearing damage may occur

3. REFERENCES
3a. Applicable motor manuals

4. PURPOSE
4a. Describes the annual preventive electrical motor inspection and maintenance required for motor reliability

5. SCOPE
5a. This procedure covers annual inspection of AC induction electric motors with a horsepower rating less than 50 Hp

6. TOOLS
6a. Standard hand tools (screwdrivers, wrenches, ratchets, and sockets)
6b. Grease gun
6c. Digital Megohm insulation resistance tester
6d. Digital ground resistance tester
6e. AC/DC current clamp on meter true-RMS
6f. Dial indicator or Optalign as appropriate
6g. Handheld digital thermometer
6h. Handheld vibration analyzer
6i. Flashlight
6j. Inspection mirror

7. PARTS AND SUPPLIES
7a. Approved grease or oil
7b. Approved nonflammable cleaning solvent
7c. Rags (lint free)

8. PROCEDURE STEPS
9. Prior to removing motor from service, perform a detailed visual inspection of motor exterior paying close attention to the following:
9a. Evidence of damage caused by dirt, loose parts, or foreign objects
9b. Verify air inlets are not blocked
9c. Evidence of moisture and/or dirt buildup
9d. Excessive temperature at housing and bearings by touch or by using a handheld digital thermometer
9e. High vibration by touch or by use of hand held vibration analyzer

9f. Unusual noises
9g. Evidence of oil leakage at bearings
9h. Degradation of foundation, bed plates, or anchor bolts
9i. With the motor operating, measure current readings and record in Step Error! Reference source not found.
9j. With the motor operating, measure phase to phase and phase to ground voltage and record in Step Error! Reference source not found.

WARNING: Do not mix greases of different type or specifications

NOTE: Some motors have sealed bearings and are not to be lubricated. Check with manufacturers cut sheet to verify if motor can be lubricated.

CAUTION: Do not to add too much grease to motor bearings or bearing damage may occur

10. For grease-type lubricated motor with a grease outlet plug
10a. Clean all grease fittings
10b. Remove grease outlet plug

NOTE: If motor is greased while running, a slightly greater quantity of grease will have to be added

10c. Add grease slowly until new grease appears at outlet plug hole
10d. Run motor for 15 to 30 minutes with outlet plug removed to allow purging of excess grease
10e. Reinstall grease outlet plug
11. For grease-type lubricated motor without a grease outlet plug
11a. Clean the grease fitting
11b. Add manufacturers recommended amount of grease to bearing
12. Verify equipment has been properly isolated and tagged
13. Wipe off dust, dirt, oil, water, etc. from external surface of the motor
14. Remove motor terminal cover (peckerhead) to inspect wires for insulation breakdown
15. Inspect motor controls
15a. Inspect all boxes and starters for water contamination
15b. Use compressed air or rags to wipe down.
15c. Check contacts on starters for pitting and corrosion
15d. Tighten all connections for motor, starter, and control boxes
15e. Check coil for tightness and corrosion.
16. Remove fan guard, fan, and end covers from motor
17. Inspect air vents and verify they are clear of dirt and obstructions
17a. Remove any dirt or obstructions that may decrease ventilation
18. Clean motor internals by blowing with clean, dry 10-30 psi compressed air
18a. Use a vacuum cleaner as needed to remove debris and dirt
18b. Clean concentrated build up of dirt with an approved nonflammable solvent and lint-free cloths
19. Check motor stator windings for insulation resistance and record in Steps Error! Reference source not found.
20. Inspect motor bearings for cracks or evidence of overheating
20a. Replace bearings as required
21. For motor where the air gap is accessible, measure air gap between rotor and stator with long feeler gages and record in Step Error! Reference source not found.

NOTE: A variation of 10% from one year to the next is permissible

CAUTION: Verify tools and/or materials are not inside the motor prior to closing

22. On motors where rotor shaft is accessible, measure endplay on rotor shaft with dial indicator and record reading in Step Error! Reference source not found.
23. Reassemble motor

WARNING: Do not mix oils of different type or specifications

24. For oil-type lubricated motor
24a. Flush and refill oil reservoirs
24b. Use oil recommended by equipment manufacture
25. Remove tags and restore equipment to service as required

26. Clean work area and remove test equipment and tools
27. Place used cleaning solvent and contaminated rags in proper storage containers
28. Clean and store tools and test equipment
29. Transfer all readings taken to Equipment Notes for the inspected motor
30. DATA
31. Motor Current

Phase A _____ Phase B _____ Phase C_____

32. Motor Voltage

32a. Phase to phase voltage

A:B _____ A:C _____ B:C _____

32b. Phase to ground voltage

A _____ B _____ C _____

33. Motor resistance

33a. Phase to phase resistance

A:B _____ A:C _____ B:C _____

33b. Phase to ground resistance

A _____ B _____ C _____

34. Rotor-stator air gap (viewed from _____)

Top _____ Right _____ Left _____ Bottom _____

35. Rotor endplay: _____

P-TMVGGE18 - MOV Grove Gearbox 18-month Inspection

1. PLANNING
1a. Prior to planned outages or when MOV repairs are required, observe MOV operation for the following: damage, smooth operation in both opening and closing directions, abnormal noise, leakage of grease, intact electrical connections, leakage from valve
1b. Record all findings in equipment notes.
1c. Check logs, CAFM work requests, and PM schedule to develop complete work list
1d. Utility Distribution System technician will coordinate to remove applicable equipment from service.

2. SAFETY PRECAUTIONS
2a. Utility Tunnels are considered Permit Required Confined Spaces and have limited egress. Tunnel entry and work shall be performed in full accordance with the latest edition of AOC/CPP Utility Distribution System Access Control Policy.
2b. Concrete, heat stress, and other hazards exist.
2c. Assume pipe insulation and surfacing materials contain asbestos, unless proven otherwise.
2d. Tunnel entry is limited to trained individuals with appropriate respirators and personnel protective equipment (PPE).
2e. Never work on equipment when energized unless proper electrical safety precautions are taken to prevent shock hazards.
2f. Ensure all energy sources (air, steam, electrical and fluid) have been secured per LOTO Procedure.
2g. Ensure all pressures are vented off prior to removing or breaking any mechanical or piping connections.
2h. Keep hands and clothing clear of rotating components.
2i. Do not manually operate the actuator with devices other than the installed handwheel and declutch lever. Using force beyond the ratings of the actuator and/or using additive force devices such as cheater bars, wheel wrenches, pipe wrenches, or other devices on the actuator handwheel or declutch lever may cause serious personal injury and/or damage to the actuator valve.
2j. If valve portion of the motor operated valve is to remain service, ensure no maintenance is performed on the pressure boundary. This includes the stem seal and all other mechanical joints.
2k. Do not depress the declutch lever during motor operation to stop valve travel.
2l. Care should be taken to avoid pinch points on motor operated valve operating mechanism.

3. REFERENCES
3a. Grove, Installation and Maintenance for B4-B5-B7 Side Entry Ball Valves

4. PURPOSE
4a. Describes the periodic MOV Grove gearbox inspections and maintenance required for system reliability

5. SCOPE
5a. This procedure covers periodic preventative maintenance for the West Plant condenser water and chilled water MOV Grove gearboxes

6. TOOLS
6a. Standard tool set
6b. Flashlight

7. PARTS AND SUPPLIES
7a. MOV Extra grease or equivalent

NOTE: Limitorque originally specified Exxon Nebula EP-0 calcium complex grease. This grease was discontinued in June 2001 and it had a shelf life of one year. Approved replacement grease is MOV Extra. MOV Extra can be mixed with Exxon Nebula EP-0.

7b. Lint-free rags

8. PROCEDURE STEPS
9. Inspect valve operation

9a. Request operations cycle valve
9b. Observe and listen to valve operation
9c. Inspect area between valve body and gearbox for evidence of leakage
9d. Record any abnormal sounds or indications in Step Error! Reference source not found.
9e. Valve observations:
10. Verify equipment has been properly isolated and tagged
11. Remove gearbox cover plate
12. Inspect gearbox for moisture
12a. If moisture is present, investigate and submit corrective work order to repair cause
13. Inspect gearing for the following
13a. Worm gear for wear or cracks
13b. Sector gear (if applicable) for wear or damage
13c. Valve yoke (if applicable) for wear or damage

NOTE: The three primary considerations in a lubrication inspection are: quantity, quality, and consistency

14. Verify lubricant is slightly fluid approximating a standard NLGI-1 grade consistency or less

NOTE: Grease comparison may be made by comparing used lubricant sample to an equal amount of new lubricant meeting the NLGI-1 grade standard

14a. If grease is hard, dry, or separating, submit corrective work order to flush gearbox and repack with fresh lubricant
14b. If grease consistency is acceptable, proceed to Step Error! Reference source not found.
15. Verify grease is clean and free of contaminants including water
15a. If dirt, water, or other foreign matter are found in the grease, submit corrective work order to flush gearbox and repack with fresh lubricant
15b. If grease quality is acceptable, proceed to Step Error! Reference source not found.
16. Verify worm gear is totally surrounded in grease

CAUTION: Do not mix lubricants of a different base chemical. Mixing lubricant bases may cause lubricant properties to be ineffective.

16a. If grease quantity is low, add grease as necessary to totally surround worm gear
16b. If grease quantity is acceptable, proceed to Step Error! Reference source not found.
17. Install gearbox cover
18. Remove tags and restore equipment to service as required
19. Clean work area
20. Remove tools
21. Clean and store tools
22. Record observations in Equipment Notes
23. Report findings to Supervisor
24. DATA
25. Notes

P-TMVLSAE18 - MOV SMB-00 Actuator 18-month Inspection

1. PLANNING
1a. Prior to planned outages or when MOV repairs are required, observe MOV operation for the following: damage, smooth operation in both opening and closing directions, abnormal noise, leakage of grease, intact electrical connections, leakage from valve
1b. Record all findings in equipment notes.
1c. Check logs, CAFM work requests, and PM schedule to develop complete work list
1d. Utility Distribution System technician will coordinate to remove applicable equipment from service.

2. SAFETY PRECAUTIONS
2a. Utility Tunnels are considered Permit Required Confined Spaces and have limited egress. Tunnel entry and work shall be performed in full accordance with the latest edition of AOC/CPP Utility Distribution System Access Control Policy.
2b. Concrete, heat stress, and other hazards exist.
2c. Assume pipe insulation and surfacing materials contain asbestos, unless proven otherwise.
2d. Tunnel entry is limited to trained individuals with appropriate respirators and personnel protective equipment (PPE).
2e. Never work on equipment when energized unless proper electrical safety precautions are taken to prevent shock hazards.
2f. Ensure all energy sources (air, steam, electrical and fluid) have been secured per LOTO Procedure.
2g. Ensure all pressures are vented off prior to removing or breaking any mechanical or piping connections.
2h. Keep hands and clothing clear of rotating components.
2i. Do not manually operate the actuator with devices other than the installed handwheel and declutch lever. Using force beyond the ratings of the actuator and/or using additive force devices such as cheater bars, wheel wrenches, pipe wrenches, or other devices on the actuator handwheel or declutch lever may cause serious personal injury and/or damage to the actuator valve.
2j. If valve portion of the motor operated valve is to remain service, ensure no maintenance is performed on the pressure boundary. This includes the stem seal and all other mechanical joints.
2k. Do not depress the declutch lever during motor operation to stop valve travel.
2l. Care should be taken to avoid pinch points on motor operated valve operating mechanism.

3. REFERENCES
3a. Limitorque, SMB Series/SB Series Actuators, Installation and Maintenance, 140-11000, July 2003

4. PURPOSE
4a. Describes the periodic SMB-00 actuator inspections and maintenance required for system reliability

5. SCOPE
5a. This procedure covers periodic preventative maintenance for the West Plant condenser water system and chilled water system MOV actuators

6. TOOLS
6a. Standard tool set
6b. Grease gun
6c. Digital Megohm insulation resistance tester
6d. AC/DC current clamp on meter true-RMS
6e. Flashlight
6f. Syringe or equivalent to sample grease

7. PARTS AND SUPPLIES

NOTE: Limitorque originally specified Exxon Nebula EP-0 calcium complex grease. This grease was discontinued in June 2001 and it had a shelf life of one year. Approved replacement grease is MOV Extra. MOV Extra can be mixed with Exxon Nebula EP-0.

7a. MOV Extra grease or equivalent grease
7b. Limit Switch Compartment Cover Gasket
7c. CRC Lectra Clean electrical-type solvent cleaner or equivalent
7d. Lint-free rags

8. PROCEDURE STEPS
9. Inspect valve operation
9a. Request operations cycle valve
9b. Observe and listen to valve actuator operation
9c. Record any abnormal sounds or indications in Step Error! Reference source not found.
9d. Valve observations:
10. Verify equipment has been properly isolated and tagged
11. Remove the limit switch compartment cover
12. Inspect for limit switch compartment for moisture
12a. If moisture is present, investigate and submit corrective work order to repair cause
12b. If moisture is present, dry the compartment and components
13. Visually check shaft penetrations for indications of seal leakage

NOTE: Slight oil weepage is not a cause for seal replacement

13a. If abnormal leakage is found, submit corrective work order to replace the seal

NOTE:The plug considered the "drain" or "fill" plug will vary depending on actuator orientation. The fill plug will be on top and the drain will plug will be at the bottom.

14. Remove "fill" plug as required to access the actuator housing
15. Check lubricant consistency
15a. Check lubricant is slightly fluid approximating a standard NLGI-0 grade consistency or less

NOTE: Grease comparison may be made by comparing used lubricant sample to an equal amount of new lubricant meeting the NLGI-1 grade standard

15b. If grease is hard, dry, or separating, submit corrective work order to flush actuator and repack with fresh lubricant
15c. If grease consistency is acceptable, proceed to Step Error! Reference source not found.
16. Inspect lubricant quality
16a. Inspect lubricant for dirt, water or other foreign matter
16b. If dirt, water, or other foreign matter are found in the grease, submit corrective work order to flush actuator and repack with fresh lubricant
16c. If grease quality is acceptable, proceed to Step Error! Reference source not found.
17. Inspect lubricant quantity
17a. Verify worm and worm gear are totally immersed in grease

NOTE: MOV Extra may be used in place of the standard lubricants supplied by Limitorque

CAUTION: Do not mix lubricants of a different base chemical. Mixing lubricant bases may cause lubricant properties to be ineffective.

17b. If grease quantity is low, add grease as necessary to totally immerse worm gear
17c. If grease quantity is acceptable, proceed to Step Error! Reference source not found.
18. Inspect all electrical controls and contacts in the electrical compartment

CAUTION: Do not use abrasive cloth to clean the contacts on the limit switch

18a. Wipe clean all electrical contacts with electrical-type solvent cleaner and remove foreign residue
18b. Verify all electrical terminal connections are tight

NOTE: A motor insulation resistance reading of 1 megohm or higher is considered normal

19. Test motor insulation with a Digital Megohm insulation resistance tester
19a. If motor insulation reading is less than 1 megohm, then submit a corrective work to repair or replace the actuator motor

CAUTION: Do not attempt to repair gearing in the limit switch. Replace entire gear frame assembly if necessary.

20. Inspect physical condition of the geared limit switch including frame and gearing

NOTE: The geared limit switch must be adjusted while the actuator is mounted on the valve

21. Prepare electrical compartment cover for installation
21a. Clean gasketed surfaces on electrical compartment cover
21b. Inspect cover gasket for damage and replace as necessary
21c. Wipe a thin coating (approximately two mils) of grease on surfaces of housing cover flanges
22. Reinstall electrical compartment cover
23. Remove maintenance locks
24. Remove tags and restore equipment to service as required
25. Clean work area
26. Remove tools
27. Clean and store tools
28. Record observations in Equipment Notes
29. Report findings to supervisor
30. DATA
31. Notes

P-TMVLSAES - MOV SMB-00 Actuator Semiannual Lubrication

1. PLANNING
1a. When MOV lubrication is scheduled, observe MOV operation for the following: damage, smooth operation in both opening and closing directions, abnormal noise, leakage of grease, intact electrical connections, leakage from valve
1b. Record all findings in equipment notes.
1c. Check logs, CAFM work requests, and PM schedule to develop complete work list

2. SAFETY PRECAUTIONS
2a. Never work on energized equipment unless proper electrical safety precautions are taken to prevent shock hazards, always work in two man teams.
2b. Do not manually operate the actuator with devices other than the installed handwheel and declutch lever. Using force beyond the ratings of the actuator and/or using additive force devices such as cheater bars, wheel wrenches, pipe wrenches, or other devices on the actuator handwheel or declutch lever may cause serious personal injury and/or damage to the actuator valve.
2c. Do not depress the declutch lever during motor operation to stop valve travel.
2d. Care should be taken to avoid pinch points on motor operated valve operating mechanism.
2e. Observe proper personal protective equipment requirements.

3. REFERENCES
3a. Limitorque, SMB Series/SB Series Actuators, Installation and Maintenance, 140-11000, July 2003

4. PURPOSE
4a. Describes the semiannual SMB-00 actuator lubrications required for system reliability

5. SCOPE
5a. This procedure covers semiannual preventative maintenance for the tunnel MOV actuators

6. TOOLS
6a. Standard tool set
6b. Grease gun
6c. Flashlight

7. PARTS AND SUPPLIES

NOTE: Limitorque originally specified Exxon Nebula EP-0 calcium complex grease. This grease was discontinued in June 2001 and it had a shelf life of one year. Approved replacement grease is MOV Extra. MOV Extra can be mixed with Exxon Nebula EP-0.

7a. MOV Extra grease or equivalent
7b. Rags

8. PROCEDURE STEPS
9. Clean housing cover grease fitting for the Drive Sleeve Top Bearing

CAUTION: Ensure no paint, dirt, or debris is imbedded in grease fitting.

10. Stroke grease gun to clear tip of any dirt or debris
11. Connect grease gun to pressure fitting for the Drive Sleeve Top Bearing
12. Pump grease gun three times
13. Remove grease gun from fitting
14. Clean housing cover grease fitting of any excess grease
15. Cycle valve two times
15a. Observe and listen to valve operation
15b. Inspect area between valve body and gearbox for evidence of leakage
16. Clean work area
17. Remove tools
18. Clean and store tools
19. DATA

20. Notes:

P-TMVLSAET - MOV SMB-00 Actuator Triennial Inspection

1. PLANNING
1a. Prior to planned outages or when MOV repairs are required, observe MOV operation for the following: damage, smooth operation in both opening and closing directions, abnormal noise, leakage of grease, intact electrical connections, leakage from valve
1b. Check logs, CAFM work requests, and PM schedule to develop complete work list
1c. Utility Distribution System technician will coordinate to remove applicable equipment from service.
2. SAFETY PRECAUTIONS
2a. Utility Tunnels are considered Permit Required Confined Spaces and have limited egress. Tunnel entry and work shall be performed in full accordance with the latest edition of AOC/CPP Utility Distribution System Access Control Policy.
2b. Concrete, heat stress, and other hazards exist.
2c. Assume pipe insulation and surfacing materials contain asbestos, unless proven otherwise.
2d. Tunnel entry is limited to trained individuals with appropriate respirators and personnel protective equipment (PPE).
2e. Never work on equipment when energized unless proper electrical safety precautions are taken to prevent shock hazards.
2f. Ensure all energy sources (air, steam, electrical and fluid) have been secured per LOTO Procedure.
2g. Ensure all pressures are vented off prior to removing or breaking any mechanical or piping connections.
2h. Keep hands and clothing clear of rotating components.
2i. Do not manually operate the actuator with devices other than the installed handwheel and declutch lever. Using force beyond the ratings of the actuator and/or using additive force devices such as cheater bars, wheel wrenches, pipe wrenches, or other devices on the actuator handwheel or declutch lever may cause serious personal injury and/or damage to the actuator valve.
2j. If valve portion of the motor operated valve is to remain service, ensure no maintenance is performed on the pressure boundary. This includes the stem seal and all other mechanical joints.
2k. Do not depress the declutch lever during motor operation to stop valve travel.
2l. Care should be taken to avoid pinch points on motor operated valve operating mechanism.

3. REFERENCES
3a. Limitorque, SMB Series/SB Series Actuators, Installation and Maintenance, 140-11000, July 2003

4. PURPOSE
4a. Describes the triennial SMB-00 actuator lubrications required for system reliability

5. SCOPE
5a. This procedure covers triennial preventative maintenance for the tunnel MOV actuators

6. TOOLS
6a. Standard tool set
6b. Flashlight

7. PARTS AND SUPPLIES
7a. Mobil 28
7b. SMB Limit Switch Compartment Cover Gasket (Part No. #57)
7c. SMB Geared Limit Switch O-ring (Part No. #7)

8. PROCEDURE STEPS
9. Verify equipment has been properly isolated and tagged
10. Remove the limit switch compartment cover
11. Change oil in geared limit switch
11a. Remove the geared limit switch
11b. Remove geared limit frame cover
11c. Drain lubricant from the gear frame

11d. Inspect geared limit switch gearing and gear frame internals
11e. Add Mobil 28 lubricant to the gear frame
11f. Install geared limit frame cover
12. Install geared limit switch
13. Adjust geared limit switch setting

NOTE: The rotor-type, two-train geared limit switch employs two rotary drum switches. Each rotary drum switch contains four contacts.

NOTE: When the rotor is properly set to trip at the desired position, two of these contacts open electric circuits and two of the contacts close electric circuits. One rotor is normally set to trip at the full open position of the valve, and the other rotor is normally set to trip at the full close position of the valve.

13a. Using the handwheel, manually open the valve to the full open position
13b. Note the direction of rotation of the Intermittent Gear Shaft, located over the Rotor to be set
13c. Using a screwdriver, turn the Set Rod (item 48) clockwise until it reaches a stop position, Refer to Figure 4.1
13d. If the Rotor for the Gear Shaft being set has not turned 90 degrees to open the contacts that should trip open at this position, insert screwdriver on the Intermittent Gear Shaft and turn in the direction noted in Step Error! Reference source not found. until the Rotor turns and opens the contacts being set
13e. If the Rotor has turned so that the contacts are already open, turn the Intermittent Gear Shaft in the opposite direction as previously noted in Step Error! Reference source not found. until the contacts close
13f. Turn the Intermittent Gear Shaft slightly in the direction noted in Step Error! Reference source not found. until the contacts open

NOTE: Rotor is set at the correct position for contact opening

13g. Back off the Set Rod until it stops

CAUTION: Do not force the Intermittent Gear Shaft in the next step.

13h. Place a screwdriver on the Intermittent Gear Shaft to ensure that the shaft is tight and will not rotate
13i. Close the valve completely
13j. Repeat Step Error! Reference source not found. through Error! Reference source not found. to set the tripping position for the other Rotor
14. Prepare electrical compartment cover for installation
14a. Clean gasketed surfaces on electrical compartment cover
14b. Inspect gaskets and O-rings for damage and replace all damaged gaskets or O-rings
14c. Wipe a thin coating (approximately two mils) of grease on surfaces of housing cover flanges
15. Reinstall electrical compartment cover
16. Remove tags and restore equipment to service as required
17. Clean work area
18. Remove tools
19. Clean and store tools
20. Record observations in Equipment Notes
21. Report findings to supervisor
22. DATA
23. Notes:

P-TSPMB - Tunnel Submersible Sump Pump Biennial Inspection

1. PLANNING
1a. Prior to outages or when pump repairs are required, observe pump operation for the following: debris in sump, water level in sump, oil sheen indicating an oil spill, float position, noise out of the ordinary, leaking from piping connections, or loose bolts.
1b. Record all findings in equipment notes
1c. Check logs, CAFM work requests, and PM schedule to develop complete work list.
1d. Utility Distribution System technician will coordinate to remove applicable equipment from service.
2. SAFETY PRECAUTIONS
2a. Utility Tunnels are considered Permit Required Confined Spaces and have limited egress. Tunnel entry and work shall be performed in full accordance with the latest edition of AOC/CPP Utility Distribution System Access Control Policy.
2b. Concrete, heat stress, and other hazards exist.
2c. Assume pipe insulation and surfacing materials contain asbestos, unless proven otherwise.
2d. Tunnel entry is limited to trained individuals with appropriate respirators and personnel protective equipment (PPE).
2e. Never work on equipment when energized unless proper electrical safety precautions are taken to prevent shock hazards.
2f. Ensure all energy sources (air, steam, electrical and fluid) have been secured per LOTO Procedure.
2g. Ensure all pressures are vented off prior to removing or breaking any mechanical or piping connections.

3. REFERENCES
3a. None

4. PURPOSE
4a. Describes the biennial preventive mechanical maintenance required for equipment reliability.

5. SCOPE
5a. This procedure covers biennial pump inspection for the Tunnel Submersible Sump Pumps

6. TOOLS
6a. Flashlight
6b. Standard tool set
6c. Manual grease gun
6d. Portable sump pump and associated hoses
6e. Hose for filling sump
6f. Rags and proper waste containers

7. PARTS AND SUPPLIES
7a. Grease, Miltec -1 or equivalent

8. PROCEDURE STEPS
9. Operate pump to check for noise, vibration, or insufficient water flow
9a. Coordinate these operational checks with the pump controls inspection
9b. Stop the sump pump
9c. Slowly fill sump with water
9d. Verify that the pump starts as water actuates the level switch
9e. Verify that the water level drops quickly and the dropping of the float turns pump off
9f. If pump runs but water level is slow to drop or if pump is excessively noisy or vibrating, inform Maintenance Supervisor to submit work order for corrective maintenance of pump
9g. Note:The most probable causes for a noisy or vibrating pump are worn bearings, lack of lubrication, low water level, impeller rubbing, damaged impeller, and insufficient NPSH.
10. Verify equipment has been properly isolated and tagged
11. Use portable sump pump to drain the sump completely

11a. Clean out any debris in and around the sump pump pit
12. Disassemble pump for inspection
12a. Request electrician disconnect the electrical supply to the motor
12b. Disconnect the discharge piping at the union nearest the pump
12c. Remove pump assembly out of sump and position it for inspection
12d. Clean pump for visual inspection
12e. Unbolt the strainer and suction cover
12f. Inspect the strainer and suction cover for wear and record in Step Error! Reference source not found.
12g. Inspect the impeller for wear and record in Step Error! Reference source not found.
12h. Remove impeller screw
12i. Remove impeller
12j. Inspect the shaft for wear and record in Step Error! Reference source not found.
12k. Measure runout of drive shaft, verify less than 0.003 inches, and record in Step Error! Reference source not found.
12l. If impeller or shaft is worn or damaged, inform the Maintenance Supervisor and submit corrective work order
12m. Measure wearing ring clearance and record in Step Error! Reference source not found.
13. Attach impeller to shaft
14. Reassemble suction cover
15. Rotate the shaft manually to ensure that the impeller rotates freely
16. Reinstall suction strainer
17. Apply grease to grease fittings (if provided)
17a. Rotate shaft while adding grease to distribute grease
17b. Wipe off excess grease
18. Return the pump assembly to the sump and secure mounting screws
19. Reconnect the piping
20. Remove tags and restore equipment to service as required
21. Add water to sump with water hose
21a. Verify that level rises and the pump starts
21b. Verify that the water level drops quickly and the dropping of the level stops the pump
22. If equipment tests are satisfactory, Mechanic will enter into LOTO log "Note: Equipment back in service".
23. Maintenance Supervisor will inform Shift Supervisor and enter into Pass Down Log, operator will enter in LOTO book, and Shift Supervisor will enter into logbook, change Status Board, and inform General Foreman's office when complete.
24. Clean up work area
25. Remove tools
26. Clean and store tools
27. DATA
28. Pump Inspection:
28a. Suction cover condition: _____
_____
28b. Impeller condition: _____
_____
28c. Suction cover condition: _____
_____
28d. Shaft runout: _____
_____
28e. Wearing ring clearance: _____
_____

P-TSTMSVMA - Tunnel Steam Safety Valve Annual Inspection and Testing

1. PLANNING
1a. Prior to outages or when the tunnel steam safety valves must be inspected or repaired, observe the safety valves during operation for the following: operating condition, steam leaks, indications of leak-by, or other abnormalities.
1b. Record all findings in equipment notes.
1c. Check logs, CAFM work requests, and PM schedule to develop a complete work list.
1d. Utility Distribution System technician will coordinate to remove applicable equipment from service.

2. SAFETY PRECAUTIONS
2a. Utility Tunnels are considered Permit Required Confined Spaces and have limited egress. Tunnel entry and work shall be performed in full accordance with the latest edition of AOC/CPP Utility Distribution System Access Control Policy.
2b. Concrete, heat stress, and other hazards exist.
2c. Assume pipe insulation and surfacing materials contain asbestos, unless proven otherwise.
2d. Tunnel entry is limited to trained individuals with appropriate respirators and personnel protective equipment (PPE).
2e. Never work on equipment when energized unless proper electrical safety precautions are taken to prevent shock hazards.
2f. Ensure all energy sources (air, steam, electrical and fluid) have been secured per LOTO Procedure.
2g. Ensure all pressures are vented off prior to removing or breaking any mechanical or piping connections.
2h. This maintenance may only be performed when the associated steam source is completely shut down, cooled down, and the steam side depressurized and vented to atmosphere.
2i. When safety valves are removed, blanks must be installed over the connections to ensure foreign material does not enter the steam line.

3. REFERENCES
3a. Consolidated Safety Valve Division Print CODE-3-1411-L
3b. Consolidated Safety Valve Division Print CODE-4-1411-L
3c. Consolidated Safety Valve Division Print CODE-4-1415-A-6
3d. Consolidated Installation, Operation, and Maintenance Manual for Consolidated Safety Valve Type 1510, 1511, and 1811,Con -11, Revised 9-93

4. PURPOSE
4a. Describes the annual inspections and testing of the steam safety valves required for system reliability

5. SCOPE
5a. This procedure covers annual preventative maintenance for the tunnel steam safety valves

6. TOOLS
6a. Standard tool set

7. PARTS AND SUPPLIES
7a. Blanks for safety valve opening

8. PROCEDURE STEPS
9. Verify equipment has been properly isolated and tagged
10. Remove the safety valve on the boiler drum
11. Send safety valve to testing/certification contractor for inspection and testing to pressure specified in Step 12
12. Find correct safety valve lift set point:

12a. PTBSC-PSV-01	TBD psig	TBD-inch valve
12b. PTGSB-PSV-01	TBD psig	TBD-inch valve
12c. PTGSA-PSV-01	TBD psig	TBD-inch valve

13. Install a blank over the exposed opening on the steam line
14. When the safety valve is returned from the testing/certification contractor, record safety valve lifting pressure in Step 23

15. Reinstall the safety valve in its designated location on the steam line
16. Visually inspect that all parts are in place
17. Remove tags and restore equipment to service as required
18. Clean work area
19. Discard rags into proper disposal containers
20. Remove, clean and store tools
21. During initial startup of the steam line and return to service, check for leaks
22. DATA
23. Safety Valve lifting pressure: _____

P-TSTMTRPMA - Tunnel Steam Trap Monthly Inspection

1. PLANNING
1a. The steam system must be in operation with steam traps in service to conduct inspection.

2. SAFETY PRECAUTIONS
2a. Care should be taken while inspecting steam traps. Operating steam traps are extremely hot and can cause burns to unprotected skin.
2b. Observe proper personal protective equipment requirements while working around steam traps.

3. REFERENCES
3a. Improving Steam System Performance, U.S. Department of Energy, DOE/GO-102002-1557, June 2002
3b. Steam Trap Inspection Methods and Steam Cost Analysis, UE Systems, Inc.

4. PURPOSE
4a. Describes the monthly inspections required for steam trap reliability

5. SCOPE
5a. This procedure covers monthly preventative maintenance for steam traps

6. TOOLS
6a. Ultrasonic leak detector
6b. Temperature measuring instrument (contact pyrometer, infrared measurement device, or equivalent)
6c. Mechanic's Stethoscope
6d. Flashlight
6e. Inspection mirror

7. PARTS AND SUPPLIES
7a. Tags

8. PROCEDURE STEPS

NOTE: Some flow noises are best picked up with high frequency electronic listening devices, but these devices are not sensitive to mechanical sounds. A mechanics stethoscopes or even screwdrivers can be used to detect mechanical sounds, for example: bucket dance or bubbling through the bucket vent.

NOTE: When checking traps on a manifold, be sure to check all traps. A good trap can telegraph a bad trap's signal. Check to see at which trap the signal is the loudest to locate the faulty trap.

9. Verify steam traps to be inspected are in service and at normal operating pressure

NOTE: Using both temperature and sound test will confirm that a trap is malfunctioning.

10. Visually inspect the steam trap for steam leaks, damage, corrosion, and paint condition and record comments in Notes section
11. Inspect an inverted bucket steam trap
11a. Measure trap inlet steam line temperature, trap temperature, and outlet line temperature

NOTE: The steam temperature at 200 psig is 387 degF. The steam temperature at 15 psig is 250 degF. The steam temperature at 0 psig is 212 degF.

11b. If measured temperatures at trap inlet and outlet are within 10% of the steam temperature, the trap is operating correctly
11c. If measured temperatures at inlet and outlet are high and near one another, then steam is blowing through the trap
11d. NOTE: If a valve upstream or downstream is shut, it will cause the trap temperature to be low. Always verify valve lineup when testing a steam trap.
11e. If the trap inlet temperature is considerably lower than corresponding steam

temperature, there is no flow through the trap
11f. Take readings on the trap with the ultrasonic test meter

NOTE: Inverted bucket traps have a discharge pattern that is usually semi-cyclical. On medium to heavy loads, the trap will have a definite on/off cycle. The ultrasonic tester reading will be a sweeping motion, back and forth. Light loads will change the discharge pattern to a modulating low flow and the ultrasonic tester will give a low continuous reading. When the trap is malfunctioning, the sonic readout will be a full 100% reading for blow-through and an erratic on/off type operation for lost prime failure.

11g. If the trap is discharging intermittently, then it is operating correctly
11h. If the trap is relatively quiet and a steady "bubbling" through the bucket vent is detected, the trap is operating correctly at a light load
11i. If the trap is erratically discharging in an on/off manner, the trap has lost its prime and may corrected by isolating the trap for one hour and then placing it back in service and retested
11j. If the trap is discharging steadily, then trap is blowing steam
11k. Attach tag to trap indicating trap failure
11l. If the trap indicates that it is blowing steam or not passing any condensate, record the results in Step Error! Reference source not found. and submit a corrective work order to repair or replace steam trap
12. Inspect a float and thermostatic trap
12a. Measure trap inlet steam line temperature, trap temperature, and outlet line temperature

NOTE: The steam temperature at 200 psig is 387 degF. The steam temperature at 15 psig is 250 degF. The steam temperature at 0 psig is 212 degF.

12b. If measured temperatures at trap inlet and outlet are within 10% of the steam temperature, the trap is operating correctly
12c. If measured temperatures at inlet and outlet are high and near one another, then steam is blowing through the trap
12d. Note:If a valve upstream or downstream is shut, it will cause the trap temperature to be low. Always verify valve lineup when testing a steam trap.
12e. If the trap inlet temperature is considerably lower than corresponding steam temperature, there is no flow through the trap
12f. Take readings on the trap with the ultrasonic test meter

Note: Float and Thermostatic traps have a discharge pattern that is a continuous modulating flow. If the condensate load is light, sound levels will be normally low and will give a low level continuous readout. A high readout means that some part of the trap has failed. When testing, be aware that this type of trap has two orifices; the main orifice located below the normal condensate level, and the thermostatic air vent at the top in the steam space.

Note: Readings should be compared at high and low loads. To reduce the load, airflow on a coil should be shut off or a blowdown valve before the trap opened. This will allow the trap to shut off or throttle back to a point where a good test can be made.

12g. If the condensate load is high as indicated by a continuous readout, reduce the load to allow the trap to shut or throttle back considerably
12h. If the load has been reduced or cut off and the ultrasound reading is very low or at zero level, the trap is operating correctly
12i. If the trap has a steady discharge at elevated sound levels indicating the trap is blowing steam, submit a corrective work order to repair or replace the steam trap
12j. Attach tag to trap indicating trap failure
12k. If the trap indicates that it is blowing steam or not passing any condensate, record the results in Step Error! Reference source not found. and submit a corrective work order to repair or replace steam trap
13. Inspect a disc (thermodynamic) trap
13a. Measure trap inlet steam line temperature, trap temperature, and outlet line temperature

NOTE: The steam temperature at 200 psig is 387 degF. The steam temperature at 15 psig is 250 degF. The steam temperature at 0 psig is 212 degF.

13b. If measured temperatures at trap inlet and outlet are within 10% of the steam temperature, the trap is operating correctly
13c. If measured temperatures at inlet and outlet are high and near one another, then steam is blowing through the trap

NOTE: If a valve upstream or downstream is shut, it will cause the trap temperature to be low. Always verify valve lineup when testing a steam trap.

13d. If the trap inlet temperature is considerably lower than corresponding steam temperature, there is no flow through the trap
13e. Take readings on the trap with the ultrasonic test meter

NOTE: Disc (thermodynamic) traps have a blast discharge and cycles on/off. An ultrasonic tester typically will give 0-100% reading. A properly operating and sized trap will cycle 4 to 10 times per minute or less. A trap cycling more than ten cycles per minute or continuous discharge means the trap is either severely worn, is subject to high back pressure, or dirt is preventing the disc from closing off.

13f. If the trap is discharging intermittently (about 4 to 10 times a minute), then the trap is operating correctly
13g. If the trap Is discharging intermittently (about twelve or more times a minute) or discharging steadily, the trap is blowing steam through it
13h. Attach tag to trap indicating trap failure
13i. If the trap indicates that it is blowing steam or not passing any condensate, record the results in Step Error! Reference source not found. and submit a corrective work order to repair or replace steam trap
14. Inspect a thermostatic trap
14a. Measure trap inlet steam line temperature, trap temperature, and outlet line temperature
14b. NOTE: The steam temperature at 200 psig is 387 degF. The steam temperature at 15 psig is 250 degF. The steam temperature at 0 psig is 212 degF.
14c. If measured temperatures at trap inlet and outlet are within 10% of the steam temperature, the trap is operating correctly
14d. If measured temperatures at inlet and outlet are high and near one another, then steam is blowing through the trap
14e. NOTE: If a valve upstream or downstream is shut, it will cause the trap temperature to be low. Always verify valve lineup when testing a steam trap.
14f. If the trap inlet temperature is considerably lower than corresponding steam temperature, there is no flow through the trap
14g. Take readings on the trap with the ultrasonic test meter
14h. NOTE: Thermostatic Traps dribble on light loads and modulates on heavy loads but can also cycle on/off. If loads are light, they should give a low readout and cycle on/off. On heavier loads, the trap will tend to modulate or sometimes cycle.
14i. If the trap is discharging intermittently, then the trap is operating correctly
14j. If the readings taken are not clear, shut the inlet valve and allow trap to cool down and then open the inlet valve
14k. After the trap cools down, if it has a high discharge and then stops after a minute, the trap is operating correctly
14l. If there is no change in sound level and trap Is discharging constantly, the trap is blowing steam through it
14m. Attach tag to trap indicating trap failure
14n. If the trap indicates that it is blowing steam or not passing any condensate, record the results in Step Error! Reference source not found. and submit a corrective work order to repair or replace steam trap
15. Clean work area
16. Remove tools
17. Transfer significant findings to the Equipment Notes
18. DATA
19. Trap Inspection:
19a. Trap _____:
19b. Trap _____:
19c. Trap _____:
19d. Trap _____:
19e. Trap _____:
19f. Trap _____:

19g. Trap _____:
19h. Trap _____:
19i. Trap _____:
19j. Trap _____:
19k. Trap _____:
19l. Trap _____:
19m. Trap _____:
19n. Trap _____:
19o. Trap _____:
19p. Trap _____:
19q. Trap _____:
19r. Trap _____:
19s. Trap _____:
19t. Trap _____:
19u. Trap _____:
19v. Trap _____:
19w. Trap _____:
20. Note:

P-TVSEMA - Tunnel Vertical Sump Pump Annual Maintenance

1. PLANNING
1a. Prior to planned outages or when vertical sump pump repairs are required, observe vertical sump pump operation, check logs, CAFM work requests, and PM schedule to develop complete work list. Record all findings in equipment notes.
1b. Utility Distribution System technician will coordinate to remove applicable equipment from service.

2. SAFETY PRECAUTIONS
2a. Utility Tunnels are considered Permit Required Confined Spaces and have limited egress. Tunnel entry and work shall be performed in full accordance with the latest edition of AOC/CPP Utility Distribution System Access Control Policy.
2b. Concrete, heat stress, and other hazards exist.
2c. Assume pipe insulation and surfacing materials contain asbestos, unless proven otherwise.
2d. Tunnel entry is limited to trained individuals with appropriate respirators and personnel protective equipment (PPE).
2e. Never work on equipment when energized unless proper electrical safety precautions are taken to prevent shock hazards.
2f. Ensure all energy sources (air, steam, electrical and fluid) have been secured per LOTO Procedure.
2g. Ensure all pressures are vented off prior to removing or breaking any mechanical or piping connections.
2h. Keep hands and clothing clear of rotating components.

3. REFERENCES
3a. AOC - West Refrigeration Plant Expansion Project O&M Manuals Volume No. 12 of 35

4. PURPOSE
4a. Describes the annual preventive mechanical maintenance required for equipment reliability.

5. SCOPE
5a. This procedure covers annual pump inspection for the vertical Tunnel Sump Pumps.

6. TOOLS
6a. Standard hand tools (screwdrivers, wrenches, ratchets, and sockets)
6b. Grease gun
6c. Flashlight
6d. Inspection mirror
6e. Arbor press
6f. Small block of wood to loosen impeller
6g. 0.015 inch shim
6h. Pin for turning lower coupling half collar (**need size of pin**)

7. PARTS AND SUPPLIES
7a. Grease, high grade multi-purpose lithium No. 1 or equivalent
7b. Approved nonflammable cleaning solvent
7c. Rags (lint free)
7d. Hose for filling pit
7e. Portable submersible sump pump with hose
7f. Sawhorse supports for the pump inspection

8. PROCEDURE STEPS
9. Before isolating Vertical Sump Pump, operate sump pump to check for noise, vibration, or insufficient water flow:
9a. Shut off one of the sump pumps at the control panel.
9b. Remove the sump cover.
9c. Slowly fill sump with water.
9d. Verify that the float for the sewage ejector that is still switched on rises and causes the sewage ejector to start.
9e. Verify that the water level drops quickly and the dropping of the float shuts off the sewage ejector.
9f. If sump pump runs but water level is slow to drop or if sewage ejector is

excessively noisy or vibrating, submit work order for corrective maintenance on sump pump

NOTE: Probable causes for a noisy or vibrating pump is a misaligned or bent shaft, worn bearings, lack of lubrication, water level below casing, impeller rubbing or damaged, and insufficient NPSH.

9g. After sump level has dropped such that sewage ejector has shut off, switch off sump pump that was on and switch on the sewage ejector that was off.
9h. Repeat Steps 9c through 9f for opposite sump pump.
10. Remove vertical sump pump from service and tag out
11. Use portable sump pump to drain the pit completely.
11a. Clean out any debris in and around the sump pit.
12. Disconnect piping from the vertical sump pump
13. Disassemble the sump pump as follows:
13a. Remove the coupling guard.
13b. Remove the motor from the pedestal but do not remove the motor half coupling.
13c. Disconnect the piping at the union nearest the sump pump
13d. Unbolt the sump pump floor plate from the sump cover.
13e. Pull the sump pump assembly out of the pit and lay across supports for inspection.
13f. Clean sump pump for visual inspection
13g. Unbolt the strainer and suction cover
13h. Inspect the impeller and suction cover for wear.
13i. Inspect the shaft for wear or if bent.
13j. If impeller or shaft is worn or damaged, submit corrective work order for repair
13k. Rotate the shaft manually to ensure that the impeller rotates freely.
14. Reinstall suction strainer.
15. Apply grease to the grease fittings:
15a. One grease fitting is located on the shaft near the intermediate bearing housing.
15b. The other grease fitting is located just above the lower bearing housing.
15c. Wipe off excess grease
16. Return the sump pump assembly to the sump pit and secure the mounting screws.
17. Reconnect the piping
18. Remove tags and restore equipment to service.
19. Perform a post maintenance operational check and level indication check as follows:
19a. Shut off one of the sump pumps at the control panel.
19b. Remove the manhole cover.
19c. Slowly fill sump with water.
19d. Verify that the float for the sump pump that is still switched on rises and causes the sump pump to start.
19e. Verify sump level indications and/or warnings illuminate during the sump level change locally
19f. Verify that the water level drops quickly and the dropping of the float shuts off the pump.
19g. Verify sump level indications and/or warnings track clear during the sump level change locally and/or remotely.
19h. If sump pump runs but water level is slow to drop or if sump pump is excessively noisy or vibrating, submit work order for corrective maintenance on sump pump
19i. After sump level has dropped such that sump pump has shut off, switch off sump pump that was on and switch on the sump pump that was off.
19j. If the sump pump does not operate as expected during the operational check, submit a work order to troubleshoot and repair sump level switches.
19k. Repeat Steps 19a through 19i for opposite sump pump
20. Clean up area and remove equipment and tools.
21. Place used cleaning solvent and contaminated rags in proper storage containers.
22. Clean and store tools and test equipment.
23. DATA
24. Notes: