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NITROGEN DIOXIDE (NO_2) AUDIT

by

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CAUTION

Disclaimer: This Standard Operating Procedure has been developed for use by ManTech Environmental Technology, Inc. in support of the National Performance Audit Program (NPAP) under contract to the U.S. Environmental Protection Agency and may not be applicable to the activities of other organizations.

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Effective: When approved

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1.0 SCOPE AND APPLICATION

This procedure describes the certification and verification of the Thermo Environmental (TECO) Model 175 Portable Calibrator for nitrogen dioxide (NO_2). All flows are compared to a primary standard flow calibrator or NIST traceable laminar flow elements (LFEs). Certifications are multiple run averages of NO_2 concentrations using ambient-level air monitors calibrated with NIST traceable standards. The concentration of ozone (O_3) generated at the NO_2 pot settings is determined using an NIST traceable ozone (O_3) monitor. Verifications are comparisons of the ozone generated during the post-audit to the concentrations generated following the GPT.

2.0 SUMMARY

The TECO 175 is a dilution system which employs an O_3 generator to perform GPT. Dilution ratios are determined for each settings on the TECO 175. The device is then connected to a calibrated NO/NOx analyzer and GPT is used to generate NO_2 audit points in the required ranges. The NO_2 audit points are repeated two more times and all three runs are averaged to determine the NO_2 baseline for each point. After the NO_2 runs are completed, the O_3 concentrations generated at the established potentiometer settings are determined. A check of these O_3 concentrations serve as the NO_2 Quick Check in the post-audit checks. If the O_3 generated at the NO_2 potentiometer settings meet the established acceptance criteria of ±4% or ±4 ppb, the device is verified for NO_2. If the O_3 concentrations do not meet the acceptance criteria, the device is re-certified for NO_2 using the NO/NOx analyzer. Any or all problems must be resolved prior to use in the audit program.

3.0 DEFINITIONS

Zero Air:	Ambient air scrubbed for O_3, sulfur, organic compounds, other reactive low molecular weight compounds, and moisture; CO converted to CO_2
UV:	Ultraviolet
NO/NO_x:	Nitric Oxide/Oxides of Nitrogen
ppb:	parts per billion
SRM:	Standard Reference Material

Working Standard: Compressed gas cylinder which has been certified against an SRM

4.0 SAFETY PRECAUTIONS

Observe standard precautions whenever electrical equipment is operated. The TECO 175 contains 120 and 800 volts AC. Use normal precautions when working on the inside of the instrument with the power connected. Under no condition should the instruments be operated without an electrical ground. The instrument is supplied with a 3-wire, grounding line cord. Observe standard safety precautions for working with compressed gas cylinders. The ManTech safety manual addresses these topics and should be reviewed.

5.0 FACILITIES REQUIREMENTS

This SOP requires a facility equipped with electricity, adequate bench space for the apparatus, and a source of zero air.

6.0 INTERFERENCES

Possible interferences include electrical interferences, variable air flow, contamination from leaks, inefficient or exhausted scrubbers, and particulate matter in the air lines or capillaries.

7.0 APPARATUS/MATERIALS

- TECO 175, Portable Calibrator
- LFEs, Types 3, 5, 11 or BIOS® DryCal
- Electronic manometer, for use with LFEs
- TECO 42, Chemiluminescence NO-NO_2-NO_x Analyzer
- NIST traceable working standard, with nominal concentration of 32 ppm NO

- Mixing chamber

- Tri-blend cylinder with the following nominal concentrations: CO (1800 ppm); SO_2 (18 ppm); NO (18 ppm)

- Teflon® tubing, 1/4" diameter, to connect the analyzer to the dilution system

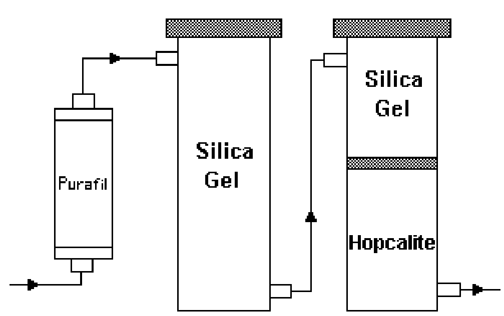
- Teflon® tubing, 1/8" diameter, to connect the gas cylinder to the dilution system

- Plastic tubing, to connect the zero air source, scrubber cartridges, and gas dilution system

- Swagelok® nuts and ferrules, 1/8" and 1/4"

- Scrubber cartridges:

Purafil®:	to remove sulfur, organic compounds, and other reactive low molecular weight compounds
Silica gel:	to remove moisture
Hopcalite®:	to convert CO to CO_2 and remove O_3



8.0 CALIBRATION AND ZERO/SPAN OF ANALYZER

8.1 Consult the NO/NOx instrument manual for proper operation and calibration procedures.

8.2 Perform a five-point calibration using NIST traceable gases on the analyzer every six months or after internal repairs. If problems occur, consult the manufacturer's manual for troubleshooting assistance.

8.3 Use a dilution system (MFCs and mixing chamber) to reduce the NIST traceable cylinder concentrations to levels usable by the analyzer.

- Adjust the dilution (zero) air MFC to obtain a dilution flow of 3 to 5 Lpm to the analyzer.
- Adjust the pollutant MFC to obtain the required flow for the desired calibration points.

8.4 Calibration

8.4.1 Using LFEs, electronic manometer, and the computer program "LFE Flow Calc" to determine flows.

1. Record the barometric pressure in the Zero/Span logbook.

2. Connect the dilution (zero) air line to a type 11 LFE for the dilution (zero) air flow measurement. Make sure that the zero air is on. Allow the pressure differential response on the electronic manometer to stabilize and record it, the LFE temperature, LFE serial number, and the MFC setting in the Zero/Span logbook. Reattach the dilution line to the mixing chamber.

3. Attach the pollutant line to a type 5 LFE. Turn on the pollutant flow. Allow the pressure differential response on the electronic manometer to stabilize and record it, the LFE temperature, LFE serial number, and the MFC setting in the Zero/Span logbook.

4. Access the "LFE Flow Calc" on the laboratory computer. Enter the flow data for both the zero and pollutant as requested by the program. Record the "LFE Input Flow at STP, cc min." in the Zero/Span logbook.

5. Calculate the dilution ratio using **Equation 1** in **Section 10.0 Calculations**. Record the dilution ration in the Zero/Span logbook.

6. Use **Equation 2** in **Section 10.0 Calculations** to determine the calculated output.

   Note: This first concentration level should be between 350 ppb and 450 ppb. If not, adjust the pollutant flow using the MFC to achieve this concentration and repeat **Steps 3 through 6**.

7. Remove the pollutant line from the LFE, attach it to the mixing chamber. Allow the analyzer to sample the NO gas until a stable reading is shown on the strip chart or VideoGraphic recorder. Record the instrument response in the Zero/Span logbook.

8. Determine the percent difference between the instrument response and the calculated concentration using **Equation 3** in **Section 10. Calculations**. Record the percent difference in the Zero/Span logbook.

   - Accept the point if the percent difference # ±1%. **Make no adjustments to the span potentiometer.**
   - If the percent difference is > ±1%, adjust the analyzer span potentiometer until agreement is reached. Always allow the analyzer to stabilize after an adjustment. **Make no further adjustments to the span pot during the remainder of this calibration.** Record the adjusted reading in the Zero/Span logbook.

9. Disconnect the pollutant line from the mixing chamber and reattach it to the type 5 LFE.

10. Repeat **Steps 3 through 8** for each of four upscale points, spaced evenly over the range of the analyzer. Obtain these points by adjusting the flows using the MFCs.

8.4.2 Using a DryCal to determine flows:

1. Dilution Flow

   A. Attach the line from the output of the dilution gas MFC to the input of the DryCal.
   B. Make sure that the zero air is on.
   C. Allow the DryCal to average 10 flows. Individual readings and the average are displayed on the front panel of the DryCal.
   D. Record the average dilution flow in the Zero/Span logbook.
   E. Reattach the dilution line to the mixing chamber.

2. Pollutant Flows

A. Attach the line from the output port of the pollutant MFC to the input of the DryCal.
B. Turn on the pollutant flow.
C. Allow the DryCal to average 10 flows. Individual readings and the average are displayed on the front panel of the DryCal.
D. Record the average pollutant flow in the Zero/Span logbook.
E. Calculate the dilution ratio using **Equation 1** in **Section 10.0 Calculations**. Record the dilution ratio in the Zero/Span logbook.
F. Use **Equation 2** in **Section 10.0 Calculations** to determine the calculated output.

Note: This concentration should be between 350 ppb and 450 ppb. If not, adjust the pollutant MFC to achieve this concentration and repeat **Steps C through E**.

G. Remove the pollutant line from the DryCal and attach it to the mixing chamber. Allow the analyzer to sample the NO gas until a stable reading is shown on the strip chart or VideoGraphic recorder. Record the instrument response in the Zero/Span logbook.

H. Use **Equation 4** in **Section 10.0 Calculations** to determine the percent difference between the instrument response and the calculated concentration. Record the percent difference in the Zero/Span logbook.
- Accept the point if the percent difference # ±1% . **Make no adjustments to the span potentiometer.**
- If the percent difference is >±1%, adjust the analyzer span potentiometer until agreement is reached. Always allow the analyzer to stabilize after an adjustment. **Make no further adjustments to the span pot during the remainder of this calibration**. Record the adjusted response in the Zero/Span logbook.

I. Disconnect the pollutant line from the mixing chamber and reattach it to the DryCal.
J. Repeat **Steps C-H** for each of four additional points which are evenly spaced over the range of the analyzer. Obtain these points by adjusting the flows using the MFCs.

8.5 Derive a calibration curve equation by plotting instrument response values (x) versus calculated concentration (y). See **Equation 4** in **Section 10.0 Calculations**. Use a least squares linear regression to determine the slope (m), y-intercept (b), and correlation (R^2) for this calibration.

1. Accept the calibration if:

   - The slope falls between 0.98 and 1.02.
   - The intercept lies between ±0.3.
   - Correlation $ 0.9999

2. Reject the calibration if the above criteria are not met. Consult the manufacturer's instrument manual for troubleshooting assistance.

8.6 **Zero/Span**

1. Perform an analysis for zero and an upscale response using an NIST traceable NO working standard prior to use.

2. Obtain the zero value while the analyzer is sampling house zero air. If the reading is not within ±0.2 ppb, adjust the analyzer's zero pot until the front panel reads zero.

3. Use either LFEs, electronic manometer, and the computer program "LFE Flow Calc" or the DryCal to determine flows.
   - Set the MFC to the span setting
   - Measure both the dilution and pollutant flows using either LFEs or a DryCal
   . Compute the dilution ratios using **Equation 1** in **Section 10.0** and the calculated concentration using **Equation 2** in **Section 10.0**.
   - Remove the line from the LFE, attach it to the glass mixing chamber. Allow the analyzer to sample the NO gas until a stable reading is shown on the strip chart or VideoGraphic recorder.
   - Record the front panel reading in the Zero/Span logbook.
   - Adjust the span value to meet specifications, if necessary. Record the adjusted value in the Zero/Span logbook.

4. Accept the check if the adjusted zero difference is within ±0.2 ppb and the adjusted span value is within ±2ppb of the calculated concentration (**See Equation 3**).

5. If the instrument cannot be adjusted within specifications, consult the manufacturer's instrument manual for troubleshooting assistance.

9.0 PROCEDURE

9.1 Flow Characterization of the Audit Device

1. Plug the device into a stable 110 V power source and turn the power switch to the ON position. Warm-up the instrument for 15 minutes until the heater indicator light comes on. Set the UV lamp switch in the OFF position.

2. Replace the zero air scrubber materials as follows:
   A. Silica gel: when it turns pink or white
   B. Purafil: when it turns brown or becomes saturated with moisture
   C. Hopcalite® Catalyst: when it has been in use for one year

3. Use ¼" tubing to connect the **OUTPUT** port on the back panel of the TECO 175 to the flow measuring device.

4. Use an NIST traceable flow measuring device to measure the pollutant flows at the **HIGH**, **MED**, and **LOW** settings, and the dilution flow at the **ZERO** setting.

   A. Using an LFE and manometer to determine air flow.

      (1) Use a Type 5 for the **LOW** setting.

      (2) Use a Type 3 for the **HIGH** and **MED** settings

      (3) Use a Type 11 for the **ZERO** setting (Dilution flow).

      (4) Record the requested parameters on the "Dilution System Flow Certification Form."

      (5) Measure each flow four times and then average the values obtained. Use this averaged value in **Step (6)**.

(6) Access the "LFE Flow Calc" on the laboratory computer. Enter the data as requested by the program and record the "LFE Input Flow at STP, cc min." These are the **certified flows**.

B. Using a DryCal to determine flows.
(1) Read the flow off the front panel.
(2) Record the requested parameters on the "Dilution System Flow Certification Form."

5. Use **Equation 1** in **Section 10.0 Calculations** to determine the dilution ratio for each setting.

6. Assign a certified tri-blend cylinder and regulator to the TECO 175.

   A. Maintain these assignments throughout the service life of the cylinder/equipment.

   B. Use the assigned pump, tri-blend cylinder, and the regulator during the certification and verification procedures.

7. For each setting, use the dilution ratio and the certified tri-blend cylinder value for NO to determine the pollutant calculated concentration (**Equation 2** in **Section 10.0 Calculations**). Record the values in "Calc. Conc." on the form "System Certification Check for 175's and GDS's."

9.2 <u>NO/NOx Certification</u>

1. Set up the TECO 175 as in **Steps 1 and 2** in **Section 9.1** **<u>Flow Characterization of the Audit Device</u>**.

2. Use a Swagelok® union cross fitting to attach the **OUTPUT** port of the TECO 175 to the NO/NOx analyzer. Be sure that the vent is open and that the remaining port is capped. Connect the zero air system to the TECO 175. Turn **ON** the pump.

3. Follow **III. Gas Cylinder Regulator Equilibration** in the "Field Instructions for the TECO 175 Multi-pollutant Audit Device" (See Attachment).

4. Connect the cylinder regulator output to the **GAS IN** port of the TECO 175 with 1/8" Teflon® tubing.

5. Set the four-way valve on **HIGH**, the air pressure on **9 psi**, and the gas pressure on **5.5 psi**. The UV lamp is in the OFF position.

A. Wait approximately 10 minutes for the reading on the NO analyzer to stabilize. Record the reading.

B. If the reading does not stabilize, repurge the cylinder regulator and check the analyzer and TECO 175 for leaks. If the problem persists, send the TECO 175 to Repair.

6. Enter the reading from (**5A)** in "Meas. Conc." on the "System Certification Check Form."

7. Repeat Steps 4 and 5 at the **MED**, **LOW**, and **ZERO** settings.

8. Use **Equation 4** in **Section 10.0 Calculations** to calculate the percent difference (% diff.) for the **HIGH**, **MED**, and **LOW** points. For the **ZERO**, determine the difference in ppb. Enter these differences on the "System Certification Check Form."

A. Accept the verification if all differences meet the acceptance criteria:

HIGH	± 3%
MED	± 5%
LOW	± 7%
ZERO	± 4ppb

B. Reject the verification if the difference exceeds the acceptance limits. Leak check both the analyzer and the TECO 175, verify the analyzer calibration, recheck the TECO 175 flows, and verify the cylinder concentration. If the problem persists, send the TECO 175 to Repair.

9.3 NO_2 Certification by GPT

1. Record the barometric pressure on the form "GPT Calibration For 175's."

2. Set the four-way valve on **HIGH**, the air pressure on **9 psi**, and the gas pressure on **5.5 psi**. Turn the UV lamp **ON**.

3. Connect the zero air train to a pump and the other end to the **AIR IN** port of the TECO 175. Turn on the pump.

   A. Set the air flow of the TECO 175 at **9 psig** using the pressure control knob. If adjustment is needed, reduce the pressure to below 9 psig and then adjust UP to 9 psig. **DO NOT** tap the gauge.

   B. After five minutes, check the gauge setting. If it has shifted, reset it to 9 psig using the above sequence.

   C. Check the pressure prior to recording a reading. Reset to 9 psig if necessary.

4. Determine the potentiometer setting that generates NO_2 in the 350 to 450 ppb range.

   Note: The TECO operations manual suggests adding enough O_3 to the NO gas concentration to bring the NO_2 channel of the analyzer upscale near the desired concentration. However do not add so much that the NO channel goes below 10% of the initial NO gas concentration.

5. Wait for the analyzer to stabilize. When the pot setting and resulting concentration is determined for this range, record the setting and each pollutant concentration (NO_2, NO, and NOx) on the form "GPT Calibration For 175's."

6. Reduce the pot until the NO_2 value stabilizes in the 150 - 200 ppb range. Record the pot setting and each pollutant concentration (NO_2, NO, and NOx) on the form "GPT Calibration For 175's".

7. Reduce the pot until the NO_2 value stabilizes in the 30 - 80 ppb range. Record the pot setting and each concentration (NO_2, NO, and NOx) on the form "GPT Calibration For 175's".

8. Turn the lamp switch OFF and let the device stabilize. Record the response for NO, NO_2, and NOx.

9. Repeat the NO_2 GPT for a total of three runs using the pot settings determined in **Steps 4, 6, 7 and 8**. Record pollutant concentrations on the form "GPT Calibration For 175's."

10. Enter the date, barometric pressure, pot settings, and NO_2 values into the NPAP data base for the first run. Enter the date, barometric pressure and NO_2 values for the second and third run. The computer program calculates ppb and percent differences using **Equations 5 and 6**. It then establishes a baseline value for each NO_2 point.

    A. Accept the verification if the differences are within the acceptance criteria:

Highest pot setting:	± 3%	(Step 5)
Middle pot setting:	± 5%	(Step 6)
Lowest pot setting:	± 7%	(Step 7)
Lamp Off (zero):	± 4ppb	(Step 8)

    Record the pot settings on the "Shipping Form."

    B. Reject the check if the criteria are not met. Recheck the flows, inspect the device for defects, check all connections for leaks, and check the analyzer calibration. If the problem persists, send the device to Repair.

9.4 O_3 Concentrations at NO_2 Pot Settings

Note: The following steps are modified from **Section 10.0** of **NPAP-SOP-012: Ozone Audit**.

9.4.1 Set Up of the TECO 175

1. Plug the device into a stable 110 V power source and turn the power switch to the ON position. Warm-up the instrument until the heater indicator light comes on. This takes approximately 15 minutes. Set the UV lamp switch in the OFF position.

2. Replace the zero air scrubber materials as follows:
   A. Silica gel: when it turns pink or white
   B. Purafil®: when it turns brown or becomes saturated with moisture
   C. Hopcalite® Catalyst: when it has been in use for one year

3. Use ¼" Teflon® tubing with the Swagelok® union cross to connect the **OUTPUT** port on the back panel of the TECO 175 device to the **SAMPLE** inlet on the TECO 49.

4. Set the four-way valve on the front panel to the **ZERO** position.

5. Connect the zero air train to a pump and the other end to the **AIR IN** port of the TECO 175. Turn ON the pump.

   A. Set the air flow of the TECO 175 at **9 psig** using the pressure control knob. If adjustment is needed, reduce the pressure to below 9 psig and then adjust UP to 9 psig. **DO NOT** tap the gauge.

   B. After five minutes, check the gauge setting. If it has shifted, reset it to 9 psig using the above sequence.

   C. Check the pressure prior to recording a reading. Reset to 9 psig if necessary.

9.4.2 Establishment of O_3 Concentrations at NO_2 Pot Settings

1. Record the atmospheric pressure and the serial number of the TECO 49 in the TECO 175 logbook.

2. With the ozone lamp switch in the off position, let the TECO 175 stabilize at **ZERO** as indicated by a straight line on the strip chart. Record the O_3 concentration for the zero setting from the front panel of the TECO 49 analyzer. If the reading from cell A differs from cell B, average the values and round to nearest whole number to determine the O_3 concentration. If this value is greater than 5 ppb, replace the silica gel, Hopcalite® and Purafil® cartridges in the zero air scrubber train. If the zero point is still greater than 5.0 ppb, contact ManTech in-house repair.

3. Turn the UV lamp on. Set the potentiometer at the **HIGH** setting determined in **Section 9.3** **NO_2 Certification by GPT**. Allow the device to stabilize for 30 to 45 minutes; a stable reading will be indicated by a straight line on the strip chart. The O_3 concentration is averaged as in **Step 2** of this section. Record the pot setting and O_3 concentration in the TECO 175 logbook.

4. Set the potentiometer at the **MED** NO_2 pot setting. Allow the device to stabilize. The device generally stabilizes at the lower settings in five to ten minutes. Record the pot setting and the O_3 generated in the TECO 175 logbook.

5. Set the potentiometer at the **LOW** NO_2 pot setting. Allow the device to stabilize. Record the pot setting and the O_3 generated in the TECO 175 logbook.

6. Run the audit pot settings for the O_3 Audit concurrently with the NO_2 pot settings. Record the pot settings and the O_3 generated in the TECO 175 logbook as an O_3 Quick Check.

7. Access the NPAP Data Base and enter both the O_3 and NO_2 data in the Standards Data Entry Section (See **Section 10.3 Verification/Quick Check Data Base Entry** in **NPAP-SOP-012: Ozone Audit** for more detail). Record the percent difference and new baseline for the O_3 section in the TECO 175 logbook.

9.4.3 NO_2 Quick Check

1. After unpacking the device, check for loose fittings or damaged parts.

2. Set up the device as in **Section 9.4.1 Set Up of the TECO 175**.

3. Record the barometric pressure and the serial number of the TECO 49 in the device logbook.

4. Run the NO_2 Quick Check concurrently with the O_3 Quick Check (See **NPAP-SOP-012: Ozone Audit**). Determine the O_3 generated at zero and all of the established potentiometer settings for the two audits. Record each pot setting and the O_3 generated in the device logbook.

5. Access the NPAP Data Base and enter the ozone concentrations for both audits in the Standards Data Entry Section. (See **Section 10.3 Verification/Quick Check Data Base Entry** in **NPAP-SOP-012: Ozone Audit** for more detail). Record the percent difference and new baseline for the O_3 section in the instrument logbook.

6. Accept the Quick Check if all the differences fall within ±4% or ±4 ppb for the **O_3 concentrations** at the NO_2 pot settings determined in **9.4.2 Establish O_3 Concentrations at NO_2 Pot Settings**. Record the pot settings on the Shipping Form.

   Note: If the device fails to meet the criteria due to debris in the ozone capillary, clean the capillary and rerun the points. If the device passes, a four-day recertification is not required.

7. A. If **only one** concentration exceeds the ±4% or ±4 ppb criteria, check for leaks or loose fittings. Repeat the Quick Check. Accept the Quick Check if the

acceptance criteria is met. If one or more concentrations exceed the acceptance criteria on this recheck, the device fails.

B. If more than one O_3 concentration fails the ±4% or ±4 ppb criteria at the NO_2 pot settings, the device fails the Quick Check. If the problem is not determined or cannot be remedied by laboratory personnel, send the device to ManTech in-house repair.

C. If the device fails the O_3 Quick Check, then by default, the device fails the NO_2 Quick Check.

8. When the cause of the failure has been determined and remedied, recertify the NO_2 by GPT. Establish the O_3 concentrations at the NO_2 pot settings. Fill out the shipping form and send the device to shipping if all other pollutant Quick Checks have passed.

10.0 CALCULATIONS

Equation 1:

$$\frac{\text{Pollutant Flow}}{\text{Pollutant Flow + Dilution Air Flow}} = \text{Dilution Ratio}$$

Equation 2:

$$\text{Dilution Ratio} \times \text{Cylinder Concentration} = \text{Calculated Concentration}$$

Equation 3:

$$y = mx + b$$

where x = Instrument Response
y = Calculated Concentration
b = y-Intercept
m = Slope

Equation 4:

$$\frac{\text{Measured Concentration - Calculated Concentration}}{\text{Calculated Concentration}} \times 100 = \text{\% Diff.}$$

Equation 5:

$$z_3 - \{(z_1 + z_2)/2\} = \text{Difference for "zero," } \textit{i.e.}\text{, lamp off}$$

where z_i = Measured concentration with the lamp OFF
i = Run number

Equation 6:

$$\frac{100\% [x_3 - \{(x_1 + x_2)/2\}]}{[(x_1 + x_2)/2]} = \text{Difference for High, Mid, or Low}$$

where x_i = Measured concentration at High, Mid, or Low pot. settings
i = Run number

11.0 QUALITY ASSURANCE/QUALITY CONTROL

- The analyzer is calibrated against an NIST traceable gas every six months.
- The span of the analyzer is checked with an NIST traceable standard before each day's use.
- GDS flows are established using an NIST traceable measuring device and are checked every six months.

12.0 CORRECTIVE ACTION

1. NO/NO_x Analyzer

   - Check flows
   - Check cylinder concentrations
   - Check analyzer calibration

2. TECO 175: O_3/NO_2 concentrations exceed criteria:

   - Check UV lamp (Also indicated by O_3 Quick Check failure)
   - Check flows
   - Check cylinder concentrations

3. Unstable O_3 production

   - Check for leaks and loose fittings
   - Replace UV lamp

13.0 SHIPPING

The TECO 175 is ready for shipment when it has been checked for all pollutants, including the O_3 response at the NO_2 potentiometer settings.

1. Check the audit kit for completeness of parts.

2. Check the audit cylinder pressure.

3. Select the next participant from the audit list.

4. Record which audit kit is being sent to that participant.

5. Prepare a data packet with the following:

   - Cover letter
   - Instructions for conducting the audit
   - Data sheets
   - Return instructions with return address labels and associated paperwork
   - Data return envelope
   - Questionnaire

6. Enclose the packet in the shipping box with the audit kit.

7. Apply the participant address label to the shipping box.

8. Ship using the appropriate carrier and following the appropriate 49CFR regulations.

9. Enter the shipment into the NPAP data base.

14.0 DATA REPORTING

Audit data is sent directly to the Data Entry personnel and handled according to **NPAP-SOP-005: Computer Data Entry, Report Printing, and System Maintenance for the NPAP**.

15.0 REFERENCES

1. NPAP-SOP-012: Ozone (O_3) Audit.

2. Thermo Environmental Instruments *Instruction Manual Model 42, Chemiluminescence NO-NO_2-NOx Analyzer*, 11/91 .

ATTACHMENT

"Section III. Gas Cylinder Regulator Equilibration" from *Field Instructions for the TECO 175 Multi-pollutant Audit Device*