

## **A SITE OPERATIONAL PROCEDURES**

### **A.1 Introduction**

A major factor in ensuring high quality data from the Automatic Urban and Rural Network will be the regular visits to each monitoring site carried out by locally based personnel. These site visits will allow the following functions to be undertaken:

- (1) Precalibration checks;
- (2) Calibration of analysers;
- (3) Changing the particulate monitor filter (if applicable);
- (4) Postcalibration checks, safety and security inspection.

Together with these routine functions, there will be instances when non-routine site visits will be necessary, in the event of apparent instrument or system malfunction.

Procedures associated with particle analysers (PM<sub>2.5</sub> or PM<sub>10</sub>) are covered in a separate section.

Local site operators will be trained in all aspects of normal equipment operation by the CMCU, and in the relevant calibration procedures by the QA/QC Unit. Operators must retain copies of instrument manuals at each site, and are required to familiarise themselves with normal operating principles and characteristics of the instrumentation.

Calibration procedures differ from instrument to instrument, but the basic principle is common to all analyser types, with the exception of the particulate analyser. As described in Chapter 10, routine calibrations will take the form of a simple two-point calibration. More detailed instrument tests will be undertaken by QA/QC Unit personnel, in combination with the 6 monthly instrument intercalibration and servicing exercises (see Chapter 13).

Each analyser must be calibrated exactly *as found*. In this way, any instrumental drifts which may have occurred since the previous calibration will

be exactly quantified, with there being no possibility that changes in response have been caused by any operator action.




Acting only on advice from the CMCU, instrument adjustments may be performed to optimise analyser sensitivity. If such adjustments are found to be necessary, the instrument will be recalibrated after a suitable initial stabilisation period typically 15 minutes, so allowing the production of provisional revised calibration factors. However, full stabilisation of the instrument may take several hours and hence, ideally the instrument should be recalibrated after a further 24 hours. The CMCU will advise on this. It is not anticipated that instrument adjustments of this sort will be required frequently.

The following sections of the manual describe step-by-step procedures which must be followed during site visits. It is essential that the procedures are followed as written, for both routine and non-routine site visits, to ensure that reliable and accurate air quality measurements are made. However, the sequence in which zero and span calibrations are performed is not critical.

The exact specification of the calibration systems at each monitoring may differ slightly. The control of gas delivery into the analysers may use an excess flow meter, or an in-line critical orifice restricting the pressure. Training in the use of these systems is provided by the QA/QC Unit as required.

## **A.2 Preparation**

1. Upon arrival at the site, check the pollutant levels on the front panel of each analyser to see if an episode is occurring i.e. pollution levels during the last hour are above, or close to, the trigger values as discussed in Section 10.6 ( $O_3 > \sim 70$  ppb,  $NO_2 > \sim 75$  ppb,  $SO_2 > \sim 90$  ppb and  $CO > \sim 10$  ppm). If an episode is occurring phone CMCU before proceeding any further.
2. Start up the electronic calibration sheet on the computer, or take a new set of check and calibration sheets and enter Site, Date and Operator and Start Time.
3. Ensure the Operational Manual is to hand, and follow the instructions carefully.

4. Ensure that the site toolkit (if provided) is complete.
  5. The analysers can be switched out of service by either:
    - pressing "Menu" , scrolling down to "Instrument controls" and selecting "Service mode". Switch the service mode on by pressing "Return ←". Press "" to return to the main screen. A spanner should appear on the bar on the screen. If the spanner does not appear, the CMCU should be telephoned upon arrival. This will allow them to ensure that calibration data is not disseminated as ambient data
- or:
- If displayed, press the "SERV" key on the main screen to enter service mode. Switch the service mode on by pressing "Return ←". Press "" to return to the main screen. A spanner should appear on the bar on the screen. If the spanner does not appear, the CMCU should be telephoned upon arrival. This will allow them to ensure that calibration data is not disseminated as ambient data



### **A.3 Precalibration Checks**

In this section, a number of initial visible checks are made on the equipment. Some checks require a value to be recorded in the precalibration spreadsheet. Complete all the checks for all the analysers and ancillary equipment. When all checks are complete, inform the CMCU if any are not correct, before proceeding with the calibration.

In case of difficulty operating the logger contact your CMCU who will be able to offer assistance.



#### **A.3.1 CO Analyser**

The Thermo Electron model 48i CO analyser has a LCD display which, in all operating modes, shows the current CO concentration.

1. Check the display and record the current CO concentration in the precalibration checklist, and check the analyser is in service mode-see Section A2 ("Preparation")
2. Record any fault warnings/unusual display status.
3. Access the analysers alarm status from the primary screen by using the Alarm and arrow keys. Note any alarms displayed. To return to the primary screen press 
4. Access the instrument operating parameters by pressing the "DIAGS" key.scroll down, using the arrow and enter keys, to access and record all of the required temperature, pressure and flow parameters in the precalibration checklist. To return to the primary screen press 



### A.3.2 NO<sub>x</sub> Analyser

The Thermo Electron model 42i Nitrogen Oxides analyser has a LCD display which, in all operational modes shows the current NO, NO<sub>2</sub> and NO<sub>x</sub> concentration.

1. Check the display and record the current NO, NO<sub>2</sub> and NO<sub>x</sub> concentrations in the precalibration checklist and check the analyser is in service mode-see Section A2 ("Preparation").
2. Record any alarms/unusual display status. Press "Alarms" and note any displayed.
3. Access the analysers alarm status from the primary screen by using the Alarm and arrow keys. Note any alarms displayed. To return to the primary screen press .
4. Access the instrument operating parameters by pressing the "DIAGS" key.scroll down, using the arrow and enter keys, to access and record all of the required temperature, pressure and flow parameters in the precalibration checklist. To return to the primary screen press .



### A.3.3 SO<sub>2</sub> Analyser

The Thermo Electron model 431 SO<sub>2</sub> analyser has a LCD display which, in normal operation shows the current SO<sub>2</sub> concentration.

1. Check the display and record the current SO<sub>2</sub> concentration on the precalibration checklist and check the analyser is in service mode-see Section A2 ("Preparation").
2. Record any alarms/unusual display status.
3. Access the analysers alarm status from the primary screen by using the Alarm and arrow keys. Note any alarms displayed. To return to the primary screen press .
4. Access the instrument operating parameters by pressing the "DIAGS" key.scroll down, using the arrow and enter keys, to access and record all of the required temperature, pressure and flow parameters in the precalibration checklist. To return to the primary screen press .

#### A.3.4 Ozone Analyser

The Thermo Electron model 49i O<sub>3</sub> analyser has a LCD display which, in normal operation shows the current O<sub>3</sub> concentration.

1. Check the display and record the current O<sub>3</sub> concentration on the precalibration checklist and check the analyser is in service mode-see Section A2 ("Preparation")
2. Record any alarms/unusual display status.
3. Access the analysers alarm status from the primary screen by using the Alarm and arrow keys. Note any alarms displayed. To return to the primary screen press 
4. Access the instrument operating parameters by pressing the "DIAGS" key.scroll down, using the arrow and enter keys, to access and record all of the required temperature, pressure and flow parameters in the precalibration checklist. To return to the primary screen press 

### A.3.10 Zero Air Generation

Zero air may be provided by chemical scrubber towers (with or without a pump), or using a zero air cylinder. For scrubber-equipped sites at which all pollutants are measured, two zero towers will be present, check the condition of the scrubber materials in the canisters, two of which are self indicating; silica gel turns from orange to clear and purafil from purple to brown as it becomes exhausted.

1. Check that at least 25% of the silica gel is still orange. If less than 25% of the silica gel is orange proceed to section A.3.11 - Changing the Silica Gel.
2. Check that at least 25% of the purafil is still purple. If less than 25% of the purafil is purple, note on the calibration record sheet, but continue with calibration.
3. Check the tubing from the canisters is secure and the lid is tight.

### A.3.11 Changing the Silica Gel

If it is necessary to change the silica gel proceed as follows. Note that silica gel is hazardous, and the dust should not be inhaled. A dust mask should be worn, and the material transferred in a well ventilated area (outside). The traditional blue/pink gel is more hazardous due to the cobalt chloride indicator, and this should be phased out by safer alternatives.

NOTE: If no silica gel is available, proceed with the full calibration of all analysers as normal, noting the fact that the silica gel needs replacing on the record sheet. Inefficient silica gel will only affect the zero on the CO analyser.

1. Remove the metal screw top, spring, metal and fabric spacer from the canister.
2. Empty the spent silica gel into a suitable container. The spent silica gel can be regenerated in an oven by the LSO or replaced by the ESU at service. Take care not to breathe in any silica gel dust, as it is harmful.

3. Refill the canister with the fresh silica gel retained on site.
4. The packing order of the components should be as shown in Figure D.5, Appendix D.
5. Replace the metal and fabric spacers. Replace the spring. Ensure that the rubber "O" ring is situated in the screw on top of the canister. Screw the metal top on to the canister.
6. Mark the date of the change with a sticker on the silica gel canister.
7. Check the tubing from the canister is secure and the lid is tight.

#### A.3.12 Completion of Precalibration Checks

If any of the above checks are not correct, inform CMCU before proceeding with calibration.

If all correct, proceed to section A.4.

#### **A.4 Analyser Calibration Procedure**

Results of the calibration will be taken from either the data logger display (if fitted) or the instrument's display for recording on the calibration record sheets. The on-site chart recorder (if present) is to be used to determine that the instrument has fully stabilized in its response to the gas sample being introduced at its inlet.

When closing the calibration gas cylinder valves, care should be taken not to over tighten the valves on the gas regulator. Over tightening can damage the needle valve mechanism resulting in the outlet valve failing to open. The main valve on the top of each cylinder should, however, be tightly closed to avoid venting the cylinder.

##### **A.4.2 CO Analyser**

The two point calibration of the carbon monoxide analyser will be undertaken during each site visit or in the rare event of an analyser adjustment. The calibration will be carried out as follows:

1. Record the instrument number on the calibration record sheet.
2. Switch CO "out of service" control to on. This allows calibration data to be flagged. Methodologies for flagging calibration data vary between systems, in case of difficulty consult your CMCU.
3. If necessary, locate the inlet line to the CO analyser, and disconnect it from the manifold.
4. (Scrubber equipped sites) Connect the zero air canister to the inlet line so that the analyser is now sampling air through the zero air canister. The zero air scrubber to be used is the one containing the orange silica gel and the black hopcalite. The silica gel end should be open to the environment, the hopcalite end connected to the instrument.

(Cylinder equipped sites) Set the calibration valve to "Zero" and turn on the zero air gas cylinder. Ensure there is sufficient gas flow to the analyser (where possible)

5. Allow the analyser to stabilise on zero air for a period of not less than 10 minutes.
6. Record three consecutive CO readings from the data-logger or instrument display (depending on site configuration), allow 10 seconds between each reading.
7. Remove the zero air canister from the inlet line, or turn off the cylinder.
8. If necessary, connect one end of the excess flow meter to the inlet line, the other end to the regulator attached to the carbon monoxide (CO) in air calibration gas cylinder. (Cylinder-equipped sites) Set the calibration valve to "Span"
9. Open the CO in air cylinder main valve by turning it fully anticlockwise. Read cylinder pressure from right hand dial and cylinder number from tag on cylinder, and enter these on the calibration sheet. Do not use the cylinder if the pressure indicated is less than 300 psi. In this event contact CMCU immediately.
10. Adjust the regulator secondary pressure to 15 psi, as read from left hand dial, by turning the pressure control (right hand) valve. Slowly open the regulator outlet (left hand) valve adjusting the flow through the excess flow meter to produce  $1.0 \pm 0.1$  litres per minute.
11. Allow the analyser to stabilise on this sample for a period of not less than 10 minutes. Ensure that the excess flow measured by the flow meter remains stable during this time. Adjust the flow, if necessary, to maintain 1.0 litre per minute.
12. Record three consecutive CO readings from the data logger or instrument display (depending on site configuration). The signal should show a large deflection from the zero point previously obtained.
13. In the following order, fully close the regulator outlet valve (do not overtighten), the main cylinder valve (tightly) and the primary regulator valve. This traps gas in the regulator, thus ensuring a positive pressure and hence, no ingress of ambient air. Note that the pressure regulator dials should remain at their previous setting, if a marked decrease is

observed there is a leak in the system, and the CMCU should be informed.

14. By considering previous calibration results (if present) obtained from the calibration just performed, satisfy yourself that the calibration has proceeded successfully. The zero value should not differ by more than 10 mV ( $\sim 0.5$  ppm) from the previous calibration. The span calibration value should not differ by more than 5% from that obtained during the previous calibration. If in doubt, repeat the relevant procedure. If the results of this are also unsatisfactory, contact the CMCU.
15. Change the CO analyser sample inlet filter, following the instructions given in part A.4.6 of this section.
16. If necessary, reconnect the ambient sample line to the analyser. Turn the calibration valve to "Ambient"
17. Switch the CO analyser back into service by exiting the service mode when the analyser has fallen to ambient levels. Access the "Service Mode" as described in section 3.1 and switch service mode off. The spanner should disappear from the bar on the screen.

#### A.4.3 NO<sub>x</sub> Analyser

The two point calibration of the Nitrogen Oxides analyser will be undertaken during each site visit or in the rare event of an analyser adjustment. The calibration will be carried out as follows:

1. Record the instrument number on the calibration record sheet.
2. Press the out-of-service switch so that the calibration data is flagged.
3. If necessary, locate the inlet line to the NO<sub>x</sub> analyser, and disconnect it from the manifold.
4. (Scrubber equipped sites) Connect the zero air canister to the inlet line so that the analyser is now sampling air through the zero air canister. The zero air scrubber to be used is the one containing the pink Purafil and the black charcoal. The Purafil end should be open to the environment, the charcoal end connected to the instrument.

(Cylinder equipped sites) Set the calibration valve to "Zero" and turn on the zero air gas cylinder. Ensure there is sufficient gas flow to the analyser (where possible)

5. Allow the analyser to stabilise on zero air for a period of not less than 10 minutes.
6. Record three consecutive sets of NO<sub>x</sub> , NO, NO<sub>2</sub> readings from the data-logger or instrument display (depending on site configuration), allow 10 seconds between each set of readings.
7. Remove the zero air canister from the inlet line, or turn off the zero air cylinder.
8. If necessary, connect one end of the excess flow meter to the inlet line, the other end to the regulator attached to the nitric oxide (NO) in nitrogen calibration gas cylinder. Turn the calibration valve to "NO Span"
9. Open the NO in nitrogen cylinder main valve by turning it fully anticlockwise. Read cylinder pressure from right hand dial and cylinder number from tag on cylinder, and enter these on the calibration sheet.

Do not use the cylinder if the pressure indicated is less than 300 psi. In this event contact CMCU immediately.

10. Adjust the regulator secondary pressure to 15 psi, as read from left hand dial, by turning the pressure control (right hand) valve. Slowly open the regulator outlet (left hand) valve adjusting the flow through the excess flow meter to produce  $1.0 \pm 0.1$  litres per minute.
11. Allow the analyser to stabilise on this sample for a period of not less than 10 minutes. Ensure that the excess flow measured by the flow meter remains stable during this time. Adjust the flow, if necessary, to maintain 1.0 litre per minute.
12. Record three consecutive sets of  $\text{NO}_x$ , NO,  $\text{NO}_2$  readings from the data-logger or instrument display (depending on site configuration), allow 10 seconds between each set of readings. The signal should show a large deflection from the zero points previously obtained.
13. In the following order, fully close the regulator outlet valve (do not overtighten), the main cylinder valve (tightly) and the primary regulator valve. This traps gas in the regulator, thus ensuring a positive pressure and hence, no ingress of ambient air. Note that the pressure regulator dials should remain at their previous setting, if a marked decrease is observed there is a leak in the system, and the CMCU should be informed.
14. Turning now to the  $\text{NO}_2$  in air calibration cylinder, repeat steps 8 to 11.
15. Record three sets of  $\text{NO}_x$ , NO and  $\text{NO}_2$  readings from the data-logger or instrument display (depending on site configuration). Allow 10 seconds between each set of readings.
16. Verify that the readings are reasonable: the NO signal should be close to that obtained while performing the zero calibration, with the  $\text{NO}_x$  and  $\text{NO}_2$  signals showing approximately the same large deflection from this zero point.
17. Repeat step 13.

18. By considering previous calibration results, satisfy yourself that the calibration has proceeded successfully. The zero values on all channels should not differ by more than 10 mV ( $\sim 4$  ppb) from the previous calibration. The span calibration values should not differ by more than 5% from those obtained during the previous calibration. If in doubt, repeat the relevant procedure. If the results of this are also unsatisfactory, contact the CMCU.
19. Change the NO<sub>x</sub> analyser sample inlet filter following the instructions given in part A.4.6 of this section.
20. Reconnect the ambient sample line to the analyser. Turn Calibration valve to "Ambient"
22. Switch the NO<sub>x</sub> analyser back into service by exiting the service mode when the analyser has fallen to ambient levels. Access the "Service Mode" as described in section 3.2 and switch service mode off. The spanner should disappear from the bar on the screen.

#### A.4.4 SO<sub>2</sub> Analyser

The two point calibration of the Sulphur Dioxide analyser will be undertaken during each site visit or in the rare event of an analyser adjustment. The calibration will be carried out as follows:

1. Record the instrument number on the calibration record sheet.
2. Press the out-of-service switch to allow calibration data to be flagged. Methodologies for flagging calibration data vary between systems, in case of difficulty consult your CMCU.
3. If necessary, locate the inlet line to the SO<sub>2</sub> analyser, and disconnect it from the manifold.
4. (Scrubber equipped sites) Connect the zero air canister to the inlet line so that the analyser is now sampling air through the zero air canister. The zero air scrubber to be used is the one containing the pink Purafil and the black charcoal. The Purafil end should be open to the environment, the charcoal end connected to the instrument.

(Cylinder equipped sites) Set the calibration valve to "Zero" and turn on the zero air gas cylinder. Ensure there is sufficient gas flow to the analyser (where possible)

5. Allow the analyser to stabilise on zero air for a period of not less than 10 minutes.
6. Record three consecutive SO<sub>2</sub> readings from the data-logger or instrument display (depending on site configuration), allow 10 seconds between each reading.
7. Remove the zero air canister from the inlet line.
8. Connect one end of the excess flow meter to the inlet line, the other end to the regulator attached to the sulphur dioxide (SO<sub>2</sub>) in air calibration gas cylinder. Turn the calibration valve to "Span"
9. Open the SO<sub>2</sub> in air cylinder main valve by turning it fully anticlockwise. Read cylinder pressure from right hand dial and cylinder number from tag on cylinder, and enter these on the calibration sheet. Do not use the

cylinder if the pressure indicated is less than 300 psi. In this event contact CMCU immediately.

10. Adjust the regulator secondary pressure to 15 psi, as read from left hand dial, by turning the pressure control (right hand) valve. Slowly open the regulator outlet (left hand) valve adjusting the flow through the excess flow meter to produce  $1.0 \pm 0.1$  litres per minute.
11. Allow the analyser to stabilise on this sample for a period of not less than 10 minutes. Ensure that the excess flow measured by the flow meter remains stable during this time. Adjust the flow, if necessary, to maintain 1.0 litre per minute.
12. Record three consecutive SO<sub>2</sub> readings from the data logger or instrument display (depending on site configuration). The signal should show a large deflection from the zero point previously obtained.
13. In the following order, fully close the regulator outlet valve (do not overtighten), the main cylinder valve (tightly) and the primary regulator valve. This traps gas in the regulator, thus ensuring a positive pressure and hence, no ingress of ambient air. Note that the pressure regulator dials should remain at their previous setting, if a marked decrease is observed there is a leak in the system, and the CMCU should be informed.
14. By considering previous calibration results (if present) obtained from the calibration just performed, satisfy yourself that the calibration has proceeded successfully. The zero value should not differ by more than 10 mV (~ 4 ppb) from the previous calibration. The span calibration value should not differ by more than 5% from that obtained during the previous calibration. If in doubt, repeat the relevant procedure. If the results of this are also unsatisfactory, contact the CMCU.
15. Change the SO<sub>2</sub> analyser sample inlet filter, following the instructions given in part A.5.6 of this section.
16. Reconnect the ambient sample line to the analyser. Turn calibration valve to "Ambient"

17. Switch the SO<sub>2</sub> analyser back into service by exiting the service mode when the analyser has fallen to ambient levels. Access the "Service Mode" as described in section 3.3 and switch service mode off. The spanner should disappear from the bar on the screen.

#### A.4.5 Ozone Analyser

There is no longer a requirement to perform the two point calibration of the ozone analyser during each site visit. The analyser performs an internal zero/span daily, and this is adequate for data ratification purposes.

#### A.4.6 Changing Analyser Sample Inlet Filters

The analyser sample inlet filters situated on the front panel of the instrument rack will be changed on a monthly or fortnightly (roadside sites only) basis at all sites. In the event of a filter appearing badly soiled, the site operator shall inform the CMCU.

Detailed instructions for sample inlet filter changing:

1. Unscrew the orange locking ring on filter holder.
2. Lift top cover of filter holder off bottom section.
3. Inspect filter for signs of excessive soiling and inspect "O" ring (if fitted). Inspect the perimeter of the filter holder for signs of wear and the effectiveness of the filter holder clip.
4. Take clean filter from box using the tweezers supplied and insert into base of filter holder.
7. Replace top of filter holder and secure with orange locking ring.
8. Check that Teflon lines to filter holder are well secured.

#### A.4.7 Changing the daily CO cylinder.

The CO analyser uses a second cylinder to perform daily checks on the performance of the instrument. Because of this, it will be necessary for LSOs to replace this cylinder periodically.

1. If not already fitted, connect the regulator to the cylinder using the spanner provided. Ensure that the regulator is tightly fitted to the cylinder (The CO regulator has a left hand thread).
2. The regulator must be purged. To do this briefly open the main cylinder valve and close it again. Open the regulator output valve. The sound of escaping gas should be heard and the 'cylinder' pressure gauge should fall rapidly. If it does not fall check that the main cylinder valve is fully turned off. When the gas present in the regulator has fully vented the regulator should be closed once more. This should be repeated twice leaving the regulator closed.
3. Connect the Teflon tubing from the analyser span input to the output of the regulator.
4. Open the cylinder main valve by turning it fully anticlockwise. Check that there are no leaks from around the regulator seals, using the SNOOP provided. Tighten the regulator, if necessary. Record the cylinder pressure from the right hand dial.
5. Adjust the regulator secondary pressure to 15 psi, as read from the left hand dial, by turning the regulator pressure control (right hand) valve.
6. Switch CO "out of service" control to "on". This allows calibration data to be flagged. Methodologies for flagging calibration data vary between systems, in case of difficulty consult your CMCU.
7. Press the span button on the front of the analyser.
8. Fully open the cylinder main valve. Slowly open the regulator output valve to allow gas to flow to the analyser. Adjust the regulator secondary pressure to 15 psi, as read from the left hand dial, by turning the regulator pressure control (right hand) valve.

9. Regulate the flow using the regulator output such that the excess flow is around 100 l/hour.
10. Note the span value on the analyser front panel. This should be within 10% of the value of the cylinder. If not contact the CMCU.
11. Press measure to return to sampling ambient air. Switch the CO "out-of-service" control to "off" when the analyser has fallen to ambient levels.

## **A.5 Postcalibration Checks, Safety and Security Inspection**

As the AURN reports time-averaged concentration data, it is important that operators critically assess the operating condition of the analysers over the time scales used in making discrete measurements. Such assessments may not be possible by consideration of averaged data, as the averaging process may mask such factors as excessive analyser noise or cyclic response changes. Information on analyser performance over very short time periods is important, as this will alert network managers and the QA/QC Unit as to whether instrumentation faults are developing.

Performing calibration checks at regular scheduled intervals, as detailed previously, is an excellent means of assessing instrument performance characteristics. For instance, excessive rise or fall times, possibly due to flow constrictions having developed, will be easily noted by a simple calibration of the analyser. Similarly, "noisy" analyser outputs, which may be caused by inefficient photomultiplier tube cooling systems, will be immediately apparent by observing the analyser output while sampling zero air.

In addition, seemingly unimportant occurrences, such as an analyser air pump being noisy, may be indicative that the unit is liable to malfunction; this should be reported by the operator.

Obviously, the level to which these problems will be detected will depend upon the experience and familiarity with the equipment of each individual operator, but the operator must critically review the calibration he/she has undertaken and comment on any unusual or suspect results or occurrences. In addition, the postcalibration check sheet must be completed as follows:

1. All checks detailed in section A.3 must now be repeated and recorded on the postcalibration check sheet as follows:
  - (i) CO Analyser
  - (ii) NO<sub>x</sub> Analyser
  - (iii) SO<sub>2</sub> Analyser
  - (iv) Ozone Analyser

- (v) TEOM/FDMS (not required when filter not changed)
- (vi) Air Sampling Manifold (not required if precalibration was OK)
- (vii) Modem
- (viii) Data Logger (where appropriate)

Compare the results of the post calibration checks to the precalibration values. If any there are any large unexpected changes notify the CMCU

2. Complete the final check section of the postcalibration check sheet if no out of service switches are present telephone the CMCU to notify them that the calibration is complete so that they may restore data dissemination.
3. Complete the calibration end time.
4. Inspect the cabinet inside and outside for security and safety purposes, paying particular attention to electrical and telephone connections. Check for any signs of vandalism, especially if this may affect safety or lead to a deterioration in data quality. Immediate action must be taken to rectify any situation that may lead to members of the public or LSO personnel being at risk.
5. Check that the roof area and fittings are secure, that there are no loose items left on the roof and stow any site ladder safely inside the monitoring station.
6. Check that all cylinders except the autocal cylinders are firmly closed and all cylinders are secure. Many sites with Thermo i-series analysers use cylinders for autocalibration, and these should be left switched on.
7. Ensure the cabinet is clean and tidy.
8. Upon returning to your office, the calibration record spreadsheets should be e-mailed to [geoff.broughton@aeat.co.uk](mailto:geoff.broughton@aeat.co.uk), or faxed to the CMCU, fax number 020 7261 1425 **and** also to the QA/QC Unit, fax number 0870 190 6610. Keep the copies at your office and, when you next visit the

site return the original calibration sheets to the monitoring site. In this way, a backup will be kept of the calibration history of all the instruments.