

**SAN JOAQUIN VALLEY UNIFIED
AIR POLLUTION CONTROL DISTRICT
COMPLIANCE DEPARTMENT**

COM 1150

APPROVED: _____ **SIGNED** _____ **DATE:** April 26, 2007
Jon Adams
Director of Compliance

TITLE: **PORTABLE EMISSION ANALYZER POLICY**

SUBJECT: **GUIDELINES ON HOW USE AND RECORD DATA FROM THE
PORTABLE EMISSION ANALYZER**

OBJECTIVE:

To establish District policies and procedures for the use of portable exhaust gas (emissions) analyzers.

PURPOSE:

This policy is meant to ensure that portable emissions analyzers (also known as combustion-gas or exhaust-gas analyzers) are used properly in determining compliance with District Rules and permit conditions.

POLICY STATEMENT:

District staff will use a portable emissions analyzer to enforce the requirements of Rules 2201, 4305, 4306, 4351, 4701, 4702, 4703, permit conditions, and other regulations as they pertain to combustion sources and their emissions of oxides of nitrogen (NO_x), carbon monoxide (CO), sulfur dioxide (SO₂), and hydrogen sulfide H₂S). Violations of the requirements of District rules and permit conditions will be subject to enforcement action according to the parameters of this policy.

The number of units to be sampled varies by the type of equipment and the number of units at a given source. Some units may be sampled more than one time per year. Inspection policy is stated in the individual rule policies. The portable analyzers will not be used to check emissions from equipment permitted for emergency use (such as fire pump or back-up electrical generator engines). Refer to Appendix 3 for guidance on engine sampling.

It is not the purpose of this document to provide directions for use of the portable analyzers. Training is required in the use of the units and the reduction of data.

1. EQUIPMENT

The following equipment will be utilized in the portable exhaust gas analyzer program:

1. District portable analyzer,
2. EPA protocol calibration and reference gases,
3. Stainless steel or manufacturer-supplied probes,
4. Teflon tubing (or tubing supplied by analyzer manufacturer),
5. Ice bath knockout system (except for Testo units),
6. Water pump and diaphragm pump (for rinsing and drying lines),
7. Heat-resistant gloves,
8. Miscellaneous equipment, tools, and supplies.

2. PRE-MONITORING ACTIVITIES

A. Calibration

In order to ensure they operate properly and that their accuracy remains within specification, portable analyzers will be maintained and calibrated at least as often as recommended by the manufacturer. EPA protocol calibration gases will be utilized to ensure proper calibration.

The analyzers shall be calibrated a minimum of once every 30 days or prior to use if the last calibration was more than 30 days ago. Between calibrations, the accuracy of the analyzer may be verified by utilizing reference gases. Records of calibration dates, instruments calibrated, gas readings prior to calibration, calibration gasses used, calibration gas certification and expiration dates shall be maintained.

When a violation is documented the analyzer shall be checked with reference gas to ensure its sensor cells are operational and accurate. Un-calibrated or malfunctioning analyzer cells shall not be used for compliance determinations.

B. Equipment Check

Manufacturer-supplied (Testo, Bacharach) or stainless steel and Teflon tubing shall be utilized for the analyzer's probes and tubing in order to eliminate potential contamination problems. All tubing shall be properly cleaned, maintained, and replaced when it is deteriorated, contaminated, or otherwise unfit for service. Ensure the probe and tubing are clean and dry prior to use.

C. Start-up Procedure

The instrument manufacturer's start up guidelines shall be strictly followed. When switched on, each unit undergoes an automated system check, sets the analyzer cells to zero, the oxygen (O₂) cell to 20.95% (ambient), and on the Land and Bacharach units, records the temperature to be used to correct the O₂ reading. It is critical that the ambient air be free of contaminants that could adversely affect the instrument start-up. The start-up procedure is never to be aborted.

D. Battery Check

Prior to using the analyzer in the field, the battery voltage should be checked for an adequate charge (this is not possible with the Bacharach unit). The “low battery” indicator light on the control panel of the Land and Bacharach units indicates inadequate battery charge. Because an artificially high reading will result, do not check the Land or Testo unit voltage while the unit is being charged. It is good practice to check the unit the day before use so that it may be charged overnight if needed. Charge the units after use, but do not leave them plugged in indefinitely. The Land and Bacharach units will be damaged if charged continually over a few days. The person who plugged the unit in is responsible for unplugging it after an overnight charge.

To check the voltage of the Land units, access the “Main Menu”, select “Diagnostics”, then “System”. The battery voltage will be displayed. Voltage (V) is displayed on one of the three Testo screens. Access the screens with the stylus or the Up or Down arrow keys. The Testos will display a voltage when the unit is not turned on. This is not the main battery voltage and does not forecast field run time; the unit must be switched on to read the main battery. The Land analyzer must not be used whenever the voltage is below 12.0 V or when the low battery indicator light is lit. The Testo should not be used if the voltage is below 8.5 V. If the voltage is close to the specified minimums, the battery should be charged prior to use in order to ensure adequate field life.

E. Diagnostic Check

Prior to using a Land analyzer in the field, a diagnostic report (Main Menu, Diagnostics, Report, Print) shall be printed out and the unit’s battery voltage (Main Menu, Diagnostics, System), and filter life (Main Menu, Diagnostics, Filter) shall be written down on the printout. A copy of the printout shall be attached to the Start-up Report with the printout of the leak check results. A copy of the results shall be placed in the “Start-Up Report” binder.

The diagnostic report is not available for the Testo or Bacharach units. However, both of these units will display an error message if a problem is detected. Do not use the unit until any problems are resolved.

F. Leak Check

Prior to using the analyzer in the field, the analyzer probes, sample lines, and ice bath knockout system (except for Testo) shall be checked for leaks with an EPA protocol low concentration oxygen reference gas, or low concentration NO or CO gas. Once the instrument is operational, assemble the sample train as it will be used in the field. Run the low concentration gas through the instrument and determine if the readings are within the following specifications:

For O₂ Gas, instrument should read within 0.2% of known gas value;
For Low CO or NO Gas, instrument should read within 4% of known gas value.

Print a strip of the leak check results and attach this to the Pre-Usage form (See FORMS). A copy of the completed report shall be filed. Because the thermal paper will fade over time, a copy of the sheet, rather than the original, shall be kept on file. The original sheet and printout may be disposed of.

Once the start up and leak check are complete, the instrument shall be switched off for transport to the field.

To facilitate going directly into the field from home, all units may be set up the day before use. Ice will keep in the bucket overnight or may be purchased on the way into the field. Do not leave the unit or equipment in the vehicle overnight; take them into your home or the office for safety. Note: Although the internal components of the ice bucket (condenser coil and impinger) are designed not to leak air, the ice bucket will leak water from the melting ice.

3. INSPECTION PROCEDURES

A. Field Start Up

The instrument manufacturer's start-up guidelines shall be strictly followed. The instrument is to be switched on in the field in ambient air that is free of contaminants that could adversely affect the start up. The start-up procedure is to be performed away from potential sources of air contaminants and at ambient temperature. Because the Land and Bacharach units depend on this temperature correction to ensure accurate O₂ readings, the unit should be re-started when the temperature varies significantly, such as between morning and afternoon. The start-up procedure is never to be aborted.

The manufacturers do not guarantee instrument accuracy beyond specified temperatures, and the data may not be reliable above these values. The unit temperature is recorded with the emission data and may be included into the report spreadsheet to verify that the data is within the thermal windows depicted below.

Unit	Instrument Temperature (° F)
Testo	113
Bacharach	104
Land	122

Once the analyzer's start-up cycle has been successfully completed, the analyzer is ready for use.

For the Land and Bacharach units, the analyzer probe shall be connected to the ice bath system, except as noted below. The purpose of the ice bath system is to ensure that water and other contaminants do not damage the analyzer cells. The Testo units have an on-board cooling system. In the case that the ice bath system has developed a problem during an inspection, the Land and Bacharach units may be run without it. This is not to be done for an extended time (no

more than two runs or 30 minutes) and is not intended to allow these units to be used without the ice bath as a matter of course.

B. Sample Location, Use of Source Test Ports

Prior to sampling, examine the stack and determine if source test ports and/or sample lines are installed. Utilize source test ports if they are accessible without a man lift or without a portable ladder. If the location of the ports is more than 2 stack diameters above and more than $\frac{1}{2}$ stack diameter below any bend, diameter change, or obstruction in the stack, then it will be assumed that the exhaust is adequately mixed (un-stratified). If the location does not meet these criteria, sample from three locations across the stack and average the data to determine compliance. For example, start at the far side of the stack for five minutes; sample the middle for five minutes, and then the near side for the remainder of the test.

C. Sample Location, No Source Test Ports or Inaccessible Ports

For heaters, boilers, steam generators, and internal combustion engines with stack diameters of 4" or less, determine if the source has installed sample lines (typically to accommodate periodic emissions testing). If installed, examine the location where the sample line enters the stack. If this location is more than 2 stack diameters above and more than $\frac{1}{2}$ stack diameter below any bend, diameter change, or obstruction in the stack, then it will be assumed that the exhaust is adequately mixed (un-stratified) and these lines may be utilized to test.

For engines with stack diameters greater than 4" without source test ports, use a hook probe and vary the location of the probe tip in the stack by moving the probe base at five-minute intervals. Note the locations of the probe base during the run. Configure the probe so that it extends into the stack as far as possible while remaining at least 2 stack diameters above any bend, diameter change, or obstruction. Be careful that the hook probe does not contact the catalyst as this may damage the catalyst. Average the data to determine compliance. If a hook probe cannot be used, or if the sample location does not meet the 2 and $\frac{1}{2}$ diameter criteria mentioned above, the samples should be obtained and analyzed, but it is recognized that they may not be valid due to potential exhaust stratification. If the source has undergone source testing, determine if the tests were obtained from the same location as with the portable analyzer. If so, and if the test reports do not indicate that the sample was stratified, then the portable results will be assumed valid. If not, it may not be possible to sample the engine. Take a photograph of the location and consult the source-testing department. If the source is using such a location to satisfy periodic monitoring requirements, a photograph of the configuration should be shown to the source-testing department.

Exercise extreme caution when near equipment to be sampled, there will be very hot surfaces and may be moving parts. The equipment is typically

loud, and surfaces are often slippery and may be elevated. Sample probes will become extremely hot and must be handled with heat resistant gloves. Wear gloves during the probe's insertion and removal from a stack. Use extreme caution when inserting a probe into the body of a boiler or steam generator as extremely hot gas and particles of refractory material are often expelled. Use a heat shield on probes inserted into boilers to protect lines and plastic probe parts. Take care that the sample lines are not touching hot or moving parts, and use caution when moving around sample lines. Allow the sample probe to cool completely before stowing.

D. Data Capture

In normal use, these instruments are set up to capture and store data in their internal memories. The stored data is subsequently recovered for analysis. The standard is a fifteen minute capture period with data recorded every 15 seconds.

Engine data is always recorded for 15 minutes per unit. Boilers and heaters may be sampled for only 5 minutes if all readings indicate compliance. If any of the readings exceeds an emission limit, the run shall be extended to 15 minutes.

Once the analyzer is connected to the stack, the instrument shall be monitored until the readings stabilize (typically when the oxygen readings are stable) and then data recording can begin.

The Testo and Bacharach units can be programmed to label each test and that label will be downloaded with the data. However, this adds to the sampling time, and is really not necessary. It is more expedient to write down the date, time, location, and permit unit for each sample unit sampled. When the data is downloaded, the time of acquisition will allow the readings to be matched to specific equipment (see Appendix 1 for an example of a downloaded data file, and instrument manual for the steps to add the facility names to the memory on the Testo and Bacharach units).

For the Land units, activate the analyzer by selecting the "Gas Readings" on the main menu and then select "GO" (F3). The unit will start analyzing the stack gases. Select "Menu", "Datalog", "Log Setup", and toggle to "Autolog". Make sure that the unit is set up to write the data to memory (not to the RS-232 port), and choose a logging period of 15 minutes and an interval of 15 seconds.

Select "Gas Readings". When the O₂ readings have stabilized, hit the "Autolog" (F4) button and the unit will begin to record data. The unit will record data every fifteen seconds for 15 minutes, and then continue to run without further collection. If all the readings indicate compliance while sampling a boiler or heater, a five-minute run is adequate and the logging can be stopped by selecting "Stoplog" (F4).

For the Bacharach unit, activate the analyzer by pushing the Run button. Select Setup and scroll down to Logging (the eleventh selection). From the Logging

menu select “Internal”, “Memory”, 15 seconds (sample interval), and 30 minute run time. This unit does not record for a shorter time than 30 minutes without interruption. The logging can be stopped sooner by pressing the Escape key. The Bacharach sample pump defaults to stop; any interruption will stop the pump and leave gas on the cells. Always select “Run” until the probe is out of the stack and the gas readings have returned to near zero. Once the readings have stopped, turn the pump back on and remove the probe to allow the instrument to air out. The Bacharach displays the record number that it will write to next. Rather than timing a run, the number of readings can be noted. For example, 60 readings are equal to 15 minutes. The unit can be stopped just after it begins to work on the reading after the one desired. For example, if a five-minute run is required, the unit can be stopped after it switches to reading #21.

The Testo units have to be programmed to capture the readings. Before inserting the probe in the stack (or at the office before use), note the name (typically a company name) displayed on the upper-middle portion of the screen, as this is where your data will be stored. You may change this name by entering a new “location” in the memory (see instrument manual for the procedure). Without the name, it will be a challenge to download data. To program the instrument to capture data, select the “Book” key (upper left), select “Memory”, and “Program”. Select “Manual Start”, do not have the machine calculate a Mean, opt for 15 minutes of run time, 60 readings, every 15 seconds, and a 5 minute Rinse Time. Remember to save the program or you will have to start over. Once the program is in memory it will stay there until deleted, even when the machine is turned off. Even if a new program is required, the machine remembers the default settings and entry is quite simple. The downside is that almost any change to unit operation (including changing the CO dilution, or selecting between 3% and 15% oxygen correction) will not be allowed if a program is in the memory. If a change is required, select the “Book” key, “Memory”, “Program”, and scroll down to “Erase”. Once the program is in place, put the probe in the stack, select the left-hand blue button to turn the pump on, and once the O₂ has stabilized, select “Start” (right-hand blue button). Once the program has run, (or in the case of a boiler or heater with all compliant readings after five minutes), push Stop (right-hand blue button), remove the probe and turn the pump on again until the readings have dropped to near zero.

Be sure to watch ppm values to insure they do not exceed upper limits of the instrument, which are as follows:

	Land	Bacharach	Testo
High CO-	100,000 ppm	100,000 ppm	10,000 ppm (undil.), 500 ppm (low)
NO-	4000-ppm	3500 ppm	3500 ppm (high), 500 ppm (low)
NO ₂ -	500 ppm	500 ppm	500 ppm
SO ₂	NA	17,000 ppm	5000 ppm
H ₂ S	NA	NA	300 ppm

It should be noted that high readings of CO and H₂S in an enclosed area are potentially hazardous. Also note that a high H₂S content in the fuel may cause a higher than actual reading of NO if the analyzer is left in the stream for an extended time. The greatest sensitivity seems to be with the Land units when left in the stream for more than one run. Remove the probe from the exhaust stream after each run. Purge the Land units carefully if multiple tests are to be conducted on units with high-sulfur fuel.

The Testo units have two ranges of cells that may be utilized. It is especially important to monitor the gas concentration if the low-range cells are installed. To check which cells are installed, either open the back of the unit and look (the low concentration cells are marked "Low-Concentration"), or access the "Book" key, select "Sensors", "Calibrate" and read the cells installed. The low cells will be listed as CO-lo or NO-lo. Use the escape key to back out of the menus.

If any gas concentration is approaching a cell's upper limit, print out the readings and immediately disconnect the sample hose from unit or remove the probe. The cells are expensive and will eventually be destroyed by over-exposure.

If the cells do not approach their upper limits, the analyzer cells shall be carefully observed for changing values, and once stabilized, measurements may commence. The O₂ cell seems to provide the best indication of stable readings.

The Testo units have the ability to dilute CO gas with an on-board pump. The dilution factor can be accessed via the "Book" key; "Input", "Dilution", and values from 0 to 40 may be selected. Note that the sampling program will have to be deleted before the dilution can be set.

When there is a possibility the emission limit will be exceeded, the run shall be fifteen minutes in length unless a cell's upper limit is approached. When all readings indicate compliance, you may stop a run on a boiler or steam generator after five minutes. All analyzer runs on engines shall be fifteen minutes in length. Compliance will be determined with a single fifteen minute run (or shorter as noted above).

Periodically check the hose from the ice bath knockout system to the analyzer for liquid. Any liquid found in the sampling hose downstream of the knockout system shall be emptied before initiating the next run. Disconnect the hose and dump out the water. Then drain the knockout trap by opening the drain plug. If liquid gets into the analyzer, it may damage the cells.

Once a run has been completed, and prior to any subsequent runs, the analyzer shall be operated in clean ambient air until all analyzer cells indicate 4 ppm or less. This will be very time-consuming if you are reading oxygen-corrected values. The Testo and Bacharach units have separate displays for corrected and

raw data. Monitor the raw data as the cells return to zero. The Land units will display either corrected or raw data, but not both. In order to correct or un-correct the data select “Menu”, “Setup”, “System”, “Next” (F4) and, using the Enter key, scroll to the “O₂ Correction”. Using the left-right arrow keys, toggle this value between “Yes” or “No”. Select No and exit back to the screen that displays the gas readings.

E. Field Indication of Non-Compliant Analyses

During testing, the analyzer shall be monitored to determine the likelihood of compliance. This will determine if a boiler or heater test may be shortened to 5 minutes. A final compliance determination cannot be made in the field, but a strong indication is often possible. If a violation is likely, the source should be advised. In many cases, the source may be able re-tune a unit upon the completion of a test, and compliance can be documented with an immediate follow-up analyzer run and without a return visit. If a probable violation is documented, it is important to have a feel for which calibration gas to run upon return to the office. Although this may be determined by downloading the data, time will be saved if the after-run calibration gas can be run first and then all of the data downloaded at once. Care needs to be taken when looking at the field data. As is mentioned above, compliance is determined with oxygen-corrected readings, but the correct calibration gas will be selected based on the raw data. Make sure to note whether raw or corrected data are viewed, and what the oxygen content is. Further, unlike the Testo, the Land and Bacharach units have high and low CO cells installed on the unit, and it is important to know what cell was being used and therefore what calibration gas to run. Once a value is exceeded, (2000 ppm for the Land and 4000 ppm for the Bacharach) the unit automatically switches to the high-range cell. If all of the high CO data is in the low range, then only the low range gas will be needed to challenge this cell.

F. Field Shut Down

At the end of each day, and before the instrument is switched off, it should be allowed to run until the cells read near zero (within 4 ppm). The Land and Testo units allow purging, and although the Testo will do this even with the probe in the stack, there is a risk of re-exposing the cells, so it is advisable to remove the probe first. To purge the Land unit, select “Main Menu, then “Purge and Pump Off” and the unit will blow internal air across the cells. Several cycles may be required, or you can just let the unit run while you put the rest of the equipment away.

To purge the Testo unit, push the blue button labeled “Zero”. Note that the function of the blue buttons is programmable (as is the entire display). If you do not have a “Zero” button, see your supervisor or lead person to program one in.

The analyzers must be shut down by selecting the Power or I/O button only after the cell values register near 0 ppm (raw, not oxygen-corrected data). If the

cell values register greater than 5 ppm after running in clean air for 15 minutes, it will be necessary to run or purge the analyzer longer. If an analyzer cell still registers > 5 ppm after an additional 15 minutes, the unit shall be shut down and a supervisor or lead person shall be contacted.

G. Cleaning Equipment

The equipment shall be cleaned and dried after each day's use, and this is the responsibility of the person using the equipment. Do not rinse the manufacturer-supplied lines for the Testo and Bacharach units. But do blow these lines out at the end of the day. All non-manufacturer probes and hoses shall be cleansed with distilled water and emptied of standing water. The diaphragm pump shall be utilized to purge any remaining water from tubing. Use the diaphragm pump to blow out the manufacturer-supplied hoses and probes. The point is to insure a clean and dry sample train for the next person.

Not only can gas linger in the system and affect the next start-up, but also water in the lines will scrub some gasses (notably NO₂ and SO₂).

4. REVIEW OF ANALYZER RESULTS

Compliance is not determined with the raw numbers, but with those that have been “corrected” to the rule-defined oxygen concentrations. Engines (including turbine engines) are corrected to a value of 15% oxygen. Boilers, steam generators, and heater-treaters are corrected to 3% oxygen. The calculated corrected values are used to determine compliance with all emission limits expressed in parts-per-million. The machines record raw data (the Testo and Bacharach units actually record both, but use the raw data for calculations). The correction is as follows:

$$M = N * ((20.95 - \text{Correction Factor}) / (20.95 - \text{Observed Oxygen}))$$

Where M is the corrected value, N is the raw gas value, Correction factor is either 3% or 15%, and the Observed Oxygen is that value recorded at the same time as N.

In Appendix 1, the spreadsheet example shows one way to summarize this data.

Note that the corrections are made with each line of data and then averaged to determine compliance. Note also that the raw data are used in the calculations without regard to the number of significant digits. Only the average of oxygen-corrected data is adjusted to the number of significant digits in the permit or rule limit (see Significant Digits Policy).

5. ENFORCEMENT ACTION BASED ON ANALYZER RESULTS

After a violation is apparently documented in the field, the analyzer shall be subjected to a known calibration gas of the same constituent. There are a limited number of calibration gases and a virtually unlimited possibility of field concentrations; the calibration gas with the closest concentration to that observed in the field shall be utilized (with the caveat that the range chosen is activating

the same analyzer cell). The violation will be considered documented if the analyzer reads the known gas within 10% of the gas value.

If the oxygen-corrected pollutant concentration is less than 115% of the applicable limit, it is considered a compliant test and no further action is required. When the corrected pollutant concentration is between 115-125% (inclusive) of the limit for any combustion equipment, the source shall be informed of the results, directed to have the equipment checked and/or serviced, and report the results of their investigation to the District within 10 days. The results of District testing and the directions given to the source shall be documented on an Inspection/Investigation Summary form, with a copy given to the source. Once the unit has been corrected, another sample run will need to be performed. For the purposes of establishing compliance, the District may accept portable emission monitor data from the facility if that facility utilizes a portable emission monitor as part of their alternative monitoring program. It should be noted that only the District analyzers consider a reading up to 115% of the limit compliant. A source detecting such a reading is probably in non-compliance with alternative monitoring conditions.

If additional data or a follow-up inspection reveals that the problem continues with pollutant concentration between 115-125% of the applicable limit from the same piece of equipment, the source shall be issued a NOV. A District portable combustion analyzer may be utilized to verify a return to compliance; however, the District may require a CARB or EPA reference test be performed to determine compliance.

When the corrected pollutant concentration is greater than 125% for any combustion equipment, the source shall be issued a Notice of Violation. A District's portable combustion analyzer may be utilized to verify a return to compliance, however the District may require a CARB or EPA reference test be performed to determine compliance.

APPENDIX I: EXAMPLE OF DATA REDUCTION

Below is an example of a portion of a simple spreadsheet showing the reduction of data from an IC engine test. Only the time, raw NO_x, CO, O₂, and instrument temperature are taken from the raw data. The CO and NO_x are corrected on each line of data and the results are averaged at the bottom of the sheet. The average of the corrected readings is compared to the appropriate limit.

Avante-Garde Resources S-7425-30-3

Run 1 of 1 on April 6, 2005

Time	NO _x	CO	O ₂	Temp.	Corr NO _x	Corr CO
12:20:42 PM	4.42	88.23	0.88	96.96	1.31	26.2
12:20:57 PM	4.63	87.29	0.8	97.01	1.37	25.8
12:21:12 PM	5	88.79	0.67	97.17	1.47	26.1
12:21:27 PM	5.19	96.88	0.51	97.2	1.51	28.2
12:21:43 PM	5.06	113.41	0.43	97.26	1.47	32.9
12:21:58 PM	5.08	138.4	0.41	97.29	1.47	40.1
12:22:13 PM	5.1	139.04	0.41	97.26	1.48	40.3
12:22:29 PM	4.95	129.28	0.4	97.23	1.43	37.4
12:22:44 PM	5.08	121.02	0.42	97.23	1.47	35.1
12:22:59 PM	5.22	126.4	0.45	97.22	1.52	36.7
12:23:14 PM	5.18	129.01	0.42	97.17	1.50	37.4
12:23:30 PM	5.07	119.34	0.41	97.13	1.47	34.6
12:23:45 PM	5.11	108.96	0.4	97.1	1.48	31.5
12:24:00 PM	5.25	101.34	0.38	97.1	1.52	29.3
12:24:16 PM	5.2	100.89	0.39	97.13	1.50	29.2
12:24:31 PM	5.02	117.37	0.41	97.13	1.45	34.0
12:24:46 PM	5.08	137.85	0.43	97.17	1.47	40.0
12:25:02 PM	5	182.01	0.42	97.19	1.45	52.8
12:25:17 PM	5.22	203.57	0.43	97.26	1.51	59.0
12:25:32 PM	5.32	193.26	0.43	97.28	1.54	56.0
12:25:48 PM	5.3	166.44	0.4	97.23	1.53	48.2
Averages	5.07	128.04	0.47	97.18	1.47	37.2

Corrected NO_x is **5.89% of 25 ppm Limit**
% of 140 ppm
 Corrected CO is **26.6Limit**

APPENDIX 2: Instrument Pre-Usage Form

Portable Emissions Monitor Pre-Usage Form

Fill Out and File a Copy in Calibration Record Book Prior to Field Use

Date: _____ Inspector: _____

Monitor (include Unit Number): Land Testo Bacharach Other _____

With Same: Probe Ice Bucket Lines

Destination: _____ Facility ID: _____

Attach Leak Test Results Below

Attach LAND System Report Below

Leak Test Performed with _____ % O2 Gas

APPENDIX 3: Portable Emission Monitor Sampling Guidelines

Usage	Engine	Reference/Reason	Portable Analyzer Testing during Inspection
Non-emergency requiring permit	Non-certified spark engines subject to limits in lines 1-4 of table 1 of Rule 4702.	Permit Equipment Description and Conditions and Rule	Do test
Non-emergency requiring permit	Diesel or spark engine subject to emissions limits in 4702 but is not certified to meet those limits, or subject to permitted NOx emissions limits but is not certified to meet permit limits	Permit Equipment Description and Conditions and Rule. (Certified NOx level may be based on model year/Tier.)	Do test
Non-emergency requiring permit	Engines not subject to any current limit in Rule 4702 or permit (e.g. grandfathered Ag engine, inspection occurs before compliance due date.)	Permit Equipment Description and Conditions and Rule/No reason to test if unit is not subject to NOx limits	Do not test*
Non-emergency requiring permit	Certified engine that complies with Rule 4702 limits and any permit limits for NOx based on certification.	Permit Equipment Description and Conditions and Rule/ Rule 4701 allows compliance by purchase of certified engine.	Do not test*
Emergency Backup	Any engine limited to emergency use and 100 hours or less for maintenance and testing by permit conditions	Permit Equipment Description and Conditions/Limits for emergency engine are generally based on certification using a multilevel test that cannot be performed in field.	Do not test*
Portable	Any registered portable engine	Portable Registration/Limits for portable engine are generally based on certification using a multilevel test that cannot be performed in field.	Do not test*

** Two exceptions - if engine has been somehow modified from manufacturer's configuration in a way that would affect emissions, or if a unit has a lower limit on their permit than the certification standard. - then testing would be appropriate.*