# Report from the Performance Audit of the

# Mexico City Ambient Air Monitoring Network

## Gobierno del Distrito Federal (GDF)
## Secretaría del Medio Ambiente

**Conducted the Third through the Seventh of November, 2003**

**By**

**The United States Environmental Protection Agency (USEPA)**
**Office of Air Quality Planning and Standards (OAQPS)**
**Pacific Southwest Regional Office (Region 9)**

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**We Appreciate Support Provided by**

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## I. Executive Summary

The United States Environmental Protection Agency (USEPA) was requested by the Environmental Secretariat of the Government of the Federal District (*Secretaría del Medio Ambiente del Gobierno del Distrito Federal* (GDF)) and the Pan American Health Organization (PAHO) to conduct performance audits of the Mexico City ambient air monitoring network. Audits had previously been performed in Mexico City by the USEPA Office of Research and Development (ORD). The USEPA Office of Air Quality Planning and Standards (OAQPS) agreed to conduct audits in calendar year (CY) 2003 and enlisted the assistance of USEPA Region 9.

The USEPA Office of Research and Development (ORD) conducted the last performance audit, which also highlighted system findings, in October 2000. Since this audit there have been improvements to GDF's air monitoring quality system especially in the area of documentation and regular application of Quality Control (QC) procedures. These include improvements in network design, the use of standard operating procedures (SOPs), logbooks, routine calibration, and zero/span schedules. There have been Quality Assurance (QA) staff identified and there is a desire by management to have a QA system equivalent to USEPA and meeting The International Organization for Standardization *Quality Management System Standard* (ISO9000) requirements.

This report details performance audits conducted using the USEPA National Performance Audit Program (NPAP) audit system. The NPAP utilizes transportable audit equipment that is designed to deliver test concentrations that are unknown directly into the air monitoring equipment being audited. Nine monitoring stations and the reference air monitors located at the GDF laboratory were audited by USEPA staff. Four of these stations were re-audited by the GDF using the NPAP device. The GDF also performed additional audits at six monitoring stations for a total of fifteen monitoring stations and laboratory monitors audited.

Based on a systematic assessment of all the individual monitors audited, the monitoring system is accurate and well-implemented. The Ozone audit data were of outstanding quality with no significant bias or imprecision detected across all stations and concentrations audited. The Ozone audit results also reflected a significant quality improvement. Nitric Oxide was monitored as a surrogate for Nitrogen Dioxide. Nitric Oxide data quality has also improved. Nitric Oxide and Carbon Monoxide audit data were of acceptable quality. However, for these two pollutants the GDF should evaluate the potential for measurement quality improvement at low concentrations. Most Sulfur Dioxide audits were of acceptable quality. Overall evaluation of the Sulfur Dioxide data indicated that there is potential for high bias and imprecision at low concentrations. The overall high bias observed, in the Sulfur Dioxide audit data, indicate that the network probably overestimates the Sulfur Dioxide concentrations in the air basin. The NPAP audits provide a more rigorous approach than has been applied to the GDF in the past. First, the audits were

conducted using a lower audit concentration. Second, each audit average percent difference was determined using three audit concentrations including the lower audit concentrations and excluding the blank. Third, the audit concentrations were not known by the auditor at the time of the audit. Fourth, a more rigorous statistical analysis was applied. The ultimate result of these performance audits indicates that the GDF monitoring system is functioning well. Additionally, as is the intent of most audits, areas where data quality can be improved have been identified.

USEPA recommends that the GDF:

1. Review its network design with the potential for reducing the number of stations monitoring pollutants not exceeding regulatory standards and increasing and/or moving Ozone monitoring in response to urban growth.
2. Institute an internal performance audit system and system audit.
3. Review monitoring stations' compliance with siting criteria and, where necessary, increase probe heights or trim back trees.

USEPA would like to thank the GDF for its cooperation, innovation, and forward thinking[1].

[1] Forward thinking programs are proactive, progressive programs which are often of better quality than reactive, conservative programs. This is because they look for potential problems before they occur and take preventive action, rather than waiting for them to happen and then reacting, which is more expensive and usually much less effective.

## II. Introduction

The USEPA provided performance and system audit support to the GDF in the months of November and December of 2003. This report details the results of these audits and recommendations from the USEPA to the GDF.

The air monitoring performance audit support provided by USEPA to the GDF is the same type of support provided by USEPA to State, Local, and Tribal monitoring networks in the United States. The monitoring results for individual air monitors have been evaluated and scored in exactly the same manner as done for monitoring networks overseen by USEPA. Some additional analysis of the pooled data has been conducted by USEPA to assist the GDF in identifying areas for improvement and data quality trends. System audit comments are provided in Section V and Appendix A of this report. These are not part of a formal system audit and should not be considered comprehensive. All the findings presented are intended to assist the GDF in identifying areas for quality improvement (recognizing that all organizations can and should identify areas for improvement).

The authors of this report are committed to providing technical feedback, upon reasonable request, to assist the GDF in making improvements to the Atmospheric Monitoring System (*Sistema de Monitoreo Atmosférico* (SIMAT)).

## III. Background

This section provides background on the organizations and procedures used during this audit. The reader who is familiar with these may want to skip to Subsection E (page 15) which summarizes previous audits of the GDF.

### A. Secretaría del Medio Ambiente del Gobierno del Distrito Federal (GDF)

The Secretariat of the Environment of the Federal District Government (*Secretaría del Medio Ambiente del Gobierno del Distrito Federal*) is responsible for environmental policies and programs, including implementing local and federal laws, in the Federal District. The GDF became the primary organization responsible for ambient air monitoring in the Mexico City area in 1993 when the Automatic Ambient Air Monitoring Network (*La Red Automática de Monitoreo Atmosférico* (RAMA)) was transferred to the GDF.

Prior to the early 1970's, air quality monitoring in Mexico City was part of the Normalized Pan American Sampling Network (*Red Panamerican de Muestreo Normalizado*). In 1971, Mexico passed the Law for Preventing and Controlling Environmental Contamination, (*Ley para Prevenir y Controlar la Contaminatión Ambiental*). In 1972 the Subsecretary for Environmental Improvement (*Subsecretaría de Mejoramiento del Ambiente*) was created under the Secretary of Health. These events led to the creation of a 48 station

National monitoring network, with 22 of these stations being in the Mexico City air basin.

Currently the Mexico City Atmospheric Monitoring System (*Sistema de Monitoreo Atmosférico* (SIMAT)) consists of 54 monitoring stations, a support laboratory, an environmental information center, and an information technology support center. Monitoring is further segregated into an Automatic Ambient Air Monitoring Network (*La Red Automática de Monitoreo Atmosférico* (RAMA)) (see Figure 1 and Table 1), a Manual Particulate Monitoring Network, an Atmospheric Deposition Network, and a Meteorological Network. With the support of the environmental information center and the information technology support center, monitoring data are translated daily and hourly into the Metropolitan Area Air Quality Index (*Indice Metropolitano de la Calidad del Aire* (IMECA)). The IMECA is widely distributed to public and private sector organizations in the Mexico City area to assist in making public heath decisions.

## B. Secretariat of the Environment and Natural Resources (SEMARNAT)

The Secretariat of the Environment and Natural Resources (*Secretaría de Medio Ambiente y Recursos Naturales* (SEMARNAT)) is the primary federal agency responsible for environmental protection in the Country of Mexico. The Subsecratary of Environmental Protection Management (*Subsecretaria de Gestión para la Protección Ambiental*) is the SEMARNAT organizational unit primarily responsible for environmental quality. However, the National Institute of Ecology (*Instituto Nacional de Ecología* (INE)) provides technical and research support for environmental issues (including monitoring).

## C. US Environmental Protection Agency (USEPA)

The USEPA has been given the role of *"protecting human health and the environment"* in the United States and its territories and possessions. The USEPA's authority to regulate ambient air emissions is derived from the US Clean Air Act (CAA). USEPA's responsibility, under the Clean Air Act (CAA) as amended in 1990, includes: setting National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to the public health and environment; ensuring that these air quality standards are met or attained (in cooperation with States) through national standards and strategies to control air emissions from sources; and ensuring that sources of toxic air pollutants are well controlled.

### 1. Office of Air Quality Planning and Standards (OAQPS)

EPA's air programs are managed by the Office of Air and Radiation (OAR) of which OAQPS is a part. The Role of OAQPS as defined by

the *Quality Assurance Handbook for Air Pollution Measurement Systems (Redbook)*, 1998, is:

*OAQPS is the organization charged under the authority of the CAA* [US Clean Air Act] *to protect and enhance the quality of the nation's air resources. OAQPS sets standards for pollutants considered harmful to public health or welfare and, in cooperation with EPA's Regional Offices and the States, enforces compliance with the standards through state implementation plans (SIPs) and regulations controlling emissions from stationary sources. OAQPS evaluates the need to regulate potential air pollutants and develops national standards; works with State and local agencies to develop plans for meeting these standards; monitors national air quality trends and maintains a database of information on air pollution and controls; provides technical guidance and training on air pollution control strategies; and monitors compliance with air pollution standards.*

The specific monitoring responsibilities of OAQPS are to:

?? *ensure that the methods and procedures used in making air pollution measurements are adequate to meet the programs objectives and that the resulting data are of satisfactory quality*
?? *operate the National Performance Audit Program (NPAP)*
?? *evaluate the performance of organizations making air pollution measurements of importance to the regulatory process*
?? *implement satisfactory quality assurance programs over EPA's Ambient Air Quality Monitoring Network*
?? *ensure that guidance pertaining to the quality assurance aspects of the Ambient Air Program are written and revised as necessary*
?? *render technical assistance to the EPA Regional Offices and air pollution monitoring community*

## 2. Pacific Southwest Regional Office (Region 9)

The USEPA Regions are responsible for implementing USEPA's environmental programs in the States, Territories, and positions under their respective jurisdictions.

USEPA Region 9 has responsibility for the States of California, Hawaii, Nevada, and Arizona (also parts of Utah and New Mexico under the jurisdiction of the Navajo Nation). Region 9 is also responsible for Guam, the Pacific Trust Territories, and US possessions in the Pacific Ocean (e.g. Midway Island). Under the North American Free Trade Agreement Treaty (NAFTA) Region 9 shares responsibility with Region 6 for the US/Mexico border area. As

such, Region 9 seeks cooperation, where appropriate, with environmental agencies in the country of Mexico.

Under the ambient air monitoring program, the EPA Regions are directly responsible to ensure State, Local, and Tribal monitoring networks are properly designed and operated. The Regions perform this task by providing training, technical assistance, interpretation of regulations, technical reviews, performance audits, technical system audits, and other support and oversight as required.

### 3. Office of Research and Development (ORD)

The USEPA ORD is responsible for providing research and scientific support to USEPA's programs. The National Exposure Research Laboratory (NERL) is the ORD program that supports USEPA's ambient air monitoring program. The *Redbook* notes:

*The mission of NERL is to develop scientific information and assessment tools to improve the Agency's exposure/risk assessments, identify sources of environmental stressors, understand the transfer and transformation of environmental stressors, and develop multi-media exposure models. The NERL provides the following activities:*

- ?? *develops, improves, and validates methods and instruments for measuring gaseous, semi-volatile, and non-volatile pollutants in source emissions and in ambient air*
- ?? *supports multi-media approaches to assessing human exposure to toxic contaminated media through development and evaluation of analytical methods and reference materials, and provides analytical and method support for special monitoring projects for trace elements and other inorganic and organic constituents and pollutants*
- ?? *develops standards and systems needed for assuring and controlling data quality*
- ?? *assesses whether emerging methods for monitoring criteria pollutants are "equivalent" to accepted Federal Reference Methods and are capable of addressing the Agency's research and regulatory objectives*
- ?? *provides an independent audit and review function on data collected by NERL or other appropriate clients*

## D. USEPA Ambient Air Monitoring Program Audits

### 1. USEPA Performance Audits and the National Performance Audit Program (NPAP)

Performance audits are intended to independently evaluate the performance of the audited agency's training, site operators, monitoring equipment, calibration equipment, standards, and all operating, calibration, maintenance, quality assurance, quality control, and data processing procedures, including calculation, transfer, and reporting. The most rigorous performance audits would involve independent audit equipment, an independent auditor, and unknown audit concentrations being delivered in a representative air matrix through the inlet of the probe. Such a system does not yet exist. USEPA uses a system which incorporates many of these concepts to produce robust audit data. On a routine basis, monitoring organizations perform audits using an internal, yet independent, auditor(s) and independent equipment. Gaseous pollutant audits may be accomplished by either adding challenge gases directly to the instruments or through the inlet of the sampling probe, the preferred method. To supplement these audits USEPA uses a mail-out system called the National Performance Audit Program (NPAP). The NPAP utilizes transportable audit equipment that is designed to deliver audit concentrations that are "blind" (unknown) through the back of the instruments audited. It is advantageous for the monitoring agency to use independent auditors to perform these audits. More recently USEPA has developed a "through the probe" (TTP) audit program. This program utilizes independent (USEPA staff or contractors) auditors using a vehicle equipped to perform audits through the sampling probe. This TTP system has the advantage, over the initial NPAP, of testing the whole sampling system using independent staff and giving real time results. Unlike NPAP, the concentration of audit gas used in the TTP system is not blind to the auditor, but is still blind to the station operator.

The mailed NPAP audits are conducted using auditing equipment that has been demonstrated reliable, when transported by commercial freight shipping, and verifiable. The audit devices are shipped in rugged cases containing rigid molded vibration insulation. The cases include a continuous zero air generation system (which includes a pump and three different scrubbing cartridges), a US National Institute of Standards and Technology (NIST) traceable gas standard cylinder, and/or an Ozone generator, and an adjustable mixing and dilution system. The equipment is certified and sent to the auditing agency by a USEPA support contractor. Independence is preserved, even for the audit equipment operator. The support contractor provides audit-

specific instructions with the devices that tell the audit operator what settings to use for each audit test point, but not what concentrations the settings will generate, and not how to calculate the concentrations with the data that the auditor or station operator has. The devices are NIST-traceably certified by the audit support contractor to audit at three concentrations as well as to evaluate the instrument's zero.

The results of the NPAP audit are assessed by USEPA's NPAP support contractor. This assessment includes verification that the audit devices are functioning properly both before their initial shipment to the audited agency and upon return. The audited agency's data are evaluated based on percent difference from the audit concentrations. The acceptance criterion for gaseous pollutants is 15% mean absolute difference and 15% for each concentration of each pollutant at each monitoring site. Monitors that exceed this criterion clearly require corrective action. Monitoring agencies should also assess the need for systematic changes. Also reported are the results for individual audit concentrations, linearity, and blank evaluations. This additional information should be considered by agencies when evaluating the need for corrective action and/or for their quality improvement process.

## 2. Technical System Audits (TSAs) and Management System Reviews (MSRs)

Technical System Audits (TSAs) and Management System Reviews (MSRs) are reviews intended to evaluate how well the established quality system is working. These types of audits can be performed by independent internal or external auditors.

Technical System Audits, as the name implies, are technical in nature. They are used to verify that appropriate technical and quality control procedures have been established and are being followed. For air monitoring organizations, some areas which are audited include:

- written procedures
- documentation
- monitoring network design
- site appropriateness/siting requirements
- instrument operation
- laboratory procedures
- sample/data custody
- data handling systems
- data processing and calculation
- quality control
- performance audit system

Management System Reviews are evaluations of how the QA program is working. These audits evaluate the overall quality system and do not effectively identify technical defects with the system. MSRs include the evaluation of:

- ?? organizational structure
- ?? quality policy
- ?? quality manager empowerment and effectiveness
- ?? quality documentation
- ?? corrective actions
- ?? training and qualifications of staff
- ?? commitment to quality by management and staff
- ?? overall effectiveness of the quality system

## E. Previous Audits of Mexico City's Air Monitoring Program

Staff from the USEPA ORD provided periodic performance audits of the Mexico City's air monitoring network prior to 2001. The last audit was conducted in October of 2000. This audit evaluated the performance for 14 monitoring stations. Additionally system audit concepts were evaluated by USEPA ORD. The results of this audit were noted as meeting the criteria used to evaluate monitor bias. The findings of the system audit, conducted in 2000, identified significant deficiencies in the quality system, the condition of the monitoring equipment (inadequate spare parts), and the physical state of some monitoring stations.

## Table 1

Mexico City's Atmospheric Monitoring System
Automatic Ambient Air Monitoring Network Stations

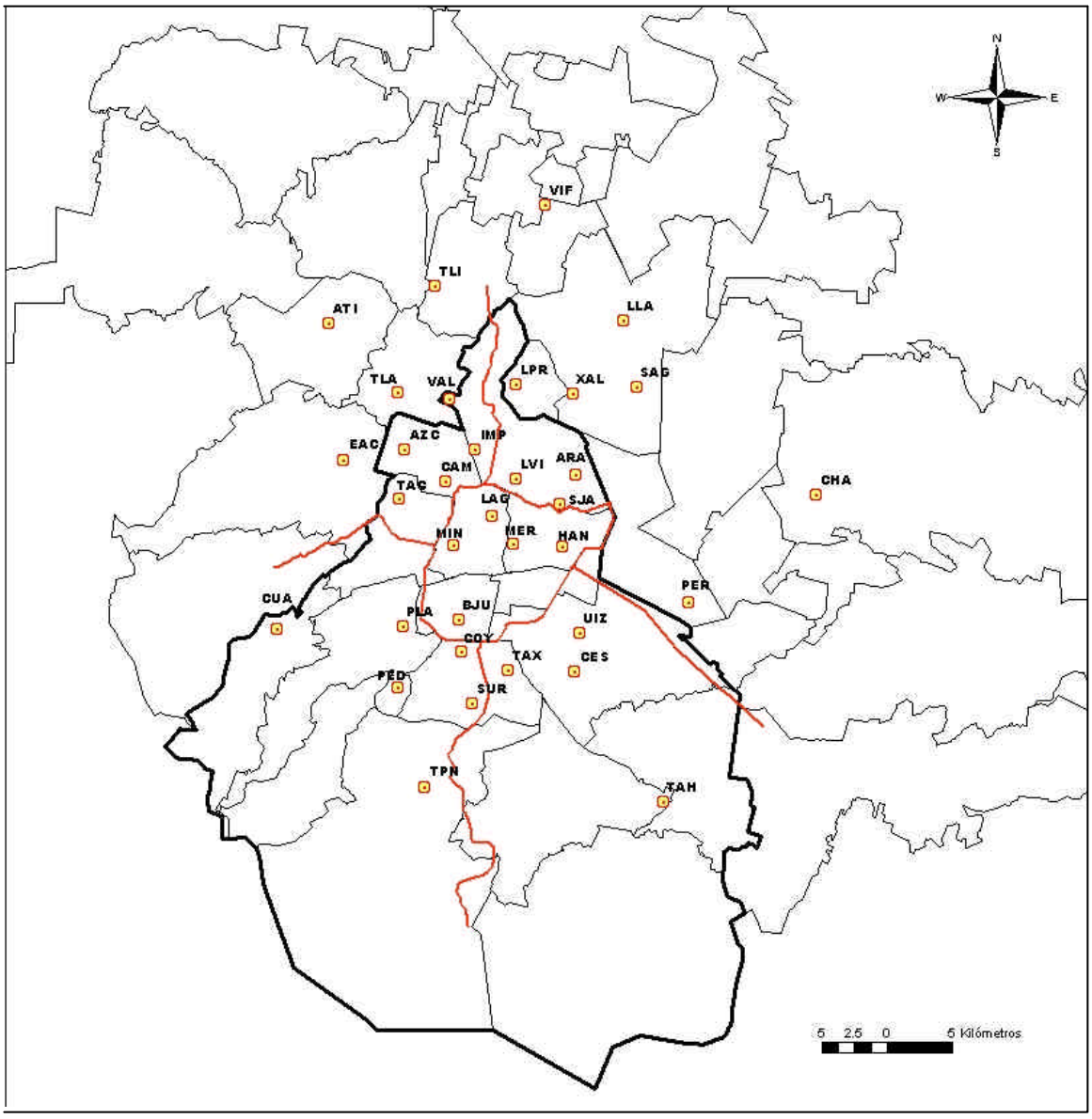
Actual Instrumentation

| Zone | Station Name | Initials | $O_3$ | CO | $SO_2$ | NOx | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|---|---|
| Northwest | Vallejo | VAL | | ■ | ■ | | | |
| | Tacuba | TAC | ■ | ■ | ■ | ■ | | |
| | ENEP Acatlán | EAC | ■ | ■ | ■ | ■ | ■ | |
| | Azcapotzalco | AZC | ■ | ■ | ■ | ■ | | |
| | Tlalnepantla | TLA | ■ | ■ | ■ | ■ | ■ | ■ |
| | I. M. P. | IMP | | ■ | | | | |
| | Tultitlán | TLI | | ■ | ■ | ■ | ■ | |
| | Atizapán | ATI | | ■ | ■ | ■ | | |
| | Cuitlahuac | CUI | | ■ | | | | |
| | Camarones | CAM | | | | | | ■ |
| Northeast | Los Laureles | LLA | | | ■ | | | |
| | La Presa | LPR | | | ■ | | | |
| | La Villa | LVI | | | ■ | | ■ | |
| | San Agustín | SAG | ■ | ■ | ■ | ■ | ■ | ■ |
| | Xalostoc | XAL | ■ | ■ | ■ | ■ | ■ | |
| | Aragón | ARA | | ■ | ■ | | | |
| | Nezahualcoyotl | NET | | ■ | ■ | | ■ | |
| | Villa de las Flores | VIF | | ■ | ■ | ■ | ■ | |
| | Chapingo | CHA | ■ | | | | | |
| | Perla Reforma | PER | | | | | | ■ |
| | San Juan de Aragón | SJA | | | | | | ■ |
| Center | Lagunilla | LAG | ■ | ■ | ■ | ■ | | |
| | Merced | MER | ■ | ■ | ■ | ■ | ■ | ■ |
| | Hangars | HAN | ■ | ■ | ■ | ■ | ■ | |
| | Benito Juárez | BJU | ■ | ■ | ■ | ■ | | |
| | Metro Insurgentes | MIN | | ■ | | | | |
| Southwest | Santa Ursula | SUR | ■ | ■ | ■ | ■ | ■ | |
| | Pedregal | PED | ■ | ■ | ■ | ■ | ■ | |
| | Plateros | PLA | ■ | ■ | ■ | ■ | ■ | |
| | Cuajimalpa | CUA | ■ | | | | | |
| | Tlalpan | TPN | ■ | | | | | |
| Southeast | Coyoacán | COY | | | | | | ■ |
| | Cerro de la Estrella | CES | ■ | ■ | ■ | ■ | ■ | |
| | UAM Iztapalapa | UIZ | ■ | ■ | ■ | ■ | | ■ |
| | Taxqueña | TAX | ■ | ■ | ■ | ■ | ■ | |
| | Tlahuac | TAH | ■ | | ■ | | ■ | |

## Figure 1

Mexico City's Atmospheric Monitoring System
Automatic Ambient Air Monitoring Network Map

Actual Coverage




Federal District Limits
Adjoined Municiaplities in the State of Mexico

## IV. Performance Audit Results

To evaluate the GDF's air monitoring network, USEPA utilized NPAP audit devices. Four parameters were audited, Ozone ($O_3$), Nitric Oxide (NO), Carbon Monoxide (CO), and Sulfur Dioxide ($SO_2$). NO audit results are representative of Nitrogen Dioxide ($NO_2$) and Oxides of Nitrogen ($NO_x$). Three distinct sets of performance audits were completed. From November third through the seventh of 2003, USEPA staff conducted audits at nine monitoring stations and at the GDF laboratory. In late November and early December of 2003 an independent GDF QA auditor conducted audits. Four stations audited by USEPA staff in early November were re-audited. Six additional monitoring stations were also audited by the GDF auditor. Sections IV.A and IV.B summarize the results of these audits, which are also included in Appendix C. The results are evaluated in Section IV.B. Finally, recommendations for air monitoring system improvements are given.

Each monitor was evaluated at three audit concentration, and "zero air" was generated to confirm the instruments baseline. These concentrations were used to determine the linearity of each instrument. Each individual concentration was then used to evaluate instrument performance for bias at high, medium, and low levels. At the conclusion of the tests, the mean absolute (MA) percent difference (%D) was calculated for the instrument by averaging the %D values for the three concentrations. The acceptance criterion for these individual tests was <15% MA %D.

The results presented in Appendix C give percent difference (%D) for each audit point, blank results, linearity, and MA %D, as prepared by USEPA's NPAP support contractor. The audit result summary sections that follow note individual monitor exceedances of the 15 %D criterion for mean absolute difference.

USEPA also assessed the data set to determine precision and bias for the monitoring network. This was done by calculating the mean and the standard deviation of the MA %Ds for each pollutant in each data set. This information was used to calculate the potential range of values which represent 96% of normally distributed data (two standard deviations from the mean). If this range exceeded the 15% criterion for MA %D, it is noted in the following sections. This approach is consistent with the quarterly performance audit assessment performed by monitoring networks in the United States (US). (US Code of Federal Regulations Title 40, Part 58, Appendix A, Section 5.1.2)

Additionally, the same statistics were used to evaluate each audit concentration and the blank concentrations in each data set. This information was used to evaluate where to focus corrective action for pollutants with MA %Ds above 15%, and where quality control improvements can be targeted for pollutants with MA %Ds below 15%.

A summary of the MA %D data is also presented graphically in Figures 2 through 9. Each station audited is identified by acronym presented from Table 1.

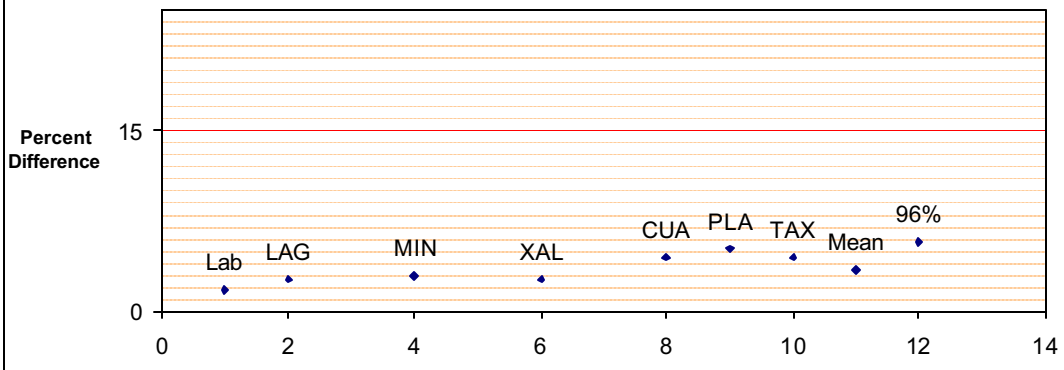
It should be noted that the evaluation of this data set that follows is based on criteria in USEPA regulation, USEPA guidance, and the best professional judgment of the auditors. Audit criteria should be set by the GDF in a quality planning document and based on locally or nationally established tolerance for measurement error.

## A. Audits conducted in November 2003 by USEPA

### 1. Ozone ($O_3$)

USEPA evaluated Ozone monitors at seven monitoring locations and the Ozone monitor at the GDF laboratory. The mean absolute %Ds ranged from 1.8 at the laboratory to 5.2 at the Plateros station. Additionally, when evaluating each audit concentration result across monitors using the 96% probability criterion, did not approach the 15 %D criterion.

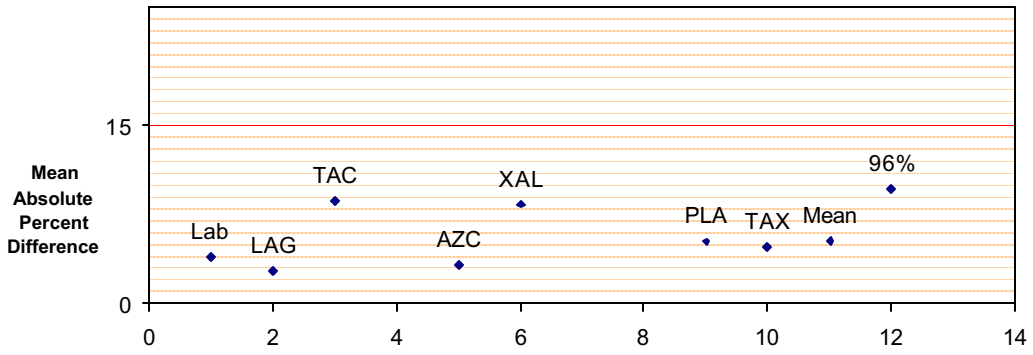
**Figure 2: Summary of USEPA Audits of Ozone Monitoring Stations**




### 2. Nitric Oxide (NO)

USEPA evaluated Nitric Oxide monitors at six monitoring locations and at the GDF laboratory. The mean absolute %Ds ranged from 2.7 at the Lagunilla station to 8.4 at the Xalostoc station. Additionally, when evaluating each audit concentration result across monitors using the 96% probability criterion, the lowest audit concentration exceeded the 15% D criterion at +15.7 % D.

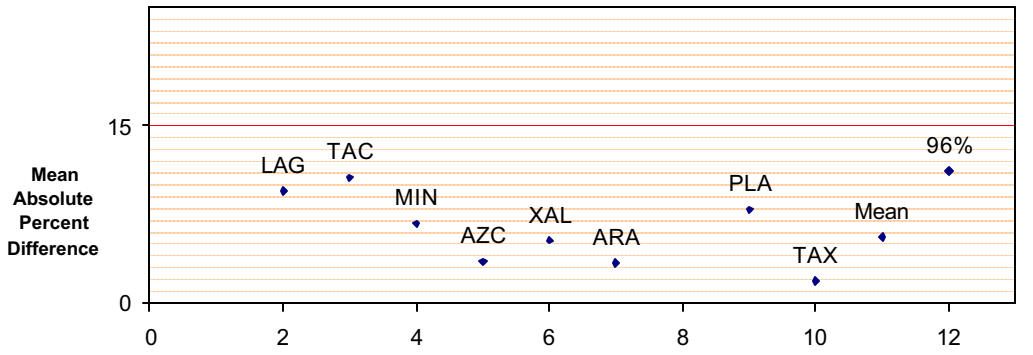
**Figure 3: Summary of USEPA Audits of Nitric Oxide Monitoring Stations**




## 3. Carbon Monoxide (CO)

USEPA evaluated Carbon Monoxide monitors at eight monitoring locations. The mean absolute %Ds ranged from 1.9 at the Taxqueña station to 10.6 at the Tacuba station. Additionally, when evaluating each audit concentration result across monitors using the 96% probability criterion, the lowest audit concentration exceeded the 15% D criterion with a range of -18 to +24 %D.

**Figure 4: Summary of USEPA Audits of Carbon Monoxide Monitoring Stations**

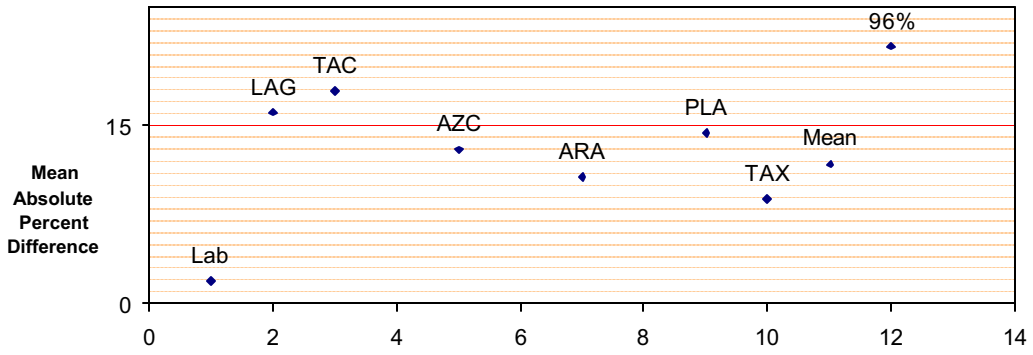



## 4. Sulfur Dioxide ($SO_2$)

USEPA evaluated Sulfur Dioxide monitors at seven monitoring locations and the Sulfur Dioxide monitor at the GDF laboratory. The mean absolute %Ds ranged from 1.9 at the laboratory to 17.9 at the Tacuba station. In addition to Tacuba, the Lagunilla station also exceeded the mean absolute criterion at 16.1 %D. Additionally, when evaluating each audit concentration result across monitors using the

96% probability criterion, the lowest audit concentration exceeded the 15% D criterion with a range of -23.9 to +37.1 %D, and the mean absolute range exceeded the criterion at 19.6%. It was also noted that the Sulfur Dioxide blank readings and predicted blank concentration range were high.

**Figure 5: Summary of USEPA Audits of Sulfur Dioxide Monitoring Stations**




## B. Audits conducted by the GDF using USEPA audit system

### 1. Re-Audits

#### a) Ozone ($O_3$)

The GDF auditor re-evaluated Ozone monitors at four monitoring locations. The %D criterion was met by all evaluations.

#### b) Nitric Oxide (NO)

The GDF auditor re-evaluated Nitric Oxide monitors at four monitoring locations. The mean absolute %Ds met the 15 percent criterion at all stations. However, when evaluating each audit concentration result across monitors using the 96% probability criterion, the lowest audit concentration exceeded the 15% D criterion at +17.6 % D.

#### c) Carbon Monoxide (CO)

The GDF auditor re-evaluated Carbon Monoxide monitors at four monitoring locations. The mean absolute %Ds met the 15 percent criterion at all stations. However, when evaluating

each audit concentration result across monitors using the 96% probability criterion, the lowest audit concentration exceeded the 15% D criterion with a range of -23.9 to +22.8 %D.

### d) Sulfur Dioxide ($SO_2$)

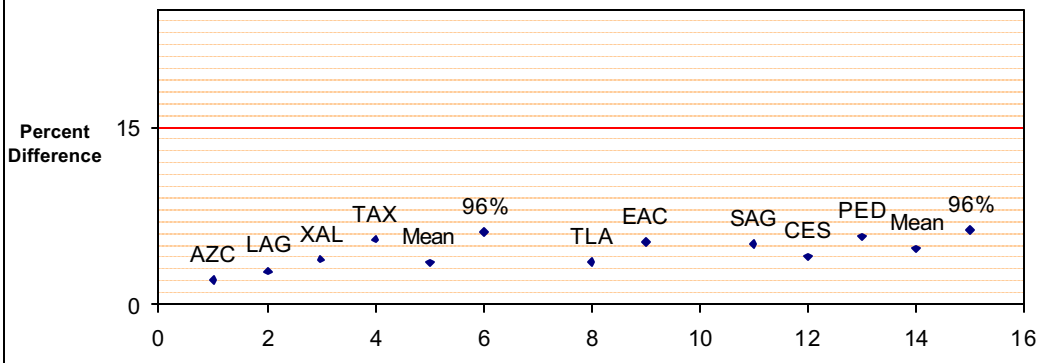
The GDF auditor re-evaluated Sulfur Dioxide monitors at four monitoring locations. The mean absolute %Ds met the 15 percent criterion at all stations. However, when evaluating each audit concentration result across monitors using the 96% probability criterion, the lowest audit concentration exceeded the 15% D criterion at +25.7 % D. It was also noted that the one Sulfur Dioxide blank reading and the predicted blank concentration range were high.

## 2. New Audits

### a) Ozone ($O_3$)

The GDF auditor evaluated Ozone monitors at six monitoring locations. The %D criterion was met by all evaluations.

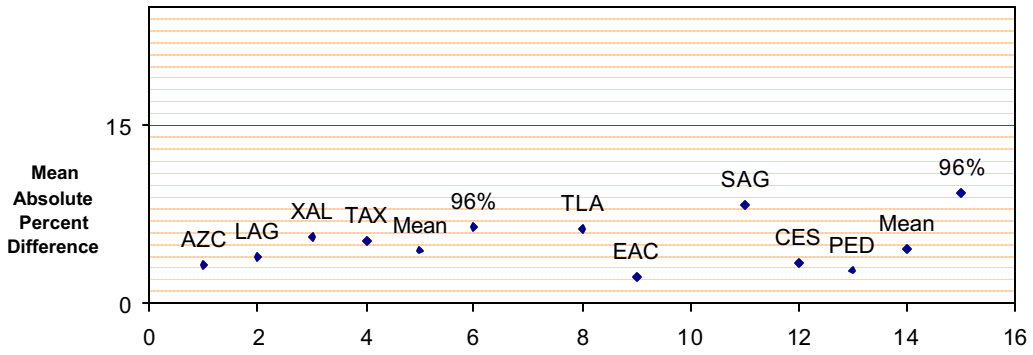
**Figure 6: Summary of GDF Audits of Ozone Monitoring Stations**




### b) Nitric Oxide (NO)

The GDF auditor evaluated Nitric Oxide monitors at six monitoring locations. The %D criterion was met by all evaluations.

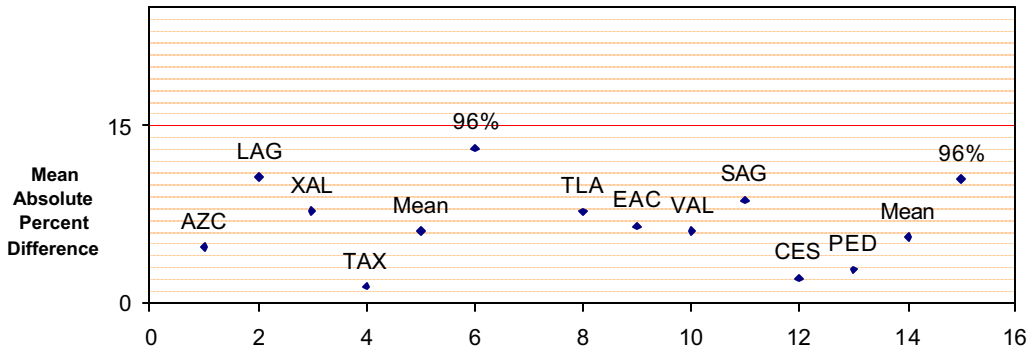
**Figure 7: Summary of GDF Audits of Nitric Oxide Monitoring Stations**




## c) Carbon Monoxide (CO)

The GDF auditor evaluated Carbon Monoxide monitors at six monitoring locations. The mean absolute %Ds met the 15 percent criterion at all stations. However, when evaluating each audit concentration result across monitors using the 96% probability criterion, the lowest audit concentration exceeded the 15% D criterion at +20.0 % D.

**Figure 8: Summary of GDF Audits of Carbon Monoxide Monitoring Stations**

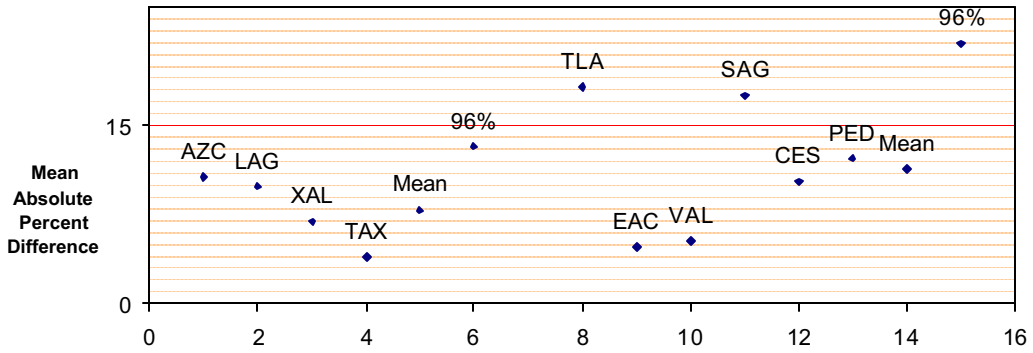



## d) Sulfur Dioxide ($SO_2$)

The GDF auditor evaluated Sulfur Dioxide monitors at six monitoring locations. The mean absolute %Ds ranged from 4.8 at ENEP Acatlán station to 18.2 at the Tlanepantla station. In addition to Tlanepantla, the San Agustín station also exceeded the mean absolute criterion at 17.5 %D. Additionally, when evaluating each audit concentration result across monitors

using the 96% probability criterion, the mid-level audit concentration exceeded the %D criterion at +17.1, and the lowest audit concentration exceeded the 15% D criterion at +38 %D, and the mean absolute range exceeded the criterion at 21.9%. It was also noted that the Sulfur Dioxide blank readings and predicted blank concentration range were high.

**Figure 9: Summary of GDF Audits of Sulfur Dioxide Monitoring Stations**




## C. Evaluation

### 1. Ozone ($O_3$)

The audits conducted by USEPA and the GDF using the USEPA NPAP audit system found no significant bias in the monitors measured. USEPA's simple statistical evaluation of the data did not indicate any potential for bias in the remainder of the network. These findings indicate that there has been data quality improvement in the Ozone monitoring since CY 2000.

### 2. Nitric Oxide (NO)

The Nitric Oxide audit data indicates the potential for a high bias at the lowest concentration audited. Measurement error at the lower end of an instrument's linear range is common in monitoring networks. The audit data from CY 2003 demonstrated some improvement from CY 2000.

### 3. Carbon Monoxide (CO)

The Carbon Monoxide audit data indicate imprecision at the lowest concentration audited. Measurement error at the lower end of an instrument's linear range is common in monitoring networks.

### 4. Sulfur Dioxide ($SO_2$)

The Sulfur Dioxide audit data indicate significant imprecision and bias at the lowest audit concentration. The potential for high bias was also evident at the mid level audit concentration. The blank concentrations were also significantly elevated at some stations. The stations that were re-audited did show some improvement.

## D. Recommendations

The performance audits indicate that there may be significant bias and imprecision in the low concentration Sulfur Dioxide data being produced by the network. The GDF should put in place a formal corrective action process to identify and eliminate this quality concern. Part of the bias observed is evidenced by elevated blank readings. The GDF should evaluate how calibrations are performed for these instruments, calibration frequency, and the potential for baseline drift. The GDF may also want to evaluate the maintenance schedule used for the Sulfur Dioxide instruments, as a positive bias could also be caused by lack of regular maintenance (e.g. a dirty reaction cell).

The performance audits indicate that it would be beneficial to improve monitoring accuracy at low Carbon Monoxide and Nitric Oxide concentrations. These could be evaluated by the QA and monitoring managers as part of their routine quality improvement process.

The GDF should investigate the feasibility of purchasing an "Ultrapure" air standard that meets USEPA protocol gas requirements. This would serve as an independent verification of instrument zero points and as a tool to evaluate the zero air scrubbers currently being used.

The GDF should institute a routine performance audit program utilizing internal, independent staff and independent monitoring equipment and standards.

# V. System Evaluation

USEPA has included some system observations as part of this report. These observations, while not part of a comprehensive TSA or MSR, may be helpful to the GDF in making improvements to its monitoring network and its quality system. USEPA ORD staff also made system observations during their CY 2000 performance audits. They observed little documentation of how monitoring system quality was being controlled. Noticeable, recent improvements to the air monitoring quality system were evident during the CY 2003 audits.

## A. Quality System

The quality system in place at the GDF is an emerging system. Many quality control processes had been recently implemented. There were signs that a well thought out Quality Management System is being developed. Several staff are assigned QA responsibilities, and a draft quality management plan is being developed. This draft plan incorporates many quality concepts from the ISO 9000 quality standards and related quality standards used in the United States for collection of environmental information.

## B. Technical Observations

It was noted that the most recent multipoint calibration information was not readily available at the monitoring stations, and was not easily retrieved for all monitors when requested. This is easily remedied by making a copy of these documents to remain at the monitoring stations. This finding, which needs to be addressed, is an improvement over the CY 2000 audits where it was noted, "It appears that multipoint calibrations are performed at regular intervals; however, no documentation of the frequency of the calibrations was provided."

## C. Network Observations

A formal network review was not performed. However, it is recommended that the monitoring network be formally reviewed based on current monitoring needs. The number of monitoring stations associated with gaseous pollutants which are at concentrations below regulatory limits seems high. However, the number and location of Ozone monitoring sites may need to be re-assessed based on urban growth and an evaluation of modeled and measured Ozone concentrations. This may result in a recommendation to add and/or shift Ozone monitoring into outlying areas where high Ozone concentrations are expected.

## D. Site Evaluation Summary

Individual site evaluations are included in Appendix A.

Generally the stations were kept up well and the manifolds that could be seen were clean. The site operators were knowledgeable and worked cooperatively with the auditors.

The structure housing the Azcapotzalco monitoring equipment should be repaired or replaced. The plywood construction is rotting in several places and rain water is getting into the monitoring station.

Several of the sites were obstructed by trees and/or buildings. Where trees obstruct the flow around the probe or provide a potential surface for scavenging pollutants, the offending trees should be trimmed or removed. Alternatively, the probe height may be increased. Increasing probe height should also be considered where air flow is obstructed by a building.

The Taxqueña site is located close to a busy roadway. This may adversely impact the representativeness of data for Ozone and Oxides of Nitrogen. These parameters should be measured at a location an appropriate distance from the roadway.

There are currently 5 station operators, each with responsibility for 5 – 6 stations. This ratio is higher than can be expected to effectively operate a monitoring network. This is compounded by travel time considerations between monitoring stations.

## E. Recommendations

The GDF should implement annual internal Technical System Audits to improve and maintain the quality of data being produced. Occasional external system audits should also be performed.

# APPENDIX A

## Station Evaluations and Result Data from USEPA Audits

**Third of November 2003**

1:00 PM – Audit of laboratory monitors.

Ozone

| Site | Lab | | | | |
|---|---|---|---|---|---|
| Audit date | 3-Nov | z/s date | | cal date | 31-Oct-03 |
| Man. | API | Model | 400A | S/N | 888 |
| | | P mm Hg | 590.7 | T deg C | 19.5 |
| Setting | Result | | | Audit C. | % D |
| Zero | 0.3 | | | .3 | |
| 485 | 405.7 | | | 407 | -0.3 |
| 350 | 175.8 | | | 178.9 | -1.7 |
| 255 | 54.5 | | | 52.7 | 3.3 |
| | | | | Mean | |
| | | | | Abs | 1.8 |
| | | | | | |

NO

| Site | Lab | | | | |
|---|---|---|---|---|---|
| audit date | 3-Nov | z/s date | | cal date | |
| Man. | API | Model | 200A | S/N | 2356 |
| | | P mm Hg | 593.2 | T deg C | 19.5 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 427.1 | | | 405.16 | 5.4 |
| 2,3 | 190.1 | | | 181.38 | 4.8 |
| 3 | 45.2 | | | 45.00 | 1.6 |
| 1,3 | 427.7 | | | | |
| Zero | -1.9 | | | 0 | |
| | | | | | |
| | | | | MA | 3.9 |

SO2

| site | Lab | | | | |
|---|---|---|---|---|---|
| audit date | 3-Nov | z/s date | | cal date | |
| Man. | API | Model | 100A | S/N | 1707 |
| | | P mm Hg | 593.2 | T deg C | 19.5 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 381.6 | | | 375.22 | 1.7 |
| 2,3 | 172.1 | | | 167.97 | 2.5 |
| 3 | 41 | | | 41.67 | -1.6 |
| 1,3 | 384.3 | | | | |
| Zero | -1.7 | | | 0 | |
| | | | | | |
| | | | | MA | 1.9 |

## Fourth of November 2003

8:30 AM – Lagunilla Station Audit $O_3$, NO, $SO_2$, and CO

Station Operator: Ernesto Ismael León Díaz
Downtown and Northeast Team

This station is in the first floor storage room of a two-story health center. The probe is long in order to clear the adjacent building. The manifold/inlet is Teflon and but has a plastic connector. The cap is missing from the inlet at this site. Any of these may impact the quality of data from this site and lead to data with a low bias.

Ozone

| Site | LAG | | | | |
|---|---|---|---|---|---|
| Audit date | 4-Nov | z/s date | 31-Oct-03 | cal date | |
| Man. | API | Model | 400 | S/N | 443 |
| | | P mm Hg | 580 | T deg C | 22.6 |
| Setting | Result | | | Audit C. | % D |
| Zero | 1.4 | | | 0.3 | |
| 485 | 394.4 | | | 404.1 | -2.4 |
| 350 | 170.3 | | | 177.6 | -4.1 |
| 255 | 53.2 | | | 52.4 | 1.6 |
| Zero | -0.4 | | | | |
| | | | | MA | 2.7 |
| | | | | | |

NO

| Site | LAG | | | | |
|---|---|---|---|---|---|
| audit date | 4-Nov | z/s date | 31-Oct | cal date | 23-Oct-03 |
| Man. | API | Model | 200 | S/N | 232 |
| | | P mm Hg | 580 | T deg C | 22.4 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 409.1 | | | 405.16 | 1.0 |
| 2,3 | 183.9 | | | 181.38 | 1.4 |
| 3 | 47.6 | | | 45 | 5.8 |
| 1,3 | 409.1 | | | | |
| Zero | 1.5 | | | 0 | |
| | | | | | |
| | | | | MA | 2.7 |

SO2

| Site | LAG | | | | |
|---|---|---|---|---|---|
| Audit date | 4-Nov | z/s date | 31-Oct | cal date | 31-Oct-03 |
| Man. | API | Model | 100 | S/N | 237 |
| | | P mm Hg | 580 | T deg C | 22.6 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 399.1 | | | 375.22 | 6.4 |
| 2,3 | 183.9 | | | 167.97 | 9.5 |
| 3 | 55.2 | | | 41.67 | 32.5 |
| 1,3 | 396.4 | | | | |
| Zero | 11.3 | | | 0 | |
| | | | | | |
| | | | | MA | 16.1 |

CO

| site | LAG | | | | |
|---|---|---|---|---|---|
| audit date | 4-Nov | z/s date | 31-Oct | cal date | |
| Man. | API | Model | 300 | S/N | 112 |
| | | P mm Hg | 580 | T deg C | 22.6 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 43 | | | 40.94 | 5.0 |
| 2,3 | 20 | | | 18.33 | 9.1 |
| 3 | 5.2 | | | 4.55 | 14.3 |
| 1,3 | 43.1 | | | | |
| Zero | 0.5 | | | 0.00 | 0.5 |
| | | | | | |
| | | | | MA | 9.5 |

**Fourth of November 2003**

12:00 PM – Tacuba Station Audit
$O_3$, NO, $SO_2$, and CO

Station Operator: Ernesto Ismael León Díaz Downtown and Northeast Team

This station is in a shed on top of the second floor of a health center. This site is well situated and is representative of residential and industrial exposures.

Ozone

| Site | TAC | Tacuba | | | |
|---|---|---|---|---|---|
| audit date | 4-Nov | z/s date | 27-Oct-03 | cal date | |
| Man. | API | Model | 400 | S/N | 442 |
| | | P mm Hg | 581 | T deg C | 22.6 |
| Setting | Result | | | Audit C. | % D |
| Zero | 0.3 | | | 0.3 | |
| 485 | 394.1 | | | 404.4 | -2.5 |
| 350 | 173.6 | | | 177.7 | -2.3 |
| 255 | 53.3 | | | 52.4 | 1.7 |
| Zero | 0.9 | | | | |
| | | | | MA | 2.2 |
| | | | | | |

NO

| site | TAC | Tacuba | | | |
|---|---|---|---|---|---|
| audit date | 4-Nov | z/s date | 27-Oct | cal date | |
| Man. | API | Model | 200 | S/N | 226 |
| | | P mm Hg | 581 | T deg C | 22.6 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 429 | | | 405.16 | 5.9 |
| 2,3 | 194 | | | 181.38 | 7.0 |
| 3 | 51 | | | 45 | 13.3 |
| 1,3 | 452 | | | | |
| Zero | 2 | | | 0 | |
| | | | | | |
| | | | | MA | 8.7 |

SO2

| Site | TAC | Tacuba | | | |
|---|---|---|---|---|---|
| audit date | 4-Nov | Z/s date | 27-Oct | cal date | |
| Man. | API | Model | 100 | S/N | 501 |
| | | P mm Hg | 581 | T deg C | 22.6 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 447 | | | 375.22 | 10.3 |
| 2,3 | 191 | | | 167.97 | 13.7 |
| 3 | 54 | | | 41.67 | 29.6 |
| 1,3 | 415 | | | | |
| Zero | 6 | | | 0 | |
| | | | | | |
| | | | | MA | 17.9 |

CO

| site | TAC | Tacuba | | | |
|---|---|---|---|---|---|
| audit date | 4-Nov | z/s date | 27-Oct | Cal date | |
| Man. | API | Model | 300 | S/N | 676 |
| | | P mm Hg | 581 | T deg C | 22.6 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 43.7 | | | 40.94 | 6.7 |
| 2,3 | 19.9 | | | 18.33 | 8.6 |
| 3 | 5.3 | | | 4.55 | 16.5 |
| 1,3 | 43.8 | | | | |
| Zero | -0.1 | | | 0 | |
| | | | | | |
| | | | | MA | 10.6 |

**Fourth of November 2003**

5:30 PM – Metro Insurgentes Audit CO

Station Operator: Ernesto Ismael León Díaz  Downtown and Northeast Team

This site is a small building (kiosk) in a plaza, which is a metro station entrance, and in the middle of a traffic circle. While it was indicated that there are problems with vandalism at this site, this site is a good choice for measuring localized CO exposures.

CO

| site | MIN | | | | |
|---|---|---|---|---|---|
| audit date | 4-Nov | z/s date | 28-Oct | cal date | |
| Man. | TECO | Model | 48 | S/N | ACM13650-140 |
| | | P mm Hg | 580 | T deg C | 22.6 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 43.4 | | | 40.94 | 6.0 |
| 2,3 | 19.5 | | | 18.33 | 6.4 |
| 3 | 4.9 | | | 4.55 | 7.7 |
| 1,3 | 43 | | | | |
| Zero | 0.2 | | | 0 | |
| | | | | | |
| | | | | MA | 6.7 |

## Fifth of November 2003

9:00 AM Azcapotzalco AZC Audit $O_3$, NO, $SO_2$, and CO

Station Operator: Cristian Gómez Rodríguez
Downtown and Northeast Team

This station is in a residential neighborhood on a health center next to a park. There are no major streets adjacent to this site. This is a good site and representative of residential no-source impacted exposures. The structure, while of sufficient size, is constructed out of plywood that is beginning to rot, and should be replaced.

Ozone

| site | AZC Azcapotzalco | | | | |
|---|---|---|---|---|---|
| audit date | 5-Nov | z/s date | 29-Oct-03 | cal date | |
| Man. | API | Model | 400 | S/N | 793 |
| | | P mm Hg | 574.6 | T deg C | 19.8 |
| Setting | Result | | | Audit C. | % D |
| Zero | 0.7 | | | 0.3 | |
| 485 | 394.8 | | | 402.6 | -1.9 |
| 350 | 166.8 | | | 176.9 | -5.7 |
| 255 | 51.5 | | | 52.2 | -1.3 |
| Zero | 0.7 | | | | |
| Zero | 0.1 | | | | |
| | | | | MA | 3.0 |

NO

| site | AZC Azcapotzalco | | | | |
|---|---|---|---|---|---|
| audit date | 5-Nov | z/s date | 20-Oct | cal date | |
| Man. | API | Model | 200 | S/N | 496 |
| | | P mm Hg | 574.6 | T deg C | 19.8 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 412.4 | 424.2 | | 405.16 | 1.8 |
| 2,3 | 174.2 | 189.2 | | 181.38 | -4.0 |
| 3 | 46.8 | 48.8 | | 45 | 4.0 |
| 1,3 | 427 | 419.8 | | | |
| Zero | 1.2 | 1.8 | | 0 | |
| | | | | | |
| | | | | MA | 3.2 |

SO2

| site | AZC Azcapotzalco | | | | |
|---|---|---|---|---|---|
| audit date | 5-Nov | z/s date | 20-Oct | cal date | |
| Man. | API | Model | 100 | S/N | 496 |
| | | P mm Hg | 574.6 | T deg C | 19.8 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 410.4 | | | 375.22 | 9.4 |
| 2,3 | 176.1 | | | 167.97 | 4.8 |
| 3 | 51.9 | | | 41.67 | 24.6 |
| 1,3 | 422 | | | | |
| Zero | 5.6 | | | 0 | |
| | | | | | |
| | | | | MA | 12.9 |

CO

| site | AZC Azcapotzalco | | | | |
|---|---|---|---|---|---|
| audit date | 5-Nov | z/s date | 20-Oct | cal date | 20-Oct-03 |
| Man. | API | Model | 300 | S/N | 309 |
| | | P mm Hg | 574.6 | T deg C | 19.8 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 43.1 | | | 40.94 | 5.3 |
| 2,3 | 19.1 | | | 18.33 | 4.2 |
| 3 | 4.5 | | | 4.55 | -1.1 |
| 1,3 | 42.7 | | | | |
| Zero | -0.1 | | | 0 | |
| | | | | | |
| | | | | MA | 3.5 |

**Fifth of November 2003**

12:00 PM Xalostoc XAL
Audit $O_3$, NO, $SO_2$, and CO

Station Operator: Ernesto Ismael León Díaz Downtown and Northeast Team

This site is in an industrial and commercial area. The site is in a shed on the back lot of a car dealership.

Ozone

| site | XAL | | | | |
|---|---|---|---|---|---|
| audit date | 5-Nov | z/s date | 24-Oct-03 | cal date | |
| Man. | API | Model | 400 | S/N | 447 |
| | | P mm Hg | 585.1 | T deg C | 18.9 |
| Setting | Result | | | Audit C. | % D |
| Zero | 1.6 | | | 0.3 | |
| 485 | 396.8 | | | 405.5 | -2.1 |
| 350 | 174 | | | 178.2 | -2.4 |
| 255 | 54.5 | | | 52.5 | 3.7 |
| Zero | 1.6 | | | | |
| | | | | | |
| | | | | MA | 2.7 |

NO

| site | XAL | | | | |
|---|---|---|---|---|---|
| audit date | 5-Nov | z/s date | 30-Oct | cal date | |
| Man. | API | Model | 200 | S/N | 521 |
| | | P mm Hg | 585.1 | T deg C | 18.9 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 434.1 | 438.5 | | 405.16 | 5.0 |
| 2,3 | 193.8 | 194 | | 181.38 | 6.9 |
| 3 | 51 | 51.5 | | 45 | 13.3 |
| 1,3 | 431.4 | 435.1 | | | |
| Zero | 3.8 | 3 | | 0 | |
| | | | | | |
| | | | | MA | 8.4 |

SO2

| site | XAL | | | | |
|---|---|---|---|---|---|
| audit date | 5-Nov | z/s date | 3-Nov | cal date | |
| Man. | API | Model | 100 | S/N | 497 |
| | | P mm Hg | 585.1 | T deg C | 18.9 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | | | | 375.22 | 4.8 |
| 2,3 | 177.6 | | | 167.97 | 5.7 |
| 3 | 44.8 | | | 41.67 | 7.5 |
| 1,3 | 395.7 | | | | |
| Zero | 0.7 | | | 0 | |
| 1,3 | 393.2 | | | | |
| | | | | MA | 6.0 |

CO

| site | XAL | | | | |
|---|---|---|---|---|---|
| audit date | 5-Nov | z/s date | 30-Oct | cal date | |
| Man. | API | Model | 300 | S/N | 308 |
| | | P mm Hg | 585.1 | T deg C | 18.9 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 41.3 | | | 40.94 | 0.9 |
| 2,3 | 18.2 | | | 18.33 | -0.7 |
| 3 | 3.9 | | | 4.55 | -14.3 |
| 1,3 | 40.7 | | | | |
| Zero | -0.4 | | | 0 | |
| | | | | | |
| | | | | MA | 5.3 |

**Fifth of November 2003**

5:00 PM Aragon ARA Audit $SO_2$ and CO

Station Operator: Ernesto Ismael León Díaz
Downtown and Northeast Team

This site is located in a residential area adjacent to a park. The station is a small shed behind a senior center. The streets around the site are wide but not heavily traveled. The probe height is just above the shed roof. There are several large trees to the north which block part of the prevailing wind direction. There is also a portion of the senior center that is higher than the probe. The trees north of the station should be trimmed or removed and the probe should be elevated. However the value of this site for $SO_2$ and CO monitoring should be considered before investing in upgrades to this station.

SO2

| site | ARA | | | | |
|---|---|---|---|---|---|
| audit date | 5-Nov | z/s date | 23-Oct | cal date | |
| Man. | API | Model | 100 | S/N | 461 |
| | | P mm Hg | 585.9 | T deg C | 17.6 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 400.7 | | | 375.22 | 6.8 |
| 2,3 | 179.2 | | | 167.97 | 6.7 |
| 3 | 49.4 | | | 41.67 | 18.6 |
| 1,3 | 394.8 | | | | |
| Zero | 3.5 | | | 0 | |
| | | | | | |
| | | | | MA | 10.7 |

CO

| site | ARA | | | | |
|---|---|---|---|---|---|
| audit date | 5-Nov | z/s date | 23-Oct | cal date | |
| Man. | TECO | Model | 48 | S/N | 33065-243 |
| | | P mm Hg | 585.9 | T deg C | 17.6 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 40.7 | | | 40.94 | -0.6 |
| 2,3 | 18 | | | 18.33 | -1.8 |
| 3 | 4.2 | | | 4.55 | -7.7 |
| 1,3 | 40.2 | | | | |
| Zero | -0.2 | | | 0 | |
| | | | | | |
| | | | | MA | 3.4 |

**Sixth of November 2003**

9:45 AM Cuajimalpa CUA Audit $O_3$

Station Operator: Julio Cesar Argueta Rodriguez

This site is in a residential area in a mountainous region west of Mexico City. The station is in a fair sized shed on top of the second floor of a school.

Ozone

| site | CUA Cuajimalpa | | | | |
|---|---|---|---|---|---|
| audit date | 6-Nov | z/s date | 3-Nov-03 | cal date | |
| Man. | API | Model | 400A | S/N | 131 |
| | | P mm Hg | 557.9 | T deg C | 18.7 |
| Setting | Result | | | Audit C. | % D |
| Zero | 1.1 | | | 0.3 | |
| 485 | 375.9 | | | 398.1 | -5.6 |
| 350 | 162.7 | | | 175.0 | -7.0 |
| 255 | 51.1 | | | 51.6 | -1.0 |
| | | | | | |
| | | | | | |
| | | | | MA | 4.5 |

**Sixth of November 2003**

12:15 PM Plateros PLA $O_3$, NO, $SO_2$, and CO

Station Operator: Julio Cesar Argueta Rodriguez

This site is located in a residential area. The site is in the back of a health center parking lot in a small shed. There are many trees in the area and there are several trees directly adjacent to the site. Because the inlet is just above the roof of the shed and these trees are blocking a significant portion of the area around the site, it is recommended that a combination of raising the probe height and cutting back trees be undertaken to make this site more suitable.

Ozone

| site | PLA Plateros | | | | |
|---|---|---|---|---|---|
| audit date | 6-Nov | z/s date | | cal date | |
| Man. | API | Model | 400A | S/N | 262 |
| | | P mm Hg | 582.3 | T deg C | 18.2 |
| Setting | Result | | | Audit C. | % D |
| Zero | 1.6 | | | 0.3 | |
| 485 | 420 | | | 404.7 | 3.8 |
| 350 | 182.3 | | | 177.9 | 2.5 |
| 255 | 57.3 | | | 52.5 | 9.2 |
| Zero | 1.4 | | | | |
| | | | | | |
| | | | | MA | 5.2 |

NO

| site | PLA Plateros | | | | |
|---|---|---|---|---|---|
| audit date | 6-Nov | z/s date | | cal date | |
| Man. | API | Model | 200 | S/N | 498 |
| | | P mm Hg | 582.3 | T deg C | 18.2 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 422.8 | 423 | | 405.16 | 4.4 |
| 2,3 | 188.2 | 189.2 | | 181.38 | 3.8 |
| 3 | 48.4 | 46.7 | | 45.00 | 7.6 |
| 1,3 | 428.2 | 425.5 | | | |
| Zero | -1.2 | -0.4 | | 0 | |
| | | | | | |
| | | | | MA | 5.2 |

SO2

| site | PLA Plateros | | | | |
|---|---|---|---|---|---|
| audit date | 6-Nov | z/s date | | cal date | |
| Man. | API | Model | 100 | S/N | 500 |
| | | P mm Hg | 582.3 | T deg C | 18.2 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 402.9 | | | 375.22 | 7.4 |
| 2,3 | 185.2 | | | 167.97 | 10.3 |
| 3 | 52.2 | | | 41.67 | 25.3 |
| 1,3 | 407.3 | | | | |
| Zero | 3.4 | | | 0 | |
| | | | | | |
| | | | | MA | 14.3 |

CO

| site | PLA Plateros | | | | |
|---|---|---|---|---|---|
| audit date | 6-Nov | z/s date | | cal date | |
| Man. | API | Model | 300 | S/N | 1160 |
| | | P mm Hg | 582.3 | T deg C | 18.2 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 42.8 | | | 40.94 | 4.5 |
| 2,3 | 19.2 | | | 18.33 | 4.7 |
| 3 | 5.2 | | | 4.55 | 14.3 |
| 1,3 | 42.7 | | | | |
| Zero | 0 | | | 0 | |
| | | | | | |
| | | | | MA | 7.9 |

**Seventh of November 2003**

10:00 AM Taxqueña TAX

Station Operator: Arturo Navarrete Miranda

This site is in the front yard of an elementary school. There is a road adjacent to the site, which appears to be heavily traveled. This site is appropriate for measuring CO exposure, however other monitoring should be moved away from the roadway.

Ozone

| site | TAX | Taxqueña | | | |
|---|---|---|---|---|---|
| audit date | 7-Nov | z/s date | 28-Oct | cal date | |
| Man. | API | Model | 400 | S/N | 229 |
| | | P mm Hg | 583.8 | T deg C | 18.3 |
| Setting | Result | | | Audit C. | % D |
| Zero | 1 | | | 0.3 | |
| 485 | 412 | | | 405.1 | 1.7 |
| 350 | 184 | | | 178.0 | 3.3 |
| 255 | 57 | | | 52.5 | 8.6 |
| Zero | 3 | | | | |
| | | | | | |
| | | | | MA | 4.5 |

NO

| site | TAX | Taxqueña | | | |
|---|---|---|---|---|---|
| audit date | 7-Nov | z/s date | 28-Oct | cal date | |
| Man. | API | Model | 200 | S/N | 525 |
| | | P mm Hg | 583.8 | T deg C | 18.3 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 420 | | | 405.16 | 3.7 |
| 2,3 | 189 | | | 181.38 | 4.2 |
| 3 | 48 | | | 45.00 | 6.7 |
| 1,3 | 412 | | | | |
| Zero | -2 | | | 0 | |
| | | | | | |
| | | | | MA | 4.8 |

SO2

| site | TAX | Taxqueña | | | |
|---|---|---|---|---|---|
| audit date | 7-Nov | z/s date | 28-Oct | cal date | |
| Man. | API | Model | 100 | S/N | 252 |
| | | P mm Hg | 583.8 | T deg C | 18.3 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 397 | | | 375.22 | 5.8 |
| 2,3 | 181 | | | 167.97 | 7.8 |
| 3 | 47 | | | 41.67 | 12.8 |
| 1,3 | 390 | | | | |
| Zero | 3 | | | 0 | |
| | | | | | |
| | | | | MA | 8.8 |

CO

| site | TAX | Taxqueña | | | |
|---|---|---|---|---|---|
| audit date | 7-Nov | z/s date | 28-Oct | cal date | |
| Man. | API | Model | 300 | S/N | 1168 |
| | | P mm Hg | 583.8 | T deg C | 18.3 |
| Setting | Result | | | Audit C. | % D |
| 1,3 | 41 | | | 40.94 | 0.1 |
| 2,3 | 18.3 | | | 18.33 | -0.2 |
| 3 | 4.8 | | | 4.55 | 5.5 |
| 1,3 | 41 | | | | |
| Zero | 0 | | | 0 | |
| | | | | | |
| | | | | MA | 1.9 |

# APPENDIX B

# GDF Audit Data

OZONE PERFORMANCE AUDIT

SITE ID_____TAXQUEÑA_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____229_____

MONITOR MODEL_____400_____

AIR TEMPERATURE NEAR MONITOR_____18.9_____

SITE BAROMETRIC PRESSURE_____579.8__

DATE FOR AUDIT_____12-04-03_____

| POTENTIOMETER SETTING | RESULTS IN PPB |
|---|---|
| ZERO | 2.0 |
| 485 | 382 |
| 350 | 167 |
| 255 | 55 |
| ZERO | 2.0 |

OZONE PERFORMANCE AUDIT

SITE ID_____CERRO DE LA ESTRELLA_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____438_____

MONITOR MODEL_____400_____

AIR TEMPERATURE NEAR MONITOR____21.3_____

SITE BAROMETRIC PRESSURE_____576.8_____

DATE FOR AUDIT_____12-03-03_____

| POTENTIOMETER SETTING | RESULTS IN PPB |
|---|---|
| ZERO | -0.1 |
| 485 | 382.9 |
| 350 | 167.0 |
| 255 | 51.7 |
| ZERO | 0.4 |

OZONE PERFORMANCE AUDIT

SITE ID_____LAGUNILLA_____

MONITOR MANUFACTURED__ API_____

MONITOR SERIAL_____443_____

MONITOR MODEL_____400_____

AIR TEMPERATURE NEAR MONITOR____20_____

SITE BAROMETRIC PRESSURE_____581.29_____

DATE FOR AUDIT_____12-01-03_____

| POTENTIOMETER SETTING | RESULTS IN PPB |
|---|---|
| ZERO | 0.4 |
| 485 | 389.4 |
| 350 | 170.3 |
| 255 | 52.1 |
| ZERO | 0.1 |

OZONE PERFORMANCE AUDIT

SITE ID_____AZCAPOTZALCO_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____793_____

MONITOR MODEL_____400_____

AIR TEMPERATURE NEAR MONITOR____21.1_____

SITE BAROMETRIC PRESSURE_____581.9_____

DATE FOR AUDIT_____11-27-03_____

| POTENTIOMETER SETTING | RESULTS IN PPB |
|---|---|
| ZERO | -0.8 |
| 485 | 394.5 |
| 350 | 174.1 |
| 255 | 53.2 |
| ZERO | -2.0 |

OZONE PERFORMANCE AUDIT

SITE ID_____TLALNEPANTLA_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____794_____

MONITOR MODEL_____400_____

AIR TEMPERATURE NEAR MONITOR___22.3_____

SITE BAROMETRIC PRESSURE_____576.7_____

DATE FOR AUDIT_____11-27-03_____

| POTENTIOMETER SETTING | RESULTS IN PPB |
|---|---|
| ZERO | 2.9 |
| 485 | 399.6 |
| 350 | 175.5 |
| 255 | 56.9 |
| ZERO | 2.9 |

OZONE PERFORMANCE AUDIT

SITE ID_____ENEP ACATLAN_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____159_____

MONITOR MODEL_____400_____

AIR TEMPERATURE NEAR MONITOR____16.6_____

SITE BAROMETRIC PRESSURE_____579.0_____

DATE FOR AUDIT_____11-28-03_____

| POTENTIOMETER SETTING | RESULTS IN PPB |
|---|---|
| ZERO | 1.2 |
| 485 | 377.0 |
| 350 | 164.5 |
| 255 | 53.3 |
| ZERO | 2 |

OZONE PERFORMANCE AUDIT

SITE ID_____XALOSTOC_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____447_____

MONITOR MODEL_____400_____

AIR TEMPERATURE NEAR MONITOR_____16.7_____

SITE BAROMETRIC PRESSURE_____578.3_____

DATE FOR AUDIT_____12-02-03_____

| POTENTIOMETER SETTING | RESULTS IN PPB |
|---|---|
| ZERO | 1.6 |
| 485 | 381.8 |
| 350 | 167.0 |
| 255 | 52.4 |
| ZERO | 1.5 |

OZONE PERFORMANCE AUDIT

SITE ID_____SAN AGUSTIN_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____440_____

MONITOR MODEL_____400_____

AIR TEMPERATURE NEAR MONITOR____20.7_____

SITE BAROMETRIC PRESSURE_____576.79_____

DATE FOR AUDIT_____12-02-03_____

| POTENTIOMETER SETTING | RESULTS IN PPB |
|---|---|
| ZERO | 3.3 |
| 485 | 383.6 |
| 350 | 168.6 |
| 255 | 55.2 |
| ZERO | 4.2 |

OZONE PERFORMANCE AUDIT

SITE ID_____PEDREGAL_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____257_____

MONITOR MODEL_____400A_____

AIR TEMPERATURE NEAR MONITOR____22.4_____

SITE BAROMETRIC PRESSURE_____572.3_____

DATE FOR AUDIT_____12-04-03_____

| POTENTIOMETER SETTING | RESULTS IN PPB |
|---|---|
| ZERO | 1.2 |
| 485 | 371.3 |
| 350 | 163.2 |
| 255 | 51.1 |
| ZERO | 1.1 |

NO PERFORMANCE AUDIT
SITE ID_____TAXQUEÑA_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____525_____

MONITOR MODEL_____200_____

AIR TEMPERATURE NEAR MONITOR_____18.9_____

SITE BAROMETRIC PRESSURE_____579.8_____

DATE FOR AUDIT_____12-04-03_____

| POINT | VALVES OPEN | NO (PPB) | Nox (PPB) | NO2 (PPB) |
|---|---|---|---|---|
| 1 | 1,3 | 386 | 391 | 5 |
| 2 | 2,3 | 173 | 175 | 3 |
| 3 | 3 | 42 | 46 | 4 |
| 4 | 1,3 | 387 | 392 | 4 |
| ZERO | All valves closed | 1 | 0 | 0 |
| 1 | 1,3 | 389 | 391 | 2 |
| 2 | 2,3 | 173 | 177 | 4 |
| 3 | 3 | 44 | 47 | 3 |
| 4 | 1,3 | 388 | 390 | 3 |
| ZERO | All valves closed | 1 | 1 | 0 |

NO PERFORMANCE AUDIT

SITE ID_____CERRO DE LA ESTRELLA_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____533_____

MONITOR MODEL_____200_____

AIR TEMPERATURE NEAR MONITOR____21.3_____

SITE BAROMETRIC PRESSURE_____576.8_____

DATE FOR AUDIT_____12-03-03_____

| POINT | VALVES OPEN | NO (PPB) | Nox (PPB) | NO2 (PPB) |
|---|---|---|---|---|
| 1 | 1,3 | 406.0 | 411.5 | 5.1 |
| 2 | 2,3 | 183.6 | 184.4 | 0.9 |
| 3 | 3 | 49 | 47.6 | -1.3 |
| 4 | 1,3 | 405.5 | 408.2 | 2.5 |
| ZERO | All valves closed | 2.3 | 3.7 | 1.5 |
| 1 | 1,3 | 408.4 | 405.8 | -2.2 |
| 2 | 2,3 | 182.4 | 183.3 | 1.7 |
| 3 | 3 | 49.1 | 47.3 | -1.7 |
| 4 | 1,3 | 407.6 | 407.6 | -0.2 |
| ZERO | All valves closed | 2 | 1.6 | 0.1 |

NO PERFORMANCE AUDIT

SITE ID_____LAGUNILLA_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____232_____

MONITOR MODEL_____200_____

AIR TEMPERATURE NEAR MONITOR_____20____

SITE BAROMETRIC PRESSURE_____581.29____

DATE FOR AUDIT_____12-01-03_____

| POINT | VALVES OPEN | NO (PPB) | Nox (PPB) | NO2 (PPB) |
|---|---|---|---|---|
| 1 | 1,3 | 414.3 | 418.5 | 4.7 |
| 2 | 2,3 | 186.2 | 189.7 | 4.0 |
| 3 | 3 | 48.1 | 51.5 | 3.7 |
| 4 | 1,3 | 414.8 | 421.0 | 4.9 |
| ZERO | All valves closed | 3.0 | 4.9 | 1.7 |
| 1 | 1,3 | 416.5 | 418.5 | 2.0 |
| 2 | 2,3 | 187.2 | 192.4 | 5.4 |
| 3 | 3 | 46.9 | 52.4 | 5.9 |
| 4 | 1,3 | 413.6 | 418.3 | 5.7 |
| ZERO | All valves closed | 1.7 | 5.1 | 3.0 |

NO PERFORMANCE AUDIT

SITE ID_____AZCAPOTZALCO_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____793_____

MONITOR MODEL_____400_____

AIR TEMPERATURE NEAR MONITOR_____21.1_____

SITE BAROMETRIC PRESSURE_____581.9_____

DATE FOR AUDIT_____11-27-03_____

| POINT | VALVES OPEN | NO (PPB) | Nox (PPB) | NO2 (PPB) |
|---|---|---|---|---|
| 1 | 1,3 | 410.8 | 419.8 | 9.4 |
| 2 | 2,3 | 187.8 | 192.8 | 6.7 |
| 3 | 3 | 47.1 | 66.2 | 19.2 |
| 4 | 1,3 | 412.5 | 437.0 | 24.2 |
| ZERO | All valves closed | 2.5 | 47.6 | 46.1 |
| 1 | 1,3 | 417.4 | 461.2 | 42.6 |
| 2 | 2,3 | 188.9 | 213.4 | 24.3 |
| 3 | 3 | 46.8 | 70.9 | 20.9 |
| 4 | 1,3 | 416.9 | 430.9 | 13.8 |
| ZERO | All valves closed | 1.0 | 14.3 | 13.3 |

NO PERFORMANCE AUDIT

SITE ID_____TLALNEPANTLA_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____526_____

MONITOR MODEL_____200_____

AIR TEMPERATURE NEAR MONITOR____22.3_____

SITE BAROMETRIC PRESSURE_____576.7_____

DATE FOR AUDIT_____11-27-03_____

| POINT | VALVES OPEN | NO (PPB) | Nox (PPB) | NO2 (PPB) |
|---|---|---|---|---|
| 1 | 1,3 | 425.3 | 432.0 | 6.4 |
| 2 | 2,3 | 191.6 | 199.3 | 7.1 |
| 3 | 3 | 48.8 | 53.4 | 4.7 |
| 4 | 1,3 | 426.1 | 429.6 | 2.7 |
| ZERO | All valves closed | -0.6 | 6.4 | 7.1 |
| 1 | 1,3 | 428.3 | 428.4 | 0.3 |
| 2 | 2,3 | 191.7 | 196.6 | 4.2 |
| 3 | 3 | 47.6 | 53.4 | 5.9 |
| 4 | 1,3 | 426.3 | 428.6 | 1.7 |
| ZERO | All valves closed | -0.3 | 4.7 | 5.1 |

NO PERFORMANCE AUDIT

SITE ID_____ENEP ACATLAN_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____225_____

MONITOR MODEL_____200_____

AIR TEMPERATURE NEAR MONITOR___16.6_____

SITE BAROMETRIC PRESSURE_____579_____

DATE FOR AUDIT_____11-28-03_____

| POINT | VALVES OPEN | NO (PPB) | Nox (PPB) | NO2 (PPB) |
|---|---|---|---|---|
| 1 | 1,3 | 415.3 | 414.9 | -0.7 |
| 2 | 2,3 | 183.0 | 186.0 | 2.2 |
| 3 | 3 | 46.5 | 47.2 | 0.9 |
| 4 | 1,3 | 413.4 | 412.9 | -1.0 |
| ZERO | All valves closed | 0.7 | 1.4 | 0.7 |
| 1 | 1,3 | 416.8 | 413.4 | -3.4 |
| 2 | 2,3 | 187.2 | 187.7 | -1.0 |
| 3 | 3 | 47.0 | 48.4 | 1.2 |
| 4 | 1,3 | 418.8 | 412.2 | -6.6 |
| ZERO | All valves closed | -1.0 | 2.9 | 3.7 |

NO PERFORMANCE AUDIT

SITE ID_____XALOSTOC_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____521_____

MONITOR MODEL_____200_____

AIR TEMPERATURE NEAR MONITOR____16.7_____

SITE BAROMETRIC PRESSURE_____578.3_____

DATE FOR AUDIT_____12-02-03_____

| POINT | VALVES OPEN | NO (PPB) | Nox (PPB) | NO2 (PPB) |
|---|---|---|---|---|
| 1 | 1,3 | 412.8 | 414.2 | 1.5 |
| 2 | 2,3 | 187.4 | 189.9 | 2.5 |
| 3 | 3 | 50.2 | 50.9 | 0.8 |
| 4 | 1,3 | 413.1 | 413.7 | 0.3 |
| ZERO | All valves closed | 2.9 | 4.3 | 1.3 |
| 1 | 1,3 | 415.3 | 414.0 | -1.1 |
| 2 | 2,3 | 190.6 | 190.9 | 1.0 |
| 3 | 3 | 50.0 | 49.9 | 0.1 |
| 4 | 1,3 | 414.5 | 417.1 | 2.3 |
| ZERO | All valves closed | 2 | 2.4 | 2.3 |

NO PERFORMANCE AUDIT

SITE ID_____SAN AGUSTIN_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____232_____

MONITOR MODEL_____200_____

AIR TEMPERATURE NEAR MONITOR_____20.7___

SITE BAROMETRIC PRESSURE_____576.8_____

DATE FOR AUDIT_____12-02-03_____

| POINT | VALVES OPEN | NO (PPB) | Nox (PPB) | NO2 (PPB) |
|---|---|---|---|---|
| 1 | 1,3 | 426.3 | 428.4 | 1.6 |
| 2 | 2,3 | 193.3 | 197.5 | 1.8 |
| 3 | 3 | 50.9 | 52.6 | 1.1 |
| 4 | 1,3 | 428.8 | 431.1 | 1.4 |
| ZERO | All valves closed | 2.1 | 5.9 | 3.8 |
| 1 | 1,3 | 434.1 | 434.0 | -0.3 |
| 2 | 2,3 | 196.5 | 197.2 | 0.4 |
| 3 | 3 | 50.6 | 57.7 | 6.5 |
| 4 | 1,3 | 434.3 | 432.7 | -2.8 |
| ZERO | All valves closed | 3.0 | 4.6 | 2.1 |

NO PERFORMANCE AUDIT

SITE ID_____PEDREGAL_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____577_____

MONITOR MODEL_____200_____

AIR TEMPERATURE NEAR MONITOR_____22.4_____

SITE BAROMETRIC PRESSURE_____572.3_____

DATE FOR AUDIT_____12-04-03_____

| POINT | VALVES OPEN | NO (PPB) | NOx (PPB) | NO2 (PPB) |
|---|---|---|---|---|
| 1 | 1,3 | 401.4 | 398.3 | -1.1 |
| 2 | 2,3 | 180.6 | 179.0 | -0.1 |
| 3 | 3 | 48.2 | 46.0 | -0.6 |
| 4 | 1,3 | 407.6 | 404.3 | -1.8 |
| ZERO | All valves closed | 5.0 | 3.0 | -0.6 |
| 1 | 1,3 | 406.6 | 408.5 | 2.8 |
| 2 | 2,3 | 186.0 | 185.7 | 2.1 |
| 3 | 3 | 50.2 | 49.2 | 0.3 |
| 4 | 1,3 | 410.1 | 407.3 | -1.1 |
| ZERO | All valves closed | 3.5 | 3.3 | 1.6 |

NO PERFORMANCE AUDIT

SITE ID_____TAXQUEÑA_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____525_____

MONITOR MODEL_____200_____

AIR TEMPERATURE NEAR MONITOR____18.9____

SITE BAROMETRIC PRESSURE_____579.8___

DATE FOR AUDIT_____12-04-03_____

| POINT | VALVES OPEN | NO (PPB) | NOx (PPB) | NO2 (PPB) |
|---|---|---|---|---|
| 1 | 1,3 | 386 | 391 | 5 |
| 2 | 2,3 | 173 | 175 | 3 |
| 3 | 3 | 42 | 46 | 4 |
| 4 | 1,3 | 387 | 392 | 4 |
| ZERO | All valves closed | 1 | 0 | 0 |
| 1 | 1,3 | 389 | 391 | 2 |
| 2 | 2,3 | 173 | 177 | 4 |
| 3 | 3 | 44 | 47 | 3 |
| 4 | 1,3 | 388 | 390 | 3 |
| ZERO | All valves closed | 1 | 1 | 0 |

SULFUR DIOXIDE PERFORMANCE AUDIT

SITE ID_____CERRO DE LA ESTRELLA_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____448_____

MONITOR MODEL_____100_____

AIR TEMPERATURE NEAR MONITOR____21.3_____

SITE BAROMETRIC PRESSURE_____576.8_____

DATE FOR AUDIT_____12-03-03_____

| POINT | VALVES OPEN | RESULTS IN PPB |
|---|---|---|
| 1 | 1,3 | 391.6 |
| 2 | 2,3 | 179.6 |
| 3 | 3 | 49.9 |
| 4 | 1,3 | 393.1 |
| ZERO | ALL VALVES CLOSED | 5.9 |

SULFUR DIOXIDE PERFORMANCE AUDIT

SITE ID_____LAGUNILLA_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____237_____

MONITOR MODEL_____100_____

AIR TEMPERATURE NEAR MONITOR____20_____

SITE BAROMETRIC PRESSURE_____581.29_____

DATE FOR AUDIT_____12-04-03_____

| POINT | VALVES OPEN | RESULTS IN PPB |
|---|---|---|
| 1 | 1,3 | 382.3 |
| 2 | 2,3 | 177.7 |
| 3 | 3 | 50.8 |
| 4 | 1,3 | 381.5 |
| ZERO | ALL VALVES CLOSED | 9.1 |

SULFUR DIOXIDE PERFORMANCE AUDIT

SITE ID_____AZCAPOTZALCO_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____496_____

MONITOR MODEL_____100_____

AIR TEMPERATURE NEAR MONITOR____21.1_____

SITE BAROMETRIC PRESSURE_____581.9_____

DATE FOR AUDIT_____11-27-03_____

| POINT | VALVES OPEN | RESULTS IN PPB |
|---|---|---|
| 1 | 1,3 | 394.1 |
| 2 | 2,3 | 185.0 |
| 3 | 3 | 48.7 |
| 4 | 1,3 | 392.6 |
| ZERO | ALL VALVES CLOSED | 3.1 |

SULFUR DIOXIDE PERFORMANCE AUDIT

SITE ID_____TLALNEPANTLA_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____451_____

MONITOR MODEL_____100_____

AIR TEMPERATURE NEAR MONITOR____22.3_____

SITE BAROMETRIC PRESSURE_____576.7_____

DATE FOR AUDIT_____11-27-03_____

| POINT | VALVES OPEN | RESULTS IN PPB |
|---|---|---|
| 1 | 1,3 | 416.7 |
| 2 | 2,3 | 190.9 |
| 3 | 3 | 54.1 |
| 4 | 1,3 | 416.2 |
| ZERO | ALL VALVES CLOSED | 7.4 |

SULFUR DIOXIDE PERFORMANCE AUDIT

SITE ID_____ENEP ACATLAN_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____236_____

MONITOR MODEL_____100_____

AIR TEMPERATURE NEAR MONITOR____16.6_____

SITE BAROMETRIC PRESSURE_____579_____

DATE FOR AUDIT_____11-28-03_____

| POINT | VALVES OPEN | RESULTS IN PPB |
|---|---|---|
| 1 | 1,3 | 402.4 |
| 2 | 2,3 | 178.7 |
| 3 | 3 | 42.0 |
| 4 | 1,3 | 405.8 |
| ZERO | ALL VALVES CLOSED | -4.8 |

SULFUR DIOXIDE PERFORMANCE AUDIT

SITE ID_____XALOSTOC_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____497_____

MONITOR MODEL_____100_____

AIR TEMPERATURE NEAR MONITOR____16.7_____

SITE BAROMETRIC PRESSURE_____578.3_____

DATE FOR AUDIT_____12-02-03_____

| POINT | VALVES OPEN | RESULTS IN PPB |
|---|---|---|
| 1 | 1,3 | 398.2 |
| 2 | 2,3 | 179.4 |
| 3 | 3 | 44.9 |
| 4 | 1,3 | 398.0 |
| ZERO | ALL VALVES CLOSED | -0.7 |

SULFUR DIOXIDE PERFORMANCE AUDIT

SITE ID_____SAN AGUSTIN_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____464_____

MONITOR MODEL_____100_____

AIR TEMPERATURE NEAR MONITOR____20.7_____

SITE BAROMETRIC PRESSURE_____576.79_____

DATE FOR AUDIT_____12-02-03_____

| POINT | VALVES OPEN | RESULTS IN PPB |
|---|---|---|
| 1 | 1,3 | 415 |
| 2 | 2,3 | 192.2 |
| 3 | 3 | 53.1 |
| 4 | 1,3 | 422.2 |
| ZERO | ALL VALVES CLOSED | 6.6 |

SULFUR DIOXIDE PERFORMANCE AUDIT

SITE ID_____PEDREGAL_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____235_____

MONITOR MODEL_____100_____

AIR TEMPERATURE NEAR MONITOR____22.4_____

SITE BAROMETRIC PRESSURE_____572.3_____

DATE FOR AUDIT_____12-04-03_____

| POINT | VALVES OPEN | RESULTS IN PPB |
|---|---|---|
| 1 | 1,3 | 402.2 |
| 2 | 2,3 | 182.5 |
| 3 | 3 | 50.5 |
| 4 | 1,3 | 406.2 |
| ZERO | ALL VALVES CLOSED | 6.2 |

SULFUR DIOXIDE PERFORMANCE AUDIT

SITE ID_____VALLEJO_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____462_____

MONITOR MODEL_____100_____

AIR TEMPERATURE NEAR MONITOR____23_____

SITE BAROMETRIC PRESSURE_____580.54_____

DATE FOR AUDIT_____12-01-03_____

| POINT | VALVES OPEN | RESULTS IN PPB |
|---|---|---|
| 1 | 1,3 | 373 |
| 2 | 2,3 | 172 |
| 3 | 3 | 47 |
| 4 | 1,3 | 371 |
| ZERO | ALL VALVES CLOSED | 4 |

SULFUR DIOXIDE PERFORMANCE AUDIT

SITE ID_____TAXQUEÑA _____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____252_____

MONITOR MODEL_____100_____

AIR TEMPERATURE NEAR MONITOR____18.9_____

SITE BAROMETRIC PRESSURE_____579.8_____

DATE FOR AUDIT_____12-04-03_____

| POINT | VALVES OPEN | RESULTS IN PPB |
|---|---|---|
| 1 | 1,3 | 380 |
| 2 | 2,3 | 172 |
| 3 | 3 | 45 |
| 4 | 1,3 | 382 |
| ZERO | ALL VALVES CLOSED | 2 |

CARBON MONOXIDE PERFORMANCE AUDIT

SITE ID_____CERRO DE LA ESTRELLA_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____318_____

MONITOR MODEL_____300_____

AIR TEMPERATURE NEAR MONITOR____21.3_____

SITE BAROMETRIC PRESSURE_____576.8_____

DATE FOR AUDIT_____12-03-03_____

| POINT | VALVES OPEN | RESULTS IN PPB |
|---|---|---|
| 1 | 1,3 | 42.0 |
| 2 | 2,3 | 18.8 |
| 3 | 3 | 4.6 |
| 4 | 1,3 | 42.0 |
| ZERO | ALL VALVES CLOSED | 0.2 |

CARBON MONOXIDE PERFORMANCE AUDIT

SITE ID_____LAGUNILLA _____

MONITOR MANUFACTURED_____API_____

**MONITOR SERIAL 112**

MONITOR MODEL_____300_____

AIR TEMPERATURE NEAR MONITOR____20.0_____

SITE BAROMETRIC PRESSURE_____581.29____

DATE FOR AUDIT_____12-01-03_____

| POINT | VALVES OPEN | RESULTS IN PPB |
|---|---|---|
| 1 | 1,3 | 43.4 |
| 2 | 2,3 | 20.1 |
| 3 | 3 | 5.3 |
| 4 | 1,3 | 43.2 |
| ZERO | ALL VALVES CLOSED | 0.6 |

CARBON MONOXIDE PERFORMANCE AUDIT

SITE ID_____AZCAPOTZALCO_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____309_____

MONITOR MODEL_____300_____

AIR TEMPERATURE NEAR MONITOR____21.1_____

SITE BAROMETRIC PRESSURE_____581.9_____

DATE FOR AUDIT_____11-27-03_____

| POINT | VALVES OPEN | RESULTS IN PPB |
|---|---|---|
| 1 | 1,3 | 42.7 |
| 2 | 2,3 | 18.7 |
| 3 | 3 | 4.2 |
| 4 | 1,3 | 42.7 |
| ZERO | ALL VALVES CLOSED | -0.5 |

CARBON MONOXIDE PERFORMANCE AUDIT

SITE ID_____ENEP ACATLAN_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____1161_____

MONITOR MODEL_____300_____

AIR TEMPERATURE NEAR MONITOR____16.6_____

SITE BAROMETRIC PRESSURE_____579.0_____

DATE FOR AUDIT_____11-28-03_____

| POINT | VALVES OPEN | RESULTS IN PPB |
|---|---|---|
| 1 | 1,3 | 41.8 |
| 2 | 2,3 | 18.9 |
| 3 | 3 | 5.2 |
| 4 | 1,3 | 41.8 |
| ZERO | ALL VALVES CLOSED | 0.1 |

CARBON MONOXIDE PERFORMANCE AUDIT

SITE ID_____XALOSTOC_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____308_____

MONITOR MODEL_____300_____

AIR TEMPERATURE NEAR MONITOR____16.7_____

SITE BAROMETRIC PRESSURE_____578.3_____

DATE FOR AUDIT_____12-02-03_____

| POINT | VALVES OPEN | RESULTS IN PPB |
|---|---|---|
| 1 | 1,3 | 39.3 |
| 2 | 2,3 | 17.4 |
| 3 | 3 | 3.9 |
| 4 | 1,3 | 39.3 |
| ZERO | ALL VALVES CLOSED | -0.3 |

CARBON MONOXIDE PERFORMANCE AUDIT

SITE ID_____SAN AGUSTIN_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____301_____

MONITOR MODEL_____300_____

AIR TEMPERATURE NEAR MONITOR____20.7_____

SITE BAROMETRIC PRESSURE_____576.79_____

DATE FOR AUDIT_____12-02-03_____

| POINT | VALVES OPEN | RESULTS IN PPB |
|---|---|---|
| 1 | 1,3 | 44.5 |
| 2 | 2,3 | 20.1 |
| 3 | 3 | 4.9 |
| 4 | 1,3 | 44.4 |
| ZERO | ALL VALVES CLOSED | 0.3 |

CARBON MONOXIDE PERFORMANCE AUDIT

SITE ID_____PEDREGAL _____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____1169_____

MONITOR MODEL_____300_____

AIR TEMPERATURE NEAR MONITOR____22.4_____

SITE BAROMETRIC PRESSURE_____572.3_____

DATE FOR AUDIT_____12-04-03_____

| POINT | VALVES OPEN | RESULTS IN PPB |
|---|---|---|
| 1 | 1,3 | 42.0 |
| 2 | 2,3 | 18.8 |
| 3 | 3 | 4.4 |
| 4 | 1,3 | 41.7 |
| ZERO | ALL VALVES CLOSED | -1.0 |

CARBON MONOXIDE PERFORMANCE AUDIT

SITE ID_____VALLEJO_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____307_____

MONITOR MODEL_____300_____

AIR TEMPERATURE NEAR MONITOR____23.0_____

SITE BAROMETRIC PRESSURE_____570.54_____

DATE FOR AUDIT_____12-01-03_____

| POINT | VALVES OPEN | RESULTS IN PPB |
|---|---|---|
| 1 | 1,3 | 43.8 |
| 2 | 2,3 | 19.0 |
| 3 | 3 | 4.2 |
| 4 | 1,3 | 44.2 |
| ZERO | ALL VALVES CLOSED | -0.1 |

CARBON MONOXIDE PERFORMANCE AUDIT

SITE ID_____TAXQUEÑA_____

MONITOR MANUFACTURED_____API_____

MONITOR SERIAL_____1168_____

MONITOR MODEL_____300_____

AIR TEMPERATURE NEAR MONITOR____18.9_____

SITE BAROMETRIC PRESSURE_____579.8_____

DATE FOR AUDIT_____12-04-03_____

| POINT | VALVES OPEN | RESULTS IN PPB |
|---|---|---|
| 1 | 1,3 | 41 |
| 2 | 2,3 | 18.2 |
| 3 | 3 | 4.7 |
| 4 | 1,3 | 41.0 |
| ZERO | ALL VALVES CLOSED | 2-0.4 |

# APPENDIX C

# NPAP Individual Monitor Audit Results

Results of Ozone (O3) Audit

for 4th Quarter 2003

01/05/2004

7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

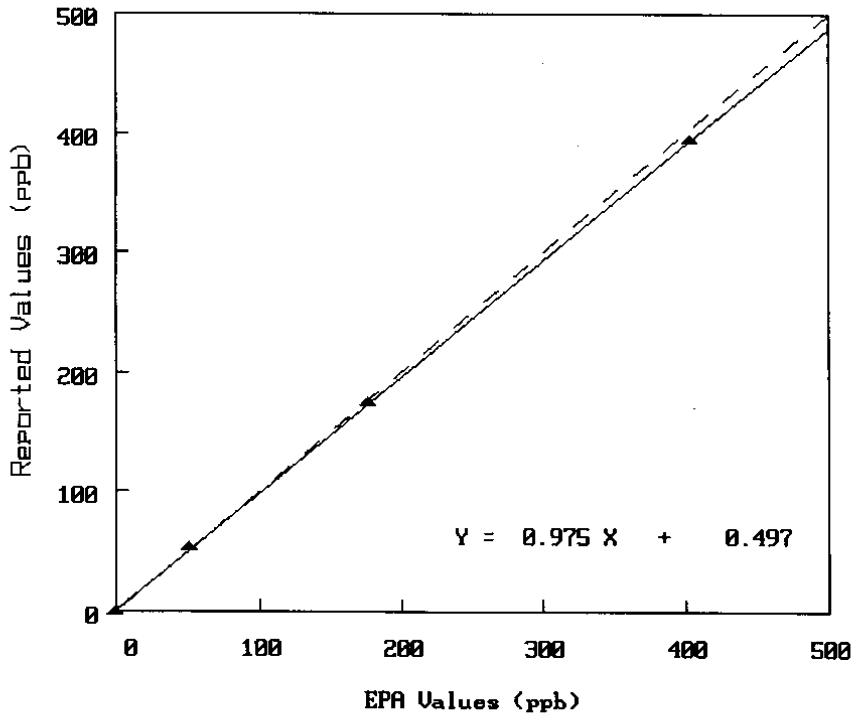
Actual values adjusted for site barometric pressure: 581.90 mm Hg

AIRS Site Number: Audit Date: 11/27/2003
Monitor Serial #: 793-1 Audit Device No.: 33910
Your Site ID: AZCAPOTZALCO

| Pot. Setting | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - ppb - - - - - -) | | | |
| 0 | -0.8 | 0.3 | -1.1 | ---- |
| 485 | 394.5 | 404.6 | -10.1 | -2.5 |
| 350 | 174.1 | 177.8 | -3.7 | -2.1 |
| 255 | 53.2 | 52.4 | 0.8 | 1.5 |

Mean Absolute % Difference = 2.0

Slope = 0.975 Intercept = 0.497 $r^2$ = 0.999944



Results of NO2 Continuous Audit

for 4th Quarter 2003

01/05/2004

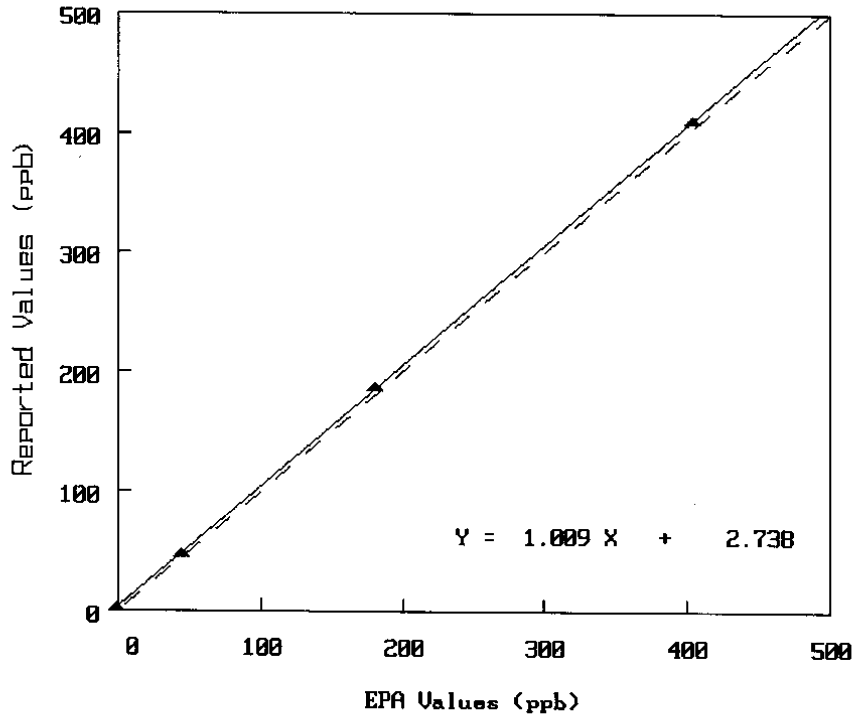
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number:
Monitor Serial #: 793-1
Site ID: AZCAPOTZALCO

Audit Date: 11/27/2003
NO Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 410.80 | 405.16 | 5.64 | 1.4 |
| 2-3 | 187.90 | 181.38 | 6.52 | 3.6 |
| 3 | 47.10 | 45.00 | 2.10 | 4.7 |
| 0 | 2.50 | 0.00 | 2.50 | ---- |
| | Mean Absolute % Difference = 3.2 | | | |

NO Slope = 1.009 Intercept = 2.738 $r^2$ = 0.999937



Results of Carbon Monoxide (CO) Audit

for 4th Quarter 2003

01/05/2004

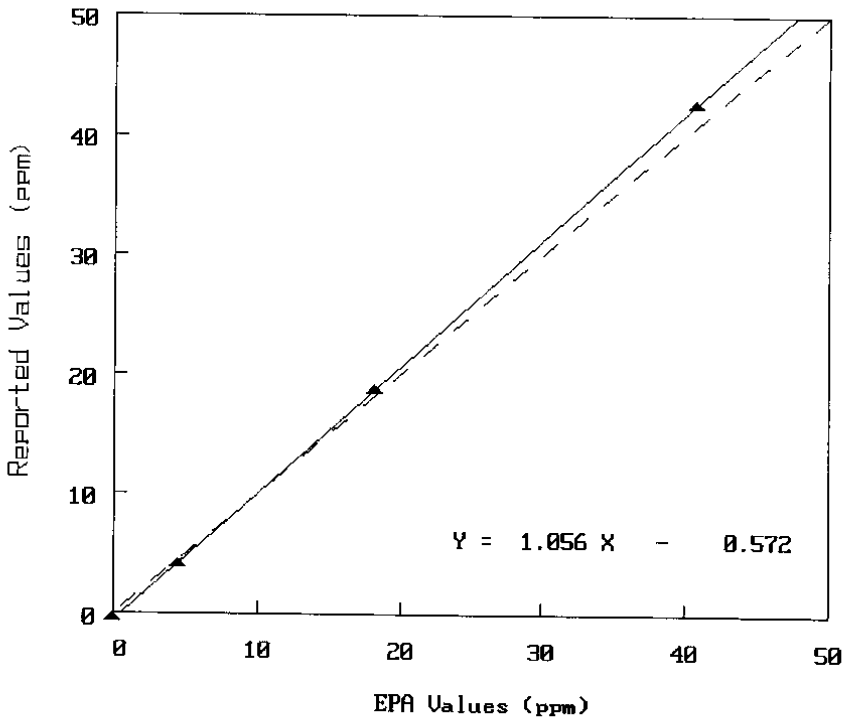
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number:
Your Site ID: AZAPOTZALCO
Monitor Serial #: 309-1

Audit Date: 11/27/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Value | Actual Value | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - - ppm - - - - - - - -) | | | |
| 1-3 | 42.70 | 40.94 | 1.76 | 4.3 |
| 2-3 | 18.70 | 18.33 | 0.37 | 2.0 |
| 3 | 4.20 | 4.55 | -0.35 | -7.7 |
| 0 | -0.50 | 0.00 | -0.50 | ---- |
| | | Mean Absolute % Difference | = | 4.7 |

Slope = 1.056 Intercept = -0.572 $r^2$ = 0.999987



Results of SO2 Continuous Audit

for 4th Quarter 2003

01/05/2004

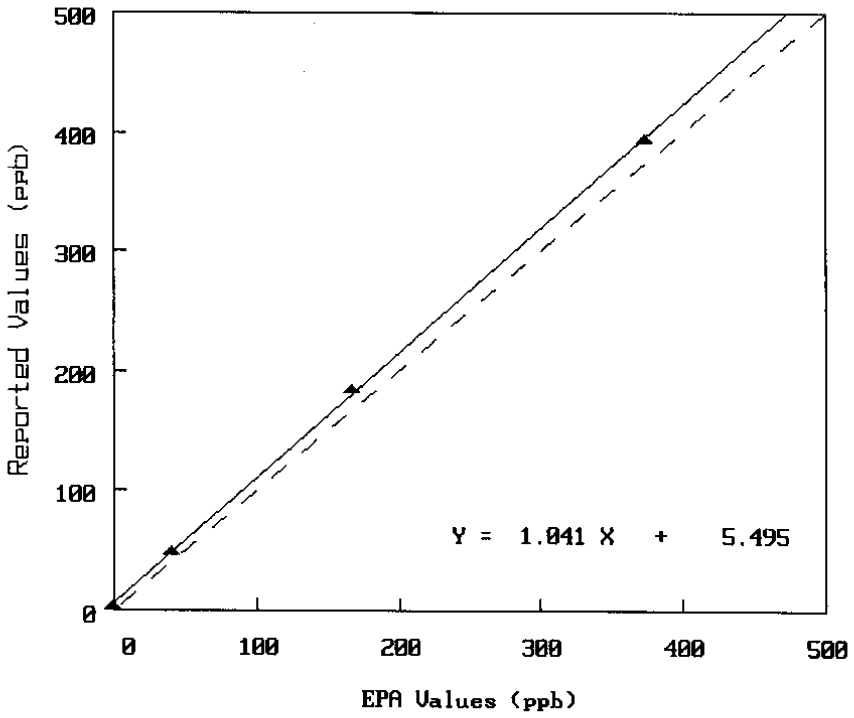
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

Site Number:
Your Site ID: AZCAPOTZALCO
Monitor Serial #: 496-1

Audit Date: 11/27/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 394.10 | 375.22 | 18.88 | 5.0 |
| 2-3 | 185.00 | 167.97 | 17.03 | 10.1 |
| 3 | 48.70 | 41.67 | 7.03 | 16.9 |
| 0 | 3.10 | 0.00 | 3.10 | ---- |
| | Mean Absolute % Difference = 10.7 | | | |

Slope = 1.041 Intercept = 5.495 $r^2$ = 0.999661



Results of Ozone (O3) Audit

for 4th Quarter 2003

01/05/2004

7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

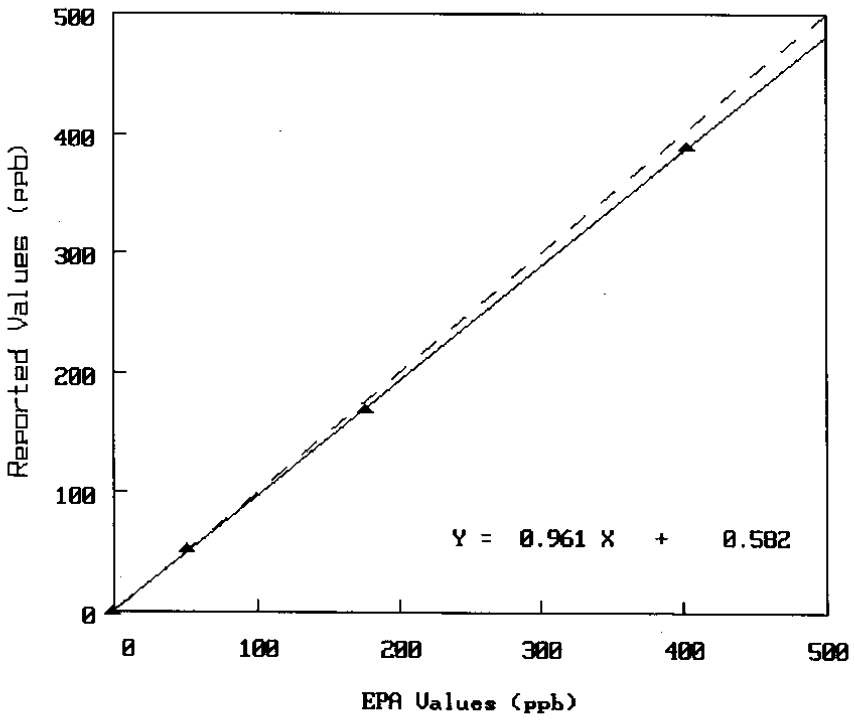
Actual values adjusted for site barometric pressure: 581.29 mm Hg

AIRS Site Number: Audit Date: 12/01/2003
Monitor Serial #: 443-1 Audit Device No.: 33910
Your Site ID: LAGUNILLA

| Pot. Setting | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - ppb - - - - - -) | | | |
| 0 | 0.4 | 0.3 | 0.1 | ---- |
| 485 | 389.4 | 404.4 | -15.0 | -3.7 |
| 350 | 170.3 | 177.7 | -7.4 | -4.2 |
| 255 | 52.1 | 52.4 | -0.3 | -0.6 |

Mean Absolute % Difference = 2.8

Slope = 0.961 Intercept = 0.582 $r^2$ = 0.999970



Results of NO2 Continuous Audit

for 4th Quarter 2003

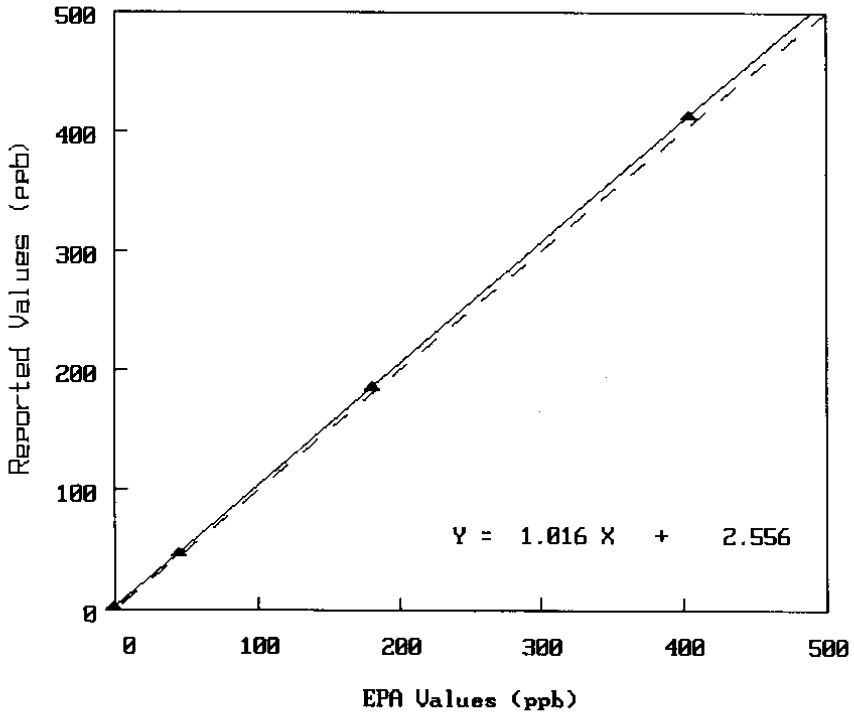
01/05/2004

7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number: Audit Date: 12/01/2003
Monitor Serial #: 232-1 NO Cyl. No.: FF28744
Site ID: LAGUNILLA Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 414.30 | 405.16 | 9.14 | 2.3 |
| 2-3 | 186.20 | 181.38 | 4.82 | 2.7 |
| 3 | 48.10 | 45.00 | 3.10 | 6.9 |
| 0 | 3.00 | 0.00 | 3.00 | ---- |
| | Mean Absolute % Difference = 3.9 | | | |

NO Slope = 1.016 Intercept = 2.556 $r^2$ = 0.999994



Results of Carbon Monoxide (CO) Audit

for 4th Quarter 2003

01/05/2004

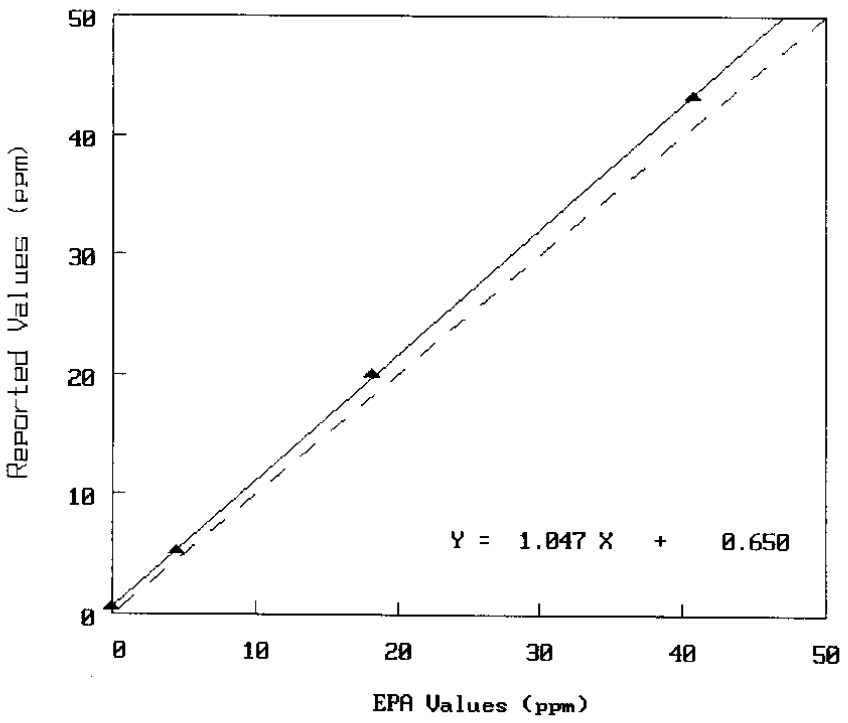
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number:
Your Site ID: LAGUNILLA
Monitor Serial #: 112-1

Audit Date: 12/01/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Value | Actual Value | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - - ppm - - - - - - - -) | | | |
| 1-3 | 43.40 | 40.94 | 2.46 | 6.0 |
| 2-3 | 20.10 | 18.33 | 1.77 | 9.7 |
| 3 | 5.30 | 4.55 | 0.75 | 16.5 |
| 0 | 0.60 | 0.00 | 0.60 | ---- |
| | | Mean Absolute % Difference | = | 10.7 |

Slope = 1.047 Intercept = 0.650 $r^2$ = 0.999914



Results of SO2 Continuous Audit

for 4th Quarter 2003

01/05/2004

7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

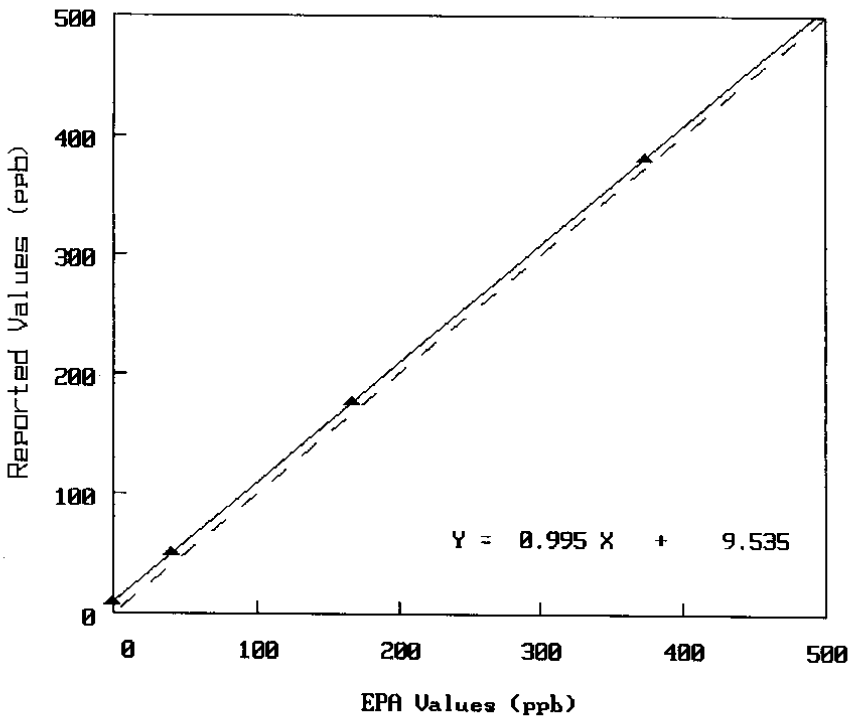
Site Number:
Your Site ID: LAGUNILLA
Monitor Serial #: 237-1

Audit Date: 12/04/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 382.30 | 375.22 | 7.08 | 1.9 |
| 2-3 | 177.70 | 167.97 | 9.73 | 5.8 |
| 3 | 50.80 | 41.67 | 9.13 | 21.9 |
| 0 | 9.10 | 0.00 | 9.10 | ---- |

Mean Absolute % Difference = 9.9

Slope = 0.995 Intercept = 9.535 $r^2$ = 0.999981



Results of Ozone (O3) Audit

for 4th Quarter 2003

01/05/2004

7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

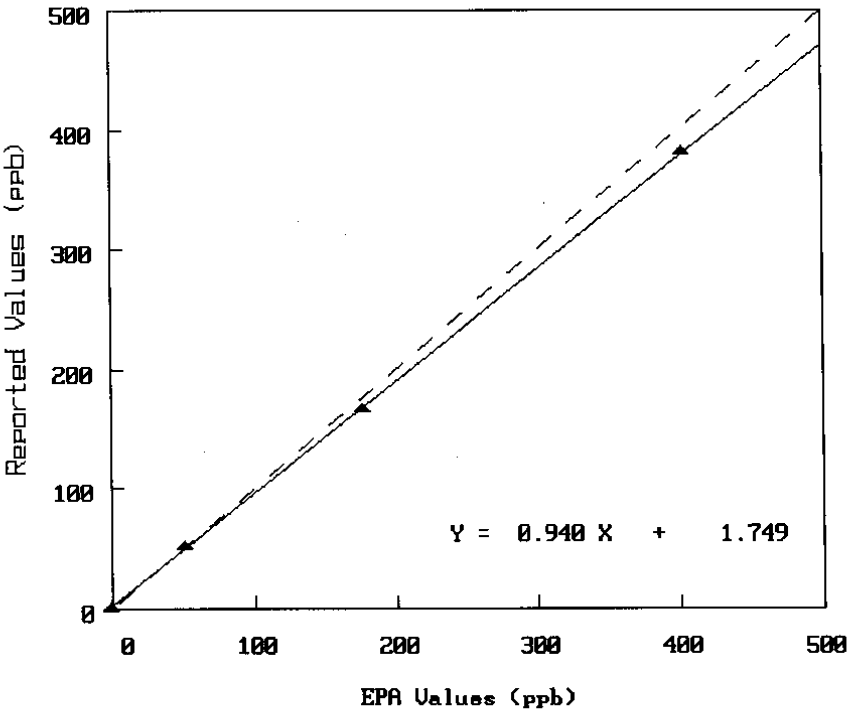
Actual values adjusted for site barometric pressure: 578.30 mm Hg

AIRS Site Number: Audit Date: 12/02/2003
Monitor Serial #: 447-1 Audit Device No.: 33910
Your Site ID: XALOSTOC

| Pot. Setting | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - ppb - - - - - - -) | | | |
| 0 | 1.6 | 0.3 | 1.3 | ---- |
| 485 | 381.8 | 403.6 | -21.8 | -5.4 |
| 350 | 167.0 | 177.4 | -10.4 | -5.9 |
| 255 | 52.4 | 52.3 | 0.1 | 0.2 |

Mean Absolute % Difference = 3.8

Slope = 0.940 Intercept = 1.749 $r^2$ = 0.999942



Results of NO2 Continuous Audit

for 4th Quarter 2003

01/05/2004

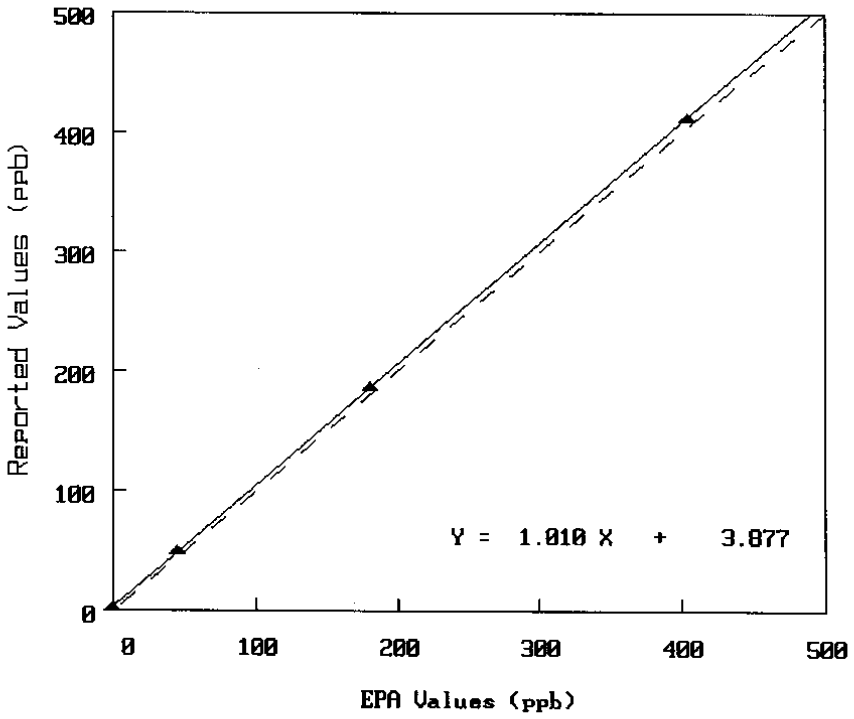
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number:
Monitor Serial #: 521-1
Site ID: XALOSTOC

Audit Date: 12/02/2003
NO Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 412.80 | 405.16 | 7.64 | 1.9 |
| 2-3 | 187.40 | 181.38 | 6.02 | 3.3 |
| 3 | 50.20 | 45.00 | 5.20 | 11.6 |
| 0 | 2.90 | 0.00 | 2.90 | ---- |
| | Mean Absolute % Difference = 5.6 | | | |

NO Slope = 1.010 Intercept = 3.877 $r^2$ = 0.999981



Results of Carbon Monoxide (CO) Audit

for 4th Quarter 2003

01/05/2004

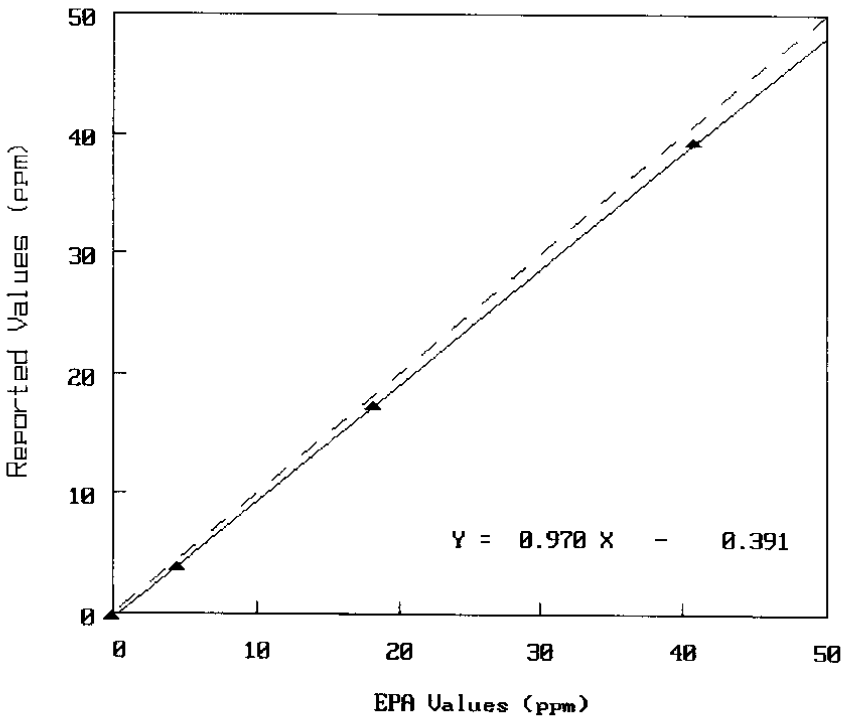
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number:
Your Site ID: XALOSTOC
Monitor Serial #: 308-1

Audit Date: 12/02/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Value | Actual Value | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - - ppm - - - - - - - -) | | | |
| 1-3 | 39.30 | 40.94 | -1.64 | -4.0 |
| 2-3 | 17.40 | 18.33 | -0.93 | -5.1 |
| 3 | 3.90 | 4.55 | -0.65 | -14.3 |
| 0 | -0.30 | 0.00 | -0.30 | ---- |
| | | Mean Absolute % Difference | = | 7.8 |

Slope = 0.970 Intercept = -0.391 $r^2$ = 0.999976



Results of SO2 Continuous Audit

for 4th Quarter 2003

01/05/2004

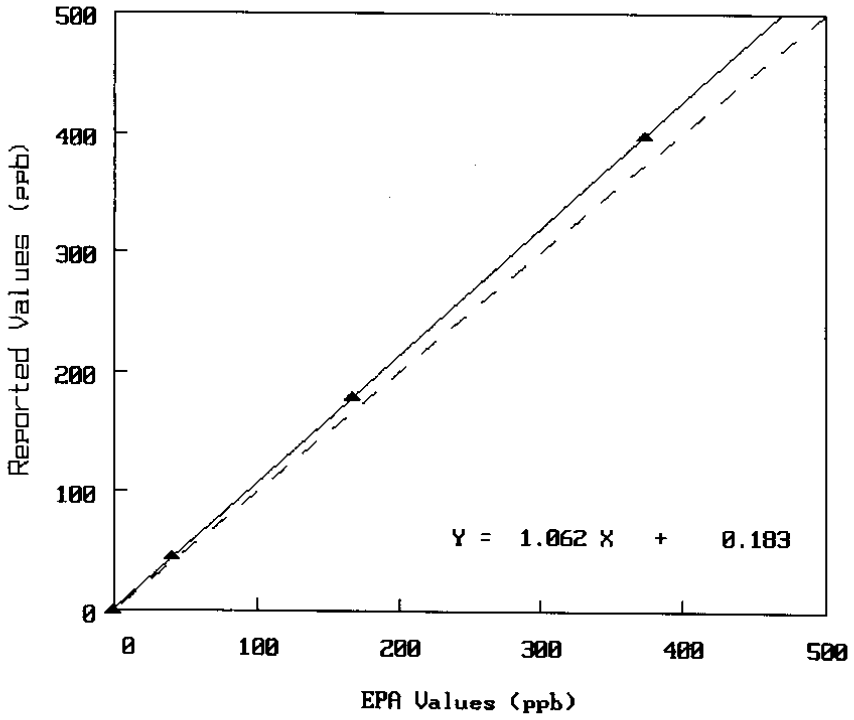
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

Site Number:
Your Site ID: XALOSTOC
Monitor Serial #: 497-1

Audit Date: 12/02/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 398.20 | 375.22 | 22.98 | 6.1 |
| 2-3 | 179.40 | 167.97 | 11.43 | 6.8 |
| 3 | 44.90 | 41.67 | 3.23 | 7.8 |
| 0 | -0.70 | 0.00 | -0.70 | ---- |
| | Mean Absolute % Difference = 6.9 | | | |

Slope = 1.062 Intercept = 0.183 $r^2$ = 0.999980



Results of Ozone (O3) Audit

for 4th Quarter 2003

01/05/2004

7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

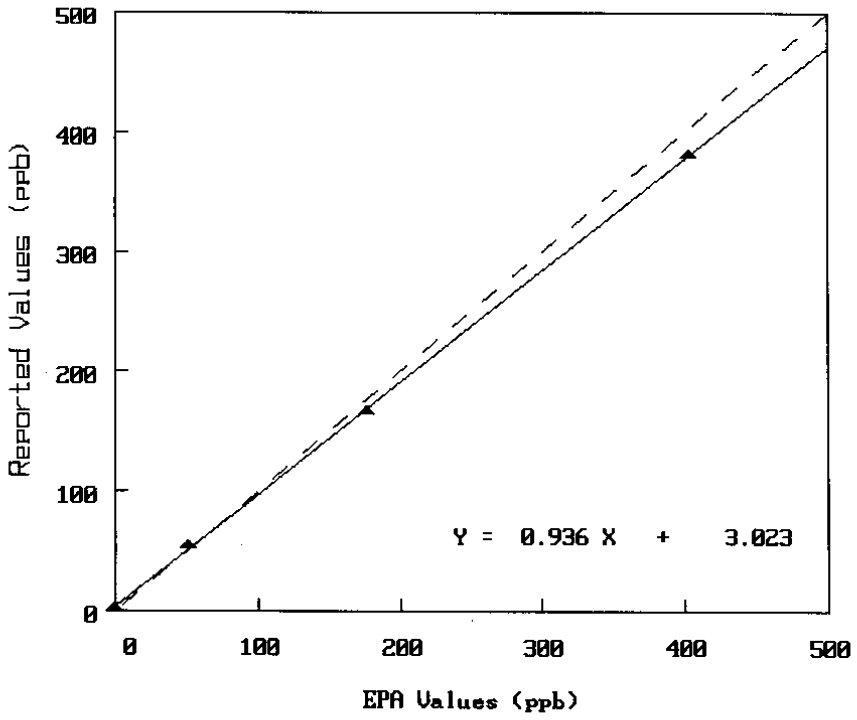
Actual values adjusted for site barometric pressure: 579.80 mm Hg

AIRS Site Number: Audit Date: 12/04/2003
Monitor Serial #: 229-1 Audit Device No.: 33910
Your Site ID: TAXQUENA

| Pot. Setting | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - - ppb - - - - - -) | | | |
| 0 | 2.0 | 0.3 | 1.7 | ---- |
| 485 | 382.0 | 404.0 | -22.0 | -5.5 |
| 350 | 167.0 | 177.6 | -10.6 | -5.9 |
| 255 | 55.0 | 52.4 | 2.6 | 5.0 |

Mean Absolute % Difference = 5.5

Slope = 0.936 Intercept = 3.023 $r^2$ = 0.999812



Results of NO2 Continuous Audit

for 4th Quarter 2003

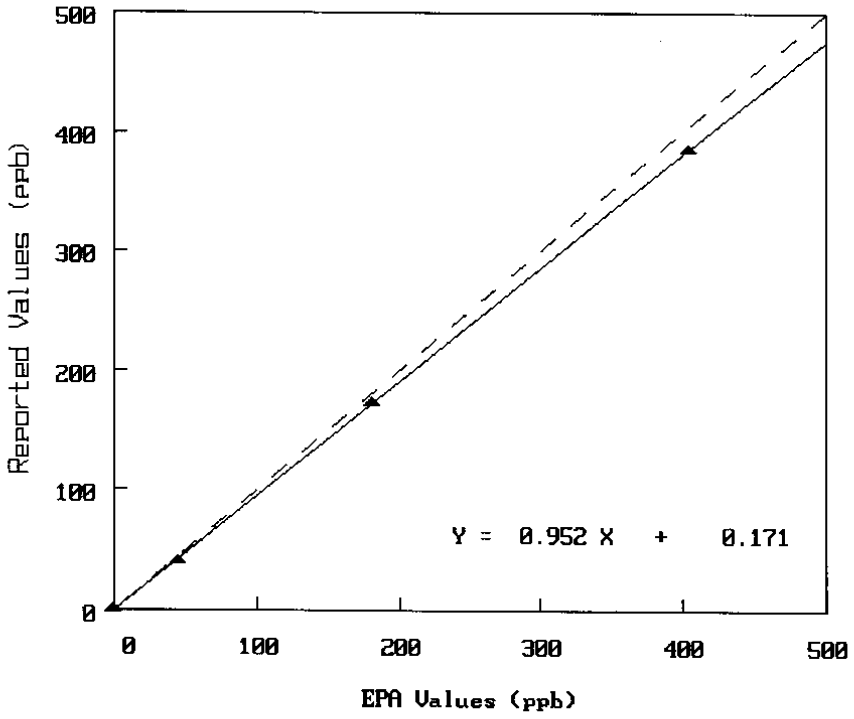
01/05/2004

7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number: Audit Date: 12/04/2003
Monitor Serial #: 525-2 NO Cyl. No.: FF28744
Site ID: TAXQUENA Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 386.00 | 405.16 | -19.16 | -4.7 |
| 2-3 | 173.00 | 181.38 | -8.38 | -4.6 |
| 3 | 42.00 | 45.00 | -3.00 | -6.7 |
| 0 | 1.00 | 0.00 | 1.00 | ---- |
| | Mean Absolute % Difference = 5.3 | | | |

NO Slope = 0.952 Intercept = 0.171 $r^2$ = 0.999981



Results of Carbon Monoxide (CO) Audit

for 4th Quarter 2003

01/05/2004

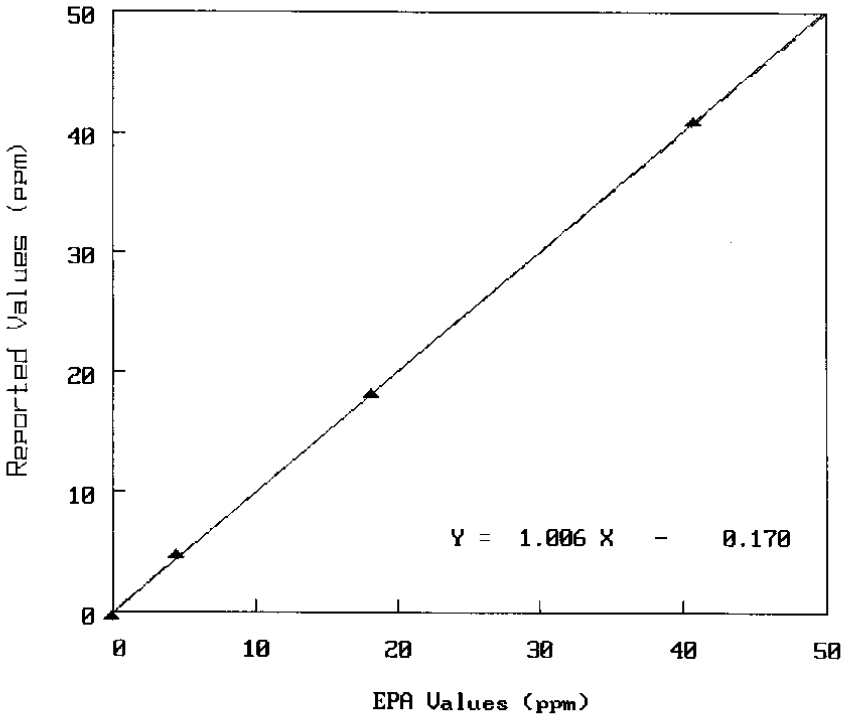
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number:
Your Site ID: TAXQUENA
Monitor Serial #: 1168-1

Audit Date: 12/04/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Value | Actual Value | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - - ppm - - - - - - - -) | | | |
| 1-3 | 41.00 | 40.94 | 0.06 | 0.1 |
| 2-3 | 18.20 | 18.33 | -0.13 | -0.7 |
| 3 | 4.70 | 4.55 | 0.15 | 3.3 |
| 0 | -0.40 | 0.00 | -0.40 | ---- |
| | | Mean Absolute % Difference | = | 1.4 |

Slope = 1.006 Intercept = -0.170 $r^2$ = 0.999859



Results of SO2 Continuous Audit

for 4th Quarter 2003

01/05/2004

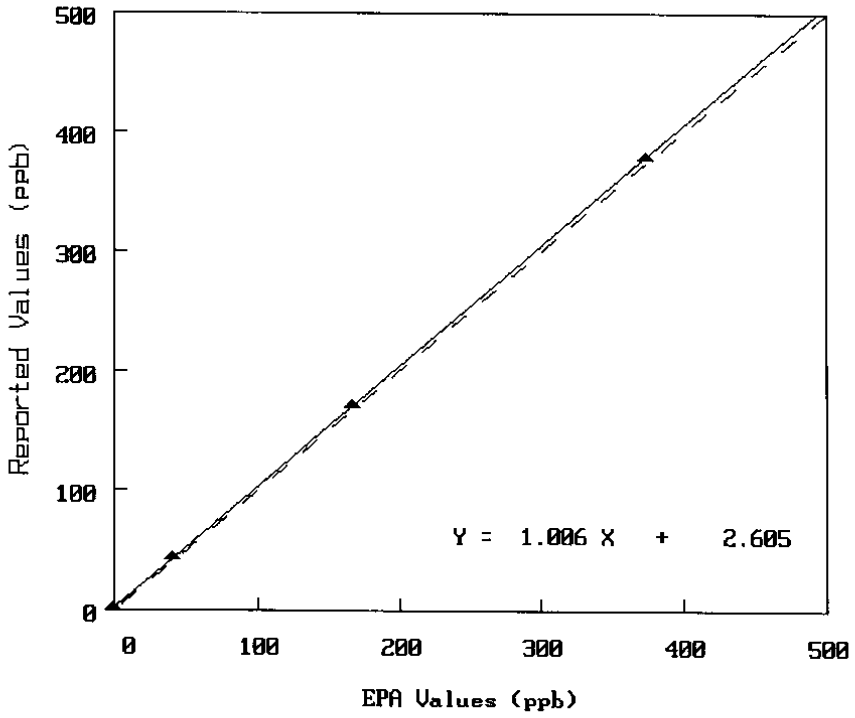
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

Site Number:
Your Site ID: TAXQUENA
Monitor Serial #: 252-1

Audit Date: 12/04/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 380.00 | 375.22 | 4.78 | 1.3 |
| 2-3 | 172.00 | 167.97 | 4.03 | 2.4 |
| 3 | 45.00 | 41.67 | 3.33 | 8.0 |
| 0 | 2.00 | 0.00 | 2.00 | ---- |
| | Mean Absolute % Difference = 3.9 | | | |

Slope = 1.006 Intercept = 2.605 $r^2$ = 0.999991



Results of Ozone (O3) Audit

for 4th Quarter 2003

11/07/2003

7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

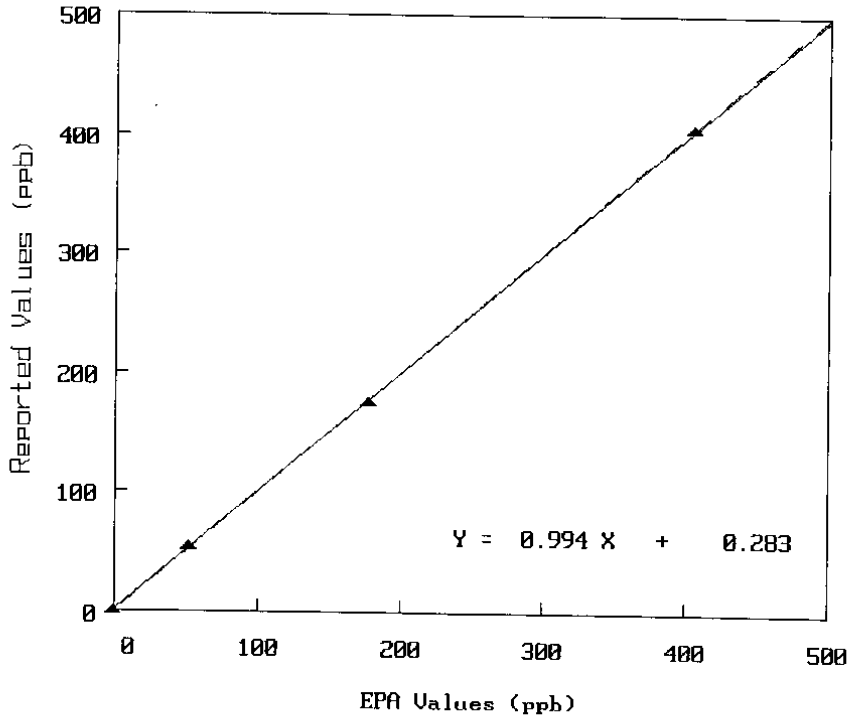
Actual values adjusted for site barometric pressure: 590.70 mm Hg

AIRS Site Number:
Monitor Serial #: 888
Your Site ID: MEXICO CITY LAB
Audit Date: 11/03/2003
Audit Device No.: 33910

| Pot. Setting | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - ppb - - - - - -) | | | |
| 0 | 0.3 | 0.3 | 0.0 | ---- |
| 485 | 405.7 | 407.0 | -1.3 | -0.3 |
| 350 | 175.8 | 178.9 | -3.1 | -1.7 |
| 255 | 54.5 | 52.7 | 1.8 | 3.3 |

Mean Absolute % Difference = 1.8

Slope = 0.994 Intercept = 0.283 $r^2$ = 0.999906



Results of NO2 Continuous Audit

for 4th Quarter 2003

11/07/2003

7ME031 0 7ME031

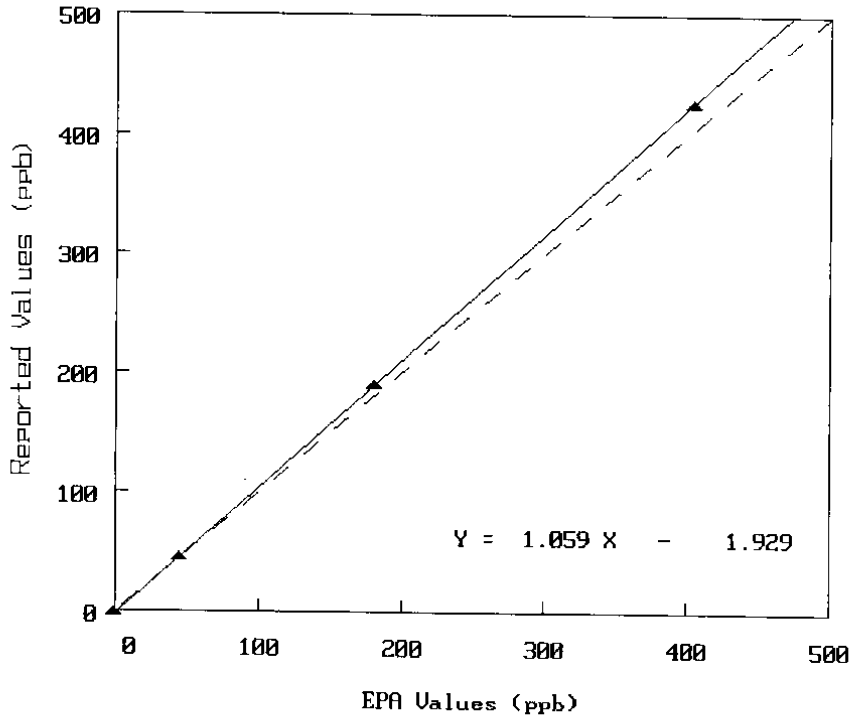
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number:
Monitor Serial #: 2356
Site ID: MEXICO CITY LAB

Audit Date: 11/03/2003
NO Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 427.10 | 405.16 | 21.94 | 5.4 |
| 2-3 | 190.10 | 181.38 | 8.72 | 4.8 |
| 3 | 45.70 | 45.00 | 0.70 | 1.6 |
| 0 | -1.90 | 0.00 | -1.90 | ---- |
| | Mean Absolute % Difference = 3.9 | | | |

NO Slope = 1.059 Intercept = -1.929 $r^2$ = 1.000000



Results of SO2 Continuous Audit

for 4th Quarter 2003

11/07/2003

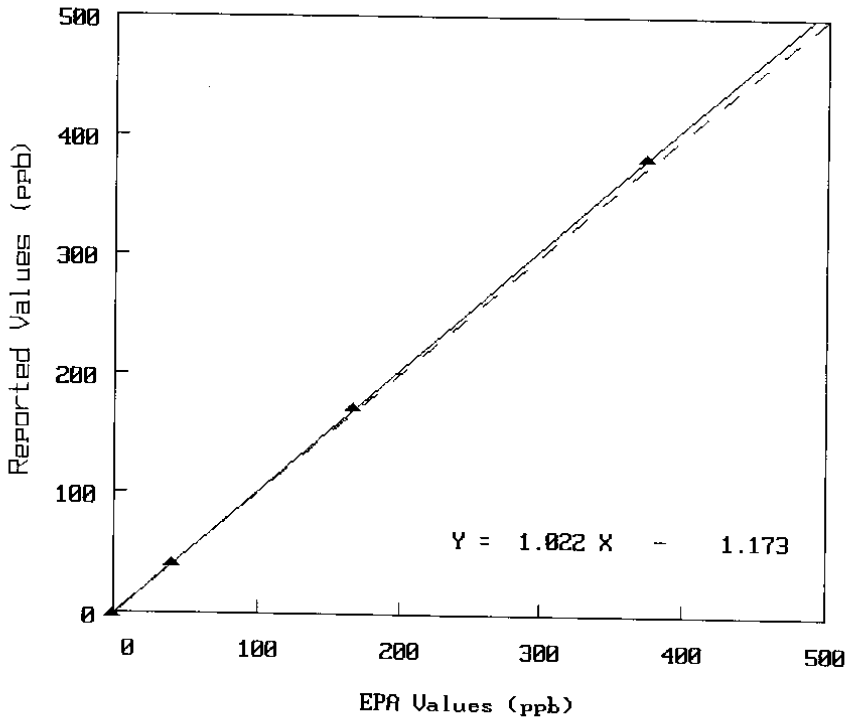
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

Site Number:
Your Site ID: MEXICO CITY LAB
Monitor Serial #: 1707

Audit Date: 11/03/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 381.60 | 375.22 | 6.38 | 1.7 |
| 2-3 | 172.10 | 167.97 | 4.13 | 2.5 |
| 3 | 41.00 | 41.67 | -0.67 | -1.6 |
| 0 | -1.70 | 0.00 | -1.70 | ---- |
| | Mean Absolute % Difference = 1.9 | | | |

Slope = 1.022 Intercept = -1.173 $r^2$ = 0.999960



Results of Ozone (O3) Audit

for 4th Quarter 2003

11/07/2003

7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

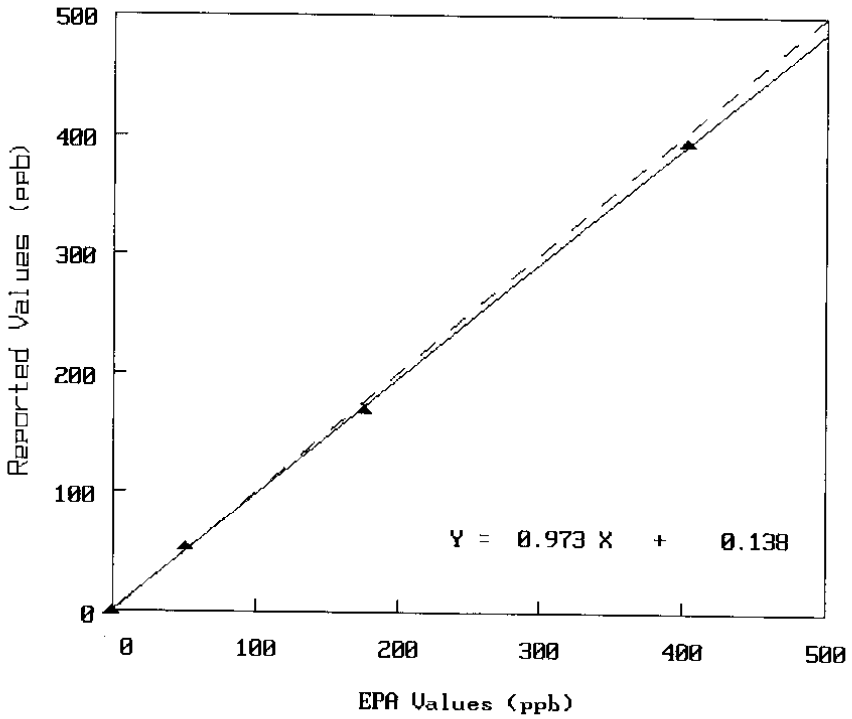
Actual values adjusted for site barometric pressure: 580.00 mm Hg

AIRS Site Number:
Monitor Serial #: 443
Your Site ID: LAG
Audit Date: 11/04/2003
Audit Device No.: 33910

| Pot. Setting | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - ppb - - - - - -) | | | |
| 0 | 0.1 | 0.3 | -0.2 | ---- |
| 485 | 394.4 | 404.1 | -9.7 | -2.4 |
| 350 | 170.3 | 177.6 | -7.3 | -4.1 |
| 255 | 53.2 | 52.4 | 0.8 | 1.6 |

Mean Absolute % Difference = 2.7

Slope = 0.973 Intercept = 0.138 $r^2$ = 0.999863



Results of NO2 Continuous Audit

for 4th Quarter 2003

11/07/2003

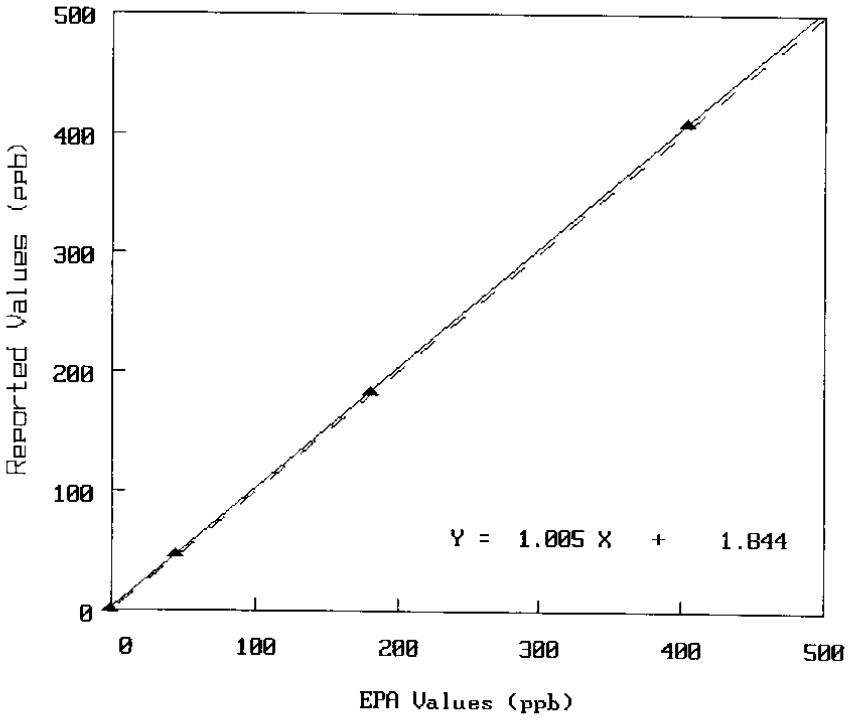
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number:
Monitor Serial #: 232
Site ID: LAG

Audit Date: 11/04/2003
NO Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 409.10 | 405.16 | 3.94 | 1.0 |
| 2-3 | 183.90 | 181.38 | 2.52 | 1.4 |
| 3 | 47.60 | 45.00 | 2.60 | 5.8 |
| 0 | 1.50 | 0.00 | 1.50 | ---- |
| | Mean Absolute % Difference = 2.7 | | | |

NO Slope = 1.005 Intercept = 1.844 $r^2$ = 0.999995



Results of Carbon Monoxide (CO) Audit

for 4th Quarter 2003

03/23/2004

7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

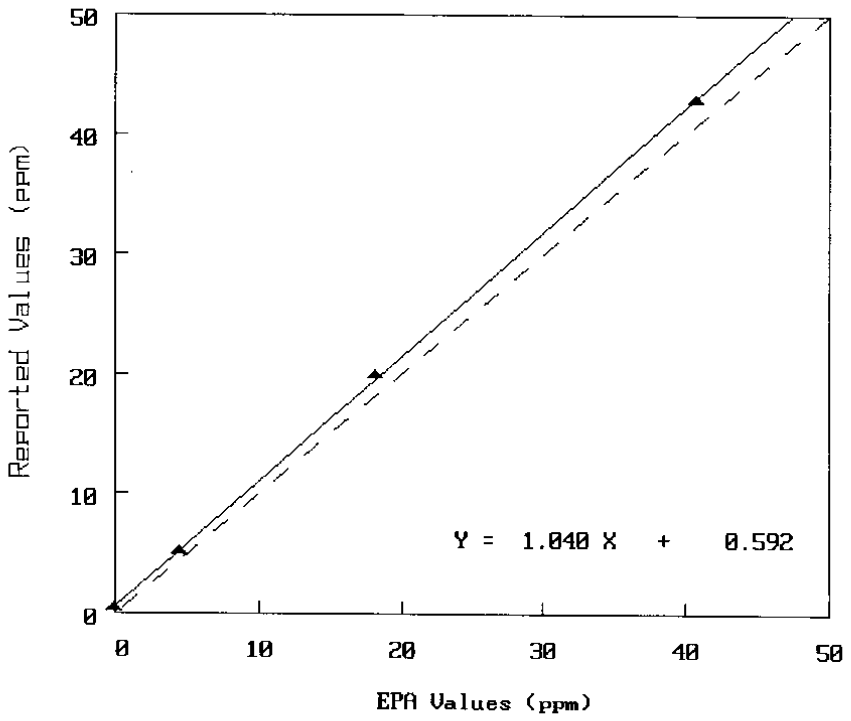
AIRS Site Number:
Your Site ID: LAG
Monitor Serial #: 112

Audit Date: 11/04/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Value | Actual Value | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - - ppm - - - - - - - -) | | | |
| 1-3 | 43.00 | 40.94 | 2.06 | 5.0 |
| 2-3 | 20.00 | 18.33 | 1.67 | 9.1 |
| 3 | 5.20 | 4.55 | 0.65 | 14.3 |
| 0 | 0.50 | 0.00 | 0.50 | ---- |

Mean Absolute % Difference = 9.5

Slope = 1.040 Intercept = 0.592 $r^2$ = 0.999843



Results of SO2 Continuous Audit

for 4th Quarter 2003

11/07/2003

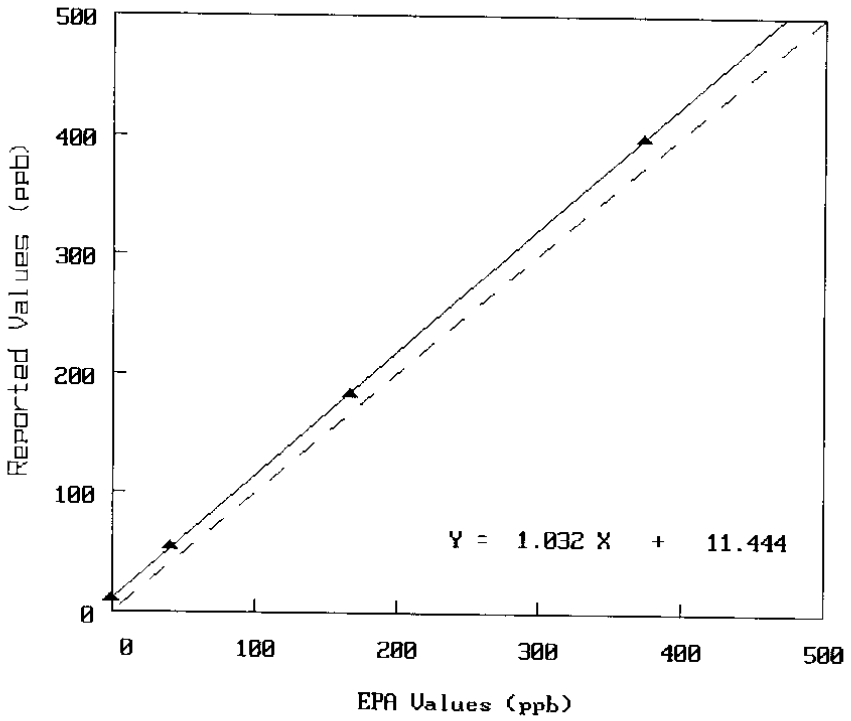
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

Site Number:
Your Site ID: LAG
Monitor Serial #: 237

Audit Date: 11/04/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 399.10 | 375.22 | 23.88 | 6.4 |
| 2-3 | 183.90 | 167.97 | 15.93 | 9.5 |
| 3 | 55.20 | 41.67 | 13.53 | 32.5 |
| 0 | 11.30 | 0.00 | 11.30 | ---- |
| | Mean Absolute % Difference = 16.1 | | | |

Slope = 1.032 Intercept = 11.444 $r^2$ = 0.999983



Results of Ozone (O3) Audit

for 4th Quarter 2003

11/07/2003

7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

Actual values adjusted for site barometric pressure: 581.00 mm Hg

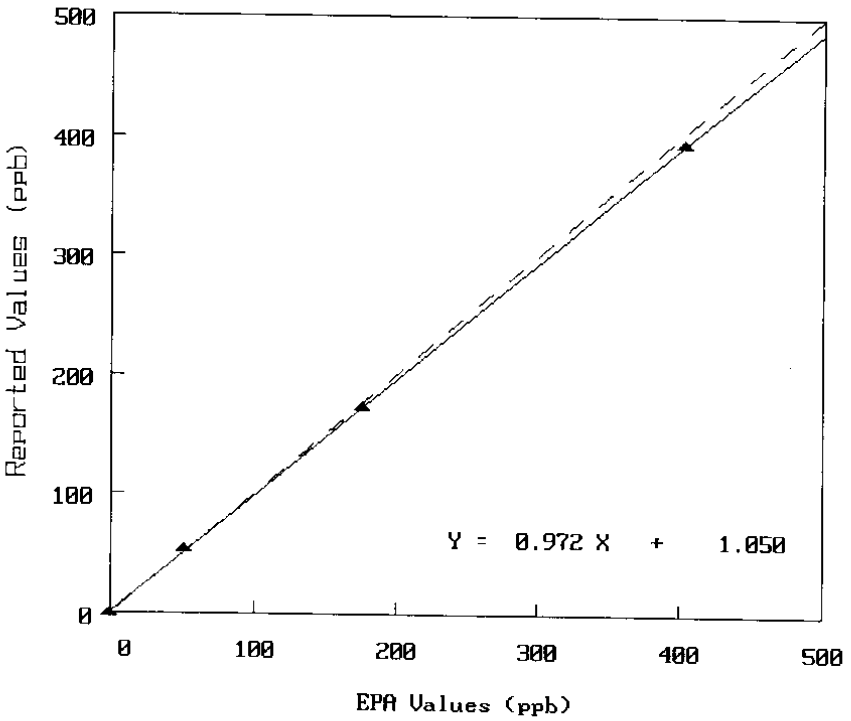
AIRS Site Number:
Monitor Serial #: 442
Your Site ID: TAC

Audit Date: 11/04/2003
Audit Device No.: 33910

| Pot. Setting | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - ppb - - - - - -) | | | |
| 0 | 0.3 | 0.3 | 0.0 | ---- |
| 485 | 394.1 | 404.4 | -10.3 | -2.5 |
| 350 | 173.6 | 177.7 | -4.1 | -2.3 |
| 255 | 53.3 | 52.4 | 0.9 | 1.7 |

Mean Absolute % Difference = 2.2

Slope = 0.972 Intercept = 1.050 $r^2$ = 0.999970



Results of NO2 Continuous Audit

for 4th Quarter 2003

11/07/2003

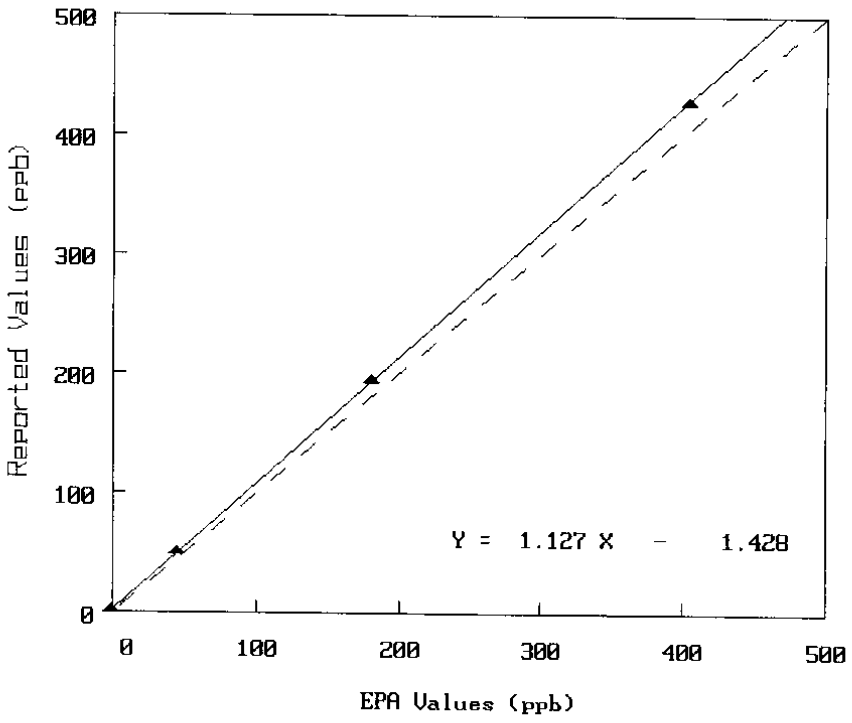
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number:
Monitor Serial #: 226
Site ID: TAC

Audit Date: 11/04/2003
NO Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 429.00 | 405.16 | 23.84 | 5.9 |
| 2-3 | 194.00 | 181.38 | 12.62 | 7.0 |
| 3 | 51.00 | 45.00 | 6.00 | 13.3 |
| 0 | 2.00 | 0.00 | 2.00 | ---- |
| | Mean Absolute % Difference = 8.7 | | | |

NO Slope = 1.052 Intercept = 2.855 $r^2$ = 0.999987



Results of Carbon Monoxide (CO) Audit

for 4th Quarter 2003

11/07/2003

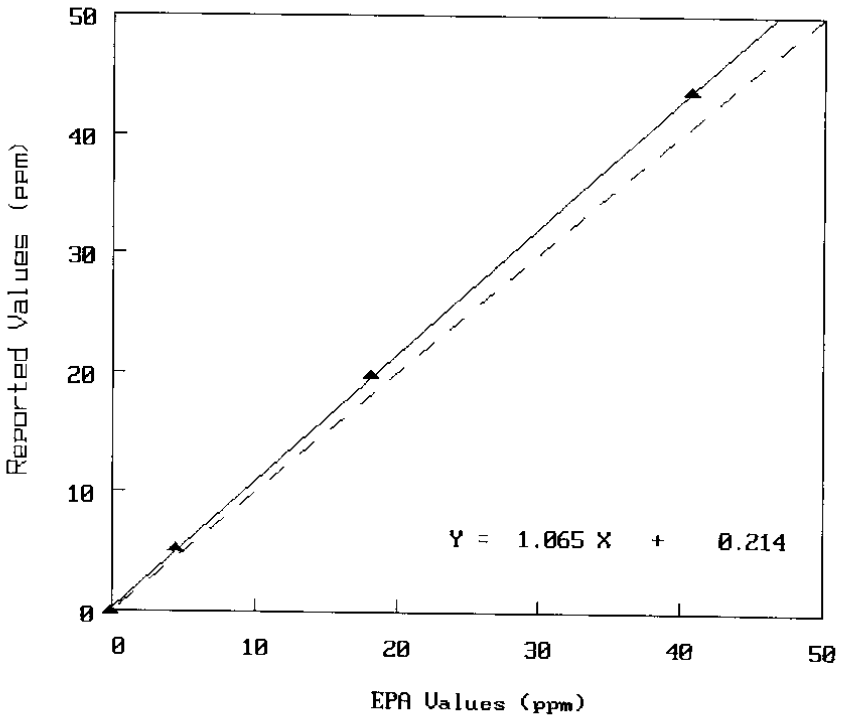
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number:
Your Site ID: TAC
Monitor Serial #: 676

Audit Date: 11/04/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Value | Actual Value | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - ppm - - - - - - -) | | | |
| 1-3 | 43.70 | 40.94 | 2.76 | 6.7 |
| 2-3 | 19.90 | 18.33 | 1.57 | 8.6 |
| 3 | 5.30 | 4.55 | 0.75 | 16.5 |
| 0 | -0.10 | 0.00 | -0.10 | ---- |
| | | Mean Absolute % Difference | = | 10.6 |

Slope = 1.065 Intercept = 0.214 $r^2$ = 0.999827



Results of SO2 Continuous Audit

for 4th Quarter 2003

11/07/2003

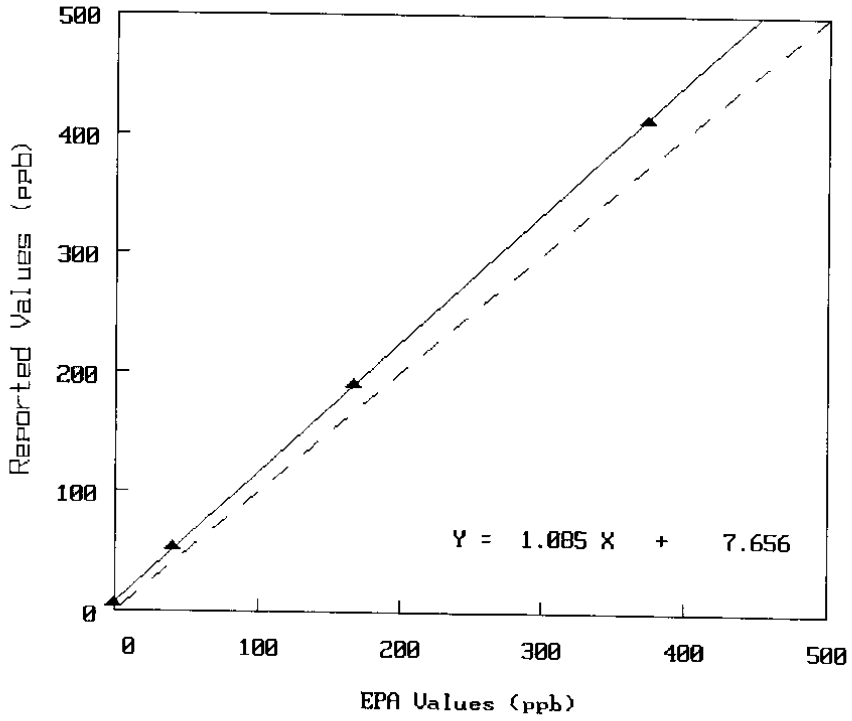
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

Site Number:
Your Site ID: TAC
Monitor Serial #: 501

Audit Date: 11/04/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 414.00 | 375.22 | 38.78 | 10.3 |
| 2-3 | 191.00 | 167.97 | 23.03 | 13.7 |
| 3 | 54.00 | 41.67 | 12.33 | 29.6 |
| 0 | 6.00 | 0.00 | 6.00 | ---- |
| | Mean Absolute % Difference = 17.9 | | | |

Slope = 1.085 Intercept = 7.656 $r^2$ = 0.999942



Results of Carbon Monoxide (CO) Audit

for 4th Quarter 2003

03/23/2004

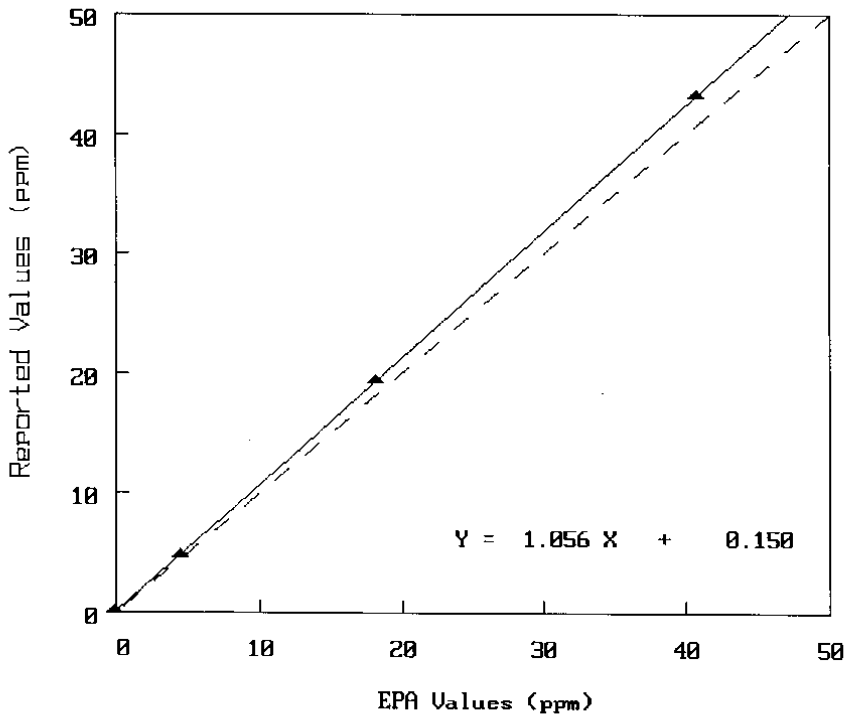
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number: .
Your Site ID: MIN
Monitor Serial #: acm13652140

Audit Date: 11/04/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Value | Actual Value | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - ppm - - - - - - -) | | | |
| 1-3 | 43.40 | 40.94 | 2.46 | 6.0 |
| 2-3 | 19.50 | 18.33 | 1.17 | 6.4 |
| 3 | 4.90 | 4.55 | 0.35 | 7.7 |
| 0 | 0.20 | 0.00 | 0.20 | ---- |
| | | Mean Absolute % Difference | = | 6.7 |

Slope = 1.056 Intercept = 0.150 $r^2$ = 0.999995



Results of Ozone (O3) Audit

for 4th Quarter 2003

11/07/2003

7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

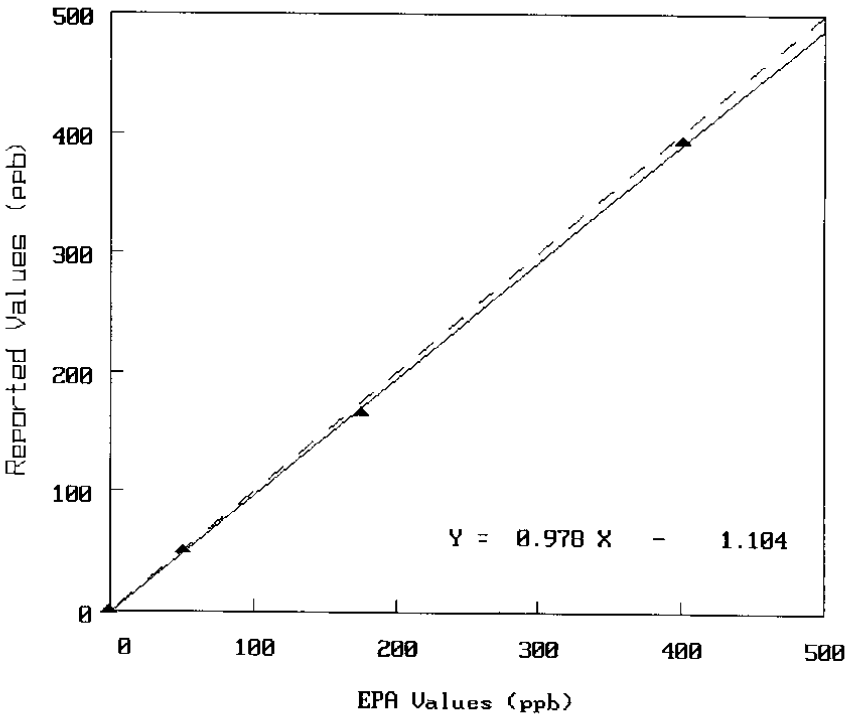
Actual values adjusted for site barometric pressure: 574.60 mm Hg

AIRS Site Number: Audit Date: 11/05/2003
Monitor Serial #: 793 Audit Device No.: 33910
Your Site ID: AZC

| Pot. Setting | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - ppb - - - - - -) | | | |
| 0 | 0.7 | 0.3 | 0.4 | ---- |
| 485 | 394.8 | 402.6 | -7.8 | -1.9 |
| 350 | 166.8 | 176.9 | -10.1 | -5.7 |
| 255 | 51.5 | 52.2 | -0.7 | -1.3 |

Mean Absolute % Difference = 3.0

Slope = 0.978 Intercept = -1.104 $r^2$ = 0.999611



Results of NO2 Continuous Audit

for 4th Quarter 2003

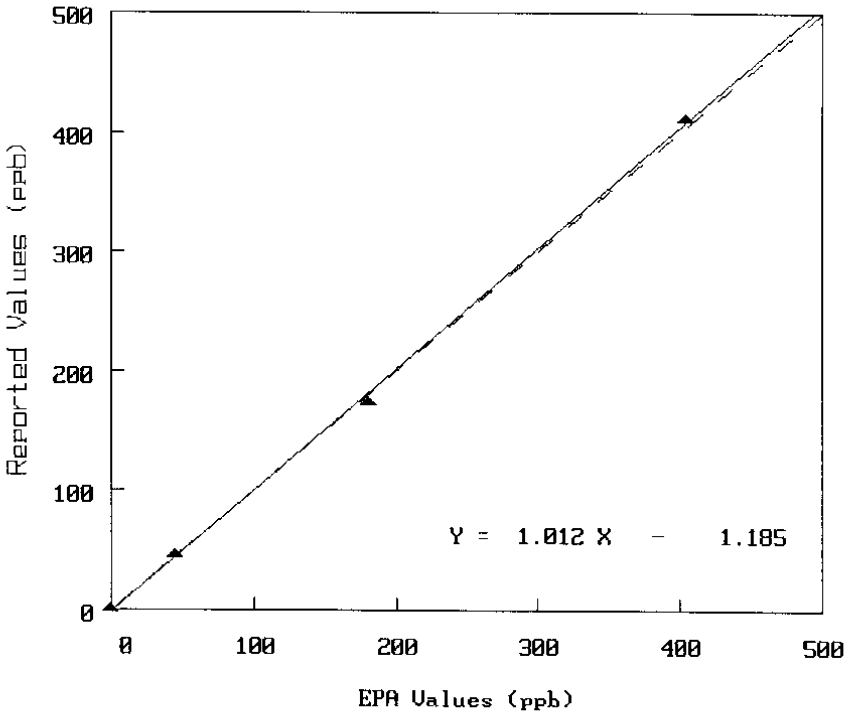
11/07/2003

7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number: Audit Date: 11/05/2003
Monitor Serial #: 496 NO Cyl. No.: FF28744
Site ID: AZC Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 412.40 | 405.16 | 7.24 | 1.8 |
| 2-3 | 174.20 | 181.38 | -7.18 | -4.0 |
| 3 | 46.80 | 45.00 | 1.80 | 4.0 |
| 0 | 1.20 | 0.00 | 1.20 | ---- |
| | Mean Absolute % Difference = 3.2 | | | |

NO Slope = 1.012 Intercept = -1.185 $r^2$ = 0.999107



Results of Carbon Monoxide (CO) Audit

for 4th Quarter 2003

03/23/2004

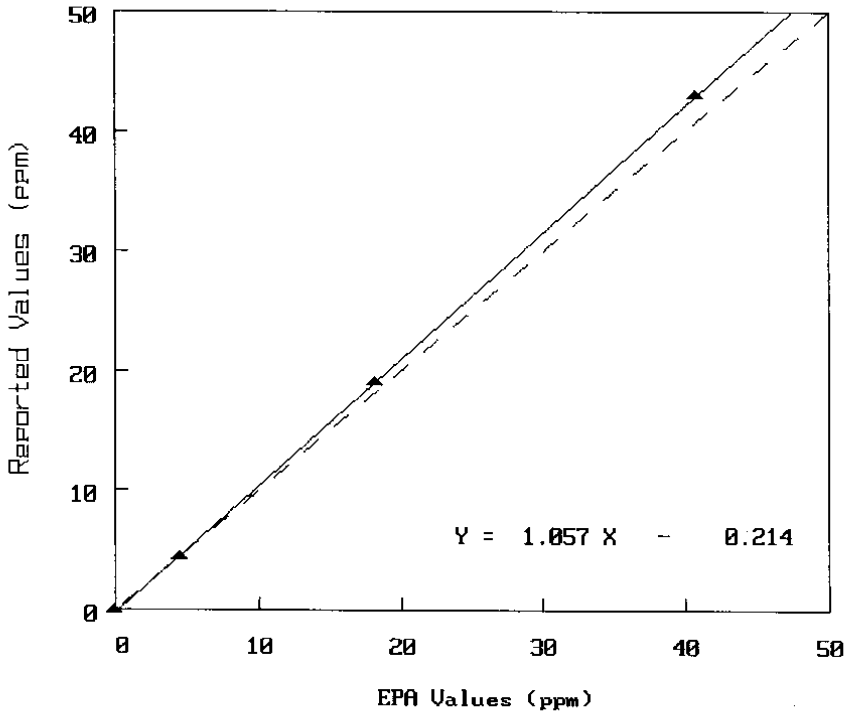
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number: .
Your Site ID: AZC
Monitor Serial #: 309

Audit Date: 11/05/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Value | Actual Value | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - - ppm - - - - - - - -) | | | |
| 1-3 | 43.10 | 40.94 | 2.16 | 5.3 |
| 2-3 | 19.10 | 18.33 | 0.77 | 4.2 |
| 3 | 4.50 | 4.55 | -0.05 | -1.1 |
| 0 | -0.10 | 0.00 | -0.10 | ---- |
| | | Mean Absolute % Difference | = | 3.5 |

Slope = 1.057 Intercept = -0.214 $r^2$ = 0.999977



Results of SO2 Continuous Audit

for 4th Quarter 2003

11/07/2003

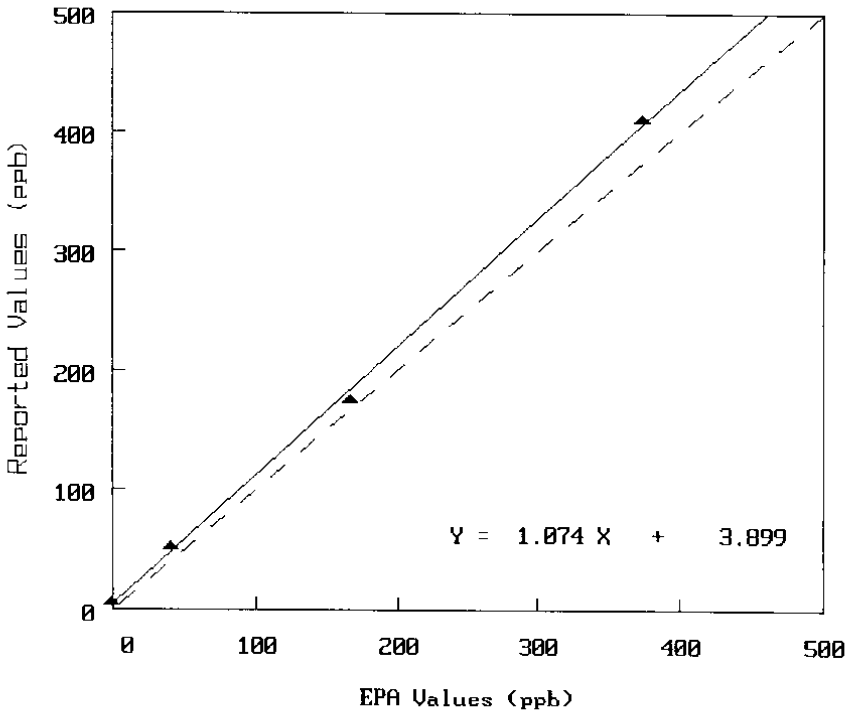
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

Site Number:
Your Site ID: AZC
Monitor Serial #: 496

Audit Date: 11/05/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 410.40 | 375.22 | 35.18 | 9.4 |
| 2-3 | 176.10 | 167.97 | 8.13 | 4.8 |
| 3 | 51.90 | 41.67 | 10.23 | 24.6 |
| 0 | 5.60 | 0.00 | 5.60 | ---- |
| | Mean Absolute % Difference = 12.9 | | | |

Slope = 1.074 Intercept = 3.899 $r^2$ = 0.999056



Results of Ozone (O3) Audit

for 4th Quarter 2003

11/07/2003

7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

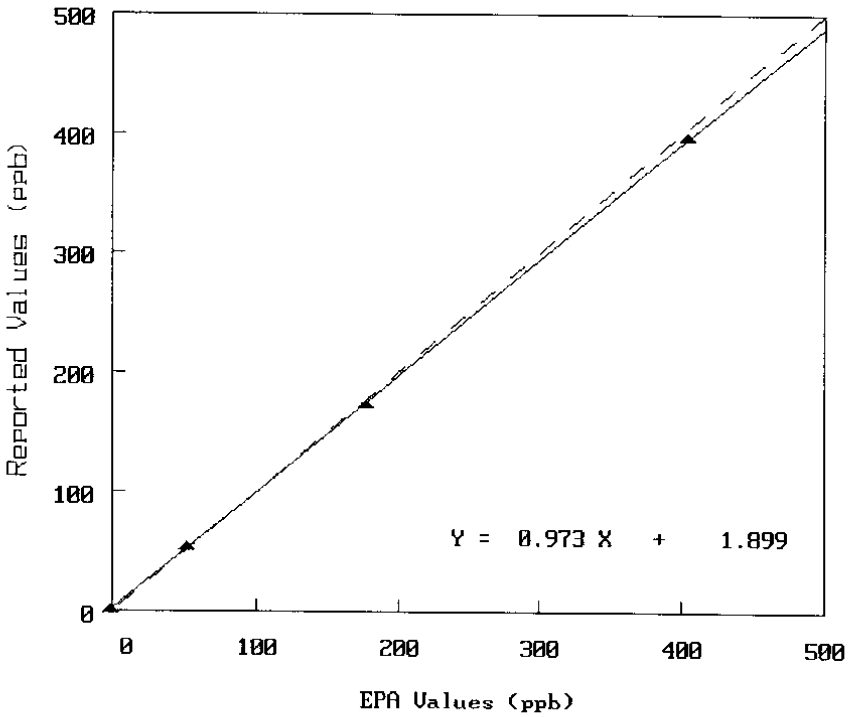
Actual values adjusted for site barometric pressure: 585.10 mm Hg

AIRS Site Number: Audit Date: 11/05/2003
Monitor Serial #: 447 Audit Device No.: 33910
Your Site ID: XAL

| Pot. Setting | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - ppb - - - - - -) | | | |
| 0 | 1.6 | 0.3 | 1.3 | ---- |
| 485 | 396.8 | 405.5 | -8.7 | -2.1 |
| 350 | 174.0 | 178.2 | -4.2 | -2.4 |
| 255 | 54.5 | 52.5 | 2.0 | 3.7 |

Mean Absolute % Difference = 2.7

Slope = 0.973 Intercept = 1.899 $r^2$ = 0.999954



Results of NO2 Continuous Audit

for 4th Quarter 2003

11/07/2003

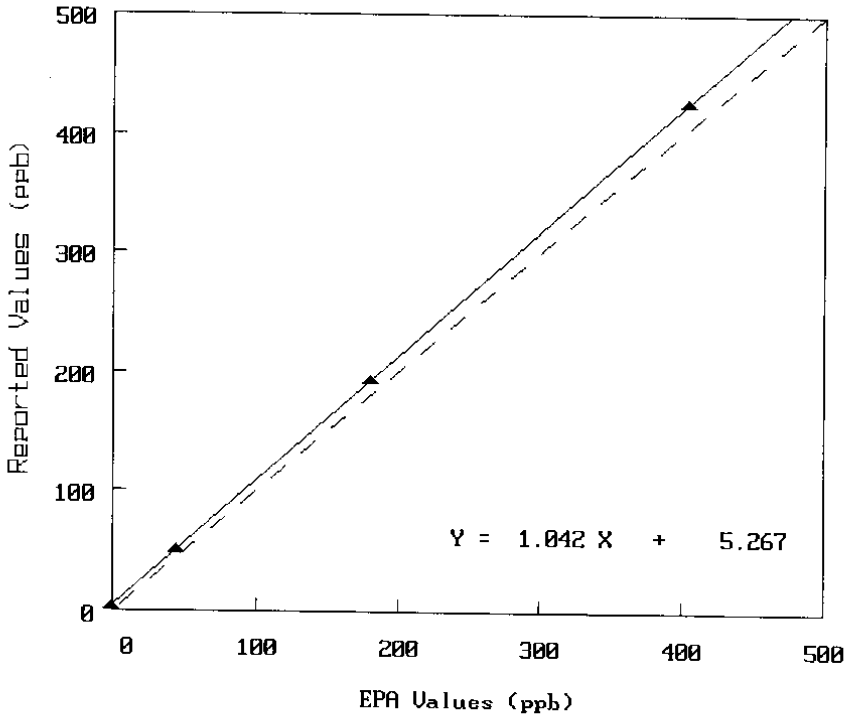
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number:
Monitor Serial #: 521
Site ID: XAL

Audit Date: 11/05/2003
NO Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 425.60 | 405.16 | 20.44 | 5.0 |
| 2-3 | 193.88 | 181.38 | 12.50 | 6.9 |
| 3 | 51.00 | 45.00 | 6.00 | 13.3 |
| 0 | 3.80 | 0.00 | 3.80 | ---- |
| | Mean Absolute % Difference = 8.4 | | | |

NO Slope = 1.041 Intercept = 4.217 $r^2$ = 0.999990



Results of Carbon Monoxide (CO) Audit

for 4th Quarter 2003

11/07/2003

7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

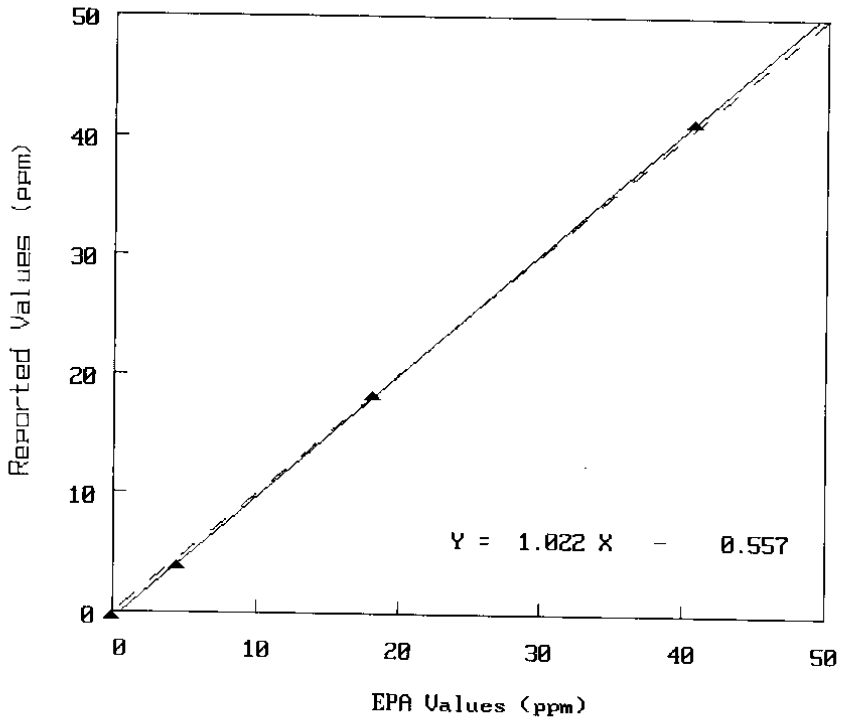
AIRS Site Number:
Your Site ID: XAL
Monitor Serial #: 308

Audit Date: 11/05/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Value | Actual Value | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - ppm - - - - - - -) | | | |
| 1-3 | 41.30 | 40.94 | 0.36 | 0.9 |
| 2-3 | 18.20 | 18.33 | -0.13 | -0.7 |
| 3 | 3.90 | 4.55 | -0.65 | -14.3 |
| 0 | -0.40 | 0.00 | -0.40 | ---- |

Mean Absolute % Difference = 5.3

Slope = 1.022 Intercept = -0.557 $r^2$ = 0.999942



Results of SO2 Continuous Audit

for 4th Quarter 2003

11/07/2003

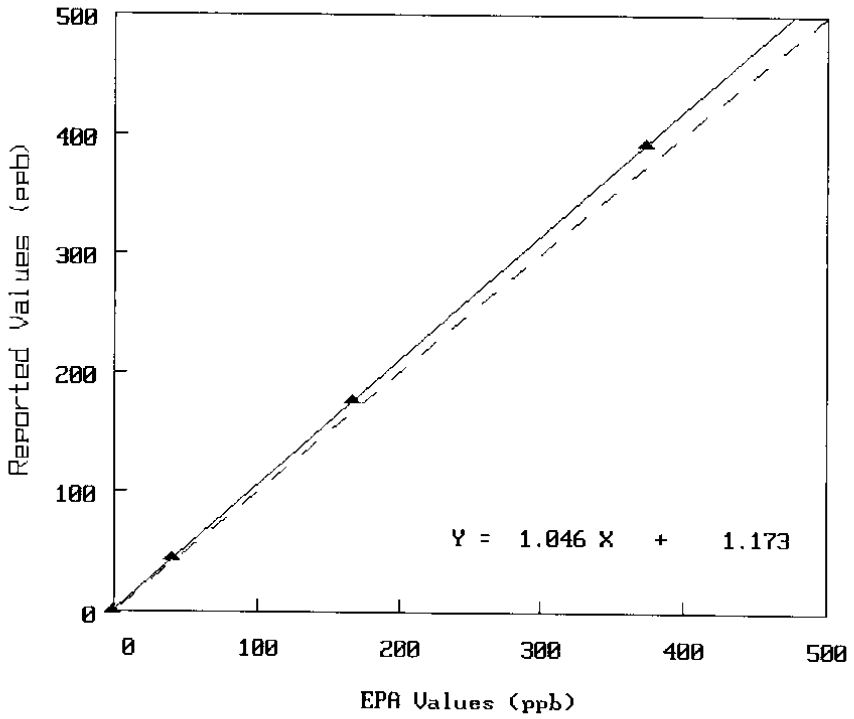
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

Site Number:
Your Site ID: XAL
Monitor Serial #: 497

Audit Date: 11/05/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 393.20 | 375.22 | 17.98 | 4.8 |
| 2-3 | 177.60 | 167.97 | 9.63 | 5.7 |
| 3 | 44.80 | 41.67 | 3.13 | 7.5 |
| 0 | 0.70 | 0.00 | 0.70 | ---- |
| | Mean Absolute % Difference = 6.0 | | | |

Slope = 1.046 Intercept = 1.173 $r^2$ = 0.999990



Results of Carbon Monoxide (CO) Audit

for 4th Quarter 2003

11/07/2003

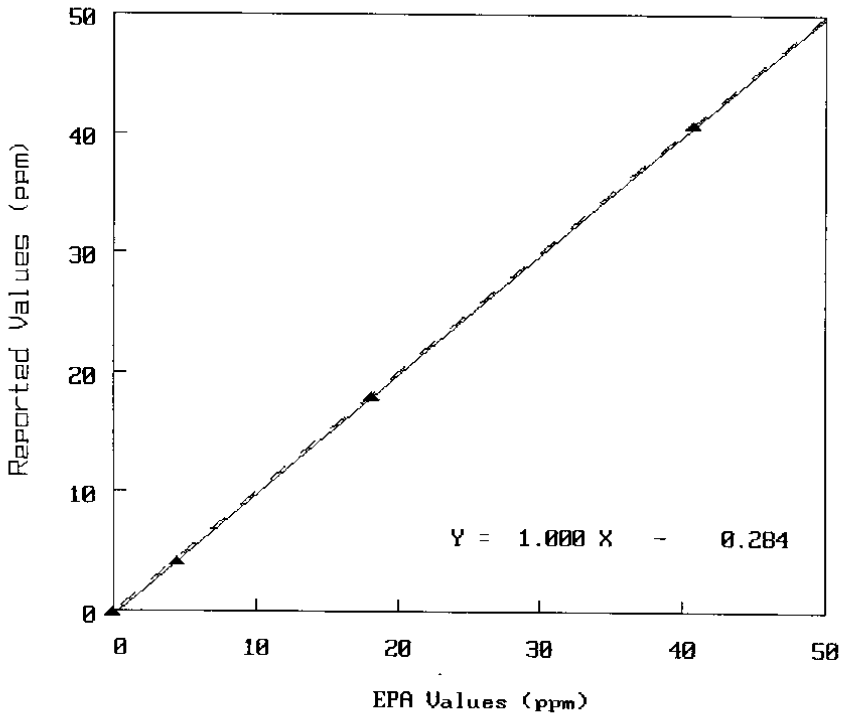
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number:
Your Site ID: ara
Monitor Serial #: 33065243

Audit Date: 11/05/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Value | Actual Value | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - - ppm - - - - - - - -) | | | |
| 1-3 | 40.70 | 40.94 | -0.24 | -0.6 |
| 2-3 | 18.00 | 18.33 | -0.33 | -1.8 |
| 3 | 4.20 | 4.55 | -0.35 | -7.7 |
| 0 | -0.20 | 0.00 | -0.20 | ---- |
| | | Mean Absolute % Difference | = | 3.4 |

Slope = 1.000 Intercept = -0.284 $r^2$ = 0.999986



Results of SO2 Continuous Audit

for 4th Quarter 2003

11/07/2003

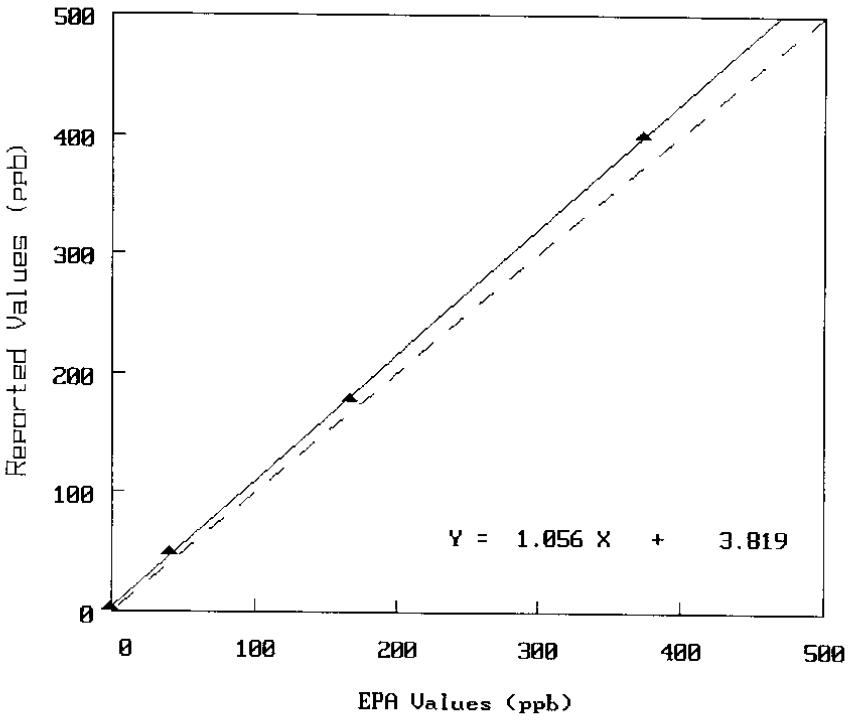
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

Site Number:
Your Site ID: ARA
Monitor Serial #: 461

Audit Date: 11/05/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 400.70 | 375.22 | 25.48 | 6.8 |
| 2-3 | 179.20 | 167.97 | 11.23 | 6.7 |
| 3 | 49.40 | 41.67 | 7.73 | 18.6 |
| 0 | 3.50 | 0.00 | 3.50 | ---- |
| | Mean Absolute % Difference = 10.7 | | | |

Slope = 1.056 Intercept = 3.819 $r^2$ = 0.999926



Results of Ozone (O3) Audit

for 4th Quarter 2003

11/07/2003

7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

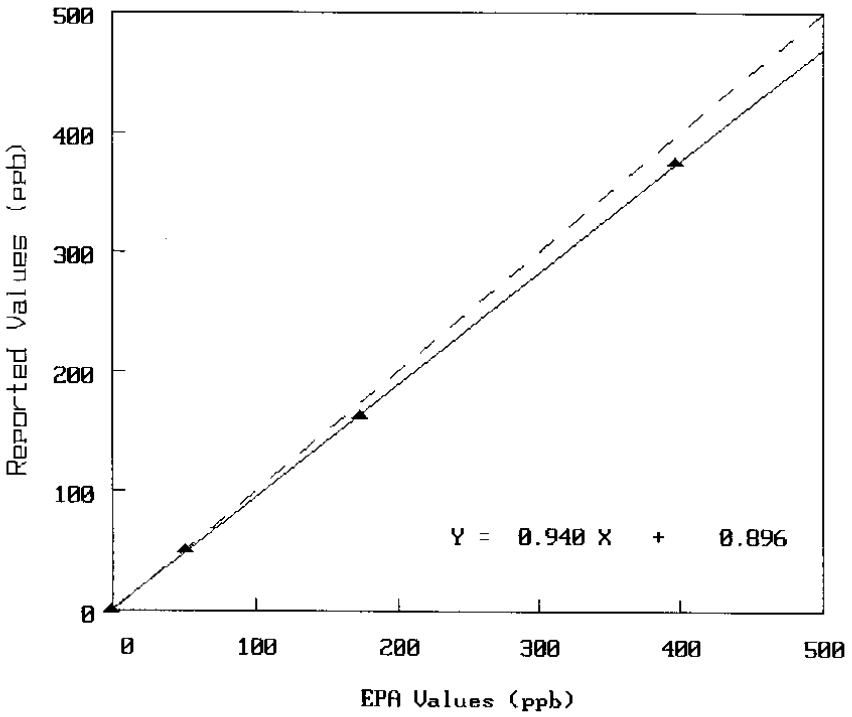
Actual values adjusted for site barometric pressure: 557.90 mm Hg

AIRS Site Number: Audit Date: 11/06/2003
Monitor Serial #: 131 Audit Device No.: 33910
Your Site ID: CUA

| Pot. Setting | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - ppb - - - - - -) | | | |
| 0 | 1.1 | 0.3 | 0.8 | ---- |
| 485 | 375.9 | 398.1 | -22.2 | -5.6 |
| 350 | 162.7 | 175.0 | -12.3 | -7.0 |
| 255 | 51.1 | 51.6 | -0.5 | -1.0 |

Mean Absolute % Difference = 4.5

Slope = 0.940 Intercept = 0.896 $r^2$ = 0.999873



Results of Ozone (O3) Audit

for 4th Quarter 2003

11/07/2003

7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

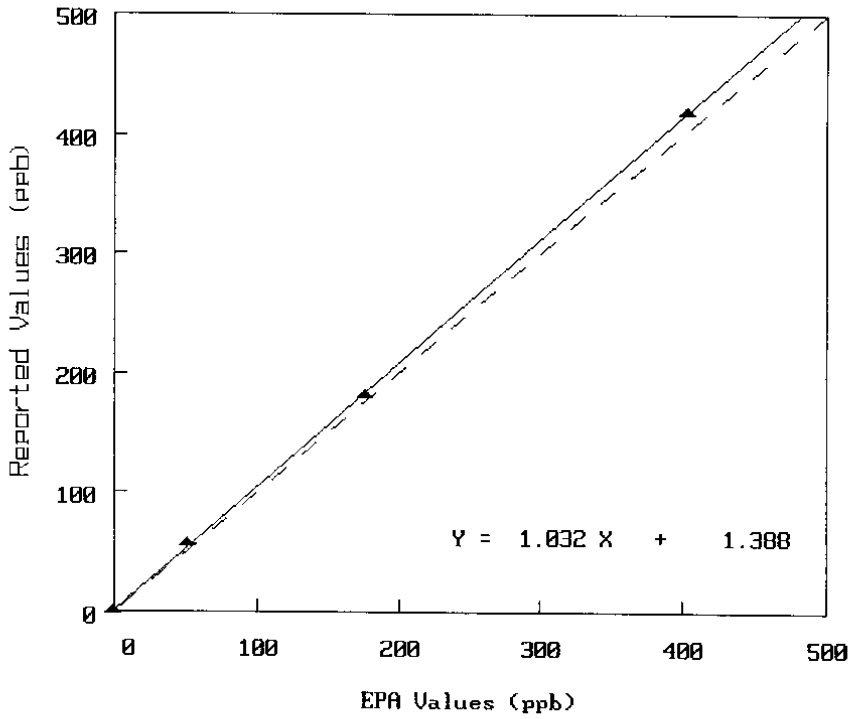
Actual values adjusted for site barometric pressure: 582.30 mm Hg

AIRS Site Number: Audit Date: 11/06/2003
Monitor Serial #: 262 Audit Device No.: 33910
Your Site ID: PLA

| Pot. Setting | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - -) | | | |
| 0 | 1.6 | 0.3 | 1.3 | ---- |
| 485 | 420.0 | 404.7 | 15.3 | 3.8 |
| 350 | 182.3 | 177.9 | 4.4 | 2.5 |
| 255 | 57.3 | 52.5 | 4.8 | 9.2 |

Mean Absolute % Difference = 5.2

Slope = 1.032 Intercept = 1.388 $r^2$ = 0.999894



Results of NO2 Continuous Audit

for 4th Quarter 2003

11/07/2003

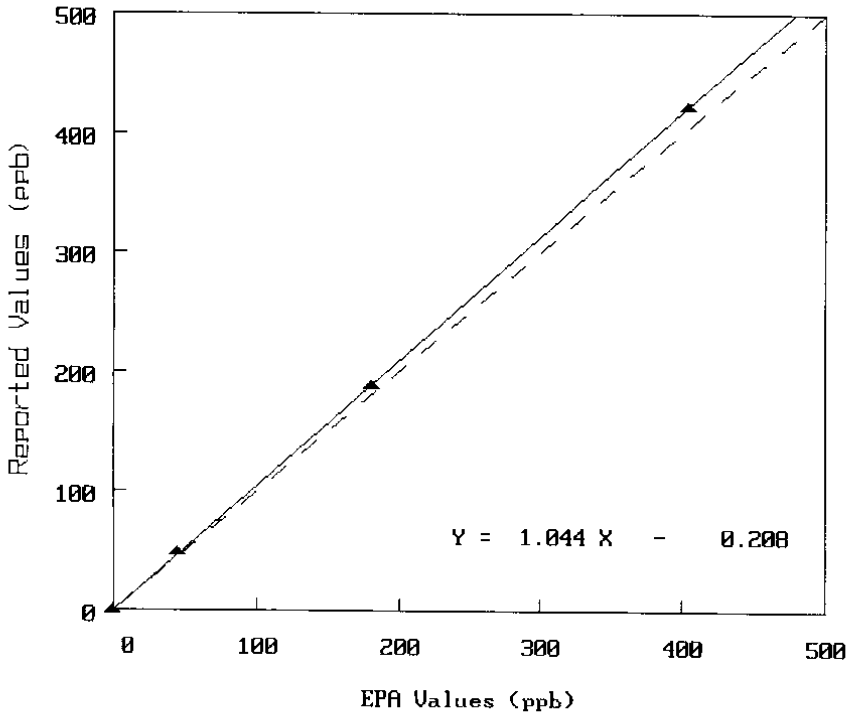
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number:
Monitor Serial #: 498
Site ID: PLA

Audit Date: 11/06/2003
NO Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 422.80 | 405.16 | 17.64 | 4.4 |
| 2-3 | 188.20 | 181.38 | 6.82 | 3.8 |
| 3 | 48.40 | 45.00 | 3.40 | 7.6 |
| 0 | -1.20 | 0.00 | -1.20 | ---- |
| | Mean Absolute % Difference = 5.2 | | | |

NO Slope = 1.044 Intercept = -0.208 $r^2$ = 0.999958



Results of Carbon Monoxide (CO) Audit

for 4th Quarter 2003

11/07/2003

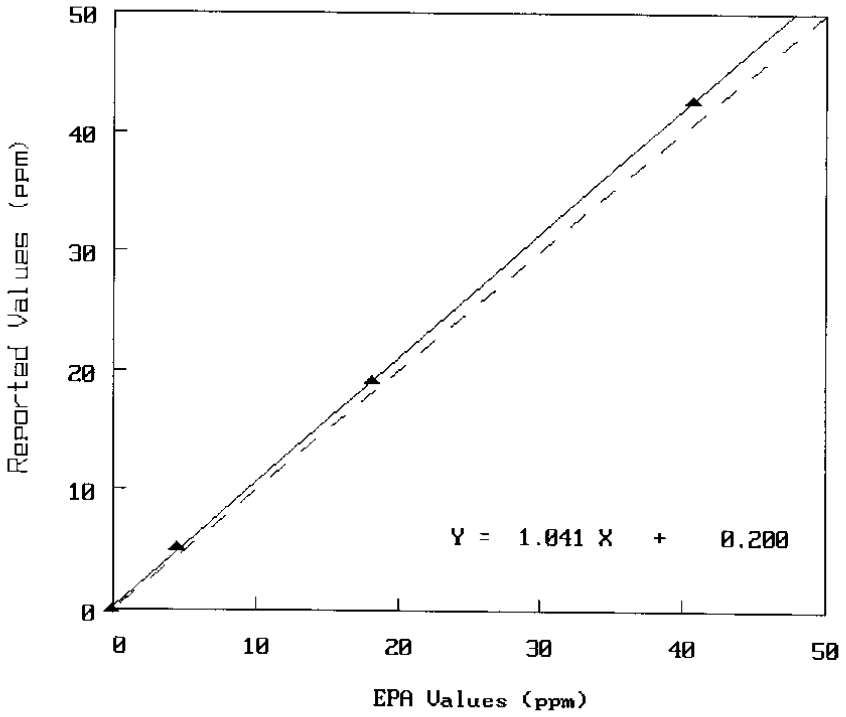
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number:
Your Site ID: PLA
Monitor Serial #: 1160

Audit Date: 11/06/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Value | Actual Value | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - - ppm - - - - - - - -) | | | |
| 1-3 | 42.80 | 40.94 | 1.86 | 4.5 |
| 2-3 | 19.20 | 18.33 | 0.87 | 4.7 |
| 3 | 5.20 | 4.55 | 0.65 | 14.3 |
| 0 | 0.00 | 0.00 | 0.00 | ---- |
| | | Mean Absolute % Difference | = | 7.9 |

Slope = 1.041 Intercept = 0.200 $r^2$ = 0.999893



Results of SO2 Continuous Audit

for 4th Quarter 2003

11/07/2003

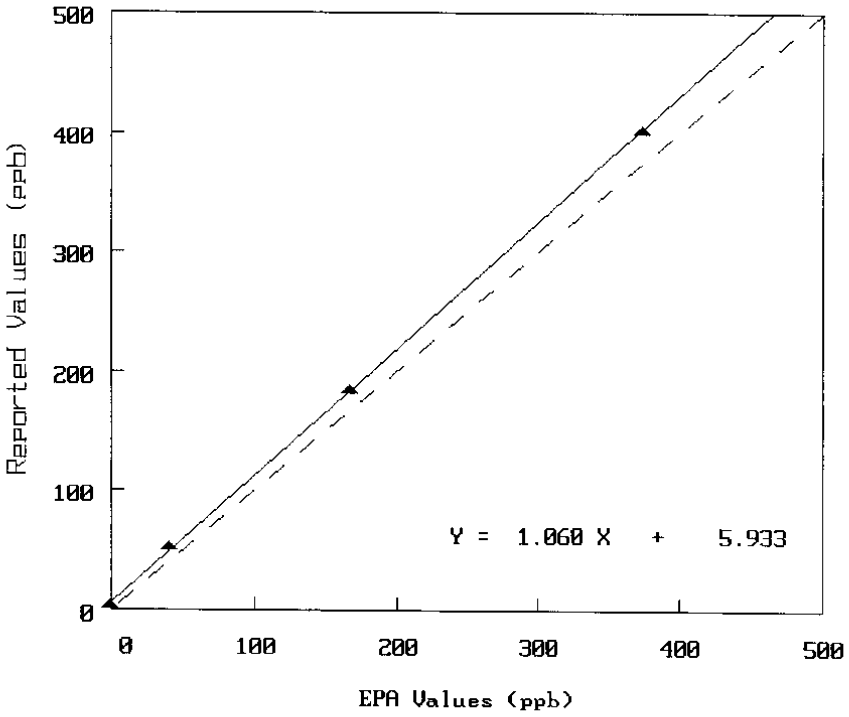
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

Site Number:
Your Site ID: PLA
Monitor Serial #: 500

Audit Date: 11/06/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 402.90 | 375.22 | 27.68 | 7.4 |
| 2-3 | 185.20 | 167.97 | 17.23 | 10.3 |
| 3 | 52.20 | 41.67 | 10.53 | 25.3 |
| 0 | 3.40 | 0.00 | 3.40 | ---- |
| | Mean Absolute % Difference = 14.3 | | | |

Slope = 1.060 Intercept = 5.933 $r^2$ = 0.999866



Results of Ozone (O3) Audit

for 4th Quarter 2003

11/07/2003

7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

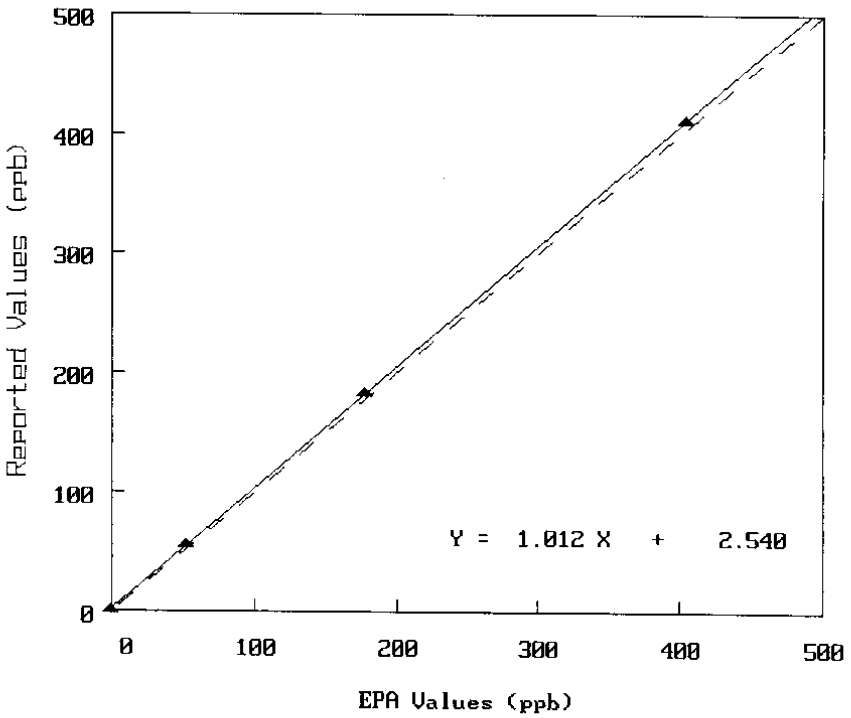
Actual values adjusted for site barometric pressure: 583.80 mm Hg

AIRS Site Number: Audit Date: 11/06/2003
Monitor Serial #: 229 Audit Device No.: 33910
Your Site ID: TAX

| Pot. Setting | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - ppb - - - - - -) | | | |
| 0 | 1.0 | 0.3 | 0.7 | ---- |
| 485 | 412.0 | 405.1 | 6.9 | 1.7 |
| 350 | 184.0 | 178.0 | 6.0 | 3.3 |
| 255 | 57.0 | 52.5 | 4.5 | 8.6 |

Mean Absolute % Difference = 4.5

Slope = 1.012 Intercept = 2.540 $r^2$ = 0.999930



Results of NO2 Continuous Audit

for 4th Quarter 2003

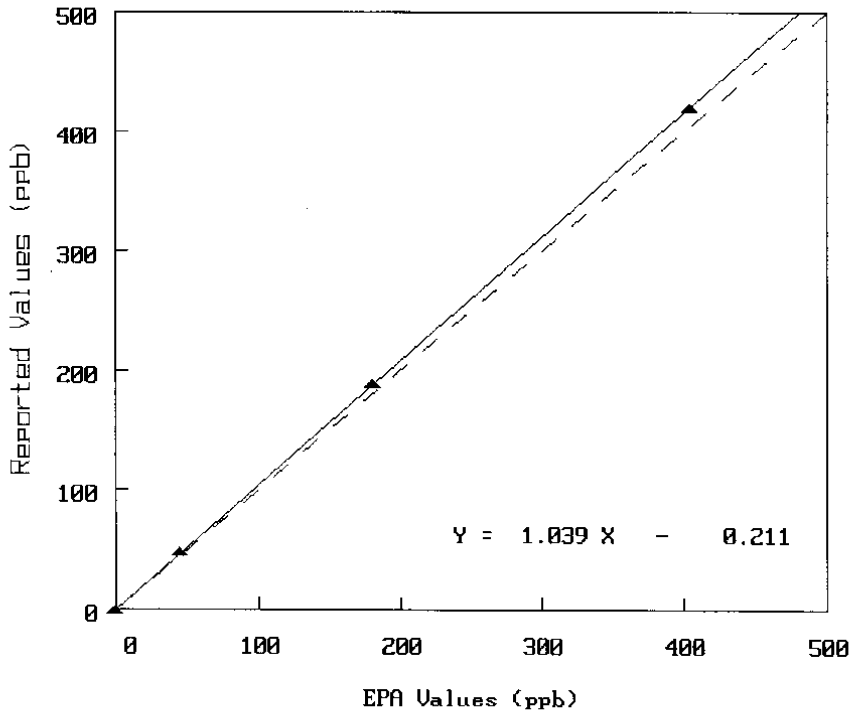
11/07/2003

7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number: Audit Date: 11/06/2003
Monitor Serial #: 525 NO Cyl. No.: FF28744
Site ID: TAX Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 420.00 | 405.16 | 14.84 | 3.7 |
| 2-3 | 189.00 | 181.38 | 7.62 | 4.2 |
| 3 | 48.00 | 45.00 | 3.00 | 6.7 |
| 0 | -2.00 | 0.00 | -2.00 | ---- |
| | Mean Absolute % Difference = 4.8 | | | |

NO Slope = 1.039 Intercept = -0.211 $r^2$ = 0.999940



Results of Carbon Monoxide (CO) Audit

for 4th Quarter 2003

11/07/2003

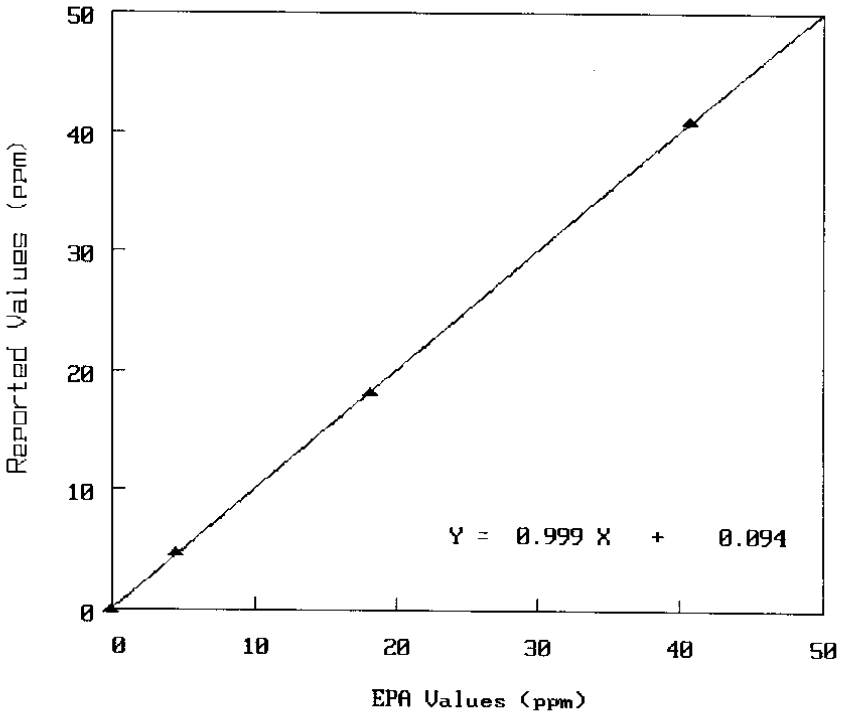
7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

AIRS Site Number:
Your Site ID: TAX
Monitor Serial #: 1168

Audit Date: 11/06/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Value | Actual Value | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - - - ppm - - - - - - - -) | | | |
| 1-3 | 41.00 | 40.94 | 0.06 | 0.1 |
| 2-3 | 18.30 | 18.33 | -0.03 | -0.2 |
| 3 | 4.80 | 4.55 | 0.25 | 5.5 |
| 0 | 0.00 | 0.00 | 0.00 | ---- |
| | | Mean Absolute % Difference | = | 1.9 |

Slope = 0.999 Intercept = 0.094 $r^2$ = 0.999955



Results of SO2 Continuous Audit

for 4th Quarter 2003

11/07/2003

7ME031 0 7ME031
Mr Matthew Witosky
Attache, US EPA-US Embassy Mexico City
225 Vermillion Road
Brownsville, TX 78521

Site Number:
Your Site ID: TAX
Monitor Serial #: 252

Audit Date: 11/06/2003
Cyl. No.: FF28744
Device No.: 141

| Valves Opened | Reported Values | Actual Values | Difference | % Difference |
|---|---|---|---|---|
| | (- - - - - - ppb - - - - - - -) | | | |
| 1-3 | 397.00 | 375.22 | 21.78 | 5.8 |
| 2-3 | 181.00 | 167.97 | 13.03 | 7.8 |
| 3 | 47.00 | 41.67 | 5.33 | 12.8 |
| 0 | 3.00 | 0.00 | 3.00 | ---- |
| | Mean Absolute % Difference = 8.8 | | | |

Slope = 1.050 Intercept = 3.450 $r^2$ = 0.999981