



The Ambient Air Precision and Accuracy Program

1996 Annual Report

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EXECUTIVE SUMMARY

Many important EPA decisions are based on the nationwide ambient air monitoring data obtained by the state and local agencies. This data is collected by approximately 5,000 ambient air samplers which make up the State and Local Air Monitoring Stations (SLAMS) network. Data collected are used by the EPA to aid in planning the nation's air pollution control strategy and to measure achievement toward meeting the National Ambient Air Quality Standards (NAAQS). Unfortunately, not all data are accompanied by estimates of its quality. To assure the most knowledgeable and effective use of the data, the quality of the national monitoring data should be determined and made known to all data users.

The Code of Federal Regulations (CFR), Part 58, Appendix A, directs that precision and accuracy checks be incorporated by the state and local agencies to verify the quality of the collected data. Precision is used in the sense of "agreement among individual measurements of the same property usually under prescribed similar conditions." Accuracy is used in the sense of "the degree of agreement between an observed value and an accepted reference value." The CFR requires that measures of data quality be reported on the basis of 'reporting organization.' A reporting organization is defined as a state or subordinate organization within a state which is responsible for a set of stations which monitor the same pollutant and for which precision and accuracy assessments can be achieved. States must define one or more reporting organizations for each pollutant such that each monitoring station in the state SLAMS network is included in one, and only one, reporting organization. The quality assurance guidelines for precision is +/- 15 % and the guideline for accuracy is +/- 20 % (see the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II, section 2.0.11).

A review of the annual 1996 data for five of the six criteria pollutants (lead excluded):

Ozone (O ₃)	Sulfur Dioxide (SO ₂)
Carbon Monoxide (CO)	Nitrogen Dioxide (NO ₂)
Particles (PM ₁₀)	

was performed on the precision and accuracy data for reporting organizations as submitted to the EPA's Aerometric Information Retrieval System (AIRS) database. This review yielded a national average with upper and lower probability limits for each pollutant which holds 95% of the stations data (see Chapter 40 Code of Federal Regulations Part 58, Appendix A, Section 5 for exact specifications and formulas).

A national review revealed that the overall quality of the nation's ambient air monitoring data was within acceptable guidelines. The national average for precision probability lower and upper limits were -7.5 and +7.7, respectively. Accuracy probability limits averaged -6.6 and +5.7 for level I, and -5.5 and +4.8 for level II. These numbers were attained by averaging all reporting organizations annual limits for the pollutants considered.

The national review can be further aggregated into specific pollutants. The precision results for the 148 reporting organizations sampling for ozone averaged -6.0 and +5.8. For the 137 reporting organizations sampling for sulfur dioxide, precision results averaged -7.0 and +6.7. The precision

results for the 91 reporting organizations sampling for nitrogen dioxide averaged -8.7 and +8.7. For the 107 reporting organizations sampling for carbon monoxide, precision results averaged -5.0 and +6.3. Precision results for the 178 reporting organizations sampling for particulate matter with an aerodynamic diameter of 10 microns or less averaged -10.8 and +11.2.

A review of the 1996 annual precision and accuracy data was also performed. For ozone, the national averages for regional reporting organization precision and accuracy data submissions were 98 and 57 percent, respectively. Similarly, carbon monoxide precision and accuracy data submissions averaged 100 and 64 percent; nitrogen dioxide averages were 96 and 55 percent; sulfur dioxide averaged 100 and 58 percent, and particulate matter averaged 92 and 79 percent.

This document fulfills the requirement within the 40 CFR Part 58 Appendix A for an annual report concerning the precision and accuracy data submitted to the EPA from the state and local agencies.

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INTRODUCTION

Many important EPA decisions are based on the ambient air quality monitoring data obtained by the state and local agencies. This data is collected by the approximately 5,000 ambient air samplers which make up the State and Local Air Monitoring Stations (SLAMS) network. Data collected and reported to the Aerometric Information Retrieval System (AIRS) are used by the EPA to aid in planning the nation's air pollution control strategy and to measure achievement toward meeting National Ambient Air Quality Standards (NAAQS). Further, the data in AIRS are made available to numerous requesters, who may use the data for various research projects, special studies, or other purposes.

Prior to the May 10, 1979 promulgation of the regulations set forth in Chapter 40 of the Code of Federal Regulations (40 CFR) Part 58 (Federal Register notice: 44 FR 27558-27604), the quality assurance and quality control practices of state and local agencies were strictly voluntary; although many forms of guidance and assistance had been provided by the EPA Regional Offices and the National Exposure Research Laboratory (formally the Environmental Monitoring Systems Laboratory), Research Triangle Park, North Carolina. Consequently, there was a wide diversity in the scope and effectiveness among the state and local agencies' QA programs.

Unfortunately, not all data are accompanied by estimates of its quality. To assure the most knowledgeable and effective use of the data, the quality of the national monitoring data should be determined and made known to all data users. The Code of Federal Regulations, Part 58, directed that precision and accuracy checks be incorporated by the state and local agencies to control and evaluate the quality of the collected data.

BACKGROUND

Precision is used in 40 CFR Part 58, Appendices A and B, in the sense of "agreement among individual measurements of the same property usually under prescribed similar conditions." Since specified conditions may vary considerably, there are many levels of agreement or precision. For example, with an automated continuous air pollution sensor, the random fluctuations in response over a short time (e.g., within a minute) when an instrument is measuring a gas of constant pollutant concentration is a very 'local' measurement of precision. Another measure of agreement would be the variation of one point precision checks made at biweekly intervals on the same instrument (Instrument Precision).

Accuracy is used in 40 CFR Part 58, Appendices A and B, in the sense of "the degree of agreement between an observed value and an accepted reference value." Deviations from the truth result from both random errors and systematic errors. Precision is associated with the random errors. The average inaccuracy, or bias, of a measurement process over some time or set of conditions is associated with the systematic error. For example, the systematic error of a given instrument is associated with average accuracy for that instrument over some specified period of time.

Although the ultimate truth cannot be known, the values of the standards determined by National Institute of Science and Technology (NIST) or other nationally recognized measurement standards bodies are accepted as 'truth'. In assessing the accuracy of measurements of an air pollution

monitoring agency, measurements are made through the implementation of independent audits in which the measurement systems are challenged with standards (materials or devices) having traceability as directly as possible to NIST standards.

Section 3 of Appendix A in 40 CFR Part 58, requires that measures of data quality be reported on the basis of 'reporting organization.' A reporting organization is defined as a state or subordinate organization within a state which is responsible for a set of stations which monitor the same pollutant and for which precision and accuracy assessments can be achieved. States must define one or more reporting organizations for each pollutant such that each monitoring station in the state SLAMS network is included in one, and only one, reporting organization. Agency precision and accuracy is the average values of all the instruments within a reporting organization during the calendar quarter or calendar year. Each reporting organization shall be defined such that precision or accuracy among all stations in the organization can be expected to be reasonably homogeneous, as a result of common factors. Common factors that should be considered by states in defining reporting organizations include: (1) operation by a common team of field operators, (2) common calibration facilities, and (3) support by a common laboratory or headquarters.

The precision and accuracy checks conducted by reporting organizations are one component of a quality assurance program. At the local level, the precision and accuracy data enable reporting organizations to identify aspects of their quality assurance programs that may need strengthening. They also enable the EPA to determine ways in which the quality of ambient data can be improved, such as additional research on measurement procedures, increased quality control for certain types of measurements, or technical assistance to areas of the country needing improved quality control.

There are other potential uses of the precision and accuracy data. First, when determining whether a site meets a National Ambient Air Quality Standard (NAAQS), it may be useful for decision makers to know to what extent a concentration reported as either above or below the standard is the result of measurement error. Second, when setting NAAQS, policy makers must estimate the protection afforded by existing and revised ambient standards on either a national or regional basis. This judgment may be influenced by measurement uncertainties.

Finally, the 1990 Clean Air Act Amendments (CAAA) identified nonattainment areas for criteria pollutants. These nonattainment areas were classified by levels of pollutant concentration in the atmosphere (marginal, moderate, serious, severe, and extreme). For an area or site to change its classification, it must show reductions in pollutant concentration levels. The monitoring data must be of acceptable quality to support the reclassification of nonattainment areas or for attainment areas to become classified as nonattainment.

QUALITY ASSURANCE GUIDELINE

The stated guidance for determining compliance to precision and accuracy guidelines is found in the Quality Assurance Handbook, Volume 2, Section 2.0.11 which states, "As a goal, the 95% probability limits for precision (all pollutants) and TSP accuracy should be less than +/- 15%. At 95% probability limits, the accuracy for all other pollutants should be less than +/- 20%."

The collected data can be accessed via the EPA Aerometric Information Retrieval System (AIRS), Air Quality Subsystem, precision/accuracy reporting organization summary report.

DATA RESULTS

National Review

Each reporting organization submitted data for 1996 into the EPA's Aerometric Information Retrieval System (AIRS) database. AIRS calculated annual average precision and accuracy acceptance limits for each reporting organization (Section 5, reference 3). The calculation was based upon data submitted from January 1, 1996 to December 31, 1996. The percentages are based upon the annual precision and accuracy (P&A) results. A reporting organization is said to be outside of the acceptable quality assurance limits if either of the upper probability limit or lower probability limit is outside of the acceptable quality assurance limit. All reporting organization acceptance limits were then averaged for a national results profile. The national results were aggregated into separate categories for automatic and manual methods of sampling.

The national results indicate the precision and accuracy data average well within the quality assurance guidelines. All of the criteria pollutant's precision acceptance lower and upper limits average nationally at -7.5 and +7.7, respectively. The criteria pollutant's accuracy acceptance lower and upper limits average nationally for level I at -6.6 and +5.7 and level II at -5.5 and +4.8, respectively. (Note: The precision and accuracy data for lead was excluded from these calculations. The standard for lead is $1.5 \mu\text{g}/\text{m}^3$ but the national average concentration (the arithmetic mean of the maximum quarterly concentration as reported in the EPA National Trends Report) is $0.04 \mu\text{g}/\text{m}^3$. This represents only 2.6 percent of the standard. These calculations and the lead program are being evaluated for revision to show a true representation of the lead sampler precision and accuracy.

Automated Methods

Table 1.0 shows the national precision summary for automated methods. All of the automated methods averaged together nationally yield a precision average of -6.7 for the lower probability limit and +6.8 for the upper probability limit. Each of the four pollutants were also reviewed separately. There were 148 reporting organizations sampling for ozone (O_3); the national precision average for ozone was -6.0 and +5.8. Likewise, for the 137 reporting organizations which sampled for sulfur dioxide (SO_2), the national precision average was -7.0 and +6.3. Ninety one reporting organizations sampled for nitrogen dioxide (NO_2) with a resultant national precision average of -8.7 and +8.7, while 105 reporting organizations sampling for carbon monoxide (CO) achieved a national precision average of -5.0 and +6.3.

The national accuracy averages, separated by concentration level, were within the acceptable quality assurance limits. The national average for automated methods at level I accuracy was -7.2 and +6.1. The corresponding national average for level II accuracy was -5.5 and +4.8, while level III automated method accuracy was -5.0 and +4.1. Table 1.0 shows the national accuracy summary for automated methods.

There were 76,798 precision audits and 4,405 accuracy audits for automated methods in 1996 performed by a total of 2,429 analyzers.

Manual Methods

Table 2.0 shows the national summary of precision for manual methods. The national precision average for particulates with diameters under 10 microns (PM_{10}) is -10.8 for the lower probability limit and +11.2 for the upper probability limit. The national precision average for lead (Pb) was excluded as current monitoring procedures are under revision. The standard for lead is $1.5 \mu g/m^3$ but the national average concentration for 1995 (the arithmetic mean of the maximum quarterly concentration as reported in the EPA National Trends Report) was $0.04 \mu g/m^3$. This represents only 2.6 percent of the standard. Based upon current precision and accuracy calculation methods, the large disparity between the standard and observed concentrations would result in a substantial number of reporting organizations submitting precision results outside of the acceptable limits. These calculations are being revised to show a true representation of lead sampler precision.

The national accuracy averages are within the acceptable quality assurance guidelines. The national average for level I accuracy, manual methods (particulates only), was -4.3 and +4.0. Accuracy levels II and III were not employed for manual methods in 1996.

Regional Review

Table 3.0 summarizes the regional precision results for both automated and manual methods. Reporting organization data submissions averaged between 92 and 100 percent. One hundred percent of possible data for carbon monoxide and sulfur dioxide were submitted. For ozone and nitrogen dioxide, 98 and 96 percent, respectively, of possible data were submitted. Ninety two percent of the possible data were submitted for particulate matter (aerodynamic diameter of 10 microns or less).

Table 4.0 summarizes the regional accuracy results for both automated and manual methods. Reporting organization data submissions averaged between 55 and 79 percent. Seventy nine percent of possible data for particulate matter were submitted. For ozone and nitrogen dioxide, 57 and 55 percent, respectively, of possible data were submitted. Carbon monoxide and sulfur dioxide data submissions averaged 64 and 58 percent, respectively.

Table 5.0 offers an explanation of the terminology used in the tables.

REFERENCES

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Table 1.0 National Results for Precision and Accuracy Data for Automated Methods

NATIONAL RESULTS												
<i>Pollutant</i>	<i>Number Reporting Organizations</i>	<i>Precision Lower Limit</i>	<i>Precision Upper Limit</i>	<i>Number Precision Checks</i>	<i>Number Analyzers</i>	<i>Number Accuracy Audits</i>	<i>Audit Level 1 Lower Limit</i>	<i>Audit Level 1 Upper Limit</i>	<i>Audit Level 2 Lower Limit</i>	<i>Audit Level 2 Upper Limit</i>	<i>Audit Level 3 Lower Limit</i>	<i>Audit Level 3 Upper Limit</i>
<i>O₃</i>	148	-6.03	5.77	26,876	938	1,734	-5.21	5.80	-4.21	4.17	-4.08	3.70
<i>SO₂</i>	137	-7.01	6.33	20,071	600	1,070	-6.88	3.88	-6.05	3.97	-5.76	3.89
<i>NO₂</i>	91	-8.65	8.73	11,328	375	694	-10.66	7.20	-7.25	5.52	-5.77	4.86
<i>CO</i>	107	-4.98	6.34	18,523	516	907	-5.92	7.64	-4.28	5.54	-4.23	3.84
National Totals and Average	483	-6.67	6.79	76,798	2,429	4,405	-7.17	6.13	-5.45	4.80	-4.96	4.07

Table 2.0 National Results for Precision and Accuracy Data for Manual Methods

NATIONAL RESULTS								
<i>Pollutant</i>	<i>Number Reporting Organizations</i>	<i>Precision Lower Limit</i>	<i>Precision Upper Limit</i>	<i>Number Collocated Sites</i>	<i>Number Collocated Samples</i>	<i>Number Accuracy Audits</i>	<i>Audit Level 1 Lower Limit</i>	<i>Audit Level 1 Upper Limit</i>
<i>PM10</i>	178	-10.83	11.16	278	13,100	4,322	-4.27	4.03
National Totals and Average	178	-10.83	11.16	278	13,100	4,322	-4.27	4.03

* The data for lead was not included in this review due to the lead rule being currently under development with major revisions expected.

Table 3.0 Percentage of Regional Reporting Organizations Submitting Data

REGIONAL PRECISION RESULTS					
Region	Ozone	CO	NO2	SO2	PM10
I	100	100	100	100	92
II	100	100	100	100	100
III	100	100	100	100	100
IV	97	100	94	100	94
V	100	100	100	100	90
VI	100	100	100	100	100
VII	100	100	100	100	93
VIII	86	100	100	100	74
IX	96	100	100	100	94
X	100	100	67	100	86
*Note 1	98	100	96	100	92
NAT. AVG.					
	Automated Methods				Manual Methods

* Note 1: The percentages are based upon the yearly P&A results from AIRS.

Table 4.0 Percentage of Regional Reporting Organizations Submitting Data

REGIONAL ACCURACY RESULTS					
Region	Ozone	CO	NO2	SO2	PM10
I	75	100	57	73	83
II	100	67	100	75	100
III	73	80	78	89	100
IV	49	48	35	38	91
V	63	50	38	58	73
VI	73	80	78	78	93
VII	36	50	17	20	67
VIII	43	57	83	71	72
IX	28	31	32	25	41
X	29	80	33	50	71
* Note 1 NAT. AVG.	57	64	55	58	79
	Automated Methods				Manual Methods

* Note-1: The percentages are based upon the yearly P&A results from AIRS.

Table 5.0 Explanations of the terms for Tables 1, 2, 3, and 4

EXPLANATION OF TERMS	
<i>Title</i>	<i>Explanation</i>
<i>Pollutant</i>	This will be one of the six criteria pollutants - Ozone, Sulfur Dioxide, Carbon Monoxide, Nitrogen Dioxide, Particles, Lead
<i>Number Reporting Organizations</i>	This is the total number of reporting organizations that submitted data into the EPA's Aerometric Information Retrieval System (AIRS) database for that particular pollutant
<i>Precision Lower Limit</i>	This is the lower limit for precision checks which represent the lower boundary of the 95% probability limits
<i>Precision Upper Limit</i>	This is the upper limit for precision checks which represent the upper boundary of the 95% probability limits
<i>Number Precision Checks</i>	This is the total number of precision checks performed on that particular pollutant within that specific year
<i>Number Analyzers</i>	The total number of analyzers that monitored that particular pollutant within that specific year
<i>Number Accuracy Audits</i>	The total number of accuracy audits performed during that specific year
<i>Audit Level 1 Lower Limit</i>	This is the lower boundary of the 95% probability limits for the level one audit as defined by 40CFR58, Appendix A
<i>Audit Level 1 Upper Limit</i>	This is the upper boundary of the 95% probability limits for the level one audit as defined by 40CFR58, Appendix A
<i>Audit Level 2 Lower Limit</i>	This is the lower boundary of the 95% probability limits for the level two audit as defined by 40CFR58, Appendix A
<i>Audit Level 2 Upper Limit</i>	This is the upper boundary of the 95% probability limits for the level two audit as defined by 40CFR58, Appendix A
<i>Audit Level 3 Lower Limit</i>	This is the lower boundary of the 95% probability limits for the level three audit as defined by 40CFR58, Appendix A
<i>Audit Level 3 Upper Limit</i>	This is the upper boundary of the 95% probability limits for the level three audit as defined by 40CFR58, Appendix A
<i>Number Collocated Sites</i>	This is the total number of collocated sites within the pollutants network of monitors
<i>Number Collocated Samples</i>	This is the total number of valid collocated samples that was submitted to the EPA's AIRS database

EXPLANATION OF TERMS	
<i>Title</i>	<i>Explanation</i>
<i>Region</i>	This will specify one of the ten EPA regions
<i>Percentages</i>	The percentages are based upon the total number of reporting organizations that submitted data into EPA's AIRS database and the total number of reporting organizations that submitted data within acceptable guidelines. For example, 149 reporting organizations submitted data within acceptable guidelines and 150 reporting organizations submitted data. The percentage is then 149/150 or 99.33%
<i>PM10 Precision</i>	This is based upon the percent differences between two collocated samplers
<i>PM10 Accuracy</i>	This is the annual flow check
<i>Lead Precision</i>	This is based upon the percent differences between two collocated samplers
<i>Lead (A) Accuracy</i>	This is a quarterly audit of the laboratory
<i>Lead (F) Accuracy</i>	This is an annual flow check

Ozone 1996 P&A Data

Reg	State	RO	Lower Limit	Upper Limit	Number Analyzers	Precision Checks	Number Audits	Type Audit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
1	9	1	-8	3	12	313	12	1	-8	3	-7	4	-6	3
1	23	1	-5	7	11	261	15	2	-6	5	-2	3	0	3
1	23	102	-4	0	1	31	2	3						
1	23	908	-6	7	1	60	2	1						
1	25	1	-7	6	17	348	30	2	-5	3	-5	3	-5	2
1	33	1	-8	6	11	613	30	1	-7	4	-5	3	-5	3
1	44	1	-3	6	3	90	12	2	-12	7	-6	1	-6	1
1	50	1	-4	4	2	31	8	1	1	4	1	2	1	1
2	34	1	-7	6	15	375	44	1	-7	3	-5	4	-4	4
2	36	1	-5	5	30	871	120	1	-2	3	-2	2	-2	2
3	10	1	-5	4	4	97	10	2	-5	3	-3	3	-3	4
3	11	1	-3	6	4	192	14	2	-1	3	-2	2	-2	1
3	24	1	-3	3	14	345	33	1	-3	5	-3	4	-3	5
3	24	5	-3	2	1	43	4	1						
3	42	1	-6	6	28	664	27	1	-9	13	-8	10	-9	8
3	42	2	-7	5	4	116	24	2	-5	5	-5	4	-5	4
3	42	3	-8	9	3	55	4	2	-3	6	-6	6	-8	7
3	51	1	-10	7	17	299	25	2	-3	5	-3	4	-3	4
3	51	3	-8	7	4	81	15	2	-2	3	-5	7	-4	7
3	51	815	-11	9	1	17	2	2						
3	54	1	-6	8	4	105								
4	1	11	-7	9	10	147	39	1	-10	8	-3	3	-2	2
4	1	12	-10	4	5	84	17	2	-3	8	0	1	-3	3
4	1	14	-9	5	2	193	15	1	3	4	0	4	-2	4
4	12	1	-1	2	3	72								
4	12	2	-2	2	1	49								
4	12	3	-2	2	4	219								
4	12	4	-2	2	3	99								
4	12	5	-2	4	2	78								
4	12	6	-1	1	1	4								
4	12	11	-6	2	2	174								
4	12	12	-1	3	3	99								
4	12	13	-5	3	3	158								
4	12	14	-2	6	1	47								
4	12	15	-5	2	2	50	4	3	-5	4	-4	2	-3	2

Ozone 1996 P&A Data

Reg	State	RO	Lower Limit	Upper Limit	Number Analyzers	Precision Checks	Number Audits	Type Audit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
4	12	16	-12	15	2	76								
4	12	17	-5	1	3	112	6	3	-5	3	-4	2	-3	1
4	12	18	-2	2	3	150								
4	12	20	-3	3	2	118								
4	12	56	-3	2	2	77								
4	12	815	-10	5	1	51								
4	13	10	-5	5	8	154								
4	21	1	-11	8	26	377	58	1	-9	2	-7	4	-6	5
4	21	2	-6	9	3	43	10	2	-6	9	-2	5	-3	4
4	21	815	-14	6	1	25	5	3						
4	28	100	-11	20	10	275	37	1	-1	2	0	1	-1	2
4	28	107	-9	4	1	9								
4	37	1	-5	5	25	518	50	1	-3	8	-3	5	-4	4
4	37	2	-6	7	4	113	12	1	-1	2	-2	3	-1	3
4	37	3	-2	2	3	79	12	1	1	3	-1	2	-1	1
4	37	4	-7	8	3	50	6	2	-3	12	-5	9	-7	9
4	45	1	-9	10	19	404	286	2	-3	4	-3	3	-2	3
4	47	1	-9	7	12	290	33	1	-8	4	-3	3	-2	3
4	47	2	-4	2	2	55	6	3	-2	0	-1	1	-4	4
4	47	3	-4	6	2	45	0							
4	47	4	-3	2	2	61	10	3	0	5	-1	3	0	3
4	47	5	-1	2	2	62	10	3	-5	1	-2	1	-1	1
4	47	6	-5	12	2	69	12	3	-5	4	-5	5	-5	5
4	47	16												
4	47	815	-6	4	3	55	11	3	-4	1	-5	1	-5	0
5	17	1	-8	8	31	1367	0							
5	17	3	-5	4	10	345	0							
5	18	1	-8	6	18	224	37	1	-9	6	-6	4	-5	4
5	18	2	-4	7	2	26	6	3	-3	3	0	2	-1	3
5	18	5	-14	8	1	12	4	3						
5	18	8	-5	4	5	70	10	2	-2	0	-1	2	-1	2
5	26	1	-5	5	20	390	22	2	-7	4	-7	3	-7	3
5	26	2	-3	6	3	19	1	2						
5	26	87	-2	8	1	13	2	1						
5	27	1	-7	7	5	154	4	2	-2	8	0	5	-2	4

Ozone 1996 P&A Data

Reg	State	RO	Lower Limit	Upper Limit	Number Analyzers	Precision Checks	Number Audits	Type Audit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
5	27	815	-14	5	2	30								
5	39	1	-10	11	5	153	6	3	-8	13	-4	3	-5	2
5	39	2	-11	14	2	26	6	3	-2	4	-2	2	-2	-2
5	39	3	-10	5	1	45	2	3						
5	39	4	-4	5	1	14	3	3						
5	39	5	-6	7	1	21	3	3						
5	39	6	-3	5	3	93	9	3	-2	1	-2	1	-2	0
5	39	7	-5	4	4	71	12	3	-4	3	-4	-1	-4	-1
5	39	8	-8	6	7	202	18	3	-5	10	-5	6	-7	5
5	39	9	-6	5	3	63	8	3	-13	8	-14	4	-14	2
5	39	10	-7	5	5	81	2	3	-7	9	-9	10	-9	7
5	39	12	-4	3	2	28	6	3	-3	5	-1	2	-3	2
5	39	13	-7	5	2	56	3	3	-26	24	-22	16	-22	14
5	39	14	-6	4	1	35	4	3						
5	39	15	-3	3	4	67	4	1	-8	22	-5	14	-4	9
5	39	16	-3	3	3	41	9	3	-5	7	-4	4	-5	3
5	55	1	-6	4	28	377	29	2	-13	9	-10	7	-10	6
6	5	1	-2	8	5	130	20	2	1	5	0	5	0	4
6	22	1	-7	5	29	1122	80	1	-11	6	-7	3	-7	2
6	35	1	-5	8	11	249	20	1	-5	3	-3	1	-3	1
6	35	2	-10	1	6	136								
6	40	101	-4	6	5	119	8	1	-4	3	-3	2	-2	2
6	40	103	-6	8	3	137	8	3	-3	10	1	7	2	5
6	48	1	-7	5	32	2503	47	1	-10	16	-7	11	-8	8
6	48	2	-5	5	3	168	13	2	-1	3	-2	4	0	3
6	48	3	-14	10	1	12	4	2						
6	48	6	-6	4	6	146	8	1	-6	4	-8	3	-6	4
6	48	815	-8	3	1	44	1	2						
7	19	1	-13	16	2	57	8	2	-1	6	-6	6	0	5
7	19	2	-4	8	1	24								
7	19	3	-1	4	2	4	1	1						
7	20	1	-15	15	6	106	8	3	-5	14	-9	12	-8	10
7	29	1	-3	3	8	183								
7	29	2	-5	3	5	77								
7	29	3	-5	8	3	60								

Ozone 1996 P&A Data

Reg	State	RO	Lower Limit	Upper Limit	Number Analyzers	Precision Checks	Number Audits	Type Audit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
7	29	4	-4	3	3	87	6	3	-6	1	-4	4	-2	1
7	29	5	-2	2	2	31								
7	31	2	2	12	1	13	2	2						
7	31	3	-4	5	3	42	3	1	-4	6	-5	4	-5	5
8	8	1	-9	7	16	691	25	2	-15	7	-4	4	-3	4
8	8	815	-6	3	2	85	1	3						
8	30	815	1											
8	38	1	-5	6	5	101	5	1	-3	3	-5	5	-3	4
8	49	1	-7	16	10	218	13	1	-3	5	-2	3	-2	2
8	49	815	-8	8	1	46								
8	56	815	-11	7	2	33								
9	4	200	-2	7	8	259	7	2	0	3	-2	2	-1	1
9	4	300	-3	4	7	154	10	1	-6	3	-3	3	-2	3
9	4	815												
9	6	1	-10	7	61	1174	14	1	-6	5	-6	4	-9	5
9	6	4	-5	6	22	1135	51	2	-4	3	-4	3	-3	4
9	6	11	-7	5	2	52								
9	6	13	-3	3	1	12								
9	6	14	-9	5	5	142	4	1	-1	7	0	6	1	6
9	6	17	-5	6	5	213								
9	6	19	-9	10	7	289								
9	6	20	-9	13	1	10								
9	6	35	-10	2	4	80								
9	6	36	-6	6	9	229	9	1	-7	10	-7	6	-6	6
9	6	46	-7	7	5	178								
9	6	58	-2	2	2	82								
9	6	61	-10	14	33	646	35	1	-17	10	-11	3	-12	5
9	6	65	-4	3	2	53								
9	6	69	-4	4	12	548								
9	6	815	-8	4	8	302	1	3						
9	6	909	-8	2	1	25								
9	15	120	-8	12	1	41								
9	32	100	-3	1	1	48								
9	32	200	-4	13	4	107								
9	32	300	-6	4	4	194								

Ozone 1996 P&A Data

[illegible]

CO 1996 P&A Data

Reg	State	RO	Lower Limit	Upper Limit	Number Analyzers	Precision Checks	Number Audits	Audit Type	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
1	9	1	-3	5	5	195	8	2	-5	5	-7	3	-2	4
1	25	1	-6	8	9	226	18	1	0	15	-2	11	-2	10
1	33	1	-3	4	2	199	8	2	6	6	1	7	-4	6
1	44	1	-5	7	2	103	11	2	-1	1	-2	2	0	2
1	50	1	-3	6	2	52	8	2	-2	9	-2	8	-3	3
2	34	1	-4	6	14	453	29	1	-7	5	-4	9	-6	6
2	36	1	-3	4	15	484	63	1	-2	4	-2	2	-2	1
2	72	1	-11	5	3	129								
3	10	1	-5	5	2	73	6	2	-8	18	-6	10	-5	7
3	11	1	-4	6	3	130	10	2	-4	3	-2	-2	-3	-1
3	24	1	-3	2	5	208	5	1	-4	6	-5	7	-7	6
3	24	5	-2	2	1	18								
3	42	1	-6	7	16	414	16	1	-14	6	-9	3	-7	2
3	42	2	-9	3	3	66	4	1	-11	15	-11	7	-2	0
3	42	3	-8	7	5	215	9	1	-2	8	-2	7	-3	7
3	51	1	-5	6	8	236	8	2	-3	7	-3	4	-4	4
3	51	3	-4	4	4	84	11	2	-13	11	-4	5	-2	9
3	54	1	-1	11	1	46								
4	1	11	-10	4	1	14	4	1						
4	1	12	-3	4	4	82	7	2	-6	6	-3	5	-2	1
4	1	14	-5	5	1	48	9	1						
4	12	11	-2	7	5	358								
4	12	12	-5	6	4	128								
4	12	13	-6	6	4	205								
4	12	15	-7	13	2	49	3	3	1	2	-3	5	-3	6
4	12	16	-6	2	2	78								
4	12	17	-3	2	6	219	6	3	-9	5	-6	4	-6	5
4	12	18	-5	6	3	152								
4	12	20	-6	4	2	107								
4	13	10	-6	9	2	60								
4	21	1	-7	4	7	140	23	1	-11	7	-9	7	-7	3
4	21	2	-7	14	6	136	37	3	-4	8	-1	9	-1	6
4	28	100	-4	2	2	37	8	1	-9	4	-4	3	-1	5
4	28	107	-12	7	1	7								
4	37	1	-4	7	12	233	26	2	-11	10	-10	6	-8	5

CO 1996 P&A Data

Reg	State	RO	Lower Limit	Upper Limit	Number Analyzers	Precision Checks	Number Audits	Audit Type	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
4	37	2	-4	3	3	1073	12	2	-3	4	-3	2	-3	5
4	37	3	-4	4	5	190	20	2	-1	3	2	6	0	6
4	45	1	-10	10	2	50	34	2	-6	4	-7	6	-2	0
4	47	2	-3	3	5	186	17	3	-3	6	-3	0	-5	4
4	47	3	-5	3	3	67								
4	47	4	-5	3	1	44	8	3						
5	17	1	-5	7	9	435								
5	17	3	-5	4	5	234								
5	18	1	-3	6	6	141	24	1	-2	4	0	5	0	6
5	18	2	-1	6	1	24	8	3						
5	18	8	-4	4	1	28	4	2						
5	26	1	-7	9	3	108	7	2	-11	4	-15	13	-7	-3
5	26	2	-6	6	6	33								
5	27	1	-3	3	10	458	13	2	-1	10	-2	2	-5	0
5	39	1	-9	6	3	106	3	3	-7	-5	-4	-2	-4	0
5	39	6	-5	4	2	106	4	3	-10	16	-3	13	-5	12
5	39	7	-3	5	1	28	4	3						
5	39	8	-3	7	2	102	4	3	-5	4	0	3	-3	5
5	39	9	-15	17	4	143	4	3	-8	14	2	5	-6	13
5	39	10	-3	10	2	51	3	3	-9	12	-6	17	-3	8
5	39	12	-7	6	1	24	5	3						
5	39	14	-3	5	1	33	3	3						
5	39	15	-3	2	1	22	2	3						
5	55	1	-9	6	7	191	8	2	-13	14	-10	8	-9	9
6	5	1	-3	4	1	27	4	2						
6	22	1	-3	7	4	171	8	1	-8	8	-7	5	-11	4
6	35	1	-1	9	6	125	7	1	-7	7	0	3	-2	1
6	35	2	-6	9	6	147								
6	40	101	-5	10	4	63	4	2	-5	5	-4	1	-4	1
6	40	103	-12	15	2	98	4	3	-5	12	-11	23	-9	17
6	48	1	-7	6	14	1040	24	1	-13	14	-7	5	-11	3
6	48	2	-8	6	2	75	9	2	-2	4	-5	3	-1	1
6	48	3	-6	11	3	55	12	2	-8	12	-5	4	-6	0
6	48	6	-7	7	3	73	4	1	-7	-1	-5	7	-4	2
7	19	1	-10	12	3	106	8	2	-1	2	-2	1	-3	1

CO 1996 P&A Data

Reg	State	RO	Lower Limit	Upper Limit	Number Analyzers	Precision Checks	Number Audits	Audit Type	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
7	19	2	-4	4	2	34								
7	20	1	-13	13	6	115	9	3	-13	14	-12	8	-16	8
7	29	1	-2	6	2	37								
7	29	2	-3	6	5	128								
7	29	3	-4	5	2	58								
7	29	4	-3	3	3	81	4	3	1	4	-3	5	-5	-2
7	29	5	-3	5	1	25								
7	31	2	3	7	2	50	8	1	0	5	-1	0	-4	-3
7	31	3	-1	3	2	48	4	1	1	2	-3	3	-8	2
8	8	1	-4	4	15	763	23	2	-5	1	1	5	0	5
8	30	2	-7	5	2	104	8	3	-13	4	-7	3	-3	2
8	30	3	-2	4	1	50	4	3						
8	30	4	-9	6	1	51	4	3						
8	30	63	-4	7	2	56	5	3	-7	5	-2	3	-2	2
8	30	73	-9	4	1	60	4	3						
8	49	1	-2	3	12	374	25	1	-9	5	-2	3	0	6
9	4	100	-3	10	1	14	2	3						
9	4	200	-3	3	8	256	2	2	-16	10	0	2	0	0
9	4	300	-2	6	5	109	7	1	-3	2	-6	0	-9	1
9	6	1	-6	7	30	571								
9	6	4	-3	4	16	840	40	1	-3	5	-2	3	-3	4
9	6	14	-5	9	4	104								
9	6	17	-3	3	2	105								
9	6	19	-6	8	2	98								
9	6	36	-3	6	8	209	7	1	2	7	-1	6	-5	4
9	6	46	-6	8	1	57								
9	6	61	-7	20	22	435	27	1	-10	13	-12	11	-10	2
9	6	69	-7	2	5	260								
9	15	120	-8	8	4	149								
9	32	100	2	9	1	48								
9	32	200	-5	10	5	288								
9	32	300	-11	13	8	277								
10	2	20	-1	6	7	102	14	2	-25	56	-11	23	-3	7
10	16	1	-3	2	2	102	8	3	0	0	-2	-1	-2	-1
10	41	1	-2	7	12	278	46	2	-2	16	-2	9	-1	2

CO 1996 P&A Data

[illegible]

NO2 1996 P&A Data

Reg	State	RO	Lower Limit	Upper Limit	Number Anlayzers	Precision Checks	Number Audits	Audit Type	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
1	9	1	-12	10	5	66	8	2	-10	2	-7	-2	-9	0
1	23	1	-27	35	1	9	1	1						
1	23	908	-11	7	1	97	3	1						
1	25	1	-14	9	11	266	16	1	-16	4	-13	3	-12	5
1	33	1	-13	8	2	207	8	1	-9	6	-9	4	-6	0
1	44	1	-9	6	3	52	4	2						
1	50	1	-6	2	2	50	7	2	-2	4	-2	5	-2	4
2	34	1	-4	9	10	240	21	1	-9	8	-6	5	-6	5
2	36	1	-8	6	9	211	129	1	-6	2	-3	2	-3	2
3	10	1	-9	7	1	33	2	2						
3	11	1	-5	8	4	177	14	2	-6	2	-6	3	-4	1
3	24	1	-3	4	5	108	4	1	2	11	2	11	1	9
3	42	1	-12	10	19	494	19	1	-6	11	-8	10	-10	11
3	42	2	-9	6	2	60	6	2	-8	-1	-8	1	-8	1
3	42	3	-6	5	3	133	5	1	-7	9	-4	5	-3	6
3	51	1	-8	7	8	228	9	2	-15	16	-5	12	-1	10
3	51	3	-12	10	4	69	14	2	-2	3	-4	7	-5	6
3	54	1	-11	9	2	84								
4	1	11	-9	8	2	16	5	1	-16	4	-5	5	-3	4
4	12	1	-6	2	1	38								
4	12	11	1	9	1	81								
4	12	12	-4	3	1	29								
4	12	16	-13	3	1	26								
4	12	17	-5	7	2	63	5	3	-9	8	-8	5	-8	4
4	12	18	-16	11	2	95								
4	12	20	-12	11	1	52								
4	13	10	-8	4	5	114								
4	21	1	-17	12	9	233	35	1	-13	12	-10	10	-9	10
4	21	2	-20	17	2	46	15	2	-3	6	-8	7	-4	2
4	37	2	-14	13	1	35	4	2						
4	37	3	-6	5	1	40	5	2						
4	45	1	-11	10	5	100	72	2	-5	3	-3	5	-5	4
4	47	2	-6	4	1	37	4	3						
4	47	3	-7	7	1	14								
4	47	6					8	3	-22	8	-7	6	-1	6

NO2 1996 P&A Data

Reg	State	RO	Lower Limit	Upper Limit	Number Anlayzers	Precision Checks	Number Audits	Audit Type	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
5	17	1	-10	11	6	222								
5	17	3	-5	7	4	173								
5	18	1	-8	10	4	72	12	1	-7	12	-4	12	-4	10
5	18	2	-10	7	1	8	3	3						
5	18	44	-9	8	1	13								
5	26	1	-7	7	2	54	4	2	-9	-2	-11	-1	-10	-1
5	26	2	-6	8	2	7								
5	27	1	-13	14	6	148	1	2						
5	39	8	-7	9	2	85	4	3	-20	0	-12	1	-6	0
5	39	9	-11	10	2	68	4	3	-33	-6	-21	-8	-19	-4
5	39	14	-6	8	1	29	3	3						
5	39	68	-7	11	1	33	2	3						
5	55	1	-11	10	4	78	6	2	-5	5	-6	5	-6	5
6	5	1	-4	9	1	26	4	2						
6	22	1	-6	8	16	685	29	1	-14	8	-13	5	-11	4
6	35	1	-14	10	7	114	11	1	-14	4	-10	5	-7	6
6	35	2	-16	17	1	25								
6	40	101	-4	5	6	132	6	2	-11	22	-10	25	-1	13
6	40	103	-6	6	2	63	4	3	1	4	2	3	-5	14
6	48	1	-8	6	14	814	24	1	-14	22	-13	16	-14	15
6	48	2	-11	12	2	77	8	2	-7	1	-6	3	-3	2
6	48	6	-4	4	3	72	4	1	-4	13	-2	5	-3	3
7	20	1	-13	27	1	26	5	2						
7	29	1	-9	8	5	130								
7	29	2	-6	5	5	135								
7	29	3	-10	8	2	47								
7	29	4	-5	5	2	54	4	3	-13	3	-10	5	-8	4
7	29	5	-2	6	1	25								
8	8	1	-11	11	7	363	8	2	-25	17	-12	11	-2	7
8	30	26	-15	24	3	58								
8	30	37	-7	7	3	41	6	3	-5	0	-2	2	0	2
8	38	1	-2	2	4	103	4	1	-26	5	-8	-1	-6	0
8	38	22	-9	13	2	51	9	3	-15	30	-9	14	-7	7
8	49	1	-9	9	4	210	15	1	-4	4	-4	2	-5	2
9	4	200	-7	6	3	88								

NO2 1996 P&A Data

[illegible]

PM10 1996 P&A Data

Reg	State	RO	Lower Limit	Upper Limit	Collocated Sites	Below Valid Range	Number Samples	Valid Pairs	Number Audits	Audit Type	Lower Limit	Upper Limit
1	9	1	-14	15	3	97	181	84	22	1	-1	8
1	23	1	-11	8	4	114	189	75	44	1	-6	6
1	23	102			1	46	47	1	9	3	0	1
1	23	103	-7	-3	1	50	57	7	12	3	-1	0
1	23	104	-6	4	1	47	59	12	12	3	-2	3
1	23	106	-23	14	1	37	46	9	12	3		
1	23	109	5	16	1	53	58	5	16	1	0	6
1	23	110	-16	14	1	13	15	2	2	3		
1	25	1	-10	15	3	49	108	59	45	1	-3	8
1	33	1	0	11	2	21	26	5	42	1	-3	5
1	44	1	-13	8	2	35	101	66	27	2	1	5
1	50	1	-9	3	2	66	108	42	32	1	-5	0
2	34	1	-8	8	2	18	69	51	24	1	-12	-1
2	36	1	-10	8	5	95	172	77	78	1	-5	7
2	72	1	-5	11	2	3	74	71	70	1	-6	3
3	10	1	-9	14	1	12	55	43	3	2	-1	5
3	24	1	-7	4	2	38	113	75	69	1	-3	3
3	42	1	-17	4	2	36	88	52	16	1	-6	5
3	42	2	-4	6	2	30	113	83	49	2	-4	1
3	42	3	-8	18	1	13	54	41	8	2	-9	7
3	51	1	-12	10	3	82	137	55	34	2	-7	5
3	51	3	-5	4	2	55	101	46	7	1	-9	9
4	1	11	-14	24	2	43	104	61	0			
4	1	12	-7	9	1	25	58	33	14	2	-2	3
4	1	14	-7	5	1	28	51	23	6	2	-5	9
4	12	1	-4	5	1	39	60	21	7	2	-3	3
4	12	2	-3	6	2	22	50	28	8	2	-19	14
4	12	3	-9	2	1	48	59	11	5	3	-2	1
4	12	4	-5	2	1	23	45	22	4	3	-2	2
4	12	5	-4	4	1	38	49	11	6	2	-3	1
4	12	11	-2	7	1	26	52	26	11	2	-3	2
4	12	12	-3	5	1	19	55	36	9	3	-1	5
4	12	13	-9	4	1	24	55	31	11	2	-3	1
4	12	14	-18	26	1	34	54	20	5	2	-44	-19
4	12	15	-4	1	1	33	59	26	8	3	-1	0

PM10 1996 P&A Data

Reg	State	RO	Lower Limit	Upper Limit	Collocated Sites	Below Valid Range	Number Samples	Valid Pairs	Number Audits	Audit Type	Lower Limit	Upper Limit
4	12	16							2	3	-1	4
4	12	17	-6	5	2	100	113	13	11	2	-5	2
4	12	18	-21	10	1	17	61	44	52	2	-1	4
4	12	20	-8	4	2	34	87	53	7	2	-4	4
4	12	53	-4	5	1	19	55	36	10	2		
4	12	56	-5	6	1	33	45	12	3	3	-5	5
4	13	10	-16	10	1	2	41	39	8	1	-2	4
4	21	1	-17	13	10	221	458	237	112	1	-5	2
4	21	2	-11	24	2	44	122	78	28	3	-5	5
4	28	100	-11	10	1	22	60	38	3	1	-1	3
4	37	1	-11	8	4	72	163	91	123	1	-3	5
4	37	2	-5	9	1	25	52	27	10	2	-3	5
4	37	3	-6	5	2	0	42	42	18	1	-5	1
4	37	4	-8	14	2	54	108	54	7	2	-3	8
4	45	1	-6	9	2	22	54	32	141	1	-1	7
4	47	1	-8	8	3	67	168	101	58	1	-4	6
4	47	2	-6	7	1	8	24	16	11	3	-2	4
4	47	3	-5	8	1	15	59	44	28	3	-1	1
4	47	4							30	2	-3	-1
4	47	5	-3	7	1	12	48	36	15	3	-4	6
4	47	29	-33	13	1	19	44	25	0			
5	17	1	-6	9	3	43	118	75	61	1	-6	7
5	17	3	-14	5	1	13	58	45	60	2	-6	2
5	18	1	-9	8	4	134	203	69	109	1	-2	3
5	18	2	-15	20	1	25	56	31	18	1	0	1
5	18	3	-7	8	1	35	55	20	12	1	-1	1
5	18	5	-10	7	1	24	58	34	34	1	-2	1
5	18	8	-2	12	2	34	112	78	46	2	-2	4
5	18	9	-3	6	1	39	58	19	16	1	-2	1
5	18	35	-17	25	1	17	25	8	2	2	-14	7
5	18	44			1	14	15	1	2	1	2	4
5	26	1	-6	9	1	35	61	26	7	1	-10	7
5	26	2	-37	10	2	7	30	23	3	1	-2	7
5	27	1	-24	21	2	0	53	53	2	2	-14	20
5	39	1	-4	14	1	22	54	32	3	3		

PM10 1996 P&A Data

Reg	State	RO	Lower Limit	Upper Limit	Collocated Sites	Below Valid Range	Number Samples	Valid Pairs	Number Audits	Audit Type	Lower Limit	Upper Limit
5	39	2	-9	2	1	18	55	37	27	3	0	3
5	39	3										
5	39	4	-12	14	2	29	70	41	5	3	-1	3
5	39	6	-5	7	1	19	48	29	4	3		
5	39	7	-10	6	1	16	55	39	7	3	-9	3
5	39	8	-3	4	2	25	121	96	10	3	-4	5
5	39	9	-11	14	1	5	55	50	18	3	-3	8
5	39	10	-6	9	1	23	45	22	2	3		
5	39	12	-10	5	1	34	56	22	4	3		
5	39	13	-18	20	1	16	50	34	1	3		
5	39	14	-13	12	2	36	101	65	19	3	-4	2
5	39	15	-7	44	1	6	10	4	2	3		
5	39	16	-3	5	2	41	118	77	11	3	-1	6
5	39	51	-10	17	1	16	31	15	12	3	-16	10
5	39	68										
5	55	1	-4	9	2	60	113	53	12	2	-3	5
6	5	1	-12	6	1	23	59	36	3	1	-4	2
6	5	2	-9	8	1	20	60	40	19	1	-2	3
6	22	1	-14	13	2	53	115	62	29	1	-4	3
6	35	1	-11	11	2	74	115	41	4	1	-1	3
6	35	2	-12	11	3	6	89	83	9	2	-9	18
6	40	101	-8	12	2	27	71	44	11	1	-11	8
6	40	102	-9	4	1	18	40	22	3	1	-11	-6
6	40	103	-8	7	1	22	60	38	6	3	-9	9
6	48	1	-9	9	3	76	194	118	135	1	-3	2
6	48	2	-9	8	1	18	57	39	54	2	1	4
6	48	3	-11	5	1	9	60	51	36	2	0	2
6	48	4	-30	21	1	32	58	26	0			
6	48	5	-27	29	1	33	54	21	12	2	-1	3
6	48	6	-10	18	1	6	47	41	27	2	-4	1
7	19	1							5	1	1	7
7	19	2	-4	19	1	47	73	26	0			
7	19	3	-17	32	2	2	10	8	0			
7	19	4	-54	44	1	8	35	27	2	1		
7	20	1	-34	39	2	42	109	67	24	2	-18	16

PM10 1996 P&A Data

Reg	State	RO	Lower Limit	Upper Limit	Collocated Sites	Below Valid Range	Number Samples	Valid Pairs	Number Audits	Audit Type	Lower Limit	Upper Limit
7	29	1	-9	4	1	14	52	38	17	3	-3	2
7	29	2	-32	21	1	39	59	20	4	3	-8	5
7	29	3	-3	4	1	11	46	35	3	3	-6	6
7	29	4	-7	7	1	19	58	39	8	3	-6	7
7	29	5	-8	10	1	43	61	18	5	3	-5	5
7	29	11	-15	13	1	8	14	6	0			
7	29	12	-5	5	1	2	28	26	0			
7	31	1	-21	17	2	26	82	56	11	1	-11	11
7	31	2	-11	6	1	16	59	43	8	1	-6	-1
7	31	3	-10	24	1	5	51	46	5	1	-2	5
8	8	1	-8	5	4	104	236	132	365	2	-2	2
8	30	1	-5	10	2	17	60	43	30	1	-4	6
8	30	2							8	1	-1	5
8	30	5										
8	30	17							3	3	-1	4
8	30	18	-21	12	1	7	19	12	8	3	-4	7
8	30	20	-15	34	1	43	49	6	0			
8	30	26	-4	4	1	47	52	5	3	3	-2	0
8	30	27	-5	6	1	47	60	13	4	3	-4	1
8	30	29	-12	13	1	91	107	16	0			
8	30	31	-11	6	1	49	52	3	4	3	-2	2
8	30	32										
8	30	33	-8	15					10	3	-4	3
8	30	37	-4	14	2	54	69	15	13	3	-1	5
8	30	41							2	3	-4	0
8	30	43	-20	34	1	78	80	2	3	3	-3	-2
8	30	44							2	3	-12	6
8	30	45							3	3	-7	1
8	30	46	-3	4	1	47	75	28	4	3	-3	1
8	30	49	-6	7	3	240	264	24	13	3	-5	4
8	30	50							2	3	-3	5
8	30	52	-2	5	1	56	59	3	2	3		
8	30	63										
8	30	70	-49	32	1	22	38	16	5	3		
8	30	74	-12	0	1	23	27	4	1	3		

PM10 1996 P&A Data

Reg	State	RO	Lower Limit	Upper Limit	Collocated Sites	Below Valid Range	Number Samples	Valid Pairs	Number Audits	Audit Type	Lower Limit	Upper Limit
8	30	819							2	3	-13	9
8	38	1	-5	3	1	44	59	15	6	1	-1	4
8	46	1	-12	7	1	9	58	49	43	1	1	5
8	49	1	-10	7	2	23	110	87	353	1	-2	0
8	56	1	-16	23	14	446	610	164	75	2	-7	5
8	56	6	-15	7	1	41	59	18	2	2		
8	56	7	-8	2	2	43	60	17	7	2	-2	2
8	56	16	-3	5	1	48	55	7	5	2	-1	5
8	56	17	-5	15	1	44	58	14	3	3	-3	4
8	56	21	-8	3	1	34	42	8	3	2	-7	4
8	56	22	-5	11	1	46	56	10	2	3		
8	56	25	-51	39	1	26	44	18	3	3	-2	2
8	56	29	-52	41	1	42	55	13	4	3	-2	0
8	56	30	-20	28	1	37	59	22	1	3		
9	4	200	-4	9	2	8	75	67	345	2	0	3
9	4	300	-10	7	2	31	114	83	8	2	0	10
9	6	1	-11	11	10	123	467	344	0			
9	6	4	-2	29	2	61	110	49	34	2	-5	6
9	6	17	-4	9	1	34	61	27	0			
9	6	19	-2	13	1	16	55	39	0			
9	6	35	-7	-2	1	11	15	4	0			
9	6	35	-7	-2	1	11	15	4	0			
9	6	36							4	1	-3	4
9	6	46	-27	27	2	53	115	62	0			
9	6	61	-19	13	2	6	110	104	22	1	-6	5
9	6	65	-6	9	1	35	53	18	0			
9	6	909	-13	6	1	14	44	30	0			
9	15	120	-13	11	2	59	79	20	0			
9	32	100	-16	9	2	37	59	22	12	3	-2	4
9	32	200	-8	3	1	23	59	36	24	2	-2	2
9	32	300	-7	16	1	2	37	35	0			
10	2	20	-25	21	2	64	107	43	9	1	-6	8
10	2	26	-18	9	1	15	35	20	2	1		
10	2	27	-29	34	1	25	34	9	2	1	1	1
10	16	1	-7	12	7	146	364	218	197	3	-4	1

PM10 1996 P&A Data

[illegible]

SO2 1996 P&A Data

Reg	State	RO	Lower Limit	Upper Limit	Number Analyzers	Precision Checks	Number Audits	Audit Type	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
1	9	1	-3	4	12	657	14	1	-10	1	-10	-2	-10	-1
1	23	1	-7	4	3	101	5	2	-1	0	-5	9	-6	10
1	23	104	-8	7	2	108	8	3	-3	2	-5	2	-3	1
1	23	110	-5	4	1	6	1	3						
1	23	113	-3	2	3	78	6	3	3	5	-1	4	-2	3
1	25	1	-10	8	10	245	15	1	-13	18	-13	15	-13	13
1	33	1	-4	4	8	818	29	1	-5	5	-6	5	-7	5
1	33	4	-2	3	1	88	4	1						
1	33	902	-15	16	2	178	0							
1	44	1	-7	6	3	152	16	2	-8	-1	-5	-2	-3	-1
1	50	1	-5	4	2	52	8	2	2	5	3	6	0	7
2	34	1	-5	7	15	362	31	1	-3	12	-5	11	-8	9
2	36	1	-5	5	22	710	97	1	-5	4	-4	3	-4	3
2	72	1	-20	13	5	203	0							
2	78	2	-9	4	2	51	8	3	-1	2	0	1	0	0
3	10	1	-9	7	4	125	4	2	-9	4	-5	-1	-3	-2
3	11	1	-3	5	2	76	6	2	-3	9	-3	9	-1	5
3	24	1	-4	4	4	140	4	1	-7	-3	-7	-3	-6	-2
3	42	1	-10	9	29	754	29	1	-11	14	-8	11	-10	11
3	42	2	-9	7	10	252	36	2	-7	5	-6	5	-6	4
3	42	3	-7	6	8	342	8	1	-1	3	-4	4	-7	3
3	51	1	-4	4	6	173	8	2	-13	8	-4	2	-4	2
3	51	3	-9	6	4	80	16	2	-4	5	-2	2	-2	5
3	54	1	-5	8	9	401								
4	1	11	-6	11	2	23	8	1	-3	1	-6	1	-8	3
4	1	12	-3	3	1	24	4	2						
4	12	1	-5	2	2	65								
4	12	2	-5	2	4	203								
4	12	4	-6	8	2	54								
4	12	11	0	10	4	317								
4	12	12	-4	3	7	193								
4	12	13	-8	7	3	151								
4	12	15	-10	3	2	51	4	3	-13	14	-10	10	-10	12
4	12	16	-14	7	1	43								
4	12	17	-12	-1	1	30	4	3						

SO2 1996 P&A Data

Reg	State	RO	Lower Limit	Upper Limit	Number Analyzers	Precision Checks	Number Audits	Audit Type	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
4	12	18	-9	6	1	50								
4	12	20	-5	3	1	52								
4	13	10	-8	5	7	224								
4	21	1	-15	8	11	263	42	1	-15	-2	-9	0	-8	1
4	21	2	-16	13	3	71	23	2	-21	3	-15	6	-11	7
4	28	100	-11	15	3	134	12	1	-7	10	-5	12	-4	12
4	37	1	-7	7	14	339	22	1	-4	6	-5	8	-8	6
4	37	2	-12	8	1	37	4	2						
4	37	3	-7	3	1	38	6	2						
4	45	1	-12	13	5	122	77	2	-3	4	-3	4	-4	1
4	47	1	-7	11	7	228	23	1	-6	6	-4	7	-7	8
4	47	2	-6	5	2	71	6	3	-6	0	-7	4	-5	1
4	47	3	-3	7	1	24								
4	47	6	-7	1	1	42	38	3	-7	9	-4	11	-5	12
4	47	20	-10	6	2	11								
5	17	1	-6	6	21	979								
5	17	3	-4	5	8	390								
5	18	1	-8	7	4	99	16	1	-6	1	-4	1	-3	-2
5	18	2	-9	6	1	25	8	3						
5	18	5	-8	5	1	26	8	3						
5	18	8	-6	3	5	143	20	2	-6	0	-3	1	-3	2
5	18	32	-7	3	2	37	4	1	-6	-2	-3	-1	-4	0
5	18	33	-5	6	3	58								
5	18	35	-5	8	7	90								
5	18	36	-5	5	2	69	6	1	0	1	1	1	0	2
5	18	912	-8	10	3	57	6	2	-8	7	-5	3	-2	1
5	26	1	-8	8	4	139	7	2	-9	1	-8	3	-9	4
5	26	2	-5	7	10	46	0							
5	27	1	-7	6	9	305	7	2	-4	1	-3	2	-3	2
5	39	1	-11	8	2	102	4	3	-10	8	-8	3	-8	2
5	39	2	-4	12	3	74	4	3	-5	-1	-5	3	-8	7
5	39	3	-3	6	1	64	3	3						
5	39	4	-4	5	3	72	4	3	-8	4	-12	4	-12	5
5	39	6	-5	5	2	101	4	3	-6	-3	-5	-3	-3	-1
5	39	7	-8	3	1	27	4	3						

SO2 1996 P&A Data

Reg	State	RO	Lower Limit	Upper Limit	Number Analyzers	Precision Checks	Number Audits	Audit Type	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
5	39	8	-6	9	6	214	4	3	-2	5	-2	6	-2	5
5	39	9	-8	8	5	181	8	3	-8	1	-4	2	-2	4
5	39	10	-9	4	2	52	2	3	-7	5	-10	4	-9	4
5	39	12	-6	5	2	49	4	3	-5	-1	-4	-1	-2	-1
5	39	13	-5	7	3	144	3	3	-1	2	-10	17	-10	14
5	39	14	-6	10	4	170	6	3	-7	3	-5	12	-5	14
5	39	15	-14	14	2	53	2	3	-4	0	-7	-2	-13	1
5	39	16	-4	3	1	24	4	3						
5	39	68	-6	13	1	33	4	3						
5	55	1	-7	6	5	136	8	2	-4	10	-3	5	-5	5
6	5	1	-6	8	2	52	8	2	-4	-4	-2	2	0	4
6	22	1	-7	7	7	268	16	1	-15	0	-15	1	-15	0
6	35	1	-9	8	10	243	15	1	-11	1	-6	2	-5	3
6	40	101	-9	8	4	92	4	2	-12	5	-13	6	-14	8
6	40	103	-10	11	2	94	5	3	-20	3	-17	3	-15	1
6	48	1	-6	6	14	1125	23	1	-18	7	-18	10	-14	9
6	48	2	-9	0	1	38	8	2						
6	48	3	-12	5	1	16	4	2						
6	48	6	-13	-3	4	102	5	1	-14	-2	-6	1	-3	3
7	19	2	-2	6	4	96								
7	19	3	-12	5	9	18								
7	19	4	-7	11	2	4								
7	20	1	-15	12	6	116	10	2	-20	14	-19	6	-17	4
7	29	1	-6	6	9	241								
7	29	2	-4	4	5	134								
7	29	3	-6	6	4	74								
7	29	4	-6	4	3	79	3	3	1	11	1	6	1	4
7	29	5	-4	4	3	75								
7	31	3	-9	6	1	23	4	1						
8	8	1	-5	7	2	104	4	2	-9	3	-4	5	-2	1
8	30	1	-3	6	2	104	8	3	-10	4	-8	1	-4	4
8	30	5	-6	7	3	157	12	3	-11	6	-10	4	-7	6
8	30	13	-3	7	13	332	10	3	-6	7	-2	5	1	5
8	30	17	-7	5	1	20								
8	30	26	-6	6	3	70	3	3	-3	3	-4	0	-5	0

SO2 1996 P&A Data

Reg	State	RO	Lower Limit	Upper Limit	Number Analyzers	Precision Checks	Number Audits	Audit Type	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
8	30	37	-3	6	3	41	6	3	1	6	1	7	0	6
8	30	52	-9	3	1	26	1	3						
8	30	67	-7	5	2	53	8	3	-2	0	-4	0	-2	4
8	30	72	-3	4	1	51	2	3						
8	30	73	-7	9	2	103	8	3	-3	2	-4	1	1	2
8	38	1	-5	5	8	210	8	1	-5	2	-5	2	-6	1
8	38	12	-3	12	1	20	4	3						
8	38	15	-5	8	2	111	8	3	-9	-6	-6	-5	-6	-5
8	38	22	-12	7	4	104	17	3	-8	8	-6	9	-7	8
8	38	24	-4	3	1	27	4	3						
8	49	1	-4	5	5	267	20	1	-2	2	-3	2	-3	3
9	4	200	-2	4	1	34								
9	4	300	-7	1	1	26	1	1						
9	6	1	-10	6	10	198								
9	6	1	-10	6	10	198								
9	6	4	-3	2	10	472	22	1	-4	4	-6	4	-5	4
9	6	14	-6	6	5	137	4	1	-8	-1	-8	-1	-10	2
9	6	17	-5	4	3	160								
9	6	19	-10	9	1	49								
9	6	35	-10	11	2	40								
9	6	36	-10	3	3	76	4	1	-11	5	-11	4	-8	2
9	6	46	-11	7	4	141								
9	6	58	-2	2	1	53								
9	6	61	-2	15	7	142	10	1	-19	13	-15	13	-8	8
9	6	65	-9	-2	1	24								
9	6	909	-7	10	1	29								
9	15	120	-11	13	4	118								
9	15	815	-4	13	1	46								
10	16	1	-1	9	2	57	8	3	-1	2	-3	1	-6	-4
10	53	1	-6	4	7	347	15	1	-3	5	-3	5	-5	3
10	53	2	-5	7	1	53	2	1						
10	53	815	-12	2	1	10								
TOTALS:			-7.007	6.32847	600	20071	1070		-6.88	3.88	-6.053	3.9733	-5.76	3.8933

TECHNICAL REPORT DATA (PLEASE READ INSTRUCTIONS ON THE REVERSE BEFORE COMPLETING)		
1. REPORT NO. EPA-454R-97-007	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE THE AMBIENT AIR PRECISION AND ACCURACY PROGRAM – 1996 ANNUAL REPORT		5. REPORT DATE 3/1/98
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) DAVID MUSICK		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS MONITORING AND QUALITY ASSURANCE GROUP EMISSIONS, MONITORING, AND ANALYSIS DIVISION RESEARCH TRIANGLE PARK, NC 27711		10. PROGRAM ELEMENT NO.
		11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS		13. TYPE OF REPORT AND PERIOD COVERED
		14. SPONSORING AGENCY CODE
15. SUPPLEMENTARY NOTES		
16. ABSTRACT <p>MANY IMPORTANT EPA DECISIONS ARE BASED ON THE AMBIENT AIR QUALITY MONITORING DATA OBTAINED BY THE STATE AND LOCAL AGENCIES. THESE DATA ARE COLLECTED BY THE APPROXIMATELY 5,000 AMBIENT AIR SAMPLERS WHICH MAKE UP THE STATE AND LOCAL AIR MONITORING STATIONS (SLAMS) NETWORK. DATA COLLECTED AND REPORTED TO THE AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS) ARE USED BY THE EPA TO AID IN PLANNING THE NATION'S AIR POLLUTION CONTROL STRATEGY AND TO MEASURE ACHIEVEMENT TOWARD MEETING NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS). FURTHER, THE DATA IN AIRS ARE MADE AVAILABLE TO NUMEROUS REQUESTERS, WHO MAY USE THE DATA FOR VARIOUS RESEARCH PROJECTS, SPECIAL STUDIES, OR OTHER PURPOSES.</p> <p>NOT ALL DATA ARE ACCOMPANIED BY ESTIMATES OF ITS QUALITY. TO ASSURE THE MOST KNOWLEDGEABLE AND EFFECTIVE USE OF THE DATA, THE QUALITY OF THE NATIONAL MONITORING DATA SHOULD BE DETERMINED AND MADE KNOWN TO ALL DATA USERS. THE CODE OF FEDERAL REGULATIONS, PART 58, DIRECTED THAT PRECISION AND ACCURACY CHECKS BE INCORPORATED BY THE STATE AND LOCAL AGENCIES TO CONTROL AND EVALUATE THE QUALITY OF THE COLLECTED DATA.</p>		
17. KEY WORDS AND DOCUMENT ANALYSIS		
a. DESCRIPTORS QUALITY ASSURANCE PRECISION ACCURACY	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI FIELD/GROUP
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