PARTICULATE MATTER AMBIENT AIR QUALITY

DATA REPORT FOR 1989 AND 1990

WBS No. 1.2.5.4.2

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1.0 EXECUTIVE SUMMARY

Routine particulate matter ambient air quality monitoring has been performed at two stations in the Yucca Mountain air monitoring network since the spring of 1989. The monitoring was established to: (1) support possible air quality permit monitoring requirements, and (2) use in general environmental characterization of the Yucca Mountain area. The monitoring program is described in the "Scientific Investigation Implementation Package for Air Quality Monitoring" (SIIP, YMP document TMSS/EFPD-91-002), and is implemented through T&MSS Work Instruction procedures. This document is a report of monitoring results for the period 1989 and 1990.

The air quality monitoring work is included in Work Breakdown Structure 1.2.5.4.2; T&MSS Environmental Field Programs Division is the responsible organization. The Quality Assurance Grading Report for this activity shows the work to be classified as not quality affecting.

The field sampling is performed using high-volume samplers of two size ranges of suspended (airborne) particulate matter: total suspended particulate matter (TSP) and the inhalable portion of suspended particulate matter, also known as PM_{10} or PM-10. The sampling period is 24 hours; samples are taken every sixth-day following the National schedule.

The National and Nevada primary and secondary ambient air quality standards for particulate matter are based on PM_{10} sampling. Prior to 1987 the National Standards applied to TSP; the Nevada particulate matter standards were based on TSP until 1991. TSP sampling is being continued to determine the fraction of total suspended particulate matter that is in the inhalable size range (PM_{10}).

Monitoring results were not required to be reported to the State of Nevada until Nevada Permit No. 2693 was granted in mid-1991. One permit condition requires reporting PM_{10} results on a quarterly basis. Reports on the PM_{10} monitoring are being submitted quarterly by the Yucca Mountain Project Office to the State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality, beginning with data sampled in July 1991.

The monitoring results from 1989 and 1990 show that the area was in compliance with State of Nevada and Federal ambient air particulate matter

TABLE 1-1. Summary of Particulate Matter Monitoring Results from 1989 and 1990.

Data shown are 24-hour sampling results and annual arithmetic mean values, expressed in micrograms per standard cubic meter ($\mu g/m^3$).

National Ambient Air Quality Standards[1]

24-Hour: 150 Annual: 50

Sampler	1989[2]			1990		
	DR[3] (%)	24-hr ($\mu g/m^3$)	Annual ($\mu g/m^3$)	DR[3] (%)	24-hr ($\mu g/m^3$)	Annual ($\mu g/m^3$)
PM_{10}						
NTS-60 (Main) Site						
Primary	93.0%	42	12	98.4%	62	12
Collocated	55.8%	40	15	91.8%	56	11
40-Mile Wash Site	92.5%	40	12	26.2%	48	10
TSP						
NTS-60 (Main) Site						
Primary	93.0%	90	26	96.7%	150	24
Collocated	53.5%	89	26	47.5%	17	9
40-Mile Wash Site	85.0%	94	27	86.9%	106	22

NOTES:

Concentrations are shown in micrograms per standard cubic meter, $\mu g/m^3$.

(1) Standards, Title 40 Code of Federal Regulations Part 50.6, maximum allowable concentrations used with 40 CFR 50 Appendix K to determine expected number of occurrences of sampling results exceeding the standard. The State of Nevada adopted the National standard (NAC 445.843) in 1991. The 24-hour and annual standards are basically:

- the expected annual number of exceedances of 24-hour level must be less than or equal to one, and
- the annual arithmetic mean must be less than or equal to level shown.

(2) Sampling began on 4/22/89 at NTS-60 site, and 5/10/89 at 40-MW site.

(3) DR is data recovery rate, number of valid samples as percent of possible; a minimum of 80% is typically required for regulatory applications.

2.0 PARTICULATE MATTER AMBIENT AIR QUALITY MONITORING METHODS

This section is a brief discussion of the methods used for ambient air quality monitoring for particulate matter in the Yucca Mountain network. Detail is presented in the SIIP for Air Quality Monitoring, and the T&MSS Work Instructions WI-AQ-001, "Routine Operations and Maintenance for Ambient Particulate Sampling", and WI-AQ-002, "Calibrations and Performance Audits of Particulate Matter Samplers".

The monitoring program is designed to meet U.S. Environmental Protection Agency (EPA), and State of Nevada, regulations and guidelines applicable to PM_{10} monitoring. The TSP monitoring program follows previous similar EPA regulations, which are no longer in effect. Note: the nominal upper particle sizes sampled are approximately 50 micrometers for TSP, and an aerodynamic diameter of 10 micrometers for PM_{10}.

Particulate matter ambient air quality was monitored at two network site locations. The NTS-60 (Main) site is located in Midway Valley immediately east of the main Yucca Mountain Ridge. The 40-Mile Wash site is about half-way from Yucca Mountain to the Amargosa Valley area, in the valley floor that contains the Forty-Mile Wash. Both sites include PM_{10} and TSP monitoring.

2.1 Monitoring Requirements and Procedures

To meet EPA requirements, the PM_{10} equipment used must meet Reference Method designation requirements given in 40 CFR 53, Subpart D. Both types of samplers used in the network are manufactured by Wedding & Associates; the PM_{10} samplers are designated Reference Methods RFPS-1087-062.

Further EPA requirements for the monitoring methods are specified in 40 CFR 50, Appendices B (TSP), and J (PM_{10}). T&MSS procedures covering ambient air quality for particulate matter are given in Work Instructions WI-AQ-001, "Routine Operations and Maintenance for Ambient Particulate Matter Sampling", and WI-AQ-002, "Calibrations and Performance Audits of Particulate Matter Samplers." T&MSS data processing procedures are given in WI-AQ-001.

Gravimetric analyses are performed on the filters to determine the net mass of particulate matter collected on the filter. This result is used, with sampler airflow information, to determine average concentration of suspended particulate matter.

2.2 Quality Assurance

EPA quality assurance requirements for Prevention of Significant Deterioration Monitoring Programs are given in 40 CFR 58, Appendix B. These were adopted by the State of Nevada for the air quality permit monitoring that began in 1991.

The quality assurance items addressed are:

- perform "precision" assessments using collocated samplers,
- achieve 80 percent "completeness", or data recovery.

The "collocated" samplers used in precision assessments are at the NTS-60 site; only one site in a network is required to have collocated samplers. Collocated samplers are identical samplers mounted near the primary samplers, and are operated on the same schedule and with the same procedures as the primary samplers. Comparisons of the results from the sampler pair are used in the "precision assessment".

Data recovery rates were calculated as the number of valid samples reported compared to the number possible during the monitoring period. On a few occasions, the primary sample was lost and the collocated sample was taken. Data from the collocated sampler are reported with the primary sampler results to optimize data reporting capability. These results were not used in assessing precision.

3.0 RESULTS

Individual sampling results, and quarterly and annual summaries, are presented in this section. The highest 24-hour concentrations observed were well below the Standard used to determine an exceedance, therefore the number of exceedances in each calendar year is zero. Further, the annual average concentrations were well below the annual Standard.

3.1 Individual Sampling Results

Results of each sampling event are reported in Tables 3-1 through 3-7 in calendar quarter-year periods. Each table shows PM_{10} and TSP concentrations by sampler and by date; concentrations are reported in micrograms per standard cubic meter, in keeping with the units of the Standards. The samplers are identified by letter-number designations, which are explained in the footnotes of the tables. The tables also show the following summary statistics:

- Data recovery rates are provided in the "Reported" row of the tables.
- The quarterly average concentrations are reported in the "Average" row.
- The highest and second-highest sampling results for each period are presented in the "Highest" and "2nd-high" rows. The second-highest results are reported as an indication if the highest result is an extreme outlier. Also, previous particulate matter standards were based on the second-highest 24-hour average; some reviewers still request these data.

3.2 Summary Tables

The highest, 2nd-highest, average and data recovery rate statistics are provided for the calendar year annual periods in Tables 3-8 and 3-9 for the years 1989 and 1990, respectively. The concentrations shown indi very good air quality conditions, that is, the levels observed ar applicable standards.

The quarterly and annual data recovery rates for the primary samplers at the NTS-60 site exceeded the 80 percent minimum requi typically associated with regulatory monitoring requirements. Th reported for the 40-Mile Wash site exceed the minimum, with two e rate for TSP in the fourth quarter in 1990 was 75%, and PM_{10} was for nearly three-fourths of 1990.

3.3 Quality Assurance Results

Typical regulatory requirements include reporting results of of the completeness and precision of the data. Completeness was in the reporting of data recovery results. Precision is expresse and lower "probability intervals", which correspond to the 95 per intervals. The intervals are calculated by the following steps.

(1) The differences (d_i) between the primary (X) and collocated (Y) sampler results are calculated from:

$$d_i = (Y - X) / [(Y + X) / 2].$$

(2) The mean (D) and standard deviation (s) of the differences (d_i) are calculated for the quarterly and annual periods. These are used in the following to calculate the upper (UL) and lower (LL) probability interval values:

$$UL = D + 1.96 \cdot s / (\sqrt{2}), \text{ and}$$

$$LL = D - 1.96 \cdot s / (\sqrt{2}).$$

A summary of the precision assessment results is reported in Table 3-10. There are no guideline measures of acceptability of precision results; interpretation is left to the user of a given data set. These results are viewed as acceptable, particularly given the very low concentrations used to calculate the comparative differences. Differences between two small concentration numbers can appear large when expressed in percent. For example, the percent difference calculated using equation (1) above for a primary result of 4 $\mu g/m^3$ and a collocated result of 3 $\mu g/m^3$ is -29%.

Given the possibly misleading percent-difference results that can occur with the typically low concentrations observed, a second precision summary was calculated using only concentrations which were at least 5 $\mu g/m^3$. These results are also reported in Table 3-10. Note that these precision confidence interval results are significantly improved for the PM_{10}; TSP sampling results were frequently at least 5 $\mu g/m^3$, so the more restrictive summary did not change the TSP values as dramatically as the PM_{10} results.

Table 3-1. Second Quarter 1989

Results are shown in micrograms per standard-cubic meter

SAMPLE DATE	....PM-10 RESULTS... MS-1	MS-2	FM-3	.....TSP RESULTS.... MS-5	MS-6	FM-4
(MS sampling began 4/22; FM began 5/10)						
04/22/89	18	19	—	38	36	—
04/28/89	6	6	—	12	12	—
05/04/89	8	10	—	12	12	—
05/10/89	11	13	15	24	23	35
05/16/89	9	7	7	12	11	18
05/22/89	15	M	17	28	25	33
05/28/89	16	15	19	39	32	39
06/03/89	11	13	11	18	17	24
06/09/89	14	12	18	27	24	65
06/15/89	17	15	17	25	25	17
06/21/89	M	M	8	13	13	22
06/27/89	13	12	15	26	27	40
Reported	91.7%	83.3%	100.0%	100.0%	100.0%	100.0%
Average	13	12	14	23	21	33
Highest	18	19	19	39	36	65
2nd-High	17	15	18	38	32	40

Sampler Identifications:

MS-1: Primary PM-10 sampler at NTS-60 (Main) Site
MS-2: Collocated PM-10 sampler at NTS-60 (Main) Site
FM-3: PM-10 sampler at 40-Mile Wash Site

MS-5: Primary TSP sampler at NTS-60 (Main) Site
MS-6: Collocated TSP sampler at NTS-60 (Main) Site
FM-4: TSP sampler at 40-Mile Wash Site

"M" signifies missing data; sample was missed or invalidated
"NA" signifies summary is not available due to missing data

Table 3-2. Third Quarter 1989

Results are shown in micrograms per standard-cubic meter

SAMPLE DATE	....PM-10 RESULTS... MS-1	MS-2	FM-3	.....TSP RESULTS.... MS-5	MS-6	FM-4
07/03/89	10	9	M	15	7	19
07/09/89	42	40	40	90	89	94
07/15/89	18	M	19	M	M	36
07/21/89#	27	28	27	55	55	53
07/27/89	28	28	27	51	50	55
08/02/89	14	M	15	M	M	M
08/08/89	24	24	23	44	M	61
08/14/89	13	M		23	21	24
08/20/89	17	M	14	35	27	28
08/26/89	22	22	14	31	35	24
09/01/89*	13	13	M	24	M	M
09/07/89	17	17	17	42	M	42
09/13/89	9	10	10	17	13	21
09/19/89*	8	8	8	17	13	M
09/25/89	9	9	9	20	15	21
Reported	100.0%	73.3%	80.0%	86.7%	66.7%	80.0%
Average	18	19	19	36	33	40
Highest	42	40	40	90	89	94
2nd-High	28	28	27	55	55	61

Sampler Identifications:

MS-1: Primary PM-10 sampler at NTS-60 (Main) Site
MS-2: Collocated PM-10 sampler at NTS-60 (Main) Site
FM-3: PM-10 sampler at 40-Mile Wash Site

MS-5: Primary TSP sampler at NTS-60 (Main) Site
MS-6: Collocated TSP sampler at NTS-60 (Main) Site
FM-4: TSP sampler at 40-Mile Wash Site

"M" signifies missing data; sample was missed or invalidated
"NA" signifies summary is not available due to missing data

*: Primary PM-10 was missing; used collocated result
#: Primary TSP was missing; used collocated result

Table 3-3. Fourth Quarter 1989

Results are shown in micrograms per standard-cubic meter

SAMPLE DATE	....PM-10 RESULTS... MS-1	MS-2	FM-3	.....TSP RESULTS.... MS-5	MS-6	FM-4
10/01/89	M	M	8	23	M	M
10/07/89	7	7	6	12	9	15
10/13/89	13	11	11	M	M	23
10/19/89	7	8	7	89	M	M
10/25/89	4	M	5	19	M	M
10/31/89	M	M	3	26	M	M
11/06/89	8	M	10	24	M	M
11/12/89	7	M	8	15	M	M
11/18/89	3	M	5	10	M	M
11/24/89	17	M	14	29	M	M
11/30/89	2	M	3	8	M	M
12/06/89	3	M	4	9	M	M
12/12/89	5	M	4	9	M	M
12/18/89	4	M	5	12	M	M
12/24/89	2	M	2	4	M	M
12/30/89	2	M	2	8	M	M
Reported	87.5%	18.8%	100.0%	93.8%	6.3%	81
Average	6	9	6	20	9	
Highest	17	11	14	89	9	
2nd-High	13	8	11	29	NA	

Sampler Identifications:

MS-1: Primary PM-10 sampler at NTS-60 (Main) Site
MS-2: Collocated PM-10 sampler at NTS-60 (Main) Site
FM-3: PM-10 sampler at 40-Mile Wash Site

MS-5: Primary TSP sampler at NTS-60 (Main) Site
MS-6: Collocated TSP sampler at NTS-60 (Main) Site
FM-4: TSP sampler at 40-Mile Wash Site

"M" signifies missing data; sample was missed or invalidat
"NA" signifies summary is not available due to missing dat

Table 3-4. First Quarter 1990

Results are shown in micrograms per standard-cubic meter

SAMPLE DATE	....PM-10 RESULTS... MS-1	MS-2	FM-3	.....TSP RESULTS.... MS-5	MS-6	FM-4
01/05/90	2	M	2	4	M	4
01/11/90	4	4	4	7	7	6
01/17/90	3	3	M	4	3	4
01/23/90	3	3	3	6	5	M
01/29/90	4	4	M	9	9	9
02/04/90	5	5	M	10	10	13
02/10/90	2	4	M	4	4	7
02/16/90	33	M	M	M	M	M
02/22/90	0	1	M	2	1	6
02/28/90#	6	1	M	12	12	12
03/06/90	2	2	M	5	4	14
03/12/90	1	1	M	9	9	14
03/18/90	4	4	M	6	5	8
03/24/90	6	6	M	9	8	13
03/30/90	6	6	M	12	11	25
Reported	100.0%	86.7%	20.0%	93.3%	86.7%	86.7%
Average	5	3	3	7	7	10
Highest	33	6	4	12	12	25
2nd-High	6	6	3	12	11	14

Sampler Identifications:

MS-1: Primary PM-10 sampler at NTS-60 (Main) Site
MS-2: Collocated PM-10 sampler at NTS-60 (Main) Site
FM-3: PM-10 sampler at 40-Mile Wash Site

MS-5: Primary TSP sampler at NTS-60 (Main) Site
MS-6: Collocated TSP sampler at NTS-60 (Main) Site
FM-4: TSP sampler at 40-Mile Wash Site

"M" signifies missing data; sample was missed or invalidated
"NA" signifies summary is not available due to missing data

#: Primary TSP was missing; used collocated result

Table 3-5. Second Quarter 1990

Results are shown in micrograms per standard-cubic meter

SAMPLE DATE	....PM-10 RESULTS... MS-1	MS-2	FM-3	.....TSP RESULTS.... MS-5	MS-6	FM-4
04/05/90	7	8	M	13	14	14
04/11/90	7	7	M	8	8	11
04/17/90	4	5	M	8	10	15
04/23/90	24	25	M	57	M	26
04/29/90	8	7	M	17	M	58
05/05/90	10	8	M	10	M	14
05/11/90	24	24	M	41	M	83
05/17/90	22	22	M	45	M	46
05/23/90	30	29	M	66	M	106
05/29/90	5	5	M	7	M	12
06/04/90	11	11	M	18	M	18
06/10/90	6	6	M	21	M	21
06/16/90	8	8	M	30	M	24
06/22/90	12	13	M	47	M	22
06/28/90	9	9	M	37	M	17
Reported	100.0%	100.0%	0.0%	100.0%	20.0%	100.0%
Average	12	12	NA	28	11	32
Highest	30	29	NA	66	14	106
2nd-High	24	24	NA	57	10	83

Sampler Identifications:

MS-1: Primary PM-10 sampler at NTS-60 (Main) Site
MS-2: Collocated PM-10 sampler at NTS-60 (Main) Site
FM-3: PM-10 sampler at 40-Mile Wash Site

MS-5: Primary TSP sampler at NTS-60 (Main) Site
MS-6: Collocated TSP sampler at NTS-60 (Main) Site
FM-4: TSP sampler at 40-Mile Wash Site

"M" signifies missing data; sample was missed or invalidated
"NA" signifies summary is not available due to missing data

Table 3-6. Third Quarter 1990

Results are shown in micrograms per standard-cubic meter

SAMPLE DATE	....PM-10 RESULTS... MS-1	MS-2	FM-3	.....TSP RESULTS.... MS-5	MS-6	FM-4
07/04/90	14	14	M	24	M	28
07/10/90	12	12	M	21	M	25
07/16/90	8	7	M	19	M	23
07/22/90	37	20	M	30	M	29
07/28/90	13	14	M	28	M	24
08/03/90	41	40	M	80	M	82
08/09/90	16	16	M	M	M	37
08/15/90*	36	36	M	75	M	M
08/21/90	15	M	M	26	M	25
08/27/90	16	11	M	23	M	M
09/02/90*	14	14	M	33	M	33
09/08/90	14	15	M	23	M	37
09/14/90	11	11	M	21	M	19
09/20/90	9	9	M	18	M	17
09/28/90	12	12	M	20	M	M
Reported	100.0%	93.3%	0.0%	93.3%	0.0%	80.0%
Average	18	17	NA	32	NA	32
Highest	41	40	NA	80	NA	82
2nd-High	37	36	NA	75	NA	37

Sampler Identifications:

MS-1: Primary PM-10 sampler at NTS-60 (Main) Site
MS-2: Collocated PM-10 sampler at NTS-60 (Main) Site
FM-3: PM-10 sampler at 40-Mile Wash Site

MS-5: Primary TSP sampler at NTS-60 (Main) Site
MS-6: Collocated TSP sampler at NTS-60 (Main) Site
FM-4: TSP sampler at 40-Mile Wash Site

"M" signifies missing data; sample was missed or invalidated
"NA" signifies summary is not available due to missing data

*: Primary PM-10 was missing; used collocated result

Table 3-7. Fourth Quarter 1990

Results are shown in micrograms per standard-cubic meter

SAMPLE DATE	....PM-10 RESULTS... MS-1	MS-2	FM-3	.....TSP RESULTS.... MS-5	MS-6	FM-4
10/02/90	M	M	M	19	M	26
10/08/90	9	8	7	14	13	18
10/14/90	9	8	8	13	11	12
10/20/90	4	4	4	8	6	9
10/26/90*	6	6	7	12	10	11
11/01/90	6	M	M	18	17	21
11/07/90	2	2	5	9	8	12
11/13/90	8	6	5	9	7	8
11/19/90	11	10	11	19	17	18
11/25/90	62	56	48	150	M	M
12/01/90	4	3	M	11	14	M
12/07/90	4	5	4	13	13	7
12/13/90*	10	10	9	17	15	16
12/19/90	49	48	43	146	M	M
12/25/90	0	0	1	6	5	6
12/31/90	1	1	2	7	6	10
Reported	87.5%	81.3%	75.0%	93.8%	75.0%	75.0%
Average	13	13	13	31	11	14
Highest	62	56	48	150	17	26
2nd-High	49	48	43	146	17	21

Sampler Identifications:

MS-1: Primary PM-10 sampler at NTS-60 (Main) Site
MS-2: Collocated PM-10 sampler at NTS-60 (Main) Site
FM-3: PM-10 sampler at 40-Mile Wash Site

MS-5: Primary TSP sampler at NTS-60 (Main) Site
MS-6: Collocated TSP sampler at NTS-60 (Main) Site
FM-4: TSP sampler at 40-Mile Wash Site

"M" signifies missing data; sample was missed or invalidated
"NA" signifies summary is not available due to missing data

*: Primary PM-10 was missing; used collocated result

Table 3-8. Annual Summary 1989

Results are shown in micrograms per standard-cubic meter

	....PM-10 RESULTS...			.....TSP RESULTS....		
	MS-1	MS-2	FM-3	MS-5	MS-6	FM-4
Monitoring began 4/22 at NTS-60 and 5/10 at 40-Mile						
APR - JUN						
High	18	19	19	39	36	65
2nd-high	17	15	18	38	32	40
Average	13	12	14	23	21	33
Reported	91.7%	83.3%	100.0%	100.0%	100.0%	100.0%
JUL-SEP						
High	42	40	40	90	89	94
2nd-high	28	28	27	55	55	61
Average	18	19	19	36	33	40
Reported	100.0%	73.3%	80.0%	86.7%	66.7%	80.0%
OCT-DEC						
High	17	11	14	89	9	23
2nd-high	13	8	11	29	NA	17
Average	6	9	6	20	9	12
Reported	87.5%	18.8%	100.0%	93.8%	6.3%	81.3%
ANNUAL						
High	42	40	40	90	89	94
2nd-high	28	28	27	89	55	65
Average	12	15	12	26	26	27
Reported	93.0%	55.8%	92.5%	93.0%	53.5%	85.0%
ANNUAL STANDARDS						
High	150	150	150	No longer applicable		
Average	50	50	50	to TSP sampling		

Sampler Identifications:

MS-1: Primary PM-10 sampler at NTS-60 (Main) Site
MS-2: Collocated PM-10 sampler at NTS-60 (Main) Site
FM-3: PM-10 sampler at 40-Mile Wash Site

MS-5: Primary TSP sampler at NTS-60 (Main) Site
MS-6: Collocated TSP sampler at NTS-60 (Main) Site
FM-4: TSP sampler at 40-Mile Wash Site

"NA" signifies summary is not available due to missing data

Table 3-9. Annual Summary 1990

Results are shown in micrograms per standard-cubic meter

	....PM-10 RESULTS...			.....TSP RESULTS....		
	MS-1	MS-2	FM-3	MS-5	MS-6	FM-4
JAN-MAR						
High	33	6	4	12	12	25
2nd-high	6	6	3	12	11	14
Average	5	3	3	7	7	10
Reported	100.0%	86.7%	20.0%	93.3%	86.7%	86.7%
APR-JUN						
High	30	29	NA	66	14	106
2nd-high	24	24	NA	57	10	83
Average	12	12	NA	28	11	32
Reported	100.0%	100.0%	0.0%	100.0%	20.0%	100.0%
JUL-SEP						
High	41	40	NA	80	NA	82
2nd-high	37	36	NA	75	NA	37
Average	18	17	NA	32	NA	32
Reported	100.0%	93.3%	0.0%	93.3%	0.0%	80.0%
OCT-DEC						
High	62	56	48	150	17	26
2nd-high	49	48	43	146	17	21
Average	13	13	13	31	11	14
Reported	88%	81%	75%	94%	75%	75%
ANNUAL						
High	62	56	48	150	17	106
2nd-high	49	48	43	146	17	82
Average	12	11	10	24	9	22
Reported	98.4%	91.8%	26.2%	96.7%	47.5%	86.9%
ANNUAL STANDARDS						
High	150	150	150	No longer applicable		
Average	50	50	50	to TSP sampling		

Sampler Identifications:

M-10 sampler at NTS-60 (Main) Site
d PM-10 sampler at NTS-60 (Main) Site
pler at 40-Mile Wash Site

SP sampler at NTS-60 (Main) Site
d TSP sampler at NTS-60 (Main) Site
er at 40-Mile Wash Site

summary is not available due to missing data

MS-1: Primary P
MS-2: Collocate
FM-3: PM-10 sam

MS-5: Primary T
MS-6: Collocate
FM-4: TSP sampl

"NA" signifies

Table 3-10. Summary of Precision Assessment Results

	PM_{10}		TSP	
Reporting Period	UL	LL	UL	LL
Apr - Jun 1989	+21.0%	-22.3%	+ 4.0%	-14.5%
Jul - Sep 1989	+ 6.9%	- 7.2%	+15.2%	-51.3%
Oct - Dec 1989	+19.7%	-21.9%	unavailable	
Annual 1989	+15.1%	-16.0%	+12.6%	-36.3%
Jan - Mar 1990	+110.5%	-91.4%	+ 3.1%	-10.3%
Apr - Jun 1990	+14.6%	-13.4%	+ 6.4%	- 1.5%
Jul - Sep 1990	+19.6%	-35.9%	unavailable	
Oct - Dec 1990	+12.3%	-25.7%	+ 1.7%	- 7.3%
Annual 1990	+51.9%	-53.7%	+ 3.3%	- 8.5%
Calculations made using only concentrations at or above 5 $\mu g/m^3$:				
Jan - Mar 1990	0.0%	0.0%	+ 3.9%	-10.8%
Apr - Jun 1990	+10.7%	-12.7%	+ 6.4%	- 1.5%
Jul - Sep 1990	+10.7%	-12.7%	unavailable	
Oct - Dec 1990	+ 2.3%	-23.4%	+ 1.7%	- 7.3%
Annual 1990	+13.7%	-24.0%	+ 3.6%	- 8.4%

Note: "unavailable" indicates less than 2 sampling pairs reported.