United States
Environmental Protection
Agency

Office of Air Quality
Planning and Standards
Research Triangle Park NC 27711

EPA-450/4-89-003
DECEMBER 1988

Air

EPA

1988 NONMETHANE ORGANIC COMPOUND MONITORING PROGRAM

FINAL REPORT

Volume I: Nonmethane Organic Compounds

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DECEMBER 1988

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EPA-450/4-89-003

TABLE OF CONTENTS

Section		Page
	VOLUME I: NONMETHANE ORGANIC COMPOUND AND THREE-HOUR AIR TOXICS MONITORING PROGRAM	
	LIST OF FIGURES	viii
	LIST OF TABLES	xii
	SYMBOLS AND ABBREVIATIONS	xv
1.0	SUMMARY AND CONCLUSIONS	1-1
1.1	NMOC MONITORING PROGRAM	1-2
1.1.1	Introduction and Data Summary	1-2
1.1.2	Calibration and Drift	1-2
1.1.3	Precision	1-6
1.1.4	Accuracy	1-6
1.1.5	Other Quality Assurance Measurements	1-12
1.2	THREE-HOUR AIR TOXICS MONITORING PROGRAM	1-18
1.2.1	Overall Data Summary	1-18
1.2.2	Site Results	1-20
1.2.3	Gas Chromatography/Mass Spectrometry Confirmation Results	1-20
1.2.4	Precision	1-20
1.2.5	External Audit	1-21
2.0	NMOC DATA SUMMARY	2-1
3.0	NMOC TECHNICAL NOTES	3-1
3.1	NMOC FIELD SAMPLING EQUIPMENT	3-1
3.1.1	Installation	3-1
3.1.2	Operation	3-3
3.1.3	Troubleshooting Instructions	3-4
3.1.4	Sampler Performance for 1988	3-6
3.1.5	Field Documentation	3-7
3.2	NMOC ANALYSIS	3-7
3.2.1	Instrumentation	3-7
3.2.2	Hewlett-Packard Model 5880 Gas Chromatograph Operating Conditions	3-9
3.2.3	NMOC Analytical Technique	3-9

TABLE OF CONTENTS (Continued)

Section		Page
3.3	CANISTER CLEANUP SYSTEM	3-10
3.3.1	Canister Cleanup Equipment	3-10
3.3.2	Canister Clanup Procedures	3-14
4.0	NMOC QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES	4-1
4.1	INTRODUCTION AND CONCLUSIONS	4-1
4.2	CALIBRATION AND INSTRUMENT PERFORMANCE	4-2
4.2.1	Performance Assessment	4-2
4.2.2	Calibration Zero, Span, and Drift	4-2
4.2.3	Calibration Drift	4-8
4.3	IN-HOUSE QC SAMPLES	4-22
4.4	REPEATED ANALYSES	4-23
4.4.1	Site Sample Results	4-33
4.4.2	Quality Control Chart	4-42
4.4.3	Precision Profile	4-51
4.4.4	Local Ambient Samples	4-55
4.5	DUPLICATE SAMPLE RESULTS	4-71
4.5.1	Sampling and Analysis Precision	4-76
4.5.2	Quality Control Chart	4-79
4.5.3	Precision Profile	4-83
4.6	CANISTER PRESSURE RESULTS	4-83
4.7	CANISTER CLEANUP RESULTS	4-88
4.8	EXTERNAL AUDIT RESULTS	4-91
4.9	DATA VALIDATION	4-91
4.10	NMOC MONITORING PROGRAM	4-100
4.10.1	Archives	4-100
4.10.2	Magnetic Disks	4-101
5.0	NMOC DATA ANALYSIS AND CHARACTERIZATION	5-1
5.1	OVERALL CHARACTERIZATION	5-1
5.2	MONTHLY VARIATIONS, 1984 - 1988	5-7

TABLE OF CONTENTS (Continued)

Section		Page
6.0	RECOMMENDATIONS	6-1
6.1	OPERATING PROCEDURE CHANGES	6-1
6.2	VERTICAL STRATIFICATION STUDY	6-1
6.3	SEASONAL NMOC STUDIES	6-1
6.4	DIURNAL STUDIES	6-2
6.5	CANISTER CLEANUP STUDIES	6-2
6.6	COORDINATED SAMPLING AT NMOC SITES	6-4
6.7	FIELD AUDIT	6-4
6.8	DUPLICATE SAMPLE AND REPLICATE ANALYSES	6-4
7.0	THREE-HOUR AIR TOXICS DATA SUMMARY	7-1
7.1	OVERALL RESULTS	7-3
7.2	SITE RESULTS	7-3
8.0	THREE-HOUR AIR TOXICS TECHNICAL NOTES	8-1
8.1	SAMPLING EQUIPMENT AND INTERFACE	8-1
8.2	SAMPLER CERTIFICATION	8-1
8.3	STANDARDS GENERATION	8-3
8.4	CALIBRATION ZERO AND SPAN	8-5
8.5	GAS CHROMATOGRAPH/MULTIDETECTOR ANALYSIS AND COMPOUND IDENTIFICATION	8-6
8.6	GAS CHROMATOGRAPH/MASS SPECTROMETER ANALYSIS AND COMPOUND IDENTIFICATION CONFIRMATION	8-6

TABLE OF CONTENTS (Continued)

Section		Page
8.7	QA/QC DATA	8-8
8.7.1	GC/MD and GC/MS Minimum Detection Limits	8-8
8.7.2	Repeated Analyses	8-8
8.7.3	Duplicate Sample Results	8-12
8.7.4	GC/MS Confirmation Results	8-18
8.7.5	External Audits	8-20
8.8	DATA RECORDS	8-20
9.0	RECOMMENDATIONS, THREE-HOUR AIR TOXICS PROGRAM	9-1
9.1	COMPOUND STABILITY STUDIES	9-2
9.2	CANISTER CLEANUP STUDIES	9-2
9.3	SAMPLER CERTIFICATION STUDIES	9-3
9.4	QUALITATIVE GC/MS FULL SCAN FOR COMPOUND IDENTIFICATION	9-3
9.5	REPLICATE AND DUPLICATE ANALYSES	9-3
10.0	REFERENCES	10-1

TABLE OF CONTENTS (Continued)

APPENDICES

APPENDIX A: CRYOGENIC PRECONCENTRATION AND DIRECT FLAME IONIZATION DETECTION (PDFID) METHOD

APPENDIX B: STANDARD OPERATING PROCEDURE FOR PDFID SAMPLE ANALYSIS

APPENDIX C: PDFID INTEGRATOR PROGRAMMING INSTRUCTIONS

APPENDIX D: SAMPLING SITES FOR 1988 NMOC MONITORING PROGRAM

APPENDIX E: 1988 NMOC MONITORING PROGRAM SITE DATA

APPENDIX F: 1988 NMOC MONITORING PROGRAM INVALIDATED AND MISSING SAMPLES

APPENDIX G: 1988 NMOC DAILY CALIBRATION DATA

APPENDIX H: 1988 NMOC IN-HOUSE QUALITY CONTROL SAMPLES

APPENDIX I: MULTIPLE DETECTOR SPECIATED THREE-HOUR SITE DATA SUMMARIES

LIST OF FIGURES

Number		Page
	VOLUME I: NONMENTHANE ORGANIC COMPOUND AND THREE-HOUR AIR TOXICS MONITORING PROGRAM	
1-1	In-house quality control, linear regression for Channel A	1-7
1-2	In-House quality control, linear regression for Channel B	1-8
1-3	In-house quality control, linear regression for Channel C	1-9
1-4	In-House quality control, linear regression for Channel D	1-10
1-5	Orthogonal regression comparing QAD with Radian NMOC analyses	1-15
1-6	Orthogonal regression comparing QAD with ASRL NMOC analyses	1-16
3-1	Sampling system for collecting 3-hour integrated ambient air samples	3-2
3-2	NMOC sampling field data form	3-5
3-3	NMOC invalid sample form	3-8
3-4	NMOC analytical equipment	3-11
3-5	Canister cleanup apparatus	3-12
4-1	NMOC performance results, Channel A	4-4
4-2	NMOC performance results, Channel B	4-5
4-3	NMOC performance results, Channel C	4-6
4-4	NMOC performance results, Channel D	4-7
4-5	Daily calibration zero, Channel A	4-9
4-6	Daily calibration zero, Channel B	4-10

LIST OF FIGURES (Continued)

Number		Page
4-7	Daily calibration zero, Channel C.....	4-11
4-8	Daily calibration zero, Channel D.....	4-12
4-9	Daily calibration span, Channel A.....	4-13
4-10	Daily calibration span, Channel B.....	4-14
4-11	Daily calibration span, Channel C.....	4-15
4-12	Daily calibration span, Channel D.....	4-16
4-13	Daily calibration percent drift, Channel A.....	4-17
4-14	Daily calibration percent drift, Channel B.....	4-18
4-15	Daily calibration percent drift, Channel C.....	4-19
4-16	Daily calibration percent drift, Channel D.....	4-20
4-17	In-house quality control results, Channel A.....	4-24
4-18	In-house quality control results, Channel B.....	4-25
4-19	In-house quality control results, Channel C.....	4-26
4-20	In-house quality control results, Channel D.....	4-27
4-21	Stem-and-leaf plot of in-house quality control differences.....	4-31
4-22	Orthogonal regression comparing QAD with Radian NMOC analyses.....	4-34
4-23	Orthogonal regression comparing ASRL with Radian NMOC analyses.....	4-35
4-24	Orthogonal regression comparing QAD with ASRL NMOC analyses.....	4-36
4-25	95% Confidence intervals for mean NMOC difference.....	4-49

LIST OF FIGURES (Continued)

Number		Page
4-26	Quality control chart of percent difference for replicate NMOC analysis	4-50
4-27	Replicate NMOC analysis results comparing average concentration with percent difference	4-52
4-28	Replicate NMOC analysis results comparing average concentration with average percent difference	4-54
4-29	Replicate NMOC analysis results comparing average concentration with average absolute percent difference	4-56
4-30	95% Confidence intervals for mean NMOC difference, Radian first analysis	4-69
4-31	95% Confidence intervals for mean NMOC difference, EPA first analysis	4-70
4-32	Quality control chart of percent difference for duplicate NMOC analysis	4-82
4-33	Duplicate NMOC sample results comparing average concentration with percent difference	4-84
4-34	Duplicate NMOC sample results comparing average concentration with average percent difference	4-86
4-35	Duplicate NMOC sample results comparing average concentration with average absolute percent difference	4-87
4-36	Audit bias, Radian Channel A vs. QAD	4-94
4-37	Audit bias, Radian Channel B vs. QAD	4-95
4-38	Audit bias, Radian Channel C vs. QAD	4-96
4-39	Audit bias, Radian Channel D vs. QAD	4-97
4-40	Audit bias, ASRL vs. QAD	4-98

LIST OF FIGURES (Continued)

Number		Page
5-1	Stem-and-leaf plot of the 1988 morning NMOC data.....	5-2
5-2	Stem-and-leaf plot for the morning ln(NMOC) data.....	5-4
5-3	Cumulative frequency distribution for 1988 NMOC data....	5-5
5-4	Cumulative frequency distribution for 1988 ln(NMOC) data.....	5-6
5-5	Stem-and-leaf plot of the morning NMOC data for April, 1988.....	5-9
5-6	Stem-and-leaf plot of the morning NMOC data for May, 1988.....	5-10
5-7	Stem-and-leaf plot of the morning NMOC data for June, 1988.....	5-11
5-8	Stem-and-leaf plot of the morning NMOC data for July, 1988.....	5-12
5-9	Stem-and-leaf plot of the morning NMOC data for August, 1988.....	5-13
5-10	Stem-and-leaf plot of the morning NMOC data for September, 1988.....	5-14
5-11	Monthly mean NMOC emissions for 1984, 1985, 1986, 1987, and 1988.....	5-15
8-1	Gas chromatographic multidetector system.....	8-2
8-2	Dynamic flow dilution apparatus.....	8-4
8-3	Air toxics multiple detector system.....	8-7
8-4	Percent coefficient of variation of 3-hour air toxics replicate analyses as a function of mean concentration.....	8-11
8-5	Percent coefficient of variation of 3-hour air toxics duplicate samples as a function of mean concentration.....	8-15

LIST OF TABLES

Number	VOLUME I: NONMETHANE ORGANIC COMPOUND AND THREE-HOUR AIR TOXICS MONITORING PROGRAM	Page
1-1	1988 NMOC COMPLETENESS RESULTS	1-3
1-2	1988 NMOC SITE STATISTICS	1-4
1-3	LINEAR REGRESSION PARAMETERS FOR IN-HOUSE QUALITY CONTROL DATA	1-11
1-4	AUDIT SAMPLE RESULTS, PERCENT BIAS	1-13
1-5	AUDIT SAMPLE RESULTS, ABSOLUTE PERCENT BIAS	1-14
1-6	ORTHOGONAL REGRESSION PARAMETERS FOR REPEATED ANALYSES OF SITE SAMPLES	1-17
1-7	EXPECTED VALUES OF RADIAN, EPA-QAD, AND EPA-ASRL NMOC CONCENTRATIONS	1-19
2-1	1988 NMOC COMPLETENESS RESULTS	2-2
2-2	1988 NMOC SITE STATISTICS	2-4
2-3	1988 LOGNORMAL STATISTICS	2-7
3-1	SUPPORT GAS OPERATING CONDITIONS	3-9
4-1	PERFORMANCE ASSESSMENT SUMMARY, RADIAN CHANNELS	4-3
4-2	SUMMARY NMOC CALIBRATION FACTOR DRIFT RESULTS	4-21
4-3	LINEAR REGRESSION PARAMETERS FOR IN-HOUSE QUALITY CONTROL DATA	4-28
4-4	IN-HOUSE QUALITY CONTROL STATISTICS, BY RADIAN CHANNEL	4-29
4-5	OVERALL IN-HOUSE QUALITY CONTROL STATISTICS	4-30
4-6	ORTHOGONAL REGRESSION PARAMETERS FOR REPEATED ANALYSES OF SITE SAMPLES	4-37
4-7	SUMMARY STATISTICS OF COMPARATIVE ANALYSES FOR RADIAN VS. QAD CHANNELS	4-38

LIST OF TABLES (Continued)

Number		Page
4-8	SUMMARY STATISTICS OF COMPARATIVE ANALYSES FOR RADIAN VS. QAD CHANNELS, BY RADIAN CHANNELS	4-39
4-9	SUMMARY STATISTICS OF COMPARATIVE ANALYSES FOR RADIAN VS. ASRL CHANNELS	4-40
4-10	SUMMARY STATISTICS OF COMPARATIVE ANALYSES FOR RADIAN VS. ASRL CHANNELS, BY RADIAN CHANNELS	4-41
4-11	SUMMARY STATISTICS OF COMPARATIVE ANALYSES FOR ASRL VS. QAD CHANNELS	4-43
4-12	SUMMARY STATISTICS FOR COMPARATIVE ANALYSES ON RADIAN CHANNELS	4-44
4-13	SUMMARY STATISTICS FOR COMPARATIVE ANALYSES ON RADIAN CHANNELS, BY CHANNEL PAIRS	4-45
4-14	95% CONFIDENCE INTERVALS FOR MEAN DELTA, REPEATED ANALYSES	4-48
4-15	1988 NMOC REPLICATE IMPRECISION	4-53
4-16	OVERALL STATISTICS FOR LOCAL AMBIENT SAMPLES	4-57
4-17	OVERALL STATISTICS FOR LOCAL AMBIENT SAMPLES, BY RADIAN ANALYSIS ORDER	4-58
4-18	STATISTICS FOR LOCAL AMBIENT SAMPLES, BY RADIAN ANALYSIS ORDER AND CHANNEL PAIR	4-59
4-19	LOCAL AMBIENT SAMPLES, RADIAN FIRST ANALYSIS	4-67
4-20	LOCAL AMBIENT SAMPLES, RADIAN SECOND ANALYSIS	4-68
4-21	COMPARISON OF PERCENT DIFFERENCE IN NMOC CONCENTRATION BETWEEN CHANNEL PAIRS	4-72
4-22	STATISTICS FOR DUPLICATE ANALYSES	4-73
4-23	DUPLICATE ANALYSES STATISTICS, BY SITE	4-74
4-24	REPLICATE ANALYSIS OF DUPLICATE SAMPLES FOR 1988	4-77
4-25	ANALYSIS OF VARIANCE FOR DUPLICATE SAMPLES	4-80

LIST OF TABLES (Continued)

Number		Page
4-26	COMPONENTS OF VARIANCE FOR DUPLICATES.....	4-81
4-27	1988 NMOC DUPLICATE IMPRECISION.....	4-85
4-28	NMOC SAMPLE PRESSURE STATISTICS.....	4-89
4-29	PRESSURE DISTRIBUTION OF NMOC AMBIENT AIR SAMPLES.....	4-90
4-30	1988 NMOC AUDIT SAMPLE RESULTS.....	4-92
4-31	AUDIT SAMPLES, RELATIVE TO EPA-QAD RESULTS.....	4-93
5-1	SUMMARY STATISTICS FOR 1988 MORNING NMOC SITES, BY MONTH.....	5-8
7-1	THREE-HOUR AMBIENT AIR SAMPLES AND ANALYSES.....	7-2
7-2	COMPOUND IDENTIFICATION WITH GC/MD FOR ALL 3-HOUR SITES.....	7-4
7-3	FREQUENCY OF OCCURRENCE OF TARGET COMPOUNDS IN 3-HOUR AMBIENT AIR SAMPLES.....	7-5
7-4	COMPOUND IDENTIFICATIONS WITH GC/MD BY SITE CODE.....	7-6
8-1	METHOD DETECTION LIMITS FOR 3-HOUR AIR TOXICS COMPOUNDS.....	8-9
8-2	3-HOUR AIR TOXICS REPLICATE ANALYSES BY GC/MD.....	8-10
8-3	GC/MD COMPOUND IDENTIFICATIONS IN ONLY ONE REPLICATE ANALYSIS.....	8-13
8-4	3-HOUR AIR TOXICS DUPLICATE SAMPLE ANALYSES BY GC/MD....	8-14
8-5	GC/MD 3-HOUR AIR TOXICS DUPLICATE PRECISION BY COMPOUND..	8-16
8-6	SINGLE COMPOUND IDENTIFICATIONS GC/MD DUPLICATE SAMPLE ANALYSES.....	8-17
8-7	COMPOUND IDENTIFICATION CONFIRMATION.....	8-19
8-8	3-HOUR AIR TOXICS AUDIT NO. 6 RESULTS FOR GC/MD AND GC/MS.....	8-21

SYMBOLS AND ABBREVIATIONS

AC, or A.C.	area counts, generated from a gas chromatograph
ADELTA	absolute value of DELTA
ADIF	absolute value of DIF
ADIFF	absolute value of DIFF
AIRS	Aerometric Information Retrieval System
a.m.	ante meridiem
APDIFF	absolute value of PDIFF
APDIF	absolute value of PDIF
APR	April
ASRL	Atmospheric Sciences Research Laboratory (EPA), now Atmospheric Research and Exposure Assessment Laboratory (AREAL)
Aug	August
AUTX	Austin, Texas
AZCA	Azusa, California
B1CA	Bakersfield, California (Oildale)
B2CA	Bakersfiled, California (Edison)
B2MA	Boston, Massachusetts (E. Boston)
Bldg.	building
BMTX	Beaumont, Texas
BNY	New York, New York (Bronx)
C2OH	Cleveland, Ohio (Civic Center)
C3IL	Chicago, Illinois (Sears Tower)
C6IL	Chicago, Illinois (CTA)
Cal., or Calib.	calibration
CHNC	Charlotte, North Carolina
CLOH	Cleveland, Ohio (St. Vincent Hospital)
cm	centimeter
D1MI	Detroit, Michigan (WAPCD Laboratory)
D2MI	Detroit, Michigan (WAPCD #4)
DELTA	Radian NMOC concentration - QAD NMOC concentration, ppmC; Radian NMOC concentration - ASRL concentration, ppmC; or ASRL NMOC concentration - QAD NMOC concentration, ppmC
DIF	(NMOC concentration for the second channel) - (NMOC concentration for the first channel
DIFF	measured NMOC concentration - calculated NMOC concentration ppmC for in-house quality control samples
DLTX	Dallas, Texas
Dup.	duplicate
e	base of natural logarithm, 2.71828...
ECD	electron capture detector
ELTX	El Paso, Texas
EPA	United States Environmental Protection Agency

(Continued)

SYMBOLS AND ABBREVIATIONS (continued)

F	Friday
FID	flame ionization detector
FECA	Fremont, California
FWTX	Fort Worth, Texas
GC/ECD	gas chromatography electron capture detection
GC/FID	gas chromatography flame ionization detection
GC/MD	gas chromatography multidetection
GC/MS	gas chromatography mass spectrometry
H	Thursday
H1TX	Houston, Texas
Hg	mercury
i.d.	inside diameter
ID	identification
INST.	instrument
Jul	July
Jun	June
L	liter
Lpm	liters per minute
m	meter
M	Monday
M1NY	New York, New York (Manhattan/P.S. 59)
M1TN	Memphis, Tennessee (Alabama Street)
M2TN	Memphis, Tennessee (Frayser Street)
M2FL	Miami, Florida (U. Miami Campus)
MAX	maximum
MID	multiple ion detection
MIFL	Miami, Florida
MIN	minimum
min.	minute
mL	milliliter
mm	millimeter
MNY	New York, New York (Manhattan/Mabel Dean)
MU	mean of ln(NMOC)
N1TN	Nashville, Tennessee (Lentz)
N2TN	Nashville, Tennessee (Trinity Lane)
NBS	National Bureau of Standards
NC	North Carolina
NMOC	Nonmethane organic compound
NOx	oxides of nitrogen
NWNJ	Newark, New Jersey

(continued)

Oct	October
o.d.	outside diameter
Off.	Office
P1AZ	Phoenix, Arizonia (39th & Earl Streets)
P2AZ	Phoenix, Arizonia (Scottsdale Fire Station)
PCDIFF	percent difference = DIFF/calculated NMOC concentration x 100, for in-house QC samples
PDELTA	$\frac{\text{DELTA}}{[(\text{Radian NMOC concentration} + \text{QAD NMOC concentration})/2]} \times 100;$ $\frac{\text{DELTA}}{[(\text{Radian NMOC concentration} + \text{ASRL NMOC concentration})/2]} \times 100;$ or, $\frac{\text{DELTA}}{[(\text{ASRL NMOC concentration} + \text{QAD NMOC concentration})/2]} \times 100$
PDFID	preconcentration, direct flame ionization detection
PDIF	DIF/([(NMOC concentration, 1st channel) + (NMOC concentration, 2nd channel)]/2) x 100
PLNJ	Plainfield, New Jersey
p.m.	post meridiem
ppb	parts per billion
ppbv	parts per billion by volume
ppm	parts per million
ppmC	parts per million by volume as carbon
ppmv	parts per million by volume
PRRI	Providence, Rhode Island
psi	pounds (force) per square inch
psig	pounds (force) per square inch gauge
QA	quality assurance
QAD	Quality Assurance Division (EPA)
QAPP	Quality Assurance Project Plan
QC	quality control
RAO	Radian analysis order: RAO = 1 for the local ambient duplicate sample analyzed first by Radian; RAO = 2 for the local ambient duplicate sample analyzed first by EPA
RT	retention time
RTP	Research Triangle Park
S1CA	Sacramento, California (Meadowview)
S1FL	St. Petersburg, Florida (Azalea Park)
S1MA	Springfield, Massachusetts
S2CA	Sacramento, California (Citrus Heights)
S2FL	St. Petersburg, Florida (East Lake)
S2MA	Springfield, Massachusetts (Hospital)

(Continued)

SYMBOLS AND ABBREVIATIONS (continued)

SAROAD	Storage and Retrieval of Aerometric Data
SATX	San Antonio, Texas
Sep	September
SLMO	St. Louis, Missouri
SOP	standard operating procedure
SOx	oxides of sulfur
SRM	Standard Reference Material
SIGMA	standard deviation of ln(NMOC)
STD. DEV., SD	standard deviation
T	Tuesday
T1FL	Tampa, Florida (EPC)
T2FL	Tampa, Florida (Beach Park)
U.S.	United States
UTM	Universal Transverse Mercator
W	Wednesday
W1NY	New York, New York (World Trade Center, Floor)
WAIL	Waukegan, Illinois
WOMA	Worcester, Massachusetts
^{o}C	degrees Celsius
^{o}F	degrees Fahrenheit
%CV	percent coefficient of variation

1.0 SUMMARY AND CONCLUSIONS

In certain areas of the country where the National Ambient Air Quality Standard for ozone is being exceeded, additional measurements of ambient nonmethane organic compounds (NMOC) are needed to assist the affected states in developing revised ozone control strategies. Because of previous difficulty in obtaining accurate NMOC measurements, the U.S. Environmental Protection Agency (EPA) has provided monitoring and analytical assistance to these states through Radian Corporation. This assistance began in 1984 and continues through the 1988 NMOC Monitoring Program. Between April 18 and October 30, 1988, Radian analyzed 3,497 ambient air samples, collected in SUMMA® polished stainless steel canisters at 45 sites. These NMOC analyses were performed by the cryogenic preconcentration, direct flame ionization detection (PDFID) method.[1] Based on the 1984, 1985, 1986, and 1987 studies, the method was shown to be precise, accurate, and cost effective relative to the capillary column gas chromatographic, flame ionization detection (GC/FID) method (see Appendix A). The 1988 study confirmed these findings and supported the conclusion that the PDFID method is the method of choice to measure NMOC concentration in ambient air.

In 1986 specific toxic compounds, primarily aromatics and halocarbons, were also determined in the ambient air samples used for the NMOC analyses. In 1987 Radian Corporation developed a gas chromatographic multidetector (GC/MD) method to determine the concentration of 38 selected toxic compounds in ambient air. In 1988, air toxic analyses were conducted by GC/MD on ambient air samples taken at 13 sites at which NMOC samples were taken. These samples were called 3-hour air toxics samples because the sampling period was 3 hours, from 6:00 a.m. to 9:00 a.m. The 1988 Urban Air Toxics Monitoring Program (UATMP) began in October 1987 at 19 urban sites and extended through September 1988. The samples from the latter program were 24-hour integrated ambient air samples and are referred to as UATMP samples throughout this report.

Volume I of the Final Report includes Sections 1.0 through 10.0. Sections 1.0 through 6.0 report the data, procedures, and assessment of the NMOC portion of the monitoring program. Sections 7.0 through 9.0 report the data, procedures, and assessment of the 3-hour air toxics portion of the air toxics monitoring program. Section 10.0 lists references for Volume I.

The UATMP data and results will be reported in Volume II.

1.1 NMOC MONITORING PROGRAM

1.1.1 Introduction and Data Summary

Table 1-1 lists the site codes, number of scheduled sampling days, total scheduled duplicate samples, total scheduled samples, number of valid samples, and percent completeness. Percent completeness, a quality measure which ratios the number of valid samples to the number of scheduled samples, averaged 93.4% in 1988 compared to 95.0% in 1987 and 96.1% in 1986. Percent completeness ranged from 77.3% for the Chicago, Illinois (C6IL) Chicago Transit Authority (CTA) site to 101.2% for the Springfield, Massachusetts (S2MA) Hospital site. The Springfield site surpassed 100% by taking a duplicate sample on the last sampling date, when no duplicate sample had been scheduled for S2MA. Statistics for the NMOC concentrations in parts per million carbon (ppmC) by volume are listed in Table 1-2. In Table 1-2, the sites are divided into "Morning Sites," "Afternoon Sites," and "Above-300-m-Altitude Sites." The Morning Sites are those which collected samples from 6:00 a.m. to 9:00 a.m.; Afternoon Sites sampled either from Noon to 3:00 p.m. or from 1:00 p.m. to 4:00 p.m.; the Above-300-m-Altitude Sites sampled from 6:00 a.m. to 9:00 a.m. at an altitude above 300 meters.

The sites were separated into these classifications because the average NMOC concentrations were expected to be different for the three groups. The overall mean for the Morning Sites was 0.636 ppmC, while for the Afternoon Sites, the overall mean was 0.353 ppmC. The overall mean for the Above-300-m-Altitude Sites was 0.286 ppmC.

1.1.2 Calibration and Drift

Each Radian PDFID channel was calibrated twice daily, using propane standards referenced to the National Bureau of Standards (NBS) Standard

TABLE 1-1. 1988 NMOC COMPLETENESS RESULTS

Radian Site Code	Scheduled Sampling Days	Total Duplicate Samples	Total Scheduled Samples	Total Valid Samples	Percent Complete
AUTX	80	6	86	80	93.02
AZCA	82	6	88	87	98.86
B1CA	83	6	89	76	85.39
B2CA	83	6	89	86	96.63
B2MA	83	6	89	85	95.51
BMTX	83	6	89	82	92.13
BNY	4	0	4	4	100.00
BRIL	83	6	89	81	91.01
C2OH	73	5	78	77	98.72
C3IL	79	6	85	74	87.06
C6IL	70	5	75	58	77.33
CHNC	75	6	81	76	93.83
CLOH	82	6	88	85	96.59
D1MI	71	6	77	73	94.81
D2MI	71	6	77	74	96.10
DLTX	83	6	89	86	96.63
ELTX	82	6	88	87	98.86
FECA	79	6	85	84	98.81
H1TX	76	6	82	81	98.78
M1NY	57	4	61	49	80.33
M1TN	82	6	88	80	90.91
M2FL	88	6	94	93	98.94
M2TN	83	6	89	90	101.12
MIFL	117	8	125	116	92.80
MNY	80	6	86	72	83.72
N1TN	83	6	89	81	91.01
N2TN	83	6	89	83	93.26
NWNJ	83	6	89	86	96.63
P1AZ	83	6	89	83	93.26
P2AZ	83	6	89	86	96.63
PLNJ	82	6	88	85	96.59
PRRI	83	6	89	82	92.13
S1CA	75	5	80	68	85.00
S1FL	75	5	80	76	95.00
S1MA	63	4	67	62	92.54
S2CA	78	6	84	77	91.67
S2FL	77	5	82	77	93.90
S2MA	78	5	83	84	101.20
SATX	83	6	89	89	100.00
SLMO	83	6	89	87	97.75
T1FL	87	6	93	82	88.17
T2FL	88	6	94	82	87.23
W1NY	35	3	38	33	86.84
WAIL	79	6	85	71	83.53
WOMA	83	6	89	87	97.75
Overall	3493	253	3746	3497	93.35

TABLE 1-2. 1988 NMOC SITE STATISTICS

Radian Site Code	NMOC, ppmC Minimum	Median	Mean	Maximum	Standard Deviation	Skewness	Kurtosis
Morning Sites							
AUTX	0.316	0.752	0.906	3.895	0.581	2.599	8.785
B1CA	0.096	0.752	0.846	1.880	0.403	0.619	-0.216
B2MA	0.193	0.527	0.631	3.524	0.432	3.989	22.513
BMTX	0.118	0.373	0.746	4.172	0.639	2.906	10.663
BRIL	0.061	0.172	0.270	1.901	0.278	3.669	16.474
C2OH	0.133	0.643	0.848	2.572	0.609	1.217	0.821
C6IL	0.384	0.835	0.904	1.819	0.344	0.594	-0.382
CHNC	0.125	0.378	0.463	1.517	0.304	1.732	2.727
CLOH	0.183	0.784	0.833	2.493	0.480	1.223	1.768
D1MI	0.151	0.499	0.619	2.104	0.426	1.454	2.073
D2MI	0.181	0.602	0.673	2.432	0.409	1.988	5.375
DLTX	0.175	0.472	0.536	1.887	0.298	2.142	5.997
ELTX	0.121	0.366	0.450	1.897	0.032	2.445	7.790
FECA	0.105	0.350	0.555	1.884	0.050	1.506	1.608
H1TX	0.179	0.917	1.048	3.088	0.599	1.162	1.454
M1NY/BNY	0.040	0.658	0.815	3.186	0.522	2.188	6.605
M1TN	0.097	0.927	0.967	2.444	0.489	0.759	0.954
M2FL	0.016	0.113	0.198	1.500	0.244	2.489	7.892
M2TN	0.090	0.417	0.526	1.791	0.373	1.378	1.586
M1FL	0.171	0.711	1.027	5.890	0.870	2.759	9.985
MNY	0.168	0.654	0.741	2.019	0.400	1.241	1.620
N1TN	0.108	0.411	0.540	1.687	0.391	1.291	0.868
N2TN	0.204	0.683	0.747	1.782	0.372	0.670	-0.013
NWNJ	0.198	0.606	0.772	3.069	0.532	1.845	3.866
P1AZ	0.174	0.890	1.144	3.569	0.775	1.103	0.702
P2AZ	0.106	0.366	0.480	3.563	0.417	5.018	33.349
PLNJ	0.094	0.440	0.595	2.076	0.441	1.458	1.794
PRRI	0.150	0.339	0.399	1.551	0.254	2.455	7.371
S1CA	0.063	0.220	0.386	1.500	0.365	1.646	1.661
S1FL	0.063	0.380	0.451	1.490	0.287	1.483	2.511
S1MA	0.137	0.405	0.562	2.650	0.477	2.856	8.889
S2FL	0.124	0.448	0.482	2.225	0.298	2.843	13.481
S2MA	0.070	0.396	0.485	1.946	0.325	2.082	5.662
SATX	0.072	0.273	0.364	1.317	0.263	1.793	3.076
SLMO	0.154	0.533	0.668	2.830	0.470	2.467	6.844
T1FL	0.172	0.516	0.661	2.053	0.422	1.478	1.693
T2FL	0.063	0.256	0.327	1.060	0.223	1.230	1.056
WOMA	0.089	0.436	0.525	1.875	0.337	1.541	3.070
Overall	0.016	0.269	0.636	5.890	0.505	2.395	10.411

(Continued)

TABLE 1-2. (Continued)

Radian Site Code	NMOC, ppmC Minimum	Median	Mean	Maximum	Standard Deviation	Skewness	Kurtosis
Afternoon Sites							
AZCA	0.212	0.633	0.625	1.025	0.186	-0.065	-0.741
B2CA	0.107	0.197	0.226	0.725	0.116	2.490	6.926
S2CA	0.077	0.181	0.216	1.472	0.020	5.447	33.271
WAIL	0.065	0.182	0.323	1.631	0.362	2.072	3.266
Overall	0.065	0.165	0.353	1.631	0.280	1.570	2.382
Above-300-m-Altitude Sites							
C3IL	0.046	0.271	0.298	0.799	0.159	0.715	0.459
W1NY	0.058	0.166	0.259	1.210	0.238	2.309	5.917
Overall	0.046	0.150	0.286	1.210	0.187	1.619	4.561

Reference Material (SRM) No. 1668B propane. Zero readings were determined with cleaned, dried air. Daily percent drift of the calibration factor ranged from -10.8% to +6.2%, averaging -0.54 percent. The absolute value of the percent drift of the daily calibration factors ranged from zero to 10.8%, averaging 1.07 percent.

1.1.3 Precision

Analytical precision was determined by repeated analyses of 217 site samples. Percent differences between the second and the first analysis averaged 0.203 percent. The average of the absolute values of the percent difference was 10.1% with a standard deviation of 12.4. The analytical precision includes the variability between Radian channels and within Radian channels.

Overall precision, including sampling and analysis variability, was determined by analysis of 265 duplicate site samples, simultaneously collected in two canisters from a common sampling system. Percent difference for Radian's analyses of the duplicates averaged 0.31 percent. The average absolute percent difference was 8.7% with a standard deviation of 10.5.

1.1.4 Accuracy

Because the NMOC measurements encompass a range of mixtures of unknown compounds, it was not possible to define absolute accuracy. Instead, accuracy was determined relative to propane standards with internal and external audit samples.

Accuracy was monitored internally throughout the program by the use of in-house propane standards. Four days per week an in-house propane quality control (QC) sample was prepared with a flow dilution apparatus and analyzed by the PDFID method. The propane used to prepare the in-house QC standards was certified by the EPA Quality Assurance Division (QAD) and was referenced to NBS SRM 1668B.

Figures 1-1 through 1-4 show the in-house quality control results for Radian Channels A, B, C, and D. Measured propane values are plotted against calculated propane standards. Table 1-3 shows the linear regression parameters for the Radian in-house quality control data. Daily quality

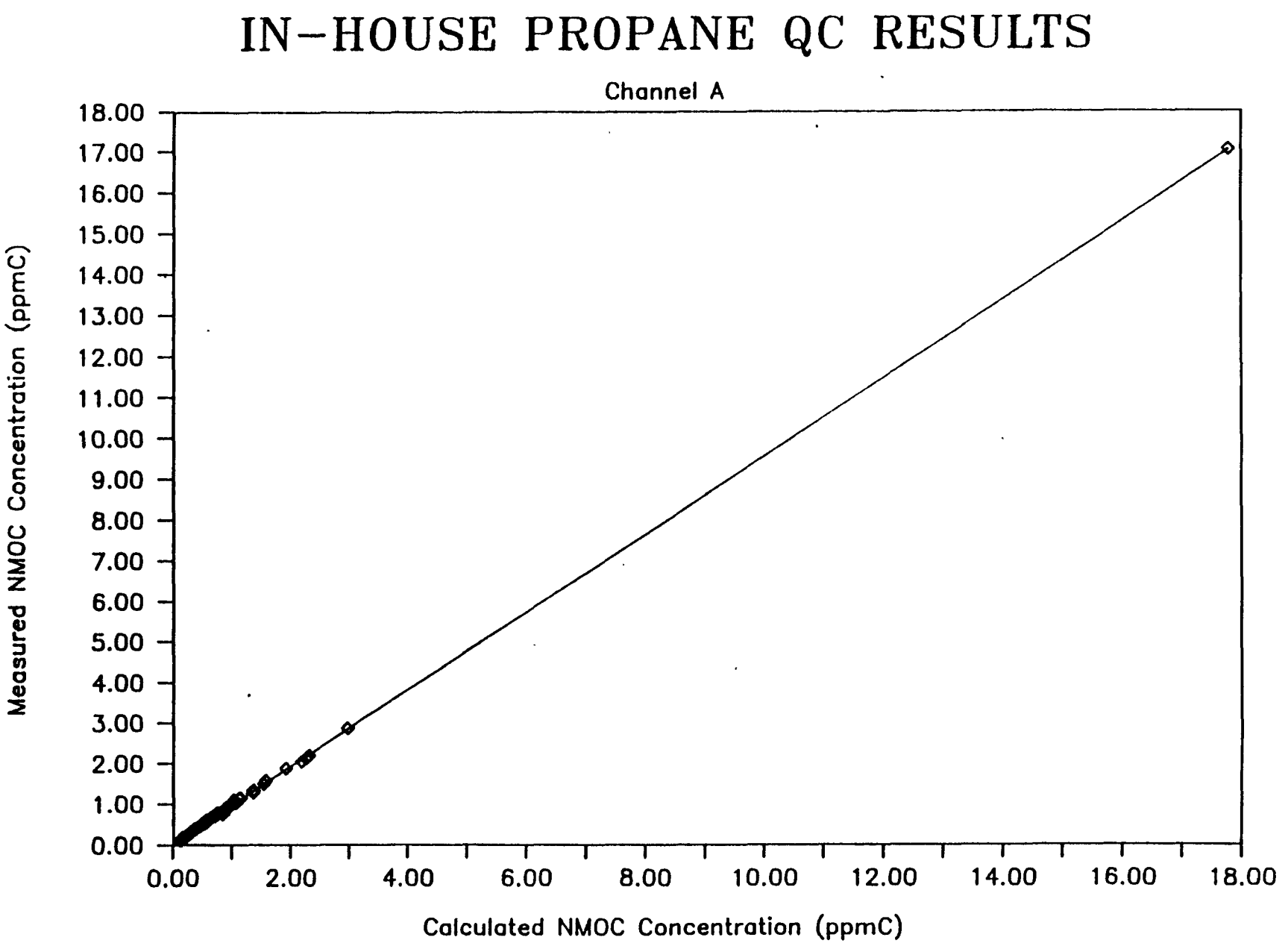


Figure 1-1. In-house quality control, linear regression for Channel A.

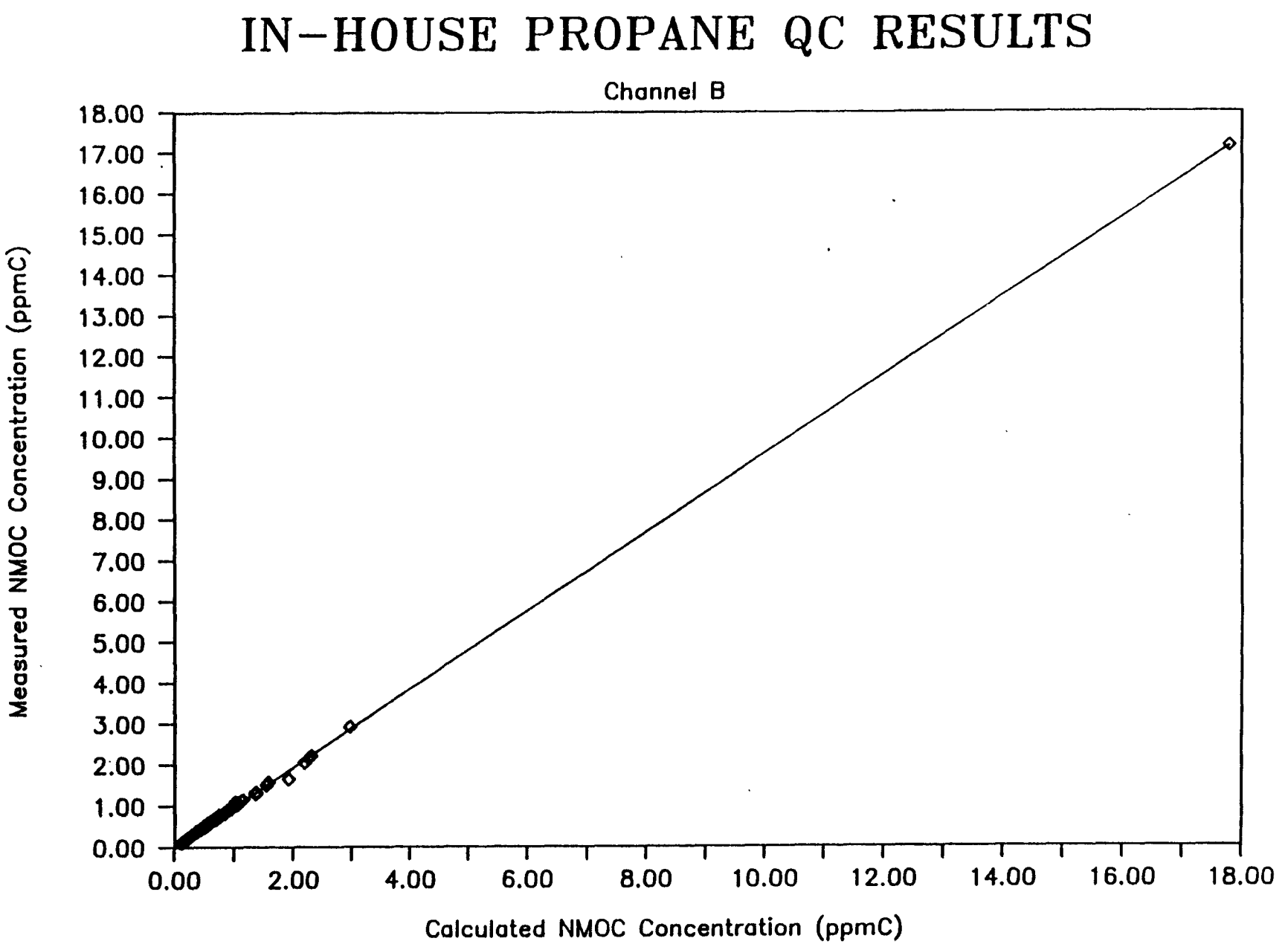


Figure 1-2. In-house quality control, linear regression for Channel B.

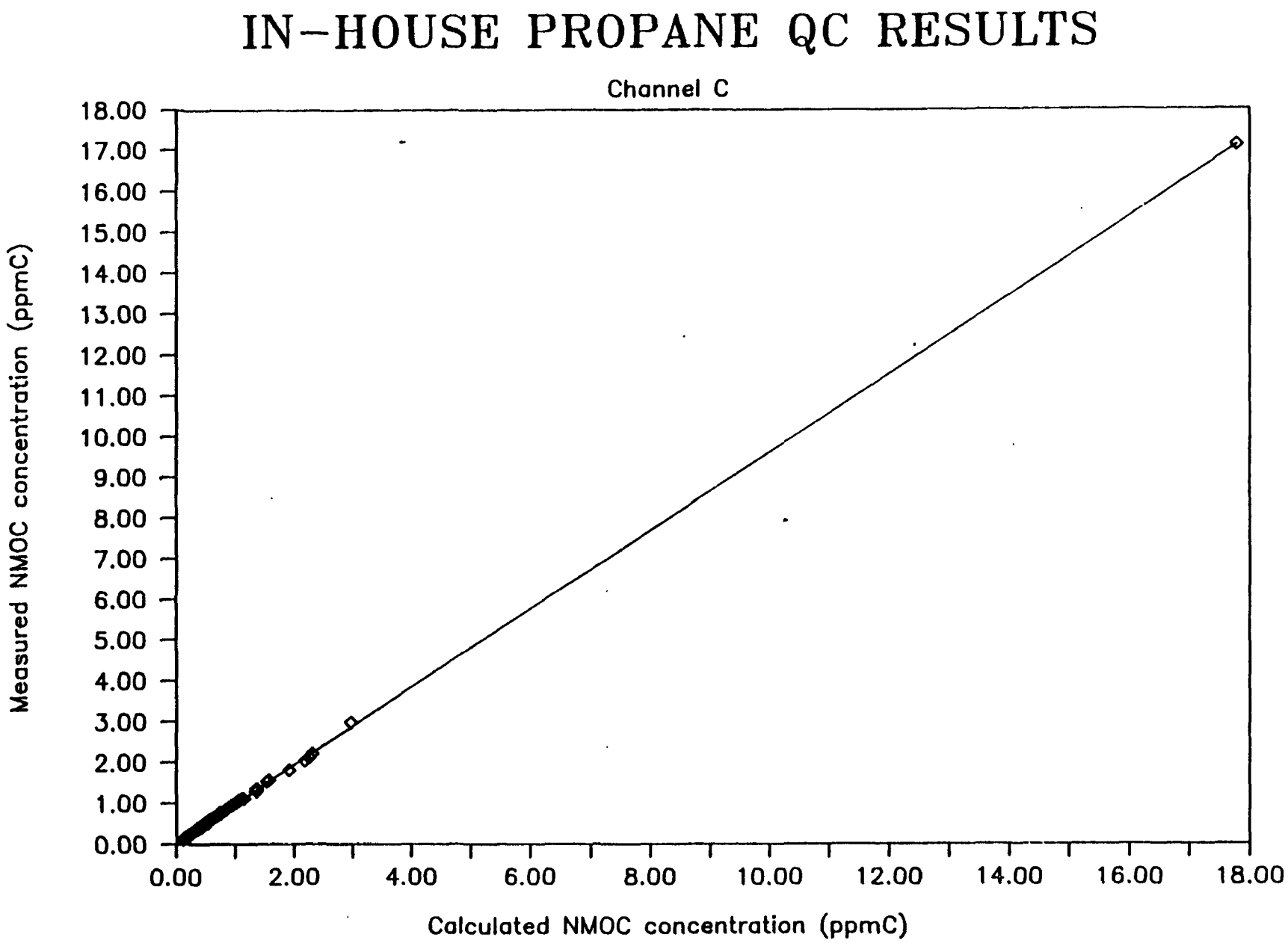


Figure 1-3. In-house quality control, linear regression for Channel C.

IN-HOUSE PROPANE QC RESULTS

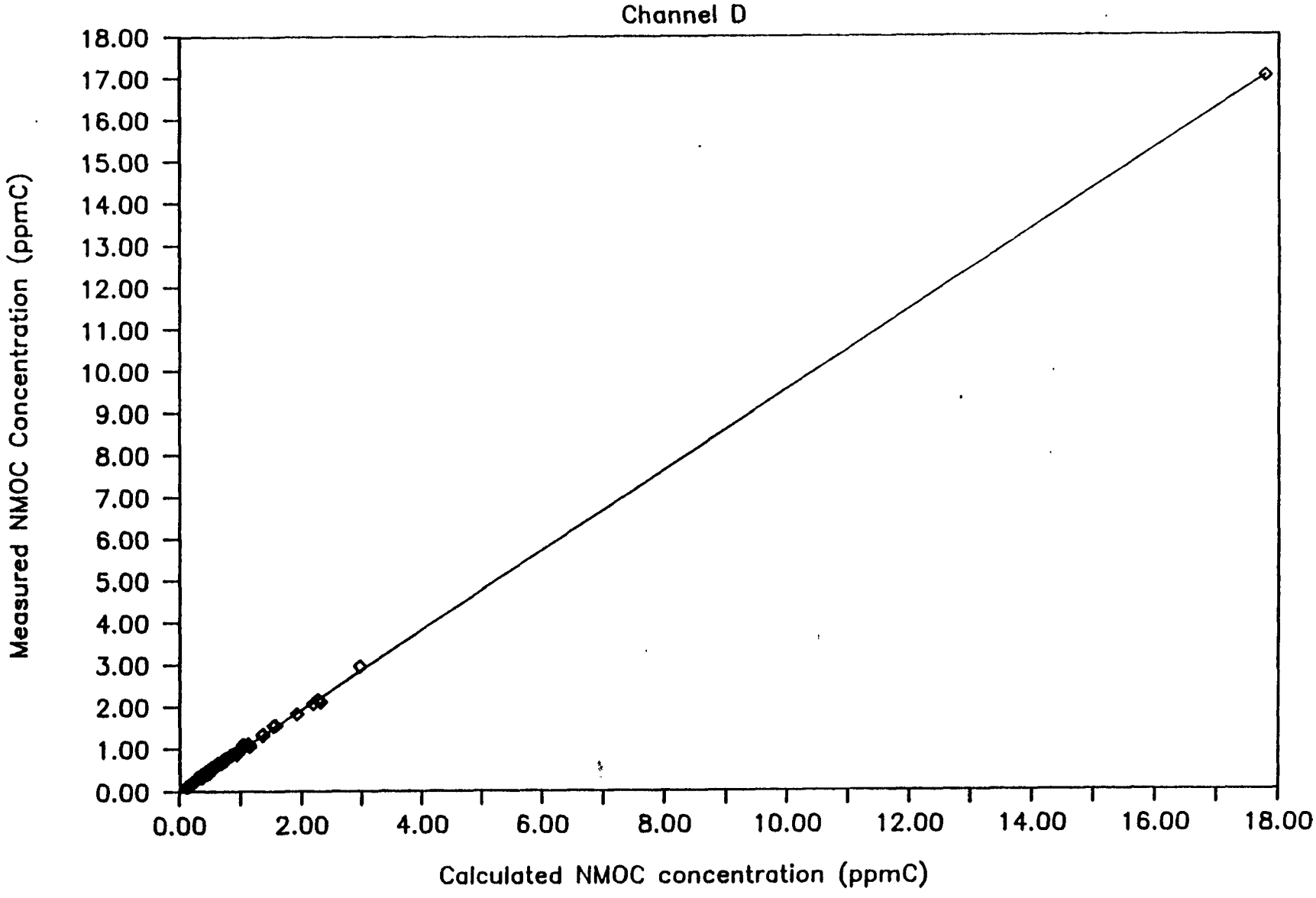


Figure 1-4. In-house quality control, linear regression for Channel D.

TABLE 1-3. LINEAR REGRESSION PARAMETERS FOR IN-HOUSE QUALITY CONTROL DATA

Radian Channel	Cases	Intercept	Slope	Coefficient of Correlation
A	76	0.030671	0.956831	0.999908
B	77	0.029393	0.961638	0.999851
C	83	0.032107	0.959886	0.999897
D	81	0.029524	0.955581	0.999864

control samples of prop were mixed from a propane standard certified by EPA-QAD and referenced to NBS SRM propane Standard No. 1668B. The regression used the propane concentration calculated from the mixing operation as the independent variable and concentration measured by each Radian Channel as the dependent variable. The concentration range of the in-house quality control samples was 0.0 to 17.775 ppmC. Table 1-3 indicates excellent quality control for each channel since, as expected, the intercepts are all near zero, and the slopes and coefficients of correlation are all near 1.0.

External propane audit samples were provided by EPA-QAD. The propane samples were referenced to NBS SRM propane Standard No. 1668B. Table 1-4 summarizes the percent bias of the Radian channels and the EPA Atmospheric Sciences Research Laboratory (ASRL) channel relative to the EPA-QAD channel. The audit samples were given Radian ID Numbers upon receipt. Radian ID No. 1004 was received in May 1988, and the other two audit samples were received in September 1988. The average percent bias for the Radian channels was 2.73%, ranging from 1.33% for Channel B to 4.51% for Channel D. Absolute percent biases are listed in Table 1-5 and range from 2.32% for Channel B to 4.73% for Channel D, averaging 3.40% overall for the Radian channels.

1.1.5 Other Quality Assurance Measurements

The results of other quality assurance measurements are discussed below. Canister cleanup studies established that there was little carryover of NMOC from one sample to the next, when using the canister cleanup apparatus and procedure developed for this study. In 686 separate determinations, percent cleanup averaged 99.689%, ranging from 95.3% to 100 percent. Cleanup was defined in terms of the percent of the NMOC concentration that was removed in the cleanup cycle. In 1987, the canister cleanup procedure was changed to use cleaned, dried air that had been humidified instead of cleaned, dried air. It has been found that humidified air (that had been previously cleaned and dried) does a better job of removing residual hydrocarbon that had adsorbed on canister surfaces.

Figure 1-5 shows a between-laboratory comparison of site sample analyses involving Radian channels and the EPA-QAD channel for the PDFID method. Figure 1-6 shows comparisons of EPA-ASRL and EPA-QAD channels. Table 1-6 gives the orthogonal regression parameters, assuming a linear relationship,

TABLE 1-4. AUDIT SAMPLE RESULTS, PERCENT BIAS[a]

Radian I.D. Number	Channels A Percent Bias	B Percent Bias	C Percent Bias	D Percent Bias	Radian Percent Bias	EPA-ASRL Percent Bias
1004	3.52998	2.46615	6.21857	2.64023		12.47582
3727	3.70741	3.00601	4.00802	11.22244		-1.50301
3728	-0.57162	-1.47949	-1.64761	-0.33625		2.58911
Average	2.22192	1.33089	2.85966	4.50881	2.73032	4.52064
Std Dev	2.42091	2.44878	4.05688	6.00163	4.01046	7.18680

[a]Percent Bias = (Measured NMOC - QAD NMOC) / QAD NMOC x 100.

TABLE 1-5. AUDIT SAMPLE RESULTS, ABSOLUTE PERCENT BIAS[a]

Radian I.D. Number	Channels A Absolute Percent Bias	B Absolute Percent Bias	C Absolute Percent Bias	D Absolute Percent Bias	Radian Absolute Percent Bias	EPA-ASRL Absolute Percent Bias
1004	3.52998	2.46615	6.21857	2.64023		12.47582
3727	3.70741	3.00601	4.00802	11.22244		1.50301
3728	0.57162	1.47949	1.64761	0.33625		2.58911
Average	2.60301	2.31722	3.95807	4.73297	3.40282	5.52264
Std Dev.	1.76147	0.77408	2.28589	5.73690	3.23416	6.04607

[a]Absolute percent Bias = Absolute Value of (Measured NMOC - QAD NMOC) / QAD NMOC x 100.

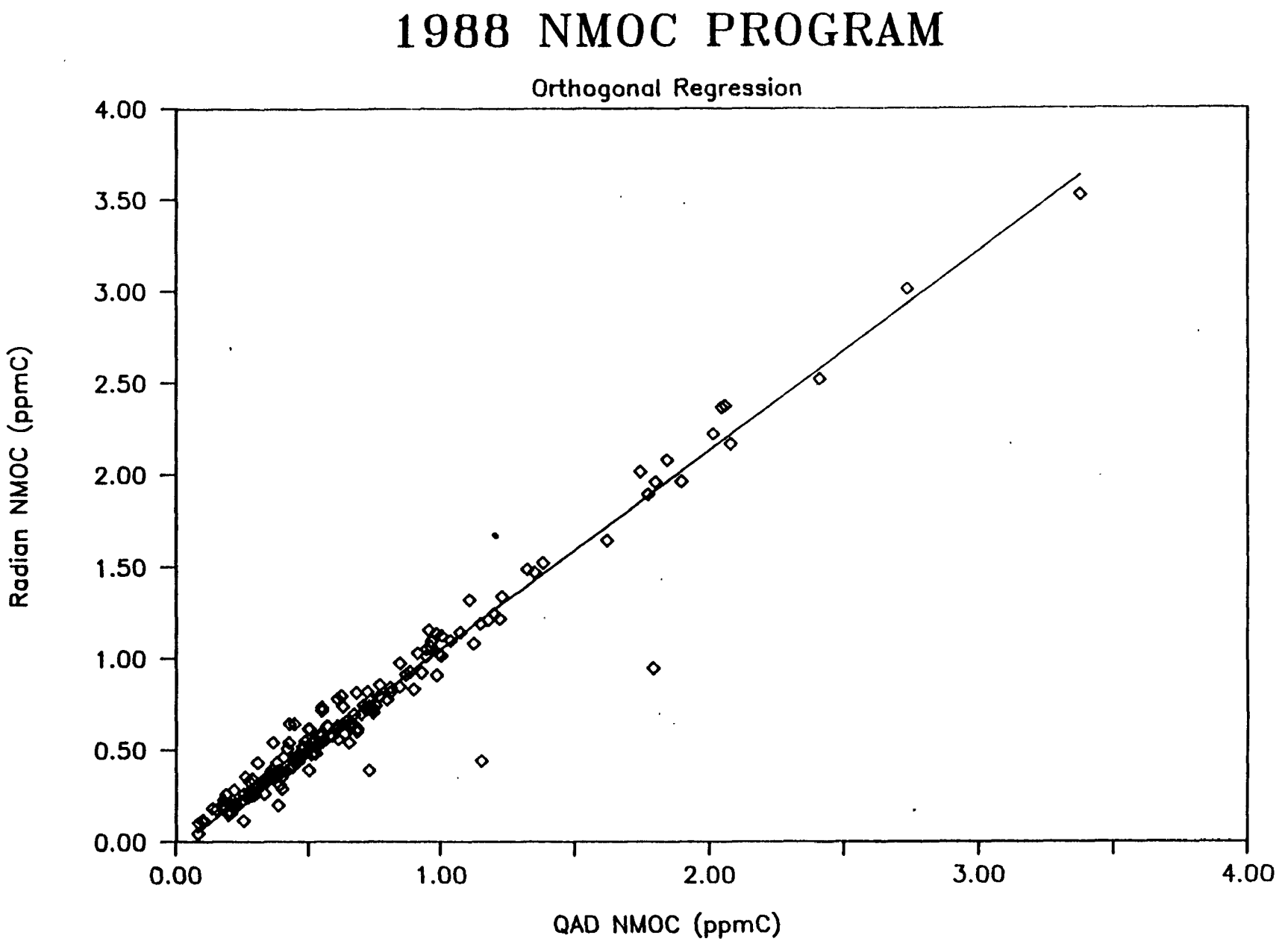


Figure 1–5. Orthogonal regression comparing QAD with Radian NMOC analyses.

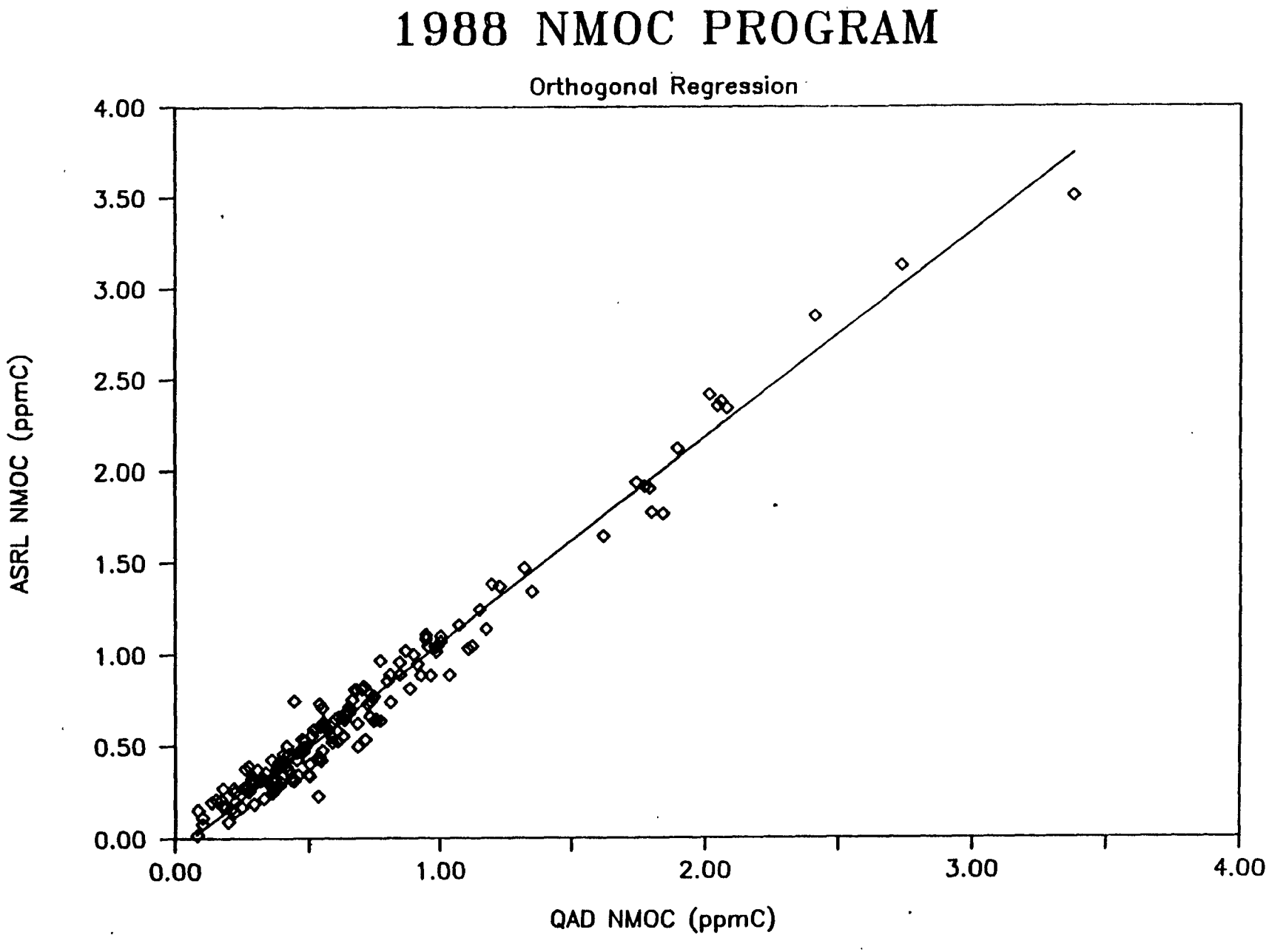


Figure 1–6. Orthogonal regression comparing QAD with ASRL NMOC analyses.

TABLE 1-6. ORTHOGONAL REGRESSION PARAMETERS FOR REPEATED ANALYSES OF SITE SAMPLES

Channel Pair (X-Y)	Cases	Intercept	Slope	Coefficient of Correlation
QAD-Radian	171	-0.033620	1.086080	0.976608
Radian-QAD	171	0.030960	0.920742	0.976608
ASRL-Radian	365	0.020184	0.986413	0.971026
Radian-ASRL	365	-0.020460	1.013773	0.971026
QAD-ASRL	156	-0.068920	1.128991	0.986652
ASRL-QAD	156	0.061045	0.885746	0.986652

for Figures 1-5 and 1-6 and other possible comparisons. The results show good agreement because the intercepts are very close to zero, the slopes are within 12% of 1.0, and the coefficients of correlation are within 3% of 1.0.

For selected hypothetical values of NMOC measured by Radian channels, EPA-QAD, and EPA-ASRL, Table 1-7 gives the predicted NMOC values for the remaining channels, based on the orthogonal regression parameters of Table 1-6. If an NMOC measurement were carried out in one of the three laboratories, Table 1-7 indicates the expected NMOC concentration and percent difference to be found if the same sample were analyzed in the other laboratories. The agreement of the Radian measurements and the EPA-QAD expected values is excellent. The percent differences among the various comparisons are very large at ppmC values less than 0.200 ppmC or greater than 5.0 ppmC.

Approximately 10.6% of the NMOC data base was validated by checking data transcriptions from original data sheets for 54 entries per sample. The six errors found equal a data base error rate of 0.025 percent.

1.2 THREE-HOUR AIR TOXICS MONITORING PROGRAM

At 13 NMOC sites, 3-hour samples were speciated by a GC/MD analytical system for 38 UATMP target compounds for a total of 98 NMOC ambient air samples. After NMOC analysis, the NMOC sample canisters were bled to atmospheric pressure, stored at least 24 hours for equilibration, and then analyzed by GC/MD. At 12 of the sites, duplicate samples were collected simultaneously and analyzed individually by GC/MD. Replicate analyses were performed on ten of the ambient air samples. A total of 120 GC/MD analyses were performed, including duplicate samples and replicate analyses.

1.2.1 Overall Data Summary

Twenty-five target compounds were identified in the 120 analyses. Benzene, m/p-xylene, toluene, ethylbenzene, styrene/o-xylene, and 1,1,1-trichloroethane, in that order, were the most frequently identified compounds. Concentrations of the target compounds identified ranged from 0.03 ppbv for 1,2-dichloroethane to 57.22 ppbv for chloroform. The overall average concentration of the target compounds identified was 2.95 ppbv.

TABLE 1-7. EXPECTED VALUES OF RADIAN, EPA-QAD, AND EPA-ASRL NMOC CONCENTRATIONS

Hypothetical NMOC			Predicted or Expected NMOC and % Difference					
			Radian		QAD		ASRL	
Radian ppmC	QAD ppmC	ASRL ppmC	ppmC	% Difference	ppmC	% Difference	ppmC	% Difference
0.2	-	-	-	-	0.215	+7.5	0.182	-9.0
0.5	-	-	-	-	0.491	-1.8	0.486	-2.8
1.0	-	-	-	-	0.952	-4.8	0.993	-0.7
5.0	-	-	-	-	4.635	-7.3	5.048	+1.0
-	0.2	-	0.184	-8.0	-	-	0.157	-21.5
-	0.5	-	0.509	+1.8	-	-	0.496	-0.8
-	1.0	-	1.052	+5.2	-	-	1.060	+6.0
-	5.0	-	5.397	+7.9	-	-	5.576	+11.5
-	-	0.2	0.217	+8.5	0.238	+19.0	-	-
-	-	0.5	0.513	+2.6	0.504	+0.8	-	-
-	-	1.0	1.006	+0.6	0.947	-5.3	-	-
-	-	5.0	4.952	-1.0	4.490	-10.2	-	-

cah.105

1.2.2 Site Results

Overall site mean concentrations ranged from 0.64 ppbv for Braidwood, Illinois (BRIL), to 5.05 ppbv for Detroit, Michigan (D2MI), for the target compounds identified. These data are presented in Section 7.0.

1.2.3 Gas Chromatography/Mass Spectrometry Confirmation Results

Twenty-four 3-hour air toxics ambient air samples were analyzed by Gas Chromatography/Mass Spectrometry (GC/MS) for compound identification confirmation of the GC/MD analyses. The GC/MS analyses were performed after the GC/MD analyses. The GC/MS analyses confirmed 82.6% of the GC/MD analyses. This figure is less than the GC/MS analyses percent confirmation, which was 90.2%, found in the UATMP.

For the 3-hour air toxics samples the negative GC/MD-positive GC/MS analyses were 15.4%, which was about twice the value found for the same comparison in the UATMP. Moreover, it was observed that the concentrations found for most of the compounds identified by GC/MS, but not identified by GC/MD, was well below 1.0 ppbv and in many cases approaching the GC/MS detection limits. It was also noted that more than a week's time separated the GC/MD and the GC/MS analyses.

These facts suggest that many of the compounds found by GC/MS were not found by GC/MD analyses because at the time of the GC/MD analyses these compounds were still adsorbed on the canister interior solid surfaces. The time between the GC/MD analyses and the GC/MS analyses was sufficient to allow adsorption equilibrium to be more nearly approached. Therefore, adsorbed compounds could desorb sufficiently to be above the Minimum Detection Limit (MDL) in the gas phase for the GC/MS analyses.

1.2.4 Precision

Sampling and analytical precision of 3-hour air toxics samples was estimated by analyzing duplicate samples. In terms of overall average absolute percent difference, the sampling and analysis precision was 13.7 percent.

Analytical precision was estimated by repeated analyses of ten samples. The analytical precision measured by the overall average absolute percent difference was 8.5 percent. Both the sampling and analytical precision results are excellent in view of the concentration range found in this study.

The data analyses showed that both for the duplicate and replicate results, the imprecision was significantly higher at concentrations less than 2 ppbv. Both the duplicate sample and repeated analyses results are discussed in Section 8.0.

1.2.5 External Audit

At about the same time the 3-hour air toxics samples were analyzed, External Audit Sample No. 6 was received from the EPA-QAD. The sample was analyzed by both the GC/MD and the GC/MS analytical systems. An average bias of 8.6% was found for the GC/MD analyses and an average bias of -18.4% was found for the GC/MS analyses. In view of the fact that the GC/MS analyses were used as a qualitative screening tool for compound identification confirmation (and not for quantitation), these are excellent results.

2.0 NMOC DATA SUMMARY

This section presents the data summary for the 1988 NMOC Monitoring Program conducted during April, May, June, July, August, September, and October. Daily NMOC concentrations and other pertinent monitoring data are given by site in Appendix E. The majority of the data presented in this section summarize the NMOC concentrations measured for samples collected at 45 sites throughout the continental United States. Sites were selected in urban and/or industrial locations; they are described in Appendix D. The site codes for the 1988 NMOC Monitoring Program are listed in Appendix D and are used throughout the report to identify the sites. Samples were collected in 6-liter (L) stainless steel canisters by local site operators trained by Radian Corporation personnel. The sampling procedure was described in detailed written instructions and given to the site operators. The sampling procedure instructions also appear in Section 3.1.2. Analytical concentration measurements of NMOC were made in the Radian Corporation Research Triangle Park (North Carolina) laboratory according to the PDFID method developed by the U.S. EPA and given in Appendix A.

The concentration of oxides of nitrogen (NO_x), site temperature, barometric pressure, wind direction, and weather conditions were provided on the field sampling forms by site personnel at the time of sampling. These data were recorded in the 1988 NMOC data base, but are not presented in this report because they were not measured by Radian equipment or personnel, nor were the data subjected to Radian quality assurance procedures.

Table 2-1 lists the NMOC Monitoring Program completeness results by site code. The scheduling of sample days and the scheduling of duplicate analyses is given in the Quality Assurance Project Plan (QAPP).[1] Two sites, M2TN (Memphis, Tennessee, Frayser Street Site) and S2MA (Springfield, Massachusetts, Hospital Site), produced over 100% completeness by taking an unscheduled duplicate in addition to all other scheduled samples. The C6IL (Chicago, Illinois, CTA Site) posted a 77.33 percent completeness, because

TABLE 2-1. 1988 NMOC COMPLETENESS RESULTS

Radian Site Code	Scheduled Sampling Days	Total Duplicate Samples	Total Scheduled Samples	Total Valid Samples	Percent Complete
AUTX	80	6	86	80	93.02
AZCA	82	6	88	87	98.86
B1CA	83	6	89	76	85.39
B2CA	83	6	89	86	96.63
B2MA	83	6	89	85	95.51
BMTX	83	6	89	82	92.13
BNY	4	0	4	4	100.00
BRIL	83	6	89	81	91.01
C2OH	73	5	78	77	98.72
C3IL	79	6	85	74	87.06
C6IL	70	5	75	58	77.33
CHNC	75	6	81	76	93.83
CLOH	82	6	88	85	96.59
D1MI	71	6	77	73	94.81
D2MI	71	6	77	74	96.10
DLTX	83	6	89	86	96.63
ELTX	82	6	88	87	98.86
FECA	79	6	85	84	98.81
H1TX	76	6	82	81	98.78
M1NY	57	4	61	49	80.33
M1TN	82	6	88	80	90.91
M2FL	88	6	94	93	98.94
M2TN	83	6	89	90	101.12
MIFL	117	8	125	116	92.80
MNY	80	6	86	72	83.72
N1TN	83	6	89	81	91.01
N2TN	83	6	89	83	93.26
NWNJ	83	6	89	86	96.63
P1AZ	83	6	89	83	93.26
P2AZ	83	6	89	86	96.63
PLNJ	82	6	88	85	96.59
PRRI	83	6	89	82	92.13
S1CA	75	5	80	68	85.00
S1FL	75	5	80	76	95.00
S1MA	63	4	67	62	92.54
S2CA	78	6	84	77	91.67
S2FL	77	5	82	77	93.90
S2MA	78	5	83	84	101.20
SATX	83	6	89	89	100.00
SLMO	83	6	89	87	97.75
T1FL	87	6	93	82	88.17
T2FL	88	6	94	82	87.23
W1NY	35	3	38	33	86.84
WAIL	79	6	85	71	83.53
WOMA	83	6	89	87	97.75
Overall	3493	253	3746	3497	93.35

cah.105

of an unstable local situation out of Radian's control. For the remainder of the 1988 NMOC sites, completeness was over 80%, and generally very near to 100 percent. A complete listing of invalid samples and the reasons for the invalidation are given in Appendix F.

Completeness figures for the 1988 NMOC Program show 93.4% complete. This compares with 95.0% complete in 1987, 96.8% complete in 1986, 95.8% complete in 1985 and 90.6% complete in 1984.[2,3,4,5] Completeness was defined as the percentage of samples, scheduled in the QAPP,[1] that were collected and analyzed as valid samples, beginning with the first valid sample and ending with the last valid sample.

Table 2-2 summarizes statistics by sites into three classifications, Morning Sites, Afternoon Sites, and Above-300-m-Altitude sites. "Morning Sites" were those where an integrated samples was collected from 6:00 a.m. to 9:00 a.m. "Afternoon Sites" collected samples either from Noon to 3:00 p.m. or from 1:00 p.m. to 4:00 p.m. The "Above 300-m-Altitude Sites" collected ambient air samples from 6:00 a.m. to 9:00 a.m. at altitudes above 300 meters from ground level. Morning and Afternoon Site samples were collected at about 10 meters above ground level. The subclassifications of the NMOC Monitoring Sites were made because it was hypothesized that the mean NMOC values would be different in the Morning and Afternoons Sites, or at the higher altitude.

The overall average of the Morning Site NMOC concentration is seen to be 0.636 ppmC, while the Afternoon Site NMOC concentration average is 0.353 ppmC, about 56% of the morning concentration average. The higher altitude sites, although only two in number, average 0.286 ppmC, only 45% of the morning concentration average.

The overall (arithmetic) mean NMOC concentration for 1988 was 0.636 ppmC, 0.738 in 1987, 0.776 in 1986, 0.755 in 1985, and 0.853 in 1984. The overall NMOC statistics given here and elsewhere are generally reported for the NMOC samples taken from 6:00 a.m. to 9:00 a.m., unless otherwise indicated.

In Table 2-2, the means are the arithmetic averages of the NMOC concentrations at each site. The numbers given for standard deviation, skewness, and kurtosis are the second, third, and fourth moments, respectively

TABLE 2-2. 1988 NMOC SITE STATISTICS

Radian Site Code	NMOC, ppmC Minimum	Median	Mean	Maximum	Standard Deviation	Skewness	Kurtosis
Morning Sites							
AUTX	0.316	0.752	0.906	3.895	0.581	2.599	8.785
B1CA	0.096	0.752	0.846	1.880	0.403	0.619	-0.216
B2MA	0.193	0.527	0.631	3.524	0.432	3.989	22.513
BMTX	0.118	0.373	0.746	4.172	0.639	2.906	10.663
BRIL	0.061	0.172	0.270	1.901	0.278	3.669	16.474
C2OH	0.133	0.643	0.848	2.572	0.609	1.217	0.821
C6IL	0.384	0.835	0.904	1.819	0.344	0.594	-0.382
CHNC	0.125	0.378	0.463	1.517	0.304	1.732	2.727
CLOH	0.183	0.784	0.833	2.493	0.480	1.223	1.768
D1MI	0.151	0.499	0.619	2.104	0.426	1.454	2.073
D2MI	0.181	0.602	0.673	2.432	0.409	1.988	5.375
DLTX	0.175	0.472	0.536	1.887	0.298	2.142	5.997
ELTX	0.121	0.366	0.450	1.897	0.032	2.445	7.790
FECA	0.105	0.350	0.555	1.884	0.050	1.506	1.608
H1TX	0.179	0.917	1.048	3.088	0.599	1.162	1.454
M1NY/BNY	0.040	0.658	0.815	3.186	0.522	2.188	6.605
M1TN	0.097	0.927	0.967	2.444	0.489	0.759	0.954
M2FL	0.016	0.113	0.198	1.500	0.244	2.489	7.892
M2TN	0.090	0.417	0.526	1.791	0.373	1.378	1.586
M1FL	0.171	0.711	1.027	5.890	0.870	2.759	9.985
MNY	0.168	0.654	0.741	2.019	0.400	1.241	1.620
N1TN	0.108	0.411	0.540	1.687	0.391	1.291	0.868
N2TN	0.204	0.683	0.747	1.782	0.372	0.670	-0.013
NWNJ	0.198	0.606	0.772	3.069	0.532	1.845	3.866
P1AZ	0.174	0.890	1.144	3.569	0.775	1.103	0.702
P2AZ	0.106	0.366	0.480	3.563	0.417	5.018	33.349
PLNJ	0.094	0.440	0.595	2.076	0.441	1.458	1.794
PRRI	0.150	0.339	0.399	1.551	0.254	2.455	7.371
S1CA	0.063	0.220	0.386	1.500	0.365	1.646	1.661
S1FL	0.063	0.380	0.451	1.490	0.287	1.483	2.511
S1MA	0.137	0.405	0.562	2.650	0.477	2.856	8.889
S2FL	0.124	0.448	0.482	2.225	0.298	2.843	13.481
S2MA	0.070	0.396	0.485	1.946	0.325	2.082	5.662
SATX	0.072	0.273	0.364	1.317	0.263	1.793	3.076
SLMO	0.154	0.533	0.668	2.830	0.470	2.467	6.844
T1FL	0.172	0.516	0.661	2.053	0.422	1.478	1.693
T2FL	0.063	0.256	0.327	1.060	0.223	1.230	1.056
WOMA	0.089	0.436	0.525	1.875	0.337	1.541	3.070
Overall	0.016	0.269	0.636	5.890	0.505	2.395	10.411

(Continued)

TABLE 2-2. (Continued)

Radian Site Code	NMOC, ppmC Minimum	Median	Mean	Maximum	Standard Deviation	Skewness	Kurtosis
Afternoon Sites							
AZCA	0.212	0.633	0.625	1.025	0.186	-0.065	-0.741
B2CA	0.107	0.197	0.226	0.725	0.116	2.490	6.926
S2CA	0.077	0.181	0.216	1.472	0.020	5.447	33.271
WAIL	0.065	0.182	0.323	1.631	0.362	2.072	3.266
Overall	0.065	0.165	0.353	1.631	0.280	1.570	2.382
Above-300-m-Altitude Sites							
C3IL	0.046	0.271	0.298	0.799	0.159	0.715	0.459
W1NY	0.058	0.166	0.259	1.210	0.238	2.309	5.917
Overall	0.046	0.150	0.286	1.210	0.187	1.619	4.561

about the arithmetic means. A skewness value greater than zero applies to distributions having a longer tail to the right. A distribution that is normally distributed would have a kurtosis of 3.0. A distribution more peaked (or pointed) than a normal distribution, having the same variance, would have a kurtosis greater than 3.0.

NMOC data for 1988 can be better characterized by a lognormal distribution than by a normal distribution, following the 1987, 1986, and 1985 findings.[2,3,4] Table 2-3 summarizes the 1988 NMOC data using the definitions that characterize a lognormal distribution, overall, and for each site. MU and SIGMA are the mean and standard deviation, respectively, of the logarithm of NMOC to the Napierian base e. The geometric mean is e raised to the power MU; the geometric standard deviation is e raised to the power SIGMA. The mode is the most frequently occurring logarithm of NMOC value for a continuous probability distribution function.

Information listed in Appendix D includes the location of the site, street address as well as the Universal Transverse Mercator (UTM) coordinates for the site (where available), the site code used throughout this report, the Storage and Retrieval of Aerometric Data (SAROAD) Number, and the Aerometric Information Retrieval System (AIRS) Number. In addition, the general classification of the site location, such as "Urban Industrial" or "Urban Residential," is listed. Elevation above sea level and other pertinent information about each site are listed where available.

Appendix E gives the daily NMOC concentration data listed chronologically for the entire sampling season. In addition, figures are given for each site in which NMOC concentrations in ppmC are plotted versus the 1988 Julian date on which the sample was taken. Data tables for each site include the following:

- calendar date sampled;
- Julian date samples;
- weekday sample (M, T, W, H, F);
- sample ID number, assigned consecutively upon receipt of the sample;
- sample canister number;

TABLE 2-3. 1988 NMOC LOGNORMAL STATISTICS

Radian Site Code	Logarithmic Normal Distribution of NMOC						
	Minimum	Mode	Median	Mean	Maximum	MU[a]	SIGMA[b]
Morning Sites							
AUTX	0.316	0.613	0.752	0.894	3.895	-0.238	0.501
B1CA	0.096	0.554	0.752	0.864	1.880	-0.294	0.544
B2MA	0.193	0.432	0.527	0.622	3.524	-0.597	0.493
BMTX	0.118	0.373	0.559	0.735	4.172	-0.534	0.673
BRIL	0.061	0.130	0.172	0.258	1.901	-1.584	0.678
C2OH	0.133	0.389	0.643	0.862	2.572	-0.413	0.728
C6IL	0.384	0.726	0.835	0.907	1.819	-0.172	0.385
CHNC	0.125	0.285	0.378	0.459	1.517	-0.938	0.564
CLOH	0.183	0.501	0.784	0.842	2.493	-0.345	0.589
D1MI	0.151	0.320	0.499	0.623	2.104	-0.695	0.667
D2MI	0.181	0.426	0.602	0.674	2.432	-0.548	0.553
DLTX	0.175	0.381	0.472	0.533	1.887	-0.741	0.472
ELTX	0.121	0.285	0.366	0.444	1.897	-0.959	0.543
FECA	0.105	0.237	0.350	0.553	1.884	-0.875	0.752
H1TX	0.179	0.619	0.917	1.066	3.088	-0.117	0.602
M1NY/BNY	0.040	0.455	0.658	0.840	3.186	-0.379	0.639
M1TN	0.097	0.565	0.927	1.004	2.444	-0.188	0.619
M2FL	0.016	0.038	0.113	0.195	1.500	-2.183	1.048
M2TN	0.090	0.258	0.417	0.530	1.791	-0.874	0.692
M1FL	0.171	0.514	0.711	1.008	5.890	-0.216	0.670
MNY	0.168	0.488	0.654	0.744	2.019	-0.436	0.530
N1TN	0.108	0.269	0.411	0.539	1.687	-0.850	0.681
N2TN	0.204	0.487	0.683	0.756	1.782	-0.426	0.542
NWNJ	0.198	0.444	0.606	0.768	3.069	-0.447	0.604
P1AZ	0.174	0.563	0.890	1.160	3.569	-0.092	0.694
P2AZ	0.106	0.282	0.366	0.470	3.563	-0.925	0.583
PLNJ	0.094	0.280	0.440	0.600	2.076	-0.765	0.712
PRRI	0.150	0.270	0.339	0.394	1.551	-1.058	0.501
S1CA	0.063	0.141	0.220	0.379	1.500	-1.301	0.812
S1FL	0.063	0.245	0.380	0.460	1.490	-0.987	0.648
S1MA	0.137	0.315	0.405	0.546	2.650	-0.789	0.606
S2FL	0.124	0.313	0.448	0.481	2.225	-0.875	0.535
S2MA	0.070	0.275	0.396	0.488	1.946	-0.909	0.619
SATX	0.072	0.202	0.273	0.360	1.317	-1.213	0.620
SLMO	0.154	0.420	0.533	0.656	2.830	-0.570	0.546
T1FL	0.172	0.404	0.516	0.657	2.053	-0.582	0.570
T2FL	0.063	0.165	0.256	0.331	1.060	-1.339	0.681
WOMA	0.089	0.287	0.436	0.532	1.875	-0.837	0.641
Overall	0.016	0.269	0.469	0.650	5.890	-0.725	0.767

(Continued)

TABLE 2-3. (Continued)

Radian Site Code	Logarithmic Normal Distribution of NMOC						
	Minimum	Mode	Median	Mean	Maximum	MU[a]	SIGMA[b]
Afternoon Sites							
AZCA	0.212	0.594	0.633	0.596	1.025	-0.519	0.036
B2CA	0.107	0.177	0.197	0.224	0.725	-1.575	0.396
S2CA	0.077	0.157	0.181	0.208	1.472	-1.664	0.435
WAIL	0.065	0.106	0.182	0.305	1.631	-1.539	0.840
Overall	0.065	0.165	0.224	0.349	1.631	-1.302	0.708
Above-300-m-Altitude Sites							
C3IL	0.046	0.171	0.271	0.307	0.799	-1.377	0.626
WINY	0.058	0.117	0.166	0.252	1.210	-1.634	0.714
Overall	0.046	0.150	0.251	0.290	1.210	-1.457	0.661

[a]MU is the mean of ln(NMOC). e^{MU} is the geometric mean.

[b]SIGMA is the standard deviation of ln(NMOC). e^{SIGMA} is called the geometric standard deviation.

- Radian analysis channel;
- NMOC concentration in ppmC, determined by Radian;
- NMOC concentration in ppmC, determined by U.S. EPA, Quality Assurance Division; and
- NMOC concentration in ppmC, determined by U. S. EPA, Atmospheric Sciences Research Laboratory.

Appendix F gives a listing of invalidated or missing samples. Table F-1 lists these data chronologically, while Table F-2 groups the listings by site code. The tables have, for each sample, the site code, the date of the missing or invalid sample, a brief description of the possible cause of the invalid or missing sample, and the assigned cause for the failure. The same information is given in both tables in Appendix F.

3.0 NMOC TECHNICAL NOTES

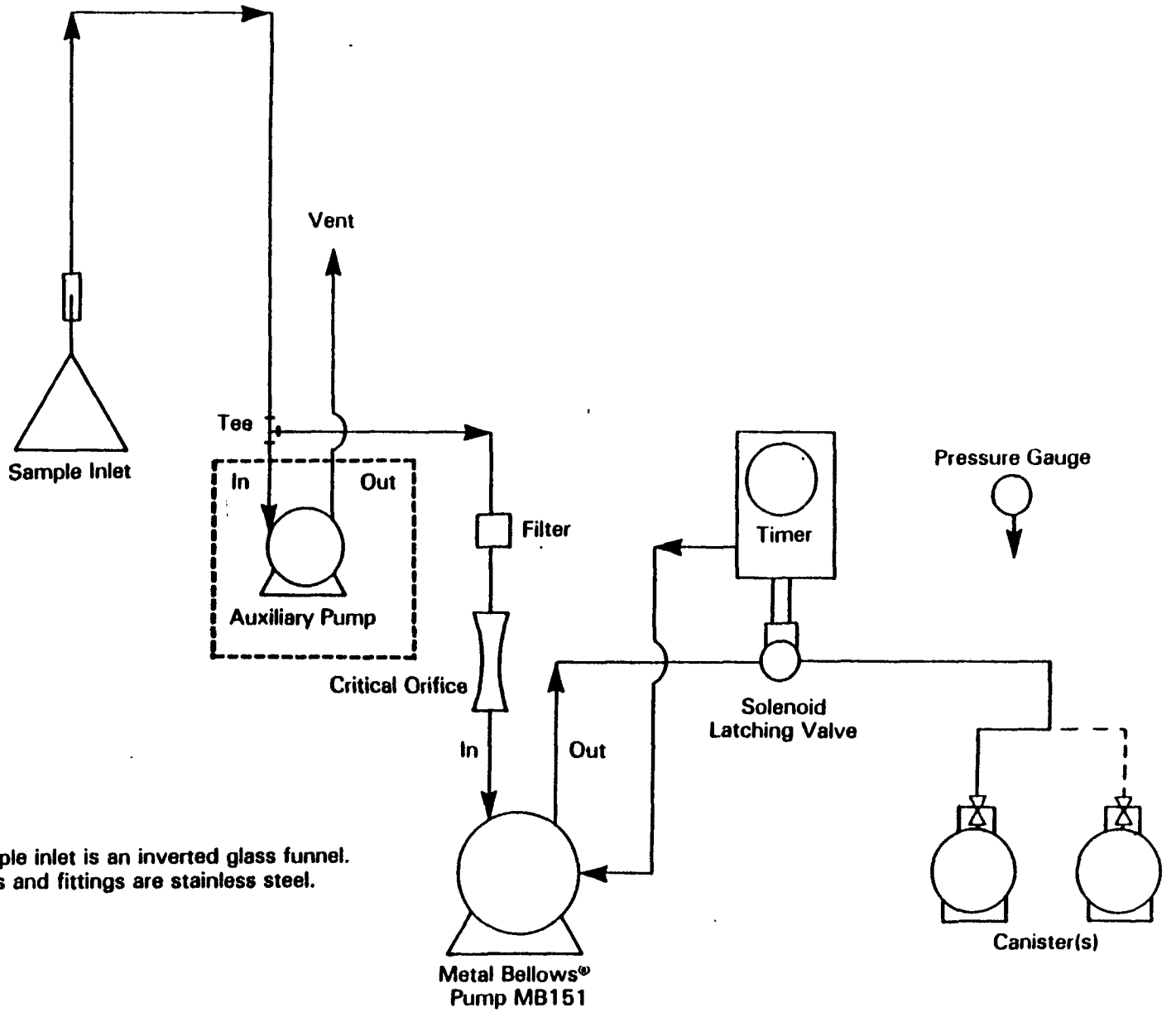
This section includes a summary of the installation and operation of the field sampling equipment, a summary of the analytical equipment and procedures for NMOC measurement, and a description of the canister cleanup equipment and procedures.

3.1 NMOC FIELD SAMPLING EQUIPMENT

The field sampling equipment used in the collection of ambient air samples for NMOC measurement is relatively simple to operate. Ambient air is drawn through a sintered stainless steel filter (2 micron) and critical orifice by a Metal Bellows® pump and delivered to a SUMMA® canister. The sampler components are made of nonbiasing stainless steel. Figure 3-1 shows a schematic diagram of the NMOC sampling system.

3.1.1 Installation

NMOC sampler installation configurations were site dependent. All field sites were installed by or under the direction of Radian personnel. Installation requirements included a temperature controlled environment (70° to 86°F), close proximity to the atmosphere to be sampled, and noncontaminating sampler connections. Glass and/or gas-chromatographic-grade stainless steel tubing are the preferred materials of construction for all connections contacting the sample. Typical sampler installations involved three configurations dependent on site constraints. These installation configurations included direct connections to a ventilated glass manifold, a slipstream connection prior to the station NO_x analyzer with a bypass pump, or collocated NMOC and NO_x sample inlet lines. For sites where the distance between the sample inlet and the stainless steel post was greater than 8 feet, an auxiliary pump, as shown in Figure 3-1, was used. The auxiliary pump helps insure that the air in the sample line is representative of the ambient air. The critical orifice was sized to maintain a constant flow rate and to fill a 6-L stainless steel canister from the 5 mm Hg vacuum to about 15 psig in 3 hours. When duplicate samples were taken the critical orifice used for



* Sample inlet is an inverted glass funnel.
Lines and fittings are stainless steel.

Figure 3-1. Sampling system for collecting 3-hour integrated ambient air samples.

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single sample collection was replaced with an orifice sized to fill two canisters during the 3-hour sampling period.

3.1.2 Operation

Presampling

The following instructions pertain to the sampling operation prior to collection of the field sample.

1.0 Verify timer program (see timer instructions). Set to MANUAL position to leak check sampling system. Once the system passes the leak check, turn timer to AUTO position.

2.0 With no canisters connected to the sampling system, turn the timer switch to the MANUAL position.

3.0 Disconnect the sample inlet from the top of the orifice/filter assembly mounted on the pump inlet. Connect the rotameter to the top of the orifice/filter assembly. Tighten Swagelok® (1/4") fitting securely with a wrench. Do not overtighten.

4.0 Turn timer switch ON. Do not turn the power off and on rapidly. Wait 20 seconds between cycles to prevent premature timer/solenoid failure. The pump should run and the latching valve should open (audible click with 2 to 5 seconds delay). Verify that the rotameter reading is approximately the same (±15%) as the reading obtained during installation as recommended on the orifice tag. If the rotameter reading is not correct, see the troubleshooting instructions.

5.0 Allow the pump to run for at least 20 seconds, then press the timer OFF button.

6.0 Connect a cleaned, evacuated canister to the sampling system. If duplicate samples are to be collected, remove the plug from the second port of the tee and connect a second canister to the sampling system. Remove the orifice assembly marked with an "S," denoting a single orifice. Install the orifice assembly marked with a "D," denoting a double orifice. Replace the filter holder on the "D" orifice. After obtaining scheduled duplicate samples, replace the plug and the "S" orifice assembly to return to single sample collection status.

7.0 With the pump off, open completely the valve on the canister (or on one of the canisters if two are connected) and verify that no flow is registered on the rotameter. If any flow is detected by the rotameter, immediately close the canister valve and see the troubleshooting instructions.

8.0 If no flow is observed, disconnect the rotameter and reconnect the inlet sample line to the filter assembly. If two canisters are connected, completely open the valve on the second canister.

9.0 Reverify that the canister valve(s) is (are) completely open and the timer is properly set for sampling from 6 a.m. to 9 a.m. the next weekday. Set timer to AUTO mode.

10.0 Reset the elapsed time counter.

Postsampling

The instructions that follow outline the NMOC postsampling operation procedures in the field.

1.0 Close the canister valve(s) firmly. Disconnect the canister(s) from the sampling system.

2.0 Connect the pressure gauge to the canister inlet and open the canister valve. Record the canister pressure on the field sampling data form. Close the canister valve and remove the pressure gauge. Repeat pressure measurement for second canister if collecting a duplicate sample. If the pressure reading is not at least 11 psig, see the troubleshooting instructions.

3.0 Fill in the required information on the NMOC SAMPLING FIELD DATA FORM. The form is a multiple page carbonless form. PLEASE PRESS HARD WITH A BALLPOINT PEN (see Figure 3-2).

4.0 Verify elapsed time counter reading equals 3 hours.

5.0 Verify that the timer shows the correct time setting. If not, note that fact on the sample form along with any information pertaining to the possible cause. Reset the timer to the correct time, if necessary.

6.0 Verify that the canister valves are closed firmly. Do not overtighten them. Put the protective cap(s) on the valve(s) and prepare the canister(s) for shipment to Radian, RTP.

3.1.3 Troubleshooting Instructions

A list of troubleshooting instructions was given to each field site during the site installation and operator training. Typical problems encountered with the field sampling apparatus included: loose fittings, misprogrammed timer, or clogged orifice. To minimize downtime, field site

RADIAN CORPORATION

NMOC SAMPLING FIELD DATA FORM

Site Code : _____ SAROAD # : __ · _____ · ____ · ___

Site Location : City: _____ State: _____

Sample Collection Date : _____ Sampling Period : _____

Operator : _____

Final Canister Pressure (psig) : _____

Sample Canister Number : _____ Side : _____

Sample Duplicate for this Date : Yes ☐ No ☐

If yes, Duplicate Canister Number : _____

NOx Analyzer Operating? Yes ☐ No ☐

If yes, Average Reading (ppmv as NOx) : _____

Average Wind Speed : _____ Average Wind Direction : _____

Rotameter Indicated Flow Rate : _____ Orifice Number : _____

Average Barometric Pressure (mm Hg or inches Hg) : _____

Ambient Temperature (°F) : _____ Relative Humidity : _____

THC Model (if available) : _____ Average THC : _____

Sky/Weather Conditions : _____

_____

Site Conditions/Remarks : _____

_____

_____

Canister Number : _____

Initial Canister Vacuum : _____

_____

Received By : _____

Date : _____

Sample Validity : _____

If Invalid, Reason : _____

_____

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Figure 3-2. NMOC Sampling field data form.

operators were encouraged to relay sampling problems to the Radian laboratory, daily, by telephone. Most sampling problems were addressed through these telephone discussions.

3.1.4 Sampler Performance for 1988

The NMOC sampler was modified in 1988 in order to improve performance. This modification involved replacing the mechanical timer previously used with an electronic version. The electronic timer improves sample integration. An elapsed time counter was added to the sampler to verify sample duration. In addition, all sampler orifice(s) and canisters were subjected to a preseason QC check to ensure field performance. All orifices were checked against the rotameter enclosed in each sampling kit, and referenced to a transfer standard (bubble flowmeter). Prior to field installation, all samplers were operated in the laboratory to establish an expected final pressure range for the canister samples. Two single orifices and one double orifice were tested for each sampler kit.

Due to the preseason checks and modifications, the NMOC sampler performance was improved for the 1988 sampling season. This assessment is based on the consistency of the final sample pressures on a site-specific basis (see Section 4.6). The sampler performance in terms of successful sample collection (i.e., completeness) was comparable to previous years. Overall completeness from all sites averaged 93.4 percent. The site-specific completeness ranged from 77.3% for C6IL to 101.2% for S2MA.

A listing of invalidated or missing samples is contained, chronologically and by site, in Appendix F. Invalidated or missing samples were primarily due to the operator or the site rather than to equipment. Completeness can be improved at certain sites through greater attention to sampling procedure, and by ensuring that trained site personnel are available. Those samples that were invalidated due to equipment failure were assigned to three major categories: timer, canister, and miscellaneous.

A total of 230 missing or invalidated samples were recorded in the 1988 NMOC Monitoring Program. There were 52 invalidated samples related to timer problems, 71 invalidated samples related to canister problems, and 103 remaining invalidated samples. Avoidable operator error accounts for 82.7% of

the timer-related invalidated samples, while 17.3% were attributable to timer malfunctions. The operator's failure to open the canister valve accounted for 38.0% of the canister-related invalidated samples, and 40.9% were attributable to canister leaks. Of the remaining 103 invalidated samples, 49.5% were caused by loose or broken sample lines, or leaking solenoid valves; 51.5% were attributable to missed samples, power outages, or consecutive samples collected into the same canister.

A further improvement in completeness may be possible as site operators gain familiarity with the electronic timer. Revised sampler operating instructions will focus additional attention on timer programming and operation, and will include a daily checklist to eliminate common operator errors.

3.1.5 Field Documentation

The field sample collection information was documented by the site operator on preformatted forms. Figure 3-2 is an example NMOC Sampling Field Data Form. Each canister sent to the field was accompanied with this form. The field data form is a multiple part unit. A copy of the field data form was retained by the site operator for the site notebook. Figure 3-3 is the Invalid Sample Form. This form was completed by the site operator to document the reasons for a missed or invalid field sample collection episode.

3.2 NMOC ANALYSIS

The NMOC analysis equipment and analysis procedure are described in greater detail in Appendix A. A brief description of the equipment and operating procedure used in this study follows.

3.2.1 Instrumentation

Two gas chromatographs were used by Radian. Each was a dual-channel Hewlett-Packard Model 5880 (HP-5880) using flame ionization detection (FID). NMOC instrument Channels A and B refer to the two FIDs on one HP-5880 unit, and Channels C and D refer to the two FIDs on the other HP-5880 unit. These chromatographs were modified to be similar to the prototype unit (EPA-QAD instrument), which is described in Appendix A. The EPA-QAD instrument was used as a reference during this program. In addition, an HP-5880 gas chromatograph located at EPA and equipped with a 60 m x 0.32 mm i.d., DB-1,

RADIAN CORPORATION

V-

NMOC INVALID SAMPLE FORM

Site Code: _____ SAROAD #: __.____.____.____

City: _____ State: _____

Sample Collection Date: _____ Operator: _____

Sample Canister Number: _____

Sample Duplicate for this Date: Yes ☐ No ☐

If Yes, Duplicate Canister Number: _____

Reason for Invalid or Missed Sample: _____

_____

_____

Average NOx Analyzer Reading for this Collection Date: _____

Wind Speed: _____ Wind Direction: _____

Average Barometric Pressure (mm Hg or inches Hg): _____

Ambient Temperature (°F): _____ Relative Humidity: _____

Sky/Weather Conditions: _____

_____

_____

Received By: _____

Date: _____

Action Taken: _____

_____

Resolution: _____

_____

Field Invalid or In-house Invalid

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Figure 3-3. NMOC Invalid sample form.

fused silica capillary column was used as the gas speciation method and as a quality assurance check. This capillary column instrument is called EPA-ASRL channel in subsequent sections of this report.

3.2.2 Hewlett-Packard, Model 5880, Gas Chromatograph Operating Conditions

The sample trap consisted of 30 cm of 1/8-inch outside diameter (o.d.) stainless steel tubing, packed with 60/80 mesh glass beads.

Three support gases were used in this analysis: helium, hydrogen, and hydrocarbon-free air. Details of their use are given below in Table 3-1.

TABLE 3-1. SUPPORT GAS OPERATING CONDITIONS

Purpose	Cylinder Composition	Pressure	Mean Flow Rate[a]
Carrier Gas	Helium	30 psig	28.7 mL/min
FID Air	Hydrocarbon-free air	30 psig	301.2 mL/min
FID Fuel	Hydrogen	32 psig	30.8 mL/min

[a]Flow rates corrected to standard conditions (1 atmosphere pressure, 20°C).

The operating temperatures of the HP-5880 were controlled for the NMOC analysis. The FID and auxiliary area were controlled at 250°C and 90°C, respectively. The oven temperature was programmed from 30°C to 90°C at a rate of 30°C per minute for 4 minutes, holding at 90°C for the fourth minute. Oven and integration parameters were controlled by HP Level 4 programmable integrators. A complete listing of the integrator programming sequence for NMOC measurement by the PDFID method is given in Appendix C.

3.2.3 NMOC Analytical Technique

The modified HP-5880, dual-FID chromatographs were operated during the 1988 study according to the Standard Operating Procedure (SOP) listed in the QAPP.[1] Further description is given below to help explain the analytical apparatus and procedure.

The six-port valve shown in Figure 3-4 was installed in the auxiliary heated zone of the HP-5880 and was pneumatically actuated using chromatographic valve control signals to apply either compressed air or vacuum to the valve. The sample trap itself was located inside the chromatograph's column oven. A section of 1/16-inch o.d. stainless steel tubing was sized to a length that prevented pressure and flow surges from extinguishing the FID flame. This length was determined experimentally and differs for each chromatograph and for each channel within chromatographs. Although the length of tubing effectively substitutes for the pressure restriction provided by a column, it does not perform its separation function.

During sample trapping, a slight excess of sample gas flow was maintained. A pressure change of 80 mm Hg in a 1.7-L vacuum reservoir was used to gauge and control the volume of sample gas cryogenically trapped. After the trapping cycle was complete, the HP-5880 program shown in Appendix B was initiated. When the program triggered a horn emitting an audible beep, the cryogen was removed from the trap and the oven door was closed. The chromatographic program then assumed control of raising the oven temperature, at the preset rate, to release the trapped sample to the FID, and set up the integration parameters.

3.3 CANISTER CLEANUP SYSTEM

A cleanup cycle consisted of first pulling a vacuum of 5 mm Hg absolute pressure in the canister, followed by pressurizing the canister to 20 psig with cleaned, dried air that had been humidified. This cycle was repeated two times during the canister cleanup procedure. The cleanness of the canister was qualified by PDFID analysis. Upon meeting the cleanness criterion, the canister was evacuated to 5 mm Hg absolute pressure a third time, in preparation for shipment to the site.

3.3.1 Canister Cleanup Equipment

A canister cleanup system was developed and used to prepare sample canisters for reuse after analysis. A diagram of the system is shown in Figure 3-5. An oil-free compressor with a twelve-gallon reservoir provided source air for the system. The oil-free compressor was chosen to minimize hydrocarbon contamination. The compressor reservoir was drained of condensed

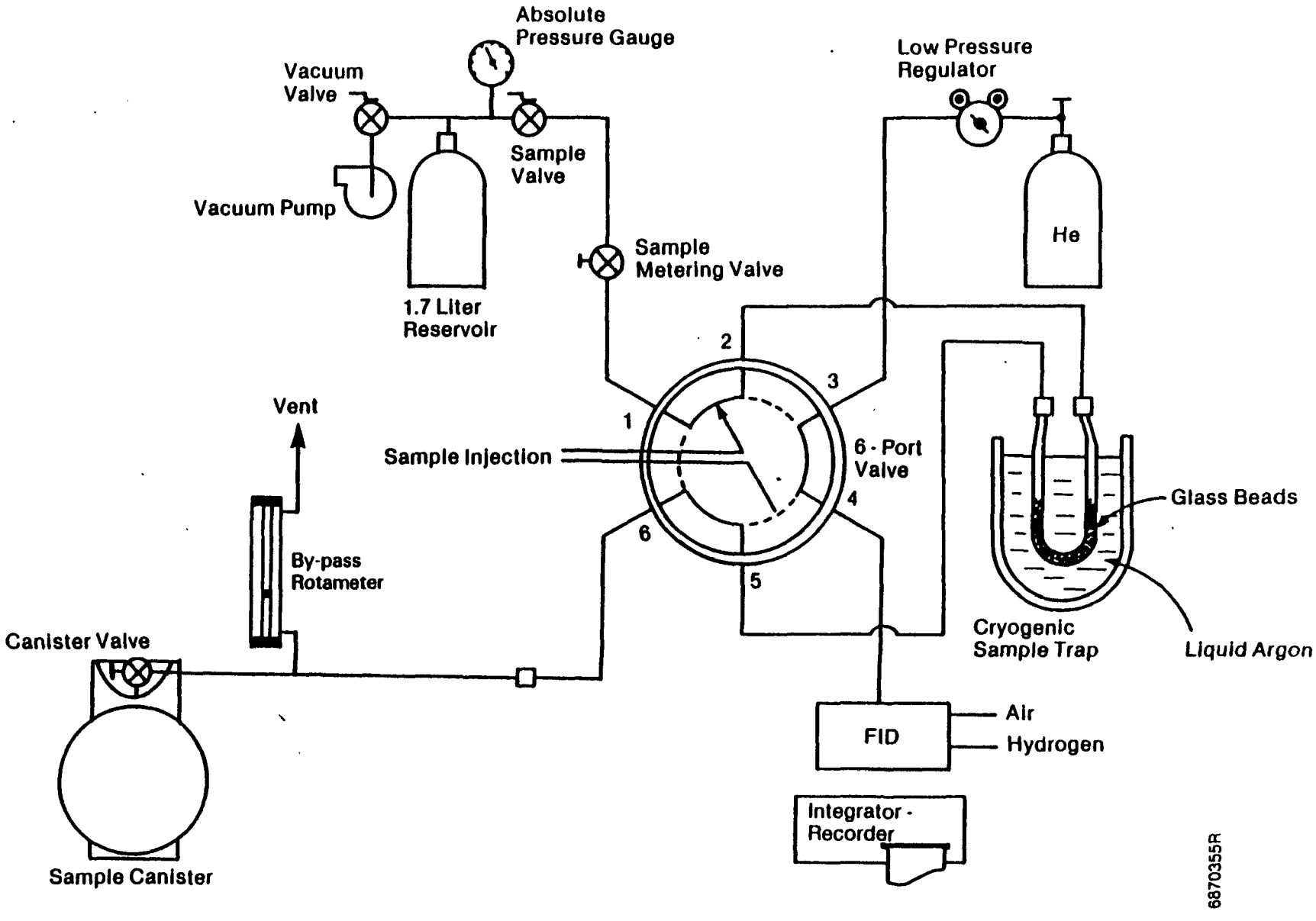

Figure 3-4. NMOC analytical equipment.

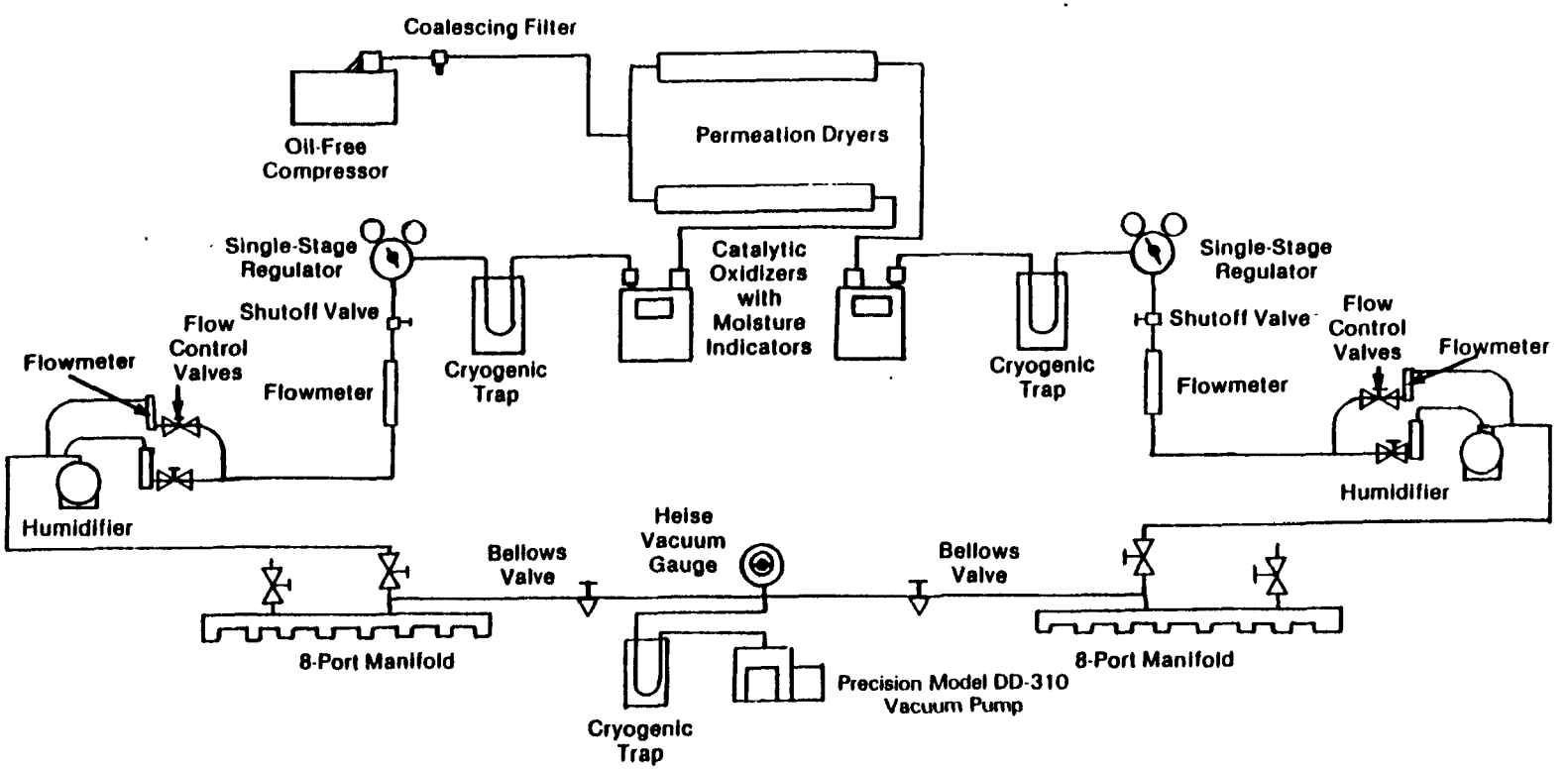

Figure 3-5. Canister cleanup appartatus

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water each morning. A coalescing filter provided water mist and particulate matter removal down to a particle size of one micron. Permeation dryers removed water vapor from the compressor source air. These permeation dryers were followed by moisture indicators to show detectable moisture in the air leaving the dryer. The moisture indicators never showed any water, indicating that the permeation dryers effectively removed all of the water vapor.

Air was then passed through catalytic oxidizers to destroy residual hydrocarbons. The oxidizers were followed by inline filters for secondary particulate matter removal, and by a cryogenic trap to condense any water formed in the catalytic oxidizers and any organic compound not destroyed by the catalytic oxidizer. A single-stage regulator controlled the final air pressure in the canisters and a metering valve was used to control the flow rate at which the canisters were filled during the cleanup cycle. The flow was indicated with a rotameter installed in the clean, dried air line. There was a shutoff valve between the rotameters and the humidifier system. The humidifier system consisted of a SUMMA® treated 6-L canister partially filled with high performance liquid chromatographic-grade (HPLC-grade) water. One flowmeter and flow control valve routed the cleaned, dried air into the 6-L canister where it was bubbled through the HPLC-grade water. A second flow-control valve and flowmeter allowed air to bypass the canister/bubbler. By setting the flow-control valves separately, the downstream relative humidity was regulated. For the 1988 study, Radian used two relative humidity settings. Until July 1988, 20% relative humidity was used. After July, 80% relative humidity was used for canister cleaning. There was another shutoff valve between the humidifier and the 8-port manifold where the canisters were connected for cleanup.

The vacuum system consisted of a Precision Model DD-310 vacuum pump, a cryogenic trap, an absolute pressure gauge, and a bellows valve connected as shown in Figure 3-5. The cryogenic trap prevented the sample canisters from being contaminated by back diffusion of hydrocarbons from the vacuum pump into the cleanup system. There are no oil-free high vacuum pumps currently available. The bellows valves enabled isolation of the vacuum pump from the system without shutting off the vacuum pump.

3.3.2 Canister Cleanup Procedures

After NMOC analyses were completed, a bank of eight canisters was connected to each manifold shown in Figure 3-5. The valve on each canister was opened, with the shutoff valves and the bellows valves closed. The vacuum pump was started and one of the bellows valves was opened, drawing a vacuum on the canisters connected to the corresponding manifold. After reaching 5 mm Hg absolute pressure as indicated by the absolute pressure gauge, the vacuum was maintained for 15 minutes on the eight canisters connected to the manifold. The bellows valve was then closed and the cleaned, dried air that had been humidified was introduced into the evacuated canisters until the pressure reached 20 psig. The canisters were filled from the clean air system at the rate of 7.0 L/min. This flow rate was recommended by the manufacturer as the highest flow rate at which the catalytic oxidizers could handle elimination of hydrocarbons with a minimum 99.7% efficiency.

When the first manifold had completed the evacuation phase and was being pressurized, the second manifold was then subjected to vacuum by opening its bellows valve. After 15 minutes, the second manifold was isolated from the vacuum and connected to the clean, dried air that had been humidified. The first manifold of canisters was then taken through a second cycle of evacuation and pressurization. Each manifold bank of eight canisters was subjected to two cleanup cycles.

During the second cleanup cycle, the canisters were pressurized to 20 psig with clean, dried air that had been humidified. For each bank of eight canisters, the canister having the highest precleanup NMOC concentration was selected for NMOC analysis to determine potential hydrocarbon residues. If the analysis measured less than 0.030 ppmC, then the eight canisters on the manifold were considered to be clean. Finally the canisters were again evacuated to 5 mm Hg pressure absolute; they were capped under vacuum and then packed in the containers used for shipping to the field sites.

4.0 NMOC QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

This section details the steps taken in the 1988 NMOC Monitoring Program to ensure that the data taken were of known quality and were well documented. Analysis results are given in terms of precision, completeness, and accuracy. Repeated analyses provided analytical precision. Duplicate samples provided sampling and analysis precision. Completeness was measured in terms of percent of scheduled samples that resulted in valid samples, beginning with the first valid site-specific sample collected and ending with the last valid site-specific sample collected. Accuracy of NMOC concentrations was reported as percent bias of audit samples referenced to an NBS SRM propane by EPA-QAD.

4.1 INTRODUCTION AND CONCLUSIONS

Completeness for the 1988 NMOC study was 93.4 percent. This value compares to 95.0% completeness for the 1987 study, 96.8% for the 1986 study, and 95.8% for the 1985 study, and indicates that good communication and planning were maintained between the site personnel and the laboratory personnel. Precision for the 1988 NMOC study averaged 10.06% absolute percent difference of repeated analysis and compared to 9.61% for the 1987 study, 9.01% for the 1986 study, and 10% for the 1985 study. Bias of the Radian channels for the 1988 audit results ranged from +1.3% to +4.5 percent. In 1987 the accuracy determined from the external audit samples ranged from -2.9% to -0.06 percent. In 1986 bias ranged from -0.52% to -3.3% and in 1985 bias ranged from -2.3% to +5.2 percent.

An initial multipoint performance evaluation was done with propane responses for each Radian channel. Twice daily calibration checks and daily in-house propane QC samples monitored instrument and operator performance. Duplicate site samples showed good overall sampling and analysis precision as well as sample stability.

Data validation was performed on 10.6% of the 1988 NMOC data base, as described later in this section.

Precision and accuracy results for 1988 are comparable to results from previous years and indicate that the data quality are good and meet all of the data quality objectives of the Quality Assurance Project Plan (QAPP).[1] Completeness for 1988 was slightly below that of 1987. But because of local conditions, especially at Chicago and New York, it was not possible to maintain the completeness measure above 95 percent.

Calibration and drift determinations showed that the instrumentation was stable and that the calibration procedures were consistent. Canister cleanup results showed there was negligible carryover from one sample to the next. In-house QC samples of propane demonstrated that the analytical systems were in control.

4.2 CALIBRATION AND INSTRUMENT PERFORMANCE

Initial performance assessments for NMOC were conducted with propane. Daily calibrations were checked with about 3.0 ppmC propane for the NMOC measurements.

4.2.1 Performance Assessment

An initial performance assessment was done on each Radian channel, using propane certified by EPA-QAD. EPA-QAD referenced the certified propane to an NBS SRM No. 1668B propane. The concentration of the propane used in the performance assessment ranged from 0.000 to 17.775 ppmC. The "zero" value was determined using cleaned, dried air from the canister cleanup system described in Section 3.0. Table 4-1 summarizes the performance assessments below. The responses are linear, having coefficients of correlation from 0.999747 to 0.999972. Figures 4-1 through 4-4 show plots of the NMOC performance results for Radian Channels A, B, C, and D, respectively. The plots show the regression line.

4.2.2 Calibration Zero, Span, and Drift

Radian PDFID channels were tested twice daily for zero and span. Zero readings were measured using cleaned, dried air. The zero air was supplied by the same system that cleans air for the canister cleanup system. Span readings used a mixture of about 3.0 ppmC propane-in-dry-air. Calibration factors were calculated from the span and zero readings for each Radian

TABLE 4-1. PERFORMANCE ASSESSMENT SUMMARY, RADIAN CHANNELS

Radian Channel	Cases	Linear Regression Results[a]		
		Intercept	Slope	Coefficient of Correlation
A	14	129.8062	3144.078	0.999961
B	14	-32.5978	3113.285	0.999972
C	14	-67.8560	3032.527	0.999747
D	14	234.4537	3125.524	0.999960

[a]Figures 4-1 through 4-4 plot propane area counts vs. concentration in ppmC.

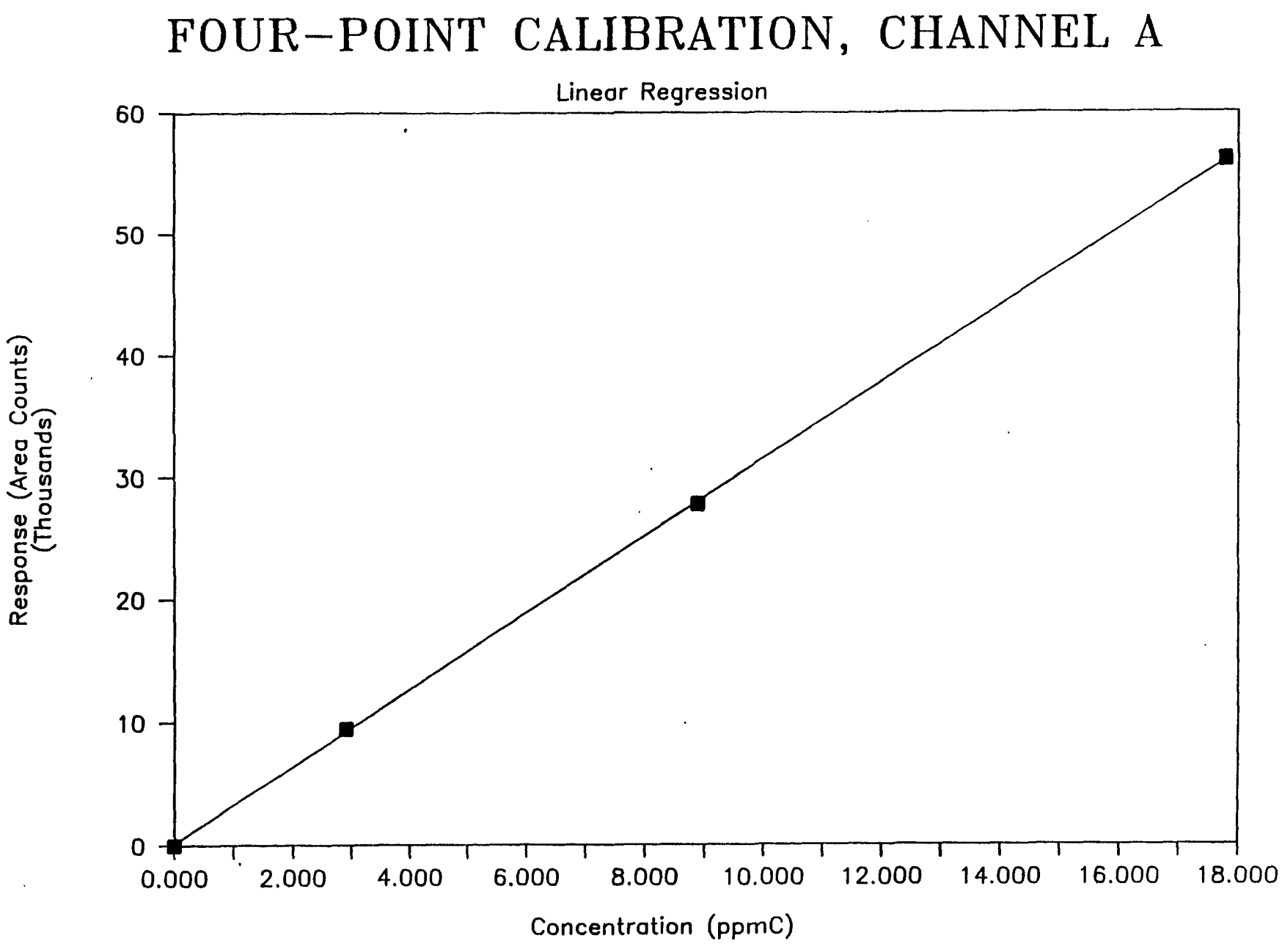

Figure 4-1. NMOC performance results, Channel A.

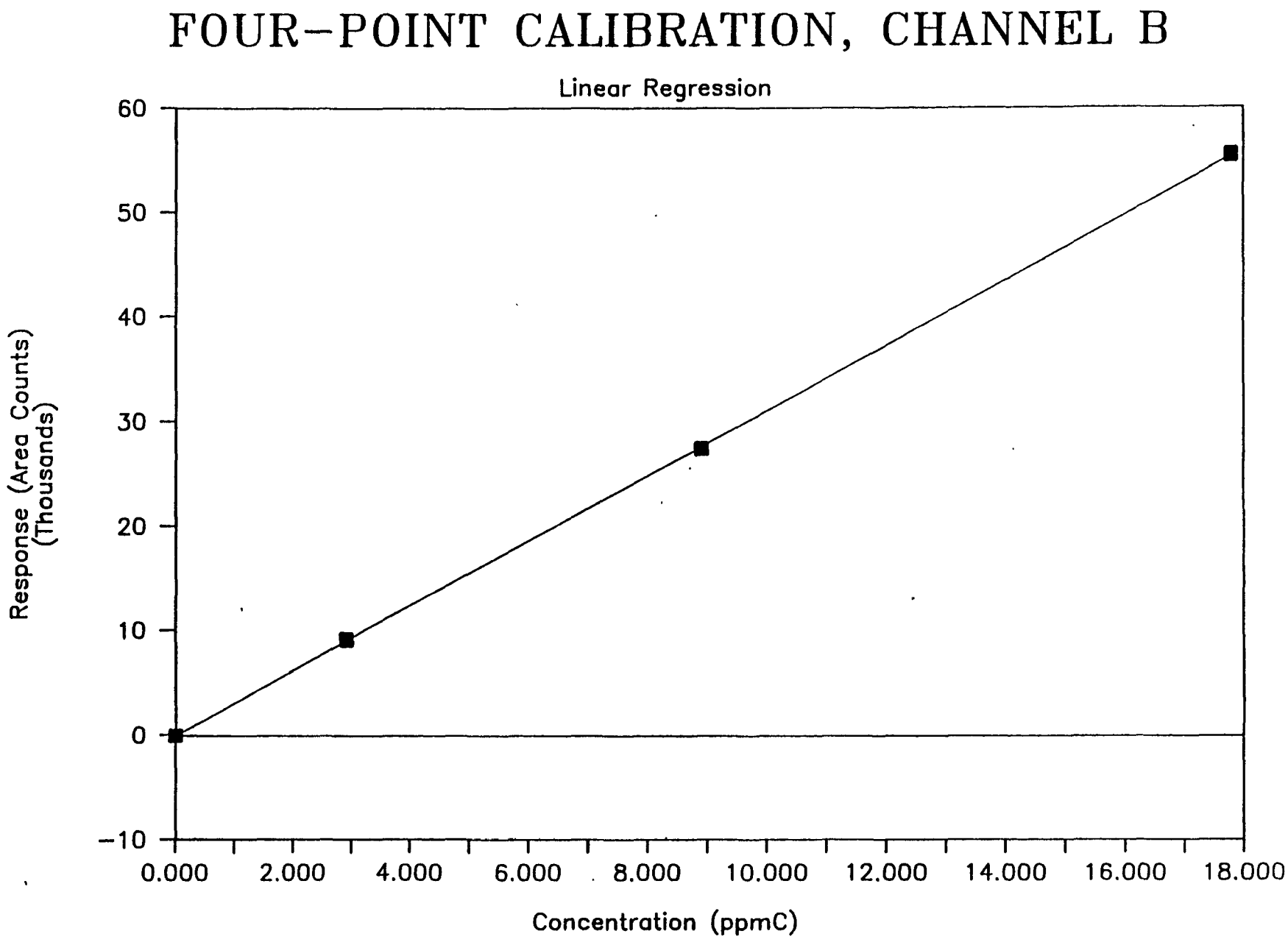

Figure 4-2. NMOC performance results, Channel B.

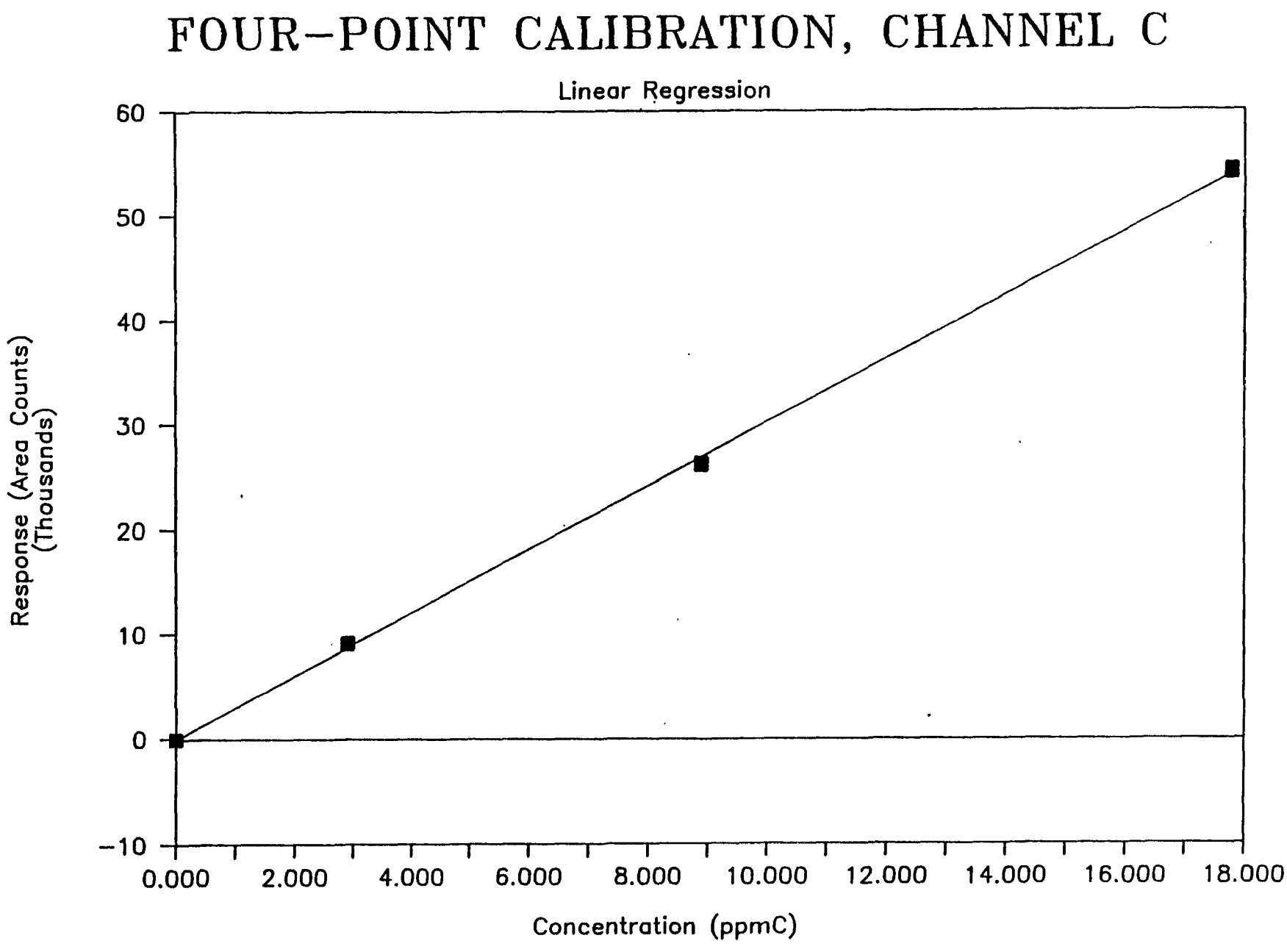

Figure 4-3. NMOC performance results, Channel C.

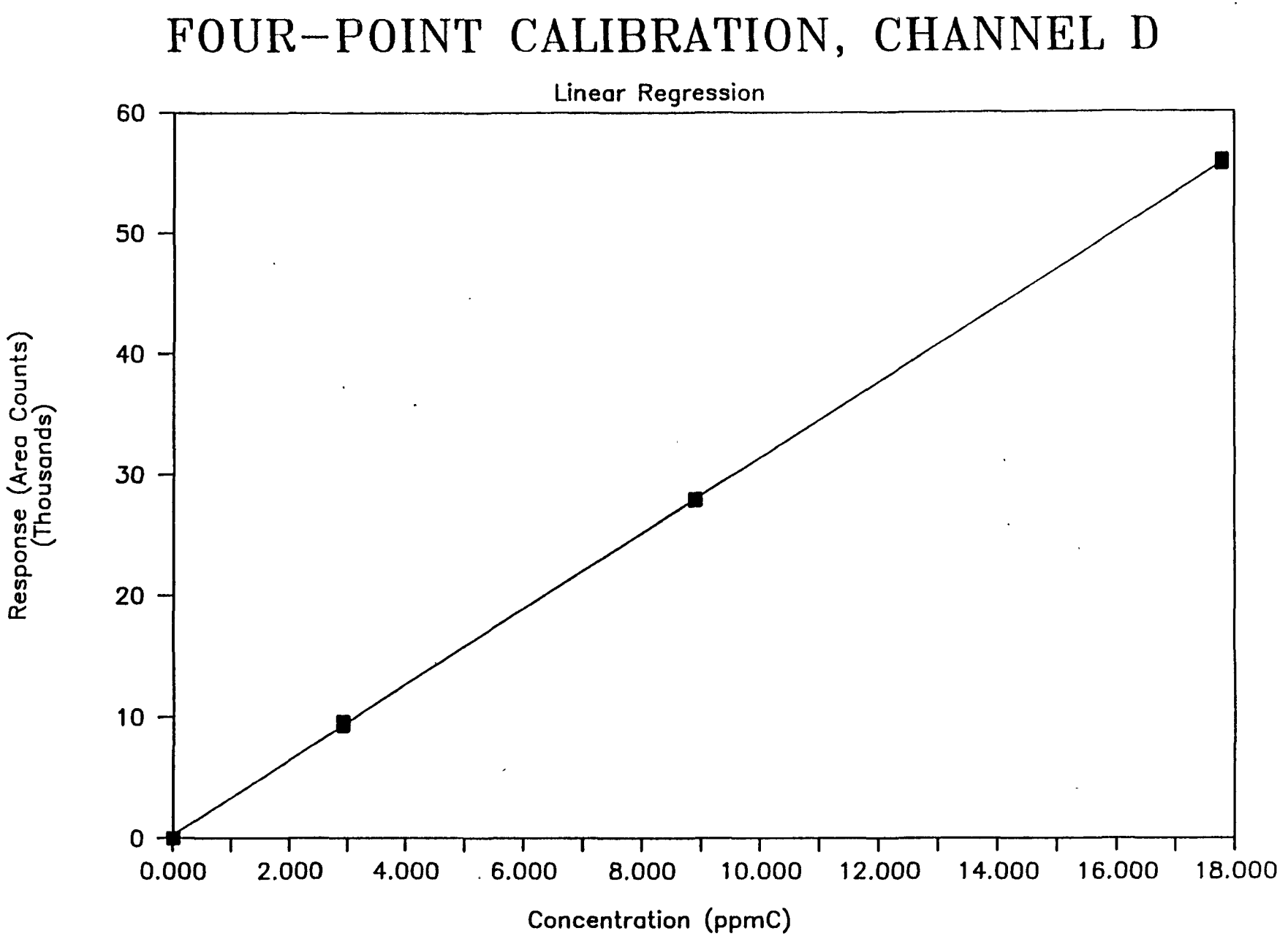

Figure 4-4. NMOC performance results, Channel D.

channel. Initial calibration factors were determined in the morning before any site samples were analyzed and final calibration factors were determined in the afternoon after all the ambient air samples had been analyzed. Percent calibration factor drifts were determined based on the initial calibration factor. The data for zeros, calibration factors, and calibration factor drifts are given in Appendix G for each Radian channel and each calendar day of the analysis season. Figures 4-5 through 4-8 show plots for daily calibration zeros for Radian Channels A, B, C, and D. Figures 4-9 through 4-12 show the daily calibration span data as a function of the 1988 Julian date. Figures 4-13 through 4-16 show daily percent drift figures for the 1988 Julian dates. Inspection of the percent drift figures shows that all of the Radian channels drifted less than 12%, which indicates that the analytical systems were in control and produced excellent results.

4.2.3 Calibration Drift

Summary calibration factor drift data are given in Table 4-2. The table presents calibration factor drift, percent calibration factor drift, and absolute percent calibration factor drift. Calibration factors were calculated from an analysis of a propane-air mixture whose concentration was known and was referenced by the EPA-QAD to an NBS SRM No. 1668B propane reference standard as follows:

$$\text{calibration factor} = \frac{\text{concentration of propane standard (ppm)} \times 3\ \text{ppmC/ppm}}{\text{(propane standard response (area counts) - zero response (area counts))}}$$

Daily calibration factors ranged from 0.000293 ppmC/area count to 0.000334 ppmC/area count, depending on the channel. Maxima, minima, and mean values are given in Table 4-2 for calibration factor drift and percent calibration factor drift. If drift and percent drift are random variables and normally distributed, the mean values would be expected to be zero. The means shown in Table 4-2 for the drift and percent drift are approximately zero, showing little bias overall, or for any channel. The overall mean values shown in Table 4-2 were weighted according to the number of calibration drift data for each channel. The last two columns of Table 4-2 show the means and

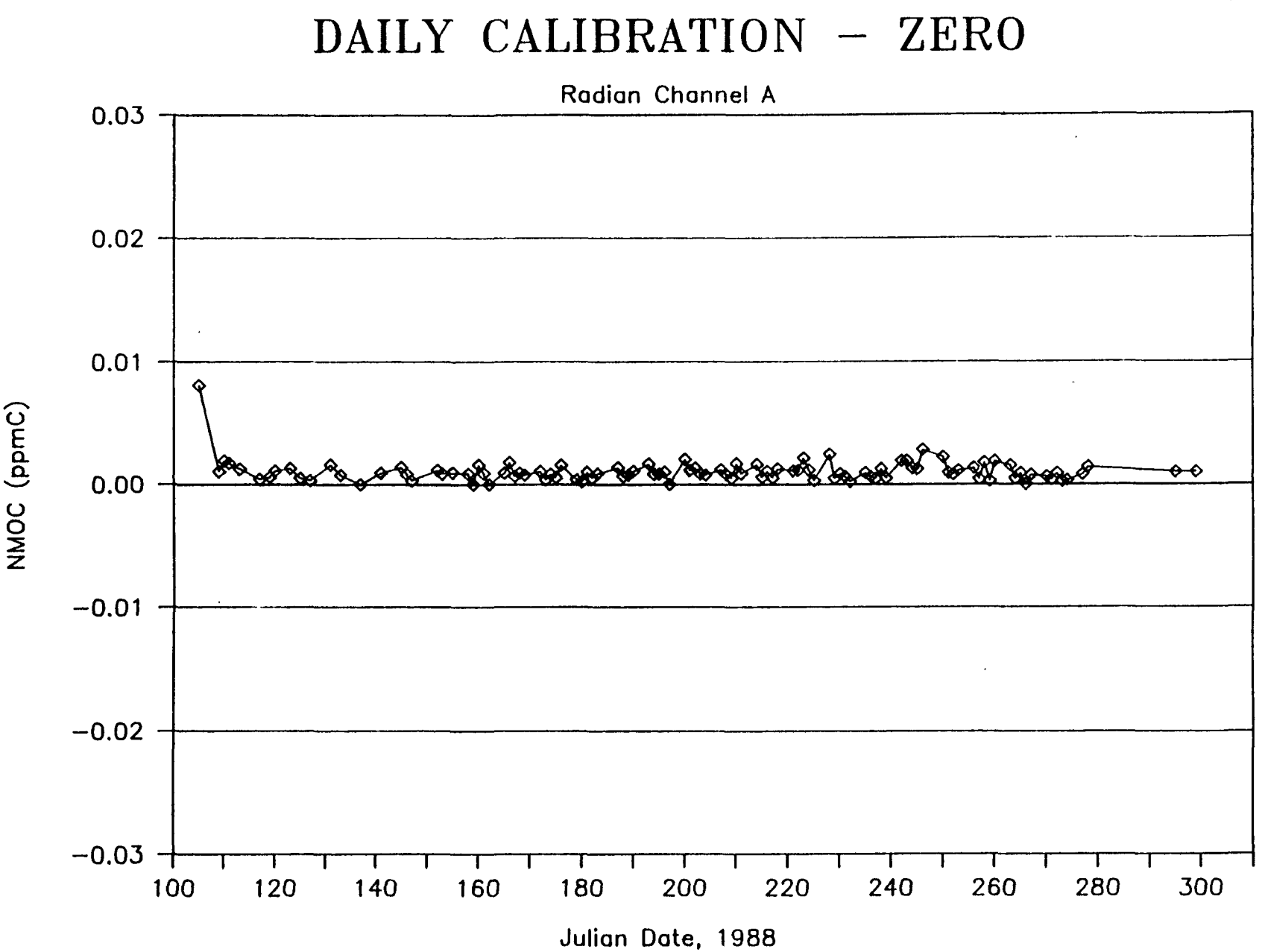

Figure 4–5. Daily calibration zero, Channel A.

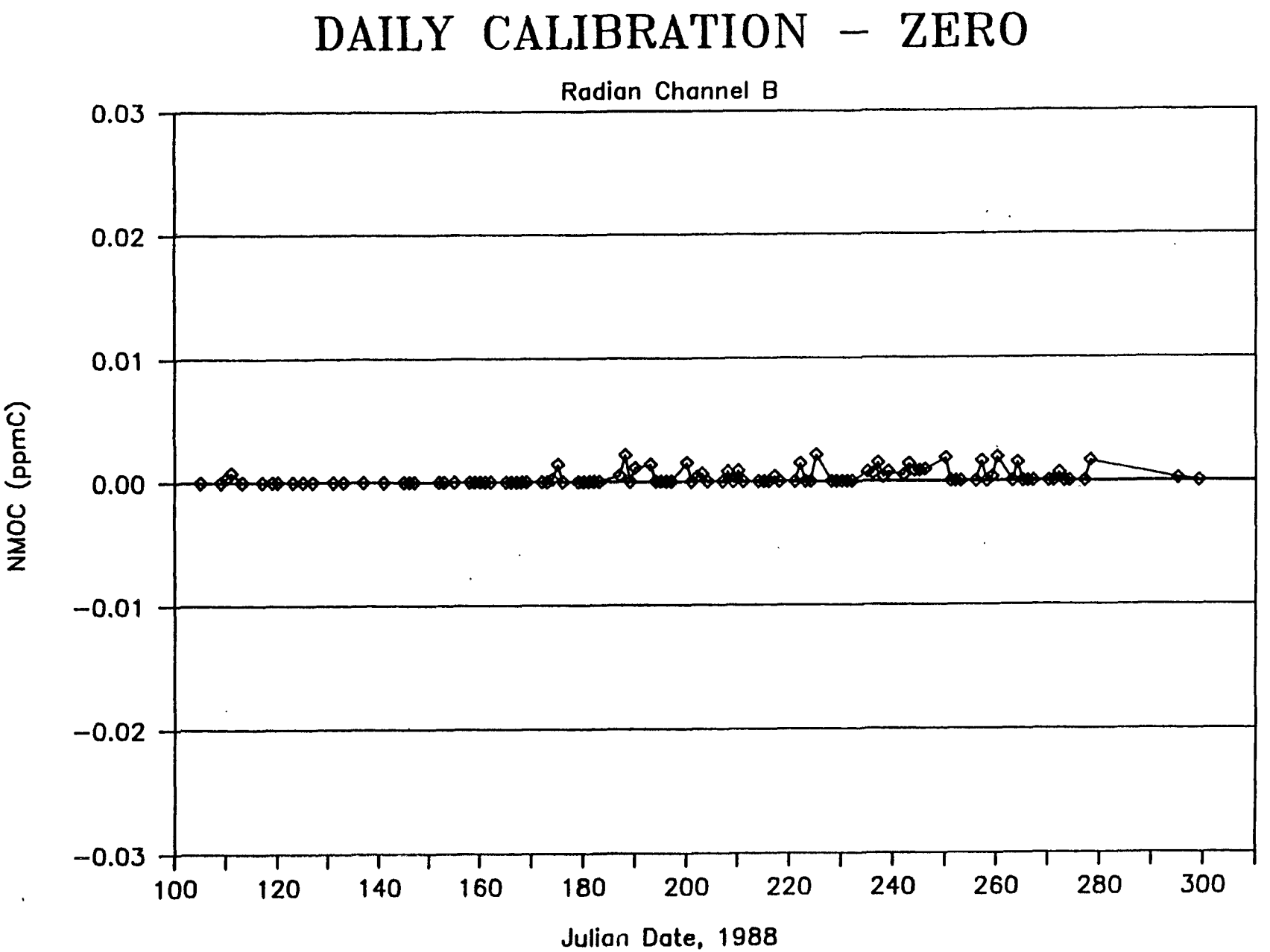

Figure 4–6. Daily calibration zero, Channel B.

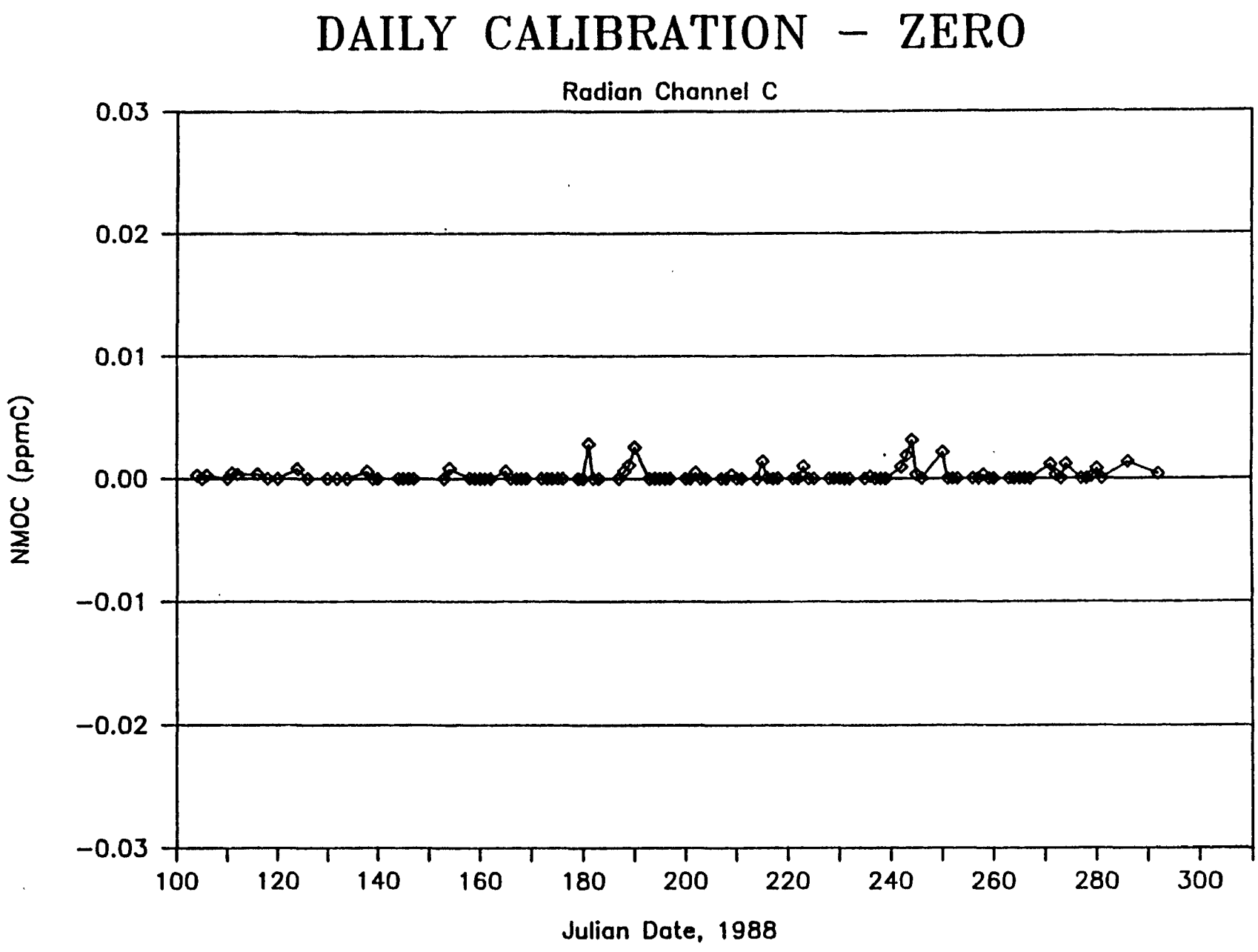

Figure 4–7. Daily calibration zero, Channel C.

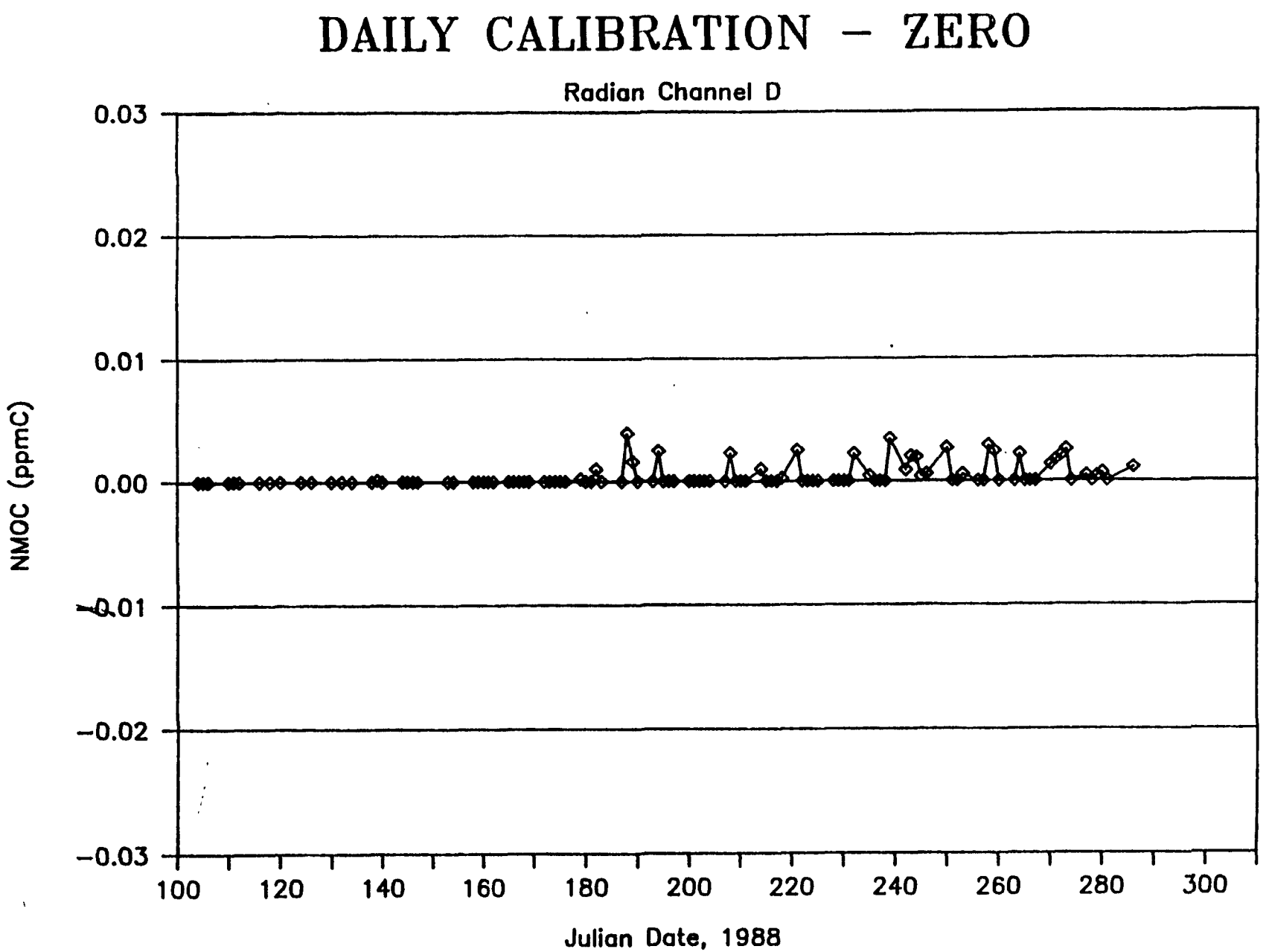

Figure 4–8. Daily calibration zero, Channel D.

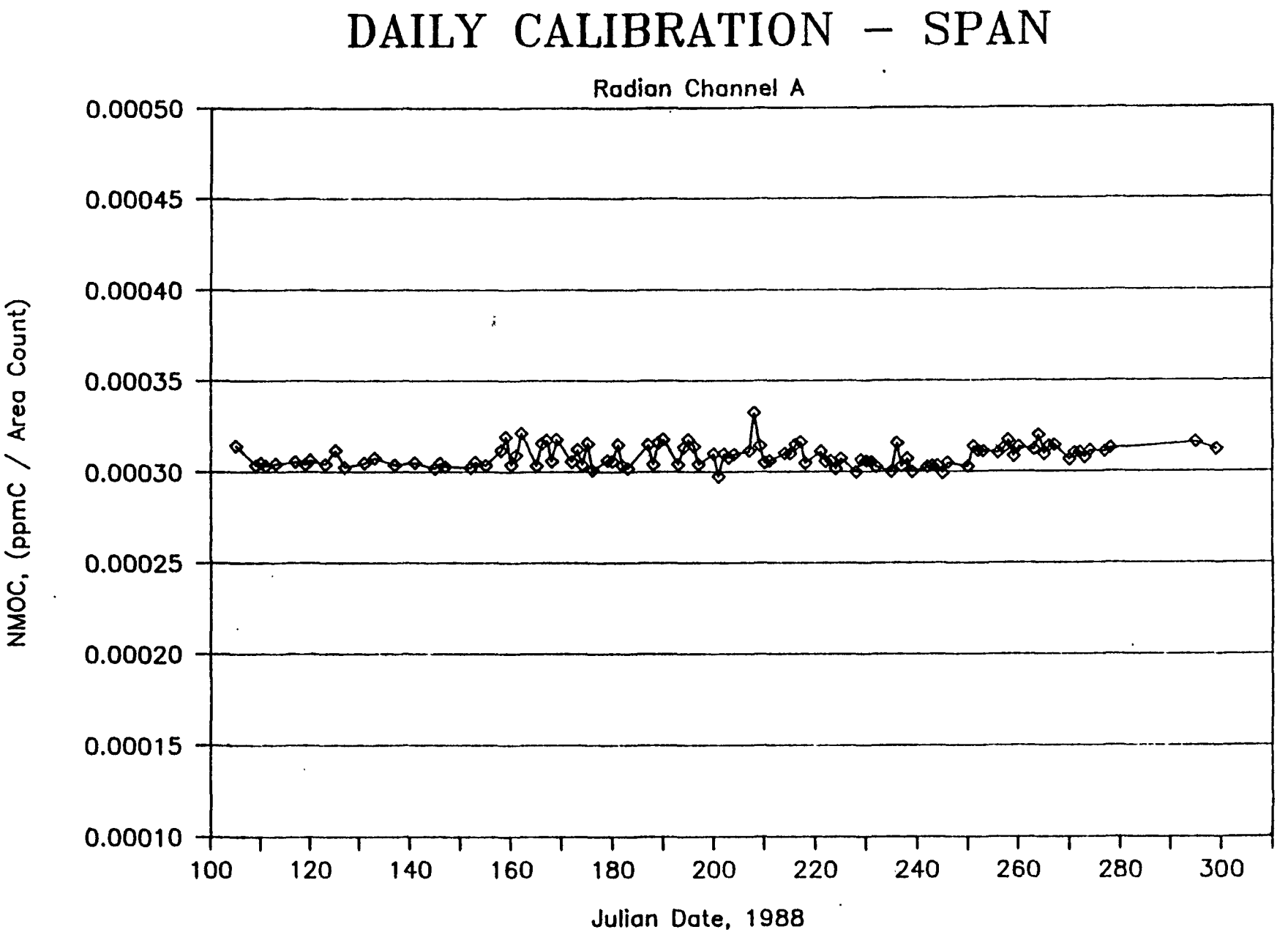

Figure 4–9. Daily calibration span, Channel A.

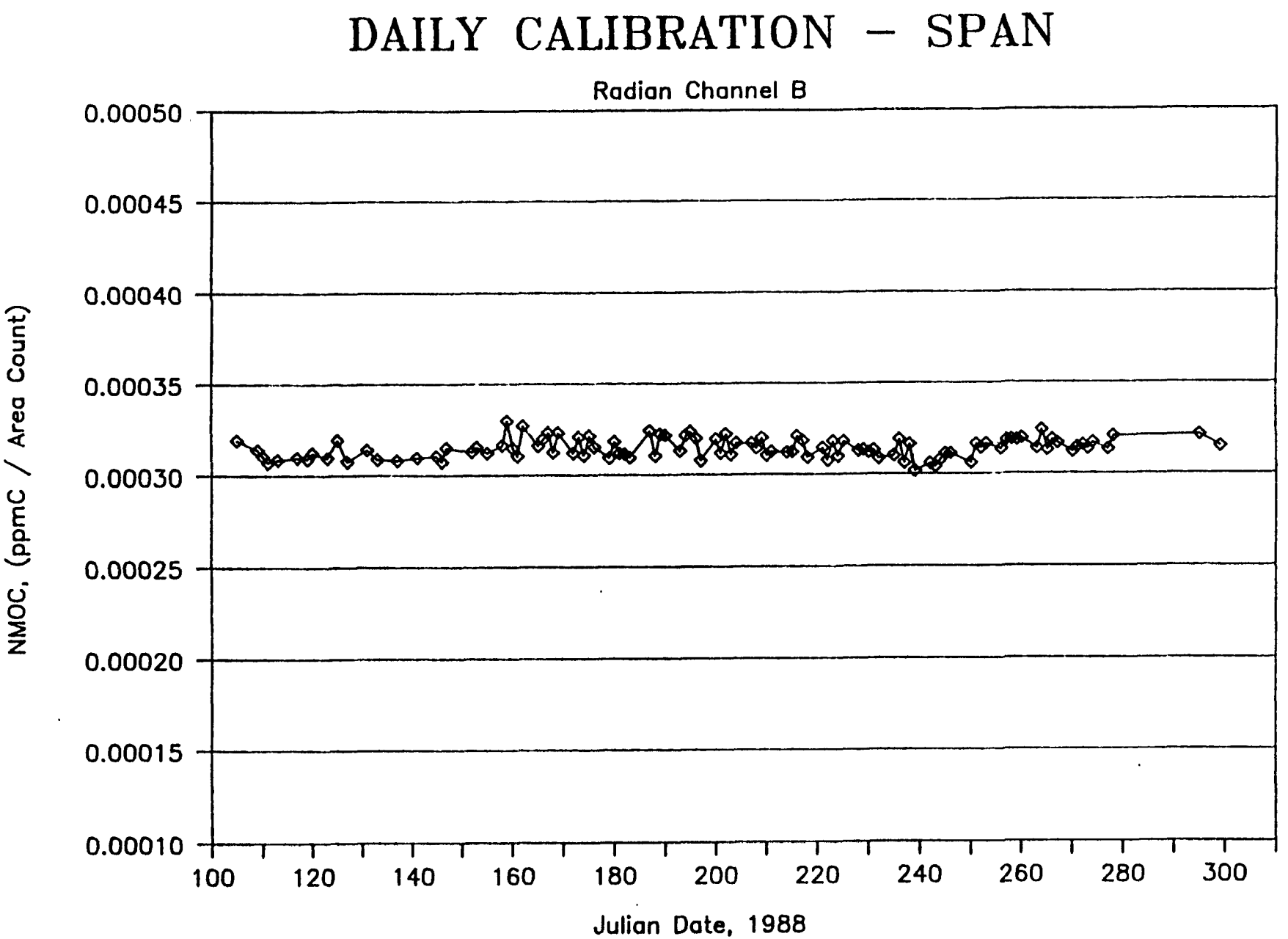

Figure 4–10. Daily calibration span, Channel B.

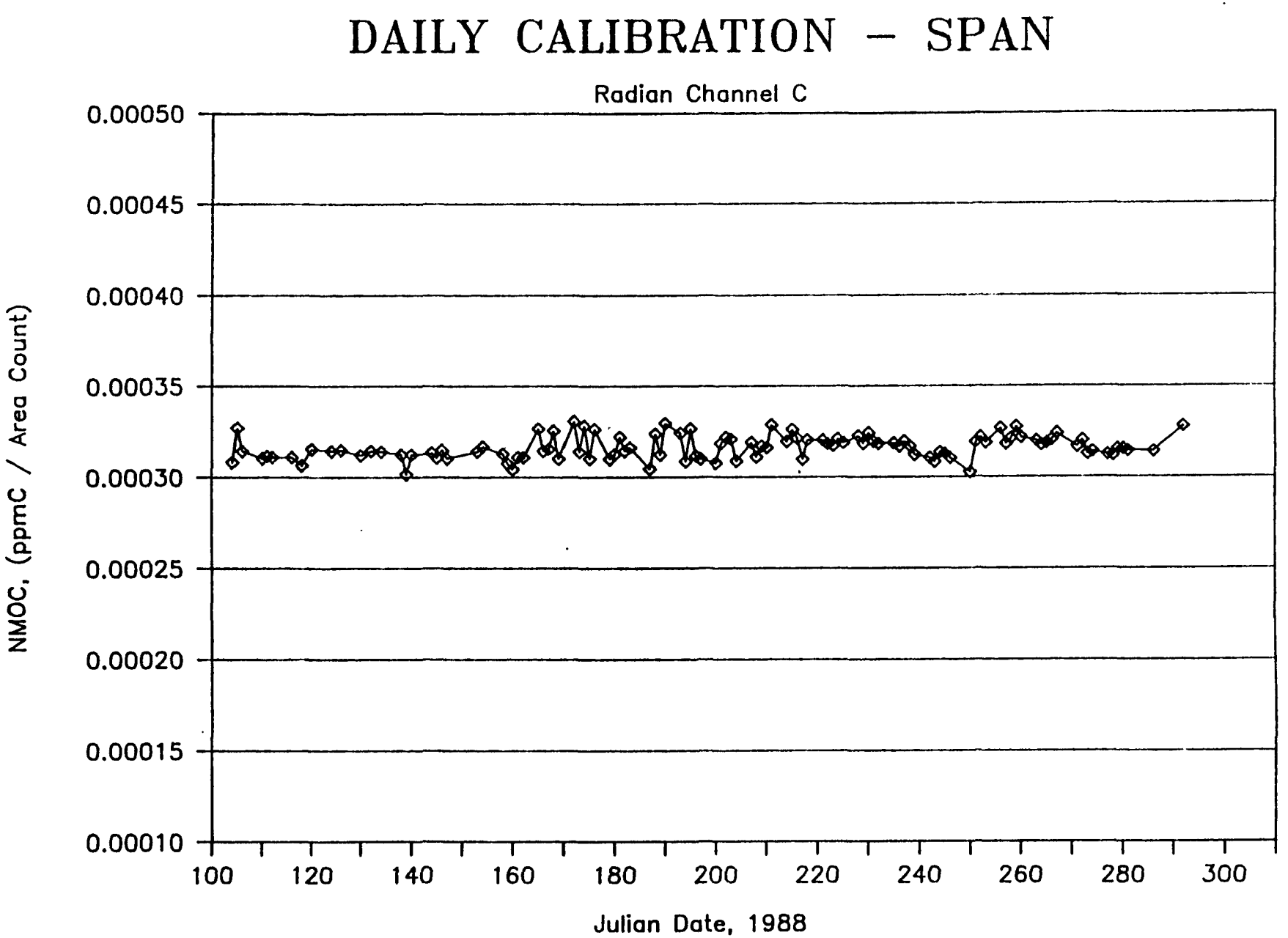

Figure 4–11. Daily calibration span, Channel C.

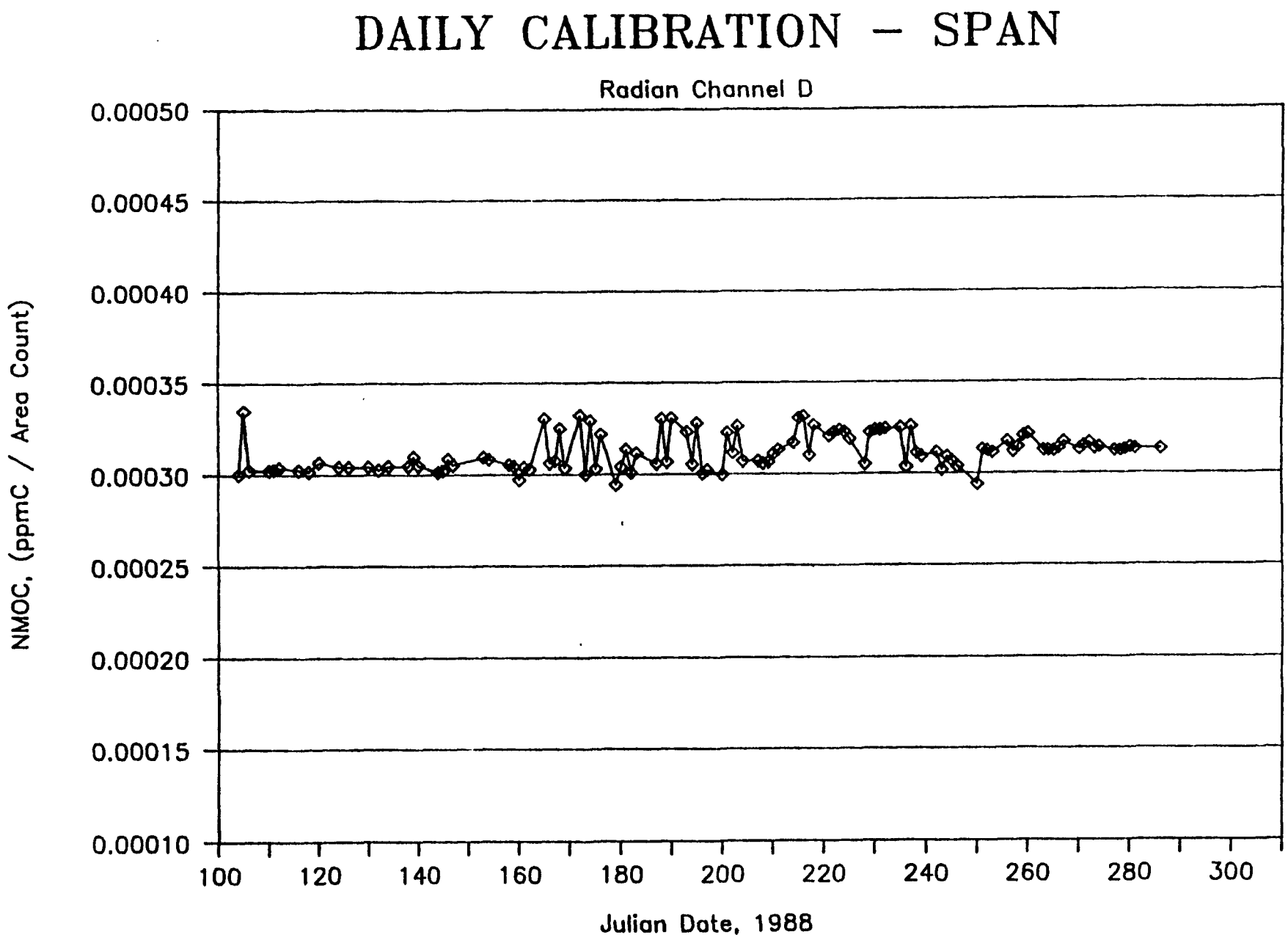

Figure 4–12. Daily calibration span, Channel D.

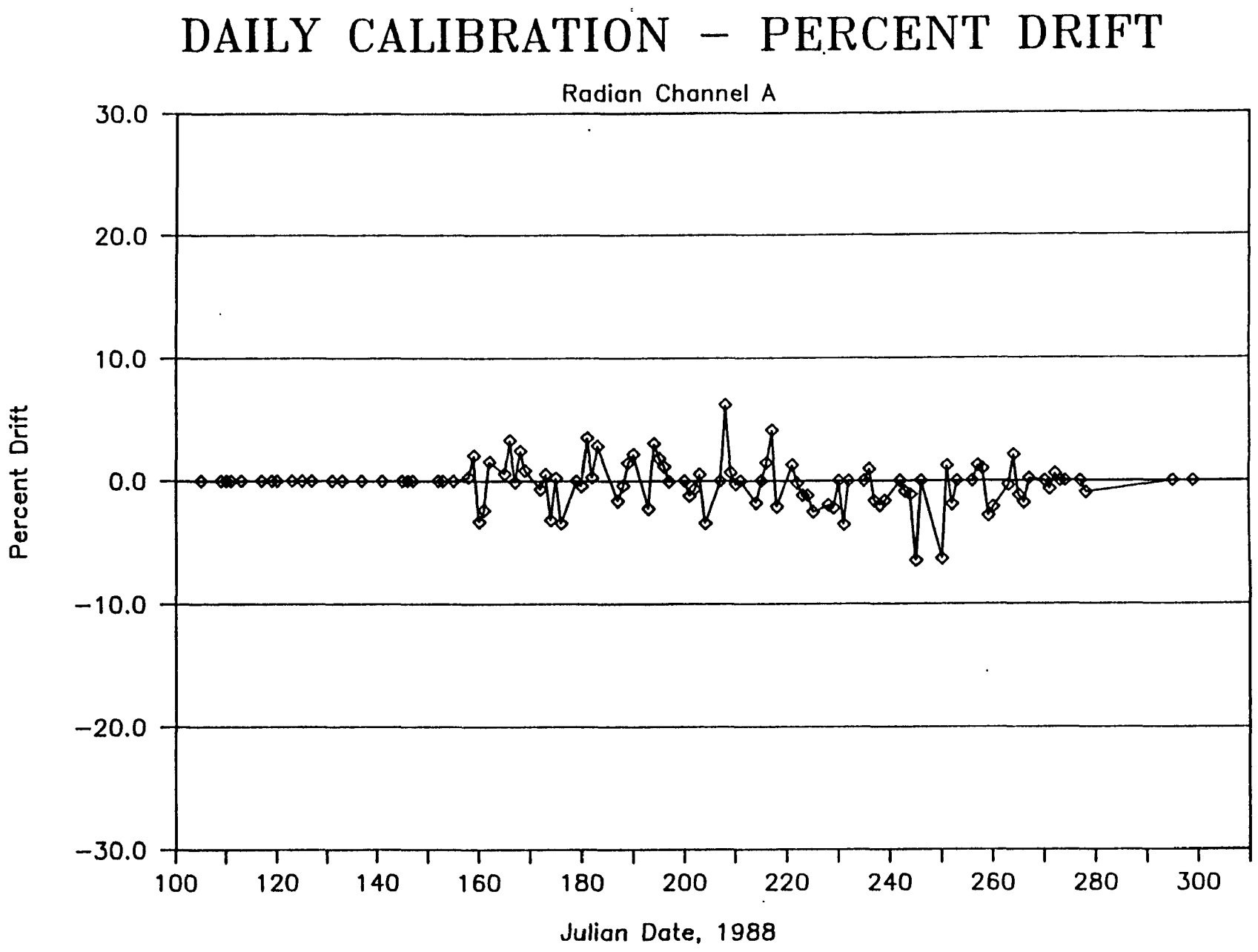

Figure 4–13. Daily calibration percent drift, Channel A.

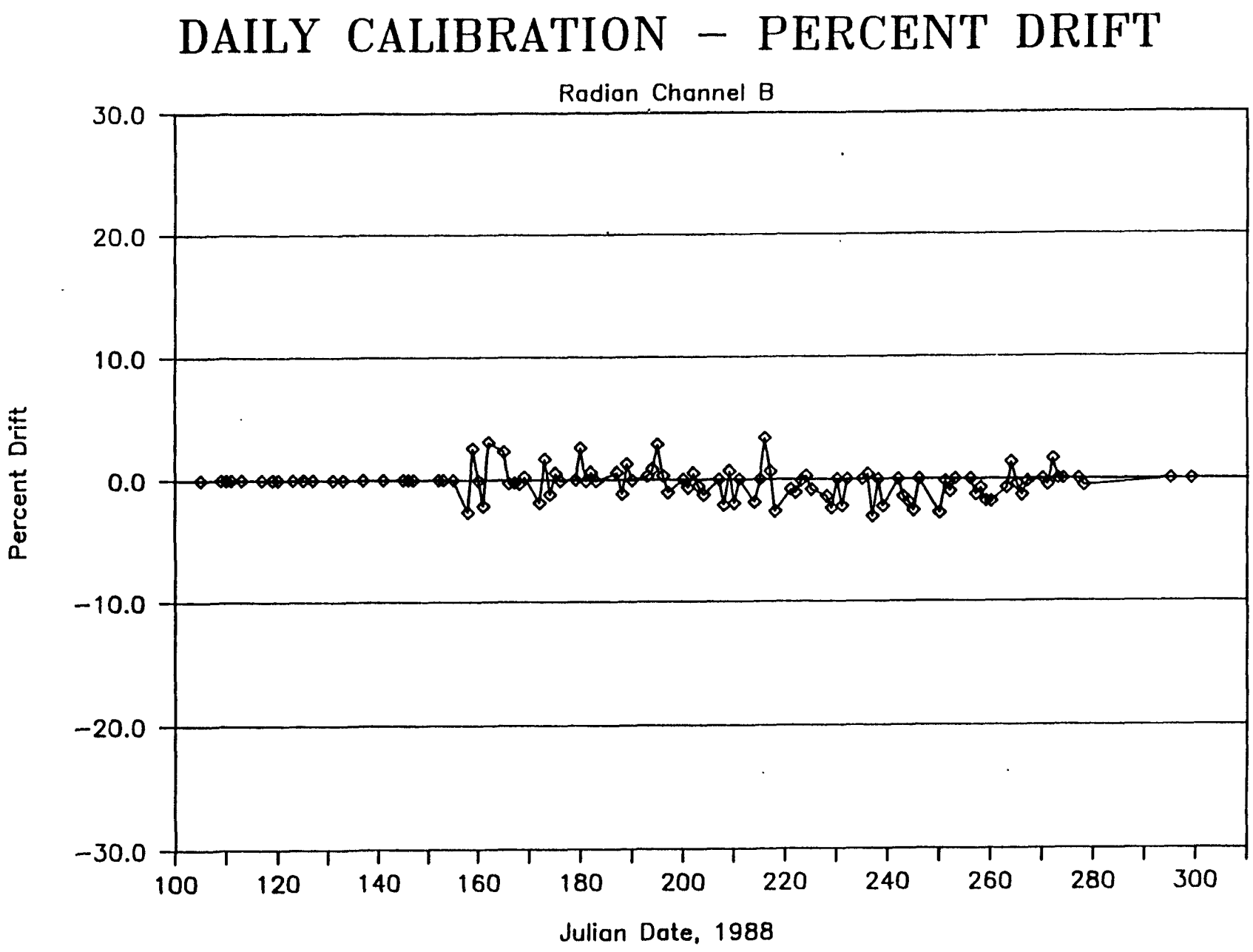

Figure 4–14. Daily calibration percent drift, Channel B.

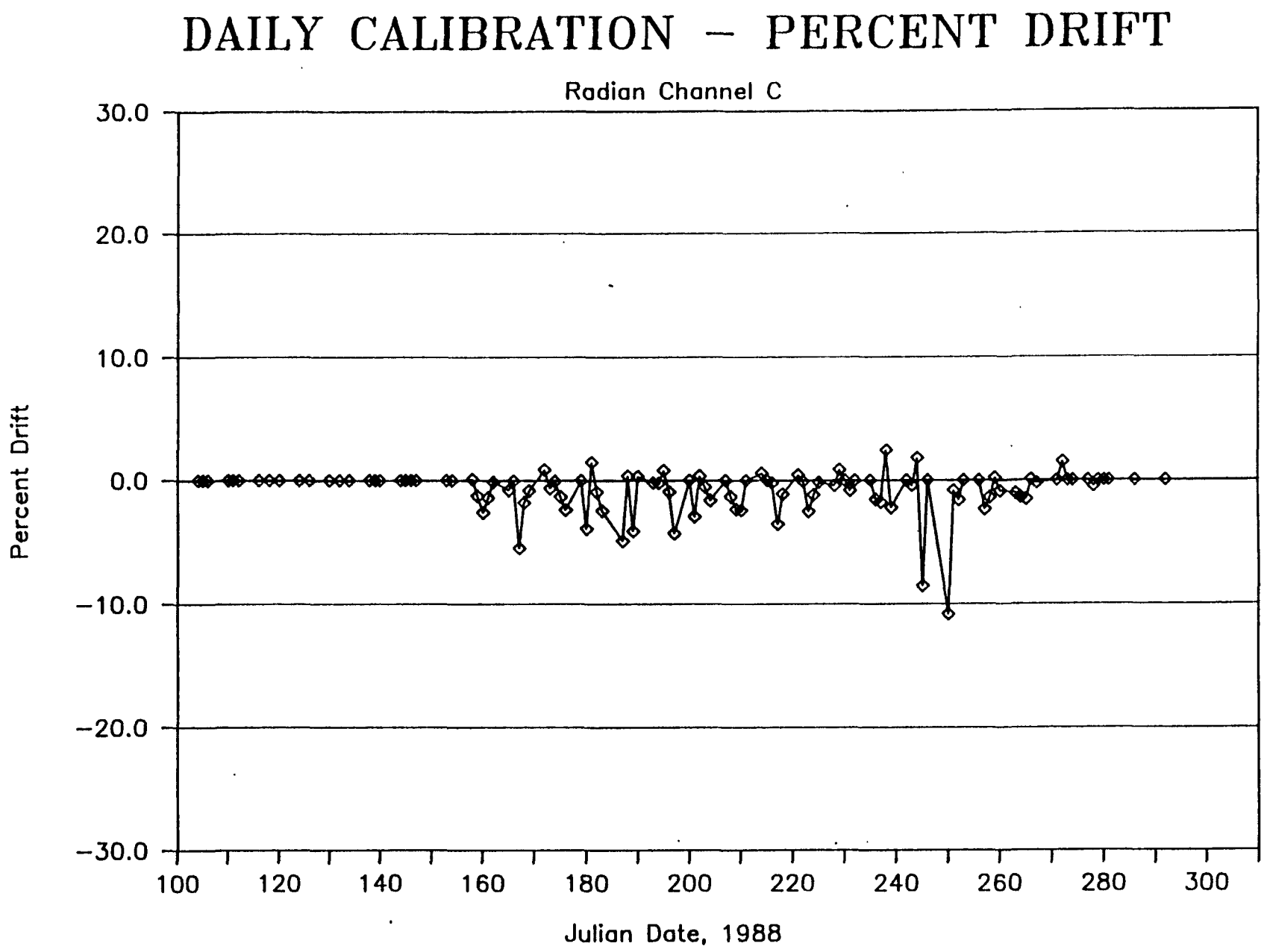

Figure 4–15. Daily calibration percent drift, Channel C.

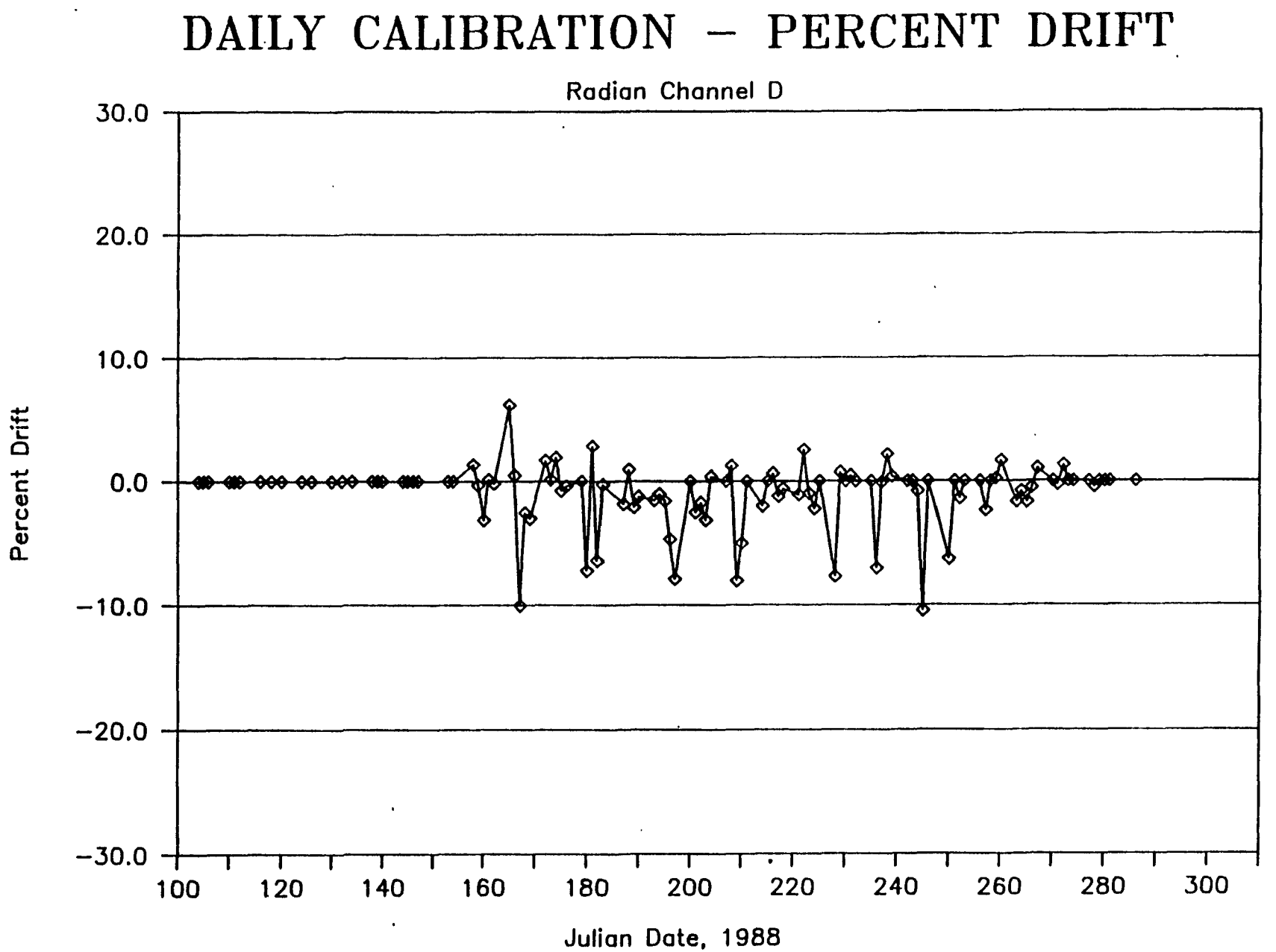

Figure 4–16. Daily calibration percent drift, Channel D.

TABLE 4-2. SUMMARY NMOC CALIBRATION FACTOR DRIFT RESULTS

Radian Channel	Cases	Calibration Factor Drift ppmC/Area Count x 10^{+6}			Percent Factor Drift			Absolute Percent Factor Drift	
		Min	Mean	Max	Min	Mean	Max	Mean	Standard Deviation
A	108	-19	-0.6	21	-6.4730	-0.2127	6.2124	1.1306	1.3911
B	108	-9	0.8	11	-3.0602	-0.2634	3.3254	0.7855	0.9338
C	112	-33	-2.4	8	-10.8368	-0.7718	2.4570	0.9906	1.6350
D	112	-32	-2.7	20	-10.4483	-0.8814	6.1596	1.3788	2.2430
Overall	440	-33	-1.6	21	-10.8368	-0.5377	6.2124	1.0734	1.6531

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standard deviations of the absolute percent calibration factor drifts. The fact that the standard deviations are the same order of magnitude as the means indicates that the mean calibration factor drifts are not significantly different from zero.

Calibration factor drift was defined as final calibration factor minus initial calibration factor. Percent calibration factor drift was defined as the calibration factor drift divided by the initial calibration factor, expressed as a percentage. The absolute percent calibration factor drift is a measure of the calibration drift variability and averaged 1.07% overall. The mean absolute percent calibration drift ranged from 0.78% for Radian Channel B to 1.38% for Radian Channel D.

4.3 IN-HOUSE QC SAMPLES

In-house quality control samples were prepared daily except for one day during the week on which duplicate local ambient samples were collected for "Round-Robin" analyses. The local ambient samples were analyzed not only by all Radian PDFID channels, but by EPA-QAD and EPA-ASRL instruments. Local ambient sample results are presented and discussed in Section 4.4.4. In-house quality control samples were prepared by diluting dry propane with cleaned, dried air using calibrated flowmeters. The propane used for the in-house quality control samples was certified by the EPA-QAD against an NBS Reference Standard. The concentration of the in-house standard varied from about 0.020 ppmC to 18.000 ppmC, but was set to average near the concentration levels that were being analyzed (0.100 to 3.000 ppmC). The analyst did not know the concentration of the in-house standard prior to analysis.

The daily in-house QC data for each Radian channel are given in Appendix H, and include:

- Calendar date analyzed;
- Julian date for 1988;
- Radian ID Number;
- Calculated NMOC concentration in ppmC;
- Measured NMOC concentration in ppmC;
- Bias (measured NMOC-calculated NMOC); and
- % Bias (Bias * 100 / calculated NMOC).

Measured versus calculated NMOC concentrations in Figures 4-17 through 4-20 show excellent agreement. Table 4-3 summarizes the results of the linear regressions for the Radian in-house quality control data, showing regression intercepts near zero, and slopes and coefficients of correlation all near 1.0.

Tables 4-4 and 4-5 give statistics for in-house quality control measurements. DIFF is the ppmC difference between the measured and the calculated NMOC concentrations, and PCDIFF is the percentage of the difference relative to the calculated value. Both DIFF and PCDIFF may be considered to be bias terms, assuming that the calculated value is the correct NMOC concentration for the in-house QC sample. Overall, PCDIFF shows a mean bias of +1.46%, and ranges from +0.81% for Channel D to +1.90% for Channel B. ADIFF and APCDIFF, absolute values of DIFF and PCDIFF, respectively, were used as measures of precision. The absolute percent difference ranged from 3.05% for Channel C to 3.47% for Channel D and averaged 3.30 percent. These figures show excellent agreement and consistency for the in-house quality control data and include errors, not only in the instrumental analysis but also in the apparatus and method used to generate the QC samples.

Figure 4-21 shows a stem-and-leaf plot of DIFF, the NMOC difference between the calculated and measured in-house quality control samples. The figure shows some negative skewness, but also shows the differences to be approximately normally distributed, which supports the assertion that DIFF is a random variable. The normal distribution of DIFF also implies that there is no significant bias between instrument channels.

4.4 REPEATED ANALYSES

Two types of repeated analyses were conducted in this study. The first type of repeated analysis was conducted primarily to establish precision, and to determine if significant differences in precision existed among Radian (PDFID) channels, the EPA-QAD (PDFID) channel, and the EPA-ASRL (GC/FID) channel. Two samples daily were selected from the received site samples for a second analysis on a Radian channel on the following workday. The second replicate analysis was performed on the day after the first analysis to allow time for the ambient air sample in the canister to equilibrate between analyses. At the beginning of the first analysis, the pressure in the

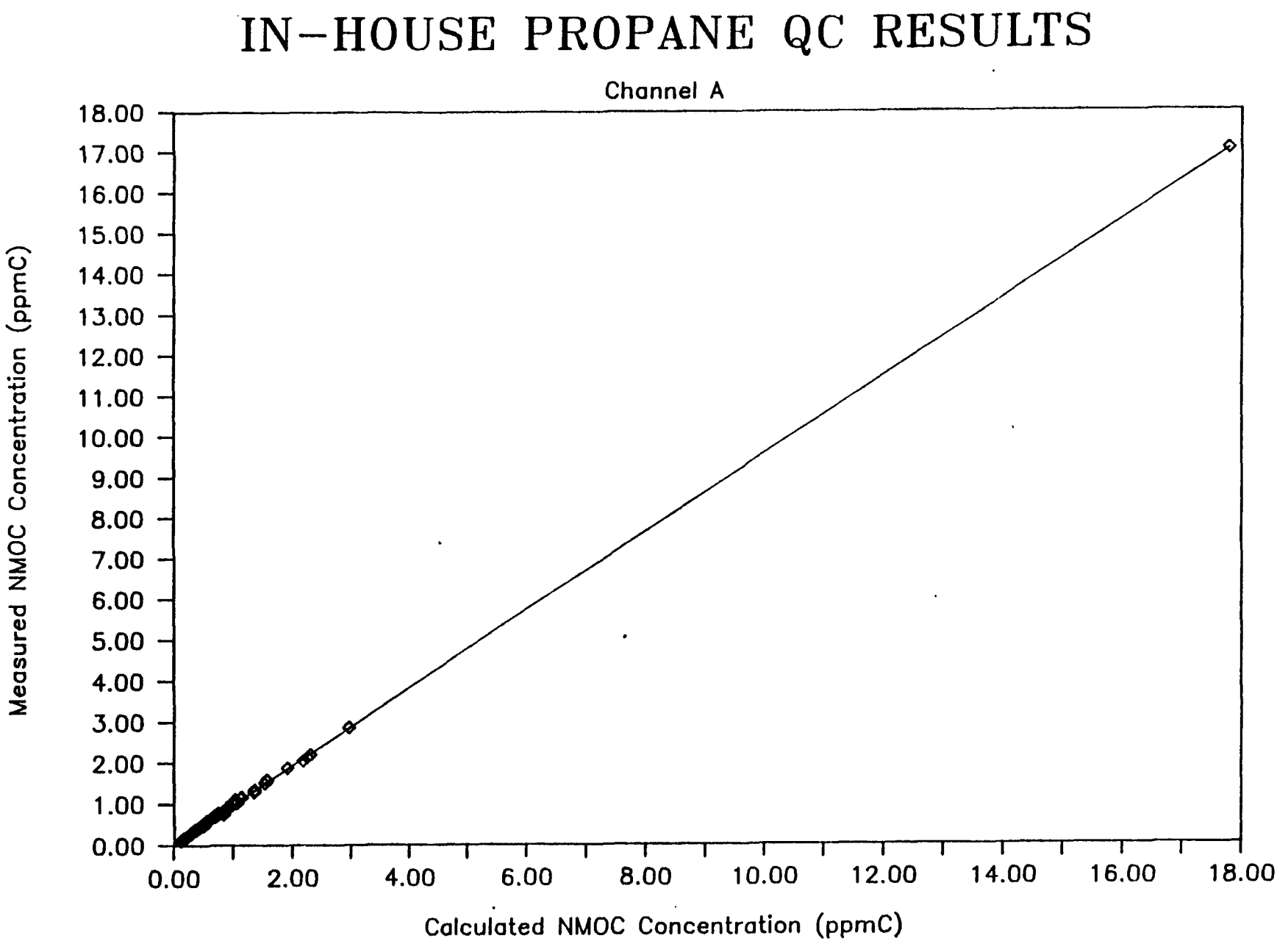

Figure 4-17. In-house quality control results, Channel A.

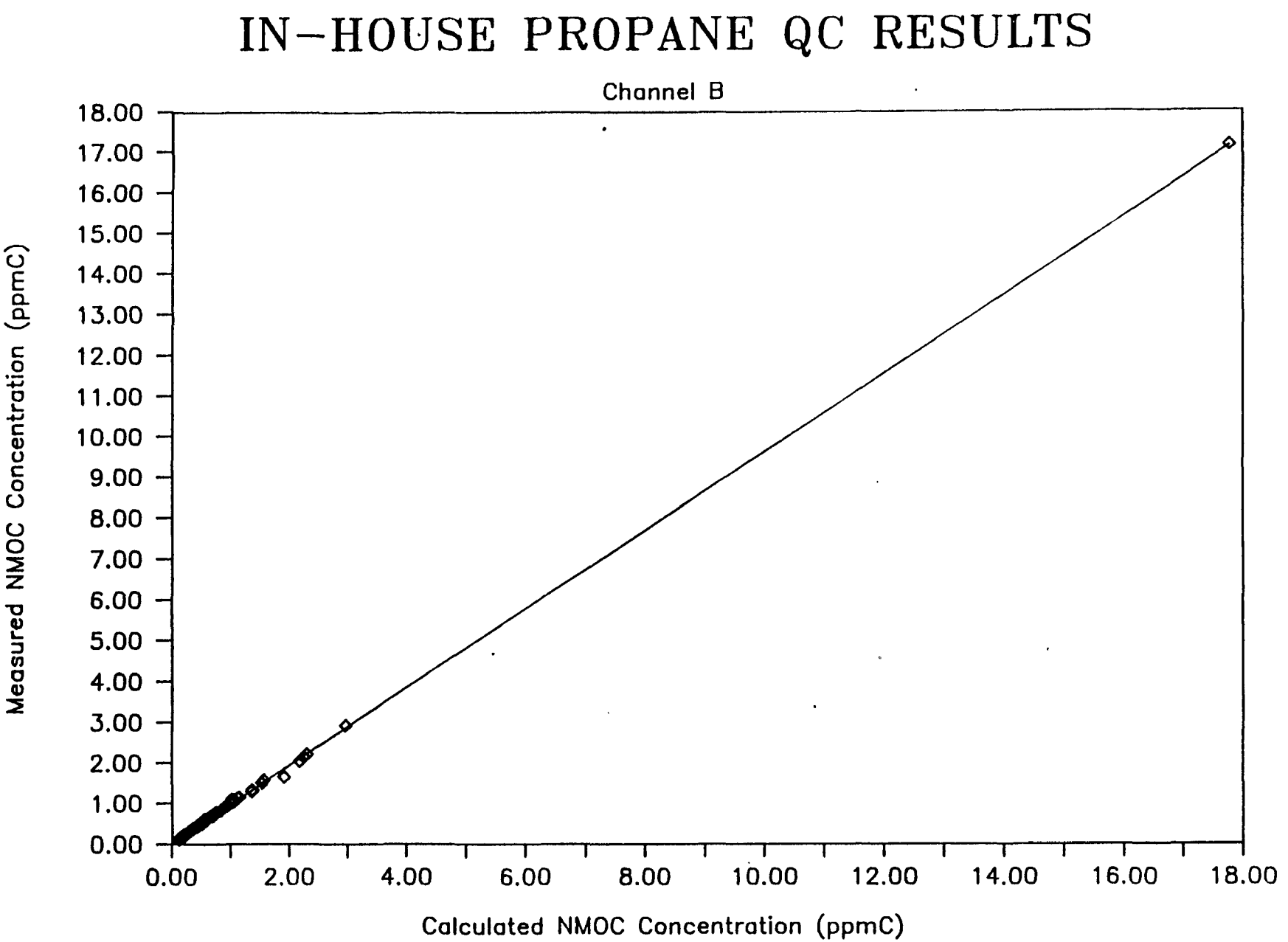

Figure 4-18. In-house quality control results, Channel B.

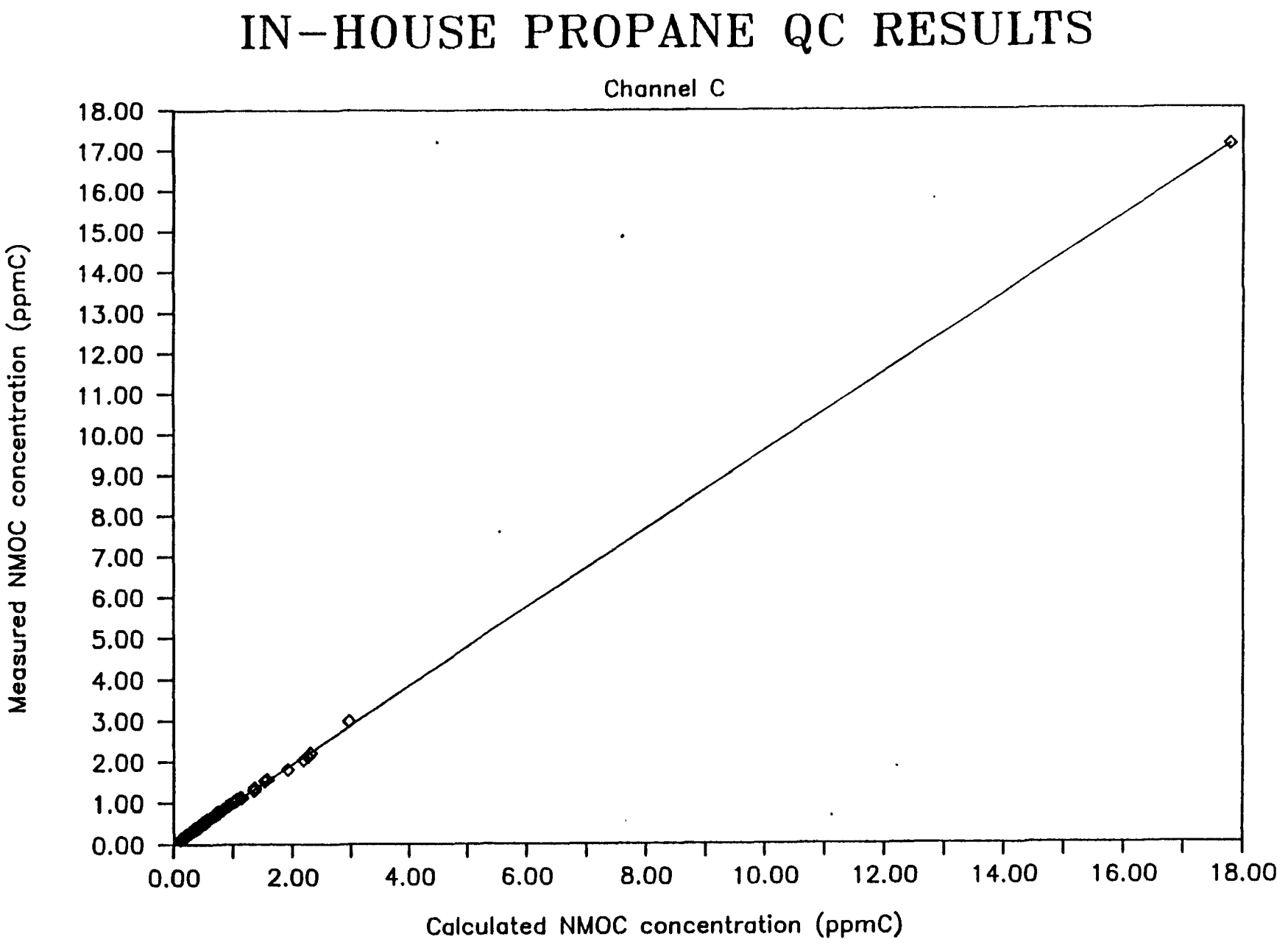

Figure 4-19. In-house quality control results, Channel C.

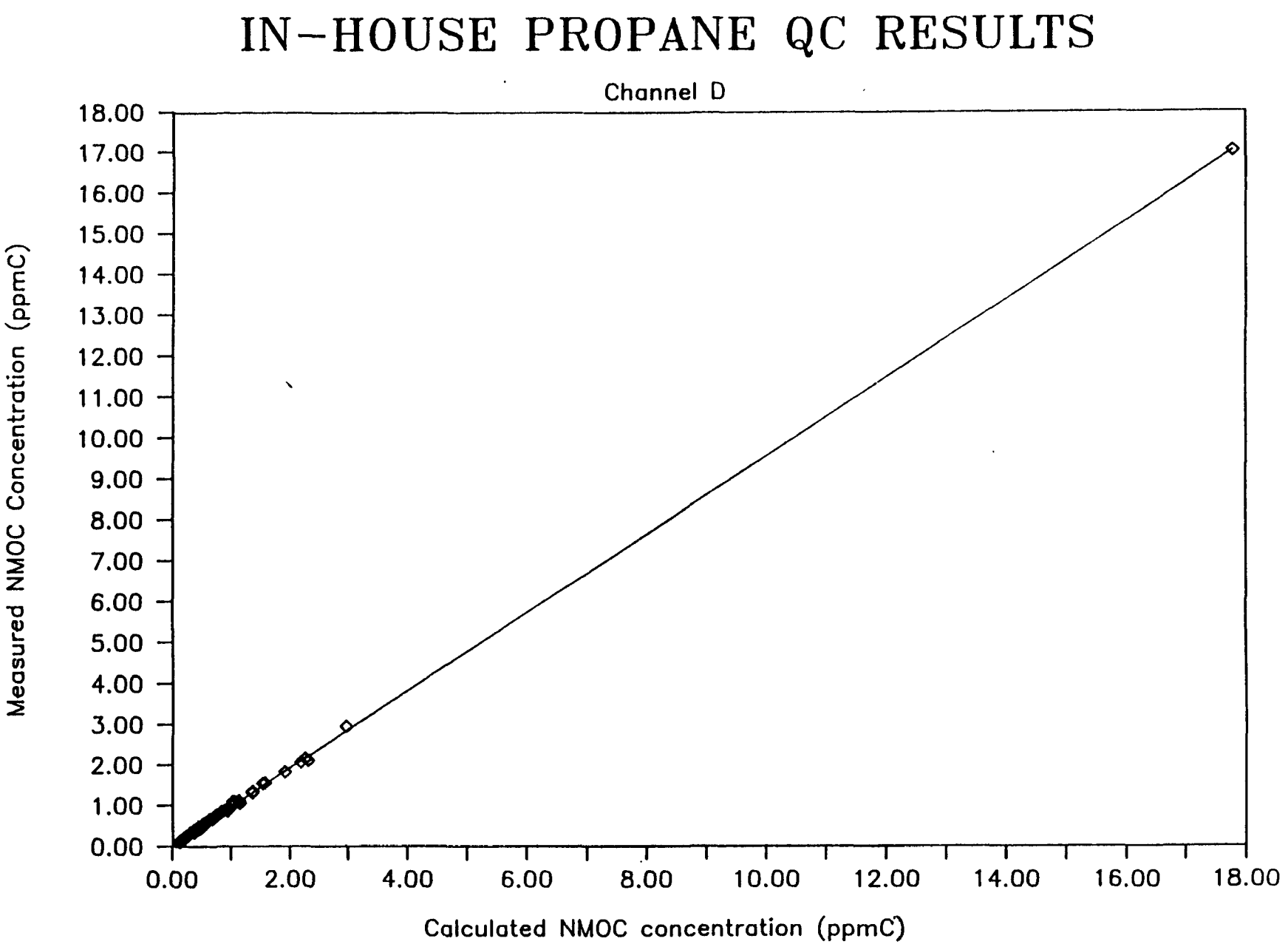

Figure 4-20. In-house quality control results, Channel D.

TABLE 4-3. LINEAR REGRESSION PARAMETERS FOR IN-HOUSE QUALITY CONTROL DATA

Radian Channel	Cases	Intercept	Slope	Coefficient of Correlation
A	76	0.030671	0.956831	0.999908
B	77	0.029393	0.961738	0.999851
C	83	0.032107	0.959886	0.999897
D	81	0.029524	0.955581	0.999864

TABLE 4-4. IN-HOUSE QUALITY CONTROL STATISTICS, BY RADIAN CHANNEL

Channel	Statistics	Variables			
		DIFF[a]	ADIFF[b]	PCDIFF[c]	APCDIFF[d]
A	Cases	76	76	76	76
	Minimum	-0.739800	-10.476190	0.000600	0.071429
	Maximum	0.077000	10.625000	0.739800	10.625000
	Mean	-0.009957	1.322208	0.031107	3.213354
	Standard Dev.	0.091652	3.989355	0.086718	2.687598
	Standard Error	0.010513	0.457610	0.009947	0.308289
	Skewness	-6.831220	0.029987	7.365137	1.151762
	Kurtosis	51.452820	0.397387	57.324782	0.654966
B	Cases	77	77	77	77
	Minimum	-0.646400	-13.113898	0.0010000	0.106045
	Maximum	0.085000	10.958904	0.646400	13.113898
	Mean	-0.006470	1.898795	0.030439	3.459536
	Standard Dev.	0.084470	4.125603	0.078987	2.923627
	Standard Error	0.009626	0.470156	0.009001	0.333178
	Skewness	-6.109698	-0.304489	6.598030	1.258513
	Kurtosis	41.967894	1.403718	47.165020	0.992573
C	Cases	83	83	83	83
	Minimum	-0.690100	-6.458716	0.000000	0.000000
	Maximum	0.056000	13.013699	0.690100	13.013699
	Mean	-0.004819	1.798976	0.027164	3.049361
	Standard Dev.	0.082544	3.843183	0.078039	2.938340
	Standard Error	0.009060	0.421844	0.008566	0.322525
	Skewness	-7.131142	0.579740	7.596049	1.436253
	Kurtosis	55.855040	0.846478	61.398427	1.763860
D	Cases	81	81	81	81
	Minimum	-0.771000	-12.686567	0.000000	0.000000
	Maximum	0.075000	13.500000	0.771000	13.500000
	Mean	-0.011548	0.808720	0.030919	3.470146
	Standard Dev.	0.092859	4.657804	0.088261	3.188245
	Standard Error	0.010318	0.517534	0.009807	0.354249
	Skewness	-6.979174	-0.067429	7.498748	1.164632
	Kurtosis	53.853482	0.681549	59.722371	0.656936

[a]DIFF = Measured NMOC Concentration - Calculated NMOC concentration, ppmC.
[b]ADIFF = Absolute value of DIFF, ppmC.
[c]PCDIFF = DIFF / Calculated NMOC concentration x 100.
[d]APCDIFF = Absolute value of PCDIFF.

TABLE 4-5. OVERALL IN-HOUSE QUALITY CONTROL STATISTICS

Statistics	Variables			
	DIFF[a]	ADIFF[b]	PCDIFF[c]	APCDIFF[d]
Cases	317	317	317	317
Minimum	-0.771000	0.000000	-13.113898	0.000000
Maximum	0.085000	0.771000	13.500000	13.500000
Mean	-0.008171	0.029864	1.455888	3.295829
Standard Dev.	0.087568	0.082707	4.169700	2.935276
Standard Error	0.004918	0.004645	0.234194	0.164862
Skewness	-6.811456	7.329806	-0.009933	1.265487
Kurtosis	51.749652	57.661471	0.920499	1.076469

[a]DIFF = Measured NMOC concentration - Calculated NMOC concentration, ppmC.
[b]ADIFF = Absolute value of DIFF.
[c]PCDIFF = DIFF/calculated NMOC concentration x 100.
[d]APCDIFF = Absolute value of PCDIFF.

```
-77      0
-73      9
-69      0
-64      6
-25      1
-19      0
-14      0
-13      11
-12      93
-10      970
 -9      9431
 -8      981
 -7      30
 -6      8
 -5      41
 -4      3
 -3      4200
 -2      886
 -2      11100
 -1      88876 655
 -1      33222 2100
 -0      99999 98888 87666 66655 5
 -0  H   44433 33322 22222 22111 1111
  0      00000 00011 22222 22222 22223 33333 34444 44444 44444
  0  M   55555 66666 66667 77777 78888 88888 89999 99999 9
  1      00000 01111 11112 22222 22333 34444 4444
  1  H   55555 55556 66677 77777 88888 88999 99999 99
  2      00000 11111 12223 33333 4
  2      55678 99999
  3      00112 344
  3      55679 9
  4      00223 4
  4      5
  4      9
  5      145
  7      57
  8      5
```

	DIFF, ppmC
Cases	317
Minimum	-0.771
Maximum	0.085
Mean	-0.008
Standard Deviation	0.087
Standard Error	0.005
Skewness	-6.811
Kurtosis	51.750
Lower Hinge (H)	-0.004
Median (M)	-0.006
Upper Hinge (H)	0.017

Figure 4-21. Stem-and-leaf plot of in-house quality control differences.

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canister is typically about 15 psig. At the beginning of the second analysis, the canister pressure is typically 9 psig. The pressure difference between the two analyses may be sufficient to affect the organic compound adsorption (or absorption) equilibrium between the organic compounds in the gas phase and those in the sorbed phase.

The QAPP[1] specified which Radian channels were selected for the repeated analyses, so that all combinations of channel pairs, i.e., A-A, B-B, B-C, A-D, etc., would be selected randomly. The EPA-QAD and the EPA-ASRL channels randomly repeated analyses of the site samples already analyzed once by Radian. None of the site samples selected for repeated analyses by Radian channels was analyzed a third time by an EPA channel.

Beginning about July 15, the QAPP[1] was changed so that the two samples selected for the replicate analyses were also duplicate samples. By conducting repeated analyses of the duplicate samples it was possible to investigate the relative magnitude of the duplicate sampling precision and the analytical precision. The results for this investigation are given in Section 4.5.3.

The second type of comparative analysis was done on local ambient samples collected by EPA-QAD personnel in Raleigh, in Research Triangle Park, or near Research Triangle Park, North Carolina. These samples were taken once weekly in duplicate at an initial pressure of about 35 psig. Each local ambient sample, called a round-robin sample, was analyzed by all four Radian channels, the EPA-QAD channel, and the EPA-ASRL channel. One of the duplicate round-robin samples was analyzed first in the Radian laboratory while the other duplicate round-robin sample was analyzed first in the EPA laboratories. Upon completion of the analyses, the laboratories exchanged canisters and analyzed the other duplicate sample on all channels. The purposes of these studies were:

- to determine if the order of analysis by one laboratory or channel made a significant difference in the measured NMOC value;
- to compare the precision of all the channels;
- to compare the PDFID method of analysis with the GC/FID speciated method of analysis; and
- to compare the results among Radian channels.

4.4.1 Site Sample Results

Figure 4-22 compares the EPA-QAD analyses with Radian analyses of the same site samples. Figure 4-23 compares the EPA-ASRL analyses with Radian analyses. Figure 4-24 compares ASRL analyses with QAD analyses. Orthogonal regression parameters for the three data sets are summarized in Table 4-6.

Summary statistics of the comparative analyses for Radian channels versus the EPA-QAD channel are given in Table 4-7. The table gives DELTA, the difference between the Radian NMOC concentration and the QAD NMOC concentration in ppmC; and PDELTA, the percent difference relative to the mean of the Radian and QAD analyses. ADELTA and APDELTA are the absolute values of DELTA and PDELTA, respectively. The mean percent difference shows Radian NMOC concentrations to average 1.64% lower than the QAD NMOC concentration. This is an average bias figure for the Radian analyses relative to a mean NMOC concentration. The average absolute percent difference is 11.76, which is a measure of the precision.

In 1987, the mean percent differences showed Radian concentrations to average 4.48% lower than the QAD NMOC concentration. The average absolute percent difference was 14.07%, relative to the mean of the Radian and QAD NMOC concentrations. The agreement between the 1987 and 1988 precision results is good, and shows that the instruments and operating procedures were consistent for the two years.

Summary statistics are given for the same data in Table 4-8 by Radian channel. The data show a mean absolute percent difference ranging from 9.34 for Channel A to 15.89 for Channel B. The mean percent differences range from -7.27% for Channel B to +4.55% for Channel D.

Table 4-9 summarizes statistics for comparative analyses for Radian channels versus ASRL channels. DELTA is the difference between the NMOC values determined by Radian channels and the NMOC values determined by ASRL.

PDELTA averages 3.34%, indicating that DELTA is symmetrical about zero. APDELTA is 16.76%, which is slightly higher than the APDELTA mean of 15.88% for 1987. Table 4-10 compares Radian NMOC analyses with ASRL NMOC analyses, by Radian channels. APDELTA values are 14.20%, 18.81%, 18.92%, and 14.89% comparing the ASRL channel with Radian Channels A, B, C, and D, respectively.

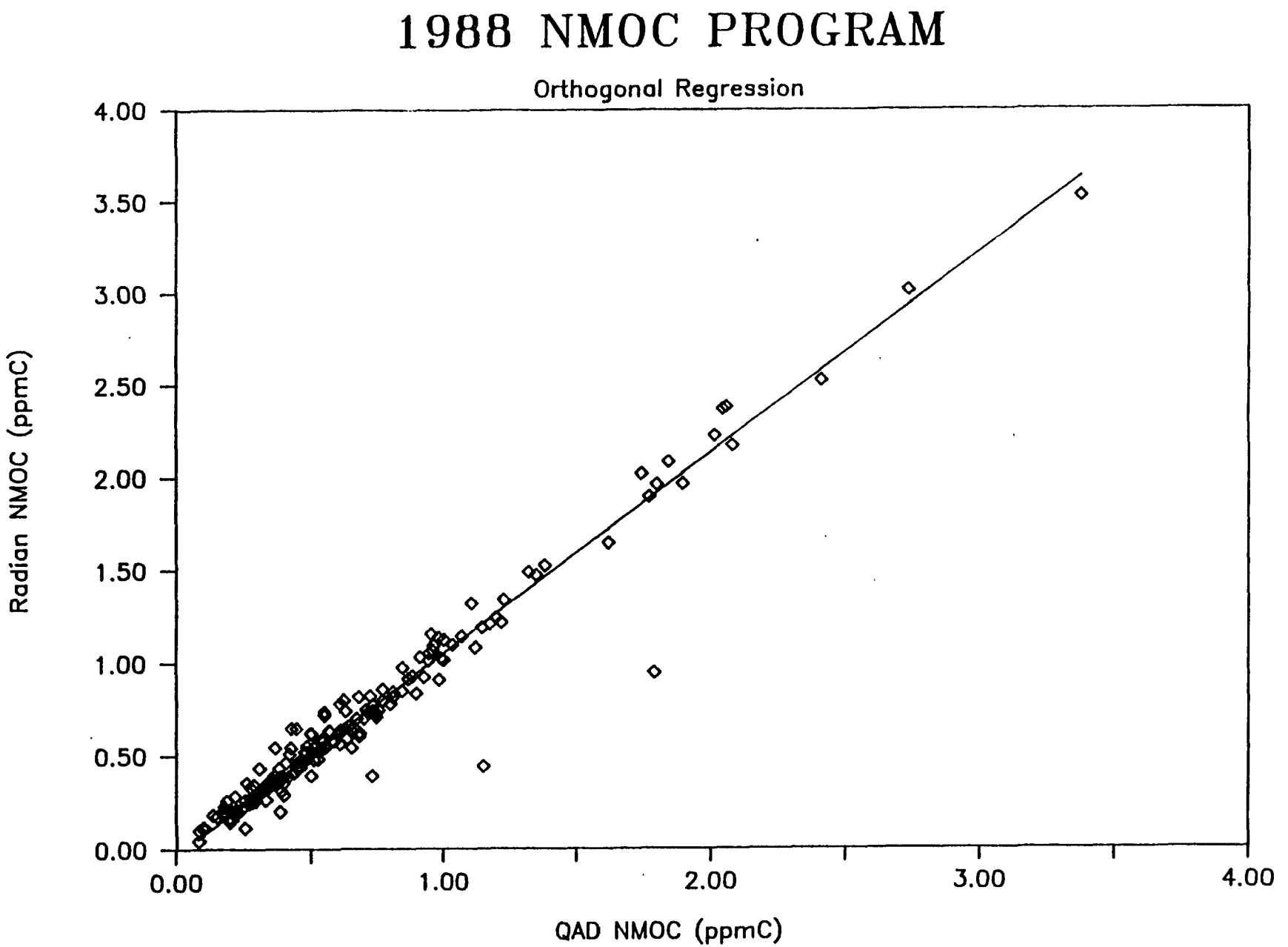

Figure 4–22. Orthogonal regression comparing QAD with Radian NMOC analyses.

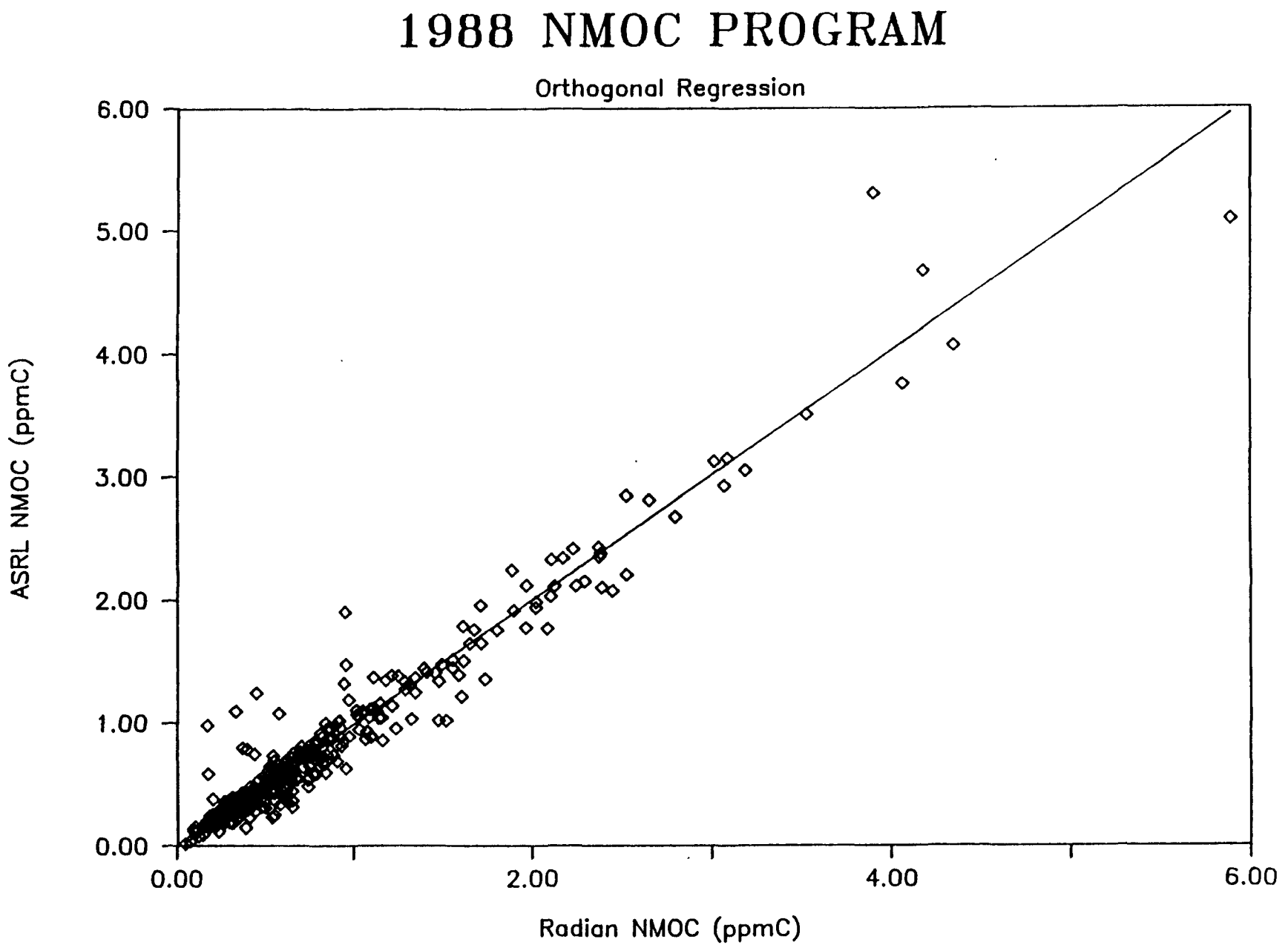

Figure 4–23. Orthogonal regression comparing ASRL with Radian NMOC analyses.

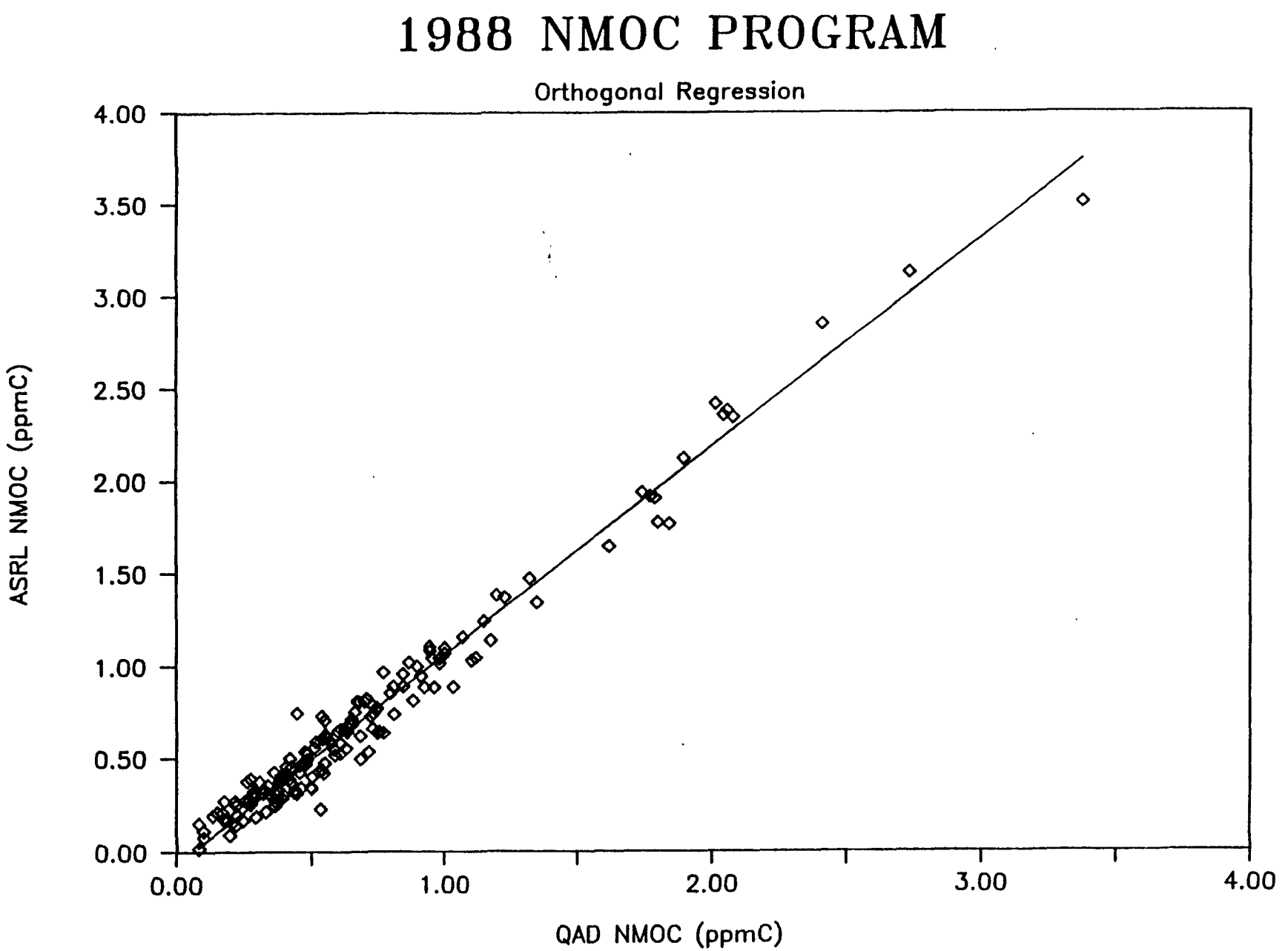

Figure 4-24. Orthogonal regression comparing QAD with ASRL NMOC analyses.

TABLE 4-6. ORTHOGONAL REGRESSION PARAMETERS FOR REPEATED ANALYSES OF SITE SAMPLES

Channel Pair (X-Y)	Cases	Intercept	Slope	Coefficient of Correlation
QAD-Radian	171	-0.033620	1.086080	0.976608
Radian-QAD	171	0.030960	0.920742	0.976608
ASRL-Radian	365	0.020184	0.986413	0.971026
Radian-ASRL	365	-0.020460	1.013773	0.971026
QAD-ASRL	156	-0.068920	1.128991	0.986652
ASRL-QAD	156	0.061045	0.885746	0.986652

TABLE 4-7. SUMMARY STATISTICS OF COMPARATIVE ANALYSES FOR RADIAN VS. QAD CHANNELS

Statistics	Variables			
	DELTA[a]	ADELTA[b]	PDELTA[a]	APDELTA[d]
Cases	171	171	171	171
Minimum	-0.840000	0.000000	-88.972431	0.000000
Maximum	0.325000	0.840000	41.192917	88.972431
Mean	0.026402	0.073279	1.644083	11.761730
Standard Dev.	0.124631	0.104080	18.339423	14.138645
Standard Error	0.009531	0.007959	1.402451	1.081209
Skewness	-2.940581	4.121023	-1.857770	2.674604
Kurtosis	19.485215	23.773504	6.602432	8.841658

[a]DELTA = Radian NMOC concentration - QAD NMOC concentration, ppmC.
[b]ADELTA = Absolute value of DELTA.
[c]PDELTA = DELTA / ((Radian NMOC concentration + QAD NMOC concentration) / 2) x 100.
[d]APDELTA = Absolute value of PDELTA.

TABLE 4-8. SUMMARY STATISTICS OF COMPARATIVE ANALYSES FOR RADIAN VS. QAD CHANNELS, BY RADIAN CHANNELS

Channel	Statistics	Variables			
		DELTA[a]	ADELTA[b]	PDELTA[c]	APDELTA[d]
A	Cases	46	46	46	46
	Minimum	-0.184000	0.000000	-62.798635	0.000000
	Maximum	0.277000	0.277000	34.278003	62.798635
	Mean	0.029276	0.051624	2.339098	9.337793
	Standard Dev.	0.073057	0.059070	14.422613	11.156733
	Standard Error	0.010772	0.008709	2.126498	1.644971
	Skewness	0.683238	1.816171	-1.667626	2.793671
	Kurtosis	2.572941	3.285199	7.664344	9.915039
B	Cases	30	30	30	30
	Minimum	-0.840000	0.000000	-88.972431	0.000000
	Maximum	0.279000	0.840000	24.842105	88.972431
	Mean	-0.044833	0.109967	-7.268897	15.890986
	Standard Dev.	0.223007	0.198247	27.535381	23.486696
	Standard Error	0.040715	0.036195	5.027250	4.288064
	Skewness	-2.424435	2.735325	-1.786254	2.031934
	Kurtosis	5.914622	6.669902	2.332804	2.867073
C	Cases	56	56	56	56
	Minimum	-0.110000	0.000000	-60.317460	0.000000
	Maximum	0.320000	0.320000	39.647577	60.317460
	Mean	0.043500	0.069250	3.825415	12.044030
	Standard Dev.	0.088715	0.070102	16.543503	11.869763
	Standard Error	0.011855	0.009368	2.210719	1.586164
	Skewness	0.820246	1.335762	-0.959044	1.610290
	Kurtosis	0.409816	1.555905	2.961614	3.378628
D	Cases	39	39	39	39
	Minimum	-0.108000	0.001000	-30.903790	0.560224
	Maximum	0.325000	0.325000	41.192917	41.192917
	Mean	0.053256	0.076385	4.548292	11.039029
	Standard Dev.	0.092933	0.074561	14.303968	10.038319
	Standard Error	0.014881	0.011939	2.290468	1.607418
	Skewness	0.862969	1.491518	0.019792	1.426275
	Kurtosis	0.604870	1.876596	1.149474	1.480298

[a]DELTA = Radian NMOC concentration - QAD NMOC concentration, ppmC.
[b]ADELTA = Absolute value of DELTA.
[c]PDELTA = DELTA / ((Radian NMOC concentration + QAD NMOC concentration) / 2) x 100.
[d]APDELTA = Absolute value of PDELTA.

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TABLE 4-9. SUMMARY STATISTICS OF COMPARATIVE ANALYSES FOR RADIAN VS. ASRL CHANNELS

Statistics	Variables			
	DELTA[a]	ADELTA[b]	PDELTA[c]	APDELTA[d]
Cases	365	365	365	365
Minimum	-1.406000	0.000000	-140.676496	0.000000
Maximum	0.802000	1.406000	92.366412	140.676496
Mean	0.009430	0.107005	3.339078	16.758297
Standard Dev.	0.182171	0.147628	25.113957	18.981013
Standard Error	0.009535	0.007727	1.314525	0.993512
Skewness	-2.209134	3.961829	-0.748789	2.601834
Kurtosis	15.069356	22.931895	5.991222	9.157782

[a]DELTA = Radian NMOC concentration - ASRL NMOC concentration, ppmC.
[b]ADELTA = Absolute value of DELTA.
[c]PDELTA = DELTA / ((Radian NMOC concentration + ASRL NMOC concentration) / 2) x 100.
[d]APDELTA = Absolute value of PDELTA.

TABLE 4-10. SUMMARY STATISTICS OF COMPARATIVE ANALYSES FOR RADIAN VS. ASRL CHANNELS, BY RADIAN CHANNELS

		Variables			
Channel	Statistic	DELTA[a]	ADELTA[b]	PDELTA[c]	APDELTA[d]
A	Cases	84	84	84	84
	Minimum	-1.406000	0.000000	-60.658579	0.000000
	Maximum	0.242000	1.406000	92.366412	92.366412
	Mean	-0.021619	0.093029	1.783863	14.196797
	Standard Dev.	0.191820	0.168847	21.130711	15.676419
	Standard Error	0.020929	0.018423	2.305550	1.710437
	Skewness	-4.796169	5.977445	0.908040	2.358621
	Kurtosis	31.052858	42.284157	4.042465	7.145410
B	Cases	80	80	80	80
	Minimum	-0.956000	0.000000	-107.952146	0.000000
	Maximum	0.385000	0.956000	80.526316	107.952146
	Mean	-0.036698	0.121403	-3.914594	18.808219
	Standard Dev.	0.212213	0.177406	28.924181	22.223847
	Standard Error	0.023726	0.019835	3.233822	2.484702
	Skewness	-2.099857	2.903355	-0.829961	2.161122
	Kurtosis	6.577376	8.908113	3.316029	4.499901
C	Cases	106	106	106	106
	Minimum	-0.811000	0.000000	-140.676496	0.000000
	Maximum	0.45000	0.811000	83.870968	140.676496
	Mean	0.046806	0.114723	8.284869	18.915250
	Standard Dev.	0.159038	0.119239	26.945216	20.836105
	Standard Error	0.015447	0.011582	2.617151	2.023781
	Skewness	-1.194748	2.388455	-1.078704	2.631618
	Kurtosis	6.859186	9.697189	7.995930	10.366842
D	Cases	95	95	95	95
	Minimum	-0.499000	0.000600	-108.753316	0.199534
	Maximum	0.802000	0.802000	70.146138	108.753316
	Mean	0.034024	0.098626	5.304111	14.890247
	Standard Dev.	0.158303	0.128059	21.343146	16.120937
	Standard Error	0.016242	0.013139	2.189761	1.653973
	Skewness	0.874684	2.850412	-1.090396	2.876794
	Kurtosis	6.974326	9.932234	7.965925	11.904168

[a]DELTA = Radian NMOC concentration - ASRL NMOC concentration, ppmC.
[b]ADELTA = Absolute value of DELTA.
[c]PDELTA = DELTA / ((Radian NMOC concentration + ASRL NMOC concentration) / 2) x 100.
[d]APDELTA = Absolute value of PDELTA.

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PDELTA averages are +1.78%, -3.91%, +8.28%, and +5.30% for ASRL versus Radian Channels A, B, C, and D, respectively.

Table 4-11 compares repeated analyses of site samples by the EPA-ASRL GC/FID instrument and the EPA-QAD PDFID instrument. The results show that PDELTA averaged -1.51%, while APDELTA averaged 15.70 percent. The table shows that the ASRL concentrations average 1.51% lower than the QAD concentrations. Radian concentrations were 1.64% lower than QAD concentrations. APDELTA between ASRL and QAD concentrations averaged 15.70%, whereas APDELTA for Radian and QAD concentrations averaged 11.76 percent.

Of NMOC concentration measurements, the comparison between Radian and the EPA-QAD channel represents between-laboratory comparisons for the PDFID method. Comparisons between the Radian channels and the EPA-ASRL channel are between-laboratory and between-method comparisons.

Table 4-12 summarizes statistics for repeated analyses on Radian channels. The QAPP[1] specified the channel pair to be involved with the repeated analysis each day. The mean APDELTA was the average percent difference between the second and the first analysis and was 10.06% for the overall data set. Table 4-13 shows the statistics for repeated analyses by Radian channel pairs. Table 4-14 gives the 95% confidence intervals for the mean differences by channel pairs. Figure 4-25 plots the means and 95% confidence intervals listed in Table 4-14. The squares on Figure 4-25 locate the mean difference for each channel pair. The vertical lines span the 95% confidence intervals of the mean differences.

4.4.2 Quality Control Chart

A quality control chart was developed for the 1988 replicate analyses and is shown in Figure 4-26. The control chart plots percent difference for the replicate analyses versus Julian date, 1988. The mean line, μ , which is nearly coincident with zero, and two sets of horizontal control lines are shown. Control lines at $\mu \pm 2\sigma$ and $\mu \pm 3\sigma$ are shown on the quality control chart. The percent difference for the control chart is defined as:

% difference = ((NMOC for 2nd analysis - NMOC for 1st analysis) / (Mean NMOC for both analyses)) * 100.

TABLE 4-11. SUMMARY STATISTICS OF COMPARATIVE ANALYSES FOR ASRL VS. QAD CHANNELS

Statistics	Variables			
	DELTA[a]	ADELTA[b]	PDELTA[c]	APDELTA[d]
Cases	156	156	156	156
Minimum	-0.308000	0.001000	-128.000000	0.345423
Maximum	0.440000	0.440000	56.540084	128.000000
Mean	0.021564	0.085577	-1.510741	15.697831
Standard Dev.	0.114218	0.078378	22.662271	16.366548
Standard Error	0.009145	0.006275	1.814434	1.310373
Skewness	0.807281	2.037408	-1.599630	3.103006
Kurtosis	1.890575	5.225227	6.428872	14.977304

[a]DELTA = ASRL NMOC concentration - QAD NMOC concentration, ppmC.
[b]ADELTA = Absolute value of DELTA.
[c]PDELTA = DELTA / ((ASRL concentration + QAD concentration) / 2) x 100.
[d]APDELTA = Absolute value of PDELTA.

TABLE 4-12. SUMMARY STATISTICS FOR COMPARATIVE ANALYSES ON RADIAN CHANNELS

Statistics	Variable			
	DELTA[a]	ADELTA[b]	PDELTA[c]	APDELTA[d]
Cases	217	217	217	217
Minimum	-0.357000	0.000500	-61.430759	0.093145
Maximum	0.199333	0.357000	66.525124	66.525124
Mean	-0.010161	0.039880	0.203105	10.064042
Standard Dev.	0.064905	0.052139	15.964091	12.374966
Standard Error	0.004406	0.003539	1.083713	0.840067
Skewness	-1.686068	2.767780	0.052430	2.162110
Kurtosis	6.196131	9.619933	3.975538	4.850956

[a]DELTA = (NMOC concentration on Channel Y) - (NMOC concentration on Channel X).
[b]ADELTA = Absolute value of DELTA.
[c]PDELTA = DELTA / ((NMOC concentration determined by Channel Y + NMOC concentration determined by Channel X) / 2) x 100.
[d]APDELTA = Absolute value of ADELTA.

TABLE 4-13. SUMMARY STATISTICS FOR COMPARATIVE ANALYSES ON RADIAN CHANNELS, BY CHANNEL PAIRS

Channel Pair[a]	Statistics	Variable			
		DELTA[b]	ADELTA[c]	PDELTA[d]	APDELTA[e]
A-A	Cases	33	33	33	33
	Minimum	-0.123500	0.001233	-43.989314	0.204946
	Maximum	0.042000	0.123500	25.961538	43.989314
	Mean	-0.017261	0.026483	-3.391746	6.817283
	Standard Dev.	0.037874	0.031912	12.044847	10.440981
	Standard Error	0.006593	0.005555	2.096739	2.817541
	Skewness	-1.363404	1.849517	-1.526186	2.414116
	Kurtosis	1.445161	2.466589	4.430222	4.898199
B-A	Cases	13	13	13	13
	Minimum	-0.096500	0.011500	-15.577889	1.983816
	Maximum	0.096000	0.096500	48.396173	48.396173
	Mean	0.003256	0.036051	2.502784	10.707028
	Standard Dev.	0.047420	0.029192	16.459645	12.389996
	Standard Error	0.013152	0.008096	4.565084	3.436367
	Skewness	-0.060877	1.362857	1.712976	2.334631
	Kurtosis	0.298124	0.406911	2.742243	4.823903
B-B	Cases	27	27	27	27
	Minimum	-0.040500	0.001000	-10.556761	0.093145
	Maximum	0.089500	0.089500	59.369818	59.369818
	Mean	0.010225	0.020163	5.018955	7.536787
	Standard Dev.	0.028469	0.022291	13.472423	12.193319
	Standard Error	0.005479	0.004290	2.592769	2.346605
	Skewness	0.803988	1.501570	2.655373	3.127074
	Kurtosis	1.096143	1.860264	8.006965	10.317092
C-A	Cases	18	18	18	18
	Minimum	-0.241000	0.001000	-38.866799	0.498753
	Maximum	0.035000	0.241000	24.728997	38.866799
	Mean	-0.046950	0.058350	-6.683428	12.710628
	Standard Dev.	0.075549	0.066608	15.398589	10.646533
	Standard Error	0.017807	0.015700	3.629482	2.509412
	Skewness	-1.200273	1.526778	0.111615	0.828282
	Kurtosis	0.622471	1.373408	0.146774	-0.093369

(Continued)

TABLE 4-13. (Continued)

Channel Pair[a]	Statistics	Variable			
		DELTA[b]	ADELTA[c]	PDELTA[d]	APDELTA[e]
C-B	Cases	24	24	24	24
	Minimum	-0.200650	0.004900	-42.119205	0.813714
	Maximum	0.103167	0.200650	41.332799	42.119205
	Mean	-0.009713	0.047947	0.326309	14.773990
	Standard Dev.	0.071543	0.053085	20.973678	14.568646
	Standard Error	0.014604	0.010836	4.281234	2.973812
	Skewness	-1.179050	1.558539	-0.375816	0.871011
	Kurtosis	1.128227	1.574663	0.162300	-0.711505
C-C	Cases	30	30	30	30
	Minimum	-0.226000	0.000500	-40.035430	0.163559
	Maximum	0.132500	0.226000	46.341463	46.341463
	Mean	-0.004635	0.043056	2.968154	9.557267
	Standard Dev.	0.067012	0.050942	14.562952	11.256209
	Standard Error	0.012235	0.009301	2.658819	2.055093
	Skewness	-1.315676	1.995388	0.180064	1.904590
	Kurtosis	2.878781	3.959447	2.994509	3.331118
C-D	Cases	12	12	12	12
	Minimum	-0.216333	0.006500	-31.207925	0.850133
	Maximum	0.133500	0.216333	15.393485	31.207925
	Mean	-0.012871	0.058482	0.055438	9.406969
	Standard Dev.	0.090140	0.067637	13.083141	8.639225
	Standard Error	0.026021	0.019525	3.776777	2.493929
	Skewness	-0.878629	1.318394	-0.963396	1.290578
	Kurtosis	0.701134	0.429700	0.753025	1.345708
D-A	Cases	20	20	20	20
	Minimum	-0.357000	0.001000	-61.430759	0.162470
	Maximum	0.199333	0.357000	66.525124	66.525124
	Mean	-0.012993	0.068523	1.249924	14.900969
	Standard Dev.	0.119454	0.097491	25.960628	21.020790
	Standard Error	0.026711	0.021800	5.804973	4.700391
	Skewness	-1.540837	1.979098	-0.305386	1.587280
	Kurtosis	2.818661	2.734787	2.251392	1.038947

(Continued)

TABLE 4-13. (Continued)

Channel Pair[a]	Statistics	Variable			
		DELTA[b]	ADELTA[c]	PDELTA[d]	APDELTA[e]
D-B	Cases	12	12	12	12
	Minimum	-0.028333	0.001667	-10.855683	0.538329
	Maximum	0.074017	0.074017	36.063470	36.063470
	Mean	0.011489	0.021825	5.288014	9.322289
	Standard Dev.	0.028521	0.020923	12.690827	9.836500
	Standard Error	0.008233	0.006040	3.663526	2.839553
	Skewness	0.627432	1.296433	1.143169	1.856641
	Kurtosis	0.169245	1.181455	1.002738	2.662359
D-D	Cases	28	28	28	28
	Minimum	-0.118000	0.000667	-31.935047	0.215332
	Maximum	0.065333	0.118000	12.990053	31.935047
	Mean	-0.016433	0.033578	-2.776457	7.978095
	Standard Dev.	0.044745	0.033360	10.347798	7.004551
	Standard Error	0.008456	0.006304	1.955550	1.323736
	Skewness	-0.673645	1.166391	-0.715572	1.512923
	Kurtosis	-0.060139	0.365656	0.569208	2.983558

[a]Pairs X-Y = Channel pair.
[b]DELTA = (NMOC concentration on Channel X) - (NMOC concentration on Channel Y).
[c]ADELTA = Absolute value of DELTA.
[d]PDELTA = DELTA / ((NMOC concentration determined by Channel X + NMOC concentration determined by Channel Y) / 2) x 100.
[e]APDELTA = Absolute value of PDELTA.

TABLE 4-14. 95% CONFIDENCE INTERVALS FOR MEAN DELTA, REPEATED ANALYSES

Pair No.	Channel Pair	Mean Difference, ppmC: Mean Difference	Standard Deviation	Cases[a]	$t_{0.975,n-1}$[b]	95% Confidence Interval: Upper	Lower
1	A-A	-0.017	0.038	33	1.700	-0.00606	-0.02847
2	B-B	0.010	0.028	27	2.056	0.02149	-0.00104
3	C-C	-0.005	0.067	30	2.045	0.02038	-0.02965
4	D-D	-0.016	0.045	28	2.052	0.00092	-0.03378
5	B-A	0.003	0.047	13	2.179	0.03191	-0.02540
6	C-A	-0.047	0.076	18	2.110	-0.00938	-0.08452
7	D-A	-0.013	0.119	20	2.093	0.04291	-0.06890
8	C-B	-0.010	0.072	24	2.069	0.02050	-0.03993
9	D-B	0.011	0.029	12	2.201	0.02961	-0.00663
10	C-D	-0.013	0.090	12	2.201	0.04440	-0.07014

[a]Cases = the number of data points in the mean DELTA.

[b]$t_{0.975,n-1}$ = Student's t-statistic for 95% confidence interval.

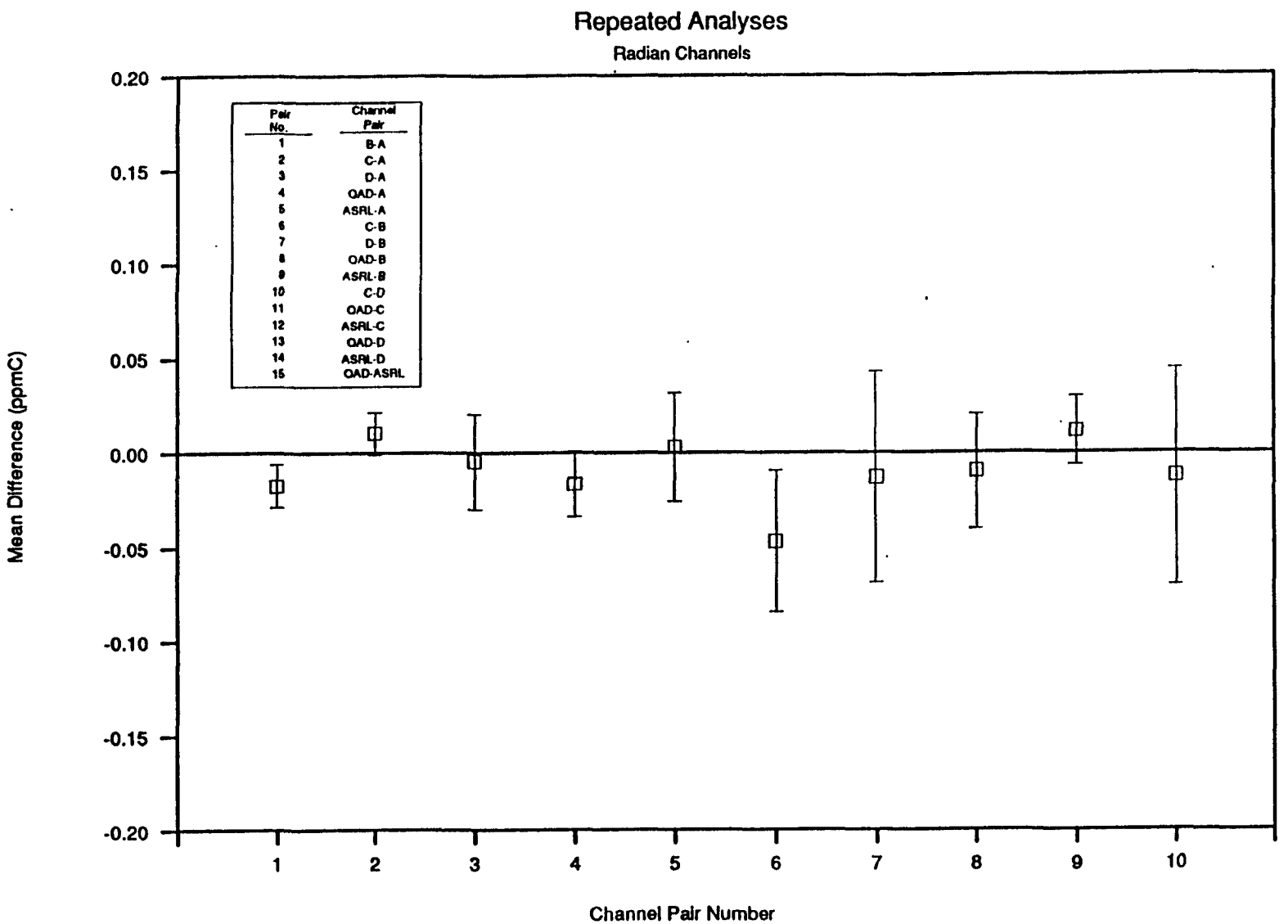

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Figure 4-25. 95% Confidence intervals for mean NMOC difference.

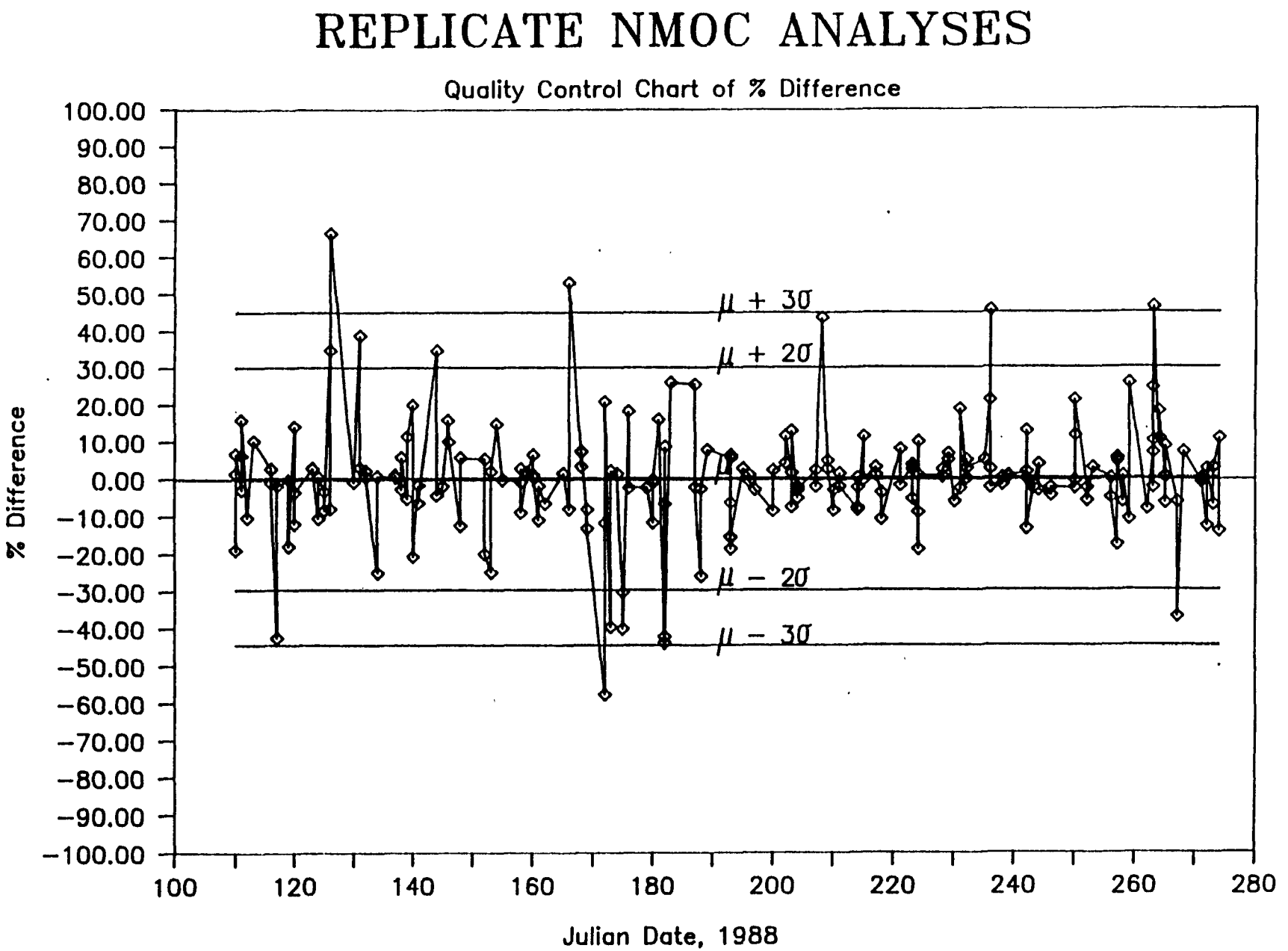

Figure 4–26. Quality control chart of percent difference for replicate NMOC analysis.

The 2-σ limits, i.e., $\mu \pm 2\sigma$, are termed the warning limits; the 3-σ limits, $\mu \pm 3\sigma$, are called the control limits. The control chart was consulted frequently to see if consecutive replicate determinations were outside the warning or control limits. In only one instance, about 1988 Julian date 184, did consecutive determinations occur outside the warning limits. In no case were consecutive determinations outside the 3-σ control limits. Two or three consecutive determinations outside the warning limits give some cause for concern, but two or three consecutive determinations outside the 3-σ limits indicate that something is out of control in the sampling and/or analytical system. As seen in the control chart, in no case was the sampling and/or analytical system out of control. To investigate the nature of the imprecision, or percent difference, the data were examined to determine if percent difference was a function of the average NMOC concentration level. This analysis is given in Section 4.4.3.

4.4.3 Precision Profile

The replicate percent differences were plotted against average NMOC concentration for the replicate pair, and are shown in Figure 4-27. It is clear from the figure that as the NMOC concentration falls below 1.0 ppmC, the imprecision increases. One of the major causes of imprecision at lower concentrations is instrument noise. Since instrument noise is essentially independent of NMOC concentration, the portion of response attributed to noise increases at lower NMOC concentrations. These facts combine to show an increased imprecision at lower NMOC concentrations.

The NMOC concentration and percent difference for 221 replicate analyses were sorted by NMOC concentration and divided into the eleven NMOC size groups shown in Table 4-15. In the table, below 1.0 ppmC, the size increments are 0.100 ppmC, and show average NMOC concentration (assuming random variable, normally distributed), minimum percent difference, average percent difference, average absolute percent difference, and maximum percent difference for each NMOC size group. The data in the table are plotted in Figures 4-28 and 4-29.

Figure 4-28 shows large fluctuations of average percent difference between about -6% and +5% difference below an average NMOC concentration of 1.0 ppmC. Above 1.0 ppmC the average percent difference is below 3.0 percent.

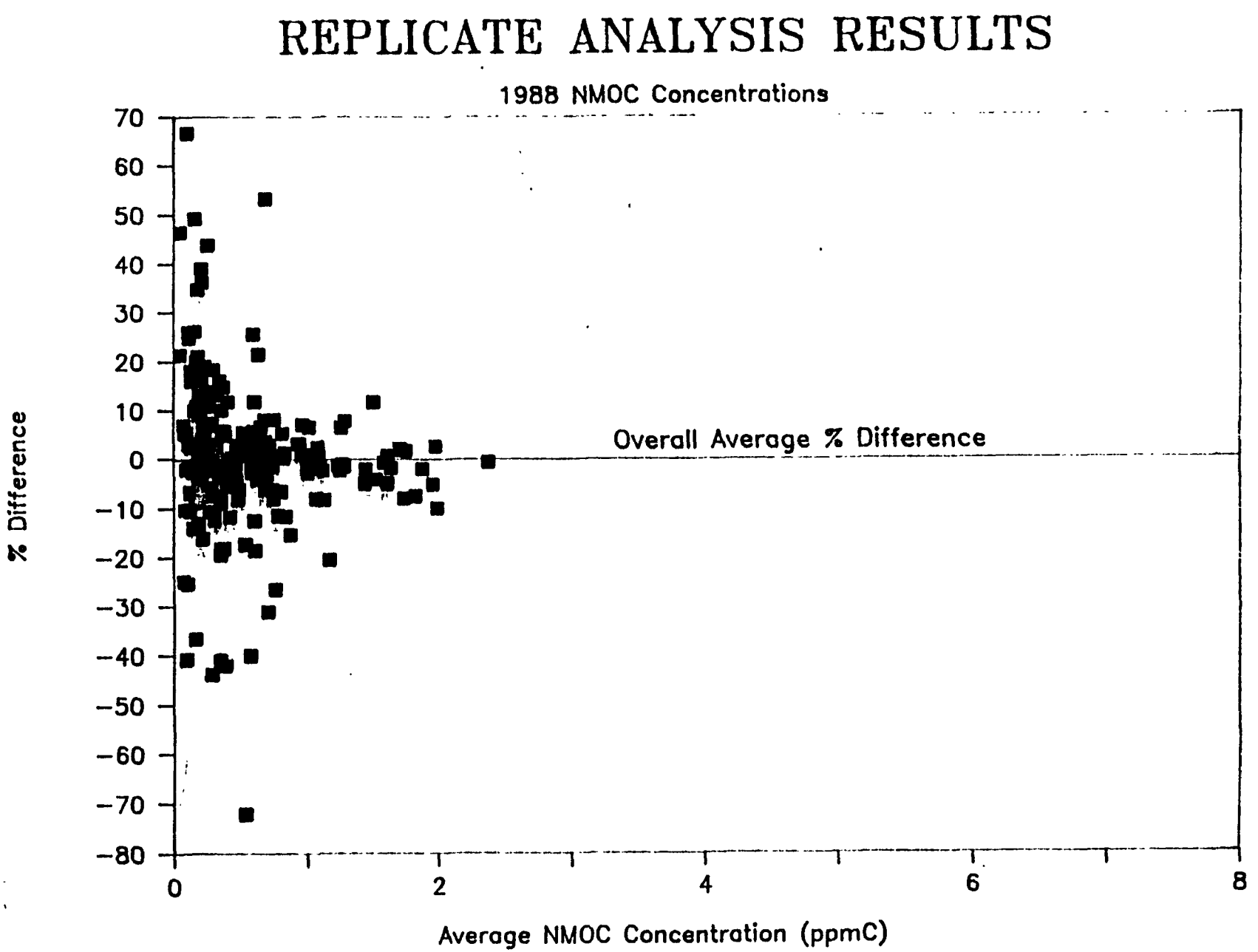

Figure 4–27. Replicate NMOC analysis results comparing average concentration with percent difference.

TABLE 4-15. 1988 NMOC REPLICATE IMPRECISION

Cases	NMOC Range	Average NMOC ppmC	Minimum % Diff	Average % Diff	Average Absolute % Diff	Maximum % Diff
11	0.000 - 0.099	0.050	-40.855	4.343	23.208	66.454
40	0.100 - 0.199	0.150	-36.709	5.183	12.289	49.088
33	0.200 - 0.299	0.250	-43.811	4.032	11.044	43.680
28	0.300 - 0.399	0.350	-42.119	-4.336	9.535	15.931
12	0.400 - 0.499	0.450	-11.763	-2.361	3.888	2.822
20	0.500 - 0.599	0.550	-72.196	3.756	11.538	25.536
20	0.600 - 0.699	0.650	-31.160	2.483	8.093	53.046
9	0.700 - 0.799	0.750	-26.555	-5.491	8.034	7.946
11	0.800 - 0.999	0.900	-15.336	-1.097	4.748	6.990
22	1.000 - 1.499	1.250	-20.583	-1.043	4.253	11.413
15	1.500 - 7.499	4.500	-10.106	-2.360	3.645	2.435
Overall			-72.196	0.273	9.459	66.454

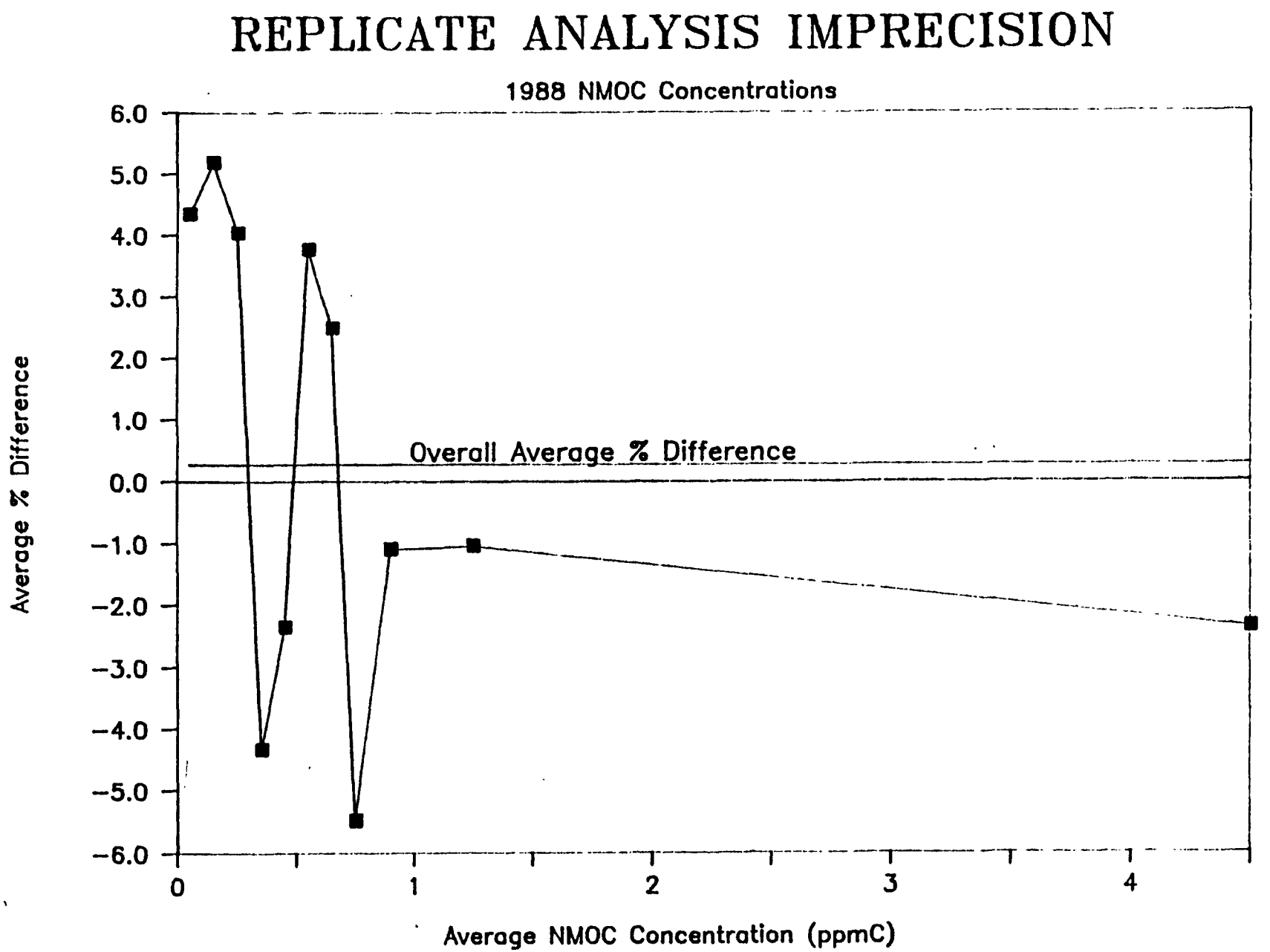

Figure 4–28. Replicate NMOC analysis results comparing average concentration with average percent difference.

A more striking profile of the replicate precision is seen in Figure 4-29 in which average absolute percent difference is shown to decrease dramatically as the NMOC concentration increases. When the NMOC concentration increases above 1.0 ppmC, the average absolute percent difference levels off at about 4 percent. Figure 4-29 also shows the overall average absolute percent difference for all 221 replicates to be about 9.3 percent.

This analysis shows that as the NMOC concentration decreases below 0.500 ppmC, the imprecision of the measurement increases dramatically. Similar results are universally found in analytical instrumentation.

4.4.4 Local Ambient Samples

Table 4-16 presents the overall statistics for local ambient samples. These data include comparisons among Radian channels and EPA channels. The mean differences and the mean percent differences are both near zero, which indicates that they are random variables. The overall mean absolute percent difference (APDIF) is 8.17%, which is lower than the precision for repeated analyses (10.06%).

Table 4-17 presents the same information separated into two cases, by the Radian analysis order. The upper part of Table 4-17 shows statistics for the local ambient sample analyzed first by Radian. The lower part of Table 4-17 shows statistics for the local ambient sample analyzed first by the EPA laboratories, Channels QAD and ASRL.

Table 4-18 shows statistics for local ambient samples by analysis order and channel pair. Mean absolute percent differences range from 3.12% for Radian Channel Pair B-A for Radian second analysis order to 18.68% for Channel Pair QAD-ASRL for Radian second analysis order, averaging 8.17% overall.

Tables 4-19 and 4-20 use data extracted from Table 4-18 and add the 95% confidence intervals for the mean values of DIF. For example, from the Table 4-19, for the channel pair C-A, the mean DIF is 0.002 ppmC, indicating that the average NMOC concentration determined for the local ambient samples was larger for Channel A than for Channel C by 0.002 ppmC. Figures 4-30 and 4-31 display the data from Tables 4-19 and 4-20 graphically and indicate no significant difference, at the 0.05 level of significance, between the channel

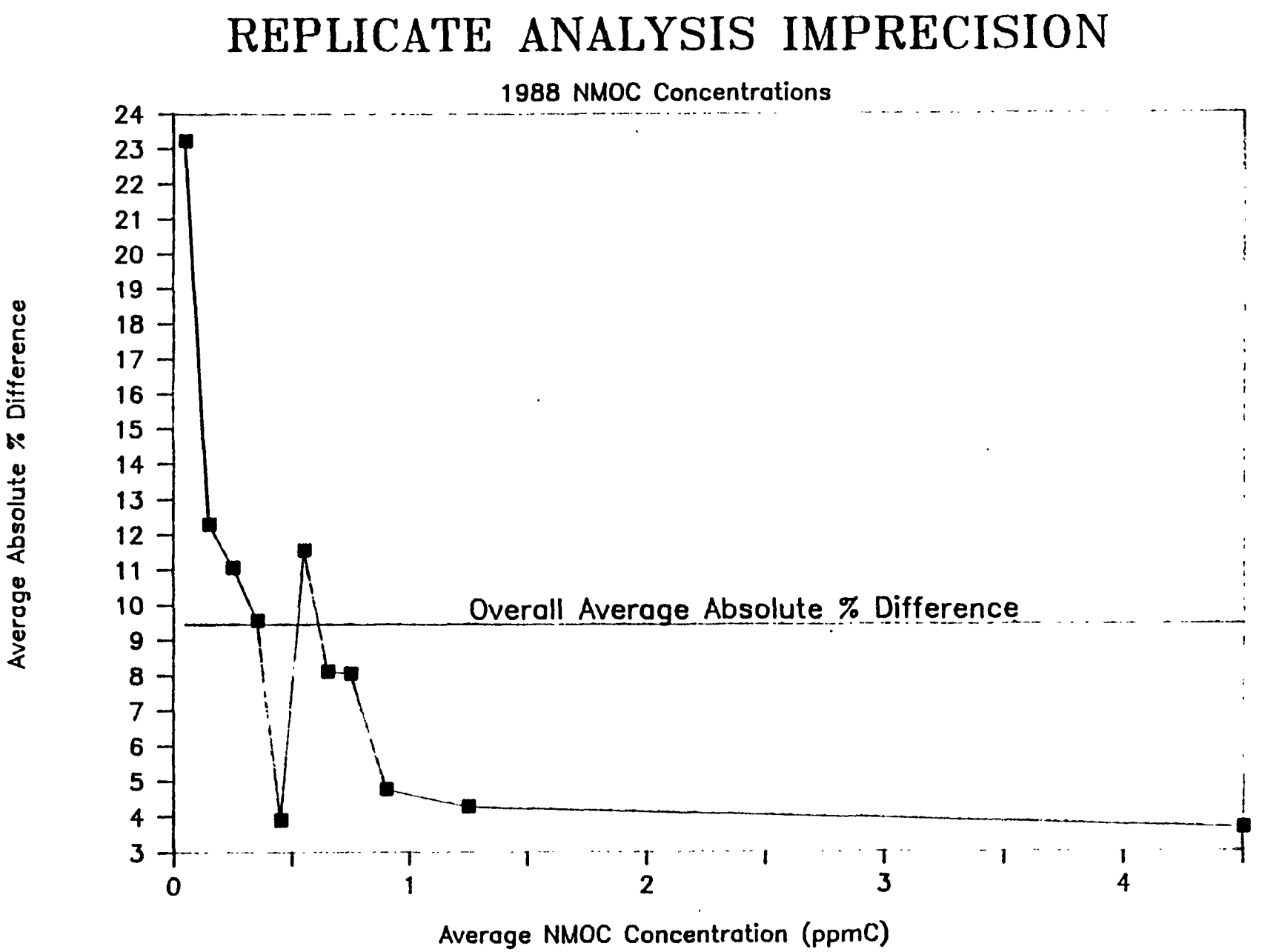

Figure 4–29. Replicate NMOC analysis results comparing average concentration with average absolute percent difference.

TABLE 4-16. OVERALL STATISTICS FOR LOCAL AMBIENT SAMPLES

Statistics	Variables			
	DIF[a]	ADIF[b]	PDIF[c]	APDIF[d]
Cases	466	466	466	466
Minimum	-0.221000	0.000000	-46.575342	0.000000
Maximum	0.343000	0.343000	45.161290	46.575342
Mean	0.011286	0.042808	0.876466	8.166535
Standard Dev.	0.063862	0.048678	12.216559	9.120221
Standard Error	0.002958	0.002255	0.565921	0.422486
Skewness	1.222121	2.641179	-0.550839	2.139399
Kurtosis	4.944375	9.104268	3.573040	4.613709

[a]DIF = (NMOC concentration for the second channel) - (NMOC concentration for first channel), ppmC.
[b]ADIF = Absolute value of DIF.
[c]PDIF = DIF / ((NMOC concentration, first channel + NMOC concentration, second channel) / 2) x 100.
[d]APDIF = Absolute value of PDIF.

TABLE 4-17. OVERALL STATISTICS FOR LOCAL AMBIENT SAMPLES, BY RADIAN ANALYSIS ORDER

Radian Analysis Order	Statistics	Variables			
		DIF[a]	ADIF[b]	PDIF[c]	APDIF[d]
First[e]	Cases	271	271	271	271
	Minimum	-0.221000	0.000000	-40.464345	0.000000
	Maximum	0.288000	0.288000	25.842697	40.464345
	Mean	0.010166	0.041551	0.200665	6.776625
	Standard Dev.	0.062270	0.047417	10.083126	7.457553
	Standard Error	0.003783	0.002880	0.612500	0.453014
	Skewness	0.937980	2.508092	-1.105659	2.277388
	Kurtosis	4.452075	7.442785	3.887652	5.777667
Second[f]	Cases	195	195	195	195
	Minimum	-0.138000	0.000000	-46.575342	0.000000
	Maximum	0.343000	0.343000	45.161290	46.575342
	Mean	0.012843	0.044556	1.815656	10.098154
	Standard Dev.	0.066142	0.050449	14.652790	10.748001
	Standard Error	0.004737	0.003613	1.049308	0.769680
	Skewness	1.542610	2.783087	-0.366040	1.795510
	Kurtosis	5.362248	10.756256	2.450925	2.645830

[a]DIF = (NMOC concentration for the second channel) - (NMOC concentration for the first channel), ppmC.
[b]ADIF = Absolute value of DIF.
[c]PDIF = DIF / ((NMOC concentration, first channel) + NMOC concentration, second channel) / 2) x 100.
[d]APDIF = Absolute value of PDIF for comparisons involving Radian Channels A, B, C, D, QAD, and ASRL.
[e]"First" Radian analysis order describes those local ambient samples analyzed first by Radian channels and secondly by EPA channels.
[f]"Second" Radian analysis order describes those local ambient samples analyzed first by EPA channels and secondly by Radian Channels.

TABLE 4-18. STATISTICS FOR LOCAL AMBIENT SAMPLES, BY RADIAN ANALYSIS ORDER AND CHANNEL PAIR

Radian Analysis Order/ Pair	Statistics	Variables			
		DIF[a]	ADIF[b]	PDIF[c]	APDIF[d]
First/ ASRL-A	Cases	18	18	18	18
	Minimum	-0.108000	0.001000	-29.305913	0.113314
	Maximum	0.081000	0.108000	22.349570	29.305913
	Mean	-0.013706	0.040183	-0.604162	7.734795
	Standard Dev.	0.049193	0.030152	11.583657	8.439272
	Standard Error	0.011595	0.007107	2.730294	1.989155
	Skewness	-0.091852	0.578225	-0.224337	1.299598
	Kurtosis	-0.709837	-0.477375	1.044789	0.558911
First/ ASRL-B	Cases	18	18	18	18
	Minimum	-0.105000	0.004000	-14.736842	0.759013
	Maximum	0.099000	0.105000	23.098592	23.098592
	Mean	-0.013711	0.047156	0.497716	7.760637
	Standard Dev.	0.055622	0.030634	10.442511	6.748188
	Standard Error	0.013110	0.007220	2.461323	1.590563
	Skewness	0.159094	0.401831	0.985536	1.168045
	Kurtosis	-0.813731	-0.645211	0.096446	0.054778
First/ ASRL-C	Cases	18	18	18	18
	Minimum	-0.200000	0.003000	-9.589041	0.497100
	Maximum	0.086000	0.200000	25.842697	25.842697
	Mean	-0.014556	0.052778	2.733957	7.911383
	Standard Dev.	0.071121	0.048304	10.574237	7.311425
	Standard Error	0.016763	0.011385	2.492371	1.723320
	Skewness	-0.936650	1.584054	0.983230	1.382673
	Kurtosis	0.640557	2.772049	-0.162452	0.739023
First/ ASRL-D	Cases	18	18	18	18
	Minimum	-0.221000	0.005000	-11.764706	1.313629
	Maximum	0.054000	0.221000	17.647059	17.647059
	Mean	-0.028778	0.057889	0.314714	7.719104
	Standard Dev.	0.075895	0.055576	9.235456	4.723238
	Standard Error	0.017889	0.013099	2.176818	1.113278
	Skewness	-1.076771	1.725785	0.696257	0.752543
	Kurtosis	0.419433	2.382501	-0.871704	-0.381762

(Continued)

TABLE 4-18. (Continued)

Radian Analysis Order/ Pair	Statistics	Variables			
		DIF[a]	ADIF[b]	PDIF[c]	APDIF[d]
First/ B-A	Cases	19	19	19	19
	Minimum	-0.053000	0.000000	-27.532468	0.000000
	Maximum	0.068000	0.068000	7.117794	27.532468
	Mean	0.000216	0.016532	-0.941234	3.709060
	Standard Dev.	0.025009	0.018359	7.152791	6.129938
	Standard Error	0.005738	0.004212	1.640963	1.406304
	Skewness	0.454858	1.681110	-2.789053	3.292242
	Kurtosis	1.889743	1.807464	8.368836	10.421723
First/ C-A	Cases	19	19	19	19
	Minimum	-0.087000	0.002000	-33.583960	0.934579
	Maximum	0.139000	0.139000	13.756614	33.583960
	Mean	0.001700	0.032932	-2.333482	5.548487
	Standard Dev.	0.048871	0.035308	9.157698	7.557450
	Standard Error	0.011212	0.008100	2.100920	1.733798
	Skewness	0.907523	1.688918	-1.918474	2.915672
	Kurtosis	1.821278	2.373493	5.600165	8.235221
First/ C-B	Cases	19	19	19	19
	Minimum	-0.048000	0.003000	-11.557297	0.180126
	Maximum	0.140000	0.140000	13.756614	13.756614
	Mean	0.001484	0.025253	-1.399566	4.278238
	Standard Dev.	0.040702	0.031398	5.492994	3.594499
	Standard Error	0.009338	0.007203	1.260179	0.824635
	Skewness	2.138783	2.761371	0.853746	1.255967
	Kurtosis	5.262548	7.571189	1.418732	1.139350
First/ C-D	Cases	19	19	19	19
	Minimum	-0.057000	0.001000	-10.731707	0.136705
	Maximum	0.017000	0.057000	7.039337	10.731707
	Mean	-0.013842	0.017211	-2.737846	3.683818
	Standard Dev.	0.018810	0.015601	4.209647	3.362874
	Standard Error	0.004315	0.003579	0.965759	0.771496
	Skewness	-0.792447	1.455031	0.077511	0.628267
	Kurtosis	0.476887	1.394441	0.074222	-0.925005

(Continued)

TABLE 4-18. (Continued)

Radian Analysis Order/ Pair	Statistics	Variables			
		DIF[a]	ADIF[b]	PDIF[c]	APDIF[d]
First/ D-A	Cases	19	19	19	19
	Minimum	-0.084000	0.000000	-40.384615	0.000000
	Maximum	0.160000	0.160000	21.978022	40.384615
	Mean	0.015542	0.036279	0.413686	6.330237
	Standard Dev.	0.052345	0.040071	11.518711	9.516472
	Standard Error	0.012009	0.009193	2.642574	2.183228
	Skewness	0.935114	1.772796	-2.128685	2.797932
	Kurtosis	1.591500	2.807827	6.974744	7.083948
First/ D-B	Cases	19	19	19	19
	Minimum	-0.051000	0.000800	-13.219616	0.828157
	Maximum	0.161000	0.161000	21.978022	21.978022
	Mean	0.015326	0.030674	1.335867	4.889913
	Standard Dev.	0.045053	0.035841	7.082594	5.177564
	Standard Error	0.010336	0.008222	1.624858	1.187815
	Skewness	1.712209	2.708733	0.775908	2.186023
	Kurtosis	3.937868	7.402611	2.591462	4.458712
First/ QAD-A	Cases	17	17	17	17
	Minimum	-0.041700	0.002000	-33.588401	0.226501
	Maximum	0.270000	0.270000	11.974978	33.588401
	Mean	0.046371	0.056571	1.555693	7.756315
	Standard Dev.	0.074839	0.066972	10.884012	7.557295
	Standard Error	0.018151	0.016243	2.639761	1.832913
	Skewness	1.719122	2.200633	-2.126854	2.407639
	Kurtosis	2.887403	4.317076	4.489405	6.234630
First/ QAD-ASRL	Cases	17	17	17	17
	Minimum	-0.054000	0.001000	-34.817814	0.113186
	Maximum	0.221000	0.221000	19.040802	34.817814
	Mean	0.057529	0.079882	0.483664	12.284499
	Standard Dev.	0.084834	0.062716	16.256385	10.206758
	Standard Error	0.020575	0.015211	3.942753	2.475502
	Skewness	0.340890	0.891954	-1.188471	1.010815
	Kurtosis	-0.905625	-0.180998	0.162183	-0.172939

(Continued)

TABLE 4-18. (Continued)

Radian Analysis Order/ Pair	Statistics	Variables			
		DIF[a]	ADIF[b]	PDIF[c]	APDIF[d]
First/ QAD-B	Cases	17	17	17	17
	Minimum	-0.048800	0.005000	-40.464345	0.614628
	Maximum	0.288000	0.288000	14.179104	40.464345
	Mean	0.043247	0.052400	1.122203	7.577468
	Standard Dev.	0.076416	0.070066	11.974211	9.149488
	Standard Error	0.018534	0.016993	2.904173	2.219077
	Skewness	2.167619	2.615331	-2.604710	2.924645
	Kurtosis	4.554445	5.914280	6.831545	8.163272
First/ QAD-C	Cases	17	17	17	17
	Minimum	-0.037000	0.008000	-29.249012	0.844900
	Maximum	0.235000	0.235000	18.248175	29.249012
	Mean	0.041529	0.048706	3.107865	7.944529
	Standard Dev.	0.058912	0.052750	10.456747	7.248847
	Standard Error	0.014288	0.012794	2.536134	1.758104
	Skewness	2.056514	2.766749	-1.688010	1.602488
	Kurtosis	5.062534	7.415109	3.576789	2.470924
First/ QAD-D	Cases	17	17	17	17
	Minimum	-0.048000	0.000000	-39.669421	0.000000
	Maximum	0.239000	0.239000	15.276558	39.669421
	Mean	0.025471	0.037588	0.142870	7.722110
	Standard Dev.	0.063266	0.056487	12.522080	9.667795
	Standard Error	0.015344	0.013700	3.037051	2.344785
	Skewness	2.355236	2.877167	-1.969240	2.186624
	Kurtosis	5.858155	7.826228	4.133224	5.089874
Second/ ASRL-A	Cases	13	13	13	13
	Minimum	-0.125000	0.002000	-14.392631	0.331675
	Maximum	0.126000	0.126000	45.161290	45.161290
	Mean	0.014638	0.052177	7.922490	14.025321
	Standard Dev.	0.065664	0.039932	17.781785	13.079989
	Standard Error	0.018212	0.011075	4.931780	3.627736
	Skewness	-0.451331	0.612112	0.676141	1.026666
	Kurtosis	-0.110119	-0.398361	-0.636634	0.313131

(Continued)

TABLE 4-18. (Continued)

Radian Analysis Order/ Pair	Statistics	Variables			
		DIF[a]	ADIF[b]	PDIF[c]	APDIF[d]
Second/ ASRL-B	Cases	13	13	13	13
	Minimum	-0.083000	0.007000	-9.760426	1.339713
	Maximum	0.150000	0.150000	37.681159	37.681159
	Mean	0.015715	0.056177	6.053810	13.761119
	Standard Dev.	0.068760	0.039708	16.428695	10.220352
	Standard Error	0.019071	0.011013	4.556500	2.834616
	Skewness	0.391207	1.003603	0.562228	1.012222
	Kurtosis	-0.694991	0.532414	-1.091725	0.221176
Second/ ASRL-C	Cases	13	13	13	13
	Minimum	-0.104000	0.005000	-11.831627	0.849618
	Maximum	0.20600	0.206000	38.738739	38.738739
	Mean	0.033769	0.066538	10.452861	16.062058
	Standard Dev.	0.083772	0.058794	17.929705	12.663055
	Standard Error	0.023234	0.016307	4.972806	3.512100
	Skewness	0.465159	1.123869	0.208437	0.436011
	Kurtosis	-0.252359	0.476983	-1.465142	-1.171785
Second/ ASRL-D	Cases	13	13	13	13
	Minimum	-0.097000	0.004000	-10.991501	0.679117
	Maximum	0.152000	0.152000	38.374718	38.174718
	Mean	0.039538	0.065692	13.374784	17.526810
	Standard Dev.	0.069504	0.043003	18.438998	14.177462
	Standard Error	0.019277	0.011927	5.114058	3.932120
	Skewness	-0.373526	0.317899	0.173233	0.455796
	Kurtosis	-0.529255	-0.565156	-1.453662	-1.385090
Second/ B-A	Cases	13	13	13	13
	Minimum	-0.082000	0.002000	-5.078597	0.297619
	Maximum	-0.028000	0.082000	7.812500	7.812500
	Standard Dev.	0.029113	0.022312	3.247348	1.980387
	Standard Error	0.008075	0.006188	0.900652	0.549261
	Skewness	-1.962071	2.041421	-0.515240	0.899189
	Kurtosis	2.862640	3.311227	0.418930	0.502126

(Continued)

TABLE 4-18. (Continued)

Radian Analysis Order/ Pair	Statistics	Variables			
		DIF[a]	ADIF[b]	PDIF[c]	APDIF[d]
Second/ C-A	Cases	13	13	13	13
	Minimum	-0.138000	0.009000	-43.678161	1.328413
	Maximum	0.023000	0.138000	17.142857	43.678161
	Mean	-0.019131	0.034100	-2.484154	8.517283
	Standard Dev.	0.048096	0.038079	14.108865	11.276343
	Standard Error	0.013339	0.010561	3.913095	3.127495
	Skewness	-1.421644	2.030508	-1.853455	2.597257
	Kurtosis	1.124006	2.642173	3.950802	5.603007
Second/ C-B	Cases	13	13	13	13
	Minimum	-0.100000	0.005000	-46.511628	1.626016
	Maximum	0.021000	0.100000	9.361702	46.511628
	Mean	-0.018054	0.028715	-4.370696	7.936605
	Standard Dev.	0.035309	0.026581	13.758450	11.905923
	Standard Error	0.009793	0.007372	3.815908	3.302109
	Skewness	-0.925061	1.646455	-2.340106	2.890837
	Kurtosis	0.163916	1.933896	5.080904	6.977965
Second/ C-D	Cases	13	13	13	13
	Minimum	-0.054000	0.001000	-4.102564	0.146735
	Maximum	0.070000	0.070000	12.867647	12.867647
	Mean	0.005769	0.019308	2.957738	3.950212
	Standard Dev.	0.028937	0.021669	4.647188	3.764182
	Standard Error	0.008026	0.006010	1.288898	1.043996
	Skewness	0.051008	1.288651	0.611370	1.101655
	Kurtosis	1.150734	0.481291	-0.154617	0.543094
Second/ D-A	Cases	13	13	13	13
	Minimum	-0.094000	0.007000	-43.317972	1.181684
	Maximum	0.010000	0.094000	7.812500	43.317972
	Mean	-0.024900	0.030485	-5.440682	7.858309
	Standard Dev.	0.034011	0.028665	12.547227	11.072559
	Standard Error	0.009433	0.007950	3.479975	3.070975
	Skewness	-0.847321	1.319085	-2.213090	2.775539
	Kurtosis	-0.253467	0.441646	4.663879	6.535834

(Continued)

TABLE 4-18. (Continued)

Radian Analysis Order/ Pair	Statistics	Variables			
		DIF[a]	ADIF[b]	PDIF[c]	APDIF[d]
Second/ D-B	Cases	13	13	13	13
	Minimum	-0.099000	0.000000	-46.153846	0.000000
	Maximum	0.014000	0.099000	1.664685	46.153846
	Mean	-0.023823	0.026331	-7.329370	7.710443
	Standard Dev.	0.031309	0.029052	12.635650	12.387525
	Standard Error	0.008684	0.008058	3.504499	3.435681
	Skewness	-1.025171	1.228762	-2.403505	2.491655
	Kurtosis	0.450604	0.874525	5.123325	5.437649
Second/ QAD-A	Cases	13	13	13	13
	Minimum	-0.061000	0.002000	-30.423940	1.492537
	Maximum	0.205000	0.205000	14.234875	30.423940
	Mean	0.027946	0.045023	1.202214	8.346933
	Standard Dev.	0.064539	0.053060	11.389698	7.470860
	Standard Error	0.017900	0.014716	3.158934	2.072044
	Skewness	1.526011	2.283929	-1.673128	2.121895
	Kurtosis	2.544852	4.559834	2.636685	4.057580
Second/ QAD-ASRL	Cases	13	13	13	13
	Minimum	-0.077000	0.026000	-46.575342	5.048830
	Maximum	0.137000	0.137000	15.533981	46.575342
	Mean	0.013308	0.070385	-6.710507	18.685758
	Standard Dev.	0.078237	0.030759	21.826644	12.121544
	Standard Error	0.021699	0.008531	6.053622	3.361912
	Skewness	0.188126	0.613519	-0.489921	0.982153
	Kurtosis	-1.530587	-0.061800	-1.254959	0.130181
Second/ QAD-B	Cases	13	13	13	13
	Minimum	-0.066000	0.005300	-33.333333	1.881768
	Maximum	0.287000	0.287000	10.292272	33.333333
	Mean	0.029023	0.047638	-0.691100	8.380423
	Standard Dev.	0.083787	0.073989	11.817628	8.005600
	Standard Error	0.023238	0.020521	3.277620	2.220354
	Skewness	2.355305	2.880384	-1.715879	2.497435
	Kurtosis	5.293215	6.917836	2.464673	5.621000

(Continued)

TABLE 4-18. (Continued)

Radian Analysis Order/ Pair	Statistics	Variables			
		DIF[a]	ADIF[b]	PDIF[c]	APDIF[d]
Second/ QAD-C	Cases	13	13	13	13
	Minimum	-0.023000	0.000000	-18.623482	0.000000
	Maximum	0.343000	0.343000	13.709677	18.623482
	Mean	0.047077	0.053077	3.721703	7.486460
	Standard Dev.	0.094250	0.090731	8.867572	5.737726
	Standard Error	0.026140	0.025164	2.459422	1.591359
	Skewness	2.591568	2.761499	-1.132073	0.373818
	Kurtosis	5.836032	6.449991	1.044279	-0.970756
Second/ QAD-D	Cases	13	13	13	13
	Minimum	-0.012000	0.003000	-9.302326	1.069519
	Maximum	0.289000	0.289000	16.520211	16.520211
	Mean	0.052846	0.054692	6.674173	8.105300
	Standard Dev.	0.077890	0.076497	7.072797	5.206779
	Standard Error	0.021603	0.021216	1.961641	1.444101
	Skewness	2.309496	2.402242	-0.556793	0.239645
	Kurtosis	4.727122	5.021137	0.127779	-1.119342

[a]DIF = (NMOC concentration for the second channel) - (NMOC concentration for first channel), ppmC.
[b]ADIF = Absolute value of DIF.
[c]PDIF = DELTA / (NMOC concentration, first channel) + (NMOC concentration, second channel) / 2 x 100.
[d]APDIF = Absolute value of PDIF.

TABLE 4-19. LOCAL AMBIENT SAMPLES, RADIAN FIRST ANALYSIS

Pair No.	Channel Pair	Mean Difference (ppmC)	Standard Deviation (ppmC)	Cases	$t_{0.975,n-1}$	95% Confidence Interval Upper	95% Confidence Interval Lower
1	B-A	0.000216	0.025009	19	2.101	0.012270	-0.01183
2	C-A	0.001700	0.048871	19	2.101	0.025255	-0.02185
3	D-A	0.015542	0.052345	19	2.101	0.040772	-0.00968
4	QAD-A	0.046371	0.074839	17	2.120	0.084851	0.00789
5	ASRL-A	-0.013700	0.049193	18	2.110	0.010759	-0.03817
6	C-B	0.001484	0.040702	19	2.101	0.021102	-0.01813
7	D-B	0.015326	0.045053	19	2.101	0.037041	-0.00638
8	QAD-B	0.043247	0.076416	17	2.120	0.082538	0.00396
9	ASRL-B	-0.013710	0.055622	18	2.110	0.013951	-0.04137
10	C-D	-0.013840	0.018810	19	2.101	-0.004770	-0.02290
11	QAD-C	0.041529	0.058912	17	2.120	0.071820	0.01124
12	ASRL-C	-0.014550	0.071121	18	2.110	0.020514	-0.04992
13	QAD-D	0.025471	0.063266	17	2.120	0.058000	-0.00705
14	ASRL-D	-0.028770	0.075895	18	2.101	0.008805	-0.06636
15	QAD-ASRL	0.057529	0.084834	17	2.120	0.101148	0.01391

$t_{0.975,n-1}$ = Student's t-statistic for 95% confidence interval, where n = the number of cases in mean DIF.

TABLE 4-20. LOCAL AMBIENT SAMPLES, RADIAN SECOND ANALYSIS

Pair No.	Channel Pair	Mean Difference (ppmC)	Standard Deviation (ppmC)	Cases	$t_{0.975,n-1}$	95% Confidence Interval Upper	95% Confidence Interval Lower
1	B-A	-0.001070	0.029113	13	2.179	0.016517	-0.01867
2	C-A	-0.019130	0.048096	13	2.179	0.009935	-0.04819
3	D-A	-0.024900	0.034011	13	2.179	-0.004340	-0.04545
4	QAD-A	0.027946	0.064539	13	2.179	0.066949	-0.01105
5	ASRL-A	0.014638	0.065664	13	2.179	0.054321	-0.02504
6	C-B	-0.018050	0.035309	13	2.179	0.003284	-0.03939
7	D-B	-0.023820	0.031309	13	2.179	-0.004900	-0.04274
8	QAD-B	0.029023	0.083787	13	2.179	0.079659	-0.02161
9	ASRL-B	0.015715	0.068760	13	2.179	0.057269	-0.02583
10	C-D	0.005769	0.028937	13	2.179	0.023256	-0.01171
11	QAD-C	0.047077	0.094250	13	2.179	0.104036	-0.00988
12	ASRL-C	0.033769	0.083772	13	2.179	0.084396	-0.01685
13	QAD-D	0.052846	0.077890	13	2.179	0.099918	0.00577
14	ASRL-D	0.039538	0.069504	13	2.179	0.081542	-0.00246
15	QAD-ASRL	0.013308	0.078237	13	2.179	0.060590	-0.03397

$t_{0.975,n-1}$ = Student's t-statistic for 95% confidence interval, where n = the number of cases in mean DIF.

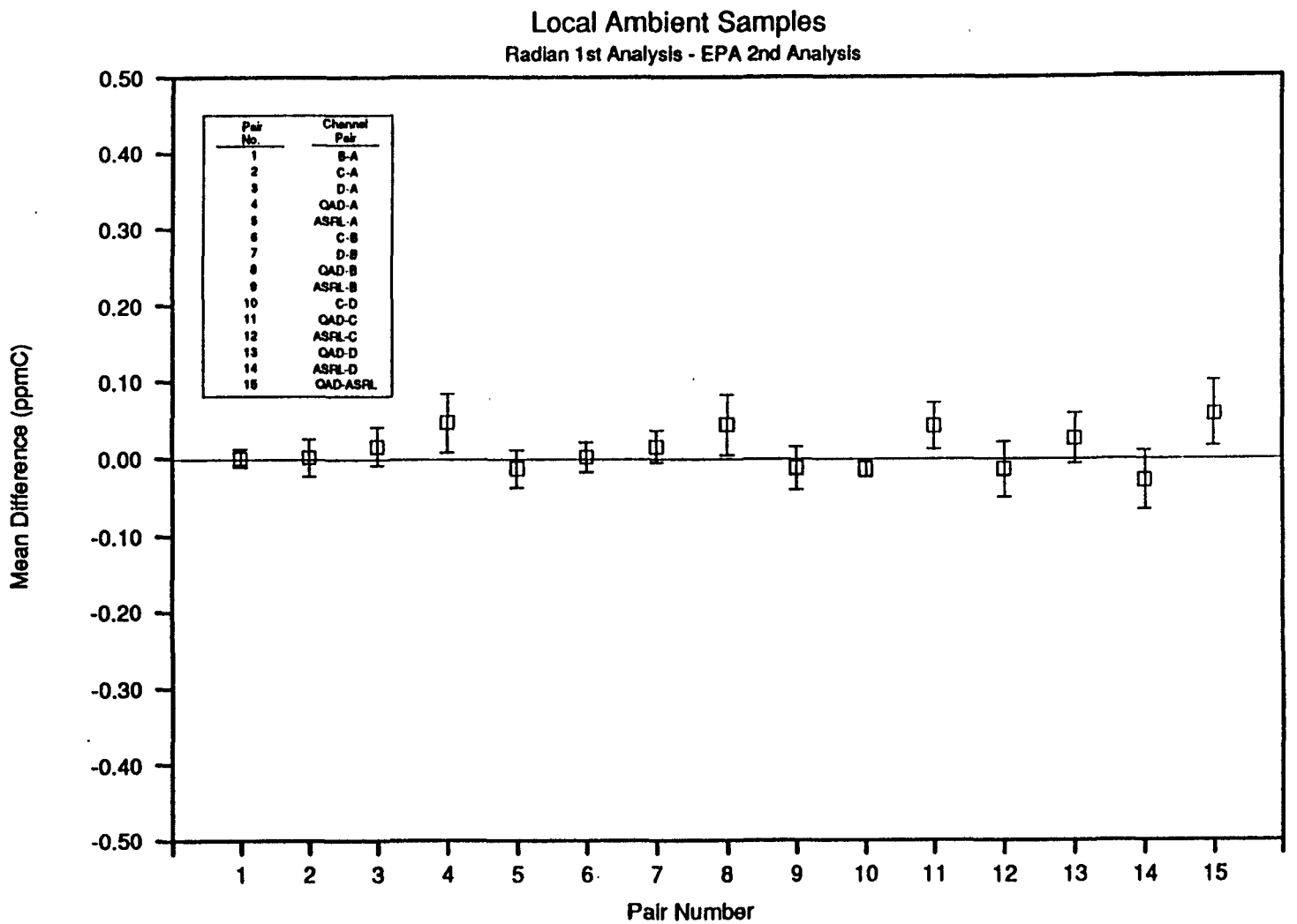

Figure 4-30. 95% Confidence intervals for mean NMOC difference, Radian first analysis

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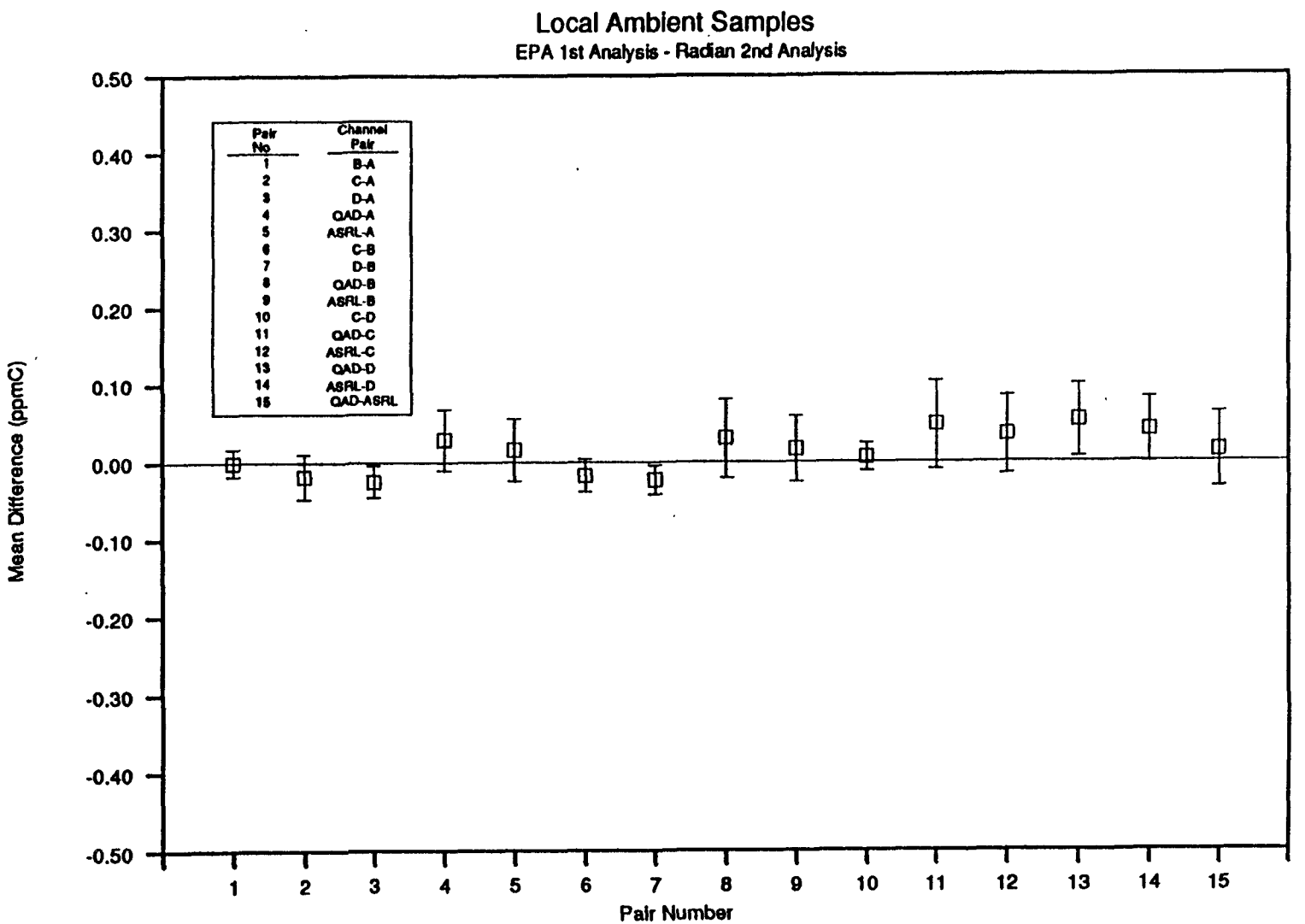

Figure 4-31. 95% Confidence intervals for mean NMOC difference, EPA first analysis

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pair mean differences and zero. The channel pairs containing QAD for Figure 4-30 show mean differences greater than zero.

Table 4-21 presents comparisons between percent differences in NMOC concentrations for all channel pairs. Overall trends in the data are difficult to discern with the exception of the fact that the standard deviations of the differences for the site samples are larger than the corresponding mean differences. This is true for all 30 comparisons for the local ambient samples.

The results in Table 4-17 show that the order of analysis by one laboratory does not make a significant difference in the measured NMOC value. Table 4-18 shows that there is no significant difference in the measured NMOC level between Radian and EPA channels. Table 4-18 also shows no significant difference between the NMOC analysis by the PDFID and the GC/FID speciated method of analysis. There are no significant differences between Radian channels.

4.5 DUPLICATE SAMPLE RESULTS

Throughout the 1988 NMOC Monitoring Program, duplicate samples were collected once every two weeks at each site. Each duplicate was analyzed by Radian for its NMOC content.

Table 4-22 summarizes statistics for NMOC, DIFF, ADIFF, PCDIFF, and APCDIFF. The mean absolute percent difference between the duplicate samples was 8.72 percent. The absolute percent difference ranged from zero to 68 percent. Table 4-23 summarizes the statistics for duplicate analyses by site code. The mean absolute percentage differences between duplicates ranged from 2.17% for CLOH to 20.4% for M1TN.

These results are lower than in 1986 and 1987, representing good precision. The analytical error for repeated analyses was 10.06%, while the precision for duplicates was 8.72 percent. Because the duplicate results include sampling and analysis precision, while the replicate (or repeated analysis) precision relates only to analytical error, the duplicate absolute percent difference is expected to be greater than the replicate absolute percent difference. The fact that the results given above appear to show an opposite trend results from the use of different sets of samples for duplicates and replicates.

TABLE 4-21. COMPARISON OF PERCENT DIFFERENCE IN NMOC CONCENTRATION BETWEEN CHANNEL PAIRS[a]

	Site Samples			Local Ambient Samples					
				Duplicate No. 1			Duplicate No. 1		
Channel Pair	Percent Difference Mean	Standard Deviation	Cases	Percent Difference Mean	Standard Deviation	Cases	Percent Difference Mean	Standard Deviation	Cases
Radian vs. Radian									
B-A	2.502784	16.459645	13	-0.941234	7.152791	19	3.247348	0.900652	13
C-A	-6.683428	15.398589	18	-2.333482	9.157698	19	-2.484154	14.108865	13
D-A	1.249924	25.960628	20	0.413686	11.518711	19	-5.440682	12.547227	13
C-B	0.326309	20.973678	24	-1.399566	5.492994	19	-4.370696	13.758450	13
D-B	5.288014	12.690827	12	1.335867	7.082594	19	-7.329370	12.635650	13
C-D	0.055438	13.083141	12	-2.737846	4.209647	19	2.957738	4.647188	13
Overall	0.203105	15.964091	217	-0.943762	7.768381	114	-2.460930	11.368191	78
ASRL vs. Radian									
ASRL-A	1.783863	21.130711	84	-0.604162	11.583657	18	7.922490	17.781785	13
ASRL-B	-3.914594	28.924181	80	0.497716	10.442511	18	6.053810	16.428695	13
ASRL-C	8.284869	26.945216	106	2.733957	10.574237	18	10.452861	17.929705	13
ASRL-D	5.304111	21.343146	95	0.314714	9.235456	18	13.374784	18.738998	13
Overall	3.339078	25.113957	365	0.735556	10.342104	72	9.450986	17.356911	52
QAD vs. Radian									
QAD-A	2.339098	14.422613	46	1.555693	10.884012	17	1.202214	11.389698	13
QAD-B	-7.268897	27.535381	30	1.122203	11.974211	17	-0.691100	11.817628	13
QAD-C	3.825415	16.543503	56	3.107865	10.456747	17	3.721703	8.867572	13
QAD-D	4.548292	14.303968	39	0.142870	12.522080	17	6.674173	7.072797	13
Overall	1.644083	18.339423	171	1.482158	11.280381	68	2.726747	10.072280	52
QAD vs. ASRL	-1.510741	22.662271	156	0.483664	16.256385	17	-6.710507	21.826644	13

[a]For the Radian Channel Pair B-A, % Difference = (NMOC (A) - NMOC (B)) / ((NMOC (A) + NMOC (B)) / 2 x 100.

TABLE 4-22. STATISTICS FOR DUPLICATE ANALYSES

Statistics	Variables				
	NMOC[a]	DIFF[b]	ADIFF[c]	PCDIFF[d]	APCDIFF[e]
Cases	265	265	265	265	265
Minimum	0.034250	-0.347000	0.000000	-60.092961	0.000000
Maximum	7.601750	0.713500	0.713500	68.252081	68.252081
Mean	0.591195	-0.003292	0.039319	0.312724	8.715158
Standard Dev.	0.645826	0.077225	0.066503	13.637914	10.480896
Standard Error	0.039673	0.004744	0.004085	0.837770	0.643836
Skewness	5.652820	2.796599	5.649232	0.301162	2.818770
Kurtosis	52.427457	32.059261	44.283826	6.383260	9.949049

[a]NMOC = Average NMOC concentration of duplicate samples, ppmC.
[b]DIFF = Difference between NMOC concentrations for duplicate samples, ppmC.
[c]ADIFF = Absolute value of DIFF.
[d]PCDIFF = DIFF / ((ppmC for Duplicate No. 1 + ppmC for Duplicate No. 2) / 2) x 100.
[e]APCDIFF = Absolute value of PCDIFF.

TABLE 4-23. DUPLICATE ANALYSES STATISTICS, BY SITE

Site Code	NMOC, ppmC		ADIFF[a], ppmC		APCDIFF[b], ppmC		Duplicate Pairs
	Mean	SD	Mean	SD	Mean	SD	
AUTX	0.552583	0.173714	0.025833	0.031346	4.073726	4.018051	3
AZCA	0.535529	0.188723	0.057708	0.070603	10.880897	11.214236	6
B1CA	0.971833	0.504359	0.036315	0.044167	5.941729	8.734416	9
B2CA	0.208625	0.035615	0.032083	0.055224	15.579577	26.211784	6
B2MA	0.583822	0.248311	0.030978	0.031796	4.452269	3.831617	6
BMTX	1.016221	0.841311	0.032238	0.033751	5.112067	5.922378	7
BRIL	0.214830	0.172941	0.032600	0.040979	17.294570	16.891987	10
C2OH	1.188850	0.956221	0.025900	0.022521	5.783052	6.278200	5
C3IL	0.237127	0.156264	0.021496	0.021651	7.629258	6.020046	8
C6IL	1.008875	0.394741	0.063750	0.072229	5.809672	5.519024	6
CHNC	0.329600	0.102566	0.018278	0.019843	5.193598	4.864368	6
CLOH	0.971217	0.743164	0.038167	0.071434	2.168126	2.814085	6
D1MI	0.456189	0.366675	0.022000	0.013670	6.671361	5.505086	6
D2MI	0.507583	0.248080	0.041333	0.032099	8.578623	5.862463	6
DLTX	0.510049	0.212594	0.031294	0.019680	7.482299	5.604756	6
ELTX	0.444333	0.193014	0.033972	0.030059	9.596016	10.374600	6
FECA	0.820386	0.741474	0.035238	0.031441	9.905411	10.666299	7
H1TX	0.825958	0.605455	0.030583	0.029011	6.225026	6.775344	6
M1NY	1.279000	-	0.078000	-	6.098514	-	1
M1TN	0.868417	0.624745	0.080322	0.031963	20.446044	23.644247	3
M2FL	0.339106	0.488391	0.020543	0.023941	14.601712	20.954312	7
M2TN	0.340856	0.177969	0.016917	0.008784	6.871337	4.584245	8
MIFL	0.736880	0.727373	0.083780	0.112172	16.187319	16.769880	5
MNY	0.796370	0.341123	0.054200	0.017122	7.761606	3.193589	5
N1TN	0.380300	0.280187	0.018333	0.017136	4.543438	1.468310	6

(Continued)

TABLE 4-23. (Continued)

Site Code	NMOC, ppmC		ADIFF[a], ppmC		APCDIFF[b], ppmC		Duplicate Pairs
	Mean	SD	Mean	SD	Mean	SD	
N2TN	0.705558	0.290438	0.080861	0.145564	9.044656	12.918000	6
NWNJ	0.624042	0.252189	0.019444	0.016802	3.275612	3.158329	6
P1AZ	1.144157	0.995190	0.064571	0.101668	7.539267	7.570105	7
P2AZ	0.463940	0.225732	0.028958	0.022725	6.351408	4.884405	8
PLNJ	0.536142	0.272260	0.033250	0.025009	6.286571	3.943782	6
PRRI	0.530106	0.414676	0.076938	0.096703	17.311929	19.509429	8
S1CA	0.615172	0.577306	0.059540	0.052760	14.977426	9.316717	8
S1FL	0.300913	0.187796	0.011625	0.005406	4.085659	0.548879	4
S1MA	0.300460	0.054812	0.011267	0.006842	4.043049	2.979636	5
S2CA	0.166243	0.023227	0.025214	0.018795	15.006297	10.095737	7
S2FL	0.533325	0.296726	0.101083	0.164758	12.413198	15.991240	4
S2MA	0.335708	0.237061	0.022472	0.016857	7.299836	3.596669	6
SATX	0.350383	0.200569	0.017333	0.006570	5.813870	2.963094	6
SLMO	0.602814	0.387961	0.031500	0.025250	6.539427	4.554910	6
T1FL	0.549758	0.294502	0.024700	0.023538	6.034169	6.110603	6
T2FL	0.403322	0.250065	0.015852	0.012112	4.485336	2.303027	9
W1NY	0.121500	0.057286	0.018000	0.015322	19.950640	23.310211	3
WAIL	2.210983	3.047410	0.184900	0.302394	11.352419	11.770054	5
WOMA	0.406300	0.267317	0.031780	0.029838	6.490158	3.841029	5

[a]ADIFF is the mean of the absolute value of the difference between duplicates, ppmC.
[b]APCDIFF is the mean of the absolute percent differences which equal ADIFF / ((NMOC Duplicate No. 1 + NMOC Duplicate No. 2) / 2) x 100.

4.5.1 Sampling and Analysis Precision

Beginning July 14, the replicate analyses were performed on duplicate samples. The replicate analyses were performed on the same Radian channels on the day after the initial analyses. The intention was to evaluate the relative importance of sampling variability and analytical variability. The data for 50 pairs of duplicates are summarized in Table 4-24. Each site, on a site-specific day, took duplicate samples. The analysis of each duplicate was performed on successive days by two or three injections each day. There were on the average 4.27 injections per duplicate sample for both replicate analyses. Replicate Mean 1 is the average of the NMOC analyses, expressed in ppmC, of two or three injections for the first replicate analysis; and Replicate Mean 2 is the average of the NMOC analyses in ppmC of two or three injections for the second replicate analyses, which took place on the day after the first replicate analysis. Replicate percent difference is the difference of the second replicate mean minus the first replicate, divided by the mean and multiplied by 100. Column 9 in the table gives the absolute percent difference for replicates, which averages 7.009% as seen in the table. The average percent difference is 2.005 percent. For each sample the table also shows the overall sample (or duplicate) mean, the percent difference for the two duplicates, and the absolute percent difference for the duplicates. Note that the overall percent difference for duplicates is -3.946% and the overall absolute percent difference for duplicates is 7.552 percent. The average percent differences and average absolute percent differences for duplicates are larger than for replicates, as expected.

To separate the sampling variability from the analytical variability an analysis of variance was performed with the following hierarchical model:

$$(NMOC)_{ijk\ell} = \mu + S_i + D_{j(i)} + R_{k(ij)} + I_{\ell(ijk)} + \epsilon_{\ell(ijk)},$$

Where: $(NMOC)_{ijk\ell}$ = a measurement of NMOC in ppmC;

μ = the overall mean value for the NMOC measurement;

S_i = sample i for a given site and day;

$D_{j(i)}$ = duplicate j of sample i, j = 1,2;

TABLE 4-24. REPLICATE ANALYSIS OF DUPLICATE SAMPLES FOR 1988

Sample No.	Site Code	Julian Date Sampled	Sample I.D. Number	Replicate Mean 1	Replicate Mean 2	Replicate Overall Mean	Replicate % Diff	Replicate Abs % Diff	Sample Overall Mean	Duplicate % Diff	Duplicate Abs % Diff
1	AZCA	196	2182	0.5275	0.5325	0.5310	0.9416	0.9416			
	AZCA	196	2183	0.5700	0.5670	0.5647	-0.5313	0.5313	0.54925	6.1454	6.1454
2	B2CA	200	2258	0.1853	0.1700	0.1788	-8.5781	8.5781			
	B2CA	200	2257	0.1650	0.1695	0.1667	2.7000	2.7000	0.17389	-6.9964	6.9964
3	BRIL	202	2325	0.2075	0.2165	0.2060	4.3689	4.3689			
	BRIL	202	2319	0.1720	0.1932	0.1747	12.1374	12.1374	0.19730	-16.4623	16.4623
4	N1TN	203	2338	0.2929	0.2715	0.2843	-7.5281	7.5281			
	N1TN	203	2339	0.2797	0.3185	0.2978	13.0471	13.0471	0.29064	4.6389	4.6389
5	C2OH	204	2399	1.6490	1.5673	1.6150	-5.0568	5.0568			
	C2OH	204	2398	1.6470	1.6155	1.6383	-1.9227	1.9227	1.61389	1.4344	1.4344
6	N2TN	204	2432	0.5770	0.5610	0.5703	-2.8054	2.8054			
	N2TN	204	2433	0.5933	0.5760	0.5860	-2.9579	2.9579	0.57867	2.7097	2.7097
7	S1CA	207	2467	0.1215	0.1247	0.1280	2.4740	2.4740			
	S1CA	207	2468	0.1045	0.1030	0.0960	-1.5625	1.5625	0.11350	-28.5714	28.5714
8	BMTX	209	2532	0.6170	0.6475	0.6243	4.8852	4.8852			
	BMTX	209	2531	0.5850	0.6010	0.5893	2.7149	2.7149	0.61263	-5.7676	5.7676
9	MNY	210	2588	1.1795	1.0853	1.1483	-8.2003	8.2003			
	MNY	210	2587	1.0115	0.9830	1.0033	-2.8405	2.8405	1.06711	-13.4779	13.4779
10	ELTX	211	2594	0.6420	0.6517	0.6443	1.5003	1.5003			
	ELTX	211	2595	0.6690	0.6560	0.6680	-1.9461	1.9461	0.65580	3.6068	3.6068
11	AZCA	214	2685	0.4850	0.4465	0.4740	-8.1224	8.1224			
	AZCA	214	2684	0.4620	0.4645	0.4610	0.5423	0.5423	0.46678	-2.7807	2.7807
12	H1TX	214	2658	1.8925	1.8500	1.8837	-2.2562	2.2562			
	H1TX	214	2659	1.8845	1.7450	1.8330	-7.6105	7.6105	1.84300	-2.7265	2.7265
13	DLTX	215	2756	0.3793	0.4250	0.4008	11.3953	11.3953			
	DLTX	215	2757	0.3873	0.3860	0.3918	-0.3404	0.3404	0.39164	-2.2713	2.2713
14	FECA	217	2781	0.1575	0.1630	0.1590	3.4591	3.4591			
	FECA	217	2782	0.1780	0.1810	0.1777	1.6886	1.6886	0.16988	11.0891	11.0891
15	SATX	221	2885	0.7130	0.7720	0.7323	8.0564	8.0564			
	SATX	221	2884	0.7340	0.7220	0.7318	-1.6399	1.6399	0.73511	-0.0797	0.0797
16	B1CA	223	2959	0.6650	0.6890	0.6730	3.5661	3.5661			
	B1CA	223	2958	0.6255	0.6490	0.6270	3.7480	3.7480	0.65622	-7.0769	7.0769
17	MIFL	223	2934	1.9475	1.9955	1.9633	2.4448	2.4448			
	MIFL	223	2935	2.0120	1.9080	1.9917	-5.2218	5.2218	1.95933	1.4328	1.4328
18	P2AZ	224	2994	0.3640	0.3275	0.3500	-10.4286	10.4286			
	P2AZ	224	2995	0.3315	0.3670	0.3410	10.4106	10.4106	0.34750	-2.6049	2.6049
19	PRRI	224	3071	0.3747	0.3110	0.3615	-17.6118	17.6118			
	PRRI	224	3070	0.2740	0.2770	0.2747	1.0922	1.0922	0.31644	-27.2989	27.2989
20	S1MA	228	3119	0.3143	0.3160	0.3112	0.5355	0.5355			
	S1MA	228	3120	0.3030	0.3105	0.3110	2.4116	2.4116	0.31133	-0.0804	0.0804
21	S2MA	229	3136	0.0750	0.0785	0.0760	4.6053	4.6053			
	S2MA	229	3137	0.0695	0.0750	0.0707	7.7830	7.7830	0.07450	-7.2727	7.2727
22	S2CA	231	3301	0.1660	0.1615	0.1613	-2.7893	2.7893			
	S2CA	231	3302	0.2005	0.2430	0.2153	19.7368	19.7368	0.19275	28.6726	28.6726
23	C6IL	232	3220	0.8147	0.8160	0.8180	0.1630	0.1630			
	C6IL	232	3219	0.7840	0.8260	0.7927	5.2986	5.2986	0.81067	-3.1457	3.1457
24	M2FL	236	3407	0.0370	0.0457	0.0397	21.9896	21.9896			
	M2FL	236	3408	0.0315	0.0505	0.0337	56.4356	56.4356	0.04118	-16.5054	16.5054
25	W1NY	236	3364	0.1915	0.1965	0.1970	2.5381	2.5381			
	W1NY	236	3365	0.1800	0.1755	0.1803	-2.4954	2.4954	0.18588	-8.8339	8.8339
26	NWNJ	238	3436	1.1005	1.0845	1.0943	-1.4621	1.4621			
	NWNJ	238	3437	1.0800	1.0840	1.0813	0.3699	0.3699	1.08725	-1.1950	1.1950
27	FECA	239	3500	1.0265	1.0365	1.0340	0.9671	0.9671			
	FECA	239	3499	0.9480	0.9523	0.9183	0.4719	0.4719	0.98656	-11.8491	11.8491
28	N1TN	242	3572	0.2125	0.2170	0.2170	2.0737	2.0737			
	N1TN	242	3573	0.2050	0.2055	0.2050	0.2439	0.2439	0.21000	-5.6872	5.6872

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TABLE 4-24. (Continued)

Sample No.	Site Code	Julian Date Sampled	Sample I.D. Number	Replicate Mean 1	Replicate Mean 2	Replicate Overall Mean	Replicate % Diff	Replicate Abs % Diff	Sample Overall Mean	Duplicate % Diff	Duplicate Abs % Diff
29	S2CA	242	3608	0.1735	0.1975	0.1817	13.2110	13.2110			
	S2CA	242	3607	0.1925	0.1685	0.1823	-13.1627	13.1627	0.18300	0.3663	0.3663
30	B1CA	243	3622	1.2600	1.2290	1.2487	-2.4826	2.4826			
	B1CA	243	3623	1.2695	1.2535	1.2617	-1.2682	1.2682	1.25300	1.0357	1.0357
31	B2CA	244	3680	0.2020	0.2100	0.2040	3.9216	3.9216			
	B2CA	244	3681	0.2015	0.1955	0.1963	-3.0560	3.0560	0.20225	-3.8301	3.8301
32	PRRI	246	3753	1.5505	1.4845	1.5453	-4.2709	4.2709			
	PRRI	246	3752	1.4615	1.4277	1.4587	-2.3195	2.3195	1.47511	-5.7701	5.7701
33	B2MA	250	3783	0.3067	0.2995	0.3085	-2.3231	2.3231			
	B2MA	250	3784	0.3100	0.3093	0.3117	-0.2139	0.2139	0.30670	1.0212	1.0212
34	FECA	250	3836	0.5575	0.6275	0.5790	12.0898	12.0898			
	FECA	250	3835	0.5555	0.6880	0.5990	22.1202	22.1202	0.60713	3.3956	3.3956
35	AZCA	252	3923	0.3893	0.3801	0.3922	-2.3459	2.3459			
	AZCA	252	3924	0.4000	0.3778	0.3896	-5.6982	5.6982	0.38678	-0.6566	0.6566
36	BMTX	256	3983	0.4200	0.4215	0.4187	0.3583	0.3583			
	BMTX	256	3982	0.4160	0.3955	0.4077	-5.0286	5.0286	0.41325	-2.6624	2.6624
37	AUTX	257	3987	0.5740	0.4825	0.5447	-16.7993	16.7993			
	AUTX	257	3988	0.5675	0.6000	0.5780	5.6228	5.6228	0.55600	5.9382	5.9382
38	PLNJ	257	4025	0.3740	0.3920	0.3800	4.7368	4.7368			
	PLNJ	257	4026	0.3455	0.3657	0.3480	5.7950	5.7950	0.36889	-8.7912	8.7912
39	NWNJ	258	4104	0.6930	0.6525	0.6787	-5.9676	5.9676			
	NWNJ	258	4103	0.6825	0.6870	0.6857	0.6563	0.6563	0.67875	1.0261	1.0261
40	MIFL	259	4148	0.1190	0.1075	0.1106	-10.4399	10.4399			
	MIFL	259	4147	0.0905	0.1175	0.1023	26.3844	26.3844	0.10861	-7.7946	7.7946
41	B2MA	263	4195	0.9250	0.9920	0.9490	7.0601	7.0601			
	B2MA	263	4196	1.0040	0.9820	0.9937	-2.2140	2.2140	0.97575	4.5985	4.5985
42	M1TN	263	4342	0.1767	0.1955	0.1823	10.3338	10.3338			
	M1TN	263	4343	0.1060	0.1955	0.1350	66.2963	66.2963	0.16933	-29.7872	29.7872
43	S1MA	264	4245	0.2375	0.2655	0.2440	11.4754	11.4754			
	S1MA	264	4244	0.2600	0.3115	0.2727	18.8875	18.8875	0.26863	11.0968	11.0968
44	N2TN	265	4378	0.7535	0.7580	0.7530	0.5976	0.5976			
	N2TN	265	4379	0.7520	0.7045	0.7373	-6.4421	6.4421	0.74200	-2.1024	2.1024
45	S2MA	265	4284	0.2000	0.2010	0.2010	0.4975	0.4975			
	S2MA	265	4285	0.1735	0.1895	0.1820	8.7912	8.7912	0.19100	-9.9217	9.9217
46	B2CA	267	4421	0.1833	0.1730	0.1793	-5.7648	5.7648			
	B2CA	267	4422	0.1870	0.1290	0.1697	-34.1847	34.1847	0.16978	-5.4932	5.4932
47	B1CA	271	4468	1.0430	1.0336	1.0387	-0.9098	0.9098			
	B1CA	271	4469	1.0585	1.0550	1.0590	-0.3305	0.3305	1.04751	1.9387	1.9387
48	B1CA	272	4486	0.6330	0.5575	0.6060	-12.4587	12.4587			
	B1CA	272	4485	0.5160	0.5305	0.5233	2.7707	2.7707	0.55925	-14.6399	14.6399
49	PRRI	273	4597	0.2665	0.2750	0.2693	3.1559	3.1559			
	PRRI	273	4598	0.2290	0.2360	0.2327	3.0086	3.0086	0.25163	-14.6082	14.6082
50	S2CA	274	4631	0.1570	0.1747	0.1655	10.6747	10.6747			
	S2CA	274	4632	0.1525	0.1330	0.1487	-13.1166	13.1166	0.15660	-10.7162	10.7162
				Overall Average:		0.5545	2.005	7.099	0.55419	-3.946	7.552

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$R_{k(ij)}$ = replicate k of duplicate ij, k = 1,2;
$I_{\ell(ijk)}$ = Analytical injection ℓ, ℓ = 1,2, or 3; and
$\epsilon_{\ell(ijk)}$ = residual error.

The hierarchical (or method) model was chosen because each duplicate pair is independent of each other duplicate pair, and likewise the replicates and injections are nested in the experimental design. No interaction terms are relevant in a nested design.

The Analysis of Variance (ANOVA) showed that R_k and I_ℓ factors were not significantly different from zero, so the ANOVA model was collapsed to:

$$(NMOC)_{ijk} = \mu + S_i + D_{j(i)} + \epsilon_{k(ij)},$$

where the variables are defined as before. The ANOVA is given in Table 4-25. Table 4-26 lists the components of variance for the 50 samples for which duplicates and replicates were analyzed. The mean squares in Table 4-26 are taken directly from the ANOVA Table 4-25. Solving for σ_A^2, the variance for analyses, and σ_D^2, the variance for duplicates gives:

$$\sigma_D^2 = 0.010455306, \text{ and}$$

$$\sigma_A^2 = 0.002591268.$$

Thus $\sigma_D^2/\sigma_A^2 = 4.0348$, which indicates that the precision (in terms of variance) for duplicates is about four times the precision (variance) for analysis. Taking the square root gives 2.009 as the ratio of standard deviations for sampling to analysis. In terms of standard deviation, the conclusion is that the imprecision of measuring NMOC concentration for sampling for duplicates is about twice the imprecision for analysis.

4.5.2 Quality Control Chart

The duplicate quality control chart showing the 2-σ warning limits and the 3-σ control limits is shown in Figure 4-32. The chart was updated daily in order to monitor whether the NMOC program sampling and analytical systems

TABLE 4-25. ANALYSIS OF VARIANCE FOR DUPLICATE SAMPLES

Source	Sum-of-Squares	df	Mean-Square	F-Ratio	P
Sample, S_i	0.902355E+02	49	1.841541487	0.710672E+03	0.000000000
Dup, $D_{j(i)}$	0.047235425	1	0.047235425	0.182287E+02	0.000024836
Error, $\epsilon_{k(ij)}$	0.974316915	376	0.002591268		

TABLE 4-26. COMPONENTS OF VARIANCE FOR DUPLICATES

Source	Mean Square	Expected Mean Square
Si	1.841541487	$\sigma_A^2 + 4.27\ \sigma_D^2 + 8.54\ \sigma_S^2$
$D_{j(i)}$	0.047235425	$\sigma_A^2 + 4.27\ \sigma_D^2$
$\epsilon_{k(ij)}$	0.002591268	σ_A^2

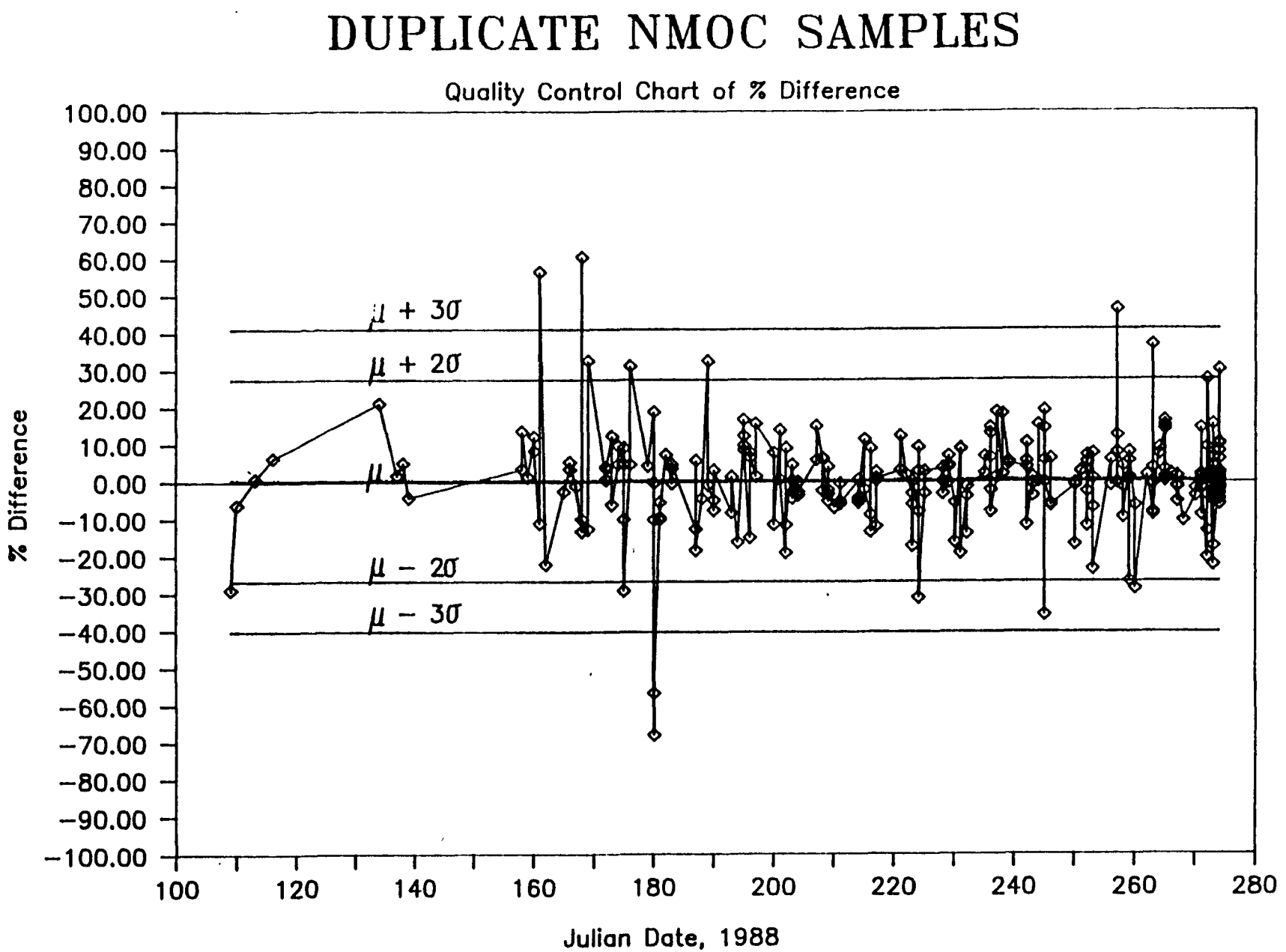

Figure 4–32. Quality control chart of percent difference for duplicate NMOC analysis.

were in control. From 1988 Julian date 160 through about 190 the control chart shows a number of excursions outside either the warning limits ($\mu \pm 2\sigma$) or the control limits ($\mu \pm 3\sigma$). Similarly, after 1988, Julian date 250 there were several excursions outside the warning limits. There was, however, no indication (more than two successive points outside either the warning limits or the control limits) of loss of control. It is necessary to keep in mind that although the analytical systems were centrally located, the sampling systems, which contributed significantly to the overall system variability, were located at 45 sites across the country. The quality control chart shows that in June 1988, as most of the sites were beginning sampling, there was increased variability at several sites, but for the rest of the monitoring program, the duplicate sampling and analysis was in good control.

4.5.3 Precision Profile

As in the case of replicate analyses, the data show that below 1.0 ppmC NMOC concentration, percent difference between duplicate analyses increases significantly. Figure 4-33 shows percent difference plotted against average NMOC concentration. Table 4-27 summarizes the duplicate imprecision into eleven data sets summarized by average NMOC concentrations ranging from 0.050 to 4.50. Average percent difference and average absolute percent difference from Table 4-27 are plotted in Figure 4-34 and 4-35, respectively. The trend of increasing imprecision at NMOC concentration levels below 1.0 ppmC is clear.

4.6 CANISTER PRESSURE RESULTS

Canister pressure results for the NMOC Monitoring Program are important to be sure that the ambient air samples obtained are representative. The NMOC sampling systems are designed to obtain an integrated ambient air sample between 6:00 a.m. and 9:00 a.m., or at other programmed intervals. The flow rate of the sample into the 6-L canister is controlled by a critical orifice, which requires a pressure drop across the orifice sufficiently high to maintain sonic velocity in the orifice. If sonic velocity can be maintained in the orifice for the entire sampling period, then the flow rate into the canister is constant and the sample is properly integrated. The temperature must also be assumed to remain constant over the sampling period.

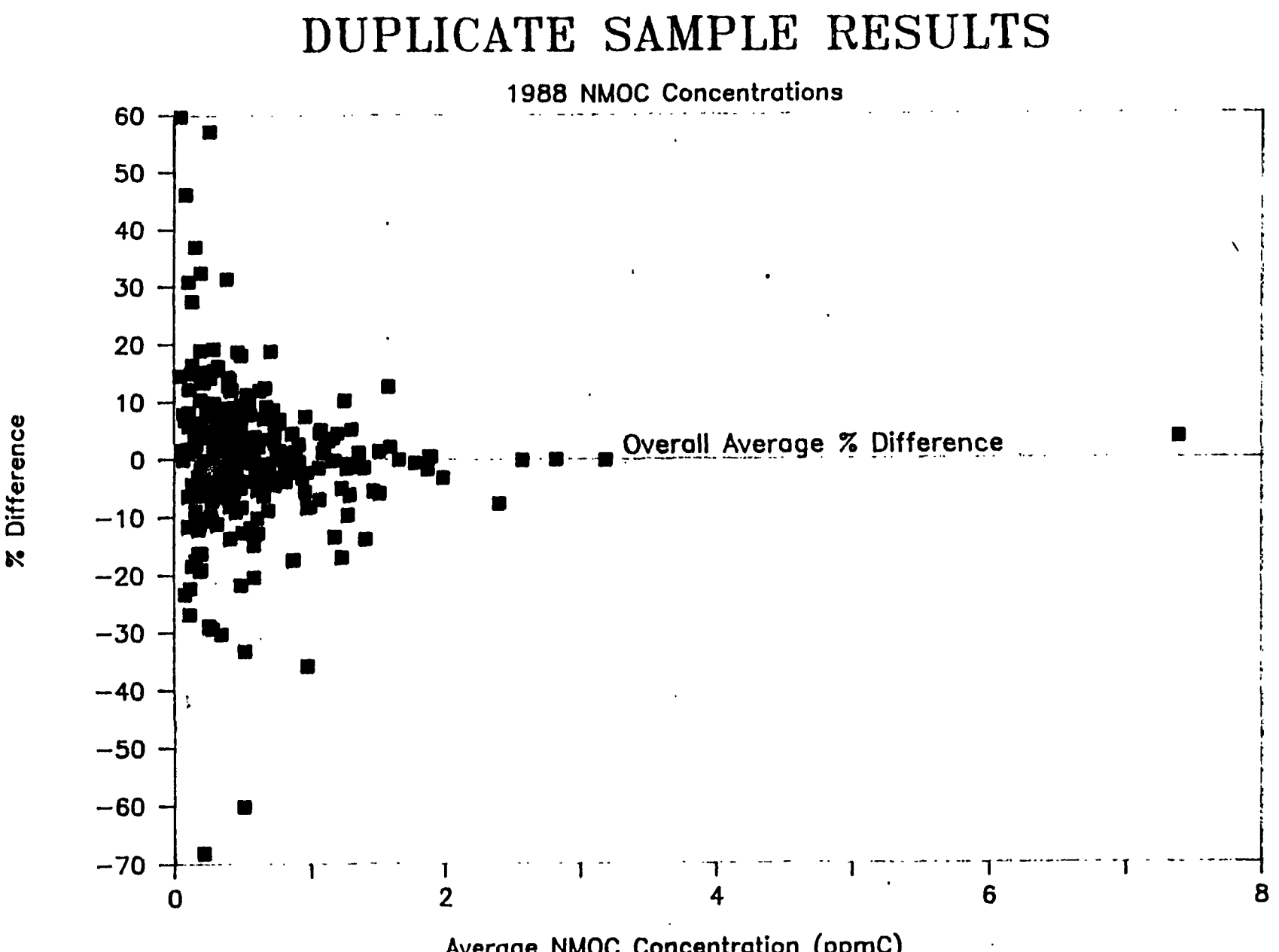

Figure 4–33. Duplicate NMOC sample results comparing average concentration with percent difference.

TABLE 4-27. 1988 NMOC DUPLICATE IMPRECISION

Cases	NMOC Range	Average NMOC ppmC	Minimum % Diff	Average % Diff	Average Absolute % Diff	Maximum % Diff
14	0.000 - 0.099	0.050	-23.264	0.870	15.737	59.688
35	0.100 - 0.199	0.150	-26.730	-0.579	12.635	37.062
38	0.200 - 0.299	0.250	-68.014	6.380	6.380	57.132
40	0.300 - 0.399	0.350	-30.203	2.760	6.812	31.465
34	0.400 - 0.499	0.450	-21.676	0.777	6.501	18.712
19	0.500 - 0.599	0.550	-60.159	1.312	10.880	11.314
17	0.600 - 0.699	0.650	-12.722	1.535	6.929	18.889
12	0.700 - 0.799	0.750	-4.394	1.957	3.435	8.653
17	0.800 - 0.999	0.900	-35.781	-4.204	6.231	7.476
27	1.000 - 1.499	1.250	-16.827	-1.566	4.713	10.306
14	1.500 - 7.499	4.500	-7.620	-0.063	2.799	12.613
		Overall	-68.014	0.398	8.405	59.688

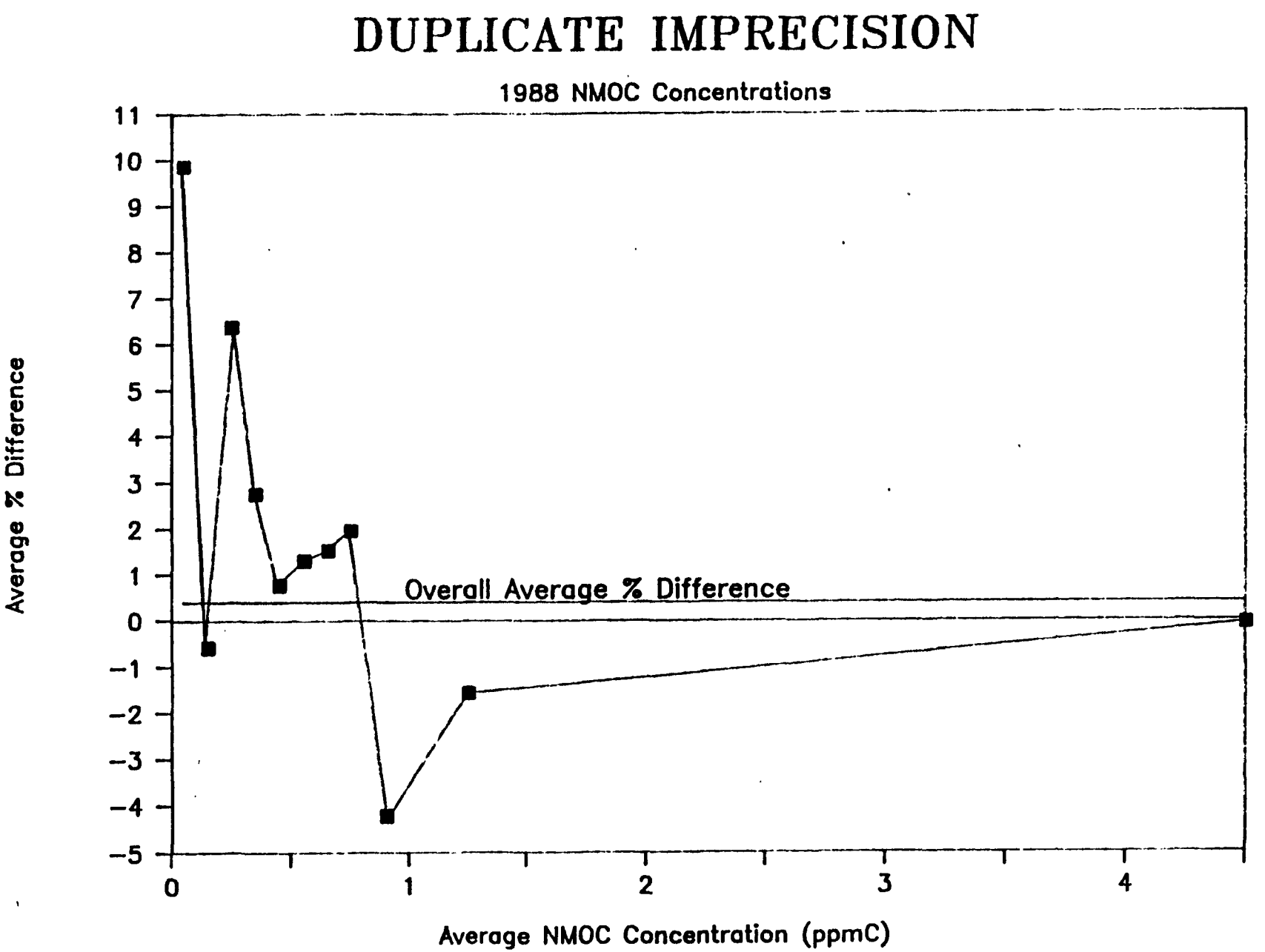

Figure 4–34. Duplicate NMOC sample results comparing average concentration with average percent difference.

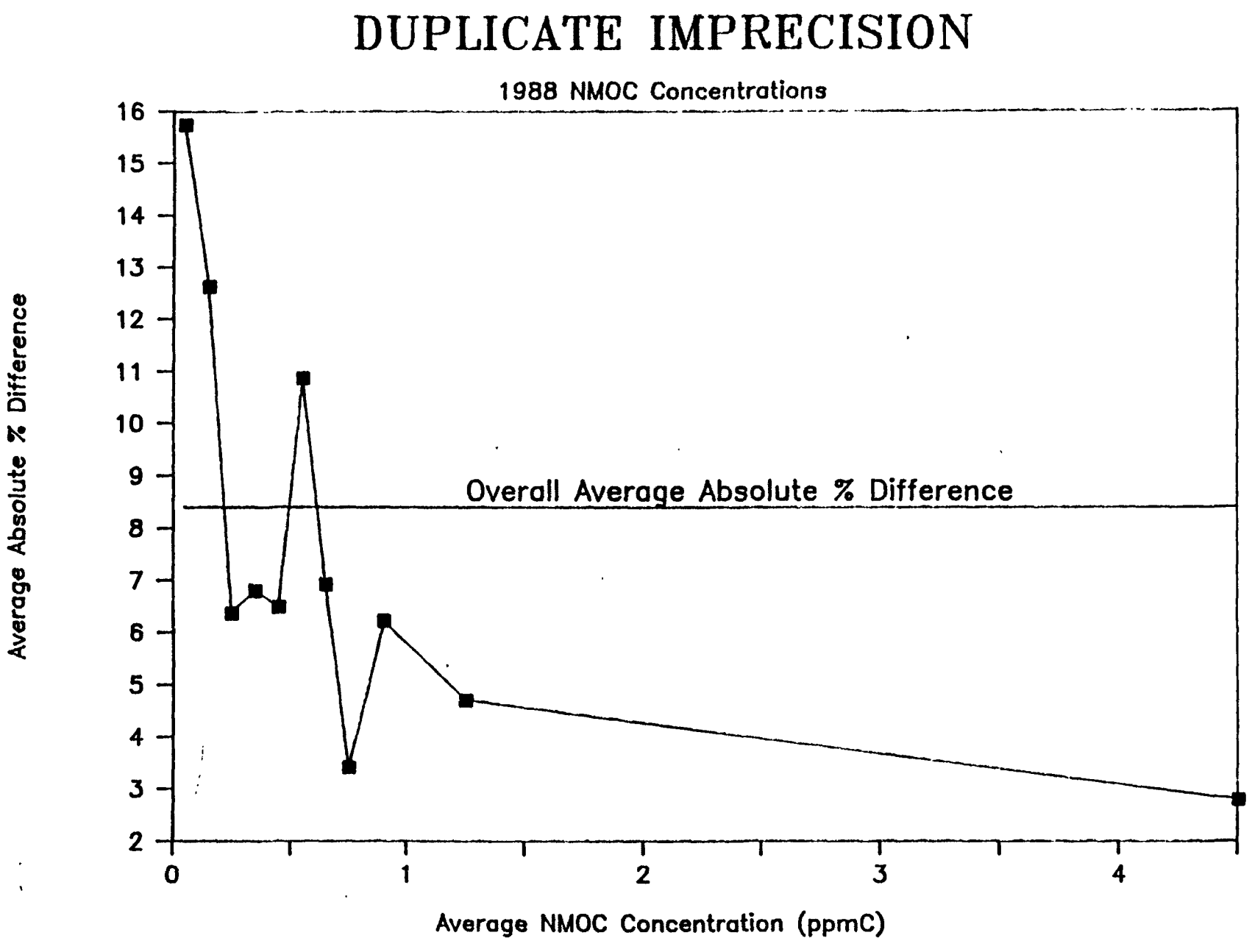

Figure 4–35. Duplicate NMOC sample results comparing average concentration with average absolute percent difference.

As the final canister pressure increases, there is a pressure downstream of the sonic orifice at which the sonic velocity can no longer be maintained. Canister pressures are being measured to obtain a better understanding of the range and magnitude of pressures being generated by the NMOC sampling systems. Canister pressure data are given in Tables 4-28 and 4-29 for both single-canister samples and duplicate samples. The pressures reported in Tables 4-28 and 4-29 are the canister sampling pressures measured in the field and may be different from the canister pressure measured immediately before analysis in the laboratory. A significant decrease between the field sampling pressure and the laboratory value might indicate a leak. The canister was leak tested when this occurred.

Table 4-28 gives statistics for single and duplicate samples. Single sample canisters average 14.6 psig and duplicate samples average 16.8 psig. Standard deviations are 2.6 and 2.5 psig, respectively. The data show little skewness, but the kurtosis is well below the expected kurtosis for a normal distribution.

The distributions of pressure for single samples and duplicate samples are given in Table 4-29 and indicate that the pressure distributions are approximately normally distributed. The small values for skewness (Table 4-28) and the fact that the means and medians are very close to being equal support the hypothesis that the distributions are approximately normal.

4.7 CANISTER CLEANUP RESULTS

Prior to the start of the 1988 NMOC Sampling and Analysis Program all of the canisters were cleaned and analyzed for their NMOC content to establish canister initial conditions. The resulting analysis with cleaned, dried air that had been humidified averaged 9.4 area counts (0.0029 ppmC), ranging from zero to 76.50 area counts (0.024 ppmC). Any canisters that produced more than 0.025 ppmC were recleaned.

Continual monitoring of the cleanup was important to ensure that there was negligible carryover from one site sample to the next. The daily canister cleanup procedure is described in detail in Section 3.4. The NMOC content was below 0.030 ppmC and cleanup was considered to be satisfactory.

TABLE 4-28. NMOC SAMPLE PRESSURE STATISTICS

Statistics	Single Samples	Duplicate Samples
Number of Cases	2930	523
Minimum Pressure, psig	5.0	7.8
Maximum Pressure, psig	24.0	22.0
Mean Pressure, psig	14.611	16.796
Median Pressure, psig	15.0	17.0
Standard Deviation, psig	2.636	2.501
Skewness, psig	-0.326	-0.026
Kurtosis, psig	0.106	-0.072

TABLE 4-29. PRESSURE DISTRIBUTION OF NMOC AMBIENT AIR SAMPLES

Pressure Range, psig	Single Sample Cases	Duplicate Samples
5.0 to 5.9	2	-
6.0 to 6.9	7	-
7.0 to 7.9	5	-
8.0 to 8.9	41	-
9.0 to 9.9	59	-
10.0 to 10.9	131	-
11.0 to 11.9	140	2
12.0 to 12.9	222	19
13.0 to 13.9	313	33
14.0 to 14.9	539	51
15.0 to 15.9	367	52
16.0 to 16.9	442	93
17.0 to 17.9	301	87
18.0 to 18.9	241	63
19.0 to 19.9	73	44
20.0 to 20.9	35	37
21.0 to 21.9	3	20
22.0 to 22.9	8	20
23.0 to 23.9	-	-
24.0 to 24.9	1	-

Percent recoveries, or percent cleanup, in 1988 averaged 99.689% (99.374% in 1987, 99.891% in 1986, and 99.898% in 1985), ranging from 95.28% to 100 percent. The reported percent cleanup figures should be considered minimum values. The actual percent cleanup was greater than the reported values because, after the percent cleanup was measured, the canister was evacuated a third time before being shipped to the site.

4.8 EXTERNAL AUDIT RESULTS

Primary measures of accuracy were calculated from the results of the analysis of audit samples provided by EPA-QAD. Results are reported in terms of percent bias, relative to the EPA standards.

Audit samples of propane provided by EPA-QAD were referenced to NBS SRM propane No. 1668B. Each Radian channel and the EPA-ASRL channel analyzed each audit sample. The results of these analyses are given in Table 4-30. Audit sample bias, percent bias, and absolute percent bias are shown in Table 4-31. In Table 4-31, all bias measurements are relative to the QAD results. Overall Radian average bias was 2.73% indicating Radian channels averaged 2.73% lower than the EPA-QAD reference values. Radian mean bias ranged from 1.33% for Channel B to 4.52% for Channel D. The overall average absolute percent bias for the Radian channels was 3.40 percent. These accuracy measurements show excellent agreement with the reference values, and lend confidence to the 1988 NMOC concentration results determined on all the Radian channels.

The EPA-ASRL channel averaged +4.5% bias, relative to EPA-QAD. Figures 4-36, 4-37, 4-38, and 4-39 show the audit bias results for the Radian channels versus the reference values provided by EPA-QAD. Figure 4-40 shows the audit bias results for EPA-ASRL versus EPA-QAD.

4.9 DATA VALIDATION

The secondary backup disks were updated daily on 20 megabyte hard disks. At the completion of the sampling and analysis phase 10.6% of the data base was checked to verify its validity. Items checked included original data sheets, checks of all the calculations, and data transfers. In making the calculations for the final report and other reports, corrections were made to the data base as errors or omissions were encountered.

TABLE 4-30. 1988 NMOC AUDIT SAMPLE RESULTS

Date Analyzed	Julian Date Analyzed	Radian ID Number	Channel A NMOC ppmC	Channel B NMOC ppmC	Channel C NMOC ppmC	Channel D NMOC ppmC	ASRL NMOC ppmC
04/19/88	110	1004	1.071	1.060	1.098	1.061	1.163
09/07/88	251	3727	1.035	1.028	1.038	1.110	0.983
09/07/88	251	3728	2.957	2.930	2.925	2.964	3.051

TABLE 4-31. AUDIT SAMPLES, RELATIVE TO EPA-QAD RESULTS

DELTAA ppmC	DELTAB ppmC	DELTAC ppmC	DELTAD ppmC	DELTAE ppmC	Chan. A Percent Bias	Chan. B Percent Bias	Chan. C Percent Bias	Chan. D Percent Bias	Chan. E Percent Bias	
0.03650	0.02550	0.06430	0.02730	0.12900	3.52998	2.46615	6.21857	2.64023	12.47582	Radian
0.03700	0.03000	0.04000	0.11200	-0.01500	3.70741	3.00601	4.00802	11.22244	-1.50301	Percent
-0.01700	-0.04400	-0.04900	-0.01000	0.07700	-0.57162	-1.47949	-1.64761	-0.33625	2.58911	Bias
Average										
0.01883	0.00383	0.01843	0.04310	0.06367	2.22192	1.33089	2.85966	4.50881	4.52064	2.73032
Std. Dev.										
0.03103	0.04149	0.05965	0.06252	0.07292	2.42091	2.44878	4.05688	6.00163	7.18680	4.01046

For Channel A:
DELTAA ppmC = NMOCA - QAD
Percent Bias = (DELTAA ppmC)/QAD*100

Channel E is EPA-ASRL Channel

Absolute Values of Percent Bias

						Radian
3.52998	2.46615	6.21857	2.64023	12.47582	Absolute	
3.70741	3.00601	4.00802	11.22244	1.50301	Percent	
0.57162	1.47949	1.64761	0.33625	2.58911	Bias	
Average 2.60301	2.31722	3.95807	4.73297	5.52264	3.40282	
Std. Dev. 1.76147	0.77408	2.28589	5.73690	6.04607	3.2341C	

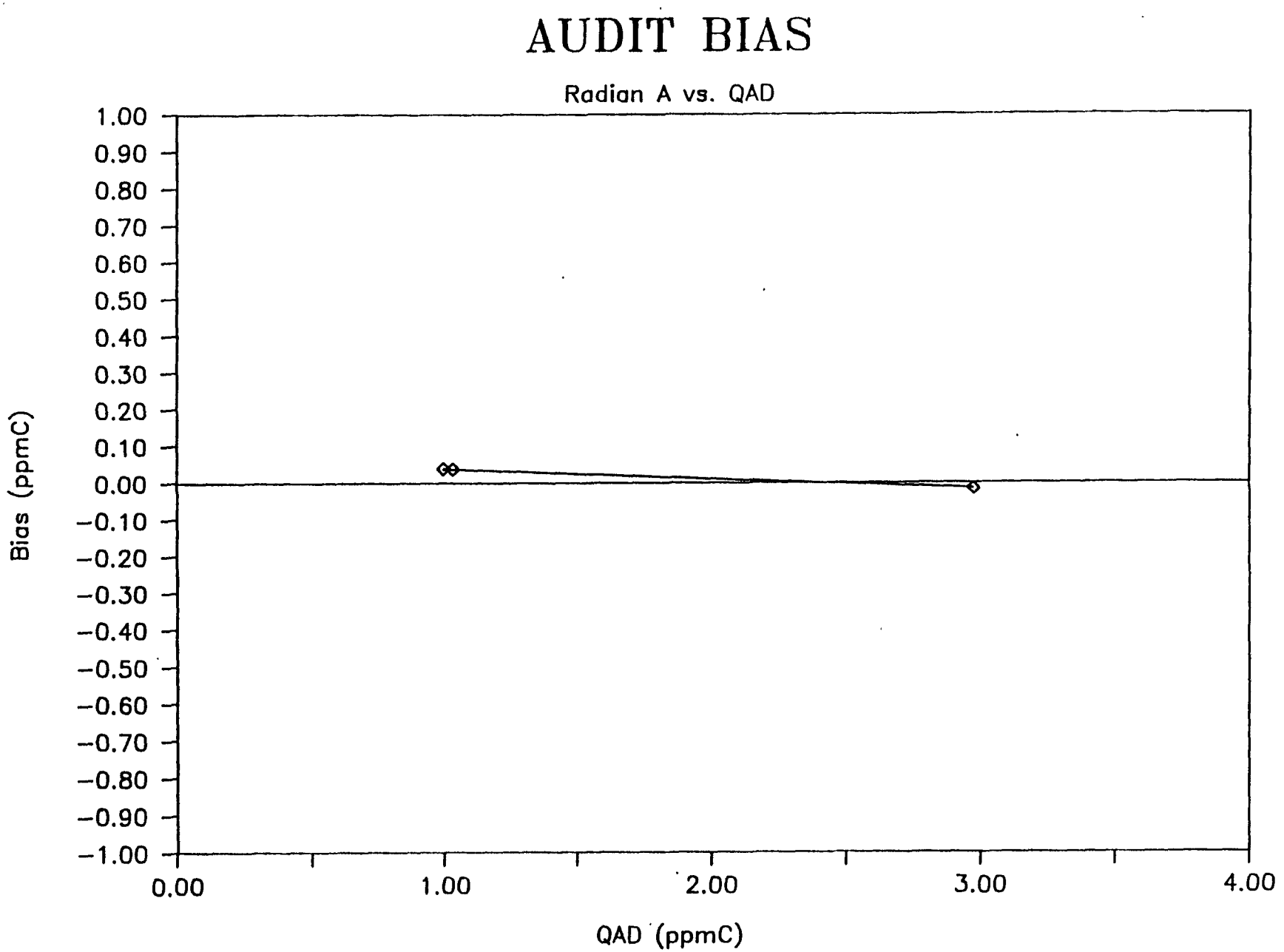

Figure 4–36. Audit Bias, Radian Channel A vs. EPA–QAD.

TABLE 4-31. AUDIT SAMPLES, RELATIVE TO EPA-QAD RESULTS

DELTAA ppmC	DELTAB ppmC	DELTAC ppmC	DELTAD ppmC	DELTAE ppmC	Chan. A Percent Bias	Chan. B Percent Bias	Chan. C Percent Bias	Chan. D Percent Bias	Chan. E Percent Bias	
0.03650	0.02550	0.06430	0.02730	0.12900	3.52998	2.46615	6.21857	2.64023	12.47582	Radian
0.03700	0.03000	0.04000	0.11200	-0.01500	3.70741	3.00601	4.00802	11.22244	-1.50301	Percent
-0.01700	-0.04400	-0.04900	-0.01000	0.07700	-0.57162	-1.47949	-1.64761	-0.33625	2.58911	Bias
Average										
0.01883	0.00383	0.01843	0.04310	0.06367	2.22192	1.33089	2.85966	4.50881	4.52064	2.73032
Std. Dev.										
0.03103	0.04149	0.05965	0.06252	0.07292	2.42091	2.44878	4.05688	6.00163	7.18680	4.01046

For Channel A:
DELTAA ppmC = NMOCA - QAD
Percent Bias = (DELTAA ppmC)/QAD*100

Channel E is EPA-ASRL Channel

	Absolute Values of Percent Bias					
						Radian
	3.52998	2.46615	6.21857	2.64023	12.47582	Absolute
	3.70741	3.00601	4.00802	11.22244	1.50301	Percent
	0.57162	1.47949	1.64761	0.33625	2.58911	Bias
Average	2.60301	2.31722	3.95807	4.73297	5.52264	3.40282
Std. Dev.	1.76147	0.77408	2.28589	5.73690	6.04607	3.23416

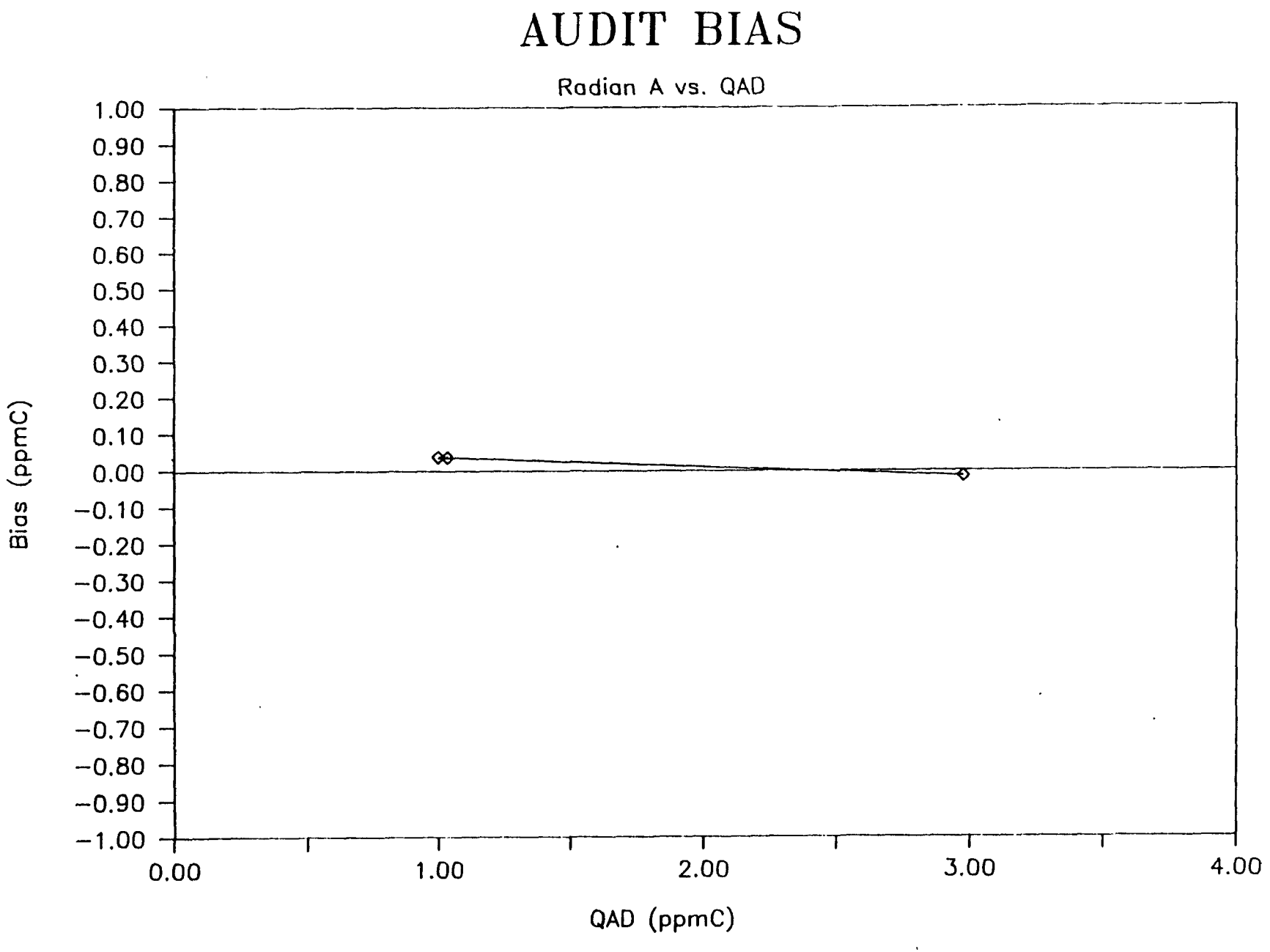

Figure 4–36. Audit Bias, Radian Channel A vs. EPA–QAD.

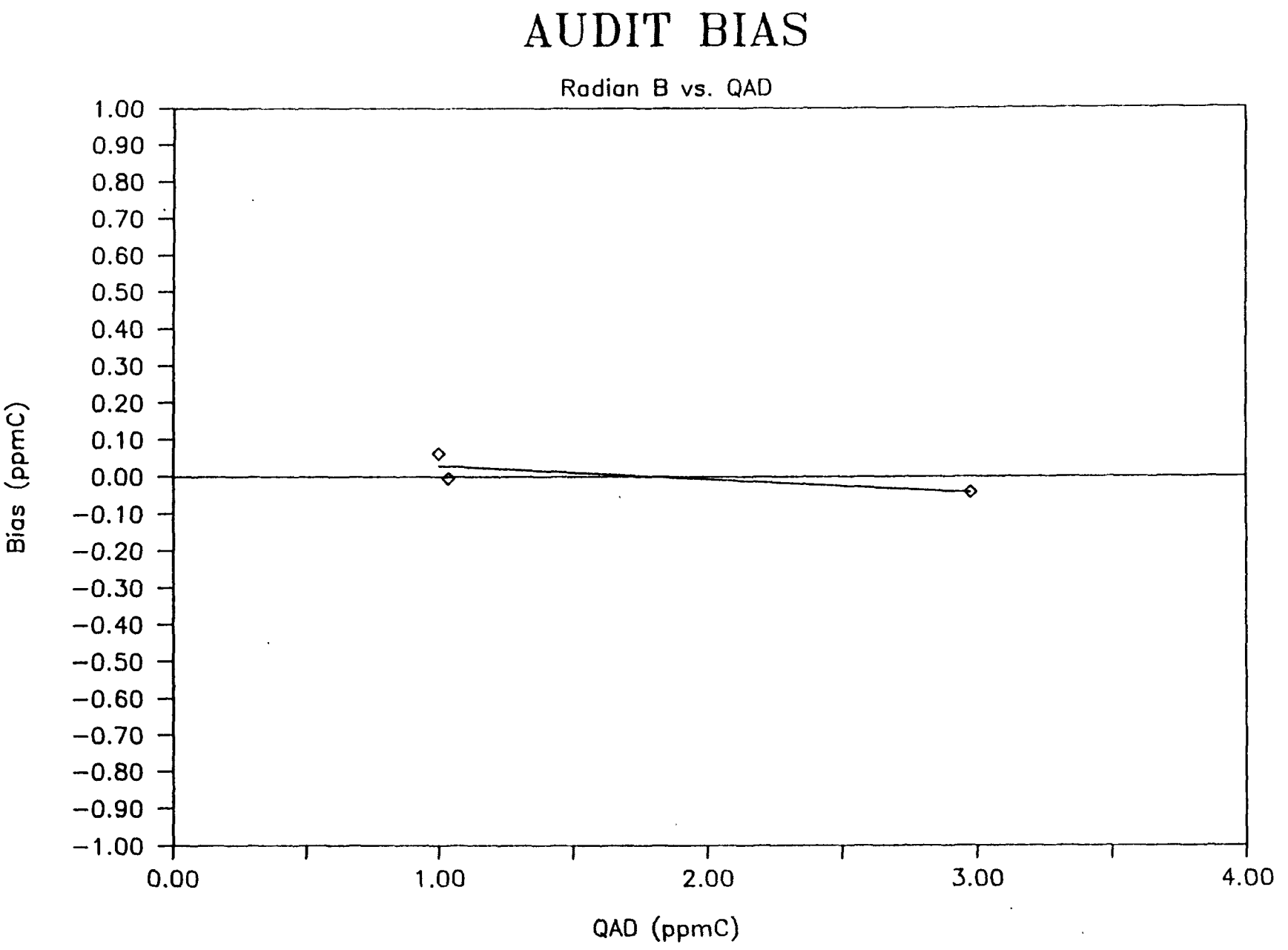

Figure 4–37. Audit Bias, Radian Channel B vs. EPA–QAD.

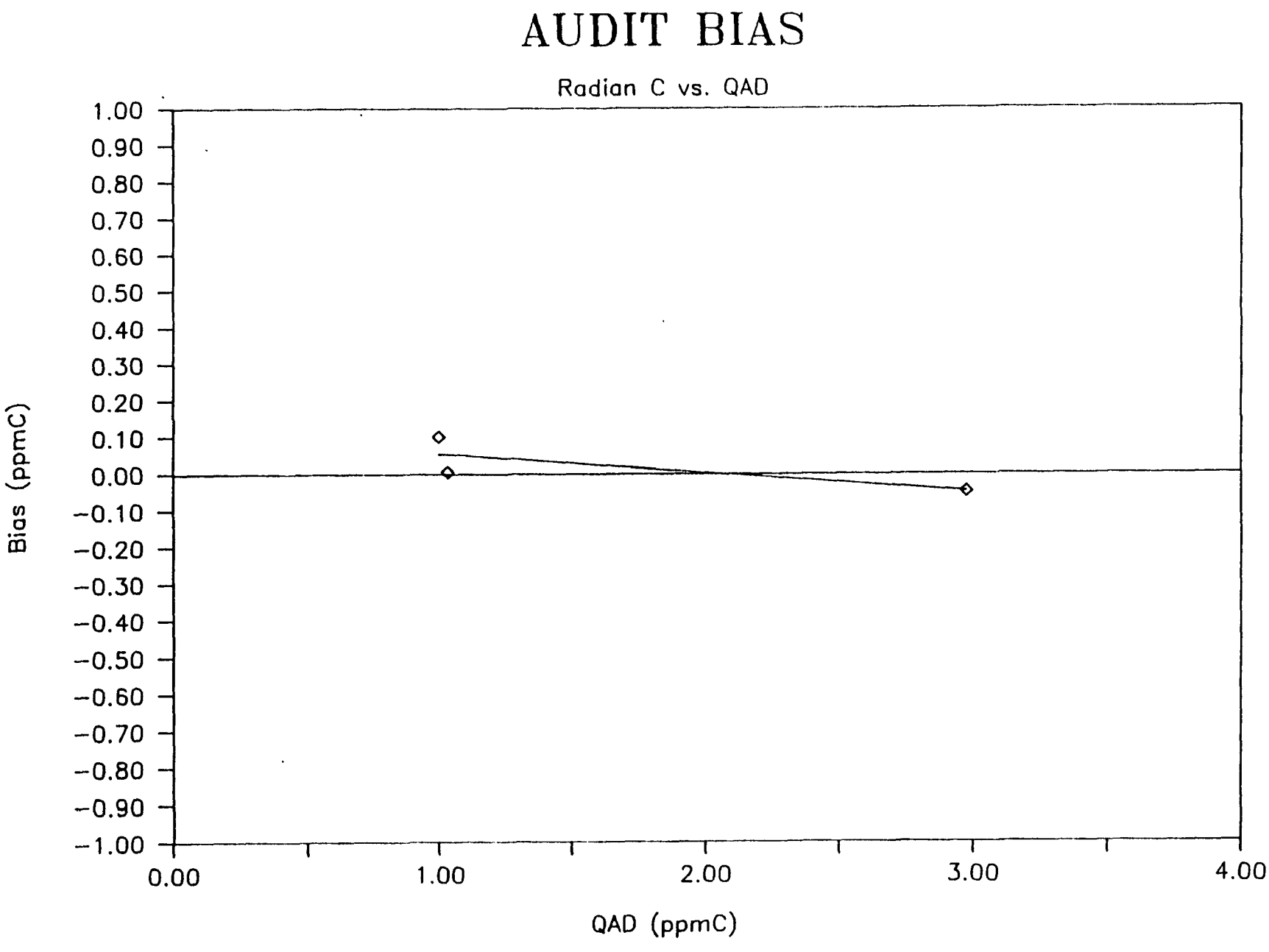

Figure 4–38. Audit Bias, Radian Channel C vs. EPA–QAD.

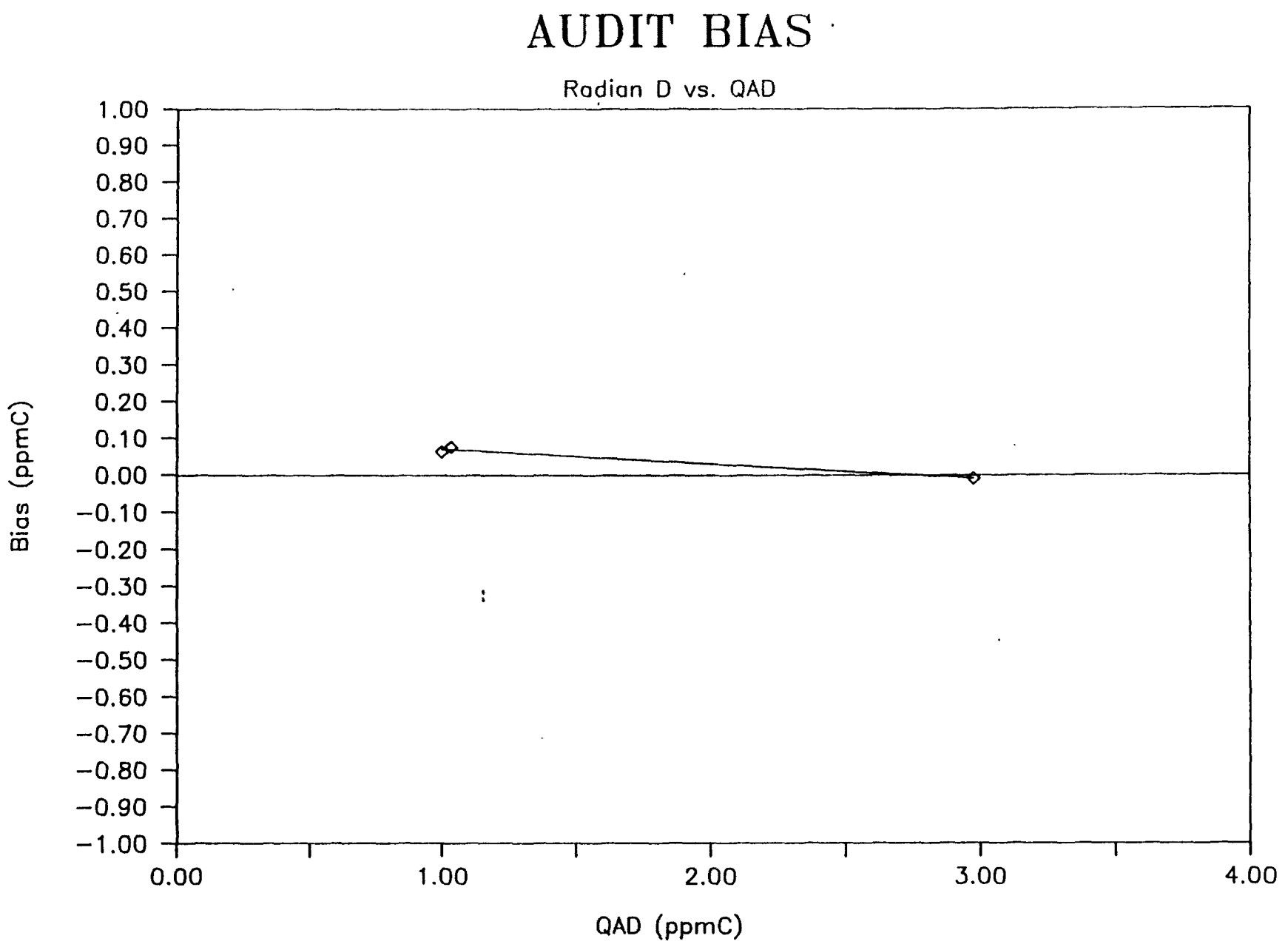

Figure 4–39. Audit Bias, Radian Channel D vs. EPA–QAD.

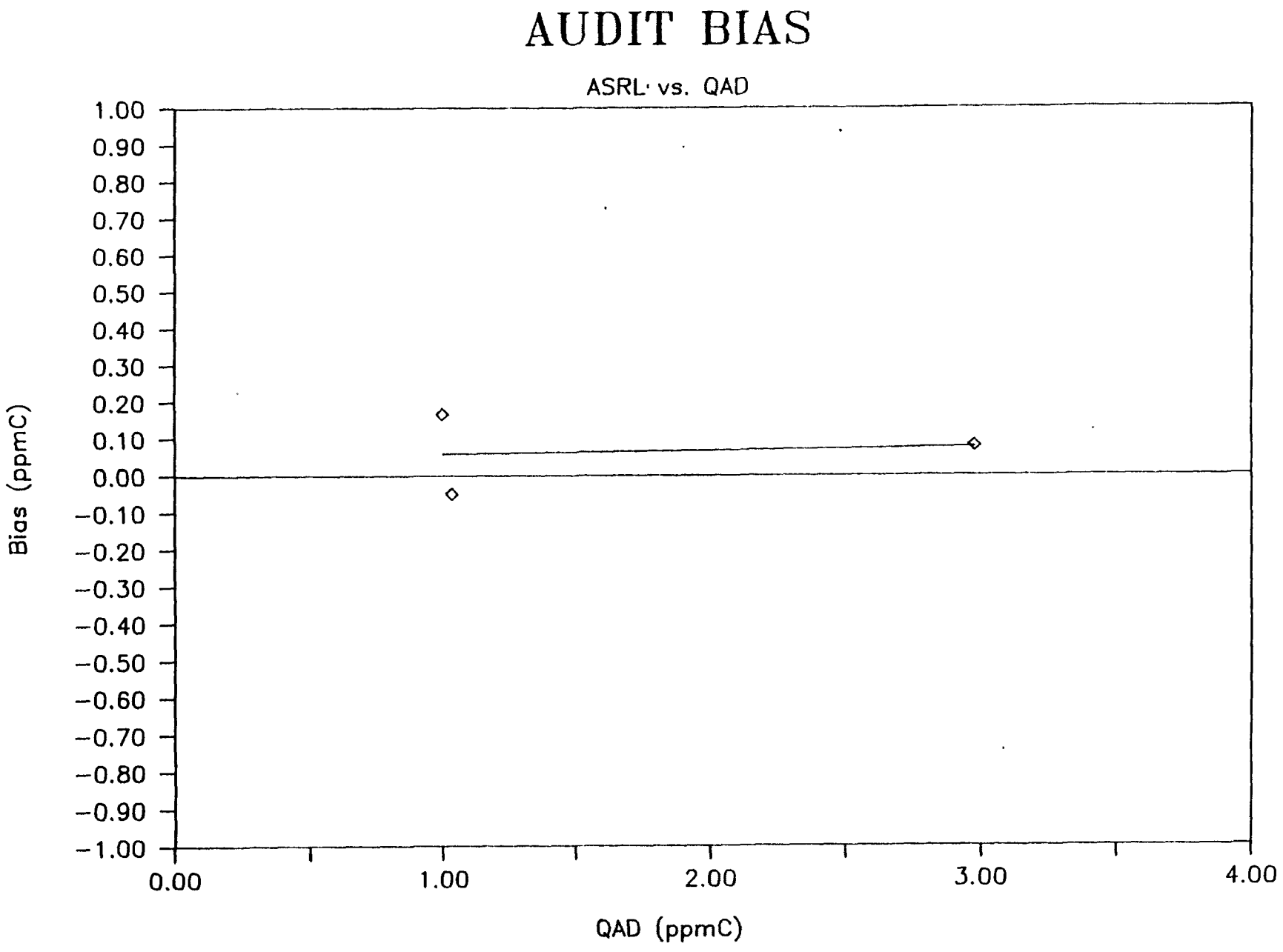

Figure 4–40. Audit Bias, EPA–ASRL vs. EPA–QAD.

A total of 4,171 NMOC measurements by Radian are in the 1988 NMOC data base. This includes 3,497 site samples and 217 repeated analyses of site samples by Radian channels. In addition, 83 QC samples, 32 local ambient samples, and 3 external audit samples were each analyzed by Radian channels. Each of these samples had a unique sample I.D. number, with the exception of the 217 repeated analyses. Each NMOC datum has 54 individual items associated with that datum.

Eleven percent of the data base (444 cases out of 4,171 data points) was selected at random and validated according to the procedure outlined below.

A. Calibration factors were checked.

   1. The area count from the strip chart that was used to determine the calibration factor was examined to verify that the data had been properly transferred to the calibration form.

   2. The calibration form was examined to verify that the calculations had been correctly made.

   3. Each datum on the disk was compared to the corresponding datum on the calibration sheet for accuracy.

B. Analysis data were checked.

   1. Area counts were verified from the appropriate strip chart.

   2. Calculations were reverified on the analysis forms.

   3. Each datum on the disk was compared to the corresponding item on the analysis form.

C. Field data sheet was checked.

   1. Each datum on the disk was compared to the corresponding datum on the field data sheet.

The error rate calculated in terms of the number of items transferred from the original data sources. For each NMOC value in the 1988 data set, 54 items were transferred from original sources to the magnetic disks. In the data validation study each item on the disk was compared with the corresponding value on the original source of data. Six errors were found (and corrected) for an expected error percentage of 0.025.

Each time the data file was opened and a suspected error found, the error was checked against the original archived documents, and corrected where appropriate.

4.10 NMOC MONITORING PROGRAM RECORDS

The quality assurance records developed by Radian for this project are extensive and will be preserved as archives. One of the most important objectives of the study was to develop a data base that was well planned and documented, and contained NMOC data of known and verifiable quality. Achieving that objective has involved keeping and preserving a number of records that trace the project from planning through reporting.

4.10.1 Archives

In order to keep detailed records that document the quality of the measurements made, Radian developed the following original material:

- Quality Assurance Project Plan;
- Notebooks;
- Field Data Sheets;
- Laboratory Calibration Sheets;
- Laboratory Analysis Sheets;
- Chromatographic Strip Charts;
- EPA-ASRL and EPA-QAD NMOC Results;
- Bi-weekly, Monthly Reports to EPA;
- Memoranda and Correspondence; and
- Final Report.

In addition to the above items, several papers to be presented at technical meetings and symposia and published in technical journals will be added to the archives.

The QAPP[1] was the Quality Assurance Project Plan and the workplan. It was designed according to the EPA Quality Assurance Guidelines, and set the pattern of steps necessary to document and control the quality of the data obtained throughout the study.

Several notebooks were necessary to maintain day-to-day records of the project. Field and laboratory data sheets were designed in advance, so that

the data recorded appeared in a logical sequence and filled in blanks on the sheet. Additional space was provided for other comments. Each NMOC analysis was assigned a unique Radian Identification Number. Field data sheets and shipping records accompanied the canisters in transit.

4.10.2 Magnetic Disks

In order to manage the data base for report generation and data analysis, pertinent data from the various data sheets and notebooks were transferred to 20 megabyte magnetic disks. Lotus 1-2-3® and PCFile+® software were used in the construction of the data base. Statistical calculations were done using SYSTAT® software. The data access is rapid and in a convenient form. The primary 20 megabyte magnetic disk has three backup disks.

5.0 NMOC DATA ANALYSIS AND CHARACTERIZATION

The purpose of this section is to characterize the NMOC data qualitatively as well as quantitatively. The NMOC data are shown to fit a two-parameter lognormal distribution better than a normal Gaussian distribution. The summary NMOC data for the sites of the 1988 study are given in Appendix E.

5.1 OVERALL CHARACTERIZATION

Figure 5-1 gives a stem-and-leaf plot of the 1988 Morning Site NMOC data along with statistics for NMOC. The stem-and-leaf plots show the actual NMOC concentrations truncated to two decimal points. The digits to the left of the vertical open space are called stems and the digits to the right of the open space are the leaves. The data are sorted from the smallest at the top of the graph to the largest at the bottom of the graph. The minimum NMOC value measured was 0.016 ppmC and is shown as "0 1" on the first row at the top of the plot. The maximum NMOC concentration measured was 5.890, shown as "58 9" at the bottom row of the chart. The plot shows 3,069 leaves, one for each NMOC Morning Site datum in the 1988 program. The H's in the open vertical space locate the stem and leaf for the upper and lower hinges, and the M locates the stem and leaf for the median. The median separates the sorted data into two equal halves; the hinges (or quartiles) separate each half into quarters. The "H spread" or inter-quartile range is the difference between the NMOC values of the two hinges.

Statistics shown for NMOC are number of cases, minimum, maximum, mean, standard deviation, standard error, skewness, and kurtosis. Each NMOC determination is the average of two or three injections of the site sample.

The standard error is the standard deviation divided by the square root of the number of cases. Positive skewness is a third moment about the mean value, and characterizes a tail to the right of the mean value. A normal Gaussian distribution has a skewness of zero. The skewness of 2.4 for the 1988 NMOC data suggests a lognormal frequency distribution; that is supported

```
0        1
0        22222 22233 33333 33
0        44444 44445 55
0        66666 66666 66777 77777 77
0        88888 88899 99999 99999 99999 999
1        00000 00000 00000 01111 11111 11111 11111 1
1        22222 22222 22222 22222 22223 33333 33333 33333 33333
1        44444 44444 44444 44444 44445 55555 55555 55555 55556 55555 55555 55555 555
1        66666 66666 66666 66666 66666 66666 77777 77777 77777 77777 77777 77777 77777 77777 77
1        88888 88888 88888 88888 88888 88888 88999 99999 99999 99999 99999 99999 999999 99
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2        44444 44444 44444 44444 44444 44444 44444 44555 55555 55555 55555 55555 55555
2        66666 66666 66666 66666 66666 66666 66666 66666 77777 77777 77777 77777 77777 77777 77777 7
2        88888 88888 88888 88888 88888 88888 88888 88899 99999 99999 99999 99999 99999 99999 99999 99999 99
3    H   00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00111 11111 11111 11111 11111 11111 11111 11111 11111 11
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3        44444 44444 44444 44444 44444 44444 44444 44444 44444 44555 55555 55555 55555 55555 55555 55555 55555 55555
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11       44444 44444 44444 45555 55
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11       88899 999
12       00000 01111111111
12       22233 3333
12       44445 55555
12       66666 777
12       88888 88999 999
13       00000 00001 11111
13       22222 23333 33333 3
13       44444 55555
13       66666 777
13       88899 99
14       00011 11
14       2233
14       55555
14       66666 677
14       88899 999
15       00001 11111
15       22222 23
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15       66777 7777
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18       01124 56777 78888 88899 99
19       02244 45888 799
20       01112 33578 9
21       02368 79
22       23567 8
23       16677 889
24       349
25       22245 67
26       5
27       499
28       1113
29       1
30       168
31       788
35       2669
38       9
40       6
41       7
43       4
58       9
```

	NMOC, ppmC
Cases	3069
Minimum	0.016
Maximum	5.890
Mean	0.636
Standard Deviation	0.505
Standard Error	0.009
Skewness	2.395
Kurtosis	10.411
Lower Hinge (H)	0.305
Median (M)	0.496
Upper Hinge (H)	0.814

Figure 5-1. Stem-and-leaf plot of the 1988 morning NMOC data.

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by the fact that for the logarithm of the NMOC value (ln(NMOC)) (see Figure 5-2), skewness equals -0.397, which is close to zero. Kurtosis is the fourth moment about the mean and relates to the pointedness of the distribution. A distribution more pointed than a normal distribution, having the same standard deviation, has a kurtosis greater than 3.0.

In Figure 5-1 there is a small node in the region of NMOC concentration from 1.5 to 2.5 ppmC. A similar node was observed in the 1987 NMOC Monitoring data. Investigation of the sources of these data revealed that 20 of the readings were from Cleveland, Ohio; 11 from Phoenix, Arizona; 10 from Miami, Florida; 10 from Houston, Texas; 9 from Newark, New Jersey; and 8 from Austin, Texas. A total of 27 sites contributed to the node, but no general pattern was discerned. The St. Louis, Missouri, site was the only site that contributed to the node both in 1987 and 1988. The node in 1987 was in the NMOC concentration region from 1.85 to 2.5 ppmC.

Figure 5-2 is a stem-and-leaf plot of the 1988 ln(NMOC) data. The plot shows an approximately symmetrical distribution (skewness = -0.397). The kurtosis equal to 0.718 indicates the ln(NMOC) distribution to be less pointed than a normal distribution. The node seen on Figure 5-1 is not apparent in Figure 5-2.

The shape of the stem-and-leaf plots suggests a lognormal distribution. Figures 5-2 and 5-3 support the lognormal distribution hypothesis for NMOC. The vertical scales in Figures 5-2 and 5-3 are arranged so that if the cumulative frequency of occurrence of NMOC were normally distributed, the numbers would plot into a straight line. The line in Figure 5-3 has a noticeable concave downward trend, indicating that the data do not fit a normal distribution well. Figure 5-4 plots the logarithm of NMOC on the same vertical scale. The fact that the digits on the graph plot into approximately a straight line supports the hypothesis that the NMOC data are approximately lognormally distributed. The asterisks on the graph indicate the location of a single datum. Integers, such as 2, 6, or 9, show the location of the corresponding number of data points. The number 999 shows the approximate location of either 27 data points or 99 + 9 data points. The results,

```
-41       3
-39       1
-38       8411
-36       770
-34       74411
-33       8
-32       99711 11
-31       92
-30       751
-29       3
-28       831
-27       98766 4430
-26       97
-26       5
-26       4310
-25       99
-25       33222
-24       98765
-24       1000
-23       99999 98766
-23       44332 21
-22       99888 7665
-22       43211 110
-21       88888 66665 5
-21       43222 22222 21000 0000
-20       99998 77776 665
-20       44422 11110
-19       99888 88887 76666 55555
-19       44333 32222 11110
-18       99999 99877 77777 76665 55555 55555
-18       44444 33333 22222 22211 00000 0000
-17       99888 88777 77766 66666 55
-17       44444 43333 33333 33322 22222 22222 21100 00000 00
-16       99999 99988 88877 77766 66666 55555 55
-16       44444 33333 33332 22211 11111 00000 00000 00
-15       99999 99999 99888 88777 77777 77666 66666 65555 55555
-15       44444 44433 33333 33322 22221 11111 10000 00000 0
-14       99888 88877 77777 76666 66666 66555 55555
-14       44444 44333 33333 33333 32222 11111 11111 11111 11100 00000
-13       99999 99988 88887 77777 77777 76666 65555 5
-13       44444 44444 44443 33333 33332 22222 22211 11111 00000 00000 0000
-12       99999 99999 99888 88888 77777 66666 66666 66666 55555 5555
-12       44444 44444 43333 33333 33333 33333 22222 22211 11111 11111 11000 00000 00000 0
-11  H    99999 99999 99998 88888 88888 87777 77777 77777 76666 66666 65555 55555 55555 5555
-11       44444 44444 44433 33333 33333 33333 22222 22222 22111 11111 11110 00000 00000 00000
-10       99999 99999 99999 99888 88888 88877 77777 77777 77776 66666 66666 66666 66555 55555
-10       44444 44444 44444 44433 33333 33333 33333 33322 22222 21111 11111 11111 10000 00000 00000
-9        99999 99999 99998 88888 88888 88888 88887 77777 77777 77776 66666 66666 66555 55555 55555 55555 55
-9        44444 44444 44444 44444 33333 33333 33333 22222 22211 11111 11111 11111 00000 0000
-8        99999 99999 99988 88888 88888 87777 77777 77777 77776 66666 66666 66666 55555 55555 55555 5
-8        44444 44444 33333 33333 33333 33333 32222 22222 22222 22222 22222 11111 11111 11111 11111 11110 00000 00000 0
-7        99999 99999 99888 88888 88888 88887 77777 77777 77777 76666 66666 66666 66555 55555 55555 55555 55555 5
-7  M    44444 44444 44444 44444 44444 44333 33333 33333 22222 22222 22222 22111 11111 11111 11111 11111 11000 00000 00000 00000 0
-6        99999 99999 99988 88888 88888 88887 77777 77777 66666 66666 66666 66655 55555 55555 55555 5
-6        44444 44444 44444 33333 33333 33333 33333 33222 22222 22222 21111 11111 11110 00000 00000 00000 00
-5        99999 99999 99999 99999 99888 88888 88888 77777 77777 77777 76666 66666 66666 66555 55555 55555 5
-5        44444 44444 44444 44444 44444 43333 33333 33333 33322 22222 22222 22222 11111 11111 11111 00000 00000 00000 000
-4        99999 99999 99999 99999 99998 88888 88888 88888 88877 77777 77777 77776 66666 66655 55555 55555 55
-4        44444 44444 44444 44444 44444 44444 33333 33333 33333 33222 22222 22222 11111 11111 11111 10000 00000 00000
-3        99999 99999 99998 88888 88888 77777 77777 66666 66666 66655 55555 55555 555
-3        44444 44444 44333 33333 33332 22222 22222 22222 11111 11111 11110 00000 00000 000
-2        99999 99999 99999 99998 88888 88888 88887 77777 77777 66666 66666 66655 55555 5555
-2  H    44444 44444 44444 43333 33333 33333 33333 22222 22222 22111 11100 00000 00000 0000
-1        99999 99999 99998 88888 88888 87777 77777 77777 76666 66666 66666 65555 55555 55555
-1        44444 44444 33333 33333 33322 22221 11111 11111 11000 00000 00000 00000 00
-0        99999 99988 88888 88888 87777 77777 77777 76666 66666 65555 55555 55555 5
-0        44444 44433 33333 33322 22222 22111 11111 11000 0000
0         00000 00011 11111 11111 22222 22333 33333 33444 44444 4
0         55555 55556 66666 66666 67777 77777 78888 88888 88888 99999 99999 9999
1         00000 00000 01111 11112 22222 22233 33333 33333 33333 44444 44444
1         55555 55555 66666 66666 77778 88888 99999 9999
2         00001 11111 11222 22223 33333 44444 44
2         55555 56666 66666 66777 77777 78888 88888 89999 9999
3         00000 00011 11122 23333 44444 44
3         55557 77777 77788 89999 9999
4         00000 11111 12222 22233 33334 4444
4         55555 55556 66667 77777 88889 999
5         00000 01112 22222 22333 33444 44
5         66667 77778 8999
6         01122 23333 33333 33344
6         55666 77778 8999
7         00000 13344
7         55777 89
8         01122 3
8         66666 6789
9         12223 344
9         7
10        12233 34
10        6
11        022
11        556
12
12        5
12        777
13        5
14        028
17        7
```

	ln (NMOC)
Cases	3069
Minimum	-4.135
Maximum	1.773
Mean	-0.725
Standard Deviation	0.767
Standard Error	0.014
Skewness	-0.397
Kurtosis	0.718
Lower Hinge (H)	-1.187
Median (M)	-0.701
Upper Hinge (H)	1.773

Figure 5-2. Stem-and-leaf plot for the morning ln(NMOC) data.

1582252R

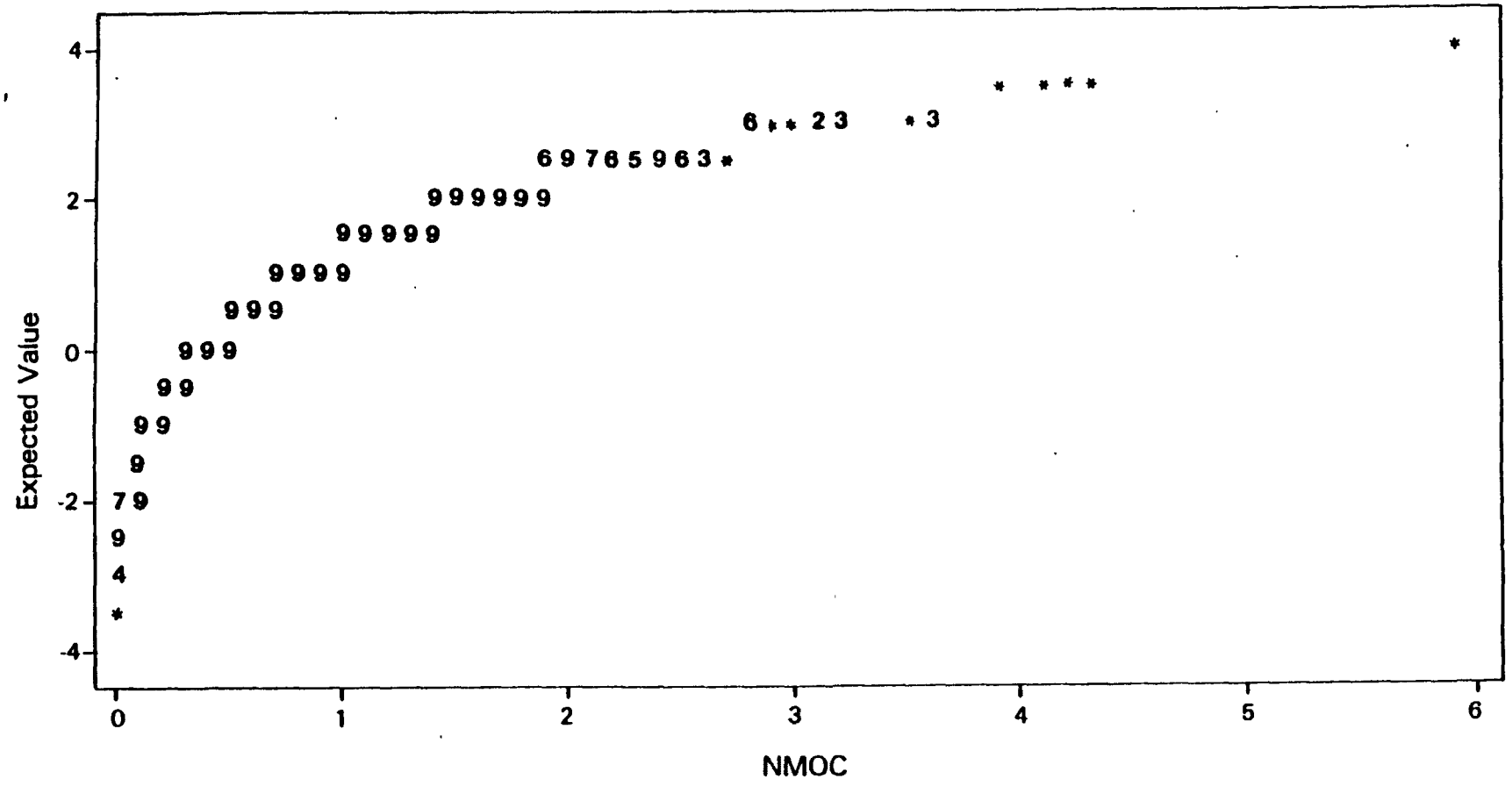

Figure 5-3. Cumulative frequency distribution for 1988 NMOC data.

1582256R

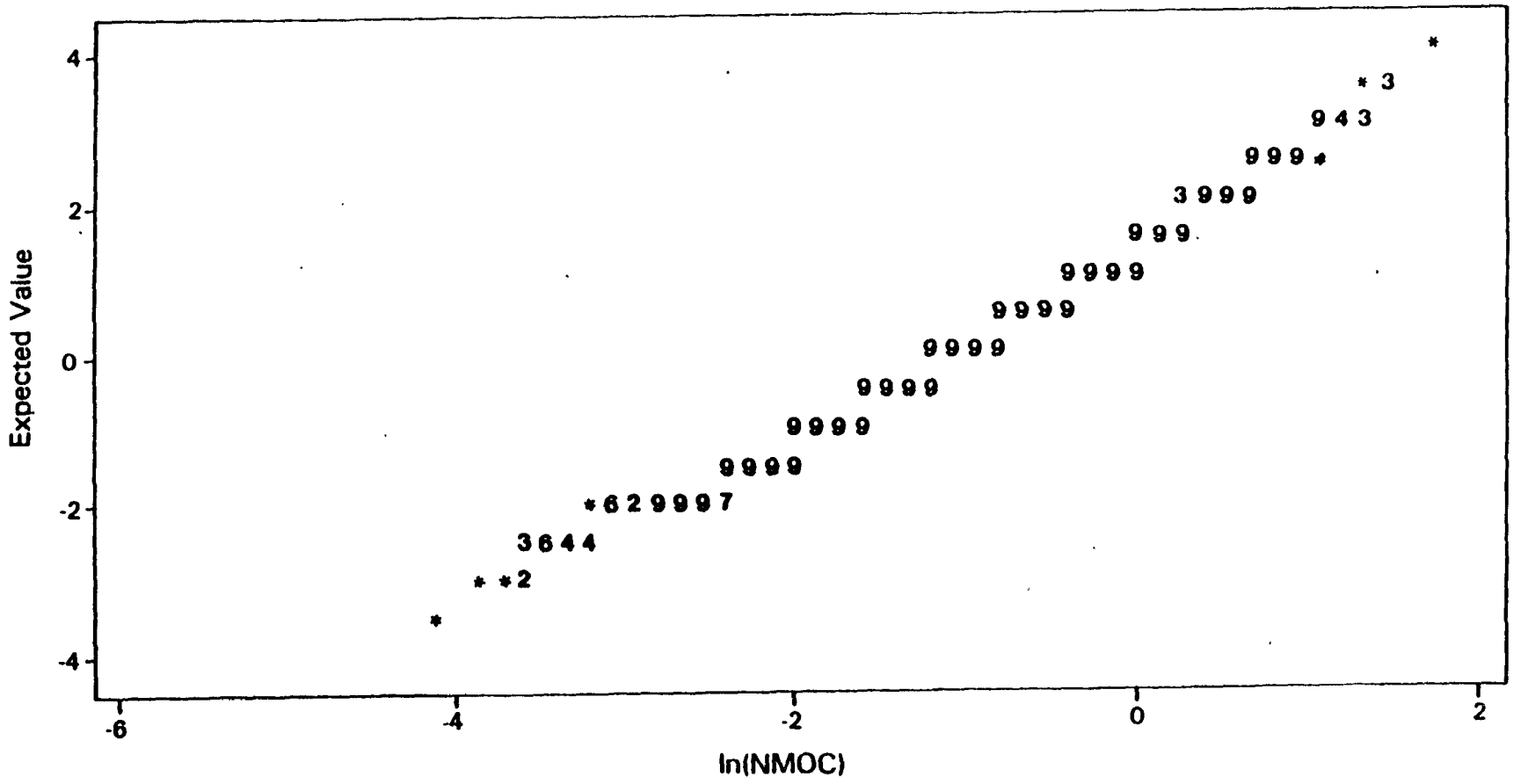

Figure 5-4. Cumulative frequency distribution for 1988 ln(NMOC) data.

1582257R

although qualitative, show a dramatic difference between the normal and lognormal hypotheses, and suggest that the latter more nearly describes the NMOC data. Figure 5-4 is labeled a "Normal Probability Plot," but since the independent variable is the logarithm (to the base e) of NMOC, if the relation between the EXPECTED VALUE and ln(NMOC) is linear, a lognormal distribution obtains.

5.2 MONTHLY VARIATIONS, 1984 - 1988

Table 5-1 partitions the NMOC data for the summer of 1988 into groups which correspond to monthly intervals. The time interval for April corresponds to Julian dates 92 to 121; for May, 122 to 152; for June, 153 to 182; for July, 183 to 213; for August, 214 to 244; and for September, 245 to 274.

The data for September appear higher than for June, July, or August, but no clear trend is seen for the summer of 1988.

Figures 5-5 through 5-10 give the stem-and-leaf plots of the NMOC data for April, May, June, July, August, and September 1988, respectively. All the plots show the general shape of lognormal distribution. May and June 1988 data are for only four Florida sites, MIFL, M2FL, T1FL, and T2FL, and should not be considered comparable to the other monthly graphs. The data for June, July, August, and September may be considered typical of the 45 sites tested during the indicated time period. Monthly mean NMOC emissions are plotted in Figure 5-11 for 1984, 1985, 1986, 1987, and 1988. No general trends are evident for the years shown. For four of the five years, September means are higher than August means, and for four of the five years, July means are less than June means. At present, however, it must be concluded that random behavior is responsible for apparent month-to-month changes.

During the 5 years of the NMOC Monitoring Program, three sites participated in the program for all five years. Two sites have been in the program 4 years; 7 sites for 3 years; 18 sites for 2 years; and 61 sites for only 1 year. In all cases; however, the sites were urban sites, but it is difficult to draw conclusions from year to year because of the different site makeup.

TABLE 5-1. SUMMARY STATISTICS FOR 1988 MORNING NMOC SITES, BY MONTH

Sample Month 1988	Minimum NMOC ppmC	Median NMOC ppmC	Mean NMOC ppmC	Maximum NMOC ppmC	Standard Deviation NMOC ppmC	Cases
April[a]	0.067	0.422	0.577	2.053	0.511	42
May[a]	0.038	0.436	0.520	1.759	0.398	84
June	0.016	0.538	0.688	3.895	0.544	570
July	0.061	0.489	0.608	2.520	0.428	675
August	0.020	0.491	0.597	3.014	0.422	880
September	0.026	0.497	0.682	5.890	0.608	818

[a]Only four sites participated in April and May, beginning in mid-April.

```
0        6699
1        15777
2  H     012456
3        02578
4  M     133599
5
6        03699
7  H     3489
8
9
10       8
11
12       01
15       8
17       3
19       9
20       5
```

	NMOC, ppmC
Cases	42
Minimum	0.067
Maximum	2.053
Mean	0.577
Standard Deviation	0.511
Standard Error	0.079
Skewness	1.503
Kurtosis	1:576
Lower Hinge (H)	0.218
Median (M)	0.422
Upper Hinge (H)	0.739

Figure 5-5. Stem-and-leaf plot of the morning NMOC data for April, 1988.

1582246R

```
 0        36778 99
 1   H    11111 23444 66779
 2        00122 23589
 3        00156 67
 4   M    00157 7
 5        44588 899
 6        01122 999
 7   H    11334 57
 8        199
 9        2679
10        4
11        4
12        378
13
14        16
15        5
17        5
```

	NMOC, ppmC
Cases	84
Minimum	0.038
Maximum	1.759
Mean	0.520
Standard Deviation	0.398
Standard Error	0.043
Skewness	1.041
Kurtosis	0.650
Lower Hinge (H)	0.188
Median (M)	0.436
Upper Hinge (H)	0.722

Figure 5-6. Stem-and-leaf plot of the morning NMOC data for May, 1988.

1582247R

```
 0        12344 58889 999
 1        00001 12223 33444 45555 56666 66777 77888 88888 89999 99999
 2        00000 11111 12222 22333 33333 33444 44445 55555 66666 66666 67777 77888 88899 99999 999
 3   H    00000 00000 00111 11111 22222 22333 33444 44444 45555 67778 88888 99999 99999 999
 4        00000 01111 11222 22233 33333 33444 44455 55556 66666 77777 77788 88899 999
 5   M    00001 11111 22222 23344 44445 55556 67777 88999 999
 6        00011 11111 12222 22222 33333 33444 44444 55555 66677 77789 99
 7        00000 01112 23344 44555 56668 88999 9999
 8        01111 22223 33444 45555 56677 7999
 9   H    00011 12222 33444 45556 66777 7888
10        00222 23555 66667 77888 9
11        00112 34456 66777 9
12        01113 33589
13        00022 35567 8899
14        157
15        01222 44557 7889
16        02345 88889
17        11357 9
18        178
19        459
20        27
21        3
22        6
23        7889
24        4
25        4
27        9
28        1
30        6
35        28
38        9
```

	NMOC, ppmC
Cases	570
Minimum	0.016
Maximum	3.895
Mean	0.688
Standard Deviation	0.544
Standard Error	0.023
Skewness	1.976
Kurtosis	5.739
Lower Hinge (H)	0.305
Median (M)	0.538
Upper Hinge (H)	0.908

Figure 5-7. Stem-and-leaf plot of the morning NMOC data for June, 1988.

1582248R

```
0       69
1       00000 01112 22233 33344 44
1       55555 66666 66667 77777 77777 78888 88889 99999 999
2       00000 00000 11111 11122 22233 33333 33444 4444
2       55555 56666 66667 77777 77778 88888 88889 99999 999
3   H   00000 00000 11111 11111 22222 22333 33333 33333 33444 44444 44444 4
3       55555 55555 55555 56666 66666 77777 77777 77888 88888 89999 999
4       00000 01111 11111 11122 22222 22333 33333 33344 44444 44444 44
4   M   55556 55569 66667 77888 88888 88899 99999 99
5       00000 00011 11122 22223 33333 33333 33444 44444 4
5       55555 55556 66666 67777 77778 88888 88889 9999
6       00000 00001 11111 11112 23333 33444 44444 44444
6       55555 56666 67778 99999
7   H   00001 11122 22333 33344 4
7       55555 56667 77777 88888
8       00011 11112 2234
8       56667 77778 99999 99
9       01122 23344
9       55778 8899
10      01113 334
10      56788 999
11      00122 33344 4
11      56677 79
12      11122 44
12      5699
13      01123 344
13      55667
14      02888 9
15      01277
16      11444 7
17      59
18      02678 9
19      6
20      138
21      669
22      378
23      16
24      9
25      2
```

	NMOC, ppmC
Cases	675
Minimum	0.061
Maximum	2.520
Mean	0.603
Standard Deviation	0.428
Standard Error	0.016
Skewness	1.765
Kurtosis	3.577
Lower Hinge (H)	0.318
Median (M)	0.489
Upper Hinge (H)	0.744

Figure 5-8. Stem-and-leaf plot of the morning NMOC data for July, 1988.

1582249R

```
 0        22233 33334 4444
 0        56777 78899 99
 1        00111 22222 22333 33344 4444
 1        55556 55555 55555 66666 66777 77777 77777 88888 99999 999
 2        00000 00000 00000 00111 11111 12222 22222 33333 33334 44444 44444
 2        55555 55569 66666 66777 77777 77788 88888 99999 9992
 3   H    00000 00000 00001 11111 11111 11122 22222 22223 33333 33333 33334 44444 44444
 3        55555 55555 56666 66666 66666 66667 77777 77777 77777 77778 88888 88888 99999 999
 4        00000 01111 11111 12222 22222 22333 33333 34444 44444 44
 4   M    55555 55555 66666 66666 66677 77777 77777 77777 77888 88888 88888 88888 99999 99999 9999
 5        00000 00111 11111 11112 22222 22223 33333 33333 44444 4
 5        55555 55555 66666 66666 66677 77777 77888 88888 88999 99999 99
 6        00000 00000 01112 22222 33333 33444 44444 44
 6        55555 56666 66666 77777 77788 88999 99
 7        00000 00111 12222 22233 33333 33444 44444 4444
 7   H    55566 66667 77778 88888 88899 99
 8        00001 11112 22223 33333 3333 44444
 8        55555 56667 77779 99
 9        00011 11122 22333 444
 9        56667 88999
10        00112 22223 3334
10        55555 66677 88888 9
11        00112 22344 444
11        56667 89
12        11334
12        55666 67999
13        23333
13        578
14        0
14        35678 89
15        14467 7789
16        11255 88
17        038
18        15588 99
19        02246 7
20        1
22        25
23        7
25        267
27        4
30        1
```

	NMOC, ppmC
Cases	880
Minimum	0.020
Maximum	3.014
Mean	0.597
Standard Deviation	0.422
Standard Error	0.014
Skewness	1.776
Kurtosis	4.459
Lower Hinge (H)	0.316
Median (M)	0.491
Upper Hinge (H)	0.760

Figure 5-9. Stem-and-leaf plot of the morning NMOC data for August, 1988.

1582250R

```
 0       22223 44566 66666 77778 89999 999
 1       00001 11111 22222 22222 33333 44444 44555 55555 55555 66666 67777 77778 88888 88889 99999 999
 2  H    00000 00000 01111 11111 11122 22222 33333 33333 34444 44444 44555 55566 66666 66667 77777 77788 88888 88888 88999 99999 99999 99
 3       00000 00011 11111 11111 12222 22222 22222 23333 33333 44444 44455 55555 55666 66666 67777 77788 88888 88888 88888 99999 9999
 4  M    00000 00011 11111 11122 22222 22233 33333 34444 44444 44445 55555 66666 66666 66667 77777 78888 88888 89999 999
 5       00000 11111 11222 22222 22222 33333 44445 55555 56666 66777 77777 88888 89999 999
 6       00000 00011 11111 11122 22223 33334 44455 55556 66677 77788 88889 99
 7       00011 12222 33334 45555 66677 88889 99999
 8       00001 11222 22333 34444 55555 56667 88888 88889 99
 9  H    00000 11111 22222 23334 45555 55677 78889
10       00011 11234 44456 66777 88888 89999 99
11       00011 22333 44444 55566 77778 889
12       00002 45678 8888
13       00000 11112 23334 44669 9
14       01123 55566 999
15       00111 22355 569
16       00138 99
17       00116 778
18       47788
19       46
20       0139
21       027
23       6
24       3
25       25
26       5
27       9
28       113
29       1
30       8
31       788
35       89
40       8
41       7
43       4
58       9
```

	NMOC, ppmC
Cases	818
Minimum	0.026
Maximum	5.890
Mean	0.682
Standard Deviation	0.608
Standard Error	0.021
Skewness	2.763
Kurtosis	12.684
Lower Hinge (H)	0.292
Median (M)	0.497
Upper Hinge (H)	5.890

Figure 5-10. Stem-and-leaf plot of the morning NMOC data for September, 1988

1582251R

Figure 5-11 shows monthly means for April through September. The April and May NMOC monitoring data were from only four Florida sites, M1FL, M2FL, T1FL, and T2FL. The remainder of the points located on the 1988 trend line included data from all 45 NMOC Monitoring Program sites. Month-to-month trends are not immediately apparent, but it is clear that since 1984, the NMOC level has decreased about 25 percent.

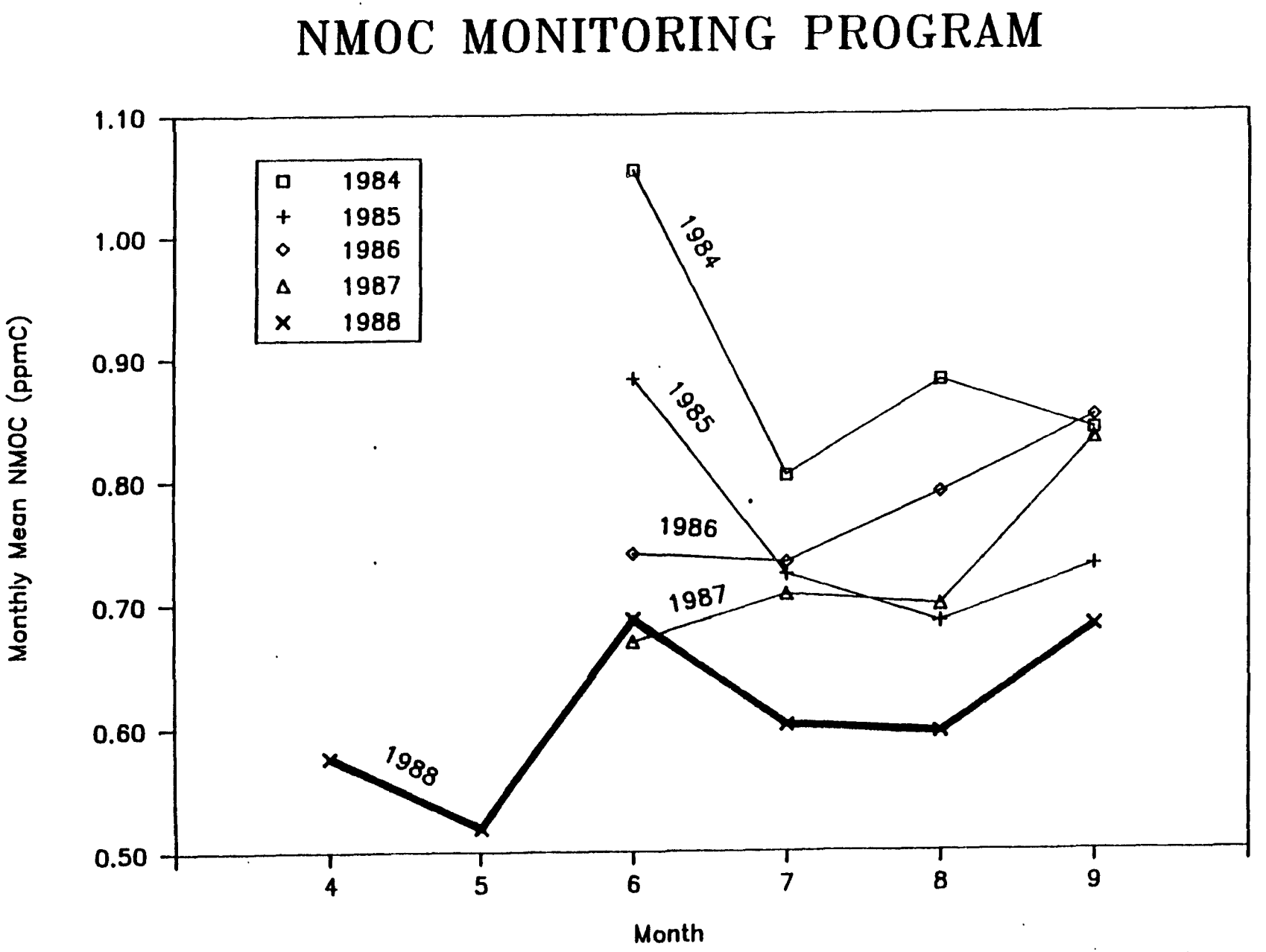

Figure 5-11. Monthly mean NMOC emissions for 1984, 1985, 1986, 1987, and 1988

6.0 RECOMMENDATIONS

Based on the experiences and results of the 1988 NMOC Monitoring Study, certain recommendations can be made with respect to equipment design and validation procedures.

6.1 OPERATING PROCEDURE CHANGES

Current operating procedures call for the use of dry propane standards and external audit samples. The experimental design recommended would cover the present NMOC span of 0 to 9 ppmC, and at least 3 levels of humidity: zero, low (~10%), and medium (~30%) relative humidity. The effect of humidity on propane calibration (and audit) results is currently unknown and should be determined.

6.2 VERTICAL STRATIFICATION STUDY

In 1987 and 1988 ambient air samples were taken at ground level (3 to 10 meters) and at the 1197-foot (364.9 meter) level. In 1988, an additional site was located on top of the World Trade Center in New York, a height of over 1000 ft. It is recommended that the study continue at these sampling locations and that at least one more level (at 100 meters or some other appropriate height above ground level) be sampled at the same site location. At the same time, site barometric pressure and site wind velocity and direction data should be obtained at each sampling level. These samples should be analyzed for NMOC content as well as for the air toxics compound concentrations. The information gained from such a study would be useful in validating various atmospheric model predictions.

6.3 SEASONAL NMOC STUDIES

Data derived in a study qualifying NMOC and NO_x in seasons other than summer could be useful in understanding the relationship of NMOC to NO_x and meteorological conditions. Currently a year-round study for 24-hour air toxics ambient air samples is being conducted. No study is currently in progress to determine seasonal NMOC concentration changes.

6.4 DIURNAL STUDIES

Some interest has been expressed in diurnal NMOC concentration data, particularly from 6:00 a.m. to 6:00 p.m. In a recent proposal[6] Radian suggested various diurnal sampling plans:

- Four 3-hour samples: 6:00 to 9:00 a.m.; 9:00 a.m. to Noon; Noon to 3:00 p.m.; and 3:00 to 6:00 p.m.;
- Four 3-hour samples: 6:00 to 9:00 a.m.; Noon to 3:00 p.m.; 6:00 to 9:00 p.m.; and midnight to 3:00 a.m.; and
- Use of automatic PDFID apparatus providing four NMOC concentration measurements per hour, 24 hours per day.

Such data are necessary in devising mathematical models to predict NMOC concentrations 24 hours per day. The data would also be useful in predicting 24-hour health risks. The same samples could be analyzed by GC/MD to determine the concentration levels of the 38 UATMP target compounds.

6.5 CANISTER CLEANUP STUDIES

Prior to July 14, 1988, the canister cleanup procedure was as follows:

1. Canister was evacuated to an absolute pressure of about 5 mm Hg;
2. Canister was pressurized to 20 psig with dried, cleaned air that hac been humidified;
3. Steps 1 and 2 were repeated;
4. Canister was evacuated a third time;
5. The canister was pressurized a third time with cleaned, dried air;
6. The canister was analyzed for NMOC concentration. If the NMOC concentration was less than 0.030 ppmC, the canister was declared tc be clean; and
7. The canister was evacuated a fourth time and sealed for shipment.

After July 14, 1988, the canister procedure was revised, as follows:

1. Steps 1, 2, and 3 above were performed; and
2. Steps 6 and 7 were performed.

If in Step 6 for either of the cleanup procedures, the NMOC concentration was greater than 0.030 ppmC, the cleaning procedure was repeated until the acceptance criterion was met.

Radian has proposed[7] initiation of several studies to determine whether the present canister cleanup procedure is adequate to prevent significant carryover of organic compounds from one canister to the next. These studies are needed since equilibration in a canister may take a week or longer.

The effect of sample pressure on the measured NMOC concentration is not clear. Ambient air samples are sufficiently humid so that at 15 psig, liquid water condenses inside the canister. The liquid water migrates to the canister walls which affect the adsorption equilibrium, and at the same time, provides a medium for further depletion of the vapor phase organic compounds because of the solubility of the organics in water. Equilibration under these conditions would take longer, perhaps 30 days or longer, and the effect on the measured air sample NMOC (and UATMP target compounds) concentration has not been determined. These effects, however, are probably not significant for the NMOC measurements.

The present cleanliness criterion for canisters is that if the NMOC concentration in Step 6 is less than 30 ppbC, the canister is declared to be clean. This measurement is taken under transient conditions. For a more meaningful cleanliness criterion, canisters after cleaning should be filled with cleaned, dried air that has been humidified to sample pressure (15 psig) and allowed to stand at least 7 days and analyzed for their NMOC concentration.

Radian has proposed to undertake a study to ensure a better understanding and measurement of the effectiveness of the canister cleanup procedure. The present canister cleanup procedure is thought to be adequate for the NMOC program, since the concentrations of interest are at the ppmC level. For the UATMP, the concentration levels are at the ppbv levels, i.e., 0.01 to 50 ppbv, and the present canister cleanup procedure may not be sufficient to prevent significant carryover of target compounds from one sample to the next for the UATMP. A study of the canister cleanup procedure for the UATMP would also further validate the present cleanup procedure for the NMOC Monitoring Program.

6.6 COORDINATED SAMPLING AT NMOC SITES

It is recommended that where possible the following sampling take place at NMOC sites for the 1989 monitoring programs:

- NMOC samples;
- Aldehyde samples;
- 3-hour air toxics compounds; and
- UATMP sampling (at least 38 target compounds).

This kind of program would effect some economy in setting up and monitoring the sampling program, and also provide some opportunity for cross-correlation of the results.

6.7 FIELD AUDIT

It is recommended that a field audit be designed and conducted at several NMOC sites during the 1989 Monitoring Program. It is suggested that one field audit per month be performed at an NMOC site during June, July, August, and September 1989. The field audit should use at least one standard of known NMOC concentration and should collect duplicate samples plus a zero-air blank for each site.

6.8 DUPLICATE SAMPLE AND REPLICATE ANALYSES

It is recommended that during the 1989 NMOC Monitoring Program, replicated analyses be performed only on duplicate samples. It is further recommended that the replicate analyses on a particular canister be performed on the same Radian channel. This recommendation will be incorporated into the 1989 Quality Assurance Project Plan for the NMOC Monitoring Program.

7.0 THREE-HOUR AIR TOXICS DATA SUMMARY

The 1988 NMOC Program and UATMP included three-hour ambient air samples at 13 NMOC urban sites (See Table 7-1) located in the contiguous United States. Overall concentration results are reported in parts per billion by volume (ppbv) in Section 7.1, and site-specific results are given in Section 7.2.

Analyses were done by a GC/MD system using flame ionization detection (FID), photoionization detection (PID), and electron capture detection (ECD). Compound identification was made using a combination of retention time, ratios of PID/FID and/or ECD/FID responses, and analyst experience and judgement. Quantitation was done using the FID response, with the exception of halogenated compounds that were quantitated using the ECD. If there was an indication that the quantitation detector response for the target compound had interference from an unknown source quantitation was performed on one of the alternate detectors if applicable. Table 7-1 indicates the number of 3-hour samples taken for GC/MD analyses to speciate for 38 UATMP compounds. About 10 analyses were performed on samples from each site, with the exception of CLOH. One of the samples from each site was taken in duplicate and the analysis of one of the samples from each site was replicated. Two of the samples from each site (with the exception CLOH) were analyzed by gas chromatography/mass spectrometry (GC/MS) for confirmation of compound identification.

Three-hour air toxics samples were regular NMOC Monitoring Program samples that were collected in 6-L stainless steel canisters from 6:00 a.m. to 9:00 a.m. The final canister pressure was about 12 psig. The NMOC samples that were speciated by GC/MD were selected at random during the summer. Each selected sample was first analyzed by the PDFID method for its NMOC concentration. Then the canister pressure was bled to atmospheric pressure and the canister bellows valve was closed. The canister was allowed to equilibrate at least 18 hours before the GC/MD analysis was performed.

TABLE 7-1. THREE-HOUR AMBIENT AIR SAMPLES AND ANALYSES

Site Code	No.	Duplicate Pairs	GC/MD Analyses Replicate	GC/MD Analyses Total	GC/MS Analyses
BRIL	6	1	0	7	2
B2MA	8	1	1	10	2
C2OH	8	1	1	10	2
C3IL	8	1	1	10	2
C6IL	7	1	1	9	2
CLOH	2	0	0	2	0
D1MI	8	1	1	10	2
D2MI	9	1	1	11	2
PRRI	8	1	1	10	2
S1MA	8	1	1	10	2
S2MA	9	1	1	11	2
WAIL	9	1	1	11	2
WOMA	8	1	0	9	2
Total	98	12	10	120	24

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7.1 OVERALL RESULTS

Concentrations of the air toxic compounds detected are summarized in Table 7-2 for the 1988 3-hour ambient air samples that were speciated. The table shows the number of cases (samples), the percent of cases in which the compound was identified, the minimum, maximum, and mean (arithmetic average) concentrations of the compound in ppbv. The target compounds identified fall into at least four categories: (1) those occurring in more than 70% of the samples tested, (2) those occurring in from 10% to 27% of the samples, (3) those identified compounds occurring in less than 10% of the samples, and (4) those not identified in any of the 3-hour air samples at concentrations above their method detection limits. These results are summarized in Table 7-3. One of the most striking observations in examining of the data of Table 7-3 is that there were no target compounds identified in the percent frequency range from 26.7% for tetrachloroethylene to 72.5% for 1,1,1-trichloroethane. Another observation derived from these results is that none of the bromine-containing compounds were identified at concentrations above their detection limits in any of the 3-hour ambient air samples analyzed by GC/MD.

Overall concentrations ranged from 0.03 ppbv for 1,2-dichloroethane to 57.22 ppbv for chloroform. The overall average concentration of the target compounds was 2.95 ppbv.

7.2 SITE RESULTS

Table 7-4 gives 3-hour ambient air concentrations by site code for the 38 target air toxics compounds. The overall site means range from 0.64 ppbv for BRIL to 5.05 for D2MI. Appendix I tabulates the complete analytical results, and includes the NMOC concentrations for each of the 3-hour air toxics samples. There appeared to be little correlation between the NMOC concentrations and overall air toxics compound concentration.

TABLE 7-2. COMPOUND IDENTIFICATION WITH GC/MD FOR ALL 3-HOUR SITES

Compounds	Cases[a] No.	Cases[a] %[b]	Minimum ppbv	Maximum ppbv	Mean ppbv
Acetylene	4	3.3	1.54	19.89	13.39
1,3-Butadiene	27	22.5	0.09	3.16	0.85
Vinyl chloride	2	1.7	0.43	0.43	0.43
Chloromethane	5	4.2	0.13	13.15	3.50
Chloroethane	3	2.5	0.10	0.97	0.58
Methylene chloride	24	20.0	1.13	5.06	2.22
trans-1,2-Dichloroethylene	8	6.7	0.05	0.55	0.30
Chloroprene	7	5.8	0.04	0.81	0.45
Chloroform	5	4.2	4.02	57.22	21.23
1,1,1-Trichloroethane	87	72.5	0.28	23.29	2.39
Carbon tetrachloride	12	10.0	0.15	0.27	0.19
1,2-Dichloroethane	16	13.3	0.03	6.12	1.01
Benzene	112	93.3	0.07	12.47	2.15
Trichloroethylene	22	18.3	0.33	9.95	3.87
1,2-Dichloropropane	3	2.5	0.54	0.64	0.59
Toluene	103	85.8	0.19	15.80	5.15
n-Octane	7	5.8	0.18	0.48	0.36
1,1,2-Trichloroethane	4	3.3	0.47	1.77	0.88
Tetrachloroethylene	32	26.7	0.22	13.03	1.69
Chlorobenzene	6	5.0	0.15	0.27	0.19
Ethylbenzene	95	79.2	0.06	2.34	0.55
m/p-Xylene	112	93.3	0.13	18.09	3.36
Styrene/o-Xylene	94	78.3	0.06	3.30	0.86
1,1,2,2-Tetrachloroethane	1	0.8	3.58	3.58	3.58
Propylene	19	15.8	0.87	9.23	4.04
Overall	--	--	0.03	57.22	2.95

[a]A total of 120 analyses were performed by GC/MD, including duplicate samples and replicate analyses.
[b]% Cases is the percent of the total ambient air samples analyzed which contained the compound at a level above the analytical method detection limit.

TABLE 7-3. FREQUENCY OF OCCURRENCE OF TARGET COMPOUNDS IN 3-HOUR AMBIENT AIR SAMPLES

Range for Frequency of Occurrence	Target Compounds	
100% to 70%	Benzene m/p-Xylene Toluene	Ethylbenzene Styrene/o-Xylene 1,1,1-Trichloroethane
27% to 10%	Tetrachloroethylene 1,3-Butadiene Methylene chloride	Trichloroethylene Propylene 1,2-Dichloroethane
10% to >0%[a]	Carbon tetrachloride Acetylene Vinyl chloride Chloromethane Chloroethane trans-1,2-Dichloroethylene Chloroprene	Chloroform n-Octane 1,1,2-Trichloroethane 1,2-Dichloropropane Chlorobenzene 1,1,2,2-Tetrachloroethane
Zero[b]	Bromomethane 1,1-Dichloroethane Bromochloromethane Bromodichloromethane trans-1,3-Dichloropropylene cis-1,3-Dichloropropylene	Dibromomethane Bromoform m-Dichlorobenzene p-Dichlorobenzene o-Dichlorobenzene

[a]This range includes only those compounds identified, i.e., at a concentration above the detection limit.
[b]Zero frequency range includes those target compounds that were not identified in any of the samples at a concentration above the detection limit.

TABLE 7-4. COMPOUND IDENTIFICATIONS WITH GC/MD BY SITE CODE

Site Code	Compound	Cases	Minimum ppbv	Maximum ppbv	Mean ppbv
B2MA	1,3-Butadiene	3	0.61	0.88	0.70
	Methylene chloride	1	1.44	1.44	1.44
	trans-1,2-Dichloroethylene	1	0.50	0.50	0.50
	Chloroform	1	4.02	4.02	4.02
	1,1,1-Trichloroethane	6	0.45	1.61	1.12
	1,2-Dichloroethane	2	0.03	1.73	0.88
	Benzene	9	1.37	3.15	2.24
	Trichloroethylene	1	0.47	0.47	0.47
	Toluene	7	3.37	7.83	5.28
	n-Octane	1	0.48	0.48	0.48
	1,1,2-Trichloroethane	1	0.47	0.47	0.47
	Tetrachloroethylene	5	0.36	1.05	0.69
	Ethylbenzene	9	0.30	0.69	0.48
	m/p-Xylene	9	2.28	4.97	3.43
	Propylene	3	1.02	9.23	4.28
	Overall	-	0.03	9.23	2.25
BRIL	trans-1,2-Dichloroethylene	1	0.13	0.13	0.13
	Chloroprene	1	0.42	0.42	0.42
	1,1,1-Trichloroethane	4	0.33	0.72	0.52
	Carbon tetrachloride	2	0.17	0.17	0.17
	Benzene	6	0.07	1.17	0.36
	Toluene	3	0.76	1.09	0.89
	Ethylbenzene	2	0.09	0.14	0.12
	m/p-Xylene	5	0.37	1.02	0.60
	Styrene/o-Xylene	2	0.13	0.37	0.25
	Propylene	1	7.56	7.56	7.56
	Overall	-	0.07	7.56	0.64
C2OH	1,2-Butadiene	5	0.31	3.16	1.37
	Methylene Chloride	4	0.78	4.92	3.58
	Chloroethane	2	0.10	0.68	0.39
	Chloroprene	1	0.81	0.81	0.81
	Chloroform	1	6.66	6.66	6.66
	1,1,1-Trichloroethane	9	0.58	2.12	1.50
	Benzene	10	0.63	10.34	4.79
	Toluene	10	1.30	15.80	9.67
	Tetrachloroethylene	3	0.44	0.71	0.62

(Continued)

TABLE 7-4. (Continued)

Site Code	Compound	Cases	Minimum ppbv	Maximum ppbv	Mean ppbv
C2OH (Continued)					
	Chlorobenzene	1	0.27	0.27	0.27
	Ethylbenzene	9	0.13	2.34	1.10
	m/p-Xylene	10	0.86	18.09	7.55
	Styrene/o-Xylene	10	0.10	3.30	1.60
	Overall	-	0.10	18.09	3.88
C3IL	Chloromethane	4	0.13	3.63	1.08
	trans-1,2-Dichloroethylene	1	0.39	0.39	0.39
	1,1,1-Trichloroethane	10	0.74	3.41	2.09
	Carbon tetrachloride	1	0.17	0.17	0.17
	1,2-Dichloroethane	1	0.25	0.25	0.25
	Benzene	8	0.16	0.91	0.48
	Toluene	7	0.19	3.29	1.85
	Tetrachloroethylene	3	0.41	0.86	0.67
	Ethylbenzene	6	0.17	0.35	0.26
	m/p-Xylene	9	0.21	2.32	1.34
	Styrene/o-Xylene	5	0.06	0.42	0.28
	Overall	-	0.06	3.68	1.09
C6IL	1,3-Butadiene	2	0.46	1.03	0.69
	Methylene chloride	3	1.23	2.85	1.82
	Chloroprene	1	0.04	0.04	0.04
	Chloroform	1	7.73	7.73	7.73
	1,1,1-Trichloroethane	7	0.82	2.50	1.23
	1,2-Dichloroethane	1	0.11	0.11	0.11
	Benzene	8	2.04	6.00	3.64
	Toluene	9	4.42	11.55	8.11
	n-Octane	3	0.30	0.46	0.36
	Tetrachloroethylene	5	0.25	13.03	7.52
	Chlorobenzene	2	0.15	0.17	0.16
	Ethylbenzene	9	0.43	1.16	0.80
	m/p-Xylene	9	3.00	7.74	5.48
	Styrene/o-Xylene	9	0.68	1.84	1.28
	Propylene	2	6.29	6.76	6.53
	Overall	-	0.04	13.03	3.46

(Continued)

TABLE 7-4. (Continued)

Site Code	Compound	Cases	Minimum ppbv	Maximum ppbv	Mean ppbv
CLOH	Acetylene	1	17.9	17.9	17.90
	1,3-Butadiene	1	1.51	1.51	1.51
	Chloromethane	1	13.15	13.15	13.15
	Chloroethane	1	0.97	0.97	0.97
	trans-1,2-Dichloroethylene	1	0.09	0.09	0.09
	1,1,1-Trichloroethane	1	2.33	2.33	2.33
	1,2-Dichloroethane	1	6.12	6.12	6.12
	Benzene	2	1.70	12.47	7.04
	Trichloroethylene	1	0.78	0.78	0.78
	Toluene	2	3.33	10.33	6.84
	Tetrachlorethylene	1	0.42	0.42	0.42
	Ethylbenzene	2	0.32	1.14	0.73
	m/p-Xylene	2	2.32	8.48	5.40
	Styrene/o-Xylene	2	0.49	1.91	1.20
	Overall	-	0.09	17.90	4.93
DIMI	Acetylene	1	14.24	14.24	14.24
	Methylene chloride	3	1.78	2.15	1.99
	1,3-Butadiene	6	0.09	2.87	1.06
	1,1,1-Trichloroethane	5	1.09	6.10	3.65
	Carbon tetrachloride	2	0.23	0.24	0.24
	1,2-Dichloroethane	1	0.08	0.08	0.08
	Benzene	9	0.76	7.05	3.64
	Trichloroethylene	2	0.33	0.70	0.52
	1,2-Dichloropropane	2	0.60	0.64	0.62
	Toluene	10	1.90	11.58	6.77
	n-Octane	2	0.33	0.41	0.37
	Tetrachloroethylene	3	0.22	0.53	0.37
	Chlorobenzene	2	0.19	0.20	0.20
	Ethylbenzene	10	0.14	1.71	0.79
	m/p-Xylene	10	1.22	12.86	5.45
	Styrene/o-Xylene	9	0.33	2.40	1.44
	Overall	-	0.08	14.24	2.93

(Continued)

TABLE 7-4. (Continued)

Site Code	Compound	Cases	Minimum ppbv	Maximum ppbv	Mean ppbv
D2MI	Acetylene	1	19.89	19.89	19.89
	Methylene chloride	2	2.09	5.06	3.58
	Chloroform	2	30.50	57.22	43.86
	1,1,1-Trichloroethylene	8	1.00	23.29	11.22
	Benzene	11	0.53	9.71	2.86
	Trichloroethylene	2	0.40	2.06	1.23
	Toluene	10	3.10	12.14	7.03
	Tetrachloroethylene	3	0.58	0.84	0.70
	Ethylbenzene	10	0.09	1.09	0.67
	m/p-Xylene	11	0.98	6.69	4.30
	Styrene/o-Xylene	10	0.12	1.41	0.91
	Overall	-	0.09	57.22	5.05
PRRI	1,3-Butadiene	1	0.34	0.34	0.34
	Methylene chloride	4	1.15	3.00	2.03
	Chloroprene	1	0.49	0.49	0.49
	1,1,1-Trichloroethane	10	0.90	4.12	1.79
	Carbon tetrachloride	2	0.16	0.27	0.22
	1,2-Dichloroethane	3	0.94	1.86	1.27
	Benzene	10	0.53	1.68	0.95
	Trichloroethylene	10	2.02	9.95	5.67
	Toluene	9	2.56	4.29	3.03
	Tetrachloroethylene	3	0.44	0.56	0.51
	Chlorobenzene	1	0.18	0.18	0.18
	Ethylbenzene	9	0.22	0.61	0.33
	m/p-Xylene	10	0.46	4.55	2.13
	Styrene/o-Xylene	10	0.31	0.91	0.48
	Propylene	3	1.59	2.38	1.94
	Overall	-	0.16	9.95	1.73
S1MA	Acetylene	1	0.17	0.17	0.17
	Methylene chloride	1	1.33	1.33	1.33
	trans-1,2-Dichlorethylene	1	0.05	0.05	0.05
	Chloroprene	1	0.28	0.28	0.28
	1,1,1-Trichloroethane	7	0.80	1.75	1.11
	Carbon tetrachloride	2	0.16	0.20	0.18

(Continued)

TABLE 7-4. (Continued)

Site Code	Compound	Cases	Minimum ppbv	Maximum ppbv	Mean ppbv
S1MA (Continued)					
	Benzene	10	0.54	2.12	1.12
	Toluene	10	2.00	10.31	3.89
	1,1,2-Trichloroethane	1	0.62	0.62	0.62
	Ethylbenzene	9	0.08	0.47	0.27
	m/p-Xylene	10	0.81	2.88	1.69
	Styrene/o-Xylene	7	0.15	0.73	0.45
	Propylene	2	3.08	3.12	3.11
	Overall	-	0.05	10.31	1.44
S2MA	Vinyl chloride	1	0.43	0.43	0.43
	1,1,1-Trichloroethylene	7	0.45	1.80	0.97
	Carbon tetrachloride	2	0.15	0.17	0.16
	Benzene	9	0.25	1.24	0.90
	Toluene	9	0.44	4.29	2.49
	Tetrachloroethylene	2	0.38	0.42	0.40
	Ethylbenzene	6	0.13	0.25	0.18
	m/p-Xylene	9	0.23	1.85	1.20
	Styrene/o-Xylene	6	0.20	0.48	0.31
	Propylene	2	1.86	1.88	1.37
	Overall	-	0.13	4.29	0.84
WAIL	Methylene chloride	4	1.14	2.92	1.69
	trans-1,2-Dichloroethylene	2	0.50	0.55	0.53
	Chloroprene	2	0.44	0.66	0.55
	1,1,1-Trichloroethane	5	0.31	1.01	0.68
	Benzene	11	0.16	3.36	1.17
	Toluene	9	0.47	6.21	3.01
	1,1,2-Trichloroethane	1	0.66	0.66	0.66
	Tetrachloroethylene	2	0.35	1.96	1.16
	Ethylbenzene	5	0.14	0.87	0.60
	m/p-Xylene	9	0.13	4.57	1.91
	Styrene/o-Xylene	6	0.09	1.14	0.65
	1,1,2,2-Tetrachloroethane	1	3.58	3.58	3.58
	Propylene	4	0.87	7.89	4.67
	Overall	-	0.09	7.89	1.67

(Continued)

TABLE 7-4. (Continued)

Site Code	Compound	Cases	Minimum ppbv	Maximum ppbv	Mean ppbv
WOMA	Acetylene	1	1.54	1.54	1.54
	1,3-Butadiene	4	0.21	0.41	0.30
	Methylene Chloride	2	1.13	1.67	1.40
	trans-1,2-Dichloroethylene	1	0.18	0.18	0.18
	1,1,1-Trichloroethane	8	0.28	1.82	1.20
	Carbon tetrachloride	1	0.16	0.16	0.16
	1,2-Dichloroethane	2	0.42	1.81	1.12
	Benzene	9	0.63	2.83	2.00
	Trichloroethylene	5	1.30	8.03	4.54
	Toluene	8	2.56	7.42	4.88
	n-Octane	1	0.18	0.18	0.18
	Tetrachloroethylene	2	0.34	0.48	0.41
	Ethylbenzene	9	0.06	0.64	0.43
	m/p-Xylene	9	0.84	4.61	2.96
	Styrene/o-Xylene	9	0.09	1.18	0.71
	Propylene	1	2.86	2.86	2.86
	Overall	-	0.06	8.03	2.02

8.0 THREE-HOUR AIR TOXICS TECHNICAL NOTES

This section describes the equipment used to sample and analyze the 3-hour air toxics samples. Also described are sample handling procedures, sampler certification procedures, standards generation and instrument calibration procedures, compound identification procedures, GC/MS compound identification confirmation, quality assurance/quality control procedures, and data records for the 3-hour air toxics compounds.

8.1 SAMPLING EQUIPMENT AND INTERFACE

The sampling equipment for the 3-hour air toxics samples was the NMOC Monitoring Program sampling equipment described in Section 3.1. The original sample was collected as an integrated ambient air sample from 6:00 a.m. to 9:00 a.m. with a final sample pressure of about 16 psig. As stated above, after NMOC analysis the canister was bled to atmospheric pressure and allowed to stand at least 16 hours before being analyzed by GC/MD.

An interface system was designed and built by Radian Corporation to take a sample from the canister and inject it into the gas chromatograph for analysis.

Figure 8-1 shows the GC/MD system including the Sample Interface System, Analytical System, and Data System. The sample interface takes a 250-mL sample from the canister, draws it through Trap Assembly 1 and condenses all the water and organic compounds, with the exception of methane, in the air sample drawn from the canister. Trap Assembly 1 is a cryogenic, liquid argon trap packed with glass beads. The cryogen is removed, and an electrical heater quickly heats Trap Assembly 1, vaporizing the water and organic compounds condensed from the canister sample.

8.2 SAMPLER CERTIFICATION

The NMOC sampler described in Section 3.0 used all stainless steel fittings. Assuming all the sample lines and fittings are clean of organic compound contaminants, the only other point in the sampling system where

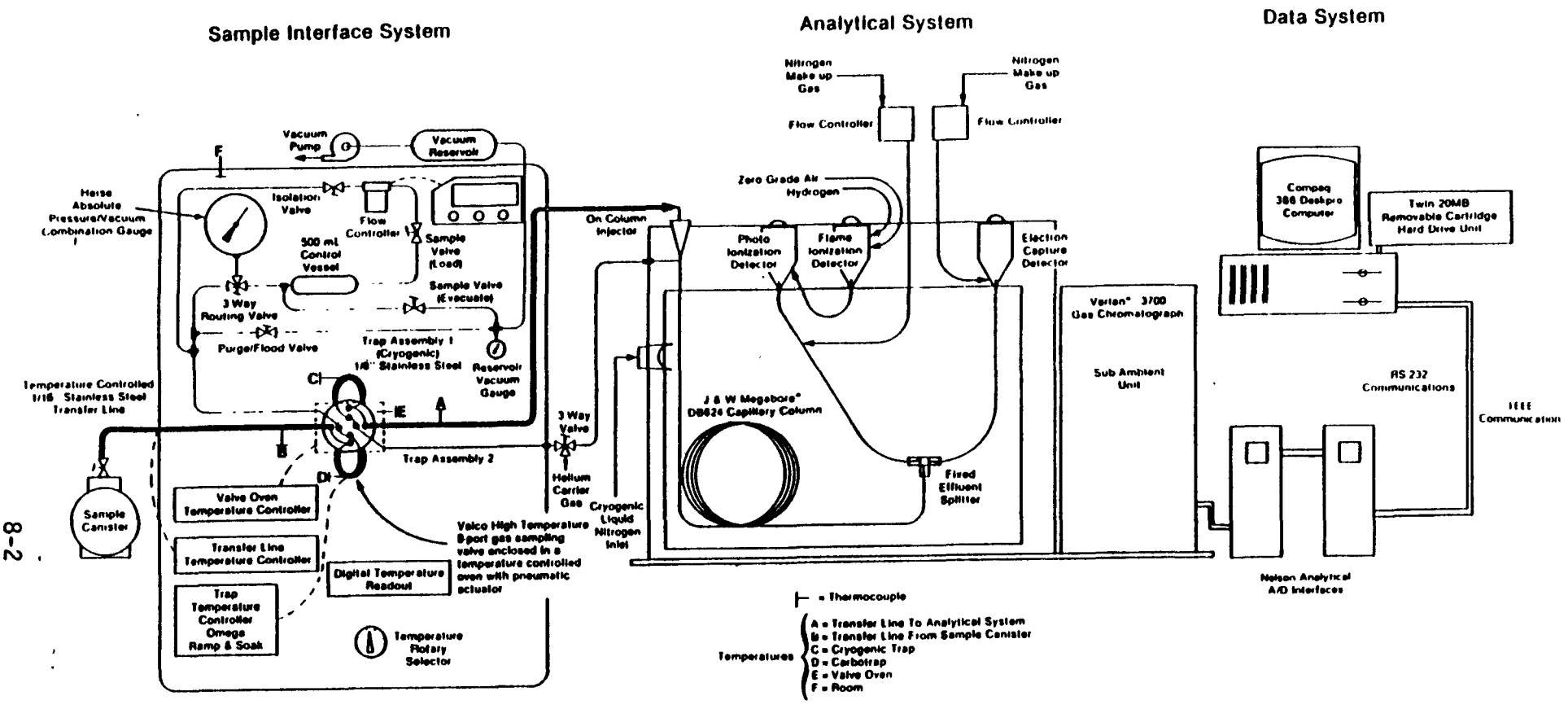

Figure 8-1. Gas chromatographic multidector system.

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organic contaminants may enter the ambient air sample collected in the canister is from seating material and packing material in the solenoid valve. The solenoid valve is connected to the electronic timer which controls the beginning and ending of the 3-hour sampling period.

In order to certify the NMOC samplers before their installation in the field, the samplers were tested in Radian's Research Triangle Park Laboratory for possible contamination. Cleaned, dried air that had been humidified was pumped through the NMOC sampling system for about 48 hours and then a 3-hour sample was collected. The sample was analyzed for a selected group of target compounds. Results showed that there were no target compounds in the certification sample having a concentration above the GC/MD method detection limit.

8.3 STANDARDS GENERATION

The GC/MD analytical equipment was calibrated daily with a gas mixture that averaged 10 ppbv of each of the 38 target compounds at 70% relative humidity.

The standard gas mixtures were generated by dynamic flow dilutions of Scott certified gas mixtures with cleaned, dried air that had been humidified with HPLC-grade water. The Scott gas mixtures were dry and contained in cylinders under pressure at a concentration of about 120 ppbv per compound. The concentration for each target gas in the Scott cylinder was certified to ±5% with the exception of the bromoform which was certified to ±20 percent.

Figure 8-2 diagrams the dynamic flow dilution apparatus. One Scott cylinder contained 18 of the air toxics target compounds, a second Scott cylinder contained 11 target compounds, while the third Scott cylinder contained the remaining 9 target compounds. The three Scott cylinders were connected to Channels 1, 2, and 3 of the flow dilution apparatus. The fourth channel was connected to a cylinder of zero-grade air by way of a catalytic oxidizer that oxidized all of the hydrocarbon material in the zero-grade air. The four mass flow controllers were set to flow rates that would give the desired final concentration of the diluted gas.

The cleaned zero-grade air was partially humidified by bubbling part of the air stream through HPLC-grade water contained in a stainless steel

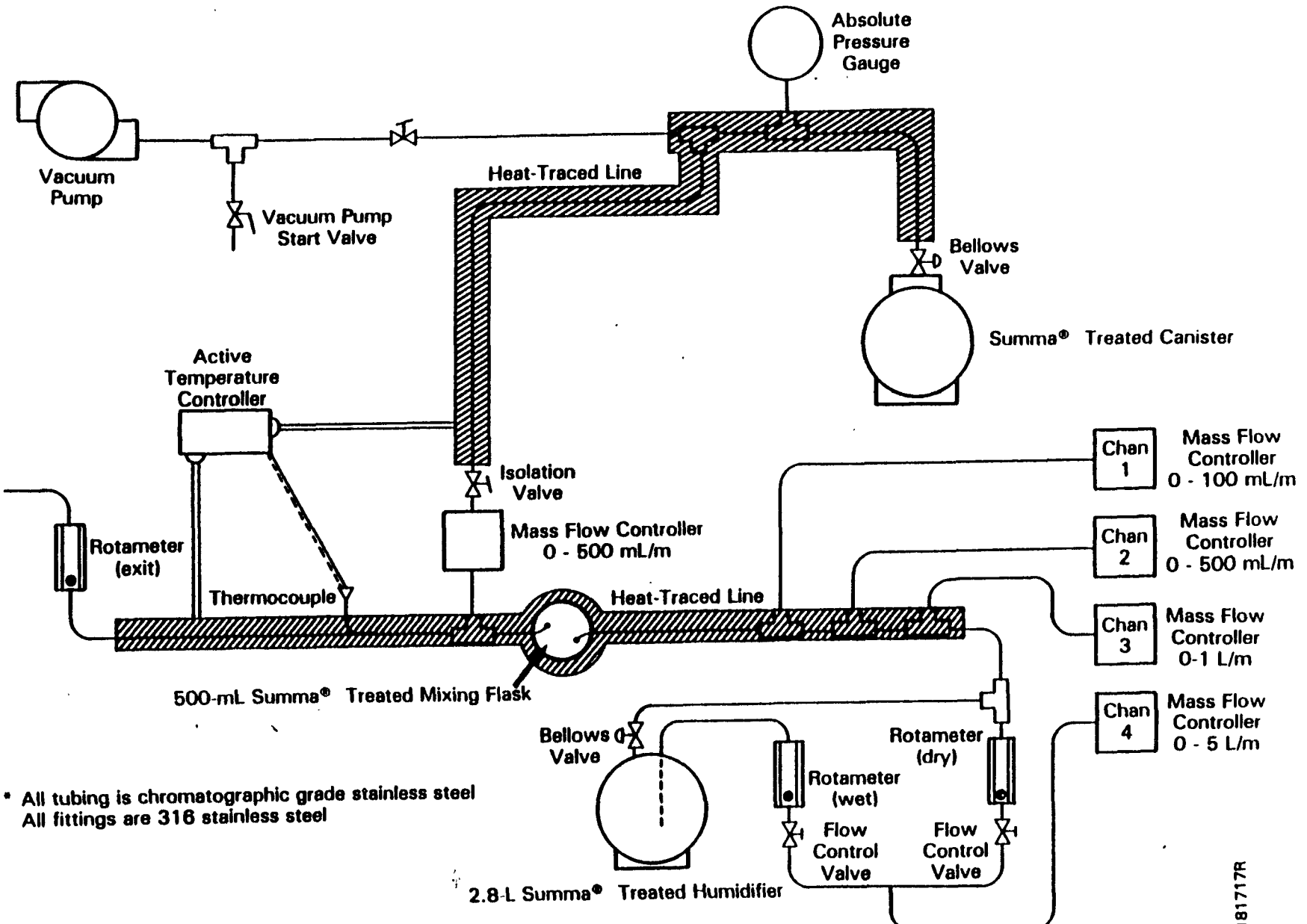

Figure 8-2. Dynamic flow dilution apparatus.

canister. The wet and dry rotameters and all the mass flow controllers were calibrated with a bubble flowmeter before being connected to the flow dilution apparatus. All of the flow controllers, the connecting lines, and the mixing flask were heat traced to reduce adsorption of the target compounds. The temperature controller that regulated electrical current flow to the heat tracing was set for 100°C.

To generate a standard, the following procedure is used. The canister into which the standard is being mixed is connected to the flow dilution apparatus at the bellows valve shown in Figure 8-2. The temperature controller for the heat tracing is activated. The isolation valve is closed and the vacuum pump turned on. The tubing, the canister, and the absolute pressure gauge are all evacuated to about 5 mm Hg absolute pressure for at least 15 minutes. The mass flow controllers are then set for the appropriate flow rate to obtain the desired dilution and the humidifier, lines, and mixing flask are purged for at least 10 minutes. The vacuum pump is then isolated from the system and the isolation valve is opened to the diluted gas mixture. The standard mixture fills the canister at a controlled rate until atmospheric pressure is reached. The canister with the diluted standard is disconnected from the flow dilution apparatus and allowed to equilibrate before use. The barometric pressure and room temperature are also recorded.

In order to calculate exactly the concentration of each target compound in the standard mixture, a correction is made for the residual gas in the standard canister before the filling with the diluted gas is begun. A correction also is made for the water vapor added to the dilution air.

8.4 CALIBRATION ZERO AND SPAN

Most of the compound quantitation is performed with the calibrated response of the FID detector. For purposes of compound identification and quantitation (when there may be interference on the FID detector) it is also necessary to calibrate the PID and ECD responses. Initial calibration curves for each compound were generated on all three detectors with calibration standards at 1, 5, 10, and 20 ppbv. In addition to the usual response (area counts) versus concentration curves, response times and response ratios for PID/FID and ECD/FID were determined for each target compound.

The first run of the day was made using zero air to be sure that the interface and analytical systems were free from contamination. Daily calibration checks at about 10 ppbv to establish response factors were performed as the second run of the day.

8.5 GAS CHROMATOGRAPH/MULTIDETECTOR ANALYSIS AND COMPOUND IDENTIFICATION

A Varian® 3700 gas chromatograph, configured with a PID in series with an FID and an ECD operating in parallel, performed the air toxics analyses. Fused silica was used for the detector-to-detector connections. The Air Toxics Multiple Detector System is shown in Figure 8-3 and diagrams the effluent splitter and multidetectors connected to the end of the Megabore® DB-624 capillary column.

The entire GC/MD system is shown in Figure 8-1, including the sample interface, the gas chromatograph/multidetector analytical system, and the data handling system. Sample volumes for the GC/MD analyses were 250-mL.

Compound identification was performed using measured retention times and ratios of PID/FID and ECD/FID responses. The analyst's skill and experience was also needed in making a judgement about the presence or absence of a target compound because of the variability of response times, and the presence of interfering compounds.

8.6 GAS CHROMATOGRAPH/MASS SPECTROMETER ANALYSIS AND COMPOUND IDENTIFICATION CONFIRMATION

Twelve of the 3-hour air toxics samples were analyzed by GC/MS for compound identification confirmation following completion of the GC/MD analyses. So that the sensitivity of the GC/MS compared favorably with that of the GC/MD, the GC/MS was operated in the multiple ion detection (MID) mode, and the sample volume was 500-mL (compared to 250-mL for the GC/MD analyses).

No comparison of the quantitative results for GC/MS and GC/MD was examined, because the purpose of the GC/MS analyses was compound identification confirmation only. This comparison is discussed below in Section 8.7.4.

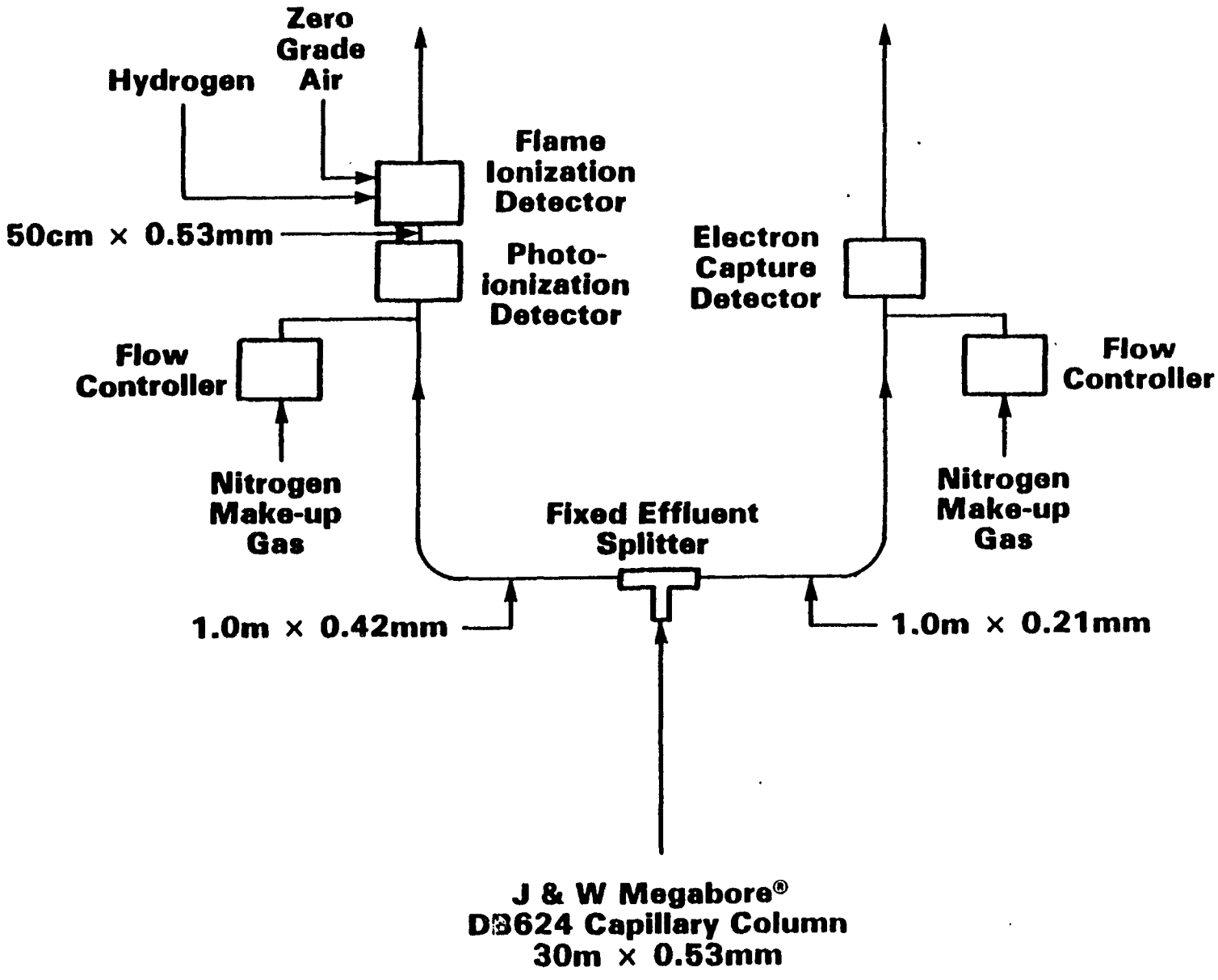

Figure 8-3. Air toxics multiple detector system.

8.7 QA/QC DATA

Quality assurance and quality control in the 3-hour air toxics data included a determination of minimum detection limits for both the GC/MD and the GC/MS analytical methods. These determinations were linked with the UATMP results, which are reported in Volume II of this report.

One of the objectives of the UATMP was to make the detection limits as low as possible, recognizing that the lower detection limits may increase the number of false positive or false negative identifications. Other quality measures reported here involved analytical precision results from repeated analyses, and sampling and analysis precision from duplicate samples. Accuracy was assessed for both the GC/MD and GC/MS using external audits supplied by the EPA-QAD.

8.7.1 GC/MD and GC/MS Minimum Detection Limits

Minimum Detection Limits for the GC/MD and GC/MS analytical systems used in this study are given in Table 8-1. Detection limits for the GC/MD analytical system are based on a sample approximately 250-mL in volume. The sample volume for the GC/MS system was about 500-mL. The GC/MS was operated in the MID mode, which detected specific ions representative of the 38 air toxics target compounds.

8.7.2 Repeated Analyses

Repeated analyses were performed on nine site samples by GC/MD. The analyses were performed on consecutive days with at least 24 hours between removing samples from the canister. From these analyses there were 55 cases in which a concentration for a target compound was found in both replicate analyses. Statistics for these data are summarized in Table 8-2, showing the overall minimums, maximums, and means of the mean concentrations, standard deviations, coefficients of variation, and absolute percent differences for the 55 replicate pairs. The absolute percent difference averages 8.542%, which is excellent agreement.

The percent coefficients of variation are plotted against the replicate sample means in Figure 8-4 and show that the largest contributions to the overall variance occurs in the samples having means less than 2 ppbv.

TABLE 8-1. METHOD DETECTION LIMITS FOR 3-HOUR AIR TOXICS COMPOUNDS

Compound	GC/MD MDL ppbv	GC/MS MDL ppbv
Acetylene	1.00	-[a]
Propylene	0.10	-[b]
Chloromethane	0.20	0.18
Vinyl chloride	0.20	0.17
1,3-Butadiene	0.10	0.50
Bromomethane	0.20	0.11
Chloroethane	0.10	0.30
Methylene chloride	0.11	0.14
trans-1,2-Dichloroethylene	0.04	0.10
1,1-Dichloroethane	0.04	0.07
Chloroprene	0.06	0.12
Bromochloromethane	0.01	0.10
Chloroform	0.01	0.05
1,1,1-Trichloroethane	0.01	0.05
Carbon tetrachloride	0.01	0.04
1,2-Dichloroethane	0.04	0.11
Benzene	0.04	0.05
Trichloroethylene	0.01	0.07
1,2-Dichloropropane	0.04	0.11
Bromodichloromethane	0.01	0.03
trans-1,3-Dichloropropylene	0.04	0.07
Toluene	0.02	0.06
n-Octane	0.03	0.13
cis-1,3-Dichloropropylene	0.04	0.05
1,1,2-Trichloroethane	0.02	0.06
Tetrachloroethylene	0.07	0.05
Dibromochloromethane	0.01	0.03
Chlorobenzene	0.02	0.04
Ethylbenzene	0.02	0.03
m/p-Xylene	0.04	0.07
Styrene/o-Xylene	0.02	-
Styrene	-	0.05
o-Xylene	-	0.05
Bromoform	0.01	0.03
1,1,2,2-Tetrachloroethane	0.01	0.03
m-Dichlorobenzene	0.02	0.03
p-Dichlorobenzene	0.09	0.09
o-Dichlorobenzene	0.02	0.04

[a]Below mass spectrometry range
[b]Instrument not calibrated for propylene

TABLE 8-2. 3-HOUR AIR TOXICS REPLICATE ANALYSES BY GC/MD

Statistics	Minimum	Maximum	Overall Mean
Mean Concentration, ppbv	0.105	11.925	2.373
Standard Deviation,[a] ppbv	-1.916	0.375	-0.037
Percent Coefficient of Variation	-41.951	33.027	-0.945
Absolute Percent Difference	0.000	59.327	8.542

[a]Standard Deviation = $(X_2 - X_1) / \sqrt{2}$

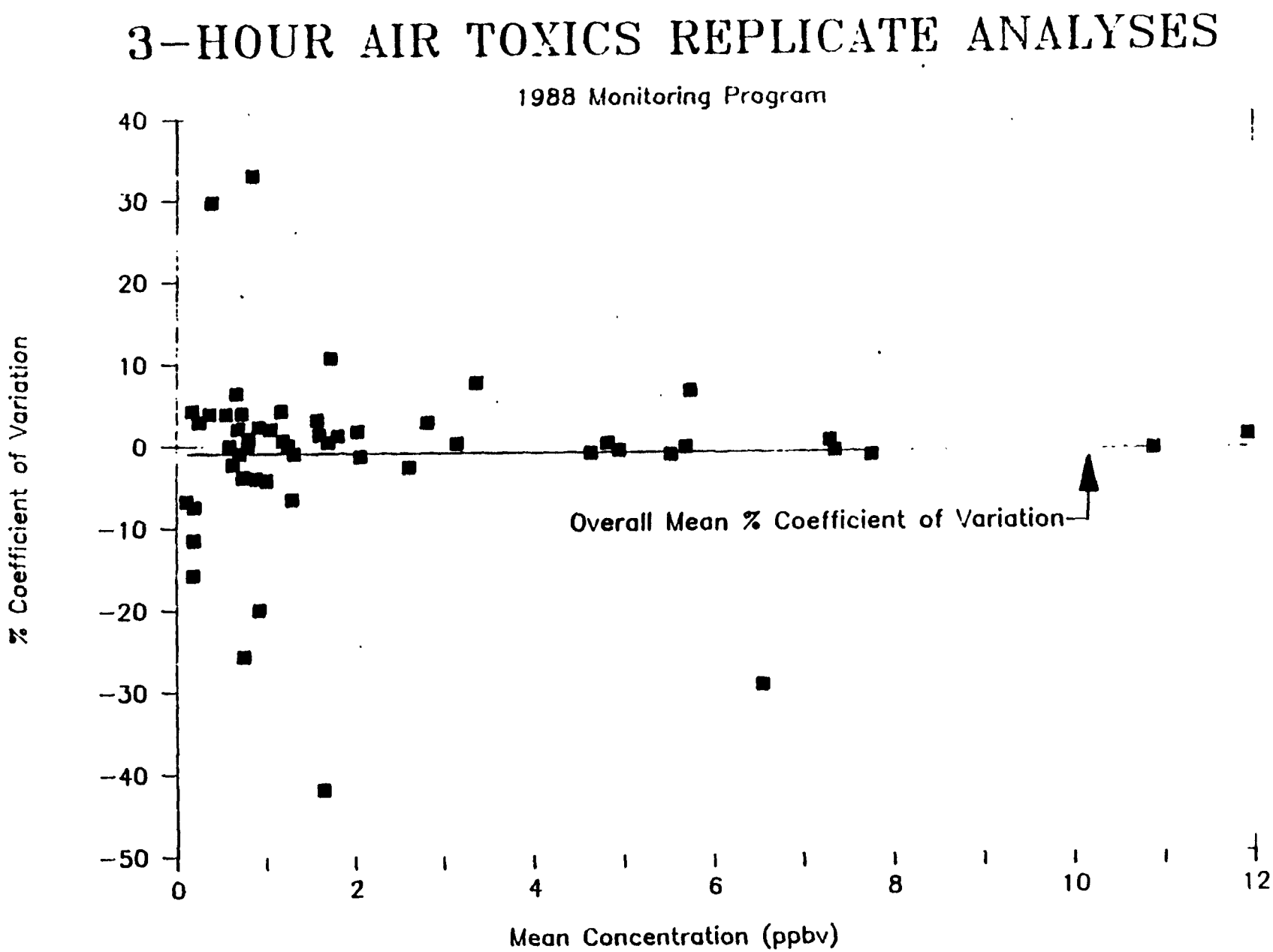

Figure 8-4. Percent coefficient of variation of 3-hour air toxics replicate analyses as a function of mean concentration.

Table 8-3 lists the cases in which a target compound was found in only one of the replicate analyses. For all except one case, the concentration wa below 1.0 ppbv, which suggests that the variability of the analyses at the lower concentration levels may explain in part why one compound was seen in one replicate analysis, but not in the other. Although the list of single compound identifications is not long, no pattern to the behavior emerges.

8.7.3 Duplicate Sample Results

Eleven duplicate 3-hour ambient air samples were analyzed by GC/MD for the 38 target compounds. Summary precision results are given in Table 8-4 in terms of mean concentration and concentration range in ppbv. Other precision statistics are given in terms of standard deviation, percent coefficients of variation, and absolute percent difference. The data in Table 8-4 are accumulated over all compounds and site locations.

The percent coefficients of variation ranged from -105.2% to 77.0%, averaging -2.130 percent. These data are also plotted in Figure 8-5 and show that the larger values of percent coefficient of variation are at the duplicate mean concentrations below 2 ppbv.

Table 8-5 also shows that the imprecision is also compound specific. Mean absolute percent difference for 1,3-butadiene is 57.384%; the concentration range is 0.190 ppbv to 0.860 ppbv. For the other selected compounds in Table 8-5, the absolute percent difference means ranged from 3.876% to 12.401 percent. The precision for the 3-hour air toxics compounds is good with an overall average absolute percent difference of 13.7 percent.

Table 8-6 lists the compounds that were identified in only one of the duplicate sample analyses. Except for three cases, the concentration was below 1.0 ppbv for the compound identified in only one duplicate sample analysis. It may be argued that some of the identifications were false positives, but such an hypothesis is not reasonable for cases in which the concentration was greater than 1.0 ppbv. In the case of 1,1,2,2-tetrachloro-ethane, a concentration of 3.58 ppbv was verified on the chromatographic traces for one of the duplicates, and was completely absent on the traces foı the other duplicate.

TABLE 8-3. GC/MD COMPOUND IDENTIFICATIONS IN ONLY ONE REPLICATE ANALYSIS

Compound	Concentration ppbv	Radian ID
m/p-Xylene	0.16	2371 R2
1,3-Butadiene	0.17	2382 R1
trans-1,2-Dichloroethylene	0.50	2429 R1
1,1,2-Trichloroethane	0.47	2429 R2
Ethylbenzene	0.13	2341 R2
Styrene/o-Xylene	0.06	2343 R2
1,2-Dichloroethane	0.08	2322 R2
Trichloroethylene	0.40	2355 R1
1,1,2-Trichlorethane	1.78	2829 R1
1,2-Dichloroethane	0.94	2829 R2

TABLE 8-4. 3-HOUR AIR TOXICS DUPLICATE SAMPLE ANALYSES BY GC/MD

Statistics	Minimum	Maximum	Overall Mean
Mean Concentration, ppbv	0.130	18.315	2.645
Standard Deviation,[a] ppbv	-1.117	0.778	-0.026
Percent Coefficient of Variation	-105.159	77.012	-2.130
Absolute Percent Difference	0.000	148.178	13.705

[a]Standard Deviation = $(X_2 - X_1) / \sqrt{2}$

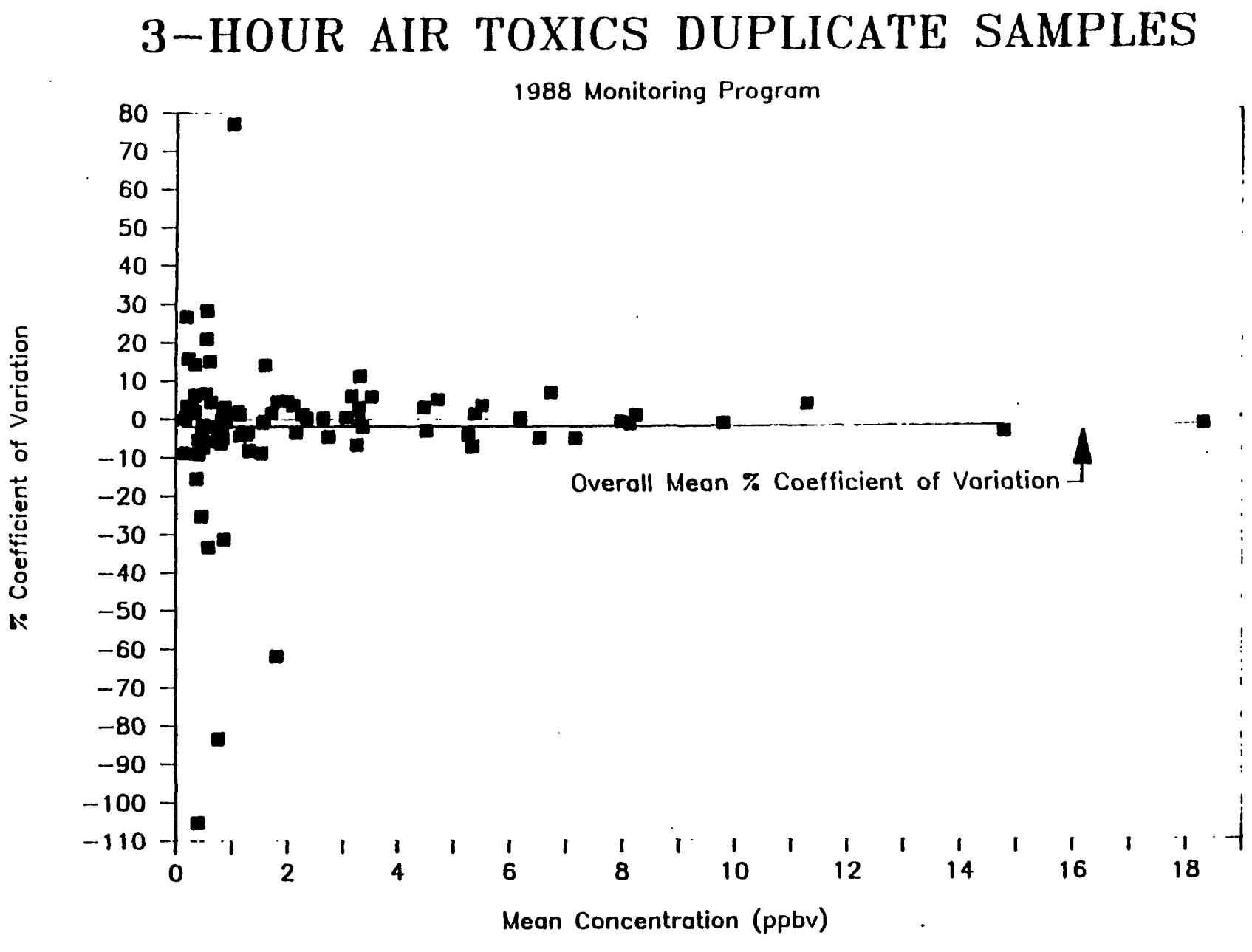

Figure 8-5. Percent coefficient of variation of 3-hour air toxics duplicate samples as a function of mean concentration.

TABLE 8-5. GC/MD 3-HOUR AIR TOXICS DUPLICATE PRECISION BY COMPOUND

Compound	Cases	Mean % CV	Mean Absolute % Diff
1,3-Butadiene	4	-16.723	57.384
Methylene chloride	4	1.989	8.560
1,1,1-Trichloroethane	9	-0.102	3.876
Benzene	11	0.190	7.250
Toluene	12	0.135	4.146
Ethylbenzene	9	-0.294	4.997
m/p-Xylene	12	6.285	12.401
Styrene/o-Xylene	9	2.650	10.747

TABLE 8-6. SINGLE COMPOUND IDENTIFICATIONS OF GC/MD DUPLICATE SAMPLE ANALYSES

Compound	Concentration ppbv	Radian ID
1,3-Butadiene	0.61	2352 D
1,3-Butadiene	0.41	2479 D
Vinyl chloride	0.43	2402 D
Chloromethane	0.13	2582 D
Methylene chloride	1.83	3071 D
1,1,1-Trichloroethane	0.90	3751 D
1,1,1-Trichloroethane	0.62	2351 D
1,2-Dichloroethane	0.03	2352 D
1,2-Dichloroethane	0.70	3030 D
1,2-Dichloroethane	1.02	3070 D
1,2-Dichloroethane	0.42	2479 D
Chloroprene	0.04	3220 D
Benzene	0.91	2582 D
Trichloroethylene	0.33	3164 D
1,2-Dichloropropane	0.54	3220 D
Tetrachloroethylene	0.74	2582 D
Tetrachloroethylene	0.25	3220 D
Tetrachloroethylene	0.58	2754 D
Tetrachloroethylene	0.53	3071 D
Ethylbenzene	0.27	3071 D
Ethylbenzene	0.08	2402 D
Styrene/o-Xylene	0.15	2401 D
1,1,2,2-Tetrachloroethane	3.58	3705 D

8.7.4 GC/MS Confirmation Results

Based on twelve GC/MS analyses of the 3-hour air toxics samples, one from each site location (except CLOH), the following results were obtained. The GC/MS analyses confirmed 82.61% of the GC/MD analyses. The results are summarized in Table 8-7, showing 19.63% positive GC/MD-positive GC/MS confirmation, 1.99% positive GC/MD-negative GC/MS confirmation, 15.40% negative GC/MD-positive GC/MS comparisons, and 62.48% negative GC/MD-negative GC/MS comparisons. The total confirmations, i.e., positive GC/MD-positive GC/MS results plus negative GC/MD-negative GC/MS results, are significantly lower than the confirmation percentages in the UATMP program, which are closer to 90% confirmations of GC/MD by GC/MS.

The reason that the percent confirmations are significantly lower is because the negative GC/MD-positive GC/MS confirmations are so high (15.4%). This indicates that the GC/MS identified a number of compounds that the GC/MD did not identify. Past experience has shown that the negative GC/MD-positive GC/MS identifications are typically twice the positive GC/MD-negative GC/MS identifications. In this case the negative GC/MD-positive GC/MS identifications are almost eight times the positive GC/MD-negative GC/MS identifications.

Review of the analysis schedule for the GC/MD and the GC/MS points to dynamic phenomena occurring in the canister. The canisters were analyzed by GC/MD 16 to 24 hours after the canister pressures were reduced to atmospheric pressure. The GC/MS analyses were performed at least 2 weeks after the GC/MD analyses. At the time of the GC/MD analyses, the equilibrium adsorption between the target compounds and the interior canister solid surfaces may not have been reached. Thus many of the compounds that were identified in the GC/MS analyses were apparently still in the adsorbed state on the canister walls when the GC/MD analysis was performed.

After two weeks (between the GC/MD and GC/MS analyses), the adsorption equilibrium had shifted and many more compounds had desorbed into the gas phase and were identified by the GC/MS analyses. These findings indicate the importance of ensuring that equilibrium occurs in the canisters before a sample is withdrawn for any analysis. This equilibration is especially important when the concentrations of the target compounds are in the ppbv range.

TABLE 8-7. COMPOUND IDENTIFICATION CONFIRMATION

GC/MD versus GC/MS comparison	Cases	Percentage
Positive GC/MD-Positive GC/MS	158	19.63
Positive GC/MD-Negative GC/MS	16	1.99
Negative GC/MD-Positive GC/MS	124	15.40
Negative GC/MD-Negative GC/MS	507	62.98
Total	805	100.00

Confirmed identifications, referenced to GC/MS = 82.61%

Unconfirmed identifications, referenced to GC/MS = 17.39%

8.7.5 External Audits

Monthly external audits were conducted for the 3-hour air toxics and UATMP by the EPA-QAD. Audit No. 6, performed during the 3-hour air toxics analysis period,[8] results are reported in Table 8-8 and show -17 to +22% bias, averaging 8.6% bias, for the GC/MD analyses and -44 to +8% bias, averaging -18.4% bias, for the GC/MS analyses. These are excellent results for the GC/MD analytical procedure since that instrument was to be used for primary quantification in the UATMP. The GC/MS analyses are done primarily for compound identification confirmation of the GC/MD identification.

8.8 DATA RECORDS

Data records for the 3-hour air toxics samples include:

- NMOC concentration of the sample;
- Total area counts of the GC/MD-FID response;
- Copies of the gas chromatographic trace for FID, PID, and ECD;
    - Response data on Bernoulli disk;
    - Response time for each compound; and
    - Area counts for each detector.

In addition, notebooks have recorded calibration factors for each day, Radian ID numbers for each sample, etc.

TABLE 8-8. 3-HOUR AIR TOXICS AUDIT NO. 6 RESULTS FOR GC/MD AND GC/MS

	Spiked ppb	Reported ppb		Bias %	
		GC/MD	GC/MS	GC/MD	GC/MS
Vinyl chloride	2.2	2.3	2.1	4.5	-4.5
Chloroform	2.4	2.8	2.2	17	-8.3
Carbon tetrachloride	2.3	2.6	1.9	13	-17
Methylene chloride	2.3	2.8	1.8	22	-22
1,2-Dichloroethane	2.5	2.6	2.3	4.0	-8.0
Trichloroethylene	2.8	3.0	1.9	7.1	-32
Benzene	2.2	2.2	1.6	0.0	-27
Tetrachloroethylene	2.5	2.9	1.4	16	-44
Bromomethane	2.4	2.9	2.2	21	-8.3
Trichlorofluoromethane	2.5	NR	NR	--	--
1,1,1-trichloroethane	2.4	2.7	2.0	12	-17
1,2-Dichloropropane	2.5	2.5	2.6	0.0	4.0
1,2-Dibromoethane	2.6	NR	NR	--	--
Toluene	2.4	2.8	1.8	17	-25
Chlorobenzene	2.5	2.9	2.0	16	-20
Ethylbenzene	2.4	2.0	1.5	-17	-38
o-Xylene	2.5	2.4	2.3	-4.0	-8.0
1,3-Butadiene	Present	2.1	2.7	--	--

NR - not reported
Contaminant reported - chloromethane: 1.5 ppb (GC/MD)
1.0 ppb (GC/MS)

9.0 RECOMMENDATIONS, THREE-HOUR AIR TOXICS PROGRAM

The following recommendations derive from the 3-hour Air Toxics Monitoring Program. The studies (Sections 9.1, 9.2, and 9.3) are directed toward areas in which additional information is needed to validate further the air toxics results. The final two suggestions (Sections 9.4 and 9.5) are designed to give additional information useful to the project without increasing the overall number of analyses.

9.1 COMPOUND STABILITY STUDIES

Compound stability in this context refers to whether the apparent concentration of a compound in a sample taken from a canister is changing over time. The apparent change in concentration may result from a chemical reaction of the compound while in the canister, or result from a change in the gas phase concentration resulting from adsorption of the compound on the interior canister surfaces.

A study needed to investigate this phenomenon would take several canisters, at least three from each initial concentration, ranging in target compound concentration from zero to 20 ppbv. The canisters would be analyzed 24 hours after mixing, 72 hours after mixing, 30 days after mixing, and 60 days after mixing to determine any concentration changes. It is also recommended that the same concentrations be mixed in canisters, but that equilibration times of 7 days and 30 days be assigned before the first samples are drawn from the canisters to determine the effect of equilibration time on the concentration samples withdrawn from the canisters.

9.2 CANISTER CLEANUP STUDIES

For those canisters used for samples on which GC/MD analyses are performed, the present canister cleanup procedure may be insufficient to prevent significant carryover of target compounds from one sample to the next.

A study needs to be conducted to determine if additional pressurization/vacuum cycles, higher vacuum during the vacuum cycles, more equilibration time during the steps of the cleanup cycle, or higher temperature during canister cleanup are needed to prevent significant carryover of target compounds from one ambient air sample to the next.

The present canister cleanup procedure is described in Section 3.3.2 and consists of two vacuum/pressurization cycles with cleaned, dried air that has been humidified. These cycles are followed by a final vacuum step to 5 mm Hg vacuum. Preliminary measurements have indicated that after this cleaning procedure has been completed, there may be sufficient organic compounds still adsorbed on the canister interior surfaces to be desorbed and measured in the 0.05 to 0.50 ppbv range.

9.3 SAMPLER CERTIFICATION STUDIES

Certification of all samplers used to collect ambient air samples on which GC/MD analyses are to be performed is recommended. This certification would ensure that the sampler is not changing the actual organic compound concentration of the ambient air being sampled, either by adding or removing target compounds.

9.4 QUALITATIVE GC/MS FULL SCAN FOR COMPOUND IDENTIFICATION

It is recommended that when performing compound identification confirmation studies by GC/MS, operation be in the full scan mode. This practice makes it possible to identify compounds which may be interfering with the target compounds. Full scan operation would reduce the sensitivity of the GC/MS measurements, and increase the GC/MS detection limits, but the GC/MS analyses are used in this study for purposes of compound identification confirmation, and the sensitivity is not a critical factor for this measurement.

9.5 REPLICATE AND DUPLICATE ANALYSES

In future studies, replicate analyses on the duplicate samples are recommended. In this way it would be possible to separate sampling precision from analytical precision.

10.0 REFERENCES

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3. McAllister, R. A., R. F. Jongleux, D-P Dayton, P. L. O'Hara, and D. E. Wagoner (Radian Corporation). Nonmethane Organic Compound Monitoring. Final Report. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Contract No. 68-02-3889, July 1987.

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APPENDIX A

CRYOGENIC PRECONCENTRATION AND DIRECT FLAME IONIZATION DETECTION (PDFID) METHOD

COMPENDIUM METHOD TO-12

DETERMINATION OF NON-METHANE ORGANIC COMPOUNDS (NMOC) IN AMBIENT AIR USING CRYOGENIC PRE-CONCENTRATION AND DIRECT FLAME IONIZATION DETECTION (PDFID)

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MAY, 1988

METHOD TO12

METHOD FOR THE DETERMINATION OF NON-METHANE ORGANIC COMPOUNDS (NMOC) IN AMBIENT AIR USING CRYOGENIC PRECONCENTRATION AND DIRECT FLAME IONIZATION DETECTION (PDFID)

1. Scope

1.1 In recent years, the relationship between ambient concentrations of precursor organic compounds and subsequent downwind concentrations of ozone has been described by a variety of photochemical dispersion models. The most important application of such models is to determine the degree of control of precursor organic compounds that is necessary in an urban area to achieve compliance with applicable ambient air quality standards for ozone (1,2).

1.2 The more elaborate theoretical models generally require detailed organic species data obtained by multicomponent gas chromatograph The Empirical Kinetic Modeling Approach (EKMA), however, requires only the total non-methane organic compound (NMOC) concentration data; specifically, the average total NMOC concentration from 6 a.m. to 9 a.m. daily at the sampling location. The use of total NMOC concentration data in the EKMA substantially reduces the cost and complexity of the sampling and analysis system by not requiring qualitative and quantitative species identification.

1.3 Method TO1, "Method for The Determination of Volatile Organic Compounds in Ambient Air Using Tenax® Adsorption and Gas Chromatography/Mass Spectrometry (GC/MS)", employs collection of certain volatile organic compounds on Tenax® GC with subsequent analysis by thermal desorption/cryogenic preconcentration and GC/MS identification. This method (TO12) combines the same type of cryogenic concentration technique used in Method TO1 for high sensitivity with the simple flame ionization detector (FID) of the GC for total NMOC measurements, without the GC columns and complex procedures necessary for species separation.

1.4 In a flame ionization detector, the sample is injected into a hydrogen-rich flame where the organic vapors burn producing ionized molecular fragments. The resulting ion fragments are then collected and detected. The FID is nearly a universal detector. However, the detector response varies with the specie of [functional group in] the organic compound in an oxygen atmos phere. Because this method employs a helium or argon carrier gas, the detector response is nearly one for all compounds. Thus, the historical short-coming of the FID involving varying detector response to different organic functional groups is minimized.

1.5 The method can be used either for direct, in situ ambient measurements or (more commonly) for analysis of integrated samples collected in specially treated stainless steel canisters EKMA models generally require 3-hour integrated NMOC measurement over the 6 a.m. to 9 a.m. period and are used by State or local agencies to prepare State Implementation Plans (SIPs) for ozone control to achieve compliance with the National Ambient Air Quality Standards (NAAQS) for ozone. For direct, in situ ambie measurements, the analyst must be present during the 6 a.m. to 9 a.m. period, and repeat measurements (approximately six per hour) must be taken to obtain the 6 a.m. to 9 a.m. average NMOC concentration. The use of sample canisters allows the collection of integrated air samples over the 6 a.m. to 9 a.m. period by unattended, automated samplers. This method has incorporated both sampling approaches.

2. Applicable Documents

2.1 ASTM Standards

D1356 - Definition of Terms Related to Atmospheric Sampling and Analysis

E260 - Recommended Practice for General Gas Chromatography Procedures

E355 - Practice for Gas Chromatography Terms and Relationships

2.2 Other Documents

U. S. Environmental Protection Agency Technical Assistance Documents (4,5)
Laboratory and Ambient Air Studies (6-10)

3. Summary of Method

3.1 A whole air sample is either extracted directly from the ambient air and analyzed on site by the GC system or collected into a precleaned sample canister and analyzed off site.

3.2 The analysis requires drawing a fixed-volume portion of the sample air at a low flow rate through a glass-bead filled trap that is cooled to approximately -186°C with liquid argon. The cryogenic trap simultaneously collects and concentrates the NMOC (either via condensation or adsorption) while allowing the methane, nitrogen, oxygen, etc. to pass through the trap without retention. The system is dynamically calibrated so that the volume of sample passing through the trap does not have to be quantitatively measured, but must be precisely repeatable between the calibration and the analytical phases.

3.3 After the fixed-volume air sample has been drawn through the trap, a helium carrier gas flow is diverted to pass through the trap, in the opposite direction to the sample flow, and into an FID. When the residual air and methane have been flushed from the trap and the FID baseline restabilizes, the cryogen is removed and the temperature of the trap is raised to approximately 90°C.

3.4 The organic compounds previously collected in the trap revolatilize due to the increase in temperature and are carried into the FID, resulting in a response peak or peaks from the FID. The area of the peak or peaks is integrated, and the integrated value is translated to concentration units via a previously-obtained calibration curve relating integrated peak areas with known concentrations of propane.

3.5 By convention, concentrations of NMOC are reported in units of parts per million carbon (ppmC), which, for a specific compound is the concentration by volume (ppmV) multiplied by the number of carbon atoms in the compound.

3.6 The cryogenic trap simultaneously concentrates the NMOC while separating and removing the methane from air samples. The technique is thus direct reading for NMOC and, because of the concentration step, is more sensitive than conventional continuous NMOC analyzers.

4. Significance

4.1 Accurate measurements of ambient concentrations of NMOC are important for the control of photochemical smog because these organic compounds are primary precursors of atmospheric ozone and other oxidants. Achieving and maintaining compliance with the NAAQS for ozone thus depends largely on control of ambient levels of NMOC.

4.2 The NMOC concentrations typically found at urban sites may range up to 5-7 ppmC or higher. In order to determine transport of precursors into an area, measurement of NMOC upwind of the area may be necessary. Upwind NMOC concentrations are likely to be less than a few tenths of 1 ppm.

4.3 Conventional methods that depend on gas chromatography and qualitative and quantitative species evaluation are excessively difficult and expensive to operate and maintain when speciated measurements are not needed. The method described here involves a simple, cryogenic preconcentration procedure with subsequent, direct, flame ionization detection. The method is sensitive and provides accurate measurements of ambient NMOC concentrations where speciated data are not required as applicable to the EKMA.

5. Definitions

[Note: Definitions used in this document and in any user-prepared Standard Operating Procedures (SOPs) should be consistent with ASTM Methods D1356 and E355. All abbreviations and symbols are defined within this document at point of use.]

5.1 Absolute pressure - Pressure measured with reference to absolute zero pressure (as opposed to atmospheric pressure), usually expressed as pounds-force per square inch absolute (psia).

5.2 Cryogen - A substance used to obtain very low trap temperatures in the NMOC analysis system. Typical cryogens are liquid argon (bp -185.7) and liquid oxygen (bp-183.0).

5.3 Dynamic calibration - Calibration of an analytical system with pollutant concentrations that are generated in a dynamic, flowing system, such as by quantitative, flow-rate dilution of a high concentration gas standard with zero gas.

5.4 EKMA - Empirical Kinetics Modeling Approach; an empirical model that attempts to relate morning ambient concentrations of nonmethane organic compounds (NMOC) and NO_x with subsequent peak, downwind ambient ozone concentrations; used by pollution control agencies to estimate the degree of hydrocarbon emission reduction needed to achieve compliance with national ambient air quality standards for ozone.

5.5 Gauge pressure - Pressure measured with reference to atmospheric pressure (as opposed to absolute pressure). Zero gauge pressure (0 psig) is equal to atmospheric pressure, or 14.7 psia (101 kPa).

5.6 *In situ* - In place; *In situ* measurements are obtained by direct, on-the-spot analysis, as opposed to subsequent, remote analysis of a collected sample.

5.7 Integrated sample - A sample obtained uniformly over a specified time period and representative of the average levels of pollutants during the time period.

5.8 NMOC - Nonmethane organic compounds; total organic compounds as measured by a flame ionization detector, excluding methane.

5.9 ppmC - Concentration unit of parts per million carbon; for a specific compound, ppmC is equivalent to parts per million by volume (ppmv) multiplied by the number of carbon atoms in the compound.

5.10 Sampling - The process of withdrawing or isolating a representative portion of an ambient atmosphere, with or without the simultaneous isolation of selected components for subsequent analysis.

6. Interferences

6.1 In field and laboratory evaluation, water was found to cause a positive shift in the FID baseline. The effect of this shift is minimized by carefully selecting the integration termination point and adjusted baseline used for calculating the area of the NMOC peak(s).

6.2 When using helium as a carrier gas, FID response is quite uniform for most hydrocarbon compounds, but the response can vary considerably for other types of organic compounds.

7. Apparatus

7.1 Direct Air Sampling (Figure 1)

7.1.1 Sample manifold or sample inlet line - to bring sample air into the analytical system.

7.1.2 Vacuum pump or blower - to draw sample air through a sample manifold or long inlet line to reduce inlet residence time. Maximum residence time should be no greater than 1 minute.

7.2 Remote Sample Collection in Pressurized Canisters (Figure 2)

7.2.1 Sample canister(s) - stainless steel, Summa®-polished vessel(s) of 4-6 L capacity (Scientific Instrumentation Specialists, Inc., P.O. Box 8941, Moscow, ID 83843), used for automatic collection of 3-hour integrated field air samples. Each canister should have a unique identification number stamped on its frame.

7.2.2 Sample pump - stainless steel, metal bellows type (Model MB-151, Metal Bellows Corp., 1075 Providence Highway, Sharon, MA 02067) capable of 2 atmospheres minimum output pressure. Pump must be free of leaks, clean, and uncontaminated by oil or organic compounds.

7.2.3 Pressure gauge - 0-30 psig (0-240 kPa).

7.2.4 Solenoid valve - special electrically-operated, bistable solenoid valve (Skinner Magnelatch Valve, New Britain,

CT), to control sample flow to the canister with negligible temperature rise (Figure 3). The use of the Skinner Magnelatch valve avoids any substantial temperature rise that would occur with a conventional, normally closed solenoid valve, which would have to be energized during the entire sample period. This temperature rise in the valve could cause outgasing of organics from the Viton valve seat material. The Skinner Magnelatch valve requires only a brief electrical pulse to open or close at the appropriate start and stop times and therefore experiences no temperature increase. The pulses may be obtained with an electronic timer that can be programmed for short (5 to 60 seconds) ON periods or with a conventional mechanical timer and a special pulse circuit. Figure 3 [a] illustrates a simple electrical pulse circuit for operating the Skinner Magnelatch solenoid valve with a conventional mechanical timer. However, with this simple circuit, the valve may operate unpredictably during brief power interruptions or if the timer is manually switched on and off too fast. A better circuit incorporating a time-delay relay to provide more reliable valve operation is shown in Figure 3[b].

7.2.5 Stainless steel orifice (or short capillary) - capable of maintaining a substantially constant flow over the sampling period (see Figure 4).

7.2.6 Particulate matter filter - 2 micron stainless steel sintered in-line type (see Figure 4).

7.2.7 Timer - used for unattended sample collection. Capable of controlling pump(s) and solenoid valve.

7.3 Sample Canister Cleaning (Figure 5)

7.3.1 Vacuum pump - capable of evacuating sample canister(s) to an absolute pressure of <5 mm Hg.

7.3.2 Manifold - stainless steel manifold with connections for simultaneously cleaning several canisters.

7.3.3 Shut off valve(s) - seven required.

7.3.4 Vacuum gauge - capable of measuring vacuum in the manif to an absolute pressure of 5 mm Hg or less.

7.3.5 Cryogenic trap (2 required) - U-shaped open tubular trap cooled with liquid nitrogen or argon used to prevent contamination from back diffusion of oil from vacuum pump, and to provide clean, zero air to sample canister(s).

7.3.6 Pressure gauge - 0-50 psig (0-345 kPa), to monitor zero air pressure.

7.3.7 Flow control valve - to regulate flow of zero air into canister(s).

7.3.8 Humidifier - water bubbler or other system capable of providing moisture to the zero air supply.

7.4 Analytical System (Figure 1)

7.4.1 FID detector system - including flow controls for the FID fuel and air, temperature control for the FID, and signal processing electronics. The FID burner air, hydrogen, and helium carrier flow rates should be set according to the manufacturer's instructions to obtain an adequate FID response while maintaining as stable a flame as possible throughout all phases of the analytical cycle

7.4.2 Chart recorder - compatible with the FID output signal, to record FID response.

7.4.3 Electronic integrator - capable of integrating the area of one or more FID response peaks and calculating peak area corrected for baseline drift. If a separate integrator and chart recorder are used, care must be exercised to be sure that these components do not interfere with each other electrically. Range selector controls on both the integrator and the FID analyzer may not provide accurate range ratios, so individual calibration curves should be prepared for each range to be used. The integrator should be capable of marking the beginnin and ending of peaks, constructing the appropriate baseline between the start and end of the integration perioc and calculating the peak area.

Note: The FID (7.4.1), chart recorder (7.4.2), integrator (7.4.3), valve heater (7.4.5), and a trap heating system are conveniently provided by a standard laboratory chromatograph and associated integrator. EPA has adapted two such systems for the PDFID method: a Hewlett-Packard model 5880 (Hewlett-Packard Corp., Avondale, PA) and a Shimadzu model GC8APF (Shimadzu Scientif Instruments Inc., Columbia, MD; see Reference 5). Other similar systems may also be applicable.

7.4.4 Trap - the trap should be carefully constructed from a single piece of chromatographic-grade stainless steel tubing (0.32 cm O.D, 0.21 cm I.D.) as shown in Figure 6. The central portion of the trap (7-10 cm) is packed with 60/80 mesh glass beads, with small glass wool (dimethyld chlorosilane-treated) plugs to retain the beads. The trap must fit conveniently into the Dewar flask (7.4.9), and the arms must be of an appropriate length to allow the beaded portion of the trap to be submerged below the level of liquid cryogen in the Dewar. The trap shou connect directly to the six-port valve, if possible, to minimize line length between the trap and the FID. T trap must be mounted to allow the Dewar to be slipped conveniently on and off the trap and also to facilitate heating of the trap (see 7.4.13).

7.4.5 Six-port chromatographic valve - Seiscor Model VIII (Seismograph Service Corp., Tulsa, OK), Valco Model 911((Valco Instruments Co., Houston, TX), or equivalent. The six-port valve and as much of the interconnecting tubing as practical should be located inside an oven or otherwise heated to 80 - 90°C to minimize wall losses or adsorption/desorption in the connecting tubing. All lines should be as short as practical.

7.4.6 Multistage pressure regulators - standard two-stage, stainless steel diaphram regulators with pressure gauge for helium, air, and hydrogen cylinders.

7.4.7 Pressure regulators - optional single stage, stainless steel, with pressure gauge, if needed, to maintain constant helium carrier and hydrogen flow rates.

7.4.8 Fine needle valve - to adjust sample flow rate through trap.

7.4.9 Dewar flask - to hold liquid cryogen to cool the trap, sized to contain submerged portion of trap.

7.4.10 Absolute pressure gauge - 0-450 mm Hg,(2 mm Hg [scale divisions indicating units]), to monitor repeatable volumes of sample air through cryogenic trap (Wallace and Tiernan, Model 61C-ID-0410, 25 Main Street, Belleville, NJ).

7.4.11 Vacuum reservoir - 1-2 L capacity, typically 1 L.

7.4.12 Gas purifiers - gas scrubbers containing Drierite® or silica gel and 5A molecular sieve to remove moisture and organic impurities in the helium, air, and hydrogen gas flows (Alltech Associates, Deerfield, IL). Note: Check purity of gas purifiers prior to use by passing zero-air through the unit and analyzing according to Section 11.4. Gas purifiers are clean if produce [contain] less than 0.02 ppmC hydrocarbons.

7.4.13 Trap heating system - chromatographic oven, hot water, or other means to heat the trap to 80° to 90°C. A simp heating source for the trap is a beaker or Dewar fille with water maintained at 80-90°C. More repeatable typ of heat sources are recommended, including a temperatu programmed chromatograph oven, electrical heating of the trap itself, or any type of heater that brings the temperature of the trap up to 80-90°C in 1-2 minutes.

7.4.14 Toggle shut-off valves (2) - leak free, for vacuum val and sample valve.

7.4.15 Vacuum pump - general purpose laboratory pump capable of evacuating the vacuum reservoir to an appropriate vacuum that allows the desired sample volume to be drawn through the trap.

7.4.16 Vent - to keep the trap at atmospheric pressure durin trapping when using pressurized canisters.

7.4.17 Rotameter - to verify vent flow.

7.4.18 Fine needle valve (optional) - to adjust flow rate of sample from canister during analysis.

7.4.19 Chromatographic-grade stainless steel tubing (Alltech Applied Science, 2051 Waukegan Road, Deerfield, IL, 6001! (312) 948-8600) and stainless steel plumbing fittings - for interconnections. All such materials in contact with the sample, analyte, or support gases prior to analysis should be stainless steel or other inert metal. Do not use plastic or Teflon® tubing or fittings

7.5 Commercially Available PDFID System (5)

7.5.1 A convenient and cost-effective modular PDFID system suit able for use with a conventional laboratory chromatograph is commercially available (NuTech Corporation, Model 8548 2806 Cheek Road, Durham, NC, 27704, (919) 682-0402).

7.5.2 This modular system contains almost all of the apparatus items needed to convert the chromatograph into a PDFID analytical system and has been designed to be readily available and easy to assemble.

8. Reagents and Materials

8.1 Gas cylinders of helium and hydrogen - ultrahigh purity grade.

8.2 Combustion air - cylinder containing less than 0.02 ppm hydrocarbons, or equivalent air source.

8.3 Propane calibration standard - cylinder containing 1-100 ppm (3-300 ppmC) propane in air. The cylinder assay should be traceable to a National Bureau of Standards (NBS) Standard Refer ence Material (SRM) or to a NBS/EPA-approved Certified Reference Material (CRM).

8.4 Zero air - cylinder containing less than 0.02 ppmC hydrocarbons. Zero air may be obtained from a cylinder of zero-grade compressed air scrubbed with Drierite® or silica gel and 5A molecular sieve or activated charcoal, or by catalytic cleanup

of ambient air. All zero air should be passed through a liquid argon cold trap for final cleanup, then passed through a hyrdocarbon-free water bubbler (or other device) for humidification.

8.5 Liquid cryogen - liquid argon (bp -185.7°C) or liquid oxygen, (bp -183°C) may be used as the cryogen. Experiments have shown no differences in trapping efficiency between liquid argon and liquid oxygen. However, appropriate safety precautions must be taken if liquid oxygen is used. Liquid nitrogen (bp -195°C) should not be used because it causes condensation of oxygen and methane in the trap.

9. Direct Sampling

9.1 For direct ambient air sampling, the cryogenic trapping system draws the air sample directly from a pump-ventilated distributio manifold or sample line (see Figure 1). The connecting line sho be of small diameter (1/8" O.D.) stainless steel tubing and as short as possible to minimize its dead volume.

9.2 Multiple analyses over the sampling period must be made to estab lish hourly or 3-hour NMOC concentration averages.

10. Sample Collection in Pressurized Canister(s)

For integrated pressurized canister sampling, ambient air is sampled by a metal bellows pump through a critical orifice (to maintain constant flow), and pressurized into a clean, evacuated, Summa®-polished sample canister. The critical orifice size is chosen so that the canister is pressurized to approximately one atmosphere abo ambient pressure, at a constant flow rate over the desired sample period. Two canisters are connected in parallel for duplicate sampl The canister(s) are then returned to the laboratory for analysis, using the PDFID analytical system. Collection of ambient air sample in pressurized canisters provides the following advantages:

- o Convenient integration of ambient samples over a specific time period
- o Capability of remote sampling with subsequent central laboratory analysis
- o Ability to ship and store samples, if necessary

- o Unattended sample collection
- o Analysis of samples from multiple sites with one analytical system
- o Collection of replicate samples for assessment of measurement precision

With canister sampling, however, great care must be exercised in selecting, cleaning, and handling the sample canister(s) and sampling apparatus to avoid losses or contamination of the samples.

10.1 Canister Cleanup and Preparation

10.1.1 All canisters must be clean and free of any contaminants before sample collection.

10.1.2 Leak test all canisters by pressurizing them to approximately 30 psig [200 kPa (gauge)] with zero air. The use of the canister cleaning system (see Figure 5) may be adequate for this task. Measure the final pressure - close the canister valve, then check the pressure after 24 hours. If leak tight, the pressure should not vary more than $\pm$ 2 psig over the 24-hour period. Note leak check result on sampling data sheet, Figure 7.

10.1.3 Assemble a canister cleaning system, as illustrated in Figure 5. Add cryogen to both the vacuum pump and zero air supply traps. Connect the canister(s) to the manifold. Open the vent shut off valve and the canister valve(s) to release any remaining pressure in the canister. Now close the vent shut off valve and open the vacuum shut off valve. Start the vacuum pump and evacua the canister(s) to $\leq$ 5.0 mm Hg (for at least one hour). [Note: On a daily basis or more often if necessary, blow out the cryogenic traps with zero air to remove any trapped water from previous canister cleaning cycles.]

10.1.4 Close the vacuum and vacuum gauge shut off valves and open the zero air shut off valve to pressurize the canis ter(s) with moist zero air to approximately 30 psig [200 kPa (gauge)]. If a zero gas generator system is used,

the flow rate may need to be limited to maintain the zero air quality.

10.1.5 Close the zero shut off valve and allow canister(s) to vent down to atmospheric pressure through the vent shut off valve. Close the vent shut off valve. Repeat steps 10.1.3 through 10.1.5 two additional times for a total o three (3) evacuation/pressurization cycles for each set canisters.

10.1.6 As a "blank" check of the canister(s) and cleanup procedure, analyze the final zero-air fill of 100% of the canisters until the cleanup system and canisters are proven reliable. The check can then be reduced to a lower percentage of canisters. Any canister that does not test clean (compared to direct analysis of humidifie zero air of less than 0.02 ppmC) should not be utilized.

10.1.7 The canister is then re-evacuated to $\leq$ 5.0 mm Hg, using the canister cleaning system, and remains in this condition until use. Close the canister valve, remove the canister from the canister cleaning system and cap canister connection with a stainless steel fitting. The canister is now ready for collection of an air sample. Attach an identification tag to the neck of each canister for field notes and chain-of-custody purposes.

10.2 Collection of Integrated Whole-Air Samples

10.2.1 Assemble the sampling apparatus as shown in Figure 2. The connecting lines between the sample pump and the canister(s) should be as short as possible to minimize their volume. A second canister is used when a duplica sample is desired for quality assurance (QA) purposes (see Section 12.2.4). The small auxiliary vacuum pump purges the inlet manifold or lines with a flow of several L/min to minimize the sample residence time. The larger metal bellows pump takes a small portion of this sample to fill and pressurize the sample canister(Both pumps should be shock-mounted to minimize vibratio Prior to field use, each sampling system should be leak

tested. The outlet side of the metal bellows pump can be checked for leaks by attaching the 0-30 psig pressure gauge to the canister(s) inlet via connecting tubing and pressurizing to 2 atmospheres or approximately 29.4 psig. If pump and connecting lines are leak free pressure should remain at ± 2 psig for 15 minutes. To check the inlet side, plug the sample inlet and insure that there is no flow at the outlet of the pump.

10.2.2 Calculate the flow rate needed so that the canister(s) are pressurized to approximately one atmosphere above ambient pressure (2 atmospheres absolute pressure) over the desired sample period, utilizing the following equation:

$$F = \frac{(P)(V)(N)}{(T)(60)}$$

where:

F = flow rate (cm^3/min)
P = final canister pressure (atmospheres absolute)
= $(P_g/P_a) + 1$
V = volume of the canister (cm^3)
N = number of canisters connected together for simultaneous sample collection
T = sample period (hours)
P_g = gauge pressure in canister, psig (kPa)
Pa = standard atmospheric pressure, 14.7 psig (101 kPa

For example, if one 6-L canister is to be filled to 2 atmospheres absolute pressure (14.7 psig) in 3 hours, the flow rate would be calculated as follows:

$$F = \frac{2 \times 6000 \times 1}{3 \times 60} = 67 \text{ cm}^3/\text{min}$$

10.2.3 Select a critical orifice or hypodermic needle suitable to maintain a substantially constant flow at the calculated flow rate into the canister(s) over the desired sample period. A 30-gauge hypodermic needle, 2.5 cm

long, provides a flow of approximately 65 cm^3/min with the Metal Bellows Model MBV-151 pump (see Figure 4). Such a needle will maintain approximately constant flow up to a canister pressure of about 10 psig (71 kPa), after which the flow drops with increasing pressure. At 14.7 psig (2 atmospheres absolute pressure), the flow is about 10% below the original flow.

10.2.4 Assemble the 2.0 micron stainless steel in-line particulate filter and position it in front of the critical orifice. A suggested filter-hypodermic needle assembly can be fabricated as illustrated in Figure 4.

10.2.5 Check the sampling system for contamination by filling two evacuated, cleaned canister(s) (See Section 10.1) with humidified zero air through the sampling system. Analyze the canisters according to Section 11.4. The sampling system is free of contamination if the canisters contain less than 0.02 ppmC hydrocarbons, similar to that of humidified zero air.

10.2.6 During the system contamination check procedure, check the critical orifice flow rate on the sampling system to insure that sample flow rate remains relatively constant (±10%) up to about 2 atmospheres absolute pressure (101 kPa). Note: A drop in the flow rate may occur near the end of the sampling period as the canister pressure approaches two atmospheres.

10.2.7 Reassemble the sampling system. If the inlet sample line is longer than 3 meters, install an auxiliary pump to ventilate the sample line, as illustrated in Figure 2.

10.2.8 Verify that the timer, pump(s) and solenoid valve are connected and operating properly.

10.2.9 Verify that the timer is correctly set for the desired sample period, and that the solenoid valve is closed.

10.2.10 Connect a cleaned, evacuated canister(s) (Section 10.1) to the non-contaminated sampling system, by way of the solenoid valve, for sample collection.

10.2.11 Make sure the solenoid valve is closed. Open the canister valve(s). Temporarily connect a small rotamete to the sample inlet to verify that there is no flow. Note: Flow detection would indicate a leaking (or open) solenoid valve. Remove the rotameter after leak detection procedure.

10.2.12 Fill out the necessary information on the Field Data Sheet (Figure 7).

10.2.13 Set the automatic timer to start and stop the pump or pumps to open and close the solenoid valve at the appropriate time for the intended sample period. Sampling will begin at the pre-determined time.

10.2.14 After the sample period, close the canister valve(s) an disconnect the canister(s) from the sampling system. Connect a pressure gauge to the canister(s) and briefly open and close the canister valve. Note the canister pressure on the Field Data Sheet (see Figure 7). The canister pressure should be approximately 2 atmospheres absolute [1 atmosphere or 101 kPa (gauge)]. Note: If the canister pressure is not approximately 2 atmosphere absolute (14.7 psig), determine and correct the cause b fore next sample. Re-cap canister valve.

10.2.15 Fill out the identification tag on the sample canister(and complete the Field Data Sheet as necessary. Note any activities or special conditions in the area (rain, smoke, etc.) that may affect the sample contents on th sampling data sheet.

10.2.16 Return the canister(s) to the analytical system for analysis.

11. Sample Analysis

11.1 Analytical System Leak Check

11.1.1 Before sample analysis, the analytical system is assem (see Figure 1) and leak checked.

11.1.2 To leak check the analytical system, place the six-port gas valve in the trapping position. Disconnect and cap the absolute pressure gauge. Insert a pressure gauge capable of recording up to 60 psig at the vacuum valve outlet.

11.1.3 Attach a valve and a zero air supply to the sample inlet port. Pressurize the system to about 50 psig (350 kPa) and close the valve.

11.1.4 Wait approximately 3 hrs. and re-check pressure. If the pressure did not vary more than ± 2 psig, the system is considered leak tight.

11.1.5 If the system is leak free, de-pressurize and reconnec absolute pressure gauge.

11.1.6 The analytical system leak check procedure needs to be performed during the system checkout, during a seri of analysis or if leaks are suspected. This should be part of the user-prepared SOP manual (see Section 12.

11.2 Sample Volume Determination

11.2.1 The vacuum reservoir and absolute pressure gauge are used to meter a precisely repeatable volume of sample air through the cryogenically-cooled trap, as follows With the sample valve closed and the vacuum valve ope the reservoir is first evacuated with the vacuum pump to a predetermined pressure (e.g., 100 mm Hg). Then the vacuum valve is closed and the sample valve is opened to allow sample air to be drawn through the cryogenic trap and into the evacuated reservoir until a second predetermined reservoir pressure is reached (e.g., 300 mm Hg). The (fixed) volume of air thus sampled is determined by the pressure rise in the vacuum reservoir (difference between the predetermin pressures) as measured by the absolute pressure gaug (see Section 12.2.1).

11.2.2 The sample volume can be calculated by:

$$V_s = \frac{(\Delta P)(V_r)}{(P_s)}$$

where:

V_s = volume of air sampled (standard cm^3)
ΔP = pressure difference measured by gauge (mm H
V_r = volume of vacuum reservoir (cm^3) usually 1 L
P_s = standard pressure (760 mm Hg)

For example, with a vacuum reservoir of 1000 cm^3 and a pressure change of 200 mm Hg (100 to 300 mm Hg), the volu sampled would be 263 cm^3. [Note: Typical sample volume using this procedure is between 200-300 cm^3.]

11.2.3 The sample volume determination need only be performed on during the system check-out and shall be part of the user-prepared SOP Manual (see Section 12.1).

11.3 Analytical System Dynamic Calibration

11.3.1 Before sample analysis, a complete dynamic calibration of the analytical system should be carried out at five or more concentrations on each range to define the calibration curve. This should be carried out initially and periodically thereafter [may be done only once during a series of analyses]. This should be part of the user-prepared SOP Manual (See Section 12.1). The calibration should be verified with two or three-point calibration checks (including zero) each day the analytical system is used to analyze samples.

11.3.2 Concentration standards of propane are used to calibrate the analytical system. Propane calibration standards may be obtained directly from low concentration cylinder standards or by dilution of high concentration cylinder

standards with zero air (see Section 8.3). Dilution flow rates must be measured accurately, and the combined gas stream must be mixed thoroughly for successful calibration of the analyzer. Calibration standards should be sampled directly from a vented manifold or tee. Note: Remember that a propane NMOC concentration in ppmC is three times the volumetric concentration in ppm.

11.3.3 Select one or more combinations of the following parameter to provide the desired range or ranges (e.g., 0-1.0 ppmC or 0-5.0 ppmC): FID attenuator setting, output voltage setting, integrator resolution (if applicable), and sample volume. Each individual range should be calibrated separately and should have a separate calibration curve. Note: Modern GC integrators may provide automatic ranging such that several decades of concentration may be covered in a single range. The user-prepared SOP manual should address variations applicable to a specific system design (see Section 12.1).

11.3.4 Analyze each calibration standard three times according to the procedure in Section 11.4. Insure that flow rates, pressure gauge start and stop readings, initial cryogen liquid level in the Dewar, timing, heating, integrator settings, and other variables are the same as those that will be used during analysis of ambient samples. Typical flow rates for the gases are: hydrogen, 30 cm^3/minute; helium carrier, 30 cm^3/minute; burner air, 400 cm^3/minute.

11.3.5 Average the three analyses for each concentration standarc and plot the calibration curve(s) as average integrated pe area reading versus concentration in ppmC. The relative standard deviation for the three analyses should be less

than 3% (except for zero concentration). Linearity should be expected; points that appear to deviate abnormally should be repeated. Response has been shown to be linear over a wide range (0-10,000 ppbC). If nonlinearity is observed, an effort should be made to identify and correct the problem. If the problem cannot be corrected, additional points in the nonlinear region may be needed to define the calibration curve adequately.

11.4 Analysis Procedure

11.4.1 Insure the analytical system has been assembled properly, leaked checked, and properly calibrated through a dynamic standard calibration. Light the FID detector and allow to stabilize.

11.4.2 Check and adjust the helium carrier pressure to provide th correct carrier flow rate for the system. Helium is used to purge residual air and methane from the trap at the end of the sampling phase and to carry the re-volatilized NMOC from the trap into the FID. A single-stage auxiliary regulator between the cylinder and the analyzer may not be necessary, but is recommended to regulate the helium pressure better than the multistage cylinder regulator. When an auxiliary regulator is used, the secondary stage of the two-stage regulator must be set at a pressure higher than the pressure setting of the single-stage regulator. Also check the FID hydrogen and burner air flow rates (see 11.3.4).

11.4.3 Close the sample valve and open the vacuum valve to evacuate the vacuum reservoir to a specific predetermined value (e.g., 100 mm Hg).

11.4.4 With the trap at room temperature, place the six-port valve in the inject position.

11.4.5 Open the sample valve and adjust the sample flow rate needle valve for an appropriate trap flow of 50-100 cm^3/min. Note: The flow will be lower later, when the trap is cold.

11.4.6 Check the sample canister pressure before attaching it to the analytical system and record on Field Data Sheet (see Figure 7). Connect the sample canister or direct sample inlet to the six-port valve, as shown in Figure 1. For a canister, either the canister valve or an optional fine needle valve installed between the canister and the vent is used to adjust the canister flow rate to a value slightly higher than the trap flow rate set by the sample flow rate needle valve. The excess flow exhausts through the vent, which assures that the sample air flowing through the trap is at atmospheric pressure. The vent is connected to a flow indicator such as a rotameter as an indication of vent flow to assist in adjusting the flow control valve. Open the canister valve and adjust the canister valve or the sample flow needle valve to obtain a moderate vent flow as indicated by the rotameter. The sample flow rate will be lower (and hence the vent flow rate will be higher) when the the trap is cold.

11.4.7 Close the sample valve and open the vacuum valve (if not already open) to evacuate the vacuum reservoir. With the six-port valve in the inject position and the vacuum valve open, open the sample valve for 2-3 minutes [with both valves open, the pressure reading won't change] to flush and condition the inlet lines.

11.4.8 Close the sample valve and evacuate the reservoir to the predetermined sample starting pressure (typically 100 mm Hg) as indicated by the absolute pressure gauge.

11.4.9 Switch the six-port valve to the sample position.

11.4.10 Submerge the trap in the cryogen. Allow a few minutes for the trap to cool completely (indicated when the cryogen stops boiling). Add cryogen to the initial level used during system dynamic calibration. The level of the cryogenic liquid should remain constant with respect to the trap and should completely cover the beaded portion of the trap.

11.4.11 Open the sample valve and observe the increasing pressure on the pressure gauge. When it reaches the specific predetermined pressure (typically 300 mm Hg) representative of the desired sample volume (Section 11.2), close the sample valve.

11.4.12 Add a little cryogen or elevate the Dewar to raise the liquid level to a point slightly higher (3-15 mm) than the initial level at the beginning of the trapping. Note: This insures that organics do not bleed from the trap and are counted as part of the NMOC peak(s).

11.4.13 Switch the 6-port valve to the inject position, keeping the cryogenic liquid on the trap until the methane and upset peaks have deminished (10-20 seconds). Now close the canister valve to conserve the remaining sample in the canister.

11.4.14 Start the integrator and remove the Dewar flask containing the cryogenic liquid from the trap.

11.4.15 Close the GC oven door and allow the GC oven (or alternate trap heating system) to heat the trap at a predetermined rate (typically, 30°C/min) to 90°. Heating the trap volatilizes the concentrated NMOC such that the FID produces integrated peaks. A uniform trap temperature rise rate (above 0°C) helps to reduce variability and facilitates more accurate correction for the moisture-shifted baseline. With a chromatograph oven to heat the trap, the following parameters have been found to be acceptable: initial temperature, 30°C; initial time, 0.20 minutes (following start of the integrator); heat rate, 30°/minute; final temperature, 90°C.

11.4.16 Use the same heating process and temperatures for both calibration and sample analysis. Heating the trap too quickly may cause an initial negative response that could hamper accurate integration. Some initial experimentation may be necessary to determine the optimal heating procedure for each system. Once established, the procedure should be consistent for each analysis as outlined in the user-prepared SOP Manual.

11.4.17 Continue the integration (generally, in the range of 1-2 minutes is adequate) only long enough to include all of the organic compound peaks and to establish the end point FID baseline, as illustrated in Figure 8. The integrator should be capable of marking the beginning and ending of peaks, constructing the appropriate operational baseline between the start and end of the integration period, and calculating the resulting corrected peak area. This ability is necessary because the moisture in the sample, which is also concentrated in the trap, will cause a slight positive baseline shift. This baseline shift starts as the trap warms and continues until all of the moisture is swept from the trap, at which time the baseline returns to its normal level. The shift always continues longer than the ambient organic peak(s). The integrator should be programmed to correct for this shifted baseline by ending the integration at a point after the last NMOC peak and prior to the return of the shifted baseline to normal (see Figure 8) so that the calculated operational baseline effectively compensates for the water-shifted baseline. Electronic integrators either do this automatically or they should be programmed to make this correction. Alternatively, analyses of humidified zero air prior to sample analyses should be performed to determine the water envelope and the proper blank value for correcting the ambient air concentration measurements accordingly. Heating and flushing of the trap should continue after the integration period has ended to insure all water has been removed to prevent buildup of water in the trap. Therefore, be sure that the 6-port valve remains in the inject position until all moisture has purged from the trap (3 minutes or longer).

11.4.18 Use the dynamic calibration curve (see Section 11.3) to convert the integrated peak area reading into concentration units (ppmC). Note that the NMOC peak shape may not be precisely reproducible due to variations in heating the trap, but the total NMOC peak area should be reproducible.

11.4.19 Analyze each canister sample at least twice and report the average NMOC concentration. Problems during an analysis occasionally will cause erratic or inconsistent results. If the first two analyses do not agree within ± 5% relative standard deviation (RSD), additional analyses should be made to identify inaccurate measurements and produce a more accurate average (see also Section 12.2.).

12. Performance Criteria and Quality Assurance

This section summarizes required quality assurance measures and provides guidance concerning performance criteria that should be achieved within each laboratory.

12.1 Standard Operating Procedures (SOPs)

12.1.1 Users should generate SOPs describing and documenting the following activities in their laboratory: (1) assembly, calibration, leak check, and operation of the specific sampling system and equipment used; (2) preparation, storage, shipment, and handling of samples; (3) assembly, leak-check, calibration, and operation of the analytical system, addressing the specific equipment used; (4) canister storage and cleaning; and (5) all aspects of of data recording and processing, including lists of computer hardware and software used.

12.1.2 SOPs should provide specific stepwise instructions and should be readily available to, and understood by, the laboratory personnel conducting the work.

12.2 Method Sensitivity, Accuracy, Precision and Linearity

12.2.1 The sensitivity and precision of the method is proportional to the sample volume. However, ice formation in the trap may reduce or stop the sample flow during trapping if the sample volume exceeds 500 cm^3. Sample volumes below about 100-150 cm^3 may cause increased measurement variability due to dead volume in lines and valves. For most typical ambient NMOC concentrations, sample volumes in the range of 200-400 cm^3 appear to be appropriate. If a response peak obtained with a 400 cm^3 sample is off scale or exceeds the calibration range, a second analysis can be carried out with a smaller volume. The actual sample volume used need not be accurately known if it is precisely repeatable during both calibration and analysis. Similarly, the actual volume of the vacuum reservoir need not be accurately known. But the reservoir volume should be matched to the pressure range and resolution of the absolute pressure gauge so that the measurement of the pressure change in the reservoir, hence the sample volume, is repeatable within 1%. A 1000 cm^3 vacuum reservoir and a pressure change of 200 mm Hg, measured with the specified pressure gauge, have provided a sampling precision of $\pm$ 1.31 cm^3. A smaller volume reservoir may be used with a greater pressure change to accommodate absolute pressure gauges with lower resolution, and vice versa.

12.2.2 Some FID detector systems associated with laboratory chromatographs may have autoranging. Others may provide attenuator control and internal full-scale output voltage selectors. An appropriate combination should be chosen so that an adequate output level for accurate integration is obtained down to the detection limit; however, the electrometer or integrator must not be driven into saturation at the upper end of the calibration. Saturation of the electrometer may be indicated by flattening of the calibration curve at

high concentrations. Additional adjustments of range and sensitivity can be provided by adjusting the sample volume used, as discussed in Section 12.2.1.

12.2.3 System linearity has been documented (6) from 0 to 10,000 ppbC.

12.2.4 Some organic compounds contained in ambient air are "sticky" and may require repeated analyses before they fully appear in the FID output. Also, some adjustment may have to be made in the integrator off time setting to accommodate compounds that reach the FID late in the analysis cycle. Similarly, "sticky" compounds from ambient samples or from contaminated propane standards may temporarily contaminate the analytical system and can affect subsequent analyses. Such temporary contamination can usually be removed by repeated analyses of humidified zero air.

12.2.5 Simultaneous collection of duplicate samples decreases the possibility of lost measurement data from samples lost due to leakage or contamination in either of the canisters. Two (or more) canisters can be filled simultaneously by connecting them in parallel (see Figure 2(a)) and selecting an appropriate flow rate to accommodate the number of canisters (Section 10.2.2). Duplicate (or replicate) samples also allow assessment of measurement precision based on the differences between duplicate samples (or the standard deviations among replicate samples).

13. Method Modification

13.1 Sample Metering System

13.1.1 Although the vacuum reservoir and absolute pressure gauge technique for metering the sample volume during analysis is efficient and convenient, other techniques should work also

13.1.2 A constant sample flow could be established with a vacuum pump and a critical orifice, with the six-port valve being switched to the sample position for a measured time period.

A gas volume meter, such as a wet test meter, could also be used to measure the total volume of sample air drawn through the trap. These alternative techniques should be tested and evaluated as part of a user-prepared SOP manual.

13.2 FID Detector System

13.2.1 A variety of FID detector systems should be adaptable to the method.

13.2.2 The specific flow rates and necessary modifications for the helium carrier for any alternative FID instrument should be evaluated prior to use as part of the user-prepared SOP manual.

13.3 Range

13.3.1 It may be possible to increase the sensitivity of the method by increasing the sample volume. However, limitations may arise such as plugging of the trap by ice.

13.3.2 Any attempt to increase sensitivity should be evaluated as part of the user-prepared SOP manual.

13.4 Sub-Atmospheric Pressure Canister Sampling

13.4.1 Collection and analysis of canister air samples at sub-atmospheric pressure is also possible with minor modifications to the sampling and analytical procedures.

13.4.2 Method TO-14, "Integrated Canister Sampling for Selective Organics: Pressurized and Sub-atmospheric Collection Mechanism," addresses sub-atmospheric pressure canister sampling. Additional information can be found in the literature (11-17).

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3. H. B. Singh, Guidance for the Collection and Use of Ambient Hydrocarbons Species Data in Development of Ozone Control Strategies, EPA-450/480-008, U.S. Environmental Protection Agency, Research Triangle Park, NC, April 1980.

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12. Rasmussen, R. A. and Khalil, M.A.K. " Atmospheric Halocarbons: Measurements and Analyses of Selected Trace Gases," Proc. NATO ASI on Atmospheric Ozone, 1980, 209-231.

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14. McClenny, W. A. Pleil J.D. Holdren, J.W.; and Smith, R.N.; 1984. " Automated Cryogenic Preconcentration and Gas Chromatographic Determination of Volatile Organic Compounds," Anal. Chem. 56:2947.

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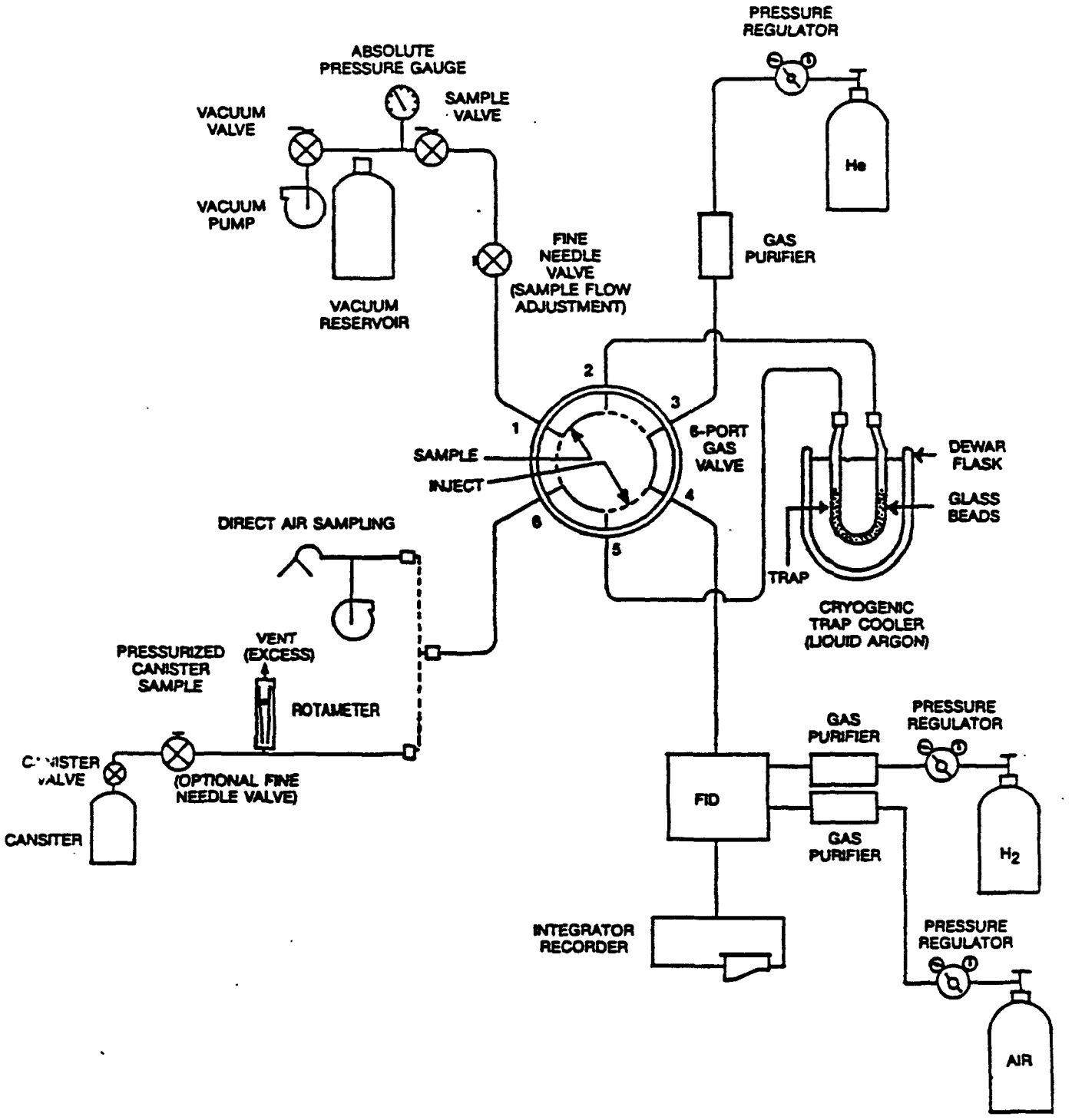


FIGURE 1. SCHEMATIC OF ANALYTICAL SYSTEM FOR NMOC—TWO SAMPLING MODES

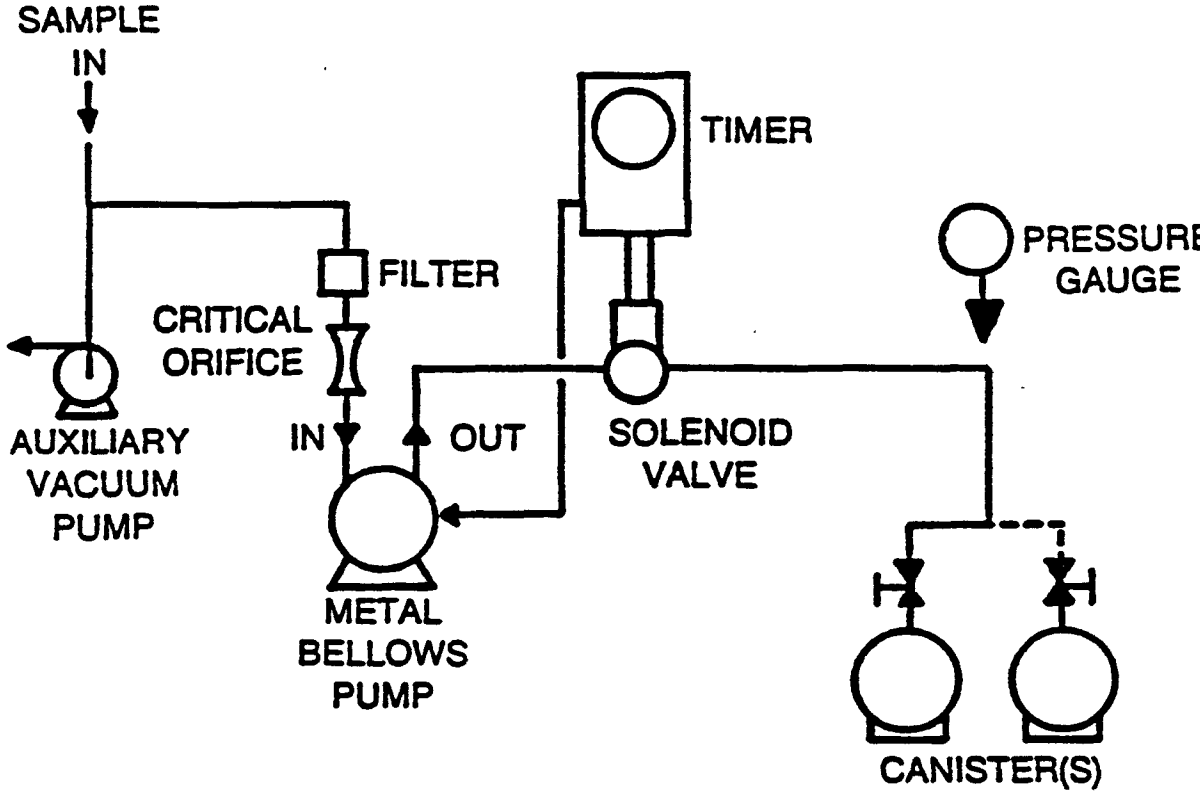
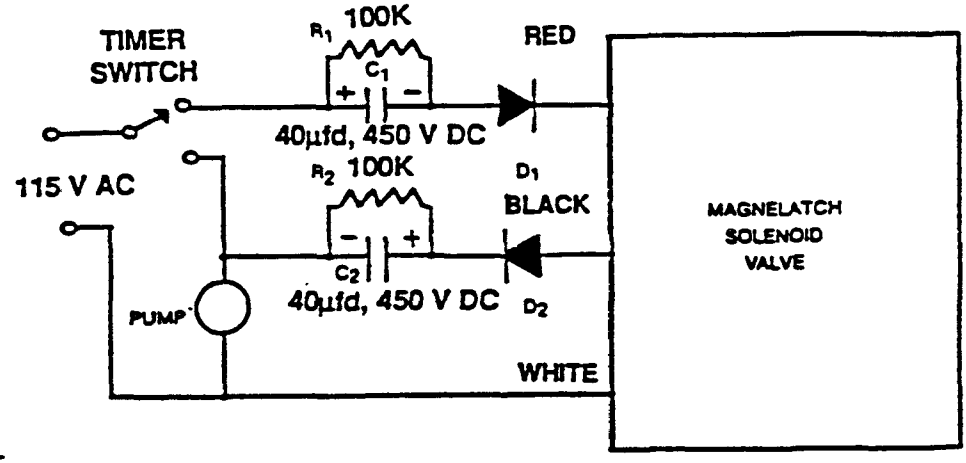
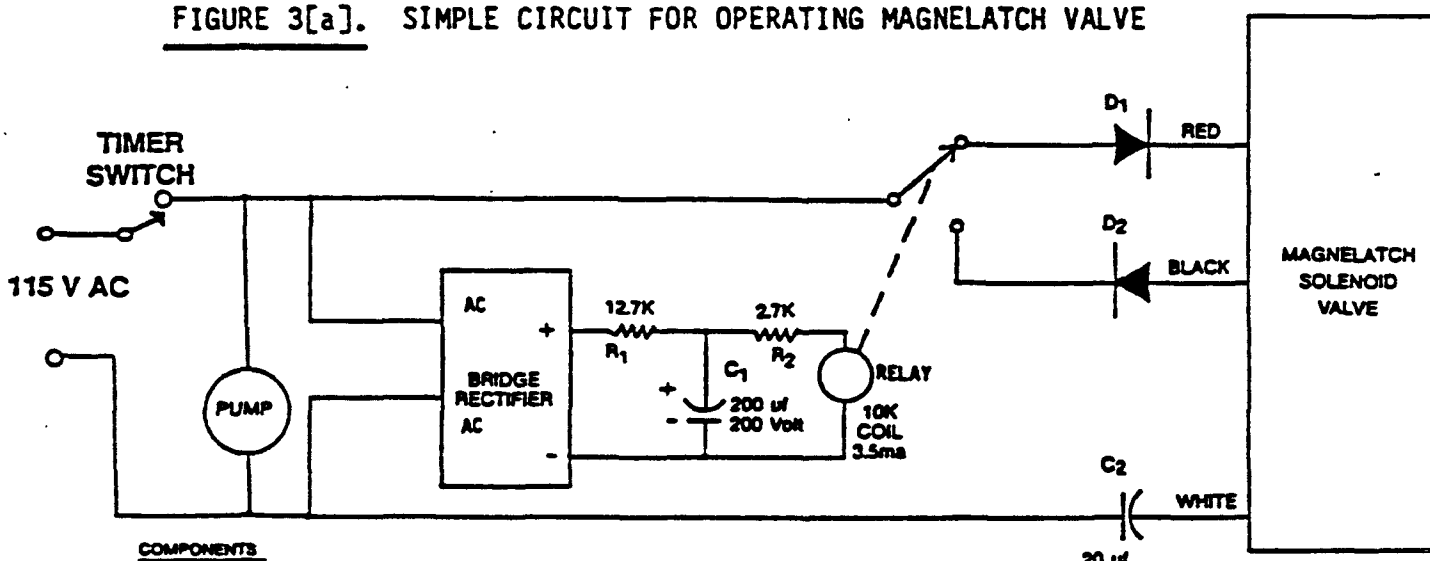


FIGURE 2. SAMPLE SYSTEM FOR AUTOMATIC COLLECTION OF 3-HOUR INTEGRATED AIR SAMPLES



COMPONENTS
Capacitor C_1 and C_2 - 40 uf, 450 VDC (Sprague Atom® TVA 1712 or equivalent)
Resistor R_1 and R_2 - 0.5 watt, 5% tolerance
Diode D_1 and D_2 - 1000 PRV, 2.5 A (RCA, SK 3081 or equivalent)

FIGURE 3[a]. SIMPLE CIRCUIT FOR OPERATING MAGNELATCH VALVE



COMPONENTS
Bridge Rectifier - 200 PRV, 1.5 A (RCA, SK 3105 or equivalent)
Diode D_1 and D_2 - 1000 PRV, 2.5 A (RCA, SK 3081 or equivalent)
Capacitor C_1 - 200 uf, 250 VDC (Sprague Atom® TVA 1528 or equivalent)
Capacitor C_2 - 20 uf, 400 VDC Non-Polarized (Sprague Atom® TVAN 1652 or equivalent)
Relay - 10,000 ohm coil, 3.5 ma (AMF Potter and Brumfield, KCP 5, or equivalent)
Resistor R_1 and R_2 - 0.5 watt, 5% tolerance

FIGURE 3[b]. IMPROVED CIRCUIT DESIGNED TO HANDLE POWER INTERRUPTIONS

FIGURE 3. ELECTRICAL PULSE CIRCUITS FOR DRIVING SKINNER MAGNELATCH SOLENOID VALVE WITH A MECHANICAL TIMER

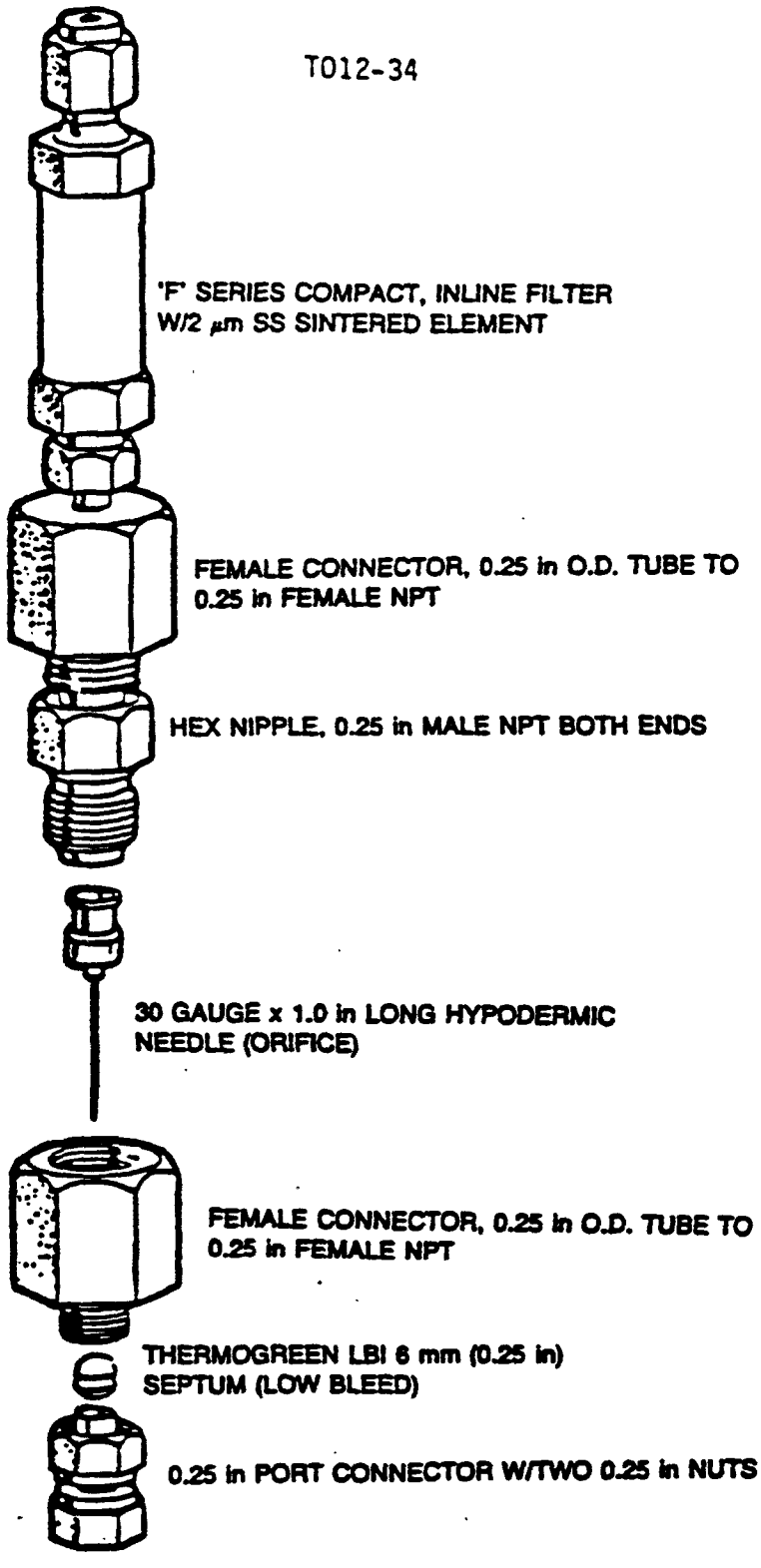


FIGURE 4. FILTER AND HYPODERMIC NEEDLE ASSEMBLY FOR SAMPLE INLET FLOW CONTROL

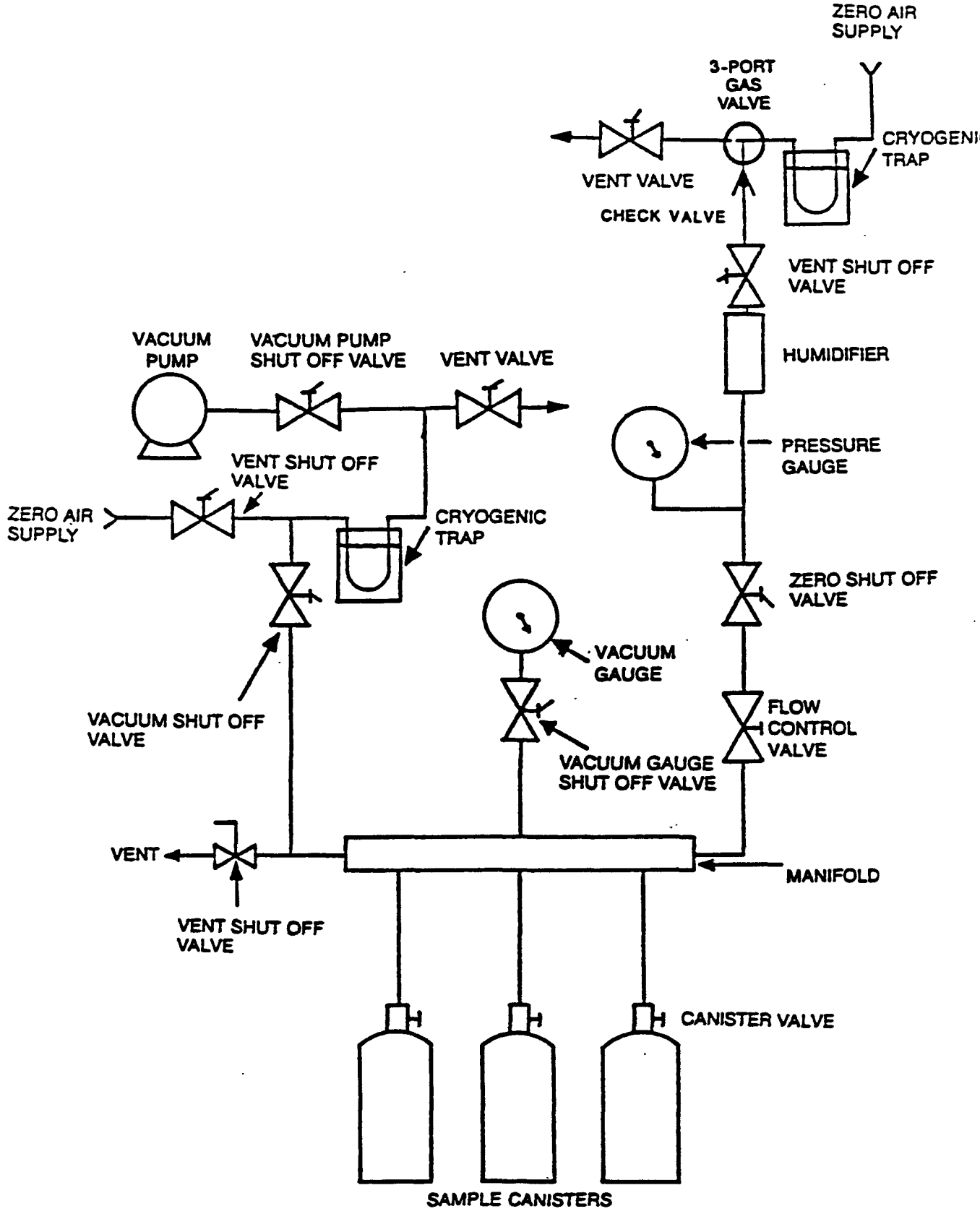


FIGURE 5. CANISTER CLEANING SYSTEM

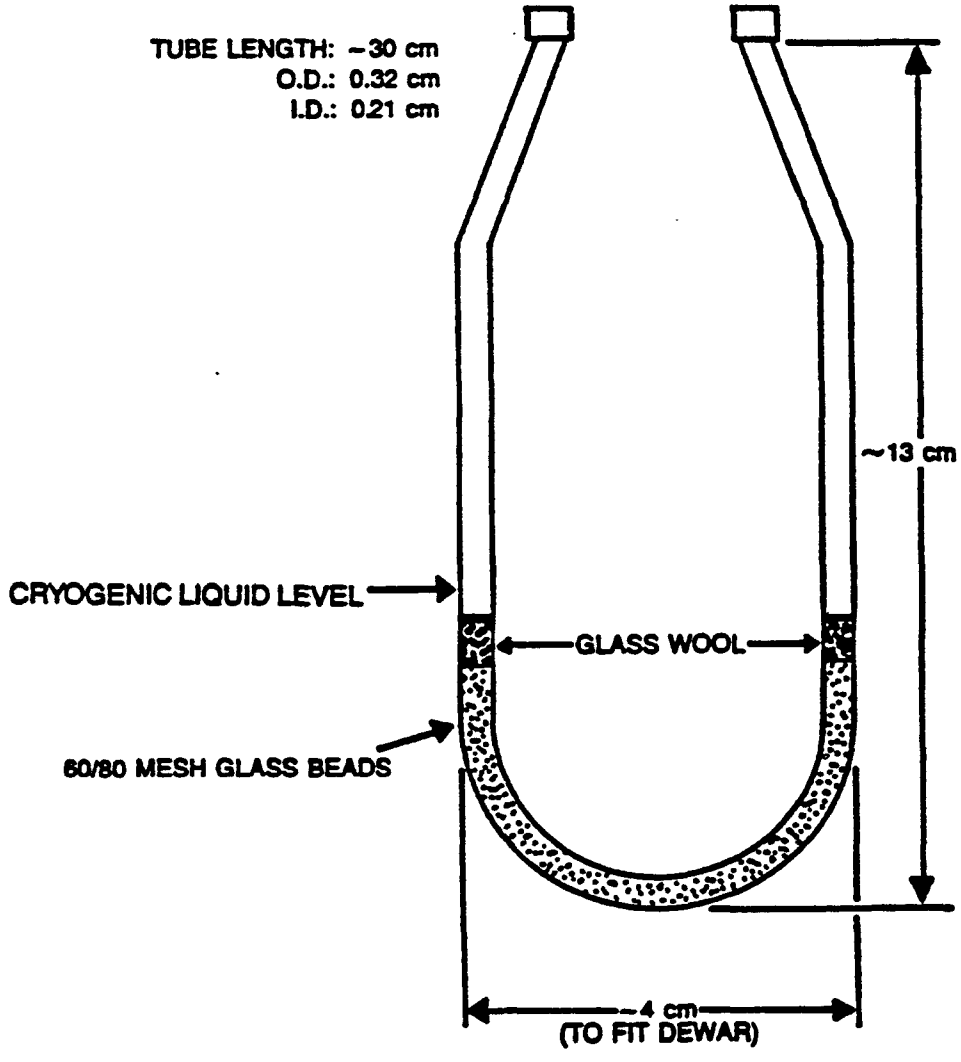


FIGURE 6. CRYOGENIC SAMPLE TRAP DIMENSIONS

PRESSURIZED CANISTER SAMPLING DATA SHEET

GENERAL INFORMATION:

PROJECT: _____
SITE: _____
LOCATION: _____
MONITOR STATION NUMBER: _____
PUMP SERIAL NUMBER: _____

OPERATOR: _____
ORIFICE IDENTIFICATION: _____
FLOW RATE: _____
CALIBRATED BY: _____
LEAK CHECK _____ Pass _____ Fail

FIELD DATA:

Date	Canister Serial Number	Sample Number	Sample Time		Average Atmospheric Conditions			Canister pressure Final, Laboratory		Comments
			Start	Stop	Temperature	Pressure	Relative Humidity			

Date _____ Title _____ Signature _____

FIGURE 5. TYPICAL SAMPLING DATA SHEET

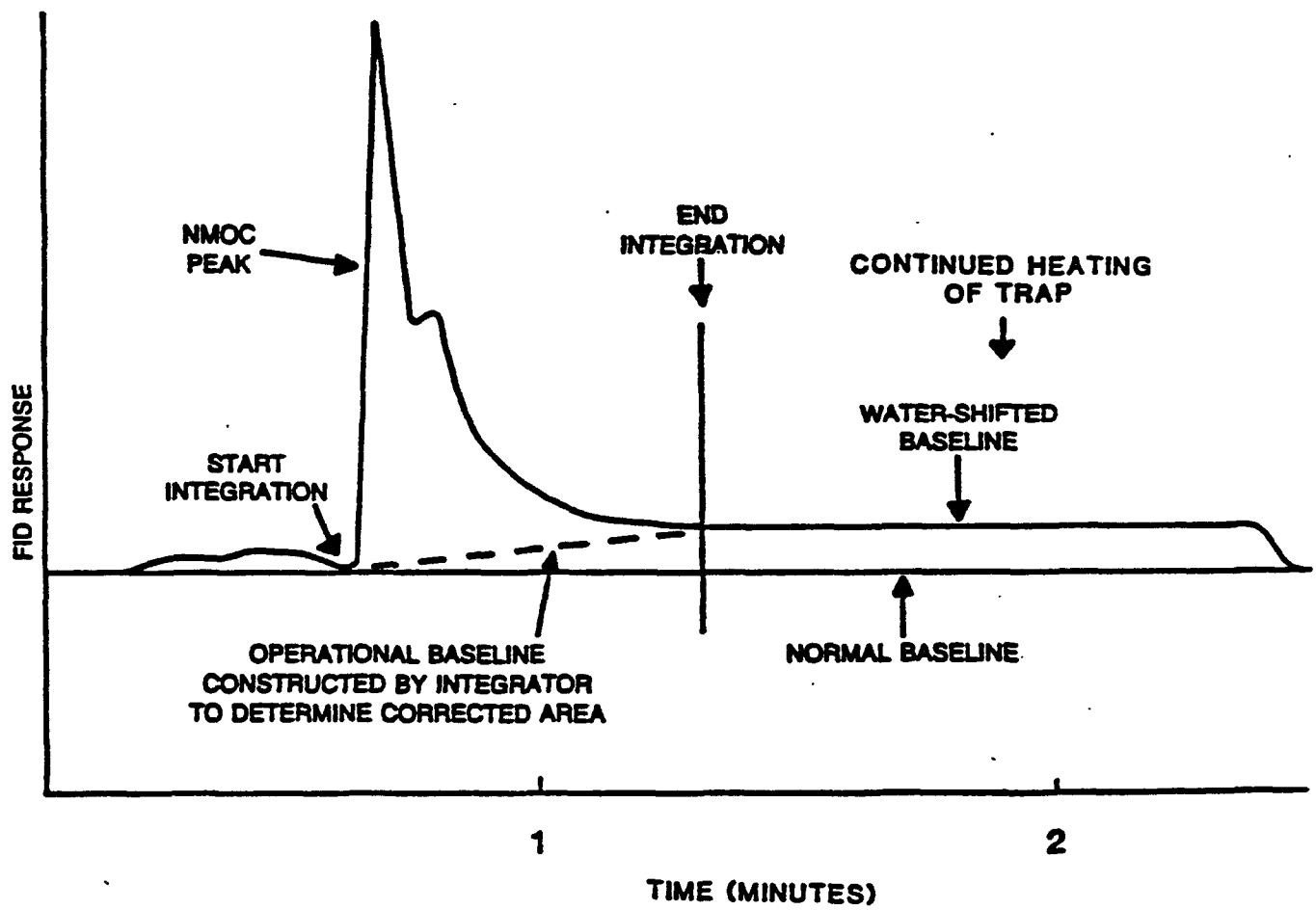


FIGURE 8. CONSTRUCTION OF OPERATIONAL BASELINE AND CORRESPONDING CORRECTION OF PEAK AREA

APPENDIX B

STANDARD OPERATING PROCEDURE FOR PDIFD SAMPLE ANALYSIS

GROUP OR LABORATORY: NMOC/Air Toxics	PROCEDURE NO: 262-AT-002	PAGE. 1 of 7
TITLE. Standard Operating Procedure for PDFID Sample Interface Analysis	REVISION NO: Original	EFFECTIVE DATE. 12/1/88
	SUPERCEDES: None	

REFERENCES
None

SATELLITE FILES.
GC

REASON FOR REVISION:
N/A

1.0 PURPOSE

The purpose of this SOP is to outline the procedures involved in the calibration and analyses of ambient air samples on a PDFID GC system.

2.0 APPARATUS/MATERIALS

2.1 HP 5880 Gas Chromatograph
2.2 HP 5880-A Level 4 Integrators
2.3 Course Flow Control Valves
2.4 Fine Flow Control Valves
2.5 Toggle Valve - Pressure
2.6 Toggle Valve - Vacuum
2.7 Absolute Pressure Gauge
2.8 Rotameter
2.9 Vacuum Pumps
2.10 Sample Introduction Ports
2.11 Sample Loops
2.12 Audio Indicator
2.13 Dewar Flasks
2.14 Calibration Manifold
2.15 Zero Air Shut Off Valve
2.16 Calibration Standard
2.17 Zero Air Standard
2.18 Sample Canister
2.19 Grade 5.0 Helium Carrier Gas
2.20 0.1 Grade Compressed Air
2.21 Grade 5.0 Hydrocarbon-free Hydrogen
2.22 Cryogen (Liquid Argon)

3.0 PROCEDURE

3.1 Precalibration

3.1.1 Make sure that the helium cylinder has not been turned off.

3.1.2 Turn the hydrogen cylinder on, and make sure the gauges read approximately 32 psig.

WRITER NAME/DATE		
ACTIVITY MGR. NAME/DATE	NAME/DATE	NAME/DATE

3.1.3 After 2 minutes, turn on compressed air cylinder, and make sure gauges read approximately 30 psig.

3.1.4 Ignite flame ionization detector units (A,B,C,D) (listen for audible pop).

3.1.5 Label current date on all four integrator charts.

3.1.6 On integrators A and C (master integrators), press LIST ENTER.

3.1.7 On integrators A and C, press LIST PROGRAM ENTER.

3.1.8 On all four integrators press
LIST RUNTBL ENTER
gold runtime

3.1.9 Turn on vacuum pumps.

3.2 Calibration

3.2.1 Attach calibration manifold to sample introduction ports on each GC.

3.2.2 Turn on zero air shut off valve.

3.2.3 Connect zero air to manifold and set vent flow at 150 (silver ball on rotameter) using the course flow control valves.

3.2.4 Label integrator paper with "initial calibration," current date, instrument channel indicator (letter), and "zero air".

3.2.5 To perform zero air calibration:

a. Evacuate the 70 mm by opening the vacuum toggle valves.
b. With vent flow at 150, open pressure toggle valves and adjust the fine flow control valves to maintain vent flow below 20, but above 0 on rotameters. (DO NOT LET IT BOTTOM OUT!!!!) Once at exactly 100 mm, close pressure toggle valves.
c. Open GC door and place cryogen-filled Dewar flask on sample loops (DO NOT CLOSE DOOR!!!). Wait for cryogen to stop boiling.
d. On master integrator, press START PROGRAM ENTER
e. Open pressure toggle valves and load to exactly 180 mm by adjusting fine flow control valves to maintain vent flow below 20, but above 0. Once at exactly 180 mm, close toggle valves.

SAMPLE ALIQUOT IS DETERMINED BY POSITIVE DISPLACEMENT. EXACT DISPLACEMENT FROM 100 mm TO 180 mm IS CRUCIAL TO ENSURE REPEATABILITY!

f. When integrator prints "Ready for Injection," lift cryogen Dewar to top of sample loops and press STARTRUN on master integrator.
g. When the audio indicator sounds, QUICKLY remove cryogen from sample loops and close GC door.

3.2.6 Repeat 3.2.5 until good repeatability is reached (i.e., as close to 0.00 (no peaks) as possible or a standard deviation of less than 0.02 Areas Counts). Once attained, disconnect zero air from calibration manifold and allow humidified zero air to flow through the lines. Connect calibration standard to manifold.

3.2.7 To perform standard calibration (propane):
a. Evacuate to 70 mm by opening the vacuum toggle valves.
b. With vent flow at 150, open pressure toggle valves and adjust the fine flow control valves to maintain vent flow below 20, but above 0 on rotameters. (DO NOT LET IT BOTTOM OUT!!!)
Once at exactly 100 mm, close pressure toggle valves.
c. Open GC door and place cryogen-filled Dewar flask on sample loops (DO NOT CLOSE DOOR!!!). Wait for cryogen to stop boiling.
d. On master integrator, press START PROGRAM ENTER
e. Open pressure toggle valves and load to exactly 180 mm by adjusting fine flow control valves to maintain vent flow below 20, but above 0. Once at exactly 180 mm, close toggle valves.

SAMPLE ALIQUOT IS DETERMINED BY POSITIVE DISPLACEMENT. EXACT DISPLACEMENT FROM 100 mm TO 180 mm IS CRUCIAL TO ENSURE REPEATABILITY!

f. When integrator prints "Ready for Injection," lift cryogen Dewar to top of sample loops and press STARTRUN on master integrator.
g. When the audio indicator sounds, QUICKLY remove cryogen from sample loops and close GC door.

3.2.8 a. Repeat 3.2.7 until good repeatability is reached (i.e., there are two analyses with total area counts within 100 of each other) and use these to calculate mean span value.
Once reached, turn off standard cylinder and disconnect from manifold.

b. Connect humidified zero air to manifold

3.2.9 Calculate mean zero air area counts and mean span area counts and calculate the calibration factor for each channel calibrated using the following equation:

$$\text{Calibration Factor} = \frac{[\text{ppmC Propane}]}{(\text{Mean Propane AC} - \text{Mean Zero Air AC})}$$

3.2.10 To perform humidified zero air purging:

a. Evacuate to 70 mm by opening the vacuum toggle valves.

b. With vent flow at 150, open pressure toggle valves and adjust the fine flow control valves to maintain vent flow below 20, but above 0 on rotameters. (DO NOT LET IT BOTTOM OUT!!!) Once at exactly 100 mm, close pressure toggle valves.

c. Open GC door and place cryogen-filled Dewar flask on sample loops (DO NOT CLOSE DOOR!!!). Wait for cryogen to stop boiling.

d. On master integrator, press START PROGRAM ENTER

e. Open pressure toggle valves and load to exactly 180 mm by adjusting fine flow control valves to maintain vent flow below 20, but above 0. Once at exactly 180 mm, close toggle valves.

SAMPLE ALIQUOT IS DETERMINED BY POSITIVE DISPLACEMENT. EXACT DISPLACEMENT FROM 100 mm TO 180 mm IS CRUCIAL TO ENSURE REPEATABILITY!

f. When integrator prints "Ready for Injection," lift cryogen Dewar to top of sample loops and press STARTRUN on master integrator.

g. When the audio indicator sounds, QUICKLY remove cryogen from sample loops and close GC door.

3.2.11 a. Repeat 3.2.10.

b. Disconnect zero air from calibration manifold and turn off the zero air.

c. Remove calibration manifold from sample introduction ports.

3.3 Analyses

3.3.1 Connect sample canister to sample introduction port.

3.3.2 Label integrator with site code and Radian ID #.

3.3.3 Evacuate to approximately 70 mm by opening vacuum toggle valves.

3.3.4 To analyze a sample:

a. Open sample canister valve completely.

b. Set vent flow at 150, open pressure toggle valves and adjust the fine flow control valves to maintain vent flow below 20, but above 0 on rotameters.
(DO NOT LET IT BOTTOM OUT!!!)
Once at exactly 100 mm, close pressure toggle valves.

c. Open GC door and place cryogen-filled Dewar flask on sample loops (DO NOT CLOSE DOOR!!!). Wait for cryogen to stop boiling.

d. On master integrator, press START PROGRAM ENTER

e. Open pressure toggle valves and load to exactly 180 mm by adjusting fine flow control valves to maintain vent flow below 20, but above 0. Once at exactly 180 mm, close toggle valves.

SAMPLE ALIQUOT IS DETERMINED BY POSITIVE DISPLACEMENT. EXACT DISPLACEMENT FROM 100 mm TO 180 mm IS CRUCIAL TO ENSURE REPEATABILITY!

f. When integrator prints "Ready for Injection," lift cryogen Dewar to top of sample loops and press STARTRUN on master integrator.

g. When the audio indicator sounds, QUICKLY remove cryogen from sample loops and close GC door.

3.3.5 Repeat 3.3.4 up to three times, until standard deviation is less than 0.03 ppmC.

3.3.6 Calculate ppmC of sample by using the equation:

ppmC = (Mean Total AC) x (Calibration Factor)

Fill out the sample analysis form completely.

3.4 Postcalibration

3.4.1 To perform zero air calibration:

a. Evacuate to 70 mm by opening the vacuum toggle valves.

b. With vent flow at 150, open pressure toggle valves and adjust the fine flow control valves to maintain vent flow below 20, but above 0 on rotameters.
(DO NOT LET IT BOTTOM OUT!!!)

Once at exactly 100 mm, close pressure toggle valves.

c. Open GC door and place cryogen-filled Dewar flask on sample loops (DO NOT CLOSE DOOR!!!). Wait for cryogen to stop boiling.

d. On master integrator, press START PROGRAM ENTER

e. Open pressure toggle valves and load to exactly 180 mm by adjusting fine flow control valves to maintain vent flow below 20, but above 0. Once at exactly 180 mm, close toggle valves.

SAMPLE ALIQUOT IS DETERMINED BY POSITIVE DISPLACEMENT. EXACT DISPLACEMENT FROM 100 mm TO 180 mm IS CRUCIAL TO ENSURE REPEATABILITY!

f. When integrator prints "Ready for Injection," lift cryogen Dewar to top of sample loops and press STARTRUN on master integrator.

g. When the audio indicator sounds, QUICKLY remove cryogen from sample loops and close GC door.

3.4.2 Repeat 3.4.1 until good repeatability is reached [i.e., as close to 0.00 (no peaks) as possible or a standard deviation of less than 0.02 area counts].
Once attained, turn off zero air shut off valve and disconnect zero air from calibration manifold and connect calibration standard to manifold.

3.4.3 To perform standard calibration (propane):

a. Evacuate to 70 mm by opening the vacuum toggle valves.

b. With vent flow at 150, open pressure toggle valves and adjust the fine flow control valves to maintain vent flow below 20, but above 0 on rotameters.
(DO NOT LET IT BOTTOM OUT!!!)
Once at exactly 100 mm, close pressure toggle valves.

c. Open GC door and place cryogen-filled Dewar flask on sample loops (DO NOT CLOSE DOOR!!!). Wait for cryogen to stop boiling.

d. On master integrator, press START PROGRAM ENTER

e. Open pressure toggle valves and load to exactly 180 mm by adjusting fine flow control valves to maintain vent flow below 20, but above 0. Once at exactly 180 mm, close toggle valves.

SAMPLE ALIQUOT IS DETERMINED BY POSITIVE DISPLACEMENT. EXACT DISPLACEMENT FROM 100 mm TO 180 mm IS CRUCIAL TO ENSURE REPEATABILITY!

f. When integrator prints "Ready for Injection," lift cryogen Dewar to top of sample loops and press STARTRUN on master integrator.

g. When the audio indicator sounds, QUICKLY remove cryogen from sample loops and close GC door.

3.4.4 a. Repeat 3.4.3 until good repeatability is reached (i.e., there are two analyses with total area counts within 100 of each other) and use these to calculate mean span value.

b. Remove calibration manifold from sample introduction ports.

3.4.5 Calculate mean zero air area counts and mean span area counts and calculate the calibration factor for each channel calibrated using the following equation:

$$\text{Postcalibration Factor} = \frac{(\text{ppmC Propane})}{(\text{Mean Propane AC} - \text{Mean Zero Air AC})}$$

3.5 Shut-down

3.5.1 Evacuate to 70 mm by opening the vacuum toggle valves.

3.5.2 Turn off vacuum pumps.

3.5.3 Turn off hydrogen cylinder.

3.5.4 After hydrogen gauge reads approximately 0 psig, turn off compressed air cylinder.

3.5.5 IMPORTANT: DO NOT TURN OFF HELIUM CYLINDER!!!

APPENDIX C

PDFID INTEGRATOR PROGRAMMING INSTRUCTIONS

INTEGRATOR PROGRAMMING INSTRUCTIONS

Instructions for programming the integrators are as follows. Be sure to press ENTER after each key sequence.

Control Integrator

Oven Temp 90
Oven Temp Limit 405
Oven Temp ON
Oven Temp OFF
List Oven Temp
(A listing should say OvenTemp X^{o}C Setpt 90°C Limit 405°C)
Oven Temp Initial Time 0.20
Oven Temp Initial Value 90
Oven Temp Pgrm Rate 30.00
Oven Temp Final Value 90.00
Oven Temp Final Time 4.00
Oven Temp Equil Time 1.00

Detector A ON
Signal A
Chart speed 4.00
%Offset 10
Zero
Attn 2^ 4

Run Time Annotation ON
Run Table Annotation ON
Clock Table Annotation OFF
Program Annotation OFF
Oven Temp Annotation OFF
Report Annotation OFF

Slave Integrator

Detector B ON
Signal B
Chart speed 4.00
%Offset 10
Zero
Attn 2^ 4

Run Time Annotation ON
Run Table Annotation ON
Clock Table Annotation OFF
Program Annotation OFF
Oven Temp Annotation OFF
(should say ***Warning***Oven Temp now owned by Chnl 2)
Report Annotation OFF

Control Integrator

Oven Temp Annotation OFF
(should say ***Warning***Oven Temp now owned by Chnl 1)
Run Time 0.01 Intg OFF
Run Time 0.01 Valve 5 ON
Run Time 0.01 Page
Run Time 0.02 List Attn2^
Run Time 0.04 Oven Temp ON
Run Time 0.20 Valve 2 ON
Run Time 0.21 Valve 2 OFF
Run Time 0.22 Intg ON
Run Time 0.23 Set BL
Run Time 0.23 List Intg
Rum Time 1.87 Set BL
Run Time 1.88 Intg OFF
Run Time 1.89 List Intg
Run Time 1.90 Chart Spped 1.5
Run Time 3.44 Valve 2 ON
Run Time 3.45 Valve 2 OFF
Run Time 3.46 Valve 2 ON
Run Time 3.47 Valve 2 OFF
Run Time 3.48 Valve 2 ON
Run Time 3.49 Valve 2 OFF
Run Time 3.50 STOP

Slave Integrator

Run Time 0.01 Intg OFF
Run Time 0.01 Page
Run Time 0.02 List Attn2^
Run Time 0.22 Intg ON
Run Time 0.23 Set BL
Run Time 0.23 List Intg
Rum Time 1.87 Set BL
Run Time 1.88 Intg OFF
Run Time 1.89 List Intg
Run Time 1.90 Chart Spped 1.5
Run Time 3.50 STOP

Control Integrator

Det 1 Temp 250
Det 1 Temp Limit 405
Inj 1 Temp 31
Inj 1 Temp Limit 405
Aux 1 Temp 90
Aux 1 Temp Limit 405
Flow A 30
Flow A Limit 500

Slave Integrator

Flow B 30
Flow B Limit 500

Control Integrator

Valve 1 OFF
Valve 2 OFF
Valve 3 OFF
Valve 4 OFF
Valve 5 ON
Valve 6 OFF
Valve 7 OFF
Valve 8 OFF
Valve 9 OFF
Valve 10 OFF
Valve 11 OFF
Valve 12 OFF

Threshold 1
Peak Width 0.04

Slave Integrator

Threshold 1
Peak Width 0.04

Control Integrator

20 Valve 5 OFF
25 List Valve 5
30 Oven Temp Initial Value 30
35 Oven Temp OFF
40 Wait 2
60 Start
70 Oven Temp 90
80 Vale 5 ON

Sync ON

APPENDIX D

SAMPLING SITES FOR 1988 NMOC MONITORING PROGRAM

1988 NMOC SITES

Site Code	Site	SAROAD #	AIRS #	Page of Site Description
PRRI	Providence, RI	41-0300	44-007-0019	D-5
B2MA	Boston, MA (E. Boston)	22-0240-021	25-025-0021	D-6
S1MA	Springfield, MA (Liberty Street)	22-2160-016	25-013-0016	D-7
S2MA	Springfield, MA (Hospital)	22-2160-017	25-013-0017	D-7
WOMA	Worcester, MA	22-0240-020	25-027-0020	D-6
MNY	New York, NY (Manhatten/Mabel Dean)	33-4680-010	36-061-0010	D-8
M1NY	New York, NY (Manhattan/P.S. 59)	33-4680-	36-061-0056	
BNY	New York, NY (Bronx)	33-4680-074	36-005-0074	D-8
W1NY	New York, NY (World Trade Center)	33-6680-	36-061-0063	D-8
NWNJ	Newark, NJ	31-3480-011	34-013-0011	D-9
PLNJ	Plainfield, NJ	31-4300-001	34-035-1001	D-9
M1TN	Memphis, TN (Alabama)	44-2340-024	47-157-0024	D-10
M2TN	Memphis, TN (Frayser)	44-2340-021	47-157-0021	D-10
N1TN	Nashville, TN (Lentz)	44-2540-010	47-037-0010	D-10
N2TN	Nashville, TN (Trinity Lane)	44-2540-011	47-037-0011	D-10
MIFL	Miami, FL (Annex)	10-0860-002	12-025-2002	D-11
M2FL	Miami, FL (U. Miami)	10-0860-027	12-025-0027	D-11
S1FL	St. Petersburg, FL	10-3980-018	12-103-0018	D-12
S2FL	St. Peterburg, FL	10-4380-002	12-103-5002	D-12
T1FL	Tampa, FL (EPC) 1900 9th Ave	10-1800-081	12-057-0081	D-11
T2FL	Tampa, FL (Beach Park)	10-4360-055	12-057-1055	D-12
C6IL	Chicago, IL (CTA)	14-1220-063		
C3IL	Chicago, IL (Sears Tower)	14-1220-042	17-031-0042	D-13
WAIL	Waukegan, IL	14-8020-002	17-097-1002	D-13
BRIL	Braidwood, IL	14-8320-007	17-197-1007	D-13

Continued

1988 NMOC SITES (Continued)

Site Code	Site	SAROAD #	AIRS #	Page of Site Description
CLOH	Cleveland, OH	36-1300-033	39-035-0033	D-14
C2OH	Cleveland, OH (Civic Center)	36-1300-	39-035	
D1MI	Detroit, MI (Linwood)	23-1180-032	26-163-0032	
D2MI	Detroit, MI (Wayne County Lab)	23-1180-029	26-163-0029	D-15
AUTX	Austin, TX	45-0220-017	48-453-0017	
BMTX	Beaumont, TX	45-0330-009	48-245-0009	
DLTX	Dallas, TX	45-1310-069	48-113-0069	D-16
ELTX	El Paso, TX	45-1700-037	48-141-0037	
HITX	Houston, TX	45-2560-034	48-201-1034	D-16
SATX	San Antonio, TX	45-4570-036	48-029-0036	
SLMO	St. Louis, MO	26-4280-006	29-510-0006	
AZCA	Azusa, CA	05-0500-002	06-037-0002	
B1CA	Bakersfield, CA (Oildale)			
B2CA	Bakersfiled, CA (Edison)	05-3480-007	06-029-0007	
FECA	Fremont, CA	05-2780-001	06-001-1001	
S1CA	Sacramento, CA (Meadowview)	05-6580-005	06-067-0005	
S2CA	Sacramento, CA (Citrus Heights)	05-1370-001	06-067-0001	
P1AZ	Phoenix, AZ (39 & Earl)	03-0600-19	04-013-0019	
P2AZ	Phoenix, AZ (Scottsdale)	03-0740-004	04-013-2004	D-17
CHNC	Charlotte, NC	34-0700-34	37-119-0034	D-18

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

AMP380

STATE (44): RHODE ISLAND

Radian Site Code: PRRI

SITE ID : 44-007-0019
CITY POPULATION : 1
AREA POPULATION : 1,571,002
EPA-REGION : 01
DATE ESTABLISHED: 08/30/71
DATE TERMINATED : / /
URBAN AREA (0000): NOT IN AN URBAN AREA
SUPPORTING AGENCY (001): RHODE ISLAND DEM AND DOH
COMMENTS: 0300,DIV. .
SITE-USER-INFO:

CITY (00000): NOT IN A CITY
COUNTY (007): PROVIDENCE CO
SITE ADDR : OUR LADY OF PROVIDENCE, 29 REGENT AVENUE
LAND USE (2): COMMERCIAL
LOCATION SETTING (1): URBAN AND CENTER CITY
AQCR (121): METROPOLITAN PROVIDENCE

LATITUDE : : :
LONGITUDE : : :
UTM ZONE :
UTM NORTHING :
UTM-EASTING :
DIFF. GMT :
ELEVATION ABOVE MSL :
RECORD LAST UPDATED : 08/11

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

AMP380

STATE (25): MASSACHUSETTS

Radian Site Code: B2MA

SITE ID : 25-025-0021
CITY POPULATION : 562,994
AQCR POPULATION : 2,858,273
EPA-REGION : 01
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (07000): BOSTON
COUNTY (025): SUFFOLK CO
SITE ADDR : 340 BREMAN STREET, EAST BOSTON
LAND USE (1): RESIDENTIAL
LOCATION SETTING (1): URBAN AND CENTER CITY
AQCR (119): METROPOLITAN BOSTON
URBAN AREA (1120): BOSTON, MA
SUPPORTING AGENCY (001): MASS-DEQE-DIVISION OF AIR QUALITY CONTROL
COMMENTS: NAMS/EMSL SAMPLING SITE
SITE-USER-INFO: NMOC-CH4 ACTIVE JUN 1 TO SEP 12,1980

LATITUDE : 42:22:41 N
LONGITUDE : 071:01:42 W
UTM ZONE : 19
UTM NORTHING : 4693531
UTM-EASTING : 00333008
DIFF. GMT : 05
ELEVATION ABOVE MSL : 00006 M
RECORD LAST UPDATED : 88/12/12

Radian Site Code: WOMA

SITE ID : 25-027-0020
CITY POPULATION : 161,799
AQCR POPULATION : 559,334
EPA-REGION : 01
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (82000): WORCESTER
COUNTY (027): WORCESTER CO
SITE ADDR : CENTRAL STREET FIRE STATION, CENTRAL ST.
LAND USE (2): COMMERCIAL
LOCATION SETTING (1): URBAN AND CENTER CITY
AQCR (118): CENTRAL MASSACHUSETTS
URBAN AREA (9240): WORCESTER, MA
SUPPORTING AGENCY (001): MASS-DEQE-DIVISION OF AIR QUALITY CONTROL
COMMENTS: SAMPLING SHELTER LOCATED IN CITY FIRE STATION PARKING LOT
SITE-USER-INFO:

LATITUDE : 42:16:01 N
LONGITUDE : 071:47:50 W
UTM ZONE : 19
UTM NORTHING : 4682991
UTM-EASTING : 00269296
DIFF. GMT : 05
ELEVATION ABOVE MSL : 00145 M
RECORD LAST UPDATED : 87/10/22

Continued

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

AMP380 STATE (25): MASSACHUSETTS (Continued)

Radian Site Code: S1MA

```
SITE ID          : 25-013-0016    CITY (67000): SPRINGFIELD
CITY POPULATION  :     152,319    COUNTY (013): HAMPDEN CO
AQCR POPULATION  :   3,372,067    SITE ADDR   : LIBERTY STREET PARKING LOT
EPA-REGION       : 01             LAND USE (2): COMMERCIAL
DATE ESTABLISHED: 88/08/01        LOCATION SETTING (1): URBAN AND CENTER CITY
DATE TERMINATED  :   /  /         AQCR (042): HARTFORD-NEW HAVEN-SPRINGFIELD
URBAN AREA (8000): SPRINGFIELD-CHICOPEE-HOLYOKE, MA-CO
SUPPORTING AGENCY (001): MASS-DEQE-DIVISION OF AIR QUALITY CONTROL
COMMENTS:
SITE-USER-INFO:

LATITUDE         :    :  :
LONGITUDE        :    :  :
UTM ZONE         :
UTM NORTHING     :
UTM-EASTING      :
DIFF. GMT        :
ELEVATION ABOVE MSL : 00031 M
RECORD LAST UPDATED : 88/12/0
```

Radian Site Code: S2MA

```
SITE ID          : 25-013-0017    CITY (67000): SPRINGFIELD
CITY POPULATION  :     152,319    COUNTY (013): HAMPDEN CO
AQCR POPULATION  :   3,372,067    SITE ADDR   : STATE OF SPRINGFIELD
EPA-REGION       : 01             LAND USE (2): COMMERCIAL
DATE ESTABLISHED: 88/01/01        LOCATION SETTING (3): RURAL
DATE TERMINATED  :   /  /         AQCR (042): HARTFORD-NEW HAVEN-SPRINGFIELD
URBAN AREA (8000): SPRINGFIELD-CHICOPEE-HOLYOKE, MA-CO
SUPPORTING AGENCY (001): MASS-DEQE-DIVISION OF AIR QUALITY CONTROL
COMMENTS:
SITE-USER-INFO:

LATITUDE         :    :  :
LONGITUDE        :    :  :
UTM ZONE         :
UTM NORTHING     :
UTM-EASTING      :
DIFF. GMT        :
ELEVATION ABOVE MSL :       M
RECORD LAST UPDATED : 88/12/0
```

AMP380

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

STATE (36): NEW YORK

Radian Site Code: BNY

SITE ID : 36-005-0074
CITY POPULATION : 7,071,639
AQCR POPULATION : 16,525,701
EPA-REGION : 02
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (51000): NEW YORK CITY
COUNTY (005): BRONX CO
SITE ADDR : PS 2, 1363 FULTON AVENUE
LAND USE (1): RESIDENTIAL
LOCATION SETTING (1): URBAN AND CENTER CITY
AQCR (043): NEW JERSEY-NEW YORK-CONNECTICUT
URBAN AREA (5601): NEW YORK, NY-NORTHEASTERN NJ
SUPPORTING AGENCY (001): NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVA
COMMENTS: NYS#7094-04,START TSP 10/7,SO2 9/18,NO2 10/1/81, TSP ELEV. 46'
SITE-USER-INFO: MEETS SITING, PM10: START 5/25/85, SSI, ELEV. 47'

LATITUDE : 40:50:02 N
LONGITUDE : 073:54:12 W
UTM ZONE : 18
UTM NORTHING : 4520684
UTM-EASTING : 00592466
DIFF. GMT : 05
ELEVATION ABOVE MSL : 00021 M
RECORD LAST UPDATED : 88/09/29

Radian Site Code: MNY

SITE ID : 36-061-0010
CITY POPULATION : 7,071,639
AQCR POPULATION : 16,525,701
EPA-REGION : 02
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (51000): NEW YORK CITY
COUNTY (061): NEW YORK CO
SITE ADDR : MABEL DEAN HIGH SCH.ANNEX, 240 2ND AVE.
LAND USE (1): RESIDENTIAL
LOCATION SETTING (1): URBAN AND CENTER CITY
AQCR (043): NEW JERSEY-NEW YORK-CONNECTICUT
URBAN AREA (5601): NEW YORK, NY-NORTHEASTERN NJ
SUPPORTING AGENCY (001): NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVA
COMMENTS: NYS#7093-05,START NO2,O3 11/18/76,TSP 10/10,CO 10/3/77,SO2 2/5/78
SITE-USER-INFO: 1980 NECRMP,DISC.CO,O3 5/25,RESTART O3 9/24/82;ELEV.TSP 102'

LATITUDE : 40:44:22 N
LONGITUDE : 073:59:10 W
UTM ZONE : 18
UTM NORTHING : 4510116
UTM-EASTING : 00585607
DIFF. GMT : 05
ELEVATION ABOVE MSL : 00038 M
RECORD LAST UPDATED : 88/09/27

Radian Site Code: W1NY

SITE ID : 36-061-0063
CITY POPULATION : 7,071,639
AQCR POPULATION : 16,525,701
EPA-REGION : 02
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (51000): NEW YORK CITY
COUNTY (061): NEW YORK CO
SITE ADDR : ROOF,TWO WORLD TRADE CENTER
LAND USE (2): COMMERCIAL
LOCATION SETTING (1): URBAN AND CENTER CITY
AQCR (043): NEW JERSEY-NEW YORK-CONNECTICUT
URBAN AREA (0000): NOT IN AN URBAN AREA
SUPPORTING AGENCY (000): ********** DESCRIPTION UNKNOWN **********
COMMENTS: NYS #7093-07, DATA START,SO2 10/22/82, NO2 11/9/82,O3 11/1/82
SITE-USER-INFO: ELEV.ABOVE GR.LEVEL 1500'; DISC. NO2 6/7,SO2 6/31/84

LATITUDE : 40:42:42 N
LONGITUDE : 074:00:47 W
UTM ZONE : 18
UTM NORTHING : 4507000
UTM-EASTING : 00583364
DIFF. GMT : 05
ELEVATION ABOVE MSL : 00003 M
RECORD LAST UPDATED : 88/06/14

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

AMP380

STATE (34): NEW JERSEY

Radian Site Code: PLNJ

SITE ID : 34-035-1001
CITY POPULATION : 45,555
AQCR POPULATION : 16,525,701
EPA-REGION : 02
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (59190): PLAINFIELD
COUNTY (035): SOMERSET CO
SITE ADDR : WEST THIRD AND BERGEN STREETS
LAND USE (1): RESIDENTIAL
LOCATION SETTING (2): SUBURBAN
AQCR (043): NEW JERSEY-NEW YORK-CONNECTICUT
URBAN AREA (0000): NOT IN AN URBAN AREA
SUPPORTING AGENCY (000): ********** DESCRIPTION UNKNOWN **********
COMMENTS: NJ #20121,START 5/80; 1980 NE OXIDANT STUDY,O3,NOX;SO2 DISC.5/2/83
SITE-USER-INFO: O3 AS A SLAMS 10/01/84, MEETS SITING

LATITUDE : 40:36:04 N
LONGITUDE : 074:26:31 W
UTM ZONE : 18
UTM NORTHING : 4494399
UTM-EASTING : 00547218
DIFF. GMT : 05
ELEVATION ABOVE MSL : 00018 M
RECORD LAST UPDATED : 88/06/21

Radian Site Code: NWNJ

SITE ID : 34-013-0011
CITY POPULATION : 329,248
AQCR POPULATION : 16,525,701
EPA-REGION : 02
DATE ESTABLISHED: 85/01/01
DATE TERMINATED : / /
CITY (51000): NEWARK
COUNTY (013): ESSEX CO
SITE ADDR : ST. CHARLES BETWEEN KOSSUTH & KAMERON ST
LAND USE (3): INDUSTRIAL
LOCATION SETTING (1): URBAN AND CENTER CITY
AQCR (043): NEW JERSEY-NEW YORK-CONNECTICUT
URBAN AREA (5601): NEW YORK, NY-NORTHEASTERN NJ
SUPPORTING AGENCY (001): NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTEC
COMMENTS: NJ #07142,START 1/1/85,RELOC.FROM 340130008, SITTING CRITERIA?
SITE-USER-INFO: PM10,DICHOT,START 3/15/86,ELEV.16';O3 DOWN 5/16/86-3/25/87

LATITUDE : 40:43:37 N
LONGITUDE : 074:08:39 W
UTM ZONE : 18
UTM NORTHING : 4508570
UTM-EASTING : 00572280
DIFF. GMT : 05
ELEVATION ABOVE MSL : 00003 M
RECORD LAST UPDATED : 88/06/30

AMP380

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

STATE (47): TENNESSEE

Radian Site Code: N1TN

SITE ID : 47-037-0010
CITY POPULATION : 455,651
AQCR POPULATION : 1,276,354
EPA-REGION : 04
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (52000): NASHVILLE-DAVIDSON
COUNTY (037): DAVIDSON CO
SITE ADDR : 311 23RD AVENUE NORTH
LAND USE (2): COMMERCIAL
LOCATION SETTING (1): URBAN AND CENTER CITY
AQCR (208): MIDDLE TENNESSEE
URBAN AREA (5360): NASHVILLE-DAVIDSON, TN
SUPPORTING AGENCY (003): METROPOLITAN HEALTH DEPARTMENT/NASHVILLE & DAVIDSON
COMMENTS: STA. M-10. ROOF OF LENTZ PUBLIC HEALTH CENTER
SITE-USER-INFO:

LATITUDE : 36:09:08 N
LONGITUDE : 086:48:28 W
UTM ZONE : 16
UTM NORTHING : 4000649
UTM-EASTING : 00517292
DIFF. GMT : 06
ELEVATION ABOVE MSL : 00165 M
RECORD LAST UPDATED : 88/11/04

Radian Site Code: N2TN

SITE ID : 47-037-0011
CITY POPULATION : 455,651
AQCR POPULATION : 1,276,354
EPA-REGION : 04
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (52000): NASHVILLE-DAVIDSON
COUNTY (037): DAVIDSON CO
SITE ADDR : 1015 TRINITY LANE
LAND USE (1): RESIDENTIAL
LOCATION SETTING (1): URBAN AND CENTER CITY
AQCR (208): MIDDLE TENNESSEE
URBAN AREA (5360): NASHVILLE-DAVIDSON, TN
SUPPORTING AGENCY (003): METROPOLITAN HEALTH DEPARTMENT/NASHVILLE & DAVIDSON
COMMENTS: STA. M-11. ROOF OF EAST NASHVILLE HEALTH CENTER
SITE-USER-INFO:

LATITUDE : 36:12:18 N
LONGITUDE : 086:44:41 W
UTM ZONE : 16
UTM NORTHING : 4006515
UTM-EASTING : 00522948
DIFF. GMT : 06
ELEVATION ABOVE MSL : 00165 M
RECORD LAST UPDATED : 88/09/30

Radian Site Code: M2TN

SITE ID : 47-157-0021
CITY POPULATION : 646,174
AQCR POPULATION : 880,542
EPA-REGION : 04
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (48000): MEMPHIS
COUNTY (157): SHELBY CO
SITE ADDR : 1330 FRAYSER BLVD
LAND USE (1): RESIDENTIAL
LOCATION SETTING (2): SUBURBAN
AQCR (018): METROPOLITAN MEMPHIS
URBAN AREA (4920): MEMPHIS, TN-ARK-MS
SUPPORTING AGENCY (002): MEMPHIS-SHELBY COUNTY HEALTH DEPARTMENT
COMMENTS: FRAYSER CONTINUOUS AIR MONITORING
SITE-USER-INFO:

LATITUDE : 35:07:30 N
LONGITUDE : 090:03:41 W
UTM ZONE : 15
UTM NORTHING : 3890661
UTM-EASTING : 00767791
DIFF. GMT : 06
ELEVATION ABOVE MSL : 00090 M
RECORD LAST UPDATED : 88/11/16

Radian Site Code: M1TN

SITE ID : 47-157-0024
CITY POPULATION : 646,174
AQCR POPULATION : 880,542
EPA-REGION : 04
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (48000): MEMPHIS
COUNTY (157): SHELBY CO
SITE ADDR : 416 ALABAMA AVENUE
LAND USE (1): RESIDENTIAL
LOCATION SETTING (2): SUBURBAN
AQCR (018): METROPOLITAN MEMPHIS
URBAN AREA (4920): MEMPHIS, TN-ARK-MS

LATITUDE : 35:08:04 N
LONGITUDE : 090:02:30 W
UTM ZONE : 15
UTM NORTHING : 3891762
UTM-EASTING : 00769558
DIFF. GMT : 06

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

AMP380

STATE (12): FLORIDA

Radian Site Code: M2FL

SITE ID : 12-025-0027
CITY POPULATION : 1
AQCR POPULATION : 3,515,388
EPA-REGION : 04
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (00000): NOT IN A CITY
COUNTY (025): DADE CO
SITE ADDR : ROSENSTIEL SCHOOL
LAND USE (1): RESIDENTIAL
LOCATION SETTING (2): SUBURBAN
AQCR (050): SOUTHEAST FLORIDA
URBAN AREA (5000): MIAMI, FL
SUPPORTING AGENCY (018): DADE COUNTY DEPARTMENT ENVIRONMENTAL RESOURCES MANA
COMMENTS: SITE MOVED 210 M TO THE SOUTHEAST INTO NEW BUILDING
SITE-USER-INFO: NAMS NO2 & OZONE

LATITUDE : 25:44:20 N
LONGITUDE : 080:09:47 W
UTM ZONE : 17
UTM NORTHING : 2846873
UTM-EASTING : 00583947
DIFF. GMT : 05
ELEVATION ABOVE MSL : 00002 M
RECORD LAST UPDATED : 88/05/09

Radian Site Code: M1FL

SITE ID : 12-025-2002
CITY POPULATION : 1
AQCR POPULATION : 3,515,388
EPA-REGION : 04
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (00000): NOT IN A CITY
COUNTY (025): DADE CO
SITE ADDR : MIAMI INTERNATIONAL AIRPORT
LAND USE (2): COMMERCIAL
LOCATION SETTING (2): SUBURBAN
AQCR (050): SOUTHEAST FLORIDA
URBAN AREA (0000): NOT IN AN URBAN AREA
SUPPORTING AGENCY (000): ********** DESCRIPTION UNKNOWN **********
COMMENTS: DCPC #13 & PROPOSED STATE SITE
SITE-USER-INFO:

LATITUDE : 25:47:36 N
LONGITUDE : 080:16:44 W
UTM ZONE : 17
UTM NORTHING : 2852845
UTM-EASTING : 00572300
DIFF. GMT : 05
ELEVATION ABOVE MSL : 00012 M
RECORD LAST UPDATED : 81/07/08

Radian Site Code: T1FL

SITE ID : 12-057-0081
CITY POPULATION : 1
AQCR POPULATION : 2,201,939
EPA-REGION : 04
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (00000): NOT IN A CITY
COUNTY (057): HILLSBOROUGH CO
SITE ADDR : E.G. SIMMONS COUNTY PARK
LAND USE ( ):
LOCATION SETTING ( ):
AQCR (052): WEST CENTRAL FLORIDA
URBAN AREA (0000): NOT IN AN URBAN AREA
SUPPORTING AGENCY (000): ********** DESCRIPTION UNKNOWN **********
COMMENTS: NAMS CONTINUOUS OZONE SITE UP WIND OF TAMPA
SITE-USER-INFO:

LATITUDE : 27:44:22 N
LONGITUDE : 082:27:55 W
UTM ZONE : 17
UTM NORTHING : 3069035
UTM-EASTING : 00355561
DIFF. GMT : 05
ELEVATION ABOVE MSL : 00004 M
RECORD LAST UPDATED : 87/10/01

AMP380

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

STATE (12): FLORIDA (Continued)

Radian Site Code: T2FL

SITE ID : 12-057-1055
CITY POPULATION : 271,523
AQCR POPULATION : 2,201,939
EPA-REGION : 04
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (71000): TAMPA
COUNTY (057): HILLSBOROUGH CO
SITE ADDR : CITY OF TAMPA PUMP STATION BAY HAY ST.
LAND USE (1): RESIDENTIAL
LOCATION SETTING (2): SUBURBAN
AQCR (052): WEST CENTRAL FLORIDA
URBAN AREA (8279): TAMPA, FL
SUPPORTING AGENCY (012): HILLSBOROUGH COUNTY ENVIRONMENTAL PROTECTION COMMIS
COMMENTS: SLAMS-NO2C,NAMS-03
SITE-USER-INFO:

LATITUDE : 27:55:56 N
LONGITUDE : 082:31:43 W
UTM ZONE : 17
UTM NORTHING : 3090463
UTM-EASTING : 00349596
DIFF. GMT : 05
ELEVATION ABOVE MSL : 00001 M
RECORD LAST UPDATED : 87/10/22

Radian Site Code: S1FL

SITE ID : 12-103-0018
CITY POPULATION : 238,647
AQCR POPULATION : 2,201,939
EPA-REGION : 04
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (63000): ST PETERSBURG
COUNTY (103): PINELLAS CO
SITE ADDR : 7200-22 AVENUE NORTH
LAND USE (1): RESIDENTIAL
LOCATION SETTING (2): SUBURBAN
AQCR (052): WEST CENTRAL FLORIDA
URBAN AREA (7060): ST. PETERSBURG, FL
SUPPORTING AGENCY (013): PINELLAS COUNTY DEPARTMENT OF ENVIRONMENTAL MANAGEM
COMMENTS:
SITE-USER-INFO:

LATITUDE : 27:47:08 N
LONGITUDE : 082:44:24 W
UTM ZONE : 17
UTM NORTHING : 3074491
UTM-EASTING : 00328563
DIFF. GMT : 05
ELEVATION ABOVE MSL : 00005 M
RECORD LAST UPDATED : 88/11/04

Radian Site Code: S2FL

SITE ID : 12-103-5002
CITY POPULATION : 13,251
AQCR POPULATION : 2,201,939
EPA-REGION : 04
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (71150): TARPON SPRINGS
COUNTY (103): PINELLAS CO
SITE ADDR : COUNTY ROAD 77 BOOKER CK. PARK
LAND USE (1): RESIDENTIAL
LOCATION SETTING (3): RURAL
AQCR (052): WEST CENTRAL FLORIDA
URBAN AREA (7060): ST. PETERSBURG, FL
SUPPORTING AGENCY (013): PINELLAS COUNTY DEPARTMENT OF ENVIRONMENTAL MANAGEM
COMMENTS: D
SITE-USER-INFO: URBAN SCALE-MAX NEIGHBORHOOD EXPOSURE

LATITUDE : 28:05:24 N
LONGITUDE : 082:42:03 W
UTM ZONE : 17
UTM NORTHING : 3108168
UTM-EASTING : 00332892
DIFF. GMT : 05
ELEVATION ABOVE MSL : 00002 M
RECORD LAST UPDATED : 88/10/06

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

AMP380

STATE (17): ILLINOIS

Radian Site Code: C3IL

SITE ID : 17-031-0042
CITY POPULATION : 3,005,072
AQCR POPULATION : 7,917,109
EPA-REGION : 05
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (14000): CHICAGO
COUNTY (031): COOK CO
SITE ADDR : SEARS TOWER
LAND USE (2): COMMERCIAL
LOCATION SETTING (1): URBAN AND CENTER CITY
AQCR (067): METROPOLITAN CHICAGO
URBAN AREA (0000): NOT IN AN URBAN AREA
SUPPORTING AGENCY (000): ********** DESCRIPTION UNKNOWN **********
COMMENTS:
SITE-USER-INFO:

LATITUDE : 41:52:43 N
LONGITUDE : 087:38:11 W
UTM ZONE : 16
UTM NORTHING : 4636300
UTM-EASTING : 00447200
DIFF. GMT : 06
ELEVATION ABOVE MSL : M
RECORD LAST UPDATED : 80/04/14

Radian Site Code: WAIL

SITE ID : 17-097-1002
CITY POPULATION : 67,653
AQCR POPULATION : 7,917,109
EPA-REGION : 05
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (79293): WAUKEGAN
COUNTY (097): LAKE CO
SITE ADDR : GOLF & JACKSON STS
LAND USE (1): RESIDENTIAL
LOCATION SETTING (2): SUBURBAN
AQCR (067): METROPOLITAN CHICAGO
URBAN AREA (1601): CHICAGO, IL-NORTHWESTERN IN
SUPPORTING AGENCY (001): ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
COMMENTS: HI VOLUME SAMPLER
SITE-USER-INFO:

LATITUDE : 42:23:26 N
LONGITUDE : 087:50:49 W
UTM ZONE : 16
UTM NORTHING : 4693274
UTM-EASTING : 00430286
DIFF. GMT : 06
ELEVATION ABOVE MSL : 00229 M
RECORD LAST UPDATED : 88/09/02

Radian Site Code: BRIL

SITE ID : 17-197-1007
CITY POPULATION : 1
AQCR POPULATION : 7,917,109
EPA-REGION : 05
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (00000): NOT IN A CITY
COUNTY (197): HILL CO
SITE ADDR : SEWAGE PLANT
LAND USE (4): AGRICULTURAL
LOCATION SETTING (3): RURAL
AQCR (067): METROPOLITAN CHICAGO
URBAN AREA (0000): NOT IN AN URBAN AREA
SUPPORTING AGENCY (000): ********** DESCRIPTION UNKNOWN **********
COMMENTS:
SITE-USER-INFO:

LATITUDE : 41:16:40 N
LONGITUDE : 088:13:13 W
UTM ZONE : 16
UTM NORTHING : 4570111
UTM-EASTING : 00397802
DIFF. GMT : 06
ELEVATION ABOVE MSL : 00174 M
RECORD LAST UPDATED : 87/10/01

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

AMP380

STATE (39): OHIO

Radian Site Code: CLOH

SITE ID : 39-035-0033
CITY POPULATION : 573,822
AQCR POPULATION : 3,212,885
EPA-REGION : 05
DATE ESTABLISHED: 71/07/02
DATE TERMINATED : / /
CITY (16000): CLEVELAND
COUNTY (035): CUYAHOGA CO
SITE ADDR : E. 22ND & WOODLAND
LAND USE (2): COMMERCIAL
LOCATION SETTING (1): URBAN AND CENTER CITY
AQCR (174): GREATER METROPOLITAN CLEVELAND
URBAN AREA (1680): CLEVELAND, OH
SUPPORTING AGENCY (009): CLEVELAND AIR POLLUTION CONTROL AGENCY
COMMENTS: ST VINCENT MUNY LOT TRAILER-REAR OF PARKING LOT ACTIVATED 1970
SITE-USER-INFO: ACTIVATED 1970

LATITUDE : 41:29:39 N
LONGITUDE : 081:40:37 W
UTM ZONE : 17
UTM NORTHING : 4593625
UTM-EASTING : 00443494
DIFF. GMT : 05
ELEVATION ABOVE MSL : 00211 M
RECORD LAST UPDATED : 88/12/12

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

AMP380

STATE (26): MICHIGAN

Radian Site Code: D2MI

SITE ID : 26-163-0029
CITY POPULATION : 1,203,339
AQCR POPULATION : 4,183,086
EPA-REGION : 05
DATE ESTABLISHED: 86/02/14
DATE TERMINATED : / /
CITY (22000): DETROIT
COUNTY (163): WAYNE CO
SITE ADDR : 2211 E. JEFFERSON
LAND USE (2): COMMERCIAL
LOCATION SETTING (1): URBAN AND CENTER CITY
AQCR (123): METROPOLITAN DETROIT-PORT HURON
URBAN AREA (0000): NOT IN AN URBAN AREA
SUPPORTING AGENCY (002): WAYNE COUNTY AIR POLLUTION CONTROL DIVISION
COMMENTS: EMSL /NFAN/SLAMS SITE
SITE-USER-INFO:

LATITUDE : 42:20:17 N
LONGITUDE : 083:01:25 W
UTM ZONE : 17
UTM NORTHING : 4689080
UTM-EASTING : 00333291
DIFF. GMT : 05
ELEVATION ABOVE MSL : 00181 M
RECORD LAST UPDATED : 88/12/07

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

AMP380 STATE (48): TEXAS

Radian Site Code: DLTX

SITE ID : 48-113-0069
CITY POPULATION : 904,078
AQCR POPULATION : 3,257,903
EPA-REGION : 06
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (19000): DALLAS
COUNTY (113): DALLAS CO
SITE ADDR : 1415 HINTON ST.
LAND USE (2): COMMERCIAL
LOCATION SETTING (1): URBAN AND CENTER CITY
AQCR (215): METROPOLITAN DALLAS-FORT WORTH
URBAN AREA (1920): DALLAS-FORT WORTH, TX
SUPPORTING AGENCY (000): ********** DESCRIPTION UNKNOWN **********
COMMENTS: FORMERLY MOCKINGBIRD SITE 451310044H01
SITE-USER-INFO: OFFICES MOVED, NEW SITE NEEDED

LATITUDE : 32:49:34 N
LONGITUDE : 096:51:50 W
UTM ZONE : 14
UTM NORTHING : 3633840
UTM-EASTING : 00699960
DIFF. GMT : 06
ELEVATION ABOVE MSL : 00125 M
RECORD LAST UPDATED : 88/12/14

Radian Site Code: H1TX

SITE ID : 48-201-1034
CITY POPULATION : 1,595,138
AQCR POPULATION : 3,276,239
EPA-REGION : 06
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (35000): HOUSTON
COUNTY (201): HARRIS CO
SITE ADDR : HARRIS ELEM SCH 1262 MAE DRIVE
LAND USE (1): RESIDENTIAL
LOCATION SETTING (2): SUBURBAN
AQCR (216): METROPOLITAN HOUSTON-GALVESTON
URBAN AREA (3360): HOUSTON, TX
SUPPORTING AGENCY (001): TEXAS AIR CONTROL BOARD
COMMENTS: EMSL TRACE METALS SAMPLING SITE
SITE-USER-INFO:

LATITUDE : 29:46:17 N
LONGITUDE : 095:13:20 W
UTM ZONE : 15
UTM NORTHING : 3295344
UTM-EASTING : 00285150
DIFF. GMT : 06
ELEVATION ABOVE MSL : 00014 M
RECORD LAST UPDATED : 88/12/14

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

AMP380

STATE (04): ARIZONA

Radian Site Code: P2AZ

SITE ID : 04-013-2004
CITY POPULATION : 88,622
AQCR POPULATION : 2,189,162
EPA-REGION : 09
DATE ESTABLISHED: / /
DATE TERMINATED : / /
CITY (65000): SCOTTSDALE
COUNTY (013): MARICOPA CO
SITE ADDR : 13665 N SCOTTSDALE RD
LAND USE (2): COMMERCIAL
LOCATION SETTING (3): RURAL
AQCR (015): PHOENIX-TUCSON
URBAN AREA (0000): NOT IN AN URBAN AREA
SUPPORTING AGENCY (000): ********** DESCRIPTION UNKNOWN **********
COMMENTS: NORTH SCOTTSDALE/PARADISE VALLEY STATION
SITE-USER-INFO:

LATITUDE : 33:36:15 N
LONGITUDE : 111:55:40 W
UTM ZONE : 12
UTM NORTHING : 3718460
UTM-EASTING : 00413922
DIFF. GMT : 07
ELEVATION ABOVE MSL : 00434 M
RECORD LAST UPDATED : 87/10/01

EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AIR QUALITY SUBSYSTEM
SITE DESCRIPTION INVENTORY

AMP380

STATE (37): NORTH CAROLINA

Radian Site Code: CHNC

SITE ID : 37-119-0034
CITY POPULATION : 314,447
AQCR POPULATION : 1,216,719
EPA-REGION : 04
DATE ESTABLISHED: / /
DATE TERMINATED : / /

CITY (12000): CHARLOTTE
COUNTY (119): MECKLENBURG CO
SITE ADDR : PLAZA ROAD AND LAKEDELL
LAND USE (1): RESIDENTIAL
LOCATION SETTING (2): SUBURBAN
AQCR (167): METROPOLITAN CHARLOTTE

LATITUDE : 35:14:50 N
LONGITUDE : 080:45:50 W
UTM ZONE : 17
UTM NORTHING : 3900287
UTM-EASTING : 00521481
DIFF. GMT : 05
ELEVATION ABOVE MSL : 00239 M
RECORD LAST UPDATED : 88/06/14

URBAN AREA (1519): CHARLOTTE, NC
SUPPORTING AGENCY (003): MECKLENBURG COUNTY DEPARTMENT OF ENVIRONMENTAL HEAL
COMMENTS: NEW SITE-OZONE CARBON MONOXIDE AND NO 2 CONTINUOUS
SITE-USER-INFO: NEIGHBORHOOD SCALE POPULATION ORIENTED FOR CO & OZONE

APPENDIX E

1988 NMOC MONITORING PROGRAM SITE DATA

APPENDIX E -- LIST OF FIGURES

Figure		Page
E-1	Plot of NMOC concentration for Boston, MA	E-2
E-2	Plot of NMOC concentration for Providence, RI	E-6
E-3	Plot of NMOC concentration for Springfield, MA	E-10
E-4	Plot of NMOC concentration for Springfield, MA (Hospital)	E-14
E-5	Plot of NMOC concentration for Worcester, MA	E-18
E-6	Plot of NMOC concentration for New York, NY (Bronx/Manhattan)	E-22
E-7	Plot of NMOC concentration for New York, NY (Manhattan)	E-26
E-8	Plot of NMOC concentration for Newark, NJ	E-30
E-9	Plot of NMOC concentration for Plainfield, NJ	E-34
E-10	Plot of NMOC concentration for New York, NY (World Trade Center)	E-38
E-11	Plot of NMOC concentration for Charlotte, NC	E-40
E-12	Plot of NMOC concentration for Memphis, TN (Alabama)	E-44
E-13	Plot of NMOC concentration for Memphis, TN (Frayser)	E-48
E-14	Plot of NMOC concentration for Miami, FL (University)	E-52
E-15	Plot of NMOC concentration for Miami, FL	E-56
E-16	Plot of NMOC concentration for Nashville, TN (Lentz)	E-60
E-17	Plot of NMOC concentration for Nashville, TN (Trinity Lane)	E-64
E-18	Plot of NMOC concentration for St. Petersburg, FL (North)	E-68
E-19	Plot of NMOC concentration for St. Petersburg, FL (Azalea Park)	E-72
E-20	Plot of NMOC concentration for Tampa, FL (EPC)	E-76
E-21	Plot of NMOC concentration for Tampa, FL (Beach Park)	E-80
E-22	Plot of NMOC concentration for Braidwood, IL	E-84
E-23	Plot of NMOC concentration for Chicago, IL (Sears Tower)	E-88

APPENDIX E -- LIST OF FIGURES (Continued)

Figure		Page
E-24	Plot of NMOC concentration for Chicago, IL (CTA).....	E-92
E-25	Plot of NMOC concentration for Cleveland, OH (Convention Center)	E-96
E-26	Plot of NMOC concentration for Cleveland, OH (Hospital).....	E-100
E-27	Plot of NMOC concentration for Detroit, MI (Linwood).....	E-104
E-28	Plot of NMOC concentration for Detroit, MI (Wayne County Lab)...	E-108
E-29	Plot of NMOC concentration for Waukegan, IL.....	E-112
E-30	Plot of NMOC concentration for Austin, TX.....	E-116
E-31	Plot of NMOC concentration for Beaumont, TX.....	E-120
E-32	Plot of NMOC concentration for Dallas, TX.....	E-124
E-33	Plot of NMOC concentration for El Paso, TX.....	E-128
E-34	Plot of NMOC concentration for Houston, TX.....	E-132
E-35	Plot of NMOC concentration for San Antonio, TX.....	E-136
E-36	Plot of NMOC concentration for St. Louis, MO.....	E-140
E-37	Plot of NMOC concentration for Azusa, CA.....	E-144
E-38	Plot of NMOC concentration for Bakersfield, CA (Oildale).....	E-148
E-39	Plot of NMOC concentration for Bakersfield, CA (Edison).....	E-152
E-40	Plot of NMOC concentration for Fremont, CA.....	E-156
E-41	Plot of NMOC concentration for Phoenix, AZ (39th & Earl).....	E-160
E-42	Plot of NMOC concentration for Phoenix, AZ (Scotsdale).....	E-164
E-43	Plot of NMOC concentration for Sacramento, CA.....	E-168
E-44	Plot of NMOC concentration for Sacramento, CA (Citrus Heights)..	E-17

APPENDIX E -- LIST OF TABLES

Table		Page
E-1	SUMMARY OF THE 1988 NMOC DATA FOR BOSTON, MA (B2MA).....	E-3
E-2	SUMMARY OF THE 1988 NMOC DATA FOR PROVIDENCE, RI (PRRI).....	E-7
E-3	SUMMARY OF THE 1988 NMOC DATA FOR SPRINGFIELD, MA (S1MA).....	E-11
E-4	SUMMARY OF THE 1988 NMOC DATA FOR SPRINGFIELD, MA (S2MA).....	E-15
E-5	SUMMARY OF THE 1988 NMOC DATA FOR WORCESTER, MA (WOMA).....	E-19
E-6	SUMMARY OF THE 1988 NMOC DATA FOR NEW YORK, NY (M1NY/BNY).....	E-23
E-7	SUMMARY OF THE 1988 NMOC DATA FOR NEW YORK, NY (MNY).....	E-27
E-8	SUMMARY OF THE 1988 NMOC DATA FOR NEWARK, NJ (NWNJ).....	E-31
E-9	SUMMARY OF THE 1988 NMOC DATA FOR PLAINFIELD, NJ (PLNJ).....	E-35
E-10	SUMMARY OF THE 1988 NMOC DATA FOR NEW YORK, NY (W1NY).....	E-39
E-11	SUMMARY OF THE 1988 NMOC DATA FOR CHARLOTTE, NC (CHNC).....	E-41
E-12	SUMMARY OF THE 1988 NMOC DATA FOR MEMPHIS, TN (M1TN).....	E-45
E-13	SUMMARY OF THE 1988 NMOC DATA FOR MEMPHIS, TN (M2TN).....	E-49
E-14	SUMMARY OF THE 1988 NMOC DATA FOR MIAMI, FL (M2FL).....	E-53
E-15	SUMMARY OF THE 1988 NMOC DATA FOR MIAMI, FL (M1FL).....	E-57
E-16	SUMMARY OF THE 1988 NMOC DATA FOR NASHVILLE, TN (N1TN).....	E-61
E-17	SUMMARY OF THE 1988 NMOC DATA FOR NASHVILLE, TN (N2TN).....	E-65
E-18	SUMMARY OF THE 1988 NMOC DATA FOR ST. PETERSBURG, FL (S1FL).....	E-69
E-19	SUMMARY OF THE 1988 NMOC DATA FOR ST. PETERSBURG, FL (S2FL).....	E-73
E-20	SUMMARY OF THE 1988 NMOC DATA FOR TAMPA, FL (T1FL).....	E-77
E-21	SUMMARY OF THE 1988 NMOC DATA FOR TAMPA, FL (T2FL).....	E-81
E-22	SUMMARY OF THE 1988 NMOC DATA FOR BRAIDWOOD, IL (BRIL).....	E-85
E-23	SUMMARY OF THE 1988 NMOC DATA FOR CHICAGO, IL (C3IL).....	E-89

APPENDIX E -- LIST OF TABLES (Continued)

Figure		Page
E-24	SUMMARY OF THE 1988 NMOC DATA FOR CHICAGO, IL (C6IL).....	E-93
E-25	SUMMARY OF THE 1988 NMOC DATA FOR CLEVELAND, OH (C2OH).....	E-97
E-26	SUMMARY OF THE 1988 NMOC DATA FOR CLEVELAND, OH (CLOH).....	E-101
E-27	SUMMARY OF THE 1988 NMOC DATA FOR DETROIT, MI (D1MI).....	E-105
E-28	SUMMARY OF THE 1988 NMOC DATA FOR DETROIT, MI (D2MI).....	E-109
E-29	SUMMARY OF THE 1988 NMOC DATA FOR WAUKEGAN, IL (WAIL).....	E-113
E-30	SUMMARY OF THE 1988 NMOC DATA FOR AUSTIN, TX (AUTX).....	E-117
E-31	SUMMARY OF THE 1988 NMOC DATA FOR BEAUMONT, TX (BMTX).....	E-121
E-32	SUMMARY OF THE 1988 NMOC DATA FOR DALLAS, TX (DLTX).....	E-125
E-33	SUMMARY OF THE 1988 NMOC DATA FOR EL PASO, TX (ELTX).....	E-129
E-34	SUMMARY OF THE 1988 NMOC DATA FOR HOUSTON, TX (H1TX).....	E-133
E-35	SUMMARY OF THE 1988 NMOC DATA FOR SAN ANTONIO, TX (SATX).....	E-137
E-36	SUMMARY OF THE 1988 NMOC DATA FOR ST. LOUIS, MO (SLMO).....	E-141
E-37	SUMMARY OF THE 1988 NMOC DATA FOR AZUSA, CA (AZCA).....	E-145
E-38	SUMMARY OF THE 1988 NMOC DATA FOR BAKERSFIELD, CA (B1CA).....	E-149
E-39	SUMMARY OF THE 1988 NMOC DATA FOR BAKERSFIELD, CA (B2CA).....	E-153
E-40	SUMMARY OF THE 1988 NMOC DATA FOR FREMONT, CA (FECA).....	E-157
E-41	SUMMARY OF THE 1988 NMOC DATA FOR PHOENIX, AZ (P1AZ).....	E-161
E-42	SUMMARY OF THE 1988 NMOC DATA FOR PHOENIX, AZ (P2AZ).....	E-165
E-43	SUMMARY OF THE 1988 NMOC DATA FOR SACRAMENTO, CA (S1CA).....	E-169
E-44	SUMMARY OF THE 1988 NMOC DATA FOR SACRAMENTO, CA (S2CA).....	E-173

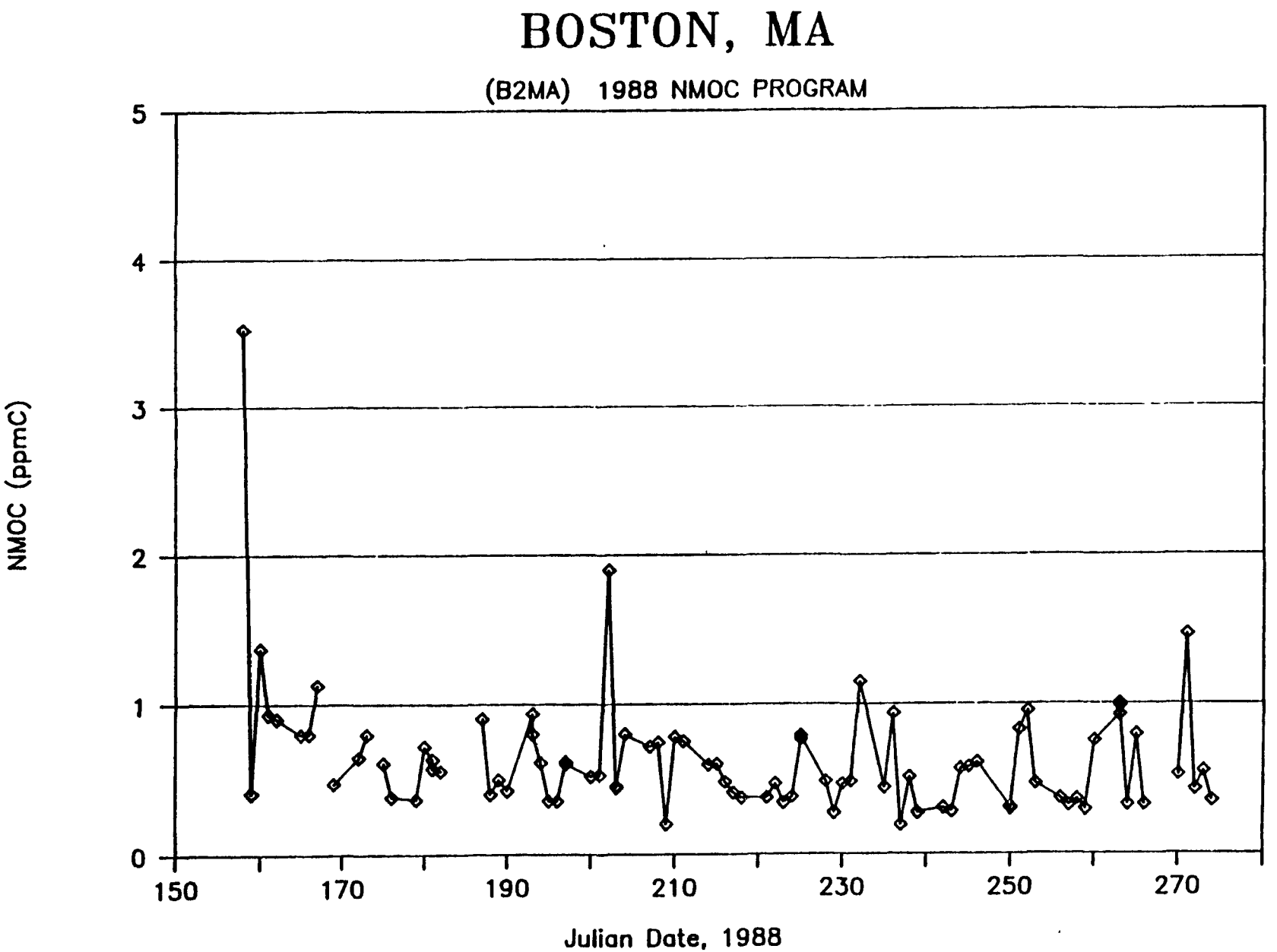


Figure E-1. Plot of NMOC concentration for Boston, MA.

TABLE E-1. SUMMARY OF THE 1988 NMOC DATA FOR BOSTON, MA (B2MA)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/06/88	158	M	1165	866	16.0	15.0	D	3.524	3.376	3.505
06/07/88	159	T	1205	106	17.0	15.0	B	0.410		
06/07/88	159	T	1206	194	17.0	16.0	B	0.405		
06/08/88	160	W	1212	719	16.0	15.0	A	1.370		
06/09/88	161	H	1249	153	16.0	15.0	B	0.930		
06/10/88	162	F	1245	779	16.0	16.0	A	0.902		0.820
06/13/88	165	M	1312	149	17.0	13.5	C	0.797		0.727
06/14/88	166	T	1368	631	17.0	17.0	A	0.800		
06/15/88	167	W	1358	807	17.0	15.0	C	1.126		
06/17/88	169	F	1451	30	15.0	16.0	C	0.469		
06/20/88	172	M	1457	785	17.0	16.5	B	0.643		0.443
06/21/88	173	T	1531	846	16.0	13.0	D	0.798		
06/23/88	175	H	1599	32	15.0	15.0	C	0.606		
06/24/88	176	F	1586	72	16.0	16.0	A	0.379		
06/27/88	179	M	1656	102	16.0	12.0	A	0.366		
06/28/88	180	T	1670	151	15.0	15.0	A	0.719		
06/29/88	181	W	1736	785	21.0	20.0	C	0.632		
06/29/88	181	W	1735	160	21.0	20.0	A	0.571		
06/30/88	182	H	1760	142	15.0	15.0	A	0.554		
07/05/88	187	T	1871	880	16.0	15.0	D	0.902		
07/06/88	188	W	1874	645	16.0	16.0	D	0.399		
07/07/88	189	H	1971	923	16.0	15.0	A	0.498		
07/08/88	190	F	1937	307	15.0	15.0	D	0.421		
07/11/88	193	M	2016	687	17.0	15.0	D	0.934		
07/11/88	193	M	2016	687	17.0	0	C	0.801		
07/12/88	194	T	2021	627	16.0	15.0	C	0.609		
07/13/88	195	W	2098	854	16.0	16.0	B	0.354		
07/14/88	196	H	2095	781	16.0	16.0	A	0.353	0.395	0.414
07/15/88	197	F	2128	186	15.0	15.0	A	0.617		
07/15/88	197	F	2128	186	15.0		B	0.600		
07/18/88	200	M	2189	897	16.0	15.5	C	0.516		
07/19/88	201	T	2208	632	17.0	15.0	C	0.529		
07/20/88	202	W	2297	714	17.0	15.5	A	1.895	1.770	1.915
07/21/88	203	H	2351	813	20.0	18.0	D	0.440		
07/21/88	203	H	2352	782	19.0	19.0	D	0.452		
07/22/88	204	F	2332	720	16.0	14.0	C	0.800		
07/25/88	207	M	2396	816	16.0	15.0	C	0.717		
07/26/88	208	T	2429	186	16.0	15.0	B	0.743		
07/27/88	209	W	2518	12	16.0	14.0	A	0.201	0.385	0.376
07/28/88	210	H	2561	16	15.0	15.0	D	0.780		
07/29/88	211	F	2560	825	16.0	15.0	A	0.753		
08/01/88	214	M	2649	139	15.0	14.0	D	0.595		
08/02/88	215	T	2693	672	16.0	15.0	A	0.602		
08/03/88	216	W	2716	820	16.0	16.0	C	0.480		
08/04/88	217	H	2807	49	16.0	15.0	D	0.408		
08/05/88	218	F	2804	83	16.0	14.0	C	0.375		
08/08/88	221	M	2862	891	16.0	15.0	B	0.374		
08/09/88	222	T	2928	21	16.0	15.0	C	0.468		0.462
08/10/88	223	W	2960	684	16.0	15.0	C	0.341		

TABLE E-1. SUMMARY OF THE 1988 NMOC DATA FOR BOSTON, MA (B2MA)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/11/88	224	H	2998	810	16.0	16.5	D	0.378		
08/12/88	225	F	3035	866	22.0	22.0	C	0.764		
08/12/88	225	F	3036	885	22.0	21.0	C	0.788		
08/15/88	228	M	3103	403	17.0	14.5	B	0.483		
08/16/88	229	T	3101	501	15.0	16.0	B	0.272		
08/17/88	230	W	3181	75	16.0	14.0	B	0.466		
08/18/88	231	H	3212	121	15.0	14.0	A	0.484		
08/19/88	232	F	3202	43	15.0	15.0	C	1.148		
08/22/88	235	M	3275	406	16.0	15.5	B	0.441		
08/23/88	236	T	3348	500	16.0	16.0	A	0.935		
08/24/88	237	W	3416	620	16.0	15.5	D	0.193		
08/25/88	238	H	3477	812	16.0	16.0	A	0.511		
08/26/88	239	F	3447	799	17.0	16.5	A	0.273		
08/29/88	242	M	3560	762	17.0	16.0	C	0.305		
08/30/88	243	T	3600	194	16.0	15.0	A	0.281		
08/31/88	244	W	3620	706	17.0	17.0	B	0.568		
09/01/88	245	H	3675	634	18.0	17.0	B	0.578		
09/02/88	246	F	3707	730	17.0	17.0	D	0.609		
09/06/88	250	T	3783	47	18.0	18.0	B	0.307		
09/06/88	250	T	3783	47	18.0	12.0	B	0.300		
09/06/88	250	T	3784	40	18.0	18.0	D	0.310		
09/06/88	250	T	3784	40	18.0	13.0	D	0.309		
09/07/88	251	W	3761	66	16.0	15.0	C	0.829		
09/08/88	252	H	3897	899	16.0	14.0	B	0.951		
09/09/88	253	F	3852	636	16.0	16.0	A	0.467		
09/12/88	256	M	3979	725	16.0	18.0	C	0.364		
09/13/88	257	T	3991	620	20.0	16.0	C	0.318		
09/14/88	258	W	4002	881	16.0	12.0	D	0.360		
09/15/88	259	H	4074	833	16.0	14.0	A	0.292		0.290
09/16/88	260	F	4139	785	17.0	15.0	B	0.752		
09/19/88	263	M	4195	641	20.0	19.0	B	0.925		
09/19/88	263	M	4196	806	20.0	18.5	D	1.004		
09/19/88	263	M	4195	641	20.0	12.0	B	0.992		
09/19/88	263	M	4196	806	20.0	12.0	D	0.982		
09/20/88	264	T	4242	152	16.0	14.0	A	0.327		
09/21/88	265	W	4262	145	15.0	12.0	A	0.794		
09/22/88	266	H	4318	676	16.0	14.0	D	0.326		
09/26/88	270	M	4420	819	15.0	15.0	A	0.527		
09/27/88	271	T	4436	922	16.0	15.0	D	1.460		
09/28/88	272	W	4498	845	16.0	11.5	D	0.427		
09/29/88	273	H	4543	790	16.0	16.0	C	0.550		
09/30/88	274	F	4553	145	16.0	15.0	D	0.352		0.405

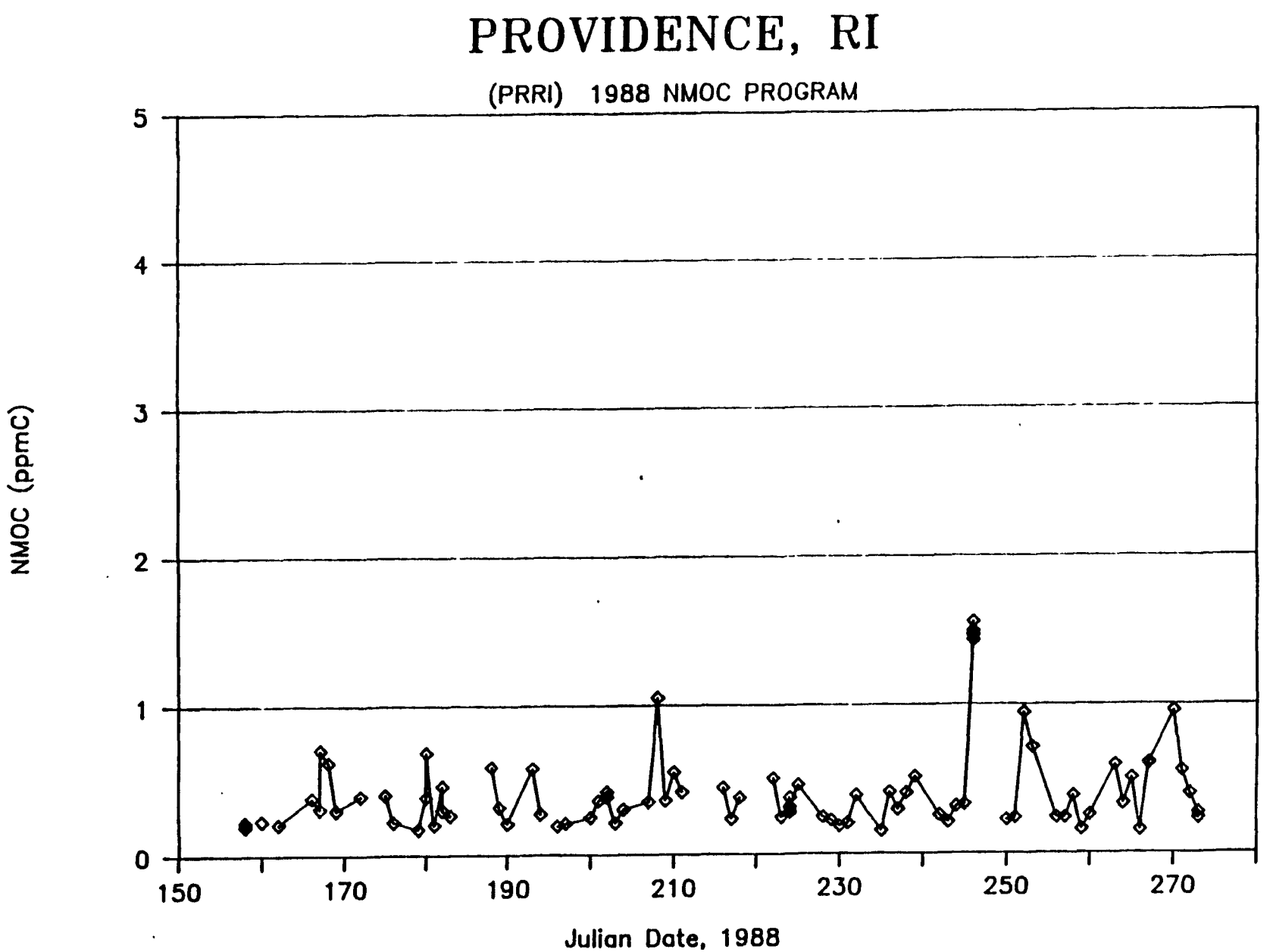


Figure E–2. Plot of NMOC concentration for Providence, RI.

TABLE E-2. SUMMARY OF THE 1988 NMOC DATA FOR PROVIDENCE, RI (PRRI)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/06/88	158	M	1194	678	20.0	12.0	A	0.221		
06/06/88	158	M	1195	627	15.9		D	0.193		
06/08/88	160	W	1214	155	14.5	14.5	D	0.231		
06/10/88	162	F	1316	645	17.8	19.0	A	0.209	0.223	0.144
06/13/88	166	M	1353	773	19.2	17.0	A	0.380		
06/14/88	167	T	1386	646	19.0	19.0	B	0.308		
06/15/88	167	W	1472	63	14.6	14.0	C	0.701		
06/16/88	168	H	1438	43	12.8	10.0	A	0.619		
06/17/88	169	F	1477	78	13.8	12.0	D	0.297		
06/20/88	172	M	1532	685	14.3	12.0	B	0.392	0.389	0.286
06/23/88	175	H	1663	147	12.7	12.0	B	0.398		
06/24/88	176	F	1681	798	14.2	14.0	A	0.219		
06/27/88	179	M	1701	801	13.0	11.0	D	0.172		0.582
06/28/88	180	T	1781	894	16.8	16.0	A	0.381		
06/28/88	180	T	1782	828	17.8	19.0	B	0.683		
06/29/88	181	W	1788	796	14.0	13.0	D	0.200		
06/30/88	182	H	1838	829	12.8	12.0	C	0.457		
06/30/88	182	H	1838	829	12.8	5.0	B	0.298		
07/01/88	183	F	1865	709	17.5	18.0	A	0.262		
07/06/88	188	W	1913	648	17.6	18.0	A	0.584		0.445
07/07/88	189	H	1997	32	18.0	17.0	C	0.315		
07/08/88	190	F	2024	889	17.6	16.0	C	0.208		
07/11/88	193	M	2065	769	17.2	17.0	A	0.575		
07/12/88	194	T	2097	640	10.0	8.0	D	0.269		
07/14/88	196	H	2185	10	17.6	16.0	C	0.192		
07/15/88	197	F	2216	137	17.8	16.0	D	0.209		
07/18/88	200	M	2252	818	17.3	16.0	B	0.247		
07/19/88	201	T	2303	101	14.2	17.0	D	0.356		
07/20/88	202	W	2320	172	16.8	18.0	C	0.418		
07/20/88	202	W	2321	104	19.0	18.0	D	0.382		
07/21/88	203	H	2314	28	17.6	17.0	C	0.211		
07/22/88	204	F	2326	92	17.0	18.0	D	0.300		0.301
07/25/88	207	M	2419	666	19.0	18.0	B	0.351		
07/26/88	208	T	2519	400	17.5	18.0	C	1.051	0.946	1.084
07/27/88	209	W	2574	830	17.8	17.0	D	0.356		
07/28/88	210	H	2513	98	17.2	16.0	B	0.548		
07/29/88	211	F	2606	185	17.9	17.0	A	0.413		
08/03/88	216	W	2777	654	17.9	18.0	B	0.440		
08/04/88	217	H	2829	176	17.8	17.0	C	0.232		
08/05/88	218	F	2812	803	18.0	18.0	B	0.373		
08/09/88	222	T	2914	808	17.9	17.0	A	0.502		
08/10/88	223	W	2983	815	19.2	28.0	D	0.243		
08/11/88	224	H	3070	882	19.0	17.0	B	0.274		
08/11/88	224	H	3071	884	19.6	18.0	D	0.375		
08/11/88	224	H	3070	882	19.0		B	0.277		
08/11/88	224	H	3071	844	19.6		D	0.311		
08/12/88	225	F	3053	892	17.7	17.0	A	0.458		0.531
08/15/88	228	M	3088	874	18.0	16.0	B	0.245		
08/16/88	229	T	3192	651	18.5	18.0	A	0.221		

TABLE E-2. SUMMARY OF THE 1988 NMOC DATA FOR PROVIDENCE, RI (PRRI)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/17/88	230	W	3188	698	18.8	18.0	A	0.183		
08/18/88	231	H	3282	868	17.9	17.0	C	0.202	0.208	
08/19/88	232	F	3276	903	18.0	17.0	C	0.388		
08/22/88	235	M	3322	661	18.8	18.5	D	0.150		
08/23/88	236	T	3424	166	18.5	19.0	D	0.407		
08/24/88	237	W	3425	911	22.2	22.0	A	0.291		
08/25/88	238	H	3503	642	18.5	18.0	B	0.402		
08/26/88	239	F	3492	771	18.6	18.0	A	0.510		
08/29/88	242	M	3566	830	18.0	17.0	A	0.257		
08/30/88	243	T	3603	640	18.8	18.0	B	0.209		
08/31/88	244	W	3619	409	18.4	18.0	A	0.313		
09/01/88	245	H	3663	75	18.3	17.0	C	0.327		
09/02/88	246	F	3752	632	20.2	20.0	A	1.461		
09/02/88	246	F	3753	77	20.4	20.0	D	1.551		
09/02/88	246	F	3752	632	20.2	16.0	A	1.428		
09/02/88	246	F	3753	677	20.4	0.0	D	1.485		
09/06/88	250	T	3833	684	18.9	18.0	B	0.223		
09/07/88	251	W	3828	658	18.8	13.0	B	0.237		
09/08/88	252	H	3848	727	19.5	18.0	A	0.942		1.326
09/09/88	253	F	3918	716	19.2	18.0	C	0.708		
09/12/88	256	M	3943	892	18.4	18.0	C	0.236		
09/13/88	257	T	4049	129	18.0	16.0	B	0.235		0.274
09/14/88	258	W	4032	304	17.8	17.0	A	0.378		
09/15/88	259	H	4091	914	18.0	17.0	B	0.154		
09/16/88	260	F	4167	839	18.8	18.0	D	0.254		
09/19/88	263	M	4188	25	18.0	17.0	B	0.586		
09/20/88	264	T	4254	153	17.9	16.0	D	0.326		
09/21/88	265	W	4260	14	17.5	14.0	A	0.496		
09/22/88	266	H	4361	723	18.8	14.0	D	0.150		
09/23/88	267	F	4380	17	19.6	19.0	A	0.593		
09/23/88	267	F	4381	799	19.6	19.0	A	0.601		
09/26/88	270	M	4412	727	19.0	18.0	D	0.951		
09/27/88	271	T	4488	901	18.2	18.0	C	0.547		
09/28/88	272	W	4503	191	18.0	17.0	C	0.394		0.428
09/29/88	273	H	4597	623	20.2	20.0	B	0.267		
09/29/88	273	H	4598	142	20.3	20.0	B	0.229		
09/29/88	273	H	4597	623	20.2	14.0	C	0.275		
09/29/88	273	H	4598	142	20.3	14.0	C	0.236		
09/30/88	274	F	4649	642	20.2	19.0	D	0.441		
09/30/88	274	F	4650	924	20.2	18.0	D	0.456		

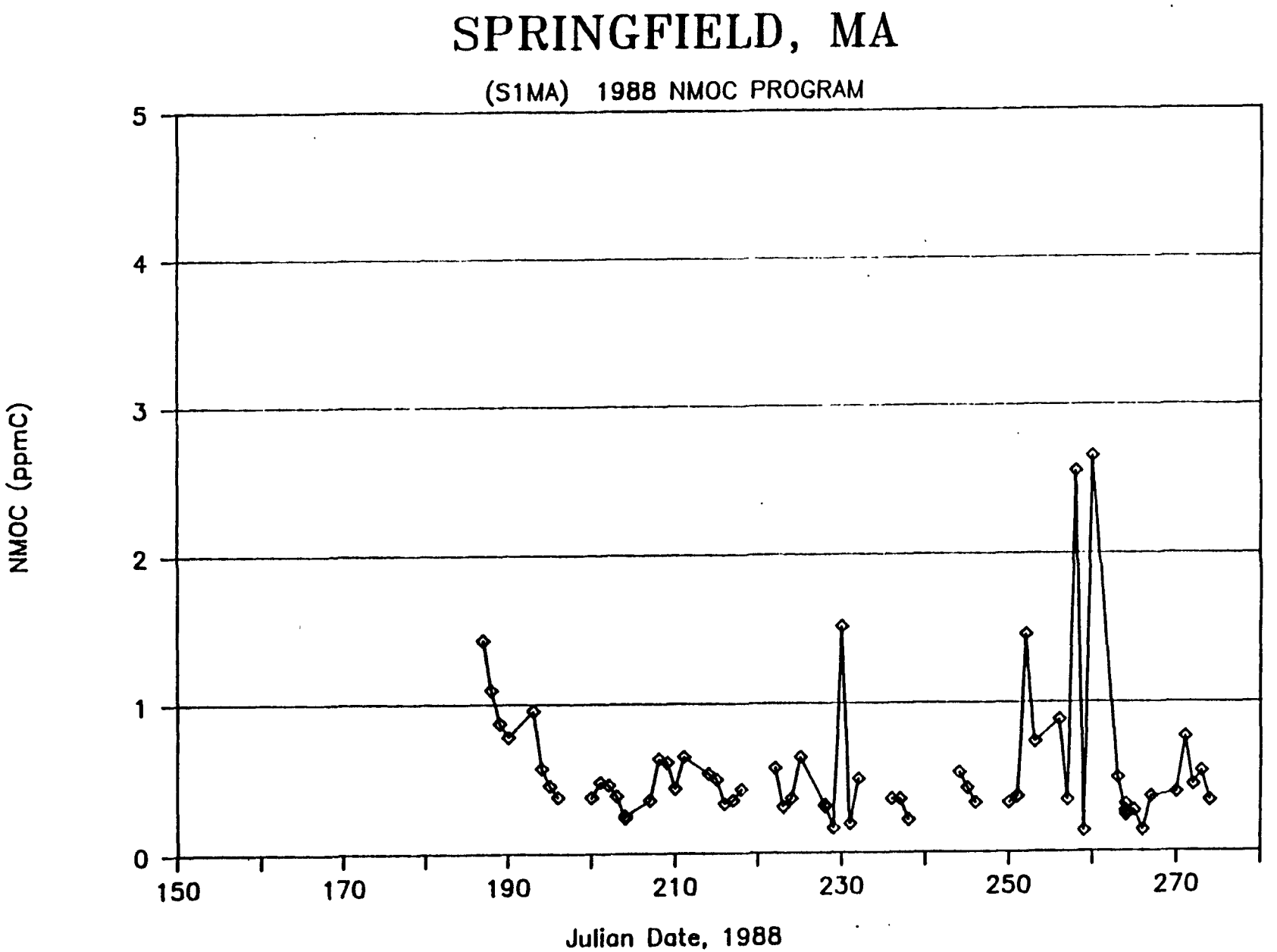


Figure E-3. Plot of NMOC concentration for Springfield, MA.

TABLE E-3. SUMMARY OF THE 1988 NMOC DATA FOR SPRINGFIELD, MA (S1MA)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
07/05/88	187	T	1878	710	14.0	11.5	B	1.426		
07/06/88	188	W	1921	895	13.8	11.0	D	1.095	0.965	0.886
07/07/88	189	H	1977	9	13.0	12.0	B	0.870		
07/08/88	190	F	1992	409	13.8	12.0	A	0.778		
07/11/88	193	M	2038	837	14.0	12.0	C	0.954		
07/12/88	194	T	2080	97	12.5	12.0	C	0.568		
07/13/88	195	W	2141	57	13.0	11.0	D	0.449		
07/14/88	196	H	2138	727	13.8	12.0	D	0.375		
07/18/88	200	M	2201	685	13.8	12.0	D	0.372		
07/19/88	201	T	2263	656	14.0	12.0	A	0.472		
07/20/88	202	W	2307	783	13.8	12.0	A	0.456		
07/21/88	203	H	2382	839	13.5	11.0	B	0.379		
07/22/88	204	F	2401	119	16.0	15.0	A	0.237		
07/22/88	204	F	2402	690	16.0	15.0	A	0.246		
07/25/88	207	M	2420	678	14.0	10.0	A	0.350		
07/26/88	208	T	2453	919	13.0	11.0	D	0.630		
07/27/88	209	W	2511	898	13.2	12.0	D	0.603		
07/28/88	210	H	2570	651	13.5	13.0	B	0.426		0.425
07/29/88	211	F	2607	779	14.0	13.0	B	0.643		
08/01/88	214	M	2637	685	14.0	13.0	A	0.527		
08/02/88	215	T	2682	688	14.0	11.0	D	0.489		0.483
08/03/88	216	W	2717	780	14.2	13.0	C	0.325		
08/04/88	217	H	2792	646	14.2	13.0	B	0.348		
08/05/88	218	F	2816	635	14.0	13.0	A	0.420		
08/09/88	222	T	2895	48	13.0	12.0	B	0.564		0.555
08/10/88	223	W	2964	130	14.0	11.0	D	0.303		
08/11/88	224	H	3093	835	13.8	12.0	B	0.359		
08/12/88	225	F	3048	633	14.0	12.0	C	0.639		
08/15/88	228	M	3119	169	16.0	14.0	D	0.314		0.305
08/15/88	228	M	3120	134	16.0	14.0	D	0.303		
08/15/88	228	M	3119	169	16.0		D	0.316		
08/15/88	228	M	3120	134	16.0	11.0	D	0.311		
08/16/88	229	T	3150	841	13.0	12.0	C	0.164		
08/17/88	230	W	3178	118	13.0	11.0	B	1.510		
08/18/88	231	H	3239	170	13.0	12.0	B	0.191		
08/19/88	232	F	3273	171	13.5	12.0	D	0.488		
08/23/88	236	T	3345	923	13.8	13.0	B	0.354		
08/24/88	237	W	3426	33	13.0	11.0	C	0.355		
08/25/88	238	H	3497	86	13.0	12.0	D	0.216		
08/31/88	244	W	3644	786	14.0	14.0	A	0.532		
09/01/88	245	H	3690	808	14.0	12.0	B	0.425		
09/02/88	246	F	3739	776	14.0	12.0	B	0.327		1.094
09/06/88	250	T	3777	173	13.0	12.0	C	0.327		
09/07/88	251	W	3837	924	16.8	14.0	C	0.372		
09/07/88	251	W	3838	865	16.8	14.0	D	0.363		
09/08/88	252	H	3919	809	10.0	10.0	B	1.452		1.410
09/09/88	253	F	3933	675	10.0	9.0	C	0.732		
09/12/88	256	M	3946	155	10.0	9.0	C	0.882		
09/13/88	257	T	3996	644	10.0	5.0	D	0.344		

TABLE E-3. SUMMARY OF THE 1988 NMOC DATA FOR SPRINGFIELD, MA (S1MA)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
09/14/88	258	W	4060	771	10.0	8.0	D	2.550		
09/15/88	259	H	4081	192	10.0	9.0	D	0.137		
09/16/88	260	F	4130	302	10.0	10.0	C	2.650		2.812
09/19/88	263	M	4172	802	10.5	10.0	D	0.490		
09/20/88	264	T	4244	682	13.2	11.0	C	0.260		
09/20/88	264	T	4245	720	13.2	13.0	C	0.238		
09/20/88	264	T	4245	720	13.2	7.0	C	0.312		
09/20/88	264	T	4244	682	13.2	10.0	C	0.265		
09/21/88	265	W	4273	95	12.8	11.0	B	0.271		
09/22/88	266	H	4352	136	13.0	12.0	C	0.140		
09/23/88	267	F	4396	834	13.0	12.0	A	0.363		
09/26/88	270	M	4400	131	13.5	11.0	D	0.390		0.420
09/27/88	271	T	4465	70	13.5	13.0	B	0.763		
09/28/88	272	W	4505	126	13.5	12.0	B	0.442		
09/29/88	273	H	4545	806	14.0	14.0	A	0.535		
09/30/88	274	F	4601	305	17.0	17.0	D	0.333		
09/30/88	274	F	4602	323	17.0	17.0	B	0.337		

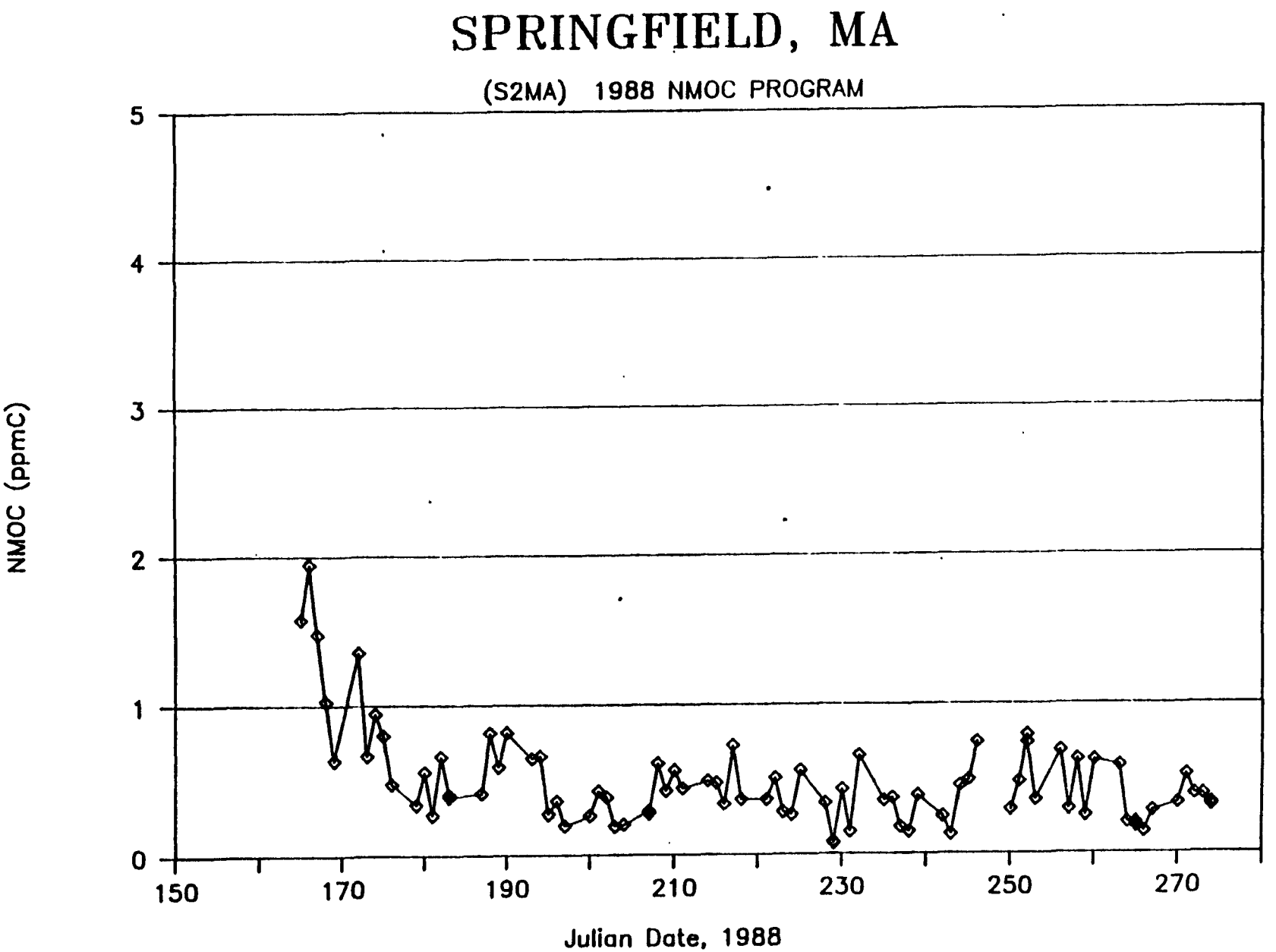


Figure E–4. Plot of NMOC concentration for Springfield, MA (Hospital).

TABLE E-4. SUMMARY OF THE 1988 NMOC DATA FOR SPRINGFIELD, MA (S2MA)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/13/88	165	M	1321	150	11.6	14.0	A	1.577		
06/14/88	166	T	1362	648	12.0	13.0	C	1.946		
06/15/88	167	W	1398	166	12.5	13.0	A	1.475	1.349	1.342
06/16/88	168	F	1464	191	12.2	11.0	D	1.028		
06/17/88	169	H	1463	809	13.5	14.0	A	0.631		
06/20/88	172	M	1505	852	13.0	11.0	C	1.356		
06/21/88	173	T	1526	135	12.4	11.0	D	0.662		
06/22/88	174	W	1552	657	13.8	12.0	C	0.944		0.854
06/23/88	175	H	1601	652	12.9	12.9	D	0.798		
06/24/88	176	F	1642	186	13.0	13.0	D	0.472	0.455	0.425
06/27/88	179	M	1689	190	12.5	12.5	C	0.335		0.312
06/28/88	180	T	1721	73	12.5	11.0	D	0.552		
06/29/88	181	W	1821	844	13.0	13.0	D	0.266		
06/30/88	182	H	1816	87	12.0	12.0	C	0.657		
07/01/88	183	F	1853	793	17.0	16.0	B	0.402		
07/01/88	183	F	1854	766	17.0	17.0	B	0.384		
07/05/88	187	T	1882	699	15.5	16.0	A	0.410	0.436	0.316
07/06/88	188	W	1914	93	14.0	14.0	D	0.811		0.716
07/07/88	189	H	1979	197	14.0	14.0	B	0.584		
07/08/88	190	F	1991	92	14.0	14.0	B	0.816		
07/11/88	193	M	2039	304	14.0	14.0	C	0.641		
07/12/88	194	T	2079	842	13.8	14.0	D	0.658		
07/13/88	195	W	2146	84	14.8	14.0	B	0.270		
07/14/88	196	H	2137	651	15.2	15.0	C	0.356		
07/15/88	197	F	2191	179	14.0	13.0	D	0.195		
07/18/88	200	M	2206	805	15.2	15.0	D	0.258		
07/19/88	201	T	2282	637	15.2	15.0	C	0.420		
07/20/88	202	W	2311	839	14.0	13.0	B	0.380		
07/21/88	203	H	2383	676	14.5	15.0	A	0.187		
07/22/88	204	F	2449	729	14.5	14.0	B	0.201		
07/25/88	207	M	2436	628	17.5	17.0	A	0.288		
07/25/88	207	M	2437	715	17.5	17.0	B	0.272		
07/26/88	208	T	2461	784	15.0	14.0	D	0.607		
07/27/88	209	W	2516	642	15.0	15.0	C	0.420		
07/28/88	210	H	2572	915	14.0	14.0	D	0.558		0.520
07/29/88	211	F	2601	818	14.0	14.0	C	0.437		0.391
08/01/88	214	M	2627	648	14.5	14.5	B	0.489		
08/02/88	215	T	2700	792	15.5	16.0	B	0.476		
08/03/88	216	W	2721	789	15.5	15.0	B	0.331		
08/04/88	217	H	2791	649	15.0	15.0	B	0.725		0.737
08/05/88	218	F	2817	809	15.0	16.0	D	0.361		
08/08/88	221	M	2854	190	14.2	15.0	B	0.363		
08/09/88	222	T	2898	915	14.0	14.0	B	0.506		
08/10/88	223	W	2962	163	14.0	14.0	A	0.278		
08/11/88	224	H	3094	136	14.0	14.5	B	0.261		
08/12/88	225	F	3056	721	15.5	15.0	D	0.555		
08/15/88	228	M	3097	186	14.0	14.0	C	0.333		
08/16/88	229	T	3136	823	16.0	16.0	D	0.075		
08/16/88	229	T	3137	819	16.0	17.0	D	0.070		

TABLE E-4. SUMMARY OF THE 1988 NMOC DATA FOR SPRINGFIELD, MA (S2MA)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/16/88	229	T	3136	823	16.0	13.0	D	0.079		
08/16/88	229	T	3137	819	16.0	12.0	D	0.075		
08/17/88	230	W	3182	122	14.0	14.0	B	0.427		
08/18/88	231	H	3248	827	14.0	14.0	B	0.146		
08/19/88	232	F	3274	674	15.0	15.0	C	0.654		
08/22/88	235	M	3326	139	14.6	15.0	B	0.350		
08/23/88	236	T	3346	306	14.8	16.0	C	0.370	0.357	
08/24/88	237	W	3419	154	14.0	14.0	A	0.178		
08/25/88	238	H	3498	51	13.8	14.0	A	0.147		
08/26/88	239	F	3515	192	14.0	14.0	A	0.385		
08/29/88	242	M	3546	16	13.8	13.0	A	0.243	0.270	0.273
08/30/88	243	T	3590	630	13.0	11.0	A	0.127		
08/31/88	244	W	3635	700	15.4	16.0	B	0.450		
09/01/88	245	H	3708	659	15.6	15.0	C	0.489		
09/02/88	246	F	3747	783	15.6	12.0	C	0.741		
09/06/88	250	T	3772	190	14.5	14.0	B	0.290		
09/07/88	251	W	3798	826	14.5	14.0	C	0.477		
09/08/88	252	H	3888	79	17.0	16.0	C	0.790		
09/08/88	252	H	3889	787	17.0	16.0	D	0.737		
09/09/88	253	F	3925	56	14.0	14.0	A	0.353		
09/12/88	256	M	3941	24	14.8	15.0	B	0.683		0.718
09/13/88	257	T	3989	648	14.2	12.0	D	0.290		
09/14/88	258	W	4057	196	14.0	13.0	A	0.623		
09/15/88	259	H	4078	112	14.0	12.0	D	0.247		
09/16/88	260	F	4136	104	15.0	16.0	C	0.617		
09/19/88	263	M	4178	134	14.0	14.0	D	0.582		
09/20/88	264	T	4231	3	14.0	12.0	C	0.203		
09/21/88	265	W	4284	842	17.0	13.0	C	0.200		
09/21/88	265	W	4285	907	17.0	14.0	D	0.174		
09/21/88	265	W	4284	842	17.0	12.0	A	0.201		
09/21/88	265	W	4285	907	17.0	14.0	D	0.190		
09/22/88	266	H	4349	183	12.0	10.0	D	0.141		
09/23/88	267	F	4395	698	12.5	12.5	C	0.277		
09/26/88	270	M	4401	301	12.0	11.0	D	0.328		0.369
09/27/88	271	T	4467	915	12.0	13.0	B	0.521		
09/28/88	272	W	4504	119	12.0	12.0	C	0.387		
09/29/88	273	H	4547	827	12.8	13.0	D	0.389		
09/30/88	274	F	4612	25	14.0	15.0	C	0.313		
09/30/88	274	F	4613	129	14.0	15.0	D	0.328		

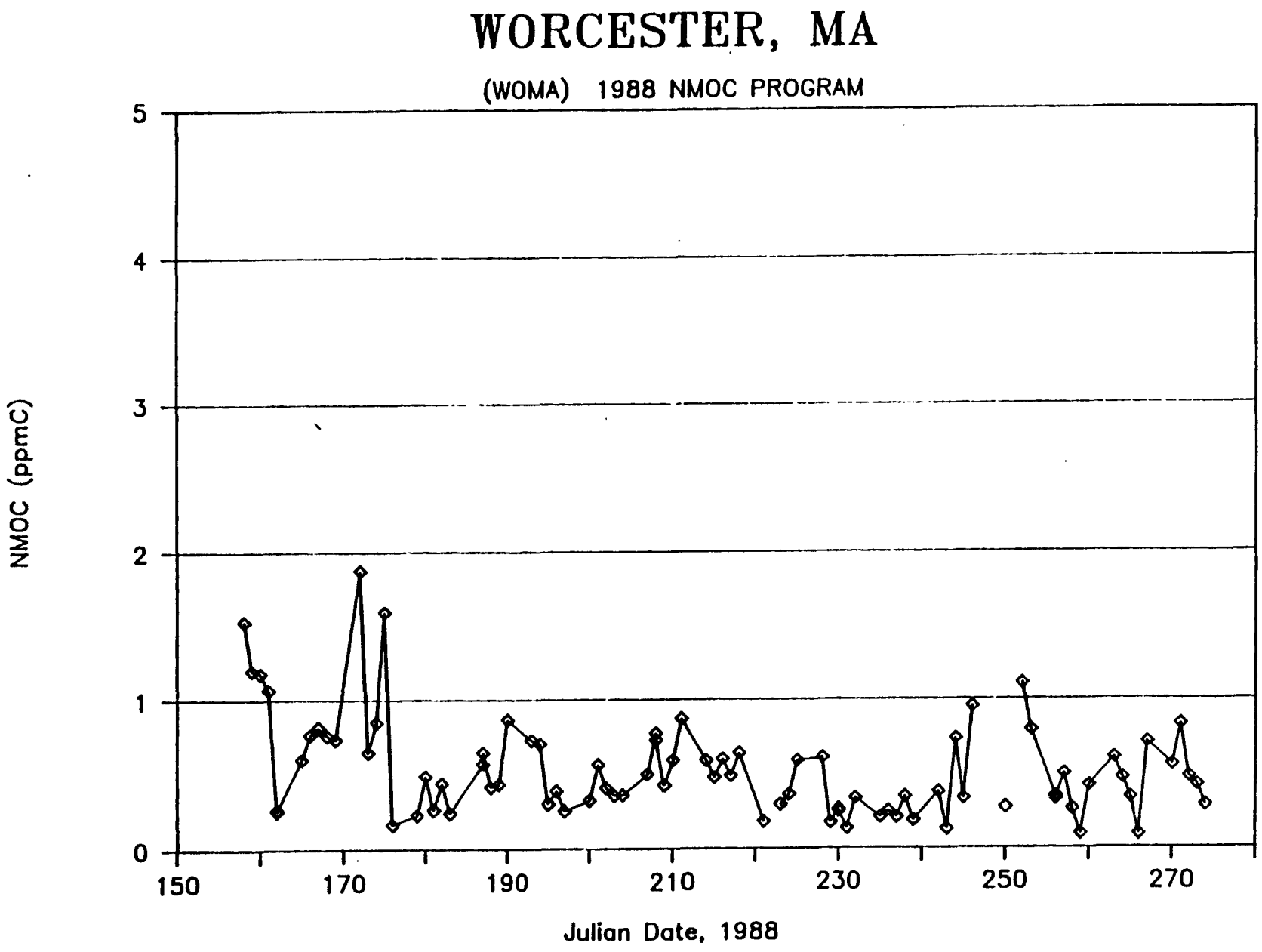


Figure E-5. Plot of NMOC concentration for Worcester, MA.

TABLE E-5. SUMMARY OF THE 1988 NMOC DATA FOR WORCESTER, MA (WOMA)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/06/88	158	M	1238	186	11.0	11.0	A	1.528		
06/07/88	159	T	1246	62	11.5	11.0	D	1.198		
06/08/88	160	W	1243	73	11.5	11.5	B	1.176		
06/09/88	161	H	1275	35	11.5	11.0	D	1.068		
06/10/88	162	F	1263	6	14.9	16.5	C	0.263		
06/10/88	162	F	1264	147	17.9	16.0	C	0.256		0.189
06/13/88	165	M	1310	97	14.8	12.0	D	0.598		
06/14/88	166	T	1326	775	14.8	13.0	C	0.765		
06/15/88	167	W	1338	713	14.5	13.0	D	0.814		
06/16/88	168	H	1400	920	14.0	11.0	D	0.758		
06/17/88	169	F	1420	761	14.0	12.5	D	0.733	0.716	0.535
06/20/88	172	M	1512	633	19.5	14.0	D	1.875		
06/21/88	173	T	1498	805	14.1	12.0	D	0.647	0.426	0.365
06/22/88	174	W	1534	56	14.0	13.0	C	0.848		
06/23/88	175	H	1553	642	14.0	15.0	A	1.593		
06/24/88	176	F	1588	51	14.0	14.0	C	0.165		
06/27/88	179	M	1662	20	12.5	13.0	D	0.227		
06/28/88	180	T	1715	700	14.1	15.0	A	0.483	0.527	0.430
06/29/88	181	W	1774	148	14.0	14.0	C	0.261		
06/30/88	182	H	1804	17	13.9	12.5	A	0.436		
07/01/88	183	F	1790	807	14.1	14.0	D	0.240		
07/05/88	187	T	1924	403	19.0	18.0	A	0.567		
07/05/88	187	T	1925	652	19.0	19.0	C	0.644		
07/06/88	188	W	1899	11	14.0	13.0	D	0.411		0.308
07/07/88	189	H	1978	183	14.0	14.0	A	0.429		
07/08/88	190	F	2006	501	14.0	12.0	A	0.864		
07/11/88	193	M	2015	853	14.0	12.0	C	0.725		0.782
07/12/88	194	T	2054	841	13.9	12.5	D	0.699		
07/13/88	195	W	2093	690	14.0	14.0	B	0.299		
07/14/88	196	H	2162	824	12.9	12.0	B	0.383		
07/15/88	197	F	2186	826	13.0	13.0	A	0.252		
07/18/88	200	M	2224	856	13.9	12.0	B	0.320		
07/19/88	201	T	2248	30	13.0	13.0	A	0.558		
07/20/88	202	W	2312	187	13.0	13.0	B	0.402		
07/21/88	203	H	2337	907	13.1	13.0	A	0.352		0.368
07/22/88	204	F	2394	401	13.5	12.0	C	0.354		
07/25/88	207	M	2426	664	14.0	12.0	C	0.495		
07/26/88	208	T	2479	877	18.0	17.0	A	0.772		
07/26/88	208	T	2480	77	18.0	18.0	D	0.726		
07/27/88	209	W	2506	618	14.0	13.0	D	0.418		
07/28/88	210	H	2575	670	14.0	13.5	B	0.591	0.636	0.644
07/29/88	211	F	2602	32	13.0	13.0	D	0.871		0.866
08/01/88	214	M	2623	876		12.0	D	0.588		
08/02/88	215	T	2728	712		16.0	B	0.472		
08/03/88	216	W	2726	19	13.0	12.0	B	0.598		
08/04/88	217	H	2789	863		13.0	B	0.482		
08/05/88	218	F	2867	853	13.0	12.5	C	0.638		
08/08/88	221	M	2853	727	14.0	13.0	D	0.179		
08/10/88	223	W	2943	75	14.0	12.0	C	0.291	0.399	

TABLE E-5. SUMMARY OF THE 1988 NMOC DATA FOR WORCESTER, MA (WOMA)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/11/88	224	H	3064	679	13.0	14.0	C	0.356		
08/12/88	225	F	3072	686	14.0	14.0	C	0.587		
08/15/88	228	M	3102	400	13.0	12.0	C	0.608		
08/16/88	229	T	3153	309	13.0	13.0	A	0.170		
08/17/88	230	W	3179	307	18.0	18.0	A	0.261		
08/17/88	230	W	3180	28	18.0	18.0	A	0.246		
08/17/88	230	W	3179	307	18.0	15.0	A	0.246		
08/18/88	231	H	3252	126	13.0	12.5	D	0.133		
08/19/88	232	F	3321	815	13.0	13.0	D	0.331		
08/22/88	235	M	3323	197	13.0	14.0	B	0.207	0.224	0.251
08/23/88	236	T	3376	839		13.5	A	0.248		
08/24/88	237	W	3428	618	14.0	14.5	B	0.204		
08/25/88	238	H	3493	25	13.0	12.0	C	0.343		
08/26/88	239	F	3530	141	13.0	12.0	B	0.184		
08/29/88	242	M	3570	129	13.0	13.0	D	0.375		0.432
08/30/88	243	T	3604	171	13.0	13.0	C	0.127		
08/31/88	244	W	3647	111	13.0	13.0	B	0.732		
09/01/88	245	H	3691	9	13.0	13.0	D	0.329		
09/02/88	246	F	3754	712	14.0	14.0	C	0.950		
09/06/88	250	T	3766	126	12.0	11.0	D	0.269		
09/08/88	252	H	3859	714	14.0	12.0	B	1.108		1.371
09/09/88	253	F	3914	709	14.0	14.0	C	0.792		
09/12/88	256	M	3980	834	18.0	18.0	A	0.343		0.377
09/12/88	256	M	3981	825	18.0	18.0	A	0.324		
09/13/88	257	T	4017	148	13.0	12.0	D	0.493		
09/14/88	258	W	4052	188	13.0	12.0	D	0.258		
09/15/55	259	H	4096	853	13.0	13.0	C	0.094		
09/16/88	260	F	4165	848	14.0	14.0	D	0.415		
09/19/88	263	M	4194	777	14.0	14.0	C	0.605		
09/20/88	264	T	4247	766	13.0	11.0	C	0.467		
09/21/88	265	W	4281	815	13.0	13.0	A	0.335		
09/22/88	266	H	4388	32	17.9	16.0	D	0.091		
09/22/88	266	H	4389	188	17.9	17.0	D	0.089		
09/23/88	267	F	4392	724	14.0	13.0	B	0.707		
09/26/88	270	M	4376	90	13.0	10.0	D	0.552		
09/27/88	271	T	4432	106	13.0	12.0	C	0.829		
09/28/88	272	W	4481	309	13.0	12.0	A	0.471		
09/29/88	273	H	4563	846	13.0	13.0	A	0.417		
09/30/88	274	F	4589	894	13.0	12.0	C	0.282		

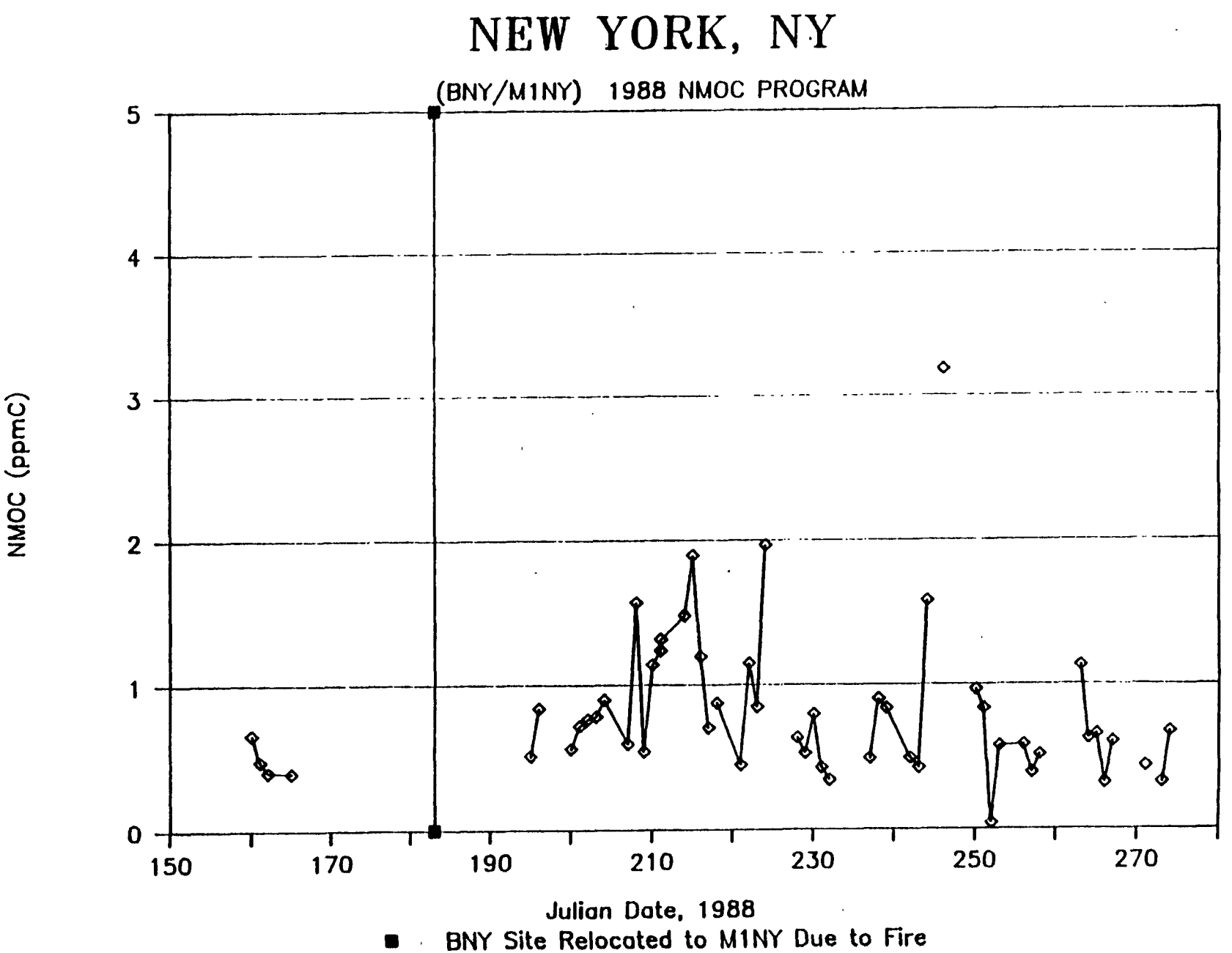


Figure E-6. Plot of NMOC concentration for New York, NY (Bronx/Manhattan).

TABLE E-6. SUMMARY OF THE 1988 NMOC DATA FOR NEW YORK, NY (M1NY/BNY)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/08/88	160	W	1221	112	12.5	12.0	C	0.658		
06/09/88	161	H	1296	22	12.0	14.0	C	0.476		
06/10/88	162	F	1282	64	12.0	14.0	D	0.400		
06/13/88	165	M	1313	771	14.0	13.0	D	0.393	0.501	0.338
07/13/88	195	W	2156	407	13.0	13.0	C	0.509	0.419	0.502
07/14/88	196	H	2130	148		14.0	C	0.838		
07/18/88	200	M	2212	761	14.0	14.0	C	0.560		
07/19/88	201	T	2272	767	14.0	14.0	A	0.717		
07/20/88	202	W	2308	923	13.0	14.0	A	0.764		
07/21/88	203	H	2368	910	13.0	13.0	C	0.780	0.800	0.855
07/22/88	204	F	2414	769	14.0	14.0	A	0.896		
07/25/88	207	M	2440	815	13.0	13.0	D	0.592		
07/26/88	208	T	2473	853	13.0	12.0	B	1.570		
07/27/88	209	W	2522	192	13.0	13.0	C	0.540		
07/28/88	210	H	2551	659	14.0	14.5	A	1.140		
07/29/88	211	F	2619	3	22.0	22.0	B	1.240		
07/29/88	211	F	2620	177	22.0	22.0	D	1.318		
08/01/88	214	M	2648	407	14.0	13.0	D	1.480		
08/02/88	215	T	2696	653	14.0	14.0	D	1.895		
08/03/88	216	W	2727	881	13.0	13.0	C	1.196		
08/04/88	217	W	2802	871	14.0	14.0	B	0.703		
08/05/88	218	F	2813	761	14.0	14.0	C	0.873		
08/08/88	221	M	2859	104	13.0	13.0	C	0.444		
08/09/88	222	T	2907	919	13.0	13.0	D	1.148		
08/10/88	223	W	2975	37	14.0	13.0	D	0.845		
08/11/88	224	H	3018	670	20.0	20.0	B	1.965	1.895	2.119
08/15/88	228	M	3090	678	16.0	16.0	D	0.633	0.572	0.587
08/16/88	229	T	3155	842	12.0	12.0	B	0.526		
08/17/88	230	W	3197	796	14.0	16.0	B	0.794		
08/18/88	231	H	3233	630	14.0	16.0	D	0.423		
08/19/88	232	F	3284	726	14.0	16.0	A	0.341		
08/24/88	237	W	3414	876	12.0	14.0	A	0.490		
08/25/88	238	H	3494	857	12.0	12.0	D	0.900		
08/26/88	239	F	3502	680	14.0	14.0	D	0.834		
08/29/88	242	M	3533	60	13.0	14.0	C	0.490		
08/30/88	243	T	3540	4	6.0	2.0	C	0.421		
08/31/88	244	W	3645	846	13.0	13.5	C	1.580		
09/02/88	246	F	3729	158	14.0	14.0	C	3.186		3.051
09/06/88	250	T	3771	624	14.0	14.0	D	0.963		
09/07/88	251	W	3812	799	13.0	15.0	A	0.831		
09/08/88	252	H	3865	873	14.0	14.0	D	0.040		
09/09/88	253	F	3922	697	14.0	16.0	A	0.573		0.597
09/12/88	256	M	3948	97	13.0	14.0	B	0.582		
09/13/88	257	T	3958	864	11.0	11.5	D	0.388		
09/14/88	258	W	3992	73	13.0	12.0	A	0.510		
09/19/88	263	M	4205	897		12.0	C	1.130		

TABLE E-6. SUMMARY OF THE 1988 NMOC DATA FOR NEW YORK, NY (M1NY/BNY)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
09/20/88	264	T	4166	626	14.0	14.0	D	0.624		
09/21/88	265	W	4282	162	14.0	12.0	D	0.655		
09/22/88	266	H	4341	858	13.0	12.0	A	0.317		0.338
09/23/88	267	F	4298	829	13.0	13.0	D	0.601		
09/27/88	271	T	4427	866	14.0	12.0	D	0.432		
09/29/88	273	H	4541	401	14.0	15.0	C	0.324		
09/30/88	274	F	4594	779	14.0	16.0	D	0.672		

* Site moved from Bronx, New York (BNY) to Manhattan, New York (M1NY)

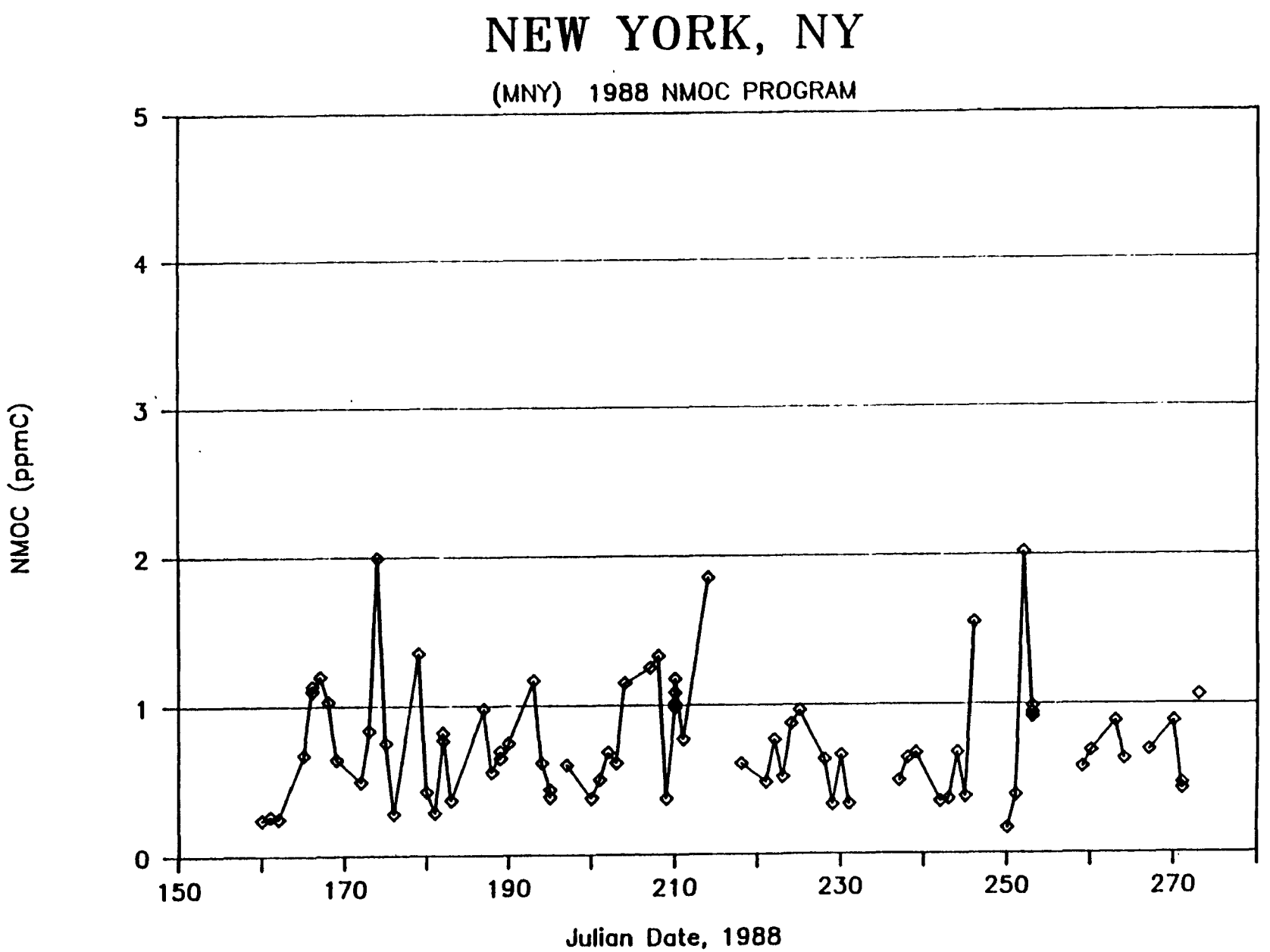


Figure E-7. Plot of NMOC concentration for New York, NY (Manhattan).

TABLE E-7. SUMMARY OF THE 1988 NMOC DATA FOR NEW YORK, NY (MNY)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/08/88	160	W	1219	126	16.5	15.0	D	0.242		
06/09/88	161	H	1293	403	16.5	16.0	B	0.263		
06/10/88	162	F	1287	783	18.0	18.0	C	0.251		
06/13/88	165	M	1315	647	18.0	18.0	B	0.674		0.535
06/14/88	166	T	1347	765	18.0	18.0	B	1.137		
06/14/88	166	T	1348	401	18.0	18.0	B	1.101		
06/15/88	167	W	1403	28	18.0	18.0	A	1.202		
06/16/88	168	H	1421	720	18.0	18.0	A	1.032		
06/17/88	169	F	1475	813	18.0	17.5	D	0.643		
06/20/88	172	M	1468	626	18.0	17.0	C	0.491		0.350
06/21/88	173	T	1530	634	18.0	18.0	C	0.836		0.594
06/22/88	174	W	1572	795	18.0	18.0	C	1.997		
06/23/88	175	H	1600	409	18.0	18.0	D	0.754		
06/24/88	176	F	1660	671	18.0	19.0	B	0.280		
06/27/88	179	M	1667	109	22.0	20.0	D	1.358		
06/28/88	180	T	1716	57	18.0	18.0	D	0.425		0.346
06/29/88	181	W	1773	91	17.0	17.0	D	0.286		
06/30/88	182	H	1785	400	17.0		A	0.768		
06/30/88	182	H	1785	400	17.0	17.0	C	0.821		
07/01/88	183	F	1851	628	18.0	19.0	C	0.369		
07/05/88	187	T	1877	72	17.0	17.0	D	0.980		
07/06/88	188	W	1903	657	18.0	18.0	D	0.552	0.486	0.529
07/07/88	189	H	1933	725	18.0	10.0	A	0.698		
07/07/88	189	H	1933	725	18.0	18.0	B	0.645		
07/08/88	190	F	2002	106	17.0	16.0	B	0.751		
07/11/88	193	M	2027	55	10.0	9.0	B	1.170		
07/12/88	194	T	2053	864	13.0	13.0	C	0.616		
07/13/88	195	W	2100	704	12.0	12.0	A	0.434	0.307	0.372
07/13/88	195	W	2101	649	12.0	12.0	D	0.384		
07/15/88	197	F	2190	180	14.0	13.0	C	0.600		
07/18/88	200	M	2214	697	17.0	17.0	A	0.376		
07/19/88	201	T	2273	663	17.0	7.0	C	0.500		
07/20/88	202	W	2318	825	16.0	17.0	C	0.684		
07/21/88	203	H	2369	887	8.0	8.0	C	0.611		
07/22/88	204	F	2400	808	12.0	11.0	D	1.153		
07/25/88	207	M	2441	154	14.0	13.0	A	1.256		
07/26/88	208	T	2487	820	14.0	14.0	D	1.335		
07/27/88	209	W	2521	171	14.0	15.0	C	0.373		
07/28/88	210	H	2587	833	20.0		B	0.983		
07/28/88	210	H	2587	833	20.0	20.0	B	1.012		
07/28/88	210	H	2588	904	20.0	20.0	C	1.085		
07/28/88	210	H	2588	904	20.0		C	1.179		
07/29/88	211	F	2598	689	16.0	16.0	C	0.772		
08/01/88	214	M	2652	52	15.0	15.0	B	1.855		
08/05/88	218	F	2815	725	10.0	10.0	D	0.607		
08/08/88	221	M	2880	126	11.0	11.0	D	0.480		
08/09/88	222	T	2905	911	12.0	13.0	C	0.768		
08/10/88	223	W	2938	16	15.0	15.0	D	0.513		
08/11/88	224	H	3020	634	16.0	16.0	C	0.873		

TABLE E-7. SUMMARY OF THE 1988 NMOC DATA FOR NEW YORK, NY (MNY)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/12/88	225	F	3067	773	16.0	16.0	D	0.964		
08/15/88	228	M	3090	798	16.0	16.0	D	0.633	0.572	0.587
08/16/88	229	T	3147	775	16.0	17.0	D	0.331		
08/17/88	230	W	3198	717	17.0	16.0	B	0.663		
08/18/88	231	H	3242	781	16.0	17.0	D	0.335		
08/24/88	237	W	3415	893	16.0	16.0	A	0.489		
08/25/88	238	H	3501	856	14.0	15.0	B	0.640		
08/26/88	239	F	3504	179	16.0	16.0	C	0.673		
08/29/88	242	M	3532	151	16.0	16.0	D	0.348		
08/30/88	243	T	3538	308	16.0	15.0	A	0.366		
08/31/88	244	W	3639	914	16.0	16.5	A	0.677		
09/01/88	245	H	3734	643	18.0	18.0	B	0.379		
09/02/88	246	F	3730	63	16.0	16.0	D	1.550		1.451
09/06/88	250	T	3774	650	17.0	16.0	B	0.168		
09/07/88	251	W	3810	633	17.0	16.5	A	0.387		
09/08/88	252	H	3855	827	16.0	13.0	D	2.019		1.987
09/09/88	253	F	3844	904	12.0	12.0	D	0.985		
09/09/88	253	F	3845	849	12.0		D	0.942		
09/09/88	253	F	3845	849	12.0	9.0	D	0.914		
09/15/88	259	H	4132	830	14.0	14.0	D	0.576		
09/16/88	260	F	4131	672	17.0	15.0	C	0.684		
09/19/88	263	M	4206	859		14.0	D	0.884		
09/20/88	264	T	4173	780	15.0	16.0	C	0.628		
09/23/88	267	F	4334	854	17.0	17.0	B	0.692		0.763
09/26/88	270	M	4418	501	20.0	20.0	B	0.882		0.734
09/27/88	271	T	4476	123	20.0	20.0	A	0.424		
09/27/88	271	T	4477	182	20.0	20.0	C	0.464		
09/29/88	273	H	4539	47	13.0	12.0	C	1.063		

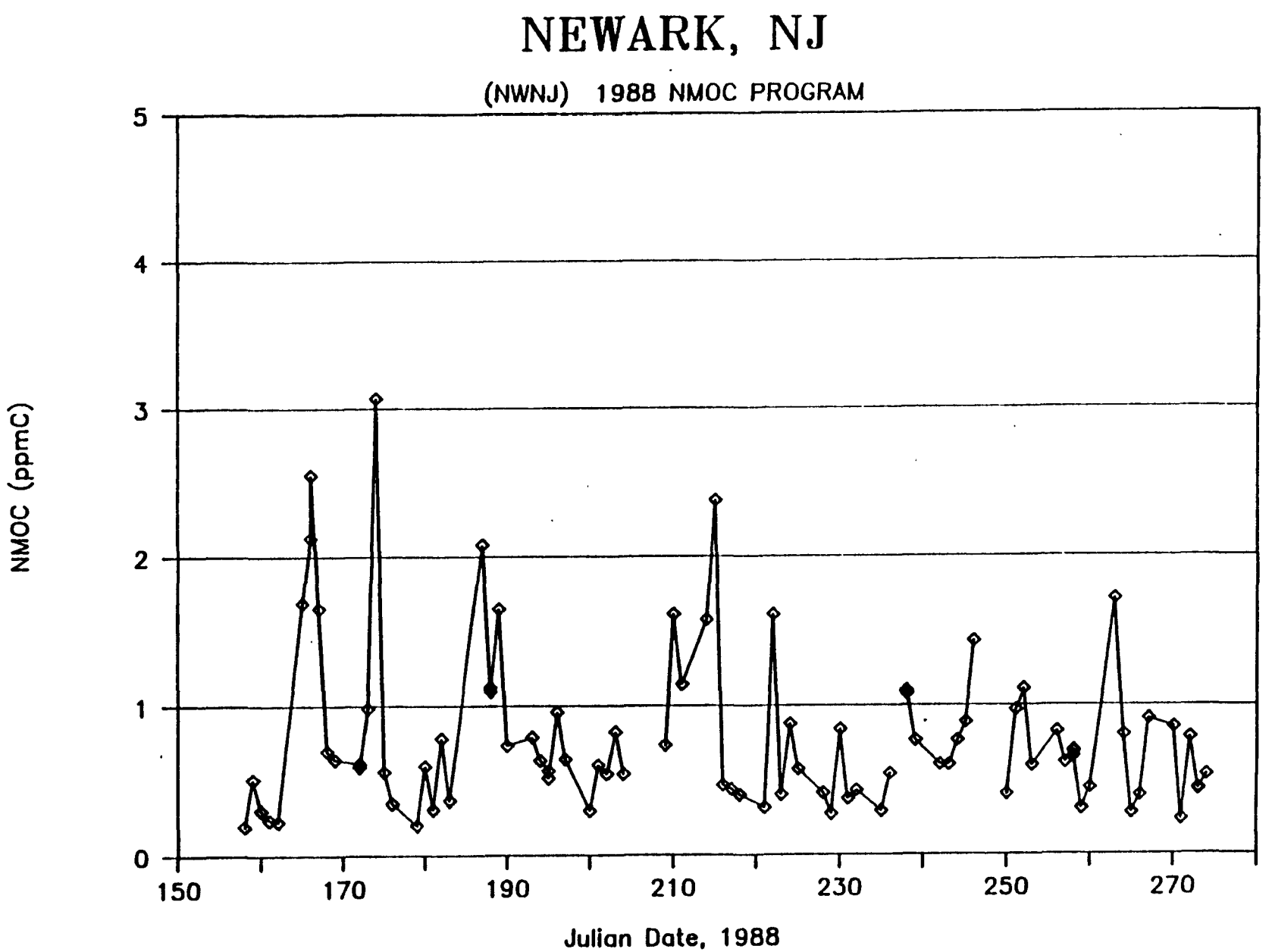


Figure E-8. Plot of NMOC concentration for Newark, NJ.

TABLE E-8. SUMMARY OF THE 1988 NMOC DATA FOR NEWARK, NJ (NWNJ)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/06/88	158	M	1215	658	18.5	14.0	A	0.198		
06/07/88	159	T	1232	95	15.9	13.0	D	0.505		
06/08/88	160	W	1234	668	17.0	16.0	B	0.300		
06/08/88	160	W	1234	668	17.0	10.0	B	0.302		
06/09/88	161	H	1260	630	16.6	14.0	D	0.239		
06/10/88	162	F	1327	49	16.1	15.0	A	0.228		
06/13/88	165	M	1330	307	16.1	14.0	D	1.688		
06/14/88	166	T	1370	893	16.2	15.5	B	2.130		
06/14/88	166	T	1370	893	16.2	15.0	A	2.553		
06/15/88	167	W	1410	924	16.2	16.0	C	1.652		
06/16/88	168	H	1411	763	17.2	16.5	D	0.698		
06/17/88	169	F	1524	12	15.9	13.0	B	0.641		
06/20/88	172	M	1514	781	19.8	19.0	B	0.611		0.453
06/20/88	172	M	1515	718	19.8	17.0	B	0.590		
06/21/88	173	T	1604	892	18.3	18.0	D	0.983		
06/22/88	174	W	1609	187	18.2	15.0	B	3.069		2.925
06/23/88	175	H	1585	891	18.0	17.0	D	0.556		
06/24/88	176	F	1676	771	20.0	20.0	A	0.345		0.227
06/27/88	179	M	1770	131	18.1	18.0	A	0.203		
06/28/88	180	T	1822	33	18.7	17.0	D	0.596		
06/29/88	181	W	1819	785	19.7	19.0	B	0.307		
06/30/88	182	H	1801	633	20.0	18.0	D	0.781		
07/01/88	183	F	1866	163	18.8	17.0	C	0.365		
07/05/88	187	T	1941	323	18.9	18.0	D	2.081	1.841	1.767
07/06/88	188	W	1934	862	19.0	17.0	D	1.126		
07/06/88	188	W	1934	862	19.0	7.0	A	1.098		
07/07/88	189	H	2043	775	19.9	19.0	C	1.649		
07/08/88	190	F	2045	898	18.7	18.0	B	0.733		
07/11/88	193	M	2117	802	19.5	18.0	A	0.789		
07/12/88	194	T	2114	712	19.0	19.0	A	0.633		0.633
07/13/88	195	W	2168	782	19.3	18.0	C	0.563		
07/13/88	195	W	2169	770	19.3	18.5	D	0.511		
07/14/88	196	H	2223	668	19.5	17.5	A	0.957		
07/15/88	197	F	2226	794	19.4	17.0	A	0.641		
07/18/88	200	M	2269	111	18.1	17.0	D	0.296		0.306
07/19/88	201	T	2299	653	19.3	18.0	C	0.600		
07/20/88	202	W	2362	781	19.0	15.0	B	0.539		
07/21/88	203	H	2373	649		18.0	B	0.822		
07/22/88	204	F	2503	17	17.9	16.0	A	0.539		
07/27/88	209	W	2545	922	18.1	17.0	D	0.737		
07/28/88	210	H	2644	630	19.4	18.0	D	1.613		1.504
07/29/88	211	F	2703	403	19.4	17.0	C	1.144	1.072	1.158
08/01/88	214	M	2741	121	18.1	16.0	A	1.576		
08/02/88	215	T	2803	4	18.0	17.0	C	2.379	2.059	2.379
08/03/88	216	W	2805	785	19.0	18.0	C	0.463		
08/04/88	217	H	2925	184	18.2	18.0	D	0.436		
08/05/88	218	F	2888	823	18.0	18.0	A	0.399		
08/05/88	218	F	2889	837	18.0	18.0	B	0.396		
08/08/88	221	M	2927	787	19.7	19.0	D	0.316		

TABLE E-8. SUMMARY OF THE 1988 NMOC DATA FOR NEWARK, NJ (NWNJ)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/09/88	222	T	2967	177	18.2	18.0	A	1.610		1.788
08/10/88	223	W	3026	30	18.0	17.0	C	0.399		
08/11/88	224	H	3021	813	19.4	18.0	D	0.877		
08/12/88	225	F	3104	864	18.1		B	0.570		
08/15/88	228	M	3151	917	18.0	16.0	B	0.408		
08/16/88	229	T	3206	107	18.1	17.0	B	0.272		
08/17/88	230	W	3253	623	20.0	18.0	C	0.839		
08/18/88	231	H	3256	716	19.0	19.0	B	0.371		
08/19/88	232	F	3325	787	20.0	18.6	A	0.428		
08/22/88	235	M	3427	158	19.3	19.0	D	0.288		
08/23/88	236	T	3423	777	20.0	18.0	A	0.538		
08/25/88	238	H	3436	662	19.0	19.0	C	1.100		
08/25/88	238	H	3437	637	19.0	18.0	C	1.080		
08/25/88	238	H	3436	662	19.0	16.0	C	1.084		
08/25/88	238	H	3437	637	19.0	16.0	C	1.084		
08/26/88	239	F	3537	769	19.4	18.0	C	0.765		
08/29/88	242	M	3583	22		16.0	B	0.600		
08/30/88	243	T	3656	899	19.0	18.0	D	0.598		
08/31/88	244	W	3697	710	20.0	18.0	B	0.763		
09/01/88	245	H	3694	689	20.0	18.0	B	0.889		0.982
09/02/88	246	F	3765	622	20.0	18.0	C	1.433		
09/06/88	250	T	3793	777	19.7	19.0	D	0.402		
09/07/88	251	W	3801	131	19.0	18.0	C	0.970		1.191
09/08/88	252	H	3901	662	20.0	20.0	B	1.109		
09/09/88	253	F	3949	782	19.9	18.5	D	0.592		
09/12/88	256	M	4008	912	19.0	18.0	B	0.822		
09/13/88	257	T	4107	17	19.1	17.0	B	0.612		
09/14/88	258	W	4103	123	19.2	17.0	A	0.682		
09/14/88	258	W	4104	913	19.2	17.0	B	0.693		
09/14/88	258	W	4103	123	19.2	10.0	A	0.694		
09/14/88	258	W	4104	913	19.2	10.0	B	0.652		
09/15/88	259	H	4127	679	20.0	19.0	C	0.304		0.298
09/16/88	260	F	4230	118	19.0	19.0	C	0.440		
09/19/88	263	M	4236	8	19.1	17.0	A	1.710		1.957
09/20/88	264	T	4274	810	19.4	19.0	B	0.800		
09/21/88	265	W	4338	891	19.1	17.0	B	0.274		
09/22/88	266	H	4336	655		19.0	A	0.390		
09/23/88	267	F	4374	687	19.3	18.0	A	0.907		
09/26/88	270	M	4509	178	19.3	17.5	C	0.850		
09/27/88	271	T	4508	42	18.9	18.0	B	0.232		
09/28/88	272	W	4549	19	18.4	19.0	B	0.781		0.827
09/29/88	273	H	4621	876	15.7	15.0	A	0.435		
09/29/88	273	H	4622	150	19.0	19.0	D	0.426		
09/30/88	274	F	4635	673	20.0	19.0	C	0.529		

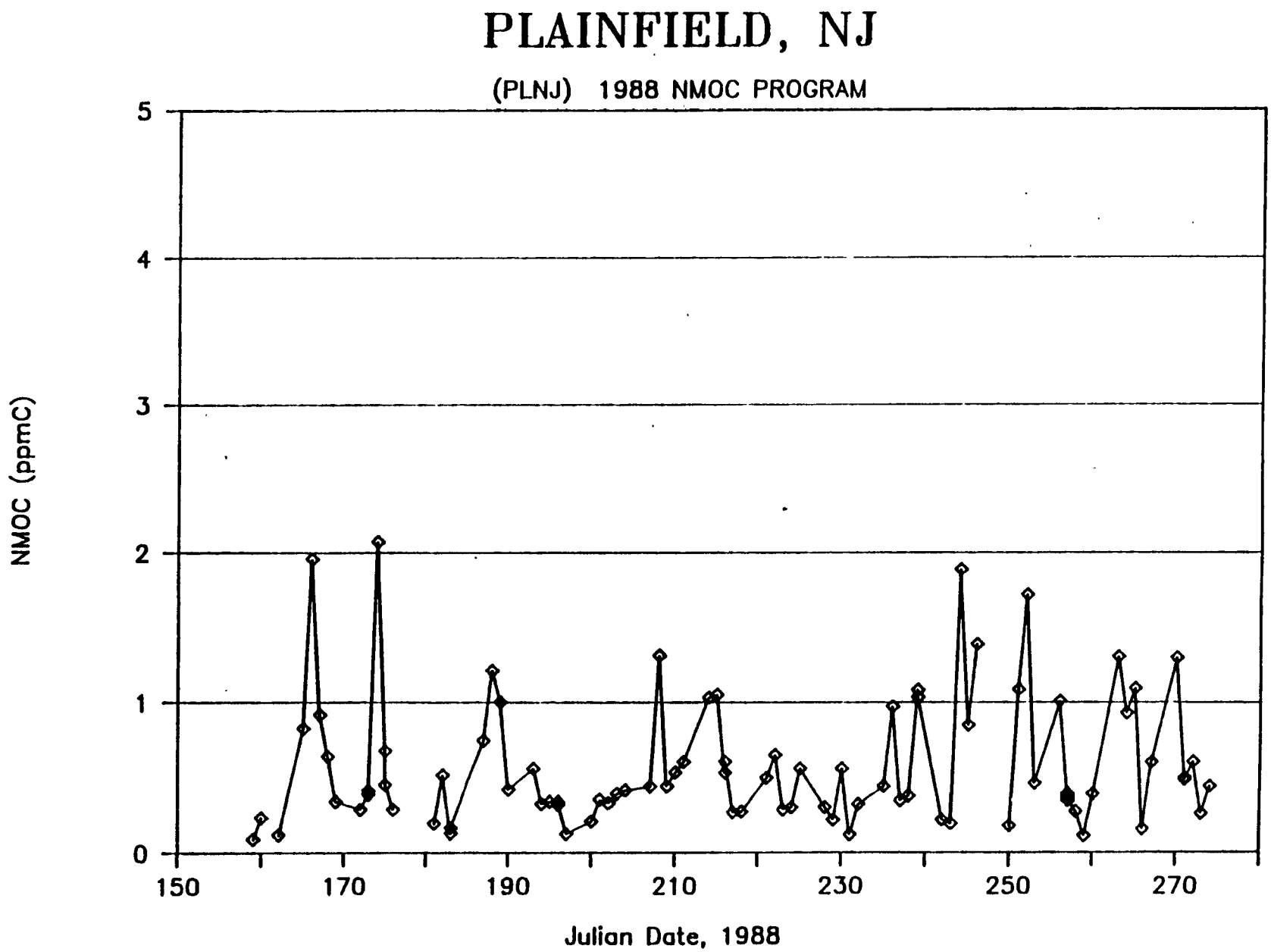


Figure E–9. Plot of NMOC concentration for Plainfield, NJ.

TABLE E-9. SUMMARY OF THE 1988 NMOC DATA FOR PLAINFIELD, NJ (PLNJ)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/07/88	159	T	1233	113	16.0	14.0	C	0.094		
06/08/88	160	W	1236	48	16.1	14.0	C	0.237		
06/10/88	162	F	1346	161	16.6	15.0	B	0.122		
06/13/88	165	M	1344	637	17.8	14.0	D	0.826		0.665
06/14/88	166	T	1419	877	16.8	15.0	B	1.958		
06/15/88	167	W	1422	825	16.8	15.0	A	0.917		
06/16/88	168	H	1412	776	17.4	17.0	B	0.640		0.520
06/17/88	169	F	1520	689	17.3	16.0	A	0.344		0.237
06/20/88	172	M	1521	192	16.5	14.0	C	0.289		
06/21/88	173	T	1563	676	16.1	16.0	B	0.390		
06/21/88	173	T	1564	673	16.1	16.0	C	0.415		
06/22/88	174	W	1603	121	16.3	15.0	D	2.076		
06/23/88	175	H	1584	895	16.0	16.0	C	0.678		
06/23/88	175	H	1584	895	16.0	10.0	C	0.452		
06/24/88	176	F	1683	654	18.0	18.0	B	0.288		0.235
06/29/88	181	W	1802	789	17.6	16.0	D	0.198		
06/30/88	182	H	1870	692	17.8	17.0	D	0.515		
07/01/88	183	F	1863	674	17.7	17.0	C	0.130		
07/01/88	183	F	1863	674	17.7	11.0	C	0.169		
07/05/88	187	T	1867	150	16.6	16.5	C	0.746	0.757	0.644
07/06/88	188	W	1958	907	16.9	16.0	C	1.213		
07/07/88	189	H	1965	187	16.5	16.5	A	1.003		
07/08/88	190	F	2067	811	17.8	16.0	A	0.419		
07/11/88	193	M	2082	808	17.2	17.0	C	0.560		
07/12/88	194	T	2136	845	16.5	15.0	D	0.327		
07/13/88	195	W	2144	629	17.2	16.5	A	0.340		
07/14/88	196	H	2233	709	16.4	15.0	B	0.341		
07/14/88	196	H	2234	710	16.4	16.0	B	0.320		
07/15/88	197	F	2237	1	16.8	16.0	C	0.126		
07/18/88	200	M	2268	723	17.5	16.0	D	0.212		
07/19/88	201	T	2309	859	16.2	15.0	A	0.354	0.338	0.356
07/20/88	202	W	2374	636	17.0	16.0	A	0.332		
07/21/88	203	H	2349	673	17.0	14.0	D	0.394		
07/22/88	204	F	2478	728	17.0	16.0	B	0.417		
07/25/88	207	M	2476	924	16.5	15.0	D	0.440	0.456	0.462
07/26/88	208	T	2552	57	16.5	16.0	C	1.315		
07/27/88	209	W	2554	826	17.0	16.0	D	0.442		
07/28/88	210	H	2558	695	17.8	16.5	C	0.533		
07/29/88	211	F	2647	699	17.8	17.0	B	0.603		
08/01/88	214	M	2705	783	17.4	17.0	D	1.033		
08/02/88	215	T	2742	175	16.8	16.0	A	1.052		
08/03/88	216	W	2809	160	15.3	15.0	D	0.532		
08/03/88	216	W	2810	153	15.3	15.0	D	0.608		
08/04/88	217	H	2966	108	16.8	13.0	C	0.269		0.316
08/05/88	218	F	3017	56	16.5	16.0	A	0.275		
08/08/88	221	M	2923	36	17.0	17.0	D	0.496		
08/09/88	222	T	3024	705	18.8	17.0	C	0.648		
08/10/88	223	W	3019	137	16.4	16.0	C	0.287		
08/11/88	224	H	3022	781	17.5	17.0	D	0.303		

TABLE E-9. SUMMARY OF THE 1988 NMOC DATA FOR PLAINFIELD, NJ (PLNJ)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/12/88	225	F	3107	830	16.5	16.0	C	0.559		
08/15/88	228	M	3152	889	16.5	16.5	C	0.304		
08/16/88	229	T	3205	141	16.2	16.0	D	0.218		
08/17/88	230	W	3225	638	17.2	16.0	A	0.560	0.559	0.612
08/18/88	231	H	3227	628	17.2	17.0	D	0.120		
08/19/88	232	F	3324	701	17.8	18.0	D	0.323		
08/22/88	235	M	3456	53	17.8	18.0	D	0.440		
08/23/88	236	T	3440	764	17.9	18.0	A	0.973		
08/24/88	237	W	3462	767	17.0	17.0	B	0.347		
08/25/88	238	H	3539	774	17.1	16.0	B	0.379		
08/26/88	239	F	3616	182	15.3	14.5	C	1.084		
08/26/88	239	F	3617	106	15.3	15.0	D	1.035		
08/29/88	242	M	3581	904	16.6	16.0	B	0.220		
08/30/88	243	T	3701	831	16.3	15.0	B	0.193		
08/31/88	244	W	3711	676	17.9	17.0	A	1.888		
09/01/88	245	H	3672	99	18.0	17.0	A	0.849		
09/02/88	246	F	3760	790	18.1	17.0	B	1.391		1.444
09/06/88	250	T	3796	618	18.0	17.0	A	0.180		
09/07/88	251	W	3799	99	17.3	16.0	C	1.088		
09/08/88	252	H	3895	726	18.5	18.0	D	1.719		
09/09/88	253	F	3942	778	17.4	17.0	A	0.462		
09/12/88	256	M	4009	898	17.1	16.0	D	1.009		
09/13/88	257	T	4025	851	15.2	14.0	A	0.374		
09/13/88	257	T	4025	851	15.2	10.5	A	0.392		
09/13/88	257	T	4026	156	15.2	14.0	B	0.346		
09/13/88	257	T	4026	156	15.2	10.0	B	0.366		
09/14/88	258	W	4108	405	17.0	17.0	A	0.276		
09/15/88	259	H	4125	799	17.4	16.0	D	0.112		
09/16/88	260	F	4243	169	17.9	16.0	A	0.391		
09/19/88	263	M	4237	4	16.3	15.0	D	1.305		
09/20/88	264	T	4269	804	17.1	15.0	D	0.929		
09/21/88	265	W	4297	919	16.5	15.5	D	1.096		
09/22/88	266	H	4325	187	16.7	16.0	A	0.156		
09/23/88	267	F	4466	657	17.0	17.0	B	0.602		
09/26/88	270	M	4454	812	17.9	17.9	D	1.300		
09/27/88	271	T	4517	836	15.9	15.0	A	0.496		
09/27/88	271	T	4518	886	15.9	15.0	C	0.487		
09/28/88	272	W	4550	11	16.9	16.5	B	0.603		
09/29/88	273	H	4645	169	17.5	18.0	C	0.260		0.300
09/30/88	274	F	4630	61	17.1	15.0	D	0.441		

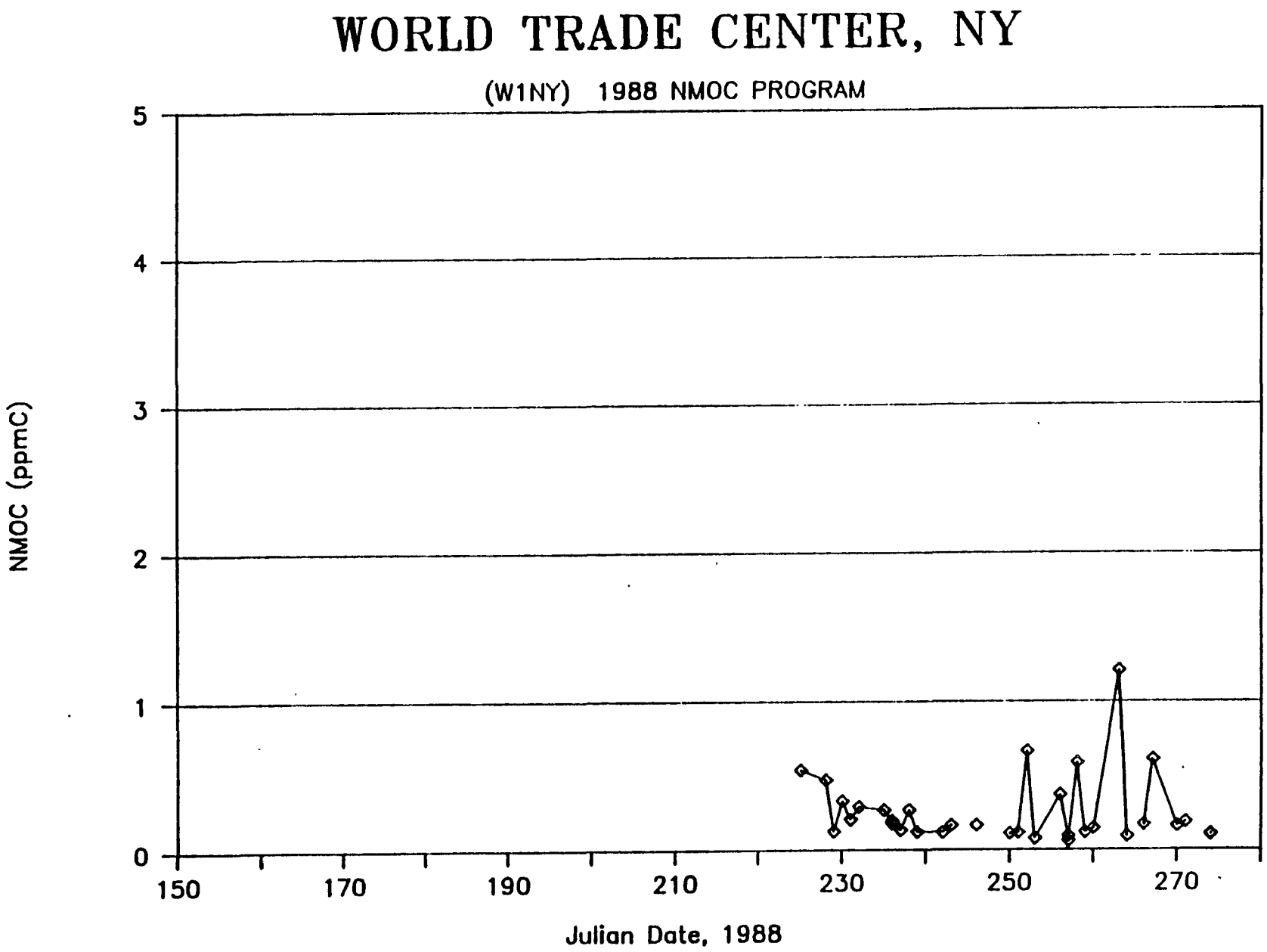


Figure E–10. Plot of NMOC concentration for New York, NY (World Trade Center).

TABLE E-10. SUMMARY OF THE 1988 NMOC DATA FOR NEW YORK, NY (W1NY)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/12/88	225	F	3050	828	14.0	13.0	C	0.536		
08/15/88	228	M	3109	20	13.0	12.0	C	0.469		
08/16/88	229	T	3149	97	14.0	13.0	C	0.126		
08/17/88	230	W	3170	873	14.0	12.0	C	0.329	0.340	0.311
08/18/88	231	H	3218	621	14.0	14.0	C	0.205		
08/19/88	232	F	3283	625	14.0	14.5	A	0.290		
08/22/88	235	M	3343	782	15.0	14.0	C	0.266		
08/23/88	236	T	3364	778	18.0	17.0	B	0.192		
08/23/88	236	T	3365	177	18.0	18.0	C	0.180		
08/23/88	236	T	3364	778	18.0		B	0.197		
08/23/88	236	T	3365	177	18.0	9.0	C	0.176		
08/24/88	237	W	3352	622	14.0	13.0	D	0.133		
08/25/88	238	H	3479	765	14.0	14.0	A	0.268		
08/26/88	239	F	3511	47	13.0	13.0	B	0.122		
08/29/88	242	M	3543	183	13.0	11.0	B	0.118		
08/30/88	243	T	3609	627	14.0	13.0	B	0.165		
09/02/88	246	F	3735	894	14.0	12.0	B	0.166		
09/06/88	250	T	3776	844	13.0	12.0	A	0.109		
09/07/88	251	W	3802	98	13.0	12.0	D	0.115		
09/08/88	252	H	3858	121	14.0	13.0	D	0.663		
09/09/88	253	F	3929	93	9.0	6.0	c	0.077		
09/12/88	256	M	3963	645	15.0	14.0	D	0.369		
09/13/88	257	T	3999	175	18.0	16.0	A	0.093		
09/13/88	257	T	4000	147	16.0	14.0	B	0.058		
09/14/88	258	W	4031	32	9.0	9.0	C	0.585		
09/15/88	259	H	4094	764	9.0	9.0	D	0.119		
09/16/88	260	F	4142	836	9.0	9.0	B	0.145		
09/19/88	263	M	4133	53	10.0	9.0	D	1.210		
09/20/88	264	T	4229	163	10.0	8.0	B	0.093		0.115
09/22/88	266	H	4322	783	11.0	10.0	A	0.170		
09/23/88	267	F	4333	856	10.0	9.0	A	0.608		0.672
09/26/88	270	M	4409	861	11.0	10.0	C	0.160		0.182
09/27/88	271	T	4445	113	10.0	10.0	D	0.187		
09/30/88	274	F	4583	107	18.0	18.0	A	0.106		
09/30/88	274	F	4584	404	18.0	18.0	D	0.100		

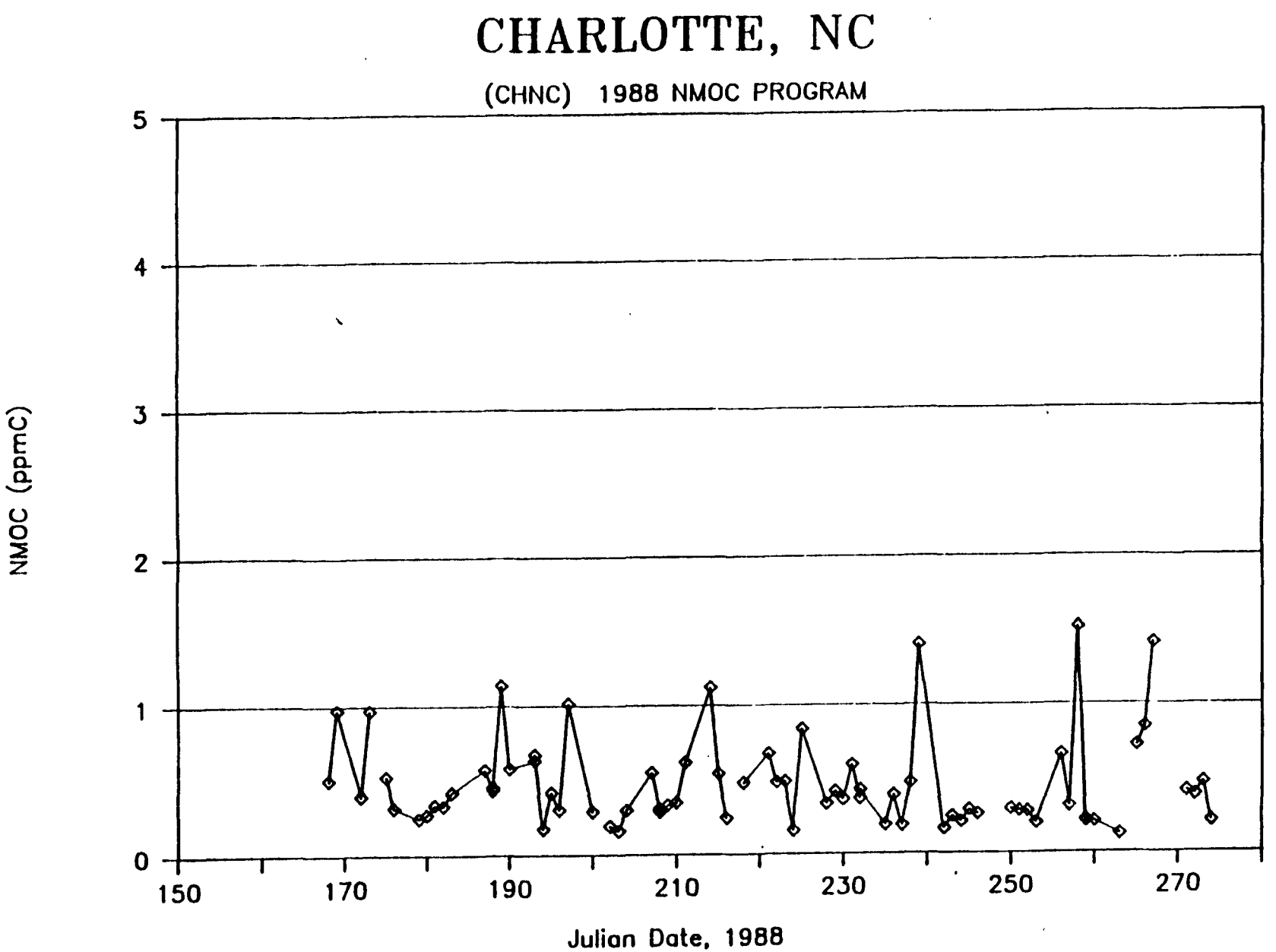


Figure E-11. Plot of NMOC concentration for Charlotte, NC.

TABLE E-11. SUMMARY OF THE 1988 NMOC DATA FOR CHARLOTTE, NC (CHNC)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/16/88	168	H	1450	48	13.5	13	D	0.505		
06/17/88	169	F	1448	857	11.6	12.0	C	0.974		
06/20/88	172	M	1479	78	18.2	18.0	B	0.402		
06/20/88	172	M	1480	91	14.2	14.0	B	0.400		
06/21/88	173	T	1508	793	12.0	12.0	C	0.968		
06/23/88	175	H	1576	93	11.5	12.0	D	0.524		
06/24/88	176	F	1587	42	11.3	11.0	D	0.320		
06/27/88	179	M	1644	665	12.1	12.0	D	0.250		
06/28/88	180	T	1738	75	13.0	10.0	C	0.275		
06/29/88	181	W	1737	850	12.0	10.0	C	0.344		
06/30/88	182	H	1769	685	11.8	12.0	C	0.333	0.322	0.310
07/01/88	183	F	1786	686	11.5	10.0	C	0.420		
07/05/88	187	T	1847	859	11.7	12.0	D	0.573		
07/06/88	188	W	1886	20	18.0	16.0	C	0.436		
07/06/88	188	W	1887	107	18.0	16.0	D	0.456		
07/07/88	189	H	1901	100	13.0	12.0	B	1.140		
07/08/88	190	F	2012	825	14.0	13.0	C	0.580		
07/11/88	193	M	1985	123	13.0	11.0	D	0.630		
07/11/88	193	M	1985	123	13.0	1.0	B	0.672		
07/12/88	194	T	2019	175	11.8	11.0	D	0.176		
07/13/88	195	W	2055	606	14.0	13.0	B	0.418		
07/14/88	196	H	2125	693	12.2	12.0	B	0.305		
07/15/88	197	F	2155	789	12.0	12.0	D	1.016	1.003	1.070
07/18/88	200	M	2172	914	13.5	13.0	D	0.291		
07/20/88	202	W	2262	149	13.0	12.0	A	0.195		
07/21/88	203	H	2289	793	14.0	13.0	D	0.161		
07/22/88	204	F	2331	799	12.0	12.0	B	0.301		
07/25/88	207	M	2408	35	13.0	12.0	D	0.549		
07/26/88	208	T	2434	647	19.0	17.0	A	0.309		
07/26/88	208	T	2435	633	19.0	17.0	D	0.290		
07/27/88	209	W	2462	41	11.5	12.0	C	0.334		
07/28/88	210	H	2538	136	13.0	12.0	A	0.350		
07/29/88	211	F	2563	834	11.6	12.0	B	0.616		
08/01/88	214	M	2610	840	12.0	11.0	D	1.125	1.003	1.098
08/02/88	215	T	2650	875	10.5	10.0	C	0.539		
08/03/88	216	W	2694	165	11.8	12.0	A	0.244		
08/05/88	218	F	2758	885	11.6	13.0	D	0.478		
08/08/88	221	M	2843	192	11.5	12.0	C	0.675		
08/09/88	222	T	2848	765	12.0	13.0	D	0.480		
08/10/88	223	W	2918	43	12.0	10.0	B	0.487		
08/11/88	224	H	2950	724	14.0	13.0	D	0.158		
08/12/88	225	F	3008	859	13.0	12.0	C	0.836	0.899	1.000
08/15/88	228	M	3062	690	14.0	14.0	A	0.338		
08/16/88	229	T	3096	878	13.0	14.0	A	0.419		
08/17/88	230	W	3145	763	14.0	13.0	B	0.366		
08/18/88	231	H	3173	99	11.5	12.0	D	0.596		
08/19/88	232	F	3265	895	18.0	18.0	A	0.371		
08/19/88	232	F	3266	899	17.9	17.0	C	0.426		
08/22/88	235	M	3294	190	13.0	13.0	B	0.194		

TABLE E-11. SUMMARY OF THE 1988 NMOC DATA FOR CHARLOTTE, NC (CHNC)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/23/88	236	T	3317	191	13.0	12.0	A	0.394	0.361	0.425
08/24/88	237	W	3382	802	14.0	13.0	D	0.191		
08/25/88	238	H	3398	623	11.0	10.0	D	0.476		
08/26/88	239	F	3483	903	13.0	13.0	C	1.408		
08/29/88	242	M	3489	14	13.0	12.0	A	0.167		
08/30/88	243	T	3551	646	12.1	12.0	D	0.247		
08/31/88	244	W	3580	849	13.5	12.0	A	0.214		
09/01/88	245	H	3657	834	11.8	12.0	D	0.293		
09/02/88	246	F	3714	118	13.5	12.0	D	0.265		0.358
09/06/88	250	T	3749	405	12.0	12.0	A	0.298		
09/07/88	251	W	3702	724	12.4	14.0	D	0.284		
09/08/88	252	H	3811	54	13.0	13.0	D	0.281		
09/09/88	253	F	3866	781	12.3	12.0	B	0.202		
09/12/88	256	M	3913	883		12.0	D	0.659		
09/13/88	257	T	3975	692	12.2	12.0	C	0.314		
09/14/88	258	W	4004	632	14.0	12.0	D	1.517		1.022
09/15/88	259	H	4037	698	19.0	18.0	A	0.223		
09/15/88	259	H	4038	671	19.0	16.0	D	0.211		
09/16/88	260	F	4076	726	14.8	12.0	C	0.208		
09/19/88	263	M	4128	825	11.6	11.0	C	0.125		
09/21/88	265	W	4210	692	12.2	12.0	B	0.719		
09/22/88	266	H	4252	305	13.5	13.0	C	0.845		
09/23/88	267	F	4329	172	12.5	11.0	B	1.414		
09/27/88	271	T	4406	796	14.0	14.0	B	0.409		0.478
09/28/88	272	W	4430	874	13.0	12.0	C	0.384		
09/29/88	273	H	4510	788	14.0	12.0	D	0.470		
09/30/88	274	F	4528	862	18.0	18.0	B	0.210		
09/30/88	274	F	4529	35	16.0	16.0	C	0.210		

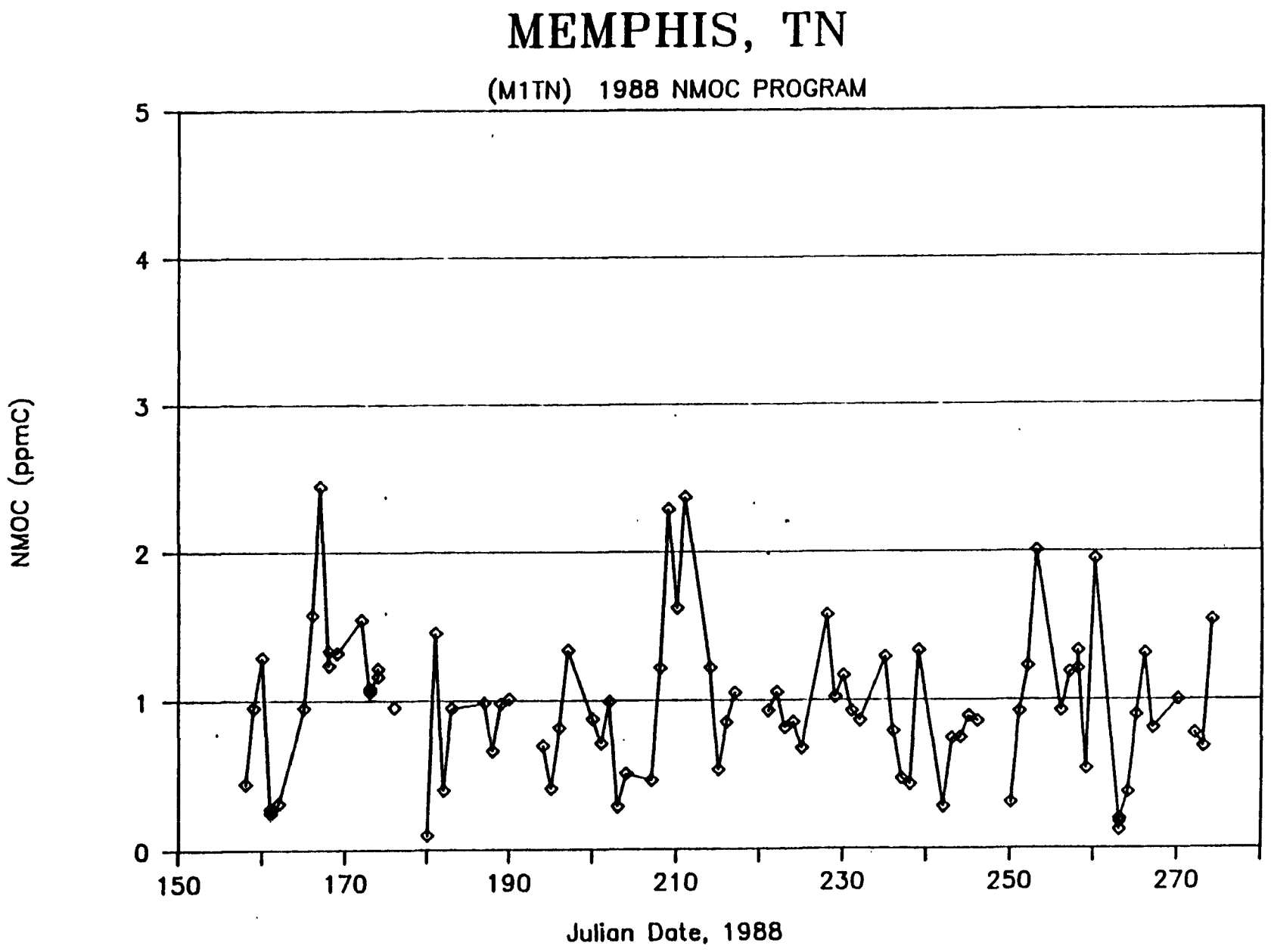


Figure E-12. Plot of NMOC concentration for Memphis, TN (Alabama).

TABLE E-12. SUMMARY OF THE 1988 NMOC DATA FOR MEMPHIS, TN (M1TN)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/07/88	159	T	1218	801	12.0	12.0	B	0.949	1.789	1.905
06/08/88	160	W	1288	895	18.0	14.0	A	1.290		
06/09/88	161	H	1235	767	19.5	15.0	D	0.272		
06/09/88	161	H	1235	767	19.5	10.0	B	0.244		
06/10/88	162	F	1328	16	18.0	16.0	B	0.310		
06/13/88	165	M	1363	799	20.0	18.0	D	0.949		
06/14/88	166	T	1399	722	20.0	18.0	B	1.573		
06/15/88	167	W	1394	803	20.0	16.0	D	2.444		2.077
06/16/88	168	H	1452	674	20.0	16.0	B	1.235		
06/16/88	168	H	1452	674	20.0	12.0	A	1.332		
06/17/88	169	F	1495	658	20.0	16.0	C	1.321	1.107	1.032
06/20/88	172	M	1539	178	24.0	18.0	D	1.541		
06/21/88	173	T	1578	782	19.5	17.0	A	1.060		
06/21/88	173	T	1578	782	19.5	12.0	B	1.084		
06/22/88	174	W	1616	97	18.0	17.0	B	1.163		
06/22/88	174	W	1615	92	18.0	13.5	B	1.217		
06/24/88	176	F	1705	179	20.0	18.0	C	0.952		0.627
06/28/88	180	T	1772	410	20.0	17.0	C	0.097		
06/29/88	181	W	1758	924	20.0	18.0	A	1.452		
06/30/88	182	H	1799	848	20.0	17.0	D	0.395		
07/01/88	183	F	1938	902	18.0	6.0	C	0.946		
07/05/88	187	T	1947	716	20.0	19.0	A	0.982		
07/06/88	188	W	1962	161	16.0	13.0	B	0.661	0.645	0.691
07/07/88	189	H	1940	668	18.0	15.0	C	0.977		
07/08/88	190	F	2029	728	17.7	14.5	D	1.012		
07/12/88	194	T	2108	142	16.0	12.5	C	0.694		0.712
07/13/88	195	W	2164	184	17.0	14.0	C	0.405		
07/14/88	196	H	2151	715	18.0	15.0	B	0.816		
07/15/88	197	F	2302	650	18.0	15.0	D	1.338		
07/18/88	200	M	2315	879	18.5	15.5	B	0.874		
07/19/88	201	T	2261	501	16.0	13.0	D	0.712		
07/20/88	202	W	2330	867		14.0	C	0.991		
07/21/88	203	H	2364	123	16.5	13.0	A	0.283	0.218	0.270
07/22/88	204	F	2457	626	18.0	14.0	B	0.505		
07/25/88	207	M	2472	809	19.5	17.0	D	0.462		
07/26/88	208	T	2504	62		12.0	D	1.217		
07/27/88	209	W	2507	103		16.0	C	2.287		2.154
07/28/88	210	H	2729	773	19.0	16.0	A	1.617		
07/29/88	211	F	2737	850	18.0	16.0	D	2.369	2.044	2.352
08/01/88	214	M	2752	864	17.0	15.0	C	1.216		
08/02/88	215	T	2800	857	16.0	15.0	C	0.532		
08/03/88	216	W	2773	627	18.0	16.0	B	0.850		
08/04/88	217	H	2860	770	17.5	17.0	D	1.051		
08/08/88	221	M	2949	913	18.0	15.0	D	0.927		
08/09/88	222	T	2978	3	17.0	15.0	C	1.053		
08/10/88	223	W	3000	896	18.0	16.0	D	0.811		
08/11/88	224	H	2988	789	17.0	17.0	C	0.850		
08/12/88	225	F	3213	685	18.0	16.0	D	0.674		
08/15/88	228	M	3237	869	19.0	17.0	C	1.573		

TABLE E-12. SUMMARY OF THE 1988 NMOC DATA FOR MEMPHIS, TN (M1TN)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/16/88	229	T	3216	301	18.0	15.0	B	1.020		
08/17/88	230	W	3207	723	19.0	17.0	B	1.167		
08/18/88	231	H	3379	699	18.0	16.0	C	0.924		
08/19/88	232	F	3387	906	17.0	15.0	A	0.859	0.773	0.967
08/22/88	235	M	3349	818	20.0	17.0	C	1.290		
08/23/88	236	T	3457	776	18.0	16.0	B	0.787		
08/24/88	237	W	3467	879	17.0	18.0	D	0.467		
08/25/88	238	H	3465	62	17.0	15.0	D	0.428		
08/26/88	239	F	3555	35	17.0	14.0	C	1.331		
08/29/88	242	M	3679	48	17.0	14.0	A	0.277		0.322
08/30/88	243	T	3669	139	17.0	14.0	D	0.738		
08/31/88	244	W	3790	885	17.5	14.0	C	0.744		
09/01/88	245	H	3822	874	17.0	14.0	C	0.887		
09/02/88	246	F	3849	33	17.0	12.0	D	0.853		0.869
09/06/88	250	T	3850	161	18.0	16.0	C	0.305		
09/07/88	251	W	3877	678	19.0	13.0	D	0.919		
09/08/88	252	H	3953	629	18.0	17.0	D	1.227		
09/09/88	253	F	4086	877	17.0	14.0	D	2.004		
09/12/88	256	M	4069	730	21.0	17.0	D	0.925		
09/13/88	257	T	4093	652	20.0	18.0	C	1.184		
09/14/88	258	W	4201	922	18.0	13.0	A	1.209		
09/14/88	258	W	4202	871	18.0	12.0	C	1.330		
09/15/88	259	H	4175	41	17.0	14.0	C	0.533		
09/16/88	260	F	4169	11	16.0	14.0	C	1.947		
09/19/88	263	M	4342	800	17.5	16.0	B	0.177		
09/19/88	263	M	4343	651	17.5	16.0	B	0.122		
09/19/88	263	M	4342	800	17.5	12.0	B	0.196		
09/19/88	263	M	4343	651	17.5	10.0	B	0.196		
09/20/88	264	T	4330	670	18.0	16.0	B	0.373		0.411
09/21/88	265	W	4299	307	17.0	14.0	D	0.896		
09/22/88	266	H	4433	702	18.0	15.0	D	1.310		
09/23/88	267	F	4450	686	14.0	11.9	A	0.807		
09/26/88	270	M	4429	885	18.0	13.0	C	0.999		
09/28/88	272	W	4648	4	18.0	15.0	D	0.770		0.786
09/29/88	273	H	4646	15	17.0	14.0	D	0.680		
09/30/88	274	F	4653	187	18.0	16.0	D	1.531		

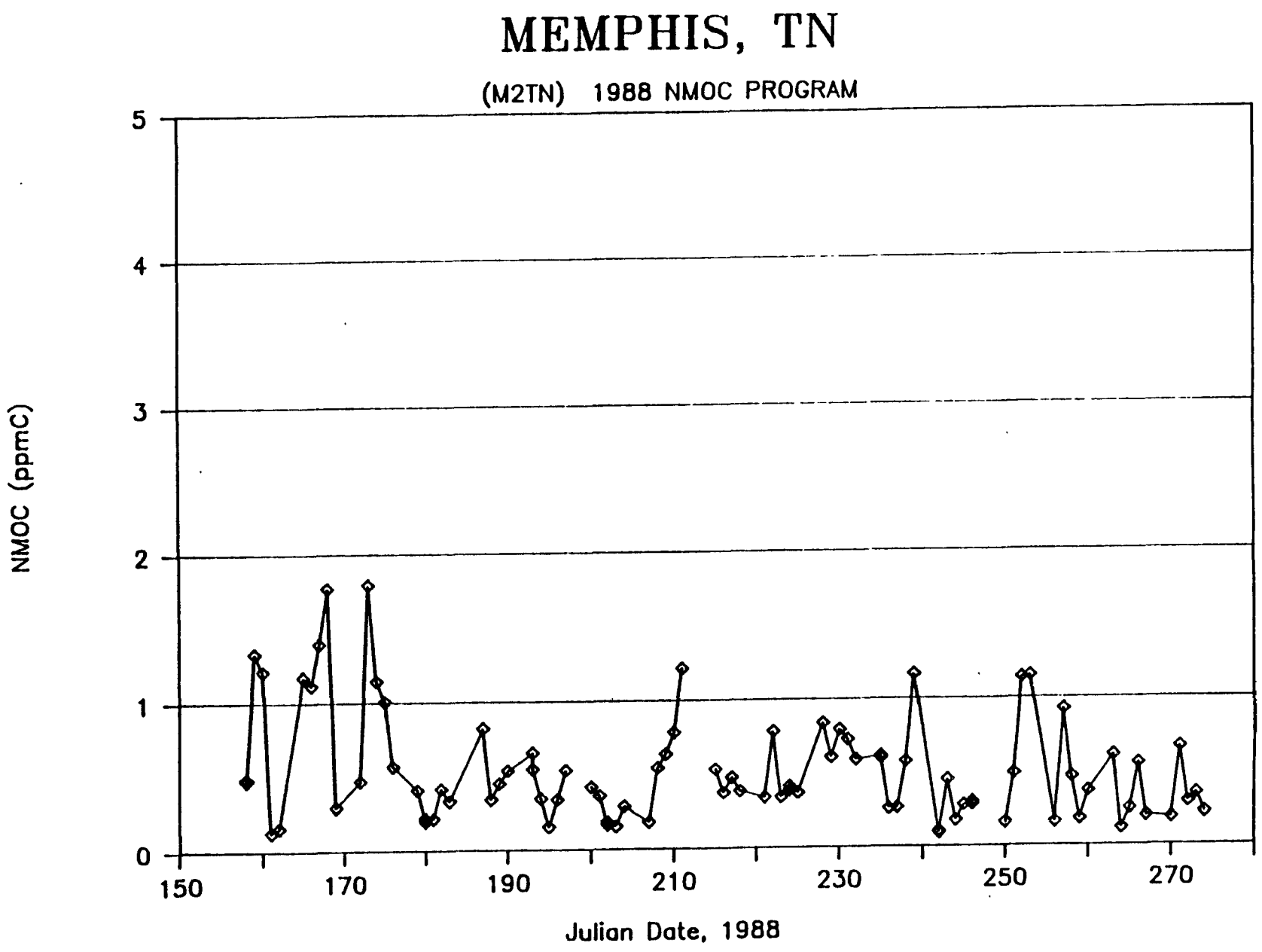


Figure E-13. Plot of NMOC concentration for Memphis, TN (Frayser).

TABLE E-13. SUMMARY OF THE 1988 NMOC DATA FOR MEMPHIS, TN (M2TN)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/06/88	158	M	1185	629	20.0	20.0	C	0.490		
06/06/88	158	M	1186	690	20.0	20.0	A	0.474		
06/07/88	159	T	1217	800	16.0	15.0	C	1.331		
06/08/88	160	W	1290	179	15.0	14.0	D	1.211	1.177	1.138
06/09/88	161	H	1239	34	16.0	14.0	D	0.126		
06/10/88	162	F	1324	92	17.0	16.5	B	0.157		
06/13/88	165	M	1359	907	17.0	17.0	A	1.172		
06/14/88	166	T	1397	897	17.0	17.0	A	1.114		
06/15/88	167	W	1389	794	18.0	17.0	B	1.396		
06/16/88	168	H	1453	787	18.0	18.0	C	1.770		
06/17/88	169	F	1494	894	16.0	14.5	B	0.292		
06/20/88	172	M	1533	27	18.0	14.0	A	0.470		
06/21/88	173	T	1549	719	16.0	15.0	C	1.791		
06/22/88	174	W	1592	150	18.0	16.0	D	1.143		
06/23/88	175	H	1640	95	17.0	15.0	D	1.005		
06/24/88	176	F	1708	181	20.0	20.0	A	0.568		
06/27/88	179	M	1729	843	16.0	16.0	C	0.404		0.225
06/28/88	180	T	1779	857	17.5	17.0	A	0.195		
06/28/88	180	T	1780	825	17.5	16.0	B	0.216		
06/29/88	181	W	1759	876	18.0	18.0	B	0.213		
06/30/88	182	H	1813	849	16.0	16.0	D	0.412		
07/01/88	183	F	1936	865	16.5	16.0	B	0.330		
07/05/88	187	T	1955	812	20.0	4.0	D	0.821		
07/06/88	188	W	1956	904	16.5	16.0	B	0.337		
07/07/88	189	H	1946	799	18.3	18.0	C	0.447		
07/08/88	190	F	2030	703	17.8	16.0	D	0.533		
07/11/88	193	M	2090	109	19.0	14.0	D	0.654		
07/11/88	193	M	2090	109	19.0		D	0.543		
07/12/88	194	T	2109	192	16.0	15.0	D	0.342		
07/13/88	195	W	2165	96	16.0	15.0	D	0.153		
07/14/88	196	H	2149	774	17.0	16.0	A	0.335		
07/15/88	197	F	2283	699	14.0	14.0	A	0.533		
07/18/88	200	M	2317	850	16.3	16.0	A	0.419		
07/19/88	201	T	2274	181	17.0	15.0	A	0.356		
07/20/88	202	W	2365	843	17.0	12.0	C	0.162		
07/20/88	202	W	2366	889	17.0	12.0	D	0.182		
07/21/88	203	H	2356	91	17.5	16.0	C	0.151		
07/22/88	204	F	2456	899	17.0	15.0	C	0.286		
07/25/88	207	M	2470	727		17.0	D	0.179	0.178	0.171
07/26/88	208	T	2500	53	17.5	17.0	D	0.544		
07/27/88	209	W	2512	48		16.0	A	0.639		
07/28/88	210	H	2733	682	17.5	17.0	B	0.785		
07/29/88	211	F	2713	861	17.0	16.0	D	1.214		
08/02/88	215	T	2799	836	16.0	17.0	B	0.532		
08/03/88	216	W	2778	696	18.0	17.0	A	0.372		
08/04/88	217	H	2886	777	18.0	18.0	A	0.476		
08/04/88	217	H	2887	728	18.0	18.0	A	0.475		
08/05/88	218	F	2984	27	16.0	16.0	A	0.378		
08/08/88	221	M	2942	697	17.5	17.0	D	0.338		

TABLE E-13. SUMMARY OF THE 1988 NMOC DATA FOR MEMPHIS, TN (M2TN)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/09/88	222	T	2980	781	17.5	17.0	A	0.784		
08/10/88	223	W	2987	877	17.0	16.0	C	0.336		
08/11/88	224	H	2986	50	15.0	17.0	D	0.382		
08/11/88	224	H	3001	93	15.0	17.0	B	0.414		
08/12/88	225	F	3214	650	15.0	17.0	D	0.364		
08/15/88	228	M	3244	831	6.5	4.0	C	0.836		
08/16/88	229	T	3215	409	17.0	17.0	B	0.608		
08/17/88	230	W	3208	919	16.0	16.0	C	0.791		
08/18/88	231	H	3375	808	17.5	16.5	A	0.724		
08/19/88	232	F	3391	844	16.0	15.0	C	0.591	0.543	0.606
08/22/88	235	M	3366	629	18.5	17.5	A	0.614		
08/22/88	235	M	3367	790	18.0	16.0	D	0.601		
08/23/88	236	T	3452	688	18.0	17.0	B	0.255		
08/24/88	237	W	3469	920	16.0	16.0	D	0.261		
08/25/88	238	H	3463	15	16.0	15.0	A	0.577		
08/26/88	239	F	3553	780	17.5	17.0	A	1.163		
08/29/88	242	M	3686	801	18.0	17.0	D	0.090		
08/29/88	242	M	3687	795	18.0	17.0	D	0.101		
08/30/88	243	T	3671	178	18.0	15.0	B	0.450		
08/31/88	244	W	3792	833	17.0	16.0	D	0.173		
09/01/88	245	H	3831	30	17.0	15.0	D	0.275		
09/02/88	246	F	3870	8	16.0	15.0	D	0.297		
09/02/88	246	F	3869	11	16.5	16.0	A	0.279		
09/06/88	250	T	3853	89	16.5	15.0	C	0.156		
09/07/88	251	W	3875	785	18.0	16.0	A	0.489		
09/08/88	252	H	3954	630	18.5	14.5	B	1.137		
09/09/88	253	F	4083	889	17.0	16.0	B	1.150		
09/12/88	256	M	4070	305	17.0	14.0	A	0.157		
09/13/88	257	T	4101	643	18.0	17.0	B	0.920		
09/14/88	258	W	4160	798	18.0	16.0	C	0.463		
09/15/88	259	H	4174	19	17.0	16.0	C	0.178		
09/16/88	260	F	4170	151	17.0	16.0	C	0.364		
09/19/88	263	M	4339	33	19.5	14.0	A	0.610		
09/20/88	264	T	4326	691	18.0	16.0	B	0.112		
09/21/88	265	W	4300	20	16.0	16.0	D	0.244		
09/22/88	266	H	4444	108	17.0	12.0	D	0.553		
09/23/88	267	F	4455	656	17.0	17.0	C	0.195		
09/26/88	270	M	4448	72	18.0	16.0	B	0.183		
09/27/88	271	T	4636	715	18.0	16.0	C	0.664		
09/28/88	272	W	4640	52	18.0	16.0	D	0.287		
09/29/88	273	H	4647	181	17.0	15.0	D	0.346		
09/30/88	274	F	4651	185	18.0	16.0	C	0.217		

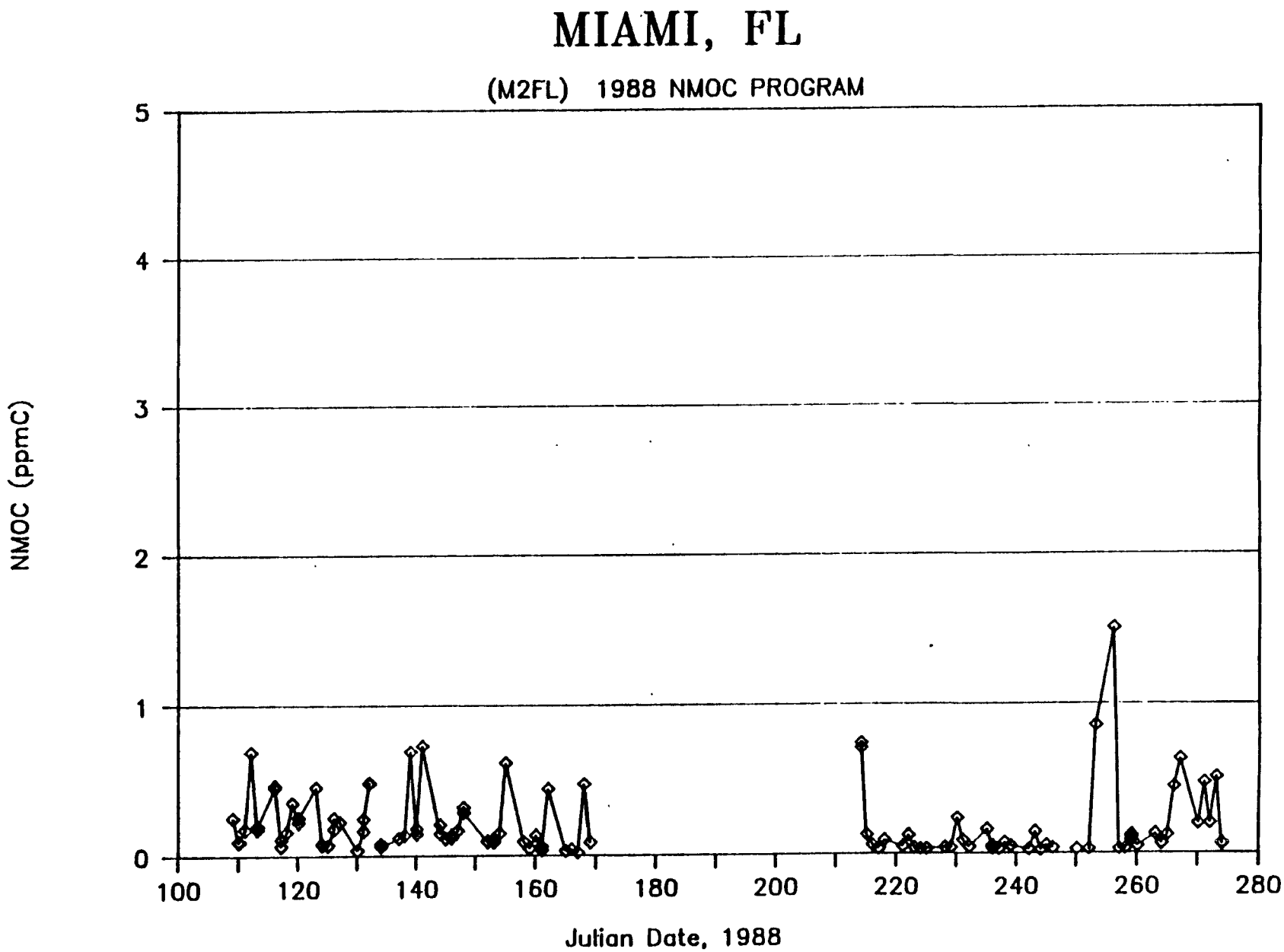


Figure E-14. Plot of NMOC concentration for Miami, FL (University).

TABLE E-14. SUMMARY OF THE 1988 NMOC DATA FOR MIAMI, FL (M2FL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
04/18/88	109	M	1012	192	11.0	10.0	B	0.251		
04/19/88	110	T	1016	175	16.0	14.0	A	0.092		
04/19/88	110	T	1017	111	16.0	14.0	B	0.098		
04/20/88	111	W	1019	160	13.0	11.0	A	0.176		
04/21/88	112	H	1022	768	14.0	13.0	C	0.691		
04/22/88	113	F	1025	73	22.0	21.0	D	0.177		
04/22/88	113	F	1025	73	22.0	11.0	B	0.196		
04/25/88	116	M	1027	649	17.0	16.0	A	0.453		
04/25/88	116	M	1027	649	17.0	9.0	D	0.466		
04/26/88	117	T	1036	676	17.0	16.0	A	0.110		
04/26/88	117	T	1036	676	17.0	10.0	C	0.064		
04/27/88	118	W	1044	163	17.0	16.0	A	0.158		
04/28/88	119	H	1040	185	17.0	15.0	D	0.351		
04/29/88	120	F	1049	804	18.0	16.0	A	0.219		
04/29/88	120	F	1049	804	18.0	8.0	C	0.252		
05/02/88	123	M	1052	641	19.0	4.0	D	0.454		
05/03/88	124	T	1059	685	17.5	16.0	C	0.082		
05/03/88	124	T	1059	685	17.5	9.0	A	0.074		
05/04/88	125	W	1064	811	17.0	15.0	A	0.071		0.038
05/05/88	126	H	1070	659	17.5	16.0	D	0.176		
05/05/88	126	H	1070	659	17.5	6.0	B	0.250		
05/06/88	127	F	1072	666	18.0	16.0	D	0.223		
05/09/88	130	M	1074	13	17.0	15.0	D	0.038		
05/10/88	131	T	1083	656	17.5	16.0	A	0.162		
05/10/88	131	T	1083	656	17.5	9.0	C	0.240		
05/11/88	132	W	1086	129	16.5	15.0	D	0.476		
05/11/88	132	W	1086	129	16.5	8.0	A	0.487		
05/13/88	134	F	1097	786	17.5	16.0	A	0.080		
05/13/88	134	F	1097	786	17.5	10.0	D	0.062		
05/16/88	137	M	1100	669	17.0	16.0	C	0.116		
05/16/88	137	M	1101	640	17.0	16.0	D	0.115		
05/17/88	138	T	1108	704	19.0	18.0	D	0.139		
05/17/88	138	T	1108	704	19.0	12.0	B	0.135		
05/18/88	139	W	1110	141	18.0	16.0	B	0.692		
05/19/88	140	H	1115	644	19.5	17.0	D	0.144		
05/19/88	140	H	1115	644	19.5	8.0	B	0.176		
05/20/88	141	F	1120	834	19.0	16.0	A	0.731		
05/23/88	144	M	1125	829	20.0	17.0	C	0.143		
05/23/88	144	M	1125	829	20.0	12.0	B	0.203		
05/24/88	145	T	1130	825	19.0	16.0	B	0.112		
05/24/88	145	T	1130	825	19.0	8.0	C	0.110		
05/25/88	146	W	1136	663	19.0	16.0	C	0.116		
05/25/88	146	W	1136	663	19.0		B	0.136		
05/26/88	147	H	1139	621	17.5	14.0	B	0.163		
05/27/88	148	F	1141	657	19.5	17.0	A	0.318		
05/27/88	148	F	1141	657	19.5	13.0	D	0.281		
05/31/88	152	T	1150	97	20.0	18.0	D	0.091		
05/31/88	152	T	1150	97	20.0	14.0	B	0.096		
06/01/88	153	W	1156	108	17.0	16.0	A	0.113		

TABLE E-14. SUMMARY OF THE 1988 NMOC DATA FOR MIAMI, FL (M2FL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/01/88	153	W	1156	108	17.0	10.0	C	0.088		
06/02/88	154	H	1159	830	17.0	16.0	D	0.147		
06/03/88	155	F	1161	854	17.0	15.0	D	0.616		
06/03/88	155	F	1161	854	17.0	7.0	A	0.615		
06/06/88	158	M	1179	721	19.0	18.0	B	0.091		
06/07/88	159	T	1204	123	18.0	16.0	C	0.044	0.082	0.018
06/08/88	160	W	1228	894	17.0	14.0	D	0.132		
06/09/88	161	H	1254	827	14.0	12.0	B	0.059		
06/09/88	161	H	1255	17	14.5	10.0	D	0.033		
06/10/88	162	F	1262	677	18.0	14.0	C	0.441		
06/13/88	165	M	1304	129	16.5	15.0	D	0.027		
06/14/88	166	T	1349	727	17.0	16.0	A	0.040		
06/15/88	167	W	1390	304	16.5	15.0	B	0.016		
06/16/88	168	H	1437	911	16.5	15.0	C	0.472		
06/17/88	169	F	1423	829	16.0	15.0	D	0.083		
08/01/88	214	M	2661	674	18.5	17.0	C	0.709		
08/01/88	214	M	2662	631	18.5	17.0	C	0.741	0.631	0.554
08/02/88	215	T	2712	46	17.0	15.0	A	0.127		
08/03/88	216	W	2736	677	18.0	16.0	C	0.056		
08/04/88	217	H	2762	73	17.0	16.0	C	0.034		
08/05/88	218	F	2797	805	18.0	17.0	B	0.090		
08/08/88	221	M	2852	171	17.0	15.0	C	0.049		
08/09/88	222	T	2903	699	18.0	16.0	A	0.122		
08/10/88	223	W	2904	628	18.0	16.0	D	0.037		
08/11/88	224	H	3007	308	17.0	16.0	C	0.032		
08/12/88	225	F	2992	139	16.5	15.0	D	0.031		
08/15/88	228	M	3114	785	17.5	16.0	C	0.040		
08/16/88	229	T	3148	84	16.5	15.0	C	0.040		
08/17/88	230	W	3186	173	17.0	16.0	B	0.233		
08/18/88	231	H	3254	799	18.0	16.0	A	0.086		
08/19/88	232	F	3238	786	17.5	16.0	B	0.041		
08/22/88	235	M	3313	46	16.5	16.0	B	0.156		
08/23/88	236	T	3407	639	16.5	14.0	B	0.037		
08/23/88	236	T	3408	806	17.0	16.0	C	0.032		
08/23/88	236	T	3407	639	16.5	10.0	B	0.046		
08/23/88	236	T	3408	806	17.0	12.0	C	0.051		
08/24/88	237	W	3417	11	17.0	16.0	D	0.028		
08/25/88	238	H	3466	785	18.0	17.0	C	0.073		
08/26/88	239	F	3472	890	17.0	15.0	D	0.047		
08/29/88	242	M	3549	77	17.0	14.0	A	0.025		
08/30/88	243	T	3582	121	17.0	15.0	D	0.140		
08/31/88	244	W	3625	670	18.0	16.0	C	0.020		
09/01/88	245	H	3713	887	17.0	16.0	C	0.053		
09/02/88	246	F	3703	847	16.0	14.0	C	0.033		
09/06/88	250	T	3805	192	16.5	15.0	D	0.026		
09/08/88	252	H	3874	646	17.5	15.0	D	0.027		
09/09/88	253	F	3863	859	16.5	16.0	C	0.853		
09/12/88	256	M	3969	181	12.5	10.0	D	1.500		
09/12/88	256	M	3032	98	13.0	12.0	D	0.996		

TABLE E-14. SUMMARY OF THE 1988 NMOC DATA FOR MIAMI, FL (M2FL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
09/13/88	257	T	3994	854	17.0	13.0	B	0.028		
09/14/88	258	W	4034	858	16.0	14.0	D	0.030		
09/15/88	259	H	4147	622	18.0	15.0	A	0.091		
09/15/88	259	H	4148	668	18.0	15.0	D	0.119		
09/15/88	259	H	4147	622	18.0	12.0	A	0.118		
09/15/88	259	H	4148	668	18.0	10.0	D	0.107		
09/16/88	260	F	4134	99	17.0	15.0	D	0.046		
09/19/88	263	M	4212	150	17.0	14.0	B	0.126		
09/20/88	264	T	4219	827		14.0	A	0.062		
09/21/88	265	W	4304	406	17.5	16.5	D	0.120		
09/22/88	266	H	4320	700	18.0	14.0	A	0.444		
09/23/88	267	F	4463	805	18.0	12.0	D	0.633		
09/26/88	270	M	4458	192	17.0	14.0	B	0.193		
09/27/88	271	T	4460	852	17.0	14.0	C	0.471		
09/28/88	272	W	4537	54	17.0	15.0	C	0.197		
09/29/88	273	H	4558	170	17.0	14.0	C	0.508		
09/30/88	274	F	4579	618	17.0	16.0	A	0.065		
09/30/88	274	F	4580	60	17.0	15.0	A	0.060		

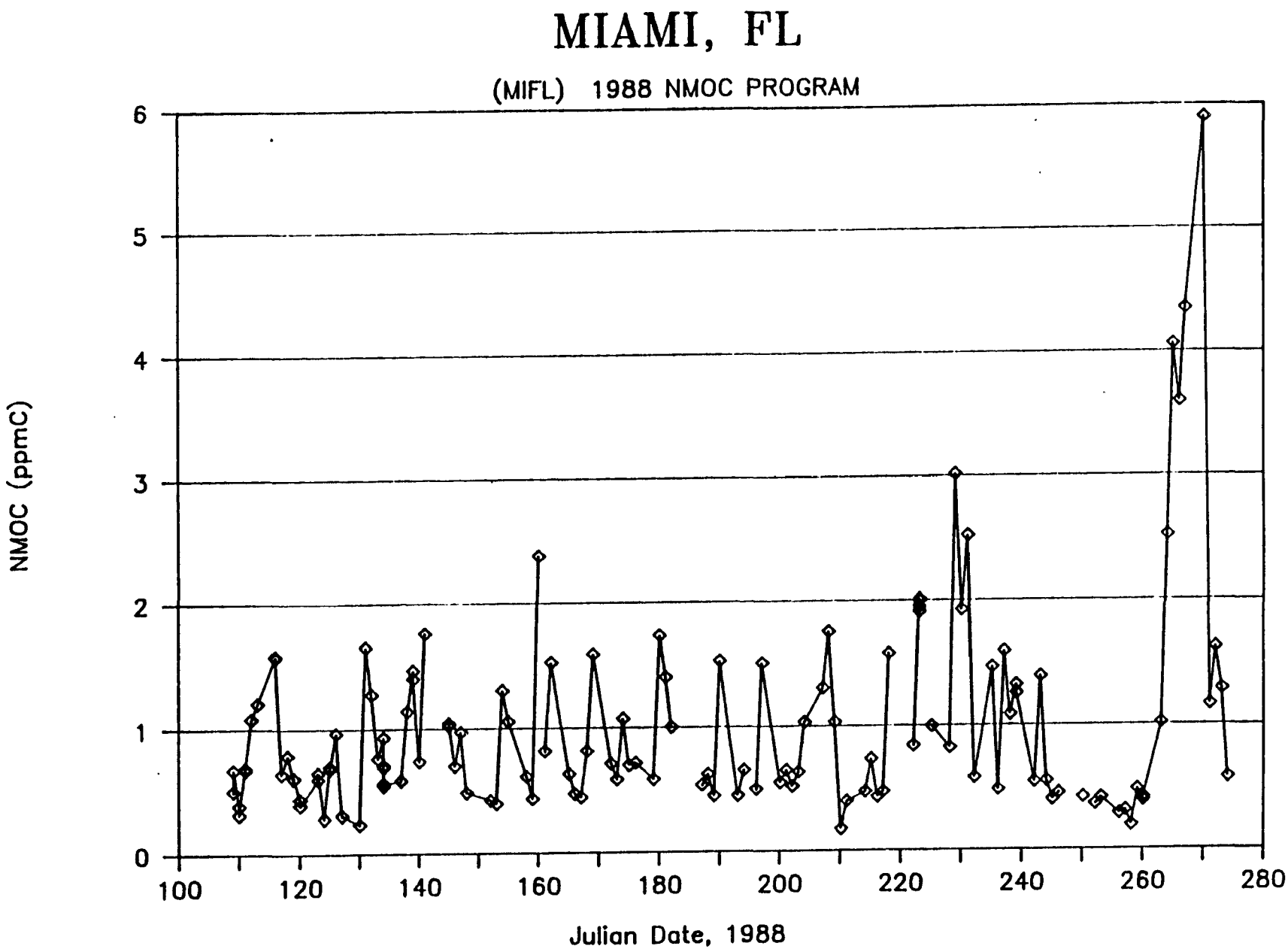


Figure E-15. Plot of NMOC concentration for Miami, FL.

TABLE E-15. SUMMARY OF THE 1988 NMOC DATA FOR MIAMI, FL (MIFL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
04/18/88	109	M	1007	51	15.5	16.0	C	0.500		
04/18/88	109	M	1008	623	15.0	14.0	C	0.669		
04/19/88	110	T	1020	187	14.5	15.0	B	0.380		
04/19/88	110	T	1020	187	14.5	9.0	C	0.315		
04/20/88	111	W	1018	130	14.0	15.0	A	0.687		
04/20/88	111	W	1018	130	14.0	8.0	D	0.668		
04/21/88	112	H	1023	687	16.0	17.0	D	1.081		
04/22/88	113	F	1026	28	15.0	15.0	D	1.207		
04/25/88	116	M	1028	762	16.0	15.0	A	1.584		
04/25/88	116	M	1028	762	16.0	9.0	D	1.570		
04/26/88	117	T	1038	677	16.0	16.0	B	0.636		
04/27/88	118	W	1045	18	15.0	15.0	D	0.785		
04/28/88	119	H	1041	138	15.0	15.0	A	0.602		
04/28/88	119	H	1041	138	15.0	9.0	A	0.601		
04/29/88	120	F	1050	52	15.0	15.0	B	0.433		
04/29/88	120	F	1050	52	15.0	9.0	C	0.384		
05/02/88	123	M	1051	630	16.0	16.0	D	0.592		
05/02/88	123	M	1051	630	16.0	9.0	A	0.645		
05/03/88	124	T	1058	653	16.0	17.0	D	0.281		0.232
05/04/88	125	W	1065	655	16.0	15.0	A	0.695		
05/04/88	125	W	1065	655	16.0	10.0	C	0.673		
05/05/88	126	H	1069	643	16.0	16.0	C	0.964		
05/06/88	127	F	1071	648	16.0	16.5	D	0.302		
05/09/88	130	M	1073	43	15.0	16.0	C	0.234		
05/10/88	131	T	1082	636	16.0	16.0	B	1.651		
05/11/88	132	W	1085	197	15.5	15.5	D	1.273		
05/12/88	133	H	1093	116	16.0	17.0	B	0.759		
05/13/88	134	F	1095	638	16.0	16.0	A	0.930		
05/13/88	134	F	1095	638	16.0		D	0.704		
05/13/88	134	F	1095	638	16.0		C	0.689		
05/13/88	134	F	1096	712	16.0	16.0	B	0.536		
05/13/88	134	F	1096	712	16.0		C	0.544		
05/13/88	134	F	1096	712	16.0		D	0.557		
05/16/88	137	M	1099	719	18.5	18.0	D	0.581		
05/16/88	137	M	1099	719	18.5	11.0	D	0.584		
05/17/88	138	T	1107	723	16.5	17.0	D	1.140		
05/18/88	139	W	1109	148	16.0	16.0	A	1.467		
05/18/88	139	W	1109	148	16.0	10.0	D	1.394		
05/19/88	140	H	1116	660	16.5	15.0	C	0.734		
05/20/88	141	F	1119	833	15.5	15.0	B	1.759		
05/24/88	145	T	1131	824	16.0	16.0	A	1.042		
05/24/88	145	T	1131	824	16.0	8.0	D	1.022		
05/25/88	146	W	1135	631	8.0	7.0	C	0.695		
05/26/88	147	H	1138	799	16.0	16.0	A	0.971		
05/27/88	148	F	1140	716	16.0	16.0	B	0.479		
05/31/88	152	T	1149	89	14.5	14	D	0.418		
06/01/88	153	W	1157	27	15.0	14.0	A	0.390		
06/02/88	154	H	1158	869	15.0	15.0	B	1.300		
06/03/88	155	F	1160	856	14.0	14.0	B	1.055		

TABLE E-15. SUMMARY OF THE 1988 NMOC DATA FOR MIAMI, FL (MIFL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/06/88	158	M	1178	814	15.0	14.5	D	0.606		
06/07/88	159	T	1199	154	14.0	14.0	D	0.428		
06/08/88	160	W	1223	66	19.0	17.0	B	2.380		
06/09/88	161	H	1259	8	14.5	13.5	C	0.813		
06/10/88	162	F	1274	777	15.5	15.5	A	1.523		
06/13/88	165	M	1305	139	14.5	13.0	D	0.626		
06/14/88	166	T	1354	724	16.0	14.5	D	0.465		
06/15/88	167	W	1404	38	14.5	15.0	A	0.437		
06/16/88	168	H	1435	899	18.5	19.0	D	0.814		0.675
06/17/88	169	F	1418	145	14.5	15.0	C	1.586		
06/20/88	172	M	1509	834	15.0	13.5	C	0.708		
06/21/88	173	T	1527	714	16.0	16.0	D	0.580	0.590	0.519
06/22/88	174	W	1581	917	15.0	15.0	D	1.072		
06/23/88	175	H	1594	710	15.5	15.5	D	0.696		
06/24/88	176	F	1610	880	14.5	14.5	B	0.714		
06/27/88	179	M	1659	604	15.0	15.0	C	0.580		
06/28/88	180	T	1747	888	14.5	10.0	C	1.732		1.360
06/29/88	181	W	1753	679	15.5	11.0	D	1.399		
06/30/88	182	H	1808	874	15.0	14.0	D	1.002		
07/05/88	187	T	1890	175	15.0	15.0	A	0.528		
07/06/88	188	W	1930	724	15.5	14.0	B	0.617		
07/07/88	189	H	1942	879	15.5	15.0	B	0.441		
07/08/88	190	F	1948	401	15.0	14.0	A	1.526	1.382	
07/11/88	193	M	2023	787	17.0	15.0	C	0.441		
07/12/88	194	T	2062	838	16.0	15.0	B	0.648		
07/14/88	196	H	2148	38	16.0	14.0	A	0.491		
07/15/88	197	F	2153	98	16.0	14.5	A	1.505		
07/18/88	200	M	2200	9	16.0	14.0	C	0.544	0.424	0.457
07/19/88	201	T	2244	833	16.0	14.0	A	0.645		
07/20/88	202	W	2323	52	16.0	15.0	A	0.511		
07/21/88	203	H	2377	688	17.0	15.0	A	0.632		
07/22/88	204	F	2376	674	16.5	15.0	A	1.032		
07/25/88	207	M	2425	500	16.5	14.0	D	1.304		
07/26/88	208	T	2452	675	16.5	16.0	C	1.753		
07/27/88	209	W	2530	856	16.0	15.0	D	1.032		
07/28/88	210	H	2577	667	16.5	16.0	C	0.171		0.982
07/29/88	211	F	2579	130	16.0	14.0	D	0.390		
08/01/88	214	M	2622	146	16.0	15.0	B	0.467		
08/02/88	215	T	2709	169	15.5	14.0	A	0.733		0.724
08/03/88	216	W	2748	629	16.0	15.0	D	0.424		
08/04/88	217	H	2764	112	15.5	14.0	C	0.469		
08/05/88	218	F	2798	706	16.0	16.0	C	1.577		
08/09/88	222	T	2902	665	16.0	15.0	A	0.838		
08/10/88	223	W	2934	113	15.0	14.0	B	1.947		
08/10/88	223	W	2935	194	15.0	15.0	C	2.012		
08/10/88	223	W	2934	113	15.0	8.0	B	1.995		
08/10/88	223	W	2935	194	15.0		C	1.908		
08/12/88	225	F	3032	98	13.0	12.0	D	0.996		
08/15/88	228	M	3111	779	13.0	12.0	D	0.822	0.725	0.729

TABLE E-15. SUMMARY OF THE 1988 NMOC DATA FOR MIAMI, FL (MIFL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/16/88	229	T	3135	72	13.0	12.0	B	3.014	2.735	3.125
08/17/88	230	W	3195	31		17.0	D	1.923		
08/18/88	231	H	3224	772	13.5	12.5	A	2.523	2.409	2.849
08/19/88	232	F	3245	697	13.0	12.0	D	0.578		
08/22/88	235	M	3312	52	12.5	11.0	D	1.462		
08/23/88	236	T	3406	860	12.5	12.0	A	0.480	0.511	0.560
08/24/88	237	W	3418	1	13.0	12.0	C	1.591		
08/25/88	238	H	3438	724	13.0	12.0	A	1.087		
08/26/88	239	F	3485	796	13.0	13.0	C	1.322		
08/26/88	239	F	3486	695	13.0	13.0	D	1.254		
08/29/88	242	M	3557	36	12.5	10.0	D	0.541		
08/30/88	243	T	3610	19	12.0	10.0	C	1.389		
08/31/88	244	W	3629	807	11.5	12.0	B	0.547	0.554	0.630
09/01/88	245	H	3709	923		10.0	D	0.393		
09/02/88	246	F	3702	854	11.0	10.5	A	0.450		
09/06/88	250	T	3806	852	12.5	10.0	A	0.415		
09/08/88	252	H	3882	774	13.0	11.5	B	0.356		
09/09/88	253	F	3861	163	12.5	10.0	C	0.407		
09/12/88	256	M	3956	813	11.5	10.0	B	0.281		
09/13/88	257	T	4012	794	14.0	12.0	A	0.308		
09/14/88	258	W	4027	667	12.5	10.0	D	0.190		0.209
09/15/88	259	H	4144	781	13.0	12.0	C	0.474		
09/16/88	260	F	4145	885	13.0	10.0	B	0.384		
09/16/88	260	F	4146	770	13.0	12.0	B	0.408		
09/19/88	263	M	4216	120	12.5	10.0	C	1.015		
09/20/88	264	T	4218	714	14.0	12.0	C	2.520		2.209
09/21/88	265	W	4308	130	14.0	13.0	B	4.060		3.759
09/22/88	266	H	4324	878	14.0	12.5	D	3.594		
09/23/88	267	F	4451	719	14.0	11.0	C	4.345		4.070
09/26/88	270	M	4443	781	15.0	12.0	D	5.890		5.088
09/27/88	271	T	4449	98	12.5	11.0	C	1.160		
09/28/88	272	W	4535	884	12.5	11.0	B	1.613		
09/29/88	273	H	4552	837	12.5	11.0	C	1.280		
09/30/88	274	F	4656	895	12.0	12.0	C	0.569		

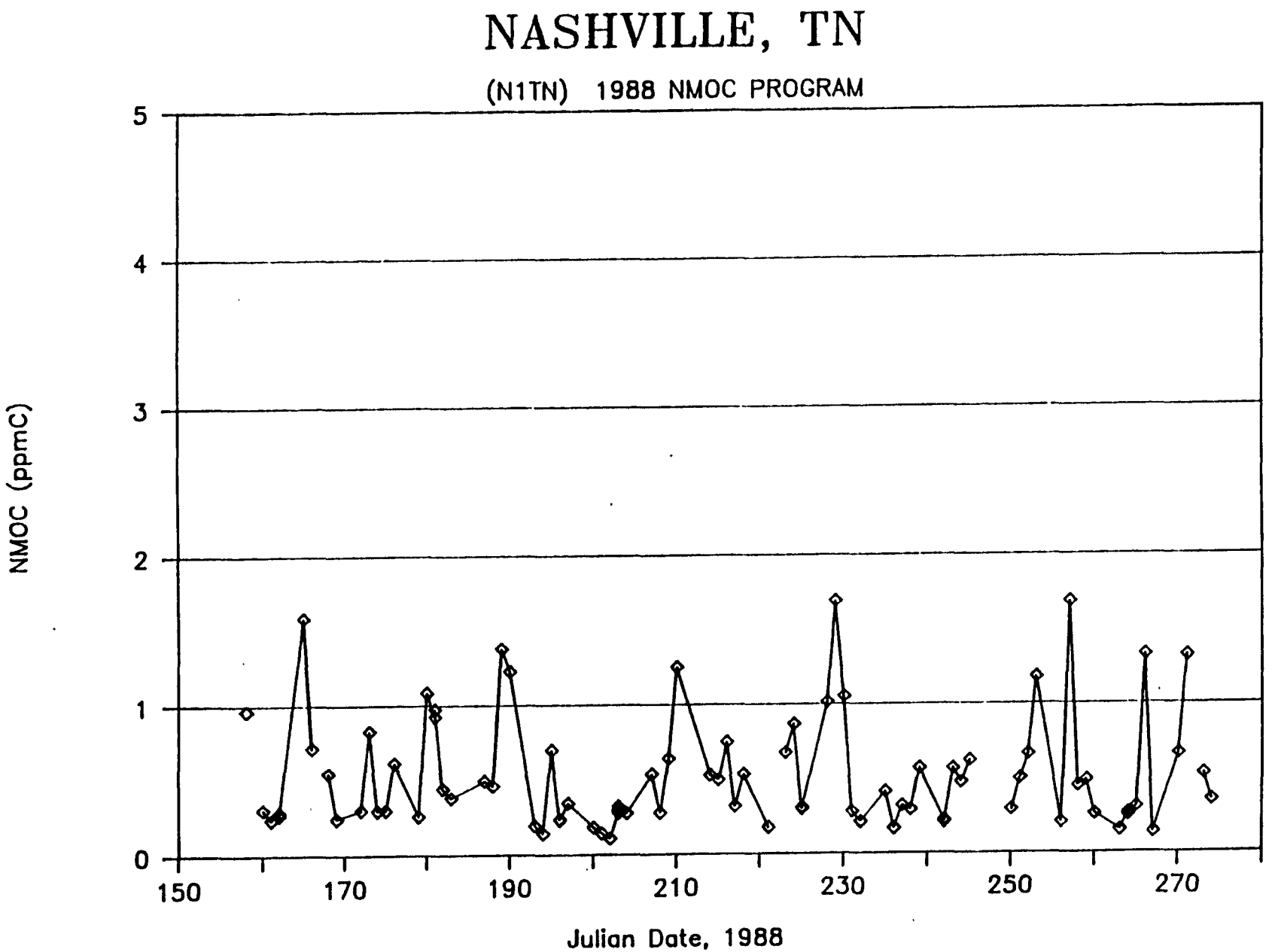


Figure E-16. Plot of NMOC concentration for Nashville, TN (Lentz).

TABLE E-16. SUMMARY OF THE 1988 NMOC DATA FOR NASHVILLE, TN (N1TN)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/06/88	158	M	1183	709	16.0	15.0	D	0.964		
06/08/88	160	W	1276	903	14.0	15.0	B	0.303		
06/09/88	161	H	1237	41	14.0	13.0	D	0.236		
06/10/88	162	F	1302	114	15.0	15.0	C	0.284		
06/10/88	162	F	1302	114	15.0	8.0	C	0.266		
06/13/88	165	M	1317	901	15.0	5.0	C	1.585		1.393
06/14/88	166	T	1402	306	15.0	16.0	B	0.714		
06/17/88	169	F	1432	155	14.0	15.0	C	0.242		
06/20/88	172	M	1546	163	16.0	15.0	A	0.297		
06/21/88	173	T	1566	194	15.0	14.0	C	0.826		
06/22/88	174	W	1631	175	15.0	15.0	D	0.292		
06/23/88	175	H	1621	667	16.0	14.0	B	0.296		
06/24/88	176	F	1639	645	16.0	16.0	C	0.612		
06/27/88	179	M	1704	629	16.0	14.0	D	0.256	0.295	0.186
06/28/88	180	T	1711	866	16.0	15.0	D	1.084		
06/29/88	181	W	1832	830	18.0	17.0	A	0.922		
06/29/88	181	W	1833	308	18.0	18.0	D	0.974		
06/30/88	182	H	1794	7	15.0	15.0	C	0.439		
07/01/88	183	F	1922	695	16.0	15.0	B	0.376		
07/05/88	187	T	1920	917	16.0	16.0	C	0.491		0.304
07/06/88	188	W	1980	689	16.0	16.0	A	0.457		
07/07/88	189	H	1983	767	16.0	15.0	C	1.375		
07/08/88	190	F	2035	169	16.0	16.0	A	1.226		
07/11/88	193	M	2041	876	16.0	15.0	C	0.192		
07/12/88	194	T	2078	14	14.0	14.0	B	0.141		
07/13/88	195	W	2142	719	16.0	16.0	B	0.698		
07/14/88	196	H	2145	844		14.5	B	0.230		0.216
07/15/88	197	F	2222	865	16.0	15.0	D	0.340		
07/18/88	200	M	2260	321	16.0	15.0	C	0.179		
07/19/88	201	T	2219	696	16.0	15.0	D	0.141		
07/20/88	202	W	2372	122	16.0	15.0	B	0.108	0.102	0.112
07/21/88	203	H	2339	903	12.0	14.0	D	0.280		
07/21/88	203	H	2339	903	12.0		D	0.319		
07/21/88	203	H	2338	869	12.0	14.0	D	0.293		
07/21/88	203	H	2338	869	12.0	10.0	D	0.272		
07/22/88	204	F	2418	802	16.0	14.0	D	0.273		
07/25/88	207	M	2477	705	19.0	19.0	B	0.534		
07/26/88	208	T	2499	880	15.0	15.0	A	0.272	0.276	0.253
07/27/88	209	W	2553	644	16.0	16.0	B	0.639		
07/28/88	210	H	2542	855	16.0	11.0	B	1.249		
08/01/88	214	M	2691	703	18.0	18.0	A	0.525		
08/02/88	215	T	2720	134	16.0	16.0	D	0.493		
08/03/88	216	W	2784	794	16.0	17.0	B	0.746		
08/04/88	217	H	2772	96	15.0	16.0	C	0.315		
08/05/88	218	F	2871	11	15.0	17.8	B	0.531		
08/08/88	221	M	2869	8	16.0	17.0	B	0.174		
08/10/88	223	W	3028	709	16.0	16.0	D	0.675		
08/11/88	224	H	3014	818	14.0	16.0	A	0.864		
08/12/88	225	F	3105	45	14.0	14.5	C	0.304		

TABLE E-16. SUMMARY OF THE 1988 NMOC DATA FOR NASHVILLE, TN (N1TN)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/12/88	225	F	3106	160	14.0	14.5	D	0.296		
08/15/88	228	M	3085	49	18.0	19.0	B	1.014	0.946	1.106
08/16/88	229	T	3251	104	14.0	15.0	B	1.687		
08/17/88	230	W	3241	24	15.0	18.0	D	1.051		
08/18/88	231	H	3203	3	14.0	17.0	D	0.276		
08/19/88	232	F	3340	165	15.0	16.0	D	0.204		0.223
08/22/88	235	M	3338	20	18.0	18.0	B	0.411		
08/23/88	236	T	3374	845	16.0	17.0	D	0.162		
08/24/88	237	W	3435	123	16.0	16.0	D	0.314		
08/25/88	238	H	3473	729	15.0	15.0	C	0.287		
08/26/88	239	F	3523	657	14.0	16.0	A	0.567		
08/29/88	242	M	3572	27	14.0	15.0	B	0.213		
08/29/88	242	M	3573	79	14.0	14.0	C	0.205		
08/29/88	242	M	3572	27	14.0	10.0	B	0.217		
08/29/88	242	M	3573	79	14.0	10.0	C	0.205		
08/30/88	243	T	3627	766	15.0	16.0	B	0.565		
08/31/88	244	W	3705	858	15.0	16.0	A	0.471		
09/01/88	245	H	3733	920	16.0	16.0	D	0.617		
09/06/88	250	T	3816	25	18.0	19.0	B	0.286		
09/07/88	251	W	3879	7	14.0	15.0	C	0.495		
09/08/88	252	H	3868	28	14.0	15.0	D	0.660		
09/09/88	253	F	3961	36	14.0	14.0	C	1.174		
09/12/88	256	M	3968	862	16.0	16.0	D	0.199		
09/13/88	257	T	4050	116	18.0	10.0	C	1.680		
09/14/88	258	W	4079	113	14.0	16.0	C	0.444		
09/15/88	259	H	4171	874	15.0	16.0	D	0.482		
09/16/88	260	F	4182	705	15.0	16.0	B	0.253		0.260
09/19/88	263	M	4159	158		16.0	C	0.147		
09/20/88	264	T	4292	699	14.0	15.0	C	0.261		
09/20/88	264	T	4293	813	14.0	16.0	C	0.244		
09/21/88	265	W	4629	864	15.0	16.0	B	0.304		
09/22/88	266	H	4356	173	14.0	14.0	D	1.320		
09/23/88	267	F	4416	677	15.0	17.0	C	0.132		
09/26/88	270	M	4414	640	14.0	17.0	C	0.660		
09/27/88	271	T	4536	833	14.0	15.0	D	1.314		
09/29/88	273	H	4544	100		14.0	A	0.525		
09/30/88	274	F	4760	919	13.0	12.0	A	0.347		

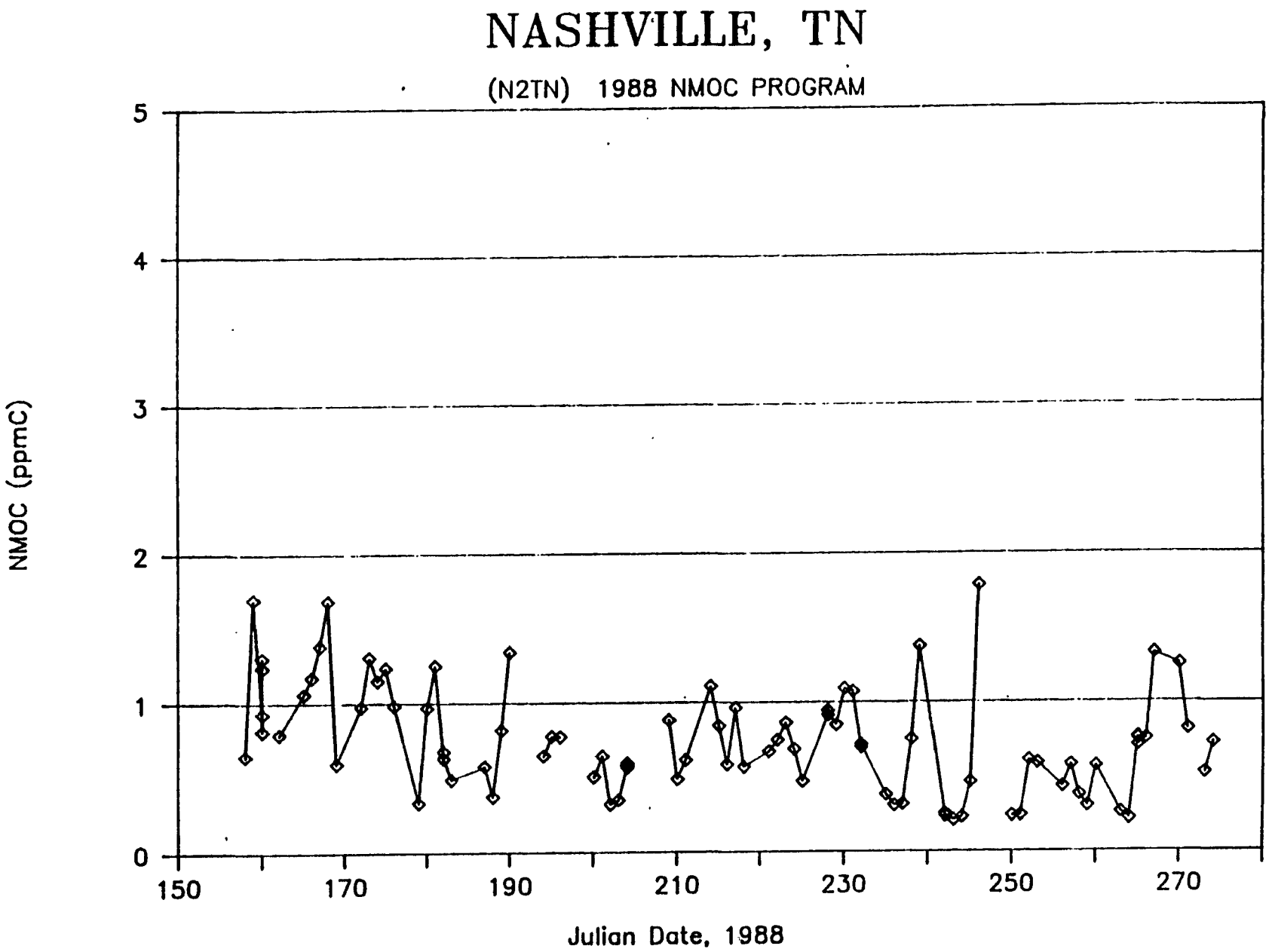


Figure E-17. Plot of NMOC concentration for Nashville, TN (Trinity Lane).

TABLE E-17. SUMMARY OF THE 1988 NMOC DATA FOR NASHVILLE, TN (N2TN)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/06/88	158	M	1190	151	12.0	11.0	A	0.645		
06/07/88	159	T	1189	784	12.0	12.0	B	1.693		
06/08/88	160	W	1266	902	16.0	18.0	B	0.927		
06/08/88	160	W	1266	902	16.0	10.0	B	0.811		
06/08/88	160	W	1267	898	16.0	16.0	C	1.303		
06/08/88	160	W	1267	898	16.0	10.0	C	1.236		
06/10/88	162	F	1318	111	12.0	8.0	D	0.790		
06/13/88	165	M	1329	806	12.0	11.0	B	1.059		
06/14/88	166	T	1401	169	12.0	11.0	A	1.170		
06/15/88	167	W	1416	922		10.0	D	1.382		
06/16/88	168	H	1392	651	12.0	12.0	A	1.683		
06/17/88	169	F	1440	14	12.0	10.0	D	0.594		
06/20/88	172	M	1545	45	12.0	8.0	A	0.974		
06/21/88	173	T	1571	106	12.0	8.0	D	1.306		
06/22/88	174	W	1632	77	12.0	8.0	A	1.148		
06/23/88	175	H	1620	783	12.0	10.0	C	1.236		
06/24/88	176	F	1634	696	12.0	11.0	A	0.981		
06/27/88	179	M	1710	632	12.0	9.0	D	0.328		
06/28/88	180	T	1732	651	12.0	11.0	D	0.966		
06/29/88	181	W	1746	708	12.0	6.0	D	1.251		
06/30/88	182	H	1830	877	14.0	15.0	A	0.674		
06/30/88	182	H	1831	878	14.0	14.0	D	0.627		
07/01/88	183	F	1923	126	12.0	10.0	D	0.483		
07/05/88	187	T	1916	783	12.0	10.0	A	0.574		
07/06/88	188	W	1981	721	12.0	10.0	A	0.367		
07/07/88	189	H	1982	671	12.0	10.0	C	0.816		
07/08/88	190	F	2033	114	12.0	10.0	A	1.340		
07/12/88	194	T	2075	78	12.0	9.0	D	0.643		
07/13/88	195	W	2143	776		9.0	C	0.773		
07/14/88	196	H	2152	830	12.0	9.0	A	0.769		
07/18/88	200	M	2259	16	12.0	9.0	D	0.501		
07/19/88	201	T	2221	644	12.0	11.0	B	0.640		
07/20/88	202	W	2370	93	12.0	10.0	B	0.314		
07/21/88	203	H	2334	175	12.0	10.0	A	0.345		
07/22/88	204	F	2432	7	14.0	15.0	A	0.577		
07/22/88	204	F	2432	7	14.0		A	0.561		
07/22/88	204	F	2433	54	14.0	14.5	A	0.593		
07/22/88	204	F	2433	54	14.0		A	0.576		
07/27/88	209	W	2540	764	14.0	15.0	C	0.879		
07/28/88	210	H	2547	60	14.0	15.0	B	0.483		
07/29/88	211	F	2692	862	14.0	15.0	B	0.613		
08/01/88	214	M	2687	720	17.0	16.5	B	1.106		
08/02/88	215	T	2718	107	14.0	14.0	B	0.841		
08/03/88	216	W	2786	647	15.0	16.0	A	0.582		
08/04/88	217	H	2766	89	14.0	15.0	C	0.961		
08/05/88	218	F	2856	63	14.0	13.0	C	0.565		
08/08/88	221	M	2874	78	16.0	16.0	A	0.668		
08/09/88	222	T	2879	40	14.0	14.0	B	0.744		
08/10/88	223	W	3016	771	15.0	15.0	B	0.859		

TABLE E-17. SUMMARY OF THE 1988 NMOC DATA FOR NASHVILLE, TN (N2TN)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/11/88	224	H	3013	840	14.0	14.0	A	0.683		
08/12/88	225	F	3100	849	14.0	15.0	C	0.465		
08/15/88	228	M	3123	838	15.0	15.0	D	0.910		
08/15/88	228	M	3124	858	15.0	15.0	D	0.940		
08/16/88	229	T	3217	183	16.0	12.0	D	0.846		
08/17/88	230	W	3240	19	14.0	14.0	D	1.091		
08/18/88	231	H	3228	27	14.0	14.0	A	1.070		
08/19/88	232	F	3341	54	14.0	14.0	A	0.695		
08/19/88	232	F	3341	54	14.0	10.0	B	0.715		
08/22/88	235	M	3337	90	14.0	14.0	A	0.373		
08/23/88	236	T	3385	96	13.0	13.0	D	0.304		
08/24/88	237	W	3446	847	13.0	14.0	C	0.312		
08/25/88	238	H	3468	886	13.0	14.0	B	0.749	0.709	0.824
08/26/88	239	F	3514	892	13.0	13.0	C	1.371		
08/29/88	242	M	3574	873	14.0	14.0	D	0.247		
08/29/88	242	M	3575	924	14.0	14.0	D	0.234		
08/30/88	243	T	3621	845	13.0	14.0	B	0.204		
08/31/88	244	W	3706	702	14.0	15.0	C	0.225		
09/01/88	245	H	3731	913	14.0	13.0	B	0.460		
09/02/88	246	F	3740	828	14.0	12.0	A	1.782		
09/06/88	250	T	3815	14	15.0	14.5	A	0.233		
09/07/88	251	W	3883	500	14.0	13.0	D	0.236		
09/08/88	252	H	3900	841	14.0	12.0	B	0.607		
09/09/88	253	F	3966	77	14.0	12.0	B	0.587		
09/12/88	256	M	3959	9	14.0	14.0	A	0.428		
09/13/88	257	T	4063	61	14.0	13.0	D	0.577		
09/14/88	258	W	4082	814	18.0	17.0	D	0.375		
09/15/88	259	H	4177	905	14.0	14.0	C	0.297		
09/16/88	260	F	4180	796	14.0	14.0	C	0.568		
09/19/88	263	M	4157	93	14.0	14.0	B	0.255		
09/20/88	264	T	4277	61	14.0	14.0	A	0.213		
09/21/88	265	W	4378	166	15.0	14.0	C	0.753		
09/21/88	265	W	4379	148	16.0	15.0	D	0.752		
09/21/88	265	W	4378	166	15.0		C	0.758		
09/21/88	265	W	4370	148	16.0		D	0.705		
09/22/88	266	H	4375	196	14.0	14.0	B	0.750		
09/23/88	267	F	4426	161	14.0	14.0	D	1.324		
09/26/88	270	M	4411	66	18.0	18.0	C	1.250		
09/27/88	271	T	4538	777	15.0	15.0	B	0.811		
09/29/88	273	H	4546	918	13.0	13.0	B	0.521		
09/30/88	274	F	4759	636	14.0	13.0	B	0.721		

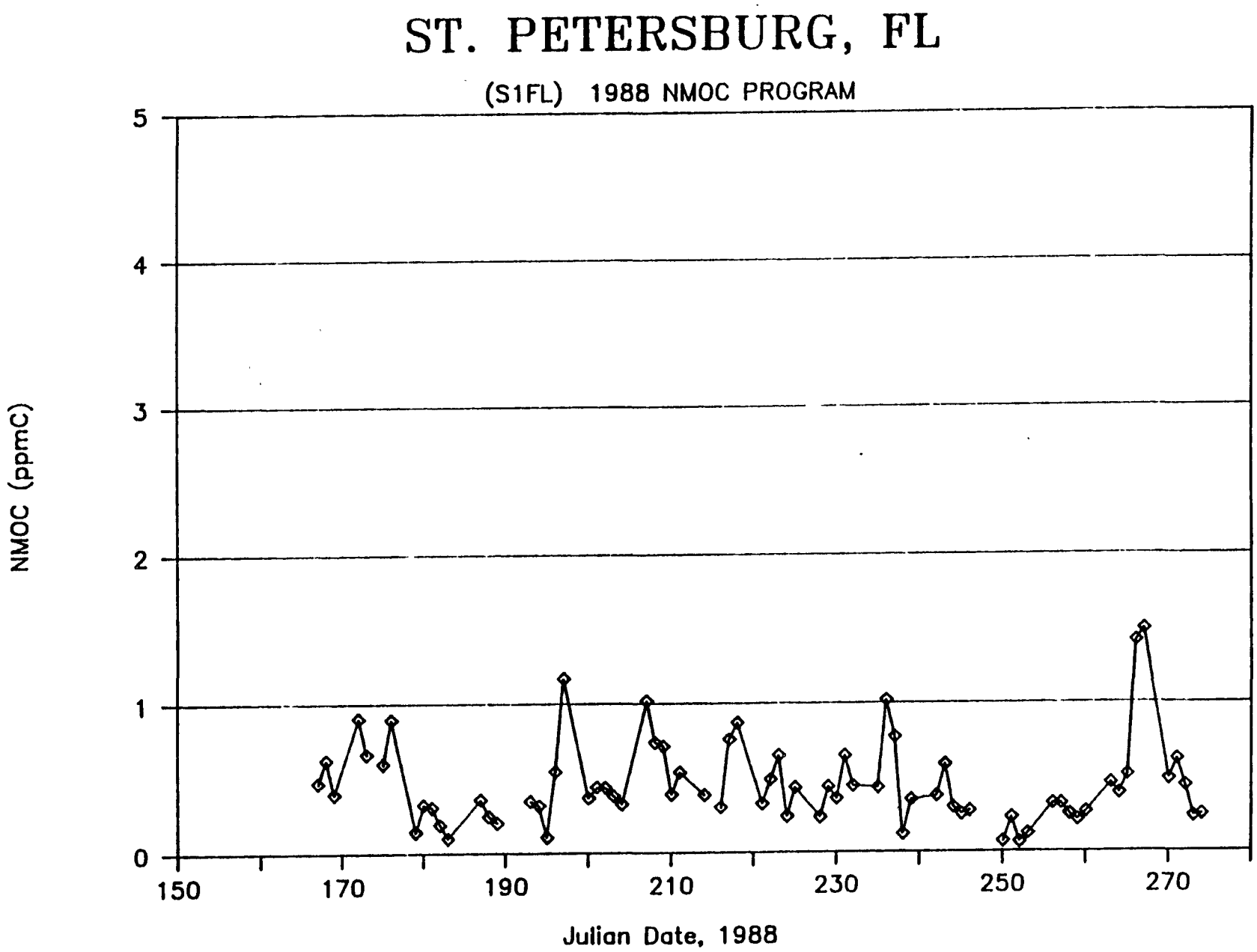


Figure E-18. Plot of NMOC concentration for St. Petersburg, FL (North).

TABLE E-18. SUMMARY OF THE 1988 NMOC DATA FOR ST. PETERSBURG, FL (S1FL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/15/88	167	W	1385	700	14.0	12.0	C	0.468		
06/16/88	168	H	1442	186	11.0	10.0	B	0.624		
06/17/88	169	F	1473	406	12.0	10.0	C	0.394		
06/20/88	172	M	1519	902	10.5	10.5	C	0.903		
06/21/88	173	T	1540	18	10.5	10.5	D	0.664		
06/23/88	175	H	1611	620	14.0	14.0	B	0.599		
06/24/88	176	F	1646	799	14.0	14.0	D	0.894		
06/27/88	179	M	1691	728	15.0	15.0	D	0.146		
06/27/88	179	M	1692	802	15.0	14.0	D	0.140		
06/28/88	180	T	1756	13	13.0	13.0	C	0.322		
06/29/88	181	W	1761	834	13.0	13.0	C	0.305		
06/30/88	182	H	1803	624	14.0	14.0	D	0.190		
07/01/88	183	F	1857	719	14.0	13.0	C	0.097		
07/05/88	187	T	1884	6	13.5	12.0	C	0.356		
07/06/88	188	W	1915	806	14.5	13.0	D	0.244		
07/07/88	189	H	1944	52	12.0	12.0	D	0.201		
07/11/88	193	M	2040	151	13.5	13.5	B	0.346		
07/12/88	194	T	2058	813	14.0	14.0	D	0.315		
07/13/88	195	W	2089	188	14.0	14.0	B	0.104		
07/13/88	195	W	2089	188	14.0		D	0.107		
07/14/88	196	H	2159	500	14.0	13.0	A	0.546		
07/15/88	197	F	2195	695	14.0		A	-1.168		
07/18/88	200	M	2279	307	15.0	14.0	A	0.365		
07/19/88	201	T	2265	131	14.5	13.0	B	0.438		
07/20/88	202	W	2348	721	16.0	13.5	A	0.436		
07/21/88	203	H	2409	792	16.0	13.5	A	0.378		
07/22/88	204	F	2410	624	16.0	13.0	D	0.324		
07/25/88	207	M	2444	164	15.0	13.0	B	1.018		
07/26/88	208	T	2469	807	16.0	13.0	A	0.737		
07/27/88	209	W	2495	189	15.0	12.0	C	0.712		
07/28/88	210	H	2548	766	15.5	13.0	C	0.388		
07/29/88	211	F	2618	75	14.0	13.0	A	0.537		
08/01/88	214	M	2678	790	16.0	15.0	A	0.382		
08/03/88	216	W	2776	148	14.0	13.0	B	0.300		
08/04/88	217	H	2820	97	15.0	13.0	C	0.756		
08/05/88	218	F	2824	500	15.0	14.0	D	0.867		
08/08/88	221	M	2883	637	16.0	15.0	C	0.322		
08/09/88	222	T	2977	876	15.0	12.0	C	0.486		
08/10/88	223	W	2939	680	16.0	13.0	C	0.649		
08/11/88	224	H	3068	404	15.0	13.0	B	0.239		
08/12/88	225	F	3066	797	16.0	14.5	A	0.432		
08/15/88	228	M	3108	898	15.0	17.5	C	0.232		
08/16/88	229	T	3140	761	16.0	13.0	C	0.437		
08/17/88	230	W	3234	728	16.0	13.0	C	0.357		
08/18/88	231	H	3250	87	14.5	14.0	D	0.647		
08/19/88	232	F	3272	664	16.0	14.0	A	0.440		
08/22/88	235	M	3330	870	14.0	12.0	D	0.429		
08/23/88	236	T	3353	862	14.0	14.0	D	1.017		
08/24/88	237	W	3442	149	14.0	13.0	A	0.771		

TABLE E-18. SUMMARY OF THE 1988 NMOC DATA FOR ST. PETERSBURG, FL (S1FL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/25/88	238	H	3521	675	14.0	14.0	C	0.117		
08/26/88	239	F	3495	119	14.0	14.0	C	0.347		
08/29/88	242	M	3545	723	15.5	13.0	C	0.374		
08/30/88	243	T	3587	54	15.0	13.0	A	0.587		
08/30/88	243	T	3588	52	15.0	13.0	A	0.581		
08/31/88	244	W	3648	191	14.0	12.0	B	0.296		
09/01/88	245	H	3668	687	15.0	13.5	B	0.250		
09/02/88	246	F	3695	806	15.0	13.0	C	0.272		
09/06/88	250	T	3829	812	14.5	13.0	B	0.067		
09/07/88	251	W	3873	625	15.0	13.0	B	0.227		
09/08/88	252	H	3899	651	11.5	9.0	A	0.063		
09/09/88	253	F	3962	35	11.0	11.0	B	0.122		
09/12/88	256	M	3944	876	14.0	12.5	B	0.319		
09/13/88	257	T	4048	783	15.0	13.0	C	0.319		
09/14/88	258	W	4035	96	15.0	13.0	A	0.254		
09/14/88	258	W	4036	63	14.5	13.0	C	0.244		
09/15/88	259	H	4089	92	14.0	12.0	D	0.212		
09/16/88	260	F	4141	315	14.0	11.0	C	0.263		
09/19/88	263	M	4163	715	15.0	13.0	C	0.457		
09/20/88	264	T	4257	630	15.0	12.0	D	0.389		
09/21/88	265	W	4306	68	14.1	12.0	A	0.515		
09/22/88	266	H	4295	867	14.0	12.0	D	1.410		
09/23/88	267	F	4354	887	14.0	12.0	C	1.490		
09/26/88	270	M	4461	31	14.2	12.0	B	0.482		
09/27/88	271	T	4585	841	14.3	13.0	C	0.618		
09/28/88	272	W	4513	839	15.0	12.3	B	0.439		
09/29/88	273	H	4623	699	14.0	10.0	A	0.233		
09/29/88	274	H	4624	153	13.0	13.0	B	0.244		

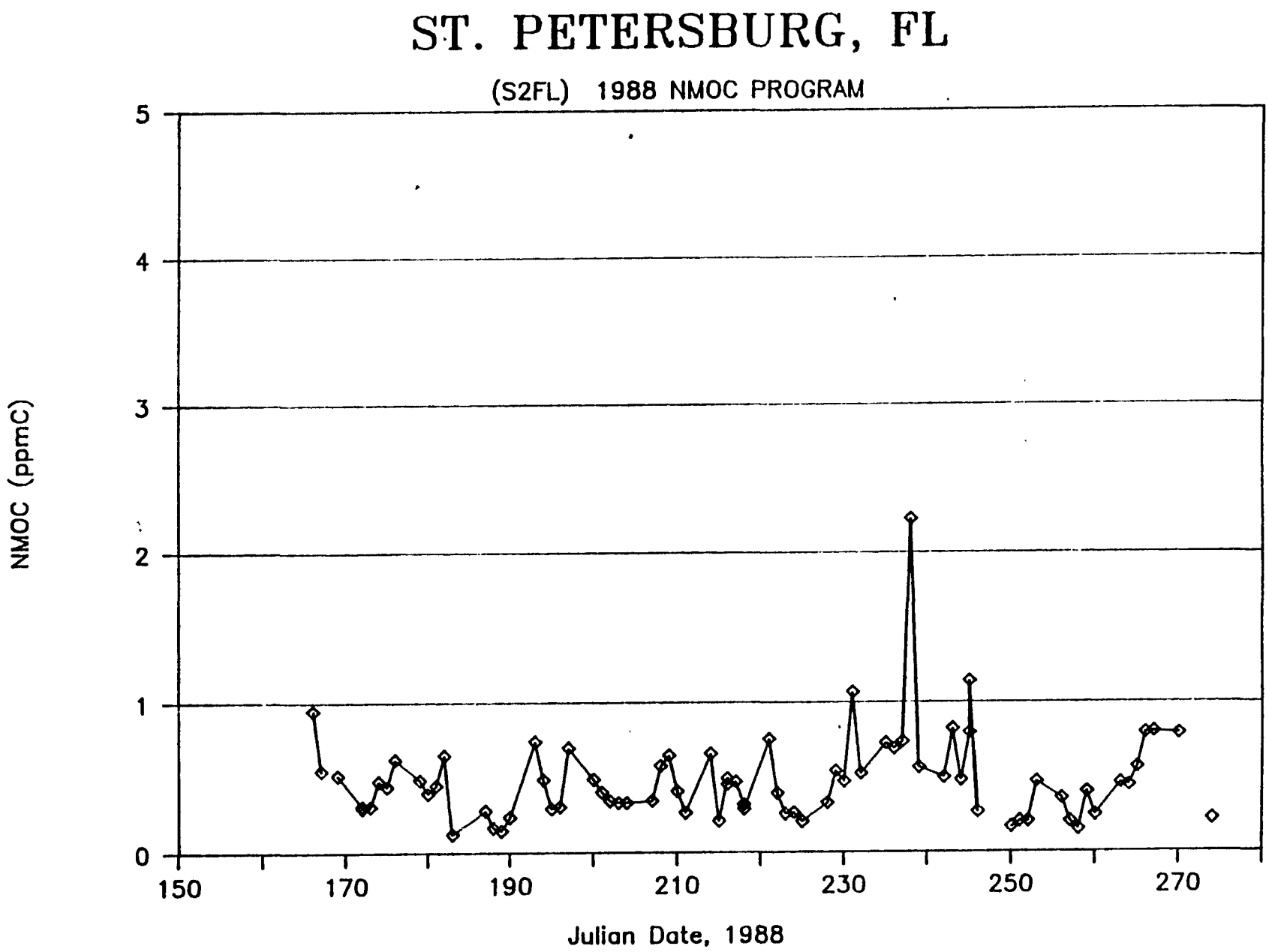


Figure E-19. Plot of NMOC concentration for St. Petersburg, FL (Azalea Park).

TABLE E-19. SUMMARY OF THE 1988 NMOC DATA FOR ST. PETERSBURG, FL (S2FL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/14/88	166	T	1367	89	13.7	13.0	C	0.944		
06/15/88	167	W	1387	784	15.0	14.0	C	0.544		
06/17/88	169	F	1474	136	14.0	14.0	C	0.514		
06/20/88	172	M	1488	848	17.0	17.0	B	0.308		
06/20/88	172	M	1489	859	17.0	17.0	B	0.296		
06/21/88	173	T	1541	16	14.0	14.0	B	0.305		
06/22/88	174	W	1569	307	14.0	14.0	D	0.476		
06/23/88	175	H	1614	833	13.8	13.0	A	0.437		
06/24/88	176	F	1645	923	14.0	14.0	D	0.621		
06/27/88	179	M	1675	53	13.8	13.8	A	0.482		
06/28/88	180	T	1754	14	13.2	14.0	C	0.392		
06/29/88	181	W	1764	626	14.3	15.0	C	0.448		
06/30/88	182	H	1805	809	14.4	14.0	A	0.650		
07/01/88	183	F	1844	62	13.0	14.0	B	0.124		
07/05/88	187	T	1881	500	15.5	15.0	D	0.279		
07/06/88	188	W	1907	642	14.8	14.0	B	0.165		
07/07/88	189	H	1949	186	14.8	13.0	A	0.146		
07/08/88	190	F	1988	729	14.4	14.0	B	0.237		
07/11/88	193	M	2037	173	14.0	14.0	C	0.739		
07/12/88	194	T	2060	796	14.8	14.0	D	0.483		
07/13/88	195	W	2092	7	13.0	13.0	C	0.290		
07/14/88	196	H	2160	35	13.2	13.0	D	0.302		
07/15/88	197	F	2196	880	13.8	14.0	D	0.697		
07/18/88	200	M	2278	8	13.5	14.0	D	0.486		
07/19/88	201	T	2264	21	13.3	13.0	B	0.400		
07/20/88	202	W	2345	665	14.3	14.0	D	0.340		
07/21/88	203	H	2412	14		13.0	A	0.329		
07/22/88	204	F	2403	693	14.0	14.0	D	0.330		
07/25/88	207	M	2443	38	13.4	13.0	B	0.342		
07/26/88	208	T	2471	625	14.5	14.0	C	0.577		
07/27/88	209	W	2498	36	13.3	13.0	D	0.646		
07/28/88	210	H	2549	768	14.4	14.0	D	0.404		
07/29/88	211	F	2615	47	13.5	14.0	D	0.262		
08/01/88	214	M	2676	676	16.8	17.0	D	0.656		
08/02/88	215	T	2731	643	14.3	15.0	B	0.209		
08/03/88	216	W	2795	848	17.0	18.0	D	0.492		
08/03/88	216	W	2796	409	16.9	17.0	D	0.450		
08/04/88	217	H	2818	51	13.5	14.0	C	0.470		
08/05/88	218	F	2823	162	13.0	14.0	C	0.315		
08/05/88	218	F	2823	162	13.0		D	0.283		
08/08/88	221	M	2881	766	13.5	15.0	D	0.754		
08/09/88	222	T	2947	906	13.3	13.0	C	0.390		
08/10/88	223	W	2979	624	14.3	16.0	B	0.252		
08/11/88	224	H	3055	129	13.2	13.0	D	0.260		
08/12/88	225	F	3069	778	14.0	14.0	A	0.202		
08/15/88	228	M	3117	879	13.3	14.0	A	0.326		
08/16/88	229	T	3130	640	15.6	15.0	D	0.538		
08/17/88	230	W	3222	714	14.4	14.0	B	0.468		
08/18/88	231	H	3243	178	14.2	14.0	C	1.067	0.962	

TABLE E-19. SUMMARY OF THE 1988 NMOC DATA FOR ST. PETERSBURG, FL (S2FL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/19/88	232	F	3271	656	14.0	15.0	A	0.522		
08/22/88	235	M	3331	924	13.4	14.0	C	0.726		
08/23/88	236	T	3358	846	13.2	13.0	B	0.687		
08/24/88	237	W	3439	153	14.0	14.0	B	0.736		
08/25/88	238	H	3505	785	14.2	14.0	C	2.225	2.014	2.416
08/26/88	239	F	3490	89	13.0	14.0	B	0.562		
08/29/88	242	M	3544	827	13.4	14.0	A	0.494		
08/30/88	243	T	3594	160	13.2	13.0	C	0.821		
08/31/88	244	W	3639	778	14.2	14.0	A	0.477		
09/01/88	245	H	3698	665	17.4	17.0	A	0.794		
09/01/88	245	H	3699	773	17.5	17.0	C	1.140		
09/02/88	246	F	3696	667	14.0	14.0	D	0.264		
09/06/88	250	T	3832	679	13.9	14.0	B	0.167		
09/07/88	251	W	3871	723	14.0	14.0	C	0.201		
09/08/88	252	H	3893	671	14.1	14.0	B	0.203		
09/09/88	253	F	3957	699	14.1	15.0	D	0.466		
09/12/88	256	M	3947	797	14.4	14.5	C	0.355		
09/13/88	257	T	4047	878	17.0	14.0	D	0.199		
09/14/88	258	W	4092	48	13.0	14.0	A	0.148		
09/15/88	259	H	4105	721	15.0	15.0	A	0.399		
09/15/88	259	H	4106	704	17.0	18.0	D	0.395		
09/16/88	260	F	4140	769	14.0	12.0	D	0.241		
09/19/88	263	M	4168	873	13.0	13.0	C	0.459		
09/20/88	264	T	4255	634	14.3	12.0	B	0.440		
09/21/88	265	W	4296	155	13.4	13.0	D	0.562		
09/22/88	266	H	4340	898	13.0	13.0	B	0.791		
09/23/88	267	F	4350	713	14.0	14.0	D	0.800		
09/26/88	270	M	4462	669	13.8	12.0	C	0.787		
09/30/88	274	F	4644	39	13.2	13.0	D	0.216		

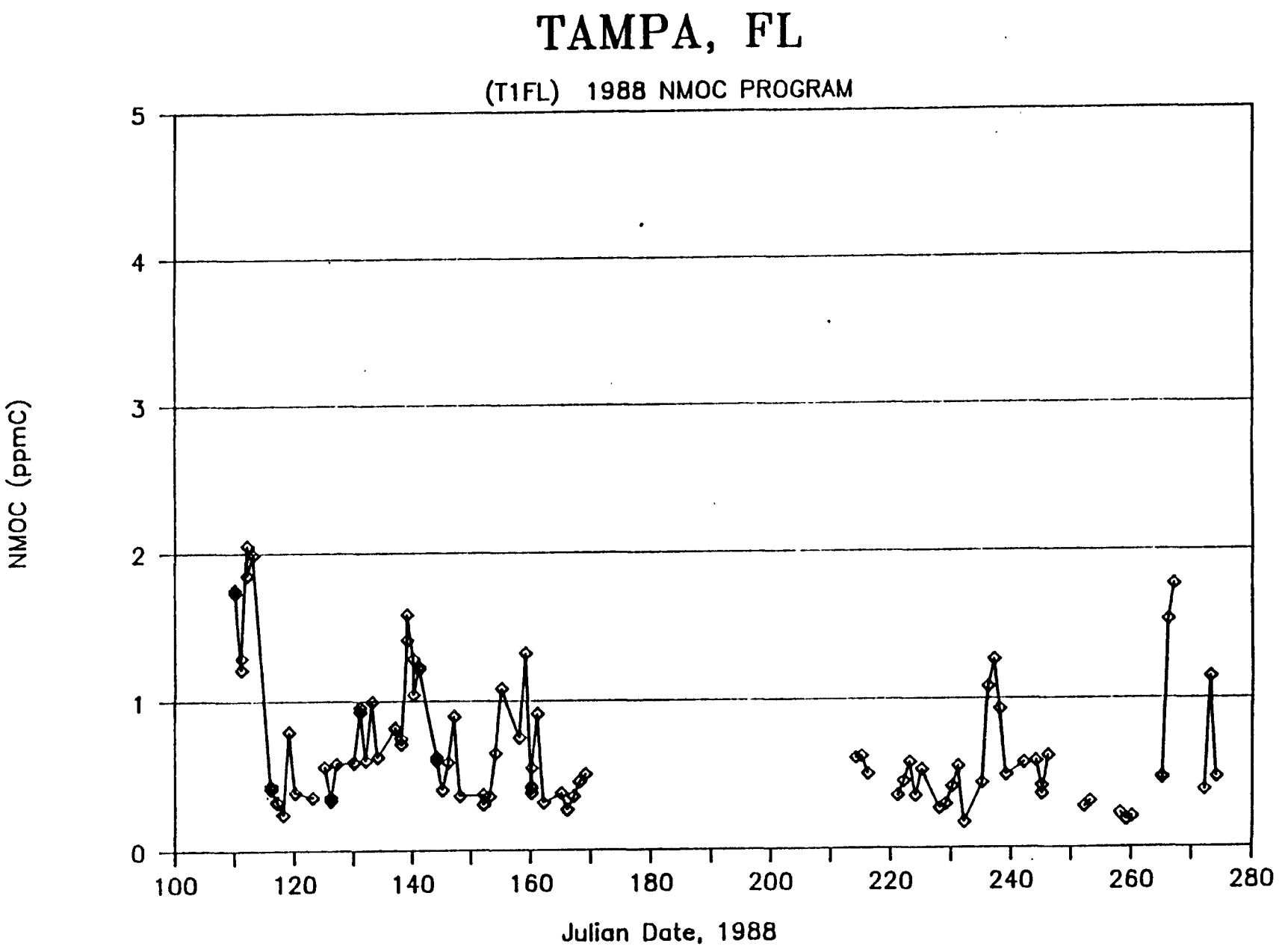


Figure E–20. Plot of NMOC concentration for Tampa, FL (EPC).

TABLE E-20. SUMMARY OF THE 1988 NMOC DATA FOR TAMPA, FL (T1FL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
04/19/88	110	T	1009	98	15.0	15.0	C	1.732		
04/19/88	110	T	1009	98	15.0	8.0	C	1.758		
04/20/88	111	W	1013	653	16.5	17.0	D	1.216		
04/20/88	111	W	1013	653	16.5	14.0	A	1.295		
04/21/88	112	H	1024	188	16.5	16.5	C	2.053		
04/21/88	112	H	1024	188	16.5	10.0	B	1.852		
04/22/88	113	F	1031	778	17.0	17.0	B	1.991		
04/25/88	116	M	1033	777	21.0	23.0	A	0.439		
04/25/88	116	M	1034	706	20.0	23.0	A	0.412		
04/26/88	117	T	1035	647	17.0	17.0	A	0.325		
04/26/88	117	T	1035	647	17.0	10.0	A	0.320		
04/27/88	118	W	1043	176	16.0	16.0	B	0.242		
04/28/88	119	H	1047	17	16.0	16.0	B	0.795		
04/29/88	120	F	1053	700	17.5	17.0	D	0.388		
05/02/88	123	M	1061	107	18.0	16.0	D	0.354		0.312
05/04/88	125	W	1063	672	18.5	17.0	B	0.558		
05/05/88	126	H	1066	135	15.5	15.0	D	0.358		
05/05/88	126	H	1066	135	15.5	8.0	B	0.331		
05/06/88	127	F	1075	140	13.0	15.0	C	0.583		
05/09/88	130	M	1077	104	18.0	19.0	C	0.592		
05/09/88	130	M	1077	104	18.0	9.0	B	0.588		
05/10/88	131	T	1080	728	17.0	17.0	A	0.928		
05/10/88	131	T	1080	728	17.0	8.0	C	0.957		
05/11/88	132	W	1087	147	15.0	15.0	D	0.601		
05/12/88	133	H	1089	61	16.5	17.0	B	0.998		
05/13/88	134	F	1091	695	16.0	16.0	A	0.624		
05/16/88	137	M	1102	120	18.0	18.0	D	0.815		
05/16/88	137	M	1102	120	18.0	10.0	C	0.824		
05/17/88	138	T	1104	680	22.0	22.0	C	0.747		
05/17/88	138	T	1105	651	22.0	22.0	C	0.711		
05/18/88	139	W	1111	784	17.0	16.0	A	1.412		
05/18/88	139	W	1111	784	17.0	10.0	C	1.583		
05/19/88	140	H	1118	703	18.0	16.5	C	1.286		
05/19/88	140	H	1118	703	18.0	10.0	A	1.046		
05/20/88	141	F	1122	837	16.0	15.0	C	1.236		
05/20/88	141	F	1122	837	16.0	8.0	D	1.217		
05/23/88	144	M	1126	830	18.0	18.0	D	0.625		
05/23/88	144	M	1126	830	18.0	12.0	A	0.599		
05/24/88	145	T	1137	724	16.5	15.0	D	0.401		
05/25/88	146	W	1133	782	14.0	13.0	C	0.586		
05/26/88	147	H	1142	826	14.5	14.0	B	0.895		
05/27/88	148	F	1144	149	14.0	14.0	A	0.362		
05/31/88	152	T	1151	720	18.0	16.0	C	0.371		
05/31/88	152	T	1151	720	18.0	10.0	B	0.304		
06/01/88	153	W	1155	674	14.5	13.0	B	0.359		
06/02/88	154	H	1162	853	12.5	12.0	A	0.650		
06/03/88	155	F	1167	847	14.0	13.0	C	1.084	1.123	1.048
06/06/88	158	M	1176	190	18.0	17.0	C	0.754		
06/07/88	159	T	1196	698	17.0	17.0	C	1.324		
06/08/88	160	W	1226	163	21.0	20.0	B	0.428		

TABLE E-20. SUMMARY OF THE 1988 NMOC DATA FOR TAMPA, FL (T1FL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/08/88	160	W	1226	163	21.0		B	0.413		
06/08/88	160	W	1227	660	21.0	20.0	C	0.379		
06/08/88	160	W	1227	660	21.0		C	0.551		
06/09/88	161	H	1258	892	16.0	14.0	D	0.913		
06/10/88	162	F	1291	93	16.0	14.0	D	0.314		0.241
06/13/88	165	M	1309	710	18.0	16.0	A	0.380		
06/14/88	166	T	1348	640	16.0	14.0	C	0.266		
06/15/88	167	W	1434	705	16.5	15.0	B	0.356		0.292
06/16/88	168	H	1447	142	13.0	12.5	D	0.455		
06/17/88	169	F	1467	10	14.0	12.0	C	0.506		
08/01/88	214	M	2642	34	22.0	21.0	A	0.606		
08/02/88	215	T	2706	636	16.0	15.0	D	0.618		0.553
08/03/88	216	W	2725	633	18.0	18.0	B	0.498		
08/08/88	221	M	2861	768	18.0	16.0	D	0.351		
08/09/88	222	T	2911	102	16.0	16.0	A	0.448		
08/10/88	223	W	2985	674	18.0	18.0	A	0.575		
08/11/88	224	H	3023	870	17.0	16.0	D	0.349		0.341
08/12/88	225	F	3074	704	17.5	17.0	A	0.525		
08/15/88	228	M	3112	706	18.0		A	0.265		
08/16/88	229	T	3131	500	17.0	17.0	C	0.292		
08/17/88	230	W	3158	922	17.0	16.5	A	0.411		
08/18/88	231	H	3226	304	17.0	16.0	C	0.548		
08/19/88	232	F	3279	705	18.0	18.0	D	0.172		
08/22/88	235	M	3363	670	18.0	17.0	C	0.434		
08/23/88	236	T	3355	826	16.0	16.0	D	1.082		
08/24/88	237	W	3400	725	17.0	18.0	D	1.267		
08/25/88	238	H	3519	176	17.0	15.0	B	0.929		
08/26/88	239	F	3507	401	16.0	16.0	A	0.487		
08/29/88	242	M	3536	912	17.0	16.0	D	0.569		0.662
08/31/88	244	W	3651	155	17.0		B	0.581		
09/01/88	245	H	3682	686	22.0	20.0	A	0.413		
09/01/88	245	H	3683	197	22.0	21.0	C	0.358		
09/02/88	246	F	3768	915	12.0	10.0	A	0.615		
09/08/88	252	H	3876	897	12.5	12.0	A	0.273		
09/09/88	253	F	3915	895	12.5	11.0	D	0.308		
09/14/88	258	W	4043	887	12.5	12.0	A	0.227		
09/15/88	259	H	4095	644	16.0	12.0	C	0.182		
09/16/88	260	F	4120	98	12.5	10.0	C	0.205		
09/21/88	265	W	4288	149	22.0	21.0	C	0.474		
09/21/88	265	W	4289	176	22.0	21.0	C	0.460		
09/22/88	266	H	4331	407	17.0	15.0	A	1.527		
09/23/88	267	F	4393	627	17.0	17.0	A	1.770		
09/28/88	272	W	4483	877	16.0	15.0	C	0.384		
09/29/88	273	H	4564	638	22.0	21.0	B	1.146		
09/29/88	273	H	4565	111	22.0	22.0	B	1.148		
09/30/88	274	F	4606	802	22.0	22.0	D	0.470		
09/30/88	274	F	4607	791	22.0	22.0	D	0.469		

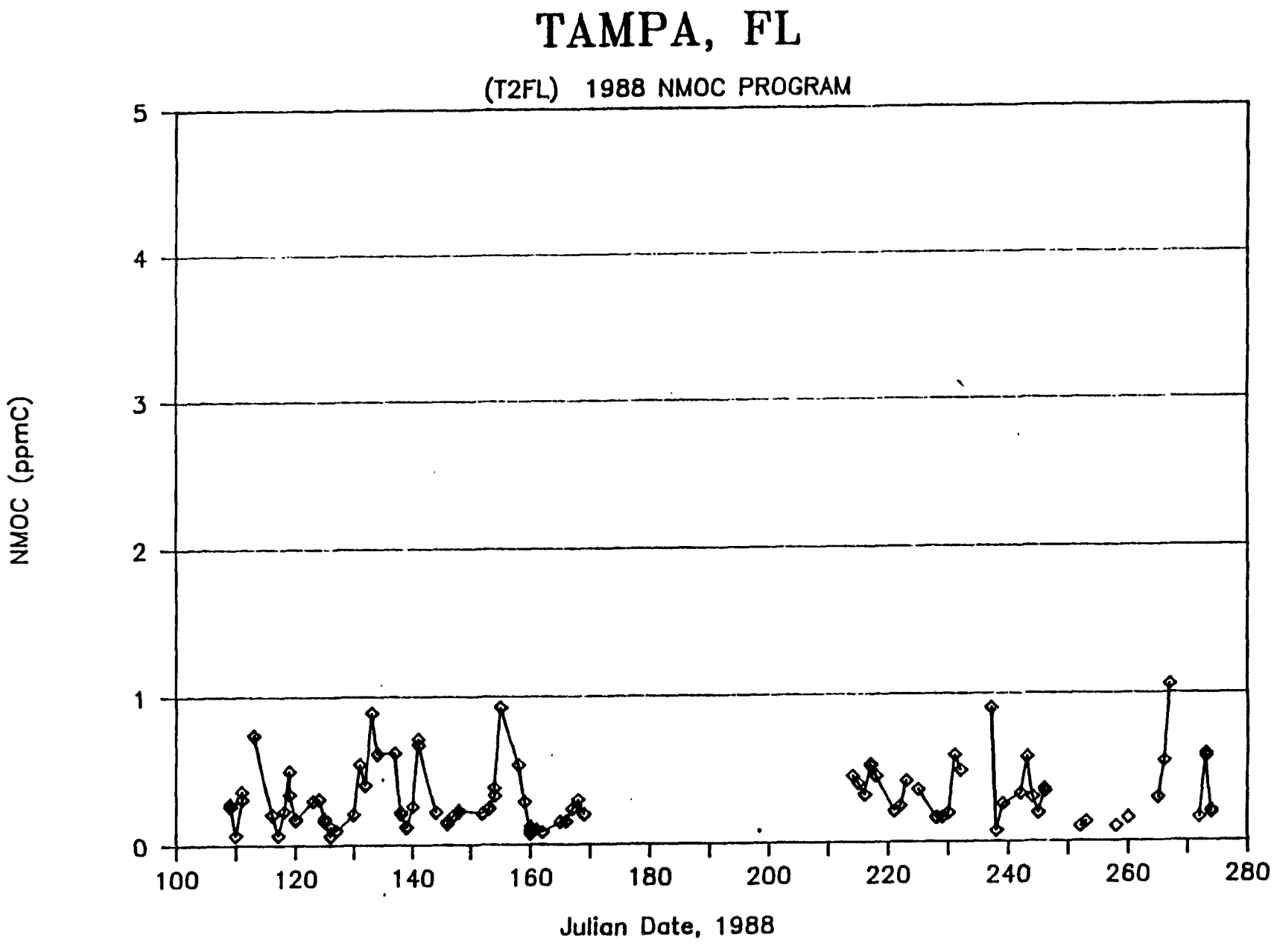


Figure E-21. Plot of NMOC concentration for Tampa, FL (Beach Park).

TABLE E-21. SUMMARY OF THE 1988 NMOC DATA FOR TAMPA, FL (T2FL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
04/18/88	109	M	1011	31	16.5	18.0	A	0.261		
04/18/88	109	M	1011	31	16.5	16.0	C	0.280		
04/19/88	110	T	1010	84	16.0	16.0	D	0.069		
04/20/88	111	W	1014	400	16.5	18.0	C	0.310		
04/20/88	111	W	1014	400	16.5	14.0	B	0.364		
04/22/88	113	F	1029	153	17.0	17.0	A	0.744		
04/22/88	113	F	1030	47	17.0	18.0	B	0.739		
04/25/88	116	M	1039	679	18.0	19.0	B	0.204		
04/26/88	117	T	1037	55	16.5	17.0	B	0.067		
04/27/88	118	W	1046	64	16.5	18.0	D	0.228		
04/28/88	119	H	1042	670	18.0	19.0	C	0.500		
04/28/88	119	H	1042	670	18.0	10.0	A	0.344		
04/29/88	120	F	1054	684	18.0	19.0	C	0.177		
04/29/88	120	F	1054	684	18.0	10.0	B	0.171		
05/02/88	123	M	1057	626	13.0	15.0	C	0.298		
05/03/88	124	T	1060	663	18.0	19.0	D	0.309		
05/03/88	124	T	1060	663	18.0	11.0	B	0.311		
05/04/88	125	W	1062	667	18.0	18.0	B	0.178		0.140
05/04/88	125	W	1062	667	18.0	12.0	C	0.164		
05/05/88	126	H	1067	186	17.0	18.0	D	0.063		
05/05/88	126	H	1067	186	17.0	9.0	A	0.126		
05/06/88	127	F	1076	689	18.5	19.0	D	0.097		
05/09/88	130	M	1078	145	18.0	18.0	D	0.209		
05/10/88	131	T	1081	99	17.0	18.0	A	0.545		
05/11/88	132	W	1088	635	18.5	20.0	C	0.401		
05/11/88	132	W	1088	635	18.5	12.0	A	0.404		
05/12/88	133	H	1090	83	17.0	18.0	B	0.890		
05/13/88	134	F	1092	103	20.0	22.0	B	0.612		
05/13/88	134	F	1092	103	20.0	16.0	C	0.617		
05/16/88	137	M	1103	3	18.0	18.0	C	0.620		
05/17/88	138	T	1106	699	18.0	19.0	D	0.209		
05/17/88	138	T	1106	699	18.0	12.0	B	0.222		
05/18/88	139	W	1112	112	16.0	18.0	A	0.119		
05/18/88	139	W	1113	152	16.0	18.0	B	0.124		
05/19/88	140	H	1117	623	19.0	17.0	D	0.259		
05/20/88	141	F	1121	838	17.0	17.0	D	0.714		
05/20/88	141	F	1121	838	17.0	10.0	C	0.670		
05/23/88	144	M	1127	671	18.0	18.0	D	0.220		
05/25/88	146	W	1134	662	18.0	17.0	D	0.143		
05/25/88	146	W	1134	662	18.0		A	0.158		
05/26/88	147	H	1143	773	18.0	18.0	A	0.197		
05/27/88	148	F	1145	827	17.0	17.0	B	0.220		
05/27/88	148	F	1145	827	17.0	12.0	C	0.233		
05/31/88	152	T	1152	134	18.0	16.0	C	0.212		
06/01/88	153	W	1154	696	18.0	18.0	A	0.238		
06/01/88	153	W	1154	696	18.0	15.0	A	0.243		
06/02/88	154	H	1163	851	17.0	17.0	C	0.330		
06/02/88	154	H	1163	851	17.0	11.0	D	0.383		
06/03/88	155	F	1168	782	17.5	17.5	C	0.923	0.928	0.886
06/06/88	158	M	1177	871	18.0	18.0	A	0.536		
06/07/88	159	T	1200	115	17.5	17.5	D	0.286		

TABLE E-21. SUMMARY OF THE 1988 NMOC DATA FOR TAMPA, FL (T2FL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/08/88	160	W	1231	680	18.0	17.0	C	0.072		
06/08/88	160	W	1231	680	18.0	10.0	C	0.093		
06/08/88	160	W	1230	802	18.0	17.0	B	0.124		
06/08/88	160	W	1230	802	18.0	10.0	B	0.101		
06/09/88	161	H	1242	681	18.0	18.0	A	0.103		
06/10/88	162	F	1289	160	17.0	16.0	C	0.084		
06/13/88	165	M	1311	639	18.0	17.0	C	0.152		
06/14/88	166	T	1356	662	18.0	16.5	C	0.155		
06/15/88	167	W	1436	768	18.0	18.0	A	0.237		
06/16/88	168	H	1449	665	18.0	19.0	C	0.300		
06/17/88	169	F	1466	189	17.0	17.0	D	0.199		
08/01/88	214	M	2633	91	18.0	17.0	C	0.446		
08/02/88	215	T	2707	782	18.0	18.0	A	0.397		
08/03/88	216	W	2740	662	18.0	16.0	C	0.318		
08/04/88	217	H	2793	897	20.0	20.0	A	0.527		
08/04/88	217	H	2794	856	17.5	17.5	A	0.514		
08/05/88	218	F	2826	618	18.0	18.0	B	0.444		
08/08/88	221	M	2863	652	22.0	20.0	A	0.209		
08/09/88	222	T	2917	9	17.0	16.0	A	0.242		
08/10/88	223	W	2981	631	18.0	18.0	D	0.411		
08/12/88	225	F	3073	795	18.0	18.0	B	0.350		
08/15/88	228	M	3116	632	18.0	18.0	C	0.162		
08/16/88	229	T	3127	1	17.0	17.0	A	0.167		
08/17/88	230	W	3159	16	16.0	18.0	B	0.193		
08/18/88	231	H	3221	912	17.0	17.0	D	0.583		
08/19/88	232	F	3278	762	17.0	17.0	B	0.481		
08/24/88	237	W	3399	632	18.0	18.0	C	0.903		
08/25/88	238	H	3513	40	17.0	16.0	A	0.074		
08/26/88	239	F	3508	698	18.0	18.0	A	0.253		
08/29/88	242	M	3535	897	17.0	17.0	B	0.322		
08/30/88	243	T	3602	500	17.0	16.0	B	0.571		
08/31/88	244	W	3655	37	16.0	17.0	C	0.299		
09/01/88	245	H	3722	839	17.0	17.0	D	0.190		
09/02/88	246	F	3785	53	17.0	16.0	A	0.354		
09/02/88	246	F	3786	123	15.0	14.0	D	0.333		
09/08/88	252	H	3878	886	16.0	12.0	C	0.102		
09/09/88	253	F	3917	10	16.5	16.0	C	0.133		
09/14/88	258	W	4039	676	18.0	16.0	D	0.102		
09/16/88	260	F	4121	308	17.0	16.0	C	0.158		
09/21/88	265	W	4290	56	17.0	17.0	C	0.292		
09/21/88	265	W	4291	56	12.5	13.0	D	0.289		
09/22/88	266	H	4305	198	17.0	17.0	D	0.539		
09/23/88	267	F	4394	775	17.0	18.0	B	1.060		
09/28/88	272	W	4499	43	17.0	17.0	D	0.159		
09/29/88	273	H	4568	692	18.0	17.0	B	0.591		
09/29/88	273	H	4569	626	18.0	18.0	C	0.568		
09/30/88	274	F	4627	40	17.0	18.0	C	0.190		
09/30/88	274	F	4628	164	17.0	18.0	C	0.202		

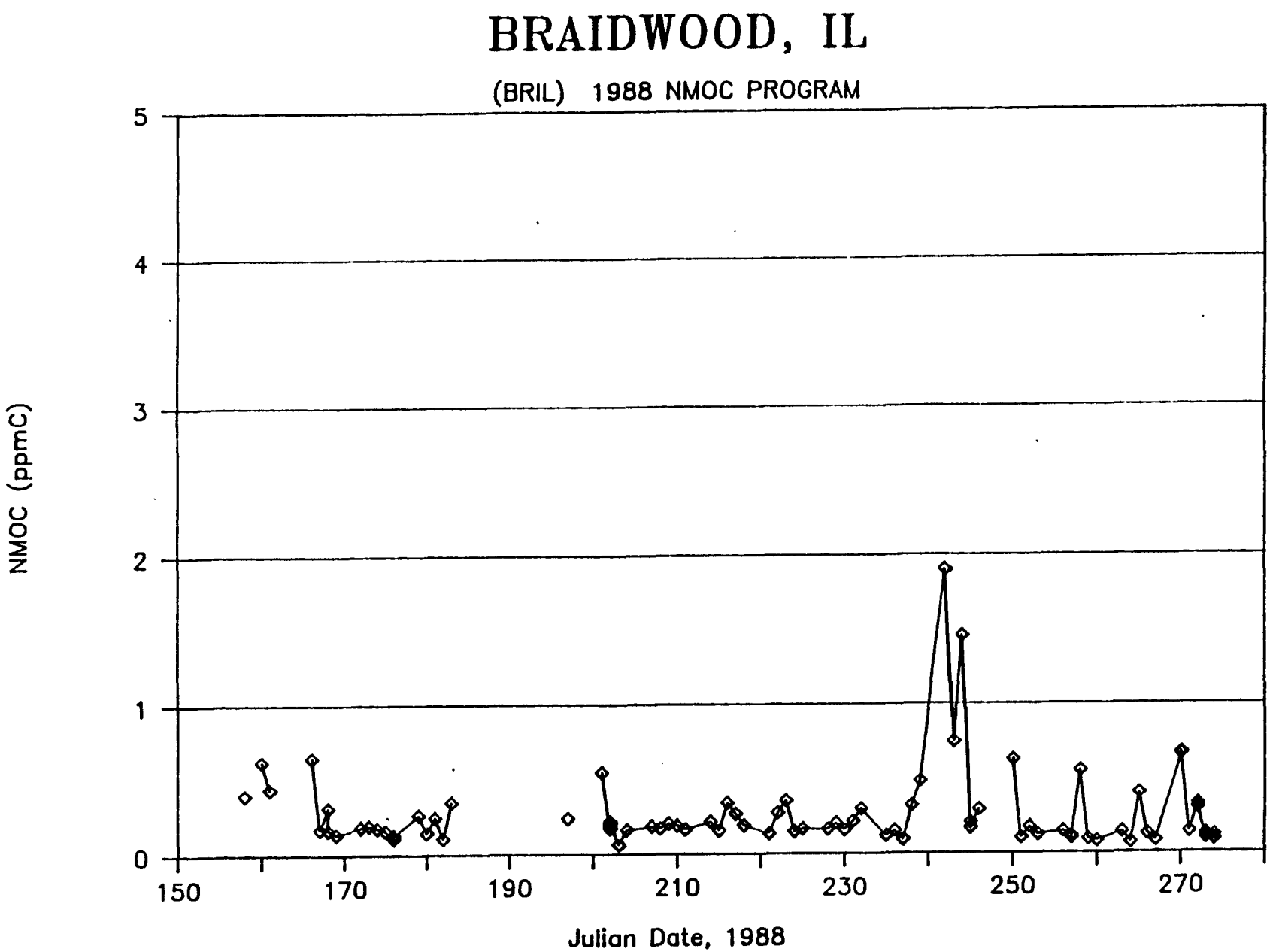


Figure E-22. Plot of NMOC concentration for Braidwood, IL.

TABLE E-22. SUMMARY OF THE 1987 NMOC DATA FOR BRAIDWOOD, IL (BRIL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/06/88	158	M	1272	891	13.0	11.0	A	0.396		
06/08/88	160	W	1203	730	13.0	12.0	C	0.620	0.503	0.403
06/09/88	161	H	1261	72	13.0	10.5	C	0.434		
06/14/88	166	T	1345	882	13.0	10.0	D	0.647	0.446	0.311
06/15/88	167	W	1355	98	13.0	12.0	B	0.170		
06/16/88	168	H	1445	84	16.0	14.0	C	0.312		
06/16/88	168	H	1446	851	16.0	15.0	A	0.167		
06/17/88	169	F	1406	13	11.0	9.0	B	0.138		
06/20/88	172	M	1538	666	14.0	12.0	C	0.185		
06/21/88	173	T	1502	838	14.0	10.0	B	0.194		
06/22/88	174	W	1619	156	12.0	11.0	C	0.178		
06/23/88	175	H	1630	98	12.0	10.0	A	0.160		
06/24/88	176	F	1668	680	14.0	13.0	B	0.109		
06/24/88	176	F	1668	680	14.0		A	0.131		
06/27/88	179	M	1684	794	14.0	13.0	D	0.264	0.332	0.213
06/28/88	180	T	1771	681	14.0	13.0	D	0.145	0.198	0.091
06/29/88	181	W	1766	910	12.0	12.0	B	0.245		
06/30/88	182	H	1787	705	14.0	13.0	B	0.107		
07/01/88	183	F	1984	918	13.0	11.0	B	0.345		
07/15/88	197	F	2240	39		13.0	D	0.238		
07/19/88	201	T	2310	860		11.5	C	0.544	0.654	0.686
07/20/88	202	W	2319	730	14.0	16.0	C	0.172		
07/20/88	202	W	2319	730	14.0	12.0	C	0.193		
07/20/88	202	W	2325	634	14.0	16.0	D	0.208		
07/20/88	202	W	2325	634	14.0	12.0	D	0.217		
07/21/88	203	H	2335	89	10.0	10.0	B	0.061		
07/22/88	204	F	2340	706	10.0	10.0	A	0.162		
07/25/88	207	M	2442	917	9.0	10.0	C	0.184		
07/26/88	208	T	2524	621	10.0	12.0	A	0.172		
07/27/88	209	W	2520	145	9.5	11.0	D	0.203		
07/28/88	210	H	2584	697	10.0	11.5	A	0.187		
07/29/88	211	F	2585	663	10.0	12.0	C	0.164		
08/01/88	214	M	2681	18	8.0	10.0	D	0.213		
08/02/88	215	T	2669	61	10.0	10.0	D	0.155		
08/03/88	216	W	2872	501	9.0	10.0	A	0.338		
08/04/88	217	H	2873	819	9.0	10.0	B	0.263		
08/05/88	218	F	2899	64	9.5	10.0	B	0.189		
08/08/88	221	M	2900	154	9.0	11.0	B	0.135		
08/09/88	222	T	3002	782	10.0	12.0	C	0.271		
08/10/88	223	W	2996	914	8.0	10.0	A	0.350		
08/11/88	224	H	3029	703	14.0	15.0	B	0.149		
08/11/88	224	H	3030	804	14.0	15.0	D	0.145		
08/12/88	225	F	3154	657	10.0	12.0	A	0.165	0.197	
08/15/88	228	M	3156	189	10.0	12.0	D	0.163		
08/16/88	229	T	3268	185	9.0	10.0	D	0.201		
08/17/88	230	W	3249	175	9.0	12.0	B	0.157		
08/18/88	231	H	3255	909	9.0	11.0	C	0.215		
08/19/88	232	F	3236	179	9.0	10.0	C	0.296		
08/22/88	235	M	3381	34	12.0	12.0	C	0.119		

TABLE E-22. SUMMARY OF THE 1987 NMOC DATA FOR BRAIDWOOD, IL (BRIL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/23/88	236	T	3386	793	10.0	10.0	B	0.151		
08/24/88	237	W	3420	704	14.0	17.0	B	0.092		
08/24/88	237	W	3421	17	14.0	15.0	D	0.091		
08/25/88	238	H	3558	98	12.0	11.0	A	0.316		
08/26/88	239	F	3565	865	9.5	10.0	A	0.481		
08/29/88	242	M	3649	835	16.0	18.0	A	1.901		
08/30/88	243	T	3660	919	13.0	15.0	A	0.743		
08/31/88	244	W	3652	882	12.0	14.0	D	1.454		
09/01/88	245	H	3684	623	15.0	16.0	A	0.201		
09/01/88	245	H	3685	114	15.0	17.0	C	0.166		
09/02/88	246	F	3782	655	14.0	15.0	C	0.287		
09/06/88	250	T	3767	654	18.0	21.0	B	0.623		
09/07/88	251	W	3821	837	13.0	16.0	B	0.102		
09/08/88	252	H	3935	115	15.0	17.0	S	0.172		
09/09/88	253	F	3934	407	13.0	16.0	D	0.122		
09/12/88	256	M	3926	86	12.0	15.0	A	0.142		
09/13/88	257	T	4005	107		17.0	A	0.112		
09/13/88	257	T	4006	306	15.0	15.0	B	0.099		
09/14/88	258	W	4061	319	12.0	15.0	B	0.548		
09/15/88	259	H	4110	807	12.0	14.0	D	0.090		0.131
09/16/88	260	F	4109	164	12.0	14.0	C	0.075		
09/19/88	263	M	4246	189	12.0	11.0	A	0.137		
09/20/88	264	T	4238	60	11.0	11.0	D	0.064		
09/21/88	265	W	4321	780	12.0	16.0	B	0.397		
09/22/88	266	H	4335	707	12.0	12.0	B	0.123		
09/23/88	267	F	4358	628	12.0	14.0	C	0.079		
09/26/88	270	M	4423	671	16.0	18.0	A	0.656		
09/26/88	270	M	4424	190	16.0	19.0	B	0.669		
09/27/88	271	T	4447	710	14.0	14.0	D	0.138		
09/28/88	272	W	4514	784	16.0	19.0	A	0.323		
09/28/88	272	W	4515	762	16.0	19.5	D	0.295		
09/29/88	273	H	4526	189	16.0	19.0	B	0.096		
09/29/88	273	H	4527	114	16.0	19.0	B	0.120		
09/29/88	273	H	4526	189	16.0	14.0	B	0.123		
09/29/88	273	H	4527	114	16.0		B	0.112		
09/30/88	274	F	4615	810	16.0	19.0	A	0.115		
09/30/88	274	F	4616	24	16.0	19.0	C	0.085		

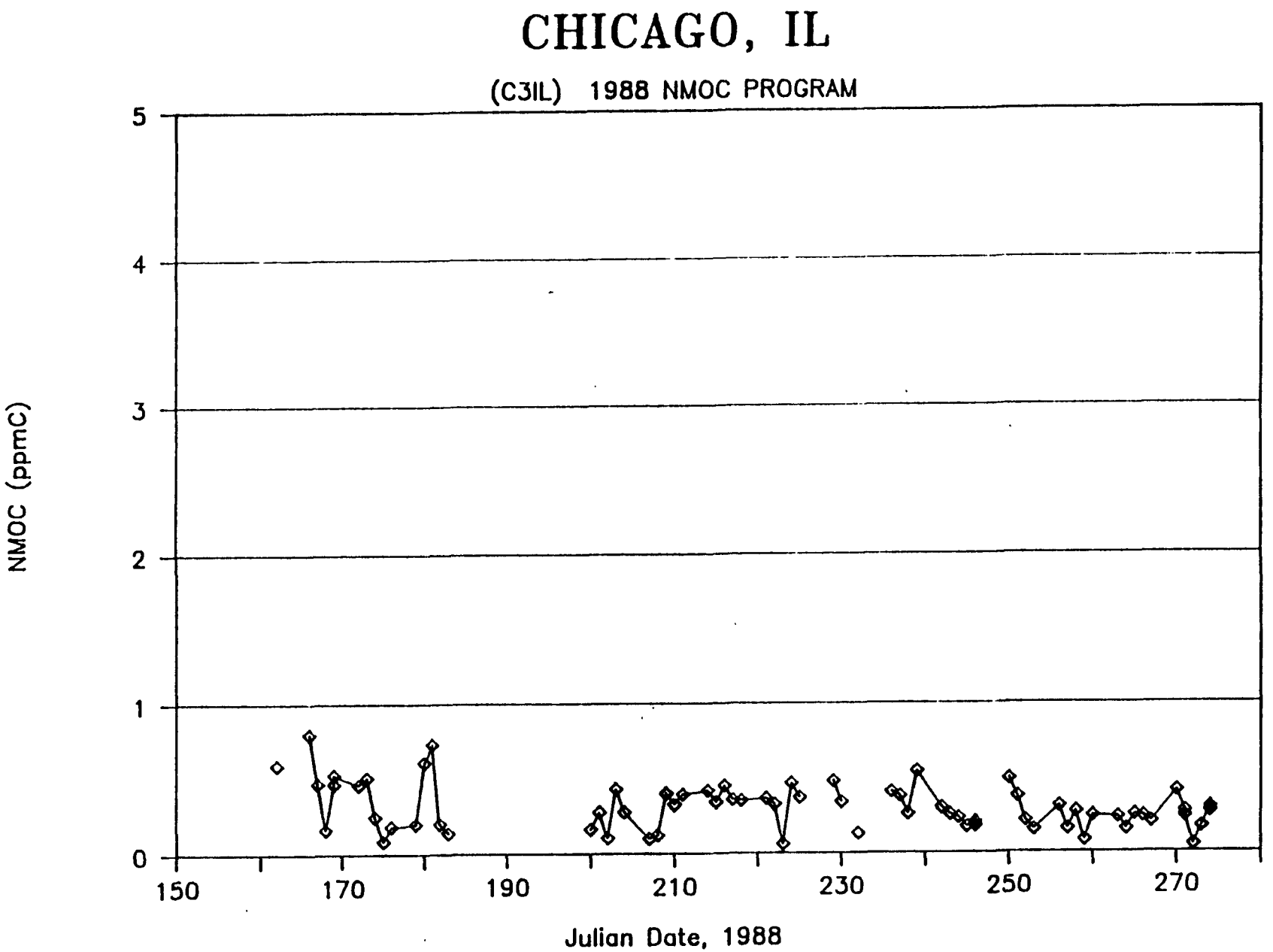


Figure E–23. Plot of NMOC concentration for Chicago, IL (Sears Tower).

TABLE E-23. SUMMARY OF THE 1988 NMOC DATA FOR CHICAGO, IL (C3IL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/10/88	162	F	1273	119	9.0	8.0	C	0.592		
06/14/88	166	T	1366	905	10.0	8.0	D	0.799		
06/15/88	167	W	1369	190	10.0	7.0	B	0.470		
06/16/88	168	H	1455	728	10.0	10.0	D	0.165		
06/17/88	169	F	1407	90	15.0	13.0	A	0.465		
06/17/88	169	F	1408	802	15.0	14.0	D	0.528		
06/20/88	172	M	1496	800	10.0	7.0	A	0.461		
06/21/88	173	T	1537	660	10.0	10.0	C	0.509		
06/22/88	174	W	1606	129	10.0	7.0	A	0.251		
06/23/88	175	H	1591	83	10.0	9.0	C	0.086		
06/24/88	176	F	1666	22	10.0	7.0	B	0.184		
06/27/88	179	M	1687	911	12.0	11.0	B	0.201		
06/28/88	180	T	1700	851	12.0	9.0	B	0.609		
06/29/88	181	W	1768	78	10.0	9.0	C	0.729		
06/30/88	182	H	1795	673	12.0	10.0	C	0.202		
07/01/88	183	F	1823	172	11.0	9.0	A	0.140		
07/18/88	200	M	2209	12	10.0	8.0	D	0.163		
07/19/88	201	T	2290	75	10.0	8.0	A	0.275		
07/20/88	202	W	2305	118	11.0	9.0	C	0.104		
07/21/88	203	H	2381	631	12.0	10.0	B	0.426		
07/22/88	204	F	2343	78	11.0	8.0	C	0.275		
07/25/88	207	M	2493	50	11.0	9.0	A	0.099		
07/26/88	208	T	2509	719	12.0	10.0	B	0.124		
07/27/88	209	W	2582	658	18.0	17.0	B	0.394		
07/27/88	209	W	2583	702	18.0	17.0	B	0.403		
07/28/88	210	H	2612	812	12.0	9.0	D	0.324		
07/29/88	211	F	2541	718	12.0	9.0	D	0.390		
08/01/88	214	M	2688	709	12.0	9.0	D	0.416		
08/02/88	215	T	2677	129	11.0	13.0	B	0.337		
08/03/88	216	W	2724	305	11.0	8.0	B	0.447		
08/04/88	217	H	2769	851	11.0	9.0	D	0.354		
08/05/88	218	F	2808	655	11.0	9.0	A	0.349		
08/08/88	221	M	2882	151	11.0	10.0	C	0.363		
08/09/88	222	T	2926	718	12.0	11.0	B	0.324		
08/10/88	223	W	2971	630	18.0	17.0	B	0.059		
08/10/88	223	W	2972	57	18.0	16.0	C	0.059		
08/11/88	224	H	2945	854	11.0	10.0	A	0.464		
08/12/88	225	F	2989	34	11.0	9.0	A	0.367		
08/16/88	229	T	3193	791	12.0	10.0	C	0.478		
08/17/88	230	W	3166	119	11.5	10.0	C	0.336		
08/19/88	232	F	3339	877	12.0	10.0	D	0.130		
08/23/88	236	T	3389	111	12.0	11.0	D	0.404		
08/24/88	237	W	3432	838	12.0	11.0	C	0.376		
08/25/88	238	H	3454	834	12.0	10.0	B	0.257		
08/26/88	239	F	3460	852	11.0	10.0	C	0.541		
08/29/88	242	M	3563	41	14.0	12.0	B	0.297		
08/30/88	243	T	3591	813	12.0	10.0	C	0.254		
08/31/88	244	W	3631	701	13.0	12.0	A	0.233		
09/01/88	245	H	3719	644	13.0	11.0	D	0.172		

TABLE E-23. SUMMARY OF THE 1988 NMOC DATA FOR CHICAGO, IL (C3IL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
09/02/88	246	F	3688	765	19.0	17.0	A	0.205		
09/02/88	246	F	3689	817	19.0	17.0	D	0.176		
09/06/88	250	T	3834	501	14.0	12.0	C	0.488		
09/07/88	251	W	3820	141	12.0	10.0	A	0.370		
09/08/88	252	H	3885	857	12.0	9.0	C	0.210		
09/09/88	253	F	3864	171	12.0	10.0	D	0.148		
09/12/88	256	M	3993	198	13.0	11.0	D	0.306		
09/13/88	257	T	4054	700	12.0	10.5	D	0.155		
09/14/88	258	W	3995	702	13.0	10.0	A	0.269		0.290
09/15/88	259	H	4073	31	11.0	9.0	C	0.078		
09/16/88	260	F	4137	161		10.0	C	0.241		
09/19/88	263	M	4158	79	12.0	10.0	A	0.233		
09/20/88	264	T	4226	75	12.0	9.0	C	0.152		
09/21/88	265	W	4272	855	12.0	10.0	A	0.251		
09/22/88	266	H	4327	881	11.0	9.0	D	0.240		
09/23/88	267	F	4364	154	12.0	10.0	C	0.199		
09/26/88	270	M	4452	816	13.0	10.0	C	0.407		
09/27/88	271	T	4470	104	20.0	16.0	C	0.271		0.268
09/27/88	271	T	4471	624	20.0	17.0	A	0.235		
09/28/88	272	W	4489	773	19.0	17.0	A	0.047		
09/28/88	272	W	4490	152	19.0	17.9	D	0.046		
09/29/88	273	H	4531	22	18.0	17.0	B	0.166		0.171
09/29/88	273	H	4532	630	18.0	14.0	B	0.171		
09/30/88	274	F	4599	180	18.0	16.0	C	0.298		
09/30/88	274	F	4600	828	18.0	17.0	A	0.270		

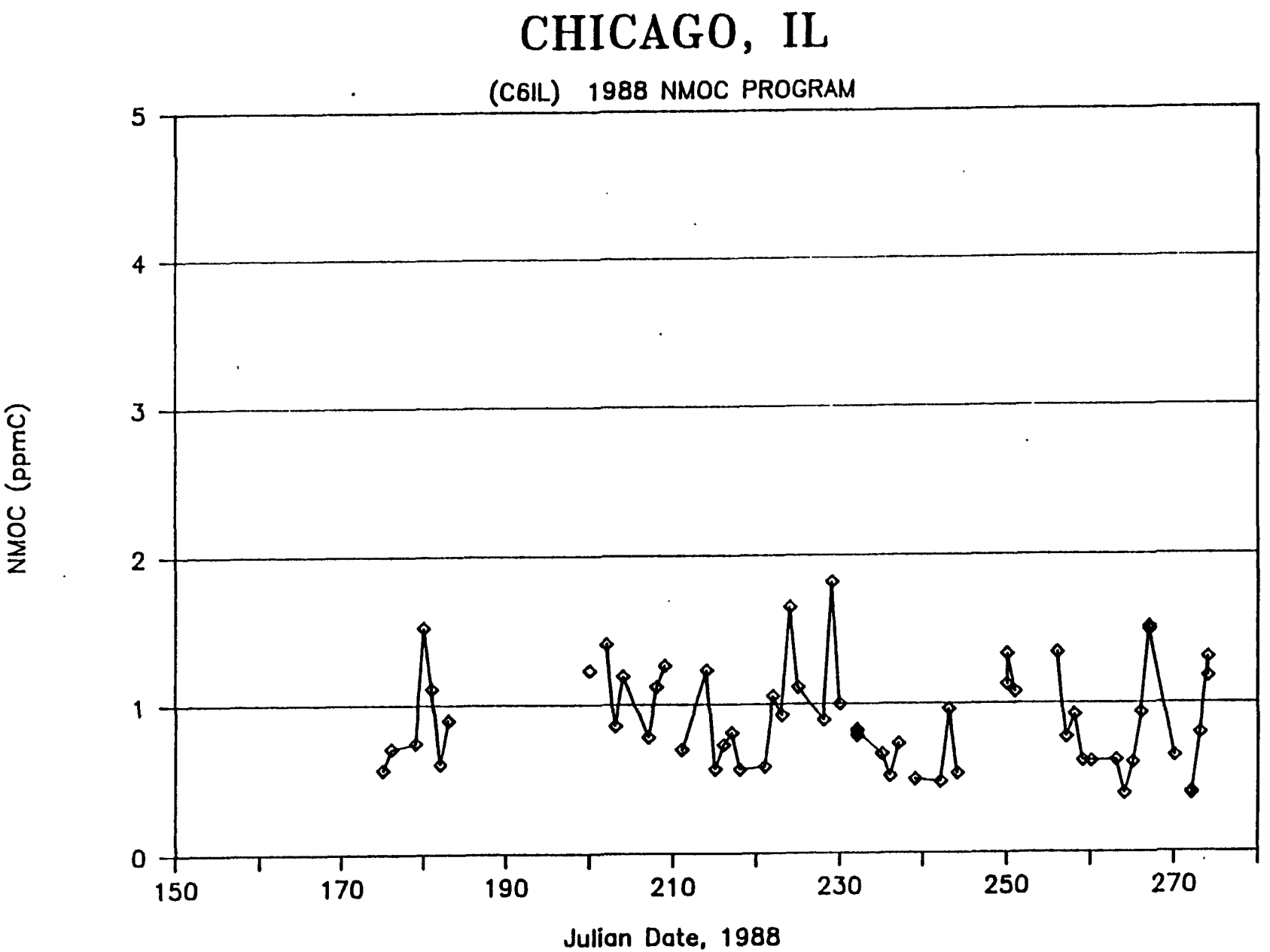


Figure E-24. Plot of NMOC concentration for Chicago, IL (CTA).

TABLE E-24. SUMMARY OF THE 1988 NMOC DATA FOR CHICAGO, IL (C6IL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/23/88	175	H	1629	730	8.0	6.0	D	0.564		
06/24/88	176	F	1664	767	8.0	6.0	A	0.705		
06/27/88	179	M	1673	914	7.0	6.0	C	0.743		
06/28/88	180	T	1706	898	6.0	5.0	C	1.523		
06/29/88	181	W	1767	173	6.0	4.0	D	1.110		
06/30/88	182	H	1793	111	7.0	5.0	C	0.602		
07/01/88	183	F	1828	885	14.0	13.0	B	0.892		
07/01/88	183	F	1829	896	14.0	12.0	B	0.896		
07/18/88	200	M	2242	22	6.0	5.0	D	1.229		
07/20/88	202	W	2298	891	6.0	5.0	B	1.406		
07/21/88	203	H	2344	864	9.0	6.0	C	0.854		
07/22/88	204	F	2379	686	10.0	8.0	A	1.190	1.148	
07/25/88	207	M	2415	698	10.0	8.0	C	0.778		
07/26/88	208	T	2529	774	10.0	8.0	C	1.117		
07/27/88	209	W	2576	795	20.0	19.0	C	1.262		
07/29/88	211	F	2580	187	9.0	7.0	C	0.694		
08/01/88	214	M	2666	10	9.0	5.0	A	1.231		
08/02/88	215	T	2711	829	9.0	7.0	C	0.563	0.612	0.659
08/03/88	216	W	2747	6	8.0	5.0	D	0.724		
08/04/88	217	H	2771	116	9.0	5.0	B	0.805		
08/05/88	218	F	2806	147	8.0	7.0	C	0.558		
08/08/88	221	M	2870	922	8.0	8.0	D	0.578		
08/09/88	222	T	2931	710	9.0	8.0	C	1.054		
08/10/88	223	W	2940	888	9.0	7.0	B	0.925		
08/11/88	224	H	2946	792	10.0	9.0	C	1.651		
08/12/88	225	F	2941	845	8.5	7.0	D	1.111		
08/15/88	228	M	3041	61	9.0	7.0	C	0.891		
08/16/88	229	T	3269	800	9.0	8.0	D	1.819		
08/17/88	230	W	3168	89	8.0	7.0	D	0.999		
08/19/88	232	F	3219	901	12.0	12.0	A	0.784		
08/19/88	232	F	3220	145	12.0	12.0	C	0.815		
08/19/88	232	F	3219	901	12.0	8.0	A	0.826		
08/19/88	232	F	3220	145	12.0		C	0.816		
08/22/88	235	M	3329	896	10.5	10.0	C	0.660		
08/23/88	236	T	3380	861	7.0	7.0	C	0.512		
08/24/88	237	W	3431	922	5.0	6.0	C	0.730		
08/26/88	239	F	3458	779	10.0	10.0	C	0.490		
08/29/88	242	M	3571	24	12.0	12.0	B	0.473		
08/30/88	243	T	3606	636	10.0	10.0	C	0.960		
08/31/88	244	W	3725	68	10.0	10.0	C	0.529		
09/06/88	250	T	3787	798	15.0	14.0	B	1.126		
09/06/88	250	T	3788	805	13.0	14.0	D	1.332		
09/07/88	251	W	3827	719	5.0	4.0	D	1.077		
09/12/88	256	M	3936	717	7.0	8.0	B	1.339		
09/13/88	257	T	4013	19	8.0	4.0	C	0.771		
09/14/88	258	W	4014	708	9.0	6.0	C	0.920		
09/15/88	259	H	4080	75	8.0	4.0	C	0.610		
09/16/88	260	F	4143	40	8.0	4.0	C	0.606		
09/19/88	263	M	4164	165	8.0	7.0	D	0.615		

TABLE E-24. SUMMARY OF THE 1988 NMOC DATA FOR CHICAGO, IL (C6IL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
09/20/88	264	T	4223	793	8.0	4.0	D	0.389		
09/21/88	265	W	4275	879	8.0	7.0	D	0.597		
09/22/88	266	H	4337	838	8.0	6.0	D	0.935		
09/23/88	267	F	4386	96	12.0	10.0	A	1.510		
09/23/88	267	F	4387	63	12.0	12.0	A	1.490		
09/26/88	270	M	4560	83	8.0	8.0	C	0.640		
09/28/88	272	W	4519	865	13.0	12.0	A	0.384		
09/28/88	272	W	4520	863	13.0	12.0	D	0.399		
09/29/88	273	H	4555	773	9.0	9.0	A	0.794		
09/30/88	274	F	4608	409	13.0	13.0	D	1.306		
09/30/88	274	F	4609	10	13.0	13.0	C	1.178		

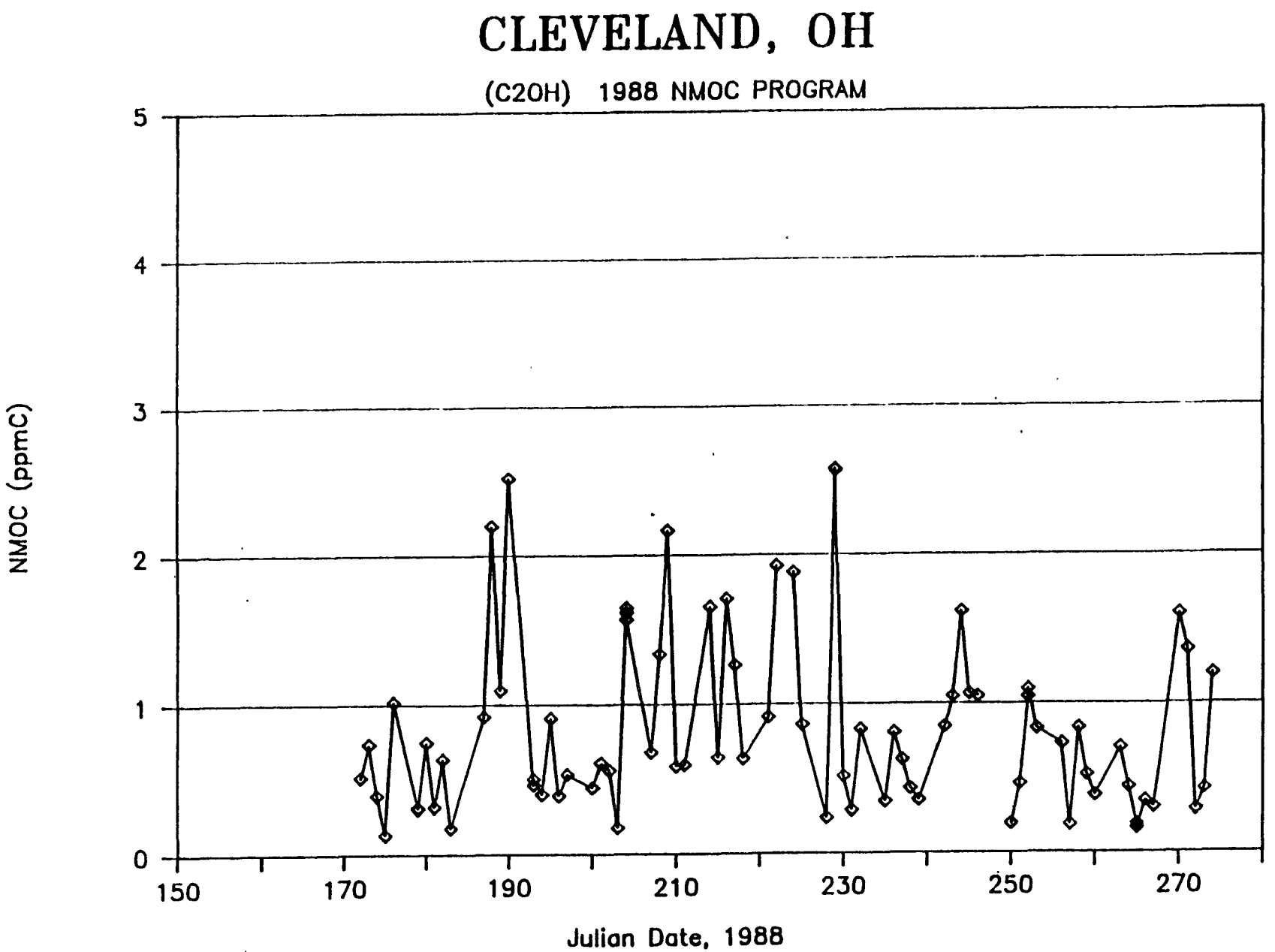


Figure E-25. Plot of NMOC concentration for Cleveland, OH (Convention Center).

TABLE E-25. SUMMARY OF THE 1988 NMOC DATA FOR CLEVELAND, OH (C2OH)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/20/88	172	M	1542	154	15.0	15.0	A	0.515		
06/21/88	173	T	1558	118	15.5	12.5	C	0.737	0.550	0.477
06/22/88	174	W	1612	699	16.0	13.0	A	0.394		
06/23/88	175	H	1638	779	16.0	14.0	B	0.133		
06/24/88	176	F	1677	662	17.0	14.0	C	1.020		
06/27/88	179	M	1702	853	12.0	15.0	B	0.313		
06/27/88	179	M	1702	853	16.0	15.0	C	0.306		
06/28/88	180	T	1762	883	15.5	15.0	A	0.750		0.725
06/29/88	181	W	1827	143	15.5	14.0	A	0.318		
06/30/88	182	H	1824	792	16.5	17.0	C	0.638		
07/01/88	183	F	1879	846	16.0	16.0	B	0.176		
07/05/88	187	T	1900	714	16.0	15.0	B	0.920		
07/06/88	188	W	1972	620	16.5	16.0	D	2.199		
07/07/88	189	H	1960	711	16.0	15.0	A	1.099	1.037	0.888
07/08/88	190	F	2005	120	15.0	14.0	B	2.520		
07/11/88	193	M	2031	847	15.0	12.5	A	0.464		
07/11/88	193	M	2032	819	15.0	12.5	A	0.504		
07/12/88	194	T	2072	883	17.5	15.0	A	0.400		
07/13/88	195	W	2112	900	19.0	16.0	B	0.910	0.984	1.016
07/14/88	196	H	2139	816	19.0	15.0	D	0.390		
07/15/88	197	F	2187	675	19.0	16.0	C	0.534		
07/18/88	200	M	2205	143	21.0	19.0	B	0.443	1.153	1.243
07/19/88	201	T	2280	804	17.0	16.0	C	0.609		
07/20/88	202	W	2293	861	17.5	14.0	B	0.559		
07/21/88	203	H	2341	308	16.0	14.0	D	0.177		
07/22/88	204	F	2398	700	15.5	14.0	A	1.647		
07/22/88	204	F	2398	700	15.5	10.0	A	1.615		
07/22/88	204	F	2399	191	15.5	14.0	A	1.649		
07/22/88	204	F	2399	191	15.5	8.0	A	1.567		
07/25/88	207	M	2447	800	18.5	18.0	D	0.679		
07/26/88	208	T	2475	845	18.0	15.0	C	1.340	1.230	1.370
07/27/88	209	W	2523	886	18.0	16.0	B	2.165		
07/28/88	210	H	2544	913	18.0	17.0	A	0.585		
07/29/88	211	F	2628	28	18.0	16.0	A	0.595		
08/01/88	214	M	2632	673	19.0	16.0	D	1.655		
08/02/88	215	T	2671	194	17.5	16.0	D	0.643		
08/03/88	216	W	2751	816	18.0	16.0	A	1.709		
08/04/88	217	H	2790	302	18.0	17.0	D	1.263		
08/05/88	218	F	2831	17	17.0	17.0	D	0.636	0.570	0.595
08/08/88	221	M	2849	620	19.5	18.0	C	0.914		
08/09/88	222	T	2921	142	17.0	17.0	A	1.926		
08/11/88	224	H	3012	52	17.0	16.0	D	1.883		
08/12/88	225	F	2993	829	17.5	16.0	C	0.860		
08/15/88	228	M	3118	805	18.5	17.0	C	0.235		
08/16/88	229	T	3098	162	16.5	16.0	D	2.566		
08/16/88	229	T	3099	11	16.5	16.0	D	2.572		
08/17/88	230	W	3191	890	17.5	16.0	D	0.515		
08/18/88	231	H	3210	163	17.0	16.0	D	0.283		
08/19/88	232	F	3270	700	19.0	18.0	B	0.829		

TABLE E-25. SUMMARY OF THE 1988 NMOC DATA FOR CLEVELAND, OH (C2OH)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/22/88	235	M	3328	70	17.5	17.0	B	0.344		
08/23/88	236	T	3377	689	18.5	17.0	A	0.807		
08/24/88	237	W	3413	114	17.0	17.0	D	0.625		
08/25/88	238	H	3459	147	17.5	18.0	D	0.430		
08/26/88	239	F	3461	97	17.0	17.0	D	0.352		
08/29/88	242	M	3550	800	18.0	18.0	C	0.846		
08/30/88	243	T	3597	621	19.0	19.0	A	1.049		
08/31/88	244	W	3641	870	17.5	18.0	B	1.619		
09/01/88	245	H	3712	70	17.5	16.0	D	1.066		
09/02/88	246	F	3741	177	17.5	16.0	C	1.048		1.099
09/06/88	250	T	3757	922	17.0	16.0	A	0.194		
09/07/88	251	W	3809	401	17.5	17.0	C	0.462		
09/08/88	252	H	3840	672	17.0	14.0	D	1.041		
09/08/88	252	H	3839	19	17.0	17.0	C	1.096		
09/09/88	253	F	3911	780	18.5	18.0	D	0.828		
09/12/88	256	M	3945	701	18.5	18.0	A	0.728		
09/13/88	257	T	3998	724	18.0	17.0	C	0.185		
09/14/88	258	W	4041	655	18.0	16.0	C	0.835		
09/15/88	259	H	4088	906	18.0	16.0	C	0.520		0.644
09/16/88	260	F	4115	179	18.0	18.0	A	0.380		
09/19/88	263	M	4154	819	17.0	16.0	D	0.703		
09/20/88	264	T	4235	797	18.0	17.0	B	0.438		
09/21/88	265	W	4286	49	15.0	11.0	C	0.187		
09/21/88	265	W	4287	35	15.0	13.8	D	0.161		
09/22/88	266	H	4319	185	17.5	17.0	B	0.343		
09/23/88	267	F	4353	652	18.0	16.0	D	0.300		
09/26/88	270	M	4415	825	17.5	16.0	C	1.598		
09/27/88	271	T	4464	109	18.0	16.0	D	1.360		
09/28/88	272	W	4487	766	18.0	17.9	B	0.284		
09/29/88	273	H	4561	120	17.5	17.0	D	0.424		
09/30/88	274	F	4537	900	18.0	18.0	D	1.197		

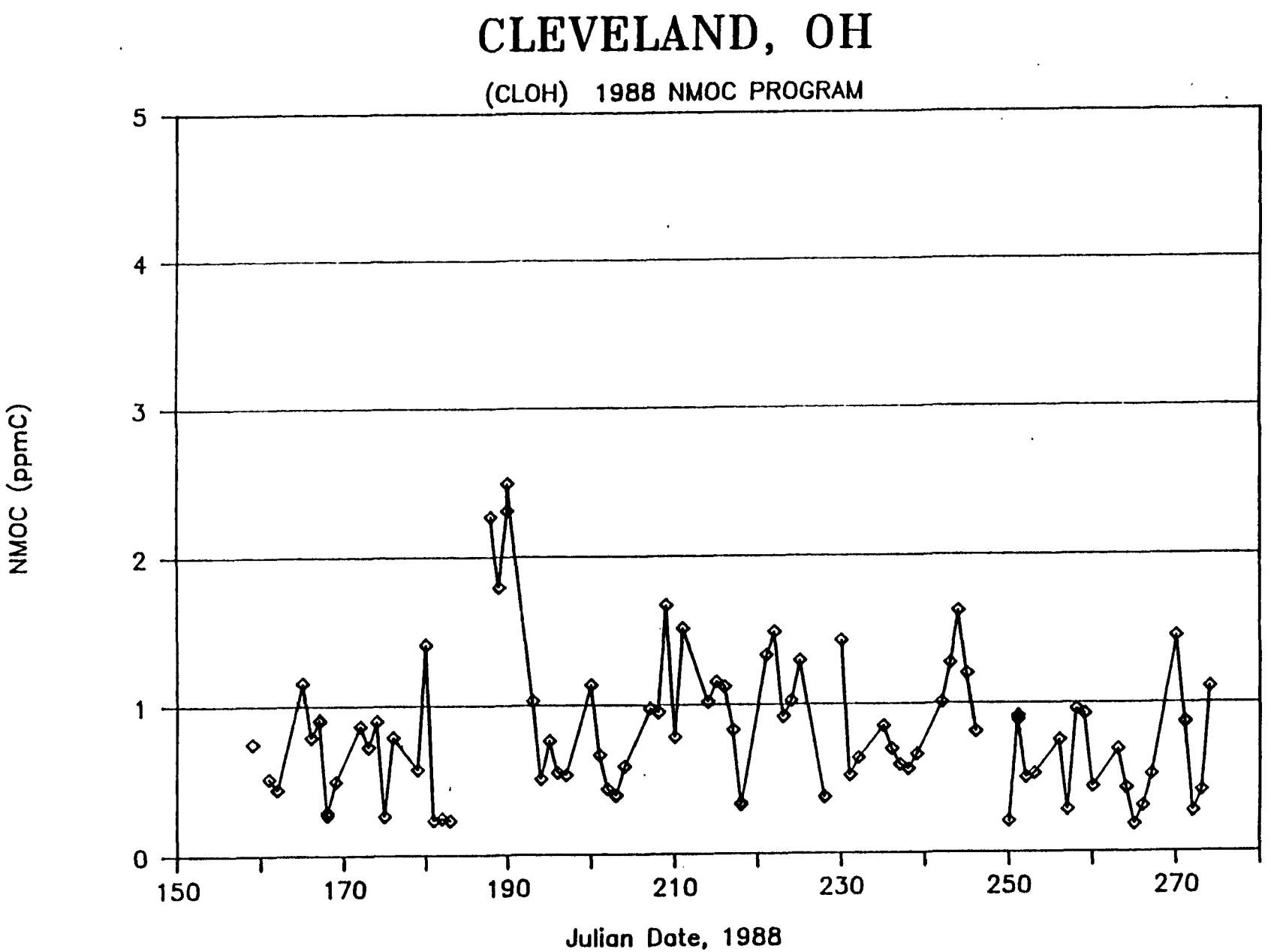


Figure E-26. Plot of NMOC concentration for Cleveland, OH (Hospital).

TABLE E-26. SUMMARY OF THE 1988 NMOC DATA FOR CLEVELAND, OH (CLOH)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/07/88	159	T	1222	889	14.0	14.0	C	0.746		
06/09/88	161	H	1220	657	16.0	15.0	D	0.513		
06/10/88	162	F	1256	642	17.0	10.0	D	0.440	0.461	0.342
06/13/88	165	M	1322	868	16.0	16.0	B	1.156		
06/14/88	166	T	1335	644	17.0	15.5	C	0.790		
06/15/88	167	W	1395	695	17.0	18.0	A	0.898		
06/15/88	167	W	1396	808	17.0	18.0	B	0.908		
06/16/88	168	H	1430	711	17.0	17.0	C	0.269		
06/16/88	168	H	1430	711	17.0	10.0	D	0.289		
06/17/88	169	F	1454	624	17.0	17.0	C	0.494		
06/20/88	172	M	1504	854	16.5	14.5	D	0.865		
06/21/88	173	T	1544	160	15.5	14.0	B	0.724		
06/22/88	174	W	1562	889	16.0	16.0	D	0.899		0.689
06/23/88	175	H	1613	656	17.0	17.0	A	0.261		
06/24/88	176	F	1637	721	17.0	17.0	C	0.788		
06/27/88	179	M	1672	808	17.0	17.0	B	0.573		
06/28/88	180	T	1712	845	16.0	16.0	D	1.413		
06/29/88	181	W	1765	823	15.5	16.0	B	0.234		0.114
06/30/88	182	H	1826	886	16.0	16.0	B	0.243		
07/01/88	183	F	1815	166	16.0	17.0	D	0.229		
07/06/88	188	W	1910	869	16.0	15.0	C	2.271		
07/07/88	189	H	1957	194	16.0	16.0	B	1.799		1.755
07/08/88	190	F	1986	882	17.0	17.0	D	2.310		
07/08/88	190	F	1987	914	17.0	16.0	D	2.493		
07/11/88	193	M	2036	623	17.0	16.0	B	1.031	0.914	0.947
07/12/88	194	T	2073	894	19.0	18.0	B	0.505		
07/13/88	195	W	2119	686	20.0	20.0	D	0.760		
07/14/88	196	H	2134	820	19.0	19.0	C	0.549		
07/15/88	197	F	2184	129	19.0	19.0	D	0.531		
07/18/88	200	M	2202	779	22.0	21.0	D	1.137	0.983	1.042
07/19/88	201	T	2281	855	16.0	12.0	A	0.666		
07/20/88	202	W	2288	701	17.5	16.0	C	0.434		
07/21/88	203	H	2358	911	17.0	15.0	D	0.392		
07/21/88	203	H	2359	920	17.0	15.5	D	0.391		
07/22/88	204	F	2406	840	15.5	15.0	B	0.586		
07/25/88	207	M	2446	900	16.0	15.0	C	0.975	0.847	0.890
07/26/88	208	T	2489	51	15.5	15.0	C	0.949		
07/27/88	209	W	2525	137	15.5	14.0	A	1.672		1.760
07/28/88	210	H	2562	874	16.0	16.0	A	0.784		
07/29/88	211	F	2631	9	14.5	15.0	B	1.514		
08/01/88	214	M	2624	692	17.0	17.0	C	1.020		
08/02/88	215	T	2674	828	15.5	16.0	C	1.154	0.955	1.043
08/03/88	216	W	2750	895	15.5	15.0	A	1.120		
08/04/88	217	H	2787	70	15.5	16.0	A	0.830		
08/05/88	218	F	2832	695	17.0	12.0	B	0.338		
08/05/88	218	F	2832	695	17.0	17.0	A	0.326		
08/08/88	221	M	2851	179	16.0	15.0	D	1.334		
08/09/88	222	T	2913	178	17.0	15.0	C	1.488		
08/10/88	223	W	2906	672	16.5	17.0	C	0.919		

TABLE E-26. SUMMARY OF THE 1988 NMOC DATA FOR CLEVELAND, OH (CLOH)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/11/88	224	H	3010	881	16.0	15.0	D	1.026	0.993	1.052
08/12/88	225	F	2990	894	16.0	15.0	B	1.298		
08/15/88	228	M	3121	924	16.0	16.0	D	0.373		
08/15/88	228	M	3122	920	16.0	16.0	D	0.373		
08/17/88	230	W	3177	156	16.0	15.0	D	1.431		
08/18/88	231	H	3211	48	15.5	15.0	D	0.519		
08/19/88	232	F	3277	702	16.5	17.0	A	0.639	0.609	
08/22/88	235	M	3327	883	16.0	16.0	C	0.850	0.846	0.958
08/23/88	236	T	3368	807	17.0	16.0	A	0.696		
08/24/88	237	W	3402	837	15.5	14.5	B	0.590		
08/25/88	238	H	3453	188	16.0	16.0	B	0.560		
08/26/88	239	F	3455	84	15.0	15.0	B	0.661		
08/29/88	242	M	3548	102	15.5	15.0	B	1.008		
08/30/88	243	T	3601	672	17.0	17.0	A	1.274		
08/31/88	244	W	3643	896	16.0	16.0	A	1.623		
09/01/88	245	H	3704	20	16.0	15.0	D	1.203		
09/02/88	246	F	3738	832	16.0	14.0	A	0.810		0.918
09/06/88	250	T	3755	620	16.5	15.0	D	0.207		
09/07/88	251	W	3841	830	17.0	16.0	C	0.913		
09/07/88	251	W	3842	41	17.0	16.0	C	0.889		
09/08/88	252	H	3800	302	16.0	16.0	B	0.500		
09/09/88	253	F	3909	835	16.0	16.0	A	0.525		
09/12/88	256	M	3950	16	16.0	14.0	C	0.750		
09/13/88	257	T	4001	650	16.5	15.0	C	0.281		
09/14/88	258	W	4042	719	17.0	16.0	D	0.959		
09/15/88	259	H	4090	924	16.0	15.0	A	0.924		0.965
09/16/88	260	F	4114	106	16.0	16.0	A	0.435		
09/19/88	263	M	4153	762	16.5	16.0	C	0.689		
09/20/88	264	T	4240	782	16.0	14.0	B	0.425		
09/21/88	265	W	4250	107	16.0	16.0	B	0.183		0.239
09/22/88	266	H	4303	45	15.5	14.0	D	0.306		
09/23/88	267	F	4373	672	16.0	14.0	C	0.521		
09/26/88	270	M	4410	99	16.0	15.0	D	1.450		
09/27/88	271	T	4474	160	17.0	16.0	A	0.874		0.888
09/27/88	271	T	4475	151	17.0	16.0	C	0.864		
09/28/88	272	W	4492	705	17.0	16.5	C	0.269		
09/29/88	273	H	4556	112	16.0	16.0	D	0.411		
09/30/88	274	F	4542	925	17.0	16.0	C	1.106		

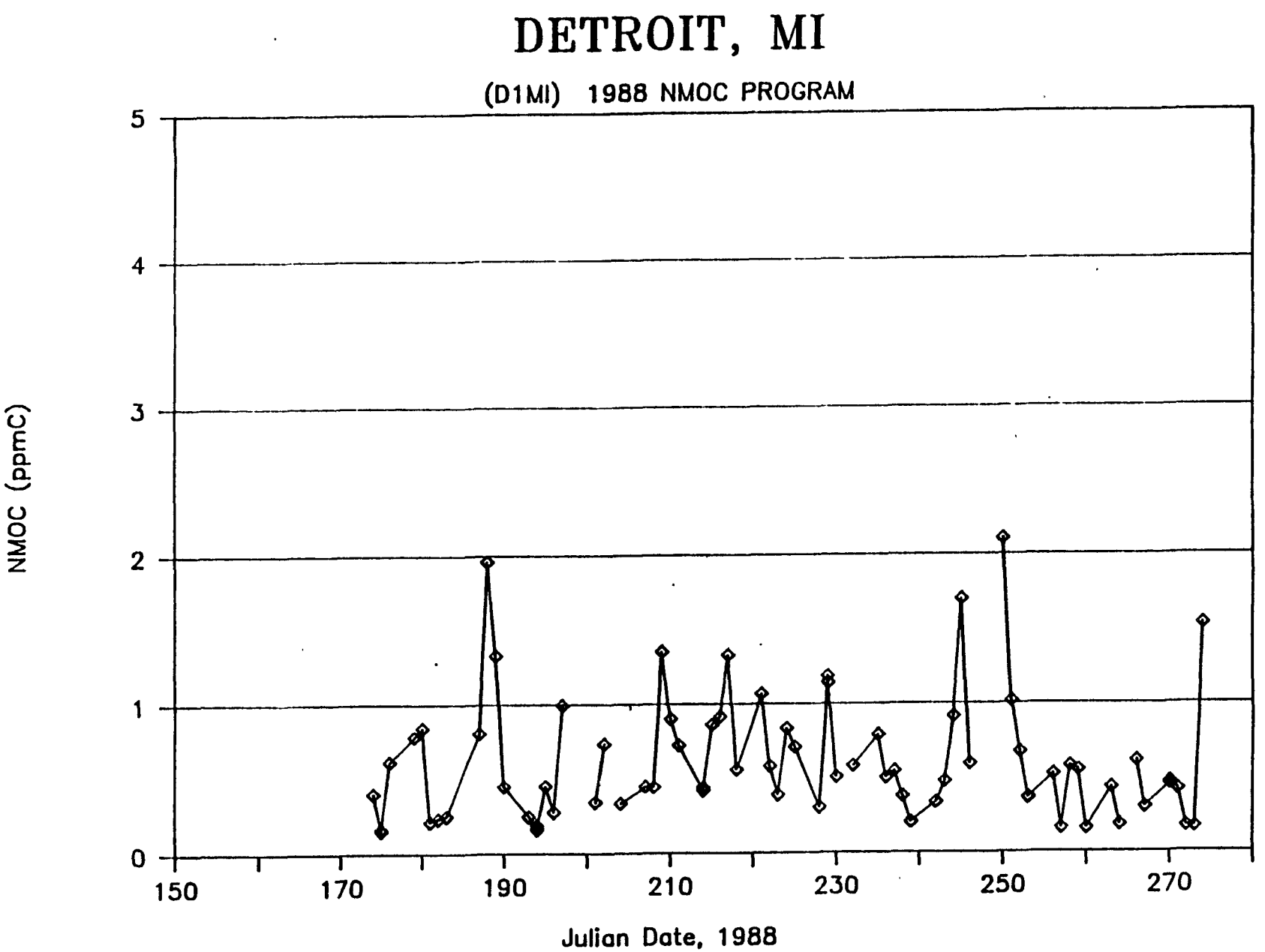


Figure E–27. Plot of NMOC concentration for Detroit, MI (Linwood).

TABLE E-27. SUMMARY OF THE 1988 NMOC DATA FOR DETROIT, MI (D1MI)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/22/88	174	W	1565	639	17.0	15.0	B	0.399		
06/23/88	175	H	1627	306	18.0	18.0	C	0.151		
06/23/88	175	H	1628	668	18.0	16.0	C	0.167		
06/24/88	176	F	1651	702	12.0	12.0	C	0.614		0.415
06/27/88	179	M	1694	873	11.0	10.0	C	0.783	0.609	0.582
06/28/88	180	T	1728	786	12.0	12.0	D	0.844		
06/29/88	181	W	1775	718	11.0	11.0	D	0.214		
06/30/88	182	H	1789	192	10.0	10.0	C	0.232		
07/01/88	183	F	1858	42	10.0	10.0	C	0.251		
07/05/88	187	T	1891	903	15.0	15.0	A	0.806		
07/06/88	188	W	1929	177	15.0	15.0	C	1.962	1.798	1.774
07/07/88	189	H	1963	662	16.0	16.0	D	1.329		
07/08/88	190	F	1961	850	15.0	15.0	B	0.448		
07/11/88	193	M	2046	768	15.0	16.0	D	0.243		
07/12/88	194	T	2085	896	16.0	16.0	A	0.159		
07/12/88	194	T	2086	308	16.0	16.0	C	0.187		
07/13/88	195	W	2120	674	16.0	17.0	C	0.450		
07/14/88	196	H	2157	628	16.0	16.0	A	0.274		
07/15/88	197	F	2243	183	15.0	15.0	B	0.995		
07/19/88	201	T	2285	32	15.0	16.0	B	0.339		
07/20/88	202	W	2322	105	15.0	16.0	A	0.734		
07/22/88	204	F	2354	854	15.0	15.0	C	0.332		
07/25/88	207	M	2431	797	16.0	14.0	C	0.443		
07/26/88	208	T	2488	126	15.0	15.0	D	0.442		
07/27/88	209	W	2528	90	15.0	15.0	D	1.351		
07/28/88	210	H	2581	767	16.0	17.0	D	0.898		
07/29/88	211	F	2614	835	15.0	16.0	A	0.721		
08/01/88	214	M	2664	95	17.0	17.0	C	0.415		
08/01/88	214	M	2665	150	17.0	17.0	C	0.439		
08/02/88	215	T	2710	92	11.0	11.0	A	0.859		
08/03/88	216	W	2749	846	10.5	10.0	D	0.915		
08/04/88	217	H	2801	143	15.0	15.0	C	1.330		
08/05/88	218	F	2830	763	16.0	16.0	B	0.557		
08/08/88	221	M	2864	161	15.0	15.0	C	1.068		
08/09/88	222	T	2908	844	15.0	15.0	C	0.580	0.586	0.550
08/10/88	223	W	2963	33	15.0	15.0	A	0.386	0.381	0.375
08/11/88	224	H	3034	629	16.0	16.0	B	0.835		
08/12/88	225	F	3051	90	15.0	15.0	B	0.708		
08/15/88	228	M	3115	767	16.0	16.0	C	0.301		
08/16/88	229	T	3163	66	17.0	16.0	D	1.185		
08/16/88	229	T	3164	103	17.0	17.0	D	1.141		
08/17/88	230	W	3190	730	16.0	16.0	A	0.505		
08/19/88	232	F	3288	789	15.0	16.0	C	0.582		
08/23/88	236	T	3383	887	15.0	15.0	B	0.499		
08/24/88	237	W	3422	881	14.0	16.0	D	0.544	0.540	0.607
08/25/88	238	H	3487	134	15.0	15.0	A	0.374	0.388	0.410
08/26/88	239	F	3517	122	14.0	14.0	B	0.200	0.221	0.248
08/29/88	242	M	3542	649	16.0	16.0	D	0.332		0.385
08/30/88	243	T	3596	671	16.0	16.0	B	0.476		

TABLE E-27. SUMMARY OF THE 1988 NMOC DATA FOR DETROIT, MI (D1MI)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/31/88	244	W	3661	851	15.0	14.0	A	0.914	0.870	1.020
09/01/88	245	H	3654	697	16.0	16.0	B	1.700		
09/01/88	245	H	3646	148	14.0	12.0	D	1.013		
09/02/88	246	F	3736	918	15.0	14.0	D	0.594		
09/06/88	250	T	3780	142	14.0	14.0	D	2.104		2.330
09/07/88	251	W	3823	134	15.0	14.0	A	1.014		
09/08/88	252	H	3890	183	15.0	14.0	A	0.672		
09/09/88	253	F	3921	640	17.0	17.0	B	0.361		
09/09/88	253	F	3939	631	17.0	17.0	D	0.358		
09/12/88	256	M	3952	855	14.0	13.0	B	0.520		
09/13/88	257	T	4015	867	15.0	14.0	B	0.156		
09/14/88	258	W	4040	657	16.0	15.0	B	0.575		
09/15/88	259	H	4068	767	16.0	15.0	C	0.548		
09/16/88	260	F	4135	916	12.5	16.0	D	0.154		
09/19/88	263	M	4190	849	15.0	16.0	D	0.429		
09/20/88	264	T	4217	910	14.0	14.0	C	0.180		
09/22/88	266	H	4279	112	15.0	15.0	A	0.610		
09/23/88	267	F	4369	684	15.0	14.0	B	0.294		
09/26/88	270	M	4384	654	17.0	17.0	A	0.451		
09/26/88	270	M	4385	848	17.0	16.0	B	0.469		
09/27/88	271	T	4417	728	10.0	9.0	B	0.414		
09/28/88	272	W	4457	782	15.0	14.0	D	0.169		
09/29/88	273	H	4501	146	12.5	15.0	B	0.165		0.199
09/30/88	274	F	4570	763	16.0	16.0	A	1.527		

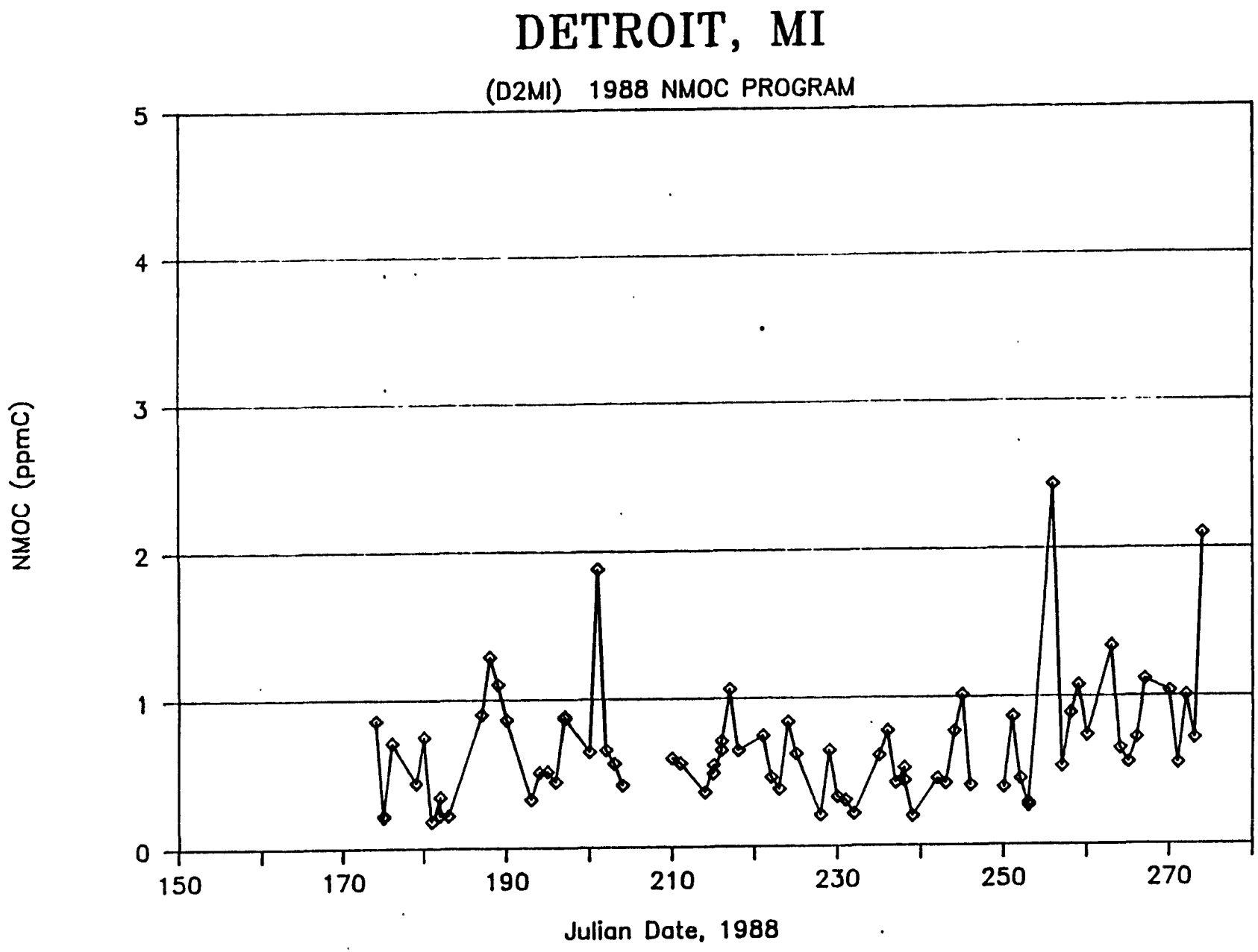


Figure E-28. Plot of NMOC concentration for Detroit, MI (Wayne County Lab).

TABLE E-28. SUMMARY OF THE 1988 NMOC DATA FOR DETROIT, MI (D2MI)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/22/88	174	W	1567	630	13.0	11.0	D	0.856		
06/23/88	175	H	1617	114		18.0	C	0.222	0.247	0.168
06/23/88	175	H	1618	690		18.0	C	0.212		
06/24/88	176	F	1648	769		10.0	A	0.708	0.748	0.636
06/27/88	179	M	1693	60	12.0	12.0	B	0.439		
06/28/88	180	T	1713	813	13.0	13.0	C	0.748		
06/29/88	181	W	1776	666	13.0	12.0	B	0.181		
06/30/88	182	H	1784	691	13.0	13.0	A	0.342		
06/30/88	182	H	1784	691	13.0	11.0	A	0.219		
07/01/88	183	F	1855	98	12.0	12.0	A	0.218		
07/05/88	187	T	1869	102	12.0	12.0	B	0.899		
07/06/88	188	W	1909	129	12.0	11.0	C	1.291		
07/07/88	189	H	1935	785	12.0	12.0	D	1.103		
07/08/88	190	F	1964	910	12.0	11.0	C	0.862		
07/11/88	193	M	2042	679	13.0	11.0	B	0.323		
07/12/88	194	T	2087	792	13.5	13.0	D	0.505		
07/13/88	195	W	2113	658	13.0	12.0	C	0.512		
07/14/88	196	H	2158	61	12.0	10.0	A	0.442		
07/15/88	197	F	2192	47	17.0	16.0	B	0.883		
07/15/88	197	F	2193	51	17.0	15.5	C	0.871		
07/18/88	200	M	2215	11	12.0	10.0	C	0.642		
07/19/88	201	T	2270	178	15.0	13.0	D	1.879		
07/20/88	202	W	2300	305	14.0	12.0	D	0.655		
07/21/88	203	H	2355	679	14.0	12.0	A	0.561		
07/22/88	204	F	2380	835	13.0	12.0	A	0.417		
07/28/88	210	H	2555	849	13.0	12.0	C	0.596		
07/29/88	211	F	2616	632	14.0	13.0	C	0.563		
08/01/88	214	M	2643	887	14.0	12.5	D	0.364		
08/02/88	215	T	2689	624	19.0	18.0	C	0.551		
08/02/88	215	T	2690	680	19.0	18.0	D	0.492		
08/03/88	216	W	2754	923	18.0	17.0	D	0.650		
08/03/88	216	W	2755	883	18.0	17.0	D	0.710		
08/04/88	217	H	2788	807	14.0	13.0	A	1.062		
08/05/88	218	F	2828	145	13.0	12.0	C	0.645	0.629	0.654
08/08/88	221	M	2865	146	13.0	13.0	A	0.744		
08/09/88	222	T	2909	834	13.0	13.0	D	0.464		
08/10/88	223	W	2965	641	14.0	14.0	A	0.383		
08/11/88	224	H	3025	720	14.0	13.0	A	0.837		
08/12/88	225	F	3054	636	14.0	13.0	D	0.621		
08/15/88	228	M	3113	725	14.0	13.0	C	0.207		
08/16/88	229	T	3194	32	13.0	13.0	A	0.643		
08/17/88	230	W	3189	695	14.0	13.0	C	0.328		
08/18/88	231	H	3280	652	14.0	13.0	D	0.306		
08/19/88	232	F	3286	684	14.0	14.0	D	0.217		
08/22/88	235	M	3332	147	13.0	13.0	C	0.607		
08/22/88	235	M	3333	150	15.0	18.0	B	0.788		
08/23/88	236	T	3359	648	14.0	13.0	B	0.773		
08/24/88	237	W	3403	32	13.0	12.0	A	0.420		
08/25/88	238	H	3444	842	18.0	17.0	C	0.522	0.476	0.536

TABLE E-28. SUMMARY OF THE 1988 NMOC DATA FOR DETROIT, MI (D2MI)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/25/88	238	H	3445	917	17.0	17.0	C	0.435	0.446	0.746
08/26/88	239	F	3510	685	14.0	13.0	C	0.197		
08/29/88	242	M	3534	112	14.0	12.0	D	0.450		
08/30/88	243	T	3584	898	13.0	13.0	A	0.417		
08/31/88	244	W	3650	818	13.0	13.8	B	0.767		
09/02/88	246	F	3737	45	13.0	12.0	D	0.403		
09/06/88	250	T	3773	64	13.0	11.0	B	0.387		
09/07/88	251	W	3825	647	14.0	13.0	B	0.863		
09/08/88	252	H	3887	12	13.0	12.0	D	0.443		
09/09/88	253	F	3930	780	19.0	18.0	D	0.262		
09/09/88	253	F	3931	688	19.0	18.0	D	0.281		
09/12/88	256	M	3951	68	11.0	9.0	C	2.432		
09/13/88	257	T	3997	903	17.0	14.0	C	0.528		
09/14/88	258	W	4055	805	19.0	18.0	C	0.887		
09/15/88	259	H	4067	639	15.0	13.0	D	1.077		
09/16/88	260	F	4138	886	10.0	10.0	D	0.736		
09/19/88	263	M	4184	904	19.0	18.0	C	1.340		1.246
09/20/88	264	T	4224	892	14.0	14.0	B	0.645		
09/21/88	265	W	4264	659	10.0	9.0	D	0.550		
09/22/88	266	H	4283	156	16.0	14.0	D	0.720		
09/23/88	267	F	4357	914	14.0	13.0	D	1.116		
09/26/88	270	M	4359	37	18.0	17.0	D	1.033		
09/27/88	271	T	4403	849	10.0	9.0	B	0.545		
09/28/88	272	W	4459	781	17.0	16.0	B	1.006		
09/29/88	273	H	4493	34	17.0	16.0	D	0.714		
09/30/88	274	F	4557	95	18.0	16.0	D	2.099		2.031

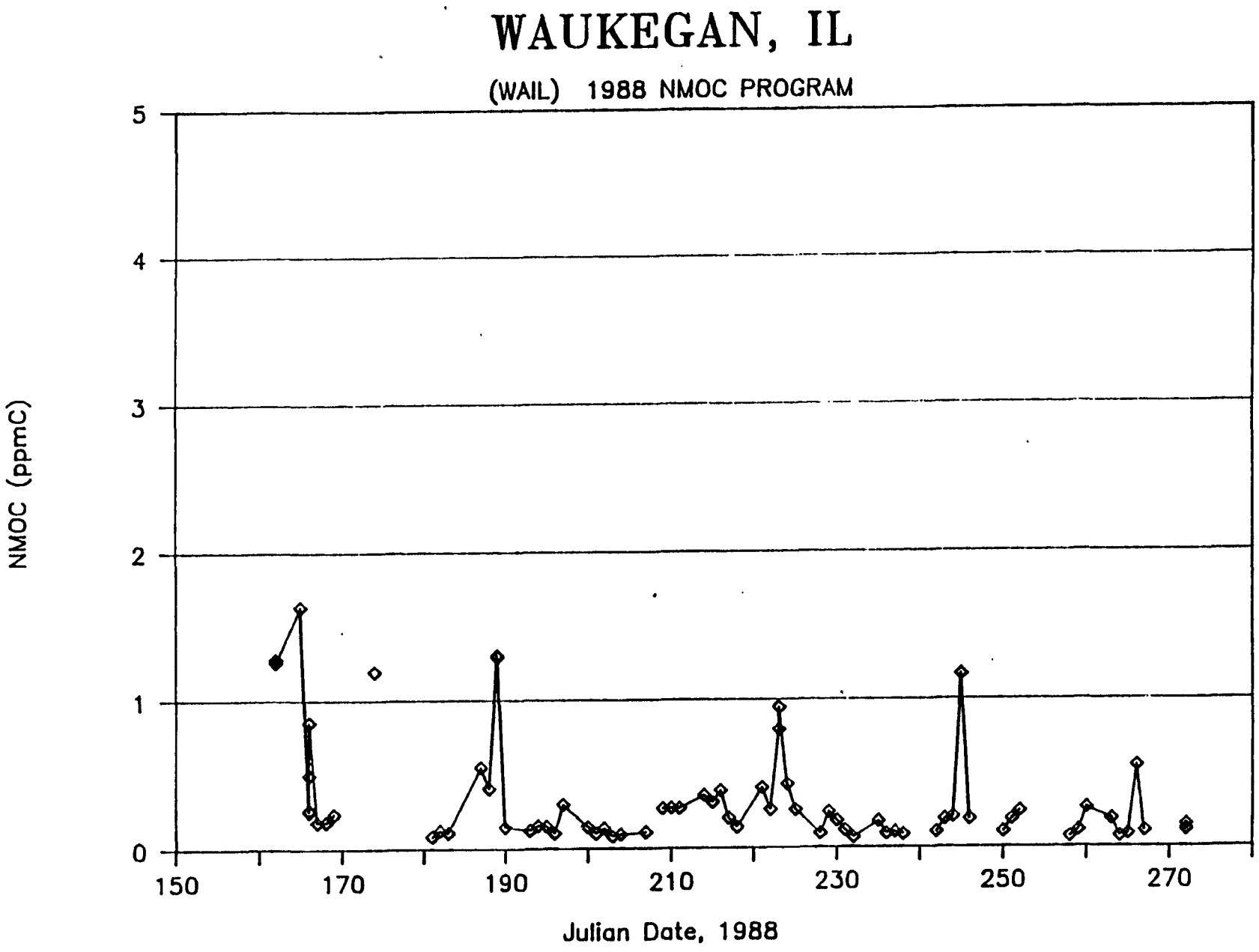


Figure E-29. Plot of NMOC concentration for Waukegan, IL.

TABLE E-29. SUMMARY OF THE 1988 NMOC DATA FOR WAUKEGAN, IL (WAIL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/10/88	162	F	1279	831	10.2	10.0	A	1.280		
06/10/88	162	F	1279	831	10.2	4.0	B	1.258		
06/13/88	165	M	1350	869	10.0	8.0	D	1.631		
06/14/88	166	T	1365	690	17.0	17.0	B	0.262		
06/14/88	166	T	1364	833	17.0	17.0	A	0.249		
06/14/88	166	T	1333	839	12.0	12.0	A	0.494		
06/14/88	166	T	1333	839	12.0	5.0	D	0.851		
06/15/88	167	W	1424	853	9.0	9.0	B	0.177		
06/16/88	168	H	1461	33	9.0	10.0	A	0.181		
06/22/88	174	W	1608	49	22.0	25.0	D	1.195		
06/29/88	181	W	1798	155	9.0	10.0	D	0.082		
06/30/88	182	H	1843	707	10.0	10.0	C	0.121		
07/01/88	183	F	1872	639	10.0	10.0	C	0.106		
07/05/88	187	T	1908	863	9.0	9.0	C	0.544	0.364	0.245
07/06/88	188	W	1943	122	9.0	9.0	C	0.402		
07/07/88	189	H	2008	781	18.0	18.0	C	1.291		
07/07/88	189	H	2009	867	18.0	18.0	D	1.303		
07/08/88	190	F	2028	83	8.5	9.0	D	0.144		
07/11/88	193	M	2052	848	9.0	10.0	C	0.122		
07/12/88	194	T	2103	840	9.0	10.0	A	0.153		
07/13/88	195	W	2154	147	8.5	9.0	B	0.150		
07/14/88	196	H	2180	48	8.5	9.0	A	0.102	0.085	0.152
07/15/88	197	F	2207	823	8.0	9.0	D	0.292		
07/18/88	200	M	2246	773	9.5	10.0	D	0.142		
07/19/88	201	T	2304	620	10.0	10.0	B	0.097		
07/20/88	202	W	2384	798	9.5	10.0	D	0.135		
07/21/88	203	H	2371	771	10.0	10.0	D	0.078		
07/22/88	204	F	2407	641	10.0	10.0	B	0.092		
07/25/88	207	M	2454	796	10.0	10.0	C	0.108		
07/27/88	209	W	2543	637	10.0	11.0	B	0.265		
07/28/88	210	H	2569	831	8.0	9.0	A	0.267		
07/29/88	211	F	2630	879	9.0	10.0	D	0.263		
08/01/88	214	M	2686	158	8.0	10.0	C	0.351		
08/02/88	215	T	2775	918	9.0	10.0	A	0.303		
08/03/88	216	W	2774	109	8.0	10.0	C	0.382		
08/04/88	217	H	2765	645	9.0	11.0	C	0.196	0.173	0.207
08/05/88	218	F	2930	700	9.0	10.0	D	0.139		
08/08/88	221	M	2929	826	8.0	10.0	C	0.402		
08/09/88	222	T	2982	648	9.0	10.0	C	0.254		
08/10/88	223	W	2968	774	18.0	20.0	B	0.795		
08/10/88	223	W	2969	626	18.0	20.0	C	0.945		
08/11/88	224	H	3003	790	9.0	10.0	B	0.423		
08/12/88	225	F	3196	647	9.0	10.0	C	0.251		
08/15/88	228	M	3200	164	8.0	10.0	C	0.093		
08/16/88	229	T	3199	63	8.0	10.0	D	0.237		
08/17/88	230	W	3235	624	8.0	10.0	C	0.177		
08/18/88	231	H	3209	897	8.0	10.0	C	0.111		
08/19/88	232	F	3390	93	8.0	10.0	B	0.065		
08/22/88	235	M	3384	849	9.0	10.0	C	0.175		

TABLE E-29. SUMMARY OF THE 1988 NMOC DATA FOR WAUKEGAN, IL (WAIL)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/23/88	236	T	3448	63	8.0	11.0	D	0.091		
08/24/88	237	W	3476	719	10.0	12.0	B	0.100		
08/25/88	238	H	3512	863	8.0	10.0	C	0.084		
08/29/88	242	M	3589	120	9.0	10.0	D	0.100		
08/30/88	243	T	3692	708	10.0	10.0	D	0.186		
08/31/88	244	W	3724	681	10.0	11.0	A	0.203		
09/01/88	245	H	3750	184	20.0	20.0	A	1.164		
09/01/88	245	H	3751	1	20.0	20.0	C	1.166		
09/02/88	246	F	3819	32	8.0	9.0	A	0.184		
09/06/88	250	T	3826	31	8.0	10.0	A	0.101		
09/07/88	251	W	3932	3	8.0	10.0	B	0.186		
09/08/88	252	H	3937	925	9.0	10.5	A	0.240		
09/14/88	258	W	4099	504	8.0	10.0	D	0.068		
09/15/88	259	H	4181	846	9.0	10.0	A	0.107		
09/16/88	260	F	4176	654	10.0	11.0	C	0.258		
09/19/88	263	M	4241	781	9.0	10.0	A	0.182		
09/20/88	264	T	4332	649	9.0	11.0	B	0.067		
09/21/88	265	W	4372	30	9.0	10.0	D	0.084		
09/22/88	266	H	4365	137	8.0	8.0	D	0.544		
09/23/88	267	F	4440	688	9.0	11.0	D	0.103		
09/28/88	272	W	4581	764	19.0	18.0	D	0.145		
09/28/88	272	W	4582	48	19.0	18.0	C	0.110		
09/29/88	273	H	4596	135	9.0	10.0	C	0.128		
09/30/88	274	F	4657	797	9.0	11.0	D	0.340		

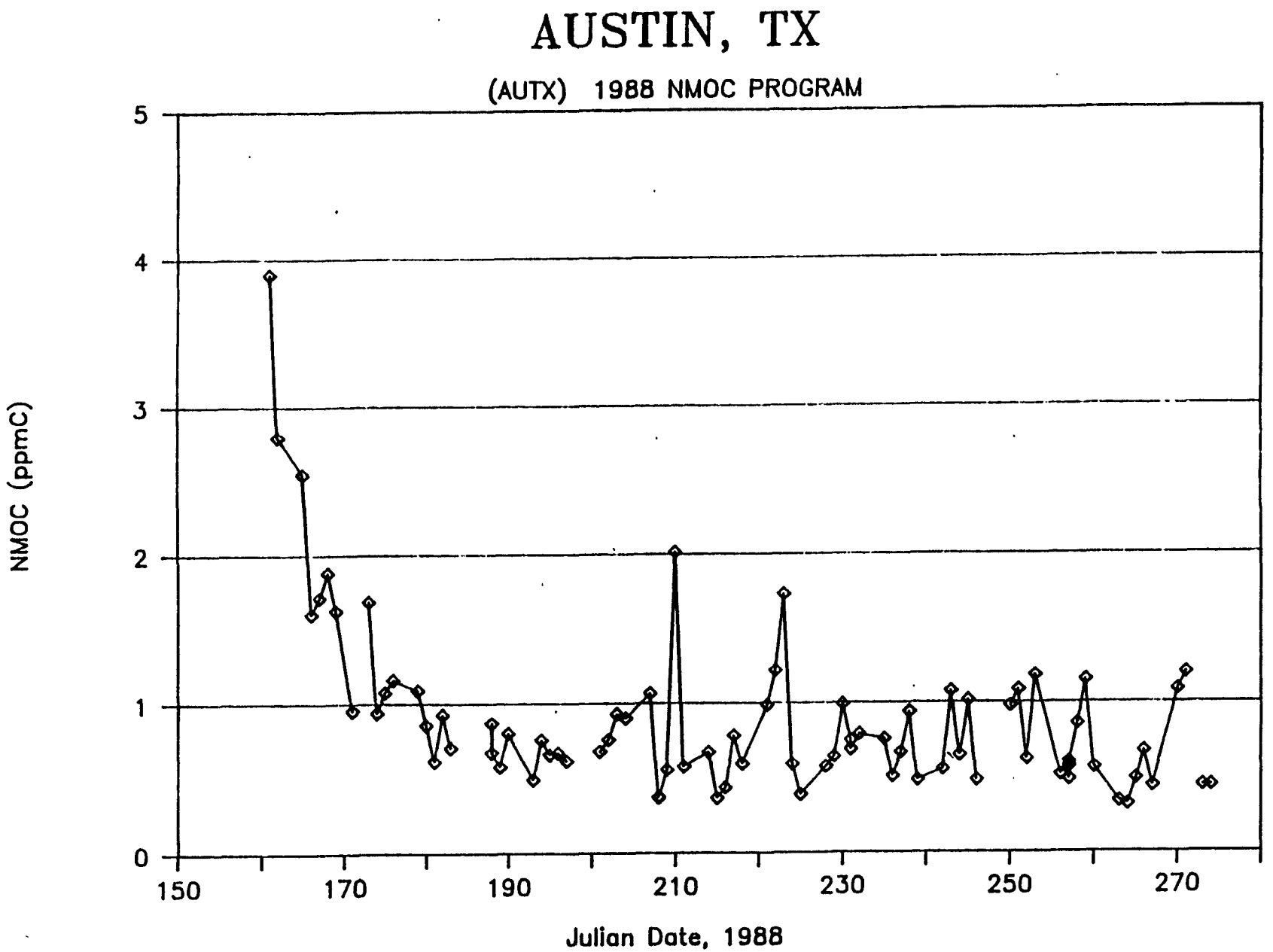


Figure E-30. Plot of NMOC concentration for Austin, TX.

TABLE E-30. SUMMARY OF THE 1988 NMOC DATA FOR AUSTIN, TX (AUTX)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/09/88	161	H	1265	409	12.0	12.0	A	3.895		5.301
06/10/88	162	F	1271	669	13.5	13.5	A	2.795		2.677
06/13/88	165	M	1314	175	14.0	12.0	C	2.546		
06/14/88	166	T	1339	721	14.0	14.0	B	1.601		1.216
06/15/88	167	W	1378	143	17.0	16.0	C	1.713		1.647
06/16/88	168	H	1375	9	13.0	12.0	D	1.882		2.244
06/17/88	169	F	1470	698	14.0	14.0	C	1.623		
06/19/88	171	S	1486	693	14.0	12.0	C	0.952		
06/21/88	173	T	1499	831	14.0	12.0	A	1.684		
06/22/88	174	W	1555	107	13.0	11.0	B	0.937		
06/23/88	175	H	1554	905	13.0	13.0	B	1.075		
06/24/88	176	F	1647	149	13.0	10.0	B	1.160		0.855
06/27/88	179	M	1685	401	13.0	11.0	A	1.089		
06/28/88	180	T	1723	30	13.0	13.0	D	0.854		
06/29/88	181	W	1725	196	13.0	10.0	D	0.613		
06/30/88	182	H	1852	915	13.0	12.0	A	0.924		
07/01/88	183	F	1845	800	13.5	13.0	C	0.702	0.702	0.810
07/06/88	188	W	1895	86	13.0	12.0	A	0.869		
07/06/88	188	W	1895	86	13.0	6.0	D	0.670		
07/07/88	189	H	1970	28	13.0	13.0	A	0.575		
07/08/88	190	F	2003	866	13.0	12.0	B	0.801	0.624	
07/11/88	193	M	2026	851	13.0	12.0	A	0.488	0.488	
07/12/88	194	T	2066	136	13.0	12.0	D	0.756		
07/13/88	195	W	2122	621	15.0	14.0	D	0.658		
07/14/88	196	H	2131	810	13.0	14.0	B	0.668		
07/15/88	197	F	2174	42	13.0	12.0	A	0.616	0.600	0.648
07/19/88	201	T	2251	905	13.0	12.0	A	0.676		
07/20/88	202	W	2291	765	13.0	14.0	D	0.756		
07/21/88	203	H	2328	836	13.0	13.0	B	0.926		
07/22/88	204	F	2327	851	13.0	13.0	D	0.898		
07/25/88	207	M	2422	837	16.0	14.0	D	1.067		0.865
07/26/88	208	T	2459	866	15.0	13.0	B	0.366		
07/26/88	208	T	2460	823	15.0	14.0	B	0.375		
07/27/88	209	W	2502	63	13.0	12.0	C	0.553		
07/28/88	210	H	2565	178	15.0	14.0	A	2.018	1.741	1.937
07/29/88	211	F	2605	410	13.0	13.0	C	0.576		
08/01/88	214	M	2641	896	13.0	13.0	D	0.670		
08/02/88	215	T	2697	164	13.0	13.0	D	0.363		0.429
08/03/88	216	W	2746	625	13.0	14.0	D	0.434		
08/04/88	217	H	2763	14	13.0	13.0	D	0.780		
08/05/88	218	F	2833	920	13.0	13.0	B	0.592		
08/08/88	221	M	2847	22	13.0	13.0	D	0.987		
08/09/88	222	T	2894	875	13.0	12.0	A	1.219	1.220	
08/10/88	223	W	2951	121	13.0	12.0	D	1.730		
08/11/88	224	H	3015	802	13.0	12.0	C	0.591		
08/12/88	225	F	3065	643	14.0	13.0	C	0.386		
08/15/88	228	M	3092	405	13.0	13.5	B	0.572		
08/16/88	229	T	3134	35	13.0	12.0	A	0.641	0.653	0.715
08/17/88	230	W	3175	692	14.0	14.0	B	0.993		

TABLE E-30. SUMMARY OF THE 1988 NMOC DATA FOR AUSTIN, TX (AUTX)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/18/88	231	H	3263	631	18.0	18.0	A	0.748		
08/18/88	231	H	3264	649	17.5	18.0	B	0.686		
08/19/88	232	F	3292	41	14.0	12.5	A	0.788		
08/22/88	235	M	3310	840	13.0	11.0	C	0.756		
08/23/88	236	T	3388	77	13.0	12.5	B	0.505		
08/24/88	237	W	3393	918	13.0	12.0	C	0.665		
08/25/88	238	H	3480	405	13.0	13.0	A	0.936		
08/26/88	239	F	3484	161	14.0	14.0	B	0.481		
08/29/88	242	M	3569	304	13.0	14.0	A	0.553		
08/30/88	243	T	3598	910	22.0	22.0	C	1.076		0.931
08/31/88	244	W	3636	147	13.0	13.0	B	0.647		
09/01/88	245	H	3718	864	13.0	12.0	C	1.015		
09/02/88	246	F	3674	889	13.0	13.0	D	0.481		
09/06/88	250	T	3759	711	13.0	13.0	C	0.977		
09/07/88	251	W	3803	819	13.0	8.0	B	1.084		
09/08/88	252	H	3894	816	13.0	10.0	A	0.621		
09/09/88	253	F	3905	102		12.0	C	1.182		
09/12/88	256	M	3977	49	13.0	12.0	C	0.513		0.611
09/13/88	257	T	3987	135	17.0	16.0	A	0.574		
09/13/88	257	T	3988	828	17.0	16.0	B	0.567		
09/13/88	257	T	3987	135	17.0	12.0	A	0.482		
09/13/88	257	T	3988	828	17.0	12.0	B	0.600		
09/14/88	258	W	4028	307	13.0	11.0	C	0.858		
09/15/88	259	H	4084	812	14.0	14.0	B	1.152		
09/16/88	260	F	4123	409	13.0	11.5	B	0.562		
09/19/88	263	M	4193	717	14.0	14.0	A	0.333		
09/20/88	264	T	4213	91	13.0	12.0	D	0.316		
09/21/88	265	W	4265	763	13.0	14.0	C	0.489		
09/22/88	266	H	4301	703	13.0	13.0	D	0.672		
09/23/88	267	F	4368	75	13.0	12.0	D	0.437		
09/26/88	270	M	4405	101	13.0	12.0	A	1.087		
09/27/88	271	T	4442	62	13.0	11.0	B	1.200		
09/29/88	273	H	4559	84	13.0	12.0	D	0.442		
09/30/88	274	F	4588	667	13.0	14.0	B	0.441		

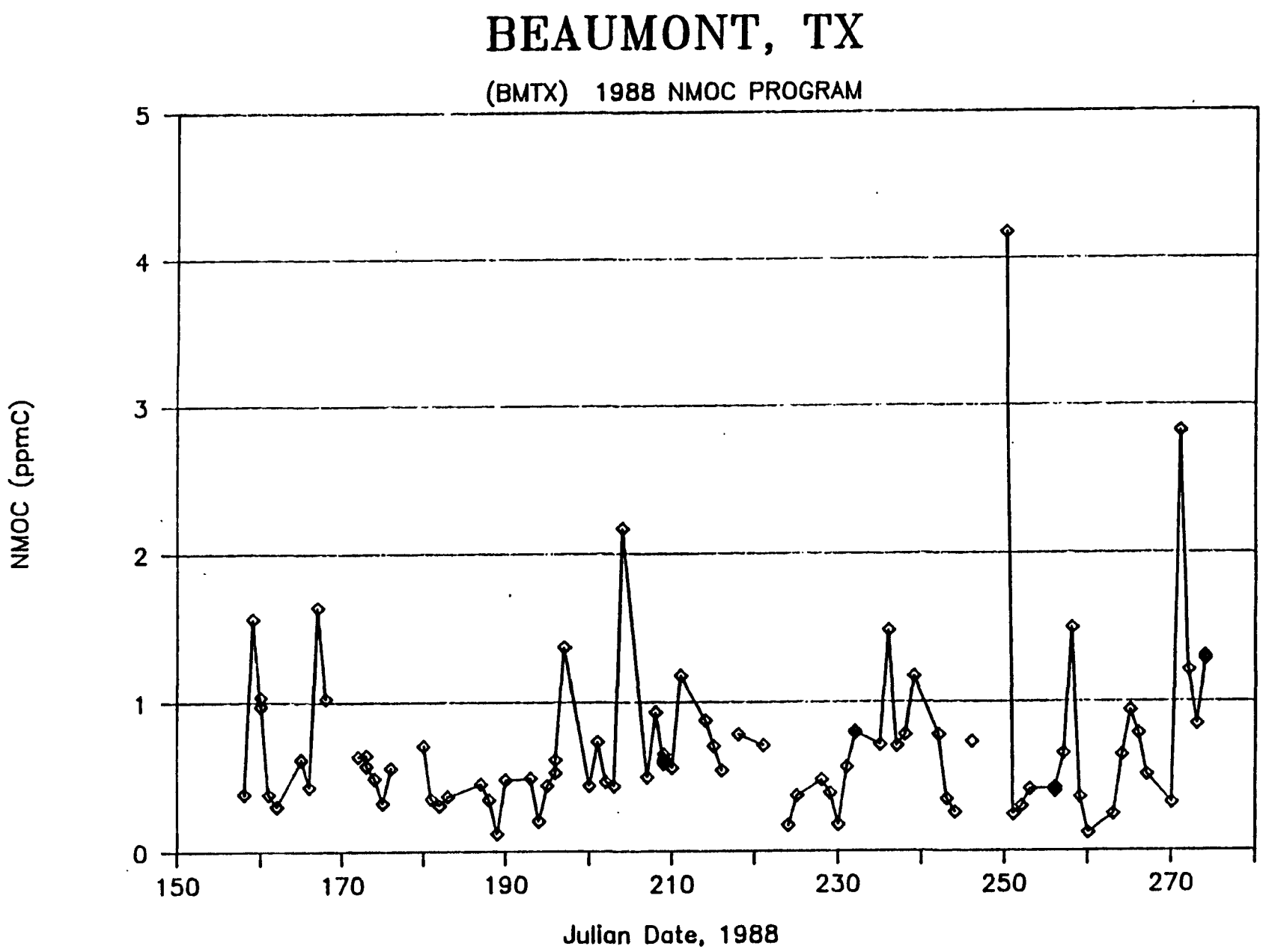


Figure E-31. Plot of NMOC concentration for Beaumont, TX.

TABLE E-31. SUMMARY OF THE 1988 NMOC DATA FOR BEAUMONT, TX (BMTX)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/06/88	158	M	1170	624	18.0	18.0	B	0.384		
06/06/88	158	M	1170	624	18.0	10.0	B	0.381		
06/07/88	159	T	1187	120	16.0	10.0	C	1.558		
06/08/88	160	W	1209	102	13.0	13.0	D	0.970		
06/08/88	160	W	1209	102	13.0	10.0	D	1.035		
06/09/88	161	H	1251	706	16.0	16.0	B	0.379		
06/10/88	162	F	1247	778	17.0	16.0	C	0.298		
06/13/88	165	M	1301	621	18.0	15.0	A	0.612		
06/13/88	165	M	1301	621	18.0	13.0	C	0.622		
06/14/88	166	T	1341	654	17.0	17.0	A	0.431		0.400
06/15/88	167	W	1340	104	196.0	15.0	D	1.637		
06/16/88	168	H	1427	47	17.0	16.0	B	1.024		
06/20/88	172	M	1491	404	17.0	16.0	C	0.634		0.545
06/22/88	174	W	1573	41	11.0	11.5	D	0.485		
06/23/88	175	H	1595	21	15.0	15.0	C	0.320		
06/24/88	176	F	1593	765	17.0	17.0	D	0.556		0.500
06/28/88	180	T	1703	120	16.0	16.0	C	0.706		
06/29/88	181	W	1751	847	15.0	16.0	D	0.347		
06/30/88	182	H	1814	647	17.0	16.0	D	0.302		0.252
07/01/88	183	F	1800	185	15.0	16.0	B	0.365	0.371	0.303
07/05/88	187	T	1873	162	16.0	16.0	B	0.449		
07/06/88	188	W	1917	139	16.0	14.0	B	0.344	0.287	0.308
07/07/88	189	H	1974	95	16.0	15.0	A	0.118		
07/08/88	190	F	2007	762	16.0	17.0	C	0.477		
07/11/88	193	M	2025	646	21.0	21.0	D	0.489		
07/12/88	194	T	2057	77	16.0	17.0	D	0.200		
07/13/88	195	W	2118	624	17.0	17.0	C	0.439		
07/14/88	196	H	2166	185	21.0	22.0	B	0.526		
07/14/88	196	H	2167	906	19.0	19.0	B	0.611		0.693
07/15/88	197	F	2176	807	17.0	16.5	C	1.368		
07/18/88	200	M	2210	659	17.0	17.0	A	0.439		
07/19/88	201	T	2254	884	15.0	15.0	C	0.732	0.747	0.772
07/20/88	202	W	2296	785	16.0	17.0	D	0.463		
07/21/88	203	H	2329	139	14.0	14.0	B	0.436		
07/22/88	204	F	2391	86	15.0	14.0	D	2.169	2.080	2.342
07/25/88	207	M	2427	83	15.0	14.0	B	0.495		0.533
07/26/88	208	T	2455	691	16.0	16.0	D	0.929		
07/27/88	209	W	2531	72	21.0	21.0	A	0.585		
07/27/88	209	W	2532	897	21.0	21.0	C	0.617		
07/27/88	209	W	2531	72	21.0		A	0.601		
07/27/88	209	W	2532	897	21.0	17.0	C	0.648		
07/28/88	210	H	2537	710	16.0	15.0	D	0.556		
07/29/88	211	F	2597	66		13.0	C	1.176		
08/01/88	214	M	2655	708	16.0	16.0	A	0.875		
08/02/88	215	T	2668	804	14.0	14.0	B	0.703		
08/03/88	216	W	2719	894	6.0	7.0	D	0.538		0.617
08/05/88	218	F	2835	182	15.0	15.0	D	0.781		
08/08/88	221	M	2858	878	11.0	12.0	D	0.707		
08/11/88	224	H	3004	659		17.0	B	0.170		

TABLE E-31. SUMMARY OF THE 1988 NMOC DATA FOR BEAUMONT, TX (BMTX)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/12/88	225	F	3045	708	16.0	18.0	B	0.368		0.794
08/15/88	228	M	3083	676	17.0	17.0	A	0.476		
08/16/88	229	T	3144	780	17.0	16.0	A	0.386	0.395	0.303
08/17/88	230	W	3172	148	15.0	15.0	B	0.174		
08/18/88	231	H	3232	187	15.0	16.0	D	0.562		
08/19/88	232	F	3303	843	21.0	20.0	A	0.790		
08/19/88	232	F	3304	916	21.0	20.0	C	0.801		
08/22/88	235	M	3320	303	16.0	16.0	C	0.712		
08/23/88	236	T	3360	874	15.0	16.0	D	1.478		
08/24/88	237	W	3478	64	15.0	17.0	B	0.703		
08/25/88	238	H	3443	913	15.0	16.0	D	0.778		
08/26/88	239	F	3526	108	16.0	16.0	A	1.170		
08/29/88	242	M	3564	403	16.0	15.0	B	0.776		
08/30/88	243	T	3593	651	15.0	15.0	B	0.342		
08/31/88	244	W	3638	43	15.0	16.0	C	0.252	0.284	0.307
09/02/88	246	F	3670	877	15.0	15.5	C	0.729		
09/06/88	250	T	3791	90	16.0	16.0	D	4.172		4.671
09/07/88	251	W	3808	848	16.0	17.0	B	0.238		
09/08/88	252	H	3867	165	15.0	14.0	A	0.294		
09/09/88	253	F	3896	796	17.0	16.0	A	0.410		
09/12/88	256	M	3982	403	21.0	22.0	A	0.416		
09/12/88	256	M	3983	108	21.0	22.0	A	0.420		
09/12/88	256	M	3982	403	21.0		A	0.396		
09/12/88	256	M	3983	108	21.0	14.0	A	0.421		
09/13/88	257	T	4016	27	15.0	14.0	C	0.653		0.586
09/14/88	258	W	4045	185	16.0	14.0	B	1.491		
09/15/88	259	H	4085	669	16.0	17.0	A	0.356		
09/16/88	260	F	4119	872	15.0	14.0	B	0.119		
09/19/88	263	M	4179	34	16.0	16.0	D	0.241		
09/20/88	264	T	4221	790	16.0	17.0	C	0.640		
09/21/88	265	W	4261	12	15.0	14.0	A	0.937		
09/22/88	266	H	4316	194	16.0	16.0	D	0.785		
09/23/88	267	F	4315	648	16.0	16.5	A	0.505		0.564
09/26/88	270	M	4399	632	17.0	16.0	D	0.318		
09/27/88	271	T	4472	635	21.0	23.9	A	2.814		
09/27/88	271	T	4473	704	21.0	22.0	C	2.817		
09/28/88	272	W	4491	844	16.0	16.0	C	1.209		1.386
09/29/88	273	H	4551	906	16.0	16.0	D	0.845		
09/30/88	274	F	4610	850	22.0	22.0	D	1.282		
09/30/88	274	F	4611	890	22.0	22.0	A	1.300		

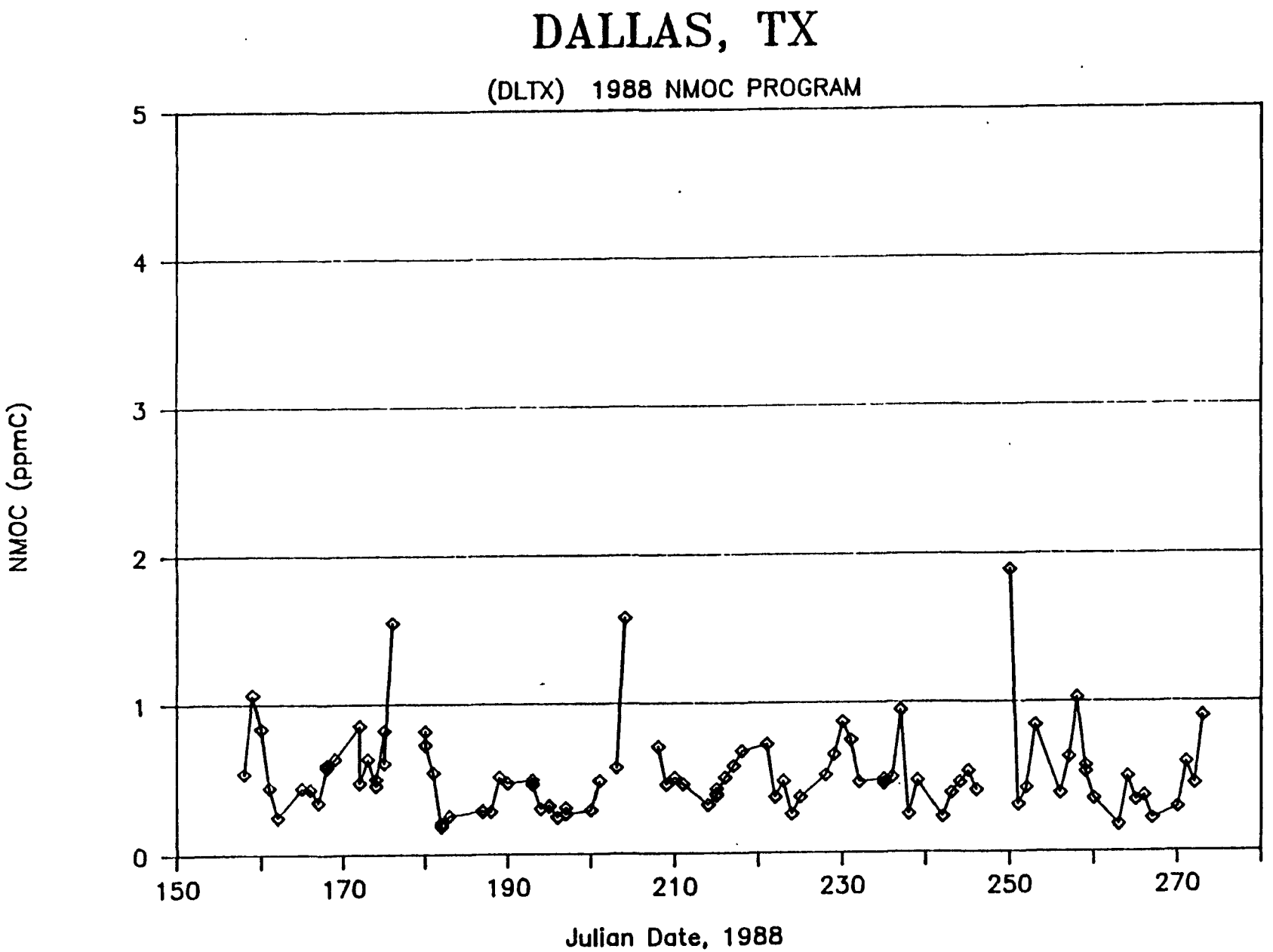


Figure E-32. Plot of NMOC concentration for Dallas, TX.

TABLE E-32. SUMMARY OF THE 1988 NMOC DATA FOR DALLAS, TX (DLTX)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/06/88	158	M	1197	13	15.0	14.0	A	0.540	0.540	0.438
06/07/88	159	T	1229	636	16.0	15.0	D	1.066		
06/08/88	160	W	1278	131	15.0	13.5	C	0.838		
06/09/88	161	H	1295	652	16.0	16.0	A	0.444		
06/10/88	162	F	1286	795	16.0	14.0	B	0.243		
06/13/88	165	M	1337	83	15.0	16.0	D	0.441		0.383
06/14/88	166	T	1380	708	17.0	18.0	B	0.433		
06/15/88	167	W	1426	815	15.5	15.0	B	0.346		
06/16/88	168	H	1476	627	16.0	16.0	B	0.579		
06/16/88	168	H	1476	627	16.0	6.0	C	0.599		
06/17/88	169	F	1500	31	15.0	14.0	C	0.637		
06/20/88	172	M	1513	791	15.0	15.0	A	0.857		
06/20/88	172	M	1513	791	15.0	9.0	A	0.474		
06/21/88	173	T	1570	303	15.0	16.0	D	0.635		
06/22/88	174	W	1626	663	16.0	16.0	D	0.454		
06/22/88	174	W	1625	723	16.0	16.0	B	0.500		0.425
06/23/88	175	H	1657	305	15.0	15.0	C	0.823		
06/23/88	175	H	1657	305	15.0	7.0	D	0.607		
06/24/88	176	F	1690	879	15.0	14.0	B	1.549		
06/28/88	180	T	1745	839	15.0	13.0	D	0.817		
06/28/88	180	T	1745	839	15.0	5.0	A	0.728		
06/29/88	181	W	1796	777	15.0	15.0	B	0.542		0.424
06/30/88	182	H	1861	404	15.0	15.0	A	0.186		
06/30/88	182	H	1861	404	15.0	12.0	B	0.203		
07/01/88	183	F	1880	655	15.0	15.0	A	0.254		
07/05/88	187	T	1896	683	15.0	15.0	C	0.288		
07/05/88	187	T	1896	683	15.0	10.0	D	0.282		
07/06/88	188	W	1967	405	15.0	15.0	C	0.282		0.275
07/07/88	189	H	1990	653	16.0	15.0	D	0.512		
07/08/88	190	F	2050	53	15.0	14.0	A	0.469	0.465	0.474
07/11/88	193	M	2051	626	15.0	15.0	A	0.492		
07/11/88	193	M	2051	626	15.0	12.0	A	0.462		
07/12/88	194	T	2104	641	15.0	16.0	B	0.297		
07/13/88	195	W	2129	145	15.0	15.0	C	0.311		
07/13/88	195	W	2129	145	15.0		B	0.320		
07/14/88	196	H	2188	852	15.0	16.0	C	0.238		
07/15/88	197	F	2235	766	14.0		B	0.304		
07/15/88	197	F	2236	90	14.0	13.0	C	0.260		
07/18/88	200	M	2256	871	15.0	15.0	C	0.286	0.286	0.322
07/19/88	201	T	2313	892	15.0	14.5	B	0.483		
07/21/88	203	H	2395	841	15.0	14.0	C	0.573		
07/22/88	204	F	2483	309	15.0	16.0	B	1.576		
07/26/88	208	T	2508	824	15.0	16.0	B	0.708		
07/27/88	209	W	2539	909	15.0	16.0	A	0.454		
07/28/88	210	H	2604	138	15.0	13.0	B	0.504		0.508
07/29/88	211	F	2603	717	16.0	16.0	D	0.459		
08/01/88	214	M	2670	780	16.0	16.0	A	0.318		
08/02/88	215	T	2756	859	15.0	15.0	C	0.379		
08/02/88	215	T	2757	869	15.0	15.0	D	0.387		

TABLE E-32. SUMMARY OF THE 1988 NMOC DATA FOR DALLAS, TX (DLTX)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/02/88	215	T	2756	859	15.0		C	0.425		
08/02/88	215	T	2757	869	15.0		D	0.386		
08/03/88	216	W	2768	7	15.0	16.0	C	0.501		0.489
08/04/88	217	H	2839	907	16.0	16.0	B	0.578		
08/05/88	218	F	2866	880	16.0	17.0	B	0.676		
08/08/88	221	M	2924	671	16.0	17.0	C	0.723		
08/09/88	222	T	2952	95	15.0	16.0	B	0.369		
08/10/88	223	W	3009	158	16.0	16.0	A	0.474		
08/11/88	224	H	3059	120	15.0	16.0	C	0.252		
08/12/88	225	F	3081	153	16.0	15.5	D	0.368		
08/15/88	228	M	3141	646	17.0	18.0	A	0.513		
08/16/88	229	T	3162	766	16.0	16.0	B	0.652	0.664	0.752
08/17/88	230	W	3257	772	15.5	16.0	D	0.872		
08/18/88	231	H	3300	673	16.0	17.0	C	0.747		
08/19/88	232	F	3334	681	16.0	16.0	C	0.466		
08/22/88	235	M	3369	659	16.0	16.0	A	0.487		
08/22/88	235	M	3370	727	16.0	17.0	D	0.456		
08/23/88	236	T	3397	832	16.0	15.0	C	0.496		
08/24/88	237	W	3441	770	16.0	16.0	C	0.945		
08/25/88	238	H	3528	99	15.0	14.0	D	0.250		
08/26/88	239	F	3562	678	16.0	16.0	D	0.476		
08/29/88	242	M	3579	115	15.0	15.0	A	0.230		
08/30/88	243	T	3653	100	15.0	14.5	A	0.390		
08/31/88	244	W	3667	135	15.0	15.0	C	0.460		
09/01/88	245	H	3678	166	15.0	14.0	C	0.537		0.518
09/02/88	246	F	3764	164	15.0	14.0	A	0.407		
09/06/88	250	T	3814	905	15.0	14.5	B	1.887		
09/07/88	251	W	3854	762	16.0	14.0	B	0.310		
09/08/88	252	H	3929	160	15.0	15.0	D	0.423		
09/09/88	253	F	3971	919	15.0	15.0	B	0.842		
09/12/88	256	M	4003	860	15.0	14.0	D	0.386		
09/13/88	257	T	4056	45	15.0	14.5	B	0.629		
09/14/88	258	W	4087	832	15.0	13.0	D	1.026		
09/15/88	259	H	4149	918	15.0	14.0	A	0.571		0.606
09/15/88	259	H	4150	831	15.0	17.0	D	0.528		
09/16/88	260	F	4187	899	15.0	14.0	D	0.349		
09/19/88	263	M	4214	9	15.0	12.0	B	0.175		
09/20/88	264	T	4280	147	15.0	16.0	B	0.498		
09/21/88	265	W	4314	911	15.0	15.0	A	0.337		
09/22/88	266	H	4371	665	16.0	14.0	D	0.369		
09/23/88	267	F	4404	817	15.0	13.0	C	0.216		
09/26/88	270	M	4428	899	15.0	16.0	B	0.290		
09/27/88	271	T	4497	897	15.0	15.0	D	0.594		0.596
09/28/88	272	W	4562	672	16.0	16.0	A	0.447		
09/29/88	273	H	4625	875	15.0	16.0	C	0.900		
09/29/88	273	H	4626	64	15.0	16.0	C	0.904		
09/30/88	274	F	4592	720	16.0	16.0	B	0.334		

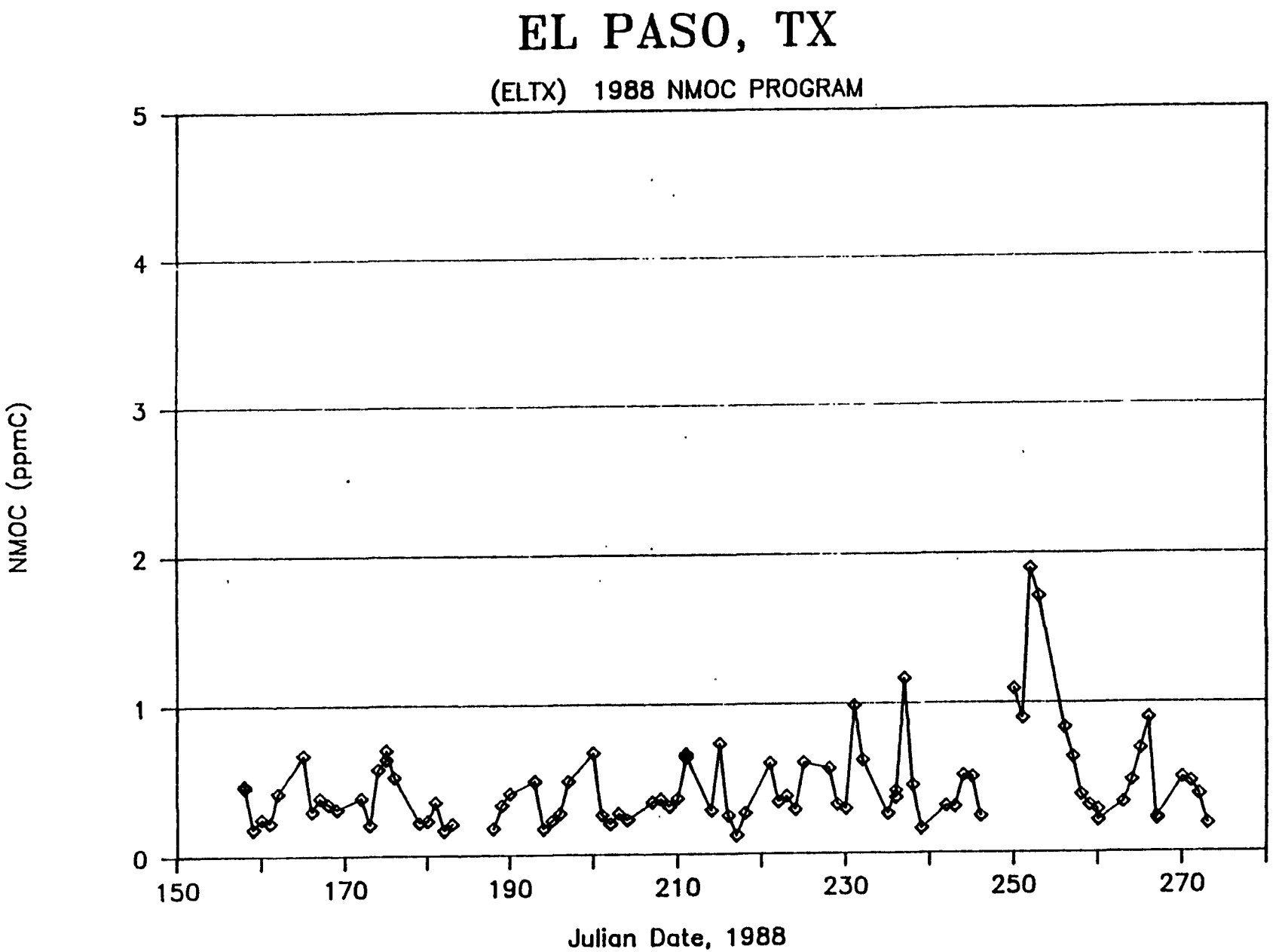


Figure E-33. Plot of NMOC concentration for El Paso, TX.

TABLE E-33. SUMMARY OF THE 1988 NMOC DATA FOR EL PASO, TX (ELTX)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/06/88	158	M	1172	718	13.5	12.0	D	0.459		
06/06/88	158	M	1172	718	13.5	4.0	B	0.472		
06/07/88	159	T	1188	3	12.5	16.0	D	0.177		
06/08/88	160	W	1208	96	13.0	10.0	B	0.244		
06/09/88	161	H	1248	20	13.0	11.0	A	0.220		
06/10/88	162	F	1294	804	12.0	10.0	D	0.419		
06/13/88	165	M	1325	185	13.0	11.0	A	0.671		0.556
06/14/88	166	T	1342	830	13.0	10.0	D	0.294		
06/15/88	167	W	1382	696	13.5	10.0	C	0.386		
06/16/88	168	H	1414	847	13.0	10.0	A	0.343		
06/17/88	169	F	1431	789	13.5	12.0	D	0.308		
06/20/88	172	M	1507	725	13.5	10.0	D	0.384		
06/21/88	173	T	1535	649	14.0	12.0	B	0.203		
06/22/88	174	W	1561	775	13.5	10.0	D	0.577	0.546	0.420
06/23/88	175	H	1623	869	12.5	11.0	C	0.641		
06/23/88	175	H	1622	907	12.5	11.0	C	0.702		
06/24/88	176	F	1665	871	13.0	10.0	D	0.523		
06/27/88	179	M	1680	729	13.0	12.0	B	0.215		
06/28/88	180	T	1722	893	12.5	11.0	D	0.227		
06/29/88	181	W	1755	864	13.0	11.0	C	0.353		
06/30/88	182	H	1818	113	13.0	10.0	B	0.164		
07/01/88	183	F	1806	852	12.5	10.0	C	0.207		0.173
07/06/88	188	W	1897	303	13.0	10.0	D	0.176		
07/07/88	189	H	1945	913	13.0	10.0	D	0.331		0.216
07/08/88	190	F	1953	887	13.0	10.0	B	0.410		
07/11/88	193	M	2048	104	11.0	8.0	A	0.494		
07/11/88	193	M	2049	309	11.0	8.0	A	0.488		
07/12/88	194	T	2069	924	13.0	10.0	B	0.171		
07/13/88	195	W	2064	320	14.0	12.0	B	0.226	0.179	0.270
07/14/88	196	H	2105	777	14.0	13.0	B	0.272		
07/15/88	197	F	2177	171	15.0	13.0	D	0.488		
07/18/88	200	M	2218	878	18.0	16.0	A	0.677		
07/19/88	201	T	2247	882	15.0	13.0	A	0.261	0.255	0.272
07/20/88	202	W	2292	803	15.0	13.0	C	0.199		
07/21/88	203	H	2336	896	15.0	13.0	A	0.270		
07/22/88	204	F	2387	43	14.0	12.5	B	0.228		
07/25/88	207	M	2421	787	18.0	16.0	D	0.345		
07/26/88	208	T	2466	184	14.0	12.0	A	0.366		
07/27/88	209	W	2514	120	14.0	12.0	B	0.316		
07/28/88	210	H	2559	135	14.0	12.0	A	0.370		
07/29/88	211	F	2495	665	13.0	11.0	B	0.642		
07/29/88	211	F	2595	765	13.0	11.0	D	0.669		
07/29/88	211	F	2594	665	13.0	8.0	B	0.652		
07/29/88	211	F	2595	765	13.0		D	0.656		
08/01/88	214	M	2663	860	17.0	16.0	B	0.289		
08/02/88	215	T	2672	810	14.0	13.0	A	0.735		
08/03/88	216	W	2699	622	15.0	13.0	B	0.253		
08/04/88	217	H	2744	890	14.0	12.0	C	0.121		
08/05/88	218	F	2836	401	14.0	13.0	B	0.271	0.289	0.290

TABLE E-33. SUMMARY OF THE 1988 NMOC DATA FOR EL PASO, TX (ELTX)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/08/88	221	M	2868	644	18.0	17.0	D	0.605	0.685	0.623
08/09/88	222	T	2920	799	14.0	12.0	A	0.346		
08/10/88	223	W	2901	802	14.0	13.0	B	0.383		
08/11/88	224	H	2991	846	14.0	12.0	B	0.293		
08/12/88	225	F	3040	850	14.0	13.0	D	0.608		
08/15/88	228	M	3080	886	17.0	15.0	D	0.567		
08/16/88	229	T	3157	662	15.0	14.0	C	0.325		
08/17/88	230	W	3185	802	15.0	14.0	A	0.299		
08/18/88	231	H	3247	801	15.0	14.0	C	0.987		
08/19/88	232	F	3297	50	14.0	13.0	D	0.621		
08/22/88	235	M	3335	910	17.0	16.0	D	0.260		
08/23/88	236	T	3372	878	13.0	11.0	B	0.417		
08/23/88	236	T	3373	914	13.0	11.0	C	0.367		
08/24/88	237	W	3396	692	14.0	12.0	D	1.165		
08/25/88	238	H	3481	889	14.0	13.0	B	0.452		
08/26/88	239	F	3524	107	12.0	10.0	D	0.159		
08/29/88	242	M	3541	163	17.0	15.0	C	0.311		
08/30/88	243	T	3595	303	14.0	13.0	B	0.305		0.374
08/31/88	244	W	3624	715	14.0	11.0	C	0.516		
09/01/88	245	H	3666	841	14.0	12.0	D	0.506		
09/02/88	246	F	3735	775	14.0	13.0	B	0.242		
09/06/88	250	T	3758	198	18.0	15.0	C	1.094		
09/07/88	251	W	3797	770	15.0	13.0	D	0.897		
09/08/88	252	H	3884	680	15.0	12.0	C	1.897		
09/09/88	253	F	3906	917	14.0	12.0	C	1.708		
09/12/88	256	M	3964	879	17.0	15.0	A	0.832		
09/13/88	257	T	4018	923	14.0	12.0	D	0.636		
09/14/88	258	W	4053	775	14.0	12.0	B	0.381		
09/15/88	259	H	4097	841	14.0	14.0	C	0.312		
09/16/88	260	F	4203	109	12.5	10.0	B	0.283		
09/16/88	260	F	4204	141	12.5	10.0	B	0.212		
09/19/88	263	M	4191	890	16.0	16.0	A	0.332		0.333
09/20/88	264	T	4239	876	14.0	10.0	A	0.480		
09/21/88	265	W	4267	920	13.0	12.0	A	0.690		0.754
09/22/88	266	H	4323	403	14.0	12.0	A	0.897		
09/23/88	267	F	4390	77	12.5	11.0	A	0.216		
09/23/88	267	F	4391	57	12.5	11.0	A	0.228		
09/26/88	270	M	4407	795	17.0	14.0	A	0.496		
09/27/88	271	T	4419	859	14.0	13.0	D	0.468		
09/28/88	272	W	4478	808	14.0	12.0	B	0.383		
09/29/88	273	H	4554	803	15.0	13.0	C	0.186		0.176

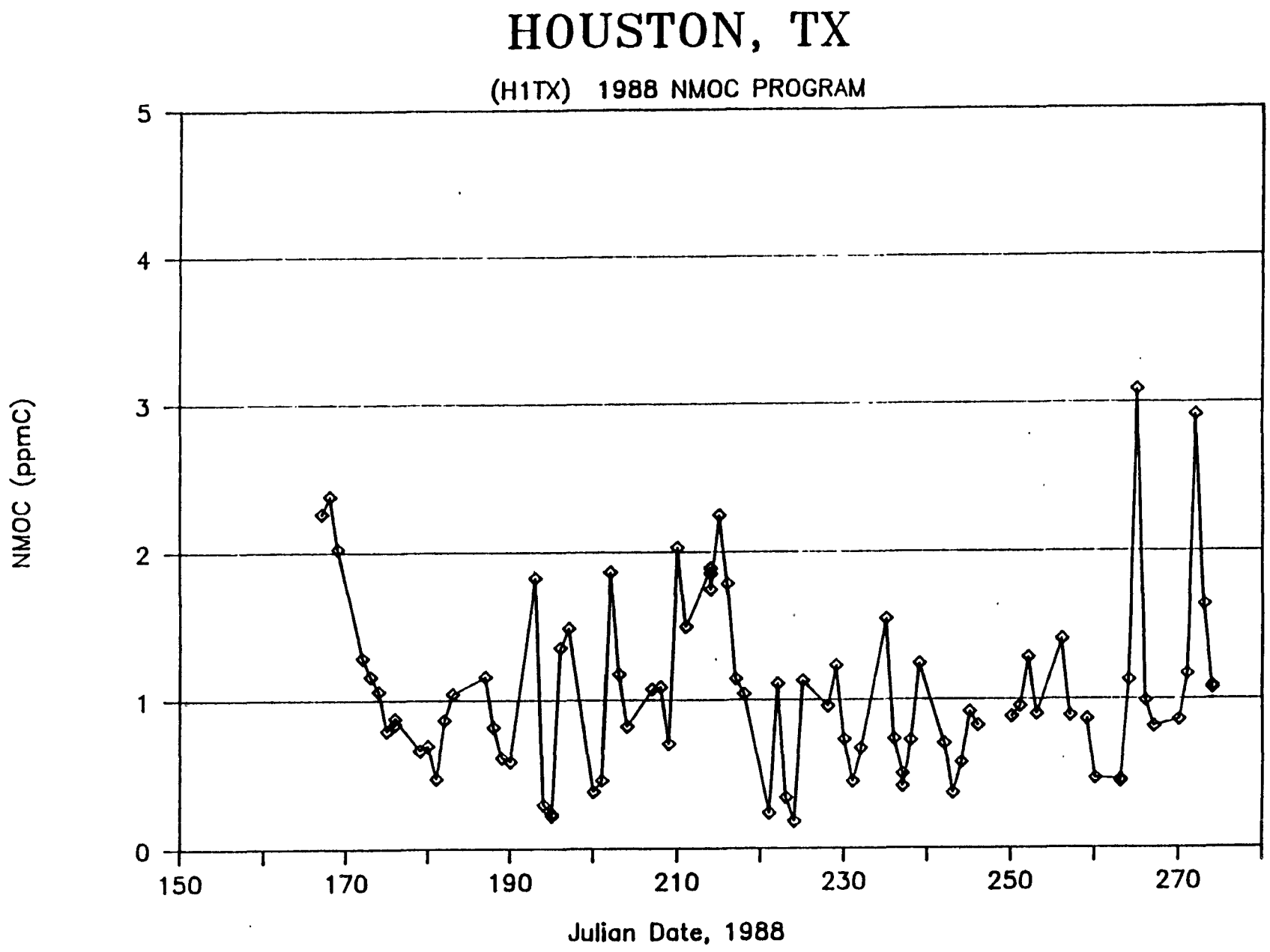


Figure E-34. Plot of NMOC concentration for Houston, TX.

TABLE E-34. SUMMARY OF THE 1988 NMOC DATA FOR HOUSTON, TX (H1TX)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/15/88	167	W	1376	701	12.0	12.0	A	2.263		
06/16/88	168	H	1409	141	10.0	9.0	C	2.383		2.105
06/17/88	169	F	1417	664	12.0	11.5	D	2.024		
06/20/88	172	M	1487	115	11.0	10.0	B	1.286		1.271
06/21/88	173	T	1543	126	10.0	10.0	D	1.160		
06/22/88	174	W	1577	139	10.0	8.0	D	1.058		
06/23/88	175	H	1596	635	11.0	11.0	C	0.793		
06/24/88	176	F	1636	621	20.0	18.0	D	0.837		
06/24/88	176	F	1635	695	20.0	20.0	C	0.876		
06/27/88	179	M	1671	784	11.0	11.0	B	0.661		
06/28/88	180	T	1726	720	11.0	10.0	B	0.691		
06/29/88	181	W	1748	838	11.0	9.0	A	0.470		0.383
06/30/88	182	H	1809	761	11.0	11.0	C	0.866		
07/01/88	183	F	1860	772	11.0	10.0	D	1.042		
07/05/88	187	T	1931	667	10.0	10.0	A	1.160		
07/06/88	188	W	1932	693	10.0	10.0	B	0.818		
07/07/88	189	H	1969	672	11.0	10.0	B	0.609		0.471
07/08/88	190	F	1996	60	11.0	10.0	C	0.584		
07/11/88	193	M	2047	843	11.0	10.0	B	1.825		
07/12/88	194	T	2071	773	11.0	10.0	C	0.291		
07/13/88	195	W	2126	191	19.0	18.0	A	0.237		
07/13/88	195	W	2127	720	19.0	19.0	D	0.218		
07/14/88	196	H	2161	713	11.0	10.0	B	1.355		
07/15/88	197	F	2181	909	10.0	10.0	D	1.483		
07/18/88	200	M	2241	26	10.0	9.0	A	0.378		
07/19/88	201	T	2284	913	10.0	10.0	D	0.457		
07/20/88	202	W	2324	648	11.0	10.0	B	1.866		
07/21/88	203	H	2378	811	11.0	10.0	B	1.174		
07/22/88	204	F	2375	868	10.0	9.0	B	0.819	0.810	0.889
07/25/88	207	M	2423	776	11.0	10.0	C	1.072		
07/26/88	208	T	2464	852	10.0	10.0	B	1.088		
07/27/88	209	W	2527	8	10.0	10.0	B	0.701		
07/28/88	210	H	2578	152	11.0	11.0	D	2.031		
07/29/88	211	F	2599	657	11.0	11.0	D	1.491	1.321	1.472
08/01/88	214	M	2658	698	20.0	20.0	C	1.892		
08/01/88	214	M	2658	698	20.0		C	1.850		
08/01/88	214	M	2659	641	20.0	20.0	C	1.884		
08/01/88	214	M	2659	641	20.0		C	1.745		
08/02/88	215	T	2708	650	11.0	11.0	B	2.251		
08/03/88	216	W	2722	43	10.3	10.0	D	1.783		
08/04/88	217	H	2783	45	10.0	10.0	A	1.143		
08/05/88	218	F	2844	663	11.0	11.0	D	1.038		
08/08/88	221	M	2875	60	10.0	10.0	B	0.236		
08/09/88	222	T	2897	673	11.0	12.0	D	1.110		1.121
08/10/88	223	W	2955	196	10.0	10.0	A	0.338		
08/11/88	224	H	3031	96	10.0	10.0	A	0.179		
08/12/88	225	F	3052	305	10.0	10.0	B	1.130		
08/15/88	228	M	3110	192	10.0	10.0	A	0.954		
08/16/88	229	T	3139	8	11.0	10.0	C	1.234		

TABLE E-34. SUMMARY OF THE 1988 NMOC DATA FOR HOUSTON, TX (H1TX)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/17/88	230	W	3184	113	11.0	11.0	C	0.731	0.725	
08/18/88	231	H	3246	672	11.0	12.0	C	0.446		
08/19/88	232	F	3281	784	12.0	12.0	D	0.671		
08/22/88	235	M	3311	100	11.0	10.0	D	1.546		
08/23/88	236	T	3378	773	12.0	12.0	D	0.733		
08/24/88	237	W	3429	146	19.0	19.0	B	0.497		
08/24/88	237	W	3430	8	19.0	19.0	D	0.412		
08/25/88	238	H	3450	730	12.0	12.0	D	0.726		
08/26/88	239	F	3509	172	11.0	10.0	D	1.245	1.200	1.383
08/29/88	242	M	3567	187	10.5	11.0	C	0.702	0.674	0.810
08/30/88	243	T	3613	150	11.0	11.0	C	0.367		
08/31/88	244	W	3634	49	11.0	11.0	D	0.575		
09/01/88	245	H	3676	840	10.5	10.0	D	0.917		
09/02/88	246	F	3710	860	10.0	8.0	C	0.822		
09/06/88	250	T	3779	695	9.0	8.0	C	0.883		
09/07/88	251	W	3804	4	11.0	11.0	B	0.951		
09/08/88	252	H	3891	845	11.0	10.0	B	1.283		
09/09/88	253	F	3892	15	11.0	10.0	B	0.900		
09/12/88	256	M	3955	896	11.0	11.0	A	1.405		1.412
09/13/88	257	T	4011	785	12.0	10.0	C	0.887		
09/15/88	259	H	4071	729	12.0	10.0	C	0.863		
09/16/88	260	F	4162	791	12.0	11.0	D	0.463		
09/19/88	263	M	4197	678	20.0	20.0	C	0.457		
09/19/88	263	M	4198	625	20.0	19.0	D	0.441		
09/20/88	264	T	4220	778	10.5	10.0	B	1.130		
09/21/88	265	W	4268	178	10.0	9.0	B	3.088		3.149
09/22/88	266	H	4317	828	10.0	10.0	B	0.989		
09/23/88	267	F	4366	730	11.0	10.0	D	0.813		
09/26/88	270	M	4367	92	10.0	9.0	D	0.859		
09/27/88	271	T	4438	89	10.0	10.0	B	1.171		
09/28/88	272	W	4495	711	11.0	10.8	B	2.914		
09/29/88	273	H	4540	85	11.0	10.0	A	1.636		
09/30/88	274	F	4575	824	18.0	19.0	C	1.087		
09/30/88	274	F	4576	908	18.0	19.0	C	1.073		

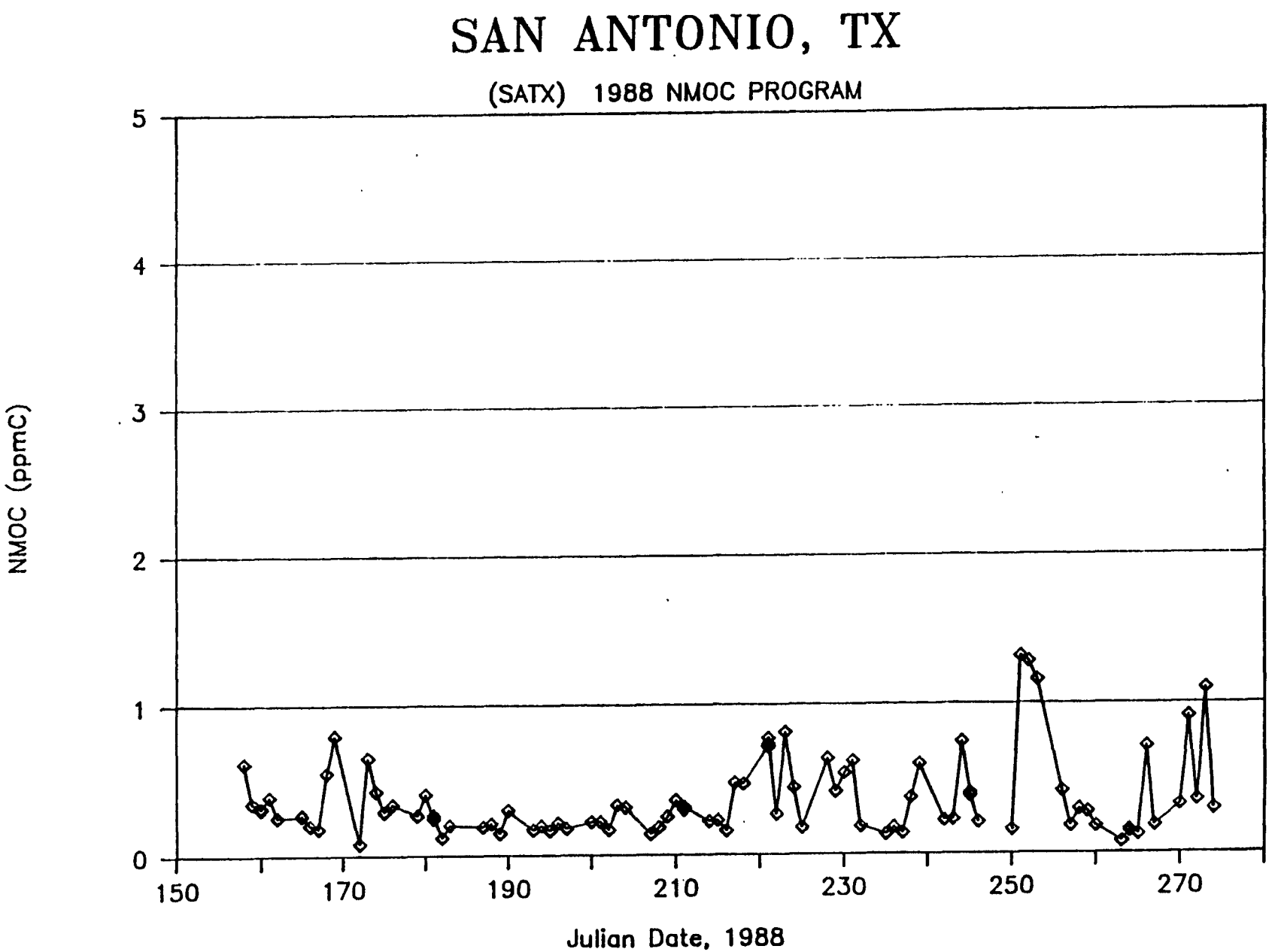


Figure E-35. Plot of NMOC concentration for San Antonio, TX.

TABLE E-35. SUMMARY OF THE 1988 NMOC DATA FOR SAN ANTONIO, TX (SATX)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/06/88	158	M	1202	798	15.0	14.0	C	0.618		
06/07/88	159	T	1201	141	14.0	13.0	C	0.350	0.373	0.327
06/08/88	160	W	1280	699	14.0	12.0	C	0.313		
06/08/88	160	W	1280	699	14.0	6.0	B	0.317		
06/09/88	161	H	1300	307	12.0	12.0	D	0.393		
06/10/88	162	F	1319	500	14.0	11.0	A	0.256		
06/13/88	165	M	1307	890	16.0	14.0	C	0.266		
06/13/88	165	M	1308	878	16.0	14.0	D	0.273		
06/14/88	166	T	1373	308	14.0	11.0	D	0.203		0.170
06/15/88	167	W	1425	762	14.0	12.0	A	0.182		
06/16/88	168	H	1433	866	14.0	12.0	C	0.553		
06/17/88	169	F	1478	618	14.0	12.0	C	0.798	0.773	0.638
06/20/88	172	M	1492	777	14.0	14.0	A	0.080		
06/21/88	173	T	1517	868	14.0	13.0	C	0.652		
06/22/88	174	W	1590	890	13.0	12.0	D	0.426		
06/23/88	175	H	1654	826	14.0	12.5	C	0.292		0.187
06/24/88	176	F	1655	405	14.0	10.0	B	0.339		
06/27/88	179	M	1719	96	14.0	12.0	B	0.268		
06/28/88	180	T	1720	640	13.0	13.0	C	0.406		
06/29/88	181	W	1834	834	14.0	14.0	C	0.245		
06/29/88	181	W	1835	770	14.0	14.0	A	0.270		
06/30/88	182	H	1841	701	14.0	12.0	D	0.119	0.102	0.076
07/01/88	183	F	1846	51	13.0	11.0	D	0.202		
07/05/88	187	T	1859	856	14.0	12.0	D	0.190		
07/06/88	188	W	1902	676	14.0	12.5	D	0.212		
07/07/88	189	H	1976	21	13.0	12.0	C	0.145		
07/08/88	190	F	1950	678	14.0	13.0	C	0.300		
07/11/88	193	M	2034	305	14.0	14.0	B	0.169		
07/12/88	194	T	2110	700	14.0	13.0	C	0.196		
07/13/88	195	W	2094	119	14.0	12.0	A	0.162		
07/14/88	196	H	2163	655	14.0	13.0	B	0.215		
07/15/88	197	F	2150	915	13.0	12.0	D	0.178		
07/18/88	200	M	2213	724	14.0	12.0	C	0.221		
07/19/88	201	T	2250	667	14.0	12.0	B	0.222		
07/20/88	202	W	2350	725	14.0	12.0	B	0.169		0.203
07/21/88	203	H	2445	662	14.0	14.0	C	0.332		
07/22/88	204	F	2333	834	14.0	11.0	C	0.317		
07/25/88	207	M	2501	645	14.0	13.0	B	0.139		
07/26/88	208	T	2510	805	14.0	13.0	C	0.182		
07/27/88	209	W	2550	890	13.0	12.0	D	0.252		
07/28/88	210	H	2573	669	14.0	14.0	A	0.362		
07/29/88	211	F	2591	671	17.0	16.0	B	0.301		
07/29/88	211	F	2592	620	17.0	16.0	D	0.317		
08/01/88	214	M	2656	888	14.0	12.0	B	0.221		
08/02/88	215	T	2701	893	14.0	11.0	D	0.228		
08/03/88	216	W	2714	122	13.0	12.0	C	0.157		0.163
08/04/88	217	H	2780	189	13.0	12.0	C	0.477		
08/05/88	218	F	2770	62	14.0	12.0	D	0.470		
08/08/88	221	M	2884	105	17.0	17.0	A	0.734	0.730	

TABLE E-35. SUMMARY OF THE 1988 NMOC DATA FOR SAN ANTONIO, TX (SATX)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/08/88	221	M	2885	701	17.0	16.0	C	0.713		
08/08/88	221	M	2884	105	17.0		A	0.722		
08/08/88	221	M	2885	701	17.0	10.0	C	0.772		
08/09/88	222	T	2976	772	14.0	12.0	D	0.266		
08/10/88	223	W	2948	782	14.0	12.0	D	0.811		
08/11/88	224	H	3005	677	14.0	12.0	B	0.445		
08/12/88	225	F	3006	916	14.0	11.0	A	0.178		
08/15/88	228	M	3076	794	14.0	13.0	C	0.638		
08/16/88	229	T	3160	151	14.0	12.0	C	0.417		
08/17/88	230	W	3230	710	14.0	13.0	B	0.540	0.540	0.730
08/18/88	231	H	3204	680	14.0	13.0	C	0.621		
08/19/88	232	F	3305	115	14.0	12.0	B	0.186		
08/22/88	235	M	3315	813	14.0	12.0	B	0.128		
08/23/88	236	T	3394	136	14.0	12.0	A	0.176	0.152	0.210
08/24/88	237	W	3434	775	14.0	13.0	A	0.138		
08/25/88	238	H	3474	164	14.0	12.0	A	0.375		
08/26/88	239	F	3449	126	14.0	12.5	C	0.597		
08/29/88	242	M	3559	781	14.0	14.0	C	0.223		0.244
08/30/88	243	T	3632	46	14.0	13.0	C	0.228		
08/31/88	244	W	3720	648	14.0	13.0	B	0.745		
09/01/88	245	H	3715	725	14.0	12.0	A	0.405		
09/01/88	245	H	3716	17	14.0	12.5	C	0.383		
09/02/88	246	F	3677	883	13.0	12.0	C	0.207		
09/06/88	250	T	3781	791	14.0	13.0	B	0.156		
09/07/88	251	W	3903	637	14.0	12.0	C	1.317		
09/08/88	252	H	3862	704	14.0	12.0	B	1.280		
09/09/88	253	F	3904	150	14.0	12.0	D	1.156		
09/12/88	256	M	3970	70	14.0	12.0	C	0.414		0.449
09/13/88	257	T	4022	838	14.0	12.0	D	0.181		
09/14/88	258	W	4113	72		13.0	D	0.292		
09/15/88	259	H	4129	66	14.0	14.0	A	0.276		
09/16/88	260	F	4234	400	14.0	14.0	A	0.178		
09/19/88	263	M	4189	184	14.0	13.0	A	0.072		
09/20/88	264	T	4344	809	16.0	16.0	B	0.141		
09/20/88	264	T	4345	644	16.0	12.0	A	0.154		
09/21/88	265	W	4311	771	14.0	12.0	D	0.122		
09/22/88	266	H	4307	789	14.0	12.0	D	0.712		
09/23/88	267	F	4370	814	14.0	12.0	B	0.182		
09/26/88	270	M	4435	134		12.0	C	0.321		
09/27/88	271	T	4439	909	14.0	11.0	A	0.910		
09/28/88	272	W	4494	780	14.0	12.0	C	0.351		
09/29/88	273	H	4500	916	14.0	14.0	C	1.098		
09/30/88	274	F	4525	149	14.0	14.0	A	0.292		

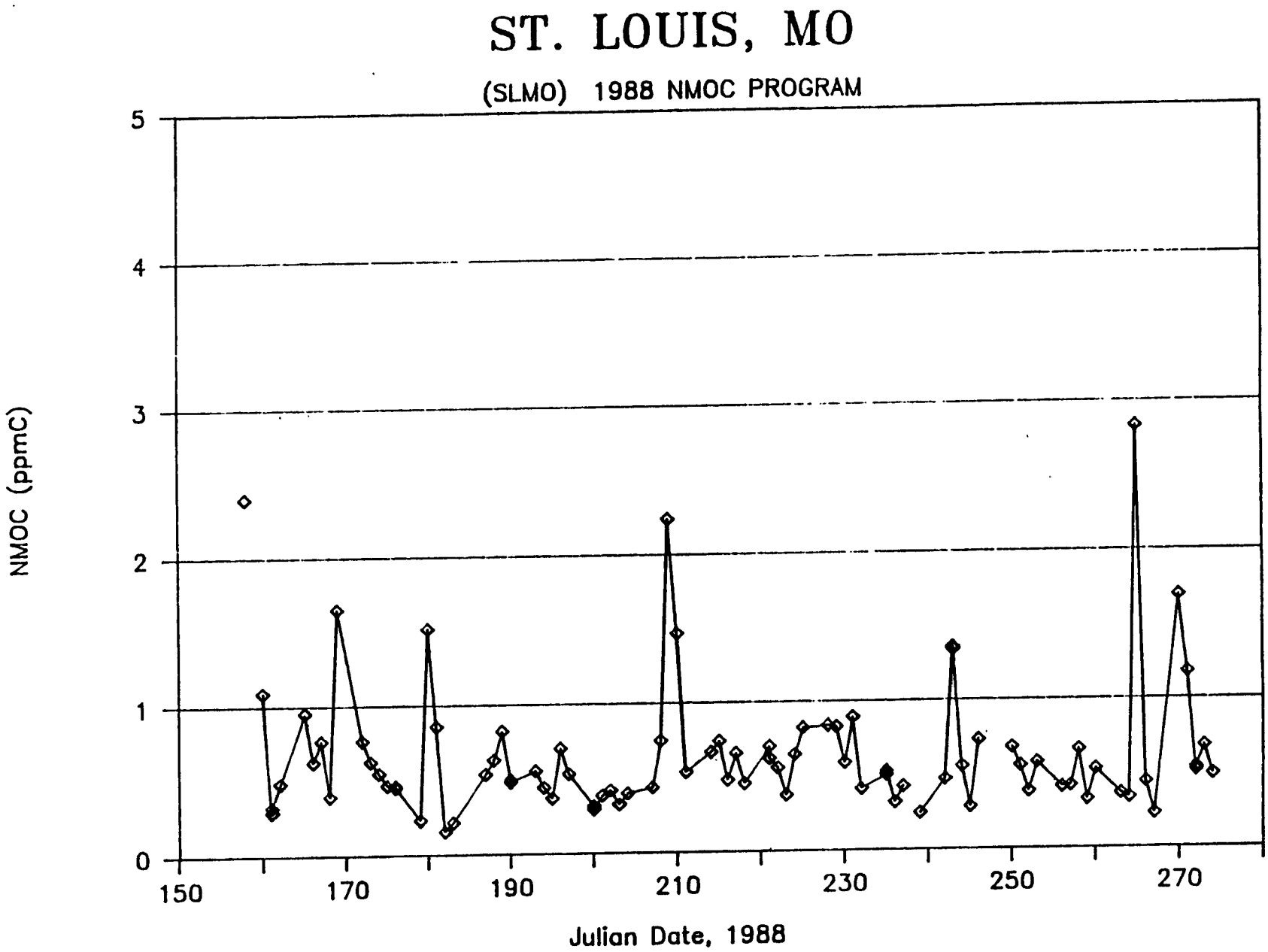


Figure E-36. Plot of NMOC concentration for St. Louis, MO.

TABLE E-36. SUMMARY OF THE 1988 NMOC DATA FOR ST. LOUIS, MO (SLMO)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/06/88	158	M	1225	711	12.0	12.0	A	2.399		
06/08/88	160	W	1252	121	16.0	14.0	D	1.091		
06/09/88	161	H	1240	55	14.0	14.0	B	0.290		
06/09/88	161	H	1241	303	14.0	12.0	D	0.324		
06/10/88	162	F	1297	181	14.5	13.0	C	0.484		0.359
06/13/88	165	M	1323	103	15.0	15.0	B	0.951		
06/14/88	166	T	1343	880	14.0	14.0	B	0.623	0.686	0.496
06/15/88	167	W	1439	629	15.0	16.0	C	0.763		
06/16/88	168	H	1441	628	15.0	13.5	B	0.392		
06/17/88	169	F	1458	918	14.0	14.0	B	1.648	1.619	1.644
06/20/88	172	M	1529	903	14.1	12.0	A	0.765		0.583
06/21/88	173	T	1525	34	14.0	14.0	D	0.625		
06/22/88	174	W	1557	683	15.0	13.0	A	0.546		
06/23/88	175	H	1643	631	14.0	14.0	A	0.463		
06/24/88	176	F	1641	644	15.0	12.0	A	0.460		
06/24/88	176	F	1641	644	15.0	9.0	D	0.450		
06/27/88	179	M	1679	790	15.0	15.0	A	0.230		
06/28/88	180	T	1709	768	19.0	20.0	B	1.515		
06/29/88	181	W	1763	154	14.0	14.0	D	0.857		
06/30/88	182	H	1817	627	15.0	14.0	C	0.154		
07/01/88	183	F	1849	824	14.0	13.5	C	0.214		
07/05/88	187	T	1883	306	14.0	13.0	D	0.533		
07/06/88	188	W	1904	665	15.0	14.0	A	0.628	0.609	0.525
07/07/88	189	H	1959	798	14.5	14.0	A	0.822		
07/08/88	190	F	2010	771	14.5	14.0	D	0.496		
07/08/88	190	F	2011	696	14.5	14.5	C	0.481		
07/11/88	193	M	2020	164	14.0	12.5	D	0.552	0.517	0.592
07/12/88	194	T	2070	846	14.0	13.0	B	0.441		
07/13/88	195	W	2106	835		14.0	C	0.368		
07/14/88	196	H	2133	302	14.0	14.0	A	0.702		
07/15/88	197	F	2178	322	14.0	13.0	D	0.530		
07/18/88	200	M	2238	708	14.0	14.0	B	0.314		0.319
07/18/88	200	M	2239	635	14.0	14.0	D	0.291		
07/19/88	201	T	2277	155	14.0	13.0	D	0.381		
07/20/88	202	W	2347	182	14.0	13.0	B	0.418		
07/21/88	203	H	2360	73	14.0	13.0	A	0.324		
07/22/88	204	F	2393	726	15.0	15.0	D	0.396		
07/25/88	207	M	2430	116	14.0	12.0	D	0.434		
07/26/88	208	T	2465	770	14.5	14.0	B	0.747		
07/27/88	209	W	2497	21	14.0	14.0	D	2.238		2.118
07/28/88	210	H	2564	832	14.0	14.0	A	1.467		
07/29/88	211	F	2639	33	14.0	14.0	A	0.534		
08/01/88	214	M	2646	102	14.0	13.5	B	0.665		
08/02/88	215	T	2683	769	15.0	15.0	B	0.740		
08/03/88	216	W	2743	785	14.5	15.0	C	0.477	0.477	0.469
08/04/88	217	H	2760	686	14.5	15.0	C	0.657		
08/05/88	218	F	2814	84	14.0	14.0	B	0.453		
08/08/88	221	M	2890	103	13.9	14.0	A	0.699		

TABLE E-36. SUMMARY OF THE 1988 NMOC DATA FOR ST. LOUIS, MO (SLMO)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/08/88	221	M	2891	66	13.9	13.0	C	0.618		
08/09/88	222	T	2916	901	14.0	13.0	B	0.554		
08/10/88	223	W	2957	769	14.5	15.0	A	0.371		
08/11/88	224	H	2999	115	14.0	13.0	A	0.643		
08/12/88	225	F	3046	696	15.0	15.0	C	0.824		
08/15/88	228	M	3079	68	14.0	14.0	C	0.837		
08/16/88	229	T	3129	770	15.0	16.0	C	0.825		
08/17/88	230	W	3161	17	14.0	14.0	B	0.583		
08/18/88	231	H	3229	131	14.0	14.0	A	0.890		
08/19/88	232	F	3296	825	14.0	14.0	B	0.406		
08/22/88	235	M	3342	885	14.0	14.0	C	0.499		
08/22/88	235	M	3342	885	14.0	10.0	B	0.526		
08/23/88	236	T	3356	706	14.5	14.5	D	0.316		
08/24/88	237	W	3412	841	14.0	14.0	B	0.422		
08/26/88	239	F	3554	819	14.5	14.0	B	0.241		
08/29/88	242	M	3556	714	15.0	14.0	A	0.470		
08/30/88	243	T	3614	782	20.0	20.0	D	1.354		
08/30/88	243	T	3615	925	20.0	20.0	D	1.339		
08/31/88	244	W	3633	28	15.0	15.5	B	0.554		
09/01/88	245	H	3664	838	14.0	14.0	D	0.280		0.353
09/02/88	246	F	3744	153	14.8	14.0	D	0.731		
09/06/88	250	T	3769	802	15.0	14.0	D	0.676		
09/07/88	251	W	3813	729	15.5	15.0	A	0.553		
09/08/88	252	H	3856	92	14.0	13.0	C	0.378		
09/09/88	253	F	3920	800	14.0	13.0	B	0.577		
09/12/88	256	M	3973	779	15.0	14.0	D	0.408		
09/13/88	257	T	4023	920	14.0	13.0	A	0.416		
09/14/88	258	W	4051	173	14.5	12.0	A	0.659		
09/15/88	259	H	4096	710	15.5	15.0	D	0.322		
09/16/88	260	F	4111	787	15.0	14.0	A	0.529		
09/19/88	263	M	4156	909	14.0	13.0	A	0.360		
09/20/88	264	T	4248	647	15.0	14.0	B	0.334		
09/21/88	265	W	4278	304	15.0	15.0	A	2.830		
09/22/88	266	H	4312	707	14.0	14.0	D	0.437		
09/23/88	267	F	4362	923	14.0	14.0	B	0.225		0.251
09/26/88	270	M	4397	726	15.5	15.0	C	1.690		
09/27/88	271	T	4456	138	14.5	14.0	D	1.176		1.349
09/28/88	272	W	4521	869	14.0	13.0	A	0.512		
09/28/88	272	W	4522	892	14.0	13.0	D	0.532		
09/29/88	273	H	4530	103	15.0	15.0	A	0.677		
09/30/88	274	F	4587	879	14.0	14.0	A	0.486		

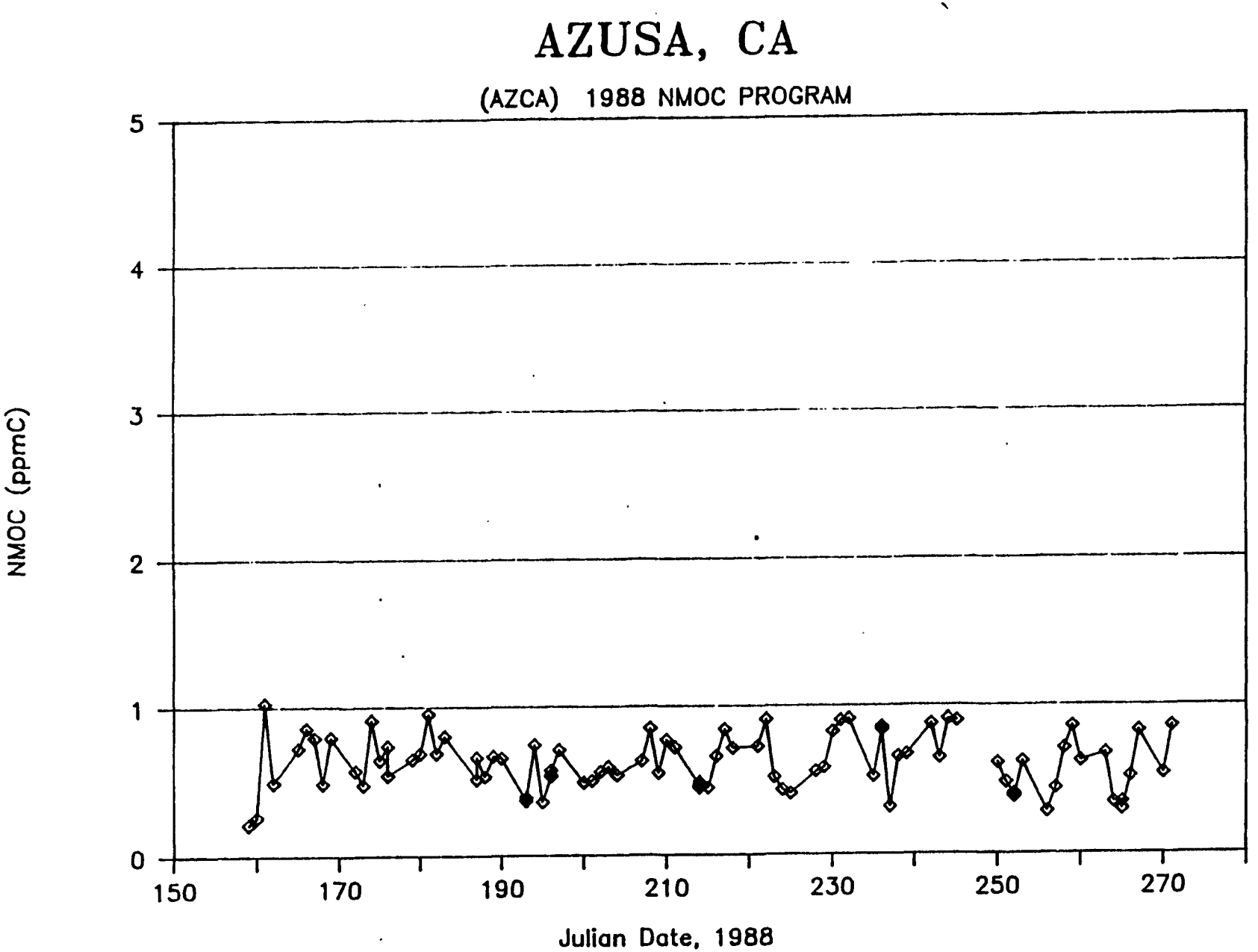


Figure E-37. Plot of NMOC concentration for Azusa, CA.

TABLE E-37. SUMMARY OF THE 1988 NMOC DATA FOR AZUSA, CA (AZCA)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/07/88	159	T	1210	42	11.0	10.0	D	0.212		0.190
06/08/88	160	W	1250	797	12.0	12.0	A	0.259		
06/09/88	161	H	1299	109	19.0	10.0	C	1.025		
06/10/88	162	F	1320	723	12.0	12.0	A	0.489		
06/13/88	165	M	1357	116	10.8	10.0	D	0.723		
06/14/88	166	T	1388	856	10.5	10.0	D	0.857		
06/15/88	167	W	1377	120	10.5	10.0	A	0.793		
06/16/88	168	H	1469	780	11.0	12.0	B	0.483		
06/17/88	169	F	1465	919	10.5	10.5	C	0.795		
06/20/88	172	M	1518	196	10.5	10.5	C	0.571		
06/21/88	173	T	1550	811	12.0	12.0	D	0.473		
06/22/88	174	W	1602	812	12.0	12.0	C	0.911		
06/23/88	175	H	1633	500	12.0	10.0	B	0.641		
06/24/88	176	F	1695	882	13.8	12.0	C	0.735		
06/24/88	176	F	1696	887	13.5	12.0	D	0.537		
06/27/88	179	M	1724	48	11.0	11.0	C	0.647		
06/28/88	180	T	1742	897	11.0	10.0	C	0.685		
06/29/88	181	W	1811	832	11.0	10.0	C	0.953		
06/30/88	182	H	1840	16	11.0	10.0	D	0.685		
07/01/88	183	F	1876	776		12.0	B	0.801		
07/05/88	187	T	1864	105	11.0	10.0	A	0.509		
07/05/88	187	T	1864	105	11.0	6.0	C	0.658		
07/06/88	188	W	1968	892	11.0	10.0	D	0.528		
07/07/88	189	H	1998	855	11.0	8.0	B	0.666		
07/08/88	190	F	2018	920	11.0	11.0	B	0.652		
07/11/88	193	M	2061	154	13.0	14.0	C	0.363		
07/11/88	193	M	2061	154	13.0	9.0	A	0.384		
07/12/88	194	T	2096	877	13.0	14.0	C	0.742		
07/13/88	195	W	2140	72	12.5	14.0	D	0.353		
07/14/88	196	H	2182	849	13.5	13.0	A	0.527		
07/14/88	196	H	2182	849	13.5	10.0	A	0.533		
07/14/88	196	H	2183	832	13.0	12.0	B	0.570		
07/14/88	196	H	2183	832	13.0	8.0	B	0.567		
07/15/88	197	F	2211	630	15.5	15.0	C	0.709		
07/18/88	200	M	2220	689	16.0	15.0	D	0.486		
07/19/88	201	T	2287	857	14.5	14.0	A	0.496		
07/20/88	202	W	2346	703	16.0	14.0	C	0.557		
07/21/88	203	H	2389	773	16.0	14.0	D	0.590		
07/22/88	204	F	2438	87	14.0	13.0	C	0.533		
07/25/88	207	M	2458	655	16.0	15.0	D	0.633		
07/26/88	208	T	2515	11		18.0	A	0.851		
07/27/88	209	W	2568	30	14.5	15.0	C	0.547		
07/28/88	210	H	2617	307	15.5	15.0	C	0.771		
07/29/88	211	F	2638	906	14.0	14.0	A	0.719		
08/01/88	214	M	2684	172	13.0	13.0	C	0.462		
08/01/88	214	M	2684	172	13.0	5.0	C	0.464		
08/01/88	214	M	2685	93	13.0	13.0	C	0.485		
08/01/88	214	M	2685	93	13.0		C	0.447		
08/02/88	215	T	2745	726	14.0	15.0	C	0.447		

TABLE E-37. SUMMARY OF THE 1988 NMOC DATA FOR AZUSA, CA (AZCA)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/03/88	216	W	2767	905	15.0	15.0	D	0.660		
08/04/88	217	H	2761	868	14.2	15.0	D	0.843		
08/05/88	218	F	2838	904	14.2	15.0	A	0.713		
08/08/88	221	M	2919	304	14.2	14.0	B	0.725		
08/09/88	222	T	2954	715	14.8	15.0	C	0.908		
08/10/88	223	W	2997	622	14.8	16.0	D	0.516		
08/11/88	224	H	3058	302	14.2	14.0	A	0.430		
08/12/88	225	F	3087	832	14.5	15.0	A	0.404		
08/15/88	228	M	3132	60	14.2	15.0	A	0.554		
08/16/88	229	T	3187	22	14.2	14.0	A	0.581		
08/17/88	230	W	3231	671	14.8	16.0	A	0.824		
08/18/88	231	H	3298	181	14.2	14.5	D	0.899		
08/19/88	232	F	3318	676	14.6	16.0	A	0.911		
08/22/88	235	M	3371	858	14.2	15.0	B	0.519		
08/23/88	236	T	3410	894	13.8	14.0	B	0.834		
08/23/88	236	T	3411	854	13.8	14.0	C	0.854		
08/24/88	237	W	3482	791	15.3	16.0	D	0.311		
08/25/88	238	H	3525	131	14.2	14.0	B	0.655		
08/26/88	239	F	3561	175	14.2	14.0	D	0.669		
08/29/88	242	M	3585	631	15.8	15.0	C	0.873		
08/30/88	243	T	3658	196	14.0	16.0	C	0.642		
08/31/88	244	W	3693	876	14.2	14.0	B	0.908		
09/01/88	245	H	3742	903	14.0	14.0	C	0.892		
09/06/88	250	T	3807	151	14.2	14.5	A	0.608		
09/07/88	251	W	3910	761	15.8	15.0	B	0.476		
09/08/88	252	H	3923	194	13.9	14.0	C	0.389		
09/08/88	252	H	3923	194	13.9	10.0	C	0.380		
09/08/88	252	H	3924	909	13.9	13.0	D	0.400		
09/08/88	252	H	3924	909	13.9	9.0	D	0.378		
09/09/88	253	F	3976	649	15.0	14.0	B	0.617		
09/12/88	256	M	4021	658	15.5	14.0	C	0.276		
09/13/88	257	T	4044	43	15.0	14.0	C	0.436		
09/14/88	258	W	4072	665	15.8	14.0	C	0.705		
09/15/88	259	H	4112	317	15.8	14.0	A	0.854		
09/16/88	260	F	4192	170	14.2	14.5	D	0.619		
09/19/88	263	M	4222	869	15.0	14.0	D	0.672		
09/20/88	264	T	4271	681	15.9	16.0	D	0.337		
09/21/88	265	W	4346	862	13.9	11.3	D	0.339		
09/21/88	265	W	4347	903	13.9	13.0	D	0.288		
09/22/88	266	H	4363	851	15.0	15.0	D	0.515		
09/23/88	267	F	4413	721	16.0	15.0	C	0.824		
09/26/88	270	M	4431	873	14.5	15.0	D	0.533		
09/27/88	271	T	4479	905	15.0	14.0	D	0.854		
09/28/88	272	W	4533	679	16.0	16.0	B	0.561		
09/29/88	273	H	4586	661		16.0	C	0.697		
09/30/88	274	F	4642	68	14.0	14.0	C	0.811		

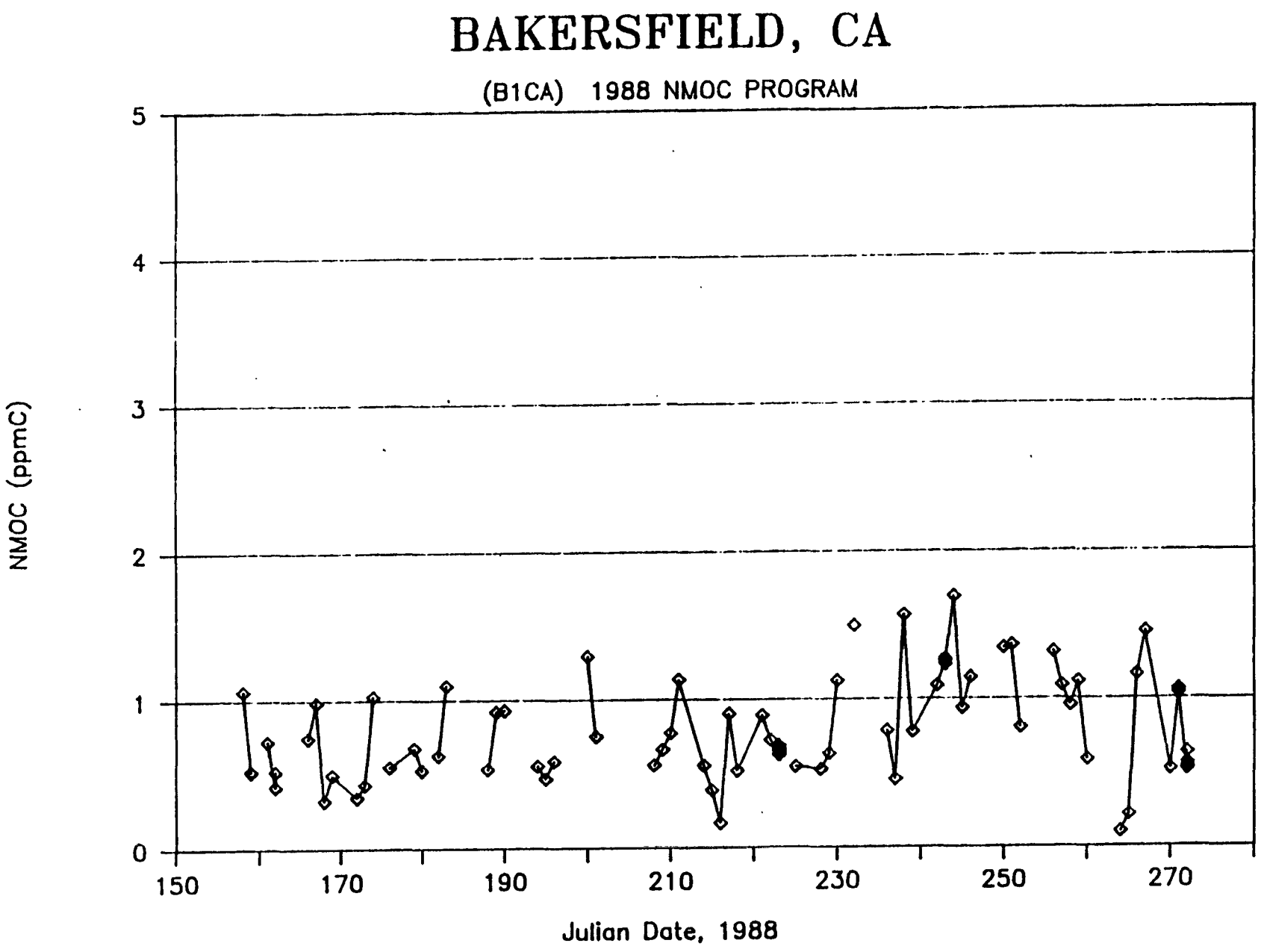


Figure E-38. Plot of NMOC concentration for Bakersfield, CA (Oildale).

TABLE E-38. SUMMARY OF THE 1988 NMOC DATA FOR BAKERSFIELD, CA (B1CA)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/06/88	158	M	1175	794	12.0	11.0	D	1.063		
06/07/88	159	T	1193	30	14.0	14.0	D	0.518		
06/07/88	159	T	1193	30	14.0	8.0	C	0.526		
06/09/88	161	H	1257	793	18.0	18.0	A	0.723		
06/10/88	162	F	1284	152	17.5	17.5	C	0.417		
06/10/88	162	F	1285	883	17.5	15.0	C	0.521		0.438
06/14/88	166	T	1384	810	14.0	10.0	C	0.743	0.733	0.661
06/15/88	167	W	1679	871	12.0	10.0	C	0.983		
06/16/88	168	H	1413	712	13.0	10.0	D	0.320		
06/17/88	169	F	1462	908	12.0	12.0	D	0.494		
06/20/88	172	M	1501	119	12.0	11.0	A	0.340		
06/21/88	173	T	1536	153	12.0	15.3	D	0.427		
06/22/88	174	W	1559	804	12.5	12.0	C	1.024		
06/24/88	176	F	1597	724	12.5	12.0	C	0.547		0.360
06/27/88	179	M	1678	664	13.0	12.0	D	0.674		
06/28/88	180	T	1739	787	18.0	16.0	A	0.522		
06/28/88	180	T	1740	713	18.0	16.0	B	0.524		
06/30/88	182	H	1812	47	12.0	11.0	A	0.624		0.537
07/01/88	183	F	1842	658	13.0	12.0	D	1.099		
07/06/88	188	W	1911	99	12.0	10.0	B	0.532		
07/07/88	189	H	1973	794	13.5	12.0	D	0.919		
07/08/88	190	F	1994	797	12.0	11.0	A	0.931	0.884	0.814
07/12/88	194	T	2084	782	13.5	11.0	D	0.550		
07/13/88	195	W	2111	36	12.0	11.0	B	0.463	0.404	0.456
07/14/88	196	H	2135	163	12.5	11.0	C	0.582		
07/18/88	200	M	2231	100	12.0	10.0	C	1.292		
07/19/88	201	T	2275	874	17.0	16.0	C	0.753		
07/19/88	201	T	2276	898	17.0	15.0	C	0.750		
07/26/88	208	T	2485	878	12.0	11.0	C	0.552		
07/27/88	209	W	2526	501	12.0	11.0	D	0.659		
07/28/88	210	H	2600	149	12.5	10.0	A	0.772	0.736	0.744
07/29/88	211	F	2611	781	13.0	12.0	D	1.136		
08/01/88	214	M	2625	113	12.0	11.0	A	0.551		
08/02/88	215	T	2680	773	13.0	12.0	A	0.381		
08/03/88	216	W	2732	86	12.0	11.0	A	0.159		
08/04/88	217	H	2785	791	13.0	12.0	D	0.902		
08/05/88	218	F	2837	111	12.5	11.0	C	0.515		
08/08/88	221	M	2877	707	13.5	13.0	A	0.891		
08/09/88	222	T	2910	692	13.0	13.0	A	0.723		
08/10/88	223	W	2958	681	19.0	15.0	B	0.625		
08/10/88	223	W	2959	762	19.0	17.0	C	0.665		
08/10/88	223	W	2958	681	19.0		B	0.649		
08/10/88	223	W	2959	762	19.0	12.0	C	0.689		
08/12/88	225	F	3047	152	13.0	11.0	C	0.543	0.512	
08/15/88	228	M	3082	182	12.5	12.0	A	0.523		0.510
08/16/88	229	T	3078	777	13.0	12.5	D	0.629		
08/17/88	230	W	3176	106	12.0	11.0	C	1.125		
08/19/88	232	F	3291	853	12.0	12.0	C	1.493		
08/23/88	236	T	3354	809	13.0	13.0	C	0.785		

TABLE E-38. SUMMARY OF THE 1988 NMOC DATA FOR BAKERSFIELD, CA (B1CA)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/24/88	237	W	3395	45	12.0	11.0	B	0.453		0.449
08/25/88	238	H	3451	647	16.0	13.0	D	1.564		
08/26/88	239	F	3520	104	14.0	11.0	C	0.774		
08/29/88	242	M	3662	661	14.0	6.0	C	1.087		
08/30/88	243	T	3622	781	21.0	18.0	A	1.260		
08/30/88	243	T	3622	781	21.0	13.0	A	1.229		
08/30/88	243	T	3623	661	21.0	18.0	A	1.269		
08/30/88	243	T	3623	661	21.0	12.0	A	1.254		
08/31/88	244	W	3637	893	14.0	12.0	A	1.690		
09/01/88	245	H	3665	763	15.0	13.0	C	0.934		
09/02/88	246	F	3778	188	14.5	10.0	C	1.142		
09/06/88	250	T	3756	73	14.5	10.0	D	1.340		
09/07/88	251	W	3830	60	15.0	10.0	A	1.360		
09/08/88	252	H	3860	409	15.0	10.0	A	0.803		
09/12/88	256	M	3965	685	16.0	12.5	C	1.312		
09/13/88	257	T	4010	656	16.0	12.0	B	1.088		1.112
09/14/88	258	W	4207	773	16.0	13.0	A	0.953		1.475
09/15/88	259	H	4102	847	15.0	11.0	C	1.114		
09/16/88	260	F	4126	10	14.5	10.0	C	0.583		
09/20/88	264	T	4227	779	16.0	10.0	C	0.096		
09/21/88	265	W	4259	24	15.0	11.0	D	0.212		
09/22/88	266	H	4309	889	15.0	10.0	D	1.160		
09/23/88	267	F	4355	712	16.0	12.0	D	1.450		
09/26/88	270	M	4402	853	15.5	10.0	C	0.518		0.540
09/27/88	271	T	4468	689	22.0	18.0	A	1.043		
09/27/88	271	T	4469	718	22.0	18.0	C	1.059		
09/27/88	271	T	4468	689	22.0	20.0	A	1.034		
09/27/88	271	T	4469	718	22.0	20.0	C	1.060		
09/28/88	272	W	4485	629	22.0	19.0	A	0.516		
09/28/88	272	W	4486	772	22.0	19.0	D	0.633		
09/28/88	272	W	4485	629	22.0	13.0	A	0.530		
09/28/88	272	W	4486	772	22.0	15.0	D	0.558		
09/29/88	273	H	4566	165	20.0	17.0	C	1.600		
09/29/88	273	H	4567	904	20.0	17.0	D	1.567		
09/30/88	274	F	4605	666	21.0	17.0	A	1.880		
09/30/88	274	F	4614	122	21.0	17.0	B	1.872		

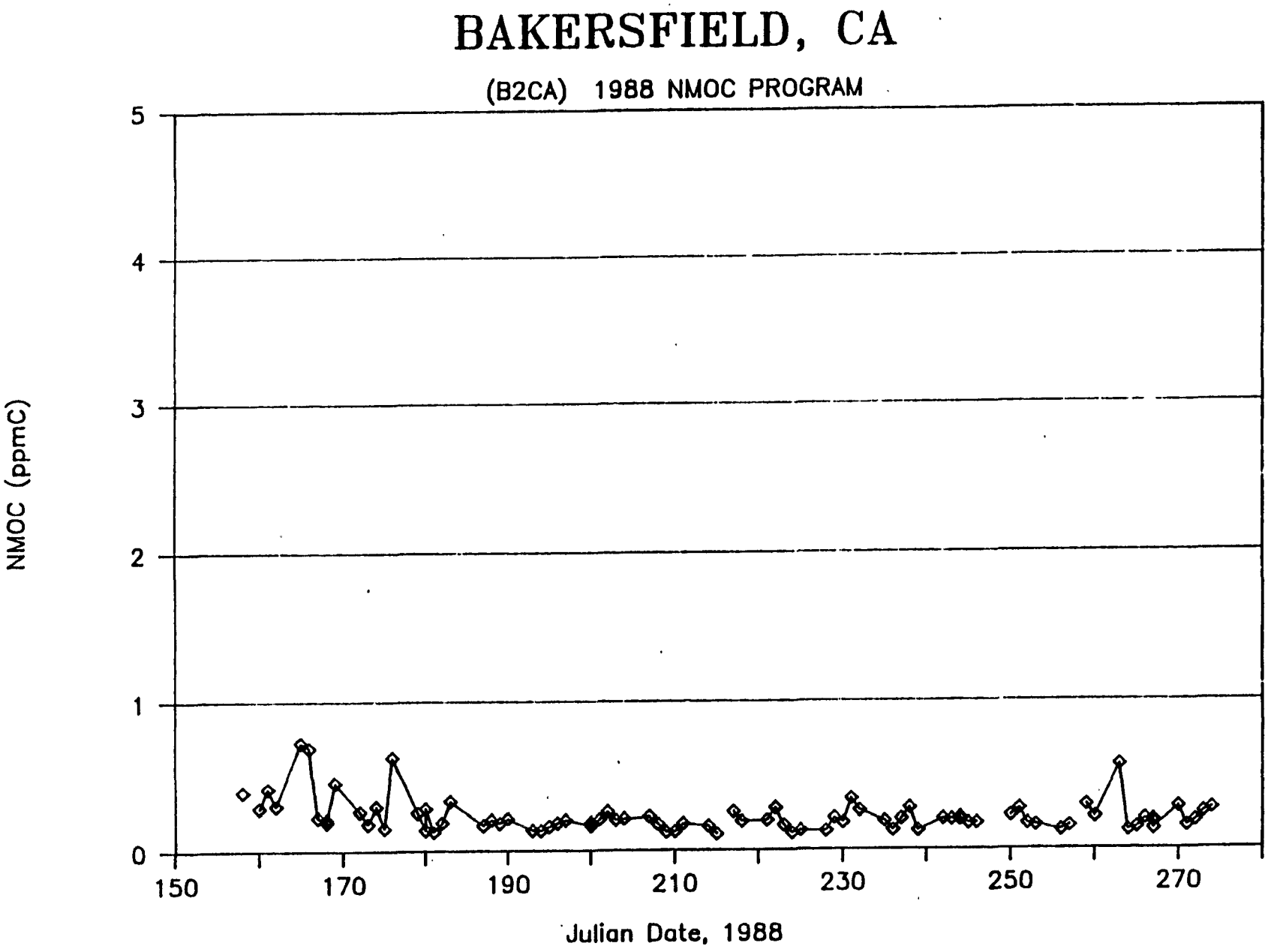


Figure E-39. Plot of NMOC concentration for Bakersfield, CA (Edison).

TABLE E-39. SUMMARY OF THE 1988 NMOC DATA FOR BAKERSFIELD, CA (B2CA)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/06/88	158	M	1198	304	11.0	10.0	A	0.392		
06/08/88	160	W	1253	196	11.0	10.0	C	0.286		
06/09/88	161	H	1298	676	12.5	10.0	A	0.415		
06/10/88	162	F	1303	156	11.0	10.0	D	0.301		
06/13/88	165	M	1351	896	11.0	10.0	C	0.725		
06/14/88	166	T	1383	887	11.0	10.0	D	0.688		
06/15/88	167	W	1428	726	12.0	10.0	B	0.223		
06/16/88	168	H	1481	177	16.0	16.0	A	0.191		
06/16/88	168	H	1482	410	16.0	14.0	C	0.211		
06/17/88	169	F	1497	850	11.0	9.0	D	0.454		
06/20/88	172	M	1522	6	11.0	11.0	D	0.260		
06/21/88	173	T	1575	111	10.8	10.5	D	0.181		
06/22/88	174	W	1583	61	11.0	11.0	A	0.292		
06/22/88	174	W	1583	61	11.0	6.0	C	0.296		
06/23/88	175	H	1589	648	12.0	12.0	C	0.152		
06/24/88	176	F	1686	855	11.5	11.0	C	0.623		
06/27/88	179	M	1731	101	12.0	10.0	D	0.252		
06/28/88	180	T	1777	727	17.0	17.0	B	0.139		
06/28/88	180	T	1778	773	17.0	16.0	A	0.282		
06/29/88	181	W	1856	191	11.0	11.0	B	0.127		
06/30/88	182	H	1839	677	12.0	11.0	D	0.188		
07/01/88	183	F	1875	868	11.2	11.0	A	0.329		
07/05/88	187	T	1919	765	12.0	11.0	D	0.169		
07/06/88	188	W	1989	181	12.2	11.0	C	0.206		
07/07/88	189	H	1995	857	11.8	11.0	C	0.183		
07/08/88	190	F	2044	182	11.9	12.0	D	0.213		
07/11/88	193	M	2056	17	11.8	11.0	A	0.134		
07/12/88	194	T	2099	815	12.0	12.0	C	0.133		
07/13/88	195	W	2197	707	12.1	12.0	A	0.159		
07/14/88	196	H	2179	618	12.1	12.0	B	0.183		
07/15/88	197	F	2204	831	12.1	12.0	A	0.202		
07/18/88	200	M	2257	671	17.0	16.0	B	0.165		
07/18/88	200	M	2257	671	17.0	10.0	B	0.169		
07/18/88	200	M	2258	716	17.0	16.0	D	0.185		
07/18/88	200	M	2258	716	17.0		D	0.170		
07/19/88	201	T	2316	157	11.8	11.5	C	0.206		
07/20/88	202	W	2424	918	11.5	10.0	D	0.259		
07/21/88	203	H	2404	134	11.5	11.0	D	0.201		
07/22/88	204	F	2428	782	12.1	10.0	C	0.210		
07/25/88	207	M	2491	635	12.1	12.0	D	0.225		
07/26/88	208	T	2517	905	11.7	11.0	C	0.174		
07/27/88	209	W	2566	404	12.0	12.0	D	0.122		
07/28/88	210	H	2654	101	11.5	11.0	C	0.125		
07/29/88	211	F	2660	781	12.6	12.0	A	0.178		
08/01/88	214	M	2673	872	11.8	10.0	D	0.161		
08/02/88	215	T	2734	120	11.5	11.0	C	0.107		
08/04/88	217	H	2842	924	11.7	12.0	D	0.255		
08/05/88	218	F	2850	912	11.5	11.0	D	0.190		
08/08/88	221	M	2915	106	11.5	11.0	D	0.196		

TABLE E-39. SUMMARY OF THE 1988 NMOC DATA FOR BAKERSFIELD, CA (B2CA)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/09/88	222	T	2973	817	16.7	16.0	B	0.280		
08/09/88	222	T	2974	656	16.7	16.0	B	0.275		
08/10/88	223	W	3042	783	12.1	12.0	C	0.163		
08/11/88	224	H	3061	712	12.2	13.0	D	0.109		
08/12/88	225	F	3084	618	12.2	12.5	A	0.128		
08/15/88	228	M	3128	637	12.5	13.0	C	0.125		
08/16/88	229	T	3165	834	11.7	11.0	A	0.210		
08/17/88	230	W	3223	79	11.7	11.0	C	0.179		
08/18/88	231	H	3295	658	12.5	13.0	B	0.336		
08/19/88	232	F	3314	781	12.2	12.0	D	0.259		
08/22/88	235	M	3351	196	11.5	12.0	A	0.189		
08/23/88	236	T	3401	118	11.7	11.0	A	0.127		
08/24/88	237	W	3464	711	12.5	13.0	D	0.202		
08/25/88	238	H	3491	869	11.9	12.0	D	0.274		
08/26/88	239	F	3568	12	11.3	12.0	A	0.123		
08/29/88	242	M	2586	787	12.2	13.0	D	0.202		
08/30/88	243	T	3626	682	13.7	14.0	D	0.196		
08/31/88	244	W	3680	814	16.1	15.0	A	0.202		
08/31/88	244	W	3681	878	16.2	16.0	B	0.202		
08/31/88	244	W	3680	814	16.1	12.0	A	0.210		
08/31/88	244	W	3681	878	16.2	12.0	B	0.196		
09/01/88	245	H	3746	154	11.0	10.0	D	0.170		
09/02/88	246	F	3770	890	11.2	11.0	C	0.174		
09/06/88	250	T	3824	308	11.8	11.0	C	0.223		
09/07/88	251	W	3886	22	11.5	10.0	A	0.268		
09/08/88	252	H	3927	136	11.3	11.0	B	0.169		
09/09/88	253	F	3978	728	12.2	12.0	D	0.156		
09/12/88	256	M	3990	659	12.2	12.0	D	0.124		
09/13/88	257	T	4030	880	11.9	11.5	B	0.152		
09/15/88	259	H	4124	177	11.5	11.0	B	0.289		
09/16/88	260	F	4183	761		12.0	B	0.211		
09/19/88	263	M	4233	36	11.0	10.0	C	0.562		
09/20/88	264	T	4256	912	11.2	11.0	B	0.120		
09/21/88	265	W	4328	794	12.2	12.0	A	0.141		
09/22/88	266	H	4377	620	12.5	10.0	D	0.198		
09/23/88	267	F	4421	770	16.2	16.0	A	0.184		
09/23/88	267	F	4422	870	16.2	17.0	A	0.187		
09/23/88	267	F	4421	770	16.2	11.0	A	0.173		
09/23/88	267	F	4422	870	16.2	12.0	A	0.129		
09/26/88	270	M	4441	664	13.0	10.0	C	0.276		
09/27/88	271	T	4480	668	12.2	12.0	B	0.149		
09/28/88	272	W	4593	801	12.5	10.0	C	0.182		
09/29/88	273	H	4591	902	11.9	10.0	A	0.240		
09/30/88	274	F	4652	780	12.7	13.0	D	0.264		

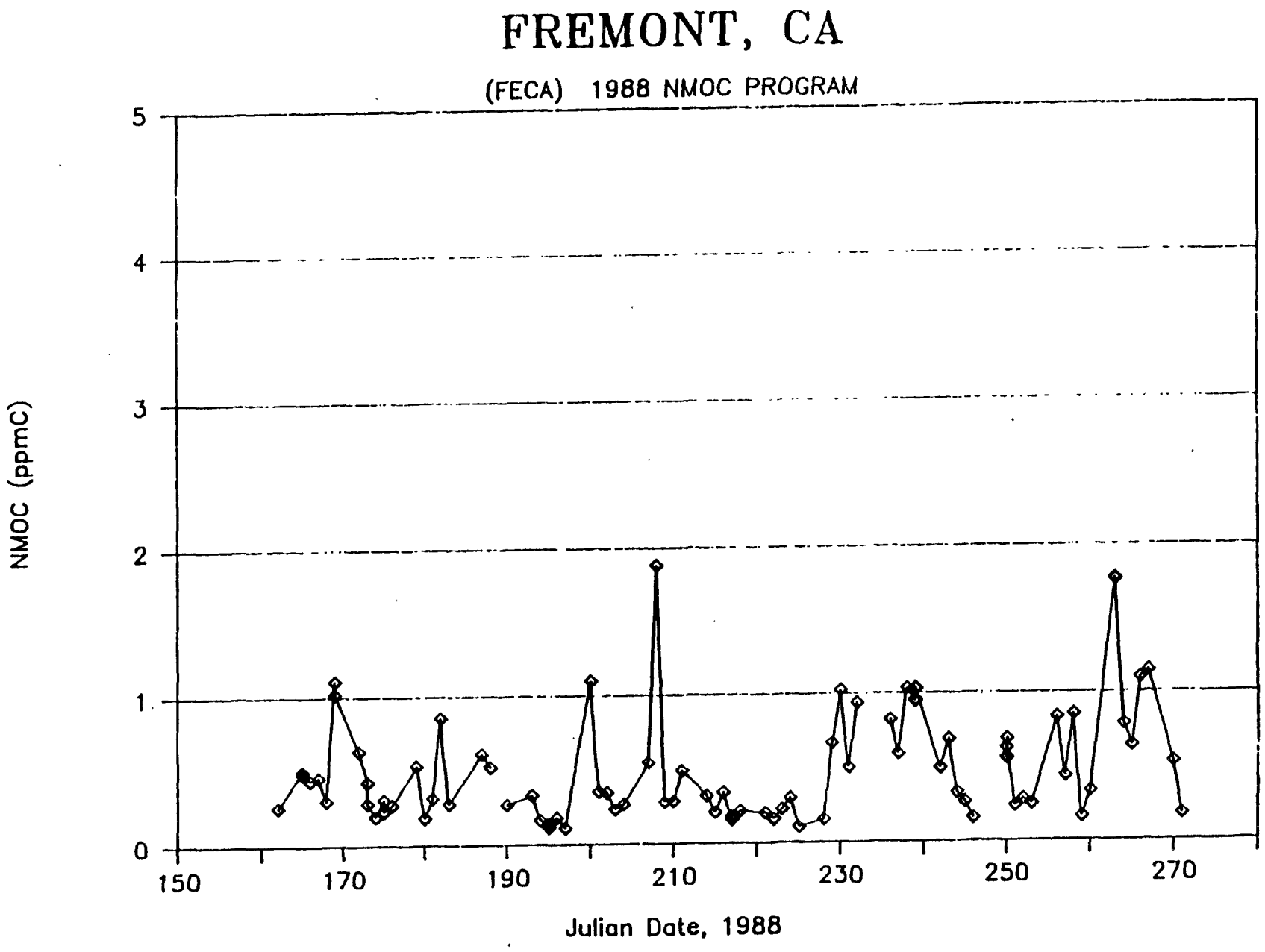


Figure E-40. Plot of NMOC concentration for Fremont, CA.

TABLE E-40. SUMMARY OF THE 1988 NMOC DATA FOR FREMONT, CA (FECA)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/10/88	162	F	1270	135	15.0	14.0	C	0.259	0.187	0.172
06/13/88	165	M	1371	405	16.0	14.0	D	0.503		
06/13/88	165	M	1371	405	16.0	4.0	A	0.483		
06/14/88	166	T	1374	400	15.0	16.0	B	0.437		
06/15/88	167	W	1493	691	15.0	14.5	C	0.458		
06/16/88	168	H	1551	122	14.0	12.5	C	0.304		
06/17/88	169	F	1490	876	15.0	14.0	D	1.106		
06/17/88	169	F	1490	876	15.0	10.0	D	1.020		
06/20/88	172	M	1574	900	16.0	17.0	D	0.634		
06/21/88	173	T	1579	858	14.0	14.0	C	0.424		
06/21/88	173	T	1579	858	14.0	9.0	B	0.284		
06/22/88	174	W	1661	146	14.0	15.0	B	0.194		
06/23/88	175	H	1653	55	16.0	17.0	C	0.310		0.178
06/23/88	175	H	1652	112	16.0	17.0	C	0.231		
06/24/88	176	F	1674	123	14.0	15.0	A	0.273		
06/27/88	179	M	1682	703	17.0	17.0	C	0.533		
06/28/88	180	T	1727	38	14.0	16.0	A	0.182		
06/29/88	181	W	1757	10	14.0	14.0	D	0.318		
06/30/88	182	H	1792	31	14.0	15.0	D	0.853		
07/01/88	183	F	1825	805	15.0	15.0	B	0.277		0.256
07/05/88	187	T	1918	618	18.0	18.0	D	0.611		
07/06/88	188	W	1906	682	15.0	15.0	C	0.522		
07/08/88	190	F	2000	905	14.0	14.0	A	0.269		
07/11/88	193	M	2083	788	16.0	17.0	B	0.332		
07/12/88	194	T	2059	834	14.0	14.0	D	0.164		
07/13/88	195	W	2123	868	16.0	17.0	A	0.137		
07/13/88	195	W	2124	828	16.0	18.0	D	0.116		
07/14/88	196	H	2173	4	14.0	14.0	C	0.181	0.137	0.194
07/15/88	197	F	2175	404	14.3	15.0	D	0.109		
07/18/88	200	M	2249	150	16.0	16.0	C	1.101		
07/19/88	201	T	2253	657	16.0	16.0	D	0.355	0.262	0.375
07/20/88	202	W	2388	409	15.0	16.0	C	0.345		
07/21/88	203	H	2405	894	15.0	15.0	C	0.232		
07/22/88	204	F	2386	847	15.0	15.0	C	0.266		
07/25/88	207	M	2474	763	17.0	17.0	C	0.549		
07/26/88	208	T	2486	109	18.0	15.0	C	1.884		
07/27/88	209	W	2593	303	15.0	15.0	C	0.282		
07/28/88	210	H	2557	22	14.0	15.0	A	0.284		
07/29/88	211	F	2634	912	15.0	15.0	A	0.489		
08/01/88	214	M	2653	793	17.5	17.5	D	0.320		
08/02/88	215	T	2730	115	15.0	15.0	D	0.207		
08/03/88	216	W	2735	882	15.0	15.0	C	0.339		
08/04/88	217	H	2781	68	17.0	17.0	A	0.158		
08/04/88	217	H	2782	301	17.0	17.0	A	0.178		
08/04/88	217	H	2781	68	17.0		A	0.163		
08/04/88	217	H	2782	301	17.0	12.0	A	0.180		
08/05/88	218	F	2841	796	19.0	19.0	D	0.215		
08/08/88	221	M	2876	135	17.0	18.0	D	0.200		
08/09/88	222	T	2953	824	15.5	16.0	C	0.157	0.207	0.157

TABLE E-40. SUMMARY OF THE 1988 NMOC DATA FOR FREMONT, CA (FECA)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/10/88	223	W	2961	786	16.0	17.0	D	0.226		
08/11/88	224	H	3057	780	16.0	16.0	C	0.301		
08/12/88	225	F	3063	191	15.0	16.0	D	0.105		
08/15/88	228	M	3138	847	15.0	16.0	C	0.155		
08/16/88	229	T	3174	918	15.0	15.0	A	0.668		
08/17/88	230	W	3169	40	14.0	13.0	C	1.026		
08/18/88	231	H	3290	880	14.0	14.5	B	0.504		
08/19/88	232	F	3293	194	14.0	16.0	B	0.938		
08/23/88	236	T	3350	634	15.0	17.0	A	0.819		
08/24/88	237	W	3361	833	14.0	16.0	D	0.594		
08/25/88	238	H	3496	309	14.0	16.0	D	1.036		
08/26/88	239	F	3499	28	16.0	16.0	B	0.947		
08/26/88	239	F	3500	301	16.0	16.0	D	1.027		
08/26/88	239	F	3499	28	16.0	11.0	B	0.952		
08/26/88	239	F	3500	301	16.0	10.0	D	1.036		
08/29/88	242	M	3605	717	16.0	16.0	B	0.491		
08/30/88	243	T	3578	895	14.0	14.0	D	0.689		
08/31/88	244	W	3640	853	14.0	14.0	A	0.330	0.275	0.392
09/01/88	245	H	3723	862	14.0	14.0	D	0.265		
09/02/88	246	F	3732	668	15.0	15.0	C	0.154		
09/06/88	250	T	3835	769	17.0	18.0	C	0.555		
09/06/88	250	T	3835	769	17.0	12.0	C	0.688		
09/06/88	250	T	3836	707	17.0	18.0	C	0.558		
09/06/88	250	T	3836	707	17.0	10.0	C	0.627		
09/07/88	251	W	3851	639	15.0	16.0	C	0.237		
09/08/88	252	H	3898	179	14.0	14.0	B	0.281		
09/09/88	253	F	3872	705	15.0	16.0	C	0.246		
09/12/88	256	M	3974	91	15.5	16.0	D	0.834		
09/13/88	257	T	4062	20	14.5	15.0	D	0.432		
09/14/88	258	W	4059	187	15.0	14.0	C	0.850		
09/15/88	259	H	4118	624	16.2	16.0	D	0.156		
09/16/88	260	F	4117	816	15.0	14.0	C	0.329		
09/19/88	263	M	4199	725	17.0	18.0	B	1.775		
09/19/88	263	M	4200	728	17.0	18.0	D	1.763		
09/20/88	264	T	4270	895	14.0	16.0	A	0.784		
09/21/88	265	W	4263	785	15.0	14.0	C	0.639		
09/22/88	266	H	4313	860	14.0	15.0	D	1.099		1.117
09/23/88	267	F	4360	729	15.0	14.0	D	1.145		
09/26/88	270	M	4348	405	16.0	17.0	B	0.526		
09/27/88	271	T	4512	625	16.0	16.0	D	0.174		
09/28/88	272	W	4516	102	15.0	15.0	A	1.308		1.315
09/29/88	273	H	4484	798	15.5	15.5	D	1.606		
09/30/88	274	F	4603	45	13.0	13.0	B	1.845		
09/30/88	274	F	4604	838	13.0	14.0	C	1.879		

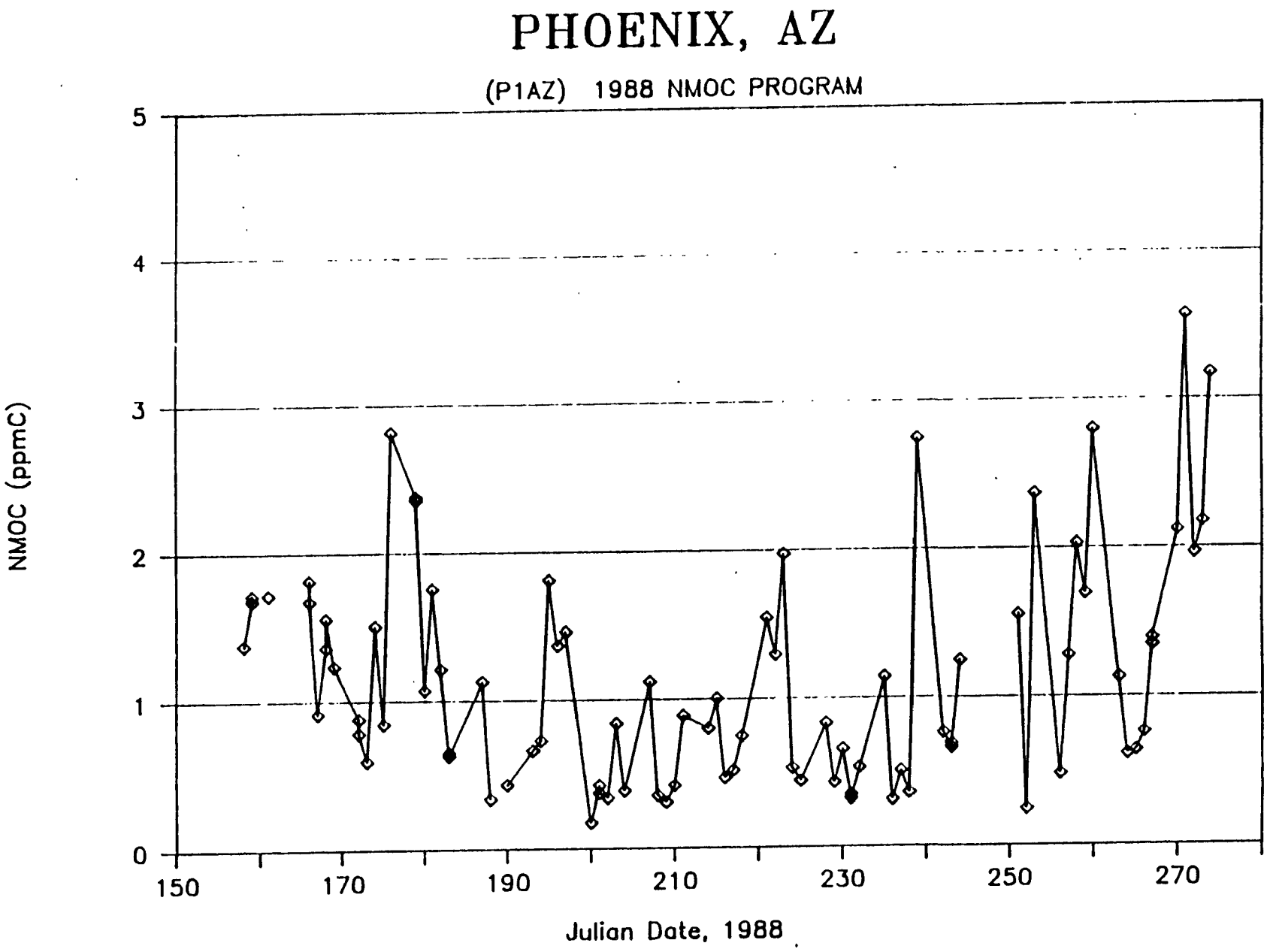


Figure E-41. Plot of NMOC concentration for Phoenix, AZ (39th & Earl).

TABLE E-41. SUMMARY OF THE 1988 NMOC DATA FOR PHOENIX, AZ (P1AZ)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/06/88	158	M	1174	10	15.0	15.0	C	1.380		
06/07/88	159	T	1191	47	15.0	15.0	B	1.680		
06/07/88	159	T	1191	47	15.0	9.0	C	1.713		
06/09/88	161	H	1292	183	16.0	14.0	D	1.717		
06/14/88	166	T	1334	913	16.0	14.0	C	1.814		
06/14/88	166	T	1334	913	16.0	9.0	D	1.674		
06/15/88	167	W	1381	703	16.0	15.5	B	0.916		
06/16/88	168	H	1443	855	19.5	17.5	A	1.361		
06/16/88	168	H	1444	113	19.5	20.0	C	1.555		
06/17/88	169	F	1471	162	15.5	14.0	C	1.235		0.953
06/20/88	172	M	1503	886	15.5	15.5	B	0.878		
06/20/88	172	M	1503	886	15.5	9.0	A	0.781		
06/21/88	173	T	1523	709	17.0	17.0	D	0.595		
06/22/88	174	W	1568	35	16.0	15.5	C	1.505		
06/23/88	175	H	1598	161	17.5	16.0	A	0.845	0.813	0.740
06/24/88	176	F	1607	922	15.0	12.0	D	2.814		
06/27/88	179	M	1669	151	15.0	15.0	D	2.379		
06/27/88	179	M	1669	151	15.0		A	2.358		
06/28/88	180	T	1717	726	16.0	15.0	B	1.074		
06/28/88	180	T	1717	726	16.0		B	1.073		
06/29/88	181	W	1743	18	14.0	11.0	D	1.756		
06/30/88	182	H	1810	119	15.0	14.0	C	1.213		
07/01/88	183	F	1836	704	18.0	18.0	B	0.649		
07/01/88	183	F	1837	649	20.0	18.0	B	0.627		
07/05/88	187	T	1885	668	17.0	15.0	A	1.130		
07/06/88	188	W	1905	663	16.0	14.0	A	0.336		
07/08/88	190	F	2001	784	16.0	16.0	C	0.433	0.380	0.273
07/11/88	193	M	2022	836	15.0	15.0	C	0.660		
07/12/88	194	T	2068	189	15.5	16.0	D	0.727	0.745	0.763
07/13/88	195	W	2115	886	15.5	16.0	D	1.809		
07/14/88	196	H	2147	62	15.5	15.0	C	1.368		
07/15/88	197	F	2232	858	16.0	15.0	B	1.460		
07/18/88	200	M	2229	806	16.5	16.0	A	0.174		
07/19/88	201	T	2266	60	19.0	19.0	C	0.425		
07/19/88	201	T	2267	120	19.0	18.0	C	0.370		
07/20/88	202	W	2306	876	16.0	16.0	D	0.340		
07/21/88	203	H	2342	772	16.5	16.0	B	0.841		
07/22/88	204	F	2392	188	16.0	16.0	B	0.388	0.415	0.388
07/25/88	207	M	2417	883	16.0	16.0	C	1.121		
07/26/88	208	T	2490	865	15.5	15.5	A	0.354		
07/27/88	209	W	2505	885	15.5	15.0	C	0.310	0.388	0.391
07/28/88	210	H	2567	867	15.5	15.5	B	0.421		
07/29/88	211	F	2609	707	16.0	15.0	B	0.890		
08/01/88	214	M	2651	817	15.5	16.0	A	0.802		
08/02/88	215	T	2679	309	16.0	15.0	B	1.006		
08/03/88	216	W	2738	305	16.0	15.0	A	0.468		
08/04/88	217	H	2759	72	15.0	16.0	D	0.520	0.483	0.495
08/05/88	218	F	2827	638	16.0	16.0	D	0.749		
08/08/88	221	M	2855	123	15.5	15.0	C	1.546		

TABLE E-41. SUMMARY OF THE 1988 NMOC DATA FOR PHOENIX, AZ (P1AZ)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/09/88	222	T	2912	131	15.5	16.0	C	1.298		
08/10/88	223	W	2956	165	15.5	15.0	D	1.974		
08/11/88	224	H	3027	70	16.0	15.0	A	0.530		0.518
08/12/88	225	F	3049	855	16.5	15.0	D	0.445		
08/15/88	228	M	3091	77	16.0	16.0	C	0.832		
08/16/88	229	T	3146	905	16.0	16.0	B	0.433		
08/17/88	230	W	3183	852	16.0	15.0	C	0.656		
08/18/88	231	H	3259	891	20.0	20.0	A	0.352		
08/18/88	231	H	3260	863	20.5	20.0	B	0.322		
08/19/88	232	F	3299	184	16.0	14.5	B	0.533	0.535	0.227
08/22/88	235	M	3319	30	16.0	15.0	C	1.143		
08/23/88	236	T	3357	761	17.0	17.0	D	0.314	0.324	0.332
08/24/88	237	W	3405	686	17.0	17.0	D	0.508		
08/25/88	238	H	3471	142	16.0	16.0	A	0.360		
08/26/88	239	F	3522	31	16.0	15.0	D	2.747		
08/29/88	242	M	3547	726	17.0	16.0	A	0.764		
08/30/88	243	T	3611	181	19.0	19.0	A	0.664		
08/30/88	243	T	3612	825	19.0	19.0	D	0.690		
08/31/88	244	W	3628	868	16.0	16.0	C	1.251		
09/07/88	251	W	3817	764	17.0	16.0	A	1.553		1.513
09/08/88	252	H	3847	906		14.0	B	0.246		
09/09/88	253	F	3938	869	16.0	15.0	B	2.367		2.429
09/12/88	256	M	3972	628	17.0	14.0	C	0.480		
09/13/88	257	T	4020	776	17.0	15.0	A	1.280		1.337
09/14/88	258	W	4046	712	14.0	16.0	C	2.030		
09/15/88	259	H	4015	795	17.0	1.0	D	1.695		
09/16/88	260	F	4122	182	16.0	14.0	B	2.797		
09/19/88	263	M	4155	160	16.0	16.0	C	1.128		
09/20/88	264	T	4215	181	16.0	12.0	D	0.611		
09/21/88	265	W	4251	146	16.5	16.0	C	0.638		
09/22/88	266	H	4302	306	16.5	15.5	D	0.762		
09/23/88	267	F	4382	639	20.5	20.0	A	1.348		
09/23/88	267	F	4383	143	20.5	19.0	A	1.395		
09/26/88	270	M	4408	843	16.0	12.0	D	2.120		2.115
09/27/88	271	T	4437	650	17.0	16.0	A	3.569		
09/28/88	272	W	4507	78	16.0	15.0	C	1.965		
09/29/88	273	H	4548	774	16.5	16.3	A	2.177		
09/30/88	274	F	4617	769	21.0	20.0	D	3.174		
09/30/88	274	F	4618	717	21.0	20.0	A	3.180		

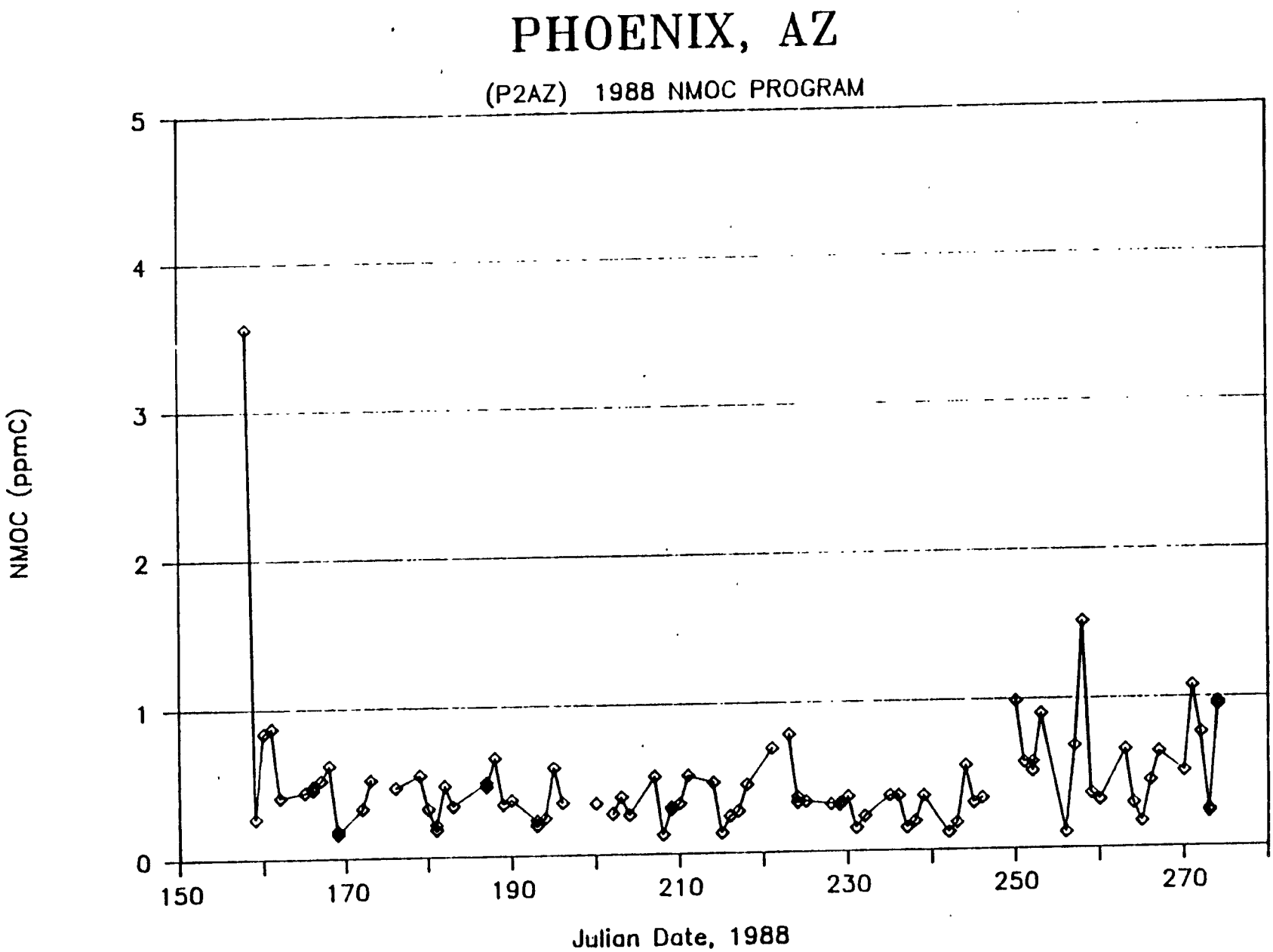


Figure E-42. Plot of NMOC concentration for Phoenix, AZ (Scotsdale).

TABLE E-42. SUMMARY OF THE 1988 NMOC DATA FOR PHOENIX, AZ (P2AZ)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/06/88	158	M	1173	145	16.0	16.0	C	3.563		
06/07/88	159	T	1192	762	15.0	15.0	D	0.273		
06/08/88	160	W	1269	305	14.2	14.0	B	0.840		
06/09/88	161	H	1268	146	16.0	14.0	D	0.873		
06/10/88	162	F	1283	187	13.5	12.0	D	0.410	0.438	0.331
06/13/88	165	M	1306	663	15.0	14.0	C	0.442		
06/14/88	166	T	1361	888	16.0	14.0	A	0.458		
06/14/88	166	T	1360	923	16.0	16.0	A	0.483		
06/15/88	167	W	1391	826	10.0	8.0	C	0.522		
06/16/88	168	H	1415	849	14.0	12.5	C	0.620	0.499	0.346
06/17/88	169	F	1460	75	14.0	12.0	D	0.187		
06/17/88	169	F	1460	75	14.0	6.0	C	0.164		
06/20/88	172	M	1510	785	15.0	13.5	C	0.332		
06/21/88	173	T	1506	17	13.5	12.0	A	0.519		
06/24/88	176	F	1658	797	15.5	15.0	D	0.466		
06/27/88	179	M	1714	36	14.2	14.0	A	0.547		
06/28/88	180	T	1718	920	14.5	14.0	B	0.322		
06/29/88	181	W	1744	641	15.0	13.0	A	0.183		
06/29/88	181	W	1744	641	15.0	10.0	B	0.215		
06/30/88	182	H	1820	854	14.0	13.0	A	0.474		0.309
07/01/88	183	F	1848	141	14.0	13.0	D	0.337		
07/05/88	187	T	1888	70	16.0	15.0	C	0.494		
07/05/88	187	T	1889	816	16.0	15.0	C	0.467		
07/06/88	188	W	1912	858	14.0	14.0	D	0.656		
07/07/88	189	H	1966	779	15.0	15.0	B	0.346		
07/08/88	190	F	1993	644	16.0	15.0	A	0.373		
07/11/88	193	M	2017	726	15.0	14.0	B	0.236		
07/11/88	193	M	2017	726	15.0	0.0	C	0.202		
07/12/88	194	T	2074	722	15.5	15.0	C	0.254		
07/13/88	195	W	2107	73	14.0	14.0	D	0.586		
07/14/88	196	H	2132	18	14.0	14.0	D	0.352		
07/18/88	200	M	2225	99	10.0	9.0	D	0.343		
07/20/88	202	W	2301	819	10.0	10.0	B	0.276		
07/21/88	203	H	2367	810	14.5	14.0	B	0.381		
07/22/88	204	F	2390	24	14.0	13.0	C	0.264		
07/25/88	207	M	2439	794	14.6	14.5	B	0.520		
07/26/88	208	T	2463	629	14.5	14.0	A	0.130		
07/27/88	209	W	2533	661	16.5	10.0	B	0.312		
07/27/88	209	W	2534	656	16.5	16.0	B	0.300		
07/28/88	210	H	2556	778	14.5	14.0	D	0.335		
07/29/88	211	F	2608	724	14.5	14.0	A	0.523		
08/01/88	214	M	2629	799	14.0	14.0	B	0.472		
08/02/88	215	T	2698	811	15.0	15.0	C	0.136		
08/03/88	216	W	2715	400	14.0	14.0	A	0.248		
08/04/88	217	H	2779	847	14.0	14.0	B	0.281		
08/05/88	218	F	2825	711	14.0	15.0	C	0.455		
08/08/88	221	M	2857	714	15.0	15.0	C	0.698		
08/10/88	223	W	2937	793	14.5	15.0	D	0.786		
08/11/88	224	H	2994	776	16.5	17.0	B	0.364		

TABLE E-42. SUMMARY OF THE 1988 NMOC DATA FOR PHOENIX, AZ (P2AZ)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/11/88	224	H	2995	811	16.5	18.0	D	0.332		
08/11/88	224	H	2994	776	16.5		B	0.328		
08/11/88	224	H	2995	811	16.5		D	0.367		
08/12/88	225	F	3060	764	15.0	15.0	A	0.335		
08/15/88	228	M	3086	51	14.0	14.0	A	0.316		
08/16/88	229	T	3142	146	16.0	16.0	D	0.323		
08/16/88	229	T	3143	123	16.0	16.0	D	0.309		
08/17/88	230	W	3167	401	13.5	14.0	C	0.364		
08/18/88	231	H	3307	654	11.0	12.0	D	0.154		
08/19/88	232	F	3289	116	10.0	10.0	D	0.234		
08/22/88	235	M	3336	160	10.0	10.0	D	0.367		
08/23/88	236	T	3347	836	10.0	10.0	A	0.365		
08/24/88	237	W	3409	49	10.0	10.0	D	0.151		
08/25/88	238	H	3475	170	10.0	10.0	C	0.198		
08/26/88	239	F	3527	679	10.5	10.0	C	0.361		
08/29/88	242	M	3552	625	10.5	10.0	C	0.119		
08/30/88	243	T	3599	704	9.5	9.0	C	0.183		
08/31/88	244	W	3642	74	10.5	11.0	C	0.563		
09/01/88	245	H	3721	97	10.0	10.0	C	0.312		
09/02/88	246	F	3745	34	10.0	10.0	A	0.344		
09/06/88	250	T	3763	112	10.5	10.0	C	0.988		
09/07/88	251	W	3818	189	10.3	9.0	D	0.580		
09/08/88	252	H	3881	698	15.0	15.0	D	0.582		
09/08/88	252	H	3880	309	13.0	12.0	D	0.517		
09/09/88	253	F	3916	715	10.5	10.0	C	0.903		
09/12/88	256	M	3967	910	10.0	10.0	A	0.106		
09/13/88	257	T	4019	166	10.0	10.0	C	0.684		
09/14/88	258	W	4033	154	10.0	9.0	D	1.516		
09/15/88	259	H	4077	817	10.0	9.0	B	0.366		
09/16/88	260	F	4161	126	10.0	10.0	B	0.319		
09/19/88	263	M	4185	28	10.0	10.0	A	0.658		
09/20/88	264	T	4225	835	10.0	8.0	D	0.295		
09/21/88	265	W	4253	139	10.0	9.0	B	0.173		
09/22/88	266	H	4310	643	10.5	10.5	D	0.448		
09/23/88	267	F	4351	16	10.0	10.0	B	0.641		
09/26/88	270	M	4398	179	10.0	10.0	D	0.508		
09/27/88	271	T	4453	807	10.5	10.0	D	1.080		
09/28/88	272	W	4496	647	10.5	11.0	C	0.764		
09/29/88	273	H	4573	907	15.5	16.0	D	0.249		
09/29/88	273	H	4574	500	15.5	15.0	D	0.234		
09/30/88	274	F	4619	871	15.0	15.0	D	0.948		
09/30/88	274	F	4620	41	14.5	15.0	C	0.970		

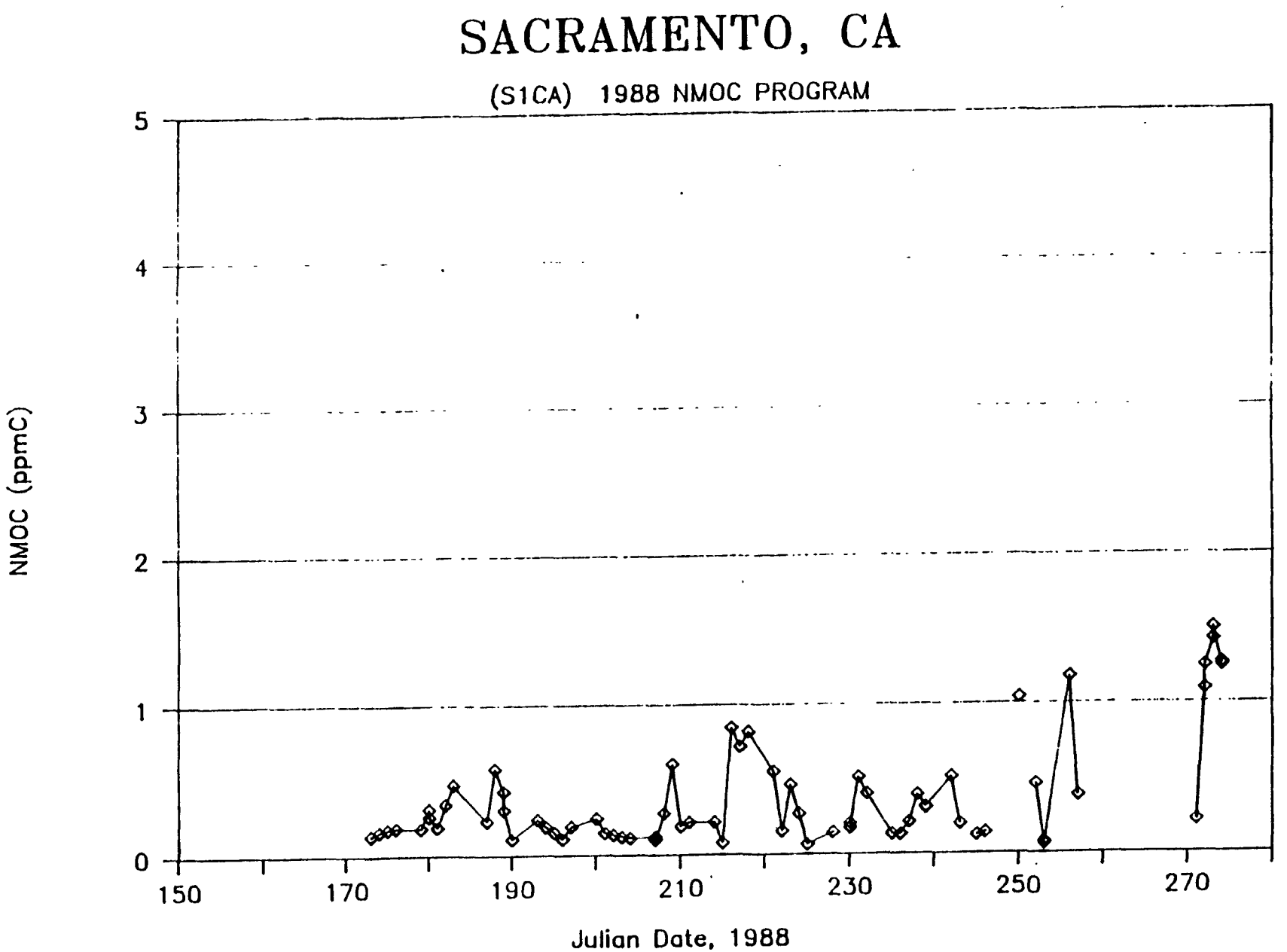


Figure E-43. Plot of NMOC concentration for Sacramento, CA.

TABLE E-43. SUMMARY OF THE 1988 NMOC DATA FOR SACRAMENTO, CA (S1CA)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/21/88	173	T	1560	52	18.0	18.0	A	0.137		
06/22/88	174	W	1580	824	18.0	17.0	B	0.164		
06/23/88	175	H	1624	50	17.0	17.0	D	0.179		
06/24/88	176	F	1605	687	18.0	16.0	A	0.189		0.171
06/27/88	179	M	1650	100	18.0	20.0	A	0.186		
06/28/88	180	T	1733	4	14.0	14.0	A	0.314		
06/28/88	180	T	1734	706	14.0	14.0	B	0.260		
06/29/88	181	W	1749	116	17.5	16.0	B	0.192		
06/30/88	182	H	1797	90	16.0	16.0	C	0.345	0.366	0.268
07/01/88	183	F	1850	22	18.0	18.0	B	0.473		
07/05/88	187	T	1868	115	18.0	18.0	B	0.233		
07/06/88	188	W	1954	827	14.0	14.0	C	0.580		0.334
07/07/88	189	H	1951	871	14.0	13.0	C	0.426		
07/07/88	189	H	1952	723	14.0	14.0	D	0.307		
07/08/88	190	F	2077	786	18.0	18.0	A	0.109		
07/11/88	193	M	2076	91	12.0	12.0	B	0.242		
07/12/88	194	T	2063	839	16.0	16.0	B	0.191		
07/13/88	195	W	2116	700	16.0	18.0	C	0.154		
07/14/88	196	H	2227	33	16.5	16.0	A	0.109		
07/15/88	197	F	2228	904	16.5	16.5	B	0.195		
07/18/88	200	M	2203	303	18.0	17.0	C	0.247		
07/19/88	201	T	2255	135	16.0	16.0	C	0.150		
07/20/88	202	W	2295	862	16.5	17.0	C	0.137		
07/21/88	203	H	2411	672	18.0	17.0	C	0.123		
07/22/88	204	F	2397	722	18.0	18.0	B	0.115	0.255	
07/25/88	207	M	2467	142	14.0	14.0	A	0.122		
07/25/88	207	M	2467	142	14.0	10.0	A	0.125		
07/25/88	207	M	2468	147	14.0	13.0	B	0.105		
07/25/88	207	M	2468	147	14.0	10.0	B	0.103		
07/26/88	208	T	2484	302	18.0	18.0	D	0.282		
07/27/88	209	W	2571	36	15.0	14.0	C	0.603		
07/28/88	210	H	2613	634	18.0	18.0	C	0.191		
07/29/88	211	F	2640	806	18.0	18.0	B	0.219		
08/01/88	214	M	2657	40	20.0	20.0	D	0.220		
08/02/88	215	T	2739	24	18.0	18.0		0.080		
08/03/88	216	W	2723	903	18.0	18.0	B	0.846		
08/04/88	217	H	2834	852	18.0	18.0	A	0.718	0.551	0.707
08/05/88	218	F	2840	900	18.0	18.0	A	0.818	0.681	0.806
08/08/88	221	M	2893	307	18.0	17.0	B	0.551		
08/09/88	222	T	2922	172	16.0	17.0	D	0.158		
08/10/88	223	W	2944	801	18.0	17.0	C	0.463		
08/11/88	224	H	3077	729	16.5	16.0	B	0.272		
08/12/88	225	F	3089	719	18.0	18.0	A	0.064		
08/15/88	228	M	3133	711	18.0	18.0	B	0.146		
08/17/88	230	W	3261	142	14.0	14.0	A	0.176		
08/17/88	230	W	3262	900	14.0	14.5	A	0.207		
08/18/88	231	H	3258	161	17.5	17.0	C	0.510		
08/19/88	232	F	3316	715	18.0	17.0	D	0.403		
08/22/88	235	M	3344	712	18.0	19.0	D	0.133		

TABLE E-43. SUMMARY OF THE 1988 NMOC DATA FOR SACRAMENTO, CA (S1CA)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/23/88	236	T	3362	407	18.0	18.0	C	0.130		
08/24/88	237	W	3404	905	18.0	18.0	C	0.213		
08/25/88	238	H	3516	152	17.0	16.0	B	0.392	0.732	0.787
08/26/88	239	F	3506	307	17.0	16.0	B	0.308		
08/29/88	242	M	3592	705	18.0	18.0	B	0.511		
08/30/88	243	T	3673	72	16.0	16.0	B	0.200		
09/01/88	245	H	3700	785	18.0	17.0	B	0.123		
09/02/88	246	F	3775	836	16.0	15.0	A	0.140		
09/06/88	250	T	3846	767	20.0	19.0	A	1.040		
09/08/88	252	H	3902	120	17.0	16.0	D	0.460		
09/09/88	253	F	3984	139	12.0	12.0	D	0.063		
09/09/88	253	F	3985	634	12.0	12.0	D	0.079		
09/12/88	256	M	4058	713	16.0	15.0	B	1.180		
09/13/88	257	T	4029	801	14.0	14.0	A	0.383		0.141
09/27/88	271	T	4482	896	18.0	18.0	B	0.215		
09/28/88	272	W	4577	832	16.0	15.0	B	1.091		
09/28/88	272	W	4578	645	16.0	16.0	D	1.246		
09/29/88	273	H	4571	308	16.0	15.0	C	1.420		
09/29/88	273	H	4572	872	16.0	15.0	D	1.500		
09/30/88	274	F	4633	776	15.0	13.0	C	1.251		
09/30/88	274	F	4634	400	15.0	14.0	D	1.270		

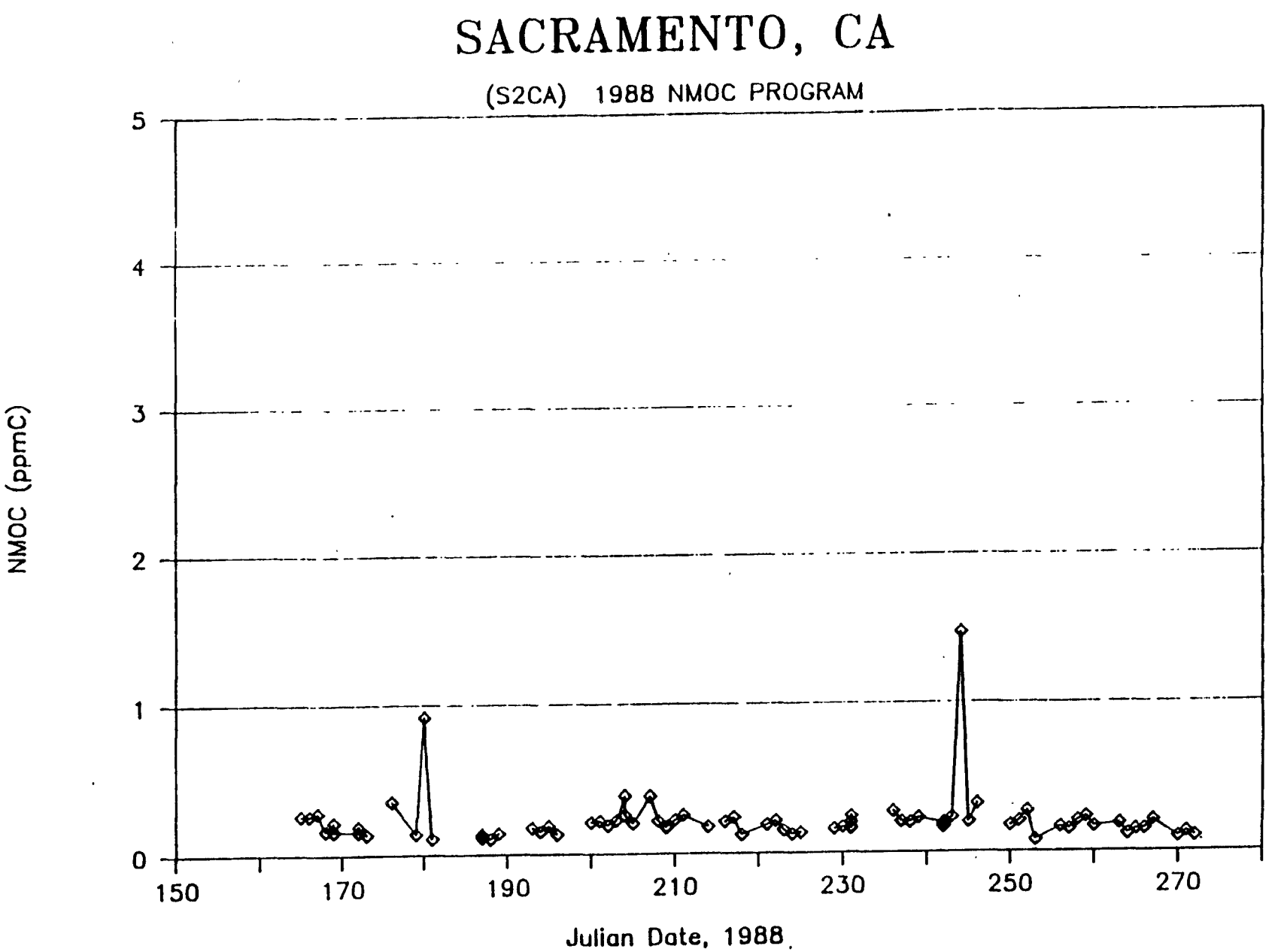


Figure E-44. Plot of NMOC concentration for Sacramento, CA (Citrus Heights).

TABLE E-44. SUMMARY OF THE 1988 NMOC DATA FOR SACRAMENTO, CA (S2CA)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
06/13/88	165	M	1336	873	7.5	5.0	B	0.264		
06/14/88	166	T	1372	769	8.5	8.0	C	0.263		
06/15/88	167	W	1429	679	8.5	7.0	B	0.283		
06/16/88	168	H	1459	716	9.0	9.0	A	0.162		
06/17/88	169	F	1484	823	7.8	7.0	A	0.218		
06/17/88	169	F	1485	792	7.8	5.0	D	0.157		
06/20/88	172	M	1516	772	13.5	13.5	C	0.154		
06/20/88	172	M	1516	772	13.5		A	0.190		
06/21/88	173	T	1556	70	13.9	11.0	B	0.138		
06/24/88	176	F	1688	138	9.0	8.0	C	0.357		
06/27/88	179	M	1752	64	13.0	8.0	C	0.141		
06/28/88	180	T	1750	136	13.0	13.0	D	0.918		
06/29/88	181	W	1791	184	13.0	12.0	A	0.109		
07/05/88	187	T	1927	135	16.5	15.0	C	0.137		
07/05/88	187	T	1926	630	16.5	16.0	A	0.114		
07/06/88	188	W	1975	171	9.0	8.0	C	0.104		
07/07/88	189	H	1999	636	10.0	9.0	D	0.142		
07/11/88	193	M	2081	37	9.5	9.0	A	0.176		
07/12/88	194	T	2102	43		9.0	C	0.151		
07/13/88	195	W	2198	801	10.0	8.0	A	0.192	0.226	0.196
07/14/88	196	H	2194	625	10.0	9.5	B	0.132		
07/18/88	200	M	2271	682	16.0	15.0	A	0.213		
07/19/88	201	T	2357	156	19.0	19.0	A	0.223		
07/20/88	202	W	2361	680	15.5	14.0	A	0.190		
07/21/88	203	H	2413	115	15.0	14.0	D	0.224		
07/22/88	204	F	2363	108	13.5	10.0	B	0.389		
07/22/88	204	F	2481	166	16.0	15.0	C	0.258		
07/23/88	205	S	2353	165	13.0	11.0	C	0.201		
07/25/88	207	M	2482	304	15.0	15.0	D	0.385		
07/26/88	208	T	2546	84	15.0	14.0	A	0.220		
07/27/88	209	W	2589	37	16.5	16.0	B	0.175		
07/27/88	209	W	2590	652	16.5	16.5	B	0.181		
07/28/88	210	H	2645	639	16.5	16.0	D	0.224		
07/29/88	211	F	2626	772	16.0	15.5	D	0.258		
08/01/88	214	M	2675	196	15.5	15.0	C	0.179		
08/03/88	216	W	2819	405	16.0	16.0	C	0.213		
08/04/88	217	H	2846	623	16.5	16.0	B	0.242		
08/05/88	218	F	2933	166	15.5	14.5	D	0.124		
08/08/88	221	M	2932	79	15.5	15.0	A	0.191		
08/09/88	222	T	3011	910	16.0	16.0	A	0.217		
08/10/88	223	W	3043	406	12.0	10.0	D	0.153		
08/11/88	224	H	3044	688	16.0	16.0	C	0.123		
08/12/88	225	F	3095	100	15.5	14.0	B	0.135		
08/16/88	229	T	3171	188	15.5	15.0	C	0.159		
08/17/88	230	W	3287	12	15.5	14.0	A	0.172		
08/18/88	231	H	3301	38	16.0	15.0	A	0.166		
08/18/88	231	H	3307	9	16.0	15.0	B	0.201		
08/18/88	231	H	3301	38	16.0	12.0	A	0.162		
08/18/88	231	H	3302	9	16.0	4.0	B	0.243		

TABLE E-44. SUMMARY OF THE 1988 NMOC DATA FOR SACRAMENTO, CA (S2CA)

Date Sampled	Julian Date Sampled	Weekday Sampled	Sample ID Number	Sample Canister Number	Sample Pressure (psig)	Analysis Pressure (psig)	Radian Channel	Mean NMOC ppmC	QAD NMOC ppmC	ASRL NMOC ppmC
08/23/88	236	T	3470	91	15.5	15.5	D	0.276		
08/24/88	237	W	3518	92	15.5	14.0	A	0.204		
08/25/88	238	H	3529	707	16.5	16.0	A	0.199		
08/26/88	239	F	3577	56	15.0	15.0	D	0.230		
08/29/88	242	M	3607	785	16.5	16.0	D	0.193		
08/29/88	242	M	3608	900	16.5	16.0	D	0.174		
08/29/88	242	M	3607	784	16.5	16.0	D	0.169		
08/29/88	242	M	3608	900	16.5	10.0	D	0.198		
08/30/88	243	T	3630	728	16.0	16.0	B	0.234		
08/31/88	244	W	3748	109	18.5	10.0	C	1.472		1.022
09/01/88	245	H	3717	61	15.5	14.0	C	0.199		
09/02/88	246	F	3794	871	15.5	15.0	D	0.322		
09/06/88	250	T	3795	169	14.0	14.0	B	0.178		
09/07/88	251	W	3857	83	15.5	14.0	D	0.205		
09/08/88	252	H	3912	793	16.5	16.0	A	0.273		
09/09/88	253	F	3960	170	15.5	15.0	B	0.077		
09/12/88	256	M	4007	911	15.5	14.0	C	0.166		
09/13/88	257	T	4064	687	16.5	15.0	B	0.150		
09/14/88	258	W	4100	663	16.5	16.0	B	0.207		
09/15/88	259	H	4186	62	15.5	15.0	A	0.233		
09/16/88	260	F	4232	52	15.5	15.0	D	0.165		
09/19/88	263	M	4211	642	16.0	14.0	A	0.186		
09/20/88	264	T	4258	894	15.0	15.0	D	0.113		
09/21/88	265	W	4658	765	16.0	16.0	D	0.147		
09/22/88	266	H	4434	197	15.5	15.0	C	0.149		
09/23/88	267	F	4446	7	15.0	12.0	D	0.208		
09/26/88	270	M	4506	709	16.5	16.0	A	0.096		
09/27/88	271	T	4487	697	16.5	16.0	B	0.128		
09/28/88	272	W	4643	302	16.0	15.0	D	0.099		
09/29/88	273	H	4638	97	16.2	16.0	C	0.137		
09/29/88	273	H	4639	883	16.2	16.0	D	0.163		
09/30/88	274	F	4631	847	16.0	14.0	C	0.157		
09/30/88	274	F	4632	14	16.0	16.0	C	0.153		
09/30/88	274	F	4631	847	16.0	12.0	C	0.175		
09/30/88	274	F	4632	14	16.0	10.0	C	0.133		

APPENDIX F

1988 NMOC MONITORING PROGRAM INVALIDATED AND MISSING SAMPLES

TABLE F-1. 1988 NMOC STUDY, CHRONOLOGICAL INVALIDATED AND MISSING SAMPLES

Site	Date	Description	Assigned
T2FL	04/21/88	Timer left in manual mode	Operator
T1FL	05/03/88	Sample line disconnected	Operator
M2FL	05/12/88	Canister leak	Canister
MIFL	05/23/88	Canister leak	Canister
T2FL	05/24/88	Reason unknown	Operator
AZCA	06/06/88	Leak in system found - Solenoid	Equipment
PLNJ	06/06/88	No analysis pressure	Canister
M1TN	06/06/88	High canister Pressure	Equipment
BRIL	06/07/88	No operator	Site
PRRI	06/07/88	Timer incorrectly programmed	Operator
S1CA	06/07/88	Power switch	Operator
MNY	06/07/88	Timer incorrectly programmed	Operator
SLMO	06/07/88	Loose nut on side arm	Operator
N1TN	06/07/88	No field pressure - wrong orifice	Operator
N1TN	06/07/88	No field pressure - wrong orifice	Operator
BNY	06/07/88	Fire in building	Site
B2CA	06/07/88	No analysis pressure	Canister
P1AZ	06/08/88	Canister not opened	Operator
S1CA	06/08/88	Power switch	Operator
AUTX	06/08/88	Timer incorrectly programmed	Operator
B1CA	06/08/88	Low canister pressure	Operator
MIFL	06/08/88	No analysis pressure - Leak found	Canister
CLOH	06/08/88	Canister unavailable	Radian
PRRI	06/09/88	No analysis pressure	Radian
PLNJ	06/09/88	Canister not connected properly	Operator
S1CA	06/09/88	Power switch	Operator
N2TN	06/09/88	Defective orifice	Equipment
P1AZ	06/10/88	No analysis pressure	Canister
S1CA	06/10/88	Power switch	Operator
BRIL	06/10/88	No operator	Operator
B1CA	06/13/88	Cannister not set up	Operator
BRIL	06/13/88	Canister unavailable	Radian
P1AZ	06/13/88	Timer left in manual mode	Operator
C3IL	06/13/88	Canister unavailable	Radian
S1FL	06/14/88	Leaks found in sampling system	Equipment
S1CA	06/14/88	Power switch	Operator
N1TN	06/15/88	Canister not opened	Operator
S1CA	06/15/88	Power switch	Equipment
S1CA	06/15/88	Power switch	Operator
BNY	06/16/88	Site has been relocated	Site
N1TN	06/16/88	High canister Pressure	Equipment
S2FL	06/16/88	Low canister pressure	Canister
S1CA	06/16/88	Power switch	Operator
B2MA	06/16/88	Defective canister	Canister
WAIL	06/17/88	Timer malfunctioning	Operator
S1CA	06/17/88	Power switch	Operator
BMTX	06/17/88	Timer left in manual mode	Operator
WAIL	06/20/88	Timer not set	Operator
S1CA	06/20/88	Power switch	Operator
AUTX	06/20/88	Sample line disconnected	Operator
PRRI	06/21/88	Unable to gain access to building	Site

TABLE F-1. 1988 NMOC STUDY, CHRONOLOGICAL INVALIDATED AND MISSING SAMPLES

Site	Date	Description	Assigned
WAIL	06/21/88	Power failure	Site
BMTX	06/21/88	High canister Pressure	Equipment
B2MA	06/22/88	Timer malfunctioning	Operator
P2AZ	06/22/88	Unable to gain access to building	Operator
S1FL	06/22/88	Low canister pressure	Canister
PRRI	06/22/88	Unable to gain access to building	Operator
S2CA	06/22/88	Canister unavailable	Radian
CHNC	06/22/88	Power failure	Site
S2CA	06/23/88	Canister unavailable	Radian
B1CA	06/23/88	Outside line not connected	Operator
P2AZ	06/23/88	Unable to gain access to building	Operator
M1TN	06/23/88	Clogged orifice	Equipment
WAIL	06/23/88	Pump or inlet leak	Equipment
WAIL	06/24/88	Pump malfunctioning	Equipment
WAIL	06/27/88	Pump malfunctioning	Equipment
M1TN	06/27/88	Bad orifice	Equipment
DLTX	06/27/88	Low canister pressure	Canister
BMTX	06/27/88	Timer left in review mode	Operator
PLNJ	06/27/88	Double run	Operator
PLNJ	06/28/88	Double run	Operator
WAIL	06/28/88	Pump malfunctioning	Equipment
B1CA	06/29/88	Timer malfunctioning	Operator
S2CA	06/30/88	Could not open canister valve	Operator
B2MA	07/01/88	Timer malfunctioning	Operator
S2CA	07/01/88	Could not open canister valve	Operator
MIFL	07/01/88	Low canister pressure	Canister
AUTX	07/05/88	Improper timer settings	Operator
C3IL	07/05/88	No operator	Site
BRIL	07/05/88	No operator	Site
B1CA	07/05/88	Timer malfunctioning	Operator
ELTX	07/05/88	Power failure	Equipment
CLOH	07/05/88	Misprogrammed timer	Operator
PRRI	07/05/88	Improper timer setting	Operator
C6IL	07/05/88	No operator	Site
C3IL	07/06/88	No operator	Site
C6IL	07/06/88	No operator	Site
BRIL	07/06/88	No operator	Site
FECA	07/07/88	Canister not opened	Operator
C3IL	07/07/88	No operator	Site
BRIL	07/07/88	No operator	Site
P1AZ	07/07/88	Low canister pressure	Operator
C6IL	07/07/88	No operator	Site
S2CA	07/08/88	Low canister pressure	Canister
C3IL	07/08/88	No operator	Site
C6IL	07/08/88	No operator	Site
S1FL	07/08/88	Timer malfunctioning	Operator
BRIL	07/08/88	No operator	Site
BRIL	07/11/88	No operator	Site
C3IL	07/11/88	No operator	Site
B1CA	07/11/88	Low canister pressure	Operator
M1TN	07/11/88	Low canister pressure	Canister

TABLE F-1. 1988 NMOC STUDY, CHRONOLOGICAL INVALIDATED AND MISSING SAMPLES

Site	Date	Description	Assigned
N2TN	07/11/88	Low canister pressure	Canister
C6IL	07/11/88	No operator	Site
C6IL	07/12/88	No operator	Site
C3IL	07/12/88	No operator	Site
BRIL	07/12/88	No operator	Site
C3IL	07/13/88	No operator	Site
BRIL	07/13/88	No operator	Site
MIFL	07/13/88	Unknown	Unexplained
C6IL	07/13/88	No operator	Site
PRRI	07/13/88	Sample line	Equipment
AUTX	07/13/88	No pressure in canister	Canister
MNY	07/14/88	No pressure in canister	Canister
BRIL	07/14/88	No operator	Site
C6IL	07/14/88	No operator	Site
C3IL	07/14/88	No operator	Site
P2AZ	07/15/88	Timer malfunctioning	Equipment
S2CA	07/15/88	Low canister pressure	Canister
C6IL	07/15/88	No operator	Site
N2TN	07/15/88	Low canister pressure	Canister
C3IL	07/15/88	No operator	Site
S1MA	07/15/88	Timer malfunctioning	Equipment
M1NY	07/15/88	No pressure in canister	Canister
M2TN	07/15/88	Power failure	Site
B1CA	07/15/88	Timer malfunctioning	Operator
D1MI	07/18/88	Canister not opened	Operator
AUTX	07/18/88	Timer malfunctioning	Equipment
CHNC	07/19/88	Canister not opened	Operator
C6IL	07/19/88	Canister not opened	Operator
P2AZ	07/19/88	Timer malfunctioning	Equipment
DLTX	07/20/88	Timer malfunctioning	Equipment
B1CA	07/20/88	Canister not opened	Operator
D1MI	07/21/88	Valve left opened	Operator
B1CA	07/21/88	Canister not opened	Operator
B1CA	07/22/88	Canister not opened	Operator
B1CA	07/25/88	Canister not opened	Operator
N2TN	07/25/88	Timer malfunctioning	Operator
D2MI	07/25/88	No sample run	Unexplained
NWNJ	07/25/88	Unable to gain access to building	Operator
DLTX	07/25/88	Timer malfunctioning	Equipment
N2TN	07/26/88	Low canister pressure	Canister
NWNJ	07/26/88	Unable to gain access to building	Operator
D2MI	07/26/88	Coupling damaged (indoor air sampled)	Operator
D2MI	07/27/88	Bad connecting arm	Equipment
C6IL	07/28/88	Low canister pressure	Canister
PRRI	08/01/88	No sample	Operator
M2TN	08/01/88	Canister received under vacuum	Operator
S1FL	08/02/88	Sticky valve	Canister
PRRI	08/02/88	Leak in system found	Equipment
S1FL	08/02/88	Low canister pressure	Canister
MNY	08/02/88	Low canister pressure	Equipment
S2CA	08/02/88	No canister pressure	Equipment

TABLE F-1. 1988 NMOC STUDY, CHRONOLOGICAL INVALIDATED AND MISSING SAMPLES

Site	Date	Description	Assigned
B2CA	08/03/88	Timer malfunctioning	Operator
MNY	08/03/88	Low canister pressure	Equipment
T1FL	08/04/88	Low canister pressure	Equipment
MNY	08/04/88	Bad connection	Equipment
CHNC	08/04/88	Timer malfunctioning	Operator
BMTX	08/04/88	Timer left in manual mode	Operator
T1FL	08/04/88	Low canister pressure	Equipment
M1TN	08/05/88	Low canister pressure	Canister
T1FL	08/05/88	Low canister pressure	Equipment
PRRI	08/08/88	Unable to gain access to building	Site
M1TN	08/08/88	Connecting arm leak	Equipment
MIFL	08/08/88	Canister not opened	Operator
S1MA	08/08/88	Canister not opened	Operator
BMTX	08/09/88	Low canister pressure	Equipment
N1TN	08/09/88	No canister pressure	Canister
P2AZ	08/09/88	Low canister pressure	Canister
WOMA	08/09/88	Timer malfunctioning	Operator
C2OH	08/10/88	Timer malfunctioning	Operator
BMTX	08/10/88	Cracked pump	Equipment
B1CA	08/11/88	Canister not opened	Operator
T2FL	08/11/88	Timer malfunctioning	Operator
MIFL	08/11/88	Low canister pressure	Canister
M1NY	08/12/88	Low canister pressure	Operator
MIFL	08/12/88	Missed sample	Unexplained
S2CA	08/15/88	No access	Operator
C3IL	08/15/88	Canister not opened	Operator
S1CA	08/16/88	Canister not opened	Operator
CLOH	08/16/88	Canister not opened	Operator
D1MI	08/18/88	Low canister pressure	Canister
C6IL	08/18/88	Timer malfunctioning	Operator
C3IL	08/18/88	Canister not opened	Operator
B1CA	08/18/88	Canister not opened	Operator
MNY	08/19/88	Low canister pressure	Equipment
S2CA	08/19/88	Canister sampled twice	Operator
MNY	08/19/88	Low canister pressure	Equipment
D1MI	08/22/88	No run	Operator
M1NY	08/22/88	Canister sampled twice (Dup.)	Operator
FECA	08/22/88	Canister not opened	Operator
C3IL	08/22/88	Low canister pressure	Operator
S1MA	08/22/88	Timer malfunctioning	Operator
B1CA	08/22/88	Low canister pressure	Operator
T2FL	08/22/88	Timer malfunctioning	Operator
S2CA	08/22/88	Canister sampled twice	Operator
M1NY	08/22/88	Canister sampled twice (Dup.)	Operator
MNY	08/22/88	Canister sampled twice	Operator
MNY	08/23/88	Canister sampled twice	Operator
M1NY	08/23/88	Canister sampled twice (Dup.)	Operator
T2FL	08/23/88	Timer malfunctioning	Operator
M1NY	08/23/88	Canister sampled twice (Dup.)	Operator
NWNJ	08/24/88	Timer malfunctioning	Operator
SLMO	08/25/88	Timer malfunctioning	Operator

TABLE F-1. 1988 NMOC STUDY, CHRONOLOGICAL INVALIDATED AND MISSING SAMPLES

Site	Date	Description	Assigned
C6IL	08/25/88	Pump unplugged	Operator
WAIL	08/26/88	Canister not opened	Operator
S1MA	08/26/88	Canister sampled twice	Operator
S1MA	08/29/88	Canister sampled twice	Operator
S1MA	08/30/88	Canister was not sampled	Operator
T1FL	08/30/88	Timer malfunctioning	Equipment
W1NY	08/31/88	Canister sampled twice	Operator
S1CA	08/31/88	Connecting arm leak	Equipment
BMTX	09/01/88	Manifold not hooked up	Operator
P1AZ	09/01/88	Timer malfunctioning	Equipment
W1NY	09/01/88	Canister sampled twice	Operator
M1NY	09/01/88	Tubing in pump was broken	Equipment
D2MI	09/01/88	Missed sample	Unexplained
C6IL	09/01/88	Outlet turned off	Operator
P1AZ	09/02/88	Timer malfunctioning	Equipment
N1TN	09/02/88	Canister unavailable	Radian
C6IL	09/02/88	Outlet turned off	Operator
AZCA	09/02/88	Missed sample	Unexplained
P1AZ	09/06/88	Timer malfunctioning	Equipment
T2FL	09/06/88	Canister sampled twice	Operator
T1FL	09/06/88	Canister sampled twice	Operator
MIFL	09/07/88	Canister unavailable	Radian
T1FL	09/07/88	Canister sampled twice	Radian
WOMA	09/07/88	Probe not sampling	Operator
M2FL	09/07/88	Canister received too late	Radian
T2FL	09/07/88	Canister sampled twice	Operator
S1CA	09/07/88	Canister unavailable	Radian
C6IL	09/08/88	Low canister pressure	Operator
B1CA	09/09/88	Timer malfunctioning	Operator
C6IL	09/09/88	Low canister pressure	Operator
WAIL	09/09/88	Missed sample	Unexplained
T1FL	09/12/88	Canister sampled twice	Operator
MNY	09/12/88	Unable to gain access to building	Operator
T2FL	09/12/88	Canister sampled twice	Operator
WAIL	09/12/88	Canister sampled twice	Operator
M1TN	09/12/88	No run	Operator
T2FL	09/13/88	Canister sampled twice	Operator
WAIL	09/13/88	Canister sampled twice	Operator
MNY	09/13/88	No run	Operator
T1FL	09/13/88	Canister sampled twice	Operator
B1CA	09/14/88	Missed sample	Unexplained
MNY	09/14/88	No run	Operator
S1CA	09/14/88	System leak	Equipment
B2CA	09/14/88	Canister not opened	Operator
H1TX	09/14/88	Missed sample	Unexplained
M1NY	09/15/88	Canister sampled twice	Operator
S1CA	09/15/88	System leak	Equipment
M2FL	09/15/88	Missed sample	Unexplained
T2FL	09/15/88	Timer malfunctioning	Operator
M2FL	09/16/88	Missed sample	Unexplained
S1CA	09/16/88	System leak	Equipment

TABLE F-1. 1988 NMOC STUDY, CHRONOLOGICAL INVALIDATED AND MISSING SAMPLES

Site	Date	Description	Assigned
M1NY	09/16/88	System leak	Equipment
T2FL	09/19/88	Canister sampled twice	Operator
T1FL	09/19/88	Canister sampled twice	Operator
S1CA	09/19/88	Solenoid leak	Equipment
B1CA	09/19/88	Timer malfunctioning	Operator
S1CA	09/20/88	System leak	Equipment
T2FL	09/20/88	Canister sampled twice	Operator
T1FL	09/20/88	Canister sampled twice	Operator
CHNC	09/20/88	Timer malfunctioning	Operator
MNY	09/21/88	Canister sampled twice (Holiday)	Operator
S1CA	09/21/88	Solenoid leak	Equipment
D1MI	09/21/88	System leak	Equipment
W1NY	09/21/88	No canister pressure	Canister
S1CA	09/22/88	Canister sampled twice	Operator
MNY	09/22/88	Canister sampled twice (Holiday)	Operator
B2MA	09/23/88	Timer malfunctioning	Operator
S1CA	09/23/88	Canister sampled twice	Operator
T2FL	09/26/88	Canister sampled twice	Operator
M1NY	09/26/88	Double orifice misinstalled	Operator
WAIL	09/26/88	Canister sampled twice	Operator
S1CA	09/26/88	Canister unavailable	Radian
T1FL	09/26/88	Canister sampled twice	Operator
CHNC	09/26/88	Canister unavailable	Radian
M1TN	09/27/88	Power failure	Equipment
S2FL	09/27/88	Sample line disconnected	Operator
WAIL	09/27/88	Canister sampled twice	Operator
T1FL	09/27/88	Canister sampled twice	Unexplained
T2FL	09/27/88	Canister sampled twice	Operator
C6IL	09/27/88	Missed sample	Unexplained
AUTX	09/28/88	System leak	Operator
M1NY	09/28/88	Missed sample	Unexplained
S2FL	09/28/88	System leak	Operator
W1NY	09/28/88	Canister sampled twice	Operator
MNY	09/28/88	Connecting arm leak	Equipment
N1TN	09/28/88	Canister unavailable	Radian
N2TN	09/28/88	Canister unavailable	Radian
W1NY	09/29/88	Canister sampled twice	Operator
S2FL	09/29/88	Sample line disconnected	Operator
MNY	09/30/88	Low canister pressure	Canister
S1FL	09/30/88	Low canister pressure	Canister
ELTX	09/30/88	System leak	Operator

TABLE F-2. 1988 NMOC STUDY, SITE SPECIFIC INVALIDATED AND MISSING SAMPLES

Site	Date	Description	Assigned
AUTX	06/08/88	Timer incorrectly programmed	Operator
AUTX	06/20/88	Sample line disconnected	Operator
AUTX	07/05/88	Improper timer settings	Operator
AUTX	07/13/88	No pressure in canister	Canister
AUTX	07/18/88	Timer malfunctioning	Equipment
AUTX	09/28/88	System leak	Operator
AZCA	06/06/88	Leak in system found - Solenoid	Equipment
AZCA	09/02/88	Missed sample	Unexplained
B1CA	06/08/88	Low canister pressure	Operator
B1CA	06/13/88	Canister not set up	Operator
B1CA	06/23/88	Outside line not connected	Operator
B1CA	06/29/88	Timer malfunctioning	Operator
B1CA	07/05/88	Timer malfunctioning	Operator
B1CA	07/11/88	Low canister pressure	Operator
B1CA	07/15/88	Timer malfunctioning	Operator
B1CA	07/20/88	Canister not opened	Operator
B1CA	07/21/88	Canister not opened	Operator
B1CA	07/22/88	Canister not opened	Operator
B1CA	07/25/88	Canister not opened	Operator
B1CA	08/11/88	Canister not opened	Operator
B1CA	08/18/88	Canister not opened	Operator
B1CA	08/22/88	Low canister pressure	Operator
B1CA	09/09/88	Timer malfunctioning	Operator
B1CA	09/14/88	Missed sample	Unexplained
B1CA	09/19/88	Timer malfunctioning	Operator
B2CA	06/07/88	No analysis pressure	Canister
B2CA	08/03/88	Timer malfunctioning	Operator
B2CA	09/14/88	Canister not opened	Operator
B2MA	06/16/88	Defective canister	Canister
B2MA	06/22/88	Timer malfunctioning	Operator
B2MA	07/01/88	Timer malfunctioning	Operator
B2MA	09/23/88	Timer malfunctioning	Operator
BMTX	06/17/88	Timer left in manual mode	Operator
BMTX	06/21/88	High canister Pressure	Equipment
BMTX	06/27/88	Timer left in review mode	Operator
BMTX	08/04/88	Timer left in manual mode	Operator
BMTX	08/09/88	Low canister pressure	Equipment
BMTX	08/10/88	Cracked pump	Equipment
BMTX	09/01/88	Manifold not hooked up	Operator
BNY	06/07/88	Fire in building	Site
BNY	06/16/88	Site has been relocated	Site
BRIL	06/07/88	No operator	Site
BRIL	06/10/88	No operator	Operator
BRIL	06/13/88	Canister unavailable	Radian

TABLE F-2. 1988 NMOC STUDY, SITE SPECIFIC INVALIDATED AND MISSING SAMPLES

Site	Date	Description	Assigned
BRIL	07/05/88	No operator	Site
BRIL	07/06/88	No operator	Site
BRIL	07/07/88	No operator	Site
BRIL	07/08/88	No operator	Site
BRIL	07/11/88	No operator	Site
BRIL	07/12/88	No operator	Site
BRIL	07/13/88	No operator	Site
BRIL	07/14/88	No operator	Site
C2OH	08/10/88	Timer malfunctioning	Operator
C3IL	06/13/88	Canister unavailable	Radian
C3IL	07/05/88	No operator	Site
C3IL	07/06/88	No operator	Site
C3IL	07/07/88	No operator	Site
C3IL	07/08/88	No operator	Site
C3IL	07/11/88	No operator	Site
C3IL	07/12/88	No operator	Site
C3IL	07/13/88	No operator	Site
C3IL	07/14/88	No operator	Site
C3IL	07/15/88	No operator	Site
C3IL	08/15/88	Canister not opened	Operator
C3IL	08/18/88	Canister not opened	Operator
C3IL	08/22/88	Low canister pressure	Operator
C6IL	07/05/88	No operator	Site
C6IL	07/06/88	No operator	Site
C6IL	07/07/88	No operator	Site
C6IL	07/08/88	No operator	Site
C6IL	07/11/88	No operator	Site
C6IL	07/12/88	No operator	Site
C6IL	07/13/88	No operator	Site
C6IL	07/14/88	No operator	Site
C6IL	07/15/88	No operator	Site
C6IL	07/19/88	Canister not opened	Operator
C6IL	07/28/88	Low canister pressure	Canister
C6IL	08/18/88	Timer malfunctioning	Operator
C6IL	08/25/88	Pump unplugged	Operator
C6IL	09/01/88	Outlet turned off	Operator
C6IL	09/02/88	Outlet turned off	Operator
C6IL	09/08/88	Low canister pressure	Operator
C6IL	09/09/88	Low canister pressure	Operator
C6IL	09/27/88	Missed sample	Unexplained
CHNC	06/22/88	Power failure	Site
CHNC	07/19/88	Canister not opened	Operator
CHNC	08/04/88	Timer malfunctioning	Operator
CHNC	09/20/88	Timer malfunctioning	Operator
CHNC	09/26/88	Canister unavailable	Radian
CLOH	06/08/88	Canister unavailable	Radian

TABLE F-2. 1988 NMOC STUDY, SITE SPECIFIC INVALIDATED AND MISSING SAMPLES

Site	Date	Description	Assigned
CLOH	07/05/88	Misprogrammed timer	Operator
CLOH	08/16/88	Canister not opened	Operator
D1MI	07/18/88	Canister not opened	Operator
D1MI	07/21/88	Valve left opened	Operator
D1MI	08/18/88	Low canister pressure	Canister
D1MI	08/22/88	No run	Operator
D1MI	09/21/88	System leak	Equipment
D2MI	07/25/88	No sample run	Unexplained
D2MI	07/26/88	Coupling damaged (indoor air sampled)	Operator
D2MI	07/27/88	Bad connecting arm	Equipment
D2MI	09/01/88	Missed sample	Unexplained
DLTX	06/27/88	Low canister pressure	Canister
DLTX	07/20/88	Timer malfunctioning	Equipment
DLTX	07/25/88	Timer malfunctioning	Equipment
ELTX	07/05/88	Power failure	Equipment
ELTX	09/30/88	System leak	Operator
FECA	07/07/88	Canister not opened	Operator
FECA	08/22/88	Canister not opened	Operator
H1TX	09/14/88	Missed sample	Unexplained
M1NY	07/15/88	No pressure in canister	Canister
M1NY	08/12/88	Low canister pressure	Operator
M1NY	08/22/88	Canister sampled twice (Dup.)	Operator
M1NY	08/22/88	Canister sampled twice (Dup.)	Operator
M1NY	08/23/88	Canister sampled twice (Dup.)	Operator
M1NY	08/23/88	Canister sampled twice (Dup.)	Operator
M1NY	09/01/88	Tubing in pump was broken	Equipment
M1NY	09/15/88	Canister sampled twice	Operator
M1NY	09/16/88	System leak	Equipment
M1NY	09/26/88	Double orifice misinstalled	Operator
M1NY	09/28/88	Missed sample	Unexplained
M1TN	06/06/88	High canister Pressure	Equipment
M1TN	06/23/88	Clogged orifice	Equipment
M1TN	06/27/88	Bad orifice	Equipment
M1TN	07/11/88	Low canister pressure	Canister
M1TN	08/05/88	Low canister pressure	Canister
M1TN	08/08/88	Connecting arm leak	Equipment
M1TN	09/12/88	No run	Operator
M1TN	09/27/88	Power failure	Equipment
M2FL	05/12/88	Canister leak	Canister
M2FL	09/07/88	Canister unavailable	Radian
M2FL	09/15/88	Missed sample	Unexplained
M2FL	09/16/88	Missed sample	Unexplained

TABLE F-2. 1988 NMOC STUDY, SITE SPECIFIC INVALIDATED AND MISSING SAMPLES

Site	Date	Description	Assigned
M2TN	07/15/88	Power failure	Site
M2TN	08/01/88	Canister received under vacuum	Operator
MIFL	05/23/88	Canister leak	Canister
MIFL	06/08/88	No analysis pressure - Leak found	Canister
MIFL	07/01/88	Low canister pressure	Canister
MIFL	07/13/88	Unknown	Unexplained
MIFL	08/08/88	Canister not opened	Operator
MIFL	08/11/88	Low canister pressure	Canister
MIFL	08/12/88	Missed sample	Unexplained
MIFL	09/07/88	Canister received too late	Radian
MNY	06/07/88	Timer incorrectly programmed	Operator
MNY	07/14/88	No pressure in canister	Canister
MNY	08/02/88	Low canister pressure	Equipment
MNY	08/03/88	Low canister pressure	Equipment
MNY	08/04/88	Bad connection	Equipment
MNY	08/19/88	Low canister pressure	Equipment
MNY	08/19/88	Low canister pressure	Equipment
MNY	08/22/88	Canister sampled twice	Operator
MNY	08/23/88	Canister sampled twice	Operator
MNY	09/12/88	Unable to gain access to building	Operator
MNY	09/13/88	No run	Operator
MNY	09/14/88	No run	Operator
MNY	09/21/88	Canister sampled twice (Holiday)	Operator
MNY	09/22/88	Canister sampled twice (Holiday)	Operator
MNY	09/28/88	Connecting arm leak	Equipment
MNY	09/30/88	Low canister pressure	Canister
N1TN	06/07/88	No field pressure - wrong orifice	Operator
N1TN	06/07/88	No field pressure - wrong orifice	Operator
N1TN	06/15/88	Canister not opened	Operator
N1TN	06/16/88	High canister Pressure	Equipment
N1TN	08/09/88	No canister pressure	Canister
N1TN	09/02/88	Canister unavailable	Radian
N1TN	09/28/88	Canister unavailable	Radian
N2TN	06/09/88	Defective orifice	Equipment
N2TN	07/11/88	Low canister pressure	Canister
N2TN	07/15/88	Low canister pressure	Canister
N2TN	07/25/88	Timer malfunctioning	Operator
N2TN	07/26/88	Low canister pressure	Canister
N2TN	09/28/88	Canister unavailable	Radian
NWNJ	07/25/88	Unable to gain access to building	Operator
NWNJ	07/26/88	Unable to gain access to building	Operator
NWNJ	08/24/88	Timer malfunctioning	Operator
P1AZ	06/08/88	Canister not opened	Operator
P1AZ	06/10/88	No analysis pressure	Canister

TABLE F-2. 1988 NMOC STUDY, SITE SPECIFIC INVALIDATED AND MISSING SAMPLES

Site	Date	Description	Assigned
P1AZ	06/13/88	Timer left in manual mode	Operator
P1AZ	07/07/88	Low canister pressure	Operator
P1AZ	09/01/88	Timer malfunctioning	Equipment
P1AZ	09/02/88	Timer malfunctioning	Equipment
P1AZ	09/06/88	Timer malfunctioning	Equipment
P2AZ	06/22/88	Unable to gain access to building	Operator
P2AZ	06/23/88	Unable to gain access to building	Operator
P2AZ	07/15/88	Timer malfunctioning	Equipment
P2AZ	07/19/88	Timer malfunctioning	Equipment
P2AZ	08/09/88	Low canister pressure	Canister
PLNJ	06/06/88	No analysis pressure	Canister
PLNJ	06/09/88	Canister not connected properly	Operator
PLNJ	06/27/88	Double run	Operator
PLNJ	06/28/88	Double run	Operator
PRRI	06/07/88	Timer incorrectly programmed	Operator
PRRI	06/09/88	No pressure for analysis	Radian
PRRI	06/21/88	Unable to gain access to building	Site
PRRI	06/22/88	Unable to gain access to building	Operator
PRRI	07/05/88	Improper timer setting	Operator
PRRI	07/13/88	Sample line	Equipment
PRRI	08/01/88	No sample	Operator
PRRI	08/02/88	Leak in system found	Equipment
PRRI	08/08/88	Unable to gain access to building	Site
S1CA	06/07/88	Power switch	Operator
S1CA	06/08/88	Power switch	Operator
S1CA	06/09/88	Power switch	Operator
S1CA	06/10/88	Power switch	Operator
S1CA	06/14/88	Power switch	Operator
S1CA	06/15/88	Power switch	Operator
S1CA	06/15/88	Power switch	Operator
S1CA	06/16/88	Power switch	Operator
S1CA	06/17/88	Power switch	Operator
S1CA	06/20/88	Power switch	Operator
S1CA	08/16/88	Canister not opened	Operator
S1CA	08/31/88	Connecting arm leak	Equipment
S1CA	09/07/88	Canister unavailable	Radian
S1CA	09/14/88	System leak	Equipment
S1CA	09/15/88	System leak	Equipment
S1CA	09/16/88	System leak	Equipment
S1CA	09/19/88	Solenoid leak	Equipment
S1CA	09/20/88	System leak	Equipment
S1CA	09/21/88	Solenoid leak	Equipment
S1CA	09/22/88	Canister sampled twice	Operator
S1CA	09/23/88	Canister sampled twice	Operator
S1CA	09/26/88	Canister unavailable	Radian
S1FL	06/14/88	Leaks found in sampling system	Equipment

TABLE F-2. 1988 NMOC STUDY, SITE SPECIFIC INVALIDATED AND MISSING SAMPLES

Site	Date	Description	Assigned
S1FL	06/22/88	Low canister pressure	Canister
S1FL	07/08/88	Timer malfunctioning	Operator
S1FL	08/02/88	Sticky valve	Canister
S1FL	08/02/88	Low canister pressure	Canister
S1FL	09/30/88	Low canister pressure	Canister
S1MA	07/15/88	Timer malfunctioning	Equipment
S1MA	08/08/88	Canister not opened	Operator
S1MA	08/22/88	Timer malfunctioning	Operator
S1MA	08/26/88	Canister sampled twice	Operator
S1MA	08/29/88	Canister sampled twice	Operator
S1MA	08/30/88	Canister was not sampled	Operator
S2CA	06/22/88	Canister unavailable	Radian
S2CA	06/23/88	Canister unavailable	Radian
S2CA	06/30/88	Could not open canister valve	Operator
S2CA	07/01/88	Could not open canister valve	Operator
S2CA	07/08/88	Low canister pressure	Canister
S2CA	07/15/88	Low canister pressure	Canister
S2CA	08/02/88	No canister pressure	Equipment
S2CA	08/15/88	No access	Operator
S2CA	08/19/88	Canister sampled twice	Operator
S2CA	08/22/88	Canister sampled twice	Operator
S2FL	06/16/88	Low canister pressure	Canister
S2FL	09/27/88	Sample line disconnected	Operator
S2FL	09/28/88	System leak	Operator
S2FL	09/29/88	Sample line disconnected	Operator
SLMO	06/07/88	Loose nut on side arm	Operator
SLMO	08/25/88	Timer malfunctioning	Operator
T1FL	05/03/88	Sample line disconnected	Operator
T1FL	08/04/88	Low canister pressure	Equipment
T1FL	08/04/88	Low canister pressure	Equipment
T1FL	08/05/88	Low canister pressure	Equipment
T1FL	08/30/88	Timer malfunctioning	Equipment
T1FL	09/06/88	Canister sampled twice	Operator
T1FL	09/07/88	Canister sampled twice	Radian
T1FL	09/12/88	Canister sampled twice	Operator
T1FL	09/13/88	Canister sampled twice	Operator
T1FL	09/19/88	Canister sampled twice	Operator
T1FL	09/20/88	Canister sampled twice	Operator
T1FL	09/26/88	Canister sampled twice	Operator
T1FL	09/27/88	Canister sampled twice	Unexplained
T2FL	04/21/88	Timer left in manual mode	Operator
T2FL	05/24/88	Reason unknown	Operator
T2FL	08/11/88	Timer malfunctioning	Operator
T2FL	08/22/88	Timer malfunctioning	Operator
T2FL	08/23/88	Timer malfunctioning	Operator

TABLE F-2. 1988 NMOC STUDY, SITE SPECIFIC INVALIDATED AND MISSING SAMPLES

Site	Date	Description	Assigned
T2FL	09/06/88	Canister sampled twice	Operator
T2FL	09/07/88	Canister sampled twice	Operator
T2FL	09/12/88	Canister sampled twice	Operator
T2FL	09/13/88	Canister sampled twice	Operator
T2FL	09/15/88	Timer malfunctioning	Operator
T2FL	09/19/88	Canister sampled twice	Operator
T2FL	09/20/88	Canister sampled twice	Operator
T2FL	09/26/88	Canister sampled twice	Operator
T2FL	09/27/88	Canister sampled twice	Operator
W1NY	08/31/88	Canister sampled twice	Operator
W1NY	09/01/88	Canister sampled twice	Operator
W1NY	09/21/88	No canister pressure	Canister
W1NY	09/28/88	Canister sampled twice	Operator
W1NY	09/29/88	Canister sampled twice	Operator
WAIL	06/17/88	Timer malfunctioning	Operator
WAIL	06/20/88	Timer not set	Operator
WAIL	06/21/88	Power failure	Site
WAIL	06/23/88	Pump or inlet leak	Equipment
WAIL	06/24/88	Pump malfunctioning	Equipment
WAIL	06/27/88	Pump malfunctioning	Equipment
WAIL	06/28/88	Pump malfunctioning	Equipment
WAIL	08/26/88	Canister not opened	Operator
WAIL	09/09/88	Missed sample	Unexplained
WAIL	09/12/88	Canister sampled twice	Operator
WAIL	09/13/88	Canister sampled twice	Operator
WAIL	09/26/88	Canister sampled twice	Operator
WAIL	09/27/88	Canister sampled twice	Operator
WOMA	08/09/88	Timer malfunctioning	Operator
WOMA	09/07/88	Probe not sampling	Operator

APPENDIX G

1988 NMOC DAILY CALIBRATION DATA

TABLE G-1. DAILY CALIBRATION DATA SUMMARY (CHANNEL A)

Calib. Date	Julian Calib. Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Calib. Factor	Final Calib. Factor	(Drift) Calib. Factor	(% Drift) Calib. Factor
04/14/88	105	25.775	25.775	0.008103	0.008103	0.000314	0.000314	0.000000	0.000
04/18/88	109	3.480	3.480	0.001057	0.001057	0.000304	0.000304	0.000000	0.000
04/19/88	110	6.270	6.270	0.001912	0.001912	0.000305	0.000305	0.000000	0.000
04/20/88	111	5.655	5.655	0.001716	0.001716	0.000303	0.000303	0.000000	0.000
04/22/88	113	4.140	4.140	0.001260	0.001260	0.000304	0.000304	0.000000	0.000
04/26/88	117	1.365	1.365	0.000417	0.000417	0.000306	0.000306	0.000000	0.000
04/28/88	119	1.965	1.965	0.000597	0.000597	0.000304	0.000304	0.000000	0.000
04/29/88	120	3.640	3.640	0.001116	0.001116	0.000307	0.000307	0.000000	0.000
05/02/88	123	4.360	4.360	0.001325	0.001325	0.000304	0.000304	0.000000	0.000
05/04/88	125	1.660	1.660	0.000518	0.000518	0.000312	0.000312	0.000000	0.000
05/06/88	127	0.965	0.965	0.000292	0.000292	0.000302	0.000302	0.000000	0.000
05/10/88	131	5.330	5.330	0.001625	0.001625	0.000305	0.000305	0.000000	0.000
05/12/88	133	2.505	2.505	0.000771	0.000771	0.000308	0.000308	0.000000	0.000
05/16/88	137	0.000	0.000	0.000000	0.000000	0.000304	0.000304	0.000000	0.000
05/20/88	141	3.090	3.090	0.000943	0.000943	0.000305	0.000305	0.000000	0.000
05/24/88	145	4.685	4.685	0.001414	0.001414	0.000302	0.000302	0.000000	0.000
05/25/88	146	2.790	2.790	0.000851	0.000851	0.000305	0.000305	0.000000	0.000
05/26/88	147	1.035	1.035	0.000314	0.000314	0.000303	0.000303	0.000000	0.000
05/31/88	152	3.895	3.895	0.001177	0.001177	0.000302	0.000302	0.000000	0.000
06/01/88	153	2.905	2.905	0.000887	0.000887	0.000305	0.000305	0.000000	0.000
06/03/88	155	3.175	3.175	0.000964	0.000964	0.000304	0.000304	0.000000	0.000
06/06/88	158	2.815	6.965	0.000878	0.002167	0.000312	0.000311	0.000001	0.289
06/07/88	159	0.000	3.190	0.000000	0.000997	0.000319	0.000313	0.000007	2.064
06/08/88	160	5.355	2.700	0.001627	0.000847	0.000304	0.000314	-0.000010	-3.289
06/09/88	161	2.945	1.990	0.000911	0.000630	0.000309	0.000317	-0.000007	-2.368
06/10/88	162	0.000	4.145	0.000000	0.001312	0.000321	0.000316	0.000005	1.548
06/13/88	165	3.165	3.880	0.000960	0.001171	0.000303	0.000302	0.000002	0.580
06/14/88	166	5.810	6.460	0.001833	0.001970	0.000315	0.000305	0.000010	3.319
06/15/88	167	2.130	2.875	0.000676	0.000914	0.000317	0.000318	-0.000000	-0.086
06/16/88	168	3.115	2.760	0.000953	0.000824	0.000306	0.000298	0.000007	2.410
06/17/88	169	2.425	1.680	0.000771	0.000530	0.000318	0.000315	0.000003	0.856
06/20/88	172	3.550	5.825	0.001085	0.001793	0.000306	0.000308	-0.000002	-0.701
06/21/88	173	1.135	2.550	0.000355	0.000792	0.000312	0.000311	0.000002	0.537
06/22/88	174	2.740	10.810	0.000833	0.003388	0.000304	0.000313	-0.000010	-3.161
06/23/88	175	1.785	2.590	0.000564	0.000816	0.000316	0.000315	0.000001	0.238
06/24/88	176	5.235	2.525	0.001575	0.000786	0.000301	0.000311	-0.000010	-3.447
06/27/88	179	1.240	1.240	0.000380	0.000380	0.000306	0.000306	0.000000	0.000
06/28/88	180	0.710	0.000	0.000217	0.000000	0.000306	0.000307	-0.000001	-0.429
06/29/88	181	3.255	5.005	0.001026	0.001522	0.000315	0.000304	0.000011	3.491
06/30/88	182	1.830	2.650	0.000555	0.000802	0.000303	0.000303	0.000001	0.277
07/01/88	183	2.880	3.340	0.000869	0.000980	0.000302	0.000293	0.000009	2.834
07/05/88	187	4.415	3.090	0.001391	0.000990	0.000315	0.000320	-0.000005	-1.662
07/06/88	188	2.060	4.270	0.000627	0.001304	0.000304	0.000305	-0.000001	-0.419
07/07/88	189	2.480	2.345	0.000783	0.000730	0.000316	0.000311	0.000005	1.457
07/08/88	190	3.345	8.635	0.001064	0.002686	0.000318	0.000311	0.000007	2.164
07/11/88	193	5.595	5.055	0.001701	0.001571	0.000304	0.000311	-0.000007	-2.246
07/12/88	194	2.710	3.080	0.000849	0.000936	0.000313	0.000304	0.000009	3.028
07/13/88	195	2.750	2.190	0.000874	0.000683	0.000318	0.000312	0.000006	1.808
07/14/88	196	3.275	3.210	0.001028	0.000996	0.000314	0.000310	0.000004	1.139

TABLE G-1. DAILY CALIBRATION DATA SUMMARY (CHANNEL A)

Calib. Date	Julian Calib. Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Calib. Factor	Final Calib. Factor	(Drift) Calib. Factor	(% Drift) Calib. Factor
07/15/88	197	0.000	3.650	0.000000	0.001110	0.000304	0.000304	-0.000000	-0.074
07/18/88	200	6.690	6.690	0.002073	0.002073	0.000310	0.000310	0.000000	0.000
07/19/88	201	3.905	4.500	0.001161	0.001355	0.000297	0.000301	-0.000004	-1.253
07/20/88	202	4.355	3.590	0.001349	0.001120	0.000310	0.000312	-0.000002	-0.674
07/21/88	203	2.900	4.695	0.000892	0.001436	0.000308	0.000306	0.000002	0.537
07/22/88	204	2.480	2.530	0.000768	0.000810	0.000310	0.000320	-0.000011	-3.445
07/25/88	207	3.850	3.850	0.001199	0.001199	0.000311	0.000311	0.000000	0.000
07/26/88	208	2.490	2.185	0.000828	0.000682	0.000333	0.000312	0.000021	6.212
07/27/88	209	1.645	1.585	0.000517	0.000495	0.000314	0.000312	0.000002	0.683
07/28/88	210	5.620	2.835	0.001714	0.000867	0.000305	0.000306	-0.000001	-0.293
07/29/88	211	2.840	2.840	0.000869	0.000869	0.000306	0.000306	0.000000	0.000
08/01/88	214	5.310	4.575	0.001647	0.001444	0.000310	0.000316	-0.000006	-1.813
08/02/88	215	1.845	1.845	0.000572	0.000572	0.000310	0.000310	0.000000	0.000
08/03/88	216	3.380	3.715	0.001064	0.001153	0.000315	0.000310	0.000005	1.456
08/04/88	217	1.750	2.775	0.000554	0.000842	0.000316	0.000303	0.000013	4.116
08/05/88	218	4.200	3.155	0.001280	0.000982	0.000305	0.000311	-0.000006	-2.123
08/08/88	221	3.610	2.870	0.001124	0.000882	0.000311	0.000307	0.000004	1.265
08/09/88	222	3.795	2.715	0.001160	0.000831	0.000306	0.000306	-0.000001	-0.189
08/10/88	223	7.060	2.855	0.002161	0.000884	0.000306	0.000310	-0.000004	-1.205
08/11/88	224	3.910	2.700	0.001179	0.000824	0.000302	0.000305	-0.000004	-1.210
08/12/88	225	0.995	1.510	0.000306	0.000476	0.000307	0.000315	-0.000008	-2.515
08/15/88	228	8.170	3.595	0.002450	0.001100	0.000300	0.000306	-0.000006	-1.997
08/16/88	229	1.500	8.085	0.000460	0.002534	0.000307	0.000313	-0.000007	-2.231
08/17/88	230	2.855	2.855	0.000873	0.000873	0.000306	0.000306	0.000000	0.000
08/18/88	231	2.105	2.200	0.000643	0.000696	0.000305	0.000316	-0.000011	-3.547
08/19/88	232	0.670	0.670	0.000203	0.000203	0.000303	0.000303	0.000000	0.000
08/22/88	235	3.160	3.160	0.000948	0.000948	0.000300	0.000300	0.000000	0.000
08/23/88	236	1.975	3.280	0.000624	0.001026	0.000316	0.000313	0.000003	0.944
08/24/88	237	1.605	1.065	0.000486	0.000328	0.000303	0.000308	-0.000005	-1.675
08/25/88	238	4.190	1.970	0.001287	0.000618	0.000307	0.000313	-0.000006	-2.023
08/26/88	239	1.715	6.805	0.000514	0.002074	0.000300	0.000305	-0.000005	-1.642
08/29/88	242	6.325	6.325	0.001913	0.001913	0.000302	0.000302	0.000000	0.000
08/30/88	243	6.370	4.635	0.001931	0.001418	0.000303	0.000306	-0.000003	-0.911
08/31/88	244	4.285	7.295	0.001300	0.002238	0.000303	0.000307	-0.000003	-1.150
09/01/88	245	4.190	6.870	0.001253	0.002187	0.000299	0.000318	-0.000019	-6.473
09/02/88	246	9.280	9.280	0.002829	0.002829	0.000305	0.000305	0.000000	0.000
09/06/88	250	7.345	7.810	0.002222	0.002512	0.000303	0.000322	-0.000019	-6.287
09/07/88	251	3.025	2.825	0.000950	0.000876	0.000314	0.000310	0.000004	1.222
09/08/88	252	2.585	0.995	0.000805	0.000316	0.000311	0.000317	-0.000006	-1.929
09/09/88	253	3.650	3.650	0.001136	0.001136	0.000311	0.000311	0.000000	0.000
09/12/88	256	4.370	4.370	0.001357	0.001357	0.000310	0.000310	0.000000	0.000
09/13/88	257	1.315	2.695	0.000411	0.000833	0.000313	0.000309	0.000004	1.250
09/14/88	258	5.650	1.065	0.001793	0.000335	0.000317	0.000314	0.000003	0.968
09/15/88	259	0.865	1.960	0.000267	0.000622	0.000308	0.000317	-0.000009	-2.844
09/16/88	260	6.045	0.000	0.001896	0.000000	0.000314	0.000320	-0.000007	-2.115
09/19/88	263	4.955	0.000	0.001546	0.000000	0.000312	0.000313	-0.000001	-0.374
09/20/88	264	1.390	0.000	0.000445	0.000000	0.000320	0.000313	0.000007	2.104
09/21/88	265	2.890	1.680	0.000894	0.000526	0.000309	0.000313	-0.000004	-1.209
09/22/88	266	0.000	1.575	0.000000	0.000504	0.000314	0.000320	-0.000006	-1.826

TABLE G-1. DAILY CALIBRATION DATA SUMMARY (CHANNEL A)

Calib. Date	Julian Calib. Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Calib. Factor	Final Calib. Factor	(Drift) Calib. Factor	(% Drift) Calib. Factor
09/23/88	267	2.435	2.570	0.000766	0.000807	0.000315	0.000314	0.000001	0.181
09/26/88	270	2.110	2.110	0.000647	0.000647	0.000307	0.000307	0.000000	0.000
09/27/88	271	1.225	7.170	0.000380	0.002241	0.000310	0.000313	-0.000002	-0.718
09/28/88	272	2.940	5.875	0.000913	0.001814	0.000311	0.000309	0.000002	0.588
09/29/88	273	0.795	0.795	0.000245	0.000245	0.000308	0.000308	0.000000	0.000
09/30/88	274	1.045	1.045	0.000325	0.000325	0.000311	0.000311	0.000000	0.000
10/03/88	277	2.560	2.560	0.000796	0.000796	0.000311	0.000311	0.000000	0.000
10/04/88	278	4.480	0.785	0.001401	0.000248	0.000313	0.000316	-0.000003	-0.983
10/21/88	295	3.195	3.195	0.001010	0.001010	0.000316	0.000316	0.000000	0.000
10/25/88	299	3.265	3.265	0.001019	0.001019	0.000312	0.000312	0.000000	0.000

TABLE G-2. DAILY CALIBRATION DATA SUMMARY (CHANNEL B)

Calib. Date	Julian Calib. Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Calib. Factor	Final Calib. Factor	(Drift) Calib. Factor	(% Drift) Calib. Factor
04/14/88	105	0.000	0.000	0.000000	0.000000	0.000320	0.000320	0.000000	0.000
04/18/88	109	0.000	0.000	0.000000	0.000000	0.000314	0.000314	0.000000	0.000
04/19/88	110	1.055	1.055	0.000328	0.000328	0.000311	0.000311	0.000000	0.000
04/20/88	111	2.500	2.500	0.000768	0.000768	0.000307	0.000307	0.000000	0.000
04/22/88	113	0.000	0.000	0.000000	0.000000	0.000309	0.000309	0.000000	0.000
04/26/88	117	0.000	0.000	0.000000	0.000000	0.000310	0.000310	0.000000	0.000
04/28/88	119	0.000	0.000	0.000000	0.000000	0.000309	0.000309	0.000000	0.000
04/29/88	120	0.000	0.000	0.000000	0.000000	0.000312	0.000312	0.000000	0.000
05/02/88	123	0.000	0.000	0.000000	0.000000	0.000310	0.000310	0.000000	0.000
05/04/88	125	0.000	0.000	0.000000	0.000000	0.000319	0.000319	0.000000	0.000
05/06/88	127	0.000	0.000	0.000000	0.000000	0.000308	0.000308	0.000000	0.000
05/10/88	131	0.000	0.000	0.000000	0.000000	0.000314	0.000314	0.000000	0.000
05/12/88	133	0.000	0.000	0.000000	0.000000	0.000309	0.000309	0.000000	0.000
05/16/88	137	0.000	0.000	0.000000	0.000000	0.000308	0.000308	0.000000	0.000
05/20/88	141	0.000	0.000	0.000000	0.000000	0.000310	0.000310	0.000000	0.000
05/24/88	145	0.000	0.000	0.000000	0.000000	0.000311	0.000311	0.000000	0.000
05/25/88	146	0.000	0.000	0.000000	0.000000	0.000307	0.000307	0.000000	0.000
05/26/88	147	0.000	0.000	0.000000	0.000000	0.000315	0.000315	0.000000	0.000
05/31/88	152	0.000	0.000	0.000000	0.000000	0.000313	0.000313	0.000000	0.000
06/01/88	153	0.000	0.000	0.000000	0.000000	0.000315	0.000315	0.000000	0.000
06/03/88	155	0.000	0.000	0.000000	0.000000	0.000312	0.000312	0.000000	0.000
06/06/88	158	0.000	2.330	0.000000	0.000757	0.000316	0.000325	-0.000008	-2.677
06/07/88	159	0.000	0.000	0.000000	0.000000	0.000330	0.000322	0.000008	2.538
06/08/88	160	0.000	0.745	0.000000	0.000235	0.000315	0.000315	-0.000000	-0.065
06/09/88	161	0.000	3.230	0.000000	0.001024	0.000310	0.000317	-0.000007	-2.148
06/10/88	162	0.000	1.085	0.000000	0.000344	0.000327	0.000317	0.000010	3.027
06/13/88	165	0.000	0.000	0.000000	0.000000	0.000316	0.000309	0.000007	2.272
06/14/88	166	0.000	1.980	0.000000	0.000635	0.000320	0.000321	-0.000001	-0.290
06/15/88	167	0.000	0.000	0.000000	0.000000	0.000323	0.000324	-0.000001	-0.248
06/16/88	168	0.000	0.000	0.000000	0.000000	0.000312	0.000313	-0.000001	-0.345
06/17/88	169	0.000	0.000	0.000000	0.000000	0.000323	0.000323	0.000001	0.240
06/20/88	172	0.000	0.000	0.000000	0.000000	0.000312	0.000318	-0.000006	-1.880
06/21/88	173	0.000	1.280	0.000000	0.000404	0.000321	0.000316	0.000005	1.641
06/22/88	174	0.605	1.700	0.000188	0.000535	0.000311	0.000314	-0.000004	-1.205
06/23/88	175	4.355	0.000	0.001401	0.000000	0.000322	0.000320	0.000002	0.524
06/24/88	176	0.000	0.000	0.000000	0.000000	0.000315	0.000316	-0.000000	-0.111
06/27/88	179	0.000	0.000	0.000000	0.000000	0.000309	0.000309	0.000000	0.000
06/28/88	180	0.000	0.000	0.000000	0.000000	0.000319	0.000310	0.000008	2.558
06/29/88	181	0.000	0.000	0.000000	0.000000	0.000312	0.000312	-0.000000	-0.131
06/30/88	182	0.000	0.000	0.000000	0.000000	0.000311	0.000309	0.000002	0.613
07/01/88	183	0.000	1.615	0.000000	0.000500	0.000309	0.000310	-0.000000	-0.149
07/05/88	187	1.510	2.970	0.000490	0.000957	0.000324	0.000322	0.000002	0.576
07/06/88	188	6.970	0.000	0.002164	0.000000	0.000310	0.000314	-0.000004	-1.182
07/07/88	189	0.000	0.000	0.000000	0.000000	0.000322	0.000318	0.000004	1.254
07/08/88	190	3.420	4.585	0.001101	0.001477	0.000322	0.000322	-0.000000	-0.083
07/11/88	193	4.445	2.760	0.001391	0.000861	0.000313	0.000312	0.000001	0.284
07/12/88	194	0.000	0.000	0.000000	0.000000	0.000321	0.000319	0.000003	0.834
07/13/88	195	0.000	0.000	0.000000	0.000000	0.000324	0.000315	0.000009	2.842
07/14/88	196	0.000	0.000	0.000000	0.000000	0.000320	0.000319	0.000001	0.300

TABLE G-2. DAILY CALIBRATION DATA SUMMARY (CHANNEL B)

Calib. Date	Julian Calib. Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Calib. Factor	Final Calib. Factor	(Drift) Calib. Factor	(% Drift) Calib. Factor
07/15/88	197	0.000	0.000	0.000000	0.000000	0.000308	0.000311	-0.000003	-1.082
07/18/88	200	4.740	4.740	0.001514	0.001514	0.000319	0.000319	0.000000	0.000
07/19/88	201	0.000	2.775	0.000000	0.000871	0.000312	0.000314	-0.000002	-0.700
07/20/88	202	1.175	0.000	0.000379	0.000000	0.000322	0.000321	0.000002	0.494
07/21/88	203	2.035	2.270	0.000633	0.000710	0.000311	0.000313	-0.000002	-0.576
07/22/88	204	0.000	0.000	0.000000	0.000000	0.000317	0.000322	-0.000004	-1.274
07/25/88	207	0.000	0.000	0.000000	0.000000	0.000317	0.000317	0.000000	0.000
07/26/88	208	2.580	0.000	0.000811	0.000000	0.000314	0.000321	-0.000007	-2.118
07/27/88	209	0.000	0.000	0.000000	0.000000	0.000320	0.000318	0.000002	0.672
07/28/88	210	2.795	0.000	0.000867	0.000000	0.000310	0.000316	-0.000006	-1.972
07/29/88	211	0.000	0.000	0.000000	0.000000	0.000313	0.000313	0.000000	0.000
08/01/88	214	0.000	1.705	0.000000	0.000542	0.000312	0.000318	-0.000006	-1.897
08/02/88	215	0.000	0.000	0.000000	0.000000	0.000312	0.000312	0.000000	0.000
08/03/88	216	0.000	0.000	0.000000	0.000000	0.000321	0.000310	0.000011	3.325
08/04/88	217	1.275	0.000	0.000406	0.000000	0.000319	0.000317	0.000002	0.625
08/05/88	218	0.000	0.000	0.000000	0.000000	0.000309	0.000317	-0.000008	-2.643
08/08/88	221	0.000	0.000	0.000000	0.000000	0.000315	0.000317	-0.000003	-0.848
08/09/88	222	4.665	0.710	0.001435	0.000221	0.000308	0.000311	-0.000003	-1.125
08/10/88	223	0.000	0.000	0.000000	0.000000	0.000318	0.000319	-0.000000	-0.118
08/11/88	224	0.000	0.000	0.000000	0.000000	0.000310	0.000309	0.000001	0.274
08/12/88	225	6.745	0.000	0.002146	0.000000	0.000318	0.000321	-0.000003	-0.872
08/15/88	228	0.000	0.000	0.000000	0.000000	0.000313	0.000317	-0.000004	-1.408
08/16/88	229	0.000	3.850	0.000000	0.001236	0.000314	0.000321	-0.000008	-2.402
08/17/88	230	0.000	0.000	0.000000	0.000000	0.000312	0.000312	0.000000	0.000
08/18/88	231	0.000	0.000	0.000000	0.000000	0.000313	0.000320	-0.000007	-2.210
08/19/88	232	0.000	0.000	0.000000	0.000000	0.000309	0.000309	0.000000	0.000
08/22/88	235	2.435	2.435	0.000755	0.000755	0.000310	0.000310	0.000000	0.000
08/23/88	236	1.945	0.000	0.000621	0.000000	0.000319	0.000318	0.000001	0.409
08/24/88	237	4.825	0.000	0.001477	0.000000	0.000306	0.000316	-0.000009	-3.060
08/25/88	238	1.035	3.270	0.000327	0.001035	0.000316	0.000317	-0.000000	-0.044
08/26/88	239	2.505	2.930	0.000756	0.000904	0.000302	0.000308	-0.000007	-2.246
08/29/88	242	1.595	1.595	0.000488	0.000488	0.000306	0.000306	0.000000	0.000
08/30/88	243	4.535	3.260	0.001378	0.001005	0.000304	0.000308	-0.000004	-1.456
08/31/88	244	2.655	5.190	0.000817	0.001628	0.000308	0.000314	-0.000006	-1.892
09/01/88	245	2.655	2.930	0.000826	0.000935	0.000311	0.000319	-0.000008	-2.594
09/02/88	246	2.900	2.900	0.000902	0.000902	0.000311	0.000311	0.000000	0.000
09/06/88	250	6.005	6.570	0.001838	0.002067	0.000306	0.000315	-0.000009	-2.794
09/07/88	251	0.000	0.000	0.000000	0.000000	0.000316	0.000317	-0.000001	-0.215
09/08/88	252	0.000	0.000	0.000000	0.000000	0.000314	0.000317	-0.000003	-1.032
09/09/88	253	0.000	0.000	0.000000	0.000000	0.000317	0.000317	0.000000	0.000
09/12/88	256	0.000	0.000	0.000000	0.000000	0.000313	0.000313	0.000000	0.000
09/13/88	257	5.100	0.000	0.001625	0.000000	0.000319	0.000323	-0.000004	-1.325
09/14/88	258	0.000	0.000	0.000000	0.000000	0.000319	0.000321	-0.000002	-0.731
09/15/88	259	1.055	0.000	0.000336	0.000000	0.000319	0.000324	-0.000006	-1.827
09/16/88	260	6.045	0.000	0.001931	0.000000	0.000320	0.000325	-0.000006	-1.838
09/19/88	263	0.000	0.000	0.000000	0.000000	0.000314	0.000316	-0.000002	-0.735
09/20/88	264	4.545	0.000	0.001473	0.000000	0.000324	0.000320	0.000004	1.319
09/21/88	265	0.000	0.000	0.000000	0.000000	0.000313	0.000314	-0.000001	-0.449
09/22/88	266	0.000	0.000	0.000000	0.000000	0.000319	0.000323	-0.000004	-1.351

TABLE G-2. DAILY CALIBRATION DATA SUMMARY (CHANNEL B)

Calib. Date	Julian Calib. Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Calib. Factor	Final Calib. Factor	(Drift) Calib. Factor	(% Drift) Calib. Factor
09/23/88	267	0.000	0.000	0.000000	0.000000	0.000317	0.000317	-0.000001	-0.224
09/26/88	270	0.000	0.000	0.000000	0.000000	0.000312	0.000312	0.000000	0.000
09/27/88	271	0.000	0.000	0.000000	0.000000	0.000315	0.000316	-0.000002	-0.497
09/28/88	272	2.035	1.895	0.000642	0.000589	0.000316	0.000311	0.000005	1.572
09/29/88	273	0.000	0.000	0.000000	0.000000	0.000314	0.000314	0.000000	0.000
09/30/88	274	0.000	0.000	0.000000	0.000000	0.000317	0.000317	0.000000	0.000
10/03/88	277	0.000	0.000	0.000000	0.000000	0.000313	0.000313	0.000000	0.000
10/04/88	278	4.995	0.000	0.001602	0.000000	0.000321	0.000323	-0.000002	-0.573
10/21/88	295	0.505	0.505	0.000162	0.000162	0.000321	0.000321	0.000000	0.000
10/25/88	299	0.000	0.000	0.000000	0.000000	0.000315	0.000315	0.000000	0.000

TABLE G-3. DAILY CALIBRATION DATA SUMMARY (CHANNEL C)

Calib. Date	Julian Calib. Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Calib. Factor	Final Calib. Factor	(Drift) Calib. Factor	(% Drift) Calib. Factor
04/13/88	104	0.875	0.875	0.000270	0.000270	0.000308	0.000308	0.000000	0.000
04/14/88	105	0.000	0.000	0.000000	0.000000	0.000327	0.000327	0.000000	0.000
04/15/88	106	0.895	0.895	0.000281	0.000281	0.000314	0.000314	0.000000	0.000
04/19/88	110	0.000	0.000	0.000000	0.000000	0.000310	0.000310	0.000000	0.000
04/20/88	111	1.550	1.550	0.000483	0.000483	0.000312	0.000312	0.000000	0.000
04/21/88	112	1.075	1.075	0.000334	0.000334	0.000311	0.000311	0.000000	0.000
04/25/88	116	1.170	1.170	0.000364	0.000364	0.000311	0.000311	0.000000	0.000
04/27/88	118	0.000	0.000	0.000000	0.000000	0.000307	0.000307	0.000000	0.000
04/29/88	120	0.000	0.000	0.000000	0.000000	0.000316	0.000316	0.000000	0.000
05/03/88	124	2.550	2.550	0.000802	0.000802	0.000314	0.000314	0.000000	0.000
05/05/88	126	0.000	0.000	0.000000	0.000000	0.000315	0.000315	0.000000	0.000
05/09/88	130	0.000	0.000	0.000000	0.000000	0.000312	0.000312	0.000000	0.000
05/11/88	132	0.000	0.000	0.000000	0.000000	0.000315	0.000315	0.000000	0.000
05/13/88	134	0.000	0.000	0.000000	0.000000	0.000314	0.000314	0.000000	0.000
05/17/88	138	1.910	1.910	0.000596	0.000596	0.000312	0.000312	0.000000	0.000
05/18/88	139	0.000	0.000	0.000000	0.000000	0.000302	0.000302	0.000000	0.000
05/19/88	140	0.000	0.000	0.000000	0.000000	0.000312	0.000312	0.000000	0.000
05/23/88	144	0.000	0.000	0.000000	0.000000	0.000313	0.000313	0.000000	0.000
05/24/88	145	0.000	0.000	0.000000	0.000000	0.000311	0.000311	0.000000	0.000
05/25/88	146	0.000	0.000	0.000000	0.000000	0.000315	0.000315	0.000000	0.000
05/27/88	147	0.000	0.000	0.000000	0.000000	0.000310	0.000310	0.000000	0.000
06/01/88	153	0.000	0.000	0.000000	0.000000	0.000314	0.000314	0.000000	0.000
06/02/88	154	2.655	2.655	0.000841	0.000841	0.000317	0.000317	0.000000	0.000
06/06/88	158	0.065	0.000	0.000020	0.000000	0.000313	0.000312	0.000000	0.085
06/07/88	159	0.000	0.000	0.000000	0.000000	0.000307	0.000311	-0.000004	-1.260
06/08/88	160	0.000	0.000	0.000000	0.000000	0.000304	0.000312	-0.000008	-2.575
06/09/88	161	0.000	0.000	0.000000	0.000000	0.000311	0.000315	-0.000004	-1.365
06/10/88	162	0.000	0.000	0.000000	0.000000	0.000311	0.000311	-0.000000	-0.141
06/13/88	165	1.895	0.000	0.000619	0.000000	0.000327	0.000330	-0.000003	-0.814
06/14/88	166	0.000	5.940	0.000000	0.001868	0.000314	0.000314	-0.000000	-0.039
06/15/88	167	0.000	0.000	0.000000	0.000000	0.000315	0.000333	-0.000017	-5.447
06/16/88	168	0.000	0.000	0.000000	0.000000	0.000326	0.000331	-0.000006	-1.796
06/17/88	169	0.000	0.000	0.000000	0.000000	0.000310	0.000313	-0.000003	-0.827
06/20/88	172	0.000	0.000	0.000000	0.000000	0.000331	0.000328	0.000003	0.881
06/21/88	173	0.000	0.000	0.000000	0.000000	0.000314	0.000316	-0.000002	-0.658
06/22/88	174	0.000	0.385	0.000000	0.000126	0.000328	0.000328	-0.000000	-0.070
06/23/88	175	0.000	0.000	0.000000	0.000000	0.000310	0.000314	-0.000004	-1.314
06/24/88	176	0.000	0.000	0.000000	0.000000	0.000326	0.000334	-0.000008	-2.363
06/27/88	179	0.000	0.000	0.000000	0.000000	0.000310	0.000310	0.000000	0.000
06/28/88	180	0.000	1.705	0.000000	0.000553	0.000312	0.000325	-0.000012	-3.860
06/29/88	181	8.835	0.000	0.002846	0.000000	0.000322	0.000317	0.000005	1.474
06/30/88	182	0.000	4.340	0.000000	0.001377	0.000314	0.000317	-0.000003	-0.929
07/01/88	183	0.000	1.490	0.000000	0.000483	0.000316	0.000324	-0.000008	-2.428
07/05/88	187	0.000	0.000	0.000000	0.000000	0.000304	0.000319	-0.000015	-4.886
07/06/88	188	1.875	6.165	0.000607	0.001989	0.000324	0.000323	0.000001	0.358
07/07/88	189	3.580	4.390	0.001118	0.001427	0.000312	0.000325	-0.000013	-4.066
07/08/88	190	7.750	3.175	0.002555	0.001043	0.000330	0.000329	0.000001	0.334
07/11/88	193	0.000	0.000	0.000000	0.000000	0.000324	0.000325	-0.000001	-0.207
07/12/88	194	0.000	0.000	0.000000	0.000000	0.000309	0.000309	-0.000001	-0.224

TABLE G-3. DAILY CALIBRATION DATA SUMMARY (CHANNEL C)

Calib. Date	Julian Calib. Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Calib. Factor	Final Calib. Factor	(Drift) Calib. Factor	(% Drift) Calib. Factor
07/13/88	195	0.000	0.625	0.000000	0.000203	0.000327	0.000324	0.000003	0.796
07/14/88	196	0.000	0.000	0.000000	0.000000	0.000312	0.000315	-0.000003	-0.947
07/15/88	197	0.000	0.000	0.000000	0.000000	0.000310	0.000323	-0.000013	-4.297
07/18/88	200	0.000	0.000	0.000000	0.000000	0.000308	0.000308	0.000000	0.000
07/19/88	201	0.000	0.805	0.000000	0.000264	0.000318	0.000328	-0.000009	-2.890
07/20/88	202	1.595	0.635	0.000514	0.000204	0.000322	0.000321	0.000001	0.368
07/21/88	203	0.000	0.000	0.000000	0.000000	0.000321	0.000323	-0.000002	-0.547
07/22/88	204	0.000	0.000	0.000000	0.000000	0.000309	0.000314	-0.000005	-1.634
07/25/88	207	0.000	0.000	0.000000	0.000000	0.000319	0.000319	0.000000	0.000
07/26/88	208	0.000	2.120	0.000000	0.000668	0.000311	0.000315	-0.000004	-1.331
07/27/88	209	0.910	0.000	0.000289	0.000000	0.000317	0.000324	-0.000007	-2.328
07/28/88	210	0.000	0.800	0.000000	0.000259	0.000316	0.000324	-0.000008	-2.407
07/29/88	211	0.000	0.000	0.000000	0.000000	0.000329	0.000329	0.000000	0.000
08/01/88	214	0.000	3.740	0.000000	0.001188	0.000319	0.000318	0.000002	0.606
08/02/88	215	4.350	4.350	0.001420	0.001420	0.000326	0.000326	0.000000	0.000
08/03/88	216	0.230	0.000	0.000074	0.000000	0.000321	0.000322	-0.000001	-0.189
08/04/88	217	0.000	0.000	0.000000	0.000000	0.000310	0.000320	-0.000011	-3.506
08/05/88	218	0.150	0.000	0.000048	0.000000	0.000320	0.000324	-0.000004	-1.119
08/08/88	221	0.000	0.000	0.000000	0.000000	0.000320	0.000319	0.000001	0.436
08/09/88	222	0.000	5.415	0.000000	0.001725	0.000318	0.000319	-0.000000	-0.103
08/10/88	223	3.230	0.000	0.001025	0.000000	0.000317	0.000325	-0.000008	-2.480
08/11/88	224	0.000	0.000	0.000000	0.000000	0.000321	0.000325	-0.000004	-1.168
08/12/88	225	0.000	0.000	0.000000	0.000000	0.000319	0.000319	-0.000001	-0.160
08/15/88	228	0.000	0.000	0.000000	0.000000	0.000323	0.000324	-0.000001	-0.452
08/16/88	229	0.000	0.000	0.000000	0.000000	0.000318	0.000316	0.000003	0.883
08/17/88	230	0.000	0.000	0.000000	0.000000	0.000325	0.000325	0.000000	0.000
08/18/88	231	0.000	0.000	0.000000	0.000000	0.000320	0.000322	-0.000003	-0.827
08/19/88	232	0.000	0.000	0.000000	0.000000	0.000318	0.000318	0.000000	0.000
08/22/88	235	0.000	0.000	0.000000	0.000000	0.000319	0.000319	0.000000	0.000
08/23/88	236	0.565	0.000	0.000179	0.000000	0.000317	0.000322	-0.000005	-1.539
08/24/88	237	0.000	0.000	0.000000	0.000000	0.000320	0.000325	-0.000006	-1.767
08/25/88	238	0.000	0.000	0.000000	0.000000	0.000317	0.000309	0.000008	2.457
08/26/88	239	0.000	3.645	0.000000	0.001163	0.000312	0.000319	-0.000007	-2.196
08/29/88	242	2.990	2.990	0.000929	0.000929	0.000311	0.000311	0.000000	0.000
08/30/88	243	6.120	4.215	0.001886	0.001305	0.000308	0.000310	-0.000001	-0.435
08/31/88	244	10.005	4.335	0.003138	0.001335	0.000314	0.000308	0.000006	1.822
09/01/88	245	0.985	1.760	0.000308	0.000598	0.000313	0.000340	-0.000027	-8.535
09/02/88	246	0.000	0.000	0.000000	0.000000	0.000310	0.000310	0.000000	0.000
09/06/88	250	7.075	5.230	0.002141	0.001754	0.000303	0.000335	-0.000033	-10.837
09/07/88	251	0.000	1.650	0.000000	0.000531	0.000319	0.000322	-0.000003	-0.833
09/08/88	252	0.000	3.220	0.000000	0.001053	0.000322	0.000327	-0.000005	-1.600
09/09/88	253	0.000	0.000	0.000000	0.000000	0.000319	0.000319	0.000000	0.000
09/12/88	256	0.000	0.000	0.000000	0.000000	0.000327	0.000327	0.000000	0.000
09/13/88	257	0.000	4.240	0.000000	0.001380	0.000318	0.000326	-0.000007	-2.330
09/14/88	258	0.920	0.000	0.000296	0.000000	0.000321	0.000326	-0.000004	-1.391
09/15/88	259	0.000	0.000	0.000000	0.000000	0.000328	0.000327	0.000001	0.186
09/16/88	260	0.000	0.000	0.000000	0.000000	0.000322	0.000325	-0.000003	-0.915
09/19/88	263	0.000	0.000	0.000000	0.000000	0.000320	0.000323	-0.000003	-1.046
09/20/88	264	0.000	0.000	0.000000	0.000000	0.000318	0.000322	-0.000004	-1.356

TABLE G-3. DAILY CALIBRATION DATA SUMMARY (CHANNEL C)

Calib. Date	Julian Calib. Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Calib. Factor	Final Calib. Factor	(Drift) Calib. Factor	(% Drift) Calib. Factor
09/21/88	265	0.000	6.590	0.000000	0.002134	0.000319	0.000324	-0.000005	-1.527
09/22/88	266	0.000	3.805	0.000000	0.001219	0.000321	0.000320	0.000000	0.064
09/23/88	267	0.000	7.770	0.000000	0.002526	0.000324	0.000325	-0.000001	-0.231
09/27/88	271	3.640	3.640	0.001152	0.001152	0.000317	0.000317	0.000000	0.000
09/28/88	272	0.855	3.075	0.000274	0.000970	0.000320	0.000316	0.000005	1.505
09/29/88	273	0.000	0.000	0.000000	0.000000	0.000313	0.000313	0.000000	0.000
09/30/88	274	3.780	3.780	0.001187	0.001187	0.000314	0.000314	0.000000	0.000
10/03/88	277	0.000	0.000	0.000000	0.000000	0.000312	0.000312	0.000000	0.000
10/04/88	278	0.000	0.680	0.000000	0.000213	0.000312	0.000313	-0.000002	-0.504
10/05/88	279	0.390	0.390	0.000123	0.000123	0.000316	0.000316	0.000000	0.000
10/06/88	280	2.535	2.535	0.000800	0.000800	0.000315	0.000315	0.000000	0.000
10/07/88	251	0.000	0.000	0.000000	0.000000	0.000314	0.000314	0.000000	0.000
10/12/88	286	4.275	4.275	0.001343	0.001343	0.000314	0.000314	0.000000	0.000
10/18/88	292	1.085	1.085	0.000356	0.000356	0.000328	0.000328	0.000000	0.000

TABLE G-4. DAILY CALIBRATION DATA SUMMARY (CHANNEL D)

Calib. Date	Julian Calib. Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Calib. Factor	Final Calib. Factor	(Drift) Calib. Factor	(% Drift) Calib. Factor
04/13/88	104	0.000	0.000	0.000000	0.000000	0.000300	0.000300	0.000000	0.000
04/14/88	105	0.000	0.000	0.000000	0.000000	0.000335	0.000335	0.000000	0.000
04/15/88	106	0.000	0.000	0.000000	0.000000	0.000302	0.000302	0.000000	0.000
04/19/88	110	0.000	0.000	0.000000	0.000000	0.000302	0.000302	0.000000	0.000
04/20/88	111	0.000	0.000	0.000000	0.000000	0.000303	0.000303	0.000000	0.000
04/21/88	112	0.000	0.000	0.000000	0.000000	0.000304	0.000304	0.000000	0.000
04/25/88	116	0.000	0.000	0.000000	0.000000	0.000302	0.000302	0.000000	0.000
04/27/88	118	0.000	0.000	0.000000	0.000000	0.000302	0.000302	0.000000	0.000
04/29/88	120	0.000	0.000	0.000000	0.000000	0.000307	0.000307	0.000000	0.000
05/03/88	124	0.000	0.000	0.000000	0.000000	0.000304	0.000304	0.000000	0.000
05/05/88	126	0.000	0.000	0.000000	0.000000	0.000304	0.000304	0.000000	0.000
05/09/88	130	0.000	0.000	0.000000	0.000000	0.000304	0.000304	0.000000	0.000
05/11/88	132	0.000	0.000	0.000000	0.000000	0.000302	0.000302	0.000000	0.000
05/13/88	134	0.000	0.000	0.000000	0.000000	0.000304	0.000304	0.000000	0.000
05/17/88	138	0.000	0.000	0.000000	0.000000	0.000304	0.000304	0.000000	0.000
05/18/88	139	0.390	0.390	0.000121	0.000121	0.000310	0.000310	0.000000	0.000
05/19/88	140	0.000	0.000	0.000000	0.000000	0.000305	0.000305	0.000000	0.000
05/23/88	144	0.000	0.000	0.000000	0.000000	0.000301	0.000301	0.000000	0.000
05/24/88	145	0.000	0.000	0.000000	0.000000	0.000302	0.000302	0.000000	0.000
05/25/88	146	0.000	0.000	0.000000	0.000000	0.000308	0.000308	0.000000	0.000
05/27/88	147	0.000	0.000	0.000000	0.000000	0.000305	0.000305	0.000000	0.000
06/01/88	153	0.000	0.000	0.000000	0.000000	0.000309	0.000309	0.000000	0.000
06/02/88	154	0.000	0.000	0.000000	0.000000	0.000308	0.000308	0.000000	0.000
06/06/88	158	0.000	0.000	0.000000	0.000000	0.000305	0.000301	0.000004	1.301
06/07/88	159	0.000	0.000	0.000000	0.000000	0.000304	0.000305	-0.000001	-0.321
06/08/88	160	0.000	0.000	0.000000	0.000000	0.000297	0.000306	-0.000009	-3.127
06/09/88	161	0.000	0.310	0.000000	0.000094	0.000304	0.000304	0.000000	0.121
06/10/88	162	0.000	0.000	0.000000	0.000000	0.000303	0.000303	-0.000001	-0.190
06/13/88	165	0.000	0.000	0.000000	0.000000	0.000330	0.000310	0.000020	6.160
06/14/88	166	0.000	0.000	0.000000	0.000000	0.000306	0.000304	0.000001	0.465
06/15/88	167	0.000	0.000	0.000000	0.000000	0.000307	0.000338	-0.000031	-10.011
06/16/88	168	0.000	0.000	0.000000	0.000000	0.000325	0.000333	-0.000008	-2.544
06/17/88	169	0.000	0.000	0.000000	0.000000	0.000303	0.000313	-0.000009	-3.013
06/20/88	172	0.000	3.210	0.000000	0.001049	0.000332	0.000327	0.000005	1.648
06/21/88	173	0.000	3.810	0.000000	0.001141	0.000300	0.000299	0.000000	0.149
06/22/88	174	0.000	0.000	0.000000	0.000000	0.000329	0.000323	0.000006	1.902
06/23/88	175	0.000	0.000	0.000000	0.000000	0.000303	0.000305	-0.000002	-0.770
06/24/88	176	0.000	12.720	0.000000	0.004109	0.000322	0.000323	-0.000001	-0.398
06/27/88	179	0.675	0.675	0.000198	0.000198	0.000294	0.000294	0.000000	0.000
06/28/88	180	0.000	0.000	0.000000	0.000000	0.000304	0.000326	-0.000022	-7.203
06/29/88	181	0.000	2.445	0.000000	0.000744	0.000313	0.000304	0.000009	2.801
06/30/88	182	3.400	3.205	0.001022	0.001025	0.000301	0.000320	-0.000019	-6.410
07/01/88	183	0.000	0.000	0.000000	0.000000	0.000311	0.000312	-0.000001	-0.255
07/05/88	187	0.000	6.540	0.000000	0.002036	0.000306	0.000311	-0.000006	-1.857
07/06/88	188	11.890	0.000	0.003927	0.000000	0.000330	0.000327	0.000003	0.908
07/07/88	189	5.305	0.000	0.001626	0.000000	0.000306	0.000313	-0.000007	-2.127
07/08/88	190	0.000	4.390	0.000000	0.001469	0.000330	0.000335	-0.000004	-1.259
07/11/88	193	0.000	1.370	0.000000	0.000449	0.000323	0.000328	-0.000005	-1.535
07/12/88	194	8.085	0.000	0.002467	0.000000	0.000305	0.000308	-0.000003	-1.041

TABLE G-4. DAILY CALIBRATION DATA SUMMARY (CHANNEL D)

Calib. Date	Julian Calib. Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Calib. Factor	Final Calib. Factor	(Drift) Calib. Factor	(% Drift) Calib. Factor
07/13/88	195	0.000	0.000	0.000000	0.000000	0.000328	0.000333	-0.000005	-1.601
07/14/88	196	0.000	3.055	0.000000	0.000960	0.000300	0.000314	-0.000014	-4.700
07/15/88	197	0.000	1.950	0.000000	0.000636	0.000302	0.000326	-0.000024	-7.877
07/18/88	200	0.000	0.000	0.000000	0.000000	0.000299	0.000299	0.000000	0.000
07/19/88	201	0.000	0.000	0.000000	0.000000	0.000322	0.000331	-0.000008	-2.523
07/20/88	202	0.000	3.475	0.000000	0.001101	0.000311	0.000317	-0.000005	-1.720
07/21/88	203	0.000	0.000	0.000000	0.000000	0.000326	0.000336	-0.000010	-3.123
07/22/88	204	0.000	0.000	0.000000	0.000000	0.000307	0.000306	0.000001	0.374
07/25/88	207	0.000	0.000	0.000000	0.000000	0.000307	0.000307	0.000000	0.000
07/26/88	208	7.525	2.305	0.002300	0.000696	0.000306	0.000302	0.000004	1.227
07/27/88	209	0.000	0.000	0.000000	0.000000	0.000306	0.000331	-0.000025	-8.028
07/28/88	210	0.000	1.545	0.000000	0.000504	0.000311	0.000326	-0.000016	-5.002
07/29/88	211	0.000	0.000	0.000000	0.000000	0.000313	0.000313	0.000000	0.000
08/01/88	214	3.045	0.000	0.000965	0.000000	0.000317	0.000323	-0.000006	-2.023
08/02/88	215	0.000	0.000	0.000000	0.000000	0.000330	0.000330	0.000000	0.000
08/03/88	216	0.000	0.000	0.000000	0.000000	0.000332	0.000330	0.000002	0.605
08/04/88	217	0.000	0.000	0.000000	0.000000	0.000310	0.000314	-0.000004	-1.233
08/05/88	218	0.720	0.000	0.000235	0.000000	0.000327	0.000329	-0.000002	-0.613
08/08/88	221	7.865	0.000	0.002520	0.000000	0.000320	0.000324	-0.000004	-1.123
08/09/88	222	0.000	0.000	0.000000	0.000000	0.000323	0.000315	0.000008	2.500
08/10/88	223	0.000	0.000	0.000000	0.000000	0.000324	0.000327	-0.000003	-1.026
08/11/88	224	0.000	0.000	0.000000	0.000000	0.000323	0.000330	-0.000007	-2.232
08/12/88	225	0.000	0.000	0.000000	0.000000	0.000319	0.000319	-0.000000	-0.004
08/15/88	228	0.000	0.000	0.000000	0.000000	0.000305	0.000328	-0.000023	-7.688
08/16/88	229	0.000	0.000	0.000000	0.000000	0.000322	0.000320	0.000002	0.697
08/17/88	230	0.000	0.000	0.000000	0.000000	0.000324	0.000324	0.000000	0.000
08/18/88	231	0.000	0.000	0.000000	0.000000	0.000324	0.000322	0.000002	0.485
08/19/88	232	6.870	6.870	0.002229	0.002229	0.000324	0.000324	0.000000	0.000
08/22/88	235	1.280	1.280	0.000416	0.000416	0.000325	0.000325	0.000000	0.000
08/23/88	236	0.000	0.000	0.000000	0.000000	0.000303	0.000325	-0.000021	-7.011
08/24/88	237	0.000	0.960	0.000000	0.000313	0.000326	0.000326	-0.000000	-0.109
08/25/88	238	0.000	0.000	0.000000	0.000000	0.000311	0.000304	0.000007	2.114
08/26/88	239	11.220	0.830	0.003466	0.000256	0.000309	0.000308	0.000001	0.332
08/29/88	242	2.835	2.835	0.000882	0.000882	0.000311	0.000311	0.000000	0.000
08/30/88	243	6.670	4.455	0.002012	0.001344	0.000302	0.000302	-0.000000	-0.001
08/31/88	244	6.265	2.340	0.001936	0.000729	0.000309	0.000312	-0.000003	-0.843
09/01/88	245	1.250	3.035	0.000383	0.001027	0.000306	0.000338	-0.000032	-10.448
09/02/88	246	1.850	1.850	0.000562	0.000562	0.000304	0.000304	0.000000	0.000
09/06/88	250	9.210	6.475	0.002706	0.002022	0.000294	0.000312	-0.000018	-6.271
09/07/88	251	0.000	0.290	0.000000	0.000091	0.000313	0.000313	-0.000000	-0.012
09/08/88	252	0.000	5.270	0.000000	0.001668	0.000312	0.000316	-0.000004	-1.399
09/09/88	253	1.760	1.760	0.000547	0.000547	0.000311	0.000311	0.000000	0.000
09/12/88	256	0.000	0.000	0.000000	0.000000	0.000317	0.000317	0.000000	0.000
09/13/88	257	0.000	9.105	0.000000	0.002903	0.000312	0.000319	-0.000007	-2.346
09/14/88	258	9.250	0.000	0.002906	0.000000	0.000314	0.000314	-0.000000	-0.013
09/15/88	259	7.585	1.025	0.002429	0.000328	0.000320	0.000320	0.000001	0.216
09/16/88	260	0.000	0.000	0.000000	0.000000	0.000321	0.000316	0.000005	1.616
09/19/88	263	0.000	0.000	0.000000	0.000000	0.000312	0.000317	-0.000005	-1.674
09/20/88	264	7.025	0.000	0.002193	0.000000	0.000312	0.000315	-0.000003	-0.821

TABLE G-4. DAILY CALIBRATION DATA SUMMARY (CHANNEL D)

Calib. Date	Julian Calib. Date	Initial Zero A.C.	Final Zero A.C.	Initial Zero ppmC	Final Zero ppmC	Initial Calib. Factor	Final Calib. Factor	(Drift) Calib. Factor	(% Drift) Calib. Factor
09/21/88	265	0.000	0.000	0.000000	0.000000	0.000312	0.000317	-0.000005	-1.725
09/22/88	266	0.000	4.605	0.000000	0.001451	0.000314	0.000315	-0.000002	-0.523
09/23/88	267	0.000	0.725	0.000000	0.000228	0.000317	0.000314	0.000003	0.999
09/26/88	270	4.305	4.305	0.001346	0.001346	0.000313	0.000313	0.000000	0.000
09/27/88	271	5.420	1.665	0.001706	0.000526	0.000315	0.000316	-0.000001	-0.311
09/28/88	272	6.555	6.640	0.002075	0.002076	0.000317	0.000313	0.000004	1.238
09/29/88	273	8.200	8.200	0.002566	0.002566	0.000313	0.000313	0.000000	0.000
09/30/88	274	0.000	0.000	0.000000	0.000000	0.000314	0.000314	0.000000	0.000
10/03/88	277	1.400	1.400	0.000437	0.000437	0.000312	0.000312	0.000000	0.000
10/04/88	278	0.000	2.180	0.000000	0.000683	0.000312	0.000313	-0.000002	-0.487
10/05/88	279	1.275	1.275	0.000399	0.000399	0.000313	0.000313	0.000000	0.000
10/06/88	280	2.140	2.140	0.000671	0.000671	0.000314	0.000314	0.000000	0.000
10/07/88	281	0.000	0.000	0.000000	0.000000	0.000313	0.000313	0.000000	0.000
10/12/88	286	3.590	3.590	0.001123	0.001123	0.000313	0.000313	0.000000	0.000

APPENDIX H

1988 NMOC IN-HOUSE QUALITY CONTROL SAMPLES

TABLE H-1. NMOC IN-HOUSE QUALITY CONTROL SAMPLES (CHANNEL A)

Date Analyzed	Julian Date Analyzed	QC I.D. Number	NMOC Calculated Concentration ppmC	NMOC Measured NMOC ppmC	NMOC Bias ppmC	NMOC Bias (%)
04/22/88	113	1015	2.180	2.057	-0.123	-5.647
04/26/88	117	1021	1.566	1.573	0.007	0.428
04/28/88	119	1032	17.775	17.035	-0.740	-4.162
05/02/88	123	1048	1.357	1.339	-0.018	-1.341
05/06/88	127	1062	0.840	0.841	0.001	0.071
05/10/88	131	1068	0.658	0.673	0.015	2.325
05/12/88	133	1079	0.545	0.553	0.008	1.486
05/16/88	137	1084	0.507	0.503	-0.004	-0.848
05/20/88	141	1114	0.360	0.393	0.033	9.167
05/24/88	145	1123	0.434	0.435	0.001	0.230
05/26/88	147	1132	0.560	0.555	-0.005	-0.893
05/31/88	152	1146	0.542	0.554	0.012	2.214
06/03/88	155	1153	0.553	0.605	0.052	9.403
06/06/88	158	1164	0.679	0.703	0.024	3.535
06/07/88	159	1169	0.725	0.764	0.039	5.379
06/10/88	162	1211	1.051	1.040	-0.011	-1.047
06/13/88	165	1277	1.057	1.063	0.006	0.568
06/15/88	166	1331	0.994	1.007	0.013	1.308
06/16/88	167	1332	0.892	0.917	0.025	2.803
06/17/88	168	1405	0.750	0.792	0.042	5.600
06/20/88	172	1456	0.680	0.701	0.021	3.088
06/21/88	173	1483	0.597	0.626	0.029	4.858
06/22/88	174	1511	0.515	0.528	0.013	2.524
06/23/88	175	1528	0.419	0.434	0.015	3.580
06/24/88	176	1578	0.382	0.384	0.002	0.524
06/27/88	179	1582	0.301	0.313	0.012	3.987
06/28/88	180	1649	0.200	0.204	0.004	2.000
07/01/88	183	1741	0.227	0.242	0.015	6.608
07/05/88	187	1783	0.198	0.200	0.002	1.010
07/06/88	188	1862	0.181	0.179	-0.002	-1.105
07/08/88	190	1894	0.113	0.125	0.012	10.619
07/11/88	193	1939	0.211	0.215	0.004	1.896
07/12/88	194	2004	0.269	0.271	0.002	0.743
07/14/88	196	2088	0.342	0.359	0.017	4.971
07/15/88	197	2091	0.478	0.497	0.019	3.975
07/18/88	200	2170	0.533	0.521	-0.012	-2.251
07/19/88	201	2171	0.570	0.560	-0.010	-1.754
07/20/88	202	2199	0.738	0.730	-0.008	-1.084
07/21/88	203	2286	0.750	0.737	-0.013	-1.733
07/25/88	207	2385	0.933	0.913	-0.020	-2.144
07/26/88	208	2416	1.030	1.107	0.077	7.476
07/27/88	209	2448	1.143	1.154	0.011	0.962
07/29/88	211	2497	1.056	1.026	-0.030	-2.841
08/01/88	214	2586	1.120	1.142	0.022	1.964
08/02/88	215	2621	1.029	1.051	0.022	2.138
08/03/88	216	2337	0.943	0.948	0.005	0.530
08/04/88	217	2695	0.840	0.752	-0.088	-10.476
08/08/88	221	2811	0.699	0.701	0.002	0.286
08/10/88	223	2845	0.574	0.572	-0.002	-0.348

TABLE H-1. NMOC IN-HOUSE QUALITY CONTROL SAMPLES (CHANNEL A)

Date Analyzed	Julian Date Analyzed	QC I.D. Number	NMOC Calculated Concentration ppmC	NMOC Measured NMOC ppmC	NMOC Bias ppmC	NMOC Bias (%)
08/11/88	224	2892	0.472	0.474	0.002	0.424
08/12/88	224	2970	0.438	0.448	0.010	2.283
08/15/88	228	3037	0.365	0.370	0.005	1.370
08/17/88	230	3125	0.320	0.331	0.011	3.438
08/18/88	231	3126	0.234	0.231	-0.003	-1.282
08/19/88	232	3201	0.134	0.126	-0.008	-5.970
08/22/88	235	3267	1.348	1.280	-0.068	-5.045
08/23/88	236	3306	0.178	0.171	-0.007	-3.933
08/25/88	238	3392	0.284	0.292	0.008	2.817
08/29/88	242	3433	0.436	0.432	-0.004	-0.917
08/30/88	243	3488	0.587	0.586	-0.001	-0.170
09/01/88	245	3531	2.258	2.129	-0.129	-5.713
09/02/88	246	3618	2.302	2.203	-0.099	-4.301
09/06/88	250	3725	1.914	1.884	-0.030	-1.567
09/08/88	252	3789	1.532	1.498	-0.034	-2.219
09/09/88	253	3843	1.022	1.033	0.011	1.076
09/12/88	256	3907	0.146	0.157	0.011	7.534
09/13/88	257	3908	0.154	0.157	0.003	1.948
09/15/88	259	4024	2.963	2.872	-0.091	-3.071
09/16/88	260	4065	0.160	0.177	0.017	10.625
09/19/88	263	4066	0.215	0.224	0.009	4.186
09/20/88	264	4151	0.290	0.311	0.021	7.241
09/22/88	266	4208	0.419	0.430	0.011	2.625
09/23/88	267	4244	0.469	0.487	0.018	3.838
09/28/88	272	4425	0.468	0.498	0.030	6.410
09/30/88	274	4523	0.627	0.669	0.042	6.699
10/03/88	277	4641	0.696	0.707	0.011	1.580

TABLE H-2. NMOC IN-HOUSE QUALITY CONTROL SAMPLES (CHANNEL B)

Date Analyzed	Julian Date Analyzed	QC I.D. Number	NMOC Calculated Concentration ppmC	NMOC Measured Conentration ppmC	NMOC Bias ppmC	NMOC Bias (%)
04/22/88	113	1015	2.180	2.049	-0.131	-6.023
04/26/88	117	1021	1.566	1.575	0.009	0.568
04/28/88	119	1032	17.775	17.129	-0.646	-3.637
05/02/88	123	1048	1.357	1.339	-0.018	-1.363
05/06/88	127	1062	0.840	0.848	0.008	0.940
05/10/88	131	1068	0.658	0.688	0.030	4.514
05/12/88	133	1079	0.545	0.555	0.010	1.761
05/16/88	137	1084	0.507	0.497	-0.010	-1.933
05/20/88	141	1114	0.360	0.396	0.036	10.000
05/24/88	145	1123	0.434	0.446	0.012	2.765
05/26/88	147	1132	0.560	0.566	0.006	1.071
05/31/88	152	1146	0.542	0.557	0.015	2.768
06/03/88	155	1153	0.553	0.603	0.050	9.042
06/06/88	158	1164	0.679	0.689	0.010	1.473
06/07/88	159	1169	0.725	0.740	0.015	2.069
06/10/88	162	1211	1.015	1.100	0.085	8.374
06/13/88	165	1277	1.057	1.088	0.031	2.933
06/15/88	166	1331	0.994	1.012	0.018	1.811
06/16/88	167	1332	0.892	0.910	0.018	2.018
06/17/88	168	1405	0.750	0.787	0.037	4.933
06/20/88	172	1456	0.680	0.689	0.009	1.324
06/21/88	173	1483	0.597	0.628	0.031	5.193
06/22/88	174	1511	0.515	0.529	0.014	2.718
06/23/88	175	1528	0.419	0.433	0.014	3.341
06/24/88	176	1578	0.382	0.399	0.017	4.450
06/27/88	179	1582	0.301	0.321	0.020	6.545
06/28/88	180	1649	0.200	0.215	0.015	7.500
06/29/88	181	1697	0.494	0.539	0.045	9.109
07/01/88	183	1741	0.227	0.250	0.023	10.132
07/05/88	187	1783	0.198	0.203	0.005	2.525
07/06/88	188	1862	0.181	0.180	-0.001	-0.552
07/08/88	190	1894	0.113	0.124	0.011	9.735
07/11/88	193	1939	0.211	0.220	0.009	4.265
07/12/88	194	2004	0.269	0.273	0.004	1.487
07/14/88	196	2088	0.342	0.359	0.017	4.971
07/15/88	197	2091	0.478	0.486	0.008	1.674
07/18/88	200	2170	0.533	0.524	-0.009	-1.689
07/19/88	201	2171	0.570	0.568	-0.002	-0.351
07/20/88	202	2199	0.738	0.758	0.020	2.710
07/21/88	203	2286	0.750	0.746	-0.004	-0.533
07/25/88	207	2385	0.933	0.942	0.009	0.965
07/26/88	208	2416	1.030	1.025	-0.005	-0.485
07/27/88	209	2448	1.143	1.148	0.005	0.437
07/29/88	211	2494	1.056	1.045	-0.011	-1.042
08/01/88	214	2586	1.120	1.143	0.023	2.054
08/02/88	215	2621	1.029	1.022	-0.007	-0.680
08/03/88	216	2667	0.943	0.942	-0.001	-0.106
08/04/88	217	2695	0.840	0.825	-0.015	-1.786
08/08/88	221	2811	0.699	0.690	-0.009	-1.288

TABLE H-2. NMOC IN-HOUSE QUALITY CONTROL SAMPLES (CHANNEL B)

Date Analyzed	Julian Date Analyzed	QC I.D. Number	NMOC Calculated Concentration ppmC	NMOC Measured Conentration ppmC	NMOC Bias ppmC	NMOC Bias (%)
08/10/88	223	2845	0.574	0.583	0.009	1.568
08/11/88	224	2892	0.472	0.475	0.003	0.636
08/12/88	225	2970	0.438	0.456	0.018	4.110
08/15/88	228	3037	0.365	0.371	0.006	1.644
08/17/88	230	3125	0.320	0.327	0.007	2.188
08/18/88	231	3126	0.234	0.237	0.003	1.282
08/19/88	232	3201	0.134	0.126	-0.008	-5.970
08/22/88	235	3267	1.348	1.294	-0.054	-4.006
08/23/88	236	3306	0.178	0.171	-0.007	-3.933
08/25/88	238	3392	0.284	0.301	0.017	5.986
08/29/88	242	3433	0.436	0.429	-0.007	-1.606
08/30/88	243	3488	0.587	0.589	0.002	0.341
09/01/88	245	3531	2.258	2.158	-0.100	-4.429
09/02/88	246	3618	2.302	2.228	-0.074	-3.215
09/06/88	250	3725	1.914	1.663	-0.251	-13.114
09/08/88	252	3789	1.532	1.511	-0.021	-1.371
09/09/88	253	3843	1.022	1.042	0.020	1.957
09/12/88	256	3907	0.146	0.162	0.016	10.959
09/13/88	257	3908	0.154	0.157	0.003	1.948
09/15/88	259	4024	2.963	2.934	-0.029	-0.979
09/16/88	260	4065	0.160	0.172	0.012	7.500
09/19/88	263	4066	0.215	0.227	0.012	5.581
09/20/88	264	4151	0.290	0.303	0.013	4.483
09/22/88	266	4208	0.419	0.429	0.010	2.387
09/23/88	267	4244	0.469	0.490	0.021	4.478
09/28/88	272	4425	0.468	0.489	0.021	4.487
09/30/88	274	4523	0.627	0.662	0.035	5.582
10/03/88	277	4641	0.696	0.703	0.007	1.006

TABLE H-3. NMOC IN-HOUSE QUALITY CONTROL SAMPLES (CHANNEL C)

Date Analyzed	Julian Date Analyzed	GC I.D. Number	NMOC Calculated Concentration ppmC	NMOC Measured Concentration ppmC	NMOC Bias ppmC	NMOC Bias (%)
04/21/88	112	1015	2.180	2.039	-0.141	-6.459
04/25/88	116	1021	1.566	1.563	-0.003	-0.185
04/29/88	120	1032	17.775	17.085	-0.690	-3.882
05/03/88	124	1048	1.357	1.351	-0.006	-0.479
05/05/88	126	1062	0.840	0.855	0.015	1.786
05/09/88	130	1068	0.658	0.669	0.011	1.672
05/11/88	132	1079	0.545	0.558	0.013	2.459
05/13/88	134	1084	0.507	0.512	0.005	0.907
05/18/88	139	1098	0.446	0.460	0.014	3.229
05/19/88	140	1098	0.446	0.487	0.041	9.170
05/20/88	141	1114	0.360	0.403	0.043	11.944
05/25/88	146	1123	0.434	0.444	0.010	2.304
05/27/88	148	1132	0.560	0.558	-0.002	-0.357
06/01/88	153	1146	0.542	0.557	0.015	2.768
06/02/88	154	1153	0.553	0.609	0.056	10.127
06/06/88	158	1164	0.679	0.686	0.007	1.031
06/07/88	159	1169	0.725	0.733	0.008	1.103
06/09/88	161	1207	0.845	0.849	0.004	0.473
06/10/88	162	1211	1.015	1.013	-0.002	-0.197
06/13/88	165	1277	1.057	1.085	0.028	2.649
06/15/88	166	1331	0.994	1.008	0.014	1.408
06/16/88	167	1332	0.892	0.907	0.015	1.682
06/17/88	168	1405	0.750	0.756	0.006	0.800
06/20/88	172	1456	0.680	0.695	0.015	2.206
06/21/88	173	1483	0.597	0.618	0.021	3.518
06/22/88	174	1511	0.515	0.538	0.023	4.466
06/23/88	175	1528	0.419	0.406	-0.013	-3.103
06/24/88	176	1578	0.382	0.389	0.007	1.832
06/27/88	179	1582	0.301	0.310	0.009	2.990
06/28/88	180	1649	0.200	0.217	0.017	8.500
06/30/88	182	1697	0.494	0.548	0.054	10.931
07/01/88	183	1741	0.227	0.248	0.021	9.251
07/05/88	187	1783	0.198	0.195	-0.003	-1.515
07/06/88	188	1862	0.181	0.181	0.000	0.000
07/08/88	190	1894	0.113	0.122	0.009	7.965
07/11/88	193	1939	0.211	0.217	0.006	2.844
07/12/88	194	2004	0.269	0.269	0.000	0.000
07/14/88	196	2088	0.342	0.354	0.012	3.509
07/15/88	197	2091	0.478	0.475	-0.003	-0.628
07/18/88	200	2170	0.533	0.515	-0.018	-3.377
07/19/88	201	2171	0.570	0.576	0.006	1.053
07/20/88	202	2199	0.738	0.746	0.008	1.084
07/21/88	203	2286	0.750	0.741	-0.009	-1.200
07/25/88	207	2385	0.933	0.936	0.003	0.322
07/26/88	208	2416	1.030	1.034	0.004	0.388
07/27/88	209	2448	1.143	1.115	-0.028	-2.450
07/29/88	211	2494	1.056	1.050	-0.006	-0.568
08/01/88	214	2586	1.120	1.123	0.003	0.268
08/02/88	215	2621	1.029	1.043	0.014	1.361

TABLE H-3. NMOC IN-HOUSE QUALITY CONTROL SAMPLES (CHANNEL C)

Date Analyzed	Julian Date Analyzed	QC I.D. Number	NMOC Calculated Concentration ppmC	NMOC Measured Concentration ppmC	NMOC Bias ppmC	NMOC Bias (%)
08/03/88	216	2667	0.943	0.962	0.019	2.015
08/04/88	217	2695	0.840	0.847	0.007	0.833
08/08/88	221	2811	0.699	0.696	-0.003	-0.429
08/10/88	223	2845	0.574	0.578	0.004	0.697
08/11/88	224	2892	0.472	0.471	-0.001	-0.212
08/12/88	225	2970	0.438	0.455	0.017	3.881
08/15/88	228	3037	0.365	0.367	0.002	0.548
08/17/88	230	3125	0.320	0.327	0.007	2.188
08/18/88	231	3126	0.234	0.234	0.000	0.000
08/19/88	232	3201	0.134	0.139	0.005	3.731
08/22/88	235	3267	1.348	1.297	-0.051	-3.783
08/23/88	236	3306	0.178	0.169	-0.009	-5.056
08/25/88	238	3392	0.284	0.303	0.019	6.690
08/29/88	242	3433	0.436	0.424	-0.012	-2.752
08/30/88	243	3488	0.587	0.587	0.000	0.000
09/01/88	245	3531	2.258	2.127	-0.131	-5.802
09/02/88	246	3618	2.302	2.213	-0.089	-3.866
09/06/88	250	3725	1.914	1.807	-0.107	-5.590
09/08/88	252	3789	1.532	1.532	0.000	0.000
09/09/88	253	3843	1.022	1.043	0.021	2.055
09/12/88	256	3907	0.146	0.165	0.019	13.014
09/13/88	257	3908	0.154	0.155	0.001	0.649
09/15/88	259	4024	2.963	2.995	0.032	1.080
09/16/88	260	4065	0.160	0.169	0.009	5.625
09/19/88	263	4066	0.215	0.225	0.010	4.651
09/22/88	266	4208	0.419	0.432	0.013	3.103
09/23/88	267	4244	0.469	0.494	0.025	5.330
09/28/88	272	4425	0.468	0.493	0.025	5.342
09/30/88	274	4523	0.627	0.657	0.030	4.785
10/03/88	277	4641	0.696	0.713	0.017	2.443
10/05/88	279	4654	0.736	0.775	0.039	5.299
10/07/88	281	4655	0.746	0.762	0.016	2.145
10/12/88	286	4655	0.746	0.765	0.019	2.547
10/18/88	292	4655	0.746	0.780	0.034	4.558

TABLE H-4. NMOC IN-HOUSE QUALITY CONTROL SAMPLES (CHANNEL D)

Date Analyzed	Julian Date Analyzed	QC I.D. Number	NMOC Calculated Concentration ppmC	NMOC Measured Concentration ppmC	NMOC Bias ppmC	NMOC Bias (%)
04/21/88	112	1015	2.180	2.070	-0.110	-5.041
04/25/88	116	1021	1.566	1.559	-0.007	-0.441
04/29/88	120	1032	17.775	17.004	-0.771	-4.338
05/02/88	124	1048	1.357	1.341	-0.016	-1.209
05/05/88	126	1062	0.840	0.838	-0.002	-0.226
05/09/88	130	1068	0.658	0.671	0.013	1.960
05/11/88	132	1079	0.545	0.550	0.005	0.844
05/13/88	134	1084	0.507	0.504	-0.003	-0.552
05/18/88	139	1098	0.446	0.455	0.009	2.063
05/19/88	140	1098	0.446	0.487	0.041	9.148
05/20/88	141	1114	0.360	0.395	0.035	9.722
05/25/88	146	1123	0.434	0.440	0.006	1.382
05/27/88	148	1132	0.560	0.558	-0.002	-0.357
06/01/88	153	1146	0.542	0.556	0.014	2.583
06/02/88	154	1153	0.553	0.572	0.019	3.436
06/06/88	158	1164	0.679	0.681	0.002	0.295
06/07/88	159	1169	0.725	0.748	0.023	3.172
06/09/88	161	1207	0.845	0.849	0.004	0.473
06/10/88	162	1211	1.015	1.015	0.000	0.000
06/13/88	165	1277	1.057	1.086	0.029	2.744
06/15/88	166	1331	0.994	1.013	0.019	1.911
06/16/88	167	1332	0.892	0.891	-0.001	-0.112
06/17/88	168	1405	0.480	0.466	-0.014	-2.917
06/20/88	172	1456	0.680	0.665	-0.015	-2.206
06/21/88	173	1483	0.597	0.601	0.004	0.670
06/22/88	174	1511	0.515	0.544	0.029	5.631
06/23/88	175	1528	0.419	0.402	-0.017	-4.057
06/24/88	176	1578	0.382	0.384	0.002	0.524
06/27/88	179	1582	0.301	0.330	0.029	9.635
06/28/88	180	1649	0.200	0.227	0.027	13.500
07/01/88	183	1741	0.227	0.249	0.022	9.692
07/05/88	187	1783	0.198	0.198	0.000	0.000
07/06/88	188	1862	0.181	0.185	0.004	2.210
07/08/88	190	1894	0.113	0.122	0.009	7.965
07/11/88	193	1939	0.211	0.215	0.004	1.896
07/12/88	194	2004	0.269	0.268	-0.001	-0.372
07/14/88	196	2088	0.342	0.345	0.003	0.877
07/15/88	197	2091	0.478	0.456	-0.022	-4.603
07/18/88	200	2170	0.533	0.513	-0.020	-3.752
07/19/88	201	2171	0.570	0.591	0.021	3.684
07/20/88	202	2199	0.738	0.726	-0.012	-1.626
07/21/88	203	2286	0.750	0.740	-0.010	-1.333
07/25/88	207	2385	0.933	0.912	-0.021	-2.251
07/26/88	208	2416	1.030	1.035	0.005	0.485
07/27/88	209	2448	1.143	1.049	-0.094	-8.224
07/29/88	211	2494	1.056	1.091	0.035	3.314
08/01/88	214	2586	1.120	1.122	0.002	0.179
08/02/88	215	2621	1.029	1.104	0.075	7.289
08/03/88	216	2667	0.943	0.873	-0.070	-7.423

TABLE H-4. NMOC IN-HOUSE QUALITY CONTROL SAMPLES (CHANNEL D)

Date Analyzed	Julian Date Analyzed	QC I.D. Number	NMOC Calculated Concentration ppmC	NMOC Measured Concentration ppmC	NMOC Bias ppmC	NMOC Bias (%)
08/04/88	217	2695	0.840	0.859	0.019	2.262
08/08/88	221	2811	0.699	0.694	-0.005	-0.715
08/10/88	223	2845	0.574	0.597	0.023	4.007
08/11/88	224	2892	0.472	0.476	0.004	0.847
08/12/88	225	2970	0.438	0.455	0.017	3.881
08/15/88	228	3037	0.365	0.338	-0.027	-7.397
08/17/88	230	3125	0.320	0.338	0.018	5.625
08/18/88	231	3126	0.234	0.231	-0.003	-1.282
08/19/88	232	3201	0.134	0.117	-0.017	-12.687
08/22/88	235	3267	1.348	1.316	-0.032	-2.374
08/23/88	236	3306	0.178	0.168	-0.010	-5.618
08/25/88	238	3392	0.284	0.303	0.019	6.690
08/29/88	242	3433	0.436	0.442	0.006	1.376
08/30/88	243	3488	0.587	0.595	0.008	1.363
09/01/88	245	3531	2.258	2.165	-0.093	-4.119
09/02/88	246	3618	2.302	2.112	-0.190	-8.254
09/06/88	250	3725	1.914	1.832	-0.082	-4.284
09/08/88	252	3789	1.532	1.535	0.003	0.196
09/09/88	253	3843	1.022	1.014	-0.008	-0.783
09/12/88	256	3907	0.146	0.160	0.014	9.589
09/13/88	257	3908	0.157	0.160	0.003	1.911
09/15/88	259	4024	2.963	2.961	-0.002	-0.067
09/16/88	260	4065	0.160	0.163	0.003	1.875
09/19/88	263	4066	0.215	0.221	0.006	2.791
09/22/88	266	4208	0.419	0.427	0.008	1.909
09/23/88	267	4244	0.469	0.426	-0.043	-9.168
09/28/88	272	4425	0.468	0.481	0.013	2.778
09/30/88	274	4523	0.627	0.671	0.044	7.018
10/03/88	277	4641	0.696	0.715	0.019	2.730
10/05/88	279	4654	0.736	0.762	0.026	3.533
10/07/88	281	4655	0.746	0.765	0.019	2.547
10/12/88	286	4655	0.746	0.769	0.023	3.083

APPENDIX I

MULTIPLE DETECTOR SPECIATED THREE-HOUR SITE DATA SUMMARIES

APPENDIX I -- LIST OF TABLES

Table		Page
I-1	MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR B2MA....	I-3
I-2	MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR BRIL....	I-5
I-3	MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR C2OH....	I-7
I-4	MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR C3IL....	I-9
I-5	MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR C6IL....	I-11
I-6	MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR CLOH....	I-13
I-7	MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR D1MI....	I-15
I-8	MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR D2MI....	I-17
I-9	MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR PRRI....	I-21
I-10	MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR S1MA....	I-23
I-11	MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR S2MA....	I-25
I-12	MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR WAIL....	I-27
I-13	MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR WOMA....	I-31

TABLE 11. MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR B2MA

Sample Date	07/21/88	07/21/88	07/26/88	07/26/88	07/29/88
Sample ID	2351D	2352D	2429	2429R	2560
Total NMOC, ppmC	0.440	0.452	0.743	0.743	0.753
Compound	Concentration, ppbv				
Acetylene	<1.00	<1.00	<1.00	<1.00	<1.00
Propylene	2.60 (L)	1.02 (H)	<0.10	<0.10	<0.10
Chloromethane	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	<0.10	0.61 (H)	0.88 (M)	0.61 (H)	<0.10
Bromomethane	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10	<0.10
Methylene chloride	<0.11	<0.11	<0.11	<0.11	<0.11
trans-1,2-Dichloroethylene	<0.04	<0.04	0.50 (M)	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	<0.06	<0.06	<0.06	<0.06
Bromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01	4.02 (H)
1,1,1-Trichloroethane	0.62 (M)	<0.01	1.58 (M)	1.61 (H)	1.28 (H)
Carbon tetrachloride	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.04	0.03 (L)	<0.04	<0.04	<0.04
Benzene	1.70 (H)	1.74 (H)	3.14 (H)	3.15 (H)	3.03 (H)
Trichloroethylene	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
Toluene	3.37 (H)	3.66 (H)	7.83 (H)	7.67 (H)	<0.02
n-Octane	<0.03	<0.03	<0.03	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	0.47 (M)	<0.02
Tetrachloroethylene	<0.07	<0.07	1.05 (M)	0.79 (H)	<0.07
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.32 (H)	0.35 (H)	0.67 (H)	0.69 (H)	0.69 (H)
m/p-Xylene	2.35 (H)	2.36 (H)	4.97 (H)	4.92 (H)	4.91 (H)
Styrene/o-Xylene	0.49 (H)	0.48 (H)	1.24 (H)	1.24 (H)	1.26 (H)
Bromoform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level (Continued)
D Duplicate sample R Replicate analysis

TABLE I1. B2MA (Continued)

Sample Date	08/08/88	08/10/88	08/11/88	08/12/88
Sample ID	2862	2960	2984	3035
Total NMOC, ppmC	0.374	0.341	0.378	0.764
Compound	Concentration, ppbv			
Acetylene	<1.00	<1.00	<1.00	<1.00
Propylene	<0.10	<0.10	<0.10	9.23 (L)
Chloromethane	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	<0.10	<0.10	<0.10	<0.10
Bromomethane	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10
Methylene chloride	<0.11	<0.11	<0.11	1.44 (L)
trans-1,2-Dichloroethylene	<0.04	<0.04	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	<0.06	<0.06	<0.06
Bromochloromethane	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	<0.01	0.45 (M)	<0.01	1.15 (H)
Carbon tetrachloride	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.04	1.73 (L)	<0.04	<0.04
Benzene	1.42 (H)	1.37 (H)	1.48 (H)	3.13 (H)
Trichloroethylene	<0.01	<0.01	<0.01	0.47 (H)
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04
Toluene	3.66 (H)	<0.02	4.22 (H)	6.56 (H)
n-Octane	<0.03	<0.03	0.48 (M)	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	<0.07	0.36 (M)	0.37 (H)	0.87 (M)
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.30 (H)	0.34 (H)	0.40 (H)	0.55 (H)
m/p-Xylene	2.40 (H)	2.28 (H)	2.93 (H)	3.78 (H)
Styrene/o-Xylene	0.48 (H)	0.45 (H)	0.57 (H)	0.98 (H)
Bromoform	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level

TABLE I2. MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR BRIL

Sample Date	07/21/88	07/22/88	07/25/88	07/28/88	08/10/88
Sample ID	2335	2340	2442	2524	2996
Total NMOC, ppmC	0.061	0.162	0.184	0.172	0.350
Compound	Concentration, ppbv				
Acetylene	<1.00	<0.10	<1.00	<1.00	<1.00
Propylene	<0.10	7.56 (H)	<0.10	<0.10	<0.10
Chloromethane	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	<0.10	<0.10	<0.10	<0.10	<0.10
Bromomethane	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10	<0.10
Methylene chloride	<0.11	<0.11	<0.11	<0.11	<0.11
trans-1,2-Dichloroethylene	<0.04	<0.04	0.13 (H)	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	<0.06	<0.06	<0.06	0.42 (H)
Bromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	<0.01	0.72 (H)	<0.01	<0.01	0.68 (L)
Carbon tetrachloride	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	0.16 (L)	<0.04	0.04 (L)	0.91 (L)	<0.04
Benzene	0.10 (H)	0.30 (H)	0.07 (M)	<0.04	1.17 (H)
Trichloroethylene	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
Toluene	<0.02	1.09 (H)	<0.02	<0.02	<0.02
n-Octane	<0.03	<0.03	<0.03	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	<0.07	<0.07	<0.07	<0.07	<0.07
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	<0.02	0.09 (H)	<0.02	<0.02	0.14 (H)
m/p-Xylene	<0.04	0.79 (H)	<0.04	0.37 (H)	1.02 (H)
Styrene/o-Xylene	<0.02	0.13 (H)	<0.02	<0.02	0.37 (H)
Bromoform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level (Continued)

TABLE I2. BRIL (Continued)

Sample Date	08/11/88	08/11/88
Sample ID	3029D	3030D
Total NMOC, ppmC	0.149	0.145
Compound	Concentration, ppbv	
Acetylene	<1.00	<1.00
Propylene	<0.10	<0.10
Chloromethane	<0.20	<0.20
Vinyl chloride	<0.20	<0.20
1,3-Butadiene	<0.10	<0.10
Bromomethane	<0.20	<0.20
Chloroethane	<0.10	<0.10
Methylene chloride	<0.11	<0.11
trans-1,2-Dichloroethylene	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04
Chloroprene	<0.06	<0.06
Bromochloromethane	<0.01	<0.01
Chloroform	<0.01	<0.01
1,1,1-Trichloroethane	0.33 (M)	0.34 (L)
Carbon tetrachloride	0.17 (H)	0.17 (M)
1,2-Dichloroethane	<0.04	0.70 (L)
Benzene	0.26 (M)	0.27 (H)
Trichloroethylene	<0.01	<0.01
1,2-Dichloropropane	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04
Toluene	0.83 (L)	0.76 (L)
n-Octane	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02
Tetrachloroethylene	<0.07	<0.07
Dibromochloromethane	<0.01	<0.01
Chlorobenzene	<0.02	<0.02
Ethylbenzene	<0.02	<0.02
m/p-Xylene	0.42 (H)	0.39 (H)
Styrene/o-Xylene	<0.02	<0.02
Bromoform	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level

D Duplicate sample

TABLE 13. MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR C2OH

Sample Date	07/12/88	07/21/88	07/22/88	07/22/88	07/25/88
Sample ID	2341	2341R	2398D	2399D	2447
Total NMOC, ppmC	0.177	0.177	1.647	1.649	0.679
Compound	Concentration, ppbv				
Acetylene	<1.00	<1.00	<1.00	<1.00	<1.00
Propylene	<0.10	<0.10	<0.10	<0.10	<0.10
Chloromethane	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	<0.10	<0.10	1.20 (H)	0.31 (M)	<0.10
Bromomethane	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	0.68 (L)	0.10 (L)	<0.10
Methylene chloride	<0.11	<0.11	3.04 (L)	3.56 (L)	<0.11
trans-1,2-Dichloroethylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	<0.06	<0.06	<0.06	<0.06
Bromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	0.58 (H)	0.58 (L)	1.76 (H)	1.88 (H)	<0.01
Carbon tetrachloride	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Benzene	0.63 (M)	0.69 (H)	5.42 (H)	5.11 (H)	2.32 (H)
Trichloroethylene	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
Toluene	1.32 (H)	1.30 (H)	15.16 (H)	14.39 (H)	5.40 (H)
n-Octane	<0.03	<0.03	<0.03	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	<0.07	<0.07	0.71 (H)	0.44 (M)	<0.07
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	<0.02	0.13 (H)	1.32 (H)	1.26 (H)	0.47 (H)
m/p-Xylene	0.91 (H)	0.86 (H)	9.88 (H)	9.70 (H)	3.66 (H)
Styrene/o-Xylene	0.11 (M)	0.10 (M)	2.20 (H)	2.09 (H)	0.81 (H)
Bromoform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level (Continued)
D Duplicate sample R Replicate analysis

TABLE I3. C2OH (Continued)

Sample Date	07/27/88	08/03/88	08/08/88	08/12/88	08/16/88
Sample ID	2523	2751	2849	2993	3098
Total NMOC, ppmC	2.165	1.709	0.914	0.860	2.566
Compound	Concentration, ppbv				
Acetylene	<1.00	<1.00	<1.00	<1.00	<1.00
Propylene	<0.10	<0.10	<0.10	<0.10	<0.10
Chloromethane	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	<0.10	1.77 (H)	0.41 (H)	<0.10	3.16 (M)
Bromomethane	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10	<0.10
Methylene chloride	<0.11	<0.11	<0.11	2.78 (L)	4.92 (L)
trans-1,2-Dichloroethylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	0.81 (H)	<0.06	<0.06	<0.06
Bromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	6.66 (H)	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	2.12 (H)	2.08 (H)	1.17 (H)	1.20 (H)	2.11 (H)
Carbon tetrachloride	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Benzene	8.93 (H)	10.34 (H)	4.26 (H)	2.91 (H)	7.28 (H)
Trichloroethylene	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
Toluene	15.80 (H)	11.79 (H)	7.78 (H)	9.10 (H)	14.62 (H)
n-Octane	<0.03	<0.03	<0.03	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	<0.07	<0.07	<0.07	<0.07	0.70 (H)
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	<0.02	<0.02	0.27 (L)
Ethylbenzene	2.34 (H)	1.18 (H)	0.79 (H)	0.96 (H)	1.49 (H)
m/p-Xylene	18.09 (H)	8.92 (H)	5.91 (H)	6.60 (H)	10.94 (H)
Styrene/o-Xylene	3.30 (H)	2.12 (H)	1.40 (H)	1.38 (M)	2.46 (H)
Bromoform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level

TABLE 14. MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR C3IL

Sample Date	07/22/88	07/22/88	07/26/88	07/27/88	07/27/88
Sample ID	2343	2343R	2509	2582D	2583D
Total NMOC, ppmC	0.275	0.275	0.124	0.394	0.403
Compound	Concentration, ppbv				
Acetylene	<1.00	<1.00	<1.00	<1.00	<1.00
Propylene	<0.10	<0.10	6.06 (H)	<0.10	<0.10
Chloromethane	<0.20	<0.20	<0.20	0.13 (L)	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	<0.10	<0.10	<0.10	<0.10	<0.10
Bromomethane	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10	<0.10
Methylene chloride	<0.11	<0.11	<0.11	<0.11	<0.11
trans-1,2-Dichloroethylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	<0.06	<0.06	<0.06	<0.06
Bromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	2.08 (M)	2.04 (H)	2.01 (H)	3.41 (H)	3.31 (H)
Carbon tetrachloride	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Benzene	0.20 (H)	0.17 (H)	0.16 (L)	0.91 (M)	<0.04
Trichloroethylene	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
Toluene	0.70 (H)	0.74 (H)	<0.02	3.02 (H)	3.29 (H)
n-Octane	<0.03	<0.03	<0.03	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	<0.07	<0.07	<0.07	0.74 (L)	<0.07
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	<0.02	<0.02	<0.02	0.28 (H)	0.29 (H)
m/p-Xylene	0.63 (H)	0.61 (H)	0.21 (H)	1.92 (H)	2.05 (H)
Styrene/o-Xylene	<0.02	0.06 (L)	<0.02	0.42 (H)	0.37 (H)
Bromoform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level (Continued)
D Duplicate sample R Replicate analysis

TABLE I4. C3IL (Continued)

Sample Date	07/28/88	08/04/88	08/09/88	08/10/88	08/11/88
Sample ID	2612	2769	2926	2972	2945
Total NMOC, ppmC	0.324	0.354	0.324	0.059	0.464
Compound	Concentration, ppbv				
Acetylene	<1.00	<1.00	<1.00	<1.00	<1.00
Propylene	<0.10	<0.10	<0.10	<0.10	<0.10
Chloromethane	0.13 (L)	<0.20	3.68 (L)	<0.20	0.39 (L)
Vinyl chloride	<0.20	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	<0.10	<0.10	<0.10	<0.10	<0.10
Bromomethane	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10	<0.10
Methylene chloride	<0.11	<0.11	<0.11	<0.11	<0.11
trans-1,2-Dichloroethylene	0.39 (H)	<0.04	<0.04	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	<0.06	<0.06	<0.06	<0.06
Bromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	1.48 (H)	1.50 (H)	1.95 (H)	0.74 (H)	2.41 (H)
Carbon tetrachloride	<0.01	0.17 (L)	<0.01	<0.01	<0.01
1,2-Dichloroethane	0.25 (L)	<0.04	<0.04	<0.04	<0.04
Benzene	0.55 (M)	0.84 (M)	0.84 (H)	0.16 (H)	<0.04
Trichloroethylene	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
Toluene	2.25 (H)	<0.02	2.78 (M)	0.19 (L)	<0.02
n-Octane	<0.03	<0.03	<0.03	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	<0.07	0.86 (M)	<0.07	<0.07	0.41 (H
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.17 (H)	0.24 (H)	0.23 (H)	<0.02	0.35 (H
m/p-Xylene	1.21 (H)	1.45 (H)	1.62 (H)	<0.04	2.32 (H
Styrene/o-Xylene	<0.02	0.20 (H)	0.33 (H)	<0.02	<0.02
Bromoform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level

TABLE 15. MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR C6IL

Sample Date Sample ID	07/22/88 2298	07/22/88 2298R	07/26/88 2529	07/27/88 2576	07/29/88 2580
Total NMOC, ppmC	1.406	1.406	1.117	1.262	0.694
Compound	Concentration, ppbv				
Acetylene	<1.00	<1.00	<1.00	<1.00	<1.00
Propylene	<0.10	<0.10	<0.10	<0.10	<0.10
Chloromethane	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	0.64 (H)	1.03 (M)	<0.10	<0.10	<0.10
Bromomethane	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10	<0.10
Methylene chloride	<0.11	<0.11	<0.11	<0.11	<0.11
trans-1,2-Dichloroethylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	<0.06	<0.06	<0.06	<0.06
Bromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	7.73 (H)	<0.01
1,1,1-Trichloroethane	1.18 (H)	1.19 (H)	1.26 (H)	<0.01	<0.01
Carbon tetrachloride	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.04	<0.04	0.11 (L)	<0.04	<0.04
Benzene	5.47 (H)	6.00 (H)	3.67 (H)	<0.04	2.81 (H)
Trichloroethylene	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
Toluene	10.95 (H)	10.80 (H)	7.22 (H)	11.55 (H)	5.03 (H)
n-Octane	0.30 (H)	0.46 (M)	0.33 (H)	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	<0.07	<0.07	13.03 (H)	12.62 (H)	11.11 (H)
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	1.03 (H)	1.06 (H)	0.80 (H)	1.16 (H)	0.43 (H)
m/p-Xylene	7.39 (H)	7.30 (H)	5.78 (H)	7.74 (H)	3.00 (H)
Styrene/o-Xylene	1.79 (H)	1.82 (H)	1.27 (H)	1.84 (H)	0.68 (H)
Bromoform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level (Continued)
R Replicate analysis

TABLE I5. C6IL (Continued)

Sample Date	08/04/88	08/05/88	08/19/88	08/19/88
Sample ID	2771	2806	32190	32200
Total NMOC, ppmC	0.805	0.558	0.826	0.816
Compound	Concentration, ppbv			
Acetylene	<1.00	<1.00	<1.00	<1.00
Propylene	<0.10	<0.10	6.76 (M)	6.29 (H)
Chloromethane	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	<0.10	<0.10	0.46 (H)	0.62 (M)
Bromomethane	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10
Methylene chloride	2.85 (L)	<0.11	1.38 (L)	1.23 (L)
trans-1,2-Dichloroethylene	<0.04	<0.04	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	<0.06	<0.06	0.04 (H)
Bromochloromethane	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	2.50 (H)	0.86 (H)	0.82 (H)	0.82 (H)
Carbon tetrachloride	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.04	<0.04	<0.04	<0.04
Benzene	2.64 (H)	2.04 (H)	3.41 (H)	3.10 (H)
Trichloroethylene	<0.01	<0.01	<0.01	<0.01
1,2-Dichloropropane	<0.04	<0.04	<0.04	0.54 (M)
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04
Toluene	6.57 (H)	4.42 (M)	8.18 (H)	8.29 (H)
n-Octane	<0.03	<0.03	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	<0.07	0.61 (H)	<0.07	0.25 (M)
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	0.17 (L)	0.15 (H)
Ethylbenzene	0.62 (H)	0.46 (H)	0.86 (L)	0.80 (H)
m/p-Xylene	4.23 (H)	3.07 (H)	5.33 (H)	5.44 (H)
Styrene/o-Xylene	0.83 (H)	0.79 (H)	1.30 (H)	1.23 (H)
Bromoform	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level
D Duplicate sample

TABLE I6. MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR CLOH

Sample Date	07/21/88	08/03/88
Sample ID	2359	2750
Total NMOC, ppmC	0.391	1.120
Compound	Concentration, ppbv	
Acetylene	17.90 (L)	<1.00
Propylene	<0.10	<0.10
Chloromethane	13.15 (L)	<0.10
Vinyl chloride	<0.20	<0.20
1,3-Butadiene	<0.10	1.51 (H)
Bromomethane	<0.20	<0.20
Chloroethane	0.97 (L)	<0.10
Methylene chloride	<0.11	<0.11
trans-1,2-Dichloroethylene	<0.04	0.09 (H)
1,1-Dichloroethane	<0.04	<0.04
Chloroprene	<0.06	<0.06
Bromochloromethane	<0.01	<0.01
Chloroform	<0.01	<0.01
1,1,1-Trichloroethane	<0.01	2.33 (H)
Carbon tetrachloride	<0.01	<0.01
1,2-Dichloroethane	<0.04	6.12 (L)
Benzene	1.70 (H)	12.47 (H)
Trichloroethylene	<0.01	0.78 (L)
1,2-Dichloropropane	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04
Toluene	3.33 (H)	10.33 (L)
n-Octane	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02
Tetrachloroethylene	<0.07	0.42 (H)
Dibromochloromethane	<0.01	<0.01
Chlorobenzene	<0.02	<0.02
Ethylbenzene	0.32 (H)	1.14 (H)
m/p-Xylene	2.32 (H)	8.48 (H)
Styrene/o-Xylene	0.49 (H)	1.91 (H)
Bromoform	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level

TABLE 17. MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR D1MI

Sample Date	07/20/88	07/20/88	07/22/88	07/25/88	07/27/88
Sample ID	2322	2322R	2354	2431	2528
Total NMOC, ppmC	0.734	0.734	0.332	0.443	1.351
Compound	Concentration, ppbv				
Acetylene	<1.00	<1.00	14.24 (L)	<1.00	<1.00
Propylene	<0.10	<0.10	<0.10	<0.10	<0.10
Chloromethane	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	2.76 (H)	2.87 (H)	<0.10	<0.10	<0.10
Bromomethane	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10	<0.10
Methylene chloride	<0.11	<0.11	<0.11	<0.11	<0.11
trans-1,2-Dichloroethylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	<0.06	<0.06	<0.06	<0.06
Bromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	<0.01	<0.01	<0.01	<0.01	1.63 (H)
Carbon tetrachloride	0.23 (L)	0.24 (M)	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.04	0.08 (L)	<0.04	<0.04	<0.04
Benzene	3.18 (H)	3.54 (H)	<0.04	0.76 (H)	4.17 (H)
Trichloroethylene	<0.01	<0.01	<0.01	<0.01	0.70 (M)
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
Toluene	5.70 (H)	5.67 (H)	3.32 (M)	1.90 (H)	10.60 (H)
n-Octane	<0.03	<0.03	<0.03	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	<0.07	<0.07	<0.07	<0.07	<0.07
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.70 (H)	0.69 (H)	0.34 (H)	0.14 (M)	1.10 (H)
m/p-Xylene	4.67 (H)	4.60 (H)	2.22 (H)	1.22 (H)	7.73 (H)
Styrene/o-Xylene	1.13 (H)	1.20 (H)	0.47 (H)	<0.02	1.81 (H)
Bromoform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level (Continued)
R Replicate analysis

TABLE I7. D1MI (Continued)

Sample Date Sample ID	07/28/88 2581	08/01/88 2665	08/04/88 2801	08/16/88 3163D	08/16/88 3164D
Total NMOC, ppmC	0.898	0.439	1.33	1.185	1.141
Compound	Concentration, ppbv				
Acetylene	<1.00	<1.00	<1.00	<1.00	<1.00
Propylene	<0.10	<0.10	<0.10	<0.10	<0.10
Chloromethane	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	<0.10	0.09 (M)	0.24 (M)	0.15 (M)	0.22 (H)
Bromomethane	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10	<0.10
Methylene chloride	<0.11	<0.11	1.78 (L)	2.04 (L)	2.15 (L)
trans-1,2-Dichloroethylene	<0.04	<0.04	<0.04	<0.04	0.76 (M)
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	<0.06	<0.06	0.49 (H)	<0.06
Bromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	1.09 (L)	<0.01	6.10 (H)	4.54 (H)	4.88 (H)
Carbon tetrachloride	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Benzene	2.17 (H)	1.51 (H)	4.01 (H)	6.41 (H)	7.05 (H)
Trichloroethylene	<0.01	<0.01	<0.01	<0.01	0.33 (L)
1,2-Dichloropropane	<0.04	<0.04	<0.04	0.60 (M)	0.64 (M)
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
Toluene	7.81 (H)	2.13 (H)	8.03 (L)	10.97 (H)	11.58 (H)
n-Octane	<0.03	<0.03	<0.03	0.41 (L)	0.33 (L)
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	<0.07	<0.07	0.22 (H)	0.53 (H)	0.37 (M)
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01	0.71 (L)
Chlorobenzene	<0.02	<0.02	<0.02	0.19 (L)	0.20 (L)
Ethylbenzene	1.71 (H)	0.23 (H)	1.26 (H)	0.85 (H)	0.89 (H)
m/p-Xylene	12.86 (H)	1.66 (H)	8.57 (H)	5.37 (H)	5.64 (H)
Styrene/o-Xylene	2.40 (H)	0.33 (H)	2.40 (H)	1.44 (H)	1.76 (H)
Bromoform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level
D Duplicate sample

TABLE 18. MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR D2MI

Sample Date	07/21/88	07/21/88	07/26/88	07/28/88	07/29/88
Sample ID	2355	2355R	2492	2555	2616
Total NMOC, ppmC	0.561	0.561		0.596	0.563
Compound	Concentration, ppbv				
Acetylene	<1.00	<1.00	<1.00	<1.00	19.89 (L)
Propylene	<0.10	<0.10	<0.10	<0.10	<0.10
Chloromethane	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	<0.10	<0.10	<0.10	<0.10	<0.10
Bromomethane	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10	<0.10
Methylene chloride	<0.11	<0.11	5.06 (L)	<0.11	<0.11
trans-1,2-Dichloroethylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	<0.06	<0.06	<0.06	<0.06
Bromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	30.50 (H)	<0.01	<0.01
1,1,1-Trichloroethane	11.87 (H)	11.98 (H)	<0.10	1.00 (M)	1.08 (H)
Carbon tetrachloride	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Benzene	1.53 (H)	1.60 (H)	9.71 (H)	2.09 (H)	1.49 (H)
Trichloroethylene	0.40 (H)	<0.01	2.06 (H)	<0.01	<0.01
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
Toluene	4.81 (H)	4.82 (H)	12.14 (H)	4.58 (H)	4.03 (H)
n-Octane	<0.03	<0.03	<0.03	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	<0.07	<0.07	0.67 (M)	<0.07	<0.07
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.79 (H)	0.79 (H)	1.09 (H)	0.70 (H)	0.59 (H)
m/p-Xylene	5.57 (H)	5.47 (H)	6.69 (H)	5.30 (H)	4.34 (H)
Styrene/o-Xylene	1.03 (H)	0.97 (H)	1.23 (H)	1.07 (H)	1.00 (H)
Bromoform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level (Continued)
R Replicate analysis

TABLE 18. D2MI (Continued)

Sample Date	08/01/88	08/03/88	08/03/88	08/04/88	08/10/88
Sample ID	2643	2754D	2755D	2788	2965
Total NMOC, ppmC	0.364	0.65	0.71	1.062	0.383
Compound	Concentration, ppbv				
Acetylene	<1.00	<1.00	<1.00	<1.00	<1.00
Propylene	<0.10	<0.10	<0.10	<0.10	<0.10
Chloromethane	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	<0.10	<0.10	<0.10	<0.10	<0.10
Bromomethane	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10	<0.10
Methylene chloride	<0.11	<0.11	<0.11	<0.11	<0.11
trans-1,2-Dichloroethylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	<0.06	<0.06	<0.06	<0.06
Bromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	57.22 (H)	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	<0.01	18.56 (H)	18.07 (H)	3.93 (H)	<0.01
Carbon tetrachloride	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Benzene	0.53 (H)	1.62 (M)	1.43 (H)	6.98 (H)	2.56 (H)
Trichloroethylene	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
Toluene	<0.02	8.20 (L)	8.05 (H)	9.14 (H)	3.10 (L)
n-Octane	<0.03	<0.03	<0.03	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	<0.07	0.58 (H)	<0.07	<0.07	<0.07
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.09 (M)	0.47 (H)	0.45 (H)	0.82 (H)	<0.02
m/p-Xylene	0.98 (H)	3.05 (H)	3.07 (H)	5.66 (H)	1.47 (H)
Styrene/o-Xylene	0.12 (H)	0.65 (H)	<0.02	1.24 (H)	0.42 (L)
Bromoform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level (Continued)

D Duplicate sample

TABLE 18. D2MI (Continued)

Sample Date	08/11/88
Sample ID	3025
Total NMOC, ppmC	0.837
Compound	**Concentration, ppbv**
Acetylene	<1.00
Propylene	<0.10
Chloromethane	<0.20
Vinyl chloride	<0.20
1,3-Butadiene	<0.10
Bromomethane	<0.20
Chloroethane	<0.10
Methylene chloride	2.09 (L)
trans-1,2-Dichloroethylene	<0.04
1,1-Dichloroethane	<0.04
Chloroprene	<0.06
Bromochloromethane	<0.01
Chloroform	<0.01
1,1,1-Trichloroethane	23.29 (H)
Carbon tetrachloride	<0.01
1,2-Dichloroethane	<0.04
Benzene	1.90 (H)
Trichloroethylene	<0.01
1,2-Dichloropropane	<0.04
Bromodichloromethane	<0.01
cis-1,3-Dichloropropylene	<0.04
Toluene	11.43 (H)
n-Octane	<0.03
trans-1,3-Dichloropropylene	<0.04
1,1,2-Trichloroethane	<0.02
Tetrachloroethylene	0.84 (H)
Dibromochloromethane	<0.01
Chlorobenzene	<0.02
Ethylbenzene	0.87 (H)
m/p-Xylene	5.70 (H)
Styrene/o-Xylene	1.41 (H)
Bromoform	<0.01
1,1,2,2-Tetrachloroethane	<0.01
m-Dichlorobenzene	<0.02
p-Dichlorobenzene	<0.09
o-Dichlorobenzene	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level

TABLE 19. MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR PRRI

Sample Date	07/20/88	07/25/88	07/27/88	07/29/88	08/04/88
Sample ID	2321	2419	2574	2606	2829
Total NMOC, ppmC	0.382	0.351	0.356	0.413	0.232
Compound	Concentration, ppbv				
Acetylene	<1.00	<1.00	<1.00	<1.00	<1.00
Propylene	<0.10	<0.10	<0.10	<0.10	1.59 (L)
Chloromethane	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	0.34 (L)	<0.10	<0.10	<0.10	<0.10
Bromomethane	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10	<0.10
Methylene chloride	<0.11	<0.11	<0.11	<0.11	2.12 (L)
trans-1,2-Dichloroethylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	0.49 (H)	<0.06	<0.06	<0.06
Bromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	1.11 (M)	1.72 (H)	1.73 (H)	1.33 (H)	0.90 (H)
Carbon tetrachloride	0.27 (M)	<0.01	<0.01	1.60 (H)	<0.01
1,2-Dichloroethane	1.86 (L)	<0.04	<0.04	<0.04	<0.04
Benzene	1.68 (H)	0.82 (H)	0.85 (H)	1.43 (H)	0.53 (H)
Trichloroethylene	6.05 (H)	4.07 (H)	5.28 (H)	2.02 (H)	7.27 (H)
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
Toluene	<0.02	3.24 (H)	2.82 (M)	3.46 (M)	2.66 (H)
n-Octane	<0.03	<0.03	<0.03	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02	1.78 (M)
Tetrachloroethylene	0.56 (H)	<0.07	<0.07	0.44 (H)	<0.07
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.39 (H)	0.29 (H)	0.39 (H)	0.31 (H)	0.24 (H)
m/p-Xylene	2.87 (H)	1.77 (H)	3.13 (H)	2.04 (H)	1.69 (H)
Styrene/o-Xylene	0.65 (H)	0.40 (H)	0.64 (H)	0.43 (H)	0.35 (H)
Bromoform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level

(Continued)

TABLE 19. PRRI (Continued)

Sample Date	08/04/88	08/05/88	07/28/88	08/11/88	08/11/88
Sample ID	2829R	2812	2513	3070D	3071D
Total NMOC, ppbC	0.232	0.373	0.548	0.274	0.311
Compound	Concentration, ppbv				
Acetylene	<1.00	<1.00	<1.00	<1.00	<1.00
Propylene	1.85 (L)	2.38 (L)	<0.10	<0.10	<0.10
Chloromethane	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	<0.10	<0.10	<0.10	<0.10	<0.10
Bromomethane	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10	<0.10
Methylene chloride	1.15 (L)	3.00 (H)	<0.11	<0.11	1.83 (L)
trans-1,2-Dichloroethylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	<0.06	<0.06	<0.06	<0.06
Bromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	0.93 (L)	2.89 (H)	4.12 (H)	1.57 (H)	1.55 (H)
Carbon tetrachloride	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	0.94 (L)	<0.04	<0.04	1.02 (L)	<0.04
Benzene	0.56 (H)	0.80 (H)	1.46 (H)	0.71 (H)	0.69 (H)
Trichloroethylene	7.31 (H)	4.08 (H)	9.95 (H)	5.61 (H)	5.06 (H)
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
Toluene	2.56 (L)	2.97 (M)	4.29 (H)	2.64 (M)	2.65 (H)
n-Octane	<0.03	<0.03	<0.03	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	<0.07	<0.07	<0.07	<0.07	0.53 (H)
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	0.18 (H)	<0.02	<0.02
Ethylbenzene	0.25 (H)	0.22 (H)	0.61 (H)	<0.02	0.27 (H)
m/p-Xylene	1.70 (H)	1.53 (H)	4.55 (H)	0.46 (H)	1.56 (H)
Styrene/o-Xylene	0.37 (M)	0.34 (H)	0.91 (H)	0.31 (H)	0.38 (H)
Bromoform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level
D Duplicate sample R Replicate analysis

TABLE I10. MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR S1MA

Sample Date Sample ID	07/21/88 2382	07/21/88 2382R	07/22/88 2401D	07/22/88 2402D	07/25/88 2420
Total NMOC, ppmC	0.379	0.379	0.237	0.246	0.350
Compound	Concentration, ppbv				
Acetylene	<1.00	<1.00	<1.00	<1.00	<1.00
Propylene	<0.10	<0.10	<0.10	<0.10	<0.10
Chloromethane	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	0.43 (H)	<0.20
1,3-Butadiene	0.17 (H)	<0.10	<0.10	<0.10	<0.10
Bromomethane	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10	<0.10
Methylene chloride	<0.11	<0.11	<0.11	<0.11	<0.11
trans-1,2-Dichloroethylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	<0.06	<0.06	<0.06	<0.06
Bromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	0.80 (L)	0.81 (H)	<0.01	<0.01	<0.01
Carbon tetrachloride	0.20 (L)	0.16 (H)	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Benzene	0.76 (H)	0.72 (H)	0.54 (H)	0.67 (H)	0.96 (H)
Trichloroethylene	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
Toluene	2.00 (H)	2.05 (L)	3.30 (H)	3.28 (H)	2.52 (H)
n-Octane	<0.03	<0.03	<0.03	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	<0.07	<0.07	<0.07	<0.07	<0.07
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.20 (H)	0.18 (H)	<0.02	0.08 (H)	0.18 (H)
m/p-Xylene	1.35 (H)	1.23 (H)	0.83 (H)	0.81 (H)	1.42 (H)
Styrene/o-Xylene	<0.02	<0.02	0.15 (H)	<0.02	0.22 (H)
Bromoform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level (Continued)
D Duplicate sample R Replicate analysis

TABLE I10. SIMA (Continued)

Sample Date	07/27/88	07/29/88	08/01/88	08/05/88	08/10/88
Sample ID	2511	2607	2637	2816	2964
Total NMOC, ppmC	0.603	0.643	0.527	0.420	0.303
Compound	Concentration, ppbv				
Acetylene	<1.00	<1.00	<1.00	<1.00	<1.00
Propylene	<0.10	<0.10	<0.10	3.12 (M)	3.09 (M)
Chloromethane	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	<0.10	<0.10	<0.10	<0.10	<0.10
Bromomethane	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10	<0.10
Methylene chloride	<0.11	<0.11	<0.11	<0.11	1.33 (L)
trans-1,2-Dichloroethylene	<0.04	<0.04	0.05 (L)	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Chloroprene	0.28 (L)	<0.06	<0.06	<0.06	<0.06
Bromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	1.28 (M)	1.75 (H)	1.10 (H)	1.11 (H)	0.95 (L)
Carbon tetrachloride	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Benzene	1.68 (H)	2.12 (H)	1.64 (H)	1.22 (H)	0.85 (M)
Trichloroethylene	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
Toluene	10.31 (H)	5.51 (H)	4.44 (M)	2.81 (H)	2.68 (L)
n-Octane	<0.03	<0.03	<0.03	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	0.62 (L)	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	<0.07	<0.07	<0.07	<0.07	<0.07
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.47 (H)	0.44 (H)	0.35 (H)	0.25 (H)	0.25 (H)
m/p-Xylene	2.85 (H)	2.88 (H)	2.50 (H)	1.57 (H)	1.49 (H)
Styrene/o-Xylene	0.73 (H)	0.67 (H)	0.57 (H)	0.48 (H)	0.34 (H)
Bromoform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level

TABLE I11. MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR S2MA

Sample Date	07/20/88	07/22/88	07/25/88	07/25/88	07/27/88
Sample ID	2311	2449	2436D	2437D	2516
Total NMOC, ppmC	0.380	0.201	0.288	0.272	0.420
Compound	Concentration, ppbv				
Acetylene	<1.00	<1.00	<1.00	<1.00	<1.00
Propylene	<0.10	1.86 (H)	<0.10	<0.10	<0.10
Chloromethane	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	0.43 (M)	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	<0.10	<0.10	<0.10	<0.10	<0.10
Bromomethane	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10	<0.10
Methylene chloride	<0.11	<0.11	<0.11	<0.11	<0.11
trans-1,2-Dichloroethylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	<0.06	<0.06	<0.06	<0.06
Bromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	1.80 (H)	1.32 (H)	0.50 (M)	0.45 (L)	0.97 (M)
Carbon tetrachloride	<0.01	0.15 (H)	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Benzene	1.24 (H)	0.47 (H)	0.91 (M)	0.90 (H)	1.18 (H)
Trichloroethylene	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
Toluene	3.47 (H)	1.57 (L)	2.25 (L)	2.29 (L)	4.29 (L)
n-Octane	<0.03	<0.03	<0.03	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	0.42 (H)	<0.07	<0.07	<0.07	<0.07
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	<0.02	<0.02	0.13 (H)	0.13 (H)	0.25 (H)
m/p-Xylene	1.37 (H)	0.61 (H)	1.24 (H)	1.18 (H)	1.85 (H)
Styrene/o-Xylene	<0.02	<0.02	0.20 (M)	0.25 (H)	0.48 (H)
Bromoform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level (Continued)

D Duplicate sample

TABLE I11. S2MA (Continued)

Sample Date	08/05/88	08/15/88	08/15/88	08/16/88
Sample ID	2817	2854	3097	3136
Total NMOC, ppmC	0.361	0.363	0.333	0.075
Compound	Concentration, ppbv			
Acetylene	<1.00	<1.00	<1.00	<1.00
Propylene	1.88 (H)	<0.10	<0.10	<0.10
Chloromethane	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	<0.10	<0.10	<0.10	<0.10
Bromomethane	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10
Methylene chloride	<0.11	<0.11	<0.11	<0.11
trans-1,2-Dichloroethylene	<0.04	<0.04	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	<0.06	<0.06	<0.06
Bromochloromethane	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	0.99 (H)	0.73	0.73 (H)	<0.01
Carbon tetrachloride	0.17 (H)	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.04	<0.04	<0.04	<0.04
Benzene	1.07 (H)	1.10 (H)	0.98 (H)	0.25 (H)
Trichloroethylene	<0.01	<0.01	<0.01	<0.01
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04
Toluene	2.98 (L)	2.21 (M)	2.90 (H)	0.44 (H)
n-Octane	<0.03	<0.03	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	<0.07	<0.07	0.38 (H)	<0.07
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.25 (H)	0.14 (H)	0.19 (H)	<0.02
m/p-Xylene	1.76 (H)	1.11 (H)	1.44 (H)	0.23 (H)
Styrene/o-Xylene	0.37 (H)	0.23 (H)	0.33 (H)	<0.02
Bromoform	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level

TABLE I12. MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR WAIL

Sample Date	07/20/88	07/21/88	07/21/88	07/28/88	07/29/88
Sample ID	2384	2371	2371R	2569	2630
Total NMOC, ppmC	0.135	0.078	0.078	0.267	0.263
Compound	Concentration, ppbv				
Acetylene	<1.00	<1.00	<1.00	<1.00	<1.00
Propylene	0.87 (M)	7.89 (M)	5.18 (H)	<0.10	4.72 (H)
Chloromethane	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	<0.10	<0.10	<0.10	<0.10	<0.10
Bromomethane	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10	<0.10
Methylene chloride	<0.11	<0.11	<0.11	<0.11	2.92 (L)
trans-1,2-Dichloroethylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	<0.06	<0.06	<0.06	<0.06
Bromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	<0.01	<0.01	<0.01	0.31 (L)	<0.01
Carbon tetrachloride	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.04	<0.04	<0.04	0.03 (L)	<0.04
Benzene	0.29 (L)	0.16 (H)	0.17 (H)	0.36 (H)	0.36 (H)
Trichloroethylene	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
Toluene	0.47 (M)	<0.02	<0.02	1.33 (H)	0.89 (M)
n-Octane	<0.03	<0.03	<0.03	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	<0.07	<0.07	<0.07	1.96 (M)	<0.07
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	<0.02	<0.02	<0.02	0.14 (M)	<0.02
m/p-Xylene	0.13 (M)	<0.04	0.16 (H)	0.64 (H)	0.37 (H)
Styrene/o-Xylene	<0.02	<0.02	<0.02	0.09 (H)	<0.02
Bromoform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level (Continued)
R Replicate analysis

TABLE 112. WAIL (Continued)

Sample Date	08/03/88	08/05/88	08/08/88	08/10/88	09/01/88
Sample ID	2774	2930	2929	2969	37500
Total NMOC, ppmC	0.382	0.139	0.402	0.945	1.164
Compound	Concentration, ppbv				
Acetylene	<1.00	<1.00	<1.00	<1.00	<1.00
Propylene	<0.10	<0.10	<0.10	<0.10	<0.10
Chloromethane	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	<0.10	<0.10	<0.10	<0.10	1.05 (L)
Bromomethane	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10	<0.10
Methylene chloride	<0.11	<0.11	<0.11	1.55 (L)	1.14 (L)
trans-1,2-Dichloroethylene	<0.04	<0.04	<0.04	<0.04	0.50 (M)
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	<0.06	<0.06	<0.06	0.44 (M)
Bromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	1.01 (H)	<0.01	0.54 (H)	0.62 (H)	<0.01
Carbon tetrachloride	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Benzene	1.23 (H)	0.29 (H)	1.26 (H)	2.21 (H)	3.22 (H)
Trichloroethylene	<0.01	<0.01	<0.01	0.88 (M)	<0.01
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
Toluene	2.69 (M)	0.47 (L)	2.70 (L)	6.10 (H)	6.19 (M)
n-Octane	<0.03	<0.03	<0.03	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	0.66 (H)	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	0.35 (H)	<0.07	<0.07	<0.07	<0.07
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.32 (H)	<0.02	<0.02	0.87 (H)	0.83 (H
m/p-Xylene	1.33 (H)	<0.04	1.10 (H)	4.53 (H)	4.38 (H
Styrene/o-Xylene	0.21 (H)	<0.02	0.24 (M)	1.14 (H)	1.09 (H
Bromoform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01	3.58 (M
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level
D Duplicate sample

TABLE I12. WAIL (Continued)

Sample Date	09/01/88
Sample ID	3751D
Total NMOC, ppmC	1.166
Compound	Concentration, ppbv
Acetylene	<1.00
Propylene	<0.10
Chloromethane	<0.20
Vinyl chloride	<0.20
1,3-Butadiene	0.67 (L)
Bromomethane	<0.20
Chloroethane	<0.10
Methylene chloride	1.16 (L)
trans-1,2-Dichloroethylene	0.55 (L)
1,1-Dichloroethane	<0.04
Chloroprene	0.66 (H)
Bromochloromethane	<0.01
Chloroform	<0.01
1,1,1-Trichloroethane	0.90 (L)
Carbon tetrachloride	<0.10
1,2-Dichloroethane	<0.04
Benzene	3.36 (M)
Trichloroethylene	<0.01
1,2-Dichloropropane	<0.04
Bromodichloromethane	<0.01
cis-1,3-Dichloropropylene	<0.04
Toluene	6.21 (L)
n-Octane	<0.03
n-Octane/t-1,3-Dichloropropylene	<0.03
trans-1,3-Dichloropropylene	<0.04
1,1,2-Trichloroethane	<0.02
Tetrachloroethylene	<0.07
Dibromochloromethane	<0.01
Chlorobenzene	<0.02
Ethylbenzene	0.86 (H)
m/p-Xylene	4.57 (H)
Styrene/o-Xylene	1.12 (M)
Bromoform	<0.01
1,1,2,2-Tetrachloroethane	<0.01
m-Dichlorobenzene	<0.02
p-Dichlorobenzene	<0.09
o-Dichlorobenzene	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level
D Duplicate sample

TABLE I13. MULTIPLE DETECTOR SPECIATED THREE-HOUR DATA SUMMARY FOR WOMA

Sample Date	07/22/88	07/25/88	07/26/88	07/26/88	08/04/88
Sample ID	2394	2426	2479D	2480D	2789
Total NMOC, ppmC	0.354	0.495	0.772	0.726	0.482
Compound	Concentration, ppbv				
Acetylene	<1.00	<1.00	<1.00	<1.00	<1.00
Propylene	<0.10	<0.10	<0.10	<0.10	<0.10
Chloromethane	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	<0.10	0.24 (M)	0.41 (H)	<0.10	0.21 (H)
Bromomethane	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10	0.18 (L)
Methylene chloride	<0.11	<0.11	<0.11	<0.11	<0.11
trans-1,2-Dichloroethylene	<0.04	<0.04	<0.04	<0.04	0.18 (M)
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	<0.06	<0.06	<0.06	<0.06
Bromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	<0.01	1.15 (H)	1.59 (H)	1.58 (H)	0.89 (H)
Carbon tetrachloride	<0.01	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	1.81 (L)	<0.04	0.42 (L)	<0.04	<0.04
Benzene	1.62 (H)	2.02 (H)	2.83 (H)	2.65 (H)	1.66 (H)
Trichloroethylene	<0.01	<0.01	8.03 (H)	7.93 (H)	1.30 (H)
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
Toluene	3.08 (H)	3.81 (H)	7.42 (M)	6.90 (H)	4.08 (H)
n-Octane	<0.03	<0.03	<0.03	<0.03	<0.03
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	<0.07	<0.07	<0.07	<0.07	<0.07
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.36 (H)	0.36 (H)	0.64 (H)	0.59 (H)	0.43 (H)
m/p-Xylene	2.61 (H)	2.70 (H)	4.61 (H)	4.41 (H)	2.72 (H)
Styrene/o-Xylene	0.51 (H)	0.63 (H)	1.18 (H)	1.11 (H)	0.60 (H)
Bromoform	<0.01	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level (Continued)

D Duplicate sample

TABLE I13. WOMA (Continued)

Sample Date	08/08/88	08/12/88	08/15/88	08/19/88
Sample ID	2853	3072	3102	3321
Total NMOC, ppmC	0.179	0.587	0.608	0.331
Compound	Concentration, ppbv			
Acetylene	<1.00	<1.00	1.54 (L)	<1.00
Propylene	<0.10	<0.10	<0.10	2.86 (L)
Chloromethane	<0.20	<0.20	<0.20	<0.20
Vinyl chloride	<0.20	<0.20	<0.20	<0.20
1,3-Butadiene	<0.10	<0.10	<0.10	0.32 (H)
Bromomethane	<0.20	<0.20	<0.20	<0.20
Chloroethane	<0.10	<0.10	<0.10	<0.10
Methylene chloride	<0.11	1.13 (L)	<0.11	1.67 (M)
trans-1,2-Dichloroethylene	<0.04	<0.04	0.18 (H)	<0.04
1,1-Dichloroethane	<0.04	<0.04	<0.04	<0.04
Chloroprene	<0.06	<0.06	<0.06	<0.06
Bromochloromethane	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	0.28 (H)	1.82 (H)	1.38 (H)	0.93 (H)
Carbon tetrachloride	0.16 (H)	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.04	<0.04	<0.04	<0.04
Benzene	0.63 (H)	2.59 (H)	2.57 (H)	1.41 (H)
Trichloroethylene	<0.01	1.52 (H)	3.92 (H)	<0.01
1,2-Dichloropropane	<0.04	<0.04	<0.04	<0.04
Bromodichloromethane	<0.01	<0.01	<0.01	<0.01
cis-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04
Toluene	<0.02	5.63 (M)	5.55 (H)	2.56 (H)
n-Octane	<0.03	<0.03	<0.03	0.18 (M)
trans-1,3-Dichloropropylene	<0.04	<0.04	<0.04	<0.04
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02
Tetrachloroethylene	<0.07	0.48 (H)	<0.07	0.34 (H)
Dibromochloromethane	<0.01	<0.01	<0.01	<0.01
Chlorobenzene	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.06 (H)	0.50 (H)	0.56 (H)	0.34 (H)
m/p-Xylene	0.84 (H)	3.29 (H)	3.44 (H)	1.98 (H)
Styrene/o-Xylene	0.09 (M)	0.83 (M)	0.87 (H)	0.54 (H)
Bromoform	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01
m-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02
p-Dichlorobenzene	<0.09	<0.09	<0.09	<0.09
o-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02

(H) High confidence level (M) Medium confidence level (L) Low confidence level