ANALYSIS OF UTILITY EMISSIONS TRACKING SYSTEM/CONTINUOUS EMISSIONS MONITORING (ETS/CEM) DATA

FINAL REPORT

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ACRONYMS AND ABBREVIATIONS

CAMD	Clean Air Markets Division
CEM	continuous emissions monitoring
CO_2	carbon monoxide
EGU	electricity generating unit
EIA	Energy Information Administration
EM	Emissions
EPA	U.S. Environmental Protection Agency
ETS/CEM	Emissions Tracking System/Continuous Emissions Monitoring
FIPS	Federal Information Processing Standard
LADCO	The Lake Michigan Air Directors Consortium
MMBtu	million British thermal units
NEI	National Emission Inventory
NIF	National Emission Inventory Input Format
NO_x	oxides of nitrogen
Pechan	E.H. Pechan & Associates, Inc.
QA/QC	quality assurance/quality control
RPO	Regional Planning Organization
SCC	Source Classification Code
SO_2	sulfur dioxide

CHAPTER I
INTRODUCTION/BACKGROUND

In September of 2001, the Lake Michigan Air Directors Consortium (LADCO) contracted with E.H. Pechan & Associates, Inc. (Pechan) to provide assistance in the processing and analysis of continuous emissions monitoring (CEM) data for electric utility sources. The purpose of this project was to develop improved methods for varying electric utility emissions in emissions and air quality models based on temporal factors and, if appropriate, ambient temperature.

Under the first phase of this contract, Pechan first acquired and processed the U.S. Environmental Protection Agency's (EPA's) Emissions Tracking System/Continuous Emissions Monitoring (ETS/CEM) hourly data from the years 1999 and 2000. Pechan performed quality assurance checks on the CEM data and then processed the data into a National Emission Inventory (NEI) Input Format (NIF) Version 2.0 "enhanced" emission table. In addition, Pechan prepared crosswalks for the data. The data processing is discussed in more detail in Chapter II.

In the second phase of this contract, Pechan used the hourly emissions data from 1999 and 2000 prepared under the first phase of this contract and performed several analyses with the data for a the Midwest Regional Planning Organization (RPO) States and the surrounding States. The data were analyzed to prepare three sets of temporal profiles: seasonal profiles, daily profiles by season, and hourly profiles by season. The temporal profile analyses and the results of these analyses are discussed in Chapter III. In addition, Pechan performed a temperature sensitivity analysis with the CEM data. In this analysis, Pechan determined the effect of ambient temperature on oxides of nitrogen (NO_x) emissions for each of the boilers in this 11-State region. The temperature sensitivity analyses and results are explained in Chapter IV.

CHAPTER II
1999 AND 2000 ETS/CEM HOURLY DATA PROCESSING

A. INTRODUCTION

Pechan was contracted by LADCO to develop EPA's ETS/CEM hourly data that were obtained from EPA/Clean Air Markets Division (CAMD), process them into a modified NIF 2.0 format for the Emissions (EM) table (called the NIF 2.0 "enhanced" EM table), and provide a crosswalk between the ORISPL and boiler IDs in the ETS/CEM files and the NEI Federal Information Processing Standard (FIPS) State-FIPS county-site IDs in the 1999 NEI Version 2.0.

B. PROCEDURE

Pechan has 1996 through1998 hourly ETS/CEM data in-house that had been approved by EPA/CAMD several years ago. A sample of 1998 Wisconsin data were first processed according to an agreement with LADCO. After acceptance by LADCO and several requested modifications, Pechan proceeded to acquire and process the 1999 and 2000 hourly ETS/CEM data. Because no other years of data were available at that time, LADCO agreed that two years of data, rather than three (as specified in the original contract), would be processed into NIF 2.0 "enhanced" EM tables.

Pechan acquired 24 text files – one for each month for 1999 and 2000 – and reviewed the data several times, comparing boilers with annual ETS/CEM data to determine whether boilers were left out of the hourly data files (some were) and whether any totals seemed unreasonable. Updated files were received from EPA several times. The last files Pechan received and used for processing were received on June 28, 2002.

Pechan created crosswalk files between ORISPL-BLRID with NEI V.2.0 identifiers. Boiler Source Classification Code (SCC) (fuel type) fractions were used to develop sulfur dioxide (SO_2), NO_x, and heat input fractions that were applied to the boiler level ETS/CEM hourly data to disaggregate to the boiler-SCC level and to add NEI identifiers to the ETS/CEM hourly data. If an ETS/CEM boiler could not be found in the NEI file, FIPST State and county were determined from Energy Information Administration (EIA) data, the site ID was formed by the concatenation of "X" and the ORISPL, and the point ID was formed by "X" and the BLRID, and the SCC was assigned based on the ETS/CEM boiler's prime fuel.

C. YEAR 1998 SAMPLE DATA

Pechan first provided a sample file for one State, using older 1998 hourly data for the State of Wisconsin. In October 2001, Pechan provided LADCO with a NIF 2.0 "enhanced" EM table text file of the data. From a data perspective, we took the boiler-level ETS/CEM data and matched back into the NEI to determine which SCCs were attached to each boiler

and then disaggregated the boiler-level emissions to the SCC level based on the ratio of each of the boiler's SCC annual heat input to the entire boiler's annual heat input. Note that we used 30 (=entire period) for the emission type, emission unit numerator='TONS', submittal flag='A' (add), emission data level='PROCESS', and a blank for control status. We also provided LADCO with a workbook containing three spreadsheets:

- The 'crosswalk information': the FIPS State code, FIPS county code, plant ID, point ID, stack ID, SCC, and segment (all from the 1998 NEI files); and the ORIS plant code and boiler ID (that were matched from the ETS/CEM data).

- Quality assurance/quality control (QA/QC) information (frequency of NO_x and SO_2 per boiler per month). The highest hourly NO_x value is 3.174300 tons -- EDGEWATER (4050, boiler=4) on 6/15/98 at hour 13; the highest hourly SO_2 value is 4.884600 tons -- COLUMBIA (8023, boiler=1) on 5/3/98 at hour 11.

- The list of ETS/CEM boilers that do not appear to be included in the NEI. There are two plants -- both small, one is a utility GT (Paris) and one a nonutility CC (Whitewater Cogen)-- that could not be matched into the 1998 NEI, so their ETS/CEM emissions are not included in the EM table file There are also four boilers from one plant, South Fond du Lac – a plant that is in the NEI – but these boilers/points are not in the NEI and the point that is there does not seem to represent the sum of the four boilers, so their ETS/CEM emissions are included in the EM file.

D. YEAR 1999 DATA

Pechan obtained the 1999 and 2000 data from EPA and processed them. These data were QA/QC reviewed by Pechan, and revised by EPA several times before we began working with the data.

At the end of March 2002, Pechan provided 14 draft files based on EPA's 1999 ETS/CEM hourly data and 1999 NEI V.1.5 point source IDs in one zip file, ladco032902.zip. Details about two of the files, ets99hrlysums.xls and xwalk99ladco032902.xls, follow:

- ets99hrlysums.xls contains 1999 ETS/CEM monthly and quarterly, as well as annual aggregated SO_2 (12,322,921) and NO_x (5,455,981) ton totals.

- xwalk99ladco032902.xls, the 1999 crosswalk file for the 1999 ETS/CEM hourly data with the original 1999 NEI version 1.5. This process-SCC level file has 3656 records, 2216 unique boilers, and 849 unique plants. We compared this crosswalk file's 1999 Wisconsin data with the 1998 Wisconsin ETS/CEM data that we delivered the previous October and noted differences with comment flags. The footnotes included in the xls with the comment flag key are listed as follows:
  - For ETS/CEM-only boilers, SCC, whenever possible, is assigned based on prime mover and fuel type as specified in the annual 1999 ETS/CEM file.
  - Segment ID is unknown; an assumption of one per boiler (X01) is used.
  - FIPS county is unknown; it remains blank.
  - Plant ID is unknown; a default value of 'X' + ORISPL is used.

- Point ID is unknown; a default value of 'X' + BLRID is used. (If the BLRID has a length of six, the first character of the ID is replaced by 'X'.)
- Stack ID is unknown; an assumption of one per plant (X01) is used.
- Point IDs are the same as those in the original 1999 NEI, but should be consistent within a plant (applies to Wisconsin and Wyoming only since we reviewed these two States).
- Some IDs are different -- not incorrect -- from the sample 1999 Wisconsin data provided by Pechan to LADCO on October 22, 2001.
- The FIPS county code for two Florida plants, Cutler and Turkey Point, is as it appears in the original 1999 NEI, but since the county name changed from 'Dade' to 'Miami-Dade', the FIPS county code should be changed from 025 to 086 for both of these plants.
- In the 1999 NEI, there are two FIPS county codes -- one representing Baltimore city (510) and one representing Baltimore county (005) for Maryland's C P Crane plant -- and the same situation, but for St. Louis city (510) and county (189), for Missouri's Meramec plant. This situation occurs because there is conflicting information about whether these two plants are in the county or city, but one FIPS county code should be chosen for each plant.
- The site ID for Wyoming's Neil Simpson 2 plant presently used in the 1999 NEI EM file for NO_x and SO_2 is 7504, but it should be changed to 0063 (which is what is presently used for particulate matter emissions in the EM file).
- Two site IDs (4140 and 0341) for Wisconsin's Alma plant are presently used in the 1999 NEI EM file, but only 0341 should be used.

Pechan also provided 12 zip files, ladco99EM01.zip through ladco99EM12.zip; each zip file included one .dbf file (of the same name) with one month of 1999 ETS/CEM hourly data in an agreed upon NIF 2.0 “enhanced” EM table. Each file has 15 variables. The first 13 variables from the NIF 2.0 format are included as the first 13 variables in the monthly dbfs (adding the other NIF 2.0 variables, which will have identical default values, would make these large files even larger, and we prudently decided that you don't want all the problems that we have faced in processing these large data files, so they are not included). We also added ORISPL and BLRID (the ETS/CEM identifiers) at the end of each .dbf file for the 14th and 15th variables. Note that: (1) we extended the width of the emission value field so that annual totals would be accurate; (2) for the 24th hour record that has a start time value of 2300, we assigned the end time a value of 2359 (for, if we assigned it the value 0000, it would not have the same start date as the start time does); (3) for ETS/CEM-only boilers, we had no easy match from the 1999 NEI, so we used the conventions specified in the comment flags to assign default NEI values; and (4) if the operating time (with a possible value from 0 to 1 for each hour) -- a variable that you do not see -- is 0, then if there is a variable with no data value, it is considered to be missing data (-99) since no data are expected; but if the operating time is greater than 0, then if a variable has no data value, it is considered to be 0. This interpretation of the operating time variable was approved by EPA.

Based on LADCO comments about the March 1999 data deliverable as well as updated EPA 1999 hourly data files, Pechan redid the 1999 data in early July 2002 and provided LADCO with 16 draft files based on EPA's 1999 ETS/CEM hourly data and 1999 NEI point source data in a zip file, ladco99071102.zip, with four files: pechanHRLY99totals.xls,

pechanHRLY9900filestructure.wpd, xwalk99ladco071102.xls, and DraftEPAPechan99XwalkNEI99v2.xls. Descriptions of these four files are below:

- pechanHRLY99totals.xls contains 1999 ETS/CEM monthly and annual aggregated data from 69,025,056 records. Totals are: SO_2=12,432,695 and NO_x=5,539,268 tons; and heat input=25,387,339,307 million British thermal units (MMBtu).

- pechanHRLY9900filestructure.wpd delineates the file's structure for the monthly comma delimited files for 1999 and 2000.

- xwalk99ladco071102.xls is the crosswalk file for the 1999 ETS/CEM hourly data with the 1999 NEI - State ID crosswalk FIPS State, FIPS county, site ID, point/emission unit, stack, and process/segment IDs. This process level file (sorted by ORISPL + boiler ID) has 4192 records, 2732 unique boilers, and 958 unique plants. This file,xwalk99ladco071102.xls, should match with the next file, DraftEPAPechan99XwalkNEI99v2.xls, although there will be records in each file that are not in the other one.

- DraftEPAPechan99XwalkNEI99v2.xls is part of EPA's latest (July 10) draft NEI version 2.0 - State crosswalk file at the emission unit ID - process ID level (sorted by FIPS State + FIPS county + site ID). Certain assumptions were made for this crosswalk that may exclude units emitting less than 100 tons of NO_x.

Additionally, 12 more year 1999 zip files, named ladco99EM01_071102.zip through ladco99EM12_071102.zip (sorted by FIPS State + FIPS county + site ID) were provided. This time, each zip file included one comma delimited text (.TXT) file with one month of 1999 ETS/CEM hourly data in a NIF 2.0 “enhanced” EM table. Each file has 16 variables. The first 13 variables from the NIF 2.0 format are included as the first 13 variables in the monthly dbfs, as agreed upon. We also added heat input (in MMBtu), as well as ORISPL and BLRID (the ETS/CEM identifiers) at the end of each record -- as the fourteenth through sixteenth variables.

Please note that:

- We extended the width of the emission value field so that annual totals would be accurate.

- For the 24th hour record that has a start time value of 2300, we assigned the end time a value of 2359 (for, if we assigned it the value 0000, it would not have the same start date as the start time does).

- For ETS/CEM-only boilers, if we had no easy match from the 1999 NEI, we found the State and county, and assigned the ORISPL preceded by an "X" as the default NEI site ID, and assigned the BLRID preceded by an "X" as the default NEI emissions unit (point) ID -- if the BLRID has a length of six, the first character of the ID is replaced by "X".

- If stack ID or segment ID is unknown, an assumption of one per boiler (X01) is used.

- Values of -99 are used to denote missing data and are different from 0 values.

- Some NEI IDs are different from those provided in the March 29, 2002 file because changes were made based on more recent information to enable LADCO to match to the DraftEPA-Pechan9900crosswalkNEI99v2 file. We also added more records to this more recent LADCO crosswalk file since the original hourly files had left out some units.

E. YEAR 2000 DATA

Using new 2000 data from EPA, Pechan processed the data and provided LADCO with 19 draft files based on EPA's 2000 ETS/CEM hourly data and 1999 NEI point source data in mid-July 2002.

A zip file, ladco00071802.zip, was provided with seven files: pechanHRLY00totals.xls, pechanHRLY9900filestructure.wpd, xwalk00ladco071802.xls, DraftEPAPechan9900XwalkNEI99.xls, ETS0012SASprg.wpd, ETS00hrSASprg.wpd, and nei00ids071802.xls. Descriptions of these seven files are below:

- pechanHRLY00totals.xls contains 2000 ETS/CEM monthly and annual aggregated data from 72,633,744 records. Totals are: SO_2=11,199,342 and NO_x=5,157,201 tons; and heat input=26,137,264,798 MMBtu.

- pechanHRLY9900filestructure.wpd delineates the file's structure for the monthly comma delimited files for 1999 and 2000.

- xwalk00ladco071802.xls is the crosswalk file for the 2000 ETS/CEM hourly data with the 1999 NEI - State ID crosswalk FIPS State, FIPS county, site ID, point/emission unit, stack, and process/segment IDs. This process level file (sorted by ORISPL + boiler ID) has 2950 unique boilers and 1018 unique plants. This file, xwalk00ladco071802.xls, should match with the next file, DraftEPAPechan9900XwalkNEI99.xls, although there will be records in each file that are not in the other one.

- DraftEPAPechan9900XwalkNEI99.xls is part of EPA's latest (July 10) draft NEI - State crosswalk file at the emission unit ID - process ID level (sorted by FIPS State + FIPS county + site ID). Certain assumptions were made for this crosswalk that may exclude units emitting less than 100 tons of NO_x. Additionally, only States that submitted State data are included, except for Wyoming which is also not included (because of budget constraints, EPA requested a file only for use for developing NEI V.2.0). This file replaces the earlier one (sent with the 1999 deliverable) with the similar name (no '00' in the older file name) because the State IDs were inadvertently not included.

- ETS0012SASprg.wpd is a text version of the mainframe program was used to take the twelfth month (there is a similar program for each of the other 11 months) of year 2000 raw data and save it as a SAS file with "EIA-corrected" ORISPL and boiler IDS, as needed. A file listing all the ORISPLs in the twelfth month was also created and then downloaded to the PC. We used all 12 months of this type of

"QA/QC" file to check that no expected plants were left out of the raw data files (which is how we determined from the previous data set of ETS/CEM hourly data files that there was a problem).

- ETS00hrSASprg.wpd is a text version of the mainframe program that was used to take the twelve monthly SAS files previously created and put them in a format compatible with the NIF 2.0 “enhanced” EM table. Using the next file, nei00ids071802.xls, NEI identifiers were added and the boiler-level SO_2, NO_x, and heat input were disaggregated to the SCC (process) level, based on SO_2, NO_x, and heat input fractions for each boiler's SCCs. These fractions (for example, SO_2's) were developed from the original 1999 NEI utility data, based on 1999 EIA-767 data, by using the boiler's SCC's (SO_2) fractional part of the entire boiler's (SO_2) value (all boilers' SCC fractions for a given data element summed to 1). If the boiler is not included in the EIA-767, but does report to ETS/CEM, then the primary fuel specified in the 1999 ETS/CEM annual Scorecard data file was used to assign one SCC for that boiler, and the three fractions were each assigned a value of 1.

Twelve year 2000 zip files, named ladco00EM01_071802.zip through ladco00EM12_071802.zip (sorted by FIPS State + FIPS county + site ID), were also provided, with each zip file including one comma delimited text (.TXT) file with one month of 2000 ETS/CEM hourly data in NIF 2.0 "enhanced" EM table. Each file has 16 variables. The first 13 variables from the NIF 2.0 format are included as the first 13 variables in the monthly dbfs, as agreed upon. We also added heat input (in MMBtu), as well as ORISPL and BLRID (the ETS/CEM identifiers) at the end of each file for the fourteenth through sixteenth variables. The same six notes that applied to the 1999 data apply to the 2000 data files.

F. FOLLOW UP

Because the NEI was in flux in July 2002 when Pechan delivered crosswalk files to LADCO, subsequent changes were made to 1999 NEI V.2.0 identifiers that are not reflected in the July files. Accordingly, Pechan delivered to LADCO in January 2003 the latest September 2002 crosswalk file, neixw913.xls, that matches ORISPL-BLRID and 1999 NEI V.2.0 identifiers.

G. SAMPLES

Samples of seven files that were sent to LADCO are displayed below. Tables II-1 through II-7 include data from seven files previously sent to LADCO and described above in this section:

- ladco99em07.txt
- pechanHRLY9900filestructure.wpd
- pechanHRLY99totals.xls and pechanHRLY00totals.xls
- draft EPApechan9900xwalknei99.xls
- xwalk99ladco071102.xls
- xwalk00ladco071802.xls
- neixw913.xls

Table II-1
Year 1999 Month 7 NIF 2.0 “Enhanced” EM Table
(ladco99em07.txt)

"EM","01","097","1001","1","22","SO2","001",19990701,19990701,0,100,0.644735543609000,1127.767352870000,3,"1"
"EM","01","097","1001","1","22","NOX","001",19990701,19990701,0,100,0.333726888349000,1127.767352870000,3,"1"
"EM","01","097","1001","1","22","SO2","001",19990701,19990701,100,200,0.534688011117000,951.413987407000,3,"1"
"EM","01","097","1001","1","22","NOX","001",19990701,19990701,100,200,0.314509889842000,951.413987407000,3,"1"
"EM","01","097","1001","1","22","SO2","001",19990701,19990701,200,300,0.445840003285000,791.553387393000,3,"1"
"EM","01","097","1001","1","22","NOX","001",19990701,19990701,200,300,0.270036264727000,791.553387393000,3,"1"
"EM","01","097","1001","1","22","SO2","001",19990701,19990701,300,400,0.477589291396000,852.854810767000,3,"1"
"EM","01","097","1001","1","22","NOX","001",19990701,19990701,300,400,0.262648951016000,852.854810767000,3,"1"
"EM","01","097","1001","1","22","SO2","001",19990701,19990701,400,500,0.726333713998000,1274.016453690000,3,"1"
"EM","01","097","1001","1","22","NOX","001",19990701,19990701,400,500,0.383391598775000,1274.016453690000,3,"1"
"EM","01","097","1001","1","22","SO2","001",19990701,19990701,500,600,0.782982443809000,1372.078860290000,3,"1"
"EM","01","097","1001","1","22","NOX","001",19990701,19990701,500,600,0.392925226605000,1372.078860290000,3,"1"
"EM","01","097","1001","1","22","SO2","001",19990701,19990701,600,700,0.790832267799000,1377.742038780000,3,"1"
"EM","01","097","1001","1","22","NOX","001",19990701,19990701,600,700,0.395221283570000,1377.742038780000,3,"1"
"EM","01","097","1001","1","22","SO2","001",19990701,19990701,700,800,0.807681889993000,1411.224339720000,3,"1"
"EM","01","097","1001","1","22","NOX","001",19990701,19990701,700,800,0.404106025736000,1411.224339720000,3,"1"
"EM","01","097","1001","1","22","SO2","001",19990701,19990701,800,900,0.784132418024000,1385.491651460000,3,"1"
"EM","01","097","1001","1","22","NOX","001",19990701,19990701,800,900,0.389780626850000,1385.491651460000,3,"1"
"EM","01","097","1001","1","22","SO2","001",19990701,19990701,900,1000,0.788382322732000,1388.273563700000,3,"1"
"EM","01","097","1001","1","22","NOX","001",19990701,19990701,900,1000,0.384988855793000,1388.273563700000,3,"1"
"EM","01","097","1001","1","22","SO2","001",19990701,19990701,1000,1100,0.806281921383000,1416.688810200000,3,"1"
"EM","01","097","1001","1","22","NOX","001",19990701,19990701,1000,1100,0.377950942055000,1416.688810200000,3,"1"
"EM","01","097","1001","1","22","SO2","001",19990701,19990701,1100,1200,0.790482275646000,1368.998886020000,3,"1"
"EM","01","097","1001","1","22","NOX","001",19990701,19990701,1100,1200,0.368616971351000,1368.998886020000,3,"1"
"EM","01","097","1001","1","22","SO2","001",19990701,19990701,1200,1300,0.786632361970000,1382.709739220000,3,"1"
"EM","01","097","1001","1","22","NOX","001",19990701,19990701,1200,1300,0.375804627936000,1382.709739220000,3,"1"
"EM","01","097","1001","1","22","SO2","001",19990701,19990701,1300,1400,0.778432545828000,1367.309867870000,3,"1"
"EM","01","097","1001","1","22","NOX","001",19990701,19990701,1300,1400,0.375055913708000,1367.309867870000,3,"1"
"EM","01","097","1001","1","22","SO2","001",19990701,19990701,1400,1500,0.769232752107000,1350.320332380000,3,"1"
"EM","01","097","1001","1","22","NOX","001",19990701,19990701,1400,1500,0.376503427881000,1350.320332380000,3,"1"

Table II-2
File Structure for the 1999 and 2000 NIF 2.0 “Enhanced” EM Table
(pechanHRLY9900filestructure.wpd)

This is the file structure for the comma delimited files named LADCOyyEMxx.TXT where yy represents the year 99 or 00 and xx represents a month from 01 to 12.

Field	Field Name	Type	Width (Decimal)	Definition
1	RECORDTY	Character	2	=”EM”
2	STATEFIP	Character	2	FIPS State code
3	CNTYFIPS	Character	3	FIPS county code
4	SITEID	Character	15	NEI site ID
5	EMISSUN	Character	6	NEI emission unit ID
6	PROCID	Character	6	NEI process ID
7	POLLU	Character	10	=”NOX” or =”SO2 ”
8	EMISSRE	Character	6	NEI emission release point
9	STRTDATE	Numeric	8	Start date in the form yyyymmdd
10	ENDDATE	Numeric	8	End date in the form yyyymmdd
11	STRTTIME	Numeric	4	Start time in the form hhmm
12	ENDTIME	Numeric	4	End time in the form hhmm
13	EMISTONS	Numeric	20 (15)	Emissions (in tons)
14	HTI	Numeric	20 (12)	Heat input (in MMBtu)
15	ORISPL	Numeric	6	
16	BLRID	Character	6	

NOTE: STATEFIP, CNTYFIPS, SITEID, EMISSUN and PROCID are ‘correct’ NEI identifiers from EPA’s latest (July 10, 2002) draft NEI version 2.0 - State crosswalk file.

Table II-3
Years 1999 and 2000 Monthly ETS/CEM Hourly Aggregated Data Totals
(pechanHRLY99totals.xls and pechanHRLY00totals.xls)

Year	Month	QTR	Heat Input	SO_2	Carbon Monoxide (CO_2)	NO_x
1999	1	1	2,076,509,110.30	1,095,386.87	199,178,899.20	489,778.31
1999	2	1	1,777,507,463.20	933,404.70	170,953,938.50	418,137.89
1999	3	1	1,942,176,731.20	1,034,000.40	185,617,411.90	456,823.05
1999		1	5,796,193,304.70	3,062,791.97	555,750,249.60	1,364,739.25
1999	4	2	1,897,295,405.40	932,929.75	177,337,807.50	426,480.91
1999	5	2	2,007,197,486.60	966,261.10	187,422,259.80	434,897.00
1999	6	2	2,256,473,007.50	1,086,898.86	209,412,362.00	476,573.62
1999		2	6,160,965,899.50	2,986,089.71	574,172,429.30	1,337,951.53
1999	7	3	2,681,360,945.40	1,269,456.20	245,579,278.00	561,221.52
1999	8	3	2,580,901,819.80	1,219,158.04	236,356,046.00	540,155.94
1999	9	3	2,171,901,596.10	1,020,675.44	201,871,635.60	454,568.19
1999		3	7,434,164,361.30	3,509,289.68	683,806,959.60	1,555,945.65
1999	10	4	2,046,887,077.70	989,641.43	191,985,961.00	434,625.71
1999	11	4	1,876,060,997.20	895,001.80	178,450,025.00	401,351.13
1999	12	4	2,073,067,666.10	989,880.36	198,047,423.50	444,654.95
1999		4	5,996,015,741.00	2,874,523.59	568,483,409.50	1,280,631.79
1999			**25,387,339,306.50**	**12,432,694.95**	**2,382,213,048.00**	**5,539,268.22**

Year	Month	QTR	Heat Input	SO_2	CO_2	NO_x
2000	1	1	2,167,107,952.60	1,001,991.49	206,680,688.60	463,596.85
2000	2	1	1,928,011,983.20	876,251.48	183,357,738.40	403,023.39
2000	3	1	1,933,154,343.80	851,118.38	181,756,077.20	397,901.92
2000		1	6,028,274,279.60	2,729,361.35	571,794,504.20	1,264,522.16
2000	4	2	1,798,376,266.40	762,149.90	168,513,452.50	363,598.38
2000	5	2	2,103,211,549.30	861,972.14	194,693,845.80	403,232.42
2000	6	2	2,304,975,325.10	970,942.99	214,435,864.20	436,679.07
2000		2	6,206,563,140.80	2,595,065.03	577,643,162.50	1,203,509.87
2000	7	3	2,488,374,237.10	1,016,604.42	231,261,617.50	465,242.57
2000	8	3	2,656,076,986.90	1,058,946.11	244,919,362.70	494,294.71
2000	9	3	2,258,432,611.30	927,089.21	210,519,573.80	424,482.47
2000		3	7,402,883,835.30	3,002,639.74	686,700,554.00	1,384,019.75
2000	10	4	2,108,707,701.40	906,088.10	198,258,763.40	412,230.16
2000	11	4	2,029,971,222.90	894,638.66	192,468,347.20	406,231.23
2000	12	4	2,360,864,617.70	1,071,549.22	223,659,667.80	486,688.08
2000		4	6,499,543,542.00	2,872,275.98	614,386,778.40	1,305,149.47
2000			**26,137,264,797.70**	**11,199,342.10**	**2,450,524,999.10**	**5,157,201.25**

Table II-4
Years 1999 and 2000 Draft Crosswalk with State Identifiers
(draftepapechan9900xwalknei99.xls)

FIPS State code	FIPS county code	NEI plant name	NEI site ID	NEI emission unit ID	NEI process ID	ORISPL	BLRID	NEI SCC	State plant name	State site ID	State emission unit ID	State process ID	State emission release point	State SCC
01	033	COLBERT	0010	1	22	47	1	10100202	TVA COLBERT	0010	010	01	009	10100202
01	033	COLBERT	0010	1	51	47	1	10100501	TVA COLBERT					
01	033	COLBERT	0010	2	22	47	2	10100202	TVA COLBERT	0010	011	01	009	10100202
01	033	COLBERT	0010	2	51	47	2	10100501	TVA COLBERT					
01	033	COLBERT	0010	3	22	47	3	10100202	TVA COLBERT	0010	012	01	009	10100202
01	033	COLBERT	0010	3	51	47	3	10100501	TVA COLBERT					
01	033	COLBERT	0010	4	22	47	4	10100202	TVA COLBERT	0010	013	01	009	10100202
01	033	COLBERT	0010	4	51	47	4	10100501	TVA COLBERT					
01	033	COLBERT	0010	5	22	47	5	10100202	TVA COLBERT	0010	014	01	010	10100202
01	033	COLBERT	0010	5	51	47	5	10100501	TVA COLBERT					
01	033	COLBERT	0010			47			TVA COLBERT	0010	002	01	001	10200501
01	033	COLBERT	0010			47			TVA COLBERT	0010	003	01	002	10200501
01	033	COLBERT	0010			47			TVA COLBERT	0010	004	01	003	20100101
01	033	COLBERT	0010			47			TVA COLBERT	0010	005	01	004	10200501
01	033	COLBERT	0010			47			TVA COLBERT	0010	006	01	005	10200501
01	033	COLBERT	0010			47			TVA COLBERT	0010	007	01	006	10200501
01	033	COLBERT	0010			47			TVA COLBERT	0010	008	01	007	10200501
01	033	COLBERT	0010			47			TVA COLBERT	0010	009	01	008	10200501
01	039	MCWILLIAMS	0001			533	4		Alabama Electric Cooperative McWilliams	0001	005	01	002	10100201
01	055	GADSDEN	0002	1	22	7	1	10100212	ALABAMA POWER COMPANY GADSDEN	0002	002	01	001	10100202
01	055	GADSDEN	0002	1	51	7	1	10100501	ALABAMA POWER COMPANY GADSDEN					
01	055	GADSDEN	0002	1	64	7	1	10100604	ALABAMA POWER COMPANY GADSDEN					
01	055	GADSDEN	0002	2	22	7	2	10100212	ALABAMA POWER COMPANY GADSDEN	0002	003	01	001	10100201
01	055	GADSDEN	0002	2	51	7	2	10100501	ALABAMA POWER COMPANY GADSDEN					
01	055	GADSDEN	0002	2	64	7	2	10100604	ALABAMA POWER COMPANY GADSDEN					
01	055	GADSDEN	0002			7			ALABAMA POWER COMPANY GADSDEN	0002	004	01	002	10200601
01	063	GREENE COUNTY	0001	1	22	10	1	10100202	ALABAMA POWER COMPANY GREENE COUNTY	0001	002	01	001	10100201
01	063	GREENE COUNTY	0001	1	51	10	1	10100501	ALABAMA POWER COMPANY GREENE COUNTY					
01	063	GREENE COUNTY	0001	001	61	10	1	10100601	ALABAMA POWER COMPANY GREENE COUNTY					
01	063	GREENE COUNTY	0001	2	22	10	2	10100202	ALABAMA POWER COMPANY GREENE COUNTY	0001	003	01	001	10100201
01	063	GREENE COUNTY	0001	2	51	10	2	10100501	ALABAMA POWER COMPANY GREENE COUNTY					

Table II-5
Year 1999 Draft Crosswalk
(xwalk99ladco071102.xls)

Plant Name	ORISPL	Boiler ID	FIPS State Code	FIPS county code	NEI Site ID	NEI emission unit ID	NEI process ID	NEI emission release point	Record Type
COLBERT	47	1	01	033	0010	1	22	002	EM
COLBERT	47	1	01	033	0010	1	51	002	EM
COLBERT	47	2	01	033	0010	2	22	002	EM
COLBERT	47	2	01	033	0010	2	51	002	EM
COLBERT	47	3	01	033	0010	3	22	002	EM
COLBERT	47	3	01	033	0010	3	51	002	EM
COLBERT	47	4	01	033	0010	4	22	002	EM
COLBERT	47	4	01	033	0010	4	51	002	EM
COLBERT	47	5	01	033	0010	5	22	001	EM
COLBERT	47	5	01	033	0010	5	51	001	EM
MCWILLIAMS	533	4	01	039	0001	X4	X01	X01	EM
GADSDEN	7	1	01	055	0002	1	22	001	EM
GADSDEN	7	1	01	055	0002	1	51	001	EM
GADSDEN	7	1	01	055	0002	1	64	001	EM
GADSDEN	7	2	01	055	0002	2	22	001	EM
GADSDEN	7	2	01	055	0002	2	51	001	EM
GADSDEN	7	2	01	055	0002	2	64	001	EM
GREENE COUNTY	10	1	01	063	0001	1	22	001	EM
GREENE COUNTY	10	1	01	063	0001	1	51	001	EM
GREENE COUNTY	10	1	01	063	0001	001	61	001	EM
GREENE COUNTY	10	2	01	063	0001	2	22	001	EM
GREENE COUNTY	10	2	01	063	0001	2	51	001	EM
GREENE COUNTY	10	2	01	063	0001	002	61	001	EM
GREENE COUNTY	10	CT2	01	063	0001	004	01	X01	EM
GREENE COUNTY	10	CT3	01	063	0001	005	01	X01	EM
GREENE COUNTY	10	CT4	01	063	0001	006	01	X01	EM
GREENE COUNTY	10	CT5	01	063	0001	007	01	X01	EM
GREENE COUNTY	10	CT6	01	063	0001	008	01	X01	EM
GREENE COUNTY	10	CT7	01	063	0001	009	01	X01	EM
GREENE COUNTY	10	CT8	01	063	0001	010	01	X01	EM

Table II-6
Year 2000 Draft Crosswalk
(xwalk00ladco071802.xls)

Plant name	ORISPL	Boiler ID	FIPS State code	FIPS county code	NEI site ID	NEI emission unit ID	NEI process ID	NEI emission release point	Record type
COLBERT	47	1	01	033	0010	1	22	002	EM
COLBERT	47	1	01	033	0010	1	51	002	EM
COLBERT	47	2	01	033	0010	2	22	002	EM
COLBERT	47	2	01	033	0010	2	51	002	EM
COLBERT	47	3	01	033	0010	3	22	002	EM
COLBERT	47	3	01	033	0010	3	51	002	EM
COLBERT	47	4	01	033	0010	4	22	002	EM
COLBERT	47	4	01	033	0010	4	51	002	EM
COLBERT	47	5	01	033	0010	5	22	001	EM
COLBERT	47	5	01	033	0010	5	51	001	EM
MCWILLIAMS	533	4	01	039	0001	X4	X01	X01	EM
GADSDEN	7	1	01	055	0002	1	22	001	EM
GADSDEN	7	1	01	055	0002	1	51	001	EM
GADSDEN	7	1	01	055	0002	1	64	001	EM
GADSDEN	7	2	01	055	0002	2	22	001	EM
GADSDEN	7	2	01	055	0002	2	51	001	EM
GADSDEN	7	2	01	055	0002	2	64	001	EM
GREENE COUNTY	10	1	01	063	0001	1	22	001	EM
GREENE COUNTY	10	1	01	063	0001	1	51	001	EM
GREENE COUNTY	10	1	01	063	0001	001	61	001	EM
GREENE COUNTY	10	2	01	063	0001	2	22	001	EM
GREENE COUNTY	10	2	01	063	0001	2	51	001	EM
GREENE COUNTY	10	2	01	063	0001	002	61	001	EM
GREENE COUNTY	10	CT2	01	063	0001	004	01	X01	EM
GREENE COUNTY	10	CT3	01	063	0001	005	01	X01	EM
GREENE COUNTY	10	CT4	01	063	0001	006	01	X01	EM
GREENE COUNTY	10	CT5	01	063	0001	007	01	X01	EM
GREENE COUNTY	10	CT6	01	063	0001	008	01	X01	EM
GREENE COUNTY	10	CT7	01	063	0001	009	01	X01	EM
GREENE COUNTY	10	CT8	01	063	0001	010	01	X01	EM

Table II-7
ORISPL-BLRID and NEI V.2.0 ID Crosswalk with State IDs
(as of September 13, 2002)
(neixw913.xls)

orispl	blrid	facname	fipsst	fipscnty	siteid	emissun
3	1	ALABAMA POWER COMPANY BARRY	01	097	1001	002
3	2	ALABAMA POWER COMPANY BARRY	01	097	1001	003
3	3	ALABAMA POWER COMPANY BARRY	01	097	1001	004
3	4	ALABAMA POWER COMPANY BARRY	01	097	1001	005
3	5	ALABAMA POWER COMPANY BARRY	01	097	1001	006
26	1	ALABAMA POWER COMPANY EC GASTON	01	117	0005	002
26	2	ALABAMA POWER COMPANY EC GASTON	01	117	0005	003
26	3	ALABAMA POWER COMPANY EC GASTON	01	117	0005	004
26	4	ALABAMA POWER COMPANY EC GASTON	01	117	0005	005
26	5	ALABAMA POWER COMPANY EC GASTON	01	117	0005	006
8	6	ALABAMA POWER COMPANY GORGAS	01	127	0001	004

CHAPTER III
TEMPORAL PROFILES

The purpose of this temporal profile analysis was to use the hourly ETS/CEM data processed in first part of this project to develop to develop sets of seasonal, daily, and hourly temporal profiles and assign each of the boilers in the ETS/CEM data set to the appropriate profiles. This analysis was performed for boilers in the Midwest RPO region and the surrounding States: Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, Ohio, Pennsylvania, West Virginia, and Wisconsin. These profiles would then be used by LADCO in future emission modeling.

A. INDIVIDUAL BOILER PROFILES

Before developing groups of profiles, Pechan prepared individual boiler emission profiles for each of the ETS/CEM units in the States listed above. A total of 936 boilers were included within these 11 States. At LADCO's request, these individual boiler emission profiles were prepared based on combined ETS/CEM data from 1999 and 2000. The emission profiles were all based on the NO_x emissions only. Three sets of individual boiler profiles were prepared: emission fractions by month, emission fractions by day of the week, and emission fractions by hour of the day.

The approach to developing these individual boiler profiles was straightforward. For the monthly emission profiles, the NO_x emissions were totaled by boiler and month. The NO_x emissions from each boiler for a given month were then divided by the total of the 1999 and 2000 NO_x emissions from that boiler. For the day of week profiles, first each daily ETS/CEM data record was coded with the day of week corresponding to the date included in the file. Next, NO_x emissions were totaled by day of the week for each boiler. The NO_x emission totals at a given boiler for each day of the week were divided by the 1999 plus 2000 NO_x emission total for that boiler. Similarly, NO_x emissions were totaled by hour and boiler. For each boiler the total for each hour was divided by the 1999 plus 2000 NO_x emission total at that boiler.

B. NEW GENERALIZED PROFILES

A set of new emission profiles was developed to better characterize the actual emission data than the current set of default emission profiles used in emission modeling. Three sets of final profiles were developed:

- seasonal temporal profiles,
- daily temporal profiles by season, and
- hourly temporal profiles by season.

As with the individual boiler profiles, these generalized temporal profiles were based on the combined ETS/CEM emissions data from 1999 and 2000. These profiles were also based on

NO_x emissions. An initial set of profiles was developed for both NO_x and SO_2 emissions. There was little difference between the NO_x and SO_2 profiles, with the exception that a significant number of the units had zero SO_2 emissions. Because of this, it was felt developing the emission profiles based on NO_x emissions would be the preferred approach. In addition, while this analysis was not performed using heat input as a determinant of the temporal profiles, heat input was analyzed in the temperature analysis in Chapter IV. This analysis showed that heat input followed the same trends as NO_x emissions, with respect to temperature effects. Thus, it is expected that temporal profiles based on heat input should give similar results to those presented here. However, this assumption may warrant further investigation in future analyses.

In this analysis, seasons were defined as follows:

- Winter–December, January, and February;
- Spring–March, April, and May;
- Summer–June, July, and August; and
- Fall–September, October, and November.

The first step in performing this analysis was to calculate NO_x emission fractions at each unit. At the boiler level, NO_x emission fractions were calculated first for each season. Next, emission fractions were calculated for each unit by day of week and season. A final set of emission fractions was calculated for each unit by hour of the day and day of week for each season. Further analysis of the hourly emission profiles were developed using only the Wednesday hourly fractions by season, as this was determined to sufficiently represent the emissions.

The next step in preparing the new temporal emission profiles was to calculate a "reduced" profile at each unit for the three sets of temporal profiles described above. The procedure for calculating these "reduced" profiles was essentially a way to round the emission profiles off in a manner that would allow similar profiles to be grouped together. To calculate these "reduced" profiles, each of the values in the seasonal emission fractions for each boiler was divided by 0.08 and rounded to the nearest integer. Similarly, the emission fractions for each boiler by season and day were divided by 0.10 and rounded to the nearest integer. The hourly emission fractions by season were divided by 0.02 and rounded to the nearest integer. Then, within each of the profile types (seasonal, daily, or hourly), boilers with the same reduced profile were grouped together. Within each group with the same reduced profile, a new NO_x emission profile was calculated as the average of the actual NO_x emission profiles from each unit in the group, weighted according to the NO_x emissions at each unit. Finally, all of these final profiles that accounted for less than 0.05 percent of total NO_x emissions were grouped together into a single profile, weighted according to NO_x emissions. This was done to limit the number of profiles developed. Each of these final profiles was then assigned a profile number and this number was then cross-referenced to all boilers using that profile.

It should be noted that the fraction used with each set of emission fractions was determined through an iterative process. The values listed here were selected to balance the needs of finding a relatively small number of profiles while at the same time maximizing the applicability of the selected profiles to the boilers in that profile group and maintaining a small level of variance within each profile group.

For the hourly profiles, an additional step was followed to better match the boilers with the profiles developed. For each boiler, the variance between the individual boiler hourly profile in a given season and each of the hourly profiles developed was calculated. The profile with the lowest variance between the individual boiler profile and the new profile set was selected for that boiler and season. This was necessary because a larger portion of the NO_x emissions were being assigned to the "catch-all" profile representing profiles that accounted for less than 0.05 percent of the NO_x emissions. Thus, if one of the developed profiles better fit a boiler with relatively small emissions than the "catch-all" hourly profile, the better fitting hourly profile was assigned to the boiler.

C. RESULTS

Table III-1 shows the NO_x and SO_2 emission totals in each of the 11 States for August 1999 and January 2000. Tables III-2 through III-6 summarize NO_x and SO_2 emissions by day for August 1999 and January 2000. Each table summarizes the results for one of the Midwest RPO States. The Illinois data are shown in Table III-2, followed by the Indiana data in Table III-3, the Michigan data in Table III-4, the Ohio data in Table III-5, and the Wisconsin data in Table III-6. These data are provided for easy comparison of the ETS/CEM emissions data to comparable data obtained through emissions modeling.

Figure III-1 illustrates the top five seasonal emission profiles, according to the mass of NO_x emissions represented by the profiles. The legend on this figure shows the profile number or label, along with the percentage of total NO_x emissions represented by each of these profiles. For example, Profile 1 accounts for 31 percent of the total NO_x mass. As expected, this is a relatively flat profile. However, it should be noted that it is not entirely flat–emissions are higher in the summer and winter and lower in the spring and fall. A typical default seasonal profile commonly used in emissions modeling normally would have distributed emissions evenly among seasons. The actual ETS/CEM data shows that almost all units show some degree of fluctuation in NO_x emissions by season. Profiles 2 and 4 have NO_x emissions with significant peaks in the winter. In profile 2, the remaining seasons have relatively equal emissions, while in Profile 4, the summer and fall emissions are similar, but the spring emissions are significantly lower than in the other seasons. Profile 3 is similar to Profile 2, except that emissions for Profile 3 peak in the summer with the remaining seasons relatively equal. Profile 5 shows a significant peak in the summer, relatively equal emissions in the winter and fall, with emissions lowest in the spring. Each of the remaining profiles not shown here accounts for 5 percent or less of the total NO_x emissions. A total of 48 seasonal profiles were prepared. Table III-7 lists the seasonal emission profiles.

The daily emission profiles are summarized in Figures III-2 through III-5. Figure III-2 shows the results for spring. Summer results are shown in Figure III-3. Tables III-5 and III-6 show the daily emission profiles for fall and winter, respectively. The same profiles were used in all 4 seasons. For example, Profile 1 is the same in all four seasons. However, this profile accounts for a different proportion of the NO_x emissions in each season. This is the top profile in fall, accounting for 16 percent of the NO_x emissions. In spring, Profile 1 drops to third, accounting for 14 percent of spring NO_x emissions and in the summer, this profile accounts for 12 percent of the summer NO_x emissions, the fourth highest of the profiles. In winter, Profile 1 drops below the top five daily profiles. A total of 71 seasonal profiles were developed. Table III-8 lists each of these profiles.

Several observations can be made about the top profiles from Figures III-2 through III-5:

- Only in winter do any of the top profiles have greater emissions on weekend days than on some weekdays.
- For each of the other seasons, the top profiles have lower emissions on Saturday and Sunday than on the weekdays.
- Of the four seasons, the fall profiles show the least variation in the shape of the top emission profiles.
- The mass of NO_x emissions included in the top five summer daily profiles is significantly higher than the NO_x mass included in the top winter daily profiles. This leads to the conclusion that there is less variation from boiler to boiler in the daily operation profiles during the summer months than there is during the winter months.
- Another important observation about these figures is that none of these top profiles is flat. This observation argues against the practice of assigning a flat daily profile as a default for emissions modeling when better data are not available.

Figures III-6 through III-9 illustrate the top hourly emission profiles by season for spring, summer, winter, and fall, respectively. As with the daily profiles, the profile numbers are consistent across all seasons. It should be noted that the profile accounting for the greatest NO_x mass is the same in each season. This profile shows lower emissions in the early morning hours with a gradual ramp up in emissions over several hours and then relatively flat emissions during the majority of the day and into the early evening. This profile accounts for 54 percent of NO_x emissions during the winter months, but only 28 percent of NO_x emissions during the summer. Again, it should be noted that this profile is not flat. A total of 90 hourly profiles were developed. These are shown in Table III-9.

Additional observations can be made about the hourly profiles, analyzed based on Wednesday data, based on the information presented in Figures III-6 through III-9:

- In contrast to the daily profiles, the top five winter hourly profiles account for 80 percent of the total NO_x emissions, while the top five hourly profiles in the summer account for only 46 percent of the NO_x emissions.
- Also, the top summer profiles include profiles with peaks in emissions between 1:00 PM and 5:00 PM, while several of the top winter hourly profiles include peaks at both the beginning and the ending of the day.
- The top profiles for spring and fall are much smoother than the top summer and winter hourly profiles.
- It should also be noted that in all four seasons, there is a significant drop off in the percentage of the NO_x emissions captured by the top profile and the second highest profile.

The results of this analysis may have been different if the 1999 and 2000 CEM data had been analyzed separately. Differences in temporal profiles between these two years may have occurred as a result of the implementation of NO_x controls to meet Phase II requirements of Title IV of the CAA, and resulting switches in operating schedules. This impact of the Phase II controls on temporal profiles could be examined under a future

sensitivity study. For this analysis, LADCO made the decision to use the combined data set. Another factor that should be considered when analyzing the results is that some NO_x controls are seasonal only (May through September). Therefore, the summer profiles may be more appropriate to apply for modeling performed for the months of May or September.

Table III-1
State-Level ETS/CEM Emission Summary for August 1999 and January 2000

State	August 1999 Emissions (tons) NO_x	August 1999 Emissions (tons) SO_2	January 2000 Emissions (tons) NO_x	January 2000 Emissions (tons) SO_2
IL	26,350	72,504	20,835	44,912
IN	30,362	83,846	30,864	79,482
IA	7,334	14,051	7,163	13,161
KY	30,235	64,813	28,747	62,609
MI	15,473	33,506	14,008	31,372
MN	7,773	8,886	8,033	8,345
MO	18,437	30,795	15,908	18,962
OH	37,290	125,274	34,953	107,964
PA	17,569	90,971	23,056	89,816
WV	25,667	65,586	24,058	54,095
WI	9,925	19,663	10,106	18,301
11-State Total	***226,414***	***609,895***	***217,731***	***529,018***

Table III-2
Illinois Daily ETS/CEM Data Summary for August 1999 and January 2000

	August 1999		January 2000	
Day	**NO_x (tons/day)**	**SO_2 (tons/day)**	**NO_x (tons/day)**	**SO_2 (tons/day)**
1	763	2,235	335	775
2	875	2,373	331	767
3	927	2,624	518	1,132
4	981	2,800	673	1,504
5	937	2,711	691	1,579
6	873	2,454	617	1,436
7	680	1,919	559	1,396
8	510	1,539	482	1,294
9	701	2,064	420	1,197
10	1,008	2,666	539	1,257
11	1,027	2,765	560	1,238
12	1,025	2,815	579	1,280
13	957	2,539	725	1,405
14	667	1,707	799	1,597
15	660	1,753	578	1,240
16	881	2,390	529	1,143
17	988	2,561	723	1,614
18	932	2,519	699	1,567
19	850	2,372	660	1,526
20	879	2,301	822	1,741
21	690	2,047	853	1,729
22	719	2,050	687	1,511
23	902	2,446	616	1,359
24	855	2,394	873	1,681
25	860	2,381	944	1,813
26	872	2,462	959	1,872
27	941	2,613	889	1,818
28	988	2,463	934	1,779
29	806	2,212	776	1,613
30	763	2,120	641	1,384
31	834	2,208	826	1,666
Total	***26,350***	***72,504***	***20,835***	***44,912***

Table III-3
Indiana Daily ETS/CEM Data Summary for August 1999 and January 2000

	August 1999		January 2000	
Day	**NO_x (tons/day)**	**SO_2 (tons/day)**	**NO_x (tons/day)**	**SO_2 (tons/day)**
1	1,011	2,833	657	1,907
2	1,093	2,829	671	1,945
3	1,082	2,835	842	2,311
4	1,088	2,996	868	2,482
5	1,084	3,031	1,094	2,877
6	1,088	2,874	1,047	2,735
7	991	2,537	995	2,548
8	886	2,330	887	2,226
9	981	2,650	778	1,907
10	1,007	2,640	894	2,158
11	938	2,696	958	2,329
12	957	2,772	1,041	2,650
13	951	2,717	1,085	2,768
14	820	2,321	1,129	2,835
15	779	2,250	998	2,346
16	984	2,819	864	2,106
17	1,095	3,154	1,056	2,681
18	1,094	3,110	1,006	2,588
19	1,056	3,063	1,068	2,739
20	989	2,764	1,090	2,710
21	870	2,458	1,155	2,984
22	896	2,438	1,135	2,785
23	1,014	2,672	1,000	2,384
24	960	2,877	1,136	2,774
25	974	3,015	1,151	2,892
26	972	2,835	1,072	3,018
27	960	2,573	1,082	3,008
28	951	2,554	1,046	2,918
29	916	2,423	995	2,677
30	945	2,385	970	2,530
31	931	2,398	1,092	2,663
Total	***30,362***	***83,846***	***30,864***	***79,482***

Table III-4
Michigan Daily ETS/CEM Data Summary for August 1999 and January 2000

	August 1999		January 2000	
Day	**NO_x (tons/day)**	**SO_2 (tons/day)**	**NO_x (tons/day)**	**SO_2 (tons/day)**
1	516	1,156	398	964
2	521	1,146	397	965
3	541	1,123	514	1,100
4	551	1,118	507	1,105
5	506	1,037	517	1,113
6	489	1,003	517	1,126
7	448	968	504	1,089
8	445	943	441	1,012
9	477	982	410	966
10	490	1,018	433	911
11	545	1,161	432	952
12	564	1,239	430	973
13	572	1,215	437	959
14	431	945	477	1,005
15	388	878	430	911
16	534	1,168	409	885
17	565	1,251	466	1,031
18	520	1,134	488	1,114
19	515	1,121	481	1,057
20	506	1,122	474	1,032
21	440	976	508	1,111
22	433	967	431	965
23	526	1,182	377	882
24	511	1,130	427	963
25	525	1,123	401	948
26	518	1,105	452	1,043
27	531	1,146	484	1,101
28	524	1,163	466	1,048
29	405	919	437	1,040
30	470	1,019	412	967
31	466	1,044	449	1,037
Total	***15,473***	***33,506***	***14,008***	***31,372***

Table III-5
Ohio Daily ETS/CEM Data Summary for August 1999 and January 2000

	August 1999		January 2000	
Day	**NO_x (tons/day)**	**SO_2 (tons/day)**	**NO_x (tons/day)**	**SO_2 (tons/day)**
1	1,278	4,164	846	2,784
2	1,314	4,241	765	2,464
3	1,259	4,280	889	2,923
4	1,264	4,421	1,088	3,346
5	1,250	4,283	1,180	3,672
6	1,224	4,125	1,149	3,749
7	1,143	3,796	1,119	3,489
8	1,065	3,463	1,075	3,105
9	1,173	3,557	1,019	2,938
10	1,226	4,111	1,140	3,331
11	1,426	4,879	1,248	3,569
12	1,356	4,888	1,209	3,647
13	1,302	4,758	1,140	3,546
14	1,064	3,932	1,230	3,844
15	1,007	3,769	1,027	3,405
16	1,179	4,591	947	3,189
17	1,234	4,495	1,189	3,949
18	1,197	4,160	1,233	3,883
19	1,204	4,140	1,090	3,424
20	1,083	3,466	1,191	3,594
21	992	3,000	1,274	3,844
22	1,016	3,029	1,132	3,341
23	1,208	3,969	1,010	3,160
24	1,231	4,066	1,209	3,742
25	1,319	4,172	1,273	3,865
26	1,264	4,095	1,209	3,797
27	1,240	4,122	1,357	4,076
28	1,227	4,240	1,307	3,869
29	1,174	3,852	1,143	3,454
30	1,190	3,630	1,022	3,100
31	1,181	3,580	1,246	3,864
Total	***37,290***	***125,274***	***34,953***	***107,964***

Table III-6
Wisconsin Daily ETS/CEM Data Summary for August 1999 and January 2000

	August 1999		January 2000	
Day	**NO_x (tons/day)**	**SO_2 (tons/day)**	**NO_x (tons/day)**	**SO_2 (tons/day)**
1	284	559	208	417
2	338	646	215	394
3	355	754	304	593
4	356	686	311	593
5	353	663	341	629
6	357	655	324	569
7	293	602	339	631
8	252	536	288	493
9	315	638	252	445
10	358	723	304	536
11	384	768	331	607
12	360	771	356	623
13	343	698	367	635
14	230	466	359	647
15	233	453	293	487
16	358	738	278	470
17	371	744	354	635
18	367	741	354	622
19	335	662	353	605
20	329	659	372	678
21	249	481	397	780
22	234	454	337	702
23	322	595	297	515
24	328	645	357	633
25	330	601	365	649
26	342	631	380	714
27	356	669	386	742
28	336	649	378	670
29	243	518	296	504
30	299	631	261	470
31	318	627	350	612
Total	***9,925***	***19,663***	***10,106***	***18,301***

Table III-7
Seasonal Emission Profiles

Profile Number	Number of Boilers	Percent of NO_x Emis.	Variance	Fraction of Emissions Occurring During:				
				Winter	Spring	Summer	Fall	Total
1	169	31.28	0.00125	0.2562	0.2461	0.2552	0.2424	0.9999
2	51	10.86	0.00125	0.2943	0.2283	0.2414	0.2361	1.0001
3	53	6.82	0.00175	0.2342	0.2329	0.2980	0.2349	1.0000
4	24	5.97	0.00079	0.3000	0.1835	0.2609	0.2555	0.9999
5	23	4.80	0.00091	0.2575	0.1835	0.3078	0.2512	1.0000
6	18	3.60	0.00125	0.2974	0.1710	0.3027	0.2288	0.9999
7	20	3.40	0.00090	0.2442	0.2901	0.2440	0.2216	0.9999
8	21	3.32	0.00120	0.3076	0.2575	0.2542	0.1807	1.0000
9	16	3.25	0.00083	0.2645	0.3004	0.2615	0.1736	1.0000
10	18	2.90	0.00078	0.2313	0.3008	0.3024	0.1656	1.0001
11	22	2.41	0.00127	0.2499	0.2573	0.3160	0.1769	1.0001
12	12	2.33	0.00020	0.2719	0.1894	0.2729	0.2658	1.0000
13	13	2.19	0.00086	0.2964	0.2974	0.2452	0.1610	1.0000
14	9	1.98	0.00129	0.2934	0.2406	0.2986	0.1673	0.9999
15	5	1.63	0.00093	0.2559	0.1730	0.2661	0.3050	1.0000
16	355	1.35	0.08506	0.2437	0.2150	0.3744	0.1670	1.0001
17	14	1.30	0.00069	0.1844	0.2527	0.3058	0.2571	1.0000
18	10	1.22	0.00170	0.1705	0.2986	0.3053	0.2256	1.0000
19	6	1.10	0.00119	0.1607	0.2333	0.3102	0.2959	1.0001
20	7	0.97	0.00124	0.2274	0.2375	0.2432	0.2918	0.9999
21	1	0.72	0.00000	0.3569	0.2742	0.2760	0.0928	0.9999
22	3	0.66	0.00038	0.3105	0.0832	0.3117	0.2946	1.0000
23	4	0.66	0.00082	0.3047	0.1741	0.2321	0.2891	1.0000
24	4	0.56	0.00110	0.3150	0.2520	0.1736	0.2595	1.0001
25	7	0.50	0.00087	0.2379	0.1587	0.2962	0.3072	1.0000
26	1	0.49	0.00000	0.1984	0.2783	0.2770	0.2463	1.0000
27	1	0.47	0.00000	0.3044	0.1191	0.2631	0.3132	0.9998
28	1	0.40	0.00000	0.3466	0.1967	0.1843	0.2724	1.0000
29	4	0.38	0.00012	0.2762	0.2640	0.2681	0.1918	1.0001
30	2	0.38	0.00000	0.2963	0.1278	0.2817	0.2942	1.0000
31	5	0.33	0.00108	0.1834	0.3132	0.2619	0.2416	1.0001
32	2	0.31	0.00010	0.2865	0.2902	0.2827	0.1406	1.0000
33	2	0.22	0.00080	0.1703	0.2990	0.2497	0.2810	1.0000
34	1	0.14	0.00000	0.2931	0.2816	0.2066	0.2187	1.0000
35	2	0.12	0.00050	0.2340	0.3109	0.3508	0.1044	1.0001
36	1	0.12	0.00000	0.1484	0.1933	0.3616	0.2966	0.9999
37	1	0.12	0.00000	0.3868	0.2290	0.2718	0.1125	1.0001
38	2	0.09	0.00010	0.1891	0.2421	0.2640	0.3050	1.0002
39	4	0.09	0.00134	0.2379	0.1544	0.3855	0.2222	1.0000
40	2	0.08	0.00080	0.1876	0.1843	0.3219	0.3063	1.0001
41	3	0.08	0.00004	0.2989	0.2072	0.2851	0.2088	1.0000
42	5	0.06	0.00102	0.2988	0.1558	0.4739	0.0715	1.0000
43	1	0.06	0.00000	0.2601	0.2995	0.1794	0.2609	0.9999
44	1	0.06	0.00000	0.1803	0.3211	0.4291	0.0695	1.0000
45	3	0.06	0.00137	0.2951	0.2972	0.1709	0.2369	1.0001
46	5	0.06	0.00006	0.1771	0.2396	0.4436	0.1397	1.0000
47	1	0.05	0.00000	0.2047	0.2859	0.2809	0.2285	1.0000
48	1	0.05	0.00000	0.0700	0.2892	0.3462	0.2946	1.0000

Table III-8
Daily Emission Profiles

Profile Number	Number of Boilers*	Percent of NO_x Emis.	Variance	Fraction of Emissions Occurring On:							
				Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Total
1	364	11.57	0.00050	0.1110	0.1513	0.1553	0.1557	0.1551	0.1506	0.1209	0.9999
2	267	11.54	0.00035	0.1194	0.1397	0.1519	0.1534	0.1550	0.1515	0.1291	1.0000
3	248	11.13	0.00039	0.1207	0.1519	0.1555	0.1548	0.1512	0.1403	0.1255	0.9999
4	157	6.60	0.00026	0.1294	0.1536	0.1541	0.1522	0.1406	0.1383	0.1318	1.0000
5	135	5.61	0.00016	0.1270	0.1415	0.1524	0.1522	0.1525	0.1420	0.1325	1.0001
6	161	5.41	0.00026	0.1274	0.1390	0.1405	0.1519	0.1529	0.1528	0.1355	1.0000
7	62	3.69	0.00010	0.1384	0.1389	0.1391	0.1399	0.1410	0.1543	0.1483	0.9999
8	61	3.18	0.00023	0.1256	0.1495	0.1413	0.1514	0.1518	0.1496	0.1309	1.0001
9	52	2.78	0.00013	0.1293	0.1404	0.1490	0.1426	0.1516	0.1508	0.1364	1.0001
10	60	2.64	0.00016	0.1328	0.1396	0.1397	0.1411	0.1519	0.1554	0.1394	0.9999
11	45	2.32	0.00022	0.1251	0.1497	0.1516	0.1421	0.1504	0.1499	0.1311	0.9999
12	52	2.08	0.00031	0.1247	0.1513	0.1526	0.1507	0.1420	0.1489	0.1298	1.0000
13	73	1.94	0.00009	0.1483	0.1391	0.1385	0.1364	0.1361	0.1517	0.1500	1.0001
14	35	1.80	0.00013	0.1354	0.1424	0.1548	0.1524	0.1403	0.1397	0.1350	1.0000
15	37	1.76	0.00013	0.1332	0.1415	0.1510	0.1485	0.1400	0.1493	0.1365	1.0000
16	44	1.75	0.00009	0.1327	0.1480	0.1523	0.1419	0.1488	0.1421	0.1342	1.0000
17	38	1.72	0.00007	0.1386	0.1403	0.1412	0.1414	0.1422	0.1551	0.1412	1.0000
18	43	1.69	0.00017	0.1375	0.1539	0.1530	0.1417	0.1387	0.1390	0.1363	1.0001
19	50	1.60	0.00015	0.1312	0.1497	0.1520	0.1419	0.1405	0.1492	0.1356	1.0001
20	32	1.26	0.00007	0.1364	0.1417	0.1498	0.1414	0.1495	0.1422	0.1389	0.9999
21	29	1.09	0.00016	0.1310	0.1485	0.1420	0.1521	0.1507	0.1433	0.1322	0.9998
22	22	1.00	0.00009	0.1367	0.1402	0.1482	0.1421	0.1416	0.1506	0.1407	1.0001
23	30	0.98	0.00014	0.1335	0.1424	0.1423	0.1537	0.1504	0.1424	0.1353	1.0000
24	34	0.96	0.00020	0.1361	0.1335	0.1318	0.1385	0.1498	0.1586	0.1517	1.0000
25	27	0.88	0.00010	0.1383	0.1511	0.1414	0.1486	0.1413	0.1400	0.1392	0.9999
26	20	0.80	0.00006	0.1481	0.1397	0.1385	0.1376	0.1404	0.1528	0.1429	1.0000

Table III-8 (continued)

Profile Number	Number of Boilers*	Percent of NO_x Emis.	Variance	Fraction of Emissions Occurring On:							
				Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Total
27	21	0.72	0.00008	0.1356	0.1404	0.1421	0.1482	0.1415	0.1518	0.1403	0.9999
28	12	0.68	0.00006	0.1343	0.1490	0.1408	0.1493	0.1419	0.1465	0.1382	1.0000
29	10	0.60	0.00010	0.1337	0.1372	0.1467	0.1394	0.1393	0.1568	0.1470	1.0001
30	7	0.60	0.00001	0.1529	0.1474	0.1337	0.1393	0.1379	0.1473	0.1415	1.0000
31	17	0.58	0.00013	0.1339	0.1493	0.1413	0.1397	0.1406	0.1548	0.1404	1.0000
32	12	0.56	0.00010	0.1491	0.1503	0.1421	0.1396	0.1370	0.1411	0.1409	1.0001
33	20	0.47	0.00013	0.1300	0.1472	0.1424	0.1414	0.1514	0.1502	0.1375	1.0001
34	12	0.45	0.00010	0.1380	0.1348	0.1391	0.1483	0.1415	0.1498	0.1485	1.0000
35	15	0.43	0.00006	0.1423	0.1528	0.1424	0.1423	0.1423	0.1421	0.1357	0.9999
36	14	0.41	0.00006	0.1370	0.1494	0.1426	0.1421	0.1481	0.1426	0.1383	1.0001
37	3	0.41	0.00004	0.1469	0.1389	0.1281	0.1419	0.1483	0.1557	0.1402	1.0000
38	12	0.40	0.00024	0.1260	0.1342	0.1370	0.1505	0.1497	0.1544	0.1482	1.0000
39	3	0.36	0.00002	0.1457	0.1380	0.1428	0.1454	0.1400	0.1469	0.1411	0.9999
40	7	0.33	0.00008	0.1405	0.1484	0.1372	0.1387	0.1387	0.1485	0.1482	1.0002
41	11	0.31	0.00004	0.1375	0.1425	0.1423	0.1413	0.1519	0.1441	0.1404	1.0000
42	16	0.31	0.00026	0.1541	0.1468	0.1357	0.1334	0.1339	0.1419	0.1543	1.0001
43	9	0.29	0.00005	0.1483	0.1477	0.1379	0.1338	0.1340	0.1502	0.1481	1.0000
44	12	0.28	0.00005	0.1368	0.1440	0.1429	0.1507	0.1421	0.1420	0.1415	1.0000
45	20	0.28	0.00012	0.1553	0.1399	0.1351	0.1368	0.1404	0.1436	0.1489	1.0000
46	2	0.27	0.00001	0.1451	0.1413	0.1496	0.1440	0.1336	0.1437	0.1425	0.9998
47	2	0.26	0.00002	0.1426	0.1393	0.1420	0.1400	0.1408	0.1446	0.1509	1.0002
48	7	0.26	0.00004	0.1413	0.1414	0.1413	0.1466	0.1384	0.1418	0.1492	1.0000
49	240	0.24	0.02108	0.0893	0.1721	0.1664	0.1617	0.1686	0.1447	0.0973	1.0001
50	53	0.23	0.00221	0.0212	0.1960	0.2059	0.1939	0.1976	0.1644	0.0210	1.0000
51	5	0.21	0.00007	0.1406	0.1465	0.1471	0.1426	0.1335	0.1417	0.1480	1.0000
52	305	0.21	0.02538	0.0901	0.1681	0.1858	0.1735	0.1479	0.1358	0.0988	1.0000
53	7	0.19	0.00003	0.1457	0.1462	0.1495	0.1375	0.1367	0.1391	0.1453	1.0000

Table III-8 (continued)

Profile Number	Number of Boilers*	Percent of NO_x Emis.	Variance	Fraction of Emissions Occurring On: Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Total
54	249	0.16	0.02538	0.0799	0.1463	0.1979	0.1904	0.1409	0.1556	0.0889	0.9999
55	4	0.16	0.00001	0.1438	0.1437	0.1429	0.1416	0.1433	0.1424	0.1422	0.9999
56	38	0.15	0.00160	0.0320	0.1777	0.1878	0.1930	0.1779	0.1712	0.0604	1.0000
57	5	0.14	0.00004	0.1470	0.1427	0.1424	0.1393	0.1430	0.1415	0.1441	1.0000
58	8	0.13	0.00003	0.1394	0.1419	0.1490	0.1425	0.1422	0.1420	0.1430	1.0000
59	6	0.12	0.00031	0.1467	0.1521	0.1527	0.1471	0.1352	0.1325	0.1336	0.9999
60	10	0.12	0.00018	0.1488	0.1664	0.1520	0.1387	0.1252	0.1394	0.1295	1.0000
61	4	0.11	0.00001	0.1456	0.1412	0.1439	0.1465	0.1417	0.1427	0.1384	1.0000
62	203	0.11	0.01905	0.0524	0.1793	0.1839	0.1767	0.1772	0.1582	0.0724	1.0001
63	6	0.11	0.00019	0.1336	0.1497	0.1519	0.1335	0.1329	0.1518	0.1466	1.0000
64	2	0.09	0.00000	0.1491	0.1463	0.1482	0.1397	0.1292	0.1460	0.1416	1.0001
65	2	0.09	0.00002	0.1478	0.1367	0.1456	0.1394	0.1349	0.1517	0.1438	0.9999
66	4	0.09	0.00030	0.1355	0.1487	0.1394	0.1516	0.1405	0.1392	0.1452	1.0001
67	4	0.08	0.00007	0.1473	0.1289	0.1388	0.1460	0.1383	0.1514	0.1492	0.9999
68	1	0.08	0.00000	0.1294	0.1418	0.1493	0.1405	0.1478	0.1461	0.1452	1.0001
69	5	0.07	0.00006	0.1403	0.1403	0.1493	0.1424	0.1368	0.1404	0.1504	0.9999
70	1	0.06	0.00000	0.1278	0.1463	0.1426	0.1465	0.1418	0.1483	0.1468	1.0001
71	6	0.05	0.00014	0.1470	0.1576	0.1401	0.1466	0.1373	0.1360	0.1354	1.0000

NOTE: *Number of boilers is the count of the number of boilers using a given profile in a specific season. Profiles were derived by boiler and season. Therefore each boiler may be counted here up to four times.

Table III-9
Hourly Emission Profiles

Profile Number	Number of Boilers	Percent of NO_x Emis.	Variance	Fraction of Emissions Occurring During: Hour 0	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	Hour 8	Hour 9	Hour 10	Hour 11
1	7,392	40.85	0.000076	0.0387	0.0381	0.0377	0.0377	0.0383	0.0396	0.0411	0.0422	0.0429	0.0433	0.0436	0.0435
2	386	3.24	0.000065	0.0329	0.0311	0.0295	0.0312	0.0337	0.0376	0.0414	0.0440	0.0452	0.0458	0.0463	0.0465
3	338	2.91	0.000054	0.0339	0.0321	0.0306	0.0295	0.0315	0.0358	0.0403	0.0432	0.0447	0.0459	0.0465	0.0467
4	347	2.50	0.000095	0.0362	0.0348	0.0342	0.0341	0.0345	0.0365	0.0389	0.0412	0.0425	0.0430	0.0444	0.0449
5	337	2.40	0.000111	0.0350	0.0346	0.0347	0.0352	0.0360	0.0382	0.0422	0.0469	0.0513	0.0471	0.0460	0.0446
6	320	2.38	0.000102	0.0361	0.0348	0.0343	0.0343	0.0347	0.0360	0.0386	0.0416	0.0434	0.0446	0.0453	0.0448
7	273	1.89	0.000077	0.0311	0.0295	0.0305	0.0311	0.0331	0.0384	0.0431	0.0450	0.0460	0.0464	0.0464	0.0463
8	253	1.71	0.000092	0.0358	0.0349	0.0343	0.0344	0.0351	0.0366	0.0393	0.0422	0.0442	0.0456	0.0463	0.0475
9	267	1.64	0.000107	0.0369	0.0358	0.0349	0.0348	0.0353	0.0361	0.0380	0.0403	0.0423	0.0434	0.0438	0.0438
10	702	1.64	0.000208	0.0384	0.0379	0.0380	0.0383	0.0387	0.0406	0.0441	0.0527	0.0461	0.0446	0.0438	0.0433
11	209	1.52	0.000068	0.0323	0.0307	0.0294	0.0294	0.0314	0.0353	0.0390	0.0428	0.0447	0.0467	0.0471	0.0483
12	263	1.48	0.000109	0.0364	0.0358	0.0355	0.0357	0.0376	0.0407	0.0436	0.0450	0.0455	0.0461	0.0465	0.0464
13	250	1.39	0.000190	0.0266	0.0258	0.0264	0.0272	0.0321	0.0402	0.0452	0.0471	0.0478	0.0481	0.0486	0.0487
14	182	1.30	0.000144	0.0282	0.0269	0.0259	0.0256	0.0278	0.0330	0.0408	0.0452	0.0474	0.0508	0.0521	0.0513
15	280	1.20	0.000124	0.0367	0.0356	0.0351	0.0350	0.0352	0.0365	0.0382	0.0399	0.0417	0.0429	0.0435	0.0436
16	182	1.19	0.000073	0.0316	0.0294	0.0291	0.0306	0.0338	0.0386	0.0426	0.0446	0.0456	0.0461	0.0470	0.0469
17	178	1.16	0.000094	0.0374	0.0354	0.0335	0.0319	0.0307	0.0291	0.0328	0.0377	0.0417	0.0448	0.0463	0.0468
18	169	1.15	0.000074	0.0360	0.0331	0.0309	0.0293	0.0292	0.0317	0.0366	0.0405	0.0434	0.0450	0.0462	0.0468
19	145	1.04	0.000178	0.0374	0.0366	0.0365	0.0363	0.0366	0.0380	0.0402	0.0429	0.0448	0.0464	0.0523	0.0467
20	162	1.04	0.000105	0.0276	0.0354	0.0356	0.0358	0.0375	0.0392	0.0422	0.0435	0.0446	0.0449	0.0451	0.0448
21	131	0.91	0.000085	0.0307	0.0286	0.0279	0.0280	0.0290	0.0319	0.0364	0.0401	0.0428	0.0466	0.0477	0.0488
22	145	0.90	0.000083	0.0359	0.0351	0.0346	0.0343	0.0349	0.0363	0.0379	0.0400	0.0418	0.0438	0.0454	0.0466
23	127	0.87	0.000183	0.0328	0.0283	0.0267	0.0265	0.0275	0.0314	0.0380	0.0461	0.0457	0.0461	0.0478	0.0470
24	139	0.81	0.000093	0.0357	0.0349	0.0347	0.0347	0.0351	0.0364	0.0374	0.0399	0.0418	0.0433	0.0447	0.0461
25	92	0.80	0.000023	0.0334	0.0310	0.0291	0.0290	0.0315	0.0360	0.0408	0.0438	0.0452	0.0462	0.0466	0.0467
26	144	0.76	0.000094	0.0290	0.0274	0.0267	0.0267	0.0283	0.0318	0.0371	0.0416	0.0448	0.0475	0.0493	0.0497
27	75	0.69	0.000046	0.0312	0.0288	0.0276	0.0273	0.0288	0.0343	0.0407	0.0446	0.0464	0.0472	0.0476	0.0476
28	103	0.69	0.000039	0.0337	0.0309	0.0288	0.0281	0.0291	0.0333	0.0385	0.0427	0.0450	0.0463	0.0470	0.0470
29	82	0.68	0.000031	0.0314	0.0290	0.0281	0.0285	0.0317	0.0373	0.0425	0.0450	0.0460	0.0466	0.0469	0.0469
30	126	0.67	0.000126	0.0336	0.0329	0.0327	0.0327	0.0327	0.0335	0.0338	0.0359	0.0377	0.0406	0.0440	0.0463

Table III-9 (continued)

Profile Number	Number of Boilers	Percent of NO_x Emis.	Variance	Fraction of Emissions Occurring During: Hour 0	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	Hour 8	Hour 9	Hour 10	Hour 11
31	99	0.65	0.000197	0.0328	0.0280	0.0260	0.0251	0.0252	0.0251	0.0265	0.0328	0.0397	0.0451	0.0478	0.0511
32	92	0.60	0.000104	0.0306	0.0288	0.0279	0.0288	0.0311	0.0347	0.0401	0.0435	0.0446	0.0460	0.0473	0.0475
33	94	0.56	0.000063	0.0281	0.0266	0.0261	0.0264	0.0283	0.0343	0.0418	0.0455	0.0468	0.0473	0.0476	0.0477
34	74	0.56	0.000111	0.0276	0.0264	0.0260	0.0264	0.0286	0.0349	0.0419	0.0455	0.0468	0.0472	0.0475	0.0478
35	1,048	0.54	0.002859	0.0267	0.0256	0.0252	0.0253	0.0283	0.0344	0.0452	0.0529	0.0554	0.0561	0.0550	0.0526
36	75	0.53	0.000092	0.0273	0.0267	0.0263	0.0263	0.0280	0.0325	0.0395	0.0446	0.0466	0.0475	0.0481	0.0479
37	86	0.51	0.000131	0.0380	0.0341	0.0308	0.0286	0.0284	0.0287	0.0321	0.0382	0.0425	0.0452	0.0463	0.0475
38	79	0.50	0.000112	0.0285	0.0279	0.0273	0.0281	0.0318	0.0385	0.0446	0.0461	0.0463	0.0477	0.0474	0.0468
39	77	0.46	0.000141	0.0358	0.0335	0.0332	0.0328	0.0333	0.0350	0.0381	0.0411	0.0440	0.0482	0.0523	0.0512
40	171	0.46	0.000299	0.0273	0.0263	0.0257	0.0258	0.0277	0.0315	0.0354	0.0400	0.0446	0.0485	0.0514	0.0532
41	88	0.44	0.000226	0.0354	0.0341	0.0336	0.0333	0.0336	0.0340	0.0346	0.0362	0.0388	0.0409	0.0418	0.0423
42	92	0.44	0.000073	0.0361	0.0349	0.0342	0.0337	0.0344	0.0344	0.0352	0.0374	0.0410	0.0430	0.0445	0.0456
43	73	0.42	0.000104	0.0309	0.0281	0.0277	0.0282	0.0293	0.0339	0.0418	0.0458	0.0461	0.0470	0.0469	0.0470
44	62	0.41	0.000098	0.0366	0.0330	0.0292	0.0273	0.0276	0.0284	0.0320	0.0389	0.0438	0.0464	0.0471	0.0478
45	46	0.41	0.000047	0.0283	0.0275	0.0276	0.0283	0.0317	0.0373	0.0425	0.0452	0.0464	0.0470	0.0474	0.0475
46	77	0.40	0.000097	0.0324	0.0312	0.0289	0.0286	0.0320	0.0334	0.0373	0.0407	0.0453	0.0491	0.0507	0.0507
47	284	0.40	0.001132	0.0262	0.0254	0.0253	0.0255	0.0271	0.0331	0.0404	0.0447	0.0458	0.0462	0.0470	0.0471
48	109	0.39	0.000168	0.0287	0.0248	0.0228	0.0221	0.0231	0.0266	0.0317	0.0400	0.0455	0.0482	0.0491	0.0489
49	62	0.38	0.000085	0.0318	0.0283	0.0263	0.0252	0.0259	0.0284	0.0339	0.0430	0.0469	0.0476	0.0485	0.0483
50	70	0.36	0.000152	0.0275	0.0268	0.0269	0.0277	0.0311	0.0374	0.0431	0.0456	0.0458	0.0466	0.0470	0.0461
51	62	0.36	0.000072	0.0276	0.0262	0.0253	0.0256	0.0262	0.0283	0.0325	0.0374	0.0429	0.0478	0.0510	0.0522
52	68	0.35	0.000088	0.0289	0.0290	0.0308	0.0325	0.0345	0.0381	0.0417	0.0434	0.0451	0.0457	0.0463	0.0468
53	465	0.35	0.002730	0.0250	0.0247	0.0245	0.0243	0.0246	0.0257	0.0287	0.0335	0.0408	0.0467	0.0510	0.0535
54	86	0.34	0.000285	0.0253	0.0243	0.0243	0.0242	0.0246	0.0273	0.0331	0.0380	0.0418	0.0454	0.0487	0.0513
55	61	0.34	0.000105	0.0359	0.0347	0.0343	0.0341	0.0344	0.0352	0.0368	0.0386	0.0407	0.0429	0.0435	0.0435
56	242	0.34	0.000883	0.0270	0.0247	0.0239	0.0249	0.0253	0.0277	0.0346	0.0414	0.0467	0.0515	0.0535	0.0538
57	94	0.34	0.000230	0.0327	0.0320	0.0316	0.0314	0.0317	0.0320	0.0323	0.0340	0.0373	0.0417	0.0468	0.0515
58	156	0.33	0.000321	0.0358	0.0345	0.0335	0.0333	0.0336	0.0340	0.0350	0.0374	0.0400	0.0423	0.0432	0.0430
59	69	0.33	0.000110	0.0365	0.0351	0.0344	0.0339	0.0342	0.0356	0.0370	0.0389	0.0416	0.0433	0.0443	0.0440
60	826	0.32	0.004005	0.0278	0.0257	0.0247	0.0246	0.0249	0.0253	0.0288	0.0340	0.0396	0.0473	0.0521	0.0543
61	28	0.32	0.000042	0.0280	0.0265	0.0258	0.0263	0.0265	0.0276	0.0329	0.0380	0.0431	0.0485	0.0520	0.0527
62	139	0.32	0.000395	0.0274	0.0267	0.0265	0.0268	0.0272	0.0284	0.0313	0.0362	0.0406	0.0432	0.0465	0.0491

Table III-9 (continued)

Profile Number	Number of Boilers	Percent of NO_x Emis.	Variance	Fraction of Emissions Occurring During: Hour 0	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	Hour 8	Hour 9	Hour 10	Hour 11
63	74	0.31	0.000116	0.0378	0.0368	0.0366	0.0365	0.0374	0.0380	0.0400	0.0421	0.0454	0.0525	0.0463	0.0456
64	67	0.31	0.000233	0.0363	0.0355	0.0351	0.0352	0.0361	0.0386	0.0411	0.0463	0.0513	0.0517	0.0479	0.0452
65	47	0.30	0.000075	0.0344	0.0333	0.0329	0.0328	0.0333	0.0339	0.0360	0.0378	0.0406	0.0426	0.0449	0.0461
66	107	0.29	0.000167	0.0360	0.0345	0.0341	0.0341	0.0343	0.0345	0.0352	0.0368	0.0397	0.0418	0.0429	0.0432
67	668	0.28	0.004356	0.0356	0.0342	0.0336	0.0334	0.0337	0.0342	0.0343	0.0356	0.0375	0.0395	0.0401	0.0405
68	73	0.28	0.000130	0.0368	0.0355	0.0349	0.0345	0.0347	0.0354	0.0373	0.0398	0.0416	0.0431	0.0440	0.0439
69	1,038	0.28	0.007154	0.0246	0.0238	0.0237	0.0239	0.0240	0.0246	0.0257	0.0293	0.0366	0.0458	0.0521	0.0549
70	54	0.28	0.000114	0.0364	0.0350	0.0344	0.0343	0.0349	0.0353	0.0370	0.0391	0.0418	0.0432	0.0439	0.0439
71	1,077	0.25	0.006913	0.0267	0.0246	0.0236	0.0230	0.0223	0.0238	0.0270	0.0342	0.0391	0.0432	0.0475	0.0515
72	71	0.23	0.000246	0.0369	0.0357	0.0357	0.0359	0.0366	0.0385	0.0414	0.0434	0.0473	0.0521	0.0522	0.0479
73	27	0.22	0.000086	0.0271	0.0262	0.0261	0.0259	0.0265	0.0280	0.0317	0.0363	0.0406	0.0452	0.0485	0.0511
74	35	0.21	0.000144	0.0273	0.0255	0.0248	0.0249	0.0256	0.0278	0.0335	0.0391	0.0449	0.0483	0.0514	0.0521
75	60	0.20	0.000166	0.0347	0.0342	0.0337	0.0334	0.0337	0.0346	0.0350	0.0366	0.0400	0.0441	0.0471	0.0515
76	42	0.19	0.000103	0.0267	0.0258	0.0259	0.0266	0.0284	0.0338	0.0404	0.0439	0.0450	0.0471	0.0477	0.0477
77	30	0.18	0.000039	0.0281	0.0270	0.0269	0.0271	0.0289	0.0353	0.0419	0.0452	0.0461	0.0470	0.0470	0.0469
78	49	0.18	0.000156	0.0279	0.0283	0.0291	0.0312	0.0348	0.0390	0.0435	0.0453	0.0457	0.0461	0.0464	0.0465
79	33	0.15	0.000101	0.0335	0.0334	0.0333	0.0333	0.0339	0.0349	0.0371	0.0387	0.0413	0.0441	0.0457	0.0466
80	41	0.15	0.000120	0.0338	0.0336	0.0335	0.0333	0.0332	0.0331	0.0339	0.0356	0.0375	0.0394	0.0430	0.0461
81	347	0.14	0.001589	0.0393	0.0396	0.0393	0.0395	0.0405	0.0417	0.0447	0.0462	0.0456	0.0457	0.0458	0.0462
82	41	0.13	0.000152	0.0357	0.0347	0.0344	0.0343	0.0346	0.0348	0.0364	0.0394	0.0419	0.0433	0.0436	0.0434
83	17	0.10	0.000068	0.0341	0.0335	0.0331	0.0331	0.0331	0.0334	0.0349	0.0368	0.0393	0.0420	0.0454	0.0474
84	81	0.10	0.001016	0.0280	0.0253	0.0244	0.0244	0.0250	0.0275	0.0331	0.0404	0.0464	0.0505	0.0532	0.0539
85	30	0.09	0.000099	0.0345	0.0335	0.0329	0.0330	0.0333	0.0338	0.0356	0.0372	0.0392	0.0424	0.0455	0.0471
86	32	0.09	0.000223	0.0267	0.0262	0.0263	0.0262	0.0263	0.0272	0.0283	0.0330	0.0399	0.0462	0.0523	0.0540
87	68	0.07	0.001762	0.0366	0.0356	0.0344	0.0344	0.0342	0.0358	0.0380	0.0410	0.0435	0.0466	0.0526	0.0537
88	36	0.06	0.000269	0.0333	0.0329	0.0328	0.0327	0.0329	0.0335	0.0347	0.0362	0.0382	0.0412	0.0451	0.0482
89	164	0.06	0.001789	0.0359	0.0359	0.0361	0.0363	0.0372	0.0401	0.0459	0.0541	0.0536	0.0474	0.0452	0.0440
90	32	0.02	0.000161	0.0371	0.0369	0.0362	0.0358	0.0361	0.0379	0.0394	0.0416	0.0430	0.0439	0.0456	0.0524

Table III-9 (continued)

Profile Number	Number of Boilers	Percent of NO_x Emis.	Variance	Fraction of Emissions Occurring During:												
				Hour 12	Hour 13	Hour 14	Hour 15	Hour 16	Hour 17	Hour 18	Hour 19	Hour 20	Hour 21	Hour 22	Hour 23	Total
1	7,392	40.85	0.000076	0.0434	0.0433	0.0431	0.0430	0.0431	0.0434	0.0437	0.0437	0.0434	0.0425	0.0410	0.0395	0.9998
2	386	3.24	0.000065	0.0465	0.0463	0.0461	0.0459	0.0460	0.0459	0.0461	0.0465	0.0456	0.0432	0.0400	0.0367	1.0000
3	338	2.91	0.000054	0.0468	0.0468	0.0464	0.0460	0.0460	0.0460	0.0462	0.0464	0.0461	0.0440	0.0411	0.0375	1.0000
4	347	2.50	0.000095	0.0440	0.0443	0.0443	0.0441	0.0460	0.0507	0.0480	0.0457	0.0454	0.0430	0.0408	0.0384	0.9999
5	337	2.40	0.000111	0.0434	0.0431	0.0423	0.0413	0.0422	0.0433	0.0444	0.0442	0.0438	0.0423	0.0403	0.0375	0.9999
6	320	2.38	0.000102	0.0441	0.0433	0.0430	0.0428	0.0438	0.0472	0.0507	0.0481	0.0461	0.0437	0.0408	0.0380	1.0001
7	273	1.89	0.000077	0.0460	0.0462	0.0457	0.0455	0.0455	0.0459	0.0472	0.0473	0.0463	0.0437	0.0391	0.0348	1.0001
8	253	1.71	0.000092	0.0510	0.0472	0.0467	0.0461	0.0449	0.0438	0.0434	0.0429	0.0424	0.0408	0.0379	0.0367	1.0000
9	267	1.64	0.000107	0.0436	0.0433	0.0425	0.0425	0.0434	0.0455	0.0484	0.0512	0.0481	0.0451	0.0420	0.0391	1.0001
10	702	1.64	0.000208	0.0428	0.0423	0.0418	0.0411	0.0414	0.0421	0.0419	0.0419	0.0411	0.0404	0.0391	0.0375	0.9999
11	209	1.52	0.000068	0.0495	0.0502	0.0490	0.0483	0.0479	0.0470	0.0465	0.0464	0.0458	0.0412	0.0370	0.0344	1.0003
12	263	1.48	0.000109	0.0460	0.0459	0.0454	0.0449	0.0452	0.0452	0.0451	0.0445	0.0425	0.0391	0.0333	0.0282	1.0001
13	250	1.39	0.000190	0.0487	0.0485	0.0481	0.0480	0.0482	0.0478	0.0478	0.0477	0.0466	0.0420	0.0348	0.0282	1.0002
14	182	1.30	0.000144	0.0513	0.0506	0.0485	0.0483	0.0478	0.0462	0.0467	0.0472	0.0470	0.0435	0.0363	0.0315	0.9999
15	280	1.20	0.000124	0.0436	0.0430	0.0429	0.0429	0.0436	0.0445	0.0456	0.0483	0.0512	0.0474	0.0431	0.0402	1.0002
16	182	1.19	0.000073	0.0469	0.0467	0.0465	0.0463	0.0461	0.0459	0.0461	0.0465	0.0451	0.0427	0.0394	0.0357	0.9998
17	178	1.16	0.000094	0.0470	0.0473	0.0477	0.0477	0.0477	0.0473	0.0469	0.0471	0.0465	0.0453	0.0427	0.0389	1.0002
18	169	1.15	0.000074	0.0473	0.0475	0.0473	0.0474	0.0468	0.0469	0.0469	0.0470	0.0469	0.0459	0.0428	0.0388	1.0002
19	145	1.04	0.000178	0.0453	0.0444	0.0433	0.0427	0.0427	0.0433	0.0430	0.0431	0.0424	0.0407	0.0385	0.0359	1.0000
20	162	1.04	0.000105	0.0453	0.0452	0.0446	0.0445	0.0445	0.0449	0.0444	0.0446	0.0442	0.0432	0.0402	0.0384	1.0002
21	131	0.91	0.000085	0.0509	0.0517	0.0519	0.0519	0.0510	0.0486	0.0467	0.0470	0.0470	0.0435	0.0381	0.0332	1.0000
22	145	0.90	0.000083	0.0480	0.0508	0.0479	0.0468	0.0464	0.0450	0.0439	0.0435	0.0434	0.0415	0.0390	0.0370	0.9998
23	127	0.87	0.000183	0.0462	0.0452	0.0442	0.0439	0.0445	0.0479	0.0515	0.0519	0.0511	0.0482	0.0435	0.0379	0.9999
24	139	0.81	0.000093	0.0460	0.0467	0.0479	0.0508	0.0484	0.0468	0.0447	0.0432	0.0428	0.0415	0.0391	0.0373	0.9999
25	92	0.80	0.000023	0.0468	0.0467	0.0465	0.0464	0.0465	0.0466	0.0465	0.0466	0.0462	0.0440	0.0407	0.0372	1.0000
26	144	0.76	0.000094	0.0500	0.0500	0.0495	0.0493	0.0496	0.0501	0.0503	0.0498	0.0480	0.0433	0.0376	0.0325	0.9999
27	75	0.69	0.000046	0.0475	0.0474	0.0471	0.0467	0.0468	0.0472	0.0476	0.0476	0.0472	0.0451	0.0413	0.0363	0.9999
28	103	0.69	0.000039	0.0470	0.0471	0.0470	0.0470	0.0471	0.0471	0.0471	0.0471	0.0472	0.0458	0.0422	0.0377	0.9998
29	82	0.68	0.000031	0.0470	0.0471	0.0467	0.0463	0.0464	0.0465	0.0469	0.0471	0.0463	0.0438	0.0401	0.0360	1.0001
30	126	0.67	0.000126	0.0483	0.0493	0.0509	0.0519	0.0524	0.0508	0.0483	0.0463	0.0455	0.0431	0.0397	0.0371	1.0000
31	99	0.65	0.000197	0.0522	0.0519	0.0524	0.0529	0.0532	0.0533	0.0520	0.0516	0.0519	0.0459	0.0414	0.0363	1.0002
32	92	0.60	0.000104	0.0484	0.0474	0.0471	0.0475	0.0476	0.0484	0.0508	0.0518	0.0481	0.0417	0.0376	0.0332	1.0005
33	94	0.56	0.000063	0.0478	0.0478	0.0475	0.0472	0.0475	0.0479	0.0483	0.0483	0.0480	0.0459	0.0415	0.0359	1.0001

Table III-9 (continued)

Profile Number	Number of Boilers	Percent of NO_x Emis.	Variance	Fraction of Emissions Occurring During: Hour 12	Hour 13	Hour 14	Hour 15	Hour 16	Hour 17	Hour 18	Hour 19	Hour 20	Hour 21	Hour 22	Hour 23	Total
34	74	0.56	0.000111	0.0479	0.0479	0.0473	0.0465	0.0471	0.0491	0.0511	0.0510	0.0480	0.0446	0.0394	0.0336	1.0001
35	1,048	0.54	0.002859	0.0498	0.0493	0.0442	0.0435	0.0439	0.0438	0.0463	0.0519	0.0475	0.0392	0.0316	0.0261	0.9998
36	75	0.53	0.000092	0.0475	0.0477	0.0474	0.0465	0.0470	0.0474	0.0487	0.0510	0.0507	0.0468	0.0414	0.0367	1.0001
37	86	0.51	0.000131	0.0478	0.0479	0.0482	0.0484	0.0482	0.0473	0.0466	0.0472	0.0481	0.0466	0.0435	0.0399	1.0001
38	79	0.50	0.000112	0.0472	0.0468	0.0462	0.0456	0.0461	0.0467	0.0480	0.0507	0.0479	0.0420	0.0374	0.0343	0.9999
39	77	0.46	0.000141	0.0480	0.0464	0.0448	0.0443	0.0439	0.0444	0.0451	0.0449	0.0438	0.0416	0.0384	0.0357	0.9998
40	171	0.46	0.000299	0.0535	0.0530	0.0529	0.0530	0.0534	0.0512	0.0478	0.0458	0.0447	0.0402	0.0349	0.0322	1.0000
41	88	0.44	0.000226	0.0425	0.0422	0.0424	0.0428	0.0463	0.0530	0.0562	0.0551	0.0523	0.0476	0.0429	0.0383	1.0002
42	92	0.44	0.000073	0.0467	0.0473	0.0487	0.0508	0.0510	0.0478	0.0459	0.0449	0.0447	0.0418	0.0393	0.0365	0.9998
43	73	0.42	0.000104	0.0468	0.0463	0.0465	0.0460	0.0466	0.0481	0.0506	0.0489	0.0477	0.0450	0.0401	0.0348	1.0001
44	62	0.41	0.000098	0.0481	0.0485	0.0488	0.0489	0.0492	0.0486	0.0474	0.0474	0.0472	0.0455	0.0429	0.0395	1.0001
45	46	0.41	0.000047	0.0474	0.0472	0.0468	0.0467	0.0467	0.0470	0.0475	0.0478	0.0468	0.0441	0.0398	0.0357	1.0002
46	77	0.40	0.000097	0.0511	0.0509	0.0490	0.0483	0.0470	0.0457	0.0434	0.0440	0.0443	0.0417	0.0381	0.0361	0.9999
47	284	0.40	0.001132	0.0456	0.0455	0.0447	0.0454	0.0482	0.0533	0.0552	0.0541	0.0517	0.0462	0.0412	0.0354	1.0003
48	109	0.39	0.000168	0.0497	0.0506	0.0516	0.0517	0.0521	0.0514	0.0515	0.0508	0.0508	0.0482	0.0438	0.0367	1.0004
49	62	0.38	0.000085	0.0480	0.0481	0.0481	0.0482	0.0480	0.0484	0.0491	0.0490	0.0488	0.0475	0.0440	0.0391	1.0004
50	70	0.36	0.000152	0.0463	0.0467	0.0449	0.0451	0.0477	0.0519	0.0521	0.0513	0.0473	0.0429	0.0390	0.0333	1.0001
51	62	0.36	0.000072	0.0529	0.0533	0.0533	0.0529	0.0527	0.0523	0.0511	0.0487	0.0474	0.0437	0.0373	0.0315	1.0001
52	68	0.35	0.000088	0.0468	0.0464	0.0458	0.0454	0.0453	0.0454	0.0461	0.0462	0.0463	0.0444	0.0410	0.0379	0.9998
53	465	0.35	0.002730	0.0546	0.0561	0.0559	0.0561	0.0559	0.0551	0.0532	0.0518	0.0510	0.0457	0.0343	0.0275	1.0002
54	86	0.34	0.000285	0.0525	0.0530	0.0527	0.0529	0.0530	0.0527	0.0526	0.0522	0.0510	0.0464	0.0396	0.0329	0.9998
55	61	0.34	0.000105	0.0429	0.0422	0.0415	0.0412	0.0431	0.0472	0.0523	0.0535	0.0516	0.0473	0.0432	0.0393	0.9999
56	242	0.34	0.000883	0.0550	0.0546	0.0542	0.0534	0.0496	0.0469	0.0456	0.0470	0.0453	0.0424	0.0379	0.0330	0.9999
57	94	0.34	0.000230	0.0530	0.0537	0.0546	0.0544	0.0537	0.0515	0.0470	0.0448	0.0437	0.0400	0.0356	0.0329	0.9999
58	156	0.33	0.000321	0.0425	0.0412	0.0407	0.0407	0.0416	0.0462	0.0525	0.0548	0.0543	0.0522	0.0464	0.0414	1.0001
59	69	0.33	0.000110	0.0432	0.0431	0.0431	0.0436	0.0461	0.0515	0.0515	0.0480	0.0461	0.0441	0.0417	0.0392	1.0000
60	826	0.32	0.004005	0.0568	0.0568	0.0574	0.0575	0.0551	0.0523	0.0485	0.0483	0.0477	0.0421	0.0366	0.0321	1.0003
61	28	0.32	0.000042	0.0542	0.0545	0.0546	0.0547	0.0516	0.0486	0.0466	0.0476	0.0456	0.0429	0.0384	0.0329	1.0001
62	139	0.32	0.000395	0.0528	0.0548	0.0557	0.0563	0.0560	0.0543	0.0507	0.0476	0.0478	0.0442	0.0377	0.0320	0.9998
63	74	0.31	0.000116	0.0447	0.0440	0.0434	0.0425	0.0416	0.0413	0.0422	0.0435	0.0431	0.0418	0.0394	0.0377	1.0002
64	67	0.31	0.000233	0.0440	0.0429	0.0419	0.0419	0.0425	0.0433	0.0433	0.0436	0.0432	0.0412	0.0370	0.0348	0.9999
65	47	0.30	0.000075	0.0478	0.0488	0.0513	0.0516	0.0507	0.0482	0.0461	0.0444	0.0447	0.0422	0.0392	0.0365	1.0001
66	107	0.29	0.000167	0.0432	0.0430	0.0425	0.0425	0.0433	0.0450	0.0476	0.0523	0.0540	0.0520	0.0462	0.0412	0.9999

Table III-9 (continued)

Profile Number	Number of Boilers	Percent of NO_x Emis.	Variance	Fraction of Emissions Occurring During: Hour 12	Hour 13	Hour 14	Hour 15	Hour 16	Hour 17	Hour 18	Hour 19	Hour 20	Hour 21	Hour 22	Hour 23	Total
67	668	0.28	0.004356	0.0405	0.0402	0.0394	0.0405	0.0448	0.0542	0.0576	0.0572	0.0562	0.0522	0.0452	0.0400	1.0002
68	73	0.28	0.000130	0.0433	0.0426	0.0421	0.0421	0.0437	0.0473	0.0519	0.0515	0.0483	0.0451	0.0421	0.0388	1.0003
69	1,038	0.28	0.007154	0.0568	0.0568	0.0567	0.0561	0.0557	0.0546	0.0525	0.0524	0.0524	0.0465	0.0389	0.0317	1.0001
70	54	0.28	0.000114	0.0439	0.0433	0.0426	0.0429	0.0435	0.0447	0.0474	0.0516	0.0518	0.0472	0.0424	0.0395	1.0000
71	1,077	0.25	0.006913	0.0535	0.0537	0.0552	0.0565	0.0573	0.0564	0.0554	0.0550	0.0532	0.0457	0.0378	0.0338	1.0000
72	71	0.23	0.000246	0.0449	0.0429	0.0417	0.0411	0.0408	0.0411	0.0421	0.0436	0.0429	0.0414	0.0384	0.0357	1.0002
73	27	0.22	0.000086	0.0533	0.0542	0.0547	0.0540	0.0551	0.0541	0.0515	0.0486	0.0476	0.0438	0.0378	0.0324	1.0003
74	35	0.21	0.000144	0.0534	0.0536	0.0538	0.0538	0.0531	0.0515	0.0486	0.0471	0.0464	0.0434	0.0376	0.0324	0.9999
75	60	0.20	0.000166	0.0523	0.0526	0.0517	0.0490	0.0477	0.0474	0.0441	0.0424	0.0416	0.0403	0.0372	0.0351	1.0000
76	42	0.19	0.000103	0.0471	0.0472	0.0468	0.0472	0.0484	0.0515	0.0525	0.0519	0.0487	0.0444	0.0398	0.0355	1.0000
77	30	0.18	0.000039	0.0466	0.0468	0.0469	0.0468	0.0472	0.0488	0.0505	0.0491	0.0481	0.0460	0.0405	0.0352	0.9999
78	49	0.18	0.000156	0.0462	0.0462	0.0459	0.0457	0.0458	0.0459	0.0459	0.0461	0.0461	0.0441	0.0407	0.0377	1.0001
79	33	0.15	0.000101	0.0466	0.0474	0.0524	0.0516	0.0481	0.0471	0.0460	0.0452	0.0448	0.0422	0.0376	0.0352	1.0000
80	41	0.15	0.000120	0.0486	0.0520	0.0532	0.0541	0.0535	0.0514	0.0481	0.0457	0.0442	0.0405	0.0371	0.0355	0.9999
81	347	0.14	0.001589	0.0459	0.0463	0.0456	0.0452	0.0453	0.0448	0.0442	0.0430	0.0405	0.0355	0.0265	0.0230	0.9999
82	41	0.13	0.000152	0.0429	0.0428	0.0422	0.0426	0.0457	0.0519	0.0541	0.0519	0.0477	0.0439	0.0405	0.0373	1.0000
83	17	0.10	0.000068	0.0511	0.0525	0.0524	0.0522	0.0513	0.0486	0.0463	0.0445	0.0433	0.0405	0.0370	0.0344	1.0002
84	81	0.10	0.001016	0.0555	0.0546	0.0541	0.0531	0.0508	0.0484	0.0468	0.0464	0.0449	0.0423	0.0383	0.0325	0.9998
85	30	0.09	0.000099	0.0488	0.0512	0.0521	0.0521	0.0513	0.0490	0.0468	0.0446	0.0433	0.0407	0.0374	0.0346	0.9999
86	32	0.09	0.000223	0.0542	0.0544	0.0551	0.0552	0.0549	0.0544	0.0514	0.0480	0.0464	0.0426	0.0377	0.0331	1.0000
87	68	0.07	0.001762	0.0520	0.0470	0.0450	0.0442	0.0435	0.0424	0.0420	0.0425	0.0418	0.0402	0.0378	0.0353	1.0001
88	36	0.06	0.000269	0.0517	0.0526	0.0531	0.0533	0.0530	0.0513	0.0474	0.0441	0.0425	0.0389	0.0363	0.0342	1.0001
89	164	0.06	0.001789	0.0421	0.0416	0.0409	0.0401	0.0402	0.0420	0.0426	0.0427	0.0414	0.0407	0.0381	0.0356	0.9997
90	32	0.02	0.000161	0.0457	0.0443	0.0437	0.0439	0.0437	0.0441	0.0436	0.0433	0.0427	0.0415	0.0395	0.0383	1.0002

NOTE: *Number of boilers is the count of the number of boilers using a given profile in a specific season and day of week. Profiles were derived by boiler, season, and day of week. Therefore, each boiler may be counted here up to 28 times.

Figure III-1
Top 5 Seasonal Emission Profiles
(Account for 60% of NOx Emissions)

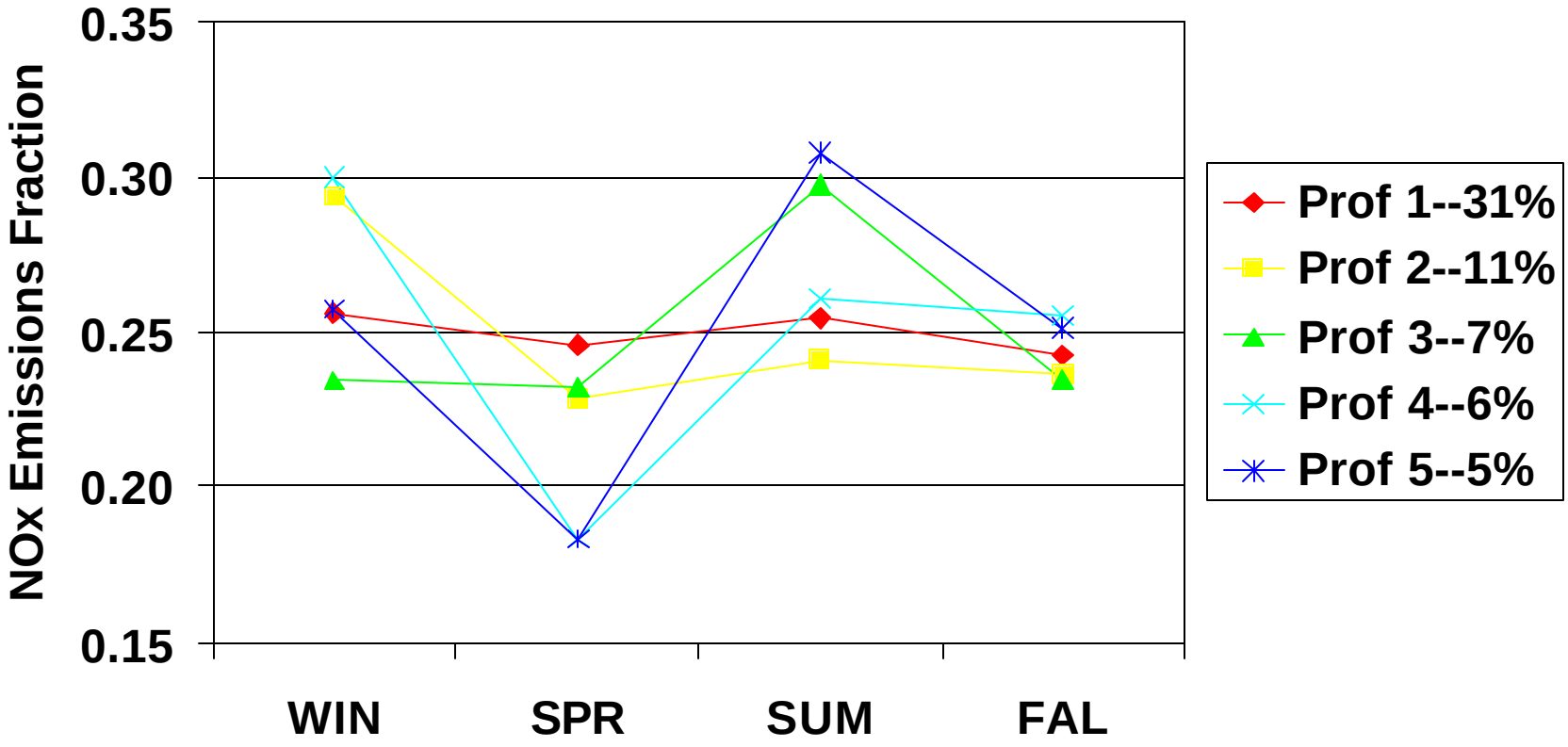


Figure III-2
Top 5 Daily Profiles in Spring
(Account for 62% of NOx Emissions)

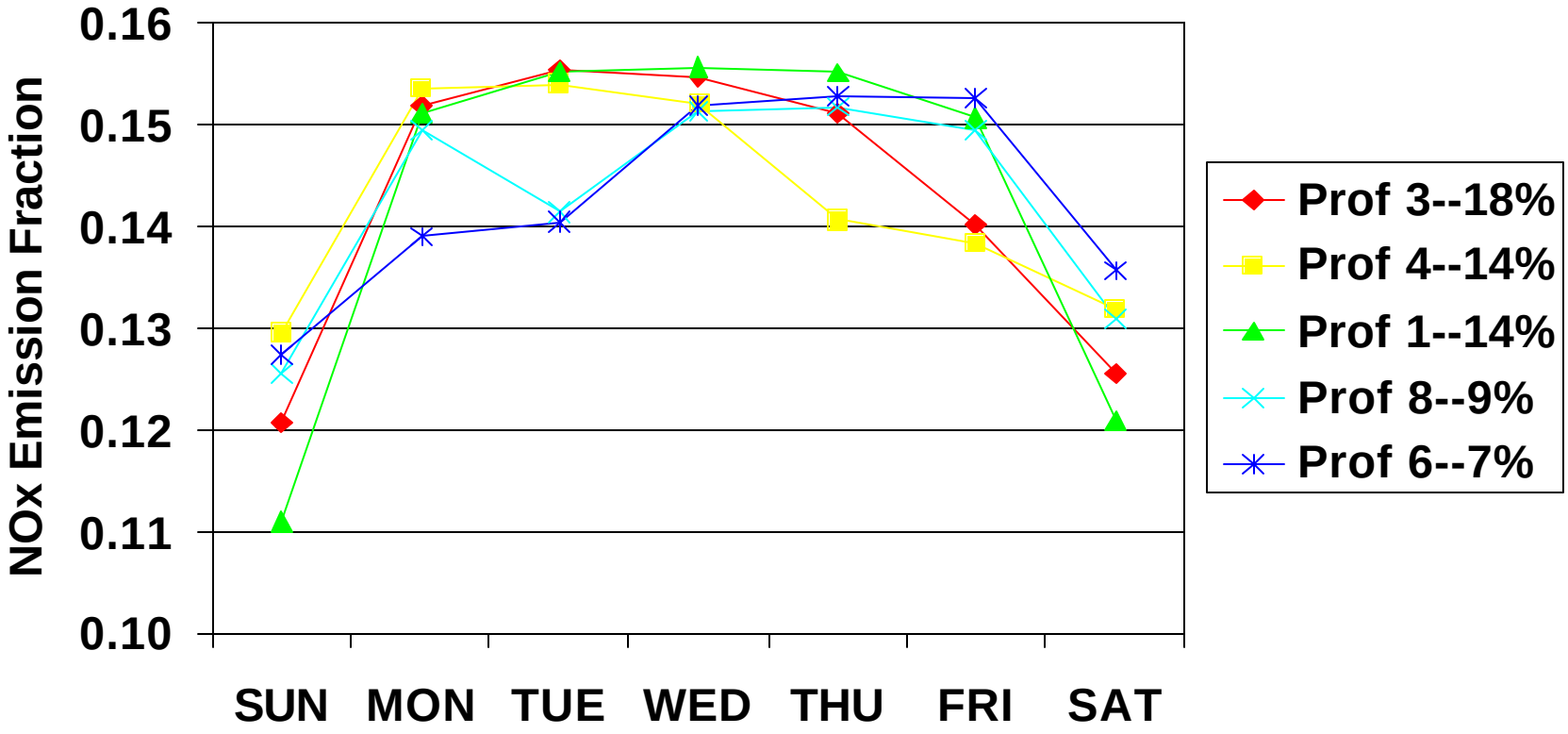


Figure III-3
Top 5 Daily Profiles in Summer
(Account for 64% of NOx Emissions)

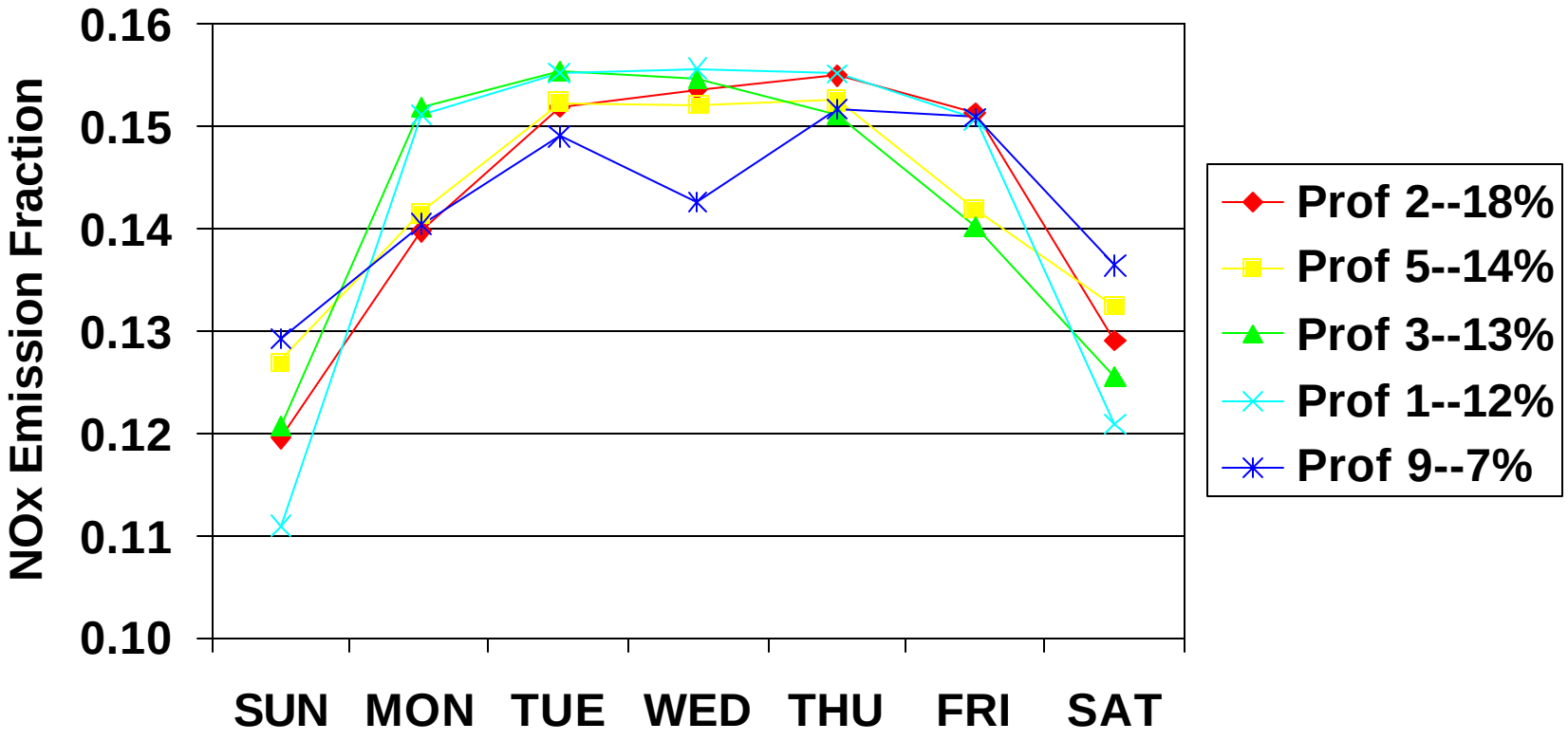


Figure III-4
Top 5 Daily Profiles in Fall
(Account for 56% of NOx Emissions)

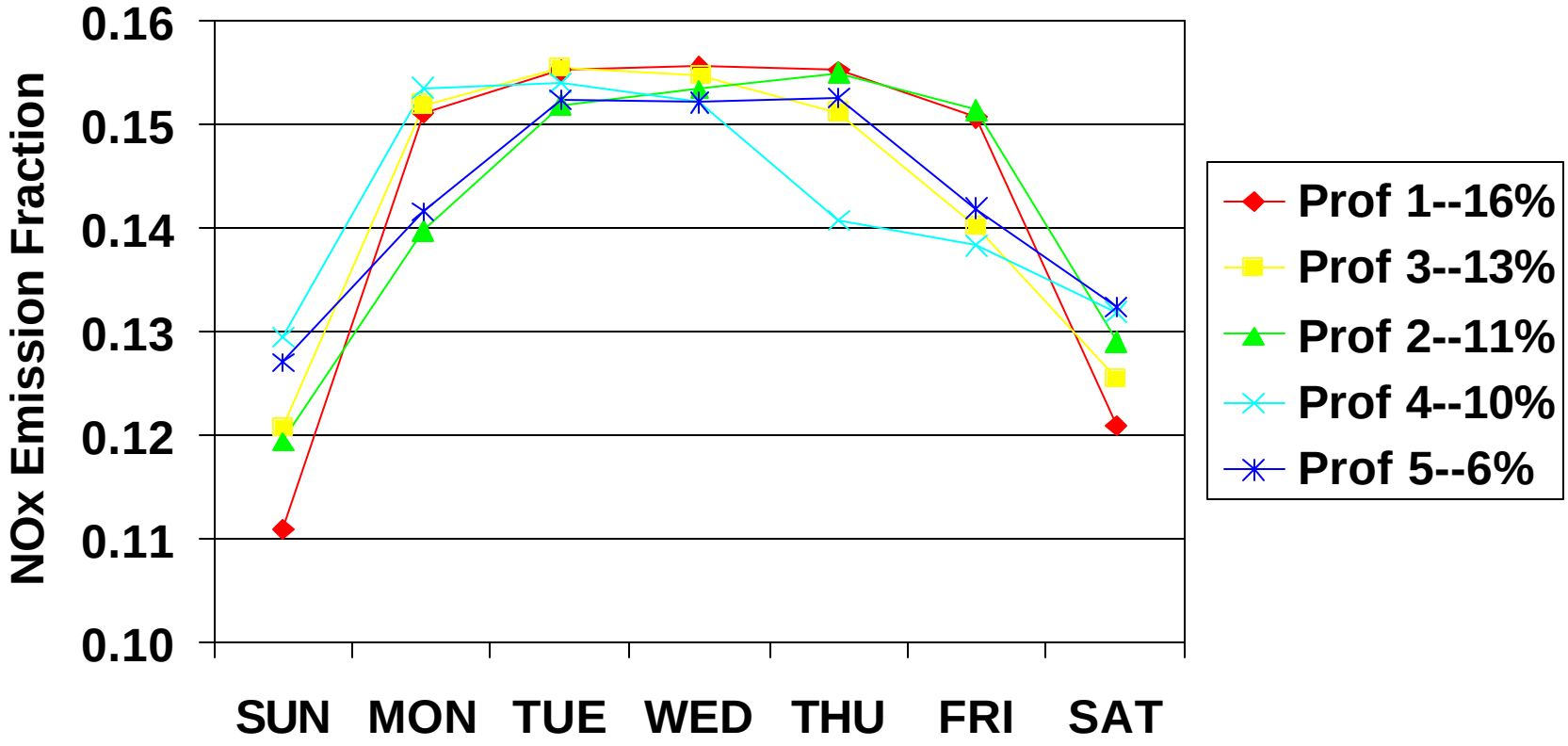


Figure III-5
Top 5 Daily Profiles in Winter
(Account for 42% of NOx Emissions)

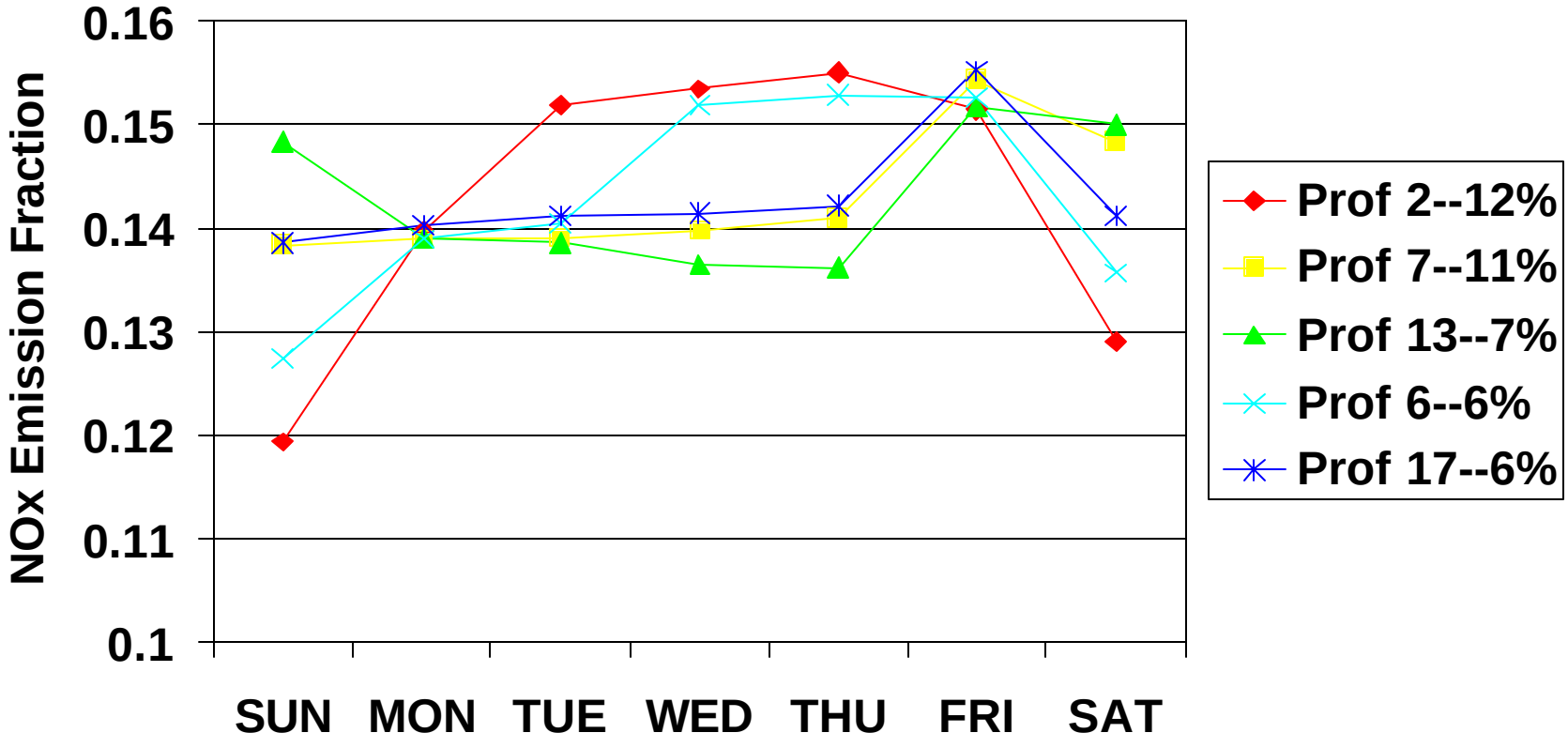


Figure III-6
Top 5 Hourly Profiles in Spring
(Account for 63% of NOx Emissions)

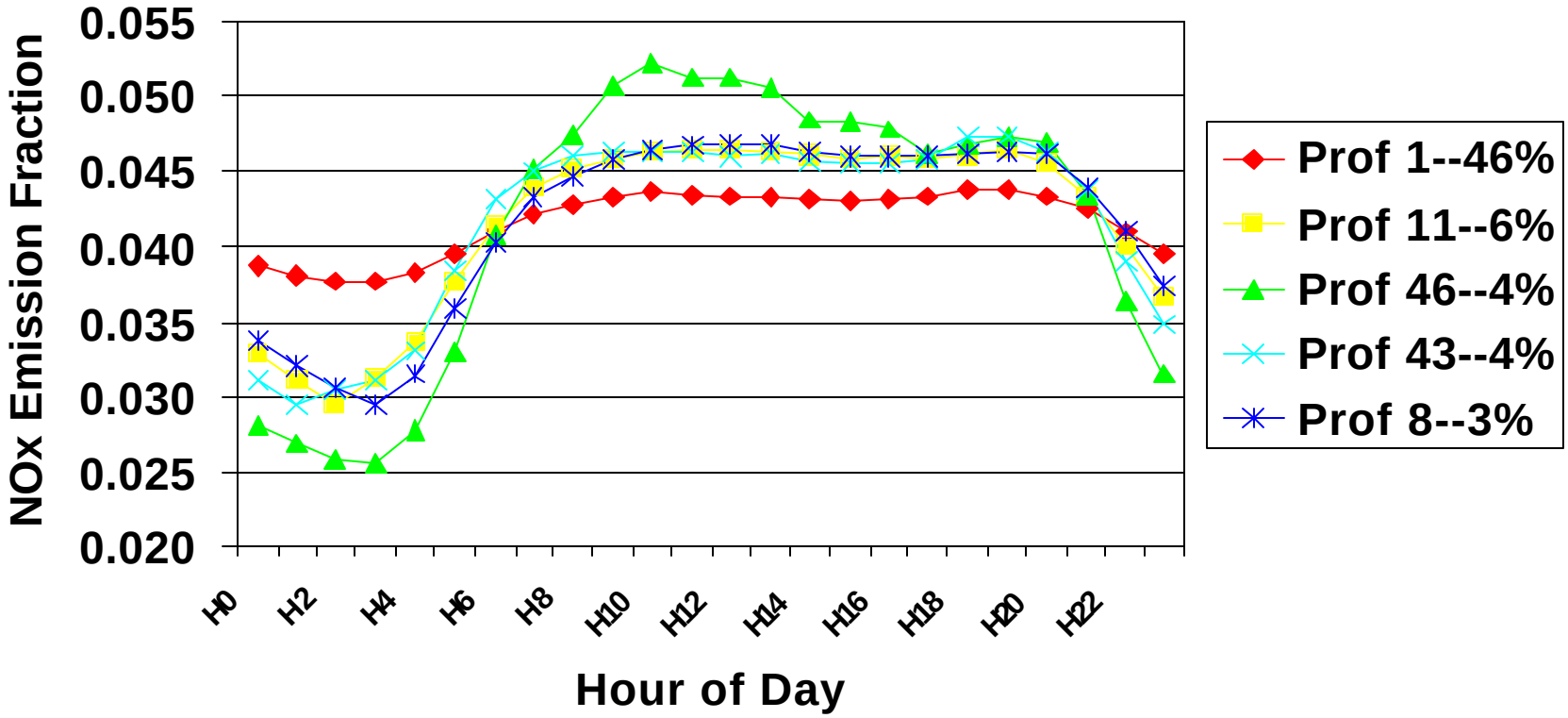


Figure III-7
Top 5 Hourly Profiles in Summer
(Account for 46% of NOx Emissions)

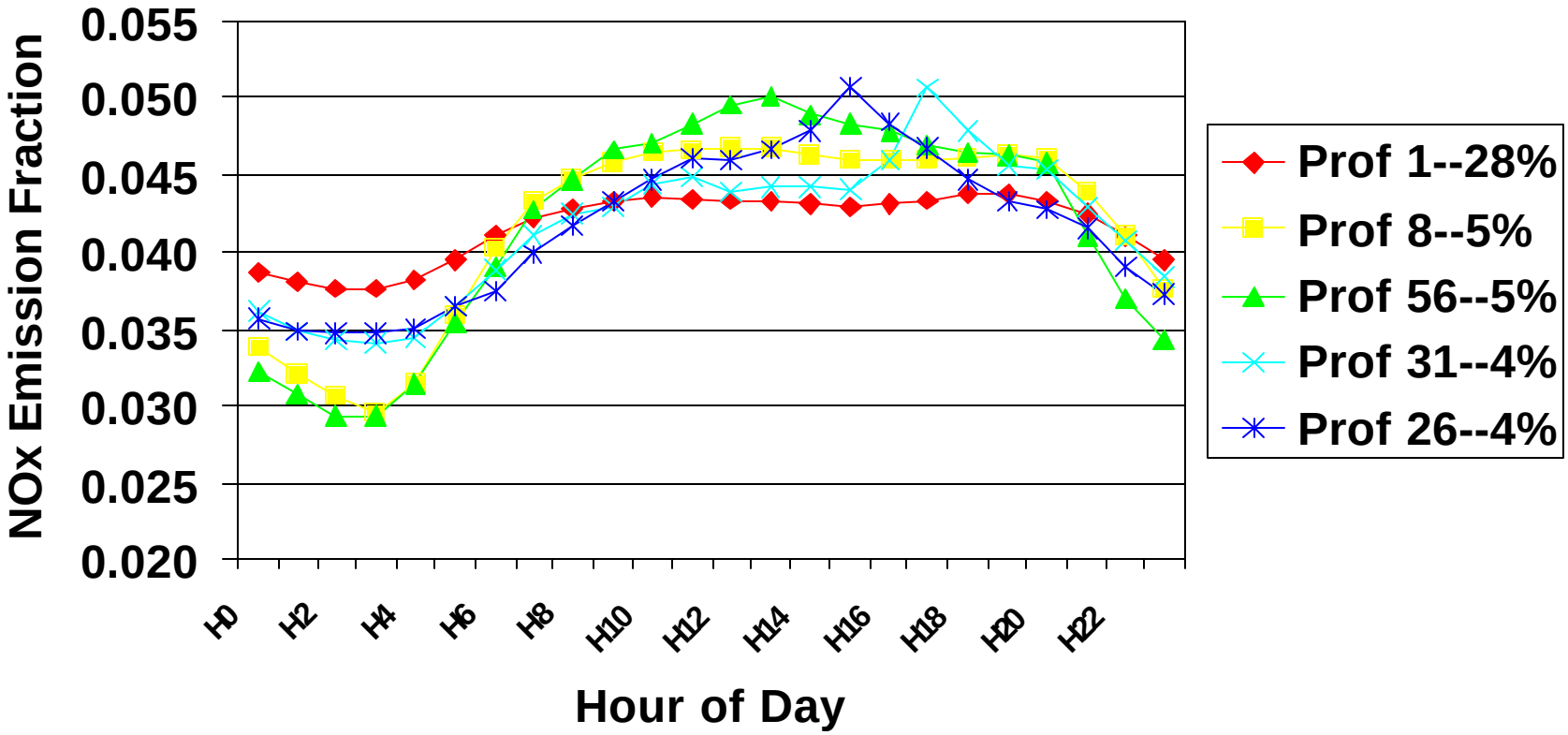


Figure III-8
Top 5 Hourly Profiles in Fall
(Account for 57% of NOx Emissions)

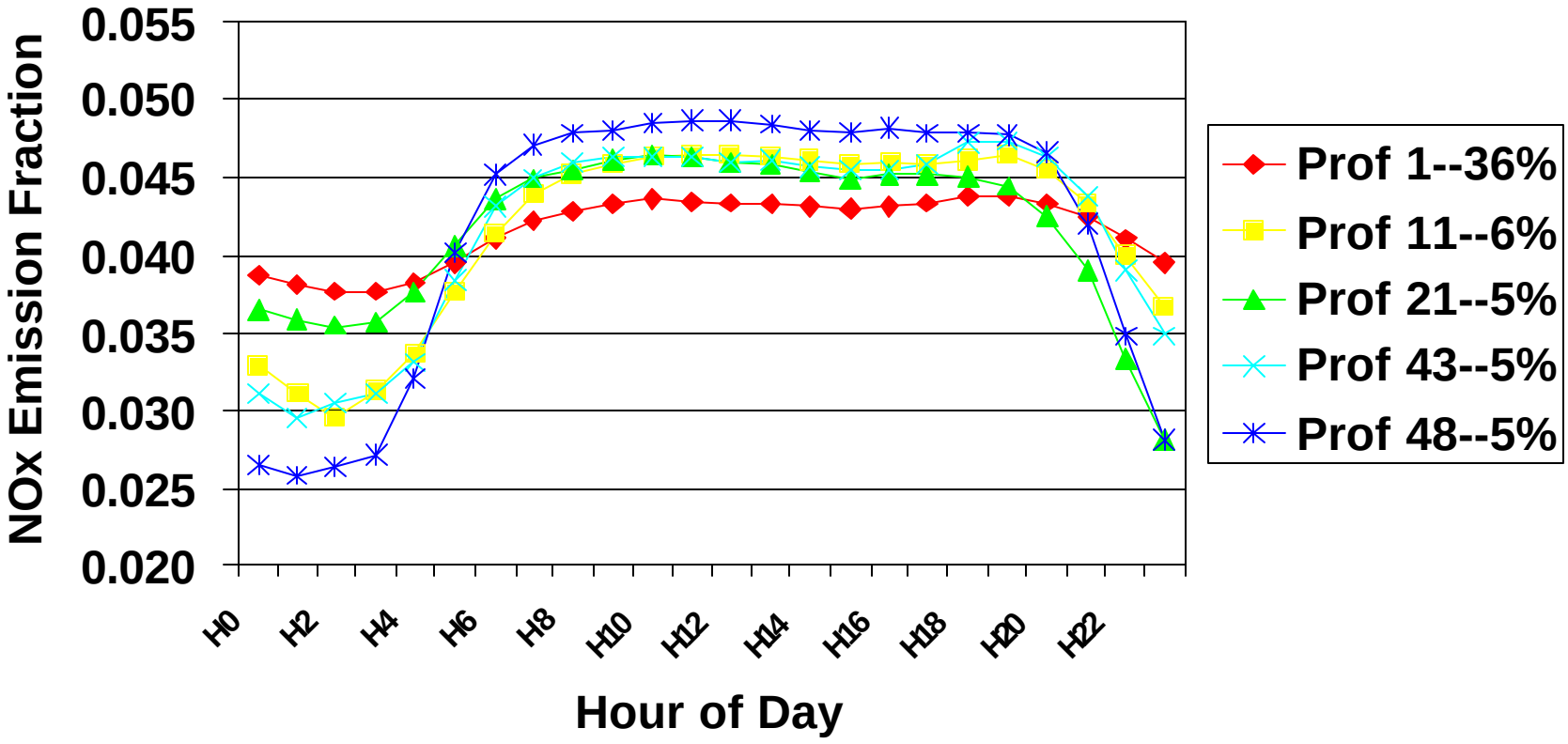
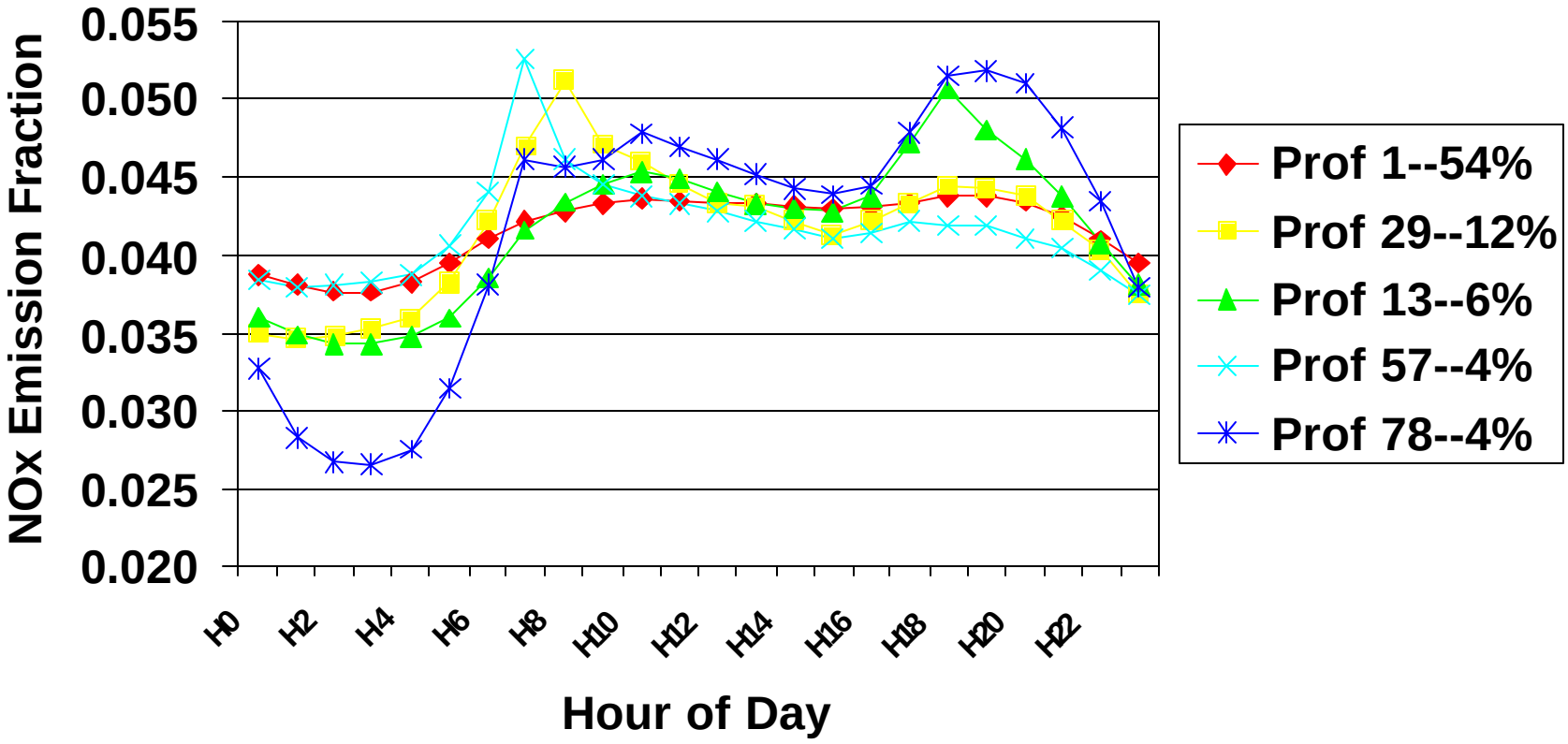


Figure III-9
Top 5 Hourly Profiles in Winter
(Account for 80% of NOx Emissions)



CHAPTER IV
TEMPERATURE SENSITIVITY ANALYSIS

A. SELECTING TEMPERATURE DATA SETS

The temperature that is relevant to the electricity produced by an electricity generating unit (EGU), and therefore, the emissions, is the temperature affecting the users demanding the electricity. Thus, rather than evaluating the effects of temperature at the site of an individual EGU, we chose an approach that is more representative of the temperature affecting the electricity demand. Several possible defensible methods could be chosen to represent this temperature. For this analysis, we used population-weighted temperatures for each State.

A set of 28 temperature data stations were selected from throughout the 11-State region. These temperature stations are all located at airports. The selected set of temperature stations was chosen to be geographically representative, with at least one temperature station in each State. Daily minimum and maximum temperature data from each of these stations were then obtained from the National Climatic Data Center for each day from January 1, 1999 through December 31, 2000. Data from three of the selected temperature stations were incomplete for significant periods of time. These sites were then eliminated from the analysis. The remaining 25 temperature stations that were used in this analysis are shown in Figure IV-1.

The next step in estimating the State-level population-weighted temperature sets was to determine which of the 25 selected temperature stations was closest to each county in the 11-State region. The distance from the centroid of each county to each of the 25 temperature stations was calculated. This calculation was based on the latitude and longitude coordinates of the county centroids and the airport locations. Each county centroid was then matched to the airport closest to that county centroid. This mapping was made regardless of the State in which an airport is located. For example, a county centroid in Michigan may be closest to an airport located in Indiana.

Once each county was mapped to an airport's temperature data set, a population-weighted daily temperature set was calculated for each State. Starting with January 1, 1999, the minimum daily temperature from the temperature set mapped to a given county was multiplied by the fraction of the State's population in that county. The product of all of the January 1, 1999 minimum daily temperatures and the corresponding population fractions were then summed for all counties within a State to determine the population-weighted January 1, 1999 minimum temperature for that State. This procedure was repeated for each day through December 21, 2000 for both the minimum and maximum daily temperatures. The end result of this procedure was a database of daily minimum and maximum temperatures for each day from January 1, 1999 through December 31, 2000 for each of the 11 States.

B. ANALYZING TEMPERATURES AT BOILERS

Minimum and maximum daily temperature sets were assigned to each boiler in the ETS/CEM database according to the State in which the boiler was located. At each boiler, several subsets of data were made. Separate temperature analyses were performed for weekdays in 1999, weekends in 1999, weekdays in 2000, and weekends in 2000. Weekdays were analyzed separately from weekends because, as shown in the emission profile analyses, emissions are typically lower on weekends than weekdays. Without separating weekends from weekdays, it would be difficult to determine whether emission fluctuations were due to the normal fluctuation that occurs between weekends and weekdays or to changes in temperature. Similarly, 1999 emissions were separated from 2000 emissions because a number of LADCO stakeholders indicated that with Phase II of Title IV of the Clean Air Act beginning implementation in 2000, boiler-level changes in dispatch would be occurring to comply with the Title IV emission allowances. By mixing 1999 and 2000, these dispatch changes would make it difficult to discern emission changes due to temperature.

Within the 1999 weekday database, the following procedure was followed to determine whether maximum daily temperature impacted NO_x emissions and heat input. At units where maximum temperature was determined to have an impact on emissions, the temperature above which emissions were determined to increase was also estimated. First, the emission and heat input data for each boiler were sorted in order of increasing maximum daily temperature. All days in 1999 were included for each boiler, with days not in the ETS/CEM database recorded at 0 emissions and 0 heat input. The average daily NO_x emissions and heat input were calculated for each boiler for all weekdays in 1999. In addition, the average daily NO_x emissions and heat input were also calculated by boiler at each temperature in the 1999 weekday database. In calculating both the annual daily emission and heat input averages and the averages at each temperature, days with 0 emissions or heat input were included in the averages. Next, for each maximum daily temperature on weekdays in 1999, the percentage difference between the average emissions at that temperature and the average 1999 weekday emissions at that boiler was calculated.

The next step was to determine at what temperature emissions began to increase, if at all. A threshold of 20 percent above the annual average daily emissions was used to indicate increased emissions. Starting with the average emissions on the highest temperature day(s) of the year, and working in order of decreasing maximum daily temperature, the third temperature at which emissions for a particular boiler were less than 20 percent higher than the annual average emissions was noted. This threshold of the third day with an increase above 20 percent was determined based on observation of the data. Differences below this threshold were assumed to be caused by daily operational changes independent of temperature. The previous temperature with emissions at or above 20 percent greater than the annual average was then determined to be the temperature at which emissions began to increase at a particular boiler. Thus, if the emissions on the highest three temperature days are all less than 20 percent higher than the annual average daily emissions for that boiler, then it was determined that there was no discernible effect of temperature on emissions.

Table IV-1 can be used to illustrate this process. These data are from one of the boilers in the LADCO region. The data include all weekdays from 1999. Only maximum daily temperatures of 60°F and above are shown in this table. The maximum daily temperature

is shown in the leftmost column. This is followed by the number of days with that maximum daily temperature. The third column shows the average daily NO_x emissions on days with the maximum daily shown in the first column. The fourth column shows the annual average daily emissions for this boiler on weekdays in 1999. This is followed by the percentage difference between the average NO_x emissions at the listed maximum daily temperature and the average 1999 weekday NO_x emissions. The three highest maximum daily temperatures with the temperature-specific average emissions less than 20 percent greater than the 1999 weekday average emissions are highlighted in gray in this table. The third highest temperature at which this occurs is 82°F. The previous temperature with emissions at least 20 percent greater than the 1999 weekday average is then 83°F, when emissions are 57 percent greater than the 1999 weekday average emissions for this boiler. Thus, for this boiler, 83°F was determined to be the temperature at which NO_x emissions begin to increase due to the maximum daily temperature.

At boilers where the percentage difference between the average NO_x emissions at the three highest maximum daily temperature and the average 1999 weekday NO_x emissions were all less than 20 percent, it was determined that maximum daily temperature did not have an effect on NO_x emissions. For the boilers that did show a response to maximum daily temperature, the amount of the temperature effect varied significantly from one boiler to the next. To quantify the significance of the temperature effect at each boiler, the cumulative percentage difference between the average NO_x emissions at and above the maximum daily temperature where the temperature effect begins and the average 1999 weekday NO_x emissions was calculated. To perform this calculation, the number of days at each of the temperatures at and above the temperature where the temperature effect began was multiplied the average emissions at that temperature. The sum of these products was then divided by the total number of days with temperatures at or above the start of the maximum daily temperature effect to determine the weighted average daily NO_x emissions for these day. Then, the percentage difference between the weighted average daily NO_x emissions and the 1999 weekday average NO_x emissions were calculated. In the example shown in Table IV-1, the cumulative weighted average daily emissions at temperatures at and above the temperature effect were 237 percent greater than the 1999 weekday NO_x emission average for this boiler.

This procedure was repeated using the minimum daily temperatures. In this case, the minimum daily temperature at and below which NO_x emissions showed at least a 20 percent increase above the average 1999 weekday emissions for that boiler were determined. Both the maximum and minimum daily temperature effect calculations were then repeated using three other data sets: 1999 weekend temperatures and emissions, 2000 weekday temperatures and emissions, and 2000 weekend temperatures and emissions.

Appendix A lists each boiler in these four data sets along with the maximum daily temperature at and above which emissions show a temperature effect along with the cumulative percentage difference between these emissions and below which emissions show a temperature effect along with the cumulative percentage difference between these emissions and the average daily emissions in that data set. These data in Appendix A are for the State of Illinois. Similar data for the remaining ten States can be obtained from LADCO. Of the four data sets (including all 11 States), the 1999 weekend data set shows the greatest percentage of units with NO_x emissions that respond to maximum daily temperature. 67 percent of boilers show a response in emissions to maximum daily

temperature on weekends in 1999. This compares to 65 percent on 1999 weekdays, 57 percent on 2000 weekdays, and 48 percent on 2000 weekends. In almost all cases, a smaller percentage of units showed an effect of minimum daily temperature on NO_x emissions. Both 2000 weekdays and 1999 weekends had 52 percent of units showing a response in NO_x emissions to minimum daily temperature, while 47 percent of units showed a response on 1999 weekdays and 50 percent showed a response on 2000 weekends.

Figures IV-2 through IV-8 are presented here to illustrate the varying degrees of the temperature effect on NO_x emissions and the different types of responses to temperature. In each of these figures, the 1999 weekday average emissions by maximum daily temperature are plotted for different boilers in Illinois. Figure IV-2 depicts a boiler with emissions within a fairly constant range from about 52°F to about 82°F. Starting around 83°F, this range of daily emissions begins to increase. In this case, the temperature effect was determined to start at 83°F, with cumulative average daily emissions 52 percent higher than the 1999 weekday average emissions at and above a temperature of 83°F. Figure IV-3 shows a boiler with a significant range in daily emissions as a function of temperature. However, starting at 81°F, the range of daily emissions begins to stay at a higher level. In this case, daily emissions at and above 81°F are 65 percent greater than the 1999 weekday average NO_x emissions. Figure IV-4 shows a very pronounced temperature effect. In this case, the daily emissions at 84°F and higher temperatures are on average 334 percent higher than the 1999 weekday NO_x emissions average. Figure IV-5 illustrates a boiler with a relatively constant range of emissions and no discernible effect of the maximum daily temperature upon the daily NO_x emissions. The boiler depicted in Figure IV-6 begins to show a temperature effect on NO_x emissions starting at 77°F. NO_x emissions at this point and above are 93 percent higher than the 1999 weekday average NO_x emissions. Figures IV-7 and IV-8 illustrate patterns that are likely to represent peaking units. The temperature effect begins in Figure IV-7 at 76°F, while it begins at 80°F in Figure IV-8. The increase in NO_x emissions above these temperatures relative to the 1999 weekday average NO_x emissions is 130 percent and 237 percent, respectively.

Information from this temperature sensitivity analysis can be used by LADCO in emissions modeling. When modeling days with very high or very low ambient temperatures, the boiler-level results shown in Appendix A can be used to adjust the emissions of units that show a marked sensitivity to temperature. The percentage that emissions increase above the annual average daily emissions at high or low temperatures provides a quantifiable method for adjusting these emissions. This analysis was also performed using heat input. However, the heat input generally followed the same trends as the NO_x emissions, so only the results for NO_x emissions are shown here.

As an alternative to applying unit-level temperature adjustments, the data were further analyzed and grouped into bins based on the average daily emissions of the unit. The temperature effect and the temperature at which this effect begins to take place were calculated based on NO_x mass weighted averages of the data presented in Appendix A. These summary data are presented in Table IV-2. These more generic data could be used to adjust emissions data in emission modeling, thus accounting for the effects of temperature, but in a less detailed manner.

Table IV-1
1999 Weekday NO_x Emissions at Sample Boiler as a Function of Maximum Daily Temperature

Max. Daily Temp. (°F)	Number of 1999 Weekdays with Max. Daily Temp.	Avg. Daily NO_x Emissions on 1999 Weekdays with Max. Daily Temp. (tons/day)	Avg. 1999 Weekday NO_x Emissions (tons/day)	Percentage Diff. Between Avg. NO_x Emissions at Max. Daily Temp. and Avg. 1999 Weekday NO_x Emissions (%)
100	1	7.84	1.31	501
97	1	5.71	1.31	338
94	1	4.53	1.31	247
93	3	7.12	1.31	446
92	2	6.26	1.31	380
91	2	6.40	1.31	391
90	3	4.61	1.31	254
89	6	6.09	1.31	367
88	2	3.86	1.31	196
87	3	6.00	1.31	360
86	9	4.39	1.31	236
85	4	0.42	1.31	-68
84	2	0.47	1.31	-64
83	5	2.05	1.31	57
82	5	1.28	1.31	-2
81	4	0.00	1.31	-100
80	8	1.85	1.31	42
79	2	0.50	1.31	-62
78	7	0.23	1.31	-82
77	4	0.57	1.31	-56
76	4	0.28	1.31	-79
75	5	0.60	1.31	-54
74	5	0.40	1.31	-70
73	5	0.39	1.31	-70
72	5	0.62	1.31	-52
71	3	0.09	1.31	-93
70	2	0.71	1.31	-46
69	10	0.46	1.31	-65
68	4	0.56	1.31	-57
67	3	0.20	1.31	-85
66	4	1.00	1.31	-23
65	7	0.76	1.31	-41
64	5	0.00	1.31	-100
63	4	0.47	1.31	-64
62	3	1.60	1.31	22
61	7	0.00	1.31	-100
60	2	0.46	1.31	-64

Table IV-2
Summary Effects of Daily Maximum and Minimum Daily Temperature on NO_x Emissions

Year	Day	Average Daily NO_x Emissions (tpd)	Increased NO_x Emissions Begin Occurring at and Above Maximum Daily Temperatures of: (ºF)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)	Increased NO_x Emissions Begin Occurring at and Below Minimum Daily Temperatures of: (ºF)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)
1999	Weekday	< 0.5	83	246.2	28	148.6
		0.5 - 1.0	80	106.5	23	77.0
		1.0 - 10	81	27.1	25	28.4
		10 - 50	78	12.8	27	20.0
		>50	79	15.0	30	17.0
1999	Weekend	< 0.5	84	383.3	33	152.6
		0.5 - 1.0	80	109.3	30	54.9
		1.0 - 10	82	31.6	27	29.8
		10 - 50	81	18.3	30	22.9
		>50	85	25.8	30	19.7
2000	Weekday	< 0.5	81	157.8	21	148.1
		0.5 - 1.0	76	37.0	21	61.9
		1.0 - 10	77	15.9	30	20.4
		10 - 50	76	10.6	27	19.6
		>50	79	17.9	28	26.4
2000	Weekend	< 0.5	78	192.4	28	156.3
		0.5 - 1.0	78	73.5	29	104.3
		1.0 - 10	78	20.7	26	26.6
		10 - 50	76	13.5	27	26.3
		>50	78	12.5	33	25.8

Figure IV-1
Locations of Airports Used for Temperature Data

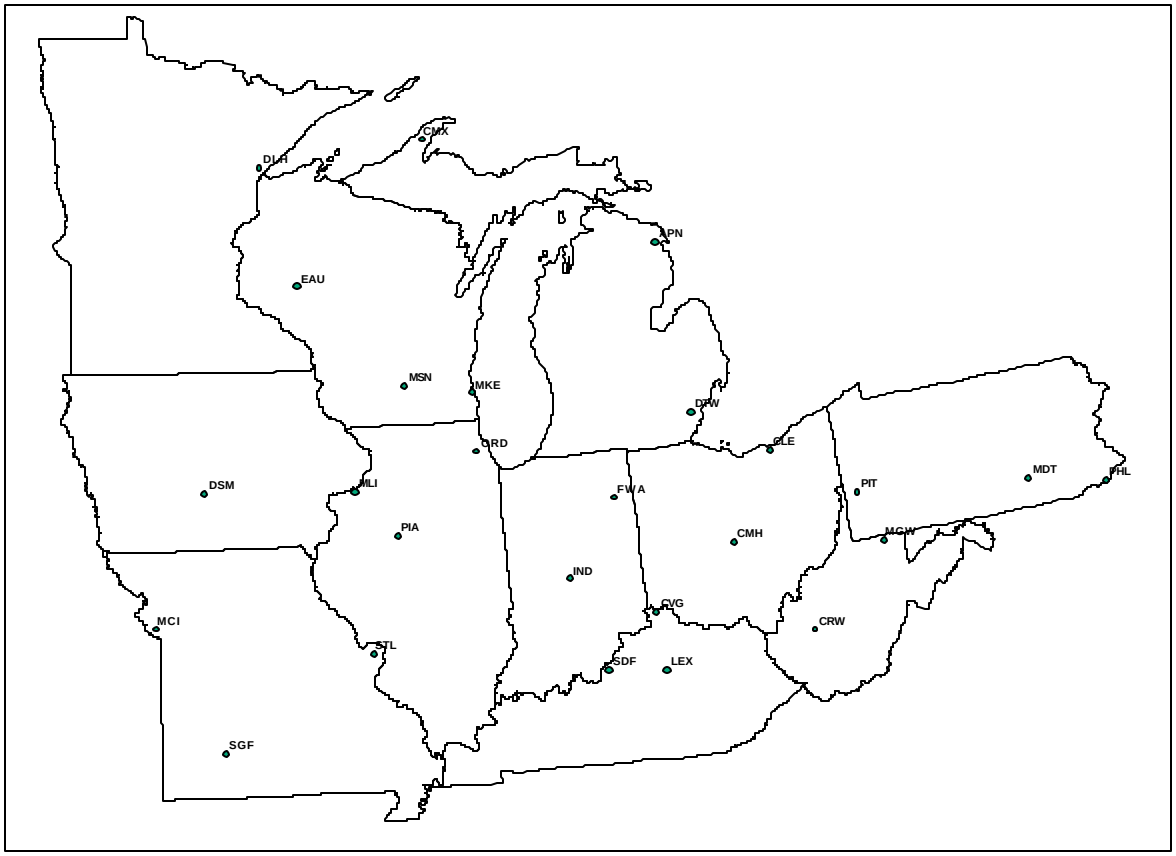


Figure IV-2
1999 Weekday NOx Emissions as a Function of Maximum Daily Temperature
Kincaid 1 (Temperature Effect at 83°F)

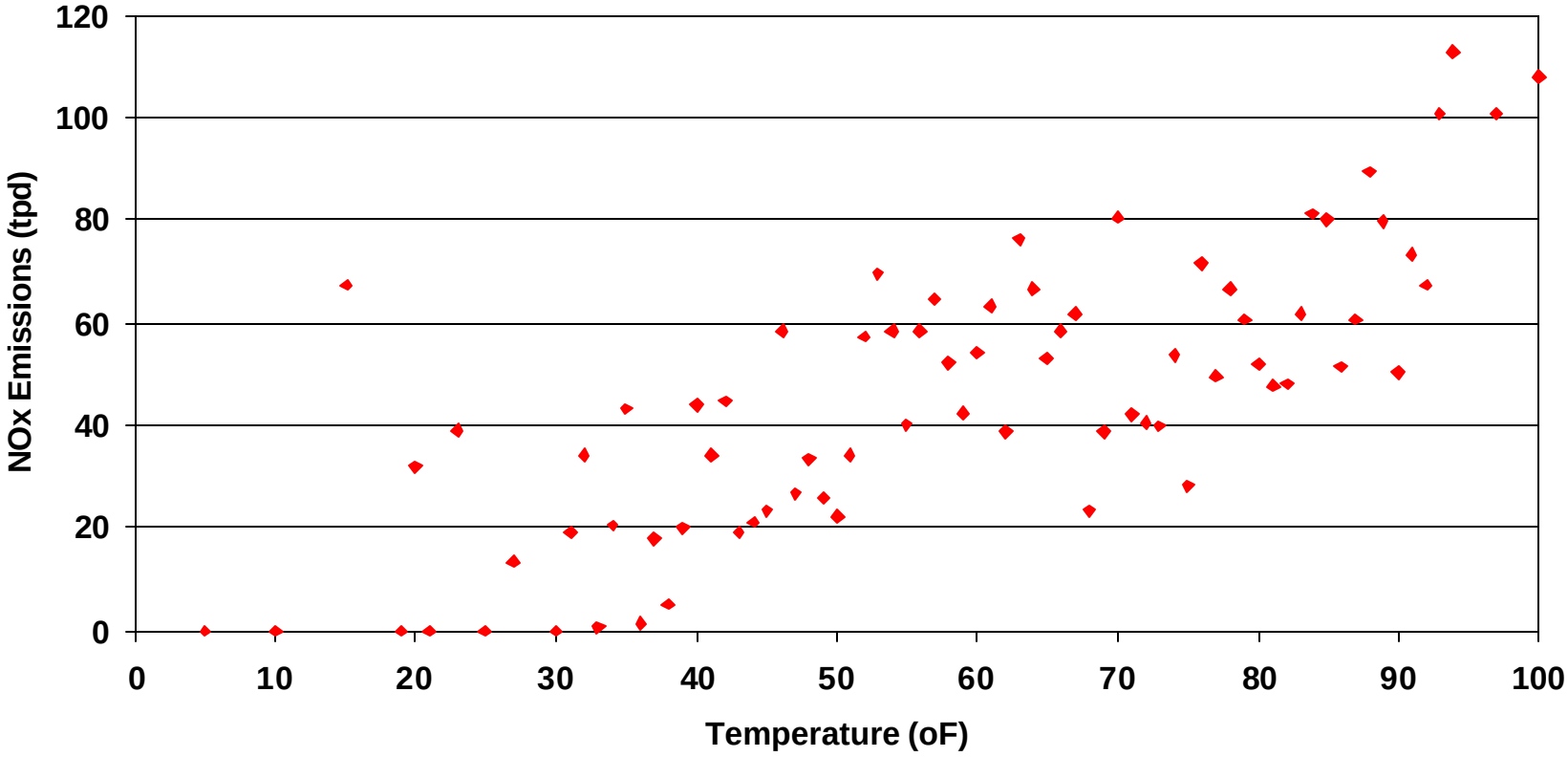


Figure IV-3
1999 Weekday NOx Emissions as a Function of Maximum Daily Temperature
Fisk 19 (Temperature Effect at 81°F)

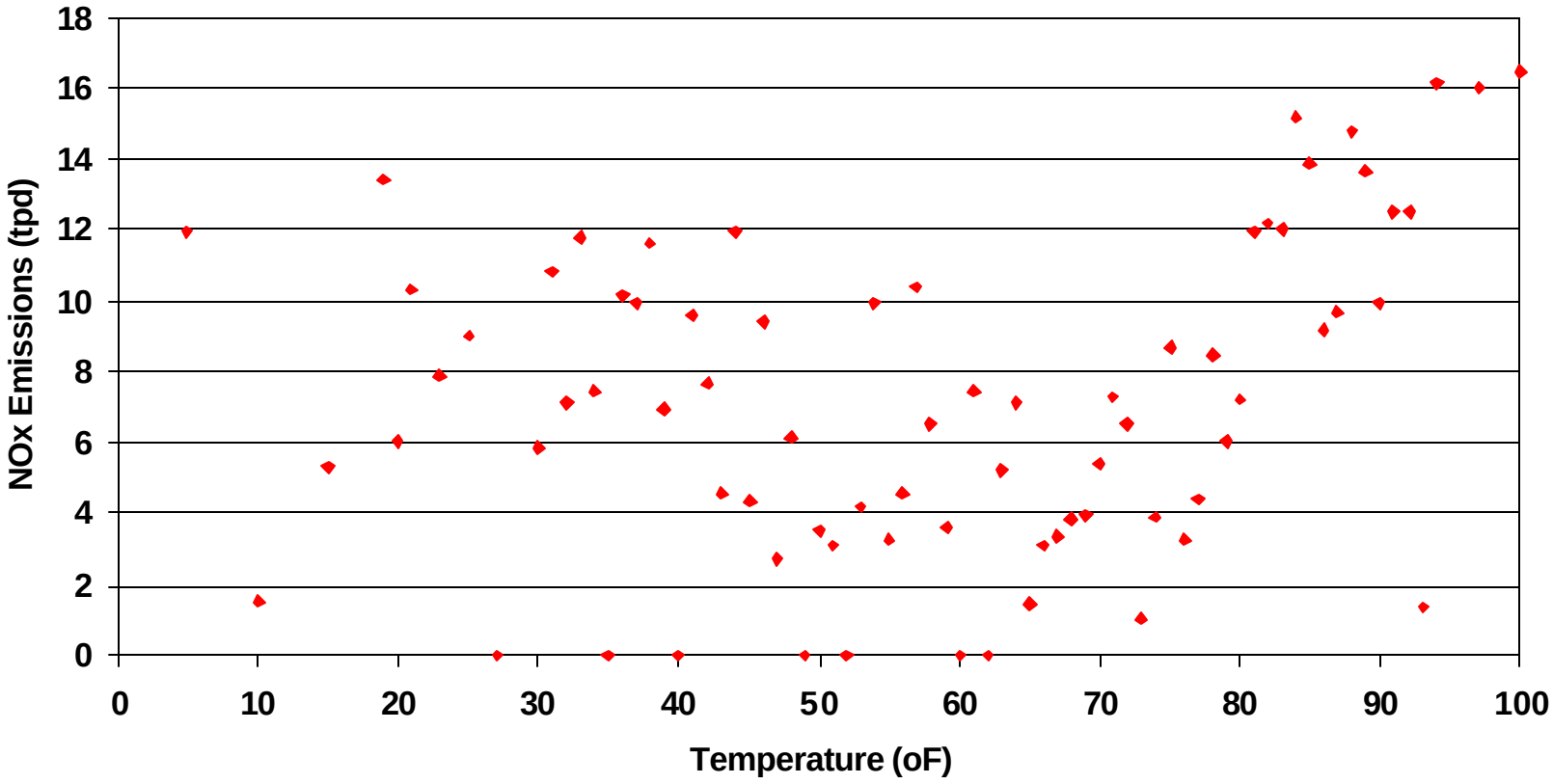


Figure IV-4
1999 Weekday NOx Emissions as a Function of Maximum Daily Temperature
Venice 6 (Temperature Effect at 84ºF)

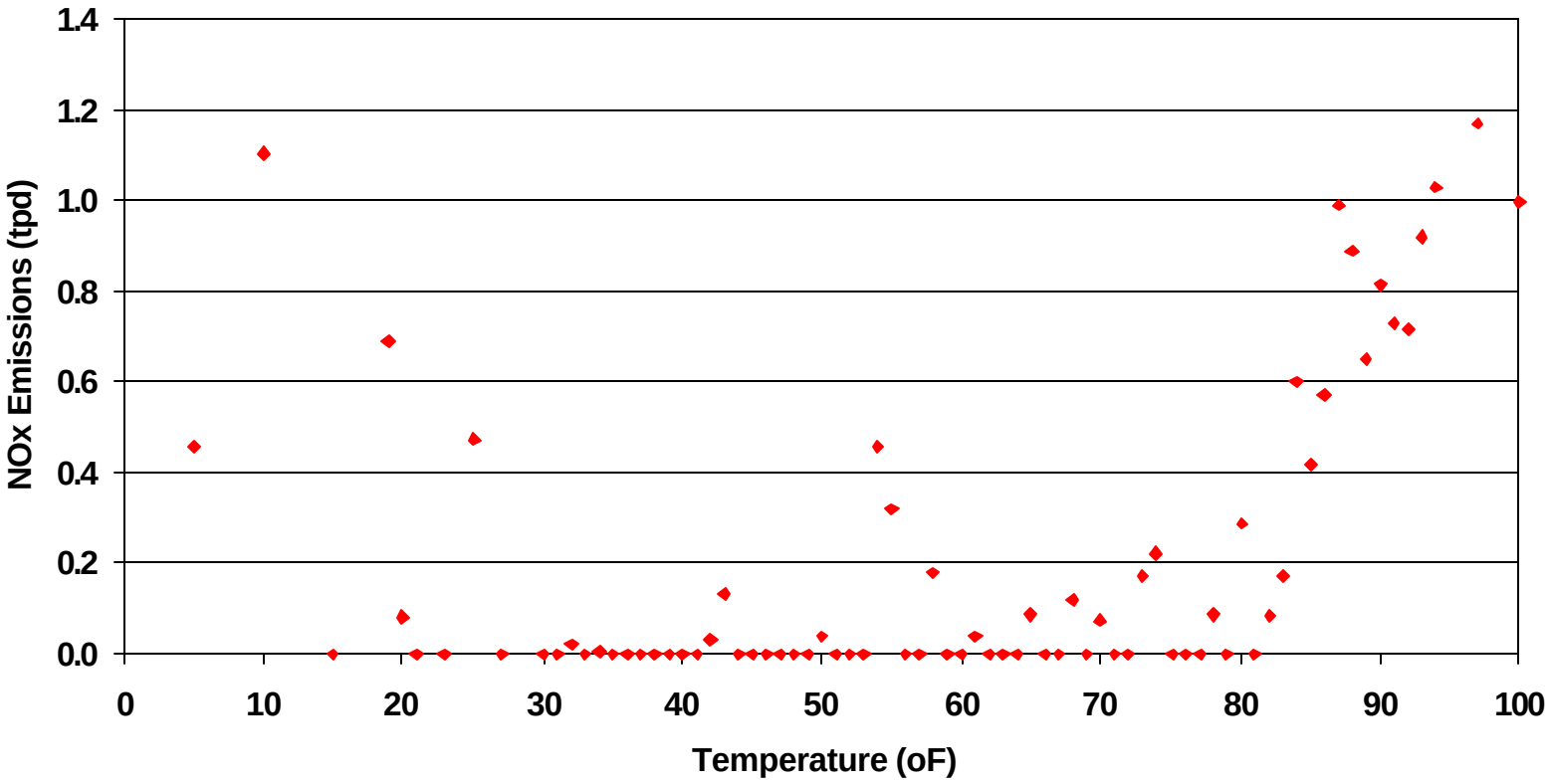


Figure IV-5
1999 Weekday NOx Emissions as a Function of Maximum Daily Temperature
Baldwin 2 (No Temperature Effect)

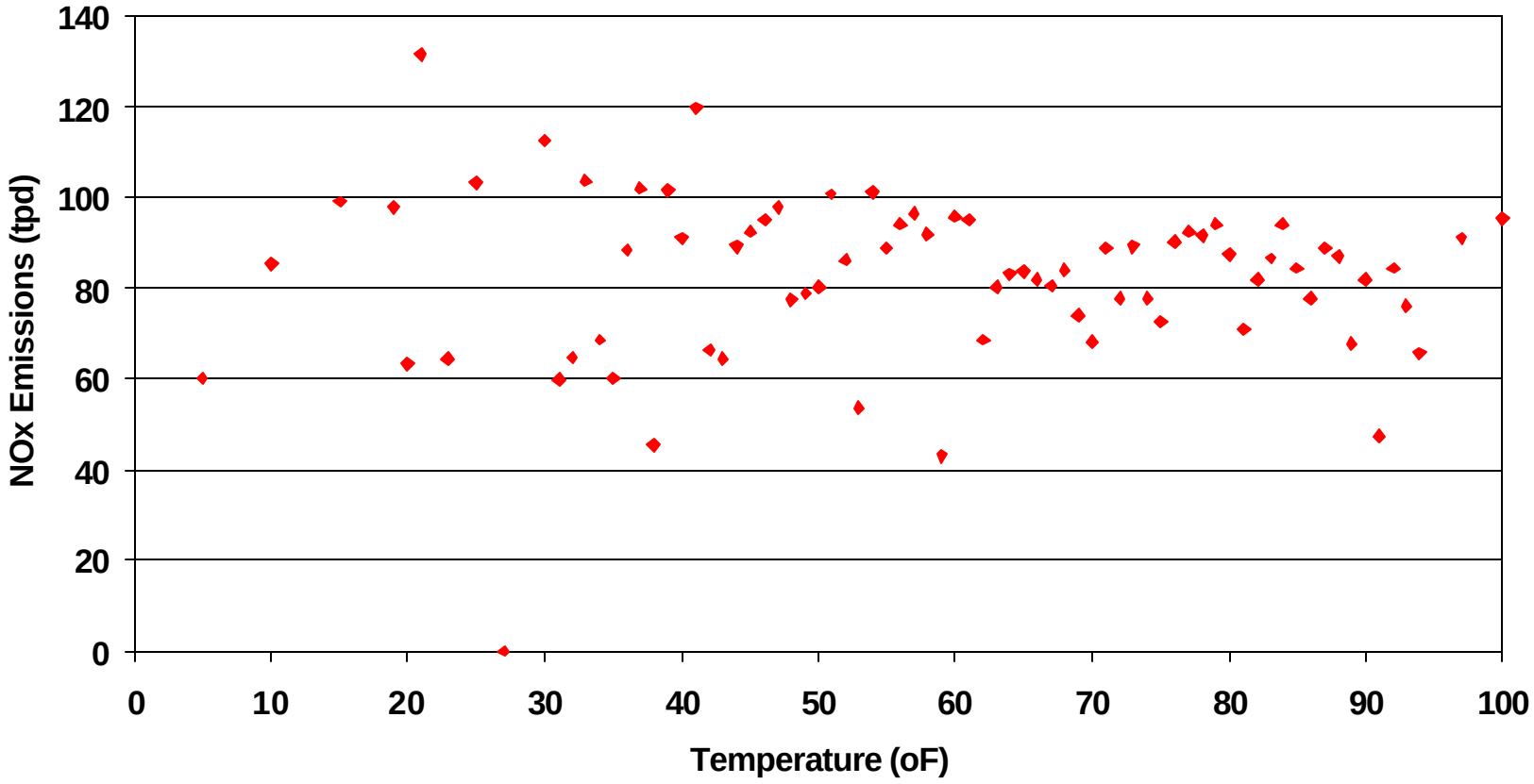


Figure IV-6
1999 Weekday NOx Emissions as a Function of Maximum Daily Temperature
Lakeside 7 (Temperature Effect at 77°F)

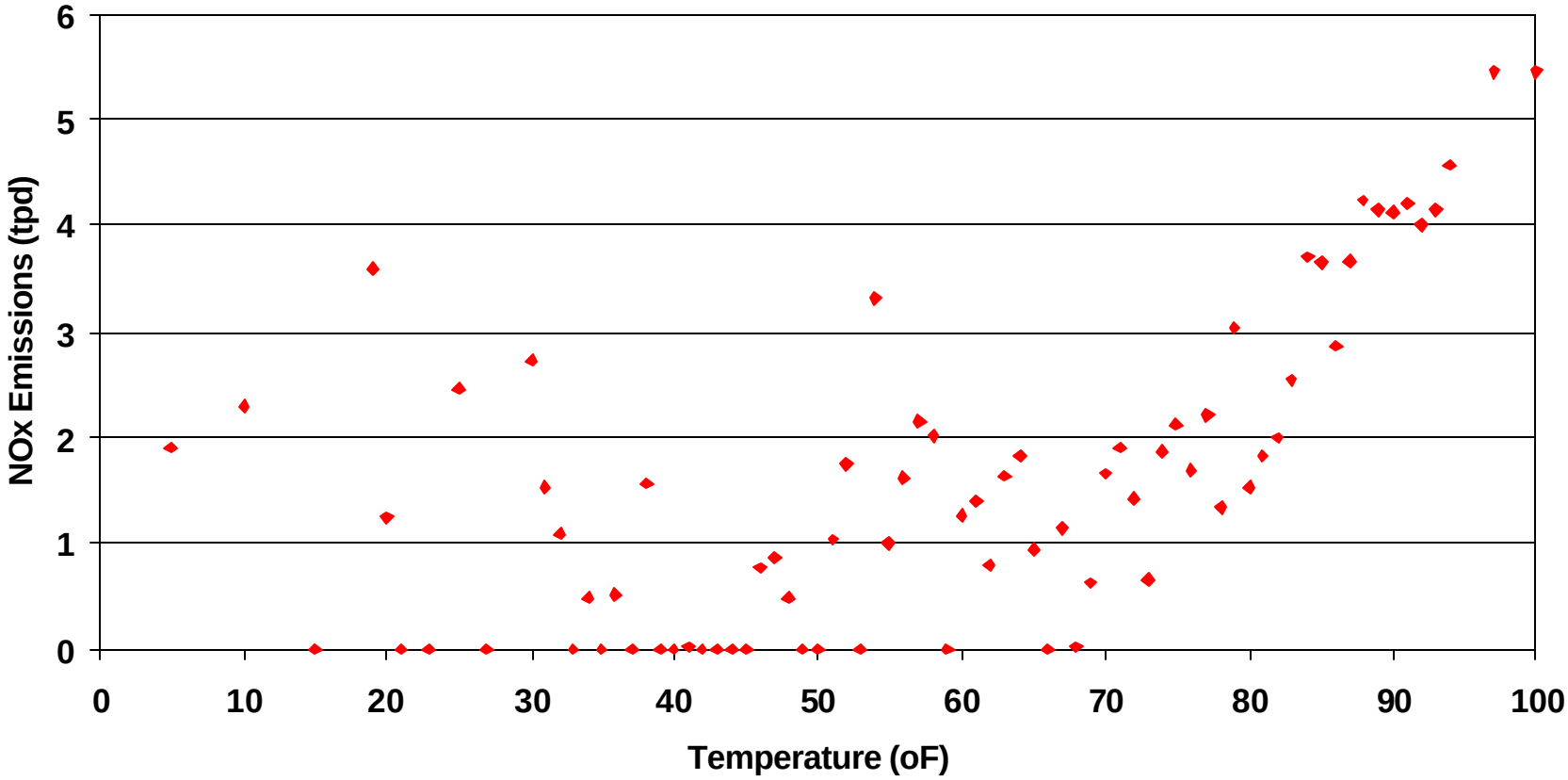


Figure IV-7
1999 Weekday NOx Emissions as a Function of Maximum Daily Temperature
Interstate 1 (Temperature Effect at 76°F)

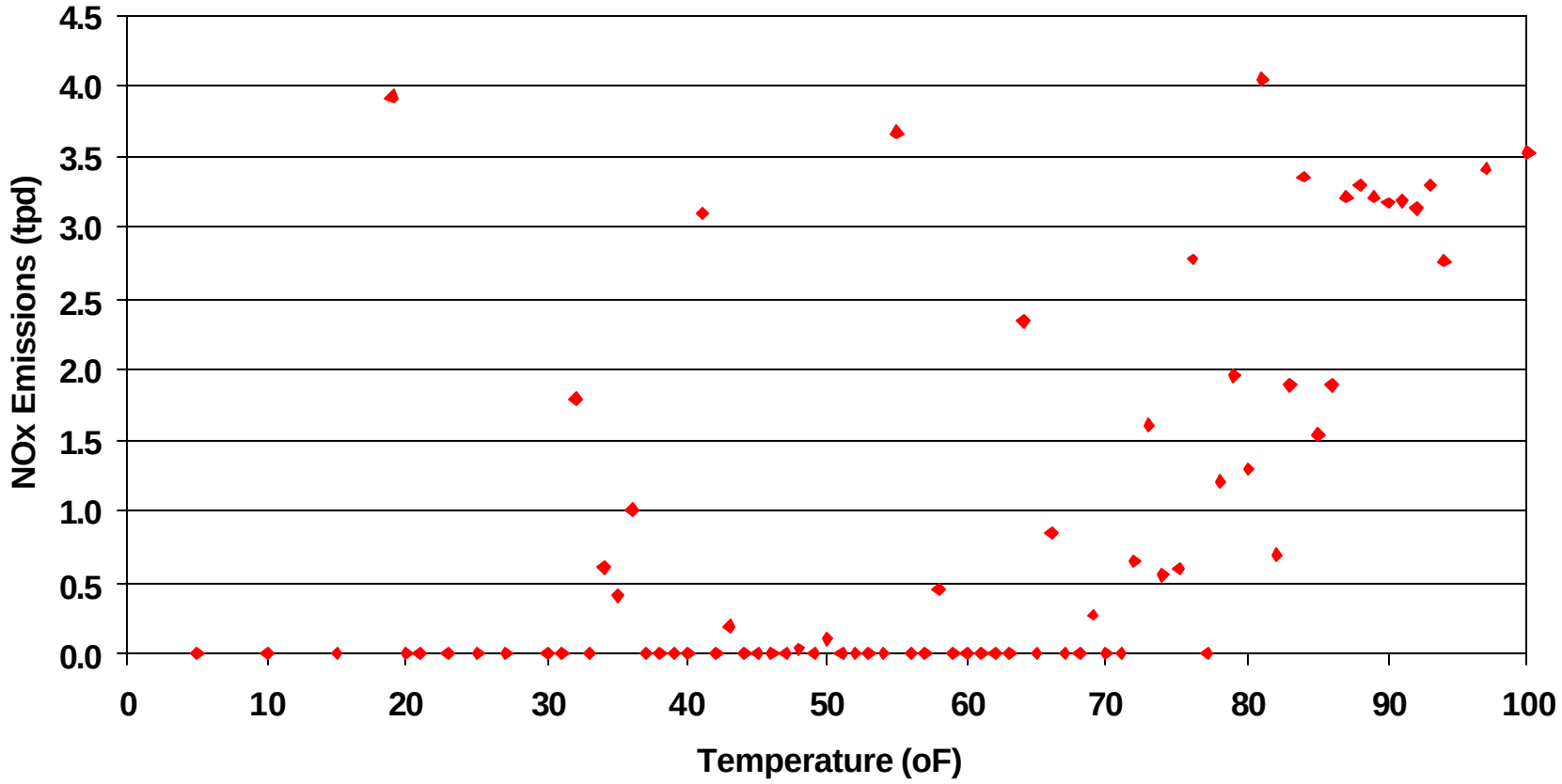
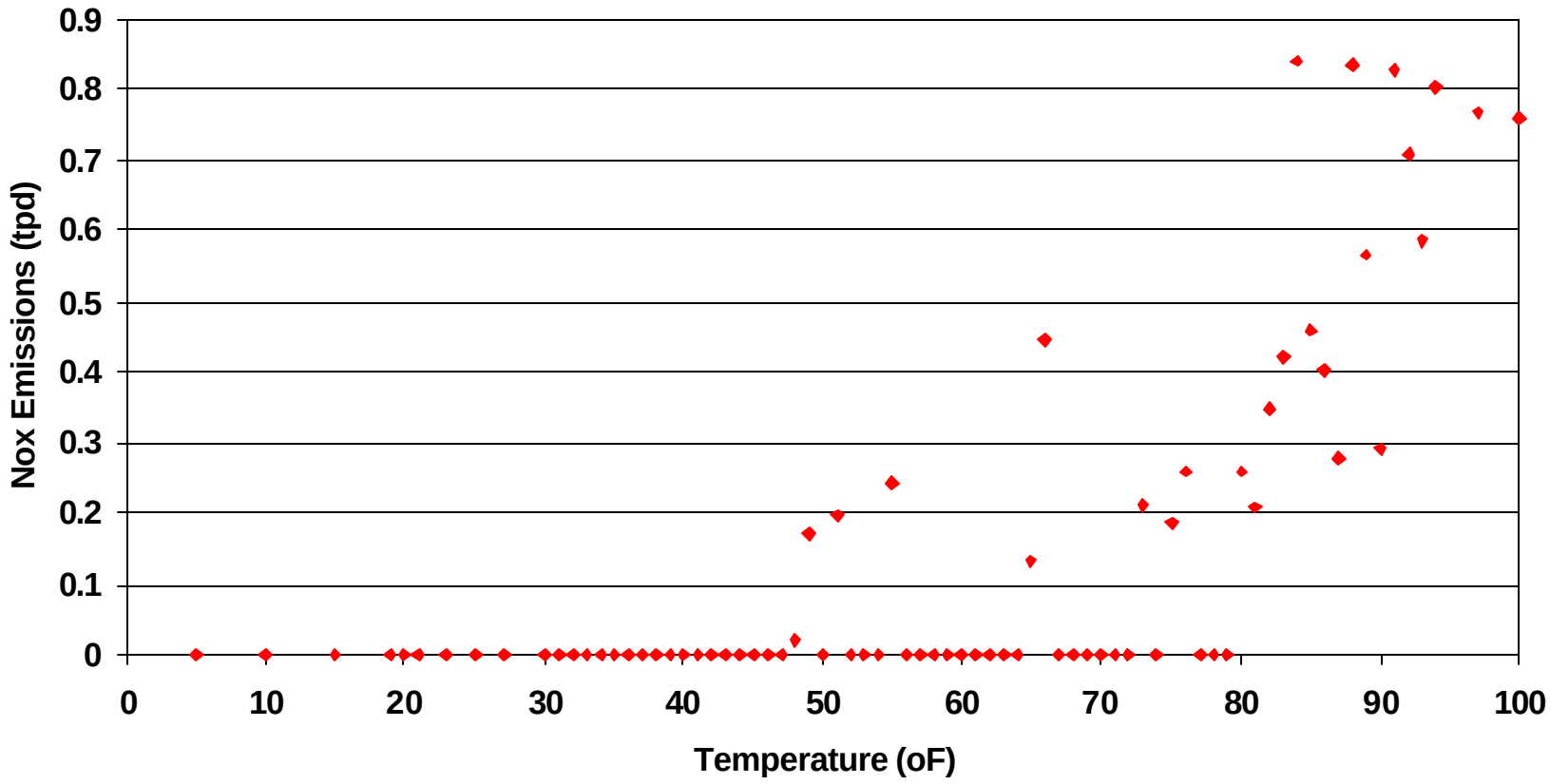


Figure IV-8
1999 Weekday NOx Emissions as a Function of Maximum Daily Temperature
Elwood Energy Facility 1 (Temperature Effect at 80°F)



APPENDIX A
TEMPERATURE SENSITIVITY RESULTS FOR ILLINOIS

This appendix presents the results of the temperature sensitivity analyses for Illinois. Table A-1 shows the results based on the 1999 weekday data. The results for weekdays in 2000 are shown in Table A-2. Tables A-3 and A-4 show the temperature sensitivity results for weekends in 1999 and 2000, respectively. Each table includes results based on the maximum daily ambient temperature as well as the minimum daily ambient temperature. An entry of 0 in the maximum daily temperature column indicates that the unit did not show an increase in NO_x emissions at high maximum daily temperatures. Similarly, an entry of 999 in the minimum daily temperature column indicates that the unit did not have increased NO_x emissions at low minimum daily temperatures.

Table A-1
Effect of Daily Maximum and Minimum Daily Temperature on NO_x Emissions
1999 Weekdays

FIPS State Code	FIPS County Code	Plant Name	ORIS Plant Code	Boiler ID	Increased NO_x Emissions Begin Occurring at and Above Maximum Daily Temperatures of: (°F)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)	Increased NO_x Emissions Begin Occurring at and Below Minimum Daily Temperatures of: (°F)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)
17	021	KINCAID	876	1	83	51.88	999	0.00
17	021	KINCAID	876	2	83	94.89	18	79.41
17	031	CRAWFORD	867	7	89	49.99	14	73.90
17	031	CRAWFORD	867	8	87	126.88	4	116.03
17	031	FISK	886	19	81	64.57	-9	81.40
17	033	HUTSONVILLE	863	05	78	44.33	9	47.69
17	033	HUTSONVILLE	863	06	81	44.52	12	56.60
17	057	DUCK CREEK	6016	1	91	31.67	4	28.21
17	063	COLLINS	6025	1	83	236.53	9	176.88
17	063	COLLINS	6025	2	84	143.68	999	0.00
17	063	COLLINS	6025	3	84	118.05	7	99.36
17	063	COLLINS	6025	4	84	132.31	7	103.54
17	063	COLLINS	6025	5	85	136.03	7	110.25
17	077	GRAND TOWER	862	07	84	57.74	7	35.26
17	077	GRAND TOWER	862	08	80	52.66	13	94.62
17	077	GRAND TOWER	862	09	78	56.02	4	58.25
17	079	NEWTON	6017	1	0	0.00	999	0.00
17	079	NEWTON	6017	2	89	28.22	999	0.00
17	089	ROCKY ROAD POWER, LLC	55109	T1	86	261.58	999	0.00
17	089	ROCKY ROAD POWER, LLC	55109	T2	86	302.23	999	0.00
17	089	ROCKY ROAD POWER, LLC	55109	T3	0	0.00	999	0.00
17	097	WAUKEGAN	883	17	91	22.60	999	0.00
17	097	WAUKEGAN	883	7	83	38.18	2	32.86
17	097	WAUKEGAN	883	8	87	78.06	4	67.87
17	119	WOOD RIVER	898	1	81	199.17	-5	373.79

Table A-1 (continued)

FIPS State Code	FIPS County Code	Plant Name	ORIS Plant Code	Boiler ID	Increased NO_x Emissions Begin Occurring at and Above Maximum Daily Temperatures of: (°F)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)	Increased NO_x Emissions Begin Occurring at and Below Minimum Daily Temperatures of: (°F)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)
17	119	WOOD RIVER	898	2	81	240.88	-9	506.50
17	119	WOOD RIVER	898	3	86	206.45	-5	675.67
17	119	WOOD RIVER	898	4	89	30.49	999	0.00
17	119	WOOD RIVER	898	5	93	24.63	4	26.78
17	119	VENICE	913	1	79	237.93	-16	130.99
17	119	VENICE	913	2	80	242.49	-16	47.15
17	119	VENICE	913	3	80	245.39	2	225.62
17	119	VENICE	913	4	84	405.85	2	218.35
17	119	VENICE	913	5	80	223.64	4	188.58
17	119	VENICE	913	6	84	333.75	4	222.54
17	119	VENICE	913	7	80	303.88	-9	617.76
17	119	VENICE	913	8	83	351.56	999	0.00
17	125	HAVANA	891	1	78	193.00	-5	371.45
17	125	HAVANA	891	2	78	230.44	999	0.00
17	125	HAVANA	891	3	84	311.95	-5	92.09
17	125	HAVANA	891	4	84	396.80	999	0.00
17	125	HAVANA	891	5	87	303.70	-5	94.90
17	125	HAVANA	891	6	89	350.47	999	0.00
17	125	HAVANA	891	7	92	41.67	999	0.00
17	125	HAVANA	891	8	81	220.43	-9	331.66
17	125	HAVANA	891	9	100	21.69	999	0.00
17	127	JOPPA STEAM	887	1	92	34.25	0	26.95
17	127	JOPPA STEAM	887	2	92	22.29	999	0.00
17	127	JOPPA STEAM	887	3	92	20.06	999	0.00
17	127	JOPPA STEAM	887	4	0	0.00	999	0.00
17	127	JOPPA STEAM	887	5	0	0.00	999	0.00
17	127	JOPPA STEAM	887	6	0	0.00	999	0.00
17	135	COFFEEN	861	01	91	21.82	7	40.91

Table A-1 (continued)

FIPS State Code	FIPS County Code	Plant Name	ORIS Plant Code	Boiler ID	Increased NO_x Emissions Begin Occurring at and Above Maximum Daily Temperatures of: (°F)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)	Increased NO_x Emissions Begin Occurring at and Below Minimum Daily Temperatures of: (°F)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)
17	135	COFFEEN	861	02	91	32.95	4	32.21
17	137	MEREDOSIA	864	01	80	103.66	999	0.00
17	137	MEREDOSIA	864	02	83	91.61	4	56.29
17	137	MEREDOSIA	864	03	80	107.95	9	87.85
17	137	MEREDOSIA	864	04	80	116.13	5	92.29
17	137	MEREDOSIA	864	05	0	0.00	2	37.58
17	137	MEREDOSIA	864	06	80	245.64	999	0.00
17	143	E D EDWARDS	856	1	91	25.38	999	0.00
17	143	E D EDWARDS	856	2	0	0.00	4	22.24
17	143	E D EDWARDS	856	3	86	24.40	999	0.00
17	155	HENNEPIN	892	1	0	0.00	999	0.00
17	155	HENNEPIN	892	2	100	22.17	18	39.67
17	157	BALDWIN	889	1	84	33.28	999	0.00
17	157	BALDWIN	889	2	0	0.00	999	0.00
17	157	BALDWIN	889	3	90	30.28	999	0.00
17	167	DALLMAN	963	31	93	24.01	-9	23.75
17	167	DALLMAN	963	32	88	25.07	7	33.52
17	167	DALLMAN	963	33	93	35.80	-9	24.66
17	167	LAKESIDE	964	7	77	92.67	4	40.40
17	167	LAKESIDE	964	8	83	153.70	999	0.00
17	167	INTERSTATE	7425	1	76	130.38	-16	314.21
17	179	POWERTON	879	51	93	21.22	9	37.70
17	179	POWERTON	879	52	100	39.31	9	44.81
17	179	POWERTON	879	61	77	41.74	999	0.00
17	179	POWERTON	879	62	79	46.98	999	0.00
17	183	VERMILION	897	1	0	0.00	4	27.46
17	183	VERMILION	897	2	94	70.61	7	30.64
17	183	TILTON	7760	1	0	0.00	999	0.00

Table A-1 (continued)

FIPS State Code	FIPS County Code	Plant Name	ORIS Plant Code	Boiler ID	Increased NO_x Emissions Begin Occurring at and Above Maximum Daily Temperatures of: (°F)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)	Increased NO_x Emissions Begin Occurring at and Below Minimum Daily Temperatures of: (°F)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)
17	183	TILTON	7760	2	0	0.00	999	0.00
17	183	TILTON	7760	3	0	0.00	999	0.00
17	183	TILTON	7760	4	0	0.00	999	0.00
17	197	JOLIET 29	384	71	86	36.85	-16	45.96
17	197	JOLIET 29	384	72	88	24.57	0	25.91
17	197	JOLIET 29	384	81	92	26.60	-16	33.38
17	197	JOLIET 29	384	82	92	27.92	-16	36.99
17	197	JOLIET 9	874	5	0	0.00	999	0.00
17	197	WILL COUNTY	884	1	88	47.39	999	0.00
17	197	WILL COUNTY	884	2	83	43.73	999	0.00
17	197	WILL COUNTY	884	3	93	86.30	18	46.37
17	197	WILL COUNTY	884	4	93	82.70	4	81.17
17	197	ELWOOD ENERGY FACILITY	55199	1	80	236.75	999	0.00
17	197	ELWOOD ENERGY FACILITY	55199	2	80	220.66	999	0.00
17	197	ELWOOD ENERGY FACILITY	55199	3	84	189.90	999	0.00
17	197	ELWOOD ENERGY FACILITY	55199	4	84	196.96	999	0.00
17	199	MARION	976	1	89	77.75	17	78.06
17	199	MARION	976	2	85	65.78	999	0.00
17	199	MARION	976	3	91	81.94	4	53.33
17	199	MARION	976	4	0	0.00	4	28.52

Table A-2
Effect of Daily Maximum and Minimum Daily Temperature on NO_x Emissions
2000 Weekdays

FIPS State Code	FIPS County Code	Plant Name	ORIS Plant Code	Boiler ID	Increased NO_x Emissions Begin Occurring at and Above Maximum Daily Temperatures of: (ºF)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)	Increased NO_x Emissions Begin Occurring at and Below Minimum Daily Temperatures of: (ºF)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)
17	021	KINCAID	876	1	94	31.02	17	72.29
17	021	KINCAID	876	2	0	0.00	21	44.32
17	031	CRAWFORD	867	7	92	21.07	999	0.00
17	031	CRAWFORD	867	8	82	40.64	999	0.00
17	031	FISK	886	19	89	31.09	0	26.39
17	033	HUTSONVILLE	863	05	84	33.40	16	62.16
17	033	HUTSONVILLE	863	06	93	37.39	11	39.18
17	035	SHELBY ENERGY CENTER	55237	SCE1	79	183.98	999	0.00
17	035	SHELBY ENERGY CENTER	55237	SCE2	80	166.21	999	0.00
17	035	SHELBY ENERGY CENTER	55237	SCE3	80	266.52	999	0.00
17	035	SHELBY ENERGY CENTER	55237	SCE4	80	271.06	999	0.00
17	035	SHELBY ENERGY CENTER	55237	SCE5	75	182.26	999	0.00
17	035	SHELBY ENERGY CENTER	55237	SCE6	0	0.00	999	0.00
17	053	GIBSON CITY POWER PLANT	55201	GCTG 1	0	0.00	999	0.00
17	053	GIBSON CITY POWER PLANT	55201	GCTG 2	0	0.00	-4	69.55
17	057	DUCK CREEK	6016	1	89	27.14	-5	23.55
17	063	COLLINS	6025	1	78	158.15	-6	77.71
17	063	COLLINS	6025	2	83	132.28	999	0.00
17	063	COLLINS	6025	3	82	132.26	0	71.06
17	063	COLLINS	6025	4	79	138.67	999	0.00
17	063	COLLINS	6025	5	81	205.64	999	0.00
17	077	GRAND TOWER	862	07	83	55.41	999	0.00

Table A-2 (continued)

FIPS State Code	FIPS County Code	Plant Name	ORIS Plant Code	Boiler ID	Increased NO_x Emissions Begin Occurring at and Above Maximum Daily Temperatures of: (°F)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)	Increased NO_x Emissions Begin Occurring at and Below Minimum Daily Temperatures of: (°F)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)
17	077	GRAND TOWER	862	08	83	56.09	999	0.00
17	077	GRAND TOWER	862	09	81	56.20	999	0.00
17	079	NEWTON	6017	1	89	25.20	8	44.40
17	079	NEWTON	6017	2	89	21.38	13	42.09
17	089	ROCKY ROAD POWER, LLC	55109	T1	89	1639.69	999	0.00
17	089	ROCKY ROAD POWER, LLC	55109	T2	89	702.63	999	0.00
17	089	ROCKY ROAD POWER, LLC	55109	T3	89	1274.60	999	0.00
17	089	ROCKY ROAD POWER, LLC	55109	T4	89	884.62	999	0.00
17	097	WAUKEGAN	883	17	0	0.00	11	30.83
17	097	WAUKEGAN	883	7	82	34.47	999	0.00
17	097	WAUKEGAN	883	8	0	0.00	999	0.00
17	119	WOOD RIVER	898	1	80	202.50	999	0.00
17	119	WOOD RIVER	898	2	81	208.57	999	0.00
17	119	WOOD RIVER	898	3	81	313.54	999	0.00
17	119	WOOD RIVER	898	4	0	0.00	999	0.00
17	119	WOOD RIVER	898	5	88	20.39	999	0.00
17	119	VENICE	913	1	0	0.00	999	0.00
17	119	VENICE	913	2	0	0.00	999	0.00
17	119	VENICE	913	3	0	0.00	999	0.00
17	119	VENICE	913	4	0	0.00	999	0.00
17	119	VENICE	913	5	83	178.20	999	0.00
17	119	VENICE	913	6	83	205.01	999	0.00
17	119	VENICE	913	7	81	229.62	-5	512.46
17	119	VENICE	913	8	0	0.00	999	0.00
17	125	HAVANA	891	1	84	247.33	1	316.52
17	125	HAVANA	891	2	83	203.46	-4	35.23
17	125	HAVANA	891	3	81	183.88	1	376.88

Table A-2 (continued)

FIPS State Code	FIPS County Code	Plant Name	ORIS Plant Code	Boiler ID	Increased NO_x Emissions Begin Occurring at and Above Maximum Daily Temperatures of: (°F)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)	Increased NO_x Emissions Begin Occurring at and Below Minimum Daily Temperatures of: (°F)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)
17	125	HAVANA	891	4	88	101.27	-5	64.68
17	125	HAVANA	891	5	81	166.55	1	303.66
17	125	HAVANA	891	6	0	0.00	999	0.00
17	125	HAVANA	891	7	83	128.42	1	258.74
17	125	HAVANA	891	8	83	177.02	1	171.16
17	125	HAVANA	891	9	88	25.65	999	0.00
17	127	JOPPA STEAM	887	1	0	0.00	999	0.00
17	127	JOPPA STEAM	887	2	0	0.00	999	0.00
17	127	JOPPA STEAM	887	3	78	49.44	-7	43.18
17	127	JOPPA STEAM	887	4	0	0.00	999	0.00
17	127	JOPPA STEAM	887	5	88	21.89	999	0.00
17	127	JOPPA STEAM	887	6	84	21.43	999	0.00
17	127	MEPI GT FACILITY	7858	1	0	0.00	999	0.00
17	127	MEPI GT FACILITY	7858	2	85	340.89	999	0.00
17	127	MEPI GT FACILITY	7858	3	0	0.00	999	0.00
17	127	MEPI GT FACILITY	7858	4	85	299.52	999	0.00
17	127	MEPI GT FACILITY	7858	5	0	0.00	999	0.00
17	135	COFFEEN	861	01	89	36.92	999	0.00
17	135	COFFEEN	861	02	88	31.12	999	0.00
17	137	MEREDOSIA	864	01	89	44.33	999	0.00
17	137	MEREDOSIA	864	02	84	33.60	-2	32.28
17	137	MEREDOSIA	864	03	0	0.00	999	0.00
17	137	MEREDOSIA	864	04	0	0.00	-2	36.40
17	137	MEREDOSIA	864	05	86	24.06	8	33.91
17	137	MEREDOSIA	864	06	78	132.22	-5	365.69
17	143	E D EDWARDS	856	1	93	20.88	999	0.00
17	143	E D EDWARDS	856	2	89	29.97	999	0.00

Table A-2 (continued)

FIPS State Code	FIPS County Code	Plant Name	ORIS Plant Code	Boiler ID	Increased NO_x Emissions Begin Occurring at and Above Maximum Daily Temperatures of: (°F)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)	Increased NO_x Emissions Begin Occurring at and Below Minimum Daily Temperatures of: (°F)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)
17	143	E D EDWARDS	856	3	0	0.00	-1	26.44
17	145	PINCKNEYVILLE POWER PLANT	55202	CT01	0	0.00	999	0.00
17	145	PINCKNEYVILLE POWER PLANT	55202	CT02	0	0.00	999	0.00
17	145	PINCKNEYVILLE POWER PLANT	55202	CT03	0	0.00	999	0.00
17	145	PINCKNEYVILLE POWER PLANT	55202	CT04	0	0.00	999	0.00
17	155	HENNEPIN	892	1	0	0.00	-1	24.79
17	155	HENNEPIN	892	2	0	0.00	999	0.00
17	157	BALDWIN	889	1	92	28.80	-5	20.94
17	157	BALDWIN	889	2	70	57.15	0	47.74
17	157	BALDWIN	889	3	0	0.00	999	0.00
17	167	DALLMAN	963	31	89	32.29	-2	186.95
17	167	DALLMAN	963	32	0	0.00	-2	181.04
17	167	DALLMAN	963	33	0	0.00	8	41.43
17	167	LAKESIDE	964	7	72	61.63	999	0.00
17	167	LAKESIDE	964	8	80	58.78	0	90.55
17	167	INTERSTATE	7425	1	83	314.92	999	0.00
17	179	POWERTON	879	51	80	34.30	15	41.71
17	179	POWERTON	879	52	82	55.16	15	46.64
17	179	POWERTON	879	61	82	34.02	-1	21.38
17	179	POWERTON	879	62	84	27.12	999	0.00
17	183	VERMILION	897	1	0	0.00	-5	22.25
17	183	VERMILION	897	2	89	27.00	-7	35.76
17	183	TILTON	7760	1	81	132.73	999	0.00
17	183	TILTON	7760	2	81	110.40	-5	23.19
17	183	TILTON	7760	3	84	131.11	-2	73.90
17	183	TILTON	7760	4	81	118.20	999	0.00
17	197	JOLIET 29	384	71	80	37.74	999	0.00

Table A-2 (continued)

FIPS State Code	FIPS County Code	Plant Name	ORIS Plant Code	Boiler ID	Increased NO_x Emissions Begin Occurring at and Above Maximum Daily Temperatures of: (°F)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)	Increased NO_x Emissions Begin Occurring at and Below Minimum Daily Temperatures of: (°F)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)
17	197	JOLIET 29	384	72	82	22.29	1	65.46
17	197	JOLIET 29	384	81	86	25.76	999	0.00
17	197	JOLIET 29	384	82	0	0.00	999	0.00
17	197	JOLIET 9	874	5	83	56.19	1	31.99
17	197	WILL COUNTY	884	1	82	45.78	999	0.00
17	197	WILL COUNTY	884	2	79	31.06	999	0.00
17	197	WILL COUNTY	884	3	86	22.16	999	0.00
17	197	WILL COUNTY	884	4	80	30.38	999	0.00
17	197	ELWOOD ENERGY FACILITY	55199	1	80	205.03	999	0.00
17	197	ELWOOD ENERGY FACILITY	55199	2	80	195.85	999	0.00
17	197	ELWOOD ENERGY FACILITY	55199	3	79	110.06	0	145.76
17	197	ELWOOD ENERGY FACILITY	55199	4	79	90.95	-2	24.20
17	197	LINCOLN ENERGY CENTER	55222	CTG-1	89	3891.30	999	0.00
17	197	LINCOLN ENERGY CENTER	55222	CTG-2	89	3456.88	999	0.00
17	197	LINCOLN ENERGY CENTER	55222	CTG-3	85	654.02	999	0.00
17	197	LINCOLN ENERGY CENTER	55222	CTG-4	85	557.17	999	0.00
17	197	LINCOLN ENERGY CENTER	55222	CTG-5	88	1823.69	999	0.00
17	197	LINCOLN ENERGY CENTER	55222	CTG-6	88	1566.43	999	0.00
17	197	LINCOLN ENERGY CENTER	55222	CTG-7	84	594.91	999	0.00
17	197	LINCOLN ENERGY CENTER	55222	CTG-8	87	1443.44	999	0.00
17	199	MARION	976	1	88	25.13	4	41.67
17	199	MARION	976	2	0	0.00	-2	133.77
17	199	MARION	976	3	92	35.21	11	44.12
17	199	MARION	976	4	0	0.00	999	0.00
17	201	INDECK-ROCKFORD ENERGY	55238	0001	0	0.00	-4	1756.99
17	201	INDECK-ROCKFORD ENERGY	55238	0002	0	0.00	-4	2160.73

Table A-3
Effect of Daily Maximum and Minimum Daily Temperature on NO_x Emissions
1999 Weekends

FIPS State Code	FIPS County Code	Plant Name	ORIS Plant Code	Boiler ID	Increased NO_x Emissions Begin Occurring at and Above Maximum Daily Temperatures of: (ºF)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)	Increased NO_x Emissions Begin Occurring at and Below Minimum Daily Temperatures of: (ºF)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)
17	021	KINCAID	876	1	86	121.31	999	0.00
17	021	KINCAID	876	2	87	132.89	17	43.72
17	031	CRAWFORD	867	7	82	60.05	17	55.02
17	031	CRAWFORD	867	8	86	158.19	18	65.90
17	031	FISK	886	19	84	92.62	999	0.00
17	033	HUTSONVILLE	863	05	85	105.71	999	0.00
17	033	HUTSONVILLE	863	06	82	65.78	23	73.15
17	057	DUCK CREEK	6016	1	90	36.86	4	45.42
17	063	COLLINS	6025	1	86	448.95	999	0.00
17	063	COLLINS	6025	2	82	253.53	999	0.00
17	063	COLLINS	6025	3	85	340.74	4	50.92
17	063	COLLINS	6025	4	82	275.52	999	0.00
17	063	COLLINS	6025	5	87	573.93	999	0.00
17	077	GRAND TOWER	862	07	87	130.81	999	0.00
17	077	GRAND TOWER	862	08	92	104.69	8	101.66
17	077	GRAND TOWER	862	09	89	154.15	17	71.40
17	079	NEWTON	6017	1	0	0.00	999	0.00
17	079	NEWTON	6017	2	84	29.11	11	22.74
17	089	ROCKY ROAD POWER, LLC	55109	T1	92	785.35	999	0.00
17	089	ROCKY ROAD POWER, LLC	55109	T2	94	1710.58	999	0.00
17	089	ROCKY ROAD POWER, LLC	55109	T3	0	0.00	999	0.00
17	097	WAUKEGAN	883	17	85	41.45	999	0.00
17	097	WAUKEGAN	883	7	87	55.57	15	38.58
17	097	WAUKEGAN	883	8	87	68.73	18	29.95
17	119	WOOD RIVER	898	1	91	597.76	0	653.22
17	119	WOOD RIVER	898	2	91	773.53	999	0.00

Table A-3 (continued)

FIPS State Code	FIPS County Code	Plant Name	ORIS Plant Code	Boiler ID	Increased NO_x Emissions Begin Occurring at and Above Maximum Daily Temperatures of: (ºF)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)	Increased NO_x Emissions Begin Occurring at and Below Minimum Daily Temperatures of: (ºF)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)
17	119	WOOD RIVER	898	3	0	0.00	-4	842.74
17	119	WOOD RIVER	898	4	85	35.01	999	0.00
17	119	WOOD RIVER	898	5	0	0.00	11	29.27
17	119	VENICE	913	1	89	687.51	999	0.00
17	119	VENICE	913	2	89	689.28	999	0.00
17	119	VENICE	913	3	86	480.35	999	0.00
17	119	VENICE	913	4	87	450.84	999	0.00
17	119	VENICE	913	5	87	426.46	999	0.00
17	119	VENICE	913	6	89	580.55	4	43.10
17	119	VENICE	913	7	0	0.00	999	0.00
17	119	VENICE	913	8	94	549.72	999	0.00
17	125	HAVANA	891	1	94	3027.64	-4	923.26
17	125	HAVANA	891	2	94	2986.62	-4	977.09
17	125	HAVANA	891	3	94	2845.47	-4	1219.04
17	125	HAVANA	891	4	92	884.92	-4	2409.33
17	125	HAVANA	891	5	92	404.29	999	0.00
17	125	HAVANA	891	6	0	0.00	-4	3749.58
17	125	HAVANA	891	7	94	111.79	999	0.00
17	125	HAVANA	891	8	92	1203.69	-4	2993.05
17	125	HAVANA	891	9	87	40.48	999	0.00
17	127	JOPPA STEAM	887	1	91	24.83	0	25.43
17	127	JOPPA STEAM	887	2	0	0.00	999	0.00
17	127	JOPPA STEAM	887	3	0	0.00	999	0.00
17	127	JOPPA STEAM	887	4	0	0.00	999	0.00
17	127	JOPPA STEAM	887	5	0	0.00	999	0.00
17	127	JOPPA STEAM	887	6	0	0.00	999	0.00
17	135	COFFEEN	861	01	0	0.00	-4	61.00
17	135	COFFEEN	861	02	86	25.53	17	32.69
17	137	MEREDOSIA	864	01	89	390.97	999	0.00

Table A-3 (continued)

FIPS State Code	FIPS County Code	Plant Name	ORIS Plant Code	Boiler ID	Increased NO_x Emissions Begin Occurring at and Above Maximum Daily Temperatures of: (ºF)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)	Increased NO_x Emissions Begin Occurring at and Below Minimum Daily Temperatures of: (ºF)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)
17	137	MEREDOSIA	864	02	84	187.62	4	35.44
17	137	MEREDOSIA	864	03	89	311.67	4	52.29
17	137	MEREDOSIA	864	04	84	210.12	4	58.28
17	137	MEREDOSIA	864	05	0	0.00	15	41.42
17	137	MEREDOSIA	864	06	91	1078.66	999	0.00
17	143	E D EDWARDS	856	1	90	33.79	999	0.00
17	143	E D EDWARDS	856	2	92	30.36	-4	50.75
17	143	E D EDWARDS	856	3	85	30.50	999	0.00
17	155	HENNEPIN	892	1	0	0.00	999	0.00
17	155	HENNEPIN	892	2	93	22.87	20	43.07
17	157	BALDWIN	889	1	85	38.67	999	0.00
17	157	BALDWIN	889	2	0	0.00	999	0.00
17	157	BALDWIN	889	3	94	39.14	0	39.74
17	167	DALLMAN	963	31	86	27.96	-4	22.67
17	167	DALLMAN	963	32	89	39.39	11	33.03
17	167	DALLMAN	963	33	93	45.41	999	0.00
17	167	LAKESIDE	964	7	87	173.18	0	157.16
17	167	LAKESIDE	964	8	81	109.87	999	0.00
17	167	INTERSTATE	7425	1	94	2434.94	999	0.00
17	179	POWERTON	879	51	85	28.10	4	66.90
17	179	POWERTON	879	52	89	27.49	17	39.17
17	179	POWERTON	879	61	87	75.25	999	0.00
17	179	POWERTON	879	62	87	70.18	999	0.00
17	183	VERMILION	897	1	91	30.52	20	49.61
17	183	VERMILION	897	2	82	25.68	22	66.33
17	183	TILTON	7760	1	0	0.00	999	0.00
17	183	TILTON	7760	2	0	0.00	999	0.00
17	183	TILTON	7760	3	0	0.00	999	0.00
17	183	TILTON	7760	4	0	0.00	999	0.00

Table A-3 (continued)

FIPS State Code	FIPS County Code	Plant Name	ORIS Plant Code	Boiler ID	Increased NO_x Emissions Begin Occurring at and Above Maximum Daily Temperatures of: (ºF)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)	Increased NO_x Emissions Begin Occurring at and Below Minimum Daily Temperatures of: (ºF)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)
17	197	JOLIET 29	384	71	85	32.41	999	0.00
17	197	JOLIET 29	384	72	0	0.00	0	20.98
17	197	JOLIET 29	384	81	82	36.59	999	0.00
17	197	JOLIET 29	384	82	81	30.15	999	0.00
17	197	JOLIET 9	874	5	92	29.84	4	33.00
17	197	WILL COUNTY	884	1	0	0.00	999	0.00
17	197	WILL COUNTY	884	2	82	59.25	999	0.00
17	197	WILL COUNTY	884	3	90	42.64	18	33.13
17	197	WILL COUNTY	884	4	89	79.00	22	64.52
17	197	ELWOOD ENERGY FACILITY	55199	1	87	357.06	999	0.00
17	197	ELWOOD ENERGY FACILITY	55199	2	87	507.11	999	0.00
17	197	ELWOOD ENERGY FACILITY	55199	3	89	654.58	999	0.00
17	197	ELWOOD ENERGY FACILITY	55199	4	87	482.26	999	0.00
17	199	MARION	976	1	87	82.13	8	85.13
17	199	MARION	976	2	87	138.69	999	0.00
17	199	MARION	976	3	94	174.13	20	113.81
17	199	MARION	976	4	0	0.00	4	22.41

Table A-4
Effect of Daily Maximum and Minimum Daily Temperature on NO_x Emissions
2000 Weekends

FIPS State Code	FIPS County Code	Plant Name	ORIS Plant Code	Boiler ID	Increased NO_x Emissions Begin Occurring at and Above Maximum Daily Temperatures of: (ºF)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)	Increased NO_x Emissions Begin Occurring at and Below Minimum Daily Temperatures of: (ºF)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)
17	021	KINCAID	876	1	86	44.39	27	80.25
17	021	KINCAID	876	2	0	0.00	27	67.92
17	031	CRAWFORD	867	7	82	31.20	5	23.45
17	031	CRAWFORD	867	8	84	80.90	999	0.00
17	031	FISK	886	19	81	24.47	5	35.81
17	033	HUTSONVILLE	863	05	78	69.76	25	131.46
17	033	HUTSONVILLE	863	06	86	102.59	28	80.20
17	053	GIBSON CITY POWER PLANT	55201	GCTG2	0	0.00	999	0.00
17	057	DUCK CREEK	6016	1	84	32.39	999	0.00
17	063	COLLINS	6025	1	80	371.55	999	0.00
17	063	COLLINS	6025	2	78	267.97	999	0.00
17	063	COLLINS	6025	3	82	220.86	0	230.23
17	063	COLLINS	6025	4	82	342.26	999	0.00
17	063	COLLINS	6025	5	82	386.60	999	0.00
17	077	GRAND TOWER	862	07	80	104.38	999	0.00
17	077	GRAND TOWER	862	08	80	119.70	999	0.00
17	077	GRAND TOWER	862	09	77	68.41	999	0.00
17	079	NEWTON	6017	1	88	28.60	13	38.60
17	079	NEWTON	6017	2	86	22.51	27	45.20
17	089	ROCKY ROAD POWER, LLC	55109	T4	0	0.00	999	0.00
17	097	WAUKEGAN	883	17	88	20.20	8	39.24
17	097	WAUKEGAN	883	7	79	35.32	999	0.00
17	097	WAUKEGAN	883	8	89	23.97	-2	24.58
17	119	WOOD RIVER	898	1	0	0.00	999	0.00
17	119	WOOD RIVER	898	2	89	277.78	999	0.00
17	119	WOOD RIVER	898	3	0	0.00	999	0.00

Table A-4 (continued)

FIPS State Code	FIPS County Code	Plant Name	ORIS Plant Code	Boiler ID	Increased NO_x Emissions Begin Occurring at and Above Maximum Daily Temperatures of: (ºF)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)	Increased NO_x Emissions Begin Occurring at and Below Minimum Daily Temperatures of: (ºF)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)
17	119	WOOD RIVER	898	4	89	276.50	999	0.00
17	119	WOOD RIVER	898	5	83	33.19	22	34.61
17	119	VENICE	913	1	0	0.00	999	0.00
17	119	VENICE	913	3	0	0.00	999	0.00
17	119	VENICE	913	4	0	0.00	999	0.00
17	119	VENICE	913	5	86	1982.96	999	0.00
17	119	VENICE	913	6	86	1935.88	999	0.00
17	119	VENICE	913	7	86	2033.23	999	0.00
17	125	HAVANA	891	2	0	0.00	999	0.00
17	125	HAVANA	891	4	0	0.00	999	0.00
17	125	HAVANA	891	5	0	0.00	999	0.00
17	125	HAVANA	891	6	0	0.00	999	0.00
17	125	HAVANA	891	7	0	0.00	0	498.93
17	125	HAVANA	891	8	0	0.00	0	3733.33
17	125	HAVANA	891	9	86	54.61	13	36.44
17	127	JOPPA STEAM	887	1	0	0.00	999	0.00
17	127	JOPPA STEAM	887	2	82	20.43	999	0.00
17	127	JOPPA STEAM	887	3	76	47.96	-2	50.99
17	127	JOPPA STEAM	887	4	82	25.31	999	0.00
17	127	JOPPA STEAM	887	5	80	21.29	999	0.00
17	127	JOPPA STEAM	887	6	80	22.50	999	0.00
17	127	MEPI GT FACILITY	7858	1	0	0.00	999	0.00
17	127	MEPI GT FACILITY	7858	2	86	2015.46	999	0.00
17	127	MEPI GT FACILITY	7858	4	92	10505.26	999	0.00
17	135	COFFEEN	861	01	83	29.73	20	36.10
17	135	COFFEEN	861	02	85	56.90	29	48.08
17	137	MEREDOSIA	864	01	83	109.87	999	0.00
17	137	MEREDOSIA	864	02	78	136.90	0	421.44
17	137	MEREDOSIA	864	03	84	73.58	6	176.16

Table A-4 (continued)

FIPS State Code	FIPS County Code	Plant Name	ORIS Plant Code	Boiler ID	Increased NO_x Emissions Begin Occurring at and Above Maximum Daily Temperatures of: (ºF)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)	Increased NO_x Emissions Begin Occurring at and Below Minimum Daily Temperatures of: (ºF)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)
17	137	MEREDOSIA	864	04	83	97.60	8	183.42
17	137	MEREDOSIA	864	05	86	35.02	10	37.79
17	137	MEREDOSIA	864	06	85	830.51	999	0.00
17	143	E D EDWARDS	856	1	86	22.39	999	0.00
17	143	E D EDWARDS	856	2	86	30.52	999	0.00
17	143	E D EDWARDS	856	3	92	49.52	17	31.97
17	145	PINCKNEYVILLE POWER PLANT	55202	CT01	86	2011.30	999	0.00
17	155	HENNEPIN	892	1	0	0.00	999	0.00
17	155	HENNEPIN	892	2	0	0.00	999	0.00
17	157	BALDWIN	889	1	84	20.59	999	0.00
17	157	BALDWIN	889	2	74	72.52	8	30.39
17	157	BALDWIN	889	3	0	0.00	999	0.00
17	167	DALLMAN	963	31	84	25.20	6	156.42
17	167	DALLMAN	963	32	0	0.00	6	142.69
17	167	DALLMAN	963	33	0	0.00	10	45.09
17	167	LAKESIDE	964	7	83	106.05	999	0.00
17	167	LAKESIDE	964	8	86	147.98	13	97.46
17	167	INTERSTATE	7425	1	0	0.00	999	0.00
17	179	POWERTON	879	51	85	81.52	13	47.58
17	179	POWERTON	879	52	85	76.92	13	51.66
17	179	POWERTON	879	61	77	45.50	-2	38.89
17	179	POWERTON	879	62	83	35.69	0	32.11
17	183	VERMILION	897	1	0	0.00	6	29.32
17	183	VERMILION	897	2	80	25.81	999	0.00
17	183	TILTON	7760	1	88	2550.00	999	0.00
17	183	TILTON	7760	3	88	2507.50	999	0.00
17	183	TILTON	7760	4	88	2570.00	999	0.00
17	197	JOLIET 29	384	71	76	39.63	999	0.00
17	197	JOLIET 29	384	72	79	28.91	0	37.32

Table A-4 (continued)

FIPS State Code	FIPS County Code	Plant Name	ORIS Plant Code	Boiler ID	Increased NO_x Emissions Begin Occurring at and Above Maximum Daily Temperatures of: (ºF)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)	Increased NO_x Emissions Begin Occurring at and Below Minimum Daily Temperatures of: (ºF)	Average Increase in NO_x Emissions Above Daily Average at these Maximum Daily Temperatures (%)
17	197	JOLIET 29	384	81	82	28.76	0	20.67
17	197	JOLIET 29	384	82	88	25.32	999	0.00
17	197	JOLIET 9	874	5	78	63.23	5	29.60
17	197	WILL COUNTY	884	1	77	49.57	999	0.00
17	197	WILL COUNTY	884	2	82	37.88	999	0.00
17	197	WILL COUNTY	884	3	85	23.96	999	0.00
17	197	WILL COUNTY	884	4	77	39.46	999	0.00
17	197	ELWOOD ENERGY FACILITY	55199	2	0	0.00	999	0.00
17	197	ELWOOD ENERGY FACILITY	55199	3	84	523.70	999	0.00
17	197	ELWOOD ENERGY FACILITY	55199	4	84	666.24	999	0.00
17	199	MARION	976	1	86	45.33	16	58.59
17	199	MARION	976	2	88	33.40	10	123.47
17	199	MARION	976	3	89	52.68	6	80.50
17	199	MARION	976	4	82	24.79	999	0.00
17	201	INDECK-ROCKFORD ENERGY	55238	0001	0	0.00	999	0.00
17	201	INDECK-ROCKFORD ENERGY	55238	0002	0	0.00	999	0.00