



NARSTO Emission Inventory Workshop: Innovative Methods for Emissions Inventory Development and Evaluation

October 14-17, 2003

University of Texas, Austin

Texas Commission on Environmental Quality



This Presentation: Incorporating Boiler-Level Data from EPA's Acid Rain Program into a Modeling Emission Inventory

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Texas Commission on Environmental Quality

Outline

- Abstract
- Background
- Use and Procedures
 - ▶ Historical
 - ▶ Current
 - ▶ Future
- Issues

Abstract

- Improve Ozone-Season EI of Power Plants for Modeling Purposes
- Incorporate hourly CEM data from ARP
- Used in Texas SIP since 1998
- Evolution of data availability
- Cross-reference generation for ARP to state and national EIs
- Boiler and stack configurations
- QA
- New sources of data

Background

- Modeling Need
 - ▶ Improve temporal allocation
 - ▶ Improve emissions quantity allocation
- EI QA tool (ARP Scorecard)
- Data Available
 - ▶ NEI (National Emission Inventory database)
 - Tables: Site, Emission Unit, Emission Release Point, Emission Period, and Emissions (pollutant and rate)
 - ▶ State EIs (periodic or sub-periodic submittals)
 - ▶ ARPDB (required by Title IV of CAAA of 1990)
 - EDR (Electronic Data Reporting) format
 - Record codes, column-specific
 - Changing options with successive versions
 - Year, Month, Date, Hour
 - NO_x, CO₂, SO₂ hourly rates
 - Heat Input (MMBtu/hr), Operating time, etc.

EDR Excerpts

File Name = 07325SS2.3RD

10000732532000V2.1

102SAN JACINTO SES TX0918946 TX0001519560 COGENERATION 4911TX201 2930000945430

201SJS2 210N2000070100 9.401

201SJS2 210N2000070101 9.501

201SJS2 210N2000070102 9.501

201SJS2 210N2000070103 9.501

201SJS2 210N2000070104 9.501

201SJS2 210N2000070105 9.501

File Name = 550982.3RD

10005509832000V2.1

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1012 NOXCONC2012143

1012 NOXRATE3202187

1012 OPERATN3002208

1012 QTRSUMM301 1

1012 SO2MASS3142186

102FRONTERA 0000088003084821500084 ELECTRIC UTILITY 4911TX215 2612300982348

2012 A2121100070100 6.301

2012 A2121100070101 5.901

Historical

- 1998 Texas SIP Revision
 - ▶ SAS datasets (Henry Clarius, EPA)
 - ▶ 1995-96 ozone episodes for DFW
 - ▶ QA with TXU
 - data substitutions
 - we created a cap
- Creating the Texas Cross-Reference (xref) file
 - ▶ From Texas PSDB parameters to ARP ORIS/BLRID
- Processing Raw Hourly boiler data on stack basis for Texas

Excerpt from Texas xref file

ORISN	BLRID	STACKCONFIG	FIPS	PLANT	STACK	POINT	FIN	EPN	PLNAME	ACCOUNT	COUNTY	OWNER	AREA
3517			48441	2	1	1	ACCTSUM	ACCTSUM	Abilene	TB0056E	TAYLOR	WTU	WTX
55173	CT1								Acadia Power				
55173	CT2								Acadia Power				
55173	CT3								Acadia Power				
55173	CT4								Acadia Power				
			48221						AES Aurora		HOOD		ETX
			48221						AES Aurora		HOOD		ETX
			48009						Archer Power		ARCHER		WTX
			48009						Archer Power		ARCHER		WTX
			48009						Archer Power		ARCHER		WTX
			48009						Archer Power		ARCHER		WTX
55167	GEN1								Augusta Pines				
55167	GEN2								Augusta Pines				
			48157						Avista-Steag		FORT BEND		HG
			48157						Avista-Steag		FORT BEND		HG
			48157						Avista-Steag		FORT BEND		HG
			48157						Avista-Steag		FORT BEND		HG
4939	1		48355	47	2	2	BMD1	1	Barney M. Davis	NE0024E	NUECES	CPL	CC
4939	2		48355	47	3	3	BMD2	2	Barney M. Davis	NE0024E	NUECES	CPL	CC
10298	CG801								Bayport Cogen				
10298	CG802								Bayport Cogen				
10298	CG803								Bayport Cogen				
10298	CG804								Bayport Cogen				
55175	CT-1		48027						Bell Energy		BELL	DE	ETX
55175	CT-2		48027						Bell Energy		BELL	DE	ETX
3497	1		48161	2	10	10	B1	50	Big Brown	FI0020W	FREESTONE	TXU	ETX
3497	2		48161	2	11	11	B2	51	Big Brown	FI0020W	FREESTONE	TXU	ETX
55064	001	MS1A, MS1B	48233	41	3	3	UNIT 1	EPN1-1	Blackhawk Station	HW0081I	HUTCHINSO	SPS	WTX
55064	002	MS2A, MS2B	48233	41	4	5	UNIT 2	EPN2-1	Blackhawk Station	HW0081I	HUTCHINSO	SPS	WTX
			48167						BP Amoco		GALVESTON		HG
			48167						BP Amoco		GALVESTON		HG
			48167						BP Amoco		GALVESTON		HG
3561	6		48041	1	3	3	6	9	Bryan	BM0010I	BRAZOS	BTU	ETX
3574	BW5		48113	7	4	4	BOILER-BW5	STACK-BW5	C E Newman	DB0384A	DALLAS	GMPL	DFW

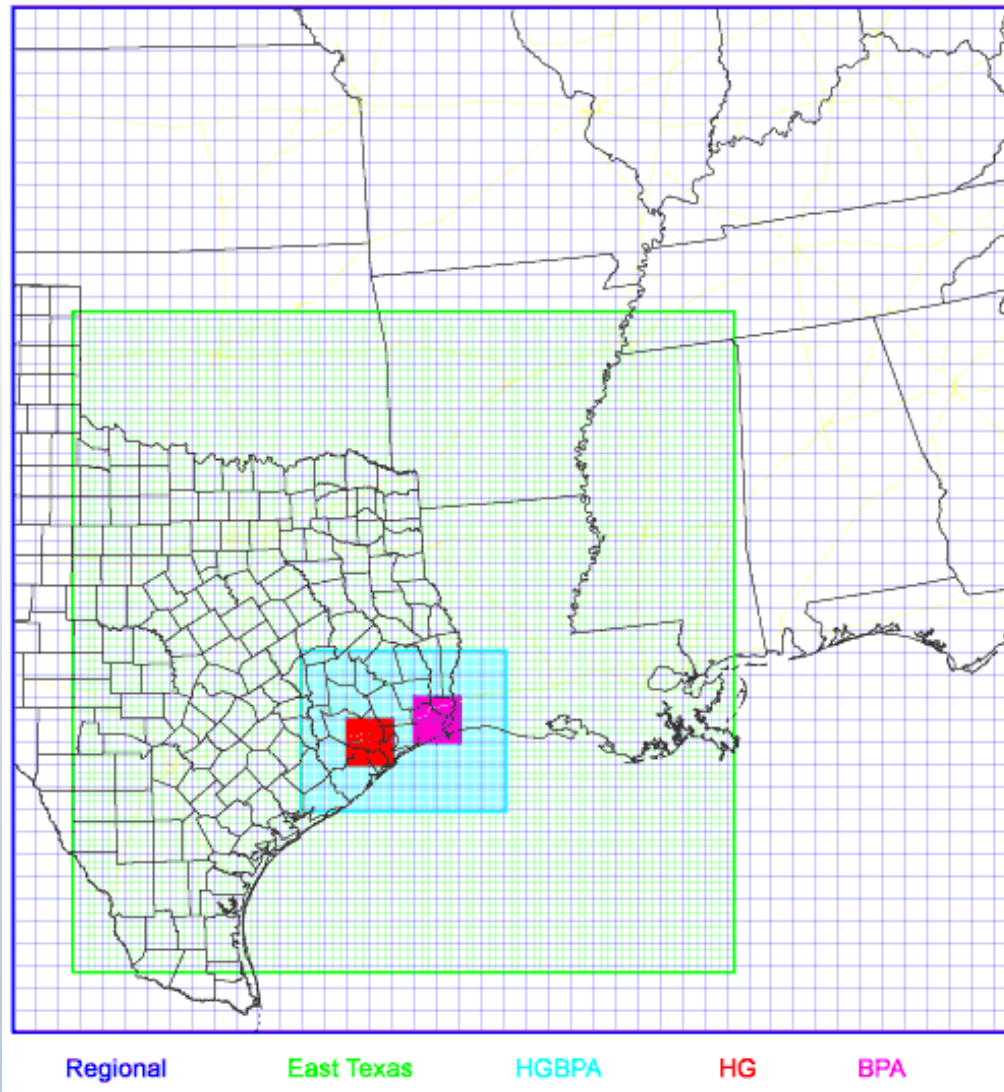
Excerpt from Resultant AFS Modeling file after incorporation of Hourly ARP data

```
B 00 00 AC 48157 HG 4911 10100222 0005 0018 014 S 00081500 00081501 423.3336 -  
1139.5708 152.4 6.707 416 25.3 21 26 28 25 24 0 7 8736 42603 1.05453 FG0020V 8  
WAP8 W A Parish P RELIANT ENERGY INC FORT BEND ARCOLA NOx E Pt ST 08/27/2001 ARP  
B 00 00 AC 48157 HG 4911 10100222 0005 0018 014 S 00081501 00081502 423.3336 -  
1139.5708 152.4 6.707 416 25.3 21 26 28 25 24 0 7 8736 42603 1.06251 FG0020V 8  
WAP8 W A Parish P RELIANT ENERGY INC FORT BEND ARCOLA NOx E Pt ST 08/27/2001 ARP  
B 00 00 AC 48157 HG 4911 10100222 0005 0018 014 S 00081502 00081503 423.3336 -  
1139.5708 152.4 6.707 416 25.3 21 26 28 25 24 0 7 8736 42603 1.14134 FG0020V 8  
WAP8 W A Parish P RELIANT ENERGY INC FORT BEND ARCOLA NOx E Pt ST 08/27/2001 ARP  
B 00 00 AC 48157 HG 4911 10100222 0005 0018 014 S 00081503 00081504 423.3336 -  
1139.5708 152.4 6.707 416 25.3 21 26 28 25 24 0 7 8736 42603 1.14977 FG0020V 8  
WAP8 W A Parish P RELIANT ENERGY INC FORT BEND ARCOLA NOx E Pt ST 08/27/2001 ARP  
B 00 00 AC 48157 HG 4911 10100222 0005 0018 014 S 00081504 00081505 423.3336 -  
1139.5708 152.4 6.707 416 25.3 21 26 28 25 24 0 7 8736 42603 1.16661 FG0020V 8  
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B 00 00 AC 48157 HG 4911 10100222 0005 0018 014 S 00081505 00081506 423.3336 -  
1139.5708 152.4 6.707 416 25.3 21 26 28 25 24 0 7 8736 42603 1.13224 FG0020V 8  
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1139.5708 152.4 6.707 416 25.3 21 26 28 25 24 0 7 8736 42603 1.14653 FG0020V 8  
WAP8 W A Parish P RELIANT ENERGY INC FORT BEND ARCOLA NOx E Pt ST 08/27/2001 ARP  
B 00 00 AC 48157 HG 4911 10100222 0005 0018 014 S 00081507 00081508 423.3336 -  
1139.5708 152.4 6.707 416 25.3 21 26 28 25 24 0 7 8736 42603 1.15945 FG0020V 8  
WAP8 W A Parish P RELIANT ENERGY INC FORT BEND ARCOLA NOx E Pt ST 08/27/2001 ARP
```

Historical (continued)

- 2001 Near-Nonattainment Modeling (1999 Episode) and December 2002 SIP Revision
 - ▶ Expand the ARP modeling domain to include:
 - ▶ Louisiana
 - Create Louisiana ARP-to-stateEI xref
 - Process all Louisiana hourly
 - ▶ “Regional” States
 - Create “Regional” ARP-to-NET xref
 - Process all 750+ MW units in entire regional domain

SIP Modeling Domain



Excerpt from Louisiana xref file

ORISN	BLRID	STACKCONFIG	PLNAME	PARISH	ID	FIPS	PLANT	STACK	POINT	LANAME	topSCC	NumStks	NumSCCs
1407	3		A B Paterson	2140	15	22071	15	1	3	ENTERGY NO/A.B. PATERSON	10100601	1	3
1407	4		A B Paterson	2140	15	22071	15	2	4	ENTERGY NO/A.B. PATERSON	10100601	1	3
1416	5A		Arsenal Hill	500	8	22017	8	1	1	AMERICAN ELECTRIC PWR/AR	10100604	1	1
1464	1B1		Big Cajun 1	2260	10	22077	10	1	1	LA GENERATING LLC/BIG CAJU	10100601	1	2
1464	1B2		Big Cajun 1	2260	10	22077	10	2	2	LA GENERATING LLC/BIG CAJU	10100601	1	2
6055	2B1		Big Cajun 2	2260	5	22077	5	1	1	LA GENERATING LLC/BIG CAJU	10100202	1	2
6055	2B2		Big Cajun 2	2260	5	22077	5	2	2	LA GENERATING LLC/BIG CAJU	10100202	1	2
6055	2B3		Big Cajun 2	2260	5	22077	5	3	3	LA GENERATING LLC/BIG CAJU	10100202	1	2
55165	GTG1		Calcasieu Power,	520	219	22019	219	1	0C1	Calcasieu Power	20100201	1	1
6558	3		D G Hunter	2360	3	22079	3	1	3	CITY OF ALEXANDRIA/D.G. HUN	10100601	1	1
6558	4		D G Hunter	2360	3	22079	3	2	4	CITY OF ALEXANDRIA/D.G. HUN	10100601	1	1
1443	1		Doc Bonin	1520	2	22055	2	1	1	CITY OF LAFAYETTE/BONIN ST	10100601	1	2
1443	2		Doc Bonin	1520	2	22055	2	2	2	CITY OF LAFAYETTE/BONIN ST	10100604	1	2
1443	3		Doc Bonin	1520	2	22055	2	3	3	CITY OF LAFAYETTE/BONIN ST	10100601	1	2
51	1		Dolet Hills	760	1	22031	1	1	1	CLECO CORP/DOLET HILLS PO	10100301	1	1
1396	6-1	MS6A, MS6AA	Evangeline (Cougl	920	2	22039	2	2	16	CLECO EVANGELINE LLC/COU	20100209	1	1
1396	7-1	MS7A, MS7AA	Evangeline (Cougl	920	2	22039	2	3	17	CLECO EVANGELINE LLC/COU	20100209	1	1
1396	7-2	MS7B, MS7BB	Evangeline (Cougl	920	2	22039	2	4	18	CLECO EVANGELINE LLC/COU	20100209	1	1
1439	15		Houma	2880	19	22109	19	2	2	TERREBONNE PAR CONSOLID/	10100601	1	1
1439	16		Houma	2880	19	22109	19	3	3	TERREBONNE PAR CONSOLID/	10100601	1	1
1417	3		Lieberman	500	7	22017	7	3	3	AMERICAN ELECTRIC POWER/	10100604	1	3
1417	4		Lieberman	500	7	22017	7	4	4	AMERICAN ELECTRIC POWER/	10100601	1	1
1402	1		Little Gypsy	2520	9	22089	9	1	1	ENTERGY LA/LITTLE GYPSY	10100601	2	2
1402	1		Little Gypsy	2520	9	22089	9	2	2	ENTERGY LA/LITTLE GYPSY	10100601	2	2
1402	2		Little Gypsy	2520	9	22089	9	3	3	ENTERGY LA/LITTLE GYPSY	10100601	2	2
1402	2		Little Gypsy	2520	9	22089	9	4	4	ENTERGY LA/LITTLE GYPSY	10100601	2	2
1402	3		Little Gypsy	2520	9	22089	9	5	5	ENTERGY LA/LITTLE GYPSY	10100601	1	2
1391	1A		Louisiana 1	840	181	22033	181	1	1	ENTERGY GS/LA STN 1	10100701	1	3
1391	2A		Louisiana 1	840	181	22033	181	2	2	ENTERGY GS/LA STN 1	10100701	1	3


Excerpt from Regional xref file

ORISN	BLRID	STACKCONFIG	PLNAME	STATE	FIPS	PLANT	STACK	POINT	topSCC
47	1	CSCO14	COLBERT	AL	01033	10	1	1	10100202
47	2	CSCO14	COLBERT	AL	01033	10	1	2	10100202
47	3	CSCO14	COLBERT	AL	01033	10	1	3	10100202
47	4	CSCO14	COLBERT	AL	01033	10	1	4	10100202
47	5		COLBERT	AL	01033	10	1	5	10100202
10	1		GREENE COUNTY	AL	01063	1	1	1	10100202
10	MS2A		GREENE COUNTY	AL	01063	1	1	2	10100202
10	MS2B		GREENE COUNTY	AL	01063	1	1	2	10100202
50	1	CSWC16	WIDOWS CREEK	AL	01071	8	1	1	10100202
50	2	CSWC16	WIDOWS CREEK	AL	01071	8	1	2	10100202
50	3	CSWC16	WIDOWS CREEK	AL	01071	8	1	3	10100202
50	4	CSWC16	WIDOWS CREEK	AL	01071	8	1	4	10100202
50	5	CSWC16	WIDOWS CREEK	AL	01071	8	1	5	10100202
50	6	CSWC16	WIDOWS CREEK	AL	01071	8	1	6	10100202
50	7		WIDOWS CREEK	AL	01071	8	1	7	10100212
50	8		WIDOWS CREEK	AL	01071	8	1	8	10100212
6002	3		JAMES H MILLER J	AL	01073	11	1	003	10100222
6002	1		JAMES H MILLER J	AL	01073	11	1	1	10100202
6002	2		JAMES H MILLER J	AL	01073	11	1	2	10100202
6002	4		JAMES H MILLER J	AL	01073	11	1	4	10100222
3	1	CS0AAN	BARRY	AL	01097	1001	1	1	10100212
3	2	CS0AAN	BARRY	AL	01097	1001	1	2	10100212
3	3	CS0AAN	BARRY	AL	01097	1001	1	3	10100212
3	MS4A	MS4A, MS4B	BARRY	AL	01097	1001	1	4A	10100212
3	MS4B	MS4A, MS4B	BARRY	AL	01097	1001	1	4B	10100212
3	MS5A	MS5A, MS5B	BARRY	AL	01097	1001	1	5A	10100212
3	MS5B	MS5A, MS5B	BARRY	AL	01097	1001	1	5B	10100212

Current

- Availability of EPA “Prepackaged” hourly boiler-level data
 - ▶ Not the easiest data to find, but handy once you find it
 - ▶ <http://www.epa.gov/airmarkets/> then link on left “Data and Maps” takes you to <http://cfpub.epa.gov/gdm/> then click on “Download [Hourly Emissions Data](#) by State, quarter and year” link
 - ▶ .csv (comma-delimited) files
 - ▶ Can be used with MS-Access or Perl scripts for joins
 - ▶ We still use SAS for the merges, on a stack-basis
- Xref now exists within NEI
 - ▶ ORIS in Site Table of NEI
 - ▶ BLRID in Emission Unit Table of NEI
 - ▶ Warning: NEI point identifiers can vary from year to year

Screen capture



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Data Caveats

U.S. Environmental Protection Agency

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Prepackaged Data

Use this page to download compressed files containing hourly emissions data by state and quarter. These comma-delimited (.csv) files are grouped by state, year, and quarter.

Step 1: Specify the states and years of data you wish to download.

If you do not know the state in which a particular facility is located, use the [facility finder](#) below.

State(s)	Year(s)
<input type="text" value="Tennessee"/> <input type="text" value="Texas"/> <input type="text" value="Utah"/>	Use Control key to select multiple items: <input type="text" value="2001"/> <input type="text" value="2000"/> <input type="text" value="1999"/>

Display List

Current (continued)

- Prepackaged available for 1997-2001
- TCEQ QA of the prepackaged data
 - ▶ May not contain all files of 1995 thru present
 - ▶ General agreement with raw
 - ▶ A few hours for a few units in raw files that are not in csv files, and vice versa
- Can still download the raw files
 - ▶ <http://www.epa.gov/airmarkets/emissions/raw/index.html>
 - ▶ Cumbersome DOS Explode program
 - ▶ EDR format

Future

- RPO data exchange format
 - ▶ Thanks to Mark Janssen at LADCO/Midwest RPO
 - ▶ Common database for all modelers of EIs
 - ▶ EPA committed to putting hourly CEM data into this format
- SMOKE reportedly does this hourly CEM data incorporation already

Issues

- EPA data-filling/substitution procedures
- EPA QA procedures on raw data
- Evolving EDR document
- Common-stacks and Multi-stacks
- Can we make other utility emissions follow those captured by ARP?
- Would be nice to have similar info available from Mexican utilities
- How to project this data into the future