Review of Residential Wood Combustion Data for Mid-Atlantic & New England States

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How Important is RWC Data?

- **48** Million woodburning appliances in U.S.
- Virtually all RWC particles are < 2.5 micrograms
- Air Toxic inventories
- Area Source Inventories "The Final Frontier"

Fundamental Fact of Emission Inventories

(Activity) X (Emission Factors) = Total Emissions RWC

The Challenges for RWC--Many different types of appliances Usage very diffuse in total population Volume measure "a cord of wood" – Inherently Imprecise

Consumers think in terms of "Wet basis"-AP-42 is calculated in "Dry basis"

Applicability of MANE-VU Survey to State & Local Levels

- Recent
- **Targeted RWC**
- **Results have received wide exposure**
- Especially illustrative of challenges with using regional data in state & local areas
- **Basic Problem for all El efforts**

Modest resources (NO \$)

MANE-VU's Novel Approach

Problem – Sample 11 states & D.C. -24.9 Million Households-

Solution – 24 test matrix cells based on: Degree Days - Northern/Southern Density - Urban/Suburban Wood availability - Forested/unforested Housing types- single/multifamily

We Test Results against other surveys

3 state surveys:

Delaware Vermont Maine

Pittsburgh NAA - Information from 3 National Surveys

Table 1A - # of survey responses & HH's for each state

State or Area	HHs in Area	# Survey Responses	# RWC HH's Surveyed
Connecticut	1,385,361	74	12
Delaware	342,437	35	2
DC	274,561	4	2
Maine	650,090	186	45
Maryland	2,144,554	201	45
Massachusetts	2,621,366	127	23
New Hampshire	546,239	83	15
New Jersey	3,309,488	115	21

Table 1B - # of survey responses & HH's for each state

State or Area	# HH's in Area	# survey Responses	# RWC HH's Surveyed
New York	7,673,327	550	79
Pennsylvania	5,245,052	449	85
Rhode Island	439,713	24	7
Vermont	293,708	57	12
Total	24,925,896	1905	348
Pittsburgh NAA	906,531	47	11

"Cord" – A 4 Letter Word!

Few people understand concept

Word has different meanings in Different Regions of North America

(Bush Cord- Face Cord, Full Cord?)

Always Loosely stacked - Not solid

Variable moisture (U.S. mean=24.1%)

Fundamental problem is conversion of "Cords" (wet basis) to "Tons" (dry basis) which is the metric of AP-42

Conversion Factors

Area	Source	Tons/Dry Cord*
National	EIA/NEI	1.16
National	Caltech	1.23
MANE-VU	MANE-VU Survey, MARAMA Calculated	1.8
MANE-VU	MANE-VU Survey, OMNI Calculated	1.45
New Jersey	U.S. Forest Service	1.44
Maryland	U.S. Forest Service	1.44
New York	U.S. Forest Service	1.37
Minnesota	State Survey	1.41
West Virginia	Southern States Energy Board	1.29
Virginia	Southern States Energy Board	1.23

PM 2.5 SIPS Rubber Meets The Road!

NA Designations are county based Strategies must be county based Most old PM -10 inventories used specific Local surveys How to cross check local, or regional surveys?

Table 3 Example States -- Dry Tons/Year

Area	MANE-VU (back calculated	OMNI (from Mane-Vu data, 1.45t/C)	EIA 2002 Adj 2000, 1.16 t/C	NEI 2002 (from NEI database)	State Survey (adjusted to 2002)	AHS/Census/ EIA
Delaware	74,900	72,900	60,500	75,400	67,500	29,000
Maine	820,600	533,000	150,500	285,800	580,200	91,900
PA	2,628,800	1,944,600	588,500	889,800	-	1,718,300
Vermont	387,300	242,200	69,800	126,500	276,700	42,900
Pittsburgh	323,800	235,900	111,800	152,400	_	169,800

Where does Your state belong?

- National surveys group states differently
 - Delaware
 - Census groups in South Atlantic
 - Along with Florida!!
 - Neilsen (Simmons Mkt research groups in Mid Atlantic- with all of New York
 - Pittsburgh -
 - Census groups in Mid-Atlantic (but WV in South)
 - Neilsen groups with Indiana, Ohio, Michigan



Nielsen Territories



Table 4 – Delaware

	MANE-VU	State Survey**	AHS	Simmons Research
Fireplaces	26,900	67,500	25,600	-
Central Heating	0	11,800	-	-
Pellet	1,970	1,890	-	-
All Wd Heaters (WS & Inserts)	12,000	20,400	52,000	34,800
EPA Wdstoves or Inserts	4,570	8,390	-	_
Conventional Wdst & Inserts	7,470	12,000	-	-

Table 5 Maine*

	MANE-VU	State Survey	AHS	Simmons Research
Fireplaces	46,300	-	18,800	-
Central Heating	18,900	17,800	-	-
Pellet	4,090	3,820**	-	-
All Wd Heaters stoves & Inserts	78,600	112,040	97,900	85,600
EPA stoves & Inserts	32,200	-	-	_
Conventional stoves or Inserts	46,400	-	-	-

	MANE-VU	State Survey	AHS	Simmons Research
Fireplaces	21,400	13,700	8,760	-
Central Heating	9,700	17,800	-	-
Pellet	2,120	-	-	-
All Wd Heaters (WS & Inserts)	36,900	61,500	45,700	39,800
EPA Wd, Inserts	15,200	18,800	_	-
Conventional stoves or Inserts	21,700	42,700	-	-

Table 7 Pittsburgh NA*

	MANE-VU	Pittsburgh AHS	Simmons Research
Fireplaces	91,600	82,500	-
Central Heating	1,810	_	_
Pellet	5,440	-	-
All Wd Heaters stoves, inserts	40,800	50,000	113,000
EPA stoves & Inserts	13,600	-	-
Conventional Stoves, inserts	27,200	-	-

Why the confusion?

- Fireplaces with/out Inserts Doubled
- Airtight Fireplace Insert confused with Manufactured fireplaces "zero clearance"
- Consumers tend to confuse safety label with "EPA certification" (Denver 1980)
- Occupants not original purchasers
- Large WS in Basement called "Furnace"
- Gas Fp confused with wood fireplace

Conclusion

- Large Regional surveys may be adequate for Regional Haze – less so for SIPs
- State & Local surveys useful for comparison & cross checking
- Each survey has limitations & assumptions which must be checked
- Nothing beats the old fashioned methodcarefully prepared, local survey with adequate sample size