AP-42
Section 1.9
Ref. #6

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR AND ENERGY ENGINEERING RESEARCH LABORATORY
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27711

OPTIONAL FORM 99 (7-90)
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To Paula Fields	From Bob McCrillis
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NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

more to come tomorrow

MEMORANDUM

DATE: November 19, 1985

SUBJECT: Fireplace Emissions

FROM: Robert C. McCrillis (M
Combustion Research Br

TO: Neil Jacquay
EPA Region 9

As per our phone conversation yesterday, please find enclosed a print out of my fireplace emissions data base. Also enclosed is a copy of a recently published report (EPA-600/2-85-047) summarizing emissions from wood stoves. The fireplace data is organized in the same manner as Table 3-1 in the report. The Study Code and Reference list for the fireplace data is as follows:

Study Code	Reference
GM2-81	Dasch, Jean M., "Particulate and Gaseous Emissions from Wood-Burning Fireplaces", Environmental Science and Technology, Vol. 16, No. 10, 1982. (See also reference 6, EPA-600/2-85-047)
GM3-84	Lipari, Frank, J.M. Dasch, and W.F. Scruggs, "Aldehyde Emissions from Wood-Burning Fireplaces", Environmental Science and Technology, Vol. 18, No. 5, 1984.
PEI-77	"Source Testing for Fireplaces, Stoves, and Restaurant Grills in Vail, Colorado", Prepared by PEDCo-Environmental, Inc. for US EPA under contract 68-01-1999, December, 1977 (published January 1979).
VT1-75	Source Sampling Residential Fireplaces for Emission Factor Development, EPA Report EPA-450/3-76-010, November, 1975.
VT2-00, VT3-00	Results of other tests also reported in EPA-450/3-76-010.

I also invented some new codes for STOVE TYPE, PART(ICULATE) TEST METHOD and TYPE OF BURN:

STOVE TYPE

FSF	Free-standing fireplace.
CONDO	Fireplace installed in a condominium (no further description given in reference).
CONDO(GD)	Same installation as above, fitted with glass doors
CONDO(OSA)	Same installation as above, fitted with draft vent bringing in outside air.
CONDO(ESP)	Same installation as above, fitted with an ESP in the stack.
BRICK	Brick fireplace (no further description given in reference).
SYM	Simulated fireplace (no further description given in reference).

PART TEST METHOD

M5/A	Standard EPA Method 5 train with a second aldehydes train.
M5/7	Standard Method 5 train with an additional unheated filter between second and third impingers. Very similar to Oregon Method 7.
MM5	Standard Method 5 train with an adsorbant cartridge filled with Tenax between filter and first impinger. (We now use XAD-2 adsorbant instead of Tenax.)

TYPE OF BURN

E	Start-up.
F	Burn down.

If you have any questions, please call me (FTS 629-2733).

11/19/85

FIREPLACE EMMISSIONS

STUDY CODE	STOVE TYPE	PART TEST METHOD	WOOD SPECIE	WOOD MOISTURE %	BURN RATE kg/hr	STACK TEMP DEG.F	TYPE OF BURN	SAMPLE TIME MIN.	EMISSIONS PART. g/kg wood burned	EMISSIONS CO g/kg wood burned	EMISSIONS NOX g/kg wood burned	EMISSIONS HC g/kg wood burned	EMISSIONS POM mg/kg wood burned	EMISSIONS BaP mg/kg wood burned	EMISSIONS ALD'S mg/kg wood burned	COMMENTS
EN2-81-01	FSF	M5	ES						13.00							EASTERN SPRUCE
EN2-81-02	FSF	M5	ES						9.60							EASTERN SPRUCE
EN2-81-03	FSF	M5	ES						15.00							EASTERN SPRUCE
EN2-81-04	FSF	M5	ES													EASTERN SPRUCE
EN2-81-05	FSF	M5	ES							58	0.80	1.1				EASTERN SPRUCE
EN2-81-06	FSF	M5	JP(G													GREEN JACK PINE
EN2-81-07	FSF	M5	JP(G						10.00							GREEN JACK PINE
EN2-81-08	FSF	M5	JP						14.00	160		1.0				SEASONED JACK PINE
EN2-81-09	FSF	M5	JP						10.00							SEASONED JACK PINE
EN2-81-10	FSF	M5	SM						24.00							SOFT MAPLE
EN2-81-11	FSF	M5	SM						9.00		1.00					SOFT MAPLE
EN2-81-12	FSF	M5	SM						9.60	120	1.00	2.7				SOFT MAPLE
EN2-81-13	FSF	M5	B(D)						15.00	71		1.0				DRY BIRCH
EN2-81-14	FSF	M5	B(G)		3.3			36	9.60	180	0.70	1.4				GREEN BIRCH
EN2-81-15	FSF	M5	HM						10.00							HARD MAPLE
EN2-81-17	FSF	M5	WA						14.00							WHITE ASH
EN2-81-18	FSF	M5	WA						9.10							WHITE ASH
EN2-81-19	FSF	M5	RO						8.00							RED OAK
EN2-81-20	FSF	M5	RO						8.20							RED OAK
EN2-81-21	FSF	M5	RO						12.00							RED OAK
EN2-81-22	FSF	M5	RO						8.90	90	1.00	1.6				RED OAK
EN2-81-23	FSF	M5	RO						11.00							RED OAK
EN2-81-24	FSF	M5	RO						29.00							RED OAK
EN2-81-25	FSF	M5	SL						19.00	200	1.00	5.1				COMPRESSED WOOD LOG
EN2-81-26	FSF	M5	SL					226	20.00	120	1.00	9.7				COMPRESSED WOOD LOG
EN3-84-1	FSF	M5/A	JP	5	8.4	183	B	30	5.60						0.952	JACK PINE
EN3-84-2	FSF	M5/A	CE	5	3.0	106	B	37	12.70						2.260	CEDAR
EN3-84-3	FSF	M5/A	RO	5	6.6	181	B	31	6.90						0.951	RED OAK
EN3-84-4	FSF	M5/A	RO	5	6.6	182	B	36	6.60						0.917	RED OAK
EN3-84-5	FSF	M5/A	RO	5	10.2	237	B	26	4.50						0.611	RED OAK
EN3-84-6	FSF	M5/A	RO	5	3.6	178	B	40	12.90						1.075	RED OAK
EN3-84-7	FSF	M5/A	WA(G	20	5.4	153	B	33	4.60						0.937	GREEN WHITE ASH
EN3-84-8	FSF	M5/A	WA(G	20	1.8	71	B	77	19.80						1.862	GREEN WHITE ASH
PE1-77-1	CONDO	M5/7	PINE	7	4.8	68	E		21.00	43		13.6				
PE1-77-2	CONDO	M5/7	PINE	7	8.2	119	C		16.60	28		13.1				
PE1-77-3	CONDO	M5/7	PINE	7	3.9	66	F		9.80	102		22.4				
PE1-77-4	CONDO(SD)	M5/7	PINE	7	11.5	160	C		9.80	74		83.3				
PE1-77-5	CONDO(DSA	M5/7	PINE	7	10.1	124	C		16.70	84		57.7				
PE1-77-6	CONDO	M5/7	COAL	6	3.6	123	C		14.40	106		138.0				
PE1-77-7	CONDO	M5/7	PINE	7	11.4	157	C		9.50	53		34.9				
PE1-77-8	CONDO	M5/7	ASP(G	20	7.1	112	C		19.10	144		296.9				GREEN ASPEN
PE1-77-9	CONDO	M5/7	ASPEN	7	4.8	119	E		34.50	78		73.0				
PE1-77-10	CONDO	M5/7	ASPEN	7	8.1	96	C		15.80	70		62.8				
PE1-77-11	CONDO	M5/7	ASPEN	7	2.0	87	F		27.00	168		400.1				
PE1-77-12	CONDO	M5/7	PINE	8	3.6	72	E		22.20	125		625.2				
PE1-77-13	CONDO	M5/7	PINE	8	7.1	108	C		20.00	108		54.9				
PE1-77-14	CONDO	M5/7	PINE	8	4.8	74	F		19.40	115		219.7				
PE1-77-15	CONDO(ESP	M5/7	PINE	7	15.2	188	C		8.70	55		6.7				
PE1-77-16	BRICK	M5/7	PINE	7	3.2	101	C		20.80	105		385.0				

(CONTINUED)

FIREPLACE EMISSIONS

STUDY CODE	STOVE TYPE	PART TEST METHOD	WOOD SPECIE	WOOD MOISTURE %	BURN RATE kg/hr	STACK TEMP DEG.F	TYPE OF BURN	SAMPLE TIME MIN.	EMISSIONS PART. g/kg wood burned	EMISSIONS CO g/kg wood burned	EMISSIONS NOX g/kg wood burned	EMISSIONS HC g/kg wood burned	EMISSIONS POM mg/kg wood burned	EMISSIONS BaP mg/kg wood burned	EMISSIONS ALD'S mg/kg wood burned	COMMENTS
PE1-77-17	BRICK	M5/7	PINE	7	3.2	126	C		23.10	110	141.3					
PE1-77-18	BRICK	M5/7	PINE	8	4.6	103	C		26.30	104	25.7					
VT1-75-1	BRICK	M7	ALDER	12	4.8	83	E	40	16.00							
VT1-75-2	BRICK	M7	ALDER	12	7.8	108	C	60	5.90							
VT1-75-3	BRICK	M7	ALDER	12	1.9	67	F	40	22.20							
VT1-75-4	BRICK	M7	ALDER	12	10.8	114	E	40	12.50							
VT1-75-5	BRICK	M7	ALDER	12	9.1	92	C	20								
VT1-75-6	BRICK	MM5	ALDER	12	6.2	99	C	60		263	12.7		0.71			TENAX CARTRIDGE
VT1-75-7	BRICK	M7	DF	11	5.7	79	C	60	11.50							DOUGLAS FIR
VT1-75-8	BRICK	M7	DF	11	4.1	88	C	60	14.40	349	12.1					DOUGLAS FIR
VT1-75-9	BRICK	M7	DF	11	8.3	83	E	60	8.80							DOUGLAS FIR
VT1-75-10	BRICK	M7	DF	11	6.7	110	C	60	13.50							DOUGLAS FIR
VT1-75-11	BRICK	MM5	DF	11	4.3	88	C	60					1.22			DOUGLAS FIR/TENAX
VT1-75-12	BRICK	M7	COAL	0	2.3	80	E	60	30.30							
VT1-75-13	BRICK	M7	COAL	0	2.7	74	C	60	14.40							
VT1-75-14	BRICK	M7	LOCUS	12	9.0	86	E	60	9.50							
VT1-75-15	BRICK	M7	LOCUS	12	6.2	92	C	60	12.70	369	13.3					
VT1-75-16	BRICK	M7	LOCUS	12	5.2	82	E	60	11.60							
VT1-75-17	BRICK	M7	LOCUS	12	4.5	91	C	30								
VT1-75-18	BRICK	M7	LOCUS	12	5.5	91	C	60	15.30							
VT1-75-19	BRICK	M7	PINE	15	11.2	125	E	60	7.20							
VT1-75-20	BRICK	M7	PINE	15	14.0	109	C	40	6.50							
VT1-75-21	BRICK	MM5	PINE	15	10.0	104	C	50					0.48			TENAX CARTRIDGE
VT1-75-22	BRICK	M7	PINE	15	11.1	136	E	60	13.60							
VT1-75-23	BRICK	M7	PINE	15	9.1	105	C	50	8.10							
VT1-75-24	BRICK	M7	PINE	15	13.6	97	C	30								
VT2-00-1	SYM	M7	SL	0	8.0	94			2.40							COMPRESSED WOOD LOG
VT3-00-1	BRICK	M7	ALDER	0	19.8	107			6.50							