

Influence of Puff Volume, Puff Frequency and Vent-Blocking on the Mutagenicity of Mainstream Smoke Condensate

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Background

- **Several research groups have reported that specific mainstream condensate mutagenicity in the Ames assay increases as filter ventilation increases when cigarettes smoked under FTC or ISO conditions**
 - Steele *et al.* (1995)
 - Tewes *et al.* (1999)
 - Chepiga *et al.* (2000)
 - Appleton *et al.* (2001)
 - Doolittle *et al.* (2002)

Background (cont'd.)

- **Some researchers have concluded that many smokers smoke light and ultralight cigarettes differently than the FTC or ISO methods**
 - More intense puffing
 - Vent blocking
- **Rickert *et al.* (2002) -- Specific mutagenicity decreased on going from ISO to Canadian Intense smoking conditions (TA98+S9, TA100+S9)**

Objective

- **Compare the specific mutagenicity of three different products under six different smoking conditions with two different Ames assays**

Experimental design

- **Products**
 - Commercial ULT 100 (0.6 mg ISO TPM)
 - KY1R5F
 - KY1R4F
- **Smoking conditions**
 - 35/60/2: 0% VB (ISO), 50% VB, or 100% VB
 - 45/30/2: 0% VB, 50% VB (MA), or 100% VB
- **Ames assays – SALM analysis**
 - TA98+S9
 - TA100+S9

Smoking data -- Ultralight 100

Puff Volume	Puff Interval	% Vent Block	# Cigs Smoked	TPM (mg/cig)	Puff Count
35	60	0	200	0.58	8.5
35	60	50	40	2.5	7.9
35	60	100	40	9.5	6.5
45	30	0	100	2.7	15.2
45	30	50	20	8.0	13.0
45	30	100	20	22.0	9.5

Smoking data – KY1R5F

Puff Volume	Puff Interval	% Vent Block	# Cigs Smoked	TPM (mg/cig)	Puff Count
35	60	0	100	2.0	7.0
35	60	50	40	3.7	6.0
35	60	100	40	8.2	5.4
45	30	0	60	6.0	10.6
45	30	50	20	10.9	9.4
45	30	100	20	20.1	7.3

Smoking data – KY1R4F

Puff Volume	Puff Interval	% Vent Block	# Cigs Smoked	TPM (mg/cig)	Puff Count
35	60	0	20	9.9	8.6
35	60	50	20	10.9	8.1
35	60	100	20	14.8	8.0
45	30	0	10	23.1	13.6
45	30	50	10	25.3	12.5
45	30	100	10	32.0	11.8

Ames data -- Ultralight 100

Puff Volume	Puff Interval	% Vent Block	# Cigs Smoked	TA98+S9 (rev/mg TPM)	TA100+S9 (rev/mg TPM)
35	60	0	200	3531	818
35	60	50	40	3335	1074
35	60	100	40	2232	468
45	30	0	100	2874	592
45	30	50	20	2740	923
45	30	100	20	1785	598

Ames data – KY1R5F

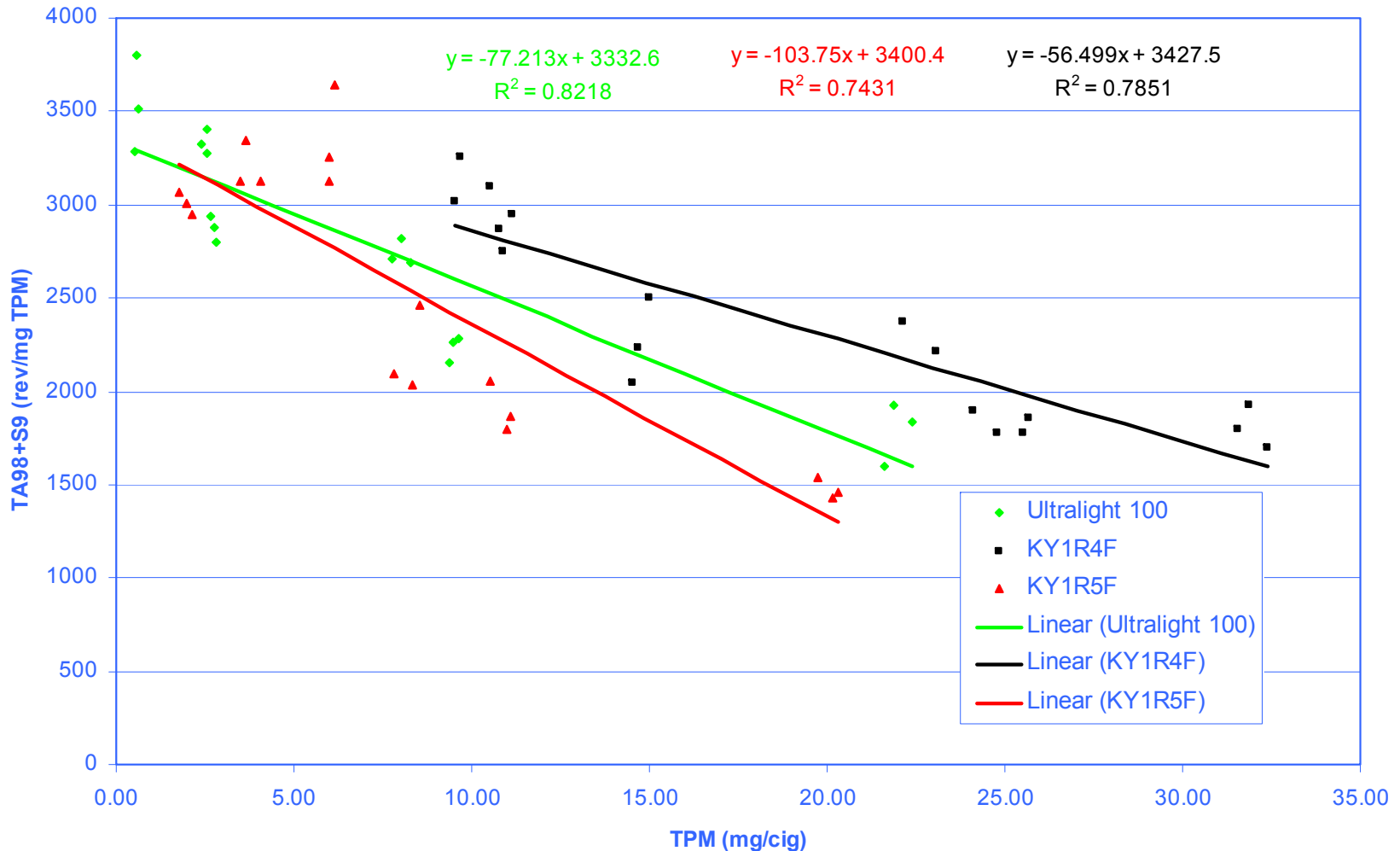
Puff Volume	Puff Interval	% Vent Block	# Cigs Smoked	TA98+S9 (rev/mg TPM)	TA100+S9 (rev/mg TPM)
35	60	0	100	3008	886
35	60	50	40	3200	917
35	60	100	40	2199	639
45	30	0	60	3339	1038
45	30	50	20	1905	645
45	30	100	20	1474	494

Ames data – KY1R4F

Puff Volume	Puff Interval	% Vent Block	# Cigs Smoked	TA98+S9 (rev/mg TPM)	TA100+S9 (rev/mg TPM)
35	60	0	20	3126	855
35	60	50	20	2854	900
35	60	100	20	2261	602
45	30	0	10	2161	841
45	30	50	10	1803	699
45	30	100	10	1807	605

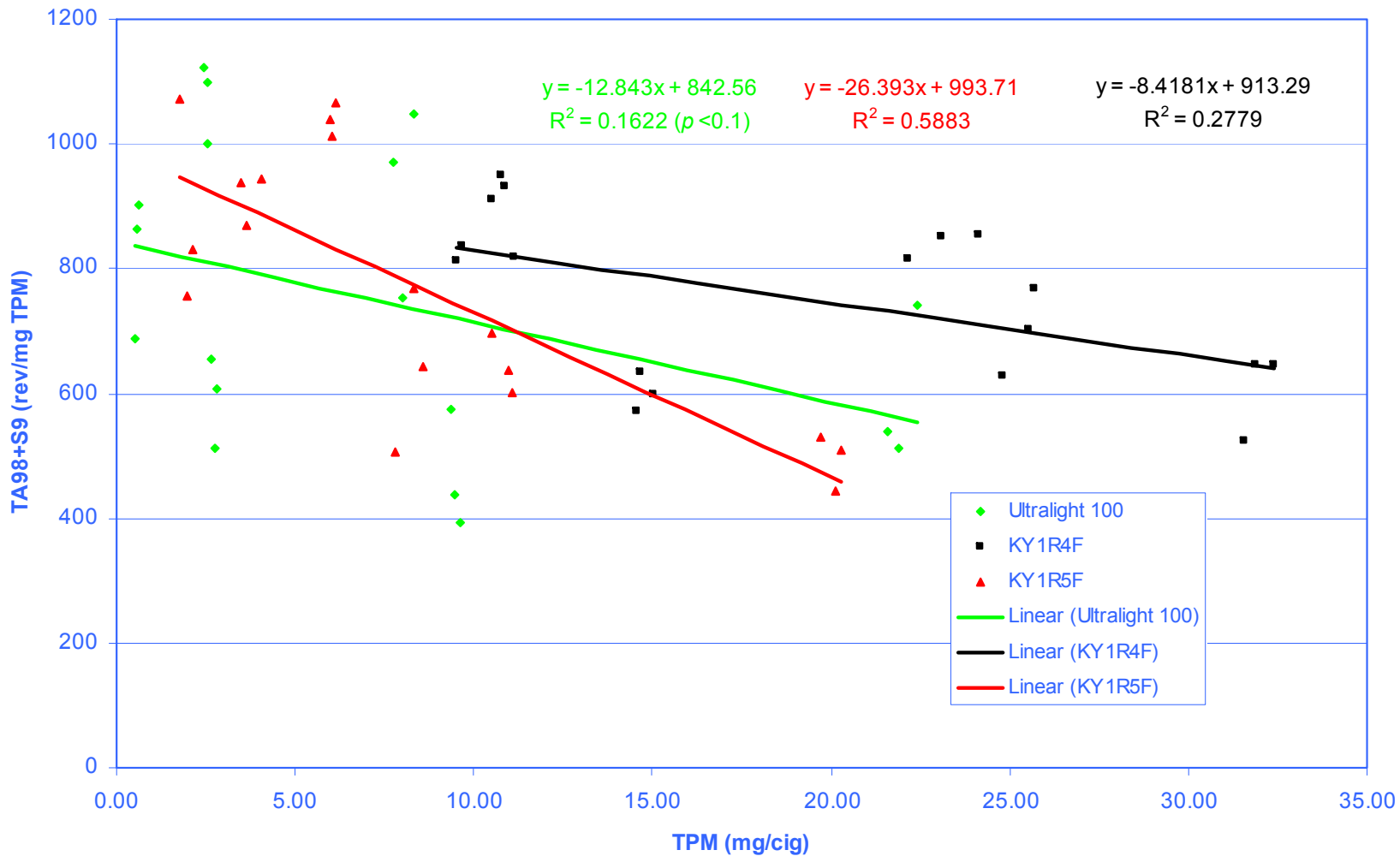
TA98+S9 on a revertants/mg TPM basis

TA98+S9 (rev/mg TPM) versus TPM (mg/cig)



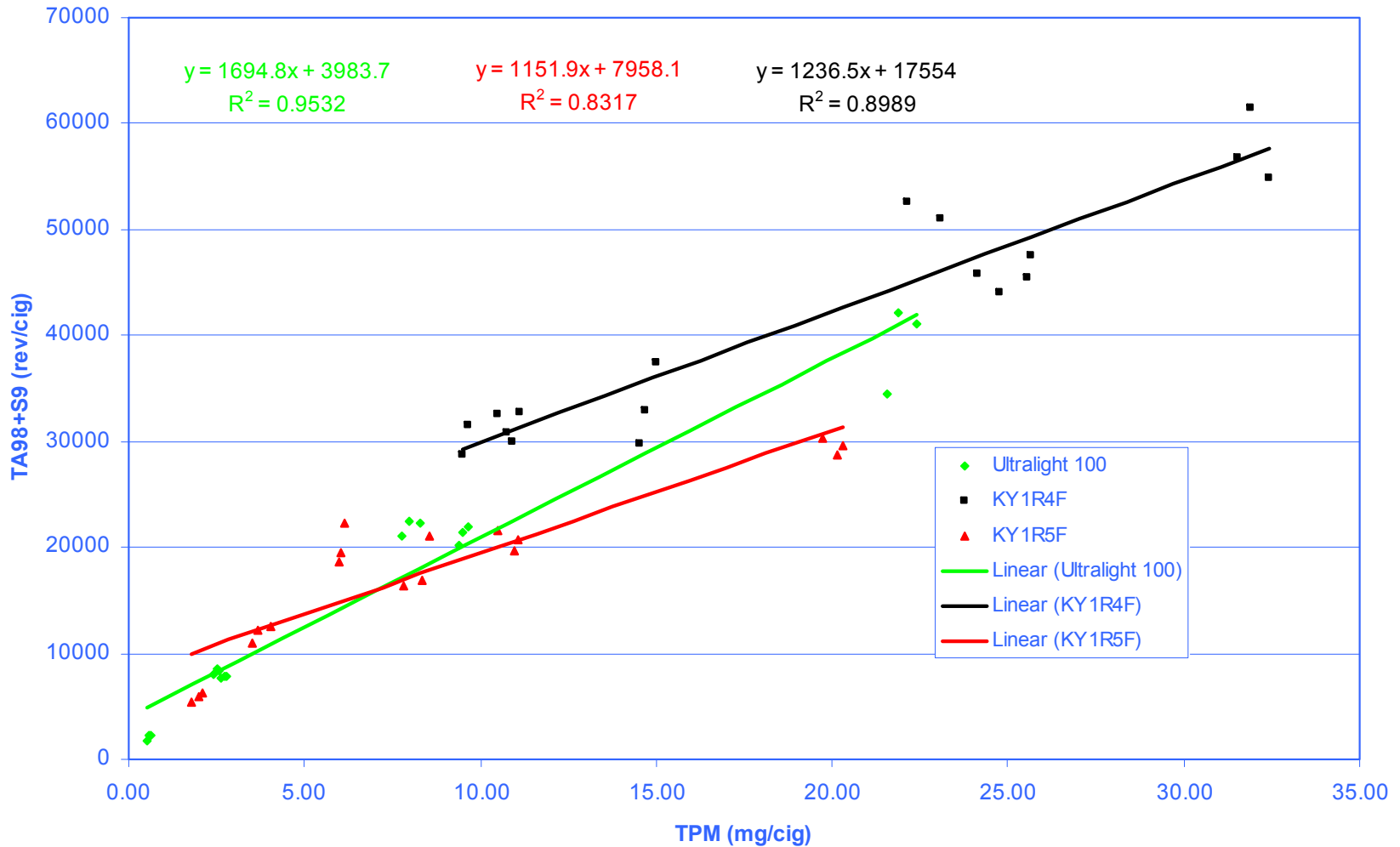
TA100+S9 on a revertants/mg TPM basis

TA100+S9 (rev/mg TPM) versus TPM (mg/cig)



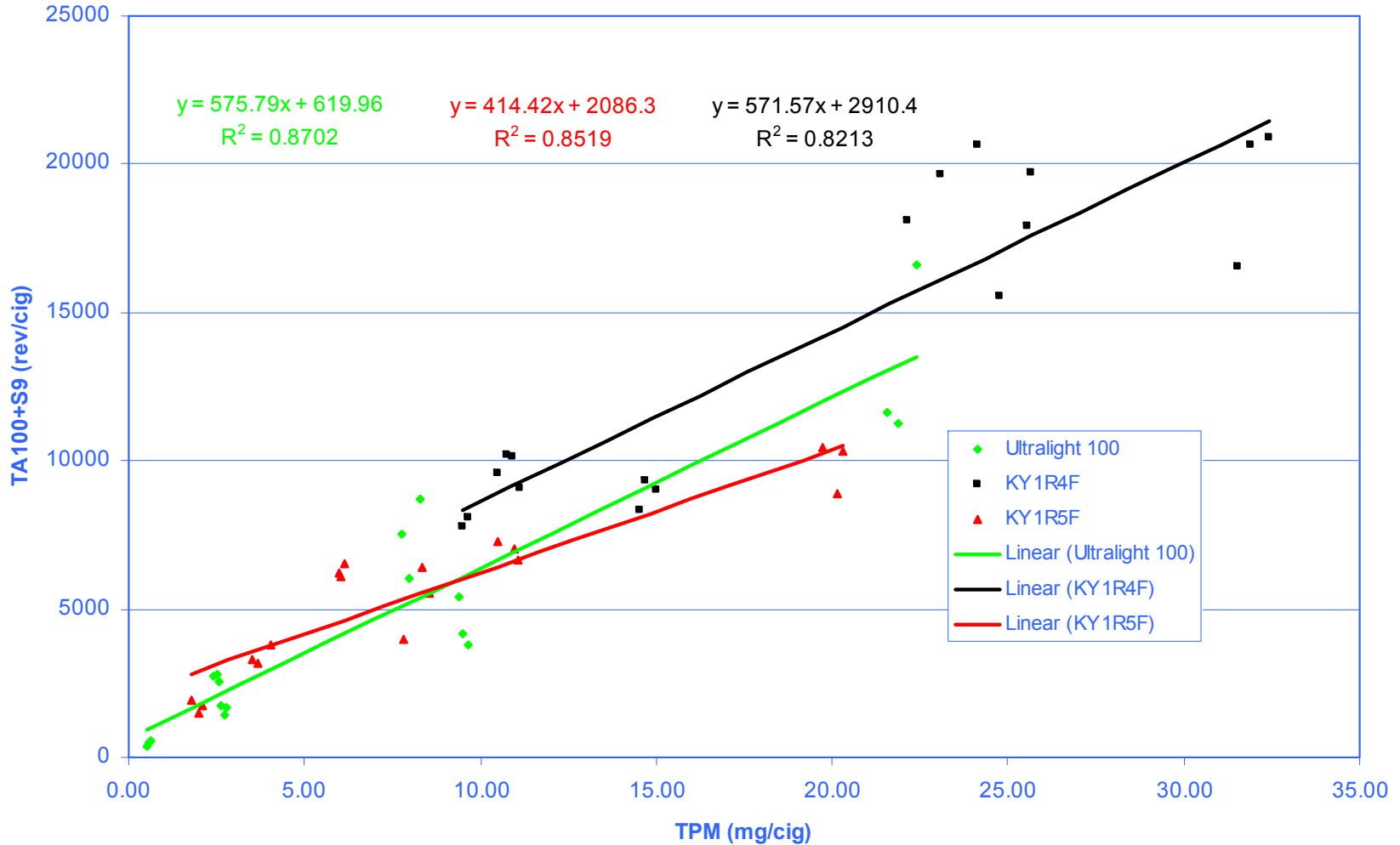
TA98+S9 on a revertants/cigarette basis

TA98+S9 (rev/cig) versus TPM (mg/cig)



TA100+S9 on a revertants/cigarette basis

TA100+S9 (rev/cig) versus TPM (mg/cig)



Conclusions

- **On a per mg TPM basis, specific mutagenicity decreased as TPM per cigarette increased**
- **On a per cigarette basis, mutagenicity increased as TPM per cigarette increased**
- **More intense puffing and vent blocking resulted in a reduction in specific mutagenicity of TPM**

Acknowledgement

**The Ames assays were done by
Labstat International
Kitchener, ON**

