

Experiment Number: Multiple

Test Type: TOX

Route: Oral Gavage

Species/Strain: Rat/Harlan Sprague Dawley

C Number:

Multiple

Study Gender:

Male

PA41X: Clinical Chemistry Summary

Test Compound: Flame Retardants

CAS Number: N/A

Date Report Requested: 04/22/2019

Time Report Requested: 15:05:21

Lab: NTP

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Route: Oral Gavage

Species/Strain: Rat/Harlan Sprague Dawley

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Lab: NTP

Urea Nitrogen (mg/dL)

Treatment Groups (umol/kg)

Test Article	0			1		10	
	Mean	Mean	% of Control	Mean	% of Control	Mean	% of Control
PBDE-47	12.0 ± 1.2 (6)	11.8 ± 0.8 (5)	98.3	11.0 ± 0.7 (4)	91.7	11.4 ± 0.4 (5)	95.0
decaBDE	10.3 ± 0.7 (6)	10.8 ± 0.9 (4)	104.0	14.2 ± 0.2 (6) **	137.1	12.7 ± 0.7 (6)	122.6
HBCD	15.6 ± 1.2 (5)	13.5 ± 0.7 (6)	86.5	15.0 ± 0.9 (6)	96.2	14.3 ± 0.6 (6)	91.9
TBB	12.4 ± 0.7 (5)	13.7 ± 0.4 (6)	110.2	13.0 ± 0.7 (5)	104.8	13.6 ± 1.5 (5)	109.7
TBPH	14.0 ± 0.5 (6)	13.0 ± 0.4 (6)	92.9	13.3 ± 1.0 (6)	95.2	14.2 ± 0.5 (6)	101.2
TBBPA-DBPE	11.7 ± 0.8 (6)	12.5 ± 0.2 (6)	107.1	12.5 ± 0.7 (6)	107.1	12.4 ± 0.2 (5)	106.3
BTBPE	13.3 ± 0.7 (6)	13.7 ± 0.7 (6)	102.5	13.8 ± 0.5 (6)	103.8	14.2 ± 0.4 (6)	106.3
DBDPE	11.7 ± 0.9 (6)	12.0 ± 0.5 (6)	102.9	14.0 ± 0.7 (6)	120.0	13.2 ± 0.8 (6)	112.9
HCDBCO	14.0 ± 0.4 (6)	14.3 ± 0.7 (6)	102.4	14.0 ± 0.4 (6)	100.0	14.2 ± 1.3 (6)	101.2

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Urea Nitrogen (mg/dL)

Treatment Groups (umol/kg)

Test Article	100		1000	
	Mean	% of Control	Mean	% of Control
PBDE-47	10.0 ± 1.0 (6)	83.3	11.7 ± 1.0 (6)	97.2
decaBDE	11.2 ± 0.4 (6)	108.1	12.8 ± 0.5 (4)	123.4
HBCD	13.8 ± 1.5 (5)	88.5	14.8 ± 0.8 (6)	95.1
TBB	13.8 ± 0.6 (5)	111.3	12.2 ± 0.7 (5)	98.4
TBPH	14.0 ± 0.5 (6)	100.0	13.8 ± 0.6 (6)	98.8
TBBPA-DBPE	12.5 ± 0.8 (6)	107.1	12.7 ± 0.9 (6)	108.6
BTBPE	13.2 ± 0.5 (6)	98.8	14.5 ± 0.8 (6)	108.8
DBDPE	12.7 ± 1.0 (6)	108.6	12.3 ± 0.7 (6)	105.7
HCDBCO	13.0 ± 0.7 (6)	92.9	14.3 ± 0.4 (6)	102.4

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Creatinine (mg/dL)

Treatment Groups (umol/kg)

Test Article	0			1		10	
	Mean	Mean	% of Control	Mean	% of Control	Mean	% of Control
PBDE-47	0.38 ± 0.02 (6)	0.36 ± 0.02 (5)	93.91	0.35 ± 0.03 (4)	91.30	0.38 ± 0.02 (5)	99.13
decaBDE	0.43 ± 0.02 (6) *	0.40 ± 0.00 (5)	92.31	0.42 ± 0.02 (5)	96.92	0.40 ± 0.00 (6)	92.31
HBCD	0.38 ± 0.02 (5)	0.37 ± 0.02 (6)	96.49	0.40 ± 0.00 (6)	105.26	0.37 ± 0.02 (6)	96.49
TBB	0.36 ± 0.02 (5)	0.37 ± 0.02 (6)	101.85	0.37 ± 0.02 (6)	101.85	0.34 ± 0.02 (5)	94.44
TBPH	0.38 ± 0.02 (5)	0.35 ± 0.02 (6)	92.11	0.33 ± 0.02 (6)	87.72	0.38 ± 0.02 (6)	100.88
TBBPA-DBPE	0.35 ± 0.02 (6)	0.38 ± 0.02 (5)	108.57	0.38 ± 0.02 (6)	109.52	0.37 ± 0.02 (6)	104.76
BTBPE	0.35 ± 0.02 (6) *	0.35 ± 0.02 (6)	100.00	0.37 ± 0.02 (6)	104.76	0.38 ± 0.02 (6)	109.52
DBDPE	0.37 ± 0.02 (6)	0.37 ± 0.02 (6)	100.00	0.38 ± 0.02 (6)	104.55	0.40 ± 0.00 (6)	109.09
HCDBCO	0.38 ± 0.02 (6)	0.38 ± 0.02 (6)	100.00	0.33 ± 0.02 (6)	86.96	0.38 ± 0.03 (6)	100.00

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Creatinine (mg/dL)

Treatment Groups (umol/kg)

Test Article	100		1000	
	Mean	% of Control	Mean	% of Control
PBDE-47	0.38 ± 0.02 (6)	100.00	0.38 ± 0.03 (6)	100.00
decaBDE	0.38 ± 0.02 (6)	88.46	0.40 ± 0.00 (5)	92.31
HBCD	0.35 ± 0.02 (6)	92.11	0.38 ± 0.02 (6)	100.88
TBB	0.35 ± 0.02 (6)	97.22	0.40 ± 0.00 (5)	111.11
TBPH	0.38 ± 0.02 (6)	100.88	0.35 ± 0.02 (6)	92.11
TBBPA-DBPE	0.35 ± 0.02 (6)	100.00	0.38 ± 0.02 (6)	109.52
BTBPE	0.38 ± 0.02 (6)	109.52	0.40 ± 0.00 (6)	114.29
DBDPE	0.40 ± 0.00 (6)	109.09	0.38 ± 0.02 (6)	104.55
HCDBCO	0.35 ± 0.02 (6)	91.30	0.40 ± 0.03 (6)	104.35

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Glucose (mg/dL)								
Treatment Groups (umol/kg)								
Test Article	0		0.1		1		10	
	Mean		Mean	% of Control	Mean	% of Control	Mean	% of Control
PBDE-47	233.3 ± 15.7 (6)		176.2 ± 40.0 (5)	75.5	236.8 ± 10.8 (5)	101.5	240.7 ± 12.1 (6)	103.1
decaBDE	247.7 ± 18.9 (6)		232.5 ± 13.7 (4)	93.9	245.7 ± 14.3 (6)	99.2	239.0 ± 15.0 (6)	96.5
HBCD	238.8 ± 12.5 (5)		240.4 ± 3.0 (5)	100.7	227.3 ± 8.7 (6)	95.2	219.8 ± 15.8 (6)	92.1
TBB	242.5 ± 9.4 (4)		263.5 ± 14.9 (6)	108.7	263.4 ± 18.9 (5)	108.6	244.6 ± 13.3 (5)	100.9
TBPH	226.3 ± 9.2 (6)		224.5 ± 11.8 (6)	99.2	223.2 ± 9.7 (6)	98.6	223.0 ± 14.3 (6)	98.5
TBBPA-DBPE	218.8 ± 14.2 (6) **		210.3 ± 15.7 (6)	96.1	224.8 ± 15.0 (6)	102.7	249.2 ± 5.3 (5)	113.9
BTBPE	252.3 ± 17.6 (6)		230.5 ± 13.2 (6)	91.3	247.7 ± 10.7 (6)	98.2	250.5 ± 7.5 (6)	99.3
DBDPE	239.8 ± 20.2 (6)		241.2 ± 7.3 (6)	100.6	259.2 ± 14.4 (6)	108.1	240.2 ± 11.6 (6)	100.1
HCDBCO	259.0 ± 9.6 (6)		233.8 ± 4.2 (6)	90.3	246.3 ± 10.6 (6)	95.1	240.0 ± 16.5 (6)	92.7

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Glucose (mg/dL)

Treatment Groups (umol/kg)

Test Article	100		1000	
	Mean	% of Control	Mean	% of Control
PBDE-47	229.5 ± 14.6 (6)	98.4	222.8 ± 18.8 (6)	95.5
decaBDE	216.5 ± 10.7 (6)	87.4	248.8 ± 8.3 (4)	100.4
HBCD	232.3 ± 8.1 (6)	97.3	226.8 ± 9.3 (6)	95.0
TBB	232.6 ± 9.2 (5)	95.9	244.7 ± 17.3 (3)	100.9
TBPH	217.5 ± 13.6 (6)	96.1	230.3 ± 8.9 (6)	101.8
TBBPA-DBPE	237.7 ± 7.6 (6)	108.6	258.7 ± 9.4 (6) *	118.2
BTBPE	241.7 ± 9.9 (6)	95.8	255.2 ± 8.1 (6)	101.1
DBDPE	265.5 ± 7.7 (6)	110.7	234.3 ± 10.0 (6)	97.7
HCDBCO	244.3 ± 16.9 (6)	94.3	261.8 ± 12.4 (6)	101.1

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Sodium (mmol/L)							
Treatment Groups (umol/kg)							
Test Article	0			1		10	
	Mean	Mean	% of Control	Mean	% of Control	Mean	% of Control
PBDE-47	149.2 ± 0.7 (6)	148.3 ± 0.3 (6)	99.4	148.5 ± 0.5 (6)	99.6	149.2 ± 0.3 (6)	100.0
decaBDE	147.2 ± 0.4 (6)	148.2 ± 0.6 (6)	100.7	147.8 ± 0.7 (6)	100.5	147.8 ± 0.3 (6)	100.5
HBCD	147.4 ± 0.7 (5)	147.2 ± 0.5 (6)	99.8	147.8 ± 0.6 (6)	100.3	146.8 ± 0.5 (6)	99.6
TBB	148.6 ± 0.2 (5) *	148.0 ± 0.4 (6)	99.6	147.8 ± 0.3 (6)	99.5	147.5 ± 0.4 (6)	99.3
TBPH	147.2 ± 0.3 (6)	147.5 ± 0.6 (6)	100.2	147.5 ± 0.3 (6)	100.2	146.7 ± 0.2 (6)	99.7
TBBPA-DBPE	147.3 ± 0.9 (6)	146.8 ± 0.7 (6)	99.7	147.8 ± 0.3 (6)	100.3	147.3 ± 0.5 (6)	100.0
BTBPE	147.7 ± 0.6 (6)	148.0 ± 0.6 (6)	100.2	148.0 ± 0.7 (6)	100.2	147.3 ± 0.5 (6)	99.8
DBDPE	147.3 ± 0.4 (6)	148.5 ± 0.4 (6)	100.8	147.5 ± 0.4 (6)	100.1	147.7 ± 0.5 (6)	100.2
HCDBCO	146.5 ± 0.5 (6)	146.2 ± 0.5 (6)	99.8	146.7 ± 0.2 (6)	100.1	146.7 ± 0.3 (6)	100.1

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Sodium (mmol/L)

Treatment Groups (umol/kg)

Test Article	100		1000	
	Mean	% of Control	Mean	% of Control
PBDE-47	149.5 ± 0.6 (6)	100.2	148.8 ± 1.0 (6)	99.8
decaBDE	148.3 ± 0.8 (6)	100.8	147.8 ± 0.3 (6)	100.5
HBCD	147.8 ± 0.7 (6)	100.3	147.8 ± 0.5 (6)	100.3
TBB	147.8 ± 0.5 (6)	99.5	146.8 ± 0.5 (6) *	98.8
TBPH	147.7 ± 0.4 (6)	100.3	147.2 ± 0.7 (6)	100.0
TBBPA-DBPE	147.7 ± 0.6 (6)	100.2	146.3 ± 0.3 (6)	99.3
BTBPE	147.7 ± 0.8 (6)	100.0	147.0 ± 0.4 (6)	99.5
DBDPE	148.2 ± 0.4 (6)	100.6	148.5 ± 0.3 (6)	100.8
HCDBCO	146.2 ± 0.2 (6)	99.8	146.5 ± 0.7 (6)	100.0

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Potassium (mmol/L)

Treatment Groups (umol/kg)

Test Article	0		0.1		1		10	
	Mean	Mean	% of Control	Mean	% of Control	Mean	% of Control	
PBDE-47	7.5 ± 0.3 (6)	7.0 ± 0.2 (6)	92.9	6.9 ± 0.3 (6)	91.8	7.1 ± 0.3 (6)	94.0	
decaBDE	7.3 ± 0.3 (6)	7.4 ± 0.3 (6)	100.7	7.5 ± 0.3 (6)	102.7	7.1 ± 0.3 (6)	97.0	
HBCD	6.8 ± 0.3 (5)	7.2 ± 0.3 (6)	104.8	7.2 ± 0.3 (6)	105.5	7.1 ± 0.2 (6)	103.6	
TBB	7.8 ± 0.6 (5)	7.4 ± 0.2 (6)	94.0	7.5 ± 0.2 (6)	95.5	7.4 ± 0.3 (6)	94.2	
TBPH	7.0 ± 0.2 (6)	6.8 ± 0.3 (6)	96.7	7.3 ± 0.2 (6)	105.0	7.3 ± 0.3 (6)	104.5	
TBBPA-DBPE	6.8 ± 0.2 (6)	7.5 ± 0.4 (6)	109.8	6.9 ± 0.2 (6)	101.5	7.7 ± 0.4 (6)	112.7	
BTBPE	7.9 ± 0.4 (6)	7.4 ± 0.3 (6)	93.8	7.6 ± 0.3 (6)	96.2	7.7 ± 0.3 (6)	98.5	
DBDPE	7.3 ± 0.4 (6)	7.0 ± 0.2 (6)	95.9	7.6 ± 0.3 (6)	104.1	7.1 ± 0.2 (6)	97.7	
HCDBCO	7.5 ± 0.4 (6)	7.8 ± 0.3 (6)	103.8	7.2 ± 0.3 (6)	96.0	7.4 ± 0.3 (6)	97.6	

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Potassium (mmol/L)

Treatment Groups (umol/kg)

Test Article	100		1000	
	Mean	% of Control	Mean	% of Control
PBDE-47	7.4 ± 0.3 (6)	98.0	7.1 ± 0.3 (6)	94.9
decaBDE	7.2 ± 0.4 (6)	97.9	7.3 ± 0.1 (6)	99.3
HBCD	6.8 ± 0.2 (6)	99.2	7.3 ± 0.2 (6)	106.7
TBB	7.0 ± 0.2 (6)	88.9	6.9 ± 0.4 (6)	88.2
TBPH	6.8 ± 0.2 (6)	97.1	7.2 ± 0.2 (6)	102.6
TBBPA-DBPE	7.1 ± 0.2 (6)	104.9	7.6 ± 0.4 (6)	112.5
BTBPE	7.0 ± 0.3 (6)	89.2	7.8 ± 0.2 (6)	99.6
DBDPE	7.7 ± 0.1 (6)	105.3	7.6 ± 0.2 (6)	104.6
HCDBCO	7.4 ± 0.2 (6)	98.5	7.7 ± 0.2 (6)	102.2

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Chloride (mmol/L)								
Treatment Groups (umol/kg)								
Test Article	0		0.1		1		10	
	Mean		Mean	% of Control	Mean	% of Control	Mean	% of Control
PBDE-47	101.2 ± 0.7 (6)		100.2 ± 0.7 (6)	99.0	101.8 ± 0.7 (6)	100.7	100.8 ± 0.3 (6)	99.7
decaBDE	99.7 ± 0.4 (6)		100.2 ± 0.5 (6)	100.5	100.3 ± 0.6 (6)	100.7	100.2 ± 0.8 (6)	100.5
HBCD	100.4 ± 0.9 (5) **		101.5 ± 0.6 (6)	101.1	101.3 ± 0.2 (6)	100.9	101.5 ± 1.0 (6)	101.1
TBB	101.0 ± 0.7 (5) *		101.0 ± 0.4 (6)	100.0	100.8 ± 0.5 (6)	99.8	100.3 ± 0.5 (6)	99.3
TBPH	101.5 ± 0.5 (6)		100.8 ± 0.7 (6)	99.3	100.8 ± 0.6 (6)	99.3	100.7 ± 0.6 (6)	99.2
TBBPA-DBPE	99.8 ± 0.6 (6)		99.3 ± 0.8 (6)	99.5	100.0 ± 0.3 (6)	100.2	99.5 ± 0.6 (6)	99.7
BTBPE	102.3 ± 0.4 (6)		102.0 ± 0.7 (6)	99.7	102.2 ± 0.6 (6)	99.8	102.2 ± 0.7 (6)	99.8
DBDPE	102.3 ± 0.6 (6)		103.0 ± 0.4 (6)	100.7	102.3 ± 0.2 (6)	100.0	101.7 ± 0.9 (6)	99.3
HCDBCO	101.7 ± 0.4 (6)		101.8 ± 0.4 (6)	100.2	101.5 ± 0.5 (6)	99.8	101.0 ± 0.4 (6)	99.3

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Chloride (mmol/L)

Treatment Groups (umol/kg)

Test Article	100		1000	
	Mean	% of Control	Mean	% of Control
PBDE-47	101.5 ± 0.6 (6)	100.3	101.8 ± 1.0 (6)	100.7
decaBDE	100.5 ± 0.5 (6)	100.8	100.5 ± 0.6 (6)	100.8
HBCD	101.8 ± 0.5 (6)	101.4	105.0 ± 0.6 (6) **	104.6
TBB	102.0 ± 0.6 (6)	101.0	103.0 ± 0.5 (6)	102.0
TBPH	101.3 ± 0.3 (6)	99.8	102.0 ± 0.4 (6)	100.5
TBBPA-DBPE	100.7 ± 0.5 (6)	100.8	100.3 ± 0.6 (6)	100.5
BTBPE	101.2 ± 0.5 (6)	98.9	101.5 ± 0.6 (6)	99.2
DBDPE	102.2 ± 0.5 (6)	99.8	102.5 ± 0.7 (6)	100.2
HCDBCO	100.7 ± 0.5 (6)	99.0	102.5 ± 0.8 (6)	100.8

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Total Protein (g/dL)							
Treatment Groups (umol/kg)							
Test Article	0			1		10	
	Mean	Mean	% of Control	Mean	% of Control	Mean	% of Control
PBDE-47	5.93 ± 0.10 (6)	5.75 ± 0.11 (6)	96.91	5.84 ± 0.18 (5)	98.43	5.92 ± 0.07 (6)	99.72
decaBDE	6.05 ± 0.11 (6)	5.88 ± 0.26 (4)	97.11	6.02 ± 0.09 (6)	99.45	5.97 ± 0.15 (6)	98.62
HBCD	5.92 ± 0.14 (5)	5.98 ± 0.07 (6)	101.07	6.22 ± 0.10 (6)	105.01	5.95 ± 0.02 (6)	100.51
TBB	6.08 ± 0.21 (5)	5.67 ± 0.10 (6)	93.20	6.08 ± 0.18 (5)	100.00	5.96 ± 0.24 (5)	98.03
TBPH	6.03 ± 0.16 (6)	5.73 ± 0.11 (6)	95.03	6.03 ± 0.19 (6)	100.00	6.07 ± 0.12 (6)	100.55
TBBPA-DBPE	5.95 ± 0.06 (6)	6.30 ± 0.15 (6)	105.88	6.30 ± 0.07 (5)	105.88	6.23 ± 0.10 (6)	104.76
BTBPE	5.80 ± 0.11 (6) *	5.83 ± 0.09 (6)	100.57	5.90 ± 0.06 (6)	101.72	5.87 ± 0.11 (6)	101.15
DBDPE	5.70 ± 0.07 (6) *	5.63 ± 0.12 (6)	98.83	5.80 ± 0.09 (6)	101.75	5.78 ± 0.21 (6)	101.46
HCDBCO	5.90 ± 0.20 (6)	5.87 ± 0.10 (6)	99.44	5.92 ± 0.11 (6)	100.28	5.78 ± 0.07 (6)	98.02

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Total Protein (g/dL)

Treatment Groups (umol/kg)

Test Article	100		1000	
	Mean	% of Control	Mean	% of Control
PBDE-47	5.72 ± 0.09 (6)	96.35	6.23 ± 0.08 (6)	105.06
decaBDE	5.88 ± 0.21 (5)	97.19	6.28 ± 0.13 (4)	103.72
HBCD	6.05 ± 0.13 (6)	102.20	6.25 ± 0.15 (6)	105.57
TBB	5.66 ± 0.09 (5)	93.09	5.90 ± 0.03 (5)	97.04
TBPH	6.18 ± 0.15 (6)	102.49	5.98 ± 0.09 (6)	99.17
TBBPA-DBPE	5.90 ± 0.03 (6)	99.16	6.22 ± 0.08 (6)	104.48
BTBPE	6.05 ± 0.14 (6)	104.31	6.08 ± 0.05 (6)	104.89
DBDPE	5.82 ± 0.06 (6)	102.05	6.08 ± 0.21 (6)	106.73
HCDBCO	5.80 ± 0.15 (6)	98.31	5.92 ± 0.17 (6)	100.28

Experiment Number: Multiple

Test Type: TOX

Route: Oral Gavage

Species/Strain: Rat/Harlan Sprague Dawley

PA41X: Clinical Chemistry Summary

Test Compound: Flame Retardants

CAS Number: N/A

Date Report Requested: 04/22/2019

Time Report Requested: 15:05:21

Lab: NTP

Globulin (g/dL)

Treatment Groups (umol/kg)

Test Article	0		0.1		1		10	
	Mean	% of Control	Mean	% of Control	Mean	% of Control	Mean	% of Control
PBDE-47	1.63 ± 0.08 (6) **	91.84	1.50 ± 0.08 (6)	91.84	1.62 ± 0.12 (5)	99.18	1.58 ± 0.09 (5)	96.73
decaBDE	1.67 ± 0.07 (6)	100.50	1.68 ± 0.21 (4)	100.50	1.67 ± 0.07 (6)	100.00	1.65 ± 0.07 (6)	99.00
HBCD	1.62 ± 0.04 (5) *	96.71	1.57 ± 0.03 (6)	96.71	1.72 ± 0.08 (6)	105.97	1.60 ± 0.03 (6)	98.77
TBB	1.62 ± 0.15 (5)	90.53	1.47 ± 0.07 (6)	90.53	1.62 ± 0.12 (5)	100.00	1.66 ± 0.16 (5)	102.47
TBPH	1.68 ± 0.13 (6)	86.14	1.45 ± 0.04 (6)	86.14	1.58 ± 0.08 (6)	94.06	1.65 ± 0.07 (6)	98.02
TBBPA-DBPE	1.55 ± 0.06 (6)	112.90	1.75 ± 0.11 (6)	112.90	1.72 ± 0.06 (5)	110.97	1.78 ± 0.11 (6)	115.05
BTBPE	1.58 ± 0.05 (6)	102.11	1.62 ± 0.05 (6)	102.11	1.55 ± 0.04 (6)	97.89	1.53 ± 0.08 (6)	96.84
DBDPE	1.42 ± 0.03 (6)	96.47	1.37 ± 0.05 (6)	96.47	1.53 ± 0.07 (6)	108.24	1.50 ± 0.15 (6)	105.88
HCDBCO	1.58 ± 0.12 (6)	103.16	1.63 ± 0.07 (6)	103.16	1.63 ± 0.03 (6)	103.16	1.60 ± 0.06 (6)	101.05

Experiment Number: Multiple

Test Type: TOX

Route: Oral Gavage

Species/Strain: Rat/Harlan Sprague Dawley

PA41X: Clinical Chemistry Summary

Test Compound: Flame Retardants

CAS Number: N/A

Date Report Requested: 04/22/2019

Time Report Requested: 15:05:21

Lab: NTP

Globulin (g/dL)

Treatment Groups (umol/kg)

Test Article	100		1000	
	Mean	% of Control	Mean	% of Control
PBDE-47	1.73 ± 0.06 (6)	106.12	2.00 ± 0.06 (6) *	122.45
decaBDE	1.66 ± 0.11 (5)	99.60	1.78 ± 0.10 (4)	106.50
HBCD	1.68 ± 0.06 (6)	103.91	1.85 ± 0.08 (6)	114.20
TBB	1.42 ± 0.05 (5)	87.65	1.58 ± 0.05 (5)	97.53
TBPH	1.77 ± 0.07 (6)	104.95	1.68 ± 0.07 (6)	100.00
TBBPA-DBPE	1.55 ± 0.03 (6)	100.00	1.63 ± 0.04 (6)	105.38
BTBPE	1.65 ± 0.11 (6)	104.21	1.65 ± 0.07 (6)	104.21
DBDPE	1.43 ± 0.06 (6)	101.18	1.68 ± 0.14 (6)	118.82
HCDBCO	1.72 ± 0.09 (6)	108.42	1.68 ± 0.09 (6)	106.32

Experiment Number: Multiple

Test Type: TOX

Route: Oral Gavage

Species/Strain: Rat/Harlan Sprague Dawley

PA41X: Clinical Chemistry Summary

Test Compound: Flame Retardants

CAS Number: N/A

Date Report Requested: 04/22/2019

Time Report Requested: 15:05:21

Lab: NTP

A/G Ratio

Treatment Groups (umol/kg)

Test Article	0		0.1		1		10	
	Mean	% of Control	Mean	% of Control	Mean	% of Control	Mean	% of Control
PBDE-47	2.66 ± 0.13 (6) **	107.90	2.87 ± 0.15 (6)	107.90	2.65 ± 0.15 (5)	99.60	2.76 ± 0.17 (5)	103.70
decaBDE	2.65 ± 0.09 (6)	98.65	2.61 ± 0.29 (4)	98.65	2.63 ± 0.12 (6)	99.45	2.63 ± 0.07 (6)	99.32
HBCD	2.65 ± 0.03 (5) *	106.38	2.82 ± 0.05 (6)	106.38	2.65 ± 0.13 (6)	99.81	2.72 ± 0.06 (6)	102.60
TBB	2.83 ± 0.20 (5)	102.23	2.89 ± 0.11 (6)	102.23	2.81 ± 0.20 (5)	99.52	2.67 ± 0.21 (5)	94.59
TBPH	2.66 ± 0.19 (6) *	111.55	2.96 ± 0.08 (6)	111.55	2.83 ± 0.07 (6)	106.49	2.70 ± 0.10 (6)	101.50
TBBPA-DBPE	2.86 ± 0.12 (6)	92.10	2.64 ± 0.12 (6)	92.10	2.68 ± 0.10 (5)	93.49	2.55 ± 0.17 (6)	88.99
BTBPE	2.67 ± 0.07 (6)	98.15	2.62 ± 0.11 (6)	98.15	2.82 ± 0.08 (6)	105.45	2.86 ± 0.15 (6)	107.14
DBDPE	3.03 ± 0.06 (6)	103.41	3.13 ± 0.06 (6)	103.41	2.81 ± 0.11 (6)	92.65	2.95 ± 0.21 (6)	97.43
HCDBCO	2.79 ± 0.17 (6)	93.76	2.61 ± 0.12 (6)	93.76	2.62 ± 0.03 (6)	94.13	2.63 ± 0.10 (6)	94.42

Experiment Number: Multiple

Test Type: TOX

Route: Oral Gavage

Species/Strain: Rat/Harlan Sprague Dawley

PA41X: Clinical Chemistry Summary

Test Compound: Flame Retardants

CAS Number: N/A

Date Report Requested: 04/22/2019

Time Report Requested: 15:05:21

Lab: NTP

A/G Ratio

Treatment Groups (umol/kg)

Test Article	100		1000	
	Mean	% of Control	Mean	% of Control
PBDE-47	2.31 ± 0.07 (6) *	86.83	2.13 ± 0.08 (6) *	79.95
decaBDE	2.57 ± 0.11 (5)	97.10	2.56 ± 0.13 (4)	96.68
HBCD	2.61 ± 0.08 (6)	98.16	2.40 ± 0.08 (6)	90.23
TBB	3.00 ± 0.08 (5)	106.06	2.75 ± 0.11 (5)	97.26
TBPH	2.51 ± 0.05 (6)	94.49	2.58 ± 0.13 (6)	97.12
TBBPA-DBPE	2.81 ± 0.07 (6)	98.30	2.82 ± 0.09 (6)	98.39
BTBPE	2.71 ± 0.14 (6)	101.49	2.71 ± 0.12 (6)	101.50
DBDPE	3.08 ± 0.13 (6)	101.78	2.69 ± 0.19 (6)	88.86
HCDBCO	2.40 ± 0.11 (6)	86.24	2.54 ± 0.09 (6)	90.94

Experiment Number: Multiple

Test Type: TOX

Route: Oral Gavage

Species/Strain: Rat/Harlan Sprague Dawley

PA41X: Clinical Chemistry Summary

Test Compound: Flame Retardants

CAS Number: N/A

Date Report Requested: 04/22/2019

Time Report Requested: 15:05:21

Lab: NTP

Albumin (g/dL)

Treatment Groups (umol/kg)

Test Article	0			0.1		1		10	
	Mean	Mean	% of Control	Mean	% of Control	Mean	% of Control	Mean	% of Control
PBDE-47	4.30 ± 0.09 (6)	4.25 ± 0.07 (6)	98.84	4.22 ± 0.07 (6)	98.06	4.30 ± 0.05 (5)	100.00		
decaBDE	4.38 ± 0.05 (6)	4.32 ± 0.09 (6)	98.48	4.35 ± 0.08 (6)	99.24	4.32 ± 0.09 (6)	98.48		
HBCD	4.30 ± 0.10 (5)	4.42 ± 0.05 (6)	102.71	4.50 ± 0.04 (6)	104.65	4.35 ± 0.03 (6)	101.16		
TBB	4.46 ± 0.07 (5)	4.20 ± 0.04 (6) *	94.17	4.40 ± 0.08 (6)	98.65	4.30 ± 0.08 (5)	96.41		
TBPH	4.35 ± 0.07 (6)	4.28 ± 0.09 (6)	98.47	4.45 ± 0.11 (6)	102.30	4.42 ± 0.07 (6)	101.53		
TBBPA-DBPE	4.40 ± 0.04 (6)	4.55 ± 0.06 (6)	103.41	4.58 ± 0.04 (5)	104.09	4.45 ± 0.08 (6)	101.14		
BTBPE	4.22 ± 0.07 (6) **	4.22 ± 0.08 (6)	100.00	4.35 ± 0.04 (6)	103.16	4.33 ± 0.07 (6)	102.77		
DBDPE	4.28 ± 0.05 (6)	4.27 ± 0.08 (6)	99.61	4.27 ± 0.04 (6)	99.61	4.28 ± 0.09 (6)	100.00		
HCDBCO	4.32 ± 0.08 (6)	4.23 ± 0.06 (6)	98.07	4.28 ± 0.08 (6)	99.23	4.18 ± 0.04 (6)	96.91		

Experiment Number: Multiple

Test Type: TOX

Route: Oral Gavage

Species/Strain: Rat/Harlan Sprague Dawley

PA41X: Clinical Chemistry Summary

Test Compound: Flame Retardants

CAS Number: N/A

Date Report Requested: 04/22/2019

Time Report Requested: 15:05:21

Lab: NTP

Albumin (g/dL)

Treatment Groups (umol/kg)

Test Article	100		1000	
	Mean	% of Control	Mean	% of Control
PBDE-47	3.98 ± 0.05 (6) *	92.64	4.23 ± 0.07 (6)	98.45
decaBDE	4.23 ± 0.09 (6)	96.58	4.43 ± 0.07 (6)	101.14
HBCD	4.37 ± 0.08 (6)	101.55	4.40 ± 0.07 (6)	102.33
TBB	4.28 ± 0.06 (6)	96.04	4.32 ± 0.04 (5)	96.86
TBPH	4.42 ± 0.09 (6)	101.53	4.30 ± 0.07 (6)	98.85
TBBPA-DBPE	4.35 ± 0.02 (6)	98.86	4.58 ± 0.08 (6)	104.17
BTBPE	4.40 ± 0.04 (6)	104.35	4.43 ± 0.04 (6) *	105.14
DBDPE	4.38 ± 0.02 (6)	102.33	4.40 ± 0.07 (6)	102.72
HCDBCO	4.08 ± 0.08 (6)	94.59	4.23 ± 0.09 (6)	98.07

Experiment Number: Multiple

Test Type: TOX

Route: Oral Gavage

Species/Strain: Rat/Harlan Sprague Dawley

PA41X: Clinical Chemistry Summary

Test Compound: Flame Retardants

CAS Number: N/A

Date Report Requested: 04/22/2019

Time Report Requested: 15:05:21

Lab: NTP

Cholesterol (mg/dL)

Treatment Groups (umol/kg)

Test Article	0		0.1		1		10	
	Mean		Mean	% of Control	Mean	% of Control	Mean	% of Control
PBDE-47	137.7 ± 2.8 (6) **		123.6 ± 3.3 (5)	89.8	143.2 ± 8.8 (5)	104.0	134.3 ± 5.0 (6)	97.6
decaBDE	151.3 ± 10.0 (6)		137.0 ± 14.1 (5)	90.5	138.8 ± 4.5 (5)	91.7	135.2 ± 9.7 (6)	89.3
HBCD	113.0 ± 23.1 (5)		132.8 ± 8.9 (5)	117.5	141.3 ± 6.6 (6)	125.1	139.2 ± 6.6 (6)	123.2
TBB	150.8 ± 14.8 (4)		130.7 ± 2.4 (6)	86.7	141.3 ± 10.6 (6)	93.8	146.0 ± 12.3 (5)	96.8
TBPH	141.3 ± 6.1 (6)		126.2 ± 3.0 (6)	89.3	133.8 ± 7.4 (6)	94.7	146.2 ± 8.5 (6)	103.4
TBBPA-DBPE	133.2 ± 3.8 (6)		151.3 ± 11.3 (6)	113.6	147.7 ± 6.7 (6)	110.9	153.2 ± 7.9 (6)	115.0
BTBPE	137.0 ± 4.2 (6)		128.8 ± 4.0 (6)	94.0	133.3 ± 3.2 (6)	97.3	138.3 ± 5.2 (6)	101.0
DBDPE	139.7 ± 5.5 (6)		132.7 ± 7.6 (6)	95.0	134.5 ± 5.9 (6)	96.3	143.8 ± 9.9 (6)	103.0
HCDBCO	138.5 ± 7.7 (6)		135.0 ± 3.5 (6)	97.5	133.5 ± 6.4 (6)	96.4	140.5 ± 8.2 (6)	101.4

Experiment Number: Multiple

Test Type: TOX

Route: Oral Gavage

Species/Strain: Rat/Harlan Sprague Dawley

PA41X: Clinical Chemistry Summary

Test Compound: Flame Retardants

CAS Number: N/A

Date Report Requested: 04/22/2019

Time Report Requested: 15:05:21

Lab: NTP

Cholesterol (mg/dL)

Treatment Groups (umol/kg)

Test Article	100		1000	
	Mean	% of Control	Mean	% of Control
PBDE-47	152.7 ± 10.1 (6)	110.9	213.0 ± 7.8 (6) **	154.7
decaBDE	144.3 ± 7.0 (6)	95.4	180.4 ± 10.2 (5)	119.2
HBCD	132.0 ± 7.5 (6)	116.8	145.0 ± 6.5 (6)	128.3
TBB	132.8 ± 3.1 (6)	88.1	135.8 ± 5.5 (5)	90.1
TBPH	138.2 ± 4.7 (6)	97.8	127.4 ± 6.8 (5)	90.1
TBBPA-DBPE	125.8 ± 5.4 (6)	94.5	138.0 ± 6.4 (6)	103.6
BTBPE	142.5 ± 6.8 (6)	104.0	141.5 ± 4.3 (6)	103.3
DBDPE	137.2 ± 4.6 (6)	98.2	152.2 ± 4.4 (6)	108.9
HCDBCO	147.5 ± 9.4 (6)	106.5	135.7 ± 7.3 (6)	98.0

Experiment Number: Multiple

Test Type: TOX

Route: Oral Gavage

Species/Strain: Rat/Harlan Sprague Dawley

PA41X: Clinical Chemistry Summary

Test Compound: Flame Retardants

CAS Number: N/A

Date Report Requested: 04/22/2019

Time Report Requested: 15:05:21

Lab: NTP

Triglyceride (mg/dL)							
Treatment Groups (umol/kg)							
Test Article	0			1		10	
	Mean	Mean	% of Control	Mean	% of Control	Mean	% of Control
PBDE-47	78.8 ± 6.8 (6)	58.7 ± 12.2 (6)	74.4	85.8 ± 8.4 (5)	108.8	52.3 ± 5.5 (6)	66.4
decaBDE	75.5 ± 12.6 (6)	87.8 ± 14.4 (5)	116.3	100.2 ± 17.5 (6)	132.7	94.7 ± 3.6 (6)	125.4
HBCD	83.4 ± 8.7 (5)	66.0 ± 11.4 (5)	79.1	85.2 ± 2.4 (6)	102.1	72.2 ± 3.3 (6)	86.5
TBB	78.4 ± 10.9 (5)	78.7 ± 11.4 (6)	100.3	79.6 ± 13.7 (5)	101.5	87.6 ± 17.2 (5)	111.7
TBPH	104.2 ± 16.3 (6)	78.2 ± 7.6 (6)	75.0	82.0 ± 4.4 (6)	78.7	97.2 ± 5.6 (6)	93.3
TBBPA-DBPE	70.7 ± 4.4 (6)	85.7 ± 11.2 (6)	121.2	84.8 ± 7.4 (6)	120.0	71.7 ± 7.9 (6)	101.4
BTBPE	73.5 ± 6.4 (6)	83.0 ± 9.7 (6)	112.9	77.8 ± 8.8 (6)	105.9	74.0 ± 5.4 (6)	100.7
DBDPE	76.0 ± 8.1 (6)	70.0 ± 7.2 (6)	92.1	63.8 ± 6.5 (6)	84.0	71.3 ± 7.1 (6)	93.9
HCDBCO	88.2 ± 5.8 (6)	66.7 ± 9.2 (6)	75.6	77.7 ± 7.5 (6)	88.1	79.0 ± 7.6 (6)	89.6

Experiment Number: Multiple

Test Type: TOX

Route: Oral Gavage

Species/Strain: Rat/Harlan Sprague Dawley

PA41X: Clinical Chemistry Summary

Test Compound: Flame Retardants

CAS Number: N/A

Date Report Requested: 04/22/2019

Time Report Requested: 15:05:21

Lab: NTP

Triglyceride (mg/dL)

Treatment Groups (umol/kg)

Test Article	100		1000	
	Mean	% of Control	Mean	% of Control
PBDE-47	98.5 ± 17.6 (6)	124.9	119.0 ± 15.1 (6)	151.0
decaBDE	91.2 ± 10.1 (6)	120.8	88.5 ± 16.0 (4)	117.2
HBCD	81.3 ± 10.9 (6)	97.5	105.5 ± 5.4 (6)	126.5
TBB	83.8 ± 6.9 (6)	106.9	87.0 ± 9.1 (5)	111.0
TBPH	83.5 ± 4.9 (6)	80.2	93.7 ± 23.1 (6)	89.9
TBBPA-DBPE	82.5 ± 8.2 (6)	116.7	74.7 ± 8.7 (6)	105.7
BTBPE	81.2 ± 11.4 (6)	110.4	78.7 ± 5.5 (6)	107.0
DBDPE	72.7 ± 4.5 (6)	95.6	68.0 ± 7.6 (6)	89.5
HCDBCO	109.3 ± 18.2 (6)	124.0	102.2 ± 8.9 (6)	115.9

Experiment Number: Multiple

Test Type: TOX

Route: Oral Gavage

Species/Strain: Rat/Harlan Sprague Dawley

PA41X: Clinical Chemistry Summary

Test Compound: Flame Retardants

CAS Number: N/A

Date Report Requested: 04/22/2019

Time Report Requested: 15:05:21

Lab: NTP

Alanine Aminotransferase (IU/L)

Treatment Groups (umol/kg)

Test Article	0		0.1		1		10	
	Mean	% of Control	Mean	% of Control	Mean	% of Control	Mean	% of Control
PBDE-47	55.0 ± 1.3 (6) **		60.0 ± 4.4 (6)	109.1	51.2 ± 2.2 (6)	93.0	59.8 ± 3.5 (5)	108.7
decaBDE	63.0 ± 4.0 (6)		64.0 ± 1.8 (6)	101.6	71.5 ± 5.0 (6)	113.5	61.3 ± 3.3 (6)	97.4
HBCD	54.6 ± 3.1 (5)		55.7 ± 2.3 (6)	102.0	64.7 ± 3.8 (6)	118.4	57.8 ± 2.8 (6)	105.9
TBB	56.4 ± 3.3 (5)		58.0 ± 2.1 (6)	102.8	63.3 ± 5.1 (6)	112.3	58.8 ± 3.5 (5)	104.3
TBPH	60.5 ± 3.3 (6)		58.8 ± 3.1 (6)	97.2	55.2 ± 3.8 (6)	91.2	55.8 ± 1.7 (6)	92.3
TBBPA-DBPE	55.8 ± 2.3 (6) **		59.2 ± 2.7 (6)	106.0	52.3 ± 2.8 (6)	93.7	79.8 ± 15.2 (6) *	143.0
BTBPE	55.0 ± 1.4 (6)		54.3 ± 2.2 (6)	98.8	57.0 ± 1.5 (6)	103.6	52.3 ± 2.4 (6)	95.2
DBDPE	49.2 ± 2.7 (6)		51.3 ± 2.8 (6)	104.4	53.5 ± 2.8 (6)	108.8	50.3 ± 1.9 (6)	102.4
HCDBCO	56.0 ± 3.3 (6)		56.0 ± 1.8 (6)	100.0	57.3 ± 4.9 (6)	102.4	58.8 ± 5.4 (6)	105.1

Experiment Number: Multiple

Test Type: TOX

Route: Oral Gavage

Species/Strain: Rat/Harlan Sprague Dawley

PA41X: Clinical Chemistry Summary

Test Compound: Flame Retardants

CAS Number: N/A

Date Report Requested: 04/22/2019

Time Report Requested: 15:05:21

Lab: NTP

Alanine Aminotransferase (IU/L)

Treatment Groups (umol/kg)

Test Article	100		1000	
	Mean	% of Control	Mean	% of Control
PBDE-47	65.5 ± 2.7 (6)	119.1	75.2 ± 4.9 (6) **	136.7
decaBDE	66.2 ± 3.6 (6)	105.0	65.0 ± 1.7 (6)	103.2
HBCD	51.7 ± 2.9 (6)	94.6	56.0 ± 5.4 (6)	102.6
TBB	55.3 ± 1.4 (6)	98.1	53.4 ± 1.7 (5)	94.7
TBPH	58.8 ± 4.1 (6)	97.2	56.7 ± 3.1 (6)	93.7
TBBPA-DBPE	66.8 ± 3.4 (6) *	119.7	75.2 ± 2.9 (6) **	134.6
BTBPE	56.3 ± 2.7 (6)	102.4	56.5 ± 2.8 (6)	102.7
DBDPE	56.5 ± 4.2 (6)	114.9	59.3 ± 3.7 (6)	120.7
HCDBCO	65.8 ± 1.6 (6)	117.6	57.5 ± 2.7 (6)	102.7

Experiment Number: Multiple

Test Type: TOX

Route: Oral Gavage

Species/Strain: Rat/Harlan Sprague Dawley

PA41X: Clinical Chemistry Summary

Test Compound: Flame Retardants

CAS Number: N/A

Date Report Requested: 04/22/2019

Time Report Requested: 15:05:21

Lab: NTP

Creatine Kinase (IU/L)

Treatment Groups (umol/kg)

Test Article	0		0.1		1		10	
	Mean		Mean	% of Control	Mean	% of Control	Mean	% of Control
PBDE-47	207.3 ± 8.4 (6)		218.2 ± 10.8 (5)	105.2	183.7 ± 12.6 (6)	88.6	209.0 ± 17.3 (6)	100.8
decaBDE	221.0 ± 24.5 (6)		226.0 ± 25.5 (5)	102.3	181.8 ± 11.9 (6)	82.3	185.2 ± 13.6 (6)	83.8
HBCD	139.0 ± 5.8 (5) *		136.7 ± 7.1 (6)	98.3	177.8 ± 14.5 (6)	127.9	174.7 ± 7.0 (6)	125.7
TBB	194.2 ± 14.7 (5)		185.2 ± 5.6 (6)	95.3	233.4 ± 33.5 (5)	120.2	224.5 ± 25.9 (6)	115.6
TBPH	183.2 ± 10.8 (6)		163.8 ± 5.7 (6)	89.4	166.7 ± 13.5 (6)	91.0	173.3 ± 13.3 (6)	94.6
TBBPA-DBPE	178.2 ± 6.2 (6) **		199.3 ± 16.8 (6)	111.9	190.3 ± 7.5 (6)	106.8	224.0 ± 12.9 (6) **	125.7
BTBPE	180.2 ± 9.2 (6)		181.5 ± 18.9 (6)	100.7	190.8 ± 12.6 (6)	105.9	181.5 ± 13.7 (6)	100.7
DBDPE	195.0 ± 9.1 (6)		191.7 ± 11.8 (6)	98.3	195.0 ± 13.0 (6)	100.0	172.3 ± 8.9 (6)	88.4
HCDBCO	145.3 ± 9.6 (6) **		162.0 ± 7.3 (6)	111.5	186.5 ± 25.9 (6)	128.3	174.0 ± 11.1 (6)	119.7

Experiment Number: Multiple

Test Type: TOX

Route: Oral Gavage

Species/Strain: Rat/Harlan Sprague Dawley

PA41X: Clinical Chemistry Summary

Test Compound: Flame Retardants

CAS Number: N/A

Date Report Requested: 04/22/2019

Time Report Requested: 15:05:21

Lab: NTP

Creatine Kinase (IU/L)

Treatment Groups (umol/kg)

Test Article	100		1000	
	Mean	% of Control	Mean	% of Control
PBDE-47	231.0 ± 18.1 (6)	111.4	203.2 ± 9.7 (6)	98.0
decaBDE	235.2 ± 43.8 (6)	106.4	195.4 ± 14.5 (5)	88.4
HBCD	153.5 ± 7.5 (6)	110.4	167.7 ± 11.4 (6)	120.6
TBB	185.0 ± 10.9 (6)	95.3	192.6 ± 16.9 (5)	99.2
TBPH	180.5 ± 10.8 (6)	98.5	163.3 ± 10.3 (6)	89.2
TBBPA-DBPE	214.8 ± 4.0 (6) **	120.6	215.3 ± 8.1 (6) **	120.9
BTBPE	179.2 ± 11.4 (6)	99.4	173.0 ± 5.4 (6)	96.0
DBDPE	196.5 ± 18.0 (6)	100.8	204.0 ± 7.2 (6)	104.6
HCDBCO	186.5 ± 9.2 (6) **	128.3	174.3 ± 8.3 (6) *	120.0

Experiment Number: Multiple

Test Type: TOX

Route: Oral Gavage

Species/Strain: Rat/Harlan Sprague Dawley

PA41X: Clinical Chemistry Summary

Test Compound: Flame Retardants

CAS Number: N/A

Date Report Requested: 04/22/2019

Time Report Requested: 15:05:21

Lab: NTP

Sorbitol Dehydrogenase (IU/L)

Treatment Groups (umol/kg)

Test Article	0		0.1		1		10	
	Mean	Mean	% of Control	Mean	% of Control	Mean	% of Control	
PBDE-47	6.5 ± 2.1 (6)	5.4 ± 3.0 (5)	83.3	-0.6 ± 4.4 (4)	-9.6	5.5 ± 1.5 (6)	84.1	
decaBDE	8.7 ± 1.0 (6)	11.5 ± 1.3 (4)	131.7	7.9 ± 1.1 (6)	90.3	9.5 ± 1.2 (6)	108.6	
HBCD	7.2 ± 0.6 (5) **	8.1 ± 1.0 (6)	112.4	9.4 ± 0.5 (6)	129.5	8.7 ± 0.5 (6)	119.8	
TBB	5.8 ± 1.1 (5)	4.8 ± 1.1 (6)	83.9	7.3 ± 2.8 (5)	126.7	6.5 ± 1.0 (6)	112.3	
TBPH	8.1 ± 0.7 (6)	8.0 ± 0.7 (6)	98.0	7.9 ± 0.8 (6)	96.5	7.2 ± 0.7 (6)	88.9	
TBBPA-DBPE	10.0 ± 1.5 (6)	7.4 ± 0.9 (6)	73.8	10.1 ± 1.1 (5)	101.0	19.2 ± 10.4 (6)	192.0	
BTBPE	6.1 ± 0.9 (5)	4.8 ± 1.0 (6)	78.4	5.5 ± 0.9 (5)	89.5	4.8 ± 0.8 (6)	78.4	
DBDPE	4.1 ± 0.5 (6)	4.3 ± 0.8 (6)	105.3	4.8 ± 0.5 (6)	115.4	4.9 ± 0.6 (6)	119.0	
HCDBCO	4.6 ± 0.8 (5)	4.6 ± 1.0 (6)	98.8	4.5 ± 0.5 (5)	97.8	6.1 ± 0.7 (6)	131.7	

Experiment Number: Multiple

Test Type: TOX

Route: Oral Gavage

Species/Strain: Rat/Harlan Sprague Dawley

PA41X: Clinical Chemistry Summary

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Date Report Requested: 04/22/2019

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Lab: NTP

Sorbitol Dehydrogenase (IU/L)

Treatment Groups (umol/kg)

Test Article	100		1000	
	Mean	% of Control	Mean	% of Control
PBDE-47	6.6 ± 2.3 (6)	102.1	15.4 ± 5.0 (6)	237.0
decaBDE	8.6 ± 1.8 (6)	98.3	6.0 ± 1.3 (4)	69.0
HBCD	10.0 ± 1.2 (6)	138.3	13.4 ± 2.2 (6) **	186.1
TBB	8.0 ± 2.0 (5)	139.2	11.7 ± 4.7 (3)	202.5
TBPH	9.9 ± 1.5 (6)	122.1	7.5 ± 1.0 (6)	92.2
TBBPA-DBPE	8.8 ± 0.5 (6)	87.5	7.9 ± 0.3 (6)	78.5
BTBPE	4.2 ± 0.8 (6)	68.9	5.0 ± 0.8 (6)	82.5
DBDPE	4.0 ± 0.6 (6)	96.0	5.3 ± 0.9 (4)	128.7
HCDBCO	5.6 ± 1.1 (5)	122.1	4.6 ± 1.0 (5)	100.4

Experiment Number: Multiple

Test Type: TOX

Route: Oral Gavage

Species/Strain: Rat/Harlan Sprague Dawley

PA41X: Clinical Chemistry Summary

Test Compound: Flame Retardants

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Date Report Requested: 04/22/2019

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Lab: NTP

Bile salt/acids (umol/L)

Treatment Groups (umol/kg)

Test Article	0		0.1		1		10	
	Mean		Mean	% of Control	Mean	% of Control	Mean	% of Control
PBDE-47	37.3 ± 8.4 (6) **		35.2 ± 9.3 (5)	94.3	33.6 ± 4.3 (5)	90.0	38.2 ± 9.4 (6)	102.2
decaBDE	55.0 ± 11.3 (6) *		54.4 ± 9.1 (5)	98.9	47.0 ± 7.9 (6)	85.5	34.5 ± 3.0 (6)	62.7
HBCD	72.8 ± 10.6 (5)		40.2 ± 4.3 (6)	55.2	63.3 ± 8.0 (6)	87.0	54.3 ± 7.4 (6)	74.6
TBB	52.8 ± 10.4 (4) **		84.0 ± 9.1 (6)	159.2	70.4 ± 4.7 (5)	133.5	44.8 ± 7.5 (6)	85.0
TBPH	34.3 ± 4.4 (6)		60.2 ± 11.8 (6)	175.2	57.7 ± 9.3 (6)	168.0	44.5 ± 5.9 (6)	129.6
TBBPA-DBPE	39.0 ± 8.5 (6)		43.5 ± 14.9 (6)	111.5	44.7 ± 11.5 (6)	114.5	27.8 ± 11.4 (6)	71.4
BTBPE	68.5 ± 3.5 (6)		79.0 ± 7.1 (6)	115.3	50.8 ± 3.6 (6)	74.2	61.0 ± 7.3 (6)	89.1
DBDPE	48.5 ± 5.0 (6)		37.5 ± 4.3 (6)	77.3	59.3 ± 10.5 (6)	122.3	49.8 ± 6.8 (6)	102.7
HCDBCO	36.7 ± 5.4 (6)		43.7 ± 3.9 (6)	119.1	59.2 ± 9.1 (6)	161.4	56.8 ± 11.7 (6)	155.0

Experiment Number: Multiple

Test Type: TOX

Route: Oral Gavage

Species/Strain: Rat/Harlan Sprague Dawley

PA41X: Clinical Chemistry Summary

Test Compound: Flame Retardants

CAS Number: N/A

Date Report Requested: 04/22/2019

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Lab: NTP

Bile salt/acids (umol/L)

Treatment Groups (umol/kg)

Test Article	100		1000	
	Mean	% of Control	Mean	% of Control
PBDE-47	15.7 ± 2.6 (6) *	42.0	9.0 ± 1.6 (6) **	24.1
decaBDE	30.2 ± 4.3 (5)	54.9	41.0 ± 7.4 (4)	74.5
HBCD	44.7 ± 14.0 (6)	61.4	43.0 ± 8.5 (6)	59.1
TBB	37.2 ± 4.9 (5)	70.5	31.5 ± 5.9 (4)	59.7
TBPH	46.8 ± 6.4 (6)	136.4	53.8 ± 7.0 (6)	156.8
TBBPA-DBPE	49.5 ± 4.5 (6)	126.9	41.0 ± 4.3 (6)	105.1
BTBPE	68.8 ± 4.8 (6)	100.5	53.5 ± 7.1 (6)	78.1
DBDPE	64.3 ± 8.8 (6)	132.6	45.3 ± 6.8 (6)	93.5
HCDBCO	48.8 ± 4.5 (6)	133.2	27.8 ± 3.2 (6)	75.9

Experiment Number: Multiple

Test Type: TOX

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LEGEND

Values given as mean \pm SEM (N) with Percent of Control calculated by (dosed group mean / control group mean) x 100

Clinical Chemistry for gestation phase includes pregnant females only

Statistical analysis performed by Jonckheere (trend) and Shirley or Dunn (pairwise) tests

Statistical significance for the control group indicates a significant trend test

Statistical significance for a treatment group indicates a significant pairwise test compared to the vehicle control group

* Statistically significant at $P \leq 0.05$

** Statistically significant at $P \leq 0.01$

Legacy Flame Retardants: PBDE-47 = 2,2',4,4'-Tetrabromodiphenyl ether; decaBDE = Decabromodiphenyl ether; HBCD = 1,3,5,7,9,11-Hexabromocyclododecane

Emerging Flame Retardants: TBB = 2-Ethylhexyl-2,3,4,5-tetrabromobenzoate; TBPH = Bis(2-ethylhexyl) tetrabromophthalate; TBBPA-DBPE = Tetrabromobisphenol A-bis(2,3 dibromopropyl ether); BTBPE = 1,2-Bis(2,4,6-tribromophenoxy)ethane; DBDPE = 1,2-Bis(pentabromophenyl)ethane; HCDBCO = Hexachlorocyclopentadienyl-dibromocyclooctane

PBDE-47: One value each for A/G Ratio, Creatine Kinase, Cholesterol, Globulin, Glucose, Total Protein and Triglycerides in the 0.1 umol/kg group were excluded. Two values each for Bile salts/acids, Creatinine, and Urea Nitrogen in the 0.1 umol/kg group were excluded. Four values for Sorbitol Dehydrogenase in the 0.1 umol/kg group were excluded. One value each for Creatinine, Sorbitol Dehydrogenase, and Urea Nitrogen in the 0.1 umol/kg group were excluded. One value each for A/G Ratio, Alanine Aminotransferase, Albumin, Creatinine, and Globulin in the 10 umol/kg group were excluded.

decaBDE: One value each for A/G Ratio, Bile salts/acids, Cholesterol, Creatine Kinase, Creatinine, Globulin, Total Protein, Triglycerides, Urea Nitrogen and two values each for Glucose and Sorbitol Dehydrogenase in the 0.1 umol/kg group were excluded. One value for Cholesterol in the 1 umol/kg group was excluded. One value each for A/G Ratio, Bile salts/acids, Globulin, and Total Protein in the 100 umol/kg group were excluded. One value each for A/G Ratio, Bile salts/acids, Cholesterol, Creatine Kinase, Creatinine, Globulin, Glucose, Sorbitol Dehydrogenase, Total Protein, Triglycerides, and Urea Nitrogen in the 1000 umol/kg group were excluded.

HBCD: One value each for Glucose and Triglycerides in the 0.1 umol/kg group were excluded. One value for Urea Nitrogen in the 100 umol/kg group was excluded.

TBB: One value each for Bile salts/acids, Cholesterol and glucose in the 0 umol/kg group were excluded. One value each for A/G Ratio, Bile salts/acids, Creatine Kinase, Globulin, Glucose, Sorbitol Dehydrogenase, Total Protein, Triglycerides, and Urea Nitrogen in the 1 umol/kg group were excluded. One value each for Albumin, Alanine Aminotransferase, Cholesterol, Creatinine, Globulin, Glucose, Total Protein, and Urea Nitrogen in the 10 umol/kg group were excluded. One value for Bile salts/acids and two values each for Glucose and Sorbitol Dehydrogenase in the 1000 umol/kg group were excluded.

TBPH: One value for Creatinine in the 0 umol/kg group and one value for Cholesterol in the 1000 umol/kg group were excluded.

TBBPA-DBPE: One value for Creatinine in the 0.1 umol/kg group was excluded. One value each for Albumin, Total Protein, Globulin, A/G Ratio and Sorbitol Dehydrogenase in the 1 umol/kg group were excluded. One value for Glucose in the 10 umol/kg group was excluded.

BTBPE: One value for Sorbitol Dehydrogenase in the 1 umol/kg group was excluded.

DBDPE: Two values for Sorbitol Dehydrogenase in the 1000 umol/kg group were excluded.

Experiment Number: Multiple

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HCDBCO: One value for Sorbitol Dehydrogenase in the 0 umol/kg group was excluded. One value for Sorbitol Dehydrogenase in the 1 umol/kg group was excluded. One value for Sorbitol Dehydrogenase in the 100 umol/kg group was excluded. One value for Sorbitol Dehydrogenase in the 1000 umol/kg group was excluded.

**** END OF REPORT ****