

Urinary Mutagenicity and Risk for Bladder Cancer in Northern New England

This file contains the primary data for this study. The study determined the urinary mutagenicity of subjects in a bladder cancer case-control study performed in northern New England. The organics were deconjugated from glucuronide by enzymatic hydrolysis using sulfatase and β -glucuronidase, and then the organics were extracted from the urine by C18-methanol. The organics were solvent exchanged at 150X in dimethyl sulfoxide (DMSO), which was the control solvent.

The *Salmonella* plate-incorporation mutagenicity assay using strain YG1041 with metabolic activation (S9) was used to evaluate the mutagenicity of the urine extracts. As shown on the following data sheets, the dose of urine extract was expressed as ml-equivalent of urine per petri plate (ml-eq/plate), and the number of mutants (revertants or rev) colonies per plate were expressed as rev/plate. The study involved 156 bladder cancer cases and 247 controls. There was sufficient urine such that >70% of the samples were tested at 2 plates/dose; the remaining samples were tested at 1 plate/dose.

The data sheets show data for hydrolyzed (enzymatically deconjugated) and unhydrolyzed (not deconjugated) urine. The doses were 0, 0.3, 0.6, 1.2, 3, 6, and 12 ml-eq/plate. The bold values are the average of the numbers of rev/plate from 2 plates. The sample IDs are shown but are not decoded here; this was done by the NIH/NCI authors; thus, the experiments were performed blinded to the EPA scientists performing the extractions and mutagenicity analyses as to whether the samples were from bladder cancer cases or controls.

Negative control data for the mutagenesis experiments are shown as SP- (spontaneous rev/plate in the absence of S9) or SP+ (spontaneous rev/plate with S9). The positive control data were generated using 2-aminoanthracene (2A) at 2 ug/plate with S9, and 2-nitrofluorene (2NF) at 5 ug/plate without S9. Controls were performed using 3 plates/condition.

The data were analyzed using Prism (GraphPad, San Diego, CA) software by performing linear regressions. The slope (rev/ml-eq) of the linear regression was the mutagenic potency of each sample and is shown as "s"; the r-squared statistic of the regression is shown as "rs."

NHEERL/ECD/MTB/DMD/2006-02-RO
 Urinary Mutagenicity Study for New England Bladder Cancer / Arsenic
 Experiment date : 9/03/2008
 Strain: YG1041
 Activation :RLAO98 2X 2ppd

Batch #14
 PPM Hydrolyzed

Controls :	Plate 1	Plate 2	Plate 3	avg.
SP-	46	38	25	
SP+	58	53	62	58
2A	1208	1294	1285	
2NF	1548	1997	1765	

Sample ID:	ml-eq/pl	UCO0405 H	UCO02482 H	UCO03948 H	avg.
0	58	58	58	58	58
0.3	74	63	55	58	63
0.6	106	130	76	60	76
1.2	69	40			
3	256	260	121	118	129
6	285	230	109	189	168
12	231	231	71	91	
rs.					0.98
s					18.6

Sample ID:	ml-eq/pl	UCO02651 H	UCO01664 H	UCO0554 H	avg.
0	58	58	58	58	58
0.3	57	58	68	78	70
0.6	71	70	67	85	84
1.2					
3	124	138	86	93	96
6	231	224	48	102	131
12	310	310	51	97	
rs.					0
s					0
					0.97
					22.1

5

Sample ID: ml-eq/pl	UCO1610 H	UCO00193 H	UCO3678 H
0	58	58	58
0.3	50	68	70
0.6	72	89	81
1.2	92	96	92
3	88	111	72
6	88	118	54
12	56	110	

rs 0 0 0 0
s 0 0 0 0

Sample ID: ml-eq/pl	UCO1043 H	Blank H
0	58	58
0.3	74	63
0.6	79	43
1.2	104	46
3	107	60
6	107	63
12	65	62

rs 0 0
s 0 0

0	58	58	58	58	58	58
0.3	62	69	67	73	58	60
0.6	74	64	70	73	58	61
1.2	76	79	66	73	65	52
3	88	80	101	94	71	70
6	83	94	120	128	99	109
12						

rs.	0	0.97	0	0
s	0	10.6	0	0

Sample ID:	UCO1043 Uh	Blank Uh
ml-eq/pl		
0	58	58
0.3	71	71
0.6	67	70
1.2	75	70
3	78	66
6	108	73
12		66
	avg.	
	58	68
	64	65
	62	72
	69	91
	104	113
	118	

rs.	0
s	0

NHEERL/ECD/MTB/DMD/2006-02-Ro
 Urinary Mutagenicity Study for New England Bladder Cancer / Arsenic
 Experiment date : 9/03/2008
 Strain : YG1041
 Activation : RLA098 2X 2ppd

Batch #14
 PPM Unhydrolyzed

Sample ID: ml-eq/pl	UCO0405 Uh	UCO02482 Uh	UCO03948 Uh	avg.
0	58	58	58	58
0.3	86	54	70	55
0.6	105	74	80	83
1.2	114	77	89	82
3	67	91	97	88
6	73	106	159	88
12	76		151	155

rs.	0	0	0	0.91
s	0	0	0	14.5

Sample ID: ml-eq/pl	UCO02651 Uh	UCO01664 Uh	UCO00554 Uh	avg.
0	58	58	58	58
0.3	72	56	66	62
0.6	78	71	74	91
1.2	38	68	56	69
3	106	79	73	70
6	142	81	93	102
12				

rs.	0	0	0	0.98
s	0	0	0	21.0

Sample ID: ml-eq/pl	UCO1610 Uh	UCO00193 Uh	UCO3678 Uh	avg.

7

Sample ID: ml-eq/pl	UCO1603 H	UCOO661 H	UCO3172 H
0	63	63	63
0.3	62	82	74
0.6	58	73	57
1.2			
3	85	96	82
6	107	75	69
12	104	58	79
rs.			
s	0	0	0
	0	0	0

Sample ID: ml-eq/pl	UCO2515 H	Blank H
0	63	63
0.3	84	84
0.6	96	98
1.2		
3	149	143
6	97	96
12	102	54
rs.		
s	0.93	23.9

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NHEERL/ECD/MTB/DMD/2006-02-Ro
 Urinary Mutagenicity Study for New England Bladder Cancer / Arsenic
 Experiment date : 9/11/2008
 Strain: YG1041
 Activation :RLAO98 2X 2ppd

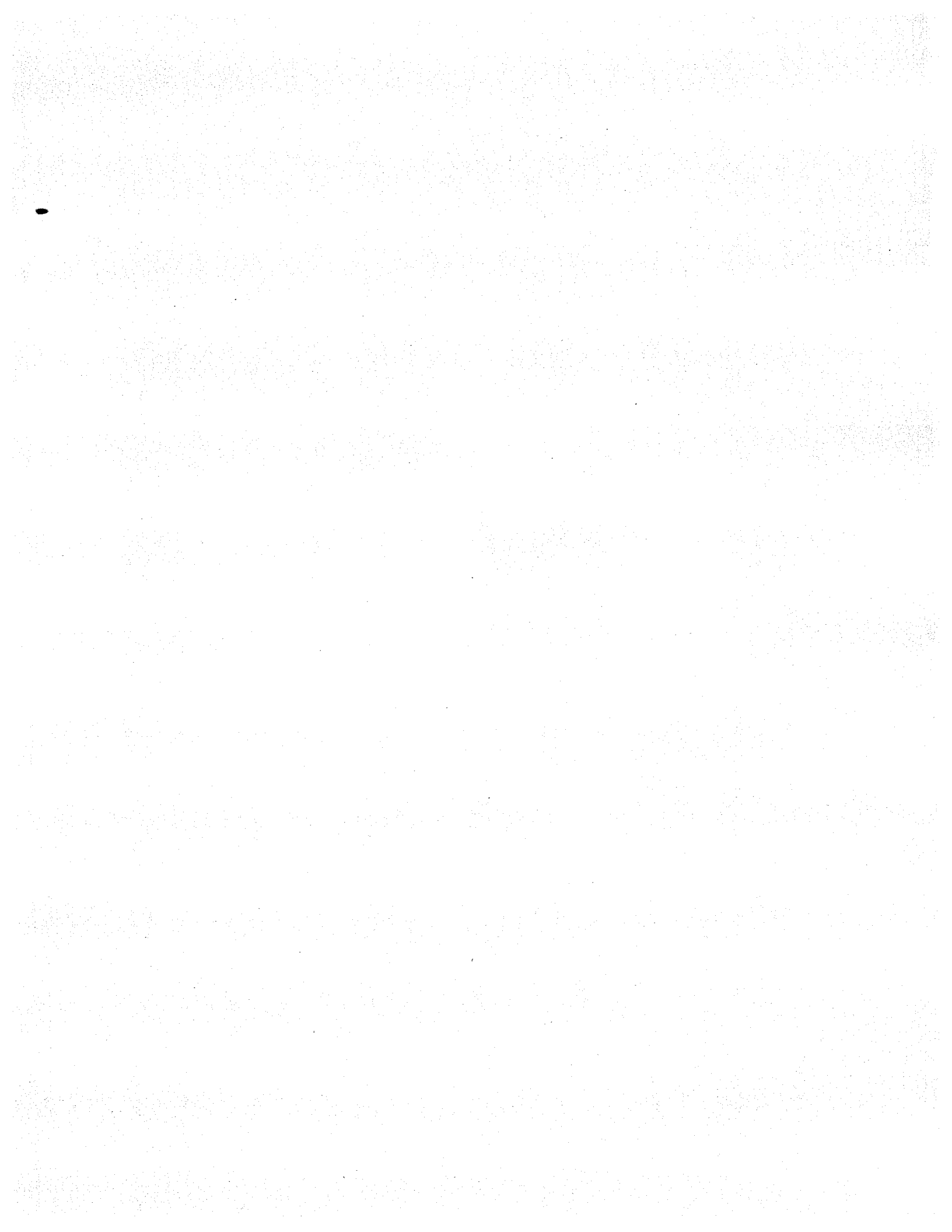
Batch #15
 PPM
 Unhydrolyzed

Sample ID: ml-eq/pl	UCO1560 Uh	UCO2873 Uh	UCO3384 Uh
0	63	63	63
0.3	44	42	42
0.6	50	75	48
1.2	65	62	57
3	61	111	87
6	90	198	113
12		88	95
			avg. 63
			48
			79
			67
			122
			202

rs. 0
 s 0
 0.96
 24.5

Sample ID: ml-eq/pl	UCO0970 Uh	UCO0609 Uh	UCO1765 Uh
0	63	63	63
0.3	62	60	52
0.6	63	59	53
1.2	52	62	61
3	65	70	34
6		94	40
12		109	
			avg. 63
			65
			51
			46
			40

rs 0
 s 0
 0
 0



Sample ID:
ml-eq/pl

UCO1603 Uh

0
0.3
0.6
1.2
3
6
12

63
68
53
71
62
85

UCOO661 Uh

63
54
57
70
77
79

63
66
64
68
83
105

UCO3172 Uh

63
52
59
58
78
89

63
73
56
60
69
130

rs
s

0
0

0
0

Sample ID:
ml-eq/pl

UCO2515 Uh

0
0.3
0.6
1.2
3
6
12

63
63
70
54
99
141

Blank Uh

63
68
59
58
106
136

63
47
62
70
65
70
64

rs
s

0.92
13.4

NHEERL/ECD/MTB/DMD/2006-02-RO
 Urinary Mutagenicity Study for New England Bladder Cancer / Arsenic
 Experiment date : 9/11/2008
 Strain: YG1041

Batch #16 Hydrolyzed

Controls :	Plate 1	Plate 2	Plate 3	avg.	
SP-	36	34	35		
SP+	62	56	70	63	
2A	1295	1232	1087		
2NF	1863	1876	1824		

Sample ID:	UCO2752 H	UCO1452 H	UCOO196 H	
ml-eq/pl				
0	63	63	63	63
0.3	78	54	80	65
0.6	77	73	93	66
1.2				
3	45	105	121	82
6		104	66	83
12		58	74	
rs				0
s				0

Sample ID:	UCOO738 H	UCO2760 H	UCOO944 H	
ml-eq/pl				
0	63	63	63	63
0.3	48	61	60	56
0.6	71	75	85	72
1.2				
3	77	87	84	98
6	66	89	75	83
12	55	70	88	
rs				0
s				0

30

Sample ID: ml-eq/pl	UCO0586 H	UCO3500 H	UCO1810 H
0	63	63	63
0.3	66	74	60
0.6	74	92	73
1.2			
3	111	104	90
6	141	146	106
12	178	88	90
fs			
s			
		avg. 112	avg. 100
		0.97	0.98
		14.6	11.7
			0
			0

Sample ID: ml-eq/pl	UCO3495 H	Blank H
0	63	63
0.3	86	62
0.6	97	59
1.2		
3	189	62
6	191	54
12	106	70
fs		
s		
		avg. 200
		0.99
		38.8

14

NHEERL/ECD/MTB/DMD/2006-02-Ro
 Urinary Mutagenicity Study for New England Bladder Cancer / Arsenic
 Experiment date : 9/11/2008
 Strain: YG1041
 Activation : RLAO98 2X 2ppd

Batch #16
 PPM
 Unhydrolyzed

Sample ID: ml-eq/pl	UCO2752 Uh	UCO1452 Uh	UCOO196 Uh
0	63	63	63
0.3	74	78	65
0.6	60	62	63
1.2	61	68	62
3	60	72	88
6	t	t	95
12	t	t	108
rs	0	0	0
s	0	0	0

Sample ID: ml-eq/pl	UCO0738 Uh	UCO2760 Uh	UCO0944 Uh
0	63	63	63
0.3	60	70	67
0.6	81	60	64
1.2	57	60	80
3	57	57	78
6	70	83	107
12			104
rs	0	0	0
s	0	0	0

Sample ID:	UCOO586 Uh	UCO3500 Uh	UCO1810 Uh
ml-eq/pl			
0	63	63	63
0.3	70	78	69
0.6	55	68	55
1.2	71	68	69
3	106	77	71
6	178	111	93
12		154	102

rs
s

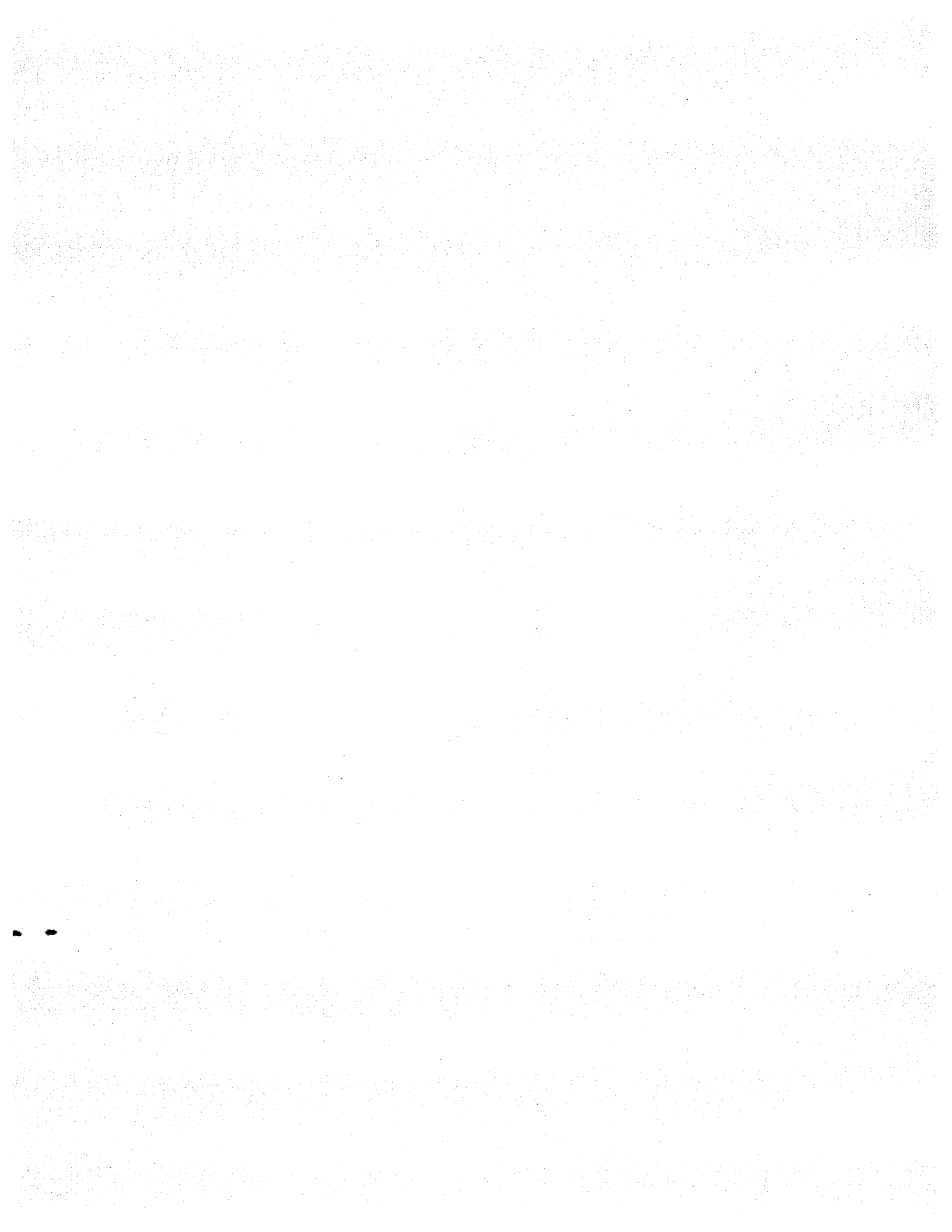
0.98
17.9

0
0

Sample ID:	UCO3495 Uh	Blank Uh
ml-eq/pl		
0	63	63
0.3	53	66
0.6	77	68
1.2	80	50
3	140	65
6	382	70
12		60

rs
s

0.97
50.9



NHEERL/ECD/MTB/DMD/2006-02-Ro
 Urinary Mutagenicity Study for New England Bladder Cancer/Arsenic

Experiment date : 9/17/2008

Strain : YG1041

Activation : RLAO 98 2X 2ppd

Batch #18

SHW PPM Unhydrolyzed

Controls	Plate 1	Plate 2	Plate 3	avg.
SP-	33	24	25	
SP+	51	65	52	56
2A	1124	1040	968	
2NF	1225	1178	1195	

Sample ID:	UCO1565 Uh	UCO3252 Uh	UCO 2836 Uh	UCO1156 Uh
ml-eq/pl		avg.	avg.	avg.
0	56	56	56	56
0.3	54	60	48	58
0.6	50	62	60	57
1.2	59	68	56	61
3	89	88	59	76
6	105	117	126	225
12	112	121	177	177
rs	0	0.90	0.97	0.86
s	0	5.9	11.9	27.1

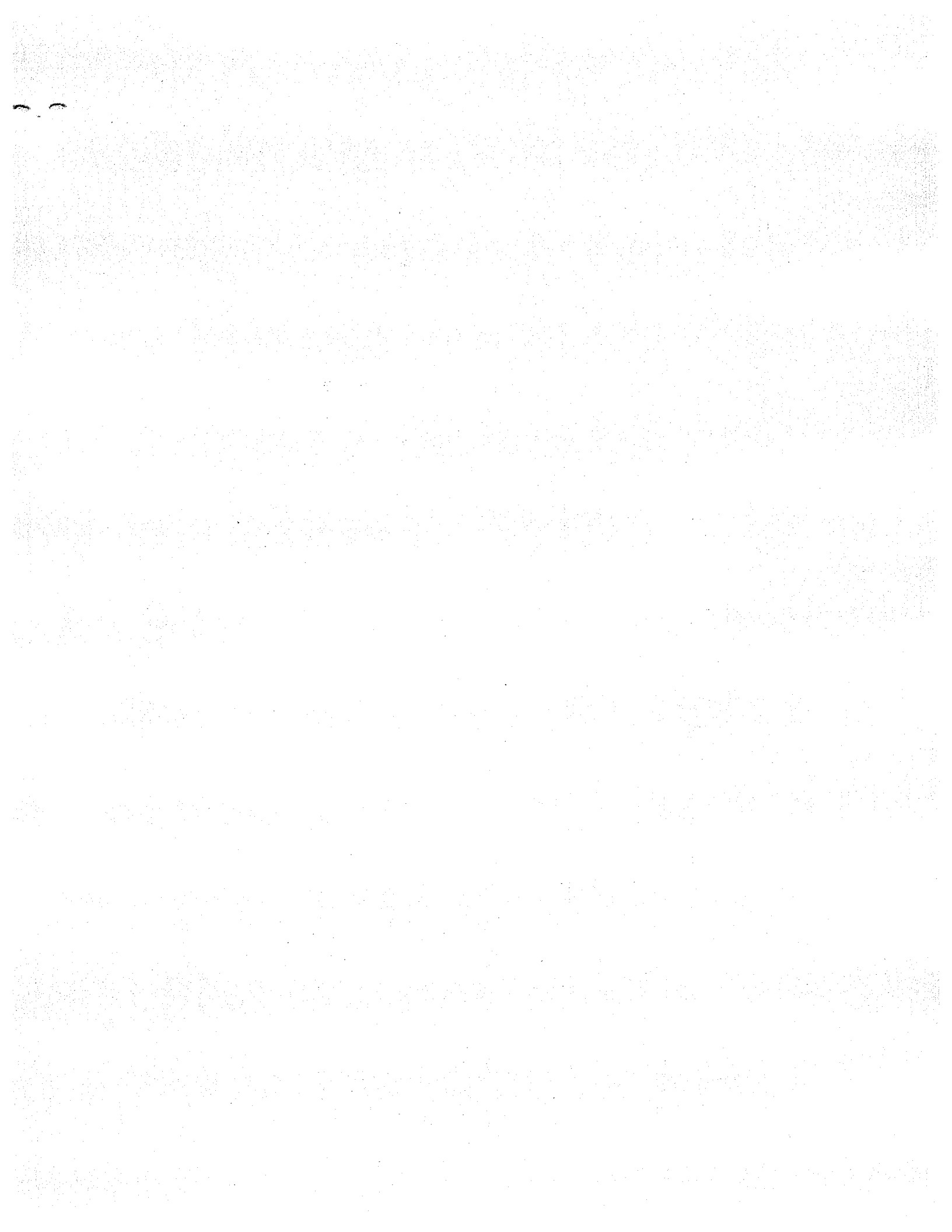
Sample ID:	UCO3694 Uh	UCO3797 Uh	UCO1587 Uh	UCO3509 Uh
ml-eq/pl			avg.	
0	56	56	56	56
0.3	65	67	35	55
0.6	68	1	64	43
1.2	45	54	c	48
3	5	194	85	63
6	c	242	108	68
12	t	133	67	56
rs	0	0.84	0.84	0
s	0	28.4	28.4	0

*** note - sample UCO2118 H was tested on 9/19/08 due to TE:

Sample ID:	UCO0346 Uh	UCO2118 Uh
ml-eq/pl		
0	56	56
0.3	63	72
0.6	49	70
1.2	58	81
3	75	73
6	54	96
12	2t	99
rs	0	0
s	0	0

NHEERL/ECD/MTB/DMD/2006-02-Ro
 Urinary Mutagenicity Study for New England Bladder Cancer/Arsenic
 Experiment date : 9/17/2008
 Strain : YG1041
 Activation ; RLAO 98 2X 2ppd

Sample ID:	UCO1565 H	UCO3252 H	UCO 2836 H	UCO1156 H
ml-eq/pl				
0	56	56	56	56
0.3	70	53	69	67
0.6	54	72	60	53
1.2	56	105	68	68
3	84	137	102	103
6	64	211	131	140
12	89	286	160	159
rs	0	0	0.97	0.96
s	0	0	24.7	14.5



Sample ID: ml-eq/pl	UCO3694 H	UCO3797 H	UCO1587 H	UCO3509 H
0	56	56	56	56
0.3	61	63	58	55
0.6	63	52	68	48
1.2	88	80	49	68
3	76	105	80	73
6	6	144	89	85
12	t	219	83	84
			avg.	
			0.97	
rs	0		14.3	0
s	0			0

Sample ID: ml-eq/pl	UCO0346 H	UCO2118 H	Blank H
0	56	56	56
0.3	53	58	69
0.6	66	46	67
1.2	74	59	49
3	92	74	57
6	107	97	43
12	104	100	60
		avg.	
		0.94	
rs		7.9	
s			

NHEERL/ECD/MTB/DMD/2006-02-RO
 Urinary Mutagenicity Study for New England Bladder Cancer/ Arsenic
 Experiment date : 9/19/2008
 Strain: YG1041
 Activation: RLOA98 2X 2ppd

Batch # 19
 PPM/ DMD

Hydrolyzed
 avg.

Controls:	Plate 1	Plate 2	Plate 3	avg.
SP-	44	39	37	
SP+	70	41	52	54
2A	1159	1189	1211	
2NF	1711	1571	1721	

Sample ID:	UCO1816 H	UCO0512 H	UCO0964 H	UCO3654 H
m/100- μ g/pl				
0	54	54	54	54
0.3	63	71	56	60
0.6	73	85	75	65
1.2	86	94	70	71
3	78	86	70	125
6	70	71	87	130
12	61	57	88	101
				avg.
				54
				53
				63
				78
				124
				136
				99
				0.97
				23.7
				0
				0

rs
 S

Sample ID:	UCO3168 H	UCO3864 H	UCO3529 H	UCO3608 H	UCO3654 H
m/100- μ g/pl					
0	54	54	54	54	54
0.3	49	46	63	75	60
0.6	72	66	68	89	70
1.2	60	73	70	88	102
3	85	80	79	127	120
6	70	78	65	135	158
12	60	71	83	175	165
				avg.	
				54	54
				68	60
				78	70
				82	80
				88	95
				127	124
				135	147
				175	170
				0.95	0.95
				21.7	21.7

rs
 S

7

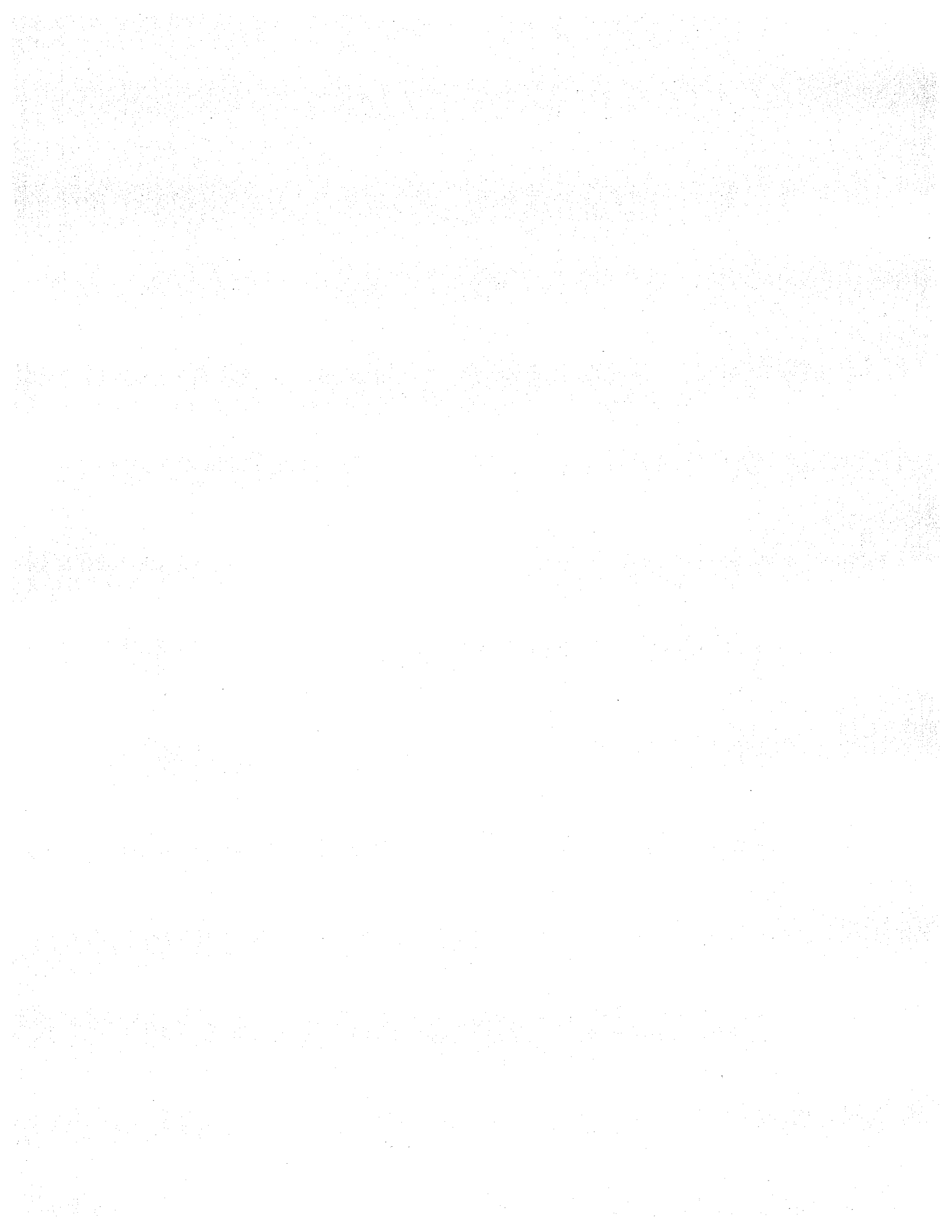
Sample ID:	UCO2263 H	UCO0390 H	Blank H
0	54	54	54
0.3	61	69	52
0.6	56	84	59
1.2	60	99	40
3	50	108	53
6	51	99	59
12	60	99	66
		avg.	
		54	54
		70	70
		106	95
		103	101
		117	113
		111	105
		109	104
rs	0	0	0.86
s	0	0	39.6

NHEERL/ECD/MTB/DMD/2006-02-RO
 Urinary Mutagenicity Study for New England Bladder Cancer/ Arsenic
 Experiment date : 9/19/2008
 Strain: YG1041
 Activation: RLOA98 2X 2ppd

Sample ID:	UCO1816 Uh	UCO0512 Uh	UCO0964 Uh	UCO3654 Uh
0	54	54	54	54
0.3	58	52	52	4
0.6	48	61	60	3
1.2	50	70	59	4
3	35	83	48	3
6	104	81	51	2
12	99	111	6	2
rs	0	0	0	0
s	0	0	0	0

Batch # 19
 PPM/ DMD
 Uhydrolyzed

A



Sample ID:	UCO3168 Uh	UCO3864 Uh	UCO3529 Uh	UCO3608 Uh
0	54	54	54	54
0.3	50	71	55	60
0.6	62	63	54	58
1.2	84	78	46	63
3	80	97	81	96
6	89	96	90	193
12	104	73	93	161
IS	0	0	0	0.96
S	0	0	0	20.3

Sample ID:	UCO2263 Uh	UCO0390 Uh	Blank Uh
0	54	54	54
0.3	59	54	20
0.6	39	78	35
1.2	12	66	43
3	11	114	30
6	3	104	34
12	9	8	40
IS	0	0	
S	0	0	

NHEERL/ECD/MTB/DMD/2006-02-RO
 Urinary Mutagenicity Study for New England Bladder Cancer/ Arsenic
 Experiment date : 9/19/2008
 Strain: YG1041
 Activation: RLOA98 2X 2ppd

Batch # 20
 PPM/ DMD

Hydrolyzed
 avg.

Controls:	Plate 1	Plate 2	Plate 3	avg.
SP-	44	39	37	
SP+	70	41	52	54
2A	1159	1189	1211	
2NF	1711	1571	1721	

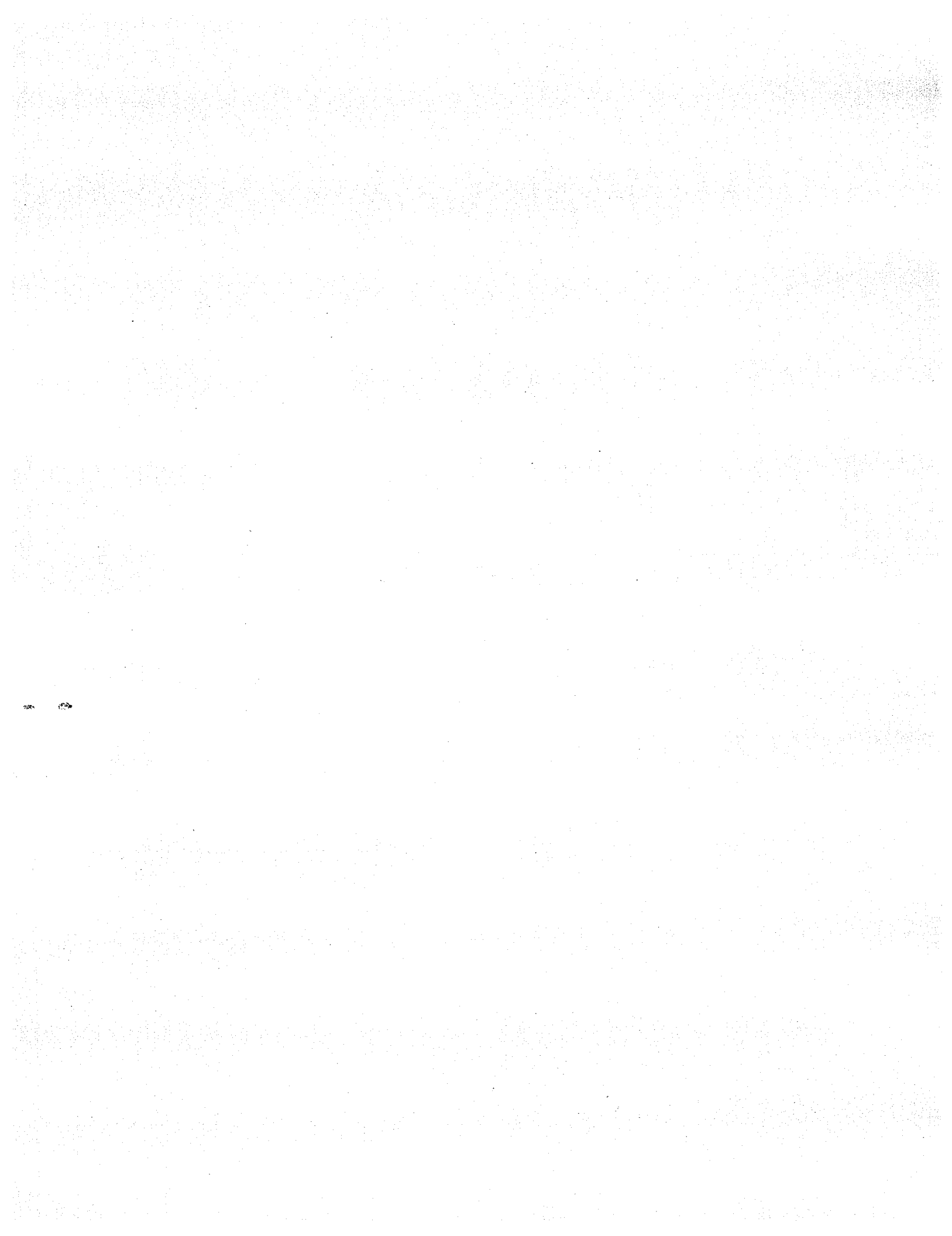
Sample ID:	UCO3413 H	UCO0742 H	UCO3203 H	UCO1675 H	avg.
0	54	54	54	54	54
0.3	51	42	49	40	48
0.6	71	57	51	48	68
1.2	75	75	69	73	79
3	99	90	103	90	134
6	71	100	109	80	125
12	44	82	66	74	77

rs	0	0	0	0	0.93
s	0	0	0	0	27.0

Sample ID:	UCO0697 H	UCO2396 H	UCO0712 H	UCO1950 H	avg.
0	54	54	54	54	54
0.3	63	48	70	56	51
0.6	56	53	46	43	76
1.2	69	74	82	71	77
3	79	80	104	116	105
6	69	78	94	98	165
12	59	50	121	75	171
					202

rs	0	0	0	0	0.86
s	0	0	0	0	19.8

10



Sample ID:	UCO0697 Uh	UCO2396 Uh	UCO0712 Uh	UCO1950 Uh	avg.
0	54	54	54	54	54
0.3	55	63	76	44	45
0.6	40	69	71	64	68
1.2	49	54	61	67	63
3	66	80	69	77	75
6	70	82	75	115	117
12	85	106	101	162	186
rs	0	0	0	0	0.98
s	0	0	0	0	11.2

Sample ID:	UCO2442 Uh	UCO2302 Uh	Blank Uh	avg.
0	54	54	54	54
0.3	39	54	43	49
0.6	42	69	67	68
1.2	52	62	67	65
3	60	62	62	62
6	119	110	79	95
12	199	159	142	151
rs	0.93	0.95	0.95	0.95
s	12.9	7.9	7.9	7.9

*** note -sample #UCO1675 the urine was red

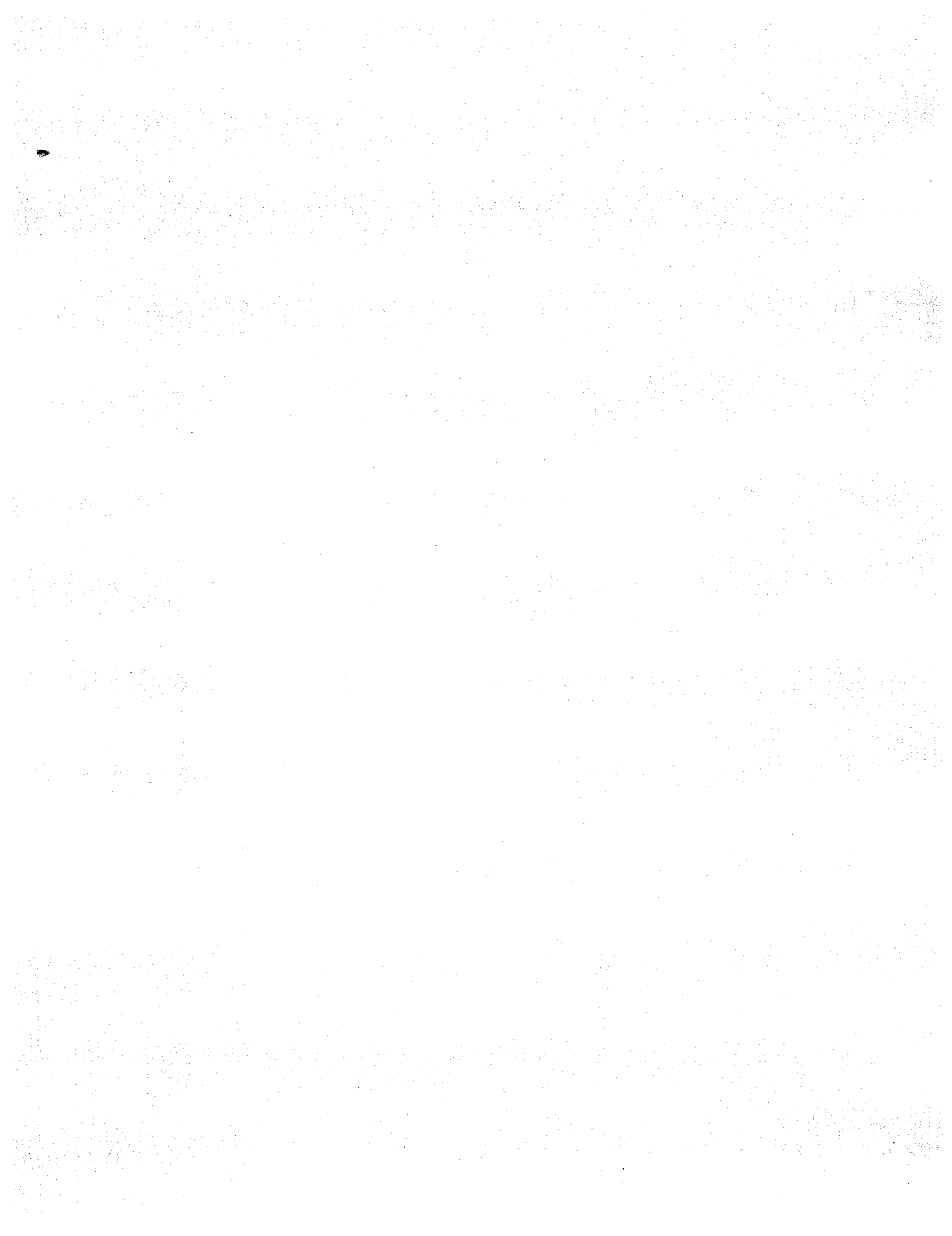
Sample ID:	UC00643H	UC02327H	Blank H
ml-eq/pl			
0	59	59	59
0.3	61	72	43
0.6	82	66	39
1.2	71	68	62
3	83	79	69
6	81	103	71
12	72	99 NES	71

rs
s 0 0 0

NHEERL/ECD/MTB/DMD/2006-02-RO
 Urinary Mutagenicity Study for New England Bladder Cancer/ Arsenic
 Experiment date : 9/24/2008
 Strain: YG1041
 Activation: RLOA98 2X 2ppd
 Batch # 21 Unhydrolyzed

Sample ID:	UC01563Uh	UC01316Uh	UC03809Uh	UC02656Uh
ml-eq/pl				
0	59	59	59	59
0.3	49	66	55	66
0.6	74	56	67	58
1.2	63	70	56	60
3	70	57	72	60
6	100	51	95	84
12	87 NES	48	67	85

rs
s 0 0 0 0



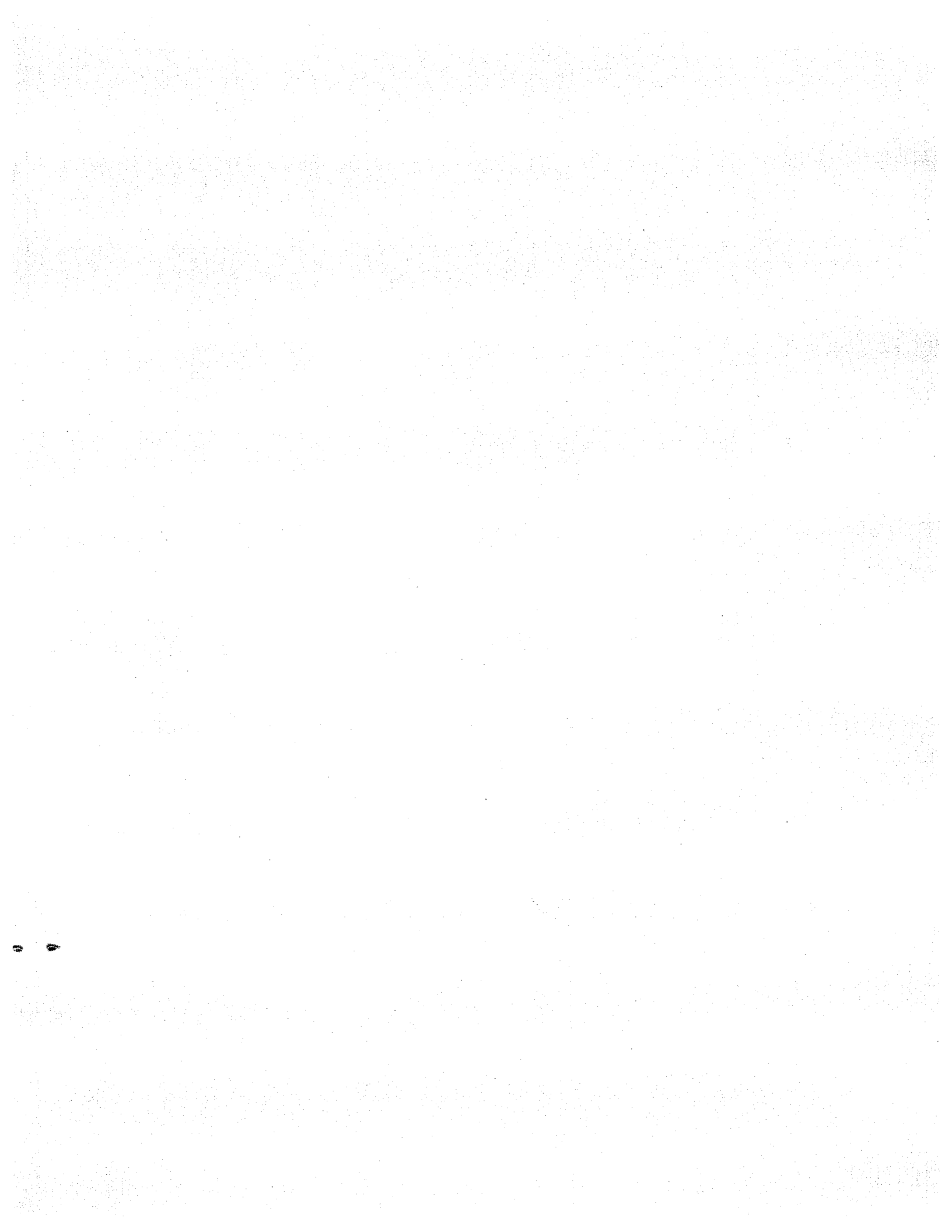
NHEERL/ECD/MTB/DMD/2006/-02-Ro
 Urinary Mutagenicity Study for New England Bladder Cancer/Arsenic
 Experiment date: 10/06/2008
 Strain: YG1041
 Activation: RLA098 2X 2ppd
 Batch #22

Controls:	Plate 1	Plate 2	Plate 3	avg.	Hydrolyzed
SP-	43	37	30		
SP+	64	63	70	66	
2A	1230	1660	1060		
2NF	1605	1645	1590		

Sample ID:	UCO3302 H	UCO0435 H	UCO1257 H	UCO0114 H
ml-eq/pl	66	66	66	66
0	66	66	66	66
0.3	78	76	68	60
0.6	78	88	74	71
1.2	93	96	68	74
3	81	109	83	76
6	89	207	87	89
12	115	270	63	81
avg.			270	
			66	
			71	
			78	
			83	
			105	
			202	
			270	
rs	0		0	0
s	0		0	0

Sample ID:	UCO0814 H	UCO2005 H	UCO2237 H	UCO1464 H
ml-eq/pl	66	66	66	66
0	66	66	66	66
0.3	72	61	47	64
0.6	54	62	86	66
1.2	85	75	138	70
3	78	85	90	73
6	89	81	3	100
12	68	86	3	90
avg.			4	107
			66	
			48	
			79	
			134	
			70	
			1	
			4	
rs	0	0	0	0
s	0	0	0	0

4



Sample ID:	UCO0982 H	UCO2052 H	Blank H
ml-eq/pl			
0	66	66	66
0.3	83	62	53
0.6	135	70	69
1.2	195	72	69
3	152	84	58
6	457	93	73
12	494	111	66
	avg.		
	66		
	78		
	126		
	187		
	196		
	471		
	466		
rs	0.94	0	0
s	62.9	0	0

NHEERL/ECD/MTB/DMD/2006/-02-Ro
 Urinary Mutagenicity Study for New England Bladder Cancer/Arsenic
 Experiment date: 10/08/2008
 Strain: YG1041
 Activation: RLA098 2X 2ppd

Batch #22
 Unhydrolyzed

Sample ID:	UCO3302 Uh	UCO0435 Uh	UCO1257 Uh	UCO0114 Uh
ml-eq/pl				
0	66	66	66	66
0.3	67	50	61	72
0.6	54	47	72	46
1.2	81	65	98	78
3	68	74	93	76
6	118	80	147	92
12	120	102	131	86
			avg.	
			66	
			59	
			74	
			88	
			93	
			136	
			142	
rs	0.94	0	0	0
s	11.7	0	0	0

69

Sample ID: ml-eq/pl	UCO0814 Uh	UCO2005 Uh	UCO2237 Uh	UCO1464 Uh
0	66	66	66	66
0.3	58	70	49	57
0.6	82	67	129	68
1.2	54	70	99	65
3	91	70	127	56
6	130	65	0	57
12	89	85	1	83
rs	0	0	0	0
	0	0	0	0

Sample ID: ml-eq/pl	UCO0982 Uh	UCO2052 Uh	Blank Uh
0	66	66	66
0.3	93	88	56
0.6	187	70	54
1.2	292	58	57
3	310	67	73
6	452	87	67
12	36	106	63
rs	0	0	0
	0	0	0
avg.	66	66	66
	88	88	56
	189	70	54
	320	58	57
	288	67	73
	412	87	67
	0.97	106	63
	223.1	0	0
		0	0

6

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NHEERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic
 Experiment date : 10/15/2008
 Strain: YG1041
 Activation : RLAO 98 2X 2ppd

Batch # 23

Hydrolyzed

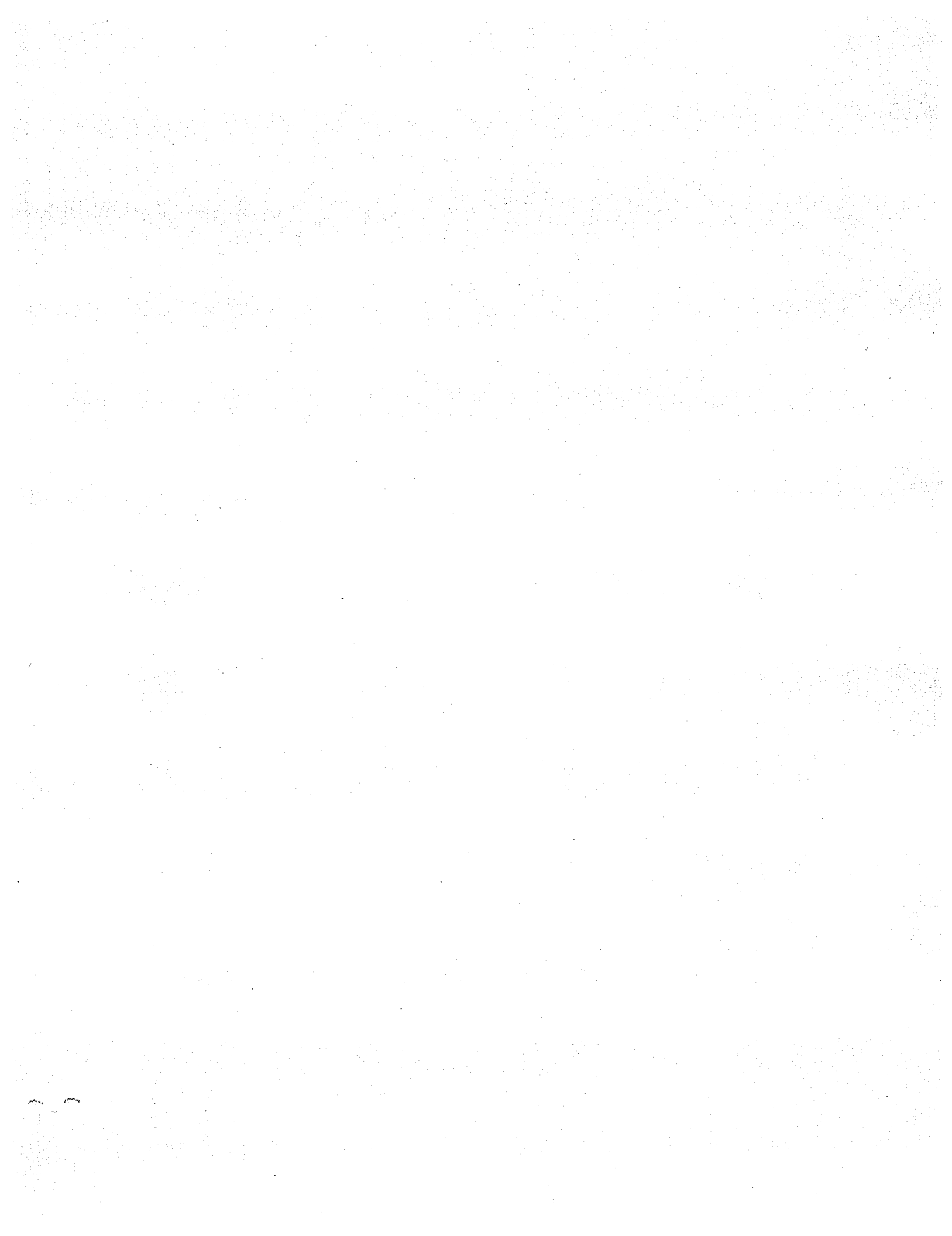
avg.

Controls:	Plate 1	Plate 2	Plate 3
SP-	35	32	44
SP+	95	69	79
2A	1195	1785	1237
2NF	1603	1732	1605

Sample ID:	UCO2719 H	UCO2696 H	UCO3806 H	UCO1408 H	UCO0284 H
0 ml-eq/pl	81	81	81	81	81
0.3	83	9	96	61	76
0.6	83	4	92	74	93
1.2	101	1	94	81	96
3	82	0	109	121	104
6	171	0	117	121	110
12	141	0	139	137	99
rs	0	0	0	0	0
s	0	0	0	0	0

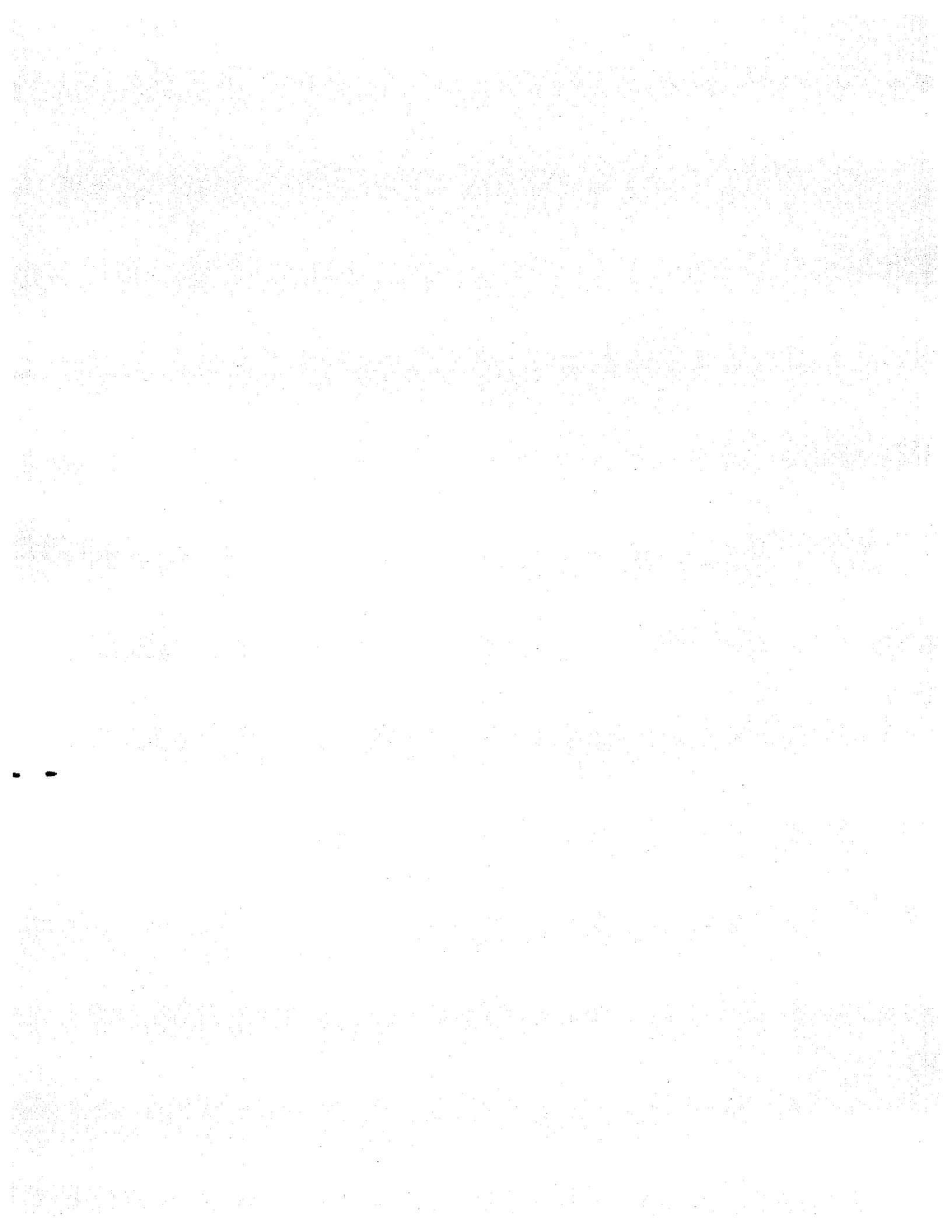
Sample ID:	UCO2613 H	UCO3902 H	UCO1726 H	UCO1408 H	UCO0284 H
0 ml-eq/pl	81	81	81	81	81
0.3	100	102	115	90	104
0.6	107	119	108	130	114
1.2	110	117	0	71	128
3	124	110	117	136	161
6	48	85	95	114	151
12	31	69	80	84	207
rs	0	0	0	0	0.79
s	0	0	0	0	11.1

7



Sample ID: ml-eq/pl	UCO1353 H	UCO1575 H	Blank
0	81	81	81
0.3	111	97	65
0.6	140	88	69
1.2	192	113	69
3	179	90	60
6	122	90	67
12	102	75	76

rs
s



Sample ID: ml-eq/pl	UCO1408Uh	UCO1353 Uh	UCO1575Uh	avg.
0	81	81	81	81
0.3	70	99	86	71
0.6	80	108	112	88
1.2	110	144	138	102
3	110	73	90	103
6	172	364	352	171
12	214	439	493	186
rs				0.92
s				14.9

Sample ID: ml-eq/pl	UCO1575Uh	avg.
0	81	81
0.3	63	93
0.6	68	110
1.2	76	141
3	80	82
6	105	358
12	103	466
rs		0.89
s		33.6

Sample ID: ml-eq/pl	Blank
0	81
0.3	71
0.6	73
1.2	52
3	75
6	71
12	68
rs	
s	

NHEERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer/Arsenic
 Experiment date :10/15/2008
 Strain: YG1041
 Activation :RLAO 98 2X 2ppd

Batch # 24
 Hydrolyzed

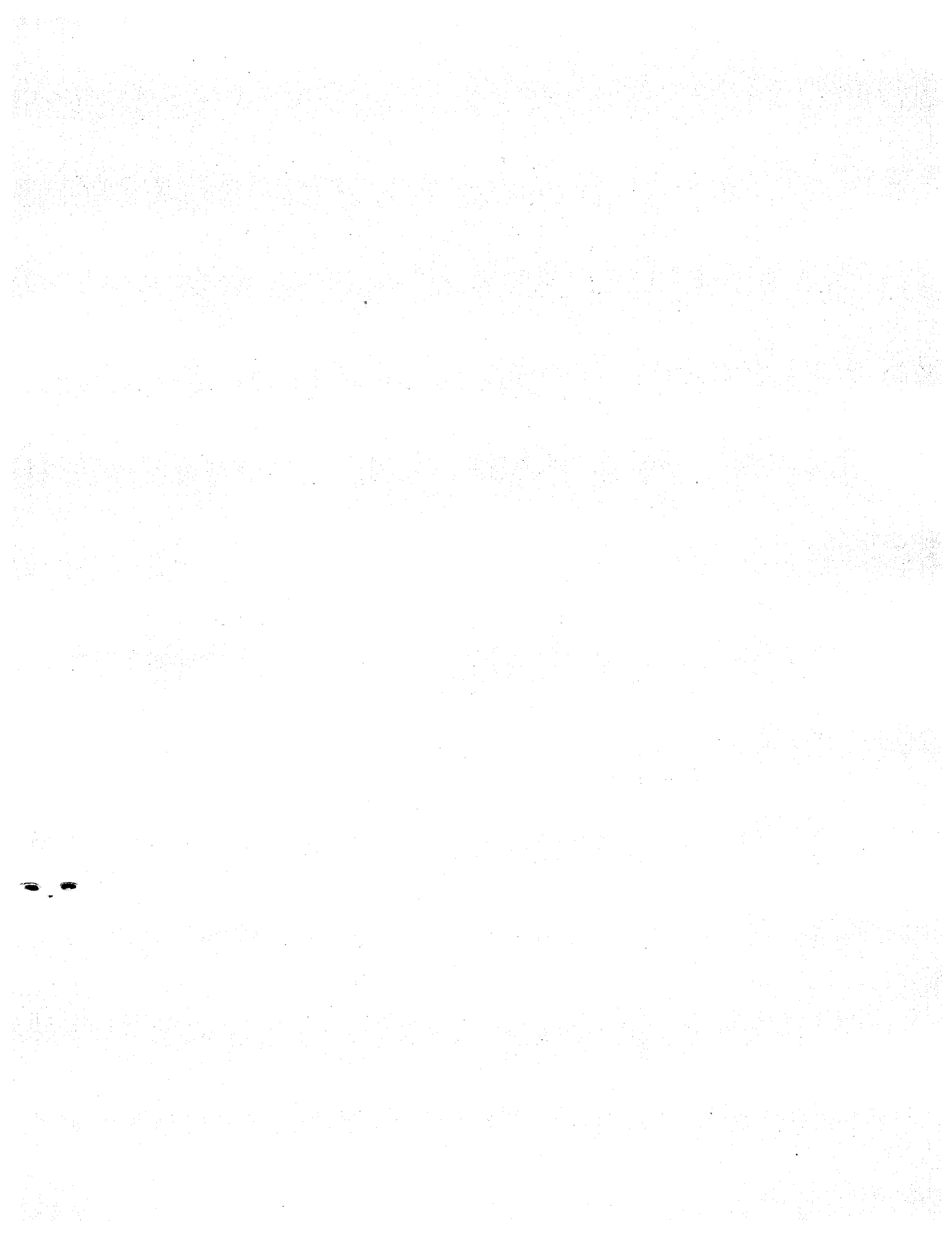
avg.

Controls:	Plate 1	Plate 2	Plate 3
SP-	35	32	44
SP+	95	69	79
2A	1195	1785	1237
2NF	1603	1732	1605

Sample ID:	UCO3699H	UCO1161 H	UCO2131H	UCO0250H
0 ml-eq/pl	81	81	81	81
0.3	57	99	87	66
0.6	77	120	74	103
1.2	106	123	89	87
3	108	110	95	109
6	120	100	82	96
12	95	72	59	66
rs	0	0	0	0
s	0	0	0	0

Sample ID:	UCO2395H	UCO1979H	UCO3792H	UCO2874H
0 ml-eq/pl	81	81	81	81
0.3	82	84	75	90
0.6	93	95	85	114
1.2	100	111	90	120
3	108	116	100	93
6	95	120	107	103
12	123	124	104	67
rs	0	0	0	0
s	0	0	0	0

//



Sample ID:	UCO2439H	UCO1648H	Blank
ml-eq/pl			
0	81	81	81
0.3	82	74	76
0.6	85	103	70
1.2	94	91	58
3	87	92	70
6	106	65	64
12	106	49	71
rs	0	0	
s	0	0	

NHEERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic
 Experiment date :10/15/2008
 Strain: YG1041
 Activation :RLAO 98 2X 2ppd

Batch # 24
 Unhydrolyzed

Sample ID:	UCO3699Uh	UCO1161 Uh	UCO2131Uh	UCO0250Uh
ml-eq/pl				
0	81	81	81	81
0.3	77	73	96	69
0.6	69	72	91	80
1.2	46	68	73	69
3	58	83	71	94
6	0	103	87	112
12	0	116	101	104
rs	0	0	0	0
s	0	0	0	0

12

Sample ID:	UCO2395Uh	UCO1979Uh	UCO3792Uh	UCO2874Uh
mi-eq/pl	81	81	81	81
0	85	86	88	56
0.3	79	82	85	81
0.6	78	70	80	95
1.2	81	79	72	79
3	106	101	143	121
6	116	114	168	119
12		127		135
rs	0			0
s	0			0
			avg	
			81	
			96	
			90	
			81	
			84	
			1313	
			170	
			0.88	
			7.6	

Sample ID:	UCO2439Uh	UCO1648Uh	Blank
mi-eq/pl	81	81	81
0	77	64	64
0.3	83	61	75
0.6	70	91	79
1.2	71	105	66
3	98	112	78
6	106	148	71
12			
rs	0		
s	0		

NHEERL/ECD/MTB/DMD/2006-02-Ro
 Urinary Mutagenicity Study for New England Bladder Cancer / Arsenic
 Experiment date : 10/24/2008
 Strain: YG1041
 Activation :RLAO98 2X 2ppd
 Batch # 25

Hydrolyzed

Controls :	Plate 1	Plate 2	Plate 3	avg.
SP-	33	30	43	
SP+	65	53	56	58
2A	1298	1270	1518	
2NF	1787	1916	1860	

Sample ID:	UCO3091 H	UCO3590 H	UCO0910 H
ml-eq/pl			
0	58	58	58
0.3	79	83	77
0.6	103	64	80
1.2	80	60	105
3	70	96	76
6	72	96	76
12	59	68	70

rs.
s

Sample ID:	UCO1216 H	UCO2361 H	UCO106 H
ml-eq/pl			
0	58	58	58
0.3	75	69	80
0.6	71	87	122
1.2	66	79	146
3	70	96	175
6	76	193	259
12	84	219	252

rs
s

avg. 58 58 58
 68 68 83
 77 77 128
 82 82 125
 106 106 157
 180 180 226
 202 202 233
 0.98 0.92
 19.2 21.1

Sample ID:	UCO2662 H	UCO1732 H	UCO1358 H	avg.
ml-eq/pl				
0	58	58	58	58
0.3	54	58	81	74
0.6	84	63	94	107
1.2	90	67	165	163
3	77	63	73	102
6	97	43	252	397
12	127	84	668	624

rs
s
0.94
47.3

Sample ID:	UCO1151 H	Blank H	avg.
ml-eq/pl			
0	58	58	58
0.3	92	60	90
0.6	113	60	106
1.2	160	62	150
3	70	63	70
6	146	61	145
12	94	60	109

rs
s
0.99
74.29

NHEERL/ECD/MTB/DMD/2006-02-R0
 Urinary Mutagenicity Study for New England Bladder Cancer / Arsenic
 Experiment date : 10/24/2008
 Strain: YG1041
 Activation :RLAO98 2X 2ppd

Unhydrolyzed

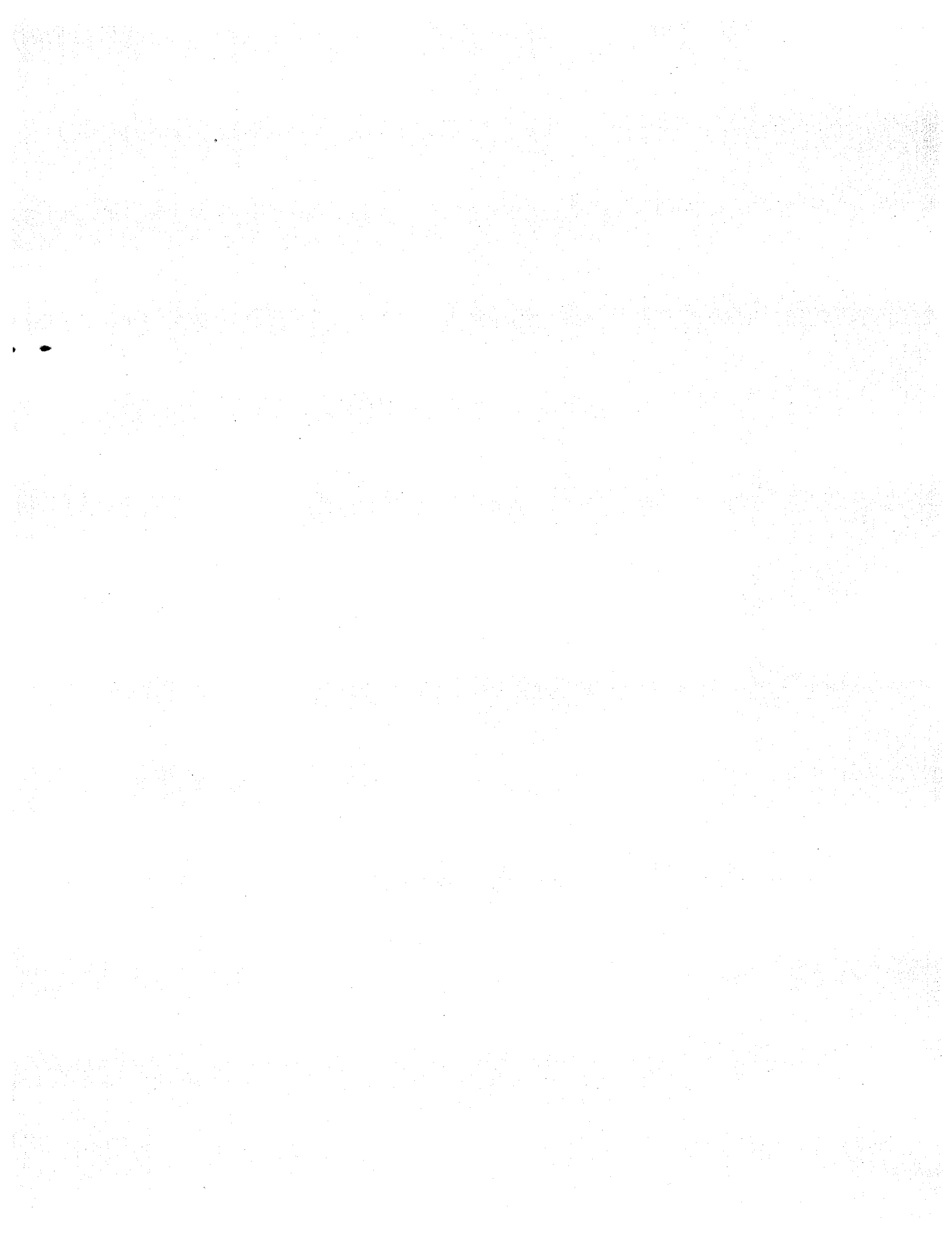
Batch # 25

Sample ID: ml-eq/pl	UCO3091 Uh	UCO3590 Uh	UCO0910 Uh	avg.
0	58	58	58	58
0.3	58	71	72	69
0.6	74	61	71	70
1.2	70	56	73	75
3	103	64	61	70
6	110	79	122	120
12	158	71	110	106

rs. 0.83
 S 8.7

Sample ID: ml-eq/pl	UCO1216 Uh	UCO2361 Uh	UCO106 Uh	avg.
0	58	58	58	58
0.3	45	72	57	64
0.6	74	52	81	85
1.2	74	82	87	77
3	78	68	135	113
6	74	273	267	264
12	101	381	352	402

rs. 0.94
 S 25.94



Sample ID: ml-eq/pl	UCO2662 Uh	UCO1732 Uh	UCO1358 Uh	avg.
0	58	58	58	58
0.3	66	68	82	80
0.6	70	78	70	73
1.2	48	68	73	74
3	62	83	81	85
6	86	116	171	153
12	144	104	206	198
rs				0.95
s				11.6

Sample ID: ml-eq/pl	UCO1151 Uh	Blank Uh
0	58	58
0.3	85	56
0.6	96	53
1.2	71	60
3	78	52
6	0	60
12	0	60
rs		
s		

*** sample # 1151 unhydrolyzed toxic

NHEERL/ECD/MTB/DMD/2006-02-Ro
 Urinary Mutagenicity Study for New England Bladder Cancer / Arsenic
 Experiment date : 10/24/2008
 Strain: YG1041
 Activation :RLAO98 2X 2ppd
 Batch # 26

Controls :	Plate 1	Plate 2	Plate 3	avg.	Hydrolyzed
SP-	33	30	43		
SP+	65	53	56	58	
2A	1298	1270	1518		
2NF	1787	1916	1860		

Sample ID:	UCO2892 H	UCO1023 H	UCO1913 H
ml-eq/pl			
0	58	58	58
0.3	69	74	71
0.6	80	79	80
1.2	92	83	91
3	87	81	98
6	133	120	125
12	146	174	193
		192	186
			2
			4
			58
			80
			79
			72
			94
			120
			86
			79
			2
			58
			71
			93
			112
			130
			212
			180
			avg. 0.98
			20.8

rs.	UCO3982 H	UCO3026 H	UCOO449 H
s			
	58	58	58
	69	68	74
	81	81	68
	80	76	79
	86	89	65
	126	102	72
	101	93	60
		104	113
		66	98
			57
			avg. 0.93
			9.0

Sample ID: ml-eq/pl	UCO0394 H	UCO0894 H	UCO3740 H
0	58	58	58
0.3	73	71	67
0.6	98	79	79
1.2	93	79	59
3	94	72	103
6	103	68	109
12	84	67	87
			58
			60
			87
			59
			79
			103
			109
			87
			58
			68
			80
			81
			113
			114
			76

rs
s

Sample ID: ml-eq/pl	UCO2190 H	Blank H
0	58	58
0.3	75	66
0.6	77	65
1.2	79	63
3	82	64
6	108	63
12	90	59
		58
		64
		69
		80
		89
		96
		119

rs
s

NHEERL/ECD/MTB/DMD/2006-02-Ro
 Urinary Mutagenicity Study for New England Bladder Cancer / Arsenic
 Experiment date : 10/24/2008
 Strain: YG1041
 Activation :RLAO98 2X 2ppd

Unhydrolyzed

Batch # 26

Sample ID: ml-eq/pl	UCO2892 Uh	UCO1023 Uh	UCO1913 Uh
0	58	58	58
0.3	63	73	49
0.6	68	88	55
1.2	66	98	58
3	75	127	72
6	113	220	20
12	162	278	9
	avg. 58	avg. 58	avg. 58
			287

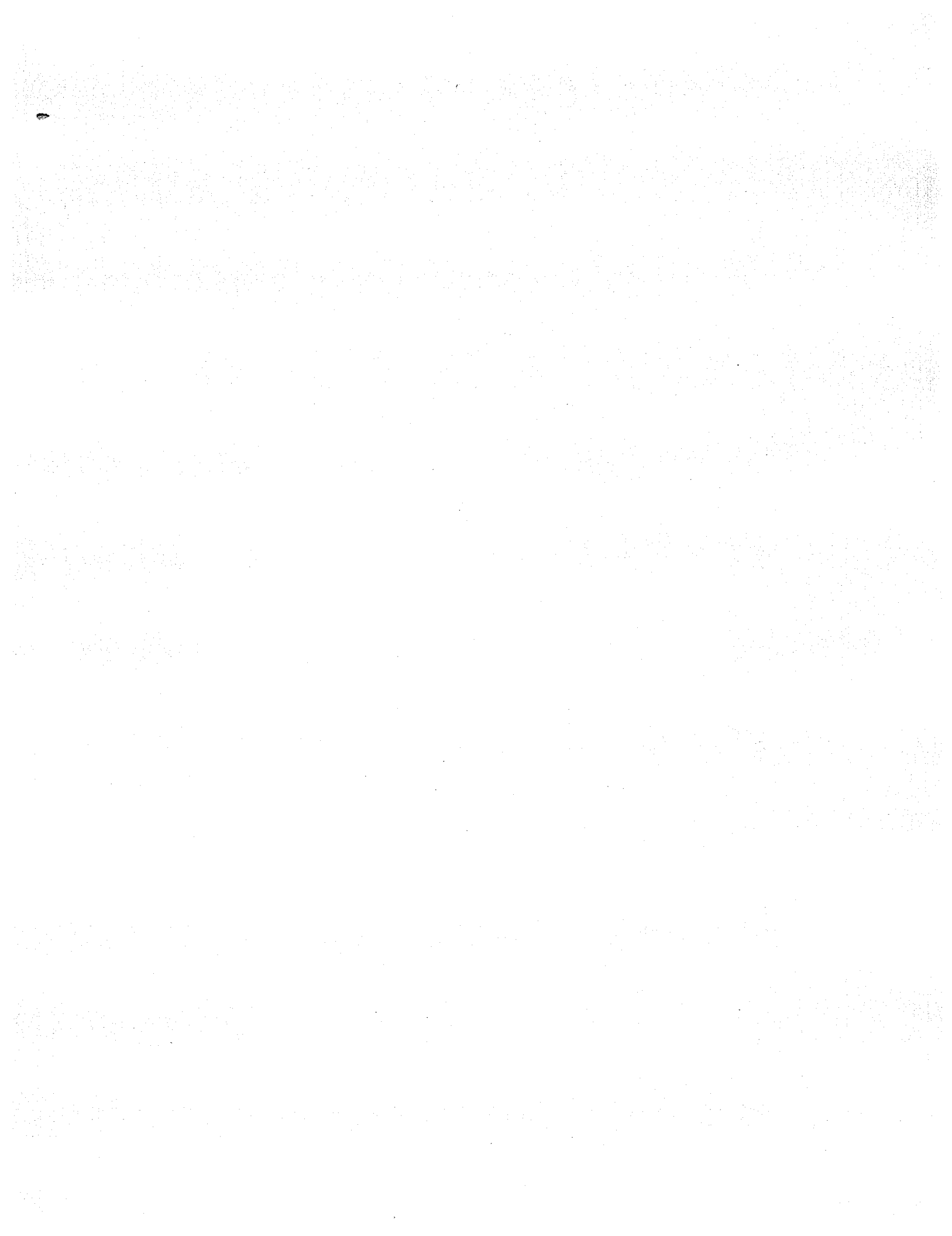
rs.
s

0.96
26.2

Sample ID:
ml-eq/pl

UCO3982 Uh	UCO3026 Uh	UCOO449 Uh
58	58	58
66	77	78
80	65	49
1.2	54	67
3	80	68
6	103	74
12	81	104
	avg. 58	avg. 58
		26.2

rs
s



Sample ID: ml-eq/pl	UCO0394 Uh	UCO0894 Uh	UCO3740 Uh	avg.
0	58	58	58	58
0.3	49	66	68	66
0.6	62	75	54	58
1.2	57	69	54	48
3	75	58	52	62
6	107	56	75	87
12	103	60	116	119

rs
s
0.90
5.3

Sample ID: ml-eq/pl	UCO2190 Uh	Blank Uh
0	58	58
0.3	81	46
0.6	56	45
1.2	67	55
3	62	45
6	72	58
12	83	60

rs
s

NHEERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic
 Experiment date :10/28/2008
 Strain: YG1041
 Activation :RLAO 98 2X 2ppd
 Batch # 27
 Hydrolyzed

Controls: avg.
 SP- Plate 1 Plate 2 Plate3
 34 27 30
 SP+ 56 63 54 58
 2A 1367 1385 1164
 2NF 1655 1851 1962

Sample ID:	UCOO401 H	UCO2062 H	UCOO611 H	UCO2827 H
eq-ml/pl	58	58	58	58
0	58	58	58	58
0.3	48	62	71	48
0.6	52	83	41	76
1.2	51	92	66	76
3	59	91	92	51
6	86	86	75	91
12	80	97	82	80
rs	0	0	0	0
s	0	0	0	0

Sample ID:	UCO3754 H	UCOO051 H	UCO2320 H	UCO3641 H
eq-ml/pl	58	58	58	58
0	58	58	58	58
0.3	51	42	54	39
0.6	84	48	44	54
1.2	95	50	58	65
3	88	58	55	71
6	94	78	73	76
12	119	82	81	84
rs	0	0	0	0
s	0	0	0	0

Sample ID:	UCO3754 Uh	UCO0051 Uh	UCO2320 Uh	UCO3641 Uh
eq-m/pl	58	58	58	58
0	64	46	52	49
0.3	55	61	48	41
0.6	43	52	59	58
1.2	58	48	40	57
3	84	41	87	72
6	86	58	t21	70
12				
rs	0	0		0
s	0	0		0

Sample ID:	UCO2641 Uh	UCO1831 Uh	Blank Uh
eq-m/pl	58	58	58
0	43	77	67
0.3	67	59	65
0.6	89	78	74
1.2	63	74	75
3	213	132	186
6	338	179	208
12			
rs	0.96	0.88	0.88
s	23.4	13.7	13.7

5

Sample ID: eq-ml/pl	UCO2641 H	UCO1831 H	Blank
0	58	58	58
0.3	39	69	41
0.6	59	80	59
1.2	83	105	40
3	112	119	46
6	162	133	57
12	174	93	40
	avg.	avg.	avg.
	58	58	58
	65	54	58
	85	75	41
	73	96	59
	89	136	40
	139	102	46
	206	103	57
			40

rs
s

0.98
37.6

0.94
23.7

NHEERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic
 Experiment date :10/28/2008
 Strain: YG1041
 Activation :RLAO 98 2X 2ppd

Batch # 27
 Unhydrolyzed

Sample ID: eq-ml/pl	UCO0401 Uh	UCO2062 Uh	UCO0611 Uh	UCO2827 Uh
0	58	58	58	58
0.3	47	38	61	52
0.6	60	44	62	56
1.2	48	56	45	66
3	70	63	56	80
6	68	55	55	107
12	66	69	t20	118
			t26	avg.
			123	58
			113	55
			104	52
			73	70
			87	80
			110	107
			113	118

rs
s

0
0

0
0

0.98
8.9

NHEERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic
 Experiment date : 11/07/2008

Strain: YG1041
 Activation : RLAO 99 2X 2ppd
 Batch # 28
 Hydrolyzed

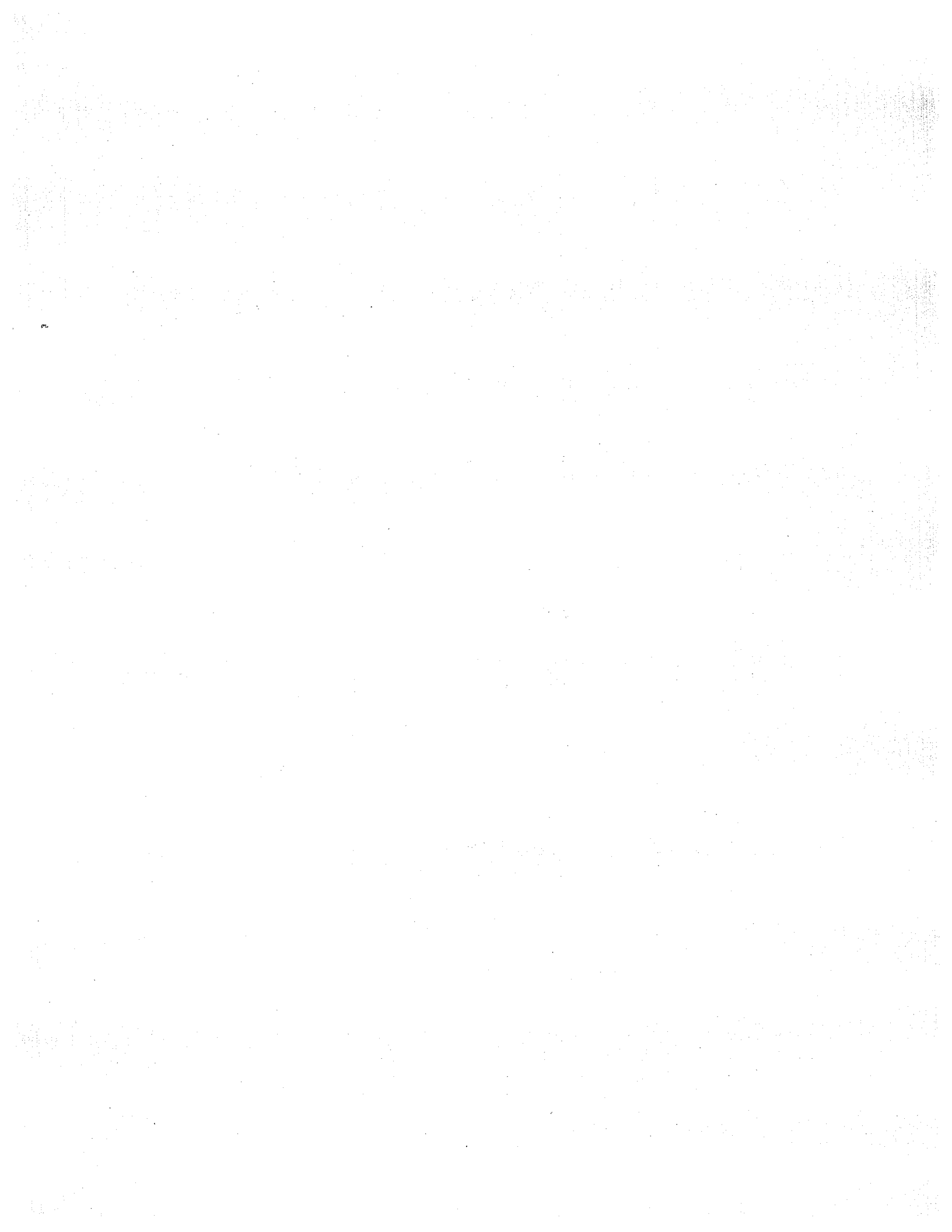
Controls:	Plate 1	Plate 2	Plate 3	avg.
SP-	32	40	25	
SP+	40	55	42	46
2A	1342	1334	1237	
2NF	1326	1409		

Sample ID :	UCO0668 H	UCO2856 H	UCO3370 H
eq-ml/pl	46	46	46
0	46	46	46
0.3	50	64	68
0.6	62	64	89
1.2	45	79	76
3	62	14	89
6	87	2	76
12	68	3	43
		3	55

rs 0
 s 0

Sample ID :	UCO3290 H	UCO3416 H	UCO2647 H
eq-ml/pl	46	46	46
0	46	46	46
0.3	57	58	68
0.6	62	54	79
1.2	63	83	82
3	83	76	120
6	94	60	73
12	80	60	63
		66	51
		avg.	avg.
		46	46
		54	70
		66	50
		67	77
		77	74
		94	102

rs 0.89
 s 0.7



Sample ID:	UCO3878 H	UCO3567 H	UCO2767 H
eq-ml/pl			
0	46	46	46
0.3	50	60	44
0.6	51	63	59
1.2	63	66	54
3	51	88	54
6	61	84	69
12	51	70	89
rs	0	0	0
s	0	0	0

***Samples # 3878
2767 very dark red

Sample ID:	UCO3109 H	Blank H
eq-ml/pl		
0	46	46
0.3	48	48
0.6	64	40
1.2	57	39
3	74	49
6	76	38
12	56	54
rs	0	0
s	0	0



NHEERL/ECD/MTB/DMD/2006-02-f0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic
 Experiment date : 11/07/2008
 Strain: YG1041
 Activation : RLAO 99 2X 2ppd

Batch # 28
 Unhydrolyzed

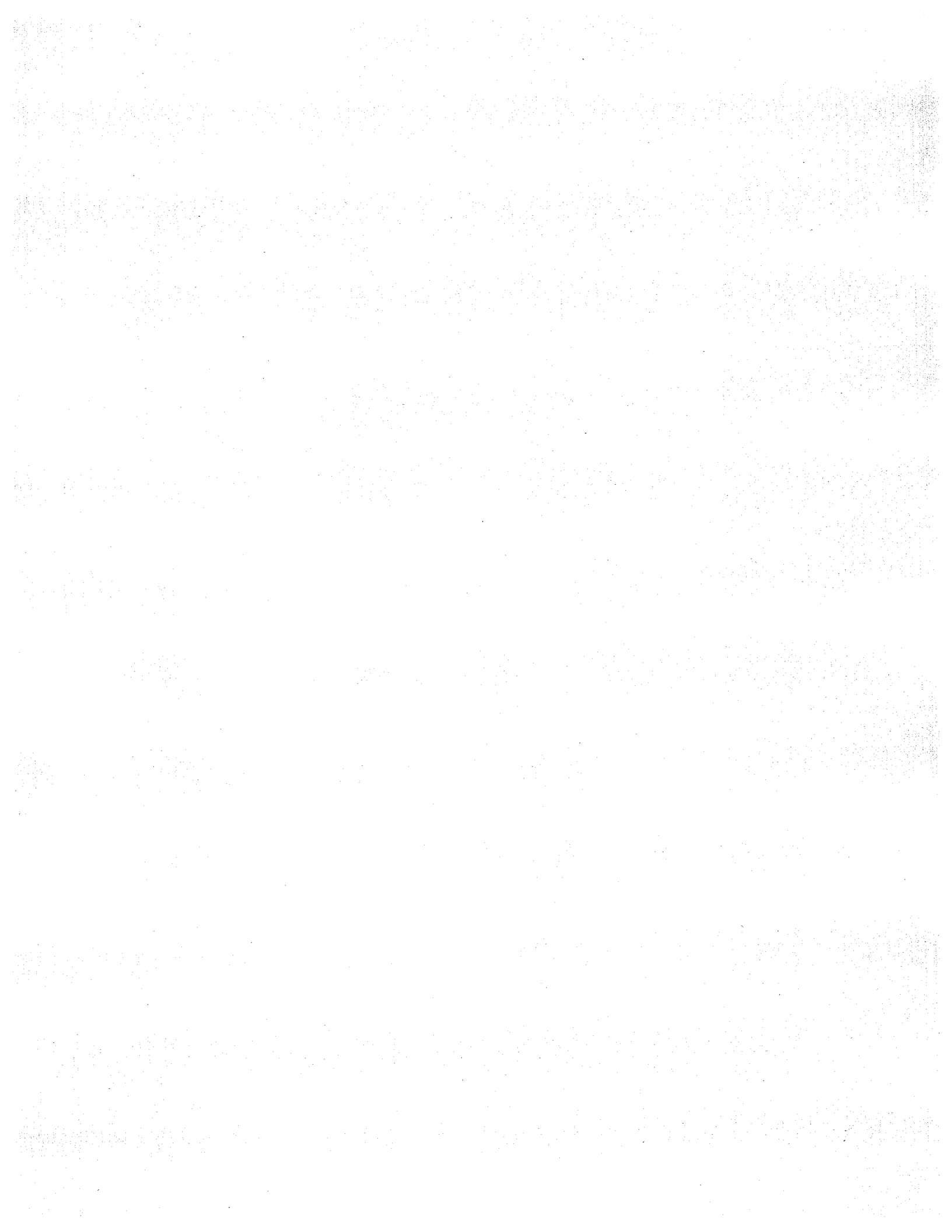
Sample ID :	UCO0668 Uh	UCO2856 Uh	UCO3370 Uh	avg.
0	46	46	46	46
0.3	39	60	71	74
0.6	32	50	50	44
1.2	36	35	46	59
3	43	32	51	48
6	42	1	87	97
12	75	5	83	92
rs	0	0		0.45
s	0	0		5.6

Sample ID :	UCO3290 Uh	UCO3416 Uh	UCO2647 Uh	avg.
0	46	46	46	46
0.3	51	42	43	49
0.6	46	0	42	38
1.2	53	45	53	47
3	48	59	48	67
6	50	59	78	80
12	9	67	56	50
rs	0	0		0
s	0	0		0

Sample ID :	UCO3878 Uh	UCO3567 Uh	UCO2767 Uh
eq-ml/pi	46	46	46
0	58	54	35
0.3	47	39	42
0.6	41	45	49
1.2	34	58	53
3	49	61	38
6	51	74	44
12	39	83	50
rs	0	0	0
s	0	0	0

Sample ID :	UCO3109 Uh	Blank Uh
eq-ml/pi	46	46
0	58	47
0.3	53	32
0.6	47	46
1.2	47	52
3	47	39
6	69	46
12	71	
rs	0	
s	0	

***Samples # 3878
2767 very dark red



NHEERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic

Experiment date : 11/07/2008

Strain: YG1041

Activation : RLAO 99 2X 2ppd

Batch # 29

Hydrolyzed

avg.

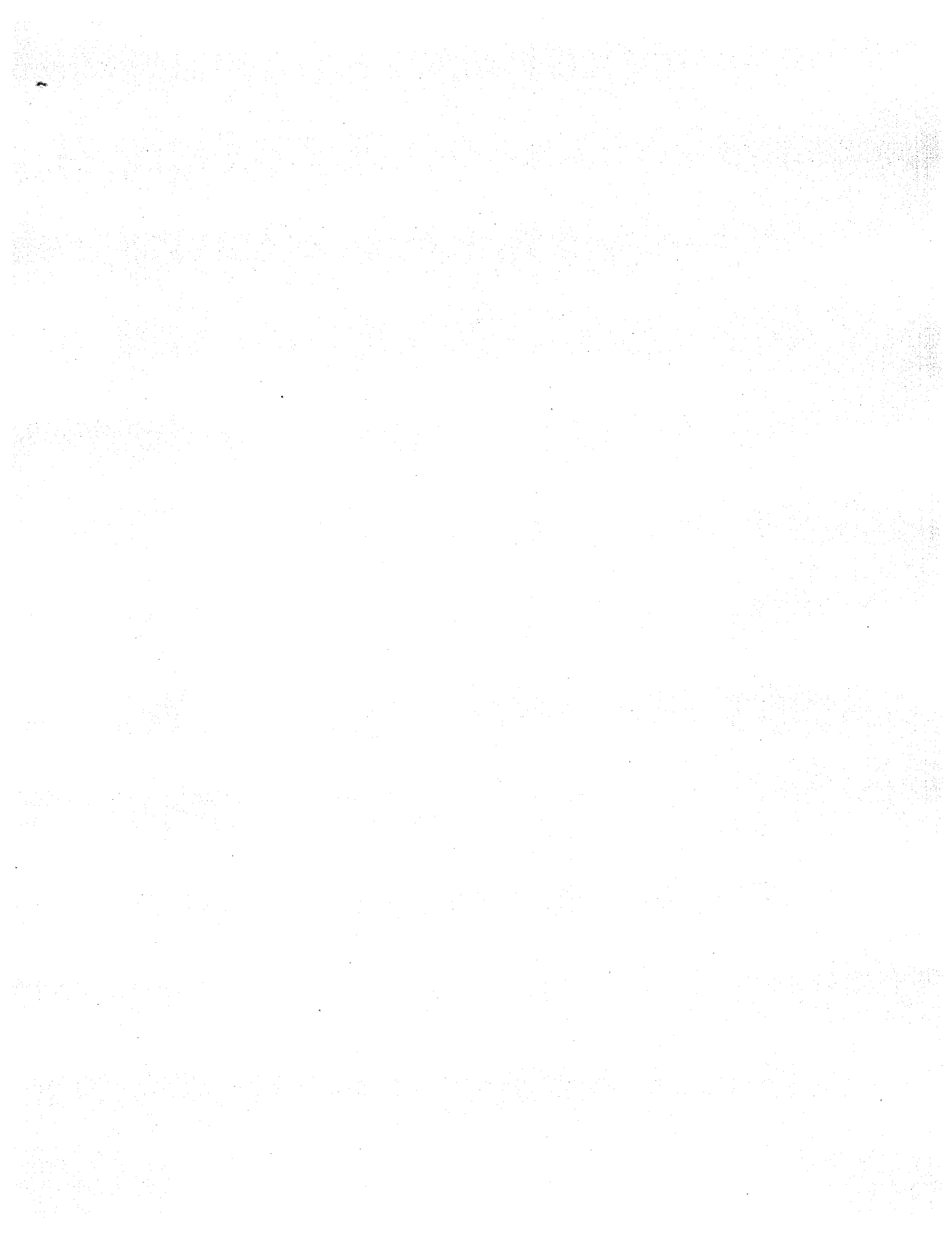
Controls:	Plate 1	Plate 2	Plate3
SP-	32	40	25
SP+	40	55	42
2A	1342	1334	1237
2NF	1326	1409	

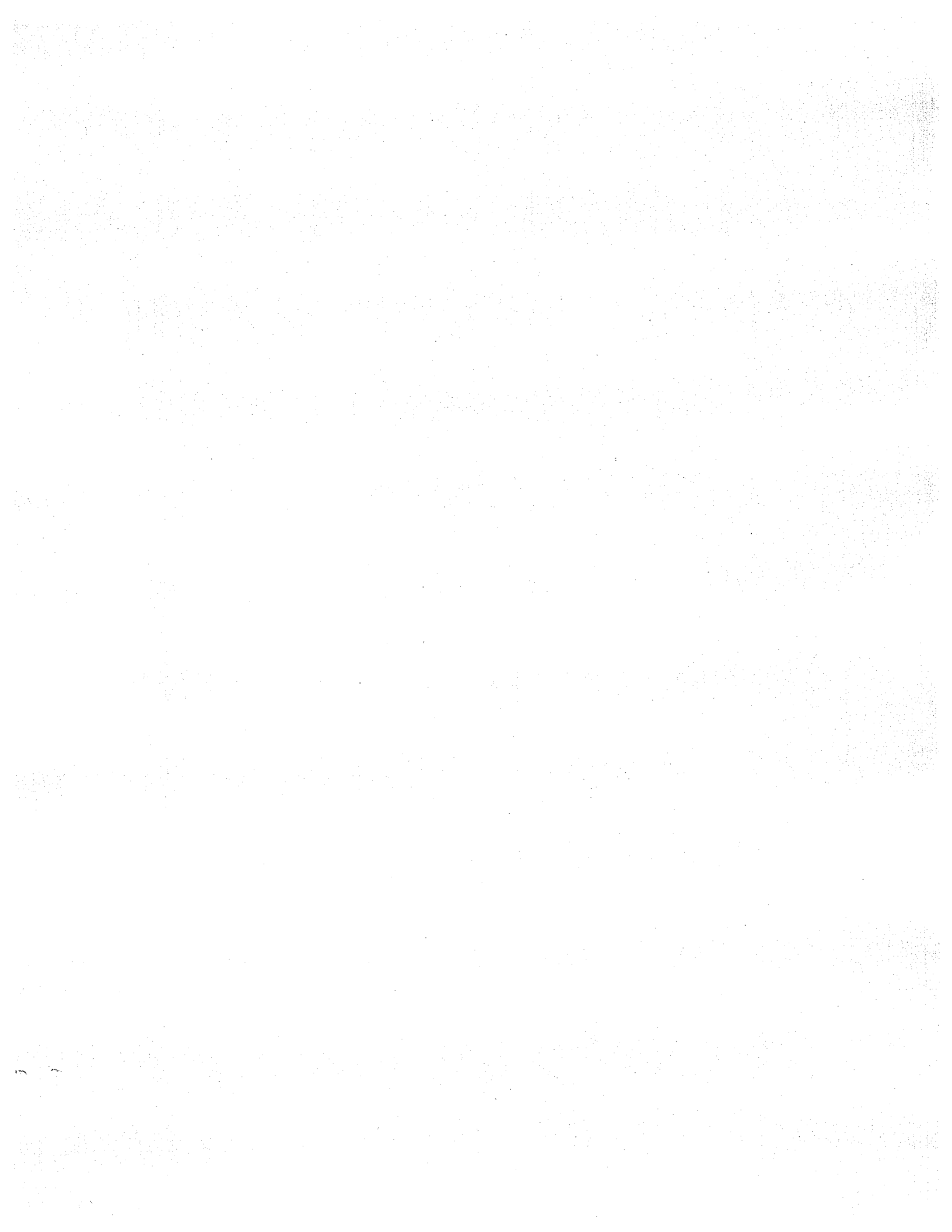
Sample ID :	UCOO602 H	UCO3708 H	UCO1796 H	avg.
0	46	46	46	46
0.3	62	59	52	43
0.6	93	80	64	69
1.2	107	54	64	50
3	107	75	75	64
6	209	66	80	105
12	257	62	90	80

rs	0.92	0	0.87	
s	23.4	0	7.1	

Sample ID :	UCO1108 H	UCO3256 H	UCOO683 H	avg.
0	46	46	46	46
0.3	60	45	43	60
0.6	56	86	78	81
1.2	62	74	98	63
3	44	103	71	92
6	87	162	142	127
12	71	151	135	103

rs	0	0.93	0.86	
s	0	16.1	12.8	





NHEERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic
 Experiment date : 11/07/2008
 Strain: YG1041
 Activation : RLAO 99 2X 2ppd

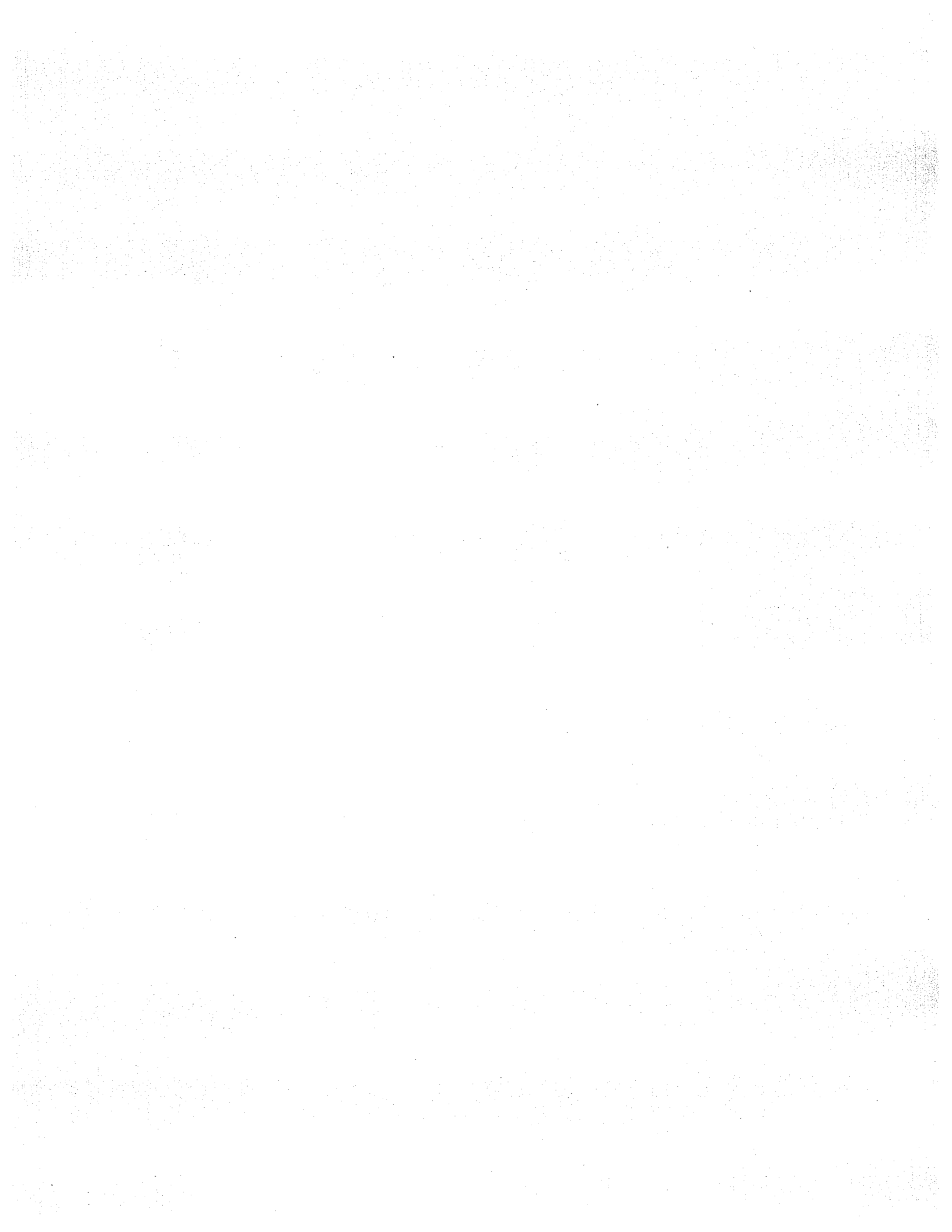
Batch # 29
 Unhydrolyzed

Sample ID :	UCOO602 Uh	UCO3708 Uh	UCO1796 Uh
eq-ml/pl	46	46	46
0	46	46	46
0.3	46	38	50
0.6	47	46	50
1.2	54	51	62
3	42	42	56
6	120	58	69
12	175	53	89
rs	0.94	0	0
s	10.7	0	0

Sample ID :	UCO1108 Uh	UCO3256 Uh	UCO0683 Uh
eq-ml/pl	46	46	46
0	46	46	46
0.3	36	53	54
0.6	49	41	55
1.2	40	49	68
3	34	59	49
6	71	84	107
12	87	24	10
rs	0	0	0.76
s	0	0	7.4

Sample ID :	UCO3010 Uh	UCO1821 Uh	UCO3247 Uh
eq-m/pl	46	46	46
0	46	46	46
0.3	51	48	42
0.6	65	51	42
1.2	70	59	59
3	71	65	54
6	7	63	51
12	1	30	49
rs	0	0	0
s	0	0	0

Sample ID :	UCO0279 Uh	Blank Uh
eq-m/pl	46	46
0	41	36
0.3	45	35
0.6	233	47
1.2	51	38
3	44	53
6	60	45
12	55	
rs	0	
s	0	



NHEERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic
 Experiment date : 11/19/2008
 Strain: YG1041
 Activation : RLAO 99 2X 2ppd

Batch # 30
 Unhydrolyzed
 avg.

Controls:	Plate 1	Plate 2	Plate 3
SP-	34	39	35
SP+	52	44	42
2A	1238	1336	1421
2NF	1447	1510	1562

Sample ID:	UCO0238 Uh	UCO1255 Uh	UCO0744 Uh
eq/ml-pl	avg.	avg.	avg.
0	46	46	46
0.3	60	52	40
0.6	57	54	47
1.2	67	81	40
3	40	69	45
6	54	75	55
12	103	105	73

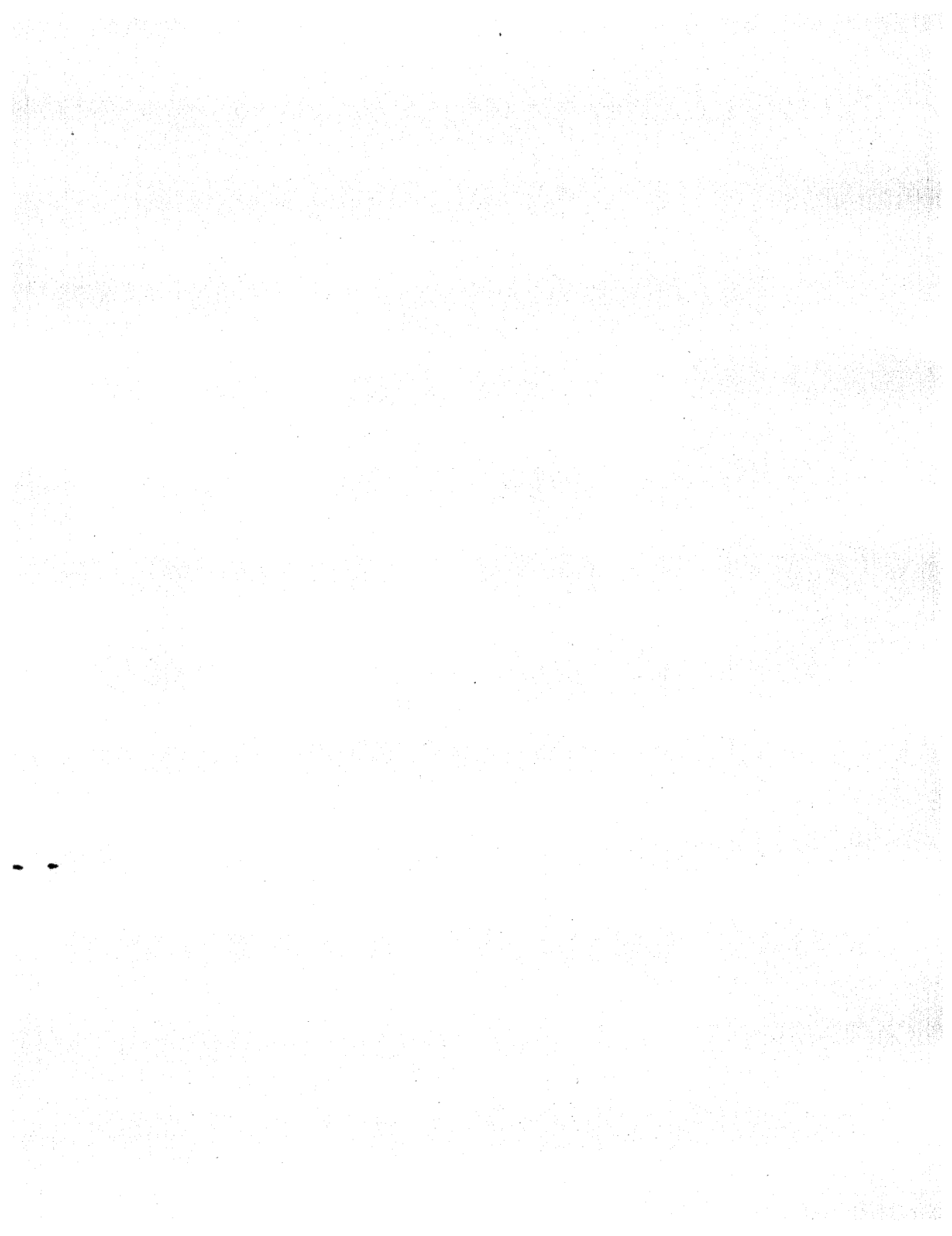
rs. 0.89 0
 s 3.7 4.6 0

Sample ID:	UCO2913 Uh	UCO1110 Uh	UCO3928 Uh
eq/ml-pl	avg.	avg.	avg.
0	46	46	46
0.3	33	39	55
0.6	42	58	68
1.2	38	53	83
3	42	55	75
6	60	68	206
12	87	85	308

rs. 0.95 0
 s 21.7 0

Sample ID: eq/mt-pl	UCO3632 Uh	UCOO103 Uh	UCOO654 Uh
0	46	46	46
0.3	59	50	51
0.6	58	72	58
1.2	51	176	62
3	65	75	77
6	76	190	87
12	51	227	50
rs.	0	0.93	0
s	0	116.0	0

Sample ID: eq/mt-pl	UCO2091 Uh	Blank Uh
0	46	46
0.3	49	43
0.6	61	49
1.2	48	49
3	52	50
6	69	58
12	95	59
rs.	0	***sample # 3432 .0103
s	0	pin point colonies



NHIERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic
 Experiment date : 11/19/2008
 Strain: YG1041
 Activation : RLAO 99 2X 2ppd

Batch # 30
 Hydrolyzed

Sample ID:	UCOO238 H	UCO1255 H	UCOO744 H	avg
eq/ml-pl	46	46	46	46
0	46	46	46	46
0.3	63	51	49	50
0.6	78	76	75	74
1.2	88	83	69	74
3	73	101	62	66
6	57	113	89	90
12	37	87	97	108
rs.				1.0
s	0	0		4.4

Sample ID:	UCO2913 H	UCO1110 H	UCO3928 H	avg
eq/ml-pl	46	46	46	46
0	46	46	46	46
0.3		44	52	56
0.6		71	53	58
1.2		67	56	57
3	85	91	83	83
6	139	85	79	90
12	106	103	129	108
rs.				0.89
s	0	0		4.9

Sample ID:	UCO3632 H	UCOO103 H	UCOO654 H	avg.
eq/ml-pl				
0	46	46	46	46
0.3	48	145	147	66
0.6	70	157	154	71
1.2	79	90	90	71
3	79	68	95	86
6	94	27	106	100
12	108	162	53	
rs.				0.83
s				7.3

Sample ID:	UCO2091 H	Blank H	***sample # 2913 lost sample due to vial breakage	***# 0103 pin point colonies	*** # urine very dark red
eq/ml-pl					
0	46	46			
0.3	63	50			
0.6	58	62			
1.2	61	65			
3	87	54			
6	44	53			
12	44	50			
rs.					
s					

NHEERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic
 Experiment date :11/21/2008
 Strain: YG1041
 Activation :RLAO 99 2X 2ppd

Batch # 31
 Hydrolyzed

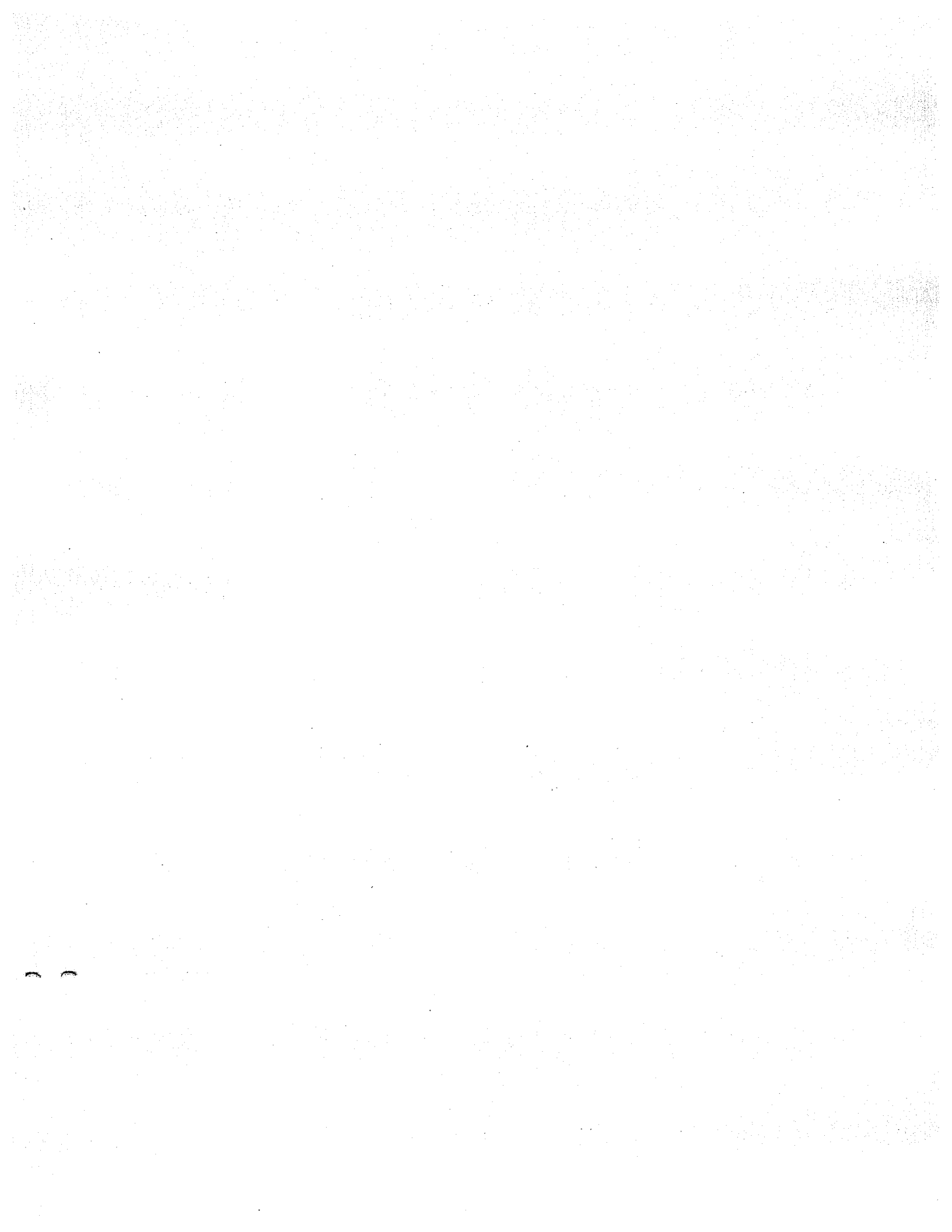
avg.

Controls:	Plate 1	Plate 2	Plate 3
SP-	20	37	37
SP+	46	56	59
2A	1643	1777	1664
2NF	1668	1552	1541

Sample ID:	UCO3835 H	UCO0567 H	UCOO133 H	UCO2294 H
0	46	46	46	46
0.3	53	54	66	49
0.6	66	66	41	45
1.2	61	76	73	71
3	59	70	68	59
6	89	128	100	102
12	67	114	109	111
rs	0	0.91	0.83	0
s	0	10.6	5.5	0

Sample ID:	UCO3149 H	UCO1771 H	UCOO919 H
0	46	46	46
0.3	54	42	45
0.6	66	74	67
1.2	74	89	72
3	72	82	62
6	63	45	93
12	57	5	103
rs	0	0.65	0.65
s	0	0	3.3

37



Sample ID: eq-ml/pl	UCO1074 H	UCO3118 H	UCO2722 H	Blank H
0	46	46	46	46
0.3	58	48	49	39
0.6	65	56	47	54
1.2	70	59	51	50
3	51	57	54	47
6	79	83	69	42
12	63	66	73	51
rs	0	0	0	0
s	0	0	0	0

sample # 3149, 1771,3118 urine very dark red
 sample # 1074 tech error, spilled plate

NHEERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic
 Experiment date :11/21/2008
 Strain: YG1041
 Activation :RLAO 99 2X 2ppd

Batch # 31
 Unhydrolyzed

Sample ID: eq-ml/pl	UCO3835 Uh	UCO567 Uh	UCO133 Uh	avg.
0	46	46	46	46
0.3	49	52	53	51
0.6	53	45	54	52
1.2	59	60	61	80
3	47	54	72	68
6	53	91	94	88
12	61	96	137	139
rs	0	0	0	0.92
s	0	0	0	7.1

UCO1771 Uh

Sample ID:	46	46	0
eq-ml/pl	48	50	0
	51	51	
	47	51	
	55	54	
	81	15t	
	3t	3t	
avg.	46		0.98
	44		4.0
	50		
	52		
	54		
	68		
	94		

UCO3149 Uh

46	46	0
39	49	0
58	42	
45	58	
58	50	
73	62	
96	91	
avg.		0.98
		4.0

UCO2294 Uh

46	46	0
43	49	0
40	55	
42	46	
41	47	
60	67	
76	62	
avg.		0.98
		4.0

rs
s

UCO3118 Uh

46	46	0
48	47	0
38	51	
51	47	
51	48	
70	71	
77	79	
avg.		0.90
		3.7

UCO1074 Uh

46	46	0
39	49	0
58	54	
59	54	
41	60	
62	87	
99	83	
avg.		0.90
		3.7

UCO0919 Uh

46	46	0
53	56	0
44	61	0
32	35	
53	41	
45	47	
40	42	
avg.		0.90
		3.7

rs
s

Blank Uh

46	46
49	49
48	48
49	49
45	45
50	50
53	53

UCO2722 Uh

46	46	0
46	53	0
51	51	
48	43	
61	52	
52	74	
64	54	
avg.		0.90
		3.7

Sample ID:
eq-ml/pl

39 RS 5

NHEERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic

Experiment date :11/21/2008

Strain: YG1041

Activation :RLAO 99 2X 2ppd

Batch # 32

Hydrolyzed

avg.

Controls:	Plate 1	Plate 2	Plate3
SP-	20	37	37
SP+	46	56	59
2A	1643	1777	1664
2NF	1668	1552	1541

Sample ID:	UCO3704 H	UCO3601 H	UCO1632 H	UCO0285 H
eq-ml/pl	46	46	46	46
0	46	46	46	46
0.3	56	53	50	52
0.6	64	67	67	61
1.2	78	76	54	80
3	85	88	76	69
6	88	107	58	99
12	72	82	61	96
rs	0	0	0	0
s	0	0	0	0

Sample ID:	UCO3055 H	UCO3147 H	UCO3555 H	UCO3568 H
eq-ml/pl	46	46	46	46
0	46	46	46	46
0.3	48	58	43	62
0.6	50	72	62	59
1.2	70	60	53	64
3	50	67	68	51
6	71	82	56	48
12	63	80	63	52
rs	0	0	0	0
s	0	0	0	0

Sample ID:	UCO1978 H	UCO0295 H	Blank H
0	46	46	46
0.3	50	40	50
0.6	50	45	56
1.2	59	58	48
3	57	64	51
6	81	58	59
12	94	58	60

rs
s

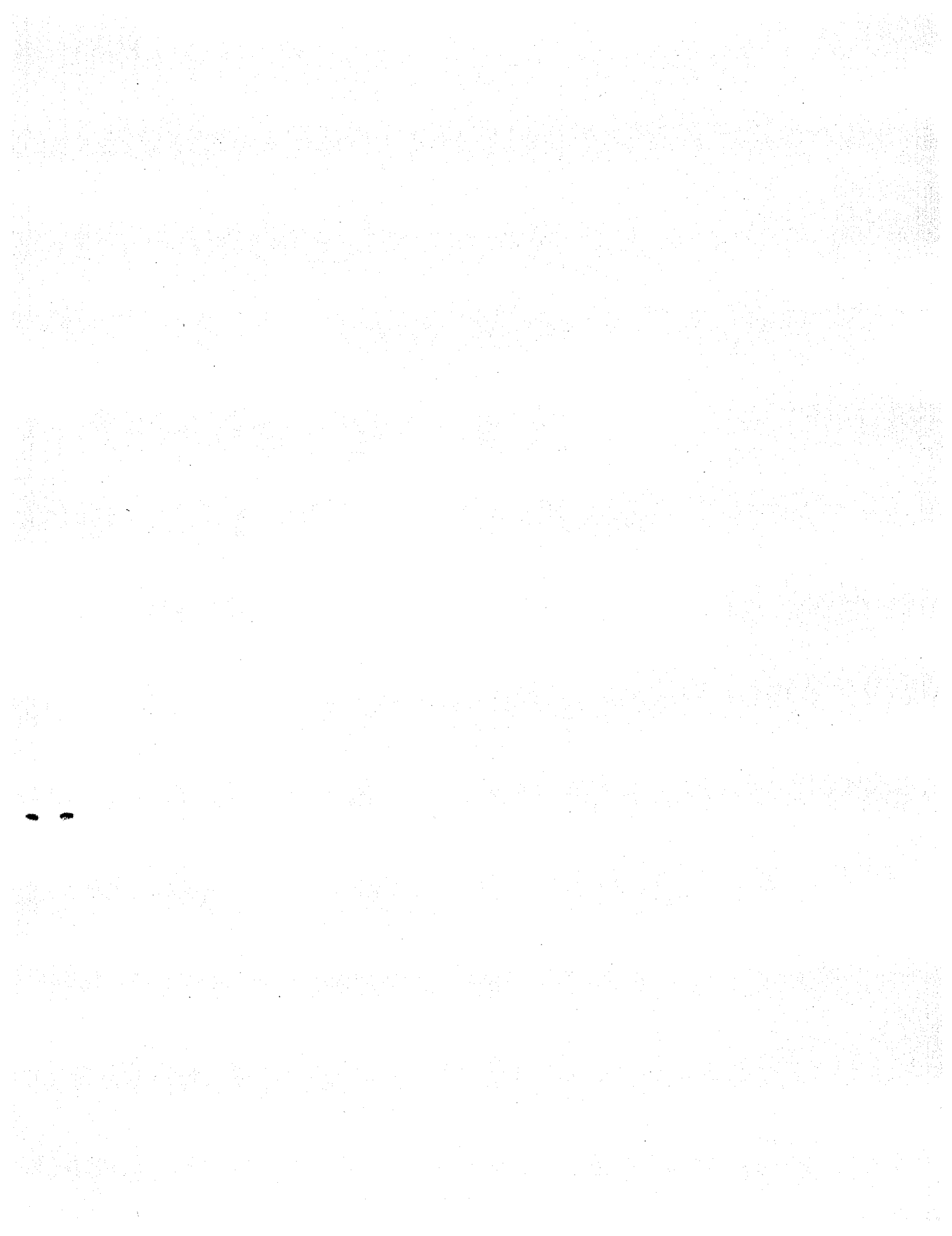
NHEERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic
 Experiment date :11/21/2008
 Strain: YG1041
 Activation :RLAO 99 2X 2ppd

Batch # 32 Unhydrolyzed

Sample ID:	UCO3704 Uh	UCO3601 Uh	UCO1632 Uh	UCO0285 Uh
0	46	46	46	46
0.3	46	53	62	55
0.6	63	49	48	44
1.2	55	57	62	63
3	40	55	66	59
6	69	101	100	66
12	64	100	91	84

rs
s

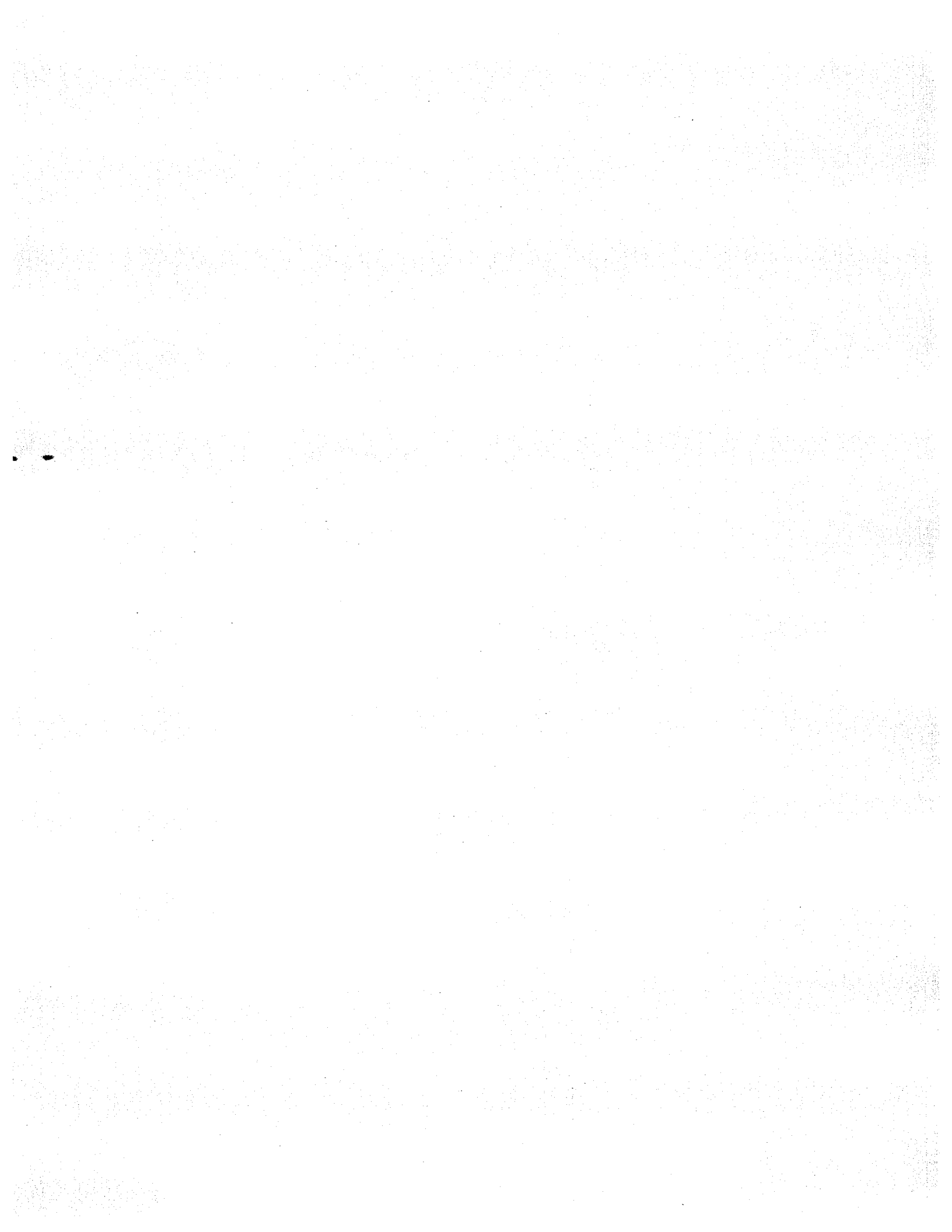
41



Sample ID:	UCO3055 Uh	UCO3147 Uh	UCO3555 Uh	UCO3568 Uh
eq-ml/pl				
0	46	46	46	46
0.3	56	41	44	33
0.6	54	45	55	59
1.2	50	45	46	47
3	37	44	53	49
6	64	65	85	69
12	66	60	70	61
rs	0	0	0	0
s	0	0	0	0

Sample ID:	UCO1978 Uh	UCO0295 Uh	Blank Uh
eq-ml/pl			
0	46	46	46
0.3	52	45	44
0.6	38	51	48
1.2	62	49	60
3	41	41	56
6	53	56	51
12	72	66	51
rs	0	0	0
s	0	0	0

***sample #3147 very dark red



Sample ID:	UCO3839 H	UCO3451 H	Blank H
0	48	48	48
0.3	36	52	47
0.6	8	69	44
1.2	2	85	51
3	24	39	49
6	0	73	40
12	0	15	58
rs	0	0	0
s	0	0	0

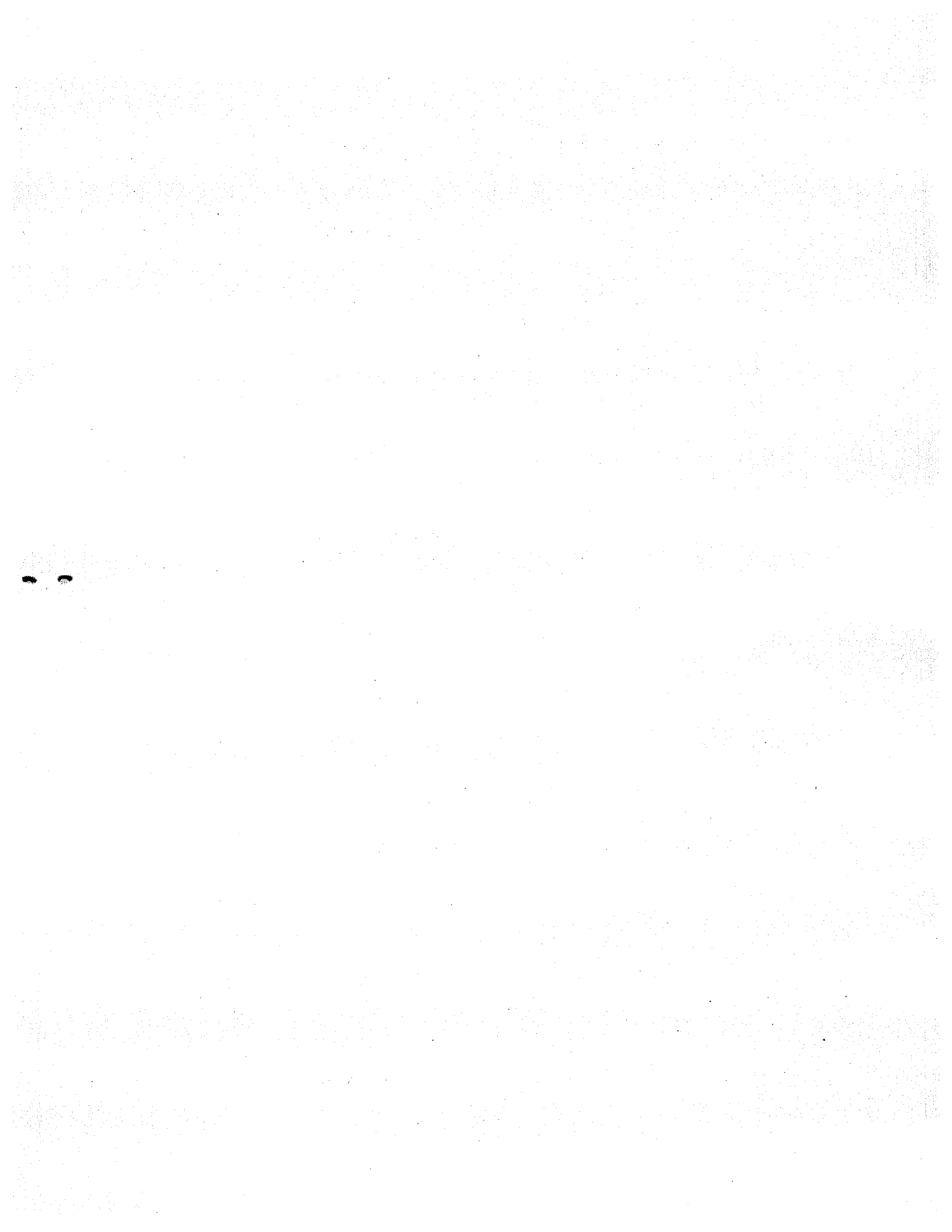
***sample # 2540 (technician error)
 ***sample # 3451 (urine very dark red)

NHEERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic
 Experiment date :12/10/2008
 Strain: YG1041
 Activation :RLAO 99 2X 2ppd

Batch # 33
 Unhydrolyzed

Sample ID: ml-eq/pl	UCO2525 Uh	UCO2253 Uh	UCO2280 Uh	UCO2540 Uh	UCO0216 Uh
0	48	48	48	48	48
0.3	48	53	52	47	61
0.6	61	46	57	57	40
1.2	52	48	52	58	51
3	36	54	72	71	58
6	1	69	129	135	72
12	0	71	175	182	85
rs	0	0	0	0.97	0
s	0	0	0	11.8	0

Sample ID: ml-eq/pl	UCO0387 Uh	UCO2915 Uh	UCO0731 Uh	UCO2540 Uh	UCO0216 Uh
0	48	48	48	48	48
0.3	65	64	52	46	48
0.6	50	54	74	50	40
1.2	61	63	53	67	68
3	61	74	58	67	76
6	97	111	54	118	128
12	98	204	72	139	143
rs	0	0	0	0.94	0
s	0	0	13.7	12.6	0



Sample ID: ml-eq/pl	UCO3899 Uh	UCO3451 Uh	Blank Uh
0	48	48	48
0.3	51	69	55
0.6	0	63	64
1.2	0	53	58
3	0	57	42
6	16	5	42
12	0	2	41
rs	0	0	0
s	0	0	0

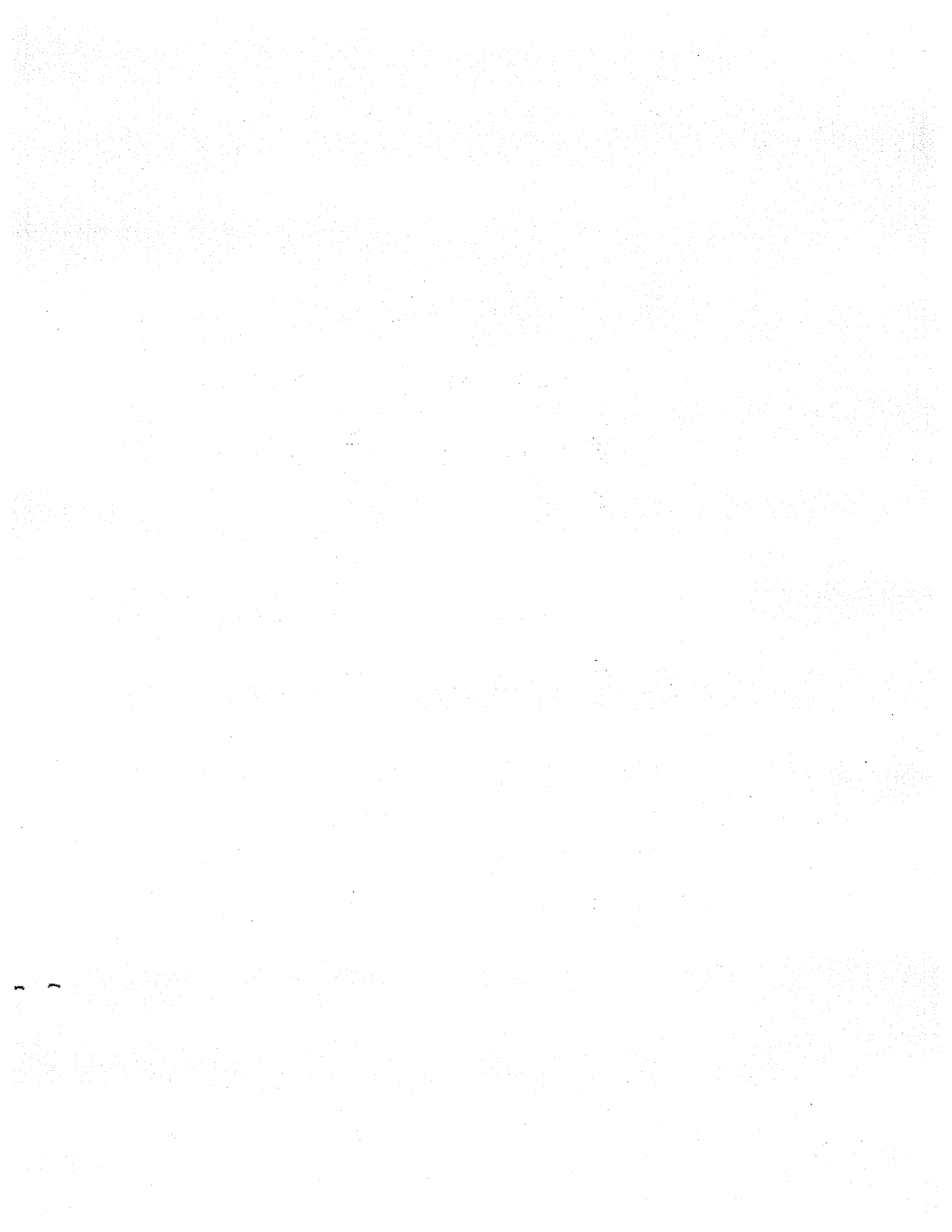
NHEERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic
 Experiment date :01/06/2009
 Strain: YG1041
 Activation :RLAO 100 2X 2ppd

Batch # 34
 Hydrolyzed

Controls:	Plate 1	Plate 2	Plate 3	avg.
SP-	35	31	21	
SP+	47	56	48	47
2NF	1708	1555	1635	
2A	1156	1286	1474	

Sampe ID:	UCO3242 H	UCO0895 H	UCO1785 H	avg.
eq-ml/pl	47	47	47	47
0	47	47	47	47
0.3	56	36	54	67
0.6	85	74	61	81
1.2	94	80	94	86
3	0	0	0	79
6	102	83	144	138
12	119	76	123	133
rs	0.71			0.80
s	4.6			12.4

Sampe ID:	UCO0584 H	UCO2300 H	UCO3963 H	avg.
eq-ml/pl	47	47	47	47
0	47	47	47	47
0.3	75	68	52	46
0.6	80	71	67	66
1.2	90	95	79	83
3	55	0	0	81
6	110	137	80	104
12	102	126	78	66
rs	0.42		0.63	
s	5.4		11.2	



Sampe ID:	UCO0076 H	UCO0255-H	UCO3735-H
eq-ml/pl			
0	47	47	47
0.3	64	57	65
0.6	91	111	97
1.2	118	124	123
3	78	111	82
6	241	244	170
12	247	239	199
		avg.	avg.
		47	47
		50	60
		131	93
		129	118
		143	111
		246	152
		230	196
rs		0.85	0.79
s		28.3	11.3

Sampe ID:	UCO0837-H	Blank H
eq-ml/pl		
0	47	47
0.3	83	79
0.6	131	137
1.2	212	214
3	210	213
6	405	369
12	398	380
		avg.
		47
		75
		142
		215
		216
		332
		362
rs		0.99
s		142.6

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NHEERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic
 Experiment date :01/06/2009
 Strain: YG1041
 Activation :RLAO 100 2X 2ppd

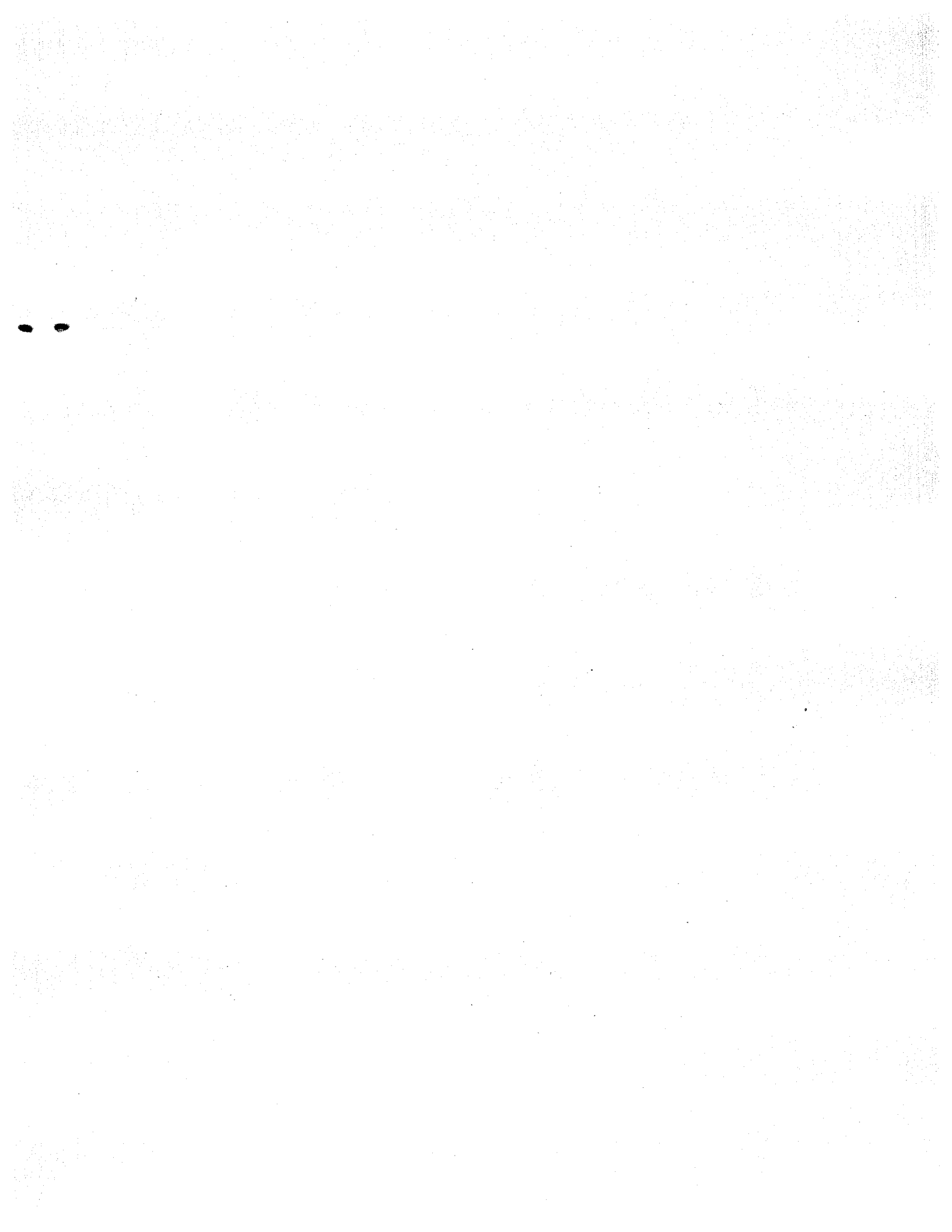
Batch # 34
 Unhydrolyzed

Sampe ID:	UCO3242 U/mh	UCO0895 U/mh	UCO1785 U/mh
0	47	47	47
0.3	55	53	53
0.6	40	50	53
1.2	62	58	59
3	56	43	44
6	56	93	94
12	80	115	110
		105	80
		avg.	47
			47
			30
			40
			40
			62
			91
			94

rs
 s
 0.84
 5.4

Sampe ID:	UCO0584 U/mh	UCO2300 U/mh	UCO3963 U/mh
0	47	47	47
0.3	51	48	49
0.6	47	61	56
1.2	42	50	48
3	47	64	62
6	117	62	72
12	115	108	112
		116	78
		avg.	47
			49
			50
			45
			60
			81
			93

rs
 s
 0.79
 6.5
 0.97
 5.2



Sampe ID:	UCO0076	UCO0255	UCO3735
eq-ml/pl	47	47	47
0	47	47	47
0.3	50	42	45
0.6	52	60	56
1.2	50	53	61
3	55	54	59
6	158	108	109
12	214	170	169
rs	0.95	0.97	0.97
s	13.6	13.6	10.3

Sampe ID:	UCO0837	Blank
eq-ml/pl	47	47
0	47	47
0.3	67	57
0.6	64	35
1.2	104	52
3	131	50
6	336	54
12	290	51
rs	0.93	0.93
s	40.7	40.7

***samples# 0584 ,0076, 0255, 0837 urine very dark red

NHEERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic

Experiment date :01/08/2009

Strain: YG1041

Activation :RLAO 100 2X 2ppd

PPM

Batch # 35

Hydrolyzed

Controls:	Plate 1	Plate 2	Plate 3	avg.
SP-	22	30	33	
SP+	43	30	43	39
2NF	1256	1207	1184	
2A	1053	1082	1035	

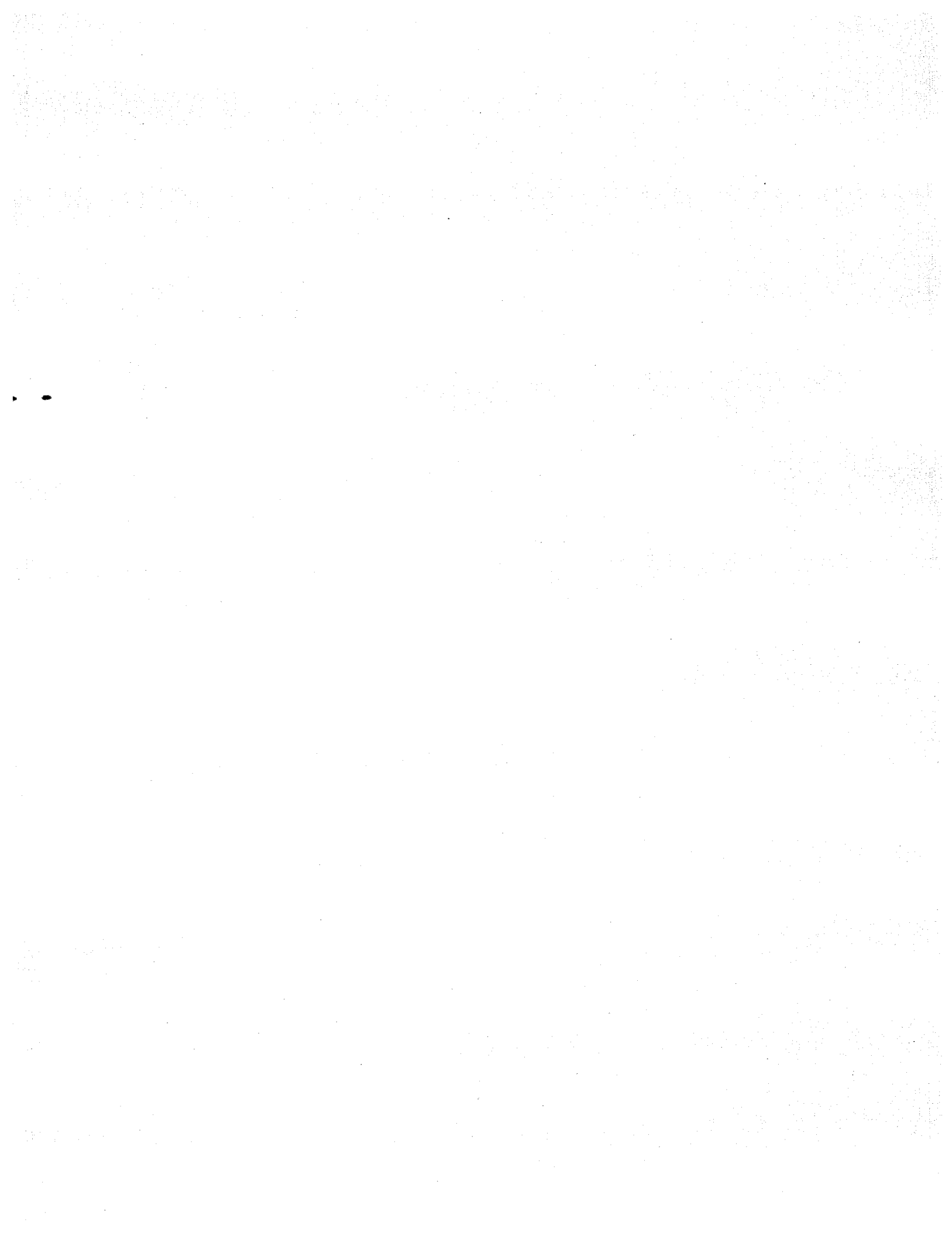
Sample ID	eq-ml/pl	UCO1480 H	UCO0142 H	UCO1260 H	avg.
0		39	39	39	39
0.3		53	69	59	46
0.6		71	91	73	61
1.2		73	154	68	64
3		53	167	0	86
6		107	240	109	127
12		72	384	124	137

rs		0.91	1.0	0.94	0.94
s		36.1	83.3	11.7	11.7

Sample ID	eq-ml/pl	UCO3135 H	UCO0708 H	UCO3624 H	avg.
0		39	39	39	39
0.3		65	50	197	184
0.6		65	83	322	317
1.2		68	91	186	384
3		54	82	374	343
6		46	195	371	381
12		48	290	314	294

rs					0.98
s					20.3

70



Sample ID eq-ml/pl	UCO0027 H			UCO3673 H			UCO0678 H		
	39	49	avg	39	50	avg	39	46	avg
0	39	49	39	39	50	39	39	46	39
0.3	68	71	59	66	64	66	53	53	50
0.6	71	66	69	77	80	73	67	68	72
1.2	78	85	82	73	0	71	66	74	67
3	74	63	69	71	64	90	53	88	64
6	70	69	70	64	60	60	71	88	80
12	70	91	81	81	60	60	58	55	57
rs			0.92						0.96
s			34.0						55.0

Sample ID eq-ml/pl	UCO1289 H			Blank H		
	39	77	avg	39	40	40
0	39	77	39	39	40	40
0.3	67	89	72	84	40	40
0.6	78	73	81	81	39	39
1.2	88	103	102	102	41	41
3	101	119	118	118	33	33
6	117	107	111	111	40	40
12	115					
rs			0.73			
s			10.1			

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NHEERL/ECD/MTB/DMD/2006-02-r0

Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic

Experiment date :01/08/2009

Strain: YG1041

Activation :RLAO 100 2X 2ppd

PPM

Batch # 35

Unhydrolyzed

Sample ID	UCO1480 Uh	UCO0142 Uh	UCO1260 Uh	eq-mi/pl	avg.
0	39	39	39	39	39
0.3	42	58	47	70	60
0.6	66	73	38	68	58
1.2	55	71	50	78	37
3	47	59	44	60	53
6	61	182	64	160	64
12	75	232	64	232	52
rs					0
s					0
					0.92
					15.6

Sample ID	UCO3135 Uh	UCO0708 Uh	UCO3624 Uh	eq-mi/pl	avg.
0	39	39	39	39	39
0.3	59	53	121	50	124
0.6	60	52	288	45	279
1.2	67	61	442	52	321
3	44	0	438	62	413
6	50	127	902	100	859
12	20	174	968	172	1045
rs					0
s					0
					0.93
					11.0
					293.3

Sample ID	UCO0027 Uh	UCO3673 Uh	UCO0678 Uh
eq-ml/pl			
0	39	39	39
0.3	51	36	49
0.6	49	61	40
1.2	70	62	45
3	0	68	51
6	86	86	69
12	86	106	62
			avg.
			39
			50
			47
			51
			49
			81
			99
			103
			0.94
			5.1

rs
s

Sample ID	UCO1289 Uh	Blank Uh
eq-ml/pl		
0	39	39
0.3	48	40
0.6	69	40
1.2	54	40
3	67	41
6	78	35
12	73	40

rs
s

***sample # 0142, 3135, 0708, 3624, 0027 urine very dark red

NHEERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic
 Experiment date :01/08/2009
 Strain: YG1041
 Activation :RLAO 100 2X 2ppd
 PPM/ SHW
 Batch # 36
 Hydrolyzed

Controls:	Plate 1	Plate 2	Plate 3	avg.
SP-	22	30	33	
SP+	43	30	43	39
2NF	1256	1207	1184	
2A	1053	1082	1035	

Sample ID	eq-ml/pl	UCO0226 H	UCO2015 H	UCO3386 H
0		39	39	39
0.3		48	58	55
0.6		79	81	68
1.2		77	58	65
3		76	36	38
6		94	2 t	67
12		81	t	38
rs				
s		0.89		
		31.7		

Sample ID	eq-ml/pl	UCO1095 H	UCO1344 H	UCO0734 H
0		39	39	39
0.3		40	51	60
0.6		65	52	57
1.2		76	62	67
3		69	81	71
6		60	83	81
12		46	78	106
rs				
s		0.83		
		6.0		
		0		
		0		
		39		
		57		
		47		
		57		
		71		
		80		
		113		
		135		

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Sample ID eq-ml/pl	UCO2233 H	UCO3938 H	UCO3165 H
0	39	39	39
0.3	59	56	72
0.6	54	58	51
1.2	63	51	83
3	88	80	88
6	95	75	75
12	115	113	109
rs		0.85	88
s		8.3	11.4
			12.7
			12.7
			128
			124

Sample ID eq-ml/pl	UCO2578 H	Blank H
0	39	39
0.3	79	63
0.6	75	66
1.2	65	71
3	82	91
6	106	116
12	105	105
rs		0.86
s		10.4

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NHEERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic
 Experiment date : 01/08/2009
 Strain: YG1041
 Activation : RLAO 100 2X 2ppd

PPM/ SHW

Batch # 36

Unhydrolyzed

Sample ID	UCO0226 Unh	UCO2015 Unh	UCO3386 Unh	
0	39	39	39	39
0.3	52	43	61	62
0.6	55	47	73	57
1.2	43	26	56	54
3	53	11	66	60
6	89	t	75	81
12	75	t	69	75
rs				0.70
s				5.0

Sample ID	UCO1095 Unh	UCO1344 Unh	UCO0734Unh	avg.
0	39	39	39	39
0.3	50	63	45	50
0.6	53	51	74	50
1.2	63	72	74	40
3	49	69	81	54
6	89	88	65	60
12	112	91	110	25
rs				101
s				2t
				0.93
				27.1

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Sample ID eq-ml/pl	UCO2233 Unh					UCO3938 Unh					UCO3165 Unh																
	39	49	65	59	54	71	74	101	39	52	60	53	53	59	61	46	78	39	52	46	43	87	73	80			
0	39	49	65	59	54	71	74	101	39	52	60	53	53	59	61	46	78	39	52	46	43	87	73	80			
0.3	56	55	51	61	77	75	88	0.86	53	60	55	58	74	88	39	57	75	39	52	46	43	87	73	80			
0.6	39	56	55	51	61	77	75	101	53	60	55	58	74	88	57	75	78	49	52	46	43	87	73	80			
1.2	39	56	55	51	61	77	75	101	60	53	55	58	74	88	57	75	78	49	52	46	43	87	73	80			
3	39	56	55	51	61	77	75	101	53	60	55	58	74	88	57	75	78	49	52	46	43	87	73	80			
6	39	56	55	51	61	77	75	101	53	60	55	58	74	88	57	75	78	49	52	46	43	87	73	80			
12	39	56	55	51	61	77	75	101	53	60	55	58	74	88	57	75	78	49	52	46	43	87	73	80			
rs	avg.																										
s	0.89																										
	13.3																										

Sample ID eq-ml/pl	UCO2578Unh					Blank Unh								
	39	48	43	61	79	92	93	39	49	57	51	38	40	52
0	39	48	43	61	79	92	93	39	49	57	51	38	40	52
0.3	39	48	43	61	79	92	93	39	49	57	51	38	40	52
0.6	39	48	43	61	79	92	93	39	49	57	51	38	40	52
1.2	39	48	43	61	79	92	93	39	49	57	51	38	40	52
3	39	48	43	61	79	92	93	39	49	57	51	38	40	52
6	39	48	43	61	79	92	93	39	49	57	51	38	40	52
12	39	48	43	61	79	92	93	39	49	57	51	38	40	52
rs	avg.													
s	0.95													
	9.2													

80

NHEERL/ECD/MTB/DMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic

Experiment date :01/14/2009

Strain: YG1041

Activation :RLAO 100 2X 2ppd

Batch # 37

Hydrolyzed

Controls:	avg.			UCO0631 H	UCO2982 H	UCO0085 H
	Plate 1	Plate 2	Plate 3			
SP-	32	28	43	61	61	61
SP+	68	56	57	61	61	61
2NF	1539	1532	1860	61	61	61
2A	1087	1125	1245	61	61	61
Sample ID:				UCO0085 H		
eq-ml/pl				UCO2982 H		
0	61	61	61	61	61	61
0.3	77	61	69	61	61	61
0.6	85	75	80	61	61	61
1.2	100	122	111	61	61	61
3	123	112	118	61	61	61
6	120	121	148	61	61	61
12			121	61	61	61
rs				UCO0085 H		
s				UCO2982 H		
				UCO0631 H		
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Sample ID: eq-ml/pl	UCO2126 H	UCO2470 H	UCO3279 H
0	61	61	61
0.3	69	75	70
0.6	86	104	94
1.2	92	111	90
3	63	102	128
6	99	90	139
12	78	45	90
rs	0	0	0
s	0	0	0
			61
			70
			88
			114
			110
			136
			44
			67
			0.93
			35.4

Sample ID: eq-ml/pl	UCO3357 H	Blank H
0	61	61
0.3	72	62
0.6	77	60
1.2	88	68
3	92	60
6	94	62
12	80	68
rs	0	0
s	0	0

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NHEERL/ECD/MTB/IDMD/2006-02-r0
 Urinary Mutagenicity Study for New England Bladder Cancer /Arsenic
 Experiment date :01/14/2009
 Strain: YG1041
 Activation :RLAO 100 2X 2ppd
 Batch # 37
 Unhydrolyzed

Sample ID: eq-ml/pl	UCOO631 Uh	UCO2982 Uh	UCOO085 Uh	avg.
0	61	61	61	61
0.3	58	67	56	61
0.6	52	61	63	82
1.2	71	72	65	70
3	68	51	71	74
6	72	78	120	110
12	36	83	129	131
rs	0	0		0.90
s	0	0		5.8

Sample ID: eq-ml/pl	UCO3838 Uh	UCO2454 Uh	UCOO411 Uh
0	61	61	61
0.3	80	68	65
0.6	78	64	72
1.2	72	76	76
3	76	66	72
6	68	99	104
12	48	109	92
rs	0	0	0
s	0	0	0

Sampe ID: eq-m/pl	UCO2126 Uh	UCO2470 Uh	UCO3279 Uh
0	61	61	61
0.3	72	72	60
0.6	68	68	69
1.2	60	97	86
3	65	66	73
6	71	89	85
12	55	87	99
rs		0	0
s		0	0

Sampe ID: eq-m/pl	UCO3357 Uh	Blank Uh
0	61	61
0.3	70	61
0.6	66	60
1.2	78	61
3	65	69
6	94	59
12	117	63
rs		0
s		0

