APPENDIX A

FIELD SAMPLING SHEETS

Ontario Hydro Sampling Field Sheets
Acid Gas Sampling Field Sheets
FGD Outlet Field Pitot Sheets

STACK SAMPLING FIELD DATA SHEET

Hg-1

PLANT	Duck Creek Station	AMBIENT TEMP [F°]	100+	COLLECTED H_2O, g	139.4
LOCATION	ESP Inlet	BAROMETRIC PRES ["Hg]	29.19	COLLECTED DUST, g	9.7000
STACK DIAMETER	12.5 x 66	%H_2O (Assumed)	6	DRY MOLE WT (Assumed)	29.0
STACK AREA	~~750~~ ft² 825	PROBE LENGTH [ft]	15	WET MOLE WT (Assumed)	29.0
DATE	July 14, 1998	NOZZLE ID [inch]	0.272		
TIME	Start– 12:25 Stop–	METER FACTOR: delta H	1.948		
METER BOX	NuTech # 5	METER FACTOR: Y	1.015	PITOT ID #	C-7
		PITOT TUBE: C_p	0.84	FILTER ID #	#1
OPERATOR(S)	MSD/DJK MSD	K	4.10	IMPINGER BOX ID #	Inlet

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Sample Type: Hg

Hg Speciation 1

Acid Gases

TRAVERSE POINT [" from wall]	SAMPLE TIME [minute]	STATIC PRES ["H_2O]	STACK TEMP [F°]	PITOT HEAD ["H_2O]	ΔH METER SETTING ["H_2O]	METER READING [ft³]	METER TEMP [F°] (Assumed= 110) inlet	outlet	PROBE TEMP [F°]	FILTER TEMP [F°]	METER EXHAUST O_2 [%]	CO_2 [%]	CO [ppm]	IMPINGER TEMP [F°]	METER VACUUM ["Hg]
---	---	---	---	---	---	125.0	---	---	---	---	---	---	---	---	---
P-1	0-5	-9.95	325	0.457	1.85	128.5	101	102			4.9	15.2		78	-14
2	5-10		324	0.482	1.85	131.8	101	102			5.0	15.1		78	-14
3	10-15		330	0.037	0.15	133.9	102	102			6.2	14.0		78	~~-14~~
N-1	15-20		309	0.146	0.55	136.0	104	105			4.3	15.9		78	-6
2	20-25		320	0.49	0.121	138.1	104	107			3.0	16.9		74	-6
3	25-30		332	0.258	1.05	140.5	106	109			3.2	16.9		61	-11
~~1~~-1	30-35 30.1		304	0.285	1.20	143.2	107	111			4.9	15.3		64	-10
2	~~35-40~~		309	0.166	0.65	143.9	107	111							-11
3	40-45		306	.022	0.08	147.3	109	111			4.4	15.7		71	-12
J-1	45-50		299	.050	0.20	148.7	108	112			5.8	14.4		80	-4
2	50-55		294	.106	0.42	150.2	108	113			3.6	15.7		77	-6
3	55-60		294	.203	0.82	152.4	109	114			2.7	17.3		71	-12
		$\bar{x}$	312.17	0.19	0.78	27.40	105.5	108.3			4.36	15.67		73.64	
AVERAGE			RMS	0.205											

Pre–Leak Check: pitot OK MSD
Vacuum 10 "Hg; Leak Rate <.02 cfm;

Post–Leak Check: pitot OK ✓
Vacuum 12 "Hg; Leak Rate <.002 cfm; MSD

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A B C D E F G H

I J K L M N O P

STACK SAMPLING FIELD DATA SHEET

PLANT	Duck Creek Station	AMBIENT TEMP [F°]		COLLECTED H_2O, g	
LOCATION	ESP Inlet	BAROMETRIC PRES ["Hg]		COLLECTED DUST, g	
STACK DIAMETER		%H_2O (Assumed)		DRY MOLE WT (Assumed)	
STACK AREA	~~750~~ ft² 825	PROBE LENGTH [ft]		WET MOLE WT (Assumed)	
DATE	July 14, 1998	NOZZLE ID [inch]			
TIME	Start– Stop– 1520	METER FACTOR: delta H			
METER BOX	NuTech #	METER FACTOR: Y		PITOT ID #	
		PITOT TUBE: C_p		FILTER ID #	
OPERATOR(S)	MSD/DJK	K	4.10	IMPINGER BOX ID #	

Sample Type: H

Hg Speciation (1)

Acid Gases

TRAVERSE POINT ["from wall]	SAMPLE TIME [minute]	STATIC PRES ["H_2O]	STACK TEMP [F°]	PITOT HEAD ["H_2O]	ΔH METER SETTING ["H_2O]	METER READING [ft³]	METER TEMP [F°] (Assumed=) inlet	outlet	PROBE TEMP [F°]	FILTER TEMP [F°]	METER EXHAUST O_2 [%]	CO_2 [%]	CO [ppm]	IMPINGER TEMP [F°]	METER VACUUM ["Hg]
---	---	---	---	---	---		---	---	---	---	---	---	---	---	---
6-1	0-5		304	0.345	1.4	155.3	108	112			4.2	15.7		68	-14
2	5-10		305	0.161	0.65	157.9	108	111			2.2	17.7		66	-9
3	10-15		298	0.150	0.61	160.0	108	111			—	—		68	-8
E-1	15-20		305	.060	0.25	161.5	107	111			2.8	17.2		80	-4
2	20-25		313	.105	0.41	163.1	107	111			2.2	17.8		76	-5
3	25-30		314	0.263	1.055	165.65	108	111			3.7	16.3		74	-11
C-1	30-35		335	0.294	1.20	168.4	108	111			3.2	16.8		78	-12
2	35-40		325	0.200	0.81	170.85	108	111			2.9	17.0		78	-13
3	40-45		319	0.440	1.77	173.55	108	110			2.9	17.1		80	-22
A-1	45-50		324	0.409	1.70	176.70	108	109			5.3	14.7		80	-18
2	50-55		324	0.400	0.81	179.4	107	108			4.1	15.8		81	-14
3	55-60		324	0.354	1.45	182.2	107	108			4.6	15.4		88	-20
	n=12		$\bar{x}$	$\bar{x}$	$\bar{x}$	Diff	$\bar{x}$	$\bar{x}$			$\bar{x}$				
			315.83	0.216	1.01	~~26.90~~	107.67	110.8			3.46	16.50		76.2	
AVERAGE	120		314	Rms .205	0.90	57.20	108.0				3.91	16.0			

Pre–Leak Check: pitot OK _____
Vacuum _____ "Hg; Leak Rate _____ cfm; _____

Post–Leak Check: pitot OK _____
Vacuum _____ "Hg; Leak Rate _____ cfm; _____

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STACK SAMPLING FIELD DATA SHEET

H6-2

PLANT	Duck Creek Station
LOCATION	ESP Inlet
STACK DIAMETER	12.5 x 66
STACK AREA	~~750~~ ft² 825
DATE	July 15, 1998
TIME	Start– 10:00 Stop–
METER BOX	NuTech # 5
OPERATOR(S)	MSD/DJK MSD

AMBIENT TEMP [F°]	98
BAROMETRIC PRES ["Hg]	29.20
%H_2O (Assumed)	12
PROBE LENGTH [ft]	14
NOZZLE ID [inch]	0.272
METER FACTOR: delta H	1.015
METER FACTOR: Y	1.948
PITOT TUBE: C_p	0.84
K	4.1

COLLECTED H_2O, g	120.8
COLLECTED DUST, g	~~4.095~~ 8.0012
DRY MOLE WT (Assumed)	30
WET MOLE WT (Assumed)	29
PITOT ID #	E-7
FILTER ID #	In #2
(4) IMPINGER BOX ID #	In #2

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Sample Type: Mercury

Hg Speciation (2)

Acid Gases

TRAVERSE POINT [" from wall]	SAMPLE TIME [minute]	STATIC PRES ["H_2O]	STACK TEMP [F°]	PITOT HEAD ["H_2O]	ΔH METER SETTING ["H_2O]	METER READING [ft³]	METER TEMP [F°] (Assumed= 110) inlet	outlet	PROBE TEMP [F°]	FILTER TEMP [F°]	METER EXHAUST O_2 [%]	CO_2 [%]	CO [ppm]	IMPINGER TEMP [F°]	METER VACUUM ["Hg]
---	---	---	---	---	---	188.00	---	---	---	---	---	---	---	---	---
A-1	0 - 5	-10.0	315	0.016	~~0.060~~ 0.060	188.80	98	98			—	—		94	-1
2	5 - 10		322	0.045	0.175	189.85	98	98			6.0	14.0		88	-2
3	10 - 15		322	0.381	1.55	192.70	98	99			5.9	14.2		64	-11
C-1	15 - 20		334	0.295	1.20	195.65	99	99			4.1	15.9		72	-8
2	20 - 25		321	0.084	0.36	197.45	99	101			3.0	17.0		63	-5
3	25 - 30		307	0.072	0.30	199.00	100	102			4.5	15.6		71	-5
E-1	30 - 35		301	0.073	0.31	200.50	101	103			4.2	15.9		77	-4
2	35 - 40		306	0.132	0.54	202.40	101	104			2.8	17.0		75	-6
3	40 - 45		307	0.282	1.15	204.90	102	104			4.5	15.6		67	-12
G-1	45 - 50		294	0.190	0.79	207.20	101	104			3.9	16.2		75	-7
2	50 - 55		293	0.080	0.33	209.10	102	104			2.7	17.3		74	-5
3	55 - 60		296	0.069	0.28	210.60	102	104			4.6	15.4		79	-5
		$\bar{X}$	309.8	~~0.143~~	0.59	22.11	100.1	101.7			3.43	14.59		72.7	
AVERAGE	120		310.8	0.129	0.60	46.16	102.3				3.8	16.2			

Pre–Leak Check: pitot OK MSD
Vacuum 11 "Hg; Leak Rate <.002 cfm; MSD

Post–Leak Check: pitot OK MSD
Vacuum 14 "Hg; Leak Rate <.002 cfm; MSD

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A B C D E F G H I J K L M N O P

STACK SAMPLIN FIELD DATA SHEET

HG-2

PLANT	Duck Creek Station	AMBIENT TEMP [F°]		COLLECTED H_2O, g	
LOCATION	ESP Inlet	BAROMETRIC PRES ["Hg]		COLLECTED DUST, g	
STACK DIAMETER		%H_2O (Assumed)	12	DRY MOLE WT (Assumed)	
STACK AREA	750 ft²	PROBE LENGTH [ft]	14	WET MOLE WT (Assumed)	
DATE	July 15, 1998	NOZZLE ID [inch]	0.272		
TIME	Start– Stop–12:30	METER FACTOR: delta H	1.948		
METER BOX	NuTech # 5	METER FACTOR: Y	1.015	PITOT ID #	
		PITOT TUBE: C_p	0.84	FILTER ID #	
OPERATOR(S)	MSD/DJK	K		(4) IMPINGER BOX ID #	

Page 2 of 2

Sample Type: Mercury

Hg Speciation (2)

Acid Gases

TRAVERSE POINT [" from wall]	SAMPLE TIME [minute]	STATIC PRES ["H_2O]	STACK TEMP [F°]	PITOT HEAD ["H_2O]	ΔH METER SETTING ["H_2O]	METER READING [ft³]	METER TEMP [F°] (Assumed=) inlet	outlet	PROBE TEMP [F°]	FILTER TEMP [F°]	METER EXHAUST O_2 [%]	CO_2 [%]	CO [ppm]	IMPINGER TEMP [F°]	METER VACUUM ["Hg]
---	---	---	---	---	---	210.65	---	---	---	---	---	---	---	---	---
S-1	0 - 5		293	0.044	0.18	211.85	101	105			7.0	13.2		83	-2
2	5 - 10		297	0.110	0.45	213.50	102	104			4.1	16.0		71	-5
3	10 - 15		288	0.168	0.65	215.50	102	104			3.4	16.5		66	-7
L-1	15 - 20		301	0.267	1.1	218.50	102	104			5.1	15.0		66	-9
2	20 - 25		309	0.095	0.38	220.35	102	104			3.7	16.3		62	-5
3	25 - 30		304	0.053	0.23	221.75	102	104			4.1	16.0		70	-4
N-1	30 - 35		314	0.140	0.57	223.90	102	105			5.0	15.3		77	-6
2	35 - 40	5	323	0.131	0.55	225.90	103	105			3.5	16.5		71	-6
3	40 - 45	10	336	0.207	0.82	228.30	104	106			3.1	16.9		70	-9
P-1	45 - 50	15	325	0.442	1.75	231.80	104	106			5.9	14.3		75	-14
2	50 - 55	20	326	0.066	0.28	233.50	104	105			5.0	15.1		71	-6
3	55 - 60	25	325	0.079	0.33	235.00	103	105			2.6	17.4		78	-6
		$\bar{X}$	311.8		0.61	24.05	102.6	104.8			4.1	15.9		71.7	
AVERAGE			RMS	0.129	~~45~~ 16										

Pre–Leak Check: pitot OK _____
Vacuum _____ "Hg; Leak Rate _____ cfm; _____

Post–Leak Check: pitot OK _____
Vacuum _____ "Hg; Leak Rate _____ cfm; _____

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STACK SAMPLING FIELD DATA SHEET

PLANT	Duck Creek Station
LOCATION	ESP Inlet
STACK DIAMETER	12.5 x 66
STACK AREA	~~750~~ ft² 825
DATE	July 16, 1998
TIME	Start-0930 Stop-
METER BOX	NuTech # 5
OPERATOR(S)	MSD/DJK MSD

AMBIENT TEMP [F°]	106	COLLECTED H_2O, g	119.3
BAROMETRIC PRES ["Hg]	29.24	COLLECTED DUST, g	7.2084
%H_2O (Assumed)	11.5	DRY MOLE WT (Assumed)	30.7
PROBE LENGTH [ft]	15	WET MOLE WT (Assumed)	29.3
NOZZLE ID [inch]	0.272		
METER FACTOR: delta H	1.948		
METER FACTOR: Y	1.015	PITOT ID #	E-7
PITOT TUBE: C_p	0.84	FILTER ID #	IN #3
K	4.1	IMPINGER BOX ID #	IN #3

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Sample Type: Hg

Hg Speciation 3

Acid Gases

TRAVERSE POINT [" from wall]	SAMPLE TIME [minute]	STATIC PRES ["H_2O]	STACK TEMP [F°]	PITOT HEAD ["H_2O]	ΔH METER SETTING ["H_2O]	METER READING [ft³]	METER TEMP [F°] (Assumed=) inlet	METER TEMP [F°] outlet	PROBE TEMP [F°]	FILTER TEMP [F°]	METER EXHAUST O_2 [%]	METER EXHAUST CO_2 [%]	METER EXHAUST CO [ppm]	IMPINGER TEMP [F°]	METER VACUUM ["Hg]	
---	---	---	---	---	---	241.0	---	---	---	---	---	---	---	---	---	
P-1	0-5		331	0.066	0.280	242.5	98	98			6.5	10.8		83	-4	
2	5-10		329	0.069	0.290	244.0	98	99			4.8	12.1		76	-4	
3	10-15		330	0.480	1.90	247.3	99	99			5.6	11.4		63	-14	
N-1	15-20		338	0.178	0.74	249.3	99	100			4.1	12.7		60	-7	-.1
2	20-25		325	0.109	0.44	251.1	99	101			2.6	17.4		64	-8	
3	25-30		321	0.174	0.72	253.26	100	101			2.3	17.7		65	-8	
L-1	30-35		308	0.084	0.35	254.65	101	102			3.3	16.4		72	-5	-.15
2	35-40		313	0.113	0.45	256.4	101	103			3.1	17.1		71	6	
3	40-45		302	0.295	1.2	259.0	102	104			4.4	15.8		68	13	
J-1	45-50		295	0.243	0.99	261.45	102	104			3.6	16.4		67	14	-.1
2	50-55		298	0.082	0.33	263.2	102	104			3.3	16.7		68	7	
3	55-60	-10.0	296	0.026	0.11	264.0	101	104			2.8	17.2		85	4	
AVERAGE																

Pre-Leak Check: pitot OK ✓
Vacuum 11 "Hg; Leak Rate <0.002 cfm; DJK

Post-Leak Check: pitot OK ✓
Vacuum 15 "Hg; Leak Rate <0.002 cfm; MSD

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A B C D E F G H | I J K L M N O P

HG-3

STACK SAMPLING FIELD DATA SHEET

PLANT	Duck Creek Station
LOCATION	ESP Inlet
STACK DIAMETER	
STACK AREA	ft^2
DATE	July 16, 1998
TIME	Start–10:40 Stop– 1150
METER BOX	NuTech # 5
OPERATOR(S)	MSD/DJK

AMBIENT TEMP [F°]	
BAROMETRIC PRES ["Hg]	
$\%H_2O$ (Assumed)	
PROBE LENGTH [ft]	
NOZZLE ID [inch]	
METER FACTOR: delta H	
METER FACTOR: Y	
PITOT TUBE: C_p	
K	

COLLECTED H_2O, g	
COLLECTED DUST, g	
DRY MOLE WT (Assumed)	
WET MOLE WT (Assumed)	
PITOT ID #	
FILTER ID #	
IMPINGER BOX ID #	

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Sample Type: Hts

Hg Speciation (3)

Acid Gases

TRAVERSE POINT ["from wall]	SAMPLE TIME [minute]	STATIC PRES ["H_2O]	STACK TEMP [F°]	PITOT HEAD ["H_2O]	ΔH METER SETTING ["H_2O]	METER READING [ft^3]	METER TEMP [F°] (Assumed=) inlet	outlet	PROBE TEMP [F°]	FILTER TEMP [F°]	METER EXHAUST O_2 [%]	CO_2 [%]	CO [ppm]	IMPINGER TEMP [F°]	METER VACUUM ["Hg]
---	---	---	---	---	---	264.2	---	---	---	---	---	---	---	---	---
G-1	0-5		299	0.059	0.245	265.6	102	105			6.3	14.6		85	4
2	5-10		296	0.107	0.41	267.3	102	106			4.7	14.4		78	5
3	10-15		291	0.192	0.78	269.55	103	107			3.6	16.4		72	9
E-1	15-20		308	0.306	1.25	272.25	103	107			5.1	15.1		75	10
2	20-25		309	0.047	0.16	273.6	103	106			3.5	16.5		70	4
3	25-30		308	0.100	0.41	275.2	103	106			2.8	17.2		77	6
C-1	30-35		311	0.096	0.38	276.9	103	106			3.8	16.3		74	6
2	35-40		324	0.156	0.63	279.0	104	107			3.5	16.5		67	9
3	40-45		339	0.206	0.83	281.35	104	107			3.8	16.3		62	14
A-1	45-50		328	0.492	2.0	285.05	104	106			5.6	14.4		61	14
2	50-55		324	0.074	0.30	286.65	104	105			6.0	14.4		61	7
3	55-60		323	0.052	0.33	288.20	104	105			5.7	14.4		65	8
							102.7								
AVERAGE	120	~~120~~	314	0.141	0.60	47.20	101.71	103.03			4.2	16.0			

Pre–Leak Check: pitot OK _____
Vacuum _____ "Hg; Leak Rate _____ cfm; _____

Post–Leak Check: pitot OK _____
Vacuum _____ "Hg; Leak Rate _____ cfm; _____

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STACK SAMPLING FIELD DATA SHEET [Hg or ~~ACID GAS~~]

PLANT	DUCK CREEK STATION, CANTON, IL	BAROMETRIC PRES [" Hg]	29.19	COLLECTED H_2O [grams]	420.1
LOCATION	STACK or SCRUBBER IN	%H_2O (Assumed)	16	COLLECTED DUST [grams]	0.0446
DUCT DIMENSIONS	20 High by 20 Deep	PROBE LENGTH [ft]	12'	DRY MOLE WT (Assumed)	
DUCT AREA	400 ft^2	NOZZLE DIAMETER [inch]	0.260	WET MOLE WT (Assumed)	
DATE	July 14, 1998	METER FACTOR: ΔH	1.844	NOZZLE ID #	Cut #1
TIME	Start- 1230 Stop-	METER FACTOR: Y	1.000	PITOT ID #	SP-2A
METER BOX	NuTech # 2	PITOT TUBE: C_p	~~0.84~~ 0.813	FILTER ID #	1/4C
OPERATOR(S)	LLA & RLO	K	3.43	IMPINGER BOX ID #	Cut #1

319.72

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PORT	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	STACK TEMP [F°]	NULL YAW [°]	PITOT HEAD [" H_2O]	ΔH METER SETTING [" H_2O]	METER READING [ft^3]	METER TEMP [F°] (Assumed-) (6) inlet	(7) outlet	(2) PROBE TEMP [F°]	(3) FILTER TEMP [F°]	METER EXHAUST O_2 [%]	CO_2 [%]	CO [ppm]	(4) IMPINGER TEMP [F°]	METER VACUUM [" Hg]	
	0-5		133		0.70	2.4	323.05	101	98	248	247	5.5			66	-9	
	5-10		133		0.75	2.6	327.45	105	99	249	248	5.9			60	-10	
	10-15		133		0.75	2.6	332.32	107	99	248	246	7.1			61	-10	calib
	15-20		134		0.75	2.6	336.50	111	101	246	247	7.4			63	-10	
	20-25		134		0.75	2.6	341.05	112	101	245	234	7.3			61	-10	
	25-30		134		0.75	2.6	345.55	114	102	248	255	7.1			58	-10	
	30-35		131		0.70	2.4	350.00	114	102	248	257	7.4			58	-9	
	35-40		134		0.70	2.4	354.20	115	103	252	245	6.9			58	-9	20.9
	40-45		133		0.70	2.4	358.55	115	103	251	246	7.1		17	58	-9	
	45-50		134		0.75	2.6	362.83	116	103	250	247	6.9			57	-10	
	50-55		133	→	0.70	2.4	367.49	117	104	252	249	7.2			57	-9	
	55-60		133		0.70	2.4	371.70	117	105	245	248	7.1			58	-9	
	60-65		133		0.70	2.4	376.10	118	106	252	247	6.4			57	-9	
	65-70		133		0.70	2.4	380.60	118	106	249	248	7.2			58	-9	
	70-75		133		0.75	2.6	385.00	120	107	248	227	7.0			59	-9	
	75-80		133		0.75	2.6	389.45	122	109	244	247	7.2			60	-9	20.9
	80-85		134		0.70	2.4	394.00	120	109	246	256	7.5	12.9	31	58	-9	calib
	85-90		134		0.70	2.4	398.70	121	109	249	243	7.2			58	-9	
	90-95		133		0.70	2.4	403.10	121	109	249	245	7.3			59	-9	
	95-100		133		0.70	2.4	407.10	121	109	249	244	7.3			59	-9	
	100-105		133		0.70	2.4	411.41	120	109	249	250	7.3	12.8	39	59	-9	
	105-110		133		0.75	2.6	416.37	121	109	252	248	7.4	12.7	17	60	-9	
	110-115		133		0.75	2.6	420.28	121	109	250	249	7.5	12.6	51	60	-9	
	115-120		132		0.70	2.4	424.70	121	110	246	246	7.4	12.6	270	61	-9	
AVERAGE																	

Pre-Leak Check: 0 @ 10" Hg

Post-Leak Check:

POSITIVE YAW IS CLOCKWISE

[O:\APPRES\STACK\ICCI-98\DUCKCREK\M5SHEET;RLO:6/30/98]

STACK SAMPLING FIELD DATA SHEET [Hg or ~~ACID GAS~~]

PLANT	DUCK CREEK STATION, CANTON, IL	BAROMETRIC PRES [" Hg]	29.19	COLLECTED H_2O [grams]	
LOCATION	STACK or SCRUBBER IN	%H_2O (Assumed)	16	COLLECTED DUST [grams]	
DUCT DIMENSIONS	20 High by 20 Deep	PROBE LENGTH [ft]	12'	DRY MOLE WT (Assumed)	
DUCT AREA	ft^2	NOZZLE DIAMETER [inch]	0.260	WET MOLE WT (Assumed)	
DATE	July 14, 1998	METER FACTOR: ΔH	1.844	NOZZLE ID #	
TIME	Start– 1230 Stop– 1445	METER FACTOR: Y	1.000	PITOT ID #	SP-2A
METER BOX	NuTech # 2	PITOT TUBE: C_p	0.813	FILTER ID #	1/4 C
OPERATOR(S)	LLA & RLO	K	3.43	IMPINGER BOX ID #	

424.70

PAGE 2 of 2

PORT	SAMPLE TIME [minute]	STATIC PRES ["H_2O]	STACK TEMP [F°]	NULL YAW [°]	PITOT HEAD ["H_2O]	ΔH METER SETTING ["H_2O]	METER READING [ft^3]	METER TEMP [F°] (Assumed=) inlet	METER TEMP [F°] (Assumed=) outlet	PROBE TEMP [F°]	FILTER TEMP [F°]	METER EXHAUST O_2 [%]	METER EXHAUST CO_2 [%]	METER EXHAUST CO [ppm]	IMPINGER TEMP [F°]	METER VACUUM ["Hg]
	120-125		133		0.70	2.4	429.60	120	110	244	249	7.5	—	26	62	-9
	125-130		133		0.75	2.6	433.55	121	110	250	248	7.7	12.6	26	62	-9
	130-135		133		0.75	2.6	438.18	121	110	250	248	7.3	12.9	80	63	-9
AVERAGE	135	-0.48	133.1		0.72	2.48	118.46	111.1				7.1	13.0			

20.9 calib

20.9

Pitot leak ok OK

purged for 10 min after test

Pre–Leak Check: 0 @ 10" Hg

Post–Leak Check: 0.10 ft^3/min @ 10" Hg

POSITIVE YAW IS CLOCKWISE

[O:\APPRES\STACK\ICCI–98\DUCKCREK\M5SHEET;RLO;6/30/98]

STACK SAMPLING FIELD DATA SHEET [Hg or ACID GAS]

PLANT	DUCK CREEK STATION, CANTON, IL
LOCATION	STACK or SCRUBBER IN
DUCT DIMENSIONS	20 High by 20 Deep
DUCT AREA	400 ft²
DATE	July 15, 1998
TIME	Start- 1033 Stop- 1228
METER BOX	NuTech # 2
OPERATOR(S)	LLA & RLO

BAROMETRIC PRES [" Hg]	29.20
%H_2O (Assumed)	15.5
PROBE LENGTH [ft]	12
NOZZLE DIAMETER [inch]	0.260
METER FACTOR: ΔH	1.844
METER FACTOR: Y	1.000
PITOT TUBE: C_p	0.813
K	3.45
445.00	

COLLECTED H_2O [grams]	885.1
COLLECTED DUST [grams]	0.0081
DRY MOLE WT (Assumed)	30.36
WET MOLE WT (Assumed)	28.440
NOZZLE ID #	
PITOT ID #	SP#2
FILTER ID #	2
IMPINGER BOX ID #	

PAGE 1

PORT	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	STACK TEMP [F°]	NULL YAW [°]	PITOT HEAD [" H_2O]	ΔH METER SETTING [" H_2O]	METER READING [ft³]	METER TEMP [F°] (Assumed=) inlet	outlet	PROBE TEMP [F°]	FILTER TEMP [F°]	METER EXHAUST O_2 [%]	CO_2 [%]	CO [ppm]	IMPINGER TEMP [F°]	METER VACUUM [" Hg]	
B	5		133		0.70	2.4	449.35	94	92	248	249	5.3	14.7	1	61	-11	
midway	10		132		0.75	2.6	454.00	96	92	245	248	5.5	14.6	0	51	-11.5	5
	15		133		0.70	2.4	458.00	99	93	250	246	5.5	14.6	3	53	-11.5	
	20		134		0.70	2.4	462.35	102	94	251	247	5.5	14.6	0	54	-11.5	20.6 ← calib
	25		134		0.70	2.4	466.66	105	95	251	248	5.3	14.8	5	55	-11.5	
	30		133		0.70	2.4	471.00	107	95	248	248	5.3	14.9	0	55	-11.5	
	35		133		0.70	2.4	475.38	108	96	247	247	5.3	14.8	2	54	-11.5	
	40		133		0.70	2.4	479.70	109	97	245	247	5.5	14.6	6	54	-11.5	
	45		133		0.70	2.4	484.10	110	97	240	248	5.2	14.9	7	55	-11.5	
	50		134		0.70	2.4	488.40	111	97	240	248	5.3	14.7	4	56	-11.5	
	55	0.32	133		0.70	2.4	492.89	112	100	246	248	5.4	14.7	4	57	-11.5	
	60		134		0.70	2.4	497.05	114	100	240	248	5.3	14.8	7	58	-11.5	20.7 ← calib
	65		133		0.70	2.4	501.40	114	101	243	248	5.6	14.6	2	58	-11.5	
	70		133		0.70	2.4	505.78	115	102	247	248	5.1	15.0	5	60	-11.5	
	75		131		0.70	2.4	510.00	116	102	243	248	5.1	15.0	20	59	-11.5	
	80		132		0.70	2.4	514.44	117	103	239	248	5.2	14.9	22	59	-11.5	
	85		133		0.70	2.4	518.81	117	104	248	248	5.3	14.8	12	59	-11.5	
	90		132		0.75	2.6	523.30	118	104	241	248	5.4	14.7	16	59	-11.5	20.8 ← ok
	95		132		0.70	2.4	527.77	118	106	239	249	5.3	14.8	27	60	-11.5	
	100		132		0.70	2.4	532.10	119	106	241	248	5.2	14.9	52	61	-11.5	
	105		132		0.70	2.4	536.50	119	107	247	248	5.3	14.8	16	63	-11.5	
	110		132		0.70	2.4	540.93	120	107	240	249	5.2	14.9	50	63	-11.5	20.7
	115		132		0.7	2.4	545.30	121	108	240	249	5.1	15.0	39	66	-11.5	
	120																
AVERAGE	120	0.223	132.7		0.70	2.4	95.95	113 (105.6)	99.9	244.3	248	5.3	14.8	13.0	57.8		

Pre-Leak Check: OK < 0.01 ft³/min @ 10" Hg Post-Leak Check: OK @ 10" Hg

POSITIVE YAW IS CLOCKWISE

Pitot leak ck (OK)

[O:\APPRES\STACK\ICCI-98\DUCKCREK\M5SHEET;RLO;6/30/98]

STACK SAMPLING FIELD DATA SHEET [Hg ~~ACID GAS~~]

PLANT	DUCK CREEK STATION, CANTON, IL
LOCATION	STACK or SCRUBBER IN
DUCT DIMENSIONS	20 High by 20 Deep
DUCT AREA	400 ft²
DATE	July 16, 1998
TIME	Start-0955 Stop-1145
METER BOX	NuTech # 2
OPERATOR(S)	LKA & RLO

BAROMETRIC PRES [" Hg]	29.28
%H_2O (Assumed)	16
PROBE LENGTH [ft]	12
NOZZLE DIAMETER [inch]	0.260
METER FACTOR: ΔH	1.944
METER FACTOR: Y	1.000
PITOT TUBE: C_p	0.813
K	3.50
555.70	

COLLECTED H_2O [grams]	374.4
COLLECTED DUST [grams]	0.0210
DRY MOLE WT (Assumed)	
WET MOLE WT (Assumed)	
NOZZLE ID #	
PITOT ID #	SP-2A
FILTER ID #	3
IMPINGER BOX ID #	

PAGE 1

PORT	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	STACK TEMP [F°]	NULL YAW [°]	PITOT HEAD [" H_2O]	ΔH METER SETTING [" H_2O]	METER READING [ft³]	METER TEMP [F°] (Assumed=) inlet	outlet	PROBE TEMP [F°]	FILTER TEMP [F°]	METER EXHAUST O_2 [%]	CO_2 [%]	CO [ppm]	IMPINGER TEMP [F°]	METER VACUUM [" Hg]	
B	5		132		0.75	2.65	560.15	96	93	242	243	5.7	14.4	10	57	-11.5	
	10		133		0.75	2.65	564.68	99	93	244	248	5.7	14.4	3	53	-11.5	
mid	15		133		0.75	2.65	569.25	101	94	246	248	5.7	14.4	6	53	-11.5	
way	20		132		0.75	2.65	573.70	104	95	241	250	5.4	14.7	29	52	-11.5	
down	25		133		0.75	2.65	578.10	106	95	240	247	5.9	14.4	58	52	-11.5	20.7
	30		133		0.75	2.65	582.68	109	96	247	248	5.3	14.9	167	50	-11.5	←
	35		133		0.75	2.65	587.20	110	97	242	248	5.5	14.6	31	51	-11.5	calib
	40		133		0.75	2.65	591.60	112	99	244	247	5.3	14.8	30	53	-11.5	
	45		133		0.75	2.65	596.2	113	99	239	248	5.7	14.4	16	54	-11.5	
	50		133		0.75	2.65	600.1	113	100	244	248	5.1	15.0	126	55	-11.5	
	55		133		0.75	2.65	604.95	115	101	239	248	5.5	14.6	43	57	-11.5	
	60		133		0.75	2.65	609.40	115	101	247	248	5.2	14.9	96	58	-11.5	
	65		133		0.75	2.65	613.83	117	103	248	247	5.5	---	44	55	-11.5	
	70		133		0.75	2.65	618.32	117	103	241	247	5.2	14.9	131	56	-11.5	20.8
	75		133		0.75	2.65	622.77	117	104	248	248	5.2	14.9	200	56	-11.5	← ok
	80		133		0.75	2.65	627.20	118	105	246	248	5.3	—	68	58	-11.5	
	85		133		0.75	2.65	631.65	119	106	241	249	5.4	---	54	56	-11.5	
	90		133		0.75	2.65	636.33	120	107	242	249	5.3	---	74	60	-11.5	20.8
	95		134		0.75	2.65	641.05	120	107	239	249	5.5	14.5	26	61	-11.5	←
	100		134		0.75	2.65	645.20	121	108	242	249	5.2	14.9	146	64	-11.5	ok calib
	105		133		0.75	2.65	649.80	121	109	239	249	5.4	14.7	40	66	-11.5	
	110		133		0.75	2.65	654.25	121	109	240	246	5.3	14.8	44	65	-11.5	20.8
	115																←
	120																
AVERAGE	110		133		0.75	2.65	98.55	107.9				5.5	14.6				

Pre-Leak Check: OK < 0.01 ft³/min @ 10" Hg Post-Leak Check: OK < 0.02 ft³/min @ 10" Hg

POSITIVE YAW IS CLOCKWISE

Pitot leak ck OK

[O:\APPRES\STACK\ICCI-98\DUCKCREK\M5SHEET;RLO;6/30/98]

STACK SAMPLIN(FIELD DATA SHEET

PLANT	Duck Creek Station	AMBIENT TEMP [F°]	100+	COLLECTED H_2O, g	153.1
LOCATION	ESP Inlet	BAROMETRIC PRES ["Hg]	29.19	COLLECTED DUST, g	
STACK DIAMETER		%H_2O (Assumed)		DRY MOLE WT (Assumed)	
STACK AREA	ft^2	PROBE LENGTH [ft]	8	WET MOLE WT (Assumed)	
DATE	July ~~13~~ 14, 1998	NOZZLE ID [inch]	—		
TIME 135	Start– ~~14~~ Stop– 1500	METER FACTOR: delta H			
METER BOX	NuTech # 3	METER FACTOR: Y	1.050	PITOT ID #	
		PITOT TUBE: C_p		FILTER ID #	
OPERATOR(S)	MSD/DJK	K		IMPINGER BOX ID #	

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Sample Type: Acid Gas

Hg Speciation

Acid Gases ①

TRAVERSE POINT [" from wall]	SAMPLE TIME [minute]	STATIC PRES ["H_2O]	STACK TEMP [F°]	PITOT HEAD ["H_2O]	ΔH METER SETTING ["H_2O]	METER READING [ft^3]	METER TEMP [F°] (Assumed=) inlet	outlet	PROBE TEMP [F°]	FILTER TEMP [F°]	METER EXHAUST O_2 [%]	CO_2 [%]	CO [ppm]	IMPINGER TEMP [F°]	METER VACUUM ["Hg]
---	---	---	---	---	---	934.00	---	---	---	---	---	---	---	---	---
6-6½	0-6		300		1.56	938.20	107	107	300	300	2.9	17.1		72	7
feet	6-12				1.50	941.70	107	107			2.9	17.1		68	7
deep	12-18				1.50	—	107	108			—	—		70	7
	18-24				1.50	—	110	107			2.6	17.4		78	8
	24-30				1.50	952.61	111	108			—	—		78	9
	30-36				1.50	956.30	112	108			2.5	17.5		77	9
	36-42				1.50	—	112	108			2.4	17.5		76	10
	42-48				1.50	963.87	112	109			2.4	17.6		76	12
	48-54				1.50	967.65	113	109			—	—		79	11
	54-60				1.50	—	114	110						80	12
	60-66				1.50	975.30	114	110			2.5	17.5		80	12
	66-72				1.50	979.00	115	111			2.2	17.8		80	12
	72-78				2.00	—	115	111			2.1	17.8		81	13
	78-84				2.00	987.60	115	112			2.2	17.7		86	13
	~~84-90~~														
						53.60									
AVERAGE					1.57	~~50~~	110.5				2.5	17.5			

Pre–Leak Check: pitot OK Non
Vacuum 11 "Hg; Leak Rate 0.002 cfm; MSD

Post–Leak Check: pitot OK _____
Vacuum _____ "Hg; Leak Rate _____ cfm; _____

O:\appres\stack\icci–98\m5–in

STACK SAMPLIN(FIELD DATA SHEET

PLANT	Duck Creek Station	AMBIENT TEMP [F°]	100	COLLECTED H_2O, g	167.8
LOCATION	ESP Inlet	BAROMETRIC PRES ["Hg]	29.20	COLLECTED DUST, g	
STACK DIAMETER		%H_2O (Assumed)	/	DRY MOLE WT (Assumed)	
STACK AREA	ft^2	PROBE LENGTH [ft]	8	WET MOLE WT (Assumed)	
DATE	July 15, 1998	NOZZLE ID [inch]	/		
TIME	Start– 1105 Stop– 1239	METER FACTOR: delta H	1.888		
METER BOX	NuTech # 3	METER FACTOR: Y	1.050	PITOT ID #	
		PITOT TUBE: C_p	/	FILTER ID #	
OPERATOR(S)	MSD/DJK	K	/	IMPINGER BOX ID #	

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Sample Type: HCl-/HF

Hg Speciation

Acid Gases (2)

TRAVERSE POINT ["from wall]	SAMPLE TIME [minute]	STATIC PRES ["H_2O]	STACK TEMP [F°]	PITOT HEAD ["H_2O]	ΔH METER SETTING ["H_2O]	METER READING [ft^3]	METER TEMP [F°] (Assumed=) inlet	outlet	PROBE TEMP [F°]	FILTER TEMP [F°]	METER EXHAUST O_2 [%]	CO_2 [%]	CO [ppm]	IMPINGER TEMP [F°]	METER VACUUM ["Hg]
---	---	---	---	---	---	994.10	---	---	---	---	---	---	---	---	---
F-6½	0-6	3~~15~~	315		2.0	998.60	102	101	315	315	2.5	17.5		68	9
Start	6-12	-10.0			2.0	—	102	101		315	2.2	17.7		65	9
Deep	12-18				2.0	7.40	104	102			2.1	17.8		73	10
	18-24				2.0	11.69	102	105			2.1	17.9		76	10
	24-30				2.0	16.12	106	103			2.3	17.7		80	10
	30-36				2.0	20.48	108	104			2.0	18.0		75	11
	36-42				2.0	24.98	109	105			2.1	17.9		73	12
	42-48				2.0	29.32	105	109			2.3	17.7		73	12
	48-54				2.0	33.79	109	105			2.3	17.7		74	12
	54-60				2.0	38.02	110	105			2.1	17.9		75	13
	60-66				2.0	—	110	106			2.3	17.7		76	13
	66-72				2.0	46.82	110	106			2.3	17.7		73	14
	72-78				2.0	51.36	110	107			2.3	17.6		73	15
	~~78-84~~				2.0	57.00	110	107			2.4	17.6		73	16
	86 minutes														
							105.8				2.2	17.7			
AVERAGE			315		2.00	62.9									

Pre–Leak Check: pitot OK NA
Vacuum 14 "Hg; Leak Rate 0.002 cfm; MSD

Post–Leak Check: pitot OK NA
Vacuum 16 "Hg; Leak Rate 0.001 cfm; MSD

O:\appres\stack\icci–98\m5–in

STACK SAMPLIN(FIELD DATA SHEET

PLANT	Duck Creek Station	AMBIENT TEMP [F°]		COLLECTED H_2O, g	105.0
LOCATION	ESP Inlet	BAROMETRIC PRES ["Hg]	29.29	COLLECTED DUST, g	
STACK DIAMETER		%H_2O (Assumed)	11.5	DRY MOLE WT (Assumed)	30.7
STACK AREA	ft^2	PROBE LENGTH [ft]		WET MOLE WT (Assumed)	29.3
DATE	July 16, 1998	NOZZLE ID [inch]	0.312		
TIME	Start–0953 Stop–1110	METER FACTOR: delta H	1.888		
METER BOX	NuTech # 3	METER FACTOR: Y	1.050	PITOT ID #	
		PITOT TUBE: C_p	0.84	FILTER ID #	
OPERATOR(S)	MSD/DJK 3	K	0.27	IMPINGER BOX ID #	

Page ____ of ____

Sample Type: HF/HCl

Hg Speciation ____

Acid Gases (3)

TRAVERSE POINT [" from wall]	SAMPLE TIME [minute]	STATIC PRES ["H_2O]	STACK TEMP [F°]	PITOT HEAD ["H_2O]	ΔH METER SETTING ["H_2O]	METER READING [ft^3]	METER TEMP [F°] (Assumed= 105) inlet	METER TEMP [F°] outlet	PROBE TEMP [F°]	FILTER TEMP [F°]	METER EXHAUST O_2 [%]	METER EXHAUST CO_2 [%]	METER EXHAUST CO [ppm]	IMPINGER TEMP [F°]	METER VACUUM ["Hg]
---	---	---	---	---	---	61.30	---	---	---	---	---	---	---	---	---
F.	0-6		315	~~0.05~~	1.25	65.01	101	101	315	315	2.8	17.2		77	6
6½'	6-12			0.20	1.25	68.30	102	102			2.8	17.2		67	7
deep	12-18				1.25	71.60	102	104			2.3	17.5		68	7
	18-24					74.85	102	104			2.9	17.1		73	11
	24-30				78.07	~~[illegible]~~	102	106			2.4	17.6		72	10
	30-36 37.0				85.15		104	107			2.5	17.2		71	10
	36-42				1.20	87.70	104	107			2.5	17.6		74	17
	42-48				1.10	89.95	105	107			2.6	17.5		75	23
	48-54				1.00	94.45	107	105			2.4	17.6		76	23
	54-60				0.90	97.32	105	107			2.4	17.5		75	23
	60-66				0.80	100.08	107	105			2.4	17.6		75	23
	66-72	76 min			0.75	101.85	107	105			2.1	17.8		77	23
	72-78														
	78-84														
	84-90														
	90-96														
	96-102														
	102-108						104.5								
	108-114														
AVERAGE					1.00	40.55					2.6	17.5			

Pre–Leak Check: pitot OK ____
Vacuum 15" "Hg; Leak Rate 0.002 cfm; MSD

Post–Leak Check: pitot OK ____
Vacuum ____ "Hg; Leak Rate ____ cfm; ____

Q:\ppres\stack\icci–98\m5–in

STACK SAMPLING FIELD DATA SHEET [~~Hg or~~ ACID GAS]

PLANT	DUCK CREEK STATION, CANTON, IL	BAROMETRIC PRES [" Hg]	29.19	COLLECTED H_2O [grams]	203.0
LOCATION	STACK or [redacted]	%H_2O (Assumed)		COLLECTED DUST [grams]	
DUCT DIMENSIONS	High by Deep	PROBE LENGTH [ft]		DRY MOLE WT (Assumed)	
DUCT AREA	ft^2	NOZZLE DIAMETER [inch]		WET MOLE WT (Assumed)	
DATE	July 14, 1998	METER FACTOR: Δ H	1.861	NOZZLE ID #	
TIME	Start- 1356 Stop- 1506	METER FACTOR: Y	1.000	PITOT ID #	
METER BOX	NuTech # 1	PITOT TUBE: C_p		FILTER ID #	
OPERATOR(S)	LLA RLO	K	13.5	IMPINGER BOX ID #	

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02 Meter check & calib

PORT	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	STACK TEMP [F°]	NULL YAW [°]	PITOT HEAD [" H_2O]	ΔH METER SETTING [" H_2O]	METER READING [ft^3]	METER TEMP [F°] (Assumed=) inlet	outlet	PROBE TEMP [F°]	FILTER TEMP [F°]	METER EXHAUST O_2 [%]	CO_2 [%]	CO [ppm]	IMPINGER TEMP [F°]	METER VACUUM [" Hg]	
	0-10		140			1.0	19.05	102	101	264		5.6			70	-6	21.0
	10 20		142			1.0	24.57	110	103	271		5.3	14.8	43	71	-5	← calib
	20 30		142			1.0	30.00	116	105	270		5.5	14.5	49	70	-5	
	30 40		141			1.0	35.60	115	105	260		5.0	15.0	35	74	-5	
	40 50		142			1.25	41.72	117	108	261		5.4	14.7	66	72	-7	20.9
	50 60		139			1.25	48.00	123	110	258		5.3	14.8	off	71	-7	← calib
	60 70		141			1.25	54.35	121	110	265		5.6	14.8	66	74	-7	
	70-80		142			1.25	60.61	124	110	255		5.5	14.7	87	77	-7	← 20.9
	80-90		142			1.25	66.85	124	113	259		5.6	14.6	43	78	-7	← 20.9
AVERAGE			141			1.13	53.35		112.1			5.4	14.7				

purged for 10 min after test

Pre-Leak Check: OK @ 10" Hg < 0.01 ft^3/min Post-Leak Check: OK @ 10" Hg

POSITIVE YAW IS CLOCKWISE

[O:\APPRES\STACK\ICCI-98\DUCKCREK\M5SHEET;RLO;6/30/98]

STACK SAMPLING FIELD DATA SHEET ~~[Hg~~ or ACID GAS

PLANT	DUCK CREEK STATION, CANTON, IL	BAROMETRIC PRES [" Hg]	29.20	COLLECTED ~~H_2O [grams]~~	266.4
LOCATION	STACK or SCRUBBER IN	%H_2O (Assumed)		COLLECTED DUST [grams]	
DUCT DIMENSIONS	High by Deep	PROBE LENGTH [ft]		DRY MOLE WT (Assumed)	
DUCT AREA	ft^2	NOZZLE DIAMETER [inch]		WET MOLE WT (Assumed)	
DATE	July 15 ~~14~~, 1998 (5th)	METER FACTOR: ΔH	1.861	NOZZLE ID #	
TIME	Start– 1104 Stop– 1234	METER FACTOR: Y	1.000	PITOT ID #	
METER BOX	NuTech # 1	PITOT TUBE: C_p		FILTER ID #	
OPERATOR(S)	KLA – RLO	K	73.70	IMPINGER BOX ID #	

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PORT	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	STACK TEMP [F°]	NULL YAW [°]	PITOT HEAD [" H_2O]	ΔH METER SETTING [" H_2O]	METER READING [ft^3]	METER TEMP [F°] (Assumed=) inlet	outlet	PROBE TEMP [F°]	FILTER TEMP [F°]	METER EXHAUST O_2 [%]	CO_2 [%]	CO [ppm]	IMPINGER TEMP [F°]	METER VACUUM [" Hg]	
D	0 10		141			1.5	80.37	103	99	247		5.2	14.9	16	77	-9	
1	20		141			↓	87.10	109	100	260		5.3	14.9	18	76	-9	
6 down	30		141				93.90	110	101	263		5.2	14.9	9	74	-9	20.7
	35		142			↓	97.30	114	103	261		5.3	14.8	3	75	-9	← calib
	40		142			2.0	101.10	116	104	255		5.2	14.8	4	76	-11.5	
	50		140			↓	108.65	119	106	250		5.4	14.7	3	73	-11.5	
	60		140				116.50	121	107	255		5.2	15.0	17	70	-11.5	20.8
	70		140				124.25	122	109	253		5.3	14.8	25	69	-11.5	← OK
	80		140				132.00	124	111	260		5.2	14.8	48	70	-11.5	
	90		140				139.81	125	112	253		5.3	14.8	20	72	-11.5	20.7
	97	off →					145.32										←
AVERAGE		$\bar{X}$	140.7			1.8	64.95	116.3	105.2	255.7		5.26	14.8	16.3	73.2		

Pre–Leak Check: OK <0.01 ~~ft³~~/min @ 10" Hg Post–Leak Check:

POSITIVE YAW IS CLOCKWISE

[O:\APPRES\STACK\ICCI–98\DUCKCREK\M5SHEET;RLO;6/30/98]

STACK SAMPLING FIELD DATA SHEET ~~[H2O or~~ (ACID GAS)

PLANT	DUCK CREEK STATION, CANTON, IL	BAROMETRIC PRES [" Hg]	29.28	COLLECTED H_2O [grams]	2408
LOCATION	STACK or SCRUBBER IN	%H_2O (Assumed)		COLLECTED DUST [grams]	
DUCT DIMENSIONS	High by Deep	PROBE LENGTH [ft]		DRY MOLE WT (Assumed)	
DUCT AREA	ft^2	NOZZLE DIAMETER [inch]		WET MOLE WT (Assumed)	
DATE	July 16, 1998	METER FACTOR: ΔH	1.861	NOZZLE ID #	
TIME	Start- 1021 Stop- 1141	METER FACTOR: Y	1.000	PITOT ID #	
METER BOX	NuTech # 1	PITOT TUBE: C_p		FILTER ID #	
OPERATOR(S)	LLA & RLO	K	149.70	IMPINGER BOX ID #	

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O2 meter check ↓

PORT	SAMPLE TIME [minute]	STATIC PRES ["H_2O]	STACK TEMP [F°]	NULL YAW [°]	PITOT HEAD ["H_2O]	ΔH METER SETTING ["H_2O]	METER READING [ft^3]	METER TEMP [F°] (Assumed=) inlet	outlet	PROBE TEMP [F°]	FILTER TEMP [F°]	METER EXHAUST O_2 [%]	CO_2 [%]	CO [ppm]	IMPINGER TEMP [F°]	METER VACUUM ["Hg]
	10		140			2.0	157.79	104	99	250		5.4	14.7	37	68	-12.5
D	20		140			↓	165.43	109	100	251		5.2	14.9	87	69	-12.5
	30		140				173.40	114	103	249		5.6	14.7	5	72	-12.5
	40		140				181.20	116	103	249		5.5	----	44	74	-12.5 20.8 ←
six	50		140				189.10	121	107	251		5.4	14.7	167	75	-12.5 OK
feet	60		140				197.03	122	108	250		5.7	---	62	76	-12.5
	70		140				204.98	125	110	249		5.4	----	46	77	-12.5
in	80		140				212.93	127	113	250		5.8	---	74	77	-12.5 20.8 ←
AVERAGE			140			2.0	63.23	111.3				5.5	14.6			

Pre-Leak Check: OK < 0.01 ft^3/min @ 10" Hg Post-Leak Check: OK @ 10" Hg

POSITIVE YAW IS CLOCKWISE

Purged @ 11:11

[O:\APPRES\STACK\ICCI-98\DUCKCREK\M5SHEET;RLO;6/30/98]

Duck Creek Method 2 Stack Volumetric Flow Data
Velocity & Temperature Traverse

Duct #	Stack	Duct Height	20			Bar,"Hg	29.19
Date	7/14/98	Duct Depth	20			Static, "H_2O	-0.48
Time	1700-1830	Duct Area	400			Dry Bulb °F	
Tube I.D.	S-31 A	% O_2	7.1	Max 5		Wet Bulb °F	
C-Factor	0.793	% CO_2	12.8			% H_2O	15.5
Operator(s)	RLO/LLA	% N_2	80.1			W.M.Wt	30.33

Ports labelled from sampling port to far wall

PORT/ POINT	Distance [' From Wall]	Temp [°F]	Delta P [" H_2O]	Velocity [fps]	Null Yaw [°CW]	Axial Vel [fps]
A-1	2.5	~~[illegible]~~	0.3480			
A-2	7.5	133	0.7244			
A-3	12.5		0.8264			
A-4	17.5		1.023			
B-1	2.5		0.7414			
B-2	7.5		0.4507			
B-mid	10		0.5283			-0.3504
B-3	12.5		0.7951			
B-4	17.5		0.7064			
C-1	2.5		0.9292			
C-2	7.5		0.7210			
C-mid	10		0.6824			-0.5991
C-3	12.5		0.9083		~0	
C-4	17.5		0.8856			
D-1	2.5		0.5279			
D-2	7.5		0.6457			
D-3	12.5		0.7404			
D-4	17.5		1.149			

DATA SUMMARY		
Parameter	Measured	Axial
Velocity [fps]		493
Velocity [fpm]		2956
ACFM		1,182552
SCFM		1025587
DSCFM		866427
Ex Air Free		642565

Duck Creek Method 2 Stack Volumetric Flow Data
Velocity & Temperature Traverse

Duct #	Stack	Duct Height	20'	Bar,"Hg	29.20
Date	7/15/98	Duct Depth	20"	Static, "H_2O	-0.29
Time	1320-1420	Duct Area		Dry Bulb °F	133
Tube I.D.	S-31A	% O_2	5.3	Wet Bulb °F	133
C-Factor	0.793	% CO_2	14.8	% H_2O	16.5 (15.1)
Operator(s)	RLO	% N_2		W.M.Wt	30.55

Ports labelled from sampling port to far wall

PORT/ POINT	Distance [' From Wall]	Temp [°F]	Delta P [" H_2O]	Velocity [fps]	Null Yaw [°CW]	Axial Vel [fps] Static
A-1	2.5		0.2732			
A-2	7.5		0.4336			
A-3	12.5		0.8308			
A-4	17.5		0.8439			
B-1	2.5		1.162			
B-2	7.5		0.7423			
B-mid	10		0.8591		~5-10° CW looking down	-0.3192
B-3	12.5		0.9772			
B-4	17.5		0.8502			
C-1	2.5		~~1.105~~	1.143		
C-2	7.5		~~0.8718~~	0.7968		
C-mid	10		0.7303		~0	~~[illegible]~~ -0.25
C-3	12.5		0.8216			
C-4	17.5		0.7434			
D-1	2.5		~~0.5789~~	0.3820		
D-2	7.5		~~0.6797~~	0.7851		
D-3	12.5		~~0.7744~~	0.9419		
D-4	17.5		~~[illegible]~~	~~[illegible]~~ 0.6418		

DATA SUMMARY		
Parameter	Measured	Axial
Velocity [fps]		
Velocity [fpm]		
ACFM		
SCFM		
DSCFM		
Ex Air Free		

Duck Creek Method 2 Stack Volumetric Flow Data
Velocity & Temperature Traverse

Duct #		Duct Height	20	Bar,"Hg	29.26
Date	7/16/98	Duct Depth	20	Static, "H_2O	-0.32
Time	1240 - 1340	Duct Area	400	Dry Bulb °F	
Tube I.D.	S-31 A	% O_2	5.5	Wet Bulb °F	
C-Factor	0.793	% CO_2	14.4	% H_2O	16.3
Operator(s)	RLO	% N_2	8.1	W.M.Wt	30.52

Ports labelled from sampling port to far wall

PORT/ POINT	Distance [' From Wall]	Temp [°F]	Delta P [" H_2O]	Velocity [fps]	Null Yaw [°CW]	Axial Vel [fps]
A-1	2.5		0.2744			
A-2	7.5		0.6137			Static
A-3	12.5		0.8413			
A-4	17.5		0.8250			
B-1	2.5		0.8237			
B-2	7.5		0.7967			
B-mid	10		0.8866		~0	-0.4154
B-3	12.5		~~0.4454~~	0.8144		
B-4	17.5		1.040			
C-1	2.5		1.094			
C-2	7.5		0.4997			
C-mid	10		0.4806		~0	-0.2109
C-3	12.5		0.6861			
C-4	17.5		0.7464			
D-1	2.5		~~0.[illegible]~~	0.4277		
D-2	7.5		~~0.7260~~	8710		
D-3	12.5		~~0.7641~~	0.8939		
D-4	17.5		0.6797			

DATA SUMMARY		
Parameter	Measured	Axial
Velocity [fps]		
Velocity [fpm]		
ACFM		
SCFM		
DSCFM		
Ex Air Free		

APPENDIX B

DETAILED TEST DATA AND TEST RESULTS

Ontario Hydro Sampling Data Reduction Spreadsheets
Ontario Hydro Speciation Results
Interim Material Balance and Process Flowrate Results
FGD Outlet Velocity Traverse Spreadsheets
Acid Gas Sampling Data Reduction Spreadsheet
Sample Calculations

DUCK CREEK Hg SAMPLING PROGRAM – ONTARIO HYDRO SAMPLING TRAIN DATA

Location		ESP IN	STACK	ESP IN	STACK	ESP IN	STACK
Date		7/14/98	7/14/98	7/15/98	7/15/98	7/16/98	7/16/98
Start Time		1225	1230	1000	1033	0930	0955
Stop Time		1520	1445	1230	1228	1150	1145
Sample Type		OH–Hg	OH–Hg	OH–Hg	OH–Hg	OH–Hg	OH–Hg
Y factor of dry gas meter	–	1.015	1.000	1.015	1.000	1.015	1.000
Gas Volume	– ft^3	57.20	118.46	46.16	111.30	47.20	98.55
Delta H of dry gas meter	– " H_2O	0.90	2.48	0.60	2.40	0.60	2.65
Meter Temperature	– ° F	108.0	111.1	102.3	105.6	102.7	107.0
C Factor of pitot tube	–	0.840	0.813	0.840	0.813	0.840	0.813
Nozzle Diameter	– inches	0.272	0.260	0.272	0.260	0.272	0.260
A n (area of nozzle)	– ft^2	0.00040	0.00037	0.00040	0.00037	0.00040	0.00037
Area of Stack	– ft^2	825	400	825	400	825	400
H_2O Weight	– gm	139.4	420.1	120.8	385.1	119.3	374.4
Sample Time	– minutes	120	135	120	120	120	110
Barometric Pressure	– " Hg	29.19	29.19	29.20	29.20	29.28	29.28
Static Pressure	– " H_2O	–9.95	–0.48	–10.00	–0.29	–10.00	–0.32
% Oxygen	–	3.9	7.1	3.8	5.3	4.2	5.5
% Carbon Dioxide	–	16.0	12.8	16.1	14.6	15.7	14.4
% N_2 + CO	–	80.1	80.1	80.1	80.1	80.1	80.1
Stack Temp (Dry Bulb)	– ° F	314	133	311	133	314	133
Stack Temp (Wet Bulb)	– ° F	NM	133	NM	133	NM	133
"S" sample (rms vel head)	– " H_2O	0.200	0.706	0.129	0.700	0.141	0.750
Dust Wt.	– gm	9.7000	0.0382	8.0012	0.0081	7.2084	0.0210
Sample Volume	– DSCF	52.75	107.47	42.98	101.97	44.04	90.37
Sample Volume	– dscm	1.494	3.044	1.217	2.888	1.247	2.559
ABS ST PRES	– " Hg	28.46	29.15	28.46	29.18	28.54	29.26
ABS ST TEMP	– ° R	774	593	771	593	774	593
H_2O – % by Vol	– vapor	11.1	15.5	11.7	15.1	11.3	16.3
Water Volume	– std ft^3	6.57	19.79	5.69	18.14	5.62	17.63
Dry Molecular Weight	– lb/lb–mole	30.72	30.33	30.73	30.55	30.68	30.52
Wet Molecular Weight	– lb/lb–mole	29.31	28.41	29.24	28.65	29.25	28.48
% EXCESS AIR	–	22.6	50.5	21.9	33.4	24.8	35.2
Dry Mole Frac.	–	0.889	0.845	0.883	0.849	0.887	0.837
Wet Mole Frac.	–	0.111	0.155	0.117	0.151	0.113	0.163
Gas Velocity, Direct	– ft/sec	30.94	49.41	24.82	48.97	25.96	50.78
ACFM	–	1531382	1185828	1228793	1175371	1285255	1218710
DSCFM	–	883646	868873	706993	866482	741816	887817
DSCFM (rounded)		883600	868900	707000	866500	741800	887800
DSCMM		25025	24606	20022	24539	21008	25143
Excess Air Free DSCFM	–	718755	573706	578449	646752	592743	654181
CALCULATED FIRING RATE:							
Dry	– lb/min	5790	4622	4659	5209	4797	5294
Wet	– lb/min	7010	5596	5619	6283	5763	6361
Dry	– lb/hr	310600	277315	315600	312550	305300	317650
Wet	– lb/hr	420615	335732	337163	376975	345810	381653
CALCULATED FIRING RATE:							
Dry	– tons/hr	173.7	138.7	139.8	156.3	143.9	158.8
Wet	– tons/hr	210.3	167.9	168.6	188.5	172.9	190.8
HEAT INPUT:							
MM Btu/hr	–	3960	3535	4019	3980	3901	4059
PARTICULATE LOADING:							
Grains/DSCF	–	2.837	0.005	2.872	0.001	2.526	0.004
lb/hr	–	21497	40.9	17412	9.1	16064	27.3
lb/MM Btu	–	5.43	0.01	4.33	0.00	4.12	0.01
Ash Production	lb/hr	31308		31655		29980	
Fly Ash		21497		17412		16064	
Bottom Ash		9812		14243		13917	
% Fly Ash		68.7%		55.0%		53.6%	
% ISOKINETIC	–	101.82	99.51	103.70	106.51	101.26	100.50

O:\APPRES\STACK\ICCI–98\DUCKCREK\OH–DATA

Duck Creek Hg Sampling Program – Ontario Hydro Analysis Spreadsheet

Testing Conducted on July 14–16, 1998

Date	7/14	7/14	7/15	7/15	7/16	7/16
Location	ESP Inlet	FGD Outlet	ESP Inlet	FGD Outlet	ESP Inlet	FGD Outlet
dsm^3	1.494	3.044	1.217	2.888	1.247	2.559
Filter Solids						
mass, g	9.7000	0.0380	8.0012	0.0081	7.2084	0.0210
ppm Hg	0.22	1.8	0.21	5.50	0.23	1.70
μg Hg on Filter	2.134	0.068	1.680	0.045	1.658	0.036
$\mu g/m^3$	1.43	0.02	1.38	0.02	1.33	0.01
RINSES:						
Probe						
liq. vol. mL	225	147	152	205	227	230
ppb Hg	1.59	2.75	0.94	2.53	1.38	0.5
$\mu g/m^3$	0.24	0.13	0.12	0.18	0.25	0.04
KCl						
liq. vol. mL	573	843	558	806	558	799
ppb Hg	11.83	3.14	11.05	4.38	6.78	1.68
$\mu g/m^3$	4.54	0.87	5.07	1.22	3.03	0.52
HNO_3/H_2O_2						
liq. vol. mL	175	177	177	177	175	177
ppb Hg	0.5	0.5	0.5	0.5	1.84	2.31
$\mu g/m^3$	0.06	0.03	0.07	0.03	0.26	0.16
$KMnO_4$						
liq. vol. mL	244	242	250	250	250	246
ppb Hg	12.11	17.38	3.80	16.19	5.04	16.32
$\mu g/m^3$	1.98	1.38	0.78	1.40	1.01	1.57
HCl Rinse						
liq. vol. mL	100	100	100	100	100	100
ppb Hg	0.50	1.79	1.16	0.50	0.50	0.50
$\mu g/m^3$	0.03	0.06	0.10	0.02	0.04	0.02
Hg Speciation:						
Particulate, $\mu g/m^3$	1.43	0.02	1.38	0.02	1.33	0.01
Particulate, %	17.3%	0.9%	18.4%	0.5%	22.4%	0.6%
Oxidized, $\mu g/m^3$	4.78	1.00	5.18	1.40	3.29	0.57
Oxidized, %	57.7%	40.2%	69.0%	48.9%	55.5%	24.4%
Elemental, $\mu g/m^3$	2.07	1.47	0.95	1.45	1.31	1.75
Elemental, %	25.0%	58.9%	12.6%	50.6%	22.1%	75.0%
Total $\mu g/m^3$	**8.27**	**2.49**	**7.51**	**2.87**	**5.92**	**2.33**

Underlined values for impinger analysis (0.5 ppb) indicate "less than" value

O:\APPRES\STACK\ICCI–98\DUCKCREK\OHCALC

Duck Creek Station Hg Material Balance Worksheet

Test ID Date	1 7/14/98	2 7/15/98	3 7/16/98	Avg	SDEV	PRSD
Coal Feed, lb/hr (dry)	311737	315731	305336	310935	5223	1.7%
Dry tph	155.9	157.9	152.7	155.5	2.6	1.7%
FGD Inlet dscfm Flue Gas	789800	798100	786800	791567	5831	0.7%
FGD OutletInlet dscfm Flue Gas	869600	875300	853400	866100	11318	1.3%
% O2	5.4	5.3	5.5			
FGD Inlet Nm^3/min	24610	24771	24151	24511	320	1.3%
FGD Outlet Inlet Nm^3/min	22888	23115	22542	22848	287	1.3%
Heating Value, Btu/lb	12748	12734	12777	12753	22	0.2%
MM Btu/hr (f–factor)	3974	4021	3901	3965	60	1.5%
F–Factor	9737	9750	9671			
	311737	315731	305336			
Coal % Carbon	70.64	70.85	70.76	70.75	0.10	0.1%
lb/hr Carbon to Boiler	220211	223695	216056	219987	3810	1.7%
% Ash in Coal	10.08	10.03	9.82	9.98	0.14	1.4%
lb/hr Ash to Boiler	31423	31668	29984	31025	906	2.9%
Bottom Ash Mass Rate, lb/hr	13100	12730	14600	13477	986	7.3%
% Ash in Bottom Ash	89.2	92.7	78.5	86.8	7.4	8.5%
lb/hr Ash	11685	11801	11461	11649	172	1.5%
% of Ash Input	37.2%	37.3%	38.2%	37.6%	0.6%	1.5%
ECON Ash Mass Rate, lb/hr	1200	1200	1200	1200	0	0.0%
% Ash in Bottom Ash	73.5	70.7	45.1	63.1	15.6	24.7%
lb/hr Ash	882	848	541	757	187	24.7%
% of Ash Input	2.8%	2.7%	1.8%	2.4%	0.5%	22.4%
ESP Ash Mass Rate, lb/hr	19900	19640	19250	19597	326	1.7%
% Ash in ESP Ash	94.7	96.8	93.4	95.0	1.7	1.8%
lb/hr Ash	18845	19012	17980	18612	552	3.0%
% of Ash Input	60.0%	60.0%	60.0%	60.0%	0.0%	0.1%
lb/hr Ash Output	31413	31661	29982	31018	903	2.9%
Total Ash Mass Balance	100.0%	100.0%	100.0%	100.0%	0.0%	0.0%
Flue Gas dscfm	869600	875300	853400	866100	11318	1.3%
Flue Gas % CO_2	13.5	13.6	13.4	13.5	0.1	0.7%
lb/hr, CO_2	801531	812761	780773	798355	16166	2.0%
lb/hr C	218599	221662	212938	217733	4409	2.0%
% of Total C	99.3%	99.1%	98.6%	99.0%	0.4%	0.4%
% Carbon in Bottom Ash	9.4	6.8	19.3	11.8	6.6	55.5%
lb/hr Carbon in Bottom Ash	1231	866	2818	1638	1034	63.1%
% Carbon in ECON Ash	25.8	27.9	51.5	35.1	14.2	40.5%
lb/hr Carbon in ECON Ash	310	335	618	421	171	40.5%
% Carbon in ESP Ash	3.8	2.2	4.9	3.6	1.4	37.2%
lb/hr Carbon in ESP Ash	756	432	943	711	258	36.3%
Total lb/hr Carbon in Ash Streams	2297	1633	4379	2770	1427	51.5%
Total Carbon Mass Balance	100.2%	99.7%	100.3%	100.0%	0.3%	0.3%

Duck Creek Station Hg Material Balance Worksheet

% Sufur in coal	4.09	4.05	4.14	4.09	0.04	1.1%
lb/hr S	12750	12787	12641	12726	76	0.6%
lb/hr SO_2 at FGD Inlet	25500	25574	25282	25452	151	0.6%
ppmv SO_2 at FGD Outet	540	500	535	525	22	4.1%
lb/dscf SO_2 at FGD Outet	9.00E−05	8.33E−05	8.91E−05	8.75E−05	3.62E−06	4.1%
lb/hr SO_2 at FGD Outlet	4694	4375	4564	4544	160	3.5%
Removal Rate	81.6%	82.9%	81.9%	82.1%	0.7%	0.8%
Stack lb hr SO_2	4694	4375	4564	4544	160	3.5%
lb/hr removed	20806	21199	20718	20908	255	1.2%
moles of sulfur	325	331	324	327	4	1.2%
Stoichometric Ratio	1	1	1			
moles gypsum produced	325	331	324	327	4	1.2%
Mol Wt of FGD Product	129	129	129			
lb/hr gypsum produced	41937	42730	41760	42142	515	1.2%
ppm Hg in Coal	0.082	0.082	0.082	0.082	0.00	0.0%
mg/s Hg to System	3.22	3.26	3.15	3.21	0.05	1.7%
Limestone Feed Rate, tph	16	16	16	16	0	0.0%
ppm Hg in Limestone	0.03	0.03	0.03	0.03	0.00	0.0%
mg/s Hg to System	0.12	0.12	0.12	0.12	0.00	0.0%
net mg/s Hg Input	3.34	3.38	3.27	3.33	0.05	1.6%
ppm Hg in Bottom Ash	0.01	0.05	0.05	0.04	0.02	62.7%
mg/s Hg in Bottom Ash	0.02	0.08	0.09	0.06	0.04	64.3%
% Hg in Bottom Ash	0.5%	2.5%	2.9%	2.0%	1.3%	64.8%
ppm Hg in ECON Ash	0.03	0.06	0.04	0.04	0.02	35.1%
mg/s Hg in ECON Ash	0.00	0.01	0.01	0.01	0.00	35.1%
% Hg in ECON Ash	0.1%	0.3%	0.2%	0.2%	0.1%	34.0%
ppm Hg in ESP Ash	0.10	0.11	0.11	0.11	0.01	5.4%
mg/s Hg in ESP Ash	0.25	0.27	0.27	0.26	0.01	4.2%
% Hg in ESP Ash	7.8%	8.3%	8.5%	8.2%	0.4%	4.4%
ppm Hg in FDG Solids	0.42	0.25	0.30	0.32	0.09	26.7%
mg/s Hg in FGD Solids	2.22	1.35	1.60	1.72	0.45	26.0%
% Hg in FGD Solids	68.9%	41.3%	50.7%	53.6%	14.0%	26.1%
mg/s FGD Filtrate	0.05	0.07	0.07	0.06	0.01	18.2%
ug/m^3 Hg FGD Outlet Gas	2.68	3.07	2.50	2.75	0.29	10.6%
mg/s Hg in FGD Outlet Gas	1.08	1.27	1.02	1.12	0.13	11.6%
% Hg in FGD Outlet Gas	33.5%	38.9%	32.3%	34.9%	3.5%	10.0%
Total mg/s Hg Output	3.62	3.03	3.03	3.23	0.34	10.5%
Net Material Balance	108.4%	89.5%	92.6%	96.8%	10.1%	10.4%
ug/m^3 Hg ESP Inlet Sample	8.87	8.06	6.50	7.81	1.20	15.4%
mg/s Hg in Inlet Gas	3.64	3.33	2.62	3.19	0.52	16.3%
% Hg in Inlet Gas	113.0%	102.0%	83.0%	99.3%	15.1%	15.2%
Balance at ESP Inlet	113.5%	104.5%	85.9%	101.3%	14.0%	13.9%
Removal Across FGD (Flue Gas)	68.1%	58.4%	56.6%	61.0%	6.2%	10.1%
Removal Across FGD (Solids)	63.4%	56.2%	63.4%	61.0%	4.1%	6.8%
Removal Across System	66.5%	61.1%	67.7%	65.1%	3.5%	5.4%

Duck Creek Method 2 Stack Volumetric Flow Data
Velocity & Temperature Traverse

Location	FGD Outlet	Duct Height	20 ft	Bar,"Hg	29.19
Date	7/14/98	Duct Depth	20 ft	Static, "H_2O	−0.42
Time	1700−1830	Duct Area	400 ft^2	Dry Bulb °F	133
Tube I.D.	S−31A	% O_2	7.1	Wet Bulb °F	133
C−Factor	0.793	% CO_2	12.8	% H_2O	15.50
Operator(s)	RLO/LLA	% N_2	80.1	W.M.Wt	28.42

Ports labelled from sampling port to far wall

PORT/ POINT	Distance [' From Wall]	Temp [°F]	Delta P [" H_2O]	Velocity [fps]	Null Yaw [°CW]	Axial Vel [fps]
A−1	2.5	133	0.348	33.83	0	33.83
A−2	7.5	133	0.724	48.81	0	48.81
A−3	12.5	133	0.826	52.14	0	52.14
A−4	17.5	133	1.023	58.01	0	58.01
B−1	2.5	133	0.741	49.38	0	49.38
B−2	7.5	133	0.451	38.50	0	38.50
B−3	12.5	133	0.795	51.14	0	51.14
B−4	17.5	133	0.706	48.20	0	48.20
C−1	2.5	133	0.929	55.29	0	55.29
C−2	7.5	133	0.721	48.70	0	48.70
C−3	12.5	133	0.903	54.51	0	54.51
C−4	17.5	133	0.886	53.97	0	53.97
D−1	2.5	133	0.528	41.67	0	41.67
D−2	7.5	133	0.646	46.09	0	46.09
D−3	12.5	133	0.740	49.35	0	49.35
D−4	17.5	133	1.143	61.32	0	61.32
Average		133	0.757	49.43	0	49.43
Maximum		133	1.143	61.32	0	61.32
Minimum		133	0.348	33.83	0	33.83
SDEV		0.0	0.198	6.81	0	6.81

DATA SUMMARY		
	(Measured)	(Axial)
Velocity, fps	49.43	49.43
Velocity, fpm	2966	2966
ACFM	1186395	1186395
SCFM	1029076	1029076
DSCFM	869569	869569
Ex Air Free	574165	574165

Duck Creek Method 2 Stack Volumetric Flow Data
Velocity & Temperature Traverse

Location	FGD Outlet	Duct Height	20 ft	Bar,"Hg	29.20
Date	7/15/98	Duct Depth	20 ft	Static, "H_2O	−0.29
Time	1320−1420	Duct Area	400 ft^2	Dry Bulb °F	133
Tube I.D.	S−31A	% O_2	5.3	Wet Bulb °F	133
C−Factor	0.793	% CO_2	14.6	% H_2O	15.10
Operator(s)	RLO/LLA	% N_2	80.1	W.M.Wt	28.65

Ports labelled from sampling port to far wall

PORT/ POINT	Distance [' From Wall]	Temp [°F]	Delta P [" H_2O]	Velocity [fps]	Null Yaw [°CW]	Axial Vel [fps]
A−1	2.5	133	0.273	29.85	0	29.85
A−2	7.5	133	0.434	37.60	0	37.60
A−3	12.5	133	0.831	52.05	0	52.05
A−4	17.5	133	0.844	52.46	0	52.46
B−1	2.5	133	1.162	61.55	0	61.55
B−2	7.5	133	0.742	49.20	0	49.20
B−3	12.5	133	0.977	56.45	0	56.45
B−4	17.5	133	0.850	52.65	0	52.65
C−1	2.5	133	1.143	61.05	0	61.05
C−2	7.5	133	0.797	50.97	0	50.97
C−3	12.5	133	0.822	51.76	0	51.76
C−4	17.5	133	0.743	49.23	0	49.23
D−1	2.5	133	0.382	35.29	0	35.29
D−2	7.5	133	0.785	50.60	0	50.60
D−3	12.5	133	0.942	55.42	0	55.42
D−4	17.5	133	0.642	45.75	0	45.75
Average		133	0.773	49.49	0	49.49
Maximum		133	1.162	61.55	0	61.55
Minimum		133	0.273	29.85	0	29.85
SDEV		0.0	0.239	8.44	0	8.44

DATA SUMMARY		
	(Measured)	(Axial)
Velocity, fps	49.49	49.49
Velocity, fpm	2969	2969
ACFM	1187786	1187786
SCFM	1030973	1030973
DSCFM	875296	875296
Ex Air Free	653331	653331

Duck Creek Method 2 Stack Volumetric Flow Data
Velocity & Temperature Traverse

Location	FGD Outlet	Duct Height	20 ft	Bar,"Hg	29.26
Date	7/16/98	Duct Depth	20 ft	Static, "H_2O	−0.31
Time	1240−1340	Duct Area	400 ft^2	Dry Bulb °F	133
Tube I.D.	S−31A	% O_2	5.5	Wet Bulb °F	133
C−Factor	0.793	% CO_2	14.4	% H_2O	16.30
Operator(s)	RLO/LLA	% N_2	80.1	W.M.Wt	28.48

Ports labelled from sampling port to far wall

PORT/ POINT	Distance [' From Wall]	Temp [°F]	Delta P [" H_2O]	Velocity [fps]	Null Yaw [°CW]	Axial Vel [fps]
A−1	2.5	133	0.274	29.97	0	29.97
A−2	7.5	133	0.614	44.82	0	44.82
A−3	12.5	133	0.841	52.48	0	52.48
A−4	17.5	133	0.825	51.97	0	51.97
B−1	2.5	133	0.824	51.93	0	51.93
B−2	7.5	133	0.797	51.07	0	51.07
B−3	12.5	133	0.814	51.63	0	51.63
B−4	17.5	133	1.046	58.52	0	58.52
C−1	2.5	133	1.094	59.84	0	59.84
C−2	7.5	133	0.500	40.44	0	40.44
C−3	12.5	133	0.686	47.39	0	47.39
C−4	17.5	133	0.746	49.43	0	49.43
D−1	2.5	133	0.428	37.42	0	37.42
D−2	7.5	133	0.871	53.40	0	53.40
D−3	12.5	133	0.894	54.09	0	54.09
D−4	17.5	133	0.680	47.17	0	47.17
Average		133	0.746	48.85	0	48.85
Maximum		133	1.094	59.84	0	59.84
Minimum		133	0.274	29.97	0	29.97
SDEV		0.0	0.207	7.44	0	7.44

DATA SUMMARY		
	(Measured)	(Axial)
Velocity, fps	48.85	48.85
Velocity, fpm	2931	2931
ACFM	1172363	1172363
SCFM	1019627	1019627
DSCFM	853428	853428
Ex Air Free	628842	628842

DUCK CREEK Hg Sampling Program – Acid Gas Removal Rates

Location		Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
Date		July 14	July 14	July 15	July 15	July 16	July 16
Start Time		1335	1335	1105	1105	0953	1021
Stop Time		1500	1505	1229	1235	1110	1141
Sample Type		Acid Gas	Acid Gas	Acid Gas	Acid Gas	Acid Gas	Acid Gas
Y factor of dry gas meter	–	1.050	1.000	1.050	1.000	1.050	1.000
Gas Volume	– ft^3	53.60	53.35	62.90	64.95	40.55	63.23
Delta H of dry gas meter	– " H_2O	1.57	1.13	2.00	1.80	1.00	2.00
Meter Temperature	– ° F	110.5	112.1	105.8	110.8	104.5	111.3
H_2O Weight	– gm	153.1	203.0	167.8	266.4	105.0	240.8
Sample Time	– minutes	84	90	86	97	76	80
Barometric Pressure	– " Hg	29.19	29.15	29.20	29.20	29.29	29.28
Static Pressure	– " H_2O	–10.00	–0.48	–10.00	–0.50	–10.00	–0.50
% Oxygen	–	2.5	5.4	2.2	5.3	2.6	5.5
% Carbon Dioxide	–	17.5	14.6	17.7	14.8	17.5	14.6
% N_2 + CO	–	80.0	80.0	80.1	79.9	79.9	79.9
Stack Temp (Dry Bulb)	– ° F	300	141	315	141	315	140
Sample Volume	– DSCF	51.00	48.09	60.43	58.88	39.07	57.45
ABS ST PRES	– " Hg	28.45	29.11	28.46	29.16	28.55	29.24
ABS ST TEMP	– ° R	760	601	775	601	775	600
H_2O – % by Vol	– w/ droplets	12.4	16.6	11.6	17.6	11.2	16.5
Water Volume	– std ft^3	7.21	9.56	7.90	12.55	4.95	11.34
Dry Molecular Weight	– lb/lb–mole	30.90	30.55	30.92	30.58	30.90	30.56
Wet Molecular Weight	– lb/lb–mole	29.30	28.47	29.43	28.37	29.45	28.49
% EXCESS AIR	–	13.4	34.4	11.6	33.6	14.1	35.3
Dry Mole Frac.	–	0.876	0.834	0.884	0.824	0.888	0.835
Wet Mole Frac.	–	0.124	0.166	0.116	0.176	0.112	0.165
DSCFM (rounded)		789800	866300	798100	874900	786800	853200
Impinger Components Wts & Volumes							
Vol NaOH, mL		1000	1000	1000	1000	1000	1000
ppm Cl		157	6	158	4	108	4
ppm F		11	0.5	21	0.5	7	0.5
Vol H_2O_2, mL		500	500	500	500	500	500
ppm Cl		0	0	0	0	0	0
ppm F		0	0	0	0	0	0
Total ug Cl		157000	6000	158000	4000	108000	4000
Total lb Cl		3.46E–04	1.32E–05	3.48E–04	8.82E–06	2.38E–04	8.82E–06
lb/dscf – Cl		6.79E–06	2.75E–07	5.77E–06	1.50E–07	6.10E–06	1.54E–07
ppmv Cl		72	3	61	2	65	2
lb/hr Cl		322	14.3	276	7.9	288	7.9
% Cl Removal			95.6%		97.2%		97.3%
			(< Values)		(< Values)		(< Values)
Total ug F		11000	500	21000	500	7000	500
Total lb F		2.43E–05	1.10E–06	4.63E–05	1.10E–06	1.54E–05	1.10E–06
lb/dscf – F		4.76E–07	2.29E–08	7.66E–07	1.87E–08	3.95E–07	1.92E–08
ppmv F		9	0.4	15	0.4	8	0.4
lb/hr F		22.5	1.2	36.7	1.0	18.7	1.0
% F Removal			>94.7%		>97.3%		>94.7%

	HCl Emissions		HF Emissions	
	Inlet	Outlet	Inlet	Outlet
ppmv	66	2	11	<0.4
lb/hr	295	10.0	26.0	<1.1
Removal		96.6%		>95.9%

Sample Calculations

CONSOL R&D Stack Sampling Calculations

Client: CILCO
Test Number: ONE
Test Location: FGD Outlet

Plant: Duck Creek
Test Date: July 14, 1998
Test Period: 1225 -1520

1. Volume of combustion air produced per MM Btu of fuel combusted (Fuel F-Factor)

$$F_d = \frac{K\,[(K_h \times \%H) + (K_c \times \%C) + (K_s \times \%S) + (K_n \times \%N) - (K_o \times \%O)]}{GCV}$$

$$F_d = \frac{10^6\,[(3.64 \times 4.85) + (1.53 \times 70.64) + (0.57 \times 4.09) + (0.14 \times 1.37) - (0.46 \times 8.81)]}{12748}$$

F_d = **9737 standard cubic feet of combustion gas per MM Btu of heat Input**

Where:

F_d	=	Volume of combustion gas per unit of heat input (dscf/MM Btu)
K	=	Conversion Factor, (10^6 Btu per MM Btu)
K_h	=	3.64 scf gas produced per pound of hydrogen in fuel
K_c	=	1.53 scf gas produced per pound of carbon in fuel
K_s	=	0.57 scf gas produced per pound of sulfur in fuel
K_n	=	0.14 scf gas produced per pound of nitrogen in fuel
K_o	=	0.46 scf gas accounted for per pound of oxygen in fuel
GCV	=	Gross caloric value of fuel, (Btu/lb)
%H	=	Percent hydrogen in fuel, dry basis
%C	=	Percent carbon in fuel, dry basis
%S	=	Percent sulfur in fuel, dry basis
%N	=	Percent nitrogen in fuel, dry basis
%O	=	Percent oxygen in fuel, dry basis

2. Volume of dry gas sampled at standard conditions, dscf (68 °F and 29.92" Hg)

$$Vm\ (std) = \frac{17.64 \times Y \times Vm \times [Pb + (\Delta H/13.6)]}{(Tm + 460\ °F)}$$

$$Vm\ (std) = \frac{17.64 \times 1.000 \times 118.46 \times [29.19 + (2.48/13.6)]}{(111.10 + 460)}$$

Vm (std) = 107.47 dscf of gas sampled

= 3.04 dscm sampled (107.47 x 0.0283 cm/cf)

Where:

Vm (std)	=	Volume of gas collected corrected to standard conditions, (dscf)
Vm	=	Volume of gas measured by dry gas meter at meter conditions, (dscf)
Pb	=	Barometric Pressure, "Hg
ΔH	=	Average pressure differential across meter orifice, "H_2O
Y	=	Dry gas meter calibration factor
17.64	=	Conversion factor for temperature and pressure
13.6	=	Conversion factor for inches of water to inches of Hg

3. Volume of water vapor in gas sample, scf at standard conditions

Vw (std) = (0.0471 x Vwc)

Vw (std) = (0.0471 x 420.1)

Vw (std) = 19.79 scf

Where:

Vw (std)	=	Volume of water vapor in gas sample at standard conditions, scf
Vwc	=	Weight of water collected in impinger train, grams
0.0471	=	Conversion factor for weight of water to volume, scf/g

4. Moisture content of flue gas

Bws	=	Vw (std) / [Vw (std) + Vm (std)]
Bws	=	19.79 / [19.79 + 107.47]
Bws	**=**	**0.155**

Where:

Bws	=	Fraction of water vapor in flue gas by volume

5. Mole fraction of dry gas volume

Md	=	1 - Bws
Md	=	1 - 0.155
Md	**=**	**0.845**

Where:

Md	=	Mole fraction of dry gas volume

6. Dry molecular weight of flue gas, lb/lb-mole

MWd	=	$(0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28 \times \%N_2)$
MWd	=	(0.44 x 12.8) + (0.32 x 7.1) + (0.28 x 80.1)
MWd	**=**	**30.33 lb/lb-mole**

Where:

MWd	=	Dry molecular weight of flue gas, lb/lb-mole
0.44	=	Molecular weight of CO_2 /100
0.32	=	Molecular weight of O_2 / 100
0.28	=	Molecular weight of N_2 / 100

Notes: The argon content of flue gas is calculated as nitrogen.
CO concentrations were less than 50 ppmv and had no impact on molecular weight.

7. Wet molecular weight of flue gas, lb/lb-mole

MWw	=	[MWd x Md] + [18.00 x (1 - Md)]
MWw	=	[30.33 x 0.845] + [18.00 x (1 - 0.845)]
MWw	**=**	**28.41 lb/lb-mole**

Where:

MWs	=	Wet molecular weight of flue gas, lb/lb-mole
18.00	=	Molecular weight of water vapor, lb/lb-mole

8. Average velocity of flue gas at actual conditions, feet per second

Vs	=	$85.49 \times Cp \times (\Delta P)^{1/2} \times (Ts / Ps / MWw)^{1/2}$
Vs	=	$85.49 \times 0.813 \times 0.706^{1/2} \times [(460 + 133) / 29.15 / 28.41]^{1/2}$
Vs	**=**	**49.42 fps**

Where:

Vs	=	Average flue gas velocity, fps
85.49	=	Conversion factor
Cp	=	Pitot tube calibration value
Ts	=	Absolute average temperature of flue gas, (°F + 460 = °R)
Ps	=	Absolute pressure of stack, " Hg, (Ps = Pb + P static)
ΔP	=	Average pitot tube pressure differential

9. Actual flue gas volumetric flowrate, acfm

Qa	=	60 x Vs x As
Qa	=	60 x 49.42 x 400
Qa	**=**	**1,186,400 (rounded) acfm**

Where:

Qa	=	Actual flue gas volumetric flowrate, acfm
As	=	Cross-sectional area of stack or duct, ft^2

10. Flue gas volumetric flowrate at standard conditions, dscfm

Qs = 17.64 x Md x Qa x Ps / Pt

Qs = 17.64 x 0.845 x 1,186,400 x 29.15/ 593

Qs = 869,600 (rounded) dscfm (24,610 dscmm)

Where

Qs = Flue gas flowrate at standard conditions, dscfm

11. Isokinetic variation from final sampling data, percent

$$I = \frac{100 \times Ts \times Vm(std) \times 29.92}{60 \times 528 \times Vs \times An \times \theta \times Ps \times Md}$$

$$I = \frac{100 \times 593 \times 107.47 \times 29.92}{60 \times 528 \times 49.42 \times 0.00037 \times 135 \times 29.15 \times 0.845}$$

I = 99%

Where:

I = Isokinetic sampling rate, %

θ = Sampling time, minutes

An = Cross-sectional area of nozzle, ft^2

12. Process heat input, MM Btu/h

$$Hin = \frac{Qs \times 60 \times [(20.9 - \%O2) / 20.9]}{Fd}$$

$$Hin = \frac{869{,}600 \times 60 \times [(20.9 - 5.4) / 20.9]}{9737}$$

Hin = 3,974 MM Btu/h

Where:

Hin = Process heat input, MM Btu/h

$\%O_2$ = $\%O_2$ in flue gas

13. Coal firing rate, lb/h

$$CFR = \frac{Hin \times 10^6}{GCV}$$

$$CFR = \frac{3{,}974{,}000{,}000}{12{,}748}$$

CFR = 311,700 lb/h (155.9 tph)

Where:

CFR = Coal firing rate, lb/h

CALCULATION OF ONTARIO HYDRO Hg RESULTS

14. Particulate Hg in Ontario Hydro Sampling Train, $\mu g/m^3$

$$Hg^p = \frac{\text{ppm Hg on filter solids x solid wt.}}{\text{Vm(std- dry standard cubic meter)}}$$

Hg^p = 1.80 x 0.0380 / 3.04

Hg^0 = 0.02 $\mu g/m^3$

Where:

Hg^p = Particulate Hg, $\mu g/m^3$

15. Total Hg in KCl Impinger, μg

$$Hg_{KCl} = \frac{\text{ng/mL by CVAA x mL solution}}{1000}$$

Hg_{KCl} = 3.14 x 843 / 1000

Hg_{KCl} = 2.65 total μg of Hg in solution

Where:

Hg_{KCl} = Total Hg in KCl impinger, μg

16. Total oxidized Hg, $\mu g/m^3$

Hg^{++} = $\frac{\mu g \text{ Hg in Probe Rinse and KCl Impinger}}{\text{Vm(std- dry standard cubic meter)}}$

Hg^{++} = 3.04 / 3.04

Hg^{++} = 1.00 $\mu g/m^3$

Where:

Hg^{++} = Concentration of oxidized Hg in flue gas, $\mu g/m^3$

17. Total elemental Hg, $\mu g/m^3$

Hg^0 = $\frac{\mu g \text{ Hg in nitric acid \& permanganate impingers and final rinse}}{\text{Vm(std- dry standard cubic meter)}}$

Hg^0 = 4.47 / 3.04

Hg^0 = 1.47 $\mu g/m^3$

Where:

Hg^0 = Concentration of elemental Hg in flue gas, $\mu g/m^3$

18. Total Hg, $\mu g/m^3$

Hg^{tot} = $Hg^p + Hg^{++} + Hg^0$

Hg^{tot} = 0.02 + 1.00 + 1.47

Hg^{tot} = 2.49 $\mu g/m^3$

Where:

Hg^{tot} = Total Hg Concentration in flue gas, $\mu g/m^3$

19. Total Hg mass emission rate, lb/h

$$Hg(mr) = \frac{Hg^{tot} \times Qs(m^3) \times 60}{10^6 \times 453.5}$$

$$Hg(mr) = \frac{2.49 \times 24{,}610 \times 60}{10^6 \times 453.5}$$

Hg(mr) = 0.008 lb/h

Where:

Hg(mr) = Hg mass emission rate, lb/hr

20. Total Hg mass emission rate, lb/10^{12} Btu

$$Hg(cr) = \frac{Hg\ (mr) \times 10^{12}}{Hin}$$

$$Hg(cr) = \frac{0.008 \times 10^{12}}{3{,}974 \times 10^6}$$

Hg(cr) = 2.01 lb/10^{12} Btu of Heat Input

Where:

Hg(cr) = Total Hg emission rate, lb/10^{12} Btu

Note: Any deviation in the values presented in these calculations from those reported in the report and spreadsheets are due to rounding procedures.

APPENDIX C

Field Recovery and Sample Login Data

Ontario Hydro Train Recovery Sheets
(Filter Weight and Liquid Volume Summary)
Example of Ontario Hydro Sample Login Sheets

ICCI MERCURY SAMPLING PROGRAM AT DUCK CREEK STATION

Ontario Hydro Hg Sampling Train Recovery Data

Date: 7-14-98 Test ID: 1

ESP INLET TRAIN:

Bottle #	Description	Imp Vol	Rinse Vol	Final Vol	ppb Hg	Total ug Hg
1	Filter					
✓ 2	Probe Rinse		225.4	225.4	1.595	
✓ 3	KCl Impingers 300	423	150	573 mL	11.83	
✓ 4	HNO_3/H_2O_2 Impinger 100	100	75	175	<1	
✓ 5	$KMnO_4$ Impingers 200	194	50	244	12.11	
✓ 6	Acid Rinse of $KMnO_4$		100	100	<1	

Total Particulate Wt. 9.7000 grams Condensate Total 139.4 mL

ESP OUTLET / SCRUBBER INLET TRAIN:

Bottle #	Description	Imp Vol	Rinse Vol	Final Vol	ppb Hg	Total ug Hg
1	Filter					
2	Probe Rinse					
3	KCl Impingers					
4	HNO_3/H_2O_2 Impinger					
5	$KMnO_4$ Impingers					
6	Acid Rinse of $KMnO_4$					

Total Particulate Wt. _____ grams Condensate Total _____ mL

SCRUBBER OUTLET (STACK) TRAIN:

Bottle #	Description	Imp Vol	Rinse Vol	Final Vol	ppb Hg	Total ug Hg
1	Filter					
✓ 2	Probe Rinse		146.9	146.9	2.745	
✓ 3	KCl Impingers 300	693	150	843 mL	3.141	
✓ 4	HNO_3/H_2O_2 Impinger 100	102	75	177	<1	
✓ 5	$KMnO_4$ Impingers 200	192	50	242	17.38	
✓ 6	Acid Rinse of $KMnO_4$		100	100	1.785	

Total Particulate Wt. 0.0382 grams Condensate Total 420.1 mL

Recovered By: [signature] Date: 7-14-98

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ICCI MERCURY SAMPLING PROGRAM AT DUCK CREEK STATION

Ontario Hydro Hg Sampling Train Recovery Data

Date: 7-15-98 Test ID: 2

ESP INLET TRAIN:

Bottle #	Description	Imp Vol	Rinse Vol	Final Vol	ppb Hg	Total ug Hg
1	Filter					
✓ 2	Probe Rinse		152.0	152.0	0.942	
✓ 3	KCl Impingers 300	408	150	558 mL	11.05	
✓ 4	HNO_3/H_2O_2 Impinger 100	102	75	177	<1	
✓ 5	$KMnO_4$ Impingers 200	200	50	250	3.797	
✓ 6	Acid Rinse of $KMnO_4$		100	100	1.156	

Total Particulate Wt. 8.0012 grams Condensate Total 120.8 mL

ESP OUTLET / SCRUBBER INLET TRAIN:

Bottle #	Description	Imp Vol	Rinse Vol	Final Vol	ppb Hg	Total ug Hg
1	Filter					
2	Probe Rinse					
3	KCl Impingers					
4	HNO_3/H_2O_2 Impinger					
5	$KMnO_4$ Impingers					
6	Acid Rinse of $KMnO_4$					

Total Particulate Wt. _____ grams Condensate Total _____ mL

SCRUBBER OUTLET (STACK) TRAIN:

Bottle #	Description	Imp Vol	Rinse Vol	Final Vol	ppb Hg	Total ug Hg
1	Filter					
✓ 2	Probe Rinse		204.5	204.5	2.532	
✓ 3	KCl Impingers 300	656	150	806 mL	4.375	
✓ 4	HNO_3/H_2O_2 Impinger 100	102	75	177	<1	
✓ 5	$KMnO_4$ Impingers 200	200	50	250	16.19	
✓ 6	Acid Rinse of $KMnO_4$		100	100	<1	

Total Particulate Wt. 0.0081 grams Condensate Total 285.1 mL

Recovered By: [signature] Date: 7-15-98

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ICCI MERCURY SAMPLING PROGRAM AT DUCK CREEK STATION

Ontario Hydro Hg Sampling Train Recovery Data

Date: 7-16-98 Test ID: 3

ESP INLET TRAIN:

Bottle #	Description	Imp Vol	Rinse Vol	Final Vol	ppb Hg	Total ug Hg
1	Filter					
✓ 2	Probe Rinse		222.6	222.6	1.377	
✓ 3	KCl Impingers 300	408	150	558 mL	6.776	
✓ 4	HNO_3/H_2O_2 Impinger 100	100	75	175	1.835	
✓ 5	$KMnO_4$ Impingers 200	200	50	250	5.039	
✓ 6	Acid Rinse of $KMnO_4$		100	100	<1	

Total Particulate Wt. 7.2084 grams Condensate Total 119.3 mL

ESP OUTLET / SCRUBBER INLET TRAIN:

Bottle #	Description	Imp Vol	Rinse Vol	Final Vol	ppb Hg	Total ug Hg
1	Filter					
2	Probe Rinse					
3	KCl Impingers					
4	HNO_3/H_2O_2 Impinger					
5	$KMnO_4$ Impingers					
6	Acid Rinse of $KMnO_4$					

Total Particulate Wt. _____ grams Condensate Total _____ mL

SCRUBBER OUTLET (STACK) TRAIN:

Bottle #	Description	Imp Vol	Rinse Vol	Final Vol	ppb Hg	Total ug Hg
1	Filter					
✓ 2	Probe Rinse		229.7	229.7	<1	
✓ 3	KCl Impingers 300	849	150	799	1.678	
✓ 4	HNO_3/H_2O_2 Impinger 100	102	75	177	2.308	
✓ 5	$KMnO_4$ Impingers 200	196	50	246	16.32	
✓ 6	Acid Rinse of $KMnO_4$		100	100	<1	

Total Particulate Wt. 0.0210 grams Condensate Total 374.4 mL

Recovered By: [signature] Date: 7-16-98

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ICCI MERCURY SAMPLING PROGRAM AT DUCK CREEK STATION

Ontario Hydro Hg Sampling Train Recovery Data

Date: 7/14/98 Test ID: ONE

ESP INLET TRAIN:

Bottle #	Description	Imp Vol	Rinse Vol	Final Vol	ppb Hg	Total ug Hg
1	Filter					
2	Probe Rinse		225.4	225.4	1.595	
3	KCl Impingers	423	150	573	11.83	
4	HNO_3/H_2O_2 Impinger	100	75	175	<1	
5	$KMnO_4$ Impingers	194	50	244	12.11	
6	Acid Rinse of $KMnO_4$		100	100	<1	

Total Particulate Wt.: 9.7000 grams Condensate Total: 139.4 mL

ESP OUTLET / SCRUBBER INLET TRAIN:

Bottle #	Description	Imp Vol	Rinse Vol	Final Vol	ppb Hg	Total ug Hg
1	Filter					
2	Probe Rinse					
3	KCl Impingers					
4	HNO_3/H_2O_2 Impinger					
5	$KMnO_4$ Impingers					
6	Acid Rinse of $KMnO_4$					

Total Particulate Wt._____ grams Condensate Total_____ mL

SCRUBBER OUTLET (STACK) TRAIN:

Bottle #	Description	Imp Vol	Rinse Vol	Final Vol	ppb Hg	Total ug Hg
1	Filter					
2	Probe Rinse		146.9	146.9	2.75	
3	KCl Impingers	693	150	843	3.14	
4	HNO_3/H_2O_2 Impinger	102	75	177	<1	
5	$KMnO_4$ Impingers	192	50	242	17.38	
6	Acid Rinse of $KMnO_4$		100	100	1.79	

Total Particulate Wt.: 0.0382 grams Condensate Total: 420.1 mL

Recovered By: O.C. Bedillion Date: 7/14/98

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ICCI MERCURY SAMPLING PROGRAM AT DUCK CREEK STATION

Ontario Hydro Hg Sampling Train Recovery Data

Date: 7/15/98 Test ID: TWO

ESP INLET TRAIN:

Bottle #	Description	Imp Vol	Rinse Vol	Final Vol	ppb Hg	Total ug Hg
1	Filter					
2	Probe Rinse		152	152	0.94	
3	KCl Impingers	408	150	558	11.05	
4	HNO_3/H_2O_2 Impinger	102	75	177	<1	
5	$KMnO_4$ Impingers	200	50	250	3.797	
6	Acid Rinse of $KMnO_4$		100	100	1.16	

Total Particulate Wt.: 8.0012 grams Condensate Total: 120.8 mL

ESP OUTLET / SCRUBBER INLET TRAIN:

Bottle #	Description	Imp Vol	Rinse Vol	Final Vol	ppb Hg	Total ug Hg
1	Filter					
2	Probe Rinse					
3	KCl Impingers					
4	HNO_3/H_2O_2 Impinger					
5	$KMnO_4$ Impingers					
6	Acid Rinse of $KMnO_4$					

Total Particulate Wt._____ grams Condensate Total_____ mL

SCRUBBER OUTLET (STACK) TRAIN:

Bottle #	Description	Imp Vol	Rinse Vol	Final Vol	ppb Hg	Total ug Hg
1	Filter					
2	Probe Rinse		204.5	204.5	2.53	
3	KCl Impingers	656	150	806	4.38	
4	HNO_3/H_2O_2 Impinger	102	75	177	<1	
5	$KMnO_4$ Impingers	200	50	250	16.19	
6	Acid Rinse of $KMnO_4$		100	100	<1	

Total Particulate Wt.: 0.0081 grams Condensate Total: 385.1 mL

Recovered By: O.C. Bedillion Date: 7/15/98

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ICCI MERCURY SAMPLING PROGRAM AT DUCK CREEK STATION

Ontario Hydro Hg Sampling Train Recovery Data

Date: 7/16/98 Test ID: THREE

ESP INLET TRAIN:

Bottle #	Description	Imp Vol	Rinse Vol	Final Vol	ppb Hg	Total ug Hg
1	Filter					
2	Probe Rinse		222.6	222.6	1.38	
3	KCl Impingers	408	150	558	6.78	
4	HNO_3/H_2O_2 Impinger	100	75	175	1.84	
5	$KMnO_4$ Impingers	200	50	250	5.04	
6	Acid Rinse of $KMnO_4$		100	100	<1	

Total Particulate Wt.: 7.2084 grams Condensate Total: 119.3 mL

ESP OUTLET / SCRUBBER INLET TRAIN:

Bottle #	Description	Imp Vol	Rinse Vol	Final Vol	ppb Hg	Total ug Hg
1	Filter					
2	Probe Rinse					
3	KCl Impingers					
4	HNO_3/H_2O_2 Impinger					
5	$KMnO_4$ Impingers					
6	Acid Rinse of $KMnO_4$					

Total Particulate Wt._____ grams Condensate Total_____ mL

SCRUBBER OUTLET (STACK) TRAIN:

Bottle #	Description	Imp Vol	Rinse Vol	Final Vol	ppb Hg	Total ug Hg
1	Filter					
2	Probe Rinse		229.7	229.7	<1	
3	KCl Impingers	649	150	799	1.68	
4	HNO_3/H_2O_2 Impinger	102	75	177	2.31	
5	$KMnO_4$ Impingers	196	50	246	16.32	
6	Acid Rinse of $KMnO_4$		100	100	<1	

Total Particulate Wt.: 0.0210 grams Condensate Total: 374.4 mL

Recovered By: O.C. Bedillion Date: 7/16/98

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Example

Consolidation Coal Company
Research & Development
Library, PA 15129

WATER ANALYSIS REQUEST

Submitted By M.S. DeVito Project No. 1621-42-2 Date Submitted 7-20-98

Sample Description Duck Creek Hg Impingers - ESP Inlet - 7-15-

Sample Number	7-15- Probe Rinse	7-15- KCl Impinger	7-15- Nitric Impinger
Analysis Number	98640	98640	98640

pH						
Acidity as $CaCO_3$						
Alkalinity as $CaCO_3$						
Hydroxide as $CaCO_3$						
Carbonate as $CaCO_3$						
Bicarbonate as $CaCO_3$						
Total Susp. Solids						
Total Diss. Solids						
Spec. Conductivity						
Hardness						
Turbidity						
Aluminum						
Calcium						
Iron, Total						
Iron, Dissolved						
Magnesium						
Manganese						
Potassium						
Sodium						
Osmotic Pressure						
Chromium						
Ammonia, N						
Bromide						
Chloride						
Fluoride						
Nitrate, N						
Nitrite, N						
Sulfate						
BOD_5						
COD						
Dissolved Oxygen						
Oil/Grease						
Coliform, Total						
Coliform, Fecal						
Hg ppb	✓	0.94	✓	11.05	✓	<1

Instructions:

Example

Consolidation Coal Company
Research & Development
Library, PA 15129

WATER ANALYSIS REQUEST

Submitted By M.S. DeVito Project No. 1621-42-2 Date Submitted 7-20-98

Sample Description Duck Creek Hg Impingers - ESP Inlet - 7-15-98

Sample Number	7-15-KMnO4 Impinger	7-15-HCl Rinse	
Analysis Number	988405	988420	

pH						
Acidity as $CaCO_3$						
Alkalinity as $CaCO_3$						
Hydroxide as $CaCO_3$						
Carbonate as $CaCO_3$						
Bicarbonate as $CaCO_3$						
Total Susp. Solids						
Total Diss. Solids						
Spec. Conductivity						
Hardness						
Turbidity						
Aluminum						
Calcium						
Iron, Total						
Iron, Dissolved						
Magnesium						
Manganese						
Potassium						
Sodium						
Osmotic Pressure						
Chromium						
Ammonia, N						
Bromide						
Chloride						
Fluoride						
Nitrate, N						
Nitrite, N						
Sulfate						
BOD_5						
COD						
Dissolved Oxygen						
Oil/Grease						
Coliform, Total						
Coliform, Fecal						
Hg	✓	3.80	✓	[illegible]		

Instructions:

APPENDIX D

Calibration Data

Gas Sampling Meters (Pre & Post Calibrations)
Pitot Tubes
Barometer
Nozzles Diameters
Initial Check of Teledyne Max 5 O_2 Analyzers

Pre

METER CALIBRATION DATA

DATE – 2/17/98 BAR – 28.54
METER – Nutech–1 OPERATOR – OCB

ΔH	V_w	V_d	T_w	T_{in}	T_{out}	TIME	Y	$\Delta H_@$
0.35	3.00	3.00	82.4	85.0	85.0	8.65	1.004	1.756
0.50	5.00	5.00	82.4	83.7	84.0	12.27	1.001	1.819
1.00	5.00	5.01	81.2	86.7	85.0	8.80	1.004	1.861
2.00	5.00	5.04	80.6	88.0	85.0	6.28	0.998	1.893
3.00	10.00	10.09	78.8	89.7	85.0	10.30	0.999	1.895
4.00	10.00	10.13	78.8	91.0	86.0	9.03	0.995	1.940
						AVG	1.000	1.861
						MIN	0.995	1.756
						MAX	1.004	1.940
						RANGE	0.005	0.092

Y = 1.000 $\Delta H_@$ = 1.861
STD DEV = 0.003 STD DEV = 0.059

PREVIOUS CALIBRATION:

DATE = 2/2/96
Y = 0.982 –1.84 % CHANGE
$\Delta H_@$ = 1.941 4.15 % CHANGE

DATE = 2/6/97
Y = 0.988 –1.23 % CHANGE
$\Delta H_@$ = 1.916 2.89 % CHANGE

Used for Acid Gas Sampling @ FGD outlet

[N1–2–98;RLO;2/26/98]

Y = 1.000 $\Delta H_@$ = 1.861
N–1 Calibration Date= 2/17/98

MS DeVito 2-17-98

METER CALIBRATION DATA

Pre

DATE – 2/18/98 BAR – 28.26
METER – Nutech–2 OPERATOR – OCB

ΔH	V_w	V_d	T_w	T_{in}	T_{out}	TIME	Y	$\Delta H_@$
0.35	3.00	2.96	79.4	77.0	75.3	8.55	1.007	1.744
0.50	5.00	4.98	77.0	78.7	76.7	12.03	1.004	1.757
1.00	5.00	5.01	78.8	84.0	78.3	8.68	1.000	1.836
2.00	5.00	5.03	78.8	86.7	79.7	6.25	0.997	1.898
3.00	10.00	10.08	78.8	92.3	81.7	10.20	0.999	1.888
4.00	10.00	10.14	78.8	95.0	83.0	8.97	0.995	1.941
	Y =	1.000		$\Delta H_@$ =	1.844	AVG	1.000	1.844
	STD DEV =	0.004		STD DEV =	0.073	MIN	0.995	1.744
						MAX	1.007	1.941
						RANGE	0.006	0.098

PREVIOUS CALIBRATION:

DATE = 1/29/96
Y = 0.970 –3.11 % CHANGE
$\Delta H_@$ = 1.959 5.88 % CHANGE

DATE = 2/6/97
Y = 0.969 –3.22 % CHANGE
$\Delta H_@$ = 1.941 5.00 % CHANGE

Used for Hg Sampling at FGD Outlet

[N2–2–98;RLO;2/26/98]

Y = 1.000 $\Delta H_@$ = 1.844
N–2 Calibration Date= 2/18/98

MS DeVito 2-18-98

Pre

METER CALIBRATION DATA

DATE – 2/17/98 BAR – 28.34
METER – Nutech–3 OPERATOR – OCB

ΔH	V_w	V_d	T_w	T_{in}	T_{out}	TIME	Y	$\Delta H_@$
0.35	3.00	2.84	77.0	79.3	79.0	8.63	1.060	1.746
0.50	5.00	4.75	77.0	82.0	80.0	12.22	1.059	1.794
1.00	5.00	4.82	77.0	86.7	83.0	8.87	1.050	1.880
2.00	5.00	4.84	77.0	91.3	84.7	6.37	1.049	1.933
3.00	10.00	9.71	78.8	95.0	85.7	10.43	1.044	1.956
3.90	10.00	9.76	80.6	98.0	87.7	9.28	1.037	2.019
	Y =	1.050		$\Delta H_@$ =	1.888	AVG	1.050	1.888
	STD DEV =	0.008		STD DEV =	0.094	MIN	1.037	1.746
						MAX	1.060	2.019
						RANGE	0.011	0.137

PREVIOUS CALIBRATION:

DATE = 1/29/96
Y = 1.014 –3.52 % CHANGE
$\Delta H_@$ = 1.953 3.34 % CHANGE

DATE = 2/10/97
Y = 1.021 –2.81 % CHANGE
$\Delta H_@$ = 1.943 2.84 % CHANGE

Used for Acid Gas Sampling @ ESP Inlet

[N3–2–98;RLO;2/26/98]

Y = 1.050 $\Delta H_@$ = 1.888
N–3 Calibration Date= 2/17/98

MSD
2-18-98

Pre

METER CALIBRATION DATA

DATE – 2/18/98 BAR – 28.27
METER – NuTech–5 OPERATOR – OCB

ΔH	V_w	V_d	T_w	T_{in}	T_{out}	TIME	Y	$\Delta H_@$
0.35	4.00	3.90	77.0	76.0	75.3	11.75	1.022	1.836
0.50	5.00	4.93	78.8	79.0	79.0	12.33	1.013	1.848
1.00	5.00	4.85	78.8	83.0	82.3	8.95	1.036	1.935
2.00	5.00	4.98	78.8	85.7	83.0	6.43	1.009	1.997
3.00	10.00	9.94	78.8	88.3	83.0	10.57	1.011	2.021
4.00	10.00	10.04	78.8	90.0	83.0	9.22	1.000	2.050
	Y =	1.015		$\Delta H_@$ =	1.948	AVG	1.015	1.948
	STD DEV =	0.011		STD DEV =	0.083	MIN	1.000	1.836
						MAX	1.036	2.050
						RANGE	0.018	0.107

PREVIOUS CALIBRATION:

DATE = 4/1/96
Y = 1.012 –0.31 % CHANGE
$\Delta H_@$ = 1.924 –1.24 % CHANGE

DATE = 2/7/97
Y = 1.008 –0.71 % CHANGE
$\Delta H_@$ = 1.928 –1.03 % CHANGE

Used for Hg Sampling at ESP Inlet

[N5–2–98;RLO;2/26/98]

Y = 1.015 $\Delta H_@$ = 1.948
N–5 Calibration Date= 2/18/98

MSD
2-19-98

Post

METER CALIBRATION DATA

DATE – 5/10/99 BAR – 29.13
METER – Nutech–1 OPERATOR – OCB

ΔH	V_w	V_d	T_w	T_{in}	T_{out}	TIME	Y	$\Delta H_@$
0.35	3.00	3.04	73.4	78.0	76.0	8.83	0.993	1.764
0.50	5.00	5.05	73.4	83.0	79.3	12.42	1.003	1.781
1.00	5.00	5.08	75.2	88.0	80.7	8.95	0.999	1.859
2.00	5.00	5.10	75.2	92.7	82.7	6.45	0.998	1.924
3.00	10.00	10.25	75.2	98.3	85.0	10.60	0.998	1.940
4.00	10.00	10.31	75.2	101.7	86.7	9.23	0.994	1.957
	Y =	0.997		$\Delta H_@$ =	1.871	AVG	0.997	1.871
	STD DEV =	0.003		STD DEV =	0.076	MIN	0.993	1.764
						MAX	1.003	1.957
						RANGE	0.005	0.096

PREVIOUS CALIBRATION:

DATE = 2/17/98
Y = 1.000 0.25 % CHANGE
$\Delta H_@$ = 1.861 –0.53 % CHANGE

DATE = 2/6/97
Y = 0.988 –0.96 % CHANGE
$\Delta H_@$ = 1.916 2.36 % CHANGE

[N1–5–99;RLO;5/11/99]

MSP 5-12-99

METER CALIBRATION DATA

Post

DATE – 5/10/99 BAR – 29.13
METER – Nutech–2 OPERATOR – OCB

ΔH	V_w	V_d	T_w	T_{in}	T_{out}	TIME	Y	$\Delta H_@$
0.35	3.00	3.11	73.4	70.7	68.7	8.88	0.957	1.809
0.50	5.00	5.15	73.4	75.0	70.3	12.52	0.968	1.841
1.00	5.00	5.14	73.4	79.0	72.3	9.12	0.974	1.946
2.00	6.00	6.16	73.4	84.0	74.7	7.87	0.980	2.003
3.00	10.00	10.30	73.4	89.0	76.7	10.72	0.981	2.000
4.00	10.00	10.34	73.4	93.0	78.7	9.30	0.980	2.001
	Y =	0.973		$\Delta H_@$ =	1.933	AVG	0.973	1.933
	STD DEV =	0.008		STD DEV =	0.080	MIN	0.957	1.809
						MAX	0.981	2.003
						RANGE	0.012	0.097

PREVIOUS CALIBRATION:

DATE = 2/18/98
Y = 1.000 2.67 % CHANGE
$\Delta H_@$ = 1.844 –4.85 % CHANGE

DATE = 2/6/97
Y = 0.969 –0.45 % CHANGE
$\Delta H_@$ = 1.941 0.39 % CHANGE

MSD 5-12-99

[N2–5–99;RLO;5/11/99]

Post

METER CALIBRATION DATA

DATE – 4/30/99 BAR – 29.26
METER – Nutech–3 OPERATOR – OCB

ΔH	V_w	V_d	T_w	T_{in}	T_{out}	TIME	Y	$\Delta H_@$
0.35	3.00	2.86	76.1	79.7	78.0	8.88	1.053	1.787
0.50	5.00	4.78	76.1	82.3	79.3	12.47	1.054	1.806
1.00	5.00	4.78	76.1	85.0	80.7	8.98	1.057	1.871
2.00	5.00	4.81	76.1	88.0	81.7	6.47	1.051	1.935
3.00	10.00	9.61	76.1	92.0	83.0	10.53	1.055	1.921
4.00	10.00	9.66	76.1	95.3	84.3	9.20	1.051	1.949
	Y =	1.053		$\Delta H_@$ =	1.878	AVG	1.053	1.878
	STD DEV =	0.002		STD DEV =	0.063	MIN	1.051	1.787
						MAX	1.057	1.949
						RANGE	0.003	0.081

PREVIOUS CALIBRATION:

DATE = 2/17/98
Y = 1.050 –0.33 % CHANGE
$\Delta H_@$ = .1.888 0.52 % CHANGE

DATE = 2/10/97
Y = 1.021 –3.18 % CHANGE
$\Delta H_@$ = 1.943 3.34 % CHANGE

[N3–4–99B;RLO;4/30/99]

MSD - 4-30-99

METER CALIBRATION DATA

Post

DATE – 7/20/99 BAR – 29.11
METER – NuTech–5 OPERATOR – OCB

ΔH	V_w	V_d	T_w	T_{in}	T_{out}	TIME	Y	$\Delta H_@$
0.35	3.00	3.00	75.2	75.7	75.0	8.98	0.999	1.841
0.50	5.00	5.02	75.2	78.0	76.0	12.60	0.998	1.859
1.00	5.00	5.02	75.2	80.3	76.0	9.08	0.999	1.933
2.00	6.00	6.03	75.2	83.3	76.0	7.83	0.998	1.996
3.00	10.00	10.14	75.2	85.3	76.0	10.65	0.989	1.993
4.00	10.00	10.07	75.2	86.0	76.0	9.22	0.994	1.990
	Y =	0.996		$\Delta H_@$ =	1.935	AVG	0.996	1.935
	STD DEV =	0.004		STD DEV =	0.064	MIN	0.989	1.841
						MAX	0.999	1.996
						RANGE	0.005	0.078

PREVIOUS CALIBRATION:

DATE = 2/18/98
Y = 1.015 1.85 % CHANGE
$\Delta H_@$ = 1.948 0.65 % CHANGE

DATE = 2/7/97
Y = 1.008 1.17 % CHANGE
$\Delta H_@$ = 1.928 –0.38 % CHANGE

[N5–7–99;RLO;7/20/99]

Y = 0.996 $\Delta H_@$ = 1.935
N–5 Calibration Date= 7/20/99

RLO 7-21-99

PROJECT_____ Notebook No._____

Continued From Page_____

PITOT TUBE CALIBRATIONS

Tips inspected before and after each use, no problems were detected

PITOT TUBE ID NUMBER– E–7
PITOT TUBE DESCRIPTION– 7.5", REPLACABLE EXTENSION
DATE CALIBRATED– 4/12/94
CALIBRATED BY– RLO,OCB

Used on ESP Inlet OH Probe

VELOCITY RANGE	SAMPLE NUMBER	SIDE	STANDARD READINGS [" of H20]	S–TUBE READINGS [" of H20]	INDIVIDUAL C FACTOR	AVG OF INDIVIDUAL C FACTOR	DEVIATION	APPROX VELOCITY [FT/SEC]
LOW	1	A	0.100	0.140	0.837	0.837	0.000	21
	2		0.100	0.140	0.837			
	3		0.100	0.140	0.837			
LOW	1	B	0.100	0.140	0.837	0.842	0.007	21
	2		0.100	0.135	0.852			
	3		0.100	0.140	0.837			
MEDIUM	1	A	0.395	0.560	0.831	0.830	0.001	41
	2		0.390	0.555	0.830			
	3		0.385	0.550	0.828			
MEDIUM	1	B	0.390	0.550	0.834	0.829	0.003	41
	2		0.390	0.560	0.826			
	3		0.385	0.550	0.828			
HIGH	1	A	0.880	1.240	0.834	0.834	0.001	61
	2		0.880	1.240	0.834			
	3		0.890	1.250	0.835			
HIGH	1	B	0.890	1.270	0.829	0.829	0.000	62
	2		0.890	1.270	0.829			
	3		0.890	1.270	0.829			

AVERAGE CALCULATIONS OVER ENTIRE VELOCITY RANGES

SIDE	C–FACTOR	DEVIATION
A	0.834	0.003
B	0.833	0.006

[PITB–7;RLO;4/12/94;1600]

for OCB 4/13/94

PITOT TUBE CALIBRATIONS

PITOT TUBE ID NUMBER– S–30
PITOT TUBE DESCRIPTION– 6', METHOD 17, HEATED
DATE CALIBRATED– 4/11/94
CALIBRATED BY– RLO,OCB

VELOCITY RANGE	SAMPLE NUMBER	SIDE	STANDARD READINGS [" of H20]	S–TUBE READINGS [" of H20]	INDIVIDUAL C FACTOR	AVG OF INDIVIDUAL C FACTOR	DEVIATION	APPROX VELOCITY [FT/SEC]
LOW	1	A	0.100	0.175	0.748	0.752	0.005	21
	2		0.100	0.175	0.748			
	3		0.100	0.170	0.759			
LOW	1	B	0.100	0.170	0.759	0.759	0.000	21
	2		0.100	0.170	0.759			
	3		0.100	0.170	0.759			
MEDIUM	1	A	0.405	0.670	0.770	0.769	0.002	41
	2		0.395	0.660	0.766			
	3		0.400	0.660	0.771			
MEDIUM	1	B	0.400	0.660	0.771	0.775	0.003	41
	2		0.400	0.650	0.777			
	3		0.400	0.650	0.777			
HIGH	1	A	0.930	1.550	0.767	0.768	0.001	63
	2		0.935	1.550	0.769			
	3		0.930	1.550	0.767			
HIGH	1	B	0.920	1.500	0.775	0.777	0.001	63
	2		0.925	1.500	0.777			
	3		0.930	1.500	0.780			

AVERAGE CALCULATIONS OVER ENTIRE VELOCITY RANGES

SIDE	C–FACTOR	DEVIATION
A	0.763	0.007
B	0.770	0.007

[PITS–30;RLO;4/12/94;1030]

Continued on Page

for OCB 4/13/94

Signed Date

Read and Understood By

Signed 4-15

D

PITOT TUBE CALIBRATIONS

PITOT TUBE ID NUMBER– SP–1
PITOT TUBE DESCRIPTION– SUPER–PROBE, 1/4", 6" LONG
DATE CALIBRATED– 4/7/98
CALIBRATED BY– OCB,FLL

VELOCITY RANGE	SAMPLE NUMBER	SIDE	STANDARD READINGS [" of H_2O]	S–TUBE READINGS [" of H_2O]	INDIVIDUAL C FACTOR	AVG OF INDIVIDUAL C FACTOR	DEVIATION	APPROX VELOCITY [FT/SEC]
LOW	1	A	0.16	0.24	0.808	0.803	0.007	27
	2		0.16	0.25	0.792			
	3		0.16	0.24	0.808			
LOW	1	B	0.16	0.25	0.792	0.797	0.007	27
	2		0.16	0.24	0.808			
	3		0.16	0.25	0.792			
MEDIUM	1	A	0.39	0.60	0.798	0.800	0.003	42
	2		0.39	0.59	0.805			
	3		0.39	0.60	0.798			
MEDIUM	1	B	0.40	0.61	0.802	0.801	0.006	42
	2		0.39	0.61	0.792			
	3		0.40	0.60	0.808			
HIGH	1	A	0.92	1.32	0.823	0.822	0.001	64
	2		0.92	1.32	0.823			
	3		0.91	1.31	0.821			
HIGH	1	B	0.91	1.29	0.828	0.827	0.001	64
	2		0.92	1.30	0.829			
	3		0.92	1.31	0.826			

AVERAGE CALCULATIONS OVER ENTIRE VELOCITY RANGES

SIDE	C–FACTOR	DEVIATION
A	0.809	0.009
B	0.808	0.013

[PITSP–1A;RLO;4/20/98;1550]

PITOT TUBE CALIBRATIONS

Used on Ontario Hydro Single Point Sample at FGD Outlet

PITOT TUBE ID NUMBER– SP–2
PITOT TUBE DESCRIPTION– SUPER–PROBE, 1/4", 6" LONG
DATE CALIBRATED– 4/7/98
CALIBRATED BY– OCB,FLL

VELOCITY RANGE	SAMPLE NUMBER	SIDE	STANDARD READINGS [" of H_2O]	S–TUBE READINGS [" of H_2O]	INDIVIDUAL C FACTOR	AVG OF INDIVIDUAL C FACTOR	DEVIATION	APPROX VELOCITY [FT/SEC]
LOW	1	A	0.17	0.25	0.816	0.816	0.000	28
	2		0.17	0.25	0.816			
	3		0.17	0.25	0.816			
LOW	1	B	0.17	0.24	0.821	0.815	0.007	27
	2		0.17	0.24	0.821			
	3		0.17	0.25	0.804			
MEDIUM	1	A	0.40	0.61	0.802	0.800	0.003	42
	2		0.40	0.61	0.802			
	3		0.40	0.62	0.795			
MEDIUM	1	B	0.40	0.61	0.802	0.797	0.003	42
	2		0.40	0.62	0.795			
	3		0.40	0.62	0.795			
HIGH	1	A	0.90	1.29	0.823	0.824	0.001	64
	2		0.91	1.30	0.824			
	3		0.91	1.30	0.824			
HIGH	1	B	0.91	1.32	0.818	0.820	0.001	64
	2		0.91	1.31	0.821			
	3		0.91	1.31	0.821			

AVERAGE CALCULATIONS OVER ENTIRE VELOCITY RANGES

SIDE	C–FACTOR	DEVIATION
A	0.813	0.009
B	0.811	0.009

[PITSP–2A;RLO;4/20/98;1615]

PITOT TUBE CALIBRATIONS

PITOT TUBE ID NUMBER– S–19
PITOT TUBE DESCRIPTION– 13', ENCLOSED
DATE CALIBRATED– 4/2/98
CALIBRATED BY– OCB,JRM

VELOCITY RANGE	SAMPLE NUMBER	SIDE	STANDARD READINGS [" of H_2O]	S–TUBE READINGS [" of H_2O]	INDIVIDUAL C FACTOR	AVG OF INDIVIDUAL C FACTOR	DEVIATION	APPROX VELOCITY [FT/SEC]
LOW	1	A	0.18	0.29	0.780	0.780	0.000	29
	2		0.18	0.29	0.780			
	3		0.18	0.29	0.780			
LOW	1	B	0.18	0.29	0.780	0.768	0.008	28
	2		0.17	0.29	0.758			
	3		0.18	0.30	0.767			
MEDIUM	1	A	0.39	0.61	0.792	0.789	0.003	42
	2		0.39	0.61	0.792			
	3		0.39	0.62	0.785			
MEDIUM	1	B	0.40	0.63	0.789	0.784	0.004	42
	2		0.39	0.62	0.785			
	3		0.39	0.63	0.779			
HIGH	1	A	0.90	1.47	0.775	0.774	0.001	64
	2		0.90	1.47	0.775			
	3		0.90	1.48	0.772			
HIGH	1	B	0.91	1.45	0.784	0.784	0.003	64
	2		0.91	1.44	0.787			
	3		0.90	1.45	0.780			

AVERAGE CALCULATIONS OVER ENTIRE VELOCITY RANGES

SIDE	C–FACTOR	DEVIATION
A	0.781	0.006
B	0.779	0.007

[PITS–19E;RLO;4/20/98;1520]

PITOT TUBE CALIBRATIONS

Used in M-2 measurement at FGD Outlet

PITOT TUBE ID NUMBER– S–31
PITOT TUBE DESCRIPTION– 19', ENCLOSED
DATE CALIBRATED– 4/2/98
CALIBRATED BY– OCB,JRM

VELOCITY RANGE	SAMPLE NUMBER	SIDE	STANDARD READINGS [" of H_2O]	S–TUBE READINGS [" of H_2O]	INDIVIDUAL C FACTOR	AVG OF INDIVIDUAL C FACTOR	DEVIATION	APPROX VELOCITY [FT/SEC]
LOW	1	A	0.20	0.34	0.773	0.776	0.005	30
	2		0.20	0.34	0.773			
	3		0.20	0.33	0.784			
LOW	1	B	0.20	0.34	0.774	0.767	0.005	30
	2		0.20	0.35	0.763			
	3		0.20	0.35	0.763			
MEDIUM	1	A	0.44	0.67	0.802	0.796	0.004	44
	2		0.43	0.67	0.793			
	3		0.43	0.67	0.793			
MEDIUM	1	B	0.44	0.65	0.807	0.801	0.004	44
	2		0.43	0.65	0.797			
	3		0.43	0.65	0.797			
HIGH	1	A	0.90	1.35	0.805	0.805	0.001	64
	2		0.91	1.36	0.806			
	3		0.90	1.35	0.805			
HIGH	1	B	0.90	1.37	0.799	0.800	0.001	64
	2		0.91	1.38	0.800			
	3		0.91	1.38	0.800			

AVERAGE CALCULATIONS OVER ENTIRE VELOCITY RANGES

SIDE	C–FACTOR	DEVIATION
A	0.793	0.01
B	0.789	0.01

[PITS–31A;RLO;4/20/98;1440]

MSD 4-2-98

5-12-98

Barometer Cal 3 Barometers

Temp 70 °F

28.950
− .107
28.84

Jr Bedellion
Pre Barometer check

METER CALIBRATION DATA

DATE –May 13, 1998 BAR – 28.95
METER – NC–4 OPERATOR – OCB SPWE
[NUTECH–COOLSIDE]

ΔH	V_w	V_d	T_w	T_{in}	T_{out}	TIME	Y	$\Delta H_@$
0.35	3.00	2.95	75.7	76.3	75.0	8.60	1.016	1.700
0.50	5.00	4.91	77.0	79.3	76.7	12.13	1.019	1.742
1.00	6.00	5.90	77.0	83.7	78.0	10.52	1.022	1.816
2.00	6.00	5.91	77.0	87.7	79.7	7.52	1.023	1.850
2.50	10.00	9.88	77.0	90.0	80.7	11.45	1.021	1.926
3.00	10.00	9.90	77.0	91.0	81.3	10.33	1.020	1.879
4.00	10.00	9.91	77.9	92.0	82.7	9.00	1.016	1.903
	Y =	1.020		$\Delta H_@$ =	1.853	AVG	1.020	1.853
	STD DEV =	0.002		STD DEV =	0.061	MIN	1.016	1.742
						MAX	1.023	1.926
						RANGE	0.003	0.092

PREVIOUS CALIBRATION:

DATE = 4/1/96
Y = 1.001 −1.91 % CHANGE
$\Delta H_@$ = 1.814 −2.13 % CHANGE

New dry test meter installed

[NC4–5–98;RLO;5/13/98]

Calibration of Field Barometers

8-3-98

Brass #1 - 29.13
Brass #2 - 29.15
Hg Column - 29.16

No adjustments made MSD

7-1-98

Brass #1 28.80
Brass #2 28.80

Hg Column - 28.86

Bothe Brass Barometers were Reset

MSD/ OCB

1-13-98

Brass #1 28.86
Brass #2 28.89

Hg Column 28.89

No Adjustments made MSD

[illegible] 1998

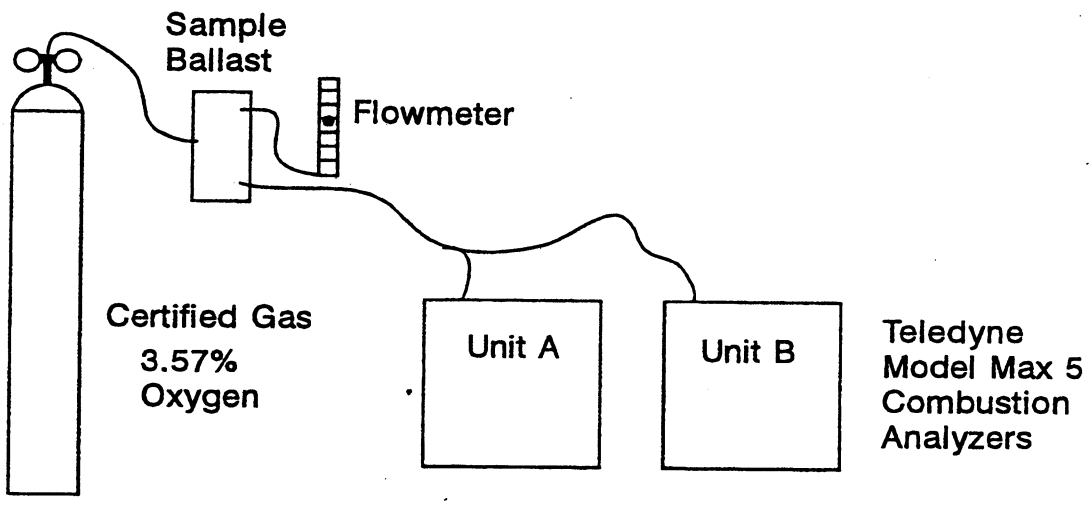
Large S.S. Goose Neck Tap Calibration.

.500	1/2	A	.501	.502	.501				
		B	.502	.502	.503				
7/16 .4375		one	.437	.436	.437				
.375	3/8	A	.373	.373	.374				
		B	.373	.373	.374				
		C	.367	.367	.368				
.344	11/32	A	.336	.336	.336				
		B	.337	.336	.336				
.3125	5/16	A	.311	.312	.312				
		B	.313	.313	.314				
		C	.314	.313	.314				
		D	.313	.313	.313				
		E	.309	.309	.310				
						July 1, 1998			
.281	9/32	A	.268	.268	.269	.270	.269	.269	
		B	.268	.268	.269	.268	.270	.271	
		C	.268	.268	.268	.273	.270	.272	Used at esp Inlet
.266	17/64	Lost							
.250	1/4	A	.249	.249	.249	.252	.250	.252	
		B	.252	.252	.253	.252	.250	.252	
		C	.269	.270	.270	.260	.260	.261	Used at FGD outlet
		D	.250	.250	.249	.251	.248	.249	
		E	.247	.247	.247	.247	.250	.248	
.219	7/32	A	.213	.213	.212	.211	.213	.212	
		B	.213	.214	.214	.214	.214	.215	
		C	.212	.213	.213	.214	.214	.213	
.1875	3/16	A	~~.212~~	~~.213~~	~~.212~~	.188	.189	.188	
		B	.189	.188	.188				
		C	.193	.193	.194				
		D	.192	.192	.192				
		E	.185	.186	.186				

3-20-98

Initial Check-out of Teledyne Max 5 Oxygen Analyzer.

Calibration of Oxygen Analyzers for Milliken Heat Pipe Testing - 2/7/95



Time	Unit A	Unit B
1000 hrs	3.5%	3.6%
1130 hrs	3.5%	3.6%
1300 hrs	3.5%	3.6%
1500 hrs	3.5%	3.6%

MSD

Continued on Page

Read and Understood By

Signed	Date	Signed	Date
Mc Wehle	2-7-95	MSD	2-7-95

APPENDIX E

Lab Reports of Ontario Hydro Sampling Train

Individual Train Sample Hg Results
Summary of CVAA Runs for Train Samples
Certificate of Analysis for Hg Standards
Calibration and QC Summary for UNICAM Mercury Analyzer

CONSOL INC.
RESEARCH & DEVELOPMENT
ANALYTICAL LABORATORY
LIBRARY, PENNSYLVANIA 15129

TO: M. DEVITO

PROJECT NUMBER 1621-42 -2

DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS ESP INLET 7-14-98
SAMPLE NUMBER 7-14 PROBE RINSE
ANALYTICAL NUMBER 986401

	-------- WATER ANALYSIS ---------			
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	1.59 ✓✓		

Note: All units mg/L unless specified

Sample duplicate = 1.83 ppb

CONSOL INC.
RESEARCH & DEVELOPMENT
ANALYTICAL LABORATORY
LIBRARY, PENNSYLVANIA 15129

TO: M. DEVITO

PROJECT NUMBER 1621-42 -2

DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS -SCRUBBER OUTLET-7-14-98
SAMPLE NUMBER 7-14 PROBE RINSE
ANALYTICAL NUMBER 986416

		-------- WATER ANALYSIS ---------		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	2.745 ✓		

Note: All units mg/L unless specified

T2

CONSOL INC.
RESEARCH & DEVELOPMENT
ANALYTICAL LABORATORY
LIBRARY, PENNSYLVANIA 15129

TO: M. DEVITO

PROJECT NUMBER 1621-42 -2

DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS ESP INLET 7-15-98
SAMPLE NUMBER 7-15 PROBE RINSE
ANALYTICAL NUMBER 986406

	-------- WATER ANALYSIS ---------			
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	0.94 ✓✓		

Note: All units mg/L unless specified

CONSOL INC.
RESEARCH & DEVELOPMENT
ANALYTICAL LABORATORY
LIBRARY, PENNSYLVANIA 15129

TO: M. DEVITO

PROJECT NUMBER 1621-42 -2

DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS -SCRUBBER OUTLET 7-15-98
SAMPLE NUMBER 7-15 PROBE RINSE
ANALYTICAL NUMBER 986421

	-------- WATER ANALYSIS ---------			
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	2.53		

Note: All units mg/L unless specified

CONSOL INC.
RESEARCH & DEVELOPMENT
ANALYTICAL LABORATORY
LIBRARY, PENNSYLVANIA 15129

TO: M. DEVITO

PROJECT NUMBER 1621-42 -2

DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS - ESP INLET - 7-16-98
SAMPLE NUMBER 7-16 PROBE RINSE
ANALYTICAL NUMBER 986411

	-------- WATER ANALYSIS ---------			
ANALYSIS	**UNITS**	**VALUE**	**VALUE**	**DUP AVG**
Hg	PPB	1.38		

Note: All units mg/L unless specified

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TO: M. DEVITO

PROJECT NUMBER 1621-42 -2

DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS -SCRUBBER OUTLET 7-16-98
SAMPLE NUMBER 7-16 PROBE RINSE
ANALYTICAL NUMBER 986426

		WATER ANALYSIS		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	<1 ✓✓		

Note: All units mg/L unless specified

Sample Spike = 5.2 ppb

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TO: M. DEVITO

PROJECT NUMBER 1621-42 -2

DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS ESP INLET 7-14-98
SAMPLE NUMBER 7-14 KCl IMPINGERS
ANALYTICAL NUMBER 986402

		-------- WATER ANALYSIS ---------		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	11.83 ✓✓		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-42 -2

DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS -SCRUBBER OUTLET-7-14-98
SAMPLE NUMBER 7-14 KCl IMPINGERS
ANALYTICAL NUMBER 986417

	-------- WATER ANALYSIS ---------			
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	3.141 ✓	✓	

Note: All units mg/L unless specified

Sample duplicate = 1.60 ppb

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TO: M. DEVITO

PROJECT NUMBER 1621-42 -2

DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS ESP INLET 7-15-98
SAMPLE NUMBER 7-15 KCl IMPINGER
ANALYTICAL NUMBER 986407

		WATER ANALYSIS		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	11.05		

Note: All units mg/L unless specified

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DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS -SCRUBBER OUTLET 7-15-98
SAMPLE NUMBER 7-15 KCl IMPINGERS
ANALYTICAL NUMBER 986422

	-------- WATER ANALYSIS ---------			
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	4.38		

Note: All units mg/L unless specified

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-42 -2

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DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS - ESP INLET - 7-16-98
SAMPLE NUMBER 7-16 KCl IMPINGER
ANALYTICAL NUMBER 986412

	-------- WATER ANALYSIS ---------			
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	6.78		

Note: All units mg/L unless specified

Spike Recovery = 5.0 ppb

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DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS -SCRUBBER OUTLET 7-16-98
SAMPLE NUMBER 7-16 KCl IMPINGERS
ANALYTICAL NUMBER 986427

	-------- WATER ANALYSIS ---------			
ANALYSIS	**UNITS**	**VALUE**	**VALUE**	**DUP AVG**
Hg	PPB	1.68		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-42 -2

DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS ESP INLET 7-14-98
SAMPLE NUMBER 7-14 NITRIC IMP.
ANALYTICAL NUMBER 986403

		-------- WATER ANALYSIS ---------		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	<1 ✓✓		

Note: All units mg/L unless specified

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DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS -SCRUBBER OUTLET-7-14-98
SAMPLE NUMBER 7-14 NITRIC IMP.
ANALYTICAL NUMBER 986418

		WATER ANALYSIS		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	<1		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-42 -2

DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS ESP INLET 7-15-98
SAMPLE NUMBER 7-15 NITRIC IMP.
ANALYTICAL NUMBER 986408

	-------- WATER ANALYSIS ---------			
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	<1 ✓	✓	

Note: All units mg/L unless specified

Duplicate = 2.02 ppb

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TO: M. DEVITO

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DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS -SCRUBBER OUTLET 7-15-98
SAMPLE NUMBER 7-15 NITRIC IMP.
ANALYTICAL NUMBER 986423

	-------- WATER ANALYSIS ---------			
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	<1		

Note: All units mg/L unless specified

Spike Recovery = 4.8 ppb

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DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS - ESP INLET - 7-16-98
SAMPLE NUMBER 7-16 NITRIC IMP.
ANALYTICAL NUMBER 986413

	-------- WATER ANALYSIS ---------			
ANALYSIS	**UNITS**	**VALUE**	**VALUE**	**DUP AVG**
Hg	PPB	1.84		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-42 -2

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DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS -SCRUBBER OUTLET 7-16-98
SAMPLE NUMBER 7-16 NITRIC IMP.
ANALYTICAL NUMBER 986428

	-------- WATER ANALYSIS ---------			
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	2.31		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-42 -2

DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS ESP INLET 7-14-98
SAMPLE NUMBER 7-14 KMNO4 IMP.
ANALYTICAL NUMBER 986404

		WATER ANALYSIS		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	12.11		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-42 -2

DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS - ESP OUTLET-7-14-98
SAMPLE NUMBER 7-14 KMNO4 IMPINGERS
ANALYTICAL NUMBER 986419

	-------- WATER ANALYSIS ---------			
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	17.38 ✓✓		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-42 -2

DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS ESP INLET 7-15-98
SAMPLE NUMBER 7-15 KMNO4 IMPINGER
ANALYTICAL NUMBER 986409

	-------- WATER ANALYSIS ---------			
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	3.80		

Note: All units mg/L unless specified

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DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS -SCRUBBER OUTLET 7-15-98
SAMPLE NUMBER 7-15 KMNO4 IMPINGERS
ANALYTICAL NUMBER 986424

	-------- WATER ANALYSIS ---------			
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	16.19		

Note: All units mg/L unless specified

Duplicate was 17.60 ppb

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DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS - ESP INLET - 7-16-98
SAMPLE NUMBER 7-16 KMNO4 IMPINGERS
ANALYTICAL NUMBER 986414

	-------- WATER ANALYSIS ---------			
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	5.04		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-42 -2

DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS -SCRUBBER OUTLET 7-16-98
SAMPLE NUMBER 7-16 KMNO4 IMPINGERS
ANALYTICAL NUMBER 986429

	-------- WATER ANALYSIS ---------			
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	16.32		

Note: All units mg/L unless specified

Spike recovery was

$$\begin{array}{r} 6.85 \\ -\ 1.63 \\ \hline 5.22 \end{array}$$

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PROJECT NUMBER 1621-42 -2

DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS ESP INLET 7-14-98
SAMPLE NUMBER 7-14 HCl RINSE
ANALYTICAL NUMBER 986405

		WATER ANALYSIS		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	<1 ✓		

Note: All units mg/L unless specified

Sample Duplicate = < 1ppb

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PROJECT NUMBER 1621-42 -2

DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS - ESP OUTLET-7-14-98
SAMPLE NUMBER 7-14 HCl RINSE
ANALYTICAL NUMBER 986420

	-------- WATER ANALYSIS ---------			
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	1.785		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-42 -2

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DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS ESP INLET 7-15-98
SAMPLE NUMBER 7-15 HCl RINSE
ANALYTICAL NUMBER 986410

	-------- WATER ANALYSIS ---------			
ANALYSIS	**UNITS**	**VALUE**	**VALUE**	**DUP AVG**
Hg	PPB	1.16		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-42 -2

DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS -SCRUBBER OUTLET 7-15-98
SAMPLE NUMBER 7-15 HCl RINSE
ANALYTICAL NUMBER 986425

	-------- WATER ANALYSIS ---------			
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	<1		

Note: All units mg/L unless specified

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TO: M. DEVITO

PROJECT NUMBER 1621-42 -2

DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS - ESP INLET - 7-16-98
SAMPLE NUMBER 7-16 HCl RINSE
ANALYTICAL NUMBER 986415

	-------- WATER ANALYSIS ---------			
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	<1 ✓		

Note: All units mg/L unless specified

Spike Recovery = 5.4 ppb

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TO: M. DEVITO

PROJECT NUMBER 1621-42 -2

DATE LOGGED 11/17/98
DATE COMPLETED 11/18/98

DESCRIPTION DUCK CREEK Hg IMPINGERS -SCRUBBER OUTLET 7-16-98
SAMPLE NUMBER 7-16 HCl RINSE
ANALYTICAL NUMBER 986430

		-------- WATER ANALYSIS ---------		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	PPB	<1		

Note: All units mg/L unless specified

Duck Creek Ontario Hydro Sampling Train Solids Analysis

Calibration curve, sample, duplicates, spike analyses, and QC checks

Filter/Filter Solids Analysis

Sample ID	Description	Abs	Dilution Factor	Hg Concentration ng/mL	Hg Concentration ppb solids[1]
Blank	0.0 ng/mL Hg	0.001	1	0.00	NA
Standard 1	1.00 ng/mL Hg	0.004	1	1.00	NA
Standard 3	5.00 ng/mL Hg	0.021	1	5.00	NA
Standard 4	10.00 ng/mL Hg	0.045	1	10.00	NA
Standard 5	20.00 ng/mL Hg	0.088	1	20.00	NA
Blank	10% HCl	0.002	1	0.39	NA
NIST SRM	**1641C 14.7 ng/mL Hg**	**0.065**	**1**	**14.73**	**NA**
Filter Blank	Quartz Blank	0.001	1	0.21	0
Inlet Particulate Solids					
7/14/98	Inlet Filter	0.021	50.5	5.07	220
7/15/98	Inlet Filter	0.018	50.5	4.15	211
7/15/98 (Dup)	Inlet Filter (duplicate)	0.013	50.5	2.83	139
7/16/98	Inlet Filter	0.020	50.5	4.63	229
7/16/98 (Dup)	Inlet Filter (duplicate)	0.024	50.5	5.43	267
Blank	10% HCl	0.002	1	0.39	NA
Outlet Particulate Samples					
7/14/98	Outlet Filter	0.007	50.5	1.62	81.7
7/15/98	Outlet Filter	0.004	50.5	0.88	44.3
7/16/98	Outlet Filter	0.003	50.5	0.72	36.3
Blank	10% HCl	0.001	1	0.11	NA
QC–Check	**20 ppb QC Check**	**0.084**	**1**	**19.05**	**NA**
Blank	10% HCl	0.000	1	0.00	NA

1 – ppb solids concentrated calculated from total filter mass and sample wt.

Duck Creek Ontario Hydro Sampling Train Impinger Mercury Analysis

Calibration curve, sample, duplicates, spike analyses, and QC checks

Sample ID	Description	Absorbance	Dilution Factor	Hg Conc. ng/mL
	Calibration Curve			
Blank	0.0 ng/mL Hg	0.000	1	0.00
Standard 1	1.00 ng/mL Hg	0.004	1	1.00
Standard 3	5.00 ng/mL Hg	0.022	1	5.00
Standard 4	10.00 ng/mL Hg	0.045	1	10.00
Standard 5	20.00 ng/mL Hg	0.089	1	20.00
	Probe and Front–Half HCl Rinse			
Blank	10% HCl	0.000	1	0.00
NIST SRM	**1641C 7.35 ng/mL Hg**	**0.034**	**1**	**7.55**
986401	7/14 – Probe Rinse (Inlet)	0.001	10	1.60
986401 (Dup)	Sample Duplicate	0.001	10	1.83
986416	7/14 – Probe Rinse (Outlet)	0.001	10	2.75
986406	7/15 – Probe Rinse (Inlet)	0.000	10	0.94
986421	7/15 – Probe Rinse (Outlet)	0.001	10	2.53
986411	7/16 – Probe Rinse (Inlet)	0.000	10	1.38
986426	7/16 – Probe Rinse (Outlet)	0.000	10	0.00
986426 (Spike)	5 ppb Hg Spike	0.023	1	5.2–0.0=5.2
Blank	10% HCl	0.000	1	0.00
NIST SRM	**1643D 7.35 ng/mL Hg**	**0.035**	**1**	**7.79**
	KCl Impinger Samples			
986402	7/14 KCl (Inlet)	0.005	10	11.83
986417	7/14 KCl (Outlet)	0.001	10	3.14
986417 (Dup)	Sample Duplicate	0.001	10	1.60
986407	7/15 KCl (Inlet)	0.005	10	11.05
986422	7/15 KCl (Outlet)	0.002	10	4.38
986412	7/16 KCl (Inlet)	0.003	10	6.78
986412 (Spike)	5 ppb Hg Spike	0.025	1	5.2–0.0=5.2
986427	7/16 KCl (Outlet)	0.001	10	1.68
Blank	10% HCl	0.000	1	0.14
NIST SRM	**1643D 7.35 ng/mL Hg**	**0.036**	**1**	**8.11**
	Nitric Acid / Hydrogen Peroxide Impingers			
986403	7/14 Nitric Imp (Inlet)	0.000	10	0.00
986418	7/14 Nitric Imp (Outlet)	0.000	10	0.00
986408	7/15 Nitric Imp (Inlet)	0.000	10	0.47
986408 (Dup)	Sample Duplicate	0.001	10	2.02
986423	7/15 Nitric Imp (Outlet)	0.000	10	0.50
986423 (Spike)	5 ppb Hg Spike	0.023	1	5.3–0.5=4.8
986413	7/16 Nitric Imp (Inlet)	0.001	10	1.84
986428	7/16 Nitric Imp (Outlet)	0.001	10	2.31
Blank	10% HCl	0.000	1	0.10
NIST SRM	**1643D 7.35 ng/mL Hg**	**0.037**	**1**	**8.31**

Duck Creek Ontario Hydro Sampling Train Impinger Mercury Analysis

Calibration curve, sample, duplicates, spike analyses, and QC checks

Sample ID	Description	Absorbance	Dilution Factor	Hg Conc. ng/mL
	Calibration Curve			
Blank	0.0 ng/mL Hg	0.000	1	0.00
Standard 1	1.00 ng/mL Hg	0.005	1	1.00
Standard 3	5.00 ng/mL Hg	0.021	1	5.00
Standard 4	10.00 ng/mL Hg	0.044	1	10.00
Standard 5	20.00 ng/mL Hg	0.087	1	20.00
	Field Blanks			
Blank	10% HCl	0.000	1	0.00
NIST SRM	**1641C 7.35 ng/mL Hg**	**0.032**	**1**	**7.33**
Field Blank, B1	7/14 – KCl	0.000	10	0.00
Field Blank, B2	7/14 HNO_3/H_2O_2	0.000	10	0.00
Field Blank, B3	7/14 $KMnO_4$	0.001	10	0.50
Field Blank, B3	7/14 $KMnO_4$ (Dup)	0.000	10	0.00
Field Blank, B1	7/15 – KCl	0.001	10	0.49
Field Blank, B3	7/15 $KMnO_4$	0.001	10	0.36
Field Blank, B1	7/16 – KCl	0.001	10	0.68
Field Blank, B1	7/16 – KCl (5 ppb Spike)	0.001	10	5.23
Blank	10% HCl	0.000	1	0.00
NIST SRM	**1643D 7.35 ng/mL Hg**	**0.034**	**1**	**7.74**
	$KMnO_4$ Impinger Samples			
986404	7/14 $KMnO_4$ (Inlet)	0.006	10	12.11
986419	7/14 $KMnO_4$ (Outlet)	0.008	10	17.38
986409	7/15 $KMnO_4$ (Inlet)	0.002	10	3.80
986424	7/15 $KMnO_4$ (Outlet)	0.007	10	16.19
986424 (Dup)	Sample Duplicate	0.008	10	17.60
986414	7/16 $KMnO_4$ (Inlet)	0.003	10	5.04
986429	7/16 $KMnO_4$ (Outlet)	0.007	10	16.32
986429 (Spike)	5 ppb Hg Spike	0.030	1	6.8−1.6=5.2
Blank	10% HCl	0.000	1	0.00
NIST SRM	**1643D 14.2 ng/mL Hg**	**0.071**	**1**	**16.26**
	$KMnO_4$ Impinger Samples – HCl Rinse			
986405	7/14 HCl Rinse (Inlet)	0.000	10	0.00
986405 (Dup)	Sample Duplicate	0.000	10	0.00
986420	7/14 HCl Rinse (Outlet)	0.001	10	1.79
986410	7/15 HCl Rinse (Inlet)	0.001	10	1.16
986425	7/15 HCl Rinse (Outlet)	0.000	10	0.00
986415	7/16 HCl Rinse (Inlet)	0.000	10	0.00
986415 (Spike)	5 ppb Hg Spike	0.024	1	5.4−0.0=5.4
986430	7/16 HCl Rinse (Outlet)	0.000	10	0.00
Blank	10% HCl	0.000	1	0.00
NIST SRM	**1643D 14.2 ng/mL Hg**	**0.072**	**1**	**16.58**

VHG LABS

Laboratory Report - Certificate of Analysis

Plasma Emission Standard

Product No: PHGN-500

Element: **Mercury (Hg)**

Lot No.: PHGN61

Concentration: **1,000 ± 3 μg/mL***

Expires: November 1999

Matrix: 5% HNO_3

This solution is intended for use as a calibration standard for plasma emission spectroscopy (ICP or DCP). It is a single element solution, that was prepared gravimetrically to contain 1,000 μg of mercury per mL of solution. The certified value is based upon gravimetric procedures, ie., weight per volume composition of 99.9994% pure mercury (Hg) metal dissolved in high purity nitric acid (HNO_3) and diluted with filtered (0.22μm) 18 megohm deionized water. The uncertainty associated with the certified value is approximated by summing the estimated errors due to the purity of the Hg, the gravimetric preparation of the solution, and transpiration of the solution through the container wall.

Traceability: The balance used to weigh the Hg is accurate to ± 0.0001g and is calibrated regularly using mass standards, which are traceable to NIST according to ME Report No. 12996-01 and NIST Test No. 39760. All volumetric dilutions are performed in class A glassware which is recalibrated regularly according to NIST recommended procedures. In order to verify the concentration, the final solution was checked by plasma emission spectrometry (ICP or DCP) against **NIST SRM 3133**. All trace level elements and impurities, in the final solution, were also determined by ICP or DCP.

Concentrations are given in μg/mL unless noted otherwise.

Al	<.04	Ag	<.02	As	<.2	Au	<.08	B	<.02	Ba	<.003	Be	<.003	Bi	<.2	**Ca**	**0.05**	Cd	<.02
Ce	<.3	Co	<.02	Cr	<.02	Cs	<100	Cu	<.02	Dy	<.03	Er	<.02	Eu	<.02	Fe	<.02	Ga	<.03
Gd	<.07	Ge	<.1	Hf	<.05	**Hg**	*	Ho	<.02	In	<.2	Ir	<.2	K	<.5	**La**	**0.10**	Li	<.02
Lu	<.02	**Mg**	**0.007**	Mn	<.02	Mo	<.04	**Na**	**0.28**	Nb	<.05	Nd	<.05	Ni	<.02	Os	<.2	P	<.1
Pb	<.1	Pd	<.1	Pr	<.06	Pt	<.2	Rb	<50	Re	<.1	Rh	<.01	Ru	<.05	S	<.05	Sb	<.2
Sc	<.01	Se	<.5	Si	<.04	Sm	<.04	Sn	<.1	Sr	<.003	Ta	<.1	Tb	<.06	Te	<.5	Th	<.2
Ti	<.02	Tl	<.1	Tm	<.04	U	<.4	V	<.02	W	<.2	Y	<.02	Yb	<.01	Zn	<.02	Zr	<.04

Recommendations: VHG guarantees the accuracy of this solution until the expiration date shown above, provided it is kept tightly capped and stored under normal laboratory conditions. To achieve the highest accuracy, the analyst should prepare fresh working solutions daily, by making serial dilutions. We recommend that the solution be thoroughly mixed, by shaking the bottle, immediately prior to use. Never pipet directly from the bottle. All glass or plastic surfaces, which come into contact with the solution, must have been previously cleaned. Dilutions should be made with certified volumetric class A flasks and pipets. Always dilute with the same matrix as the original standard.

VHG Labs, Inc.

Q. A. Manager

VHG Labs, Inc. waives all responsibility for any damages resulting from the usage and/or implementation of the products/data described herein.

National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Materials 1641c

Mercury in Water

(Acidified with 2% HNO_3)

This Standard Reference Material (SRM) is intended for use in the primary calibration of instruments and techniques used for the determination of mercury in natural waters. It is designed for the preparation of calibration solutions and for use as a "spike" sample in a "method-of-additions" type analytical procedure. A unit of SRM 1641c consists of six ampoules, each ampoule containing 20 mL of solution containing a trace amount of mercury in 2% (v/v) HNO_3, initially stabilized with 1 mg/L gold.

The mercury content in this SRM was certified using flow injection analysis cold vapor atomic absorption (FIA-CVAA) and inductively coupled plasma mass spectrometry (ICP-MS). The certified mercury content and its estimated uncertainty is given below.

Mercury concentration: 1.47 ± 0.04 mg/L

The certified value, minus and plus the uncertainty, gives a 95% confidence interval for the true concentration of mercury in this material, with an allowance for differences between the analytical methods used.

Notice to users: The certification of this SRM is considered valid for one year from the date of shipment from NIST. At or below the mg/mL level, mercury solutions are not adequately stabilized with mineral acid alone. The addition of trace quantities of gold to the nitric acid solution of mercury provides greater stability. However, the gold which stabilizes the mercury content may plate out on the ampoule wall during the period for which the certification is valid. Experience with the three previous issues of this SRM indicates that this has no affect on the mercury concentration. The stability of this SRM will continue to be monitored and any substantive change in the certified value will be reported to customers. Please return the enclosed registration card to facilitate the notification.

This SRM was prepared by J.R. Moody, and certification analyses were performed by M.S. Epstein, R. Saraswati, R.A. Tores, and G.C. Turk of the NIST Inorganic Analytical Research Division.

The overall direction and coordination of technical measurements leading to certification were performed by J.D. Fassett of the NIST Inorganic Analytical Research Division.

The statistical evaluation of certification data was performed by S.B. Schiller of the NIST Statistical Engineering Division.

The technical and support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by J.S. Kane.

Gaithersburg, MD 20899
June 14, 1993
(Revision of certificate dated 4-6-93)

Thomas E. Gills, Acting Chief
Standard Reference Materials Program

(over)

UNICAM MODEL 969 Hg Calibration Data

Duck Creek Ontario Hydro Train and Process Stream Samples

Date	8/6	8/11	8/11	8/30	9/25	9/25	9/28
Sample Matrix	Impingers	Impingers	Liquids	OH Filters	Solids	Solids	Coals
Hg Conc., ng/mL				***Aborbance***			
0	0.001	0.000	0.000	0.001	0.001	0.002	0.000
1	0.004	0.005	0.005	0.004	0.006	0.006	0.005
5	0.022	0.021	0.022	0.021	0.024	0.025	0.023
10	0.045	0.044	0.046	0.045	0.049	0.051	0.048
20	0.089	0.087	0.092	0.088	0.096	0.105	0.098
Calibration Data:							
R Squared	0.9997	0.9997	0.9998	0.9994	0.9999	0.9990	0.9997
Slope	0.0044	0.0043	0.0046	0.0044	0.0048	0.0052	0.0049
Intercept	0.000	0.000	0.001	0.000	0.001	0.001	0.000
QA/QC Data:							
% SRM Recovery	108	107	107	98	101	101	102
Average Blank	0.06	0.00	0.05	0.04	0.13	0.00	0.00

APPENDIX F

Process Stream Data

Field Sampling QA/QC Checklists
Example Login Sheet
Lab Reports
Replicate Analysis Summary for Coal Samples

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DESCRIPTION *DUCK CREEK "AIR-DRIED" FGD SOLIDS*

SAMPLE NUMBER AD-FGD-7/15

DATE LOGGED 08/28/98
DATE COMPLETED 10/29/98
PROJECT NUMBER 1621-42 -2
ANALYTICAL NUMBER **984846**

ANALYSIS REPORT

PROXIMATE (Dry)%

Sulfur, Total	19.83

MISC. (As Det.)

Hg	0.25

AS DETERMINED MOISTURE: 0.39 %

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DESCRIPTION *DUCK CREEK "AIR-DRIED" FGD SOLIDS*

SAMPLE NUMBER AD-FGD-7/16

DATE LOGGED *08/28/98*
DATE COMPLETED *10/29/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER **984847**

ANALYSIS REPORT

PROXIMATE (Dry)%

Sulfur, Total	20.80

MISC. (As Det.)

Hg	0.30

AS DETERMINED MOISTURE: 0.49 %

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TO: M. DEVITO

PROJECT NUMBER 1621-42 -2

DATE LOGGED 07/22/98
DATE COMPLETED 07/28/98

DESCRIPTION DUCK CREEK FGD SLURRY COMPOSITES
SAMPLE NUMBER 7-14
ANALYTICAL NUMBER 984137

	-------- WATER ANALYSIS ---------			
ANALYSIS	**UNITS**	**VALUE**	**VALUE**	**DUP AVG**
Total Susp. Solids	%	~~13~~	13.1	

Note: All units mg/L unless specified

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TO: M. DEVITO

PROJECT NUMBER 1621-42 -2

DATE LOGGED 07/22/98
DATE COMPLETED 07/28/98

DESCRIPTION DUCK CREEK FGD SLURRY COMPOSITES
SAMPLE NUMBER 7-15
ANALYTICAL NUMBER 984138

		-------- WATER ANALYSIS ---------		
ANALYSIS	**UNITS**	**VALUE**	**VALUE**	**DUP AVG**
Total Susp. Solids	%	~~14~~	13.5	

Note: All units mg/L unless specified

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TO: M. DEVITO

PROJECT NUMBER 1621-42 -2

DATE LOGGED 07/22/98
DATE COMPLETED 07/28/98

DESCRIPTION DUCK CREEK FGD SLURRY COMPOSITES
SAMPLE NUMBER 7-16
ANALYTICAL NUMBER 984139

	-------- WATER ANALYSIS ---------			
ANALYSIS	**UNITS**	**VALUE**	**VALUE**	**DUP AVG**
Total Susp. Solids	%	13.0		

Note: All units mg/L unless specified

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TO: M. DEVITO

PROJECT NUMBER 1621-42 -2

DATE LOGGED 07/21/98
DATE COMPLETED / /

DESCRIPTION DUCK CREEK FGD FILTRATE SAMPLES
SAMPLE NUMBER 7-14-FILTRATE
ANALYTICAL NUMBER 984115

	-------- WATER ANALYSIS ---------			
ANALYSIS	**UNITS**	**VALUE**	**VALUE**	**DUP AVG**
pH		6.61		
Calcium		1650		
Sulfate		1700		
Hg	ppb	1.499		

Note: All units mg/L unless specified

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TO: M. DEVITO

PROJECT NUMBER 1621-42 -2

DATE LOGGED 07/21/98
DATE COMPLETED / /

DESCRIPTION DUCK CREEK FGD FILTRATE SAMPLES
SAMPLE NUMBER 7-15-FILTRATE
ANALYTICAL NUMBER 984116

	-------- WATER ANALYSIS ---------			
ANALYSIS	**UNITS**	**VALUE**	**VALUE**	**DUP AVG**
pH		6.58		
Calcium		1710		
Sulfate		1900		
Hg	ppb	2.080		

Note: All units mg/L unless specified

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TO: M. DEVITO

PROJECT NUMBER 1621-42 -

DATE LOGGED 07/21/98
DATE COMPLETED / /

DESCRIPTION DUCK CREEK FGD FILTRATE SAMPLES
SAMPLE NUMBER 7-16-FILTRATE
ANALYTICAL NUMBER 984117

		-------- WATER ANALYSIS ---------		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
pH		6.60		
Calcium		1750	1750	1750
Sulfate		1810	1810	1810
Hg	ppb	1.923		

Note: All units mg/L unless specified

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TO: M. DEVITO

PROJECT NUMBER 1621-42 -2

DATE LOGGED 07/21/98
DATE COMPLETED 09/28/98

DESCRIPTION DUCK CREEK MAKE-UP WATER
SAMPLE NUMBER WATER COMPOSITE
ANALYTICAL NUMBER 984114

	-------- WATER ANALYSIS ---------			
ANALYSIS	**UNITS**	**VALUE**	**VALUE**	**DUP AVG**
pH		2.01		
Acidity as CaCO3		1050		
Alkalinity as CaCO3		0		
Total Susp. Solids		1		
Chloride		2.50		
FLUORIDE				
Hg	ppb	<1		

Note: All units mg/L unless specified

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DESCRIPTION *DUCK CREEK LIMESTONE*

SAMPLE NUMBER LS-COMPOSITE

DATE LOGGED *07/21/98*
DATE COMPLETED *09/09/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER **984103**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	56.72
Sulfur, Total	0.04

ULTIMATE	(Dry)%
Carbon	11.68
Sulfur, Total	0.04
Ash	56.72

MAJOR ASH ELEM	(Dry)%
SiO2	0.72
Al2O3	0.11
TiO2	0.01
Fe2O3	<0.00
CaO	55.73
MgO	0.49
Na2O	<0.00
K2O	0.04
P2O5	0.06
SO3	0.30
UND	42.54

MISC. (As Det.)	
Hg	0.03 ug/gr

AS DETERMINED MOISTURE: 0.07 %

DISTRIBUTION:
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Calculation of % RPD for Duck Creek Coal Samples

(As Determined Analysis)

Coal Moisture Determination:

Sample	Run 1	Run 2	R1-R2	Avg	RPD
7/14	12.63	12.69	-0.06	12.66	0.47
7/15	12.75	12.72	0.03	12.74	0.24
7/16	12.44	12.48	-0.04	12.46	0.32

Average Relative Percent Difference **0.34**

Coal Ash Determination:

Sample	Run 1	Run 2	R1-R2	Avg	RPD
7/14	8.76	8.84	-0.08	8.80	0.91
7/15	8.72	8.77	-0.05	8.75	0.57
7/16	8.58	8.61	-0.03	8.60	0.35

Average Relative Percent Difference **0.61**

Coal VM Determination:

Sample	Run 1	Run 2	R1-R2	Avg	RPD
7/14	36.82	36.83	-0.01	36.83	0.03
7/15	36.95	36.90	0.05	36.93	0.14
7/16	37.23	37.14	0.09	37.19	0.24

Average Relative Percent Difference **0.13**

Coal Carbon Determination:

Sample	Run 1	Run 2	R1-R2	Avg	RPD
7/14	61.57	61.82	-0.25	61.70	0.41
7/15	61.83	61.82	0.01	61.83	0.02
7/16	61.99	61.89	0.10	61.94	0.16

Average Relative Percent Difference **0.19**

Coal Hydrogen Determination:

Sample	Run 1	Run 2	R1-R2	Avg	RPD
7/14	5.67	5.62	0.05	5.65	0.89
7/15	5.59	5.59	0.00	5.59	0.00
7/16	5.48	5.49	-0.01	5.49	0.18

Average Relative Percent Difference **0.36**

Coal Nitrogen Determination:

Sample	Run 1	Run 2	R1-R2	Avg	RPD
7/14	1.22	1.18	0.04	1.20	3.33
7/15	1.18	1.17	0.01	1.18	0.85
7/16	1.17	1.15	0.02	1.16	1.72

Average Relative Percent Difference **1.97**

Coal Sulfur Determination:

Sample	Run 1	Run 2	R1-R2	Avg	RPD
7/14	3.57	3.57	0.00	3.57	0.00
7/15	3.56	3.51	0.05	3.54	1.41
7/16	3.65	3.60	0.05	3.63	1.38

Average Relative Percent Difference **0.93**

Coal Chlorine Determination:

Sample	Run 1	Run 2	R1-R2	Avg	RPD
# 5 - 1	0.13	0.12	0.01	0.13	8.00
# 9 - 2	0.12	0.12	0.00	0.12	0.00
# 9 - 3	0.12	0.12	0.00	0.12	0.00

Average Relative Percent Difference **2.67**

Coal Mercury Determination (ppb):

Sample	Run 1	Run 2	R1-R2	Avg	RPD
7/14	76	65	11	71	15.60
7/15	76	85	-9	81	11.18
7/16	96	96	0	96	0.00

Average Relative Percent Difference **8.93**

Coal Btu Determination:

Sample	Run 1	Run 2	R1-R2	Avg	RPD
7/14	11134	11135	-1	11135	0.01
7/15	11105	11120	-15	11113	0.13
7/16	11175	11196	-21	11186	0.19

Average Relative Percent Difference **0.11**

Coal SiO_2 Determination:

Sample	Run 1	Run 2	R1-R2	Avg	RPD
7/14	47.75	48.38	-0.63	48.07	1.31
7/15	49.15	48.59	0.56	48.87	1.15
7/16	48.55	48.61	-0.06	48.58	0.12

Average Relative Percent Difference **0.86**

Coal Al_2O_3 Determination:

Sample	Run 1	Run 2	R1-R2	Avg	RPD
7/14	17.96	17.54	0.42	17.75	2.37
7/15	17.89	17.69	0.20	17.79	1.12
7/16	17.31	17.39	-0.08	17.35	0.46

Average Relative Percent Difference **1.32**

CONSOL Inc.
Research & Development
4000 Brownsville Road
Library, PA 15129-9566
412-854-6600
FAX: 412-854-6613

412-854-6679

April 1, 1999

Mr. C. Wier
Central Illinois Light Company
Duck Creek Station
300 Liberty Street
Peoria, IL 61602

Subject: EPA Hg Information Collection Request

Dear Chuck:

As indicated in earlier discussions, the Hg emission data collected by the CONSOL test team at the Duck Creek facility in July 1998 may be suitable for submission to EPA in response to the Hg ICR. As we have discussed, EPA has prepared a generic sampling plan for conducting these measurements. There are deviations between the EPA generic plan (published this year) and the sampling plan used in July 1998. We believe that the sampling modifications incorporated by CONSOL do not affect the Hg emission data. We believe, however, that it is important to document these deviations and discuss them with EPA. The purpose of this correspondence is to document these modifications, discuss the rationale for the incorporating these modifications, and to assess the impact of the modifications on the emission data.

Location of the FGD Outlet Mercury (Hg) Measurements

The flue gas Hg concentration was determined in the horizontal breaching duct between the FGD outlet and the stack. At this location, it was assumed that the gaseous species were well-mixed and a single-point, isokinetic sample was representative of the flue gas Hg concentration. This location is a rectangular duct, and velocity was determined using a multi-point traverse. Axial flow was confirmed at this location and the velocity measurements are considered to be accurate and representative of the total volumetric gas flow. The Hg emission rate was calculated from the flue gas concentration and the flow rate data.

Obtaining measurements in the stack was considered, but dismissed due to the location of the sampling platform. The sampling platform is located at the 350' level. There is no access to this location other than a series of stairs and ladders. The testing equipment would have had to be manually hoisted up the exterior of the stack. The stack is under positive pressure at this location, and there is sufficient flue gas leakage (~400 ppmv SO_2) to present a safety hazard. The test team would have had to be trained in the use and operation of self contained breathing apparatus and safety procedures. Therefore, a decision was made to use the alternate sampling location in the breaching duct.

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DESCRIPTION *FGD SLURRY SOLIDS - DUCK CREEK - FGD SOLIDS*

SAMPLE NUMBER 7-15-98

DATE LOGGED 07/21/98
DATE COMPLETED 11/03/98
PROJECT NUMBER 1621-42 -2
ANALYTICAL NUMBER **984092**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	95.12

MISC. (As Det.)	
Hg	0.[illegible]

[illegible] "Air Dried" Sample

ULTIMATE	(Dry)%
Carbon	0.87
Hydrogen	0.37
Ash	95.12

MAJOR ASH ELEM	(Dry)%
SiO2	0.56
Al2O3	0.17
TiO2	0.02
Fe2O3	0.23
CaO	42.06
MgO	0.33
Na2O	0.05
K2O	0.06
P2O5	0.03
SO3	53.52
UND	2.97

AS DETERMINED MOISTURE: 0.31 %

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DESCRIPTION *DUCK CREEK "AIR-DRIED" FGD SOLIDS*

SAMPLE NUMBER AD-FGD-7/14

DATE LOGGED *08/28/98*
DATE COMPLETED *10/29/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER **984845**

ANALYSIS REPORT

PROXIMATE (Dry)%

Sulfur, Total	19.94

MISC. (As Det.)

Hg	0.42 ug/gr

AS DETERMINED MOISTURE: 0.46 %

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DESCRIPTION *FGD SLURRY SOLIDS - DUCK CREEK - FGD SOLIDS*

SAMPLE NUMBER 7-14-98

DATE LOGGED 07/21/98
DATE COMPLETED 11/03/98
PROJECT NUMBER 1621-42 -2
ANALYTICAL NUMBER **984091**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	95.29

MISC. (As Det.)	
Hg	.97 ug/gr

See "air-dried" Sample

ULTIMATE	(Dry)%
Carbon	0.86
Hydrogen	0.44
Ash	95.29

MAJOR ASH ELEM	(Dry)%
SiO2	0.71
Al2O3	0.17
TiO2	0.01
Fe2O3	0.23
CaO	42.64
MgO	0.44
Na2O	0.05
K2O	0.06
P2O5	0.03
SO3	53.76
UND	1.90

AS DETERMINED MOISTURE: 0.42 %

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Site Visit

PROCESS STREAM SAMPLING CHECKLIST

PLANT Duck Creek DATE 1-29-98 SURVEYOR MSD

Sample ID	Sample Stream	Location	Sample Type	Sampling Equipment	Sample Prep	Sample Storage	Sample Notes
JOHN A2 S-1	Coal To Feeders	5th Floor	Grab - 30-40 minute	Tray & chute	?	Buckets 2 per test	Plant Assist
✓ S-2	Bottom Ash	1st Floor	Test Grab	Lock Hopper - Shovel Dailey	No	Bucket 2gal	Plant Assist
✓ S-3	Econ Ash	7th Flor	Test Grab	Thief 30" Dailey	No	Bottle 8 oz	Plant Assist
D S-4	ESP Ash (4)	1st Floor + 1 ESP Room	Test Grab	Bottle Dailey	No	Bottle 8 oz.	Plant Assist
E S-5 ✓	ESP Ash (1)			Daily		1c	
(F) S-6 ✓	ESP Ash (2)			Daily		1c	
✓ S-7	LIME	3rd Floor Grinder Bldg	Weekly Grab	Shovel		5gal. Bucket	
✓ L-1	Make-up Water	1ST FLOOR	(Red Pump)	weekly		1L BOTTLE HNO_3	
✓ L-2	FGD Slurry		?	2 ice Dailey		1L BOTTLE	
~~S-8?~~	~~FGD Cake~~	AFTER ABSORBER?					
	~~Mill Rejects~~						

LAB 2ND Floor (FRANK)

AO: CURTIS 1st floor

Process Stream Sampling Checklist

Plant DUCK CREEK **Date** 7/14/98

Interval	1	2	3	4	5	6	7	8
	Bucket				Bucket			
Time	1030	1113	1152	1245	1330	1420	1457	1545
~~Weight~~ / Volume	~1¼ gal	1¼ GAL	1¼ GAL	1¼ GAL	1¼ GAL	1¼ GAL	1¼ GAL	1¼ GAL
Comp / ~~Grab~~								
Process Status								
Sampler Condition								
Container Clean	✓							
Container Labeled	✓							
Chain of Custody								
Sampler	LRS.							
Sample Stored								
pH (if required)								
Temperature								
Preservative Added								

Sample Stream A2 COAL FEEDER
ID Number S1-14
Target Size 10 GAL.
Sample Device CHUTE
Test ID #1
Analysis
Preservative
Container 5gal. plastic
Frequency EVERY 0.75 HR
Protective Gear

Composite Logged? Y
Sample Stored? Y
Storage Methods: HDPE Bucket
Checked By: MSD
Date Checked: 7-14-98

Process Stream Sampling Checklist

Plant DUCK CREEK **Date** 7/14/98

Interval	1	2	3	4	5	6	7	8
Time	Between 1300 TO 1400							
~~Weight~~ / Volume	2 gal.							
~~Comp~~ / Grab								
Process Status								
Sampler Condition								
Container Clean	✓							
Container Labeled	✓							
Chain of Custody								
Sampler	CURTIS							
Sample Stored								
pH (if required)								
Temperature								
Preservative Added								

Sample Stream BOTTOM ASH
ID Number S2-14
Target Size 2 gallon
Sample Device
Test ID #1
Analysis
Preservative
Container 2 gal. plastic
Frequency ONCE DAILY
Protective Gear

Composite Logged? Y
Sample Stored? Y
Storage Methods: HDPE Bucket
Checked By: MSD
Date Checked: 7-14-98

G:\approstatest\process.mxd

Process Stream Sampling Checklist

Plant Duck Creek **Date** 7/14/98

Interval	1	2	3	4	5	6	7	8
Time Between	1300 1400							
~~Weight~~ / Volume	8oz.							
~~Comp~~ / Grab								
Process Status								
Sampler Condition								
Container Clean	✓							
Container Labeled	✓							
Chain of Custody								
Sampler	Curtis							
Sample Stored								
pH (if required)								
Temperature								
Preservative Added								

Sample Stream Economizer Ash
ID Number S3-14
Target Size 8oz.
Sample Device
Test ID #1
Analysis
Preservative
Container 8oz. GLASS
Frequency ONCE DAILY
Protective Gear

Composite Logged? Y
Sample Stored? Y
Storage Methods: Glass Bottle
Checked By: MJD
Date Checked: 7-14-98

Process Stream Sampling Checklist

Plant Duck Creek **Date** 7/14/98

Interval	1	2	3	4	5	6	7	8
Time Between	1300 - 1400							
~~Weight~~ / Volume	8 oz.							
~~Comp~~ / Grab								
Process Status								
Sampler Condition								
Container Clean	✓							
Container Labeled	✓							
Chain of Custody								
Sampler	CURTIS							
Sample Stored								
pH (if required)								
Temperature								
Preservative Added								

Sample Stream ESP HOPPERS 8, 5, 9
ID Number S4, S5, S6
Target Size 8 oz. EACH
Sample Device
Test ID #1
Analysis
Preservative ~~Ø~~
Container 8 oz. Glass
Frequency ONCE DAILEY
Protective Gear

Composite Logged? Y
Sample Stored? Y
Storage Methods: Glass Bottle
Checked By: MSD
Date Checked: 7-14-98

C:\Approval\Process.mod

Process Stream Sampling Checklist

Plant DUCK CREEK **Date** 7/14/98

Interval	1	2	3	4	5	6	7	8
Time	1255	1510						
~~Weight~~ / Volume	500 cc	500 cc						
Comp / ~~Grab~~								
Process Status								
Sampler Condition								
Container Clean	✓							
Container Labeled	✓							
Chain of Custody								
Sampler	RS							
Sample Stored								
pH (if required)								
Temperature								
Preservative Added								

Sample Stream FGD SLURRY
ID Number L2-A, B, C, D
Target Size 1 LITER EACH
Sample Device ~~500 cc plastic~~ SPIGOT
Test ID #1
Analysis
Preservative
Container 1 LITER GLASS
Frequency Twice DAILY
Protective Gear

Composite Logged? Y
Sample Stored? Y
Storage Methods: Acid Rinsed Bottle
Checked By: MSD
Date Checked: 7-14-98

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Process Stream Sampling Checklist

Plant DUCK CREEK **Date** 7/15/98

Bucket

Interval	1	2	3	4	5	6	7	8
Time	1015	~~1050~~ 1100	1140	1230	1300	1330	1400	
~~Weight~~ / Volume	1 1/4 GAL	1 1/4 GAL	1 1/4 GAL	1 1/4 GAL	2 1/2 GAL.	1 1/4 Gal	1 1/4 Gal	
Comp / ~~Grab~~								
Process Status								
Sampler Condition								
Container Clean	✓							
Container Labeled	✓							
Chain of Custody								
Sampler	[illegible]							
Sample Stored								
pH (if required)								
Temperature								
Preservative Added								

Sample Stream A2 Coal FEEDER
ID Number 31-15
Target Size 10 gal.
Sample Device CHUTE
Test ID #2
Analysis
Preservative
Container 2-5gallon plastic
Frequency
Protective Gear

Composite Logged? Y
Sample Stored? Y
Storage Methods: HDPE Bucket
Checked By: MSD
Date Checked: 7-15-98

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Process Stream Sampling Checklist

Plant DUCK CREEK **Date** 7/15/98

Interval	1	2	3	4	5	6	7	8
Time Between	1300 & 1400							
~~Weight~~ / Volume	2 gal.							
~~Comp~~ / Grab								
Process Status								
Sampler Condition								
Container Clean								
Container Labeled								
Chain of Custody								
Sampler								
Sample Stored								
pH (if required)								
Temperature								
Preservative Added								

Sample Stream BOTTOM ASH
ID Number S2-15
Target Size 2 gallon
Sample Device
Test ID #2
Analysis
Preservative
Container 2 gal. plastic
Frequency ONCE DAILY
Protective Gear

Composite Logged? Y
Sample Stored? Y
Storage Methods: Hope Bucket
Checked By: MSD
Date Checked: 7-15-98

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Process Stream Sampling Checklist

Plant Duck Creek **Date** 7/15/98

Interval	1	2	3	4	5	6	7	8
Time Between	1300 & 1400							
~~Weight~~ / Volume	8oz.							
~~Comp~~ / Grab								
Process Status								
Sampler Condition								
Container Clean	✓							
Container Labeled	✓							
Chain of Custody								
Sampler	Curtis							
Sample Stored								
pH (if required)								
Temperature								
Preservative Added								

Sample Stream Economizer Ash
ID Number 83-15
Target Size 8oz
Sample Device
Test ID #2
Analysis
Preservative
Container 8oz. GLASS
Frequency ONCE DAILY
Protective Gear

Composite Logged? Y
Sample Stored? Y
Storage Methods: Glass Bottle
Checked By: MSP
Date Checked: 7-15-98

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Process Stream Sampling Checklist

Plant Duck Creek **Date** 7/15/98

Interval	1	2	3	4	5	6	7	8
Time Between	1300 & 1400							
~~Weight~~ / Volume	8 oz.							
~~Comp~~ / Grab								
Process Status								
Sampler Condition								
Container Clean	✓							
Container Labeled	✓							
Chain of Custody								
Sampler	Curtis							
Sample Stored								
pH (if required)								
Temperature								
Preservative Added								

Sample Stream ESP HOPPERS 1, 5, 9
ID Number S4, S5, S6
Target Size 8 oz. EACH
Sample Device
Test ID #2
Analysis
Preservative
Container 8 oz. glass
Frequency ONCE Daily
Protective Gear

Composite Logged? Y
Sample Stored? Y
Storage Methods: Glass Bottles
Checked By: MJP
Date Checked: 7-15-98

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Process Stream Sampling Checklist

Plant Duck Creek **Date** 7/15/98

Interval	1	2	3	4	5	6	7	8
Time	1250							
~~Weight~~ / Volume	5 gal.							
~~Comp~~ / Grab								
Process Status								
Sampler Condition								
Container Clean	✓							
Container Labeled	✓							
Chain of Custody								
Sampler	RS.							
Sample Stored								
pH (if required)								
Temperature								
Preservative Added								

Sample Stream LIMESTONE
ID Number 57-15
Target Size 5 GALLON
Sample Device SHOVEL
Test ID
Analysis
Preservative
Container 5 gallon plastic
Frequency WEEKLY
Protective Gear

Composite Logged? Y
Sample Stored? Y
Storage Methods: HDPE Bucket
Checked By: MSD
Date Checked: 7-15-98

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Process Stream Sampling Checklist

Plant Duck Creek **Date** 7/15/98

Interval	1	2	3	4	5	6	7	8
Time	1146							
~~Weight~~ / Volume	1 L							
~~Comp~~ / Grab								
Process Status								
Sampler Condition								
Container Clean	✓							
Container Labeled	✓							
Chain of Custody								
Sampler	SRJ							
Sample Stored								
pH (if required)								
Temperature								
Preservative Added	✓							

Sample Stream MAKE-UP WATER
ID Number L1-15
Target Size 1 LITER
Sample Device 1 LITER BOTTLE
Test ID #1
Analysis
Preservative HNO_3 (1 ML)
Container 1 LITER GLASS
Frequency WEEKLY
Protective Gear

Composite Logged? Y
Sample Stored? Y
Storage Methods: Acid Rinsed Glass Bottle
Checked By: MSP
Date Checked: 7-15-98

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Process Stream Sampling Checklist

Plant Duck Creek **Date** 7/15/98

Interval	1	2	3	4	5	6	7	8
Time	1132	1407						
~~Weight~~ / Volume	500cc	500 cc						
Comp / ~~Grab~~								
Process Status								
Sampler Condition								
Container Clean	✓							
Container Labeled	✓							
Chain of Custody								
Sampler	GRS.							
Sample Stored								
pH (if required)								
Temperature								
Preservative Added								

Sample Stream FGD SLURRY
ID Number L2 - A, B, C, D
Target Size 1 LITER EACH
Sample Device SPIGOT
Test ID #2
Analysis
Preservative
Container 1 LITER GLASS
Frequency TWICE DAILY
Protective Gear

Composite Logged? Y
Sample Stored? Y
Storage Methods: Acid Rinsed Glass Bottle
Checked By: MSD
Date Checked: 7-15-98

Process Stream Sampling Checklist

Plant DUCK CREEK **Date** 7/16/98

BUCKET

Interval	1	2	3	4	5	6	7	8
Time	0930	1010	1050	1120	1150	1240	1315	
~~Weight~~ / ~~Volume~~ Volume	1 1/4 Gal	1 1/4 Gal	1 1/4 GAL	1 1/4 GAL	1 1/4 GAL	1 1/4 GAL	1 1/4 GAL	
Comp / ~~Grab~~								
Process Status								
Sampler Condition								
Container Clean	✓							
Container Labeled	✓							
Chain of Custody								
Sampler	HJ							
Sample Stored								
pH (if required)								
Temperature								
Preservative Added								

Sample Stream A2 COAL FEEDER
ID Number S1-16
Target Size 10 GALLON
Sample Device CHUTE
Test ID #3
Analysis
Preservative
Container 2 - 5gal. plastic
Frequency
Protective Gear

Composite Logged? Y
Sample Stored? Y

Storage Methods: HDPE Bucket

Checked By: MSD

Date Checked: 7-16-98

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Process Stream Sampling Checklist

Plant Duck Creek **Date** 7/16/98

Interval	1	2	3	4	5	6	7	8
Time	1300	-1400						
~~Weight~~ / Volume								
~~Comp~~ / Grab								
Process Status								
Sampler Condition								
Container Clean	✓							
Container Labeled	✓							
Chain of Custody								
Sampler	CURTIS							
Sample Stored								
pH (if required)								
Temperature								
Preservative Added								

Sample Stream Bottom Ash
ID Number S2-16
Target Size 2 gallon
Sample Device
Test ID #3
Analysis
Preservative
Container 2 gal. plastic
Frequency ONCE DAILY
Protective Gear

Composite Logged? Y
Sample Stored? Y
Storage Methods: HDPE Bucket
Checked By: MSP
Date Checked: 7-16-98

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Process Stream Sampling Checklist

Plant Duck Creek **Date** 7/16/98

Interval	1	2	3	4	5	6	7	8
Time	1300-1400							
~~Weight~~ / Volume	8oz							
~~Comp~~ / Grab								
Process Status								
Sampler Condition								
Container Clean	✓							
Container Labeled	✓							
Chain of Custody								
Sampler	Curtis							
Sample Stored								
pH (if required)								
Temperature								
Preservative Added								

Sample Stream ESP HOPPERS 1, 5, 9
ID Number S4, S5, S6
Target Size 8 oz. EACH
Sample Device
Test ID #3
Analysis
Preservative
Container 8oz glass
Frequency ONCE DAILY
Protective Gear

Composite Logged? Y
Sample Stored? Y
Storage Methods: Glass Bottle
Checked By: MSD
Date Checked: 7-16-98

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Process Stream Sampling Checklist

Plant Duck Creek **Date** 7/16/98

Interval	1	2	3	4	5	6	7	8
Time	1300-1400							
~~Weight~~ / Volume	8oz							
~~Comp~~ / Grab								
Process Status								
Sampler Condition								
Container Clean	✓							
Container Labeled	✓							
Chain of Custody								
Sampler	Curtis							
Sample Stored								
pH (if required)								
Temperature								
Preservative Added								

Sample Stream Economizer Ash
ID Number 33-16
Target Size 8oz
Sample Device
Test ID #3
Analysis
Preservative
Container 8 oz. glass
Frequency once daily
Protective Gear

Composite Logged? Y
Sample Stored? Y
Storage Methods: Glass Bottle.
Checked By: MSP
Date Checked: 7-16-98

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Process Stream Sampling Checklist

Plant Duck Creek **Date** 7/16/98

Interval	1	2	3	4	5	6	7	8
Time	1023	1324						
~~Weight~~ / Volume	500 cc	500 cc						
Comp / ~~Grab~~								
Process Status								
Sampler Condition								
Container Clean	✓							
Container Labeled	✓							
Chain of Custody								
Sampler	JRJ							
Sample Stored								
pH (if required)								
Temperature								
Preservative Added								

Sample Stream FGD SLURRY
ID Number L2-A, B, C, D
Target Size 1 LITER EACH
Sample Device SPIGOT
Test ID #3
Analysis
Preservative
Container 1 LITER glass
Frequency TWICE DAILY
Protective Gear

Composite Logged? Y
Sample Stored? Y
Storage Methods: Acid Rinsed Glass Bottle
Checked By: MSD
Date Checked: 7-16-98

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Research & Development Department
Analytical Laboratory
Library, PA 15219

SOLID ANALYSIS REQUES

Example of Actua

Distribution:
m.s. DeVito

Project No.: 1621-42-2 Date: 7-21-98

Sample Description	Duck Creek Coal Samples					
	Coal-7/14		Coal-7/15		Coal-7/16	
Sample Number						
Analytical Number	984110		984111		984112	
*CODE						
		As Determined		As Determined		As Determined
Moisture	✓	12.63 12.69	✓	12.75 12.72	✓	12.44 12.48
Volatile Matter	✓	36.82 36.83	✓	36.95 36.90	✓	37.23 37.14
Ash	✓	8.76 8.84	✓	8.72 8.77	✓	8.58 8.61
Carbon	✓	61.57 61.82	✓	61.83 61.82	✓	61.99 61.85
Hydrogen	✓	5.67 5.62	✓	5.59 5.59	✓	5.48 5.49
Nitrogen	✓	1.22 1.18	✓	1.18 1.17	✓	1.17 1.15
Sulfur, Total	✓	3.57 3.57	✓	3.56 3.51	✓	3.65 3.60
Pyritic Sulfur						
Sulfate Sulfur						
~~Chlorine~~ F ppm	✓	104	✓	115 116	✓	96 94
Chlorine %	✓	0.15 0.12	✓	0.12 0.12	✓	0.12 0.12
Btu	✓	11134 11135	✓	11105 11120	✓	11175 11196
HGI						
FSI						
Major Ash Elements	✓	COMPLETED AUG 31	✓	COMPLETED AUG 31		COMPLETED AUG 31
Ash Fusion, Red.						
Ash Fusion, Ox.						
Hg	✓	0.08 0.06	✓	0.08 0.09	✓	0.10 0.10
Total Moisture	✓	17.39	✓	17.10	✓	16.77
Air Dry	✓	5.42	✓	5.00	✓	4.92
Soluble Cl						
Soluble Na						
Soluble K						

Remarks:

Need total moisture

INTERIM REPORT

ANALYTICAL NUMBER: 984110
SAMPLE DESCRIPTION: DUCK CREEK COAL SAMPLES
COMMENTS:
PREPARATION: SAMPLE ASHED AT 750 DEGREES C; ASTM D-3682.
SUBMITTED BY: M. DEVITO RUN DATE: 08/27/98
CUSTOMER'S SAMPLE NUMBER: COAL - 7/14 RUN TIME: 11:15
PROJECT NUMBER 1621-42 -2

MAJOR ASH ELEMENTS

WEIGHT:	0.1156			
BOTTLE #	152	152		
ELEMENT	CONC (WT %)	CONC (WT %)	AVG (WT %)	DIFF (WT %)
SiO2	47.75	48.38	48.07	0.63
Al2O3	17.96	17.54	17.75	0.42
TiO2	0.86	0.88	0.87	0.02
Fe2O3	18.45	18.16	18.31	0.29
CaO	4.85	4.69	4.77	0.16
MgO	0.83	0.84	0.84	0.01
Na2O	1.19	1.26	1.23	0.07
K2O	2.14	2.21	2.18	0.07
P2O5	0.12	0.11	0.12	0.01
SO3	3.57	3.58	3.58	0.01
UND	2.28	2.35	2.32	
Nb	9448.3	9535.7		
TOTAL WT%	97.72	97.65	97.68	
COMPREHENSIVE TOTAL WT%			97.68	

PROXIMATE AND ULTIMATE +

	CONCENTRATION (WT %)
MOISTURE	0.00
ASH	0.00
CARBON	0.00
HYDROGEN	0.00
NITROGEN	0.00
SULFUR	0.00
CHLORINE	0.00
CARBONATE	0.00
TOTAL	0.00

CHARACTERISTIC CALCULATIONS FOR EASTERN BITUMINOUS COALS

B/A	0.34
T250	2495
T100	2591
Rs	0.00
Rf	0.00

MISSING DATA/CUTOFFS/N.E.S. REPORTED AS ZERO

INTERIM REPORT

ANALYTICAL NUMBER: 984111
SAMPLE DESCRIPTION: DUCK CREEK COAL SAMPLES
COMMENTS:
PREPARATION: SAMPLE ASHED AT 750 DEGREES C; ASTM D-3682.
SUBMITTED BY: M. DEVITO RUN DATE: 08/27/98
CUSTOMER'S SAMPLE NUMBER: COAL - 7/15 RUN TIME: 11:22
PROJECT NUMBER 1621-42 -2

MAJOR ASH ELEMENTS

WEIGHT:	0.1095			
BOTTLE #	154	154		
ELEMENT	CONC (WT %)	CONC (WT %)	AVG (WT %)	DIFF (WT %)
SiO2	49.15	48.59	48.87	0.56
Al2O3	17.89	17.69	17.79	0.20
TiO2	0.89	0.89	0.89	
Fe2O3	18.23	18.71	18.47	0.48
CaO	5.10	4.80	4.95	0.30
MgO	0.89	0.87	0.88	0.02
Na2O	1.24	1.24	1.24	
K2O	2.08	2.08	2.08	
P2O5	0.15	0.15	0.15	
SO3	3.70	3.55	3.63	0.15
UND	0.68	1.43	1.06	
Nb	9786.3	9435.7		
TOTAL WT%	99.32	98.57	98.94	
COMPREHENSIVE TOTAL WT%			98.94	

PROXIMATE AND ULTIMATE +

	CONCENTRATION (WT %)
MOISTURE	0.00
ASH	0.00
CARBON	0.00
HYDROGEN	0.00
NITROGEN	0.00
SULFUR	0.00
CHLORINE	0.00
CARBONATE	0.00
TOTAL	0.00

CHARACTERISTIC CALCULATIONS FOR EASTERN BITUMINOUS COALS

B/A	0.35
T250	2483
T100	2581
Rs	0.00
Rf	0.00

MISSING DATA/CUTOFFS/N.E.S. REPORTED AS ZERO

INTERIM REPORT

ANALYTICAL NUMBER: 984112
SAMPLE DESCRIPTION: DUCK CREEK COAL SAMPLES
COMMENTS:
PREPARATION: SAMPLE ASHED AT 750 DEGREES C; ASTM D-3682.
SUBMITTED BY: M. DEVITO RUN DATE: 08/27/98
CUSTOMER'S SAMPLE NUMBER: COAL - 7/16 RUN TIME: 11:29
PROJECT NUMBER 1621-42 -2

MAJOR ASH ELEMENTS

WEIGHT:	0.1185			
BOTTLE #	156	156		
ELEMENT	CONC (WT %)	CONC (WT %)	AVG (WT %)	DIFF (WT %)
SiO2	48.55	48.61	48.58	0.06
Al2O3	17.31	17.39	17.35	0.08
TiO2	0.88	0.88	0.88	
Fe2O3	18.39	18.50	18.45	0.11
CaO	4.46	4.39	4.43	0.07
MgO	0.84	0.85	0.85	0.01
Na2O	1.17	1.17	1.17	
K2O	2.06	2.06	2.06	
P2O5	0.15	0.15	0.15	
SO3	3.72	3.65	3.69	0.07
UND	2.47	2.35	2.41	
Nb	9573.3	9547.0		
TOTAL WT%	97.53	97.65	97.59	
COMPREHENSIVE TOTAL WT%			97.59	

PROXIMATE AND ULTIMATE +

	CONCENTRATION (WT %)
MOISTURE	0.00
ASH	0.00
CARBON	0.00
HYDROGEN	0.00
NITROGEN	0.00
SULFUR	0.00
CHLORINE	0.00
CARBONATE	0.00
TOTAL	0.00

CHARACTERISTIC CALCULATIONS FOR EASTERN BITUMINOUS COALS

B/A	0.35
T250	2475
T100	2573
Rs	0.00
Rf	0.00

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DESCRIPTION *DUCK CREEK COAL SAMPLES*

SAMPLE NUMBER COAL - 7/14

DATE LOGGED *07/21/98*
DATE COMPLETED *08/28/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER **984110**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	10.08
Volatile Matter	42.16
Fixed Carbon	47.76
Sulfur, Total	4.09
BTU/lb	12748
MAF BTU/lb	14177

ULTIMATE	(Dry)%
Carbon	70.64
Hydrogen	4.85
Nitrogen	1.37
Chlorine	0.155
Sulfur, Total	4.09
Ash	10.08
Oxygen (DIFF)	8.81

MAJOR ASH ELEM	%
Ignited at 750 C	
SiO2	48.07
Al2O3	17.75
TiO2	0.87
Fe2O3	18.31
CaO	4.77
MgO	0.84
Na2O	1.23
K2O	2.17
P2O5	0.12
SO3	3.58
UND	2.29

TOTAL MOISTURE % 17.39

MISC. (As Det.)

Hg	0.07
F	104 ppm
AIR DRY	5.42

AS DETERMINED MOISTURE: 12.66 %

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DESCRIPTION *DUCK CREEK COAL SAMPLES*

SAMPLE NUMBER COAL - 7/15

DATE LOGGED *07/21/98*
DATE COMPLETED *08/28/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER **984111**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	10.02
Volatile Matter	42.31
Fixed Carbon	47.67
Sulfur, Total	4.05
BTU/lb	12734
MAF BTU/lb	14152
TOTAL MOISTURE %	17.10

ULTIMATE	(Dry)%
Carbon	70.85
Hydrogen	4.77
Nitrogen	1.35
Chlorine	0.138
Sulfur, Total	4.05
Ash	10.02
Oxygen (DIFF)	8.82

MAJOR ASH ELEM	%
Ignited at 750 C	
SiO2	48.87
Al2O3	17.79
TiO2	0.89
Fe2O3	18.47
CaO	4.95
MgO	0.88
Na2O	1.24
K2O	2.08
P2O5	0.15
SO3	3.63
UND	1.05

MISC. (As Det.)

Hg	~~0.09~~ 0.081 MSD
F	116 ppm
AIR DRY	5.00

AS DETERMINED MOISTURE: 12.74 %

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DESCRIPTION *DUCK CREEK COAL SAMPLES*

SAMPLE NUMBER COAL - 7/16

DATE LOGGED *07/21/98*
DATE COMPLETED *08/28/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER **984112**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	9.82
Volatile Matter	42.48
Fixed Carbon	47.70
Sulfur, Total	4.14
BTU/lb	12778
MAF BTU/lb	14169

ULTIMATE	(Dry)%
Carbon	70.76
Hydrogen	4.68
Nitrogen	1.33
Chlorine	0.137
Sulfur, Total	4.14
Ash	9.82
Oxygen (DIFF)	9.13

MAJOR ASH ELEM	%
Ignited at 750 C	
SiO2	48.58
Al2O3	17.35
TiO2	0.88
Fe2O3	18.45
CaO	4.43
MgO	0.85
Na2O	1.17
K2O	2.06
P2O5	0.15
SO3	3.69
UND	2.39

TOTAL MOISTURE % 16.77

MISC. (As Det.)

Hg	0.10
F	95 ppm
AIR DRY	4.92

AS DETERMINED MOISTURE: 12.46 %

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DESCRIPTION *DUCK CREEK BOTTOM ASH SAMPLES*

SAMPLE NUMBER BA - 7/14

DATE LOGGED *07/21/98*
DATE COMPLETED *10/15/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER **984107**

ANALYSIS REPORT

PROXIMATE	**(Dry)%**	**ULTIMATE**	**(Dry)%**
Ash	89.20	Carbon	9.39
Sulfur, Total	0.58	Sulfur, Total	0.58
		Ash	89.20

MISC. (As Det.)

Hg	<0.01	ug/gr

AS DETERMINED MOISTURE: 2.15 %

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DESCRIPTION *DUCK CREEK BOTTOM ASH SAMPLES*

SAMPLE NUMBER BA - 7/15

DATE LOGGED *07/21/98*
DATE COMPLETED *10/15/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER **984108**

ANALYSIS REPORT

PROXIMATE	**(Dry)%**	**ULTIMATE**	**(Dry)%**
Ash	92.73	Carbon	6.76
Sulfur, Total	0.31	Sulfur, Total	0.31
		Ash	92.73

MISC. (As Det.)

Hg 0.05 ug/gr

AS DETERMINED MOISTURE: 1.18 %

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DESCRIPTION *DUCK CREEK BOTTOM ASH SAMPLES*

SAMPLE NUMBER BA - 7/16

DATE LOGGED *07/21/98*
DATE COMPLETED *10/15/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER **984109**

ANALYSIS REPORT

PROXIMATE	**(Dry)%**	**ULTIMATE**	**(Dry)%**
Ash	78.45	Carbon	19.31
Sulfur, Total	0.85	Sulfur, Total	0.85
		Ash	78.45

MISC. (As Det.)

Hg 0.05 ug/gr

AS DETERMINED MOISTURE: 1.74 %

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DESCRIPTION *DUCK CREEK ECONOMIZER ASH SAMPLES*

SAMPLE NUMBER EA - 7/16

DATE LOGGED *07/21/98*
DATE COMPLETED *10/15/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER **984106**

ANALYSIS REPORT

PROXIMATE	**(Dry)%**	**ULTIMATE**	**(Dry)%**
Ash	45.14	Carbon	51.50
Sulfur, Total	1.90	Sulfur, Total	1.90
		Ash	45.14

MISC. (As Det.)

Hg 0.04 ug/gr

AS DETERMINED MOISTURE: 3.19 %

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DESCRIPTION *DUCK CREEK ECONOMIZER ASH SAMPLES*

SAMPLE NUMBER EA - 7/14

DATE LOGGED *07/21/98*
DATE COMPLETED *10/15/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER **984104**

ANALYSIS REPORT

PROXIMATE	**(Dry)%**	**ULTIMATE**	**(Dry)%**
Ash	73.45	Carbon	25.80
Sulfur, Total	1.13	Sulfur, Total	1.13
		Ash	73.45

MISC. (As Det.)

Hg 0.03 ug/gr

AS DETERMINED MOISTURE: 0.45 %

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DESCRIPTION *DUCK CREEK ECONOMIZER ASH SAMPLES*

SAMPLE NUMBER EA - 7/15

DATE LOGGED *07/21/98*
DATE COMPLETED *10/15/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER **984105**

ANALYSIS REPORT

PROXIMATE	**(Dry)%**	**ULTIMATE**	**(Dry)%**
Ash	70.74	Carbon	27.89
Sulfur, Total	1.32	Sulfur, Total	1.32
		Ash	70.74

MISC. (As Det.)

Hg 0.06 ug/gr

AS DETERMINED MOISTURE: 0.53 %

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DESCRIPTION *DUCK CREEK ESP SAMPLES 7/14/98*

SAMPLE NUMBER HOPPER #1

DATE LOGGED *07/21/98*
DATE COMPLETED *10/15/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER **984100**

ANALYSIS REPORT

PROXIMATE	(Dry)%	ULTIMATE	(Dry)%
Ash	94.91	Carbon	3.61
		Ash	94.91

MISC. (As Det.)

Hg 0.11 ug/gr

AS DETERMINED MOISTURE: 0.46 %

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DESCRIPTION *DUCK CREEK ESP SAMPLES 7/14/98*

SAMPLE NUMBER HOPPER #5

DATE LOGGED *07/21/98*
DATE COMPLETED *10/15/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER **984101**

ANALYSIS REPORT

PROXIMATE	**(Dry)%**	**ULTIMATE**	**(Dry)%**
Ash	93.46	Carbon	4.66
		Ash	93.46

MISC. (As Det.)

Hg	0.11 ug/gr

AS DETERMINED MOISTURE: 0.32 %

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DESCRIPTION *DUCK CREEK ESP SAMPLES 7/14/98*

SAMPLE NUMBER HOPPER #9

DATE LOGGED *07/21/98*
DATE COMPLETED *10/15/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER **984102**

ANALYSIS REPORT

PROXIMATE	(Dry)%	ULTIMATE	(Dry)%
Ash	95.72	Carbon	3.09
		Ash	95.72

MISC. (As Det.)

Hg 0.08 ug/gr

AS DETERMINED MOISTURE: 0.29 %

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DESCRIPTION *DUCK CREEK ESP SAMPLES 7/15/98*

SAMPLE NUMBER HOPPER #1

DATE LOGGED *07/21/98*
DATE COMPLETED *11/18/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER **984097**

ANALYSIS REPORT

PROXIMATE	(Dry)%	ULTIMATE	(Dry)%
Ash	97.11	Carbon	0.87
		Ash	97.11

MISC. (As Det.)

Hg 0.03 ug/gr

AS DETERMINED MOISTURE: 1.10 %

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DESCRIPTION *DUCK CREEK ESP SAMPLES 7/15/98*

SAMPLE NUMBER HOPPER #5

DATE LOGGED *07/21/98*
DATE COMPLETED *11/18/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER **984098**

ANALYSIS REPORT

PROXIMATE	(Dry)%	ULTIMATE	(Dry)%
Ash	96.20	Carbon	3.04
		Ash	96.20

MISC. (As Det.)

Hg 0.14 ug/gr

AS DETERMINED MOISTURE: 0.37 %

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DESCRIPTION *DUCK CREEK ESP SAMPLES 7/15/98*

SAMPLE NUMBER HOPPER #9

DATE LOGGED *07/21/98*
DATE COMPLETED *11/18/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER **984099**

ANALYSIS REPORT

PROXIMATE	(Dry)%	ULTIMATE	(Dry)%
Ash	97.04	Carbon	2.53
		Ash	97.04

MISC. (As Det.)

Hg 0.10 ug/gr

AS DETERMINED MOISTURE: 0.26 %

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DESCRIPTION *DUCK CREEK ESP SAMPLES 7/16/98*

SAMPLE NUMBER HOPPER #1

DATE LOGGED *07/21/98*
DATE COMPLETED *10/05/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER 984094

ANALYSIS REPORT

PROXIMATE	(Dry)%	ULTIMATE	(Dry)%
Ash	96.43	Carbon	1.11
		Ash	96.43

MISC. (As Det.)

Hg 0.11 ug/gr

AS DETERMINED MOISTURE: 0.96 %

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DESCRIPTION *DUCK CREEK ESP SAMPLES 7/16/98*

SAMPLE NUMBER HOPPER #5

DATE LOGGED *07/21/98*
DATE COMPLETED *11/18/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER **984095**

ANALYSIS REPORT

PROXIMATE	(Dry)%	ULTIMATE	(Dry)%
Ash	96.76	Carbon	2.57
		Ash	96.76

MISC. (As Det.)

Hg 0.15 ug/gr

AS DETERMINED MOISTURE: 0.20 %

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DESCRIPTION *DUCK CREEK ESP SAMPLES 7/16/98*

SAMPLE NUMBER HOPPER #9

DATE LOGGED *07/21/98*
DATE COMPLETED *11/18/98*
PROJECT NUMBER *1621-42 -2*
ANALYTICAL NUMBER **984096**

ANALYSIS REPORT

PROXIMATE	(Dry)%	ULTIMATE	(Dry)%
Ash	87.12	Carbon	10.93
		Ash	87.12

MISC. (As Det.)

Hg 0.07 ug/gr

AS DETERMINED MOISTURE: 0.22 %

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