APPENDIX A

RAW FIELD DATA SHEETS

Printed on Recycled Paper

SAMPLE SUBMITTAL SHEET

PROJECT GRE-ICR DATE SUBMITTED 8/24/99

REQUESTOR FUND# 4891

RUN #	SAMPLE ID	SAMPLE TYPE	VOL/WT		WATER LAB	RESULTS
GRE-U1	D1-IN-OH-1	KCl #1 & 2 + Probe rinse	500	Hg		
		KCl #3	200	Hg		
		H_2O_2	250	Hg		
		$KMnO_4$ #1,2,3	500			
		excess $KMnO_4$ rinse	100	Hg		
	Di-IN-OH-1	Nozzle Rinse	200	Hg		
		~~Ash Sample Field #3~~		Hg		
		Ash Sample Field #1	1 gal	Hg		
		~~Ash Sample Field #2~~				
				Hg		
	Di-STACK-OH-1	KCl #1 + 2 + probe rinse	500	Hg		
		KCl #3	200	Hg		
		H_2O_2	250	Hg		
		$KMnO_4$	500	Hg		
	Di-STACK-OH-1	Nozzle rinse	200	Hg		
		Filter Ash		Hg		
				Hg		
				Hg		
	Di-IN-CH-1	Coal Sample	Bag	Hg		
		[illegible]		Hg		
		8/24/99		Hg		
				Hg		
				Hg		
				Hg		
				Hg		
				Hg		

insufficient sample (discard) KW

page 1 of 2
8/24/99 Day 1

SBMTL3O.WK4

SAMPLE SUBMITTAL SHEET

PROJECT GRE-ICR DATE SUBMITTED 8/24/99

REQUESTOR FUND# 4891

RUN #	SAMPLE ID	SAMPLE TYPE	VOL/WT		WATER LAB	RESULTS
GRE-U1	DI-FB-SPIKE	KCl #1+2	500	Hg		
		KCl #3	200	Hg		
		H_2O_2	250	Hg		
		$KMnO_4$	500			
				Hg		
	DI-FB-IN	KCl	500	Hg		
		H_2O_2	250	Hg		
		$KMnO_4$	500	Hg		
				Hg		
	DI-FB-OUT	KCl	500	Hg		
		H_2O_2	250	Hg		
		$KMnO_4$	500	Hg		
				Hg		
				Hg		

Date 8/24/99 Time _____
GRE-U1-D1-In-OH-1

DATE 8/24/99
RUN # Unit 1 East ESP Inlet -1
FUND # _____
COST CENTER NUMBER _____

DUST LOADING DATA SHEET

Time at Start 12:27 Operators J. Thompson, M. Heidt

Sample Pt. A, C, E, G, I East ESP Inlet Traverse Pt. 1-5

P_B(Barometric Pressure)= 28.25 in. Hg

P_s(Stack Pressure)= P_B ±(2 in H_2O/13.6) = 27.86 in Hg .29 x 13.6 -3.9

T_s(Stack Temp)= 344 °F+460= 804 °R

ΔP(Pitot)= .256 in H_2O ✓ Type S Cp=.84 _____ Standard

D_n(Nozzle Diam)= .251 in Approx % H_2O= 13

ΔH@= _____ in H_2O Cm= _____

V_s(Stack Velocity) = $951.6\ Cp \sqrt{\frac{Ts}{Ps}\Delta P}$ = 1695 ft/min

Q_n(Nozzle flow Rate)= $V_s \pi D_n^2/576$= .5823 ACFM

Q_m(meter flow rate $\frac{Q_n T_m Q_n}{CmT_s(p_B+\Delta H/13.6)}$ (1 - $\frac{\%H_2O}{100}$)= .4626 ACFM

ΔH(orifice)= $\frac{Qm^2 \Delta H@(P_B+\Delta H/13.6)}{0.03175 T_m}$ = .64 in H_2O

Second/Rev= 13.0 %CO_2 _____ %O_2 _____

Note: Standard Temperature and Pressure are 70 °F and 29.92 in Hg

N
I G E C A

S/R	Trav. Point	Time	Gas Meter	ΔP	ΔH	Pump Vac.	Stack Temp.	Probe Temp.	Meter In	Meter Out				
		A	C	E	G	I		HV						
	O_2	6.7	7.2	7.1	6.6	7.0		6.9						
	CO_2	13.0	12.5	12.7	13.0	12.6		12.8						

Comments: _____

Date 8/24/ Time 12:27
GRE-U1-D1-In-OH-1

DATE: _____ START TIME: _____

RUN NUMBER: _____

SAMPLING SUMMARY

TOTAL SAMPLING TIME 125 MINUTES

MAXIMUM SYSTEM VACUUM 11.0 in Hg

AVERAGE STACK TEMPERATURE 343.77 °F

AVERAGE VELOCITY HEAD ΔP 0.256 in H_2O

AVERAGE STACK VELOCITY 37.58 FT/SEC

AVERAGE ORRIFICE PERSSURE ΔH 0.943 in H_2O

TOTAL VOLUME SAMPLED 56.954 FT^3

AVERAGE DGM INLET 112.24 °F

AVERAGE DGM OUTLET 103.59 °F

AVERAGE DGM TEMPERATURE 107.92 °F

FILTER TEMPERATURE — °F

LAST IMPINGER TEMPERATURE 67.77 °F

METER PRESSURE Pm 28.36 in Hg

STACK PRESSURE Ps 27.65 in Hg

AREA OF NOZZLE 0.0495 IN^2

AVG SQRT ΔP 0.502

MOLECULAR WEIGHT 26.70

MOISTURE CONTENT 0.13

VmSTD = 50.098 SCF .40 CFM

% ISOKINETIC 97.95

Date_____ Time_____

GRE-U1-D1-In-OH-1

Sample Pt. _____

Train Type : **ONTARIO-HYDRO METHOD**

Date _____
Run _____
Fund # _____
Cost Center # _____

Stopper Type	Type Of Solution	Initial Wt. (g)	Final Wt. (g)	Net Wt. (g)
BUBBLER	KCl	594.5	752.6	158.1
BUBBLER	KCl	625.3	648.1	22.8
IMPINGER	KCl	692.6	700.9	8.3
BUBBLER	H_2O_2/HNO_3	740.9	743.7	2.8
BUBBLER	$KMnO_4/H_2SO_4$	756.4	754.99	-1.4
BUBBLER	$KMnO_4/H_2SO_4$	752.8	805.5	52.7
IMPINGER	$KMnO_4/H_2SO_4$	747.0	695.6	-51.4
BUBBLER	SILICA GEL	945.5	961.1	15.6
			Total H_2O (g)	207.5
FILTER		~~0.15803~~	~~RB~~ replaced with thimble Filter	
		3.28030	9.29987	6.01957
				-50 rinse
			Total Dust (g)	157.5

$V_w std = 0.0474 * (H_2O\ g)$ _____ 7.426 _____ SCF

$V_m Corrected = V_m * C_m$ _____ 56.954 _____ ACF

$V_m std = \frac{17.71\ V_m C\ (P_b + \Delta H/13.6)}{T_m}$ _____ 50.305 _____ SCF

$V_t std = V_w std + V_m std$ _____ 57.731 _____ SCF

$\%H_2O = (V_w std / V_t std) * 100$ _____ 12.9 _____ $\%H_2O$

$Q_n std = 17.71\ Q_n\ P_s / T_s$ _____ 0.451 _____ SCFM

% Isokinetic = $V_t std / (Q_n std * Time)$ _____ 102.4 _____ %

DUST LOADING CALCULATIONS (Concentration Basis)

DCL = 15.432 (dust g) / $V_t std$ _____ 1.6091 _____ grains/scf

% Efficiency = $\frac{(\text{Inlet DCL - Outlet DCL})}{\text{Inlet DCL}} * 100$ _____ — _____ %

ACFM = V_s * Pipe Area (ft^2) _____ _____ ACFM

SCFM = ACFM * $P_s/29.92 * 530/T_s$ = ACFM * P_s/T_s * 17.71 _____ _____ SCFM

lbs/hour = grains / scf * 0.000143 * SCFM * 60 _____ _____ lbs/hour

Date [illegible] / Time _____

GRE-U1-D1-Stack-OH-1

DATE _____

RUN # _____

FUND # _____

COST CENTER NUMBER _____

DUST LOADING DATA SHEET

Time at Start 12:29 Operators DON

Sample Pt. STACK / EAST Traverse Pt. _____

P_B(Barometric Pressure)= 28.25 in. Hg

P_s(Stack Pressure)= P_B ±(-4 in H_2O/13.6) = 27.46 in Hg

T_s(Stack Temp)= 376.3 °F+460= 836 °R

ΔP(Pitot)= ~~.233~~ .446 in H_2O ✓ Type S Cp=.84 _____ Standard

D_n(Nozzle Diam)= .233 in Approx % H_2O= 14

ΔH@= 1.84 in H_2O Cm= 1.00

V_s(Stack Velocity) = 951.6 Cp $\sqrt{\frac{Ts}{Ps}}$ ΔP = 2920 ft/min

Q_n(Nozzle flow Rate)= $V_s \pi D_n^2/576$= .8645 ACFM

Q_m(meter flow rate $\frac{Q_n T_m Qn}{CmT_s(p_B+\Delta H/13.6)}$ (1 - %H_2O)= .4876 ACFM

ΔH(orifice)= $\frac{Qm^2 \Delta H@(P_B+\Delta H/13.6)}{0.03175 T_m}$ = .70 in H_2O

Second/Rev= 12.3 %CO_2 _____ %O_2 _____

95

Note: Standard Temperature and Pressure are 70 °F and 29.92 in Hg

S/R	Trav. Point	Time	Gas Meter	ΔP	ΔH	Pump Vac.	Stack Temp.	Probe Temp.	Meter In	Meter Out				
	A	12:37	O_2 = 6.5%		CO = 1 ppm									
	C	13:03	O_2 = 6%		CO = 18 ppm									
	E	13:53	O_2 = 6.5%		CO = 7 ppm									
	G	14:06	O_2 = 6.3%		CO = 0 ppm									
	G2	14:25	O_2 = 6.9%		CO = 0 ppm			CO_2 = 12.5%						
	I	14:34	O_2 = 6.4%		CO_2 = 13%									
		Final Lk ✓			target		20.7	gat	17.3	bet	cfm	ads		
											.012			
			Avg /	6.4			13.8							

Comments: _____

Date_____ Time_____
GRE-U1-D1-Stack-OH-1

DATE: 8-24-99 START TIME: 12:29

RUN NUMBER: GRE-U1-D1-STACK-OH-1

SAMPLING SUMMARY

TOTAL SAMPLING TIME 130 MINUTES

MAXIMUM SYSTEM VACUUM 20.7 in Hg

AVERAGE STACK TEMPERATURE 376.3 °F

AVERAGE VELOCITY HEAD ΔP .446 in H_2O

AVERAGE STACK VELOCITY 50.2 FT/SEC

AVERAGE ORRIFICE PERSSURE ΔH 1.192 in H_2O

TOTAL VOLUME SAMPLED 61.136 FT^3

AVERAGE DGM INLET 113.63 °F

AVERAGE DGM OUTLET 108.4 °F

AVERAGE DGM TEMPERATURE 111.02 °F

FILTER TEMPERATURE ~~539.4~~ not used °F (M-17)

LAST IMPINGER TEMPERATURE 97.34 °F

METER PRESSURE Pm 28.428 in Hg

STACK PRESSURE Ps 27.53 in Hg

AREA OF NOZZLE 0.0426 IN^2

AVG SQRT ΔP 0.665

MOLECULAR WEIGHT 27.46

MOISTURE CONTENT 0.14

VmSTD = 53.748 SCF

% ISOKINETIC 92.79

Sample Pt. _____

Train Type : **ONTARIO-HYDRO METHOD**

Date_____ Time_____

Date GRE-U1-D1-Stack-OH-1

Run _____

Fund # _____

Cost Center # _____

Stopper Type	Type Of Solution	Initial Wt. (g)	Final Wt. (g)	Net Wt. (g)
BUBBLER	KCl	608.3	762.8	154.5
BUBBLER	KCl	725.5	757.1	31.6
IMPINGER	KCl	607.2	619.0	11.8
BUBBLER	H_2O_2/HNO_3	744.1	746.8	2.7
BUBBLER	$KMnO_4/H_2SO_4$	755.2	753.8	-1.4
BUBBLER	$KMnO_4/H_2SO_4$	606.7	607.3	.6
IMPINGER	$KMnO_4/H_2SO_4$	711.5	713.0	1.5
BUBBLER	SILICA GEL	820.6	844.9	24.3
			Total H_2O (g)	225.6
FILTER		0.16651	.17767	.01116
				-50.0
				175.6
			Total Dust (g)	

$V_w std = 0.0474 * (H_2O\ g)$ — 8.280 SCF

$V_m Corrected = V_m * C_m$ — 61.136 ACF

$V_m std = \frac{17.71\ V_m C\ (P_b + \Delta H/13.6)}{T_m}$ — 53.732 SCF

$V_t std = V_w std + V_m std$ — 62.011 SCF

$\%H_2O = (V_w std / V_t std) * 100$ — 13.4 $\%H_2O$

$Q_n std = 17.71\ Q_n\ P_s / T_s$ — 0.510 SCFM

% Isokinetic = $V_t std / (Q_n std * Time)$ — 93.6 %

DUST LOADING CALCULATIONS (Concentration Basis)

DCL = 15.432 (dust g) / $V_t std$ — 0.0028 grains/scf

% Efficiency = $\frac{(\text{Inlet DCL} - \text{Outlet DCL})}{\text{Inlet DCL}} * 100$ — — %

ACFM = V_s * Pipe Area (ft^2) — ACFM

SCFM = ACFM * $P_s/29.92 * 530/T_s$ = ACFM * P_s/T_s * 17.71 — SCFM

lbs/hour = grains / scf * 0.000143 * SCFM * 60 — lbs/hour

SAMPLE SUBMITTAL SHEET

PROJECT: GRE-ICR

DATE SUBMITTED: 8/25/99

REQUESTOR: R. Schulz

FUND#: 4891

RUN #	SAMPLE ID	SAMPLE TYPE	VOL/WT		WATER LAB	RESULTS
GRE-U1-D2	IN-OH-2 (15:45) Field #1	Ash Sample Field #1	1qt	Hg		
				Hg		
				Hg		
				Hg		
	D2-FB-In	KCl	500	Hg		
		H_2O_2	250	Hg		
		$KMnO_4$	500	Hg		
				Hg		
	D2-FB-OUT	KCl	500	Hg		
		H_2O_2	250	Hg		
		$KMnO_4$	500	Hg		
				Hg		
	D2-FB-Spike	KCl	500	Hg		
		H_2O_2	250	Hg		
		$KMnO_4$	500	Hg		
				Hg		
	IN-OH-1	Coal Sample	Bag	Hg		
		Unit 1 Composite		Hg		
		8/25/99		Hg		
		Run 2		Hg		
	IN-OH-1 Field #1 (11:15)	Ash Sample	Bag	Hg		
				Hg		
				Hg		
				Hg		

page 1 of 2
8/25/99 Day 2

SBMTL30.WK4

SAMPLE SUBMITTAL SHEET

PROJECT GRE-ICR DATE SUBMITTED 8/25/99

REQUESTOR P. Schulz FUND# 4891

RUN #	SAMPLE ID	SAMPLE TYPE	VOL/WT		WATER LAB	RESULTS
GRE-01-D2-	IN-OH-1	KCl #1+2 + probe rinse	500	Hg		
		KCl #3	200	Hg		
		H_2O_2	250	Hg		
		$KMnO_4$	500			
		Nozzle rinse	200	Hg		
	Stack-OH-1	KCl #1+2 + probe rinse	500	Hg		
		KCl #3	200	Hg		
		H_2O_2	250	Hg		
		$KMnO_4$	500			
		nozzle rinse	200	Hg		
	IN-OH-2	KCl #1+2 + probe rinse	500	Hg		
		KCl #3	200	Hg		
		H_2O_2	250	Hg		
		$KMnO_4$	500	Hg		
		nozzle rinse	200			
	Stack-OH-2	KCl #1+2 + probe rinse	500	Hg		
		KCl #3	200	Hg		
		H_2O_2	250	Hg		
		$KMnO_4$	500	Hg		
		nozzle rinse	200			
	D2-IN-OH-2	Coal Sample		Hg		
		8/25/99		Hg		
		Unit 1 Composite		Hg		
		1400-1600 Test		Hg		
				Hg		
				Hg		
				Hg		
				Hg		

Page 2 of 2

8/25/99 Day 2

SBMTL3O.WK4

Date 0/03/14 Time

DATE GRE-U1-D2-In-OH-1

RUN #

FUND #

COST CENTER NUMBER

DUST LOADING DATA SHEET

Time at Start 9:35

Operators Jeff T., Craig E., Marlys H.

Sample Pt. A, C, E, G, I

Traverse Pt. 1-5

P_B(Barometric Pressure)= 28.03 in. Hg

P_s(Stack Pressure)= P_B ±(-6 in H_2O/13.6) = 27.46 in Hg

T_s(Stack Temp)= 315 °F+460= 775 °R

ΔP(Pitot)= .234 in H_2O ✓ Type S Cp=.84 Standard

D_n(Nozzle Diam)= .251 in Approx % H_2O= 13

ΔH@= 1.84 in H_2O Cm= 1

V_s(Stack Velocity) = 951.6 Cp $\sqrt{\frac{Ts}{Ps}}$ ΔP = 2.044 ft/min

Q_n(Nozzle flow Rate)= $V_s \pi D_n^2/576$= 3.7023 ACFM

Q_m(meter flow rate $\frac{Q_n T_m Qn}{CmT_s(p_B+\Delta H/13.6)}$ (1 - %H_2O)= .4303 ACFM

100

ΔH(orifice)= $\frac{Qm^2 \Delta H@(P_B+\Delta H/13.6)}{0.03175T_m}$ = .44 in H_2O

Second/Rev= 13.7 %CO_2 %O_2

N

I G E C A

Note: Standard Temperature and Pressure are 70 °F and 29.92 in Hg

S/R	Trav. Point	Time	Gas Meter	ΔP	ΔH	Pump Vac.	Stack Temp.	Probe Temp.	Meter In	Meter Out				
	I	G	E	C	A		Avg							
O_2	6.7	6.8	6.6	6.7	6.7		6.7							
CO_2	12.9	12.8	13.0	12.9	12.9		12.9							

Comments: Leak ✓ SOT passed.
" ✓ port E "
" ✓ EOT "

DATE: 8/25/99 START TIME: 9:35

RUN NUMBER: East ESP, Unit 1, Inlet

SAMPLING SUMMARY

TOTAL SAMPLING TIME 125 MINUTES

MAXIMUM SYSTEM VACUUM 12.4 in Hg

AVERAGE STACK TEMPERATURE 314.66 °F

AVERAGE VELOCITY HEAD ΔP 0.234 in H_2O

AVERAGE STACK VELOCITY 35.60 FT/SEC

AVERAGE ORRIFICE PERSSURE ΔH 0.736 in H_2O

TOTAL VOLUME SAMPLED 52.282 FT^3

AVERAGE DGM INLET 103.84 °F

AVERAGE DGM OUTLET 94.80 °F

AVERAGE DGM TEMPERATURE 99.32 °F

FILTER TEMPERATURE 532.93 °F

LAST IMPINGER TEMPERATURE 54.60 °F

METER PRESSURE Pm 28.193 in Hg

STACK PRESSURE Ps 27.46 in Hg

AREA OF NOZZLE 0.0495 IN^2

AVG SQRT ΔP ~~0.04~~ 0.480

MOLECULAR WEIGHT 26.40

MOISTURE CONTENT 0.160

VmSTD = 46.335 SCF

% ISOKINETIC 96.13

D2-IN-ON-1

Sample Pt. _____

Train Type : **ONTARIO-HYDRO METHOD**

Date 8/25/99
Run _____
Fund # _____
Cost Center # _____

Stopper Type	Type Of Solution	Initial Wt. (g)	Final Wt. (g)	Net Wt. (g)
BUBBLER	KCl	720.3	~~863.5~~ 864.2	143.7
BUBBLER	KCl	700.8	718.5	17.7
IMPINGER	KCl	629.2	636.7	7.5
BUBBLER	H_2O_2/HNO_3	642.1	645.9	3.8
BUBBLER	$KMnO_4/H_2SO_4$	614.7	668.6	53.9
BUBBLER	$KMnO_4/H_2SO_4$	761.8	753.9	-7.9
IMPINGER	$KMnO_4/H_2SO_4$	712.6	667.0	-45.6
BUBBLER	SILICA GEL	824.1	838.2	14.1
			Total H_2O (g)	-50 rinse
FILTER		3.20481		137.2
			9.87372	
			Total Dust (g)	6.66891

$V_w std = 0.0474 * (H_2O\ g)$ — 6.469 SCF

$V_m Corrected = V_m * C_m$ — 52.282 ACF

$V_m std = \frac{17.71\ V_m C\ (P_b + \Delta H/13.6)}{T_m}$ — 46.491 SCF

$V_t std = V_w std + V_m std$ — 52.960 SCF

$\%H_2O = (V_w std / V_t std) * 100$ — 12.2 $\%H_2O$

$Q_n std = 17.71\ Q_n\ P_s / T_s$ — 0.440 SCFM

% Isokinetic = $V_t std$ / ($Q_n std$ * Time) — 96.4 %

DUST LOADING CALCULATIONS (Concentration Basis)

DCL = 15.432 (dust g) / $V_t std$ — 1.9432 grains/scf

% Efficiency = $\frac{(\text{Inlet DCL - Outlet DCL})}{\text{Inlet DCL}} * 100$ — — %

ACFM = V_s * Pipe Area (ft^2) — — ACFM

SCFM = ACFM * $P_s/29.92$ * $530/T_s$ = ACFM * P_s/T_s * 17.71 _____ SCFM

lbs/hour = grains / scf * 0.000143 * SCFM * 60 _____ lbs/hour

Date 8/25/99 Time

DATE ~~GRE-U1-D2-In-OH-2~~
RUN #
FUND #
COST CENTER NUMBER

DUST LOADING DATA SHEET

Time at Start 13:50 Operators Jeff T., Marlis H., Craig E.

Sample Pt. A, C, E, G, I Traverse Pt. 1-5

P_B(Barometric Pressure)= 28.01 in. Hg

P_s(Stack Pressure)= P_B ±(-8 in H_2O/13.6) = 27.39 in Hg

T_s(Stack Temp)= 328 °F+460= 788 °R

ΔP(Pitot)= .224 in H_2O ✓ Type S Cp=.84 Standard

D_n(Nozzle Diam)= .251 in Approx % H_2O= 13

ΔH@= 1.84 in H_2O Cm= 1.00

V_s(Stack Velocity) = $951.6\ Cp \sqrt{\frac{Ts\ \Delta P}{Ps}}$ = 2028 ft/min

Q_n(Nozzle flow Rate)= $V_s \pi D_n^2/576$= .6969 ACFM

Q_m(meter flow rate $\frac{Q_n T_m Qn}{CmT_s(p_B+\Delta H/13.6)}$ (1 - $\frac{\%H_2O}{100}$)= .4248 ACFM

ΔH(orifice)= $\frac{Qm^2 \Delta H@(P_B+\Delta H/13.6)}{0.03175 T_m}$ = .52 in H_2O

Second/Rev= 14.1 %CO_2 %O_2

Tm 105

Note: Standard Temperature and Pressure are 70 °F and 29.92 in Hg

ΔH .657

S/R	Trav. Point	Time	Gas Meter	ΔP	ΔH	Pump Vac.	Stack Temp.	Probe Temp.	Meter In	Meter Out				
		A	C	E	G	I		Avg						
	O_2	6.7	6.5	6.4	6.4	6.5		6.5						
	CO_2	12.9	13.1	13.2	13.2	13.1		13.1						

Comments: Leak ✓ SOT passed
Leak ✓ port E passed
Leak ✓ EOT passed

Date_____ Time_____
GRE-U1-D2-In-OH-2

DATE: 8/25/99 START TIME: 13:50

RUN NUMBER: East ESP Inlet Unit 1

SAMPLING SUMMARY

TOTAL SAMPLING TIME 130.1 MINUTES

MAXIMUM SYSTEM VACUUM 12.4 in Hg

AVERAGE STACK TEMPERATURE 328.47 °F

AVERAGE VELOCITY HEAD ΔP 0.224 in H_2O

AVERAGE STACK VELOCITY 33.70 FT/SEC

AVERAGE ORRIFICE PERSSURE ΔH 0.657 in H_2O

TOTAL VOLUME SAMPLED 52.082 FT^3

AVERAGE DGM INLET 109.85 °F

AVERAGE DGM OUTLET 100.79 °F

AVERAGE DGM TEMPERATURE 105.32 °F

FILTER TEMPERATURE ~~532.~~ NA °F

LAST IMPINGER TEMPERATURE 58.07 °F

METER PRESSURE Pm 28.134 in Hg

STACK PRESSURE Ps 27.39 in Hg

AREA OF NOZZLE 0.0495 IN^2

AVG SQRT ΔP 0.469

MOLECULAR WEIGHT 28.70

MOISTURE CONTENT 0.130

VmSTD = 45.629 SCF

% ISOKINETIC 94.68

Sample Pt. _____

Train Type : **ONTARIO-HYDRO METHOD**

Date _____ Time _____
Date ~~GRE-U1-D2 In-OH-2~~
Run _____
Fund # _____
Cost Center # _____

Stopper Type	Type Of Solution	Initial Wt. (g)	Final Wt. (g)	Net Wt. (g)
BUBBLER	KCl	~~720.3~~ 716.1	871.0	154.9
BUBBLER	KCl	~~700.7~~ 694.5	714.5	20.0
IMPINGER	KCl	~~629.1~~ 726.1	733.0	6.9
BUBBLER	H_2O_2/HNO_3	~~641.9~~ 735.9	739.8	3.9
BUBBLER	$KMnO_4/H_2SO_4$	~~614.6~~ 701.6	752.7	51.1
BUBBLER	$KMnO_4/H_2SO_4$	~~761.7~~ 724.1	723.8	-.3
IMPINGER	$KMnO_4/H_2SO_4$	~~712.5~~ 704.5	653.9	-50.6
BUBBLER	SILICA GEL	~~824.0~~ 833.2	846.7	13.5
			Total H_2O (g)	-50
FILTER		2.94053		149.4
			11.96059	
			Total Dust (g)	9.02006

$V_w std = 0.0474 * (H_2O\ g)$ — 7.044 SCF

$V_m Corrected = V_m * C_m$ — 52.082 ACF

$V_m std = \frac{17.71\ V_m C\ (P_b + \Delta H/13.6)}{T_m}$ — 45.806 SCF

$V_t std = V_w std + V_m std$ — 52.850 SCF

$\%H_2O = (V_w std / V_t std) * 100$ — 13.3 $\%H_2O$

$Q_n std = 17.71\ Q_n\ P_s / T_s$ — .429 SCFM

% Isokinetic = $V_t std$ / ($Q_n std$ * Time) — 94.7 %

DUST LOADING CALCULATIONS (Concentration Basis)

DCL = 15.432 (dust g) / $V_t std$ — 2.6338 grains/scf

% Efficiency = $\frac{(\text{Inlet DCL - Outlet DCL})}{\text{Inlet DCL}} * 100$ — _____ %

ACFM = V_s * Pipe Area (ft^2) $10 \times 11.5 = 115\ ft^2$ — 233220 ACFM

SCFM = ACFM * P_s/29.92 * 530/T_s = ACFM * P_s/T_s * 17.71 — 343,597 SCFM 8,615,830

lbs/hour = grains / scf * 0.000143 * SCFM * 60 — _____ lbs/hour

Date 8-25-97 Time 0935
GRE-U1-D2-Stack-OH-1

DATE _____
RUN # _____
FUND # _____
COST CENTER NUMBER _____

DUST LOADING DATA SHEET

Time at Start 0935 Operators DON / RAY J

Sample Pt. ~~Stack~~ Unit 1E port A Traverse Pt. _____

P_B(Barometric Pressure)= 27.97 in. Hg

P_s(Stack Pressure)= P_B ±(_____ in H_2O/13.6) = [ ] in Hg

T_s(Stack Temp)= _____ °F+460= [ ] °R

ΔP(Pitot)= _____ in H_2O _____ Type S Cp=.84 _____ Standard

D_n(Nozzle Diam)= .251 in Approx % H_2O= _____

ΔH@= _____ in H_2O Cm= _____

V_s(Stack Velocity) = $951.6\ Cp \sqrt{\frac{Ts}{Ps}\frac{\Delta P}{}}$ = _____ ft/min

Q_n(Nozzle flow Rate)= $V_s \pi D_n^2/576$= _____ ACFM

Q_m(meter flow rate $\frac{Q_n T_m Qn}{CmT_s(p_B+\Delta H/13.6)}$ $(1 - \frac{\%H_2O}{100})$= _____ ACFM

ΔH(orifice)= $\frac{Qm^2 \Delta H@(P_B+\Delta H/13.6)}{0.03175 T_m}$ = _____ in H_2O

Second/Rev= _____ %CO_2 _____ %O_2 _____

Note: Standard Temperature and Pressure are 70 °F and 29.92 in Hg

S/R	Trav. Point	Time	Gas Meter	ΔP	ΔH	Pump Vac.	Stack Temp.	Probe Temp.	Meter In	Meter Out				
	A	9:48	O_2 =	6.9	%	CO_2 =	12.5	%						
	C	10:09	O_2 =	6.7	%	CO_2 =	12.7	%						
	E	10:39	O_2 =	6.9	%	CO_2 =	12.5	%						
	G	11:17	O_2 =	6.9	%	CO_2 =	12.5	%						
	I	11:37	O_2 =	6.9	%	CO_2 =	12.5	%						
		Avg /		6.9			12.5							

Comments: @ point 7 Fand Imp TC Hooked up wrong - plugged in correct 80.86 °F
LK V initial 5" Hg OK after port #2 @ 8" Hg OK
after EOR @ 17.5

Date 8-25-99 Time 935
GRE-U1-D2-Stack-OH-1

DATE: 8-25-99 START TIME: 935

RUN NUMBER: GRE-U1-D2-Stack-OH-1

SAMPLING SUMMARY

TOTAL SAMPLING TIME 125.0 MINUTES

MAXIMUM SYSTEM VACUUM 15.7 in Hg

AVERAGE STACK TEMPERATURE 301.6 °F

AVERAGE VELOCITY HEAD ΔP 0.368 in H_2O

AVERAGE STACK VELOCITY 43.92 FT/SEC

AVERAGE ORRIFICE PERSSURE ΔH 1.184 in H_2O

TOTAL VOLUME SAMPLED 66.355 FT^3

AVERAGE DGM INLET 105.42 °F

AVERAGE DGM OUTLET 98.36 °F

AVERAGE DGM TEMPERATURE 101.89 °F

FILTER TEMPERATURE — °F

LAST IMPINGER TEMPERATURE — °F

METER PRESSURE Pm 28.238 in Hg

STACK PRESSURE Ps 27.43 in Hg

AREA OF NOZZLE 0.0495 IN^2

AVG SQRT ΔP 0.605

MOLECULAR WEIGHT 27.19

MOISTURE CONTENT 0.165

VmSTD = 58.552 SCF

% ISOKINETIC 97.47

Sample Pt. _____

Train Type : **ONTARIO-HYDRO METHOD**

Date _____ Time _____

Date GRE-U1-D2-Stack-OH-1

Run _____

Fund # _____

Cost Center # _____

Stopper Type	Type Of Solution	Initial Wt. (g)	Final Wt. (g)	Net Wt. (g)
BUBBLER	KCl	699.1	866.3	167.2
BUBBLER	KCl	721.5	759.6	38.1
IMPINGER	KCl	714.9	728.5	13.6
BUBBLER	H_2O_2/HNO_3	743.2	747.9	4.7
BUBBLER	$KMnO_4/H_2SO_4$	758.9	757.7	-1.2
BUBBLER	$KMnO_4/H_2SO_4$	701.0	701.0	0.0
IMPINGER	$KMnO_4/H_2SO_4$	627.1	628.5	1.4
BUBBLER	SILICA GEL	896.7	921.8	25.1
			Total H_2O (g)	-50.0 rinse
FILTER		.15803		~~744.2~~ 198.9
			.16481	
			Total Dust (g)	0.00678

$V_w std = 0.0474 * (H_2O\ g)$ — 9.378 SCF

$V_m Corrected = V_m * C_m$ — 66.355 ACF

$V_m std = \frac{17.71\ V_m C\ (P_b + \Delta H/13.6)}{T_m}$ — 58.679 SCF

$V_t std = V_w std + V_m std$ — 68.057 SCF

$\%H_2O = (V_w std / V_t std) * 100$ — 13.8 $\%H_2O$

$Q_n std = 17.71\ Q_n\ P_s / T_s$ — 0.558 SCFM

% Isokinetic = $V_t std$ / ($Q_n std$ * Time) — 97.5 %

DUST LOADING CALCULATIONS (Concentration Basis)

DCL = 15.432 (dust g) / $V_t std$ — 0.0015 grains/scf

% Efficiency = $\frac{(\text{Inlet DCL - Outlet DCL})}{\text{Inlet DCL}} * 100$ — _____ %

ACFM = V_s * Pipe Area (ft^2) — _____ ACFM

SCFM = ACFM * $P_s/29.92$ * $530/T_s$ = ACFM * P_s/T_s * 17.71 — _____ SCFM

lbs/hour = grains / scf * 0.000143 * SCFM * 60 — _____ lbs/hour

DATE _____ Date 8-20-99 Time 15:
RUN # GRE-U1-D2-Stack-OH-2
FUND # _____
COST CENTER NUMBER _____

DUST LOADING DATA SHEET

Time at Start 13:52 Operators DON / RAY

Sample Pt. _____ Traverse Pt. _____

P_B(Barometric Pressure)= 27.95 in. Hg

P_s(Stack Pressure)= P_B ±(-10. in H_2O/13.6) = 27.21 in Hg

T_s(Stack Temp)= 317 °F+460= 777 °R

ΔP(Pitot)= .399 in H_2O ✓ Type S Cp=.84 _____ Standard

D_n(Nozzle Diam)= .251 in Approx % H_2O= ~~16.5~~ 18.1

ΔH@= 1.84 in H_2O Cm= 1.00

V_s(Stack Velocity) = 951.6 Cp $\sqrt{\frac{Ts}{Ps}}$ ΔP = 2698 ft/min

Q_n(Nozzle flow Rate)= $V_s \pi D_n^2/576$= .9271 ACFM

Q_m(meter flow rate $\frac{Q_n T_m Qn}{CmT_s(p_B+\Delta H/13.6)}$ (1 - %H_2O)= .5637 ACFM

ΔH(orifice)= $\frac{Qm^2 \Delta H@(P_B+\Delta H/13.6)}{0.03175 T_m}$ = .91 in H_2O

Second/Rev= 10.6 %CO_2 _____ %O_2 _____

Tm = 106
ΔA = 1.199

Note: Standard Temperature and Pressure are 70 °F and 29.92 in Hg

S/R	Trav. Point	Time	Gas Meter	ΔP	ΔH	Pump Vac.	Stack Temp.	Probe Temp.	Meter In	Meter Out				
14:10	A	80 °F Lambl.48	330 Run 96.1 ~~99~~ 3.9% Loss O_2 =	6.8%			Co = 0 ppm	no 163 ppm		SO_2 = 530 ppm			CO_2 12.6	
	C	14:24	O_2 =	6.9%			CO_2 = 12.5%							
	E	15:00	O_2 =	6.5%			CO_2 = 12.9%							
	G	15:23	O_2 =	6.7%			CO_2 = 12.7%							
	I	15:51	O_2 =	6.8%			CO_2 = 12.6%							
		Avg		6.7			12.7							

Comments: ✓ check meter @ 5" OK LK ✓ after test 2 @ 17" OK, LK ✓ EOR 17" OK

Date 8-2-99 Time 1352
GRE-U1-D2-Stack-OH-2

DATE: 8-25-99

START TIME: _____

RUN NUMBER: _____

SAMPLING SUMMARY

TOTAL SAMPLING TIME 125 MINUTES

MAXIMUM SYSTEM VACUUM 15.8 in Hg

AVERAGE STACK TEMPERATURE 317.1 °F

AVERAGE VELOCITY HEAD ΔP .399 in H_2O

AVERAGE STACK VELOCITY 45.04 FT/SEC

AVERAGE ORRIFICE PERSSURE ΔH 1.199 in H_2O

TOTAL VOLUME SAMPLED 67.946 FT^3

AVERAGE DGM INLET 110.32 °F

AVERAGE DGM OUTLET 102.18 °F

AVERAGE DGM TEMPERATURE 106.25 °F

FILTER TEMPERATURE — °F

LAST IMPINGER TEMPERATURE 68.87 °F

METER PRESSURE Pm 28.187 in Hg

STACK PRESSURE Ps 27.35 in Hg

AREA OF NOZZLE 0.0495 IN^2

AVG SQRT ΔP 0.63

MOLECULAR WEIGHT 28.68

MOISTURE CONTENT .13

VmSTD = 59.495 SCF

% ISOKINETIC 94.87

Sample Pt. _____

Train Type : **ONTARIO-HYDRO METHOD**

Date _____ Date_____ Time_____
Run GRE-U1-D2-Stack-OH-2
Fund # _____
Cost Center # _____

Stopper Type	Type Of Solution	Initial Wt. (g)	Final Wt. (g)	Net Wt. (g)
BUBBLER	KCl	740.6	909.3	168.7
BUBBLER	KCl	715.6	751.1	35.5
IMPINGER	KCl	705.4	720.9	15.5
BUBBLER	H_2O_2/HNO_3	679.6	685.3	5.7
BUBBLER	$KMnO_4/H_2SO_4$	694.4	693.5	-.9
BUBBLER	$KMnO_4/H_2SO_4$	586.5	585.1	-1.4
IMPINGER	$KMnO_4/H_2SO_4$	627.3	632.4	5.1
BUBBLER	SILICA GEL	961.7	989.9	28.2
			Total H_2O (g)	-50 rinse
FILTER		.15989		206.4
			.16708	.00719
			Total Dust (g)	

$V_w std = 0.0474 * (H_2O\ g)$ — 9.732 SCF

$V_m Corrected = V_m * C_m$ — 67.946 ACF

$V_m std = \frac{17.71\ V_m C\ (P_b + \Delta H/13.6)}{T_m}$ — 59.610 SCF

$V_t std = V_w std + V_m std$ — 69.341 SCF

$\%H_2O = (V_w std / V_t std) * 100$ — 14.0 $\%H_2O$

$Q_n std = 17.71\ Q_n\ P_s / T_s$ — ~~.556~~ R8 .575 SCFM

% Isokinetic = $V_t std$ / ($Q_n std$ * Time) — 96.5 %

DUST LOADING CALCULATIONS (Concentration Basis)

DCL = 15.432 (dust g) / $V_t std$ — .0016 grains/scf

% Efficiency = $\frac{(\text{Inlet DCL - Outlet DCL})}{\text{Inlet DCL}} * 100$ — _____ %

ACFM = V_s * Pipe Area (ft^2) — _____ ACFM

SCFM = ACFM * P_s/29.92 * 530/T_s = ACFM * P_s/T_s * 17.71 — _____ SCFM

lbs/hour = grains / scf * 0.000143 * SCFM * 60 — _____ lbs/hour

APPENDIX B

ANALYTICAL LAB REPORTS

Unit 1 Day 1

Sample ID	Sample Type	Volume, mL	Hg, μg/L
KCL Reagent Blank	KCl	100	<0.03
H_2O_2 Reagent Blank	H_2O_2–HNO_3	100	<0.03
$KMnO_4$ Reagent Blank	$KMnO_4$–H_2SO_4	100	<0.03
5% $KMnO_4$ Blank	$KMnO_4$	100	<0.03
10% HNO_3 Blank	HNO_3	100	<0.03
0.1 N HNO_3 Blank	HNO_3	100	<0.03
GRE-U1-D1-IN-OH-1	Nozzle rinse	200	<0.03
GRE-U1-D1-IN-OH-1	KCl Nos. 1 and 2	500	0.27
GRE-U1-D1-IN-OH-1	KCl No. 3	200	<0.03
GRE-U1-D1-IN-OH-1	H_2O_2	250	1.29
GRE-U1-D1-IN-OH-1	$KMnO_4$	500	19.97
GRE-U1-D1-IN-OH-1	Excess $KMnO_4$	100	1.22
GRE-U1-D1-STACK-OH-1	Nozzle rinse	200	<0.03
GRE-U1-D1-STACK-OH-1	KCl Nos. 1 and 2	500	0.83
GRE-U1-D1-STACK-OH-1	KCl No. 3	200	<0.03
GRE-U1-D1-STACK-OH-1	H_2O_2	250	1.46
GRE-U1-D1-STACK-OH-1	$KMnO_4$	500	21.6
GRE-U1-D1-FB-SPIKE	KCl Nos. 1 and 2	500	10.36
GRE-U1-D1-FB-SPIKE	KCl No. 3	200	<0.03
GRE-U1-D1-FB-SPIKE	H_2O_2	250	1.92
GRE-U1-D1-FB-SPIKE	$KMnO_4$	500	9.68
GRE-U1-D1-FB-IN	KCl	500	<0.03
GRE-U1-D1-FB-IN	H_2O_2	250	<0.03
GRE-U1-D1-FB-IN	$KMnO_4$	500	<0.03
GRE-U1-D1-FB-OUT	KCl	500	<0.03
GRE-U1-D1-FB-OUT	H_2O_2	250	<0.03
GRE-U1-D1-FB-OUT	$KMnO_4$	500	<0.03

Unit 1 Day 2

Sample ID	Sample Type	Volume, mL	Hg, μg/L
GRE-U1-D2-IN-OH-1	Nozzle rinse	200	<0.03
GRE-U1-D2-IN-OH-1	KCl Nos. 1 and 2	500	0.21
GRE-U1-D2-IN-OH-1	KCl No. 3	200	<0.03
GRE-U1-D2-IN-OH-1	H_2O_2	250	2.49
GRE-U1-D2-IN-OH-1	$KMnO_4$	500	16.73
GRE-U1-D2-STACK-OH-1	Nozzle rinse	200	<0.03
GRE-U1-D2-STACK-OH-1	KCl Nos. 1 and 2	500	0.89
GRE-U1-D2-STACK-OH-1	KCl No. 3	200	<0.03
GRE-U1-D2-STACK-OH-1	H_2O_2	250	0.58
GRE-U1-D2-STACK-OH-1	$KMnO_4$	500	23.6
GRE-U1-D2-IN-OH-2	Nozzle rinse	200	<0.03
GRE-U1-D2-IN-OH-2	KCl Nos. 1 and 2	500	0.09
GRE-U1-D2-IN-OH-2	KCl No. 3	200	<0.03
GRE-U1-D2-IN-OH-2	H_2O_2	250	2.72
GRE-U1-D2-IN-OH-2	$KMnO_4$	500	18.22
GRE-U1-D2-STACK-OH-2	Nozzle rinse	200	<0.03
GRE-U1-D2-STACK-OH-2	KCl Nos. 1 and 2	500	0.96
GRE-U1-D2-STACK-OH-2	KCl No. 3	200	<0.03
GRE-U1-D2-STACK-OH-2	H_2O_2	250	0.68
GRE-U1-D2-STACK-OH-2	$KMnO_4$	500	25.2
GRE-U1-D2-FB-SPIKE	KCl	500	10.65
GRE-U1-D2-FB-SPIKE	H_2O_2	250	1.7
GRE-U1-D2-FB-SPIKE	$KMnO_4$	500	10.72
GRE-U1-D2-FB-IN	KCl	500	<0.03
GRE-U1-D2-FB-IN	H_2O_2	250	<0.03
GRE-U1-D2-FB-IN	$KMnO_4$	500	<0.03
GRE-U1-D2-FB-OUT	KCl	500	<0.03
GRE-U1-D2-FB-OUT	H_2O_2	250	<0.03
GRE-U1-D2-FB-OUT	$KMnO_4$	500	<0.03

8/24/99

Calibration Standards: 0, 1, 5, 10, 20 ppb R = 0.9999 QC = 4.12(4)

Sample ID	Sample Type	Spike Amount	Sample Reading, μg/L	Spike Reading, μg/L	Spike Location	Spike Recovery, %
GRE-U1-D1-IN-OH-1	KCl	5	0.27	4.93	Lab	93.20
GRE-U1-D1-IN-OH-1	KCl	10	0.27	9.7	Lab	94.32
GRE-U1-D1-FB-SPIKE	KCl	10	0	10.36	Field	103.60
GRE-U1-D1-FB-SPIKE	KCl	5	10.36	15.68	Lab	106.40
GRE-U1-D1-FB-SPIKE	KCl	10	10.36	20.44	Lab	100.80
GRE-U1-D1-IN-OH-1	H_2O_2	5	1.29	6.39	Lab	102.00
GRE-U1-D1-IN-OH-1	H_2O_2	10	1.29	11.12	Lab	98.30
GRE-U1-D1-FB-SPIKE	H_2O_2	2	0	1.92	Field	96.00
GRE-U1-D1-FB-SPIKE	H_2O_2	5	1.92	6.74	Lab	96.42
GRE-U1-D1-FB-SPIKE	H_2O_2	10	1.92	11.4	Lab	94.83
GRE-U1-D1-FB-SPIKE	$KMnO_4$	10	0	9.68	Field	96.80
GRE-U1-D1-FB-SPIKE	$KMnO_4$	5	9.68	14.44	Lab	95.20
GRE-U1-D1-IN-OH-1	$KMnO_4$	5	19.97	24.48	Lab	90.20

8/26/99

Calibration Standards: 0, 1, 5, 10, 20 ppb R = 0.9994 QC = 4.14(4)

Sample ID	Sample Type	Spike Amount	Sample Reading, µg/L	Spike Reading, µg/L	Spike Location	Spike Recovery, %
GRE-U1-D2-STACK-OH-1	KCl	5	0.89	5.82	Lab	98.60
GRE-U1-D2-STACK-OH-1	KCl	10	0.89	10.26	Lab	93.70
GRE-U1-D2-FB-SPIKE	KCl	10	0	10.65	Field	106.50
GRE-U1-D2-FB-SPIKE	KCl	5	10.65	15.4	Lab	95.00
GRE-U1-D2-FB-SPIKE	KCl	10	10.65	20.44	Lab	97.90
GRE-U1-D2-STACK-OH-1	H_2O_2	5	0.58	5.67	Lab	101.80
GRE-U1-D2-STACK-OH-1	H_2O_2	10	0.58	12.21	Lab	116.30
GRE-U1-D2-FB-SPIKE	H_2O_2	2	0	1.7	Field	85.00
GRE-U1-D2-FB-SPIKE	H_2O_2	5	1.7	6.53	Lab	96.60
GRE-U1-D2-FB-SPIKE	H_2O_2	10	1.7	10.86	Lab	91.60
GRE-U1-D2-IN-OH-1	$KMnO_4$	5	17.72	22.36	Lab	92.80
GRE-U1-D2-FB-SPIKE	$KMnO_4$	10	0	10.72	Field	107.20
GRE-U1-D2-FB-SPIKE	$KMnO_4$	5	10.72	15.46	Lab	94.80

Final Results

September 15, 1999

Set Number: 49890
Fund#: 4891
PI: Richard Schulz
Contact Person: Richard Schulz

Request Date: Thursday, September 09, 1999
Due Date: Thursday, September 23, 1999
Set Description: Great River Energy Site

Sample 49890-01

49890-01	**GRE-U1 D1-In-OH-1 ash**		
Mercury		0.005	µg/g
49890-02	**GRE-U1 D1-Stack-OH-1 ash (total ug)**		
Mercury		0.0395	µg
49890-03	**GRE-U1 D2-In-OH-1 ash**		
Mercury		0.016	µg/g
49890-04	**GRE-U1 D2-In-OH-2 ash**		
Mercury		0.0079	µg/g
49890-05	**GRE-U1 D2-Stack-OH-1 ash (total ug)**		
Mercury		0.023	µg
49890-06	**GRE-U1 D2-Stack-OH-2 ash (total ug)**		
Mercury		0.0060	µg
49890-07	**GRE-U10 D3-In-OH-1 ash**		
Mercury		0.011	µg/g
49890-08	**GRE-U10 D3-Stack-OH-1 ash (total ug)**		
Mercury		0.016	µg
49890-09	**GRE-U10 D4-In-OH-1 ash**		
Mercury		0.028	µg/g
49890-10	**GRE-U10 D4-In-OH-2 ash**		
Mercury		0.049	µg/g
49890-11	**GRE-U10 D4-Stack-OH-1 ash (total ug)**		
Mercury		0.0050	µg
49890-12	**GRE-U10 D4-Stack-OH-2 ash (total ug)**		
Mercury		0.0090	µg
49890-13	**GRE-U10 D5-In-OH-1 ash**		
Mercury		0.016	µg/g
49890-14	**GRE-U10 D5-Stack-OH-1 ash (total ug)**		
Mercury		0.[illegible]	µg
49890-15	**GRE-U10 Blank Thimble (total ug)**		
Mercury		< 0.002	µg
49890-16	**GRE-U10 Blank Filter Paper (total ug)**		
Mercury		< 0.002	µg

Distribution TS Date 9-15-99

Final Results

October 26, 1999

Set Number: 49909
Fund#: 4891
PI: Richard Schulz
Contact Person: Richard Schulz

Request Date: Monday, October 25, 1999
Due Date: Monday, November 08, 1999
Set Description: Great River Energy Site Coal

Sample **49909-01**

	49909-01	**GRE-Coal Sx Unit1 Day1**		GREU1D1OH-1
1	Chloride	< 70	µg/g	
	Mercury	0.0855	µg/g	
	49909-02	**GRE-Coal Sx Unit1 14-1600**		GREU1D2OH-1
2	Chloride	< 70	µg/g	
	Mercury	0.105	µg/g	GREU1D2OH-2
	49909-03	**GRE-Coal Sx Unit1 RUN2**		
3	Chloride	81	µg/g	
	Mercury	0.0558	µg/g	
	49909-04	**GRE-Coal Sx Unit10 Comp.**		GREU1D3OH-1
1	Chloride	< 60	µg/g	
	Mercury	0.0865	µg/g	
	49909-05	**GRE-Coal Sx Unit10 9:30-11:30**		GREU1D4OH-2
3	Chloride	< 50	µg/g	
	Mercury	0.0630	µg/g	
	49909-06	**GRE-Coal Sx Unit10 14-1600Hrs**		GREU1D4OH-1
2	Chloride	< 60	µg/g	
	Mercury	0.101	µg/g	
	49909-07	**Mill 1&2 Composite**		GREU1D5OH-1
4	Chloride	< 70	µg/g	
	Mercury	0.0422	µg/g	

Distribution 33 Date 10-26-99

K. Laudal

UND ENERGY RESEARCH CENTER
COAL ANALYSIS REPORT

GF NUMBER: 99-0458 LAB NUMBER: 4681

DATE SAMPLED : 08/24/99 RUN NUMBER: GREU1D1INOH-1
DATE RECEIVED : 10/04/99
DATE OF REPORT: 10/08/99

SAMPLE DESCRIPTION: GRE-COAL SAMPLE UNIT1

SUBMITTER: LAUDAL

AIR DRY LOSS: 15.40 %

	AS DET. (%)	AS RECD. (%)	MOIST FREE (%)	MOIST/ASH FREE (%)
PROXIMATE ANALYSIS				
MOISTURE	24.68	36.30	N/A	N/A
VOLATILE MATTER	36.51	30.89	48.47	53.73
FIXED CARBON (IND)	31.44	26.58	41.74	46.27
ASH	7.37	6.24	9.79	N/A
ULTIMATE ANALYSIS				
HYDROGEN	5.72	6.55	3.96	4.39
CARBON	46.53	39.37	61.78	68.48
NITROGEN	1.05	0.89	1.40	1.55
SULFUR	0.91	0.77	1.21	1.34
OXYGEN (IND)	38.40	46.18	21.86	24.23
ASH	7.37	6.24	9.79	N/A
HEATING VALUE (BTU/LB)				
BTU	8040	6802	10674	11833
CALC.CALORIFIC VALUE	8022	6787		

AS RECEIVED HYDROGEN NOT INCLUDING HYDROGEN FROM MOISTURE: 2.52 %
AS RECEIVED OXYGEN NOT INCLUDING OXYGEN FROM MOISTURE : 13.93 %

SULFUR FORMS		ASH FUSION (DEGREES F)	
SULFATE	N/A	INIT. DEFORM. TEMP.	N/A
PYRITIC	N/A	SOFTENING TEMP.	N/A
ORGANIC	N/A	HEMISPH. TEMP.	N/A
		FLUID TEMP.	N/A

COMMENTS :

UND ENERGY RESEARCH CENTER
COAL ANALYSIS REPORT

GF NUMBER: 99-0459 LAB NUMBER: 4682

DATE SAMPLED : 08/25/99 RUN NUMBER: GREU1D2INOH-1
DATE RECEIVED : 10/04/99
DATE OF REPORT: 10/08/99

SAMPLE DESCRIPTION: GRE-COAL SAMPLE UNIT1 ~~[illegible]~~

SUBMITTER: LAUDAL

AIR DRY LOSS: 13.97 %

	AS DET. (%)	AS RECD. (%)	MOIST FREE (%)	MOIST/ASH FREE (%)
PROXIMATE ANALYSIS				
MOISTURE	27.38	37.50	N/A	N/A
VOLATILE MATTER	34.81	29.94	47.93	53.82
FIXED CARBON (IND)	29.86	25.71	41.12	46.18
ASH	7.95	6.84	10.95	N/A
ULTIMATE ANALYSIS				
HYDROGEN	6.02	6.73	4.10	4.60
CARBON	45.00	38.71	61.96	69.58
NITROGEN	1.02	0.87	1.40	1.57
SULFUR	1.22	1.05	1.68	1.89
OXYGEN (IND)	38.80	45.79	19.91	22.36
ASH	7.95	6.84	10.95	N/A
HEATING VALUE (BTU/LB)				
BTU	7806	6716	10749	12071
CALC.CALORIFIC VALUE	7951	6840		

AS RECEIVED HYDROGEN NOT INCLUDING HYDROGEN FROM MOISTURE: 2.56 %
AS RECEIVED OXYGEN NOT INCLUDING OXYGEN FROM MOISTURE : 12.44 %

SULFUR FORMS

SULFATE	N/A
PYRITIC	N/A
ORGANIC	N/A

ASH FUSION (DEGREES F)

INIT. DEFORM. TEMP.	N/A
SOFTENING TEMP.	N/A
HEMISPH. TEMP.	N/A
FLUID TEMP.	N/A

COMMENTS :

UND ENERGY RESEARCH CENTER
COAL ANALYSIS REPORT

GF NUMBER: 99-0460 LAB NUMBER: 4683

DATE SAMPLED : 08/25/99 RUN NUMBER: GREU1D2INOH-2
DATE RECEIVED : 10/04/99
DATE OF REPORT: 10/08/99

SAMPLE DESCRIPTION: GRE-COAL SAMPLE UNIT1 ~~RUN 2~~

SUBMITTER: LAUDAL

AIR DRY LOSS: 27.90 %

	AS DET. (%)	AS RECD. (%)	MOIST FREE (%)	MOIST/ASH FREE (%)
PROXIMATE ANALYSIS				
MOISTURE	12.97	37.30	N/A	N/A
VOLATILE MATTER	41.20	29.71	47.34	52.62
FIXED CARBON (IND)	37.10	26.70	42.63	47.38
ASH	8.73	6.29	10.03	N/A
ULTIMATE ANALYSIS				
HYDROGEN	5.01	6.71	4.10	4.56
CARBON	54.14	39.04	62.21	69.15
NITROGEN	1.22	0.88	1.40	1.56
SULFUR	0.88	0.63	1.01	1.12
OXYGEN (IND)	30.02	46.45	21.25	23.62
ASH	8.73	6.29	10.03	N/A
HEATING VALUE (BTU/LB)				
BTU	9315	6716	10703	11896
CALC.CALORIFIC VALUE	9144	6593		

AS RECEIVED HYDROGEN NOT INCLUDING HYDROGEN FROM MOISTURE: 2.57 %
AS RECEIVED OXYGEN NOT INCLUDING OXYGEN FROM MOISTURE : 13.33 %

SULFUR FORMS		ASH FUSION (DEGREES F)	
SULFATE	N/A	INIT. DEFORM. TEMP.	N/A
PYRITIC	N/A	SOFTENING TEMP.	N/A
ORGANIC	N/A	HEMISPH. TEMP.	N/A
		FLUID TEMP.	N/A

COMMENTS :