

APPENDIX A

**PHOTOGRAPHS OF
FIELD TESTS, CONSTRUCTION AND INSTRUMENTATION**



Fig A1. Road-surface gravel (RSG) before construction



Fig A2. Soil Stiffness measurement by using SSG on subgrade.



Fig A3. Measurement of water content and unit weight of subgrade.



Fig A4. Dynamic cone penetration (DCP) test on subgrade



Fig A5. Collecting a sample in a thin-wall tube



Fig A6. Lay-down truck placing fly ash on RSG



Fig A7. Road-reclaimer blending fly ash and water truck



Fig A8. Road surface after blending process.



Fig A9. Compaction of fly ash and RSG mix by using sheep foot and roller drum compactors.



. Fig A10. Compaction and grading of S-RSG surface.



Fig A11. Nuclear gauge and SSG tests on S-RSG.



Fig A12. Collection subgrade, RSG, fly ash and S-RSG bucket samples



Fig A13. M_r and CBR sample preparation of field mix soils collected with in 1-2 hour of blending process.



Fig A14. Excavation of lysimeter pit.



Fig A15. Construction of water tank and lysimeter – tank connection pipe.



Fig A16. Placement of geomembrane and geotextile.



Fig A17. Controlled filling of lysimeter pit with subgrade and RSG.



Fig A18. Installation of volumetric water content and temperature sensors into subgrade and RSG in lysimeter pit Sensor 1 is in subgrade and Sensor 2 is in RSG.



Fig A19. Installation of temperature sensors into subgrade and RSG in lysimeter pit. Sensor 6 is in subgrade and Sensor 5 is in RSG.



Fig A20. Installation of volumetric water content and temperature sensors (Sensor 3) into S-RSG on lysimeter.



Fig A21. Compaction of sensor trench with a hand compactor in S-RSG



Fig A22. View of monitoring station.

APPENDIX B
BORE HOLE LOGS

Braun Project BBXX-01-097A Geotechnical Evaluation Various Gravel Roads Chisago County, Minnesota		BORING: 53-0+00 LOCATION: 25' Right			
DRILLER:		METHOD: Power Auger			
DATE: 5/24/01		SCALE: 1" = 4'			
Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0					
0.3	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, Aggregate Base, brown, moist.			
2.0	CL	FILL: Silty Sand, fine- to medium-grained, trace of Gravel with roots, dark gray, moist. LEAN CLAY, with a trace of Gravel, light yellow brown, moist.			
5.0		END OF BORING. Boring then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)

BRAUN BASIC LOG B1097A.GPJ BRAUN.GDT 6/27/01 12:08

BRAUN™**LOG OF BORING****INTERTEC**

Braun Project BBXX-01-097A			BORING: 53-5+00		
Geotechnical Evaluation			LOCATION: 24' in the Middle		
Various Gravel Roads					
Chisago County, Minnesota					
DRILLER:		METHOD: Power Auger	DATE: 5/24/01	SCALE: 1" = 4'	
Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0					
0.6	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, Aggregate Base, reddish brown, moist.			
2.0	CL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, dark gray, moist. LEAN CLAY, with a trace of Gravel, light yellowish brown, moist.			
5.0		END OF BORING. Boring then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)

BRAUN BASIC LOG: B1097A.GPJ BRAUN GPT 6/27/01 12-11

Braun Project BBXX-01-097A Geotechnical Evaluation Various Gravel Roads Chisago County, Minnesota		BORING: 53-10+00 LOCATION: 24' Left			
DRILLER:		METHOD: Power Auger	DATE: 5/24/01	SCALE: 1" = 4'	
Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0					
0.8	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, Aggregate Base, reddish brown, moist.			
2.0	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, grayish brown, moist.			
	CL	LEAN CLAY, with a trace of Gravel, yellowish brown, moist.			
5.0		END OF BORING. Boring then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)

BRAUN BASIC LOG R1097A.GPJ BRAUN.GDT 6/27/01 12:08

BRAUN™**LOG OF BORING****INTERTEC**

Braun Project BBXX-01-097A Geotechnical Evaluation Various Gravel Roads Chisago County, Minnesota	BORING: 53-15+00
	LOCATION: 26' in the Middle

DRILLER:	METHOD: Power Auger	DATE: 5/24/01	SCALE: 1" = 4'
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Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0					
0.7	FILL SP	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, Aggregate Base, yellowish brown, moist. POORLY GRADED SAND, fine- to medium-grained, yellowish brown, moist.			
4.0					
5.0	CL	LEAN CLAY, with a trace of Gravel, grayish brown, moist. END OF BORING. Boring then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)

BRAUN BASIC LOG B1097A.GPJ BRAUN.GDT 6/27/01 12:09

Braun Project BBXX-01-097A Geotechnical Evaluation Various Gravel Roads Chisago County, Minnesota		BORING: 53-25+00 LOCATION: 24' Right			
DRILLER:		METHOD: Power Auger			
DATE: 5/24/01		SCALE: 1" = 4'			
Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, Aggregate Base, yellowish brown, moist.			
0.5	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, dark gray, moist.			
2.0	ML	SILT, with wood, black, moist.			
5.0		END OF BORING. Boring then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)

BRAUN BASIC LOG: B1097A.GPJ BRAUN.GDT 6/27/01 12:09

Braun Project BBXX-01-097A Geotechnical Evaluation Various Gravel Roads Chisago County, Minnesota		BORING: 53-30+00 LOCATION: 26' in the Middle			
DRILLER:		METHOD: Power Auger	DATE: 5/24/01	SCALE: 1" = 4'	
Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0					
0.8	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, Aggregate Base, yellowish brown, moist.			
2.0	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, dark gray, moist.			
	CL	LEAN CLAY, with a trace of Gravel, light yellowish brown, moist.			
5.0		END OF BORING. Boring then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)

BRAUN BASIC LOG B1097A.GPJ BRAUN GDT 6/27/01 12:10

Braun Project BBXX-01-097A Geotechnical Evaluation Various Gravel Roads Chisago County, Minnesota		BORING: 53-35+00 LOCATION: 26' Left			
DRILLER:		METHOD: Power Auger			
DATE: 5/24/01		SCALE: 1" = 4'			
Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0					
0.4	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, Aggregate Base, yellowish brown, moist.			
2.0	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, dark brown, moist.			
	SP	POORLY GRADED SAND, fine- to medium-grained, yellowish brown, moist.			
5.0		END OF BORING. Boring then backfilled.			

BRAUN BASIC LOG B1007A.GPJ BRAUNLOGDT 6/27/01 12:10
 (See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project BBXX-01-097A Geotechnical Evaluation Various Gravel Roads Chisago County, Minnesota		BORING: 53-40+00 LOCATION: 24' in the Middle			
DRILLER:		METHOD: Power Auger	DATE: 5/24/01	SCALE: 1" = 4'	
Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0					
0.4	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, Aggregate Base, yellowish brown, moist.			
1.5	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, brown, moist.			
	SM	SILTY SAND, fine-grained, with a trace of Gravel, dark gray, moist.			
3.5					
	SP	POORLY GRADED SAND, fine- to medium-grained, orangish brown, moist.			
5.0		END OF BORING. Boring then backfilled.			

BRAUN BASIC LOG BU097A.GPJ BRAUN.GDT 6/27/01 12:10
 (See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project BBXX-01-097A Geotechnical Evaluation Various Gravel Roads Chisago County, Minnesota		BORING: 53-45+20 LOCATION: 25' Left, #323			
DRILLER:		METHOD: Power Auger			
DATE: 5/24/01		SCALE: 1" = 4'			
Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0					
0.3	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, Aggregate Base, brown, moist.			
1.5	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, dark brown, moist.			
	CL	LEAN CLAY, with a trace of Gravel, light yellowish brown, moist.			
5.0		END OF BORING. Boring then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)
 BRAUN-BASIC-LOG-BL097A.GPJ BRAUN.GDT 6/27/01 12:11

BRAUN™**LOG OF BORING****INTERTEC**

Braun Project BBXX-01-097A
Geotechnical Evaluation
Various Gravel Roads
Chisago County, Minnesota

BORING: **53-50+00**

LOCATION: 25' in the Middle

DRILLER:

METHOD: Power Auger

DATE: 5/24/01

SCALE: 1" = 4'

Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0					
0.8	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, Aggregate Base, brown, moist.			
	SP	POORLY GRADED SAND, fine- to medium-grained, yellowish brown, moist.			
4.5					
5.0	CL	LEAN CLAY, with a trace of Gravel, green to brown, waterbearing.			
		END OF BORING.			
		Boring then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)

BRAUN BASIC LOG B1097A.GPJ BRAUN.GDT 6/27/01 12:11

Braun Project BBXX-01-097A Geotechnical Evaluation Various Gravel Roads Chisago County, Minnesota			BORING: 53-55+00 LOCATION: 25' Left		
DRILLER:		METHOD: Power Auger		DATE: 5/24/01	SCALE: 1" = 4'
Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0					
0.7	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, Aggregate Base, brown, moist.			
2.0	SM	SILTY SAND, fine- to medium-grained, with a trace of Gravel, dark gray, moist.			
	CL	LEAN CLAY, with a trace of Gravel, light yellowish brown, moist.			
5.0		END OF BORING. Boring then backfilled.			

BRAUN BASIC LOG B1097A.GPJ BRAUN.GDT 6/27/01 12:12
 (See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project BBXX-01-097A Geotechnical Evaluation Various Gravel Roads Chisago County, Minnesota		BORING: 53-60+00 LOCATION: 26' in the Middle			
DRILLER:		METHOD: Power Auger			
DATE: 5/24/01		SCALE: 1" = 4'			
Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0					
0.6	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, Aggregate Base, brown, moist.			
2.0	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, grayish brown, moist.			
3.0	SM	SILTY SAND, fine- to medium-grained, with a trace of Gravel, dark brownish gray, moist.			
	CL	LEAN CLAY, with a trace of Gravel, light gray, moist.			
5.0		END OF BORING. Boring then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)

BRAUN BASIC LOG, B1097A.GPJ BRAUN.GDT 6/27/01 12:12

Braun Project BBXX-01-097A Geotechnical Evaluation Various Gravel Roads Chisago County, Minnesota			BORING: 53-65+00 LOCATION: 26' Right		
DRILLER:		METHOD: Power Auger		DATE: 5/24/01	SCALE: 1" = 4'
Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0					
0.7	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, Aggregate Base, yellowish brown, moist.			
2.0	FILL	FILL: Silt with Sand, with a trace of Gravel, dark brown, moist.			
3.5	CL	LEAN CLAY, with a trace of Gravel, gray, moist.			
5.0	CL	LEAN CLAY, with a trace of Gravel, light yellowish brown, moist.			
		END OF BORING.			
		Boring then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)
 BRAUN BASIC LOG B1097A CPT BRAUN.GDT 6/27/01 12:12

Braun Project BBXX-01-097A Geotechnical Evaluation Various Gravel Roads Chisago County, Minnesota		BORING: 53-70+00 LOCATION: 26' in the Middle			
DRILLER:		METHOD: Power Auger			
DATE: 5/24/01		SCALE: 1" = 4'			
Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0					
0.8	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, Aggregate Base, yellowish brown.			
2.0	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, light gray.			
	CL	LEAN CLAY, with a trace of Gravel, light yellowish brown.			
5.0		END OF BORING. Boring then backfilled.			

BRAUN BASIC LOG B1097A.GPJ BRAUN.GDT 6/27/01 12:12: (See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project BBXX-01-097A Geotechnical Evaluation Various Gravel Roads Chisago County, Minnesota			BORING: 53-75+00 LOCATION: 26' Right		
DRILLER:		METHOD: Power Auger		DATE: 5/24/01	SCALE: 1" = 4'
Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0					
0.1	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, Aggregate Base, yellowish brown, moist.			
2.0	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, dark gray, moist.			
	SM	SILTY SAND, fine- to medium-grained, with a trace of Gravel, light yellowish brown, moist.			
5.0		END OF BORING. Boring then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)

BRAUN BASIC LOG B1097A.GPJ BRAUN.GDT 6/27/01 12:13

Braun Project BBXX-01-097A Geotechnical Evaluation Various Gravel Roads Chisago County, Minnesota			BORING: 53-80+00 LOCATION: 23' in the Middle		
DRILLER:		METHOD: Power Auger		DATE: 5/24/01	SCALE: 1" = 4'
Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, light grayish brown, moist.			
0.6	SM	SILTY SAND, fine- to medium-grained, with a trace of Gravel, light grayish brown, moist.			
2.0	ML	SILT, with organics and fibers, black, moist.			
5.0		END OF BORING. Boring then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)

BRAUN-BASIC LOG B1097A.GPJ BRAUN.GDT 6/27/01 12:13

Braun Project BBXX-01-097A Geotechnical Evaluation Various Gravel Roads Chisago County, Minnesota	BORING: 53-85+00
	LOCATION: 28' Right

DRILLER:	METHOD: Power Auger	DATE: 5/24/01	SCALE: 1" = 4'
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Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0					
0.5	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, yellowish brown, moist.			
2.0	FILL	FILL: Lean Clay, with a trace of Gravel, gray, moist.			
	CL	LEAN CLAY, with a trace of Gravel, light yellowish brown, moist.			
5.0		END OF BORING. Boring then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)
 BRAUN BASIC LOG B1097A.GPJ BRAUN.GDT 6/27/01 12:13

BRAUN™**LOG OF BORING****INTERTEC**

Braun Project BBXX-01-097A			BORING: 53-90+00		
Geotechnical Evaluation			LOCATION: 26' in the Middle		
Various Gravel Roads					
Chisago County, Minnesota					
DRILLER:		METHOD: Power Auger	DATE: 5/24/01	SCALE: 1" = 4'	
Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0					
0.7	FILL SP	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, Aggregate Base, yellowish brown, moist. POORLY GRADED SAND, fine- to medium-grained, brown, moist.			
4.0					
5.0	CL	LEAN CLAY, bluish gray, moist.			
		END-OF BORING. Boring then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)

BRAUN BASIC LOG B1097A.GPJ BRAUN.GDT 6/7/01 12:14

Braun Project BBXX-01-097A Geotechnical Evaluation Various Gravel Roads Chisago County, Minnesota		BORING: 53-95+00 LOCATION: 26' Left			
DRILLER:		METHOD: Power Auger			
DATE: 5/24/01		SCALE: 1" = 4'			
Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0					
0.3	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, Aggregate Base, yellowish brown, moist.			
2.0	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, dark brown, moist.			
	CL	LEAN CLAY, with a trace of Gravel, light yellowish gray, moist.			
5.0		END OF BORING. Boring then backfilled.			

BRAUN BASIC LOG B1097A.GPJ BRAUN.GDT 6/22/01 12:14
 (See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project BBXX-01-097A Geotechnical Evaluation Various Gravel Roads Chisago County, Minnesota			BORING: 53-105+00 LOCATION: 26' Right		
DRILLER:		METHOD: Power Auger		DATE: 5/24/01	SCALE: 1" = 4'
Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0					
0.3	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, Aggregate Base, brown, moist.			
2.0	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, dark gray, moist.			
	CL	LEAN CLAY, with a trace of Gravel, light yellowish brown, moist.			
5.0		END OF BORING. Boring then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)

BRAUN BASIC LOG B1097A.GPJ BRAUN.GDT 6/27/01 12:39

Braun Project BBXX-01-097A Geotechnical Evaluation Various Gravel Roads Chisago County, Minnesota		BORING: 53-110+00 LOCATION: 25' in the Middle			
DRILLER:		METHOD: Power Auger			
DATE: 5/24/01		SCALE: 1" = 4'			
Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
0.0	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, Aggregate Base, yellowish brown.			
0.7	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of Gravel, dark brown.			
2.5	CL	LEAN CLAY, with a trace of Gravel, black.			
5.0		END OF BORING. Boring then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)
 BRAUN BASIC LOG B1097A.GPJ BRAUN.GDT 5/27/01 12:09

APPENDIX C

LYSIMETER MONITORING DATA

Table C1. Summary of lysimeter data (except concentrations).

LYSIMETER DATA FORM

Site: Chisago Cty, MN

Lysimeter Size:	9.3	m²	Thickness =	0.63	m	Porosity =	0.258	
Construction Date:	9/1/2005		Dry Density =		19.3	kN/m³	PV=	1.512
			Water content =		7.5	%		

Sample	Air	EC	Eh	pH	Cum	Drain	PVF
ID	Temp	mS/cm	mV	(-)	(L)	(mm/d)	(-)
	(F)						
11/03/05	-	471	237.1	6.77	183	0.31	0.121062
12/19/05	-10	579	135.4	7.43	5283	12.35	3.494921
01/17/06	24	789	341.5	7.04	5683	21.07	3.759538
2/17/2006	-1	1130	280	7.56	7683	26.65	5.08262
3/24/2006	37	669	68.5	7.31	24183	74.29	15.99805
4/17/2006	68	1150	74.9	7.39			
5/1/2006		2810	128.2	7.02			
7/5/2006	80	898	40.8	7.09			
7/31/2006	100	813	78.8	7.38			

Table C2. Summary of concentrations in drainage from lysimeter.

Sample ID	Lab Rpt	PVF	Ca ppb	Zn ppb	B ppb	Mn ppb	Sr ppb	Be ppb	V ppb
C-11-03-05	5102	0.12	64406	59.4	85.9	2.3	109.4	<0.06	3.95
C-12-19-05	5102	0.35	100194	141.8	36.7	1884.8	148.1	<0.06	2.26
C-01-17-06	5101	0.38	127058	30.6	34.1	3682	166.6	<0.06	2.38
C-02-17-06	5357	0.51	153039	36.0	<20	1272	227.1	<0.06	13.28
C-03-24-06	5487	1.60	61337	4.7	57.3	212	97.7	<0.06	26.08

Sample ID	Lab Rpt	PVF	Cr ppb	Co ppb	Ni ppb	Cu ppb	As ppb	Se ppb	Cu ppb
C-11-03-05	5102	0.12	0.67	1.06	10.0	5.81	2.39	<2	5.81
C-12-19-05	5102	0.35	0.61	3.02	16.1	4.84	1.55	<2	4.84
C-01-17-06	5101	0.38	0.88	4.99	17.3	2.48	11.3	<2	2.48
C-02-17-06	5357	0.51	0.84	3.28	20	3.6	3.2	3	3.6
C-03-24-06	5487	1.60	1.89	1.21	7.99	8.78	3.34	6.60	8.78

Sample ID	Lab Rpt	PVF	As ppb	Se ppb	Mo ppb	Ag ppb	Cd ppb	Sn ppb	Sb ppb
C-11-03-05	5102	0.12	2.39	<2	10.6	<0.02	0.07	0.21	0.63
C-12-19-05	5102	0.35	1.55	<2	2.8	<0.02	<0.06	0.04	0.36
C-01-17-06	5101	0.38	11.3	<2	1.08	<0.02	<0.06	0.12	0.41
C-02-17-06	5357	0.51	3.2	3	0.8	<0.02	<0.06	0.08	0.17
C-03-24-06	5487	1.60	3.34	6.60	6.26	<0.02	<0.06	<0.03	0.13

Sample ID	Lab Rpt	PVF	Ba ppb	Tl ppb	Pb ppb	Hg ppb	F ppb	Cl ppb	NO2 ppb
C-11-03-05	5102	0.12	39.8	<0.02	0.14	<0.1	<10	32220	<10
C-12-19-05	5102	0.35	59.6	<0.02	0.03	<0.1	<10	25160	<10
C-01-17-06	5101	0.38	98.0	<0.02	0.17	<0.1	<10	30608	<10
C-02-17-06	5357	0.51	121.7	<0.02	0.06		<10	221900	<10
C-03-24-06	5487	1.60	51.56	0.03	0.11		110	138730	<10

Sample ID	Lab Rpt	PVF	Br ppb	NO3 ppb	PO4 ppb	SO4 ppb	Eh mV	pH (-)
C-11-03-05	5102	0.12	2463	<12	4621	21347	237.1	6.77
C-12-19-05	5102	0.35	14800	<13	4669	34370	135.4	7.43
C-01-17-06	5101	0.38	<11	<12	4623	20704	341.5	7.04
C-02-17-06	5357	0.51	<10	4884	<20	26442	280	7.56
C-03-24-06	5487	1.60	<10	8940	<20	11590	68.5	7.31

APPENDIX D

COLUMN LEACH TEST DATA

Table D1. Summary of concentrations in effluent from CLT on S-RSG from Station 2.

<u>PVF</u>	<u>Ca</u> <u>ppm</u>	<u>Ba</u> <u>ppm</u>	<u>B</u> <u>ppm</u>	<u>Sr</u> <u>ppm</u>	<u>Sb</u> <u>ppb</u>	<u>As</u> <u>ppb</u>	<u>Be</u> <u>ppb</u>	<u>Cd</u> <u>ppb</u>	<u>Cr</u> <u>ppb</u>	<u>Co</u> <u>ppb</u>
0.13	157	3.92	0.44	9.09	0.92	36	0.16	4.68	543	11.45
0.45	153	4.49	0.37	9.35	0.65	33	0.16	3.00	427	7.58
0.70	159	4.48	0.31	9.15	0.60	30	0.17	2.22	384	6.08
1.05	155	4.33	0.29	9.22	0.54	32	0.16	1.71	330	5.12
1.50	155	4.23	0.28	9.06	0.53	36	0.14	1.61	295	4.56
2.01	152	4.08	0.27	8.56	0.50	35	0.17	1.21	243	3.57
3.03	154	3.94	0.29	8.33	0.43	33	0.15	1.00	227	3.07
4.07	143	3.94	0.29	8.02	0.54	37	0.20	0.95	199	2.79
6.12	164	3.96	0.27	7.45	0.47	34	0.13	0.70	166	2.67
8.37	143	3.80	0.28	6.87	0.49	36	0.15	0.58	161	2.27
10.08	89	3.33	0.34	5.92	0.55	34	0.16	0.45	142	1.67
12.43	150	3.56	0.29	5.81	0.57	34	0.19	0.49	115	1.78
15.20	131	3.24	0.29	5.03	0.51	33	0.18	0.34	93	1.64

<u>PVF</u>	<u>Cu</u> <u>ppb</u>	<u>Pb</u> <u>ppb</u>	<u>Mn</u> <u>ppb</u>	<u>Mo</u> <u>ppb</u>	<u>Ni</u> <u>ppb</u>	<u>Se</u> <u>ppb</u>	<u>Ag</u> <u>ppb</u>	<u>Tl</u> <u>ppb</u>	<u>Sn</u> <u>ppb</u>	<u>V</u> <u>ppb</u>	<u>Zn</u> <u>ppb</u>
0.13	141	2.06	0.93	1314	36	32	0.03	0.04	0.18	264	65
0.45	90	0.40	0.31	889	24	33	<0.02	0.04	0.08	230	23
0.70	77	0.38	0.46	732	22	32	0.02	0.05	0.06	223	27
1.05	62	0.23	0.34	576	20	36	<0.02	0.06	0.08	214	16
1.50	54	0.22	0.33	499	18	41	0.02	0.06	0.09	217	30
2.01	44	0.18	0.37	379	15	41	0.04	0.06	0.09	213	19
3.03	42	0.19	0.44	333	15	41	0.03	0.06	0.05	212	13
4.07	36	0.16	0.49	280	13	46	0.08	0.07	0.06	214	36
6.12	31	0.11	0.49	216	14	43	0.05	0.06	0.05	195	11
8.37	31	0.12	0.51	180	13	48	0.02	0.06	0.07	210	6
10.08	28	0.06	1.19	153	10	46	0.03	0.06	<0.03	220	6
12.43	26	0.09	0.49	126	11	48	0.03	0.04	0.07	214	3
15.20	19	0.07	0.48	95	11	45	0.03	0.04	0.05	225	3

Table D2. Summary of concentrations in effluent from CLT on S-RSG from Station 2 (Ion Chromotography)

Sample ID	PVF	F (ppm)	Cl (ppm)	Chloridometer* (ppm)	NO2 (ppm)	Br (ppm)	NO3 (ppm)	PO4 (ppm)	SO4 (ppm)
CH2-1	0.13	3.12	3386.88	2245.40	<0.01	6.20	142.28	6.67	97.76
CH2-4	0.45	1.59	4275.39	2733.50	<0.01	<0.01	73.59	<0.02	82.32
CH2-6	0.70	1.40	4525.17	2893.20	<0.01	<0.01	60.32	<0.02	77.83
CH2-9	1.05	1.32	4741.20	2822.30	<0.01	<0.01	43.90	<0.02	72.43
CH2-12	1.50	1.30	4955.69	3310.40	<0.01	<0.01	34.14	<0.02	68.36
CH2-15	2.01	1.22	5083.70	3115.10	<0.01	<0.01	22.40	<0.02	60.48
CH2-19	3.03	1.22	5256.11	2973.10	<0.01	<0.01	15.59	<0.02	55.74
CH2-21	4.07	1.24	5398.48	3345.90	<0.01	<0.01	11.29	<0.02	48.09
CH2-25	6.12	1.24	5375.08	3310.40	<0.01	<0.01	6.90	<0.02	41.91
CH2-28	8.37	1.15	5479.48	3505.60	<0.01	<0.01	5.33	<0.02	41.11
CH2-30	10.08	1.05	5479.14	3390.30	<0.01	<0.01	3.78	<0.02	38.54
CH2-34	12.43	0.95	5262.73	3354.80	<0.01	<0.01	3.56	<0.02	35.76
CH2-39	15.20	0.87	5450.66	3115.10	<0.01	<0.01	3.38	<0.02	35.69

* Chloridometer was used to run samples for Cl since the Cl concentration is too high for IC and dilution will render the other anions undetectable.

Table D3. Summary of concentrations in effluent from CLT on S-RSG from Station 5.

PVF	Ca ppm	Ba ppm	B ppm	Sr ppm	Sb ppb	As ppb	Be ppb	Cd ppb	Cr ppb	Co ppb
0.10	331	0.84	2.82	8.27	2.18	50	1.02	3.52	801	24.64
0.29	251	1.32	1.63	9.45	1.64	34	0.70	1.84	467	12.50
0.49	231	1.68	1.23	9.95	1.35	28	0.41	1.80	420	10.28
0.68	219	2.12	0.96	10.30	1.17	27	0.27	1.42	411	8.78
0.88	201	2.39	0.70	10.55	0.98	27	0.21	1.30	360	7.36
1.56	222	3.28	0.55	11.20	0.83	26	0.27	1.08	337	6.21
2.82	211	4.43	0.54	10.94	0.61	25	0.24	0.89	277	4.03
4.42	207	4.46	0.46	9.55	0.48	27	0.25	0.88	247	3.43
6.84	173	4.10	0.49	8.26	0.55	28	0.25	0.69	219	2.60
9.53	157	3.74	0.43	6.90	0.49	26	0.23	0.39	169	2.21
12.21	156	3.32	0.40	5.76	0.52	27	0.29	0.41	149	2.23
14.39	114	3.00	0.41	4.95	0.56	29	0.25	0.25	127	1.71
18.05	136	2.74	0.43	4.14	0.55	27	0.27	0.20	92	1.57

PVF	Cu ppb	Pb ppb	Mn ppb	Mo ppb	Ni ppb	Se ppb	Ag ppb	Tl ppb	Sn ppb	V ppb	Zn ppb
0.10	244	0.42	0.42	1068	54	45	0.03	0.15	<0.03	294	23
0.29	169	0.20	0.47	692	43	40	<0.02	0.14	0.08	228	10
0.49	152	0.16	0.46	599	35	35	0.04	0.11	0.11	216	9
0.68	137	0.30	0.44	540	33	35	<0.02	0.10	0.05	214	19
0.88	115	0.23	0.30	458	31	35	0.03	0.10	0.06	195	9
1.56	101	1.52	0.43	405	27	35	0.03	0.09	0.03	186	8
2.82	66	0.74	0.36	274	21	35	0.03	0.08	0.10	173	8
4.42	58	0.81	0.43	231	19	37	0.03	0.09	0.11	170	8
6.84	47	0.55	0.56	189	17	40	0.05	0.09	0.05	175	6
9.53	36	3.98	0.46	110	13	38	0.03	0.08	0.05	173	6
12.21	32	0.28	0.99	69	12	39	0.05	0.07	0.04	194	27
14.39	26	0.11	0.40	51	9	41	0.02	0.07	0.03	200	3
18.05	23	0.16	0.54	32	9	39	<0.02	0.06	0.05	211	1

Table D4. Summary of concentrations in effluent from CLT on S-RSG from Station 5 (Ion Chromotography)

Sample ID	PVF	F (ppm)	Cl (ppm)	Chloridometer* (ppm)	NO2 (ppm)	Br (ppm)	NO3 (ppm)	PO4 (ppm)	SO4 (ppm)
CH5-1	0.10	42.07	2974.38	1987.90	27.19	12.09	255.68	8.28	553.94
CH5-3	0.29	18.04	3691.83	2484.90	<0.01	<0.01	87.79	<0.02	102.84
CH5-5	0.49	14.71	4041.45	2724.60	<0.01	<0.01	71.34	<0.02	78.75
CH5-7	0.68	12.44	4235.54	2786.70	<0.01	<0.01	61.18	<0.02	69.32
CH5-11	0.88	9.69	4347.48	2786.70	<0.01	<0.01	46.88	<0.02	60.31
CH5-12	1.56	6.71	4787.20	3026.40	<0.01	<0.01	30.91	<0.02	56.63
CH5-15	2.82	2.48	5411.90	3496.70	<0.01	<0.01	7.47	<0.02	49.45
CH5-18	4.42	1.61	5497.54	3612.10	<0.01	<0.01	3.86	<0.02	62.32
CH5-21	6.84	1.41	5518.06	3656.50	<0.01	<0.01	3.63	<0.02	49.36
CH5-23	9.53	1.22	5459.96	3399.10	<0.01	<0.01	2.74	<0.02	49.20
CH5-26	12.21	1.05	5465.36	3443.80	<0.01	<0.01	0.66	<0.02	33.08
CH5-29	14.39	0.86	5324.30	3354.80	<0.01	<0.01	3.38	5.04	36.72
CH5-32	18.05	0.65	5371.42	3443.50	<0.01	<0.01	3.48	<0.02	39.99

* Chloridometer was used to run samples for Cl since the Cl concentration is too high for IC and dilution will render the other anions undetectable.

APPENDIX E

ON-SITE METEOROLOGICAL DATA

(to be added in final copy...this is a big file)