RE: West Lake Landfill OU-2 Part 1 of 2
Ward Herst
to:
'Paul Rosasco', Dan Gravatt, david.vasbinder
11/26/2012 09:40 AM
Hide Details
From: "Ward Herst" <wherst@herstassociates.com>

To: "'Paul Rosasco'" <paulrosasco@emsidenver.com>, Dan Gravatt/R7/USEPA/US@EPA, <david.vasbinder@republicservices.com>

1 Attachment

Pages 1-203.pdf.pdf

The following Attachments are available only on CD
Pages 1-203.pdf.pdf

Attached is Part 1 of 2 well construction information for OU-2. The boring logs / well construction summaries are taken from the 1996 Physical Characterization Memorandum, Volume III, dated August 15, 1996

Ward Herst
Managing Partner

(636) 939-9111 phone
(636) 939-9757 fax
(314) 368-3874 cell

Herst & Associates, Inc.
4631 North St. Peters Parkway
St. Charles, MO 63304

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Superfund

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OU01

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From: Paul Rosasco [mailto:paulrosasco@emsidenver.com]
Sent: Friday, November 23, 2012 11:43 AM
To: Gravatt.Dan@epamail.epa.gov; david.vasbinder@republicservices.com
Cc: Ward Herst
Subject: RE: West Lake Landfill: compilation of monitoring well construction data?

The boring logs for the OU-1 wells are contained in the McLaren Hart Groundwater Conditions Report. I am out of town and do not have a copy of that report with me but will assemble and scan these logs/boring construction records when I am back in the office next week and send them to you.

There were no boring logs included in the NRC reports and I have never seen any boring logs for the NRC borings (identified with the "PVC" designation in the OU-1 RI reports).

I only have paper copies of the OU-2 boring logs/ well construction records that are contained in the various OU-2 reports. Ward, could you assemble an electronic version of these and send them to all of us on this e-mail?

I do not have either paper or electronic copies of any of the logs of the wells around the quarry pits. Again, Ward, could you have someone assemble and electronic version of these and send it to us.

Thanks.

From: Gravatt.Dan@epamail.epa.gov [mailto:Gravatt.Dan@epamail.epa.gov]
Sent: Wednesday, November 21, 2012 12:03 PM
To: Paul Rosasco; david.vasbinder@republicservices.com
Subject: West Lake Landfill: compilation of monitoring well construction data?

Paul, David,
To help interpret the gamma log data I just collected, I am trying to find construction details for the wells I logged (almost all of the 75 you sampled for groundwater back in July-August). I have only found a very few partial sets of well construction data for these wells in the reports and documents I have looked at (McLaren Hart 1996, OU1 RI, OU2 RI, OU1 site characterization summary, etc). Do you know of other documents or a master list where this construction information would be found? I've asked Shawn Muenks at MDNR to look into their well registry database as well. Generally, what I want to know about each well is the depth intervals for the sand pack, bentonite seal, concrete/grout backfill, and any steel casings, as I suspect each of these materials will attenuate and/or emit gammas differently.

Thanks,
Daniel R. Gravatt, PG
US EPA Region 7 SUPR / MOKS
11201 Renner Boulevard, Lenexa, KS 66219
Phone (913) 551-7324

Principles and integrity are expensive, but they are among the very few things worth having.

PHYSICAL CHARACTERIZATION TECHNICAL MEMORANDUM FOR THE WEST LAKE LANDFILL OPERABLE UNIT 2 BRIDGETON, MISSOURI

VOLUME III:
APPENDICES

Prepared for:

LAIDLAW

LAIDLAW WASTE SYSTEMS INC.

Prepared by:

APPENDIX A

SOIL BOREHOLE LOGS AND RECORD OF DRILLHOLE LOGS

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			GRAPHIC SYMBOL	GROUP SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LESS THAN 5% FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO.4 SIEVE	GRAVELS WITH FINES (MORE THAN 12% FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO.200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SAND (LESS THAN 5% FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING NO.4 SIEVE	SANDS WITH FINES (MORE THAN 12% FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50%		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO.200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50%		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.

SOLID WASTE

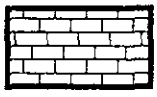
Golder Associates Denver, Colorado

TITLE: SOIL CLASSIFICATION CHART

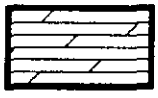
CLIENT/PROJECT: LAIDLAW WASTE SYSTEMS INC. — BRIDGETON ACTIVE SANITARY LANDFILL

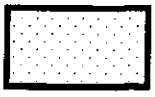
DRAWN BDL	DATE SEPT. 1995	JOB NO. 943-2848
CHECKED BGT	SCALE N/A	DWG NO./REV. NO.
REVIEWED WEH	FILE NO.	FIGURE NO. A-1

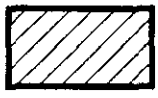
BEDROCK SYMBOL CHART


LIMESTONE

SILTSTONE


DOLOMITE


SANDSTONE


CLAYSTONE

CHERT

Golder Associates
Denver, Colorado

CLIENT/PROJECT
LAIDLAW
LAIDLAW WASTE SYSTEMS INC.
BRIDGETON ACTIVE SANITARY LANDFILL

TITLE
RECORD OF DRILLHOLE
BEDROCK GRAPHIC SYMBOLS

DRAWN	SMA	DATE	SEPT.1995	JOB NO.	943-2848
CHECKED	CER	SCALE	NA	DWG NO./REV. NO.	A'01
REVIEWED	WEH	FILE NO.	2848A101	FIGURE NO.	A-2

Golder Rock Classification System

Weathered state, structure, GSA color (code), grain or crystal size, rock material strength, ROCK TYPE (FORMATION NAME)

TERM	CRITERION
Very thickly bedded	Thicker than 1 m
Thickly bedded	30-100 cm
Medium bedded	10-30 cm
Thinly bedded	3-10 cm
Very thinly bedded	1-3 cm
Thickly laminated	0.3-1 cm
Thinly laminated	Thinner than 0.3 cm

Source: Blatt, H., and E.G. Ehlers, 1982

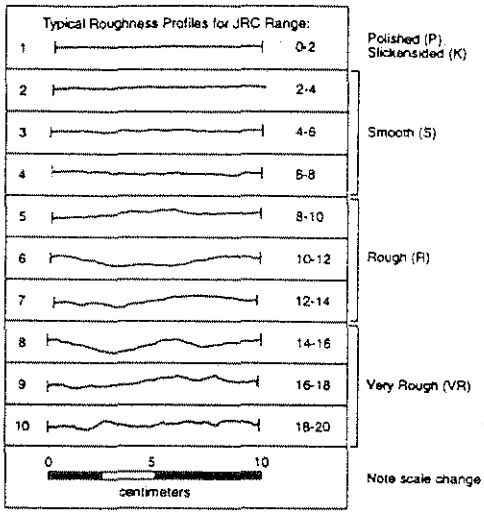
WENTWORTH GRAIN SCALE	
VC - Very Coarse	1-2 mm
C - Coarse	0.5-1 mm
M - Medium	0.25-0.5 mm
F - Fine	0.125-0.25 mm
VF - Very Fine	less than 0.125 mm

Source: Blatt, H., and E.G. Ehlers, 1982

Weathered State*

Term	Description	Grade
Fresh	No visible sign of rock material weathering; perhaps slight discoloration on major discontinuity surfaces.	I
Slightly Weathered	Discoloration indicates weathering of rock material and discontinuity surfaces. All the rock material may be discolored by weathering and may be somewhat weaker externally than in its fresh condition.	II
Moderately Weathered	Less than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a continuous framework or as corestones.	III
Highly Weathered	More than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a discontinuous framework or as corestones.	IV
Completely Weathered	All rock material is decomposed and/or disintegrated to soil. The original mass structure is still largely intact.	V
Residual Soil	All rock material is converted to soil. The mass structure and material fabric are destroyed. There is a large change in volume, but the soil has not been significantly transported.	VI

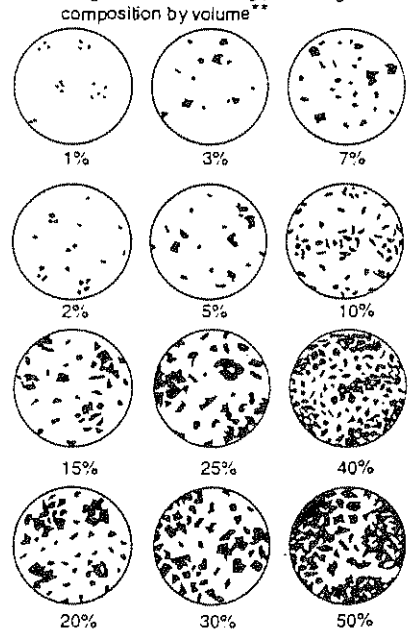
Discontinuity Roughness*



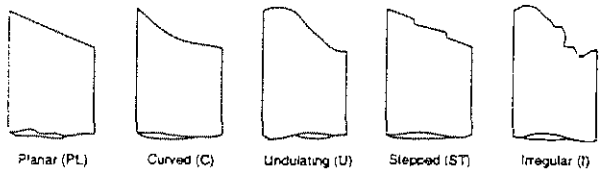
Rock Material Strength*

Grade	Description	Field Identification	Approximate range of uniaxial compressive strength (MPa)
S1	Very Soft Clay	Easily penetrated several inches by fist.	<0.025
S2	Soft Clay	Easily penetrated several inches by thumb.	0.025 - 0.05
S3	Firm Clay	Can by penetrated several inches by thumb with moderate effort.	0.05 - 0.10
S4	Stiff Clay	Readily indented by thumb but penetrated only with great effort.	0.10 - 0.25
S5	Very Stiff Clay	Readily indented by thumbnail.	0.25 - 0.50
S6	Hard Clay	Indented with difficulty by thumbnail.	>0.50
R0	Extremely Weak Rock	Indented with thumbnail.	0.25 - 1.0
R1	Very Weak Rock	Crumbles under firm blows with point of geological hammer, can be peeled by a pocket knife.	1.0 - 5.0
R2	Weak Rock	Can be peeled by a pocket knife with difficulty; shallow indentations made by firm blow with point of geological hammer.	5.0 - 25
R3	Medium Strong Rock	Cannot be scraped or peeled with a pocket knife, specimen can be fractured with single firm blow of geological hammer.	25 - 50
R4	Strong Rock	Specimen requires more than one blow of geological hammer to fracture it.	50 - 100
R5	Very Strong Rock	Specimen requires many blows of geological hammer to fracture it.	100 - 250
R6	Extremely Strong Rock	Specimen can only be chipped with geological hammer.	>250

Diagrams for estimating percentage composition by volume**



Discontinuity Shape Classification



Fracture Orientation wrt Core Axis

References:
* Brown, 1981
** Terry and Chilingar, 1955
Golder Associates Inc. Technical Procedures TP1.2-2

913 1092.300/25770 4/95

Golder Associates Denver, Colorado

TITLE

GOLDER ROCK CLASSIFICATION SYSTEM

CLIENT/PROJECT

LAIDLAW WASTE SYSTEMS INC. BRIDGETON ACTIVE SANITARY LANDFILL

DRAWN		DATE SEPT. 95	JOB NO. 943-2848
CHECKED BGT		SCALE N/A	DWG NO./REV. NO.
REVIEWED WEH		FILE NO.	FIGURE NO. A-3

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Weathered state, structure, GSA color (code), grain or crystal size, rock material strength, ROCK TYPE (FORMATION NAME)

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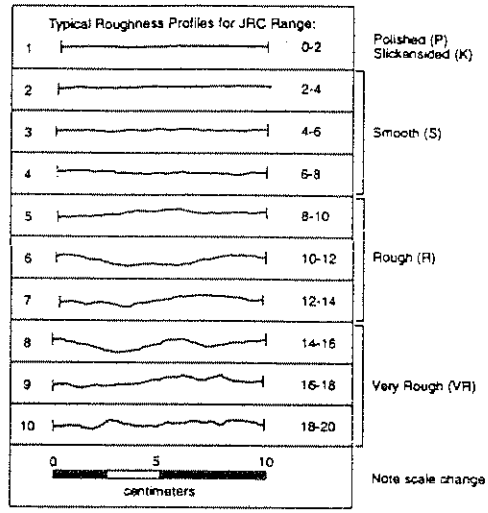

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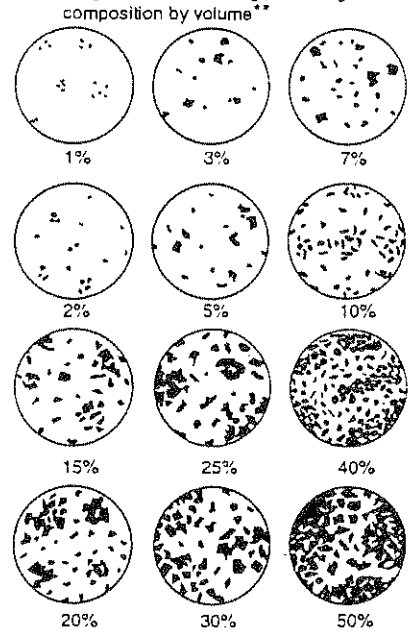
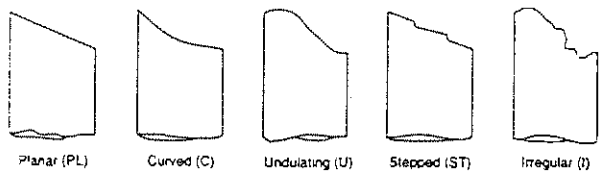


Discontinuity Shape Classification



Fracture Orientation wrt Core Axis

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Golder Associates Inc. Technical Procedures TP1.2-2

913 1092.300/25770 4/95

Golder Associates Denver, Colorado

TITLE

GOLDER ROCK CLASSIFICATION SYSTEM

CLIENT/PROJECT

LADLAW WASTE SYSTEMS INC.

BRIDGETON ACTIVE SANITARY LANDFILL

DRAWN		DATE SEPT. 95	JOB NO. 943-2848
CHECKED BGT		SCALE N/A	DWG NO./REV. NO.
REVIEWED WEH		FILE NO.	FIGURE NO. A-3

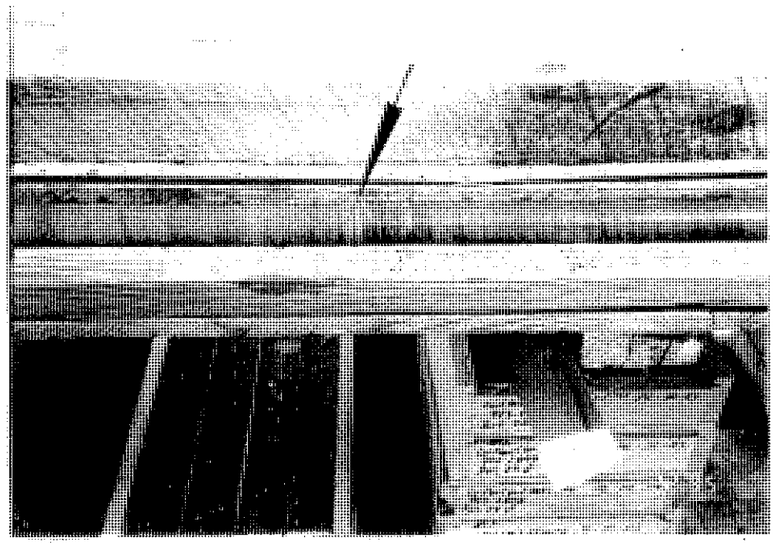

PHOTO 1: Example of a natural fracture in the Warsaw Formation at PZ-111-KS, Run# 19 from 223.5-225.5 ft. The fracture was described as follows: 90°-J,I,SM,CL.

PHOTO 2: Example of drilling induced fracture in the St.Louis Formation at PZ-205-SS, Run# 5 from 88.4-90.9 ft. Note that black "X" used in field examination to denote drilling induced fractures.

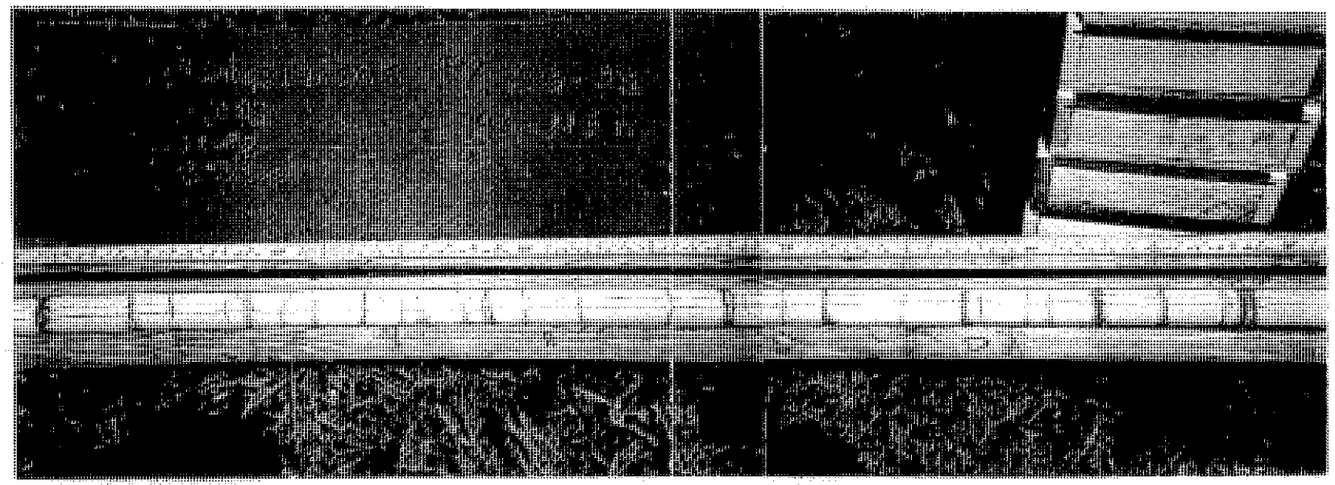

PHOTO: 3 Example of natural fractures in the upper St.Louis formation at PZ-208-SS, Run# 2 from 23.2-28.3 ft. See record of drillhole for descriptions of fractures.

Golder Associates Denver, Colorado	TITLE EXAMPLES OF ROCK CORE PHOTOGRAPHS SHOWING NATURAL AND DRILLING INDUCED FRACTURES		
CLIENT/PROJECT LAIDLAW WASTE SYSTEMS INC. WEST LAKE LANDFILL	DRAWN BGT	DATE JULY 1996	JOB NO. 943-2848
	CHECKED BGT	SCALE N/A	DWG. NO./REV. NO.
	REVIEWED WEH	FILE NO.	FIGURE NO. A-4

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	6.25 inch I.D. Hollow Stem Auger	PZ-100-KS
		SHEET 1 OF 3
	SAMPLING METHOD:	
	SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP)	DRILLING
	SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	START / FINISH
	WATER LEVEL	TIME / TIME
	TIME	13:20 / 17:42
	DATE	DATE / DATE
	CASING DEPTH	1/25/95 / 1/25/95

DATUM NORTHING: 1068842.03 EASTING: 517211.63 ELEVATION 483.8

DRILL RIG CME 75 - TRUCK MOUNT

SURFACE CONDITIONS

ANGLE BEARING

SAMPLE HAMMER

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
1	6 3 4 6	1.6'/2.0' (80%)			(0.0-7.2 ft.) Firm, dusky yellowish brown (10YR 2/2), SILTY CLAY, little organics, NR, moist, (CL), (LOESS)	SP 1	
2 3	4 6 7 8	1.8'/2.0' (90%)				SP 2	
4 5	2 5 5 5	1.7'/2.0' (85%)			@ 4.0 ft., color changes to moderate yellowish brown (10YR 5/4)	SP 3	
6 7	2 2 2 3	1.8'/2.0' (90%)			(7.2-11.6 ft.) Firm, moderate yellowish brown (10YR 5/4), mottled SILTY CLAY, NR, moist, (CL), (LOESS)	SP 4	
8 9	3 4 5 5	1.7'/2.0' (85%)				SP 5	
10 11	4 4 5 5	1.4'/2.0' (70%)			(472.2) 11.6	SP 6	
12 13	3 4 3 3	2.0'/2.0' (100%)			(11.6-19.2 ft.) Loose, moderate yellowish brown (10YR 5/4), mottled CLAYEY SILT, NR, moist, (ML), (LOESS)	SP 7	
14	1 3 6 7	1.8'/2.0' (90%)				SP 8	

DRILLING CONTR LAYNE-WESTERN

LOGGED BY J. MILLER CHK'D BY W. HERST

DATE 1/25/95

JOB NO.: 943-2848

FILENAME: PZ100KS

SOIL BOREHOLE LOG

LAIDLAW WASTE SYSTEMS INC.

SITE NAME AND LOCATION	DRILLING METHOD: 6.25 inch I.D. Hollow Stem Auger	BORING NO. PZ-100-KS
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP) SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	SHEET 2 OF 3
		DRILLING START TIME 13:20 DATE 1/25/95 — FINISH TIME 17:42 DATE 1/25/95
NORTHING: 1068842.03 DATUM EASTING: 517211.63 ELEVATION 483.8	WATER LEVEL / TIME / DATE / CASING DEPTH	
DRILL RIG CME 75 - TRUCK MOUNT	SURFACE CONDITIONS	
ANGLE BEARING		
SAMPLE HAMMER		

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
					(11.6-19.2 ft.) Loose, moderate yellowish brown (10YR 5/4), mottled CLAYEY SILT, NR, moist, (ML), (LOESS)	SP 8	
16	3 4 7 10	1.2'/2.0' (60%)				SP 9	
17							
18	3 4 5 7	1.9'/2.0' (95%)				SP 10	
19					(19.2-22.4 ft.) Loose, light olive gray (5Y 6/1), CLAYEY SILT, NR, moist, (ML), (LOESS)		
20	5 6 7 8	1.5'/2.0' (75%)				SP 11	
21							
22	2 7 9 10	1.2'/2.0' (60%)			(461.4) 22.4 (22.4-28.2 ft.) Compact light olive gray (5Y 6/1), fine SANDY SILT, NR, dry, (SM), (ALLUVIAL)	SP 12	
23							
24	5 10 9 14	1.7'/2.0' (85%)				SP 13	
25					@ 25.4 ft., partings of light olive gray (5Y 6/1), CLAYEY SILT		
26	3 9 14 15	1.4'/2.0' (70%)				SP 14	
27							
28	3 5 7 11	0.0'/2.0' (0%)			(455.6) 28.2 (28.2-32.1 ft.) Compact, light olive gray (5Y 6/1), mottled CLAYEY SILT, organics wet at 29.0 ft., NR, moist-wet, (ML), (ALLUVIAL)	SP 15	
29							

DRILLING CONTR LAYNE-WESTERN

LOGGED BY J. MILLER CHK'D BY W. HERST

DATE 1/25/95

JOB NO.: 943-2848

FILENAME: PZ100KS

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD: 6.25 inch I.D. Hollow Stem Auger	BORING NO. PZ-100-KS
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP) SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	SHEET 3 OF 3
NORTHING: 1068842.03 DATUM EASTING: 517211.63 ELEVATION 483.8	WATER LEVEL / TIME / DATE / CASING DEPTH	DRILLING START TIME 13:20 DATE 1/25/95; FINISH TIME 17:42 DATE 1/25/95
DRILL RIG CME 75 - TRUCK MOUNT	SURFACE CONDITIONS	
ANGLE BEARING		
SAMPLE HAMMER		

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
31	4 9 10 19	1.5'/2.0' (75%)			(28.2-32.1 ft.) Compact light olive gray (5Y 6/1), mottled CLAYEY SILT, NR, moist-wet, (ML), (ALLUVIAL)	SP 16	
32					@ 31.6 ft., ~1 inch of fine SAND (451.7) 32.1		
33	15 14 12 14	1.1'/2.0' (55%)			(32.1-33.9 ft.) Compact, brownish gray, (5YR 4/1), fine SAND, NR, wet, (SM), (ALLUVIAL)	SP 17	
34	50/6"	0.6'/2.0' (30%)			(33.9 ft.) Loose, light gray (5Y 6/1), CLAYEY SILT, NR, moist, (ALLUVIAL) (449.3) 34.5	SP 18	
35					End of Soil Borehole Log at 34.5 ft. See PZ-100-KS Record of Drillhole for rock descriptions		Augers chatter, spoon refusal, hit bedrock at 34.5 ft.
36							
37							
38							
39							
40							
41							
42							
43							
44							

DRILLING CONTR LAYNE-WESTERN

LOGGED BY J. MILLER CHK'D BY W. HERST

DATE 1/25/95

JOB NO.: 943-2848

FILENAME: PZ100KS

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.8
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (1:2)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
32	0.0-34.0 ft. See Soil Borehole Log PZ-100-KS														0.0-34.0 ft. Drilling conducted with 6.25 inch ID hollow stem augers
	449.80		449.80												
34	34.0-52.3 ft. 34.00 Slightly weathered, very thickly bedded, very light gray (N8), medium crystalline, weak, LIMESTONE, (ST. LOUIS FORMATION) 1 mm. iron concretions common, thin calcite vein (1 cm.), irregular joints, stylolitic		34.00						J,ST,R						1/27/95 Began coring
									J,I,R						
									J,I,R (2)						
									J,PL,R						
									J,C,R						
									J,I,R						
									J,PL,R						
36									J,I,R						
				1	100 %				J,I,R-CL						
									J,I,R						
38									J,PL,R						
			444.30												
			39.50						J,I,R						
40									J,PL,R						
									J,I,R						
									J,C,R						
									J,I,R						
42									J,C,R						
									J,PL,SM-CL (2)						
	42.9 ft. 1 in. thick clay seam								J,C,R						
				2	100 %				J,C,R						
44									J,ST,R						
									J,ST,R						
									J,PL,R						
46									J,PL,R						
									J,PL,R						
									J,C,R						
48															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.8
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH (FEET)	ROCK TYPE DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
48	34.0-52.3 ft. Slightly weathered, very thickly bedded, very light gray (N8), medium crystalline, weak, LIMESTONE, (ST. LOUIS FORMATION), 1 mm. iron concretions common, thin calcite vein (1 cm.), irregular joints, stylolitic						J,PL,R					
							J,PL,R					
			2	100 %			J,PL,R					
							J,ST,R					
		434.30 / 49.50										
							J,PL,R					
							J,ST,R					
50							J,C,R					
							J,PL,R (3)					
							J,PL,R (2)					
52	52.3-62.5 ft. Fresh, medium bedded, light gray (N7), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) Stylolitic, numerous clay filled discontinuities, some iron oxide staining											
54			3	100 %			J,PL,R					
							J,C,R					
56							J,I,R					
58							J,C,R					
							J,U,R					
		424.30 / 59.50										
							J,P,S (2)					1/27/95 @ 17:15 Measured water level in hole at 34.49 ft. below ground surface 1/28/95 @ 8:18 Measured water level in hole at 36.6 ft. below ground surface
60							J,I,R					
							J,PL,R-CL (2)					
			4	100 %			J,I,R (2)					
62	62.5-67.5 ft. Fresh, medium bedded, medium light gray (N6), crypto-crystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION)						J,C,R (2)					
64												

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.8
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH (FEET)	ROCK TYPE / DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
64	62.5-37.5 ft. Fresh, medium bedded, medium light gray (N6), crypto-crystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION)			4	100 %				J,I,R						
			418.70 / 65.10						J,C,R						
	1-2 in. chert nodules common														1/27/95 @ 17:15 Quit drilling for the day @ 65.1 ft.
66									J,PL,SM						
									J,I,R-CL (2)						
68	67.5-76.0 ft. Slightly weathered, medium bedded, olive gray (5Y 4/1), m-c grained, medium strong rock, CLASTIC LIMESTONE (ST. LOUIS FORMATION)								J,I,R						
									J,C,R						
70				5	99%				J,I,R (2)						
									J,C,R						
									J,I,R						
									J,C,R						
	Shaley partings common, fossiliferous								J,I,R (2)						
72									J,PL,R						
									J,ST,R						
74															
			408.70 / 75.10						J,PL,SM-CL (2)						
									J,C,R (2)						
76	76.0-88.5 ft. Slightly weathered, medium to thickly bedded, medium gray (N5) to light gray (N7), coarse grained, medium strong, CLASTIC LIMESTONE, (ST. LOUIS FORMATION)								J,PL,R-CL						
				6	99%										
78									J,C,R-CL						
									J,ST,R						
80	Stylolitic, shaley partings, sandy, more porous than above														

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.8
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
80	76.0-88.5 ft. Slightly weathered, medium to thickly bedded, medium gray (N5) to light grat (N7), coarse grained, medium strong, CLASTIC LIMESTONE, (ST. LOUIS FORMATION)							J,C,SM					
								J,PL,SM-CL					
82			8	99%									
								J,PL,SM (2)					
84								J,I,R-CL					
								J,I,VR (2)					
		398.70 / 85.10											
86								J,I,R					
								J,PL,R					
88			7	100 %									
	395.30 / 88.50 88.5-94.0 ft. Slightly weathered, thickly laminated to thinly bedded, medium gray (N5), fine grained, extremely weak to very weak, SILTY CLAYSTONE and SILTSTONE, (ST. LOUIS FORMATION) Pyrite in claystone, cross-bedded, fine sandy siltstone interbeds							J,I,R					
								J,I,R-CL					
								J,PL,SM					
90		393.40 / 90.40											
								J,I,R (3)					
								J,I,R					
								J,I,R (3)					
								J,I,R (2)					
92			8	79%				J,ST,SM					
								J,I,SM					92.7-93.3 ft. Core Loss
		390.50 / 93.30						J,I,R					
								J,I,R					
	389.80 / 94.00 94.0-98.0 ft. Slightly weathered, thickly bedded, very light gray (N8), fine grained, medium strong, DOLOMITE (ST. LOUIS FORMATION)							J,C,R					
94								J,ST,R (2)					
			9	98%				J,I,R					
								J,PL,R-CH					
96													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.6
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation; PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular; P-Polished, X-Slickensided, SM-Smooth, R-Rough, VR-V. Rough; Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
96	94.0-98.0 ft. Slightly weathered, thickly bedded, very light gray (N8), fine grained, medium strong, DOLOMITE, (ST. LOUIS FORMATION) Vuggy, highly silicified, bioturbated				J,I,R-CL				
98	98.0-116.4 ft. Slightly weathered, very thickly bedded, light brownish gray (5Y 6/1), fine grained, medium strong, DOLOMITE, (ST. LOUIS FORMATION)		9	98%					
100	Laminae, vuggy in places, clay infilling, some silicification 101.0-103.0 ft. Vuggy								
102					J,C,S-CL				
		380.50 / 103.30							
104					J,PL,R				
	104.5-106.4 ft. Vuggy, some silicification in veins, clay partings				J,PL,R				
106					J,PL,R				
			10	99%					
108									
110					J,I,R				
112									

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.8
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
112	98.0-116.4 ft. Slightly weathered, very thickly bedded, light brownish gray (5Y 6/1), fine grained, medium strong, DOLOMITE, (ST. LOUIS FORMATION)	370.40 / 113.40	10	99%			90	J,I,VR	SW FR MW HW CW	R6 R5 R4 R3 R2 R1	R1 30 R2 150 R3 300 R4 600 R5 1500 R6		
114													
116	116.4-119.6 ft. Fresh, thickly bedded, medium light gray (N6), medium crystalline, medium strong, DOLOMITE, (ST. LOUIS FORMATION)												
118			11	100 %									
120	364.20 / 119.60 119.6-120.7 ft. Fresh, thinly bedded, medium gray (N5), finely crystalline, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) 363.10 / 120.70 Bioturbated, calcite infilling							J,PL,R-CL					
122	120.7-123.7 ft. Fresh, thickly bedded, medium light gray (N6), f-m crystalline, medium strong, DOLOMITE, (ST. LOUIS FORMATION)	360.30 / 123.50											1/28/95 @ 17:32 Finish drilling for the day at 123.5 ft., we blow out hole and measure water level at 72.77 ft. below ground surface
124	123.7-147.5 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine crystalline, medium strong, DOLOMITE, (ST. LOUIS FORMATION) Stylolitic							J,I,R J,I,R J,I,R					
126			12	100 %									
	126.9 ft. 1 in. clay seam, fractures at ~124.5 and 127.6 ft.							J,C,R J,I,R					
128													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.6
INCLINATION: -90

ROCK TYPE

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation

PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular

P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough

Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH (FEET) | DESCRIPTION | GRAPHIC LOG | ELEV / DEPTH (FT) | RUN NO. | CORE RECOVERY | RQD (60 60 40 20) | FRACTURES PER FOOT (2 4 6 8 10) | DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90) | TYPE AND SURFACE DESCRIPTION | GRAPHIC LOG | WEATHERING INDEX (SW FR WW HW CW) | STRENGTH INDEX (R6 R5 R4 R3 R2 R1) | POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6) | TEST ORIENTATION | NOTES WATER LEVELS INSTRUMENTATION

128

123.7-147.5 ft.
Fresh, thickly bedded, light olive gray (5Y 6/1), fine crystalline, medium strong, DOLOMITE, (ST. LOUIS FORMATION)
Stylolitic

J,I,R-CL,CH

J,C,SM

130

12 — 100 %

J,ST,R

132

351.60
132.20

J,PL,R-CL

J,I,R

134

138

J,PL,S-CL

Note: rock breaks along stylolites and clay partings

13 — 100 %

138

J,PL,S

140

142

341.60
142.20

14 — 100 %

144

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.6
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
144	123.7-147.5 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine crystalline, medium strong, DOLOMITE, (ST. LOUIS FORMATION)					
146						
	336.30 / 147.50					
	147.5-159.5 ft. Fresh, thickly bedded, pale yellowish brown (10YR 6/2), m-c crystalline, strong, LIMESTONE, (ST. LOUIS FORMATION) 147.5 ft. 1 in. clay partings				J,C,R-CL	
148			14	100 %	J,C,SM-CL	148.1-149.0 ft. 1 in. clay filled vertical fracture
150						
152		331.60 / 152.20			J,I,R	1/29/95 @ 16:06 Drillers quit drilling for the day, they blew out the hole, measured water level @ 80.4 ft. below ground surface, drilled to 152.2 ft.,
	Stylolitic				J,I,R	
154					J,I,R	1/30/95 @ 9:38 Measured water level in hole @ 48.3 ft. 1/30/95 @ 9:51 Begin Run 15
					J,I,R	
					J,I,VR	
156	Brecciated, glauconitic, clay and silt sized infilling		15	100 %		
					J,I,R-CL	
158						
					J,I,R	
	159.5-165.5 ft. Fresh, thickly bedded, greenish gray (5GY 6/1), coarsely crystalline, medium strong, DOLOMITE, (ST. LOUIS FORMATION) 324.30 / 159.50				J,PL,R	
160					J,I,R	

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2648
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.6
INCLINATION: -90

J-Joint, F-Fault, B-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH (FEET)	ROCK TYPE DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX (SW FR, MW HW, CW)	STRENGTH INDEX (R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30, R2 150, R3 300, R4 600, R5 1500, R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
160	159.5-165.5 ft. Fresh, thickly bedded, greenish gray (5GY 6/1), coarsely crystalline, medium strong, DOLOMITE, (ST. LOUIS FORMATION)		15	100 %			90	J,I,VR					
162		321.50 / 162.30											
	Some dark gray organic laminae												
164													
	318.30 / 165.50												
166	165.5-173.0 ft. Fresh, thickly bedded, pale yellowish brown (10YR 6/2), f-m grained, strong, LIMESTONE, (SALEM FORMATION)						90	J,C,R					@ 165.5 ft. Inferred contact between ST. LOUIS FORMATION and SALEM FORMATION
	167.3-169.6 ft. Brecciated, glauconite and gray clay infilling, stylolitic, some calcite filled veins		16	100 %									
168							90	J,C,R					
170													
172		311.50 / 172.30											
174	173.0-181.2 ft. Fresh, thinly bedded, pale yellowish brown (10YR 6/2), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (SALEM FORMATION)		17	100 %									
176													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.6
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH (FT)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP w/r CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R5 R6 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
176	173.0-181.2 ft. Fresh, thinly bedded, pale yellowish brown (10YR 6/2), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (SALEM FORMATION)														
178				17	100 %										
180															
182	181.2-183.0 ft. Thickly bedded, pale yellowish brown (10YR 6/2), coarse grained, strong, (SALEM FORMATION)		301.60 / 182.20												
184	183.0-190.5 ft. Fresh, thinly laminated, pale yellowish brown (10YR 6/2), fine grained, medium strong, ARGILLACEOUS LIMESTONE (SALEM FORMATION)								J,I,R-CL						
				18	100 %										
186	185.9-186.7 ft. Clay rich horizons, becoming siltier 186.7 ft. Chert nodules, stylolitic														
188									J,I,R						
			295.30 / 188.50												
190				19	100 %				J,PL,S						
	190.5-205.5 ft. Fresh, thickly bedded, pale yellowish brown (10YR 6/2), medium grained, strong, ARENACEOUS LIMESTONE, (SALEM FORMATION)		292.80 / 191.00												1/31/95 @ 8:00 Measure water level in hole at 38.05 ft. @ 8:10 resume coring on Run 20
192				20	100 %				J,I,VR						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.8
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
192	190.5-205.5 ft. Fresh, thickly bedded, pale yellowish brown (10YR 6/2), medium grained, strong, ARENACEOUS LIMESTONE, (SALEM FORMATION)							J,I,S					
	Silty, fine sand, fossil fragments, organic laminae, some clayey laminae, cherty, bioturbated												
194													
196			20	100 %									
198													
		283.90 / 199.90											
200													
202	202.0 ft. Silicified horizons		21	100 %									
204													
		278.70 / 205.10											1/31/95 @ 17:15 Finish coring @ 205.1 ft., driller tried 1/2 day to get past the chert at this depth and failed
206	205.5-210.0 ft. Fresh, thinly bedded, pale yellowish brown (10YR 6/2), fine grained, medium strong, ARENACEOUS LIMESTONE, (SALEM FORMATION)		22	100 %				J,I,R-CL J,I,R (2) J,I,R J,I,R-CL					
	206.0-206.3 ft. Clay interbed												
	Silty, cherty, some clay horizons, silicified, coarse grained interbeds												
208													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.6
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
208	205.5-210.0 ft. Fresh, thinly bedded, pale yellowish brown (10YR 6/2), fine grained, medium strong, ARENACEOUS LIMESTONE, (SALEM FORMATION)			22	100 %										
	Silty, cherty, some clay horizons, silicified, coarse grained interbeds 273.80		273.70												
210	210.0-220.7 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARGILLACEOUS DOLOMITE (SALEM FORMATION) 210.00		210.10												
212															
214				23	91%										
216															
218															
									Core Loss						
220			263.70 / 220.10												
	263.10 220.70 220.7-222.5 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), medium grained, medium strong, ARENACEOUS DOLOMITE, (SALEM FORMATION) shell debris in lower .5 ft., coarser downward, organic laminae 261.30			24	100 %										
222	222.5-233.8 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARGILLACEOUS DOLOMITE, (SALEM FORMATION) 222.50								J,PL,SM						
224															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2648
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1088642.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.6
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
224	222.5-233.8 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARGILLACEOUS DOLOMITE, (SALEM FORMATION) Chert nodules common, bioturbated, organic laminae, some texture laminae								J,I,SM						
226				24	100 %										
228															
230			253.50 / 230.30												
									J,C,SM						
232									J,PL,SM						
	233.7 ft. Organic clay lense			25	100 %										
	250.00 / 233.80								J,I,R-CL						
234	233.8-241.4 ft. Fresh, thickly bedded, light gray (N7), coarse grained, medium strong, BIOCLASTIC LIMESTONE, (SALEM FORMATION)								J,PL,R						
236			247.60 / 236.20												2/1/95 End drilling @ 16:30, 2/6/95 @ 8:26 Measure water level at 80.8 ft. below ground surface 2/6/95 @ 9:50 Begin coring Run 26
				26	100 %				J,PL,R						
	Stylolitic, sandy, dark gray laminae		246.20 / 237.60												
238									J,PL,R						
				27	75%										
									J,PL,S						
240	239.8 ft. Medium sand, 1 cm. thick layer														

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.6
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR, MW HW, CW)	STRENGTH INDEX (R5 R6, R4, R3, R2, R1)	POINT LOAD INDEX (psi) (R1 30, R2 150, R3 300, R4 600, R5 1500, R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
240	233.8-241.4 ft. Fresh, thickly bedded, light gray (N7), coarse grained, medium strong, BIOCLASTIC LIMESTONE, (SALEM FORMATION)														
	241.4-245.6 ft. Fresh, thickly bedded, light gray (N7) to dark gray (N3), coarse grained, medium strong, ARENACEOUS LIMESTONE (SALEM FORMATION)							90	J,I,R						
242				27	75%			90	J,I,R						
	242.8 ft. Silty sand, fossiliferous, 1 in. thick clayey horizon														Core loss occurred due to barrel falling down hole
									Core Loss						
244			239.20												
			244.60												
	238.20														
	245.6-249.8 ft. 245.60 Fresh, thickly bedded, olive gray (5Y 4/1), fine grained, medium strong, SILTSTONE, (WARSAW FORMATION)														Run 28 recovery poor, because core barrel fell in hole and core was lost after Run 27. Run 28 core is broken up due to damage during its retrieval. Contacts @ 245.6 and 249.8 ft. are approximate because of core loss
246															
248				28	81%										
	234.00														
250	249.8-254.5 ft. 249.80 Fresh, thickly bedded, olive gray (5Y 4/1), fine grained, medium strong, CLAYSTONE, (WARSAW FORMATION) Grades to siltstone near base														
									Core Loss						
252			231.20												
			252.60												
254				29	96%										
	229.30														
	254.5-256.4 ft. 254.50 Fresh, thickly bedded, medium dark gray (N4), coarse grained, medium strong, FOSSILIFEROUS LIMESTONE, (WARSAW FORMATION)														
256															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.6
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE: DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
256															
	227.40														
	256.4-261.3 ft. 256.40 Fresh, thickly bedded, olive black (5Y 6/1), fine grained, medium strong, SILTSTONE, (WARSAW FORMATION) Black organic laminae, slightly pitted, dolomitic														
258				29	96%										
			224.10						Minor Core Loss						2/6/95 @ 16:50 Quit for the day 2/7/95 @ 8:30 Start coring Run 30
			259.70												
260									J,I,SM						
	222.50														
	261.3-264.8 ft. 261.30 Fresh, thickly bedded, olive gray (5Y 4/1), medium crystalline, medium strong, DOLOMITE, (WARSAW FORMATION)														
262															
264															
	219.00														
	264.8-276.7 ft. 264.80 Fresh, thickly bedded, dark gray (N3), microcrystalline, medium strong, LIMESTONE, (WARSAW FORMATION)			30	100 %										
266															
268															
	Packstone, fossiliferous														
			213.90												
270			269.90												
				31	100 %										
									J,PL,VR						
272															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.6
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
272	264.8-276.7 ft. Fresh, thickly bedded, dark, gray (N3), microcrystalline, medium strong, LIMESTONE, (WARSAW FORMATION)														
274															
276				31	100 %										
	207.10 / 276.70														
	276.7-278.5 ft. Fresh, medium bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARENACEOUS DOLOMITE (WARSAW FORMATION)														
278															
	205.30 / 278.50														
	278.5-287.2 ft. Fresh, thickly bedded, medium light gray (N6), coarsely crystalline, medium strong, FOSSILIFEROUS LIMESTONE, (WARSAW FORMATION)		203.90 / 279.90												
280															
282									J,I,VR						
284				32	100 %										
286															
288	287.2-301.0 ft. Fresh, thickly bedded, olive black (5Y 2/1), coarse crystalline, medium strong, LIMESTONE, (WARSAW FORMATION)														

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.8
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
288	287.2-301.0 ft. Fresh, thickly bedded, olive black (5Y 2/1), coarse crystalline, medium strong, LIMESTONE, (WARSAW FORMATION)		32	100 %				J,PL,VR-Calcite mineralization					Possible water producer
		193.90 / 289.90											2/7/95 @ 15:07 Start Run 33
290	Stylolitic common, fossiliferous							J,I,VR-Calcite mineralization					
292								J,PL,VR-Calcite mineralization					
294			33	100 %									
	295.4-295.7 ft. Vuggy porosity												
296													
298													
		184.50 / 299.30						J,I,R					2/7/95 @ 16:30 Quit drilling @ 299.3 ft. after Run 33 2/8/95 @ 9:10 Start coring Run 34, measured water level @ 18.8 ft. below ground surface
300								J,I,R					
								J,I,R					
	182.80 / 301.00 301.0-304.3 ft. Fresh, thickly bedded, olive black (5Y 2/1), medium grained, medium strong, DOLOMITE, (WARSAW FORMATION) Argillaceous, vuggy 301.0-304.3 ft. Vuggy porosity		34	99%									
302													
304													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.6
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
304															
	179.50														
	304.3-306.1 ft. 304.30 Fresh, thickly bedded, medium dark gray (N4), coarsely crystalline, medium strong, LIMESTONE, (WARSAW LIMESTONE)														
306	177.70														
	306.1-313.0 ft. 306.10 Fresh, thinly bedded, grayish black (N2), fine grained, weak, CLAYEY SILTSTONE, (WARSAW FORMATION) Pyrite crystals, calcite mineralization			34	99%										
308									J,I,SM						
			174.60 / 309.20												
310															
312															
									J,PL,R						312.5-313.5 ft. 90 and 50 degree fractures are not open
	170.80														
	313.0-316.5 ft. 313.00 Fresh, thickly bedded, dark greenish gray (5GY 4/1), medium crystalline, medium strong, ARENACEOUS DOLOMITE, (WARSAW FORMATION), glauconitic, stylolitic, vuggy, silty shale interbeds								J,I,VR						314.5-315.5 ft. Second fracture not open
									J,PL,SM-CL (2)						
314				35	100%										2/8/95 Finish in Run 36, break down due to hydraulic leaks
									J,PL,R						
316															
	167.30														
	316.5-341.0 ft. 316.50 Fresh, thinly bedded, olive black (5Y 2/1), fine grained, weak, CLAYEY SILTSTONE, (WARSAW FORMATION)														
318															
			164.70 / 319.10												2/9/95 @ 7:40 Resume coring Run 36
				36	100%										
320															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.6
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R5 R6 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
320	316.5-341.0 ft. Fresh, thinly bedded, olive black (5Y 2/1), fine grained, weak, CLAYEY SILTSTONE, (WARSAW FORMATION)														
	321.1-322.1 ft. 1-2 in. thick limey and dolomite interbeds														
322									J,PL,SM						
									J,I,SM						
									J,PL,SM						
									J,C,SM						
									J,PL,SM						
324				36	100 %										
326															
328	Very fine pyrite crystals, calcite infilled veins, thin (0.2-0.3 in.) dolomite interbeds		154.60 / 329.20												
330									J,ST,SM-CL						
332				37	98%										
334			148.40 / 335.40												4 drill induced fractures in Run 37, especially at point core was lost
				38	99%										
336															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.6
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
336	316.5-341.0 ft. Fresh, thinly bedded, olive black (5Y 2/1), fine grained, weak, CLAYEY SILTSTONE, (WARSAW FORMATION)												
338													5 drill induced fractures in upper 5 ft. of Run 38
340			38	99%				J,PL,SM					
	142.80												
	341.0-344.6 ft. Fresh, medium bedded, greenish black (5GY 2/1), fine grained, medium strong, ARGILLACEOUS DOLOMITE, (WARSAW FORMATION)	341.00						J,PL,SM					
342													
344	Black organic laminae, calcite filled vugs	139.50											
	139.20	344.30											
	344.6-348.8 ft. Fresh, thinly bedded, olive black (5Y 2/1), fine grained, weak, SILTY CLAYSTONE, (WARSAW FORMATION)	344.60											Two drilling induced fractures in upper 2 ft. of Run 39
346													
	Calcite filled vugs												
348			39	100 %									
	135.00												
	348.8-352.8 ft. Fresh, medium bedded, olive gray (5Y 4/1), fine grained, medium strong, ARGILLACEOUS DOLOMITE, (WARSAW FORMATION)	348.80											
350	Vuggy, fossil fragments												
352													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.6
INCLINATION: -90

ROCK TYPE

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation

PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular

P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough

Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
352															
	131.00 / 352.80 352.8-357.6 ft. Fresh, medium bedded, olive gray (5Y 4/1), medium grained, medium strong, LIMESTONE, some fossils, race thin chert layers (<1 in.), (WARSAW FORMATION)			39	100 %										2/9/95 @ 15:15 Finish Run 39, quit work on the hole 2/11/95 @ 13:15 Corehole reamed out with 6 in. bit using Schramm Rotadrill to 354.5 ft.
354			129.60												
			354.20 / 129.30												
			354.50												
	354.8-355.0 ft. and 355.4-355.7 ft. Thinly bedded, medium dark gray (N4), Claystone layers														
356									J,I,R						
	126.20 / 357.60 357.6-386.6 ft. Fresh, thin to medium bedded, medium light gray (N6), very coarse grained, medium strong, FOSSILIFEROUS LIMESTONE, (KEOKUK FORMATION) Predominantly argillaceous, shaley partings common, numerous light bluish gray (5B 7/1) chert layers (1-2 in. thick), chert nodules (1-10 mm.)														@ 357.6 ft. Inferred top of KEOKUK FORMATION
358				40	100 %				J,I,R						
									J,I,R						
360									J,I,R						
			121.80 / 362.00												
362															363.0-372.0 ft. Numerous drilling induced fractures (2-3 per foot)
364				41	100 %										
366															
368															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.6
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
368	357.6-386.6 ft. Fresh, thin to medium bedded, medium light gray (N6), very coarse grained, medium strong, FOSSILIFEROUS LIMESTONE, (KEOKUK FORMATION) Predominantly argillaceous, shaley partings common, numerous light bluish gray (5B 7/1) chert layers (1-2 in. thick), chert nodules (1-10 mm.)												
370			41	100 %									
372		111.80 / 372.00											
374	374.2-375.2 ft. Moderately weathered, medium bedded, light olive gray (5Y 6/1), medium strong, ARENACEOUS DOLOMITE layer, (KEOKUK FORMATION) 109.60 374.20 108.60 375.20		42	100 %									
							90	J,I,S,CL					
								B,I,R					
376							90	B,I,R (2)					
		106.60 / 377.20											
							90	J,I,R					
378							90	B,C,R,CL					
							90	J,R,R					
380							90	B,PL,S					
	380.7-381.0 ft. Thinly laminated, dark greenish gray (5G 4/1), SILTY CLAYSTONE layer		43	100 %			90	B,PL,R					
382							90	B,U,CL					
384													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 1/27/95 - 2/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068842.0
AZIMUTH: 0

COLLAR ELEV: 483.8
E: 517211.8
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
384	357.6-386.6 ft. Fresh, thin to medium bedded, medium light gray (N6), very coarse grained, medium strong, FOSSILIFEROUS LIMESTONE, (KEOKUK FORMATION) Predominantly argillaceous, shaley partings common, numerous light bluish gray (5B 7/1) chert layers (1-2 in. thick), chert nodules (1-10 mm.)							90	B,PL,CL						
				43	100 %										
386								90	B,I,VR						
								60	J,I,VR						
	386.6-391.2 ft. Slightly weathered, thinly bedded, light gray (N7), coarse grained, medium strong to strong, ARENACEOUS LIMESTONE, (KEOKUK FORMATION),		96.80					0	J,I,R						
			387.00					90	B,I,R						2/12/95 @ 18:00 Complete Run 43 2/13/95 @ 9:00 Resume coring Run 44
								60	B,I,R						
388	Thin dolomite layers layers (<6 in.), argillaceous in some zones, stylolitic, chert nodules (<1 in.) silicified zones (<6 in.), some joints highly weathered, fossiliferous @ 389.0 ft. Open vug with calcite crystals (1/2 in. dia.)							30	J,I,VR						
				44	100 %										
								60	J,I,VR						
								90	J,I,R						
390								90	J,I,R						
	92.60		92.60												
	End of Record of Drillhole at 391.2 ft. 391.20		391.20												
392															
394															
396															
398															
400															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-SD

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2648
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/22/95
DRILL RIG: SCHRAMM

DATUM: MSL
COORDINATES N: 1068851.8
AZIMUTH: 0

COLLAR ELEV: 464.3
E: 517195.4
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

SCALE (Feet)	DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
224	0.0-235.0 ft. No sampling conducted See Record of Drillhole for PZ-100-KS														0.0-34.0 ft. Drilling conducted with 6 1/4 in. ID hollow stem augers 34.0-235.0 ft. Borehole drilled with 5 7/8 in. bit using compressed air
226															
228															
230															
232															
234															
	249.00		249.00												
236	235.3-237.3 ft. Fresh, thinly bedded, very light gray (N8) to light gray (N7), coarse grained, medium strong, ARENACEOUS LIMESTONE (SALEM FORMATION) 235.30		235.30									R5 R4 R3 R2			
238	237.3-242.4 ft. Fresh, thickly bedded, pale yellowish brown (10YR 6/2), m-c grained, medium strong, BIOCLASTIC LIMESTONE, (SALEM FORMATION)			1	97%							R5 R4 R3 R2			
	238.7-238.8 ft. Very light gray (N8), coarse grained Dolomite layer							90	B,PL,SM			R5 R4 R3 R2			
240												R5 R4 R3 R2			

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: M. VOGT

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-SD

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/22/95
DRILL RIG: SCHRAMM

DATUM: MSL
COORDINATES N: 1068851.8
AZIMUTH: 0

COLLAR ELEV: 484.3
E: 517195.4
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
240	237.3-242.4 ft. Fresh, thickly bedded, pale yellowish brown (10YR 6/2), m-c grained, medium strong, BIOCLASTIC LIMESTONE, (SALEM FORMATION)						90	J,I,SM					
	240.9-214.3 ft. Fossiliferous, stylolitic												
242	241.3-241.7 ft. Thinly laminated												
	242.1-242.4 ft. Thinly laminated												
	242.4-245.3 ft. Fresh, thickly bedded, light gray (N7), very coarse grained, medium strong, ARENACEOUS LIMESTONE (SALEM FORMATION)		1	97%									
244							60	J,U,R					
		239.00											
	245.3-246.0 ft. Fresh, thickly bedded, olive gray (5Y 4/1), very fine grained, medium strong, (WARSAW FORMATION) 238.30 246.00	245.30	2	100 %									
246		238.30 / 246.00											
	End of Record of Drillhole at 246.0 ft.												
248													
250													
252													
254													
256													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: M. VOGT

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-SS

PROJECT: LAIDLAW/RI-F$
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/24/95
DRILL RIG: SCHRAMM

DATUM: MSL
COORDINATES N: 1068867.81
AZIMUTH: 0

COLLAR ELEV: 484.35
E: 517175.03
INCLINATION: -90

ROCK TYPE

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation

PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular

P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough

Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (ft)	DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (FR SW MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
64	0.0-78.9 ft. No sampling conducted See Record of Drillhole for PZ-100-KS														0.0-51.0 ft. Drilling conducted with 6 1/4 in. ID hollow stem auger, then borehole advanced to 78.9 ft. with 5 7/8 in. air rotary bit
66															
68															
70															
72															
74															
76															
78															
	405.45		405.45												
	78.9-81.8 ft. 78.90 Moderately weathered, medium bedded, light brownish gray (5Y 6/1), fine grained, strong, ARENACEOUS DOLOMITE, open vugs (<1/2 mm), (ST. LOUIS FORMATION)		78.90	1	100 %										
80															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: M. VOGT

LOGGED: B. TILTON
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

RECORD OF DRILLHOLE PZ-100-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/24/95
DRILL RIG: SCHRAMM

DATUM: MSL
COORDINATES N: 1068867.81
AZIMUTH: 0

COLLAR ELEV: 484.35
E: 517175.03
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH (ft)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP w/r CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX (FR, SW, MW, HW, CW)	STRENGTH INDEX (R1–R6)	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
80	78.9-81.8 ft. Moderately weathered, medium bedded, light brownish gray (5Y 6/1), fine grained, strong, ARENACEOUS DOLOMITE, open vugs (<1/2 mm.), (ST. LOUIS FORMATION)												
	402.55 / 81.80												
82	81.8-90.6 ft. Slightly weathered, thickly bedded, light olive gray (5Y 6/1), very finely crystalline, strong ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION)		1	100 %									
	Below 82.3 ft. Stylolites common						90	J,I,SM					
84	@ 83.9 and 84.5 ft. Chert zones (<2 in.)						60	J,P,SM					
	84.4-84.7 ft. Silicified and finely disseminated pyrite						90	J,P,SM					
	84.7-84.9 ft. Medium gray chert zone	399.65 / 84.70											
	85.1-85.5 ft. Olive gray (5Y 3/2), DOLOMITIC LIMESTONE layer, low porosity, vugs (<1/4 mm)	399.25 / 85.10 / 398.85 / 85.50					90	J,C,SM,CL					
86							90	J,C,SM					
			2	86%			60	J,I,R					
86		395.35 / 89.00						Core Loss					
90	90.6-94.0 ft. Moderately weathered, thickly bedded, light brownish gray (5Y 6/1), f-m grained, medium strong BIOCLASTIC LIMESTONE, (ST. LOUIS FORMATION)						60	J,I,R					
			3	100 %									
92							90	J,I,R,CL					
	390.35	390.35											
94	End of Record of Drillhole at 94.0 ft. 94.00	94.00											2/25/95 @ 11:15 Completed drilling
96													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: M. VOGT

LOGGED: B. TILTON
CHECKED: R. BOOTH
DATE: 3/9/95

Golder Associates

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	4.25 inch I.D. Hollow Stem Auger	PZ-101-SS
		SHEET 1 OF 1
	SAMPLING METHOD:	
	SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP)	DRILLING
	SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	START / FINISH

					START	FINISH
WATER LEVEL					TIME	TIME
TIME					13:35	14:30
DATE					DATE	DATE
CASING DEPTH					2/23/95	2/23/95

DATUM NORTHING: 1068472.89 EASTING: 516622.94 ELEVATION 474.9

DRILL RIG CME 75 - TRUCK MOUNT

SURFACE CONDITIONS

ANGLE BEARING

SAMPLE HAMMER

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
1	2 2 3 3	1.1'/2.0' (55%)			(0.0-0.2 ft.) Firm, olive gray (5Y 4/1), SILT, trace clay, NR, damp, (CL-ML), (LOESS) (0.2-2.7 ft.) Firm, mottled dark yellowish brown (10YR 4/2), CLAYEY SILT, some roots, NR, damp, (CL-ML), (LOESS)	SP 1	
2							
3	5 4 5 4	1.6'/2.0' (80%)			(2.7-8.0 ft.) Firm, stiff, olive gray (5Y 3/2), CLAYEY SILT, NR, damp, (CL-ML), (LOESS)	SP 2	
4							
5	1 1 3 5	1.7'/2.0' (85%)				SP 3	
6		1.7'/2.0' (85%)					
7						SH 4	
8	1 3 6 6	1.7'/2.0' (85%)			(8.0-8.9 ft.) Stiff, mottled olive gray (5Y 3/2) and dark yellowish brown (10YR 4/2), CLAYEY SILT, NR, damp, (CL-ML), (LOESS) (8.9-10.3 ft.) Stiff, mottled moderate yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/2), CLAYEY SILT, NR, damp, (CL-ML), (LOESS)	SP 5	Iron oxide staining from 8.0-14.0 ft.
9							
10	3 5 5 5	1.7'/2.0' (85%)			(10.3-13.2 ft.) Stiff, mottled light olive gray (5Y 5/2) and moderate yellowish brown (10YR 4/2), CLAYEY SILT, NR, damp, (CL-ML), (LOESS)	SP 6	
11							
12	1 1 2 6	1.6'/2.0' (80%)				SP 7	
13					(13.2-14.0 ft.) Soft, dark greenish gray (5GY 4/1), CLAYEY SILT, NR, damp, (CL-ML), (LOESS) (460.9) 14.0		
14					End of Soil Borehole Log at 14 ft. See PZ-101-SS Record of Drillhole for rock descriptions		Auger refusal at 14.0 ft.

DRILLING CONTR LAYNE-WESTERN

LOGGED BY M. HIRT CHK'D BY W. HERST

DATE 2/23/95

JOB NO.: 943-2848

FILENAME: PZ101SS

RECORD OF DRILLHOLE PZ-101-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/23/95-2/25/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068472.9
AZIMUTH: 0

COLLAR ELEV: 474.8
E: 518622.9
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE / DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
0	0.0-14.0 ft. See Soil Borehole Log PZ-101-SS														
2															
4															
6															
8															
10															
12															
14	460.80		460.80												
	14.0-27.6 ft. 14.00 Slightly weathered to fresh, medium bedded, very light gray (N8), medium grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Braciopod fossils, iron staining, 1 in. thick clay filled joint at 15.4 ft.		14.00	1	55%				Broken Zone Broken Zone						
16															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-101-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/23/95-2/25/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068472.9
AZIMUTH: 0

COLLAR ELEV: 474.8
E: 516622.9
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
16	14.0-27.6 ft. Slightly weathered to fresh, medium bedded, very light gray (N8), medium grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolitic		1	55%	Core Loss	Core loss due to highly fractured rock
		456.80 / 18.00				
18					J,I,R,Fe (2)	
					J,I,R,Fe (2)	
					J,I,R,Fe (2)	
					J,I,R (2)	
					J,I,R	
					J,I,R	
					J,I,R	
					J,I,R	
					J,I,R (2)	
					J,I,R	
20					J,I,R	
					J,I,R,CL (3)	
			2	100 %	J,I,R,CL (2)	
					J,I,R,CL (2)	
22					J,I,R,CL (2)	
					J,I,R,CL	
					J,I,R	
					J,I,SM	
					J,I,R,CL	
24					J,I,R,CL	
		450.30 / 24.50				
					J,ST,R,Fe	
					J,I,R,CL (3)	
26					J,I,R,CL (2)	
					J,I,SM,CL (3)	
			3	96%	J,I,SM,CL	
					J,U,SM,CL	
	27.6-40.5 ft. Fresh, medium bedded, very light gray (N8), very fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Some braciopod fossils				J,I,R,CL	
28					J,PL,SM,CL (2)	
					J,I,R,CL	
					J,I,SM,CL (2)	
					J,I,SM,CL (2)	
		445.30 / 29.50				
30					J,I,SM (2)	
					J,U,SM	
			4	98%	J,I,R	
					J,I,R,chert	
					J,PL,SM	
					J,I,R,CL (2)	
					J,I,R (2)	
32						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-101-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/23/95-2/25/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068472.9
AZIMUTH: 0

COLLAR ELEV: 474.8
E: 516622.9
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (Feet)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
32	27.6-40.5 ft. Fresh, medium bedded, very light gray (N8), very fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION)								J,PL,SM,CL						
	32.7 ft. Calcite and pyrite crystals								J,PL,R (2)						
	33.8 ft.								J,PL,SM						
34	Chert nodule														
	34.1 ft. Crinoid fossils								J,PL,SM						
	35.0-35.6 ft. Moderately weathered														
				4	98%				J,PL,SM,CL						
36	36.1 ft. Stylolitic														
	37.7-40.5 ft. Large chert nodules														
38									J,I,R (2)						
									J,U,SM,CL						
									J,I,SM						
			435.30						J,I,SM						
			39.50												
40	40.3-40.5 ft. Joints intersecting large chert nodules, some pyrite								J,I,R (2)						
	40.5-50.2 ft. Fresh, medium bedded, very light gray (N8) to light gray (N7), m-c grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION)								J,PL,R						
42	42.2-45.1 ft. Stylolitic														
				5	100 %				J,I,R						
44									J,I,R						
									J,I,R (2)						
									J,I,R (3)						
46									J,PL,R (4)						
									J,PL,R (2)						
	47.5-49.3 ft. Stylolitic														
48															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-101-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/23/95-2/25/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068472.9
AZIMUTH: 0

COLLAR ELEV: 474.8
E: 516622.9
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (Feet)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
48	40.5-50.2 ft. Fresh, medium bedded, very light gray (N8) to light gray (N7), m-c grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION)		5	100 %	J,I,R (2)				
	49.1 ft. Brachiopoda fossil	425.30 / 49.50			J,U,R				
50	50.2-52.7 ft. Fresh, very thinly to medium bedded, medium light gray (N6) to medium gray (N5), coarse grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION)				J,PL,R				
	51.2-52.2 ft. Numerous calcite veins at 20 degrees to core axis in healed fractures				J,I,R (3)				
52	52.7-54.5 ft. Fresh, medium bedded, light olive gray (5Y 6/1), medium grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION)				J,PL,SM				
					J,PL,SM				
54		420.30 / 54.50			J,I,R				
	54.5-58.0 ft. Slightly weathered, medium light olive gray (5Y 6/1), fine to medium grained, medium strong, DOLOMITE, (ST. LOUIS FORMATION)		6	98%	J,I,R				
56	Very porous/vuggy, vugs < 1 mm. in diameter								
58	58.0-61.9 ft. Fresh, medium bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARENACEOUS DOLOMITE, (ST. LOUIS FORMATION)				J,I,SM				
		415.30 / 59.50							
	59.7-60.0 ft. Weahtered, crumbly chert				J,I,R (2)				
60	60.0-61.9 ft. Porous/vuggy (vugs < 1 mm.)				J,I,R				
	61.4 ft. Calcite filled (healed) fracture	412.90 / 61.90	7	100 %	J,PL,SM,CL				
62	61.9-66.3 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARENACEOUS LIMESTONE, (ST. LOUIS FORMATION)				J,PL,R				
64									

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-101-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/23/95-2/25/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068472.9
AZIMUTH: 0

COLLAR ELEV: 474.8
E: 516822.9
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
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DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
64	61.9-66.3 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARENACEOUS LIMESTONE, (ST. LOUIS FORMATION)		410.30 / 64.50	7	100 %				J,U,SM,CL						
66	66.3-72.7 ft. Slightly weathered, medium to thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Very stylolitic, numerous chert nodules, slightly porous/vuggy (vugs <1 mm. in diameter)								J,I,R,CL; J,ST,R,CL						
68									J,I,R						
70				8	100 %										
72									J,I,R,CL						
	402.10														
	72.7-78.9 ft. Slightly weathered, medium bedded, pinkish gray (5YR 8/1) to light brownish gray (5YR 6/1), coarse grained, medium strong, ARENACEOUS DOLOMITE, (ST. LOUIS FORMATION)		72.70						J,I,R,CL						
74	74.0-74.3 ft. Crumbly texture, porous, limestone 74.4 ft. Cross bedding		400.30 / 74.50						J,PL,SM,CL; J,I,SM; J,PL,SM,CL						
76	76.4-76.8 ft. Crystalline Limestone layer			9	100 %										
78															
	395.90														
	78.9-83.2 ft. Fresh, medium bedded, light brownish gray (5YR 6/1), medium grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION)		78.90						J,U,SM; J,U,SM; J,I,R						
80	Stylolitic to 80.1 ft.														

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-101-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/23/95-2/25/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068472.9
AZIMUTH: 0

COLLAR ELEV: 474.8
E: 516622.9
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
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DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
80	78.9-83.2 ft. Fresh, medium bedded, light brownish gray (5YR 6/1), medium grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) 80.1-80.5 ft. Dolomite							J,PL,R,CL					
82			9	100 %									
	391.60 / 83.20												
84	83.2-92.0 ft. Slightly weathered, thickly bedded, yellowish gray (5Y 7/2) to light olive gray (5Y 5/2), fine grained, medium strong, ARENACEOUS DOLOMITE, (ST. LOUIS FORMATION) Porous/vuggy (vugs <1 mm.)	390.30 / 84.50											
86													
88													
	89.7-91.3 ft. Stylolitic 89.9-90.9 ft. Limestone (crystalline)		10	99%				J,PL,R					
90								J,PL,R					
								J,ST,SM					
								J,PL,R					
	382.80 / 92.00												
92	92.0-94.5 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), micro-crystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION)												
94	93.9-94.1 ft. Thickly laminated							J,PL,SM,CL					
	94.5-101.0 ft. Fresh, thickly bedded, pale yellowish brown (10YR 6/2), coarse to very coarse grained, strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION)	380.30 / 94.50	11	100 %									
96													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

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RECORD OF DRILLHOLE PZ-101-SS

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SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR, MW HW, CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 R2 30 R3 150 R4 300 R5 600 R6 1500)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
96	94.5-101.0 ft. Fresh, thickly bedded, pale yellowish brown (10YR 6/2), coarse to very coarse grained, strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION)								J,PL,SM						
									J,PL,SM,CL						
									J,PL,SM						
	96.3 ft. Calcite crystals														
98	97.1-97.3 ft. Moderately weahtered zone, thickly laminated														
	98.8-99.0 ft. Chert nodules														
									J,PL,SM						
100				11	100 %										
	100.7 ft. Calcite crystals								J,I,R						
	101.0-119.9 ft. Fresh, medium bedded, light olive gray (5Y 6/1), micro-crystalline, strong, LIMESTONE, (ST. LOUIS FORMATION)								J,I,SM						
102	101.7-103.0 ft. Stylolitic								J,PL,SM						
									J,PL,SM						
104	104.1-104.8 ft. Slightly weathered dolomite layer, porous/vuggy		370.30 / 104.50						J,PL,SM						
	104.8-106.2 ft. Stylolitic								J,I,R						
									J,I,R						
106															
	106.7-109.2 ft. Some arenaceous zones								J,PL,R						
108	107.8-108.3 ft. Bioturbated zone, some calcite crystallization			12	100 %										
									J,PL,SM						
110	110.1-111.5 ft. Slightly to moderately weathered dolomite, porous/vuggy								J,I,R						
112															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-101-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/23/95-2/25/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068472.9
AZIMUTH: 0

COLLAR ELEV: 474.8
E: 516622.9
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
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DL SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
112	101.0-119.9 ft. Fresh, medium bedded, light olive gray (5Y 6/1), micro-crystalline, strong, LIMESTONE, (ST. LOUIS FORMATION)												
	112.9-113.1 ft. Thinly laminated 361.20		12	100 %			90	J,I,R,CL					
	113.1-113.2 ft. 113.60 Bioturbated, calcite crystallization												
114	113.6-115.3 ft. Slightly to moderately weathered, dolomite, porous/vuggy	360.30 / 114.50											
	359.50 / 115.30												
116	116.5 ft. Becoming fine to medium grained												
	116.8-117.7 ft. Some arenaceous laminae						90	J,PL,SM					
118	118.3-118.7 ft. Stylolitic						90	J,PL,SM					
	354.90		13	100 %									
120	119.9-121.7 ft. 119.90 Slightly weathered, medium bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARGILLACEOUS DOLOMITE, (ST. LOUIS FORMATION) Porous/vuggy (<1 mm. in diameter)												
122	121.7-125.0 ft. Slightly weathered, medium bedded, light olive gray (5Y 6/1), fine grained, strong, DOLOMITE, (ST. LOUIS FORMATION)												
124		350.30 / 124.50					90	J,I,R,CL					
	349.80												
	125.0-128.3 ft. 125.00 Fresh, thinly bedded, light olive gray (5Y 6/1) to olive gray (5Y 4/1), interbedded microcrystalline and m-c grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION)												
126			14	99%			90	J,I,SM					
							90	J,PL,SM,CL (2)					
							90	J,ST,SM					
128													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-101-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/23/95-2/25/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068472.9
AZIMUTH: 0

COLLAR ELEV: 474.8
E: 516822.8
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DL SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
128	346.50							J,PL,SM,CL					
	128.3-130.5 ft. 128.30 Slightly weathered, medium bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARENACEOUS DOLOMITE, (ST. LOUIS FORMATION) 129.3-130.3 ft. Porous/vuggy							J,I,R					
130	344.30												
	130.5-140.5 ft. 130.50 Fresh, medium bedded, light olive gray (5Y 6/1), coarse grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION)		14	99%				J,I,SM,CL					
132													
	133.5-133.9 ft. Stylolitic, bioturbated, calcite crystals 133.9-135.3 ft. Microcrystalline							J,PL,SM					
134		340.30 134.50											
	134.9-135.2 ft. Small pyrite crystals 135.0-135.1 ft. Large chert nodules												
	135.7-137.1 ft. Slightly weathered, some calicte crystals and stylolites							J,I,R,CL					
136								J,I,R,CL					
	137.1-138.9 ft. Stylolites 137.4-138.5 ft. Microcrystalline, arenaceous, thickly laminated		15	100 %				J,I,SM					
138								J,PL,R					
140	334.30	334.30											
	End of Record of Drillhole at 140.5 ft. 140.50	140.50											
142													
144													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/13/95

Golder Associates

LAIDLAW
LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD: 4.25 inch I.D. Hollow Stem Auger	BORING NO. PZ-102-SS
		SHEET 1 OF 3
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP) SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	DRILLING START / FINISH
	WATER LEVEL	TIME 15:21 / TIME 17:33
	TIME	
	DATE	DATE 2/13/95 / DATE 2/13/95
NORTHING: 1068087.67 DATUM EASTING: 516887.97 ELEVATION 482.1	CASING DEPTH	

DRILL RIG CME 75 - TRUCK MOUNT	SURFACE CONDITIONS
ANGLE BEARING	
SAMPLE HAMMER	

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
1	3 2 2 3	1.3'/2.0' (65%)			(0.0-2.6 ft.) Firm, dark yellowish brown (10YR 4/2), homogenous, CLAYEY SILT, NR, damp, (CL-ML), (LOESS)	SP 1	2/13/95 - 15:21 Begin drilling PZ-102-SS Air monitoring 15:27 21% O2 0.0 ppm H2S 0% LEL 0.0 ppm PID
2	2 2 2 4	1.4'/2.0' (70%)			(479.5) 2.6	SP 2	
3					(2.6-5.0 ft.) Firm, moderate yellowish brown (10YR 5/4), homogenous, SILTY CLAY, NR, damp, (CL), (LOESS)		
4		2.3'/2.0' (115%)					
5					(477.1) 5.0	SH 3	
6	1 2 3 4	1.6'/2.0' (80%)			(5.0-13.0 ft.) Firm, moderate yellowish brown (10YR 5/4), trace light gray (N7), homogenous, CLAYEY SILT, NR, damp, (CL-ML), (LOESS)	SP 4	15:43 @ 6 ft. 21.1% O2 0.0 ppm H2S 0% LEL 0.3 ppm PID
7							
8	1 3 3 5	1.9'/2.0' (95%)				SP 5	
9							
10		1.9'/2.0' (95%)				SH 6	15:49 @ 10 ft. 21% O2 1.0 ppm H2S 0% LEL 0.3 ppm PID
11							
12	3 4 5 6	1.6'/2.0' (80%)					
13					(469.1) 13.0	SP 7	
					(13.0-15.0 ft.) Compact, dark yellowish orange (10YR 6/6), homogenous, fine SAND, trace Silt, NR, dry, (SP), (ALLUVIUM)		
14	5 5 7 7	1.5'/2.0' (75%)				SP 8	

DRILLING CONTR LAYNE-WESTERN

LOGGED BY J. MILLER CHK'D BY W. HERST

DATE 2/13/95

JOB NO.: 943-2848

FILENAME: PZ102SS

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	4.25 inch I.D. Hollow Stem Auger	PZ-102-SS
		SHEET 2 OF 3
	SAMPLING METHOD:	
	SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP)	DRILLING
	SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	START / FINISH

WATER LEVEL					START TIME	FINISH TIME
TIME					15:21	17:33
DATE					START DATE	FINISH DATE
CASING DEPTH					2/13/95	2/13/95

NORTHING: 1068087.67
DATUM EASTING: 516887.97 ELEVATION 482.1

DRILL RIG CME 75 - TRUCK MOUNT

SURFACE CONDITIONS

ANGLE BEARING

SAMPLE HAMMER

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
					(15.0-23.6 ft.) Loose to compact, pale yellowish brown (10YR 6/2), homogenous, fine SAND, NR, dry, (SP), (ALLUVIUM)	SP 8	
16	4 4 6 7	1.3'/2.0' (65%)				SP 9	16:03 @ 16 ft. 21.1% O2 1.0 ppm H2S 0% LEL 0.0 ppm PID
17							
18	4 4 5 5	1.4'/2.0' (70%)				SP 10	
19							
20	3 3 4 6	1.6'/2.0' (80%)				SP 11	
21							
22	6 5 4 8	1.5'/2.0' (75%)				SP 12	
23					(458.5) 23.6		
24	5 6 7 10	1.5'/2.0' (75%)			(23.6-25.6 ft.) Stiff, light gray (N7) to light brown (5YR 5/6), laminated CLAYEY SILT, trace fine Sand, some rootlets, NR, moist, (CL-ML), (ALLUVIUM)	SP 13	16:20 @ 24 ft. 21% O2 0.0 ppm H2S 0% LEL 0.0 ppm PID
25							
26	5 7 10 11	1.6'/2.0' (80%)			(25.6-28.1 ft.) Very stiff, medium gray (N5), stratified, CLAYEY SILT, some fine SAND, thin organic rootlet beds (<1 cm.), NR, moist, (CL-ML), (ALLUVIUM)	SP 14	
27							
28	4 5 5 7	1.7'/2.0' (85%)			(28.1-29.9 ft.) Stiff, medium gray (N5), stratified, CLAYEY SILT and fine SAND, 1-15 cm. beds, NR, moist, (CL-ML), (ALLUVIUM)	SP 15	16:40 @ 28 ft. 21.1% O2 0.0 ppm H2S 0% LEL 0.0 ppm PID
29					(452.2) 29.9 (29.9-34.5 ft.) Hard, light olive gray (5Y 6/1), fractured LIMESTONE, SR, (WEATHERED BEDROCK)		

DRILLING CONTR LAYNE-WESTERN

LOGGED BY J. MILLER CHK'D BY W. HERST

DATE 2/13/95

JOB NO.: 943-2848

FILENAME: PZ102SS

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD: 4.25 inch I.D. Hollow Stem Auger	BORING NO. PZ-102-SS
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP) SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	SHEET 3 OF 3
		DRILLING START TIME 15:21 DATE 2/13/95; FINISH TIME 17:33 DATE 2/13/95
NORTHING: 1068087.67 DATUM EASTING: 516887.97 ELEVATION 482.1	WATER LEVEL / TIME / DATE / CASING DEPTH	
DRILL RIG CME 75 - TRUCK MOUNT	SURFACE CONDITIONS	
ANGLE BEARING		
SAMPLE HAMMER		

DEPTH IN FEET (ELEVATION)	BLOW/6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
31	5 5 5 20	1.7' / 2.0' (85%)			(29.9-34.5 ft.) Hard, light olive gray (5Y 6/1), fractured LIMESTONE, SR, (WEATHERED BEDROCK) @ 30.2 ft., wood fragments	SP (16)	
32							
33	13 23 55 31	1.1' / 2.0' (55%)				SP (17)	
34					(447.6) 34.5		
35	12 18 21 18	0.5' / 2.0' (25%)			(34.5-37.0 ft.) Hard, dark greenish gray (5GY 4/1), SILTY CLAY, trace to little fine sand, little fine gravel, NR, moist, (CL), (WEATHERED BEDROCK)	SP (18)	17:07 @ 35 ft. 21.3% O2 2.0 ppm H2S 0% LEL 0.0 ppm PID
36							
37					(445.1) 37.0 End of Soil Borehole Log at 37.0 ft. See PZ-102-SS Record of Drillhole for rock descriptions		
38							
39							
40							
41							
42							
43							
44							

DRILLING CONTR. LAYNE-WESTERN

LOGGED BY J. MILLER CHK'D BY W. HERST

DATE 2/13/95

JOB NO.: 943-2848

FILENAME: PZ102SS

RECORD OF DRILLHOLE PZ-102-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/14/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1088087.7
AZIMUTH: 0

COLLAR ELEV: 482.1
E: 516887.9
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation; PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular; P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough; Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DISCONTINUITY DATA: 0 DIP wrt CORE AXIS 90

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO	CORE RECOVERY	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
32	0.0-37.0 ft. See Soil Borehole Log PZ-102-SS 37.0-37.8 ft. No samples collected					
34						
36						
38	37.8-41.0 ft. Highly weathered, thickly bedded, dark yellowish orange (10YR 6/6), fine grained, extremely weak, SANDSTONE, (ST. LOUIS FORMATION)	444.30 / 37.80			J,PL,SM-GRF; J,I,SM-CL; J,PL,SM-CL (2); J,I,SM-GRF; J,PL,SM-intact; J,PL,SM-GRF	2/14/95 @ 8:09 Began coring Run 1
40	41.0-44.6 ft. Moderately weathered, dark yellowish orange (10YR 6/6), fine grained, weak, SANDSTONE, (ST. LOUIS FORMATION)		1	91%	J,PL,SM-intact; J,I,SM; J,I,SM; J,I,SM (2); J,I,R (2)	Fractures in upper portion of Run 1, are mapped in highly weathered sandstone, very clayey, likely drilling induced
42						
44		438.10 / 44.00			Core Loss	Core loss due to weak rock
	44.6-59.6 ft. Slightly to moderately weathered, thickly bedded, light olive gray, micro-crystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION)	437.50 / 44.60			J,I,SM; J,I,R-CL; J,I,R-CL	Fractures in Run 2, along contacts between lithologies of clay and limestone
46			2	70%	J,I,R-CL (2)	
	@ 47.0 ft. Solutioned, in-filled with unlithified sandy clay, in Run 2, approximately 50%, competent rock	435.10 / 47.00			Core Loss	
48		434.20 / 47.90	3	85%		

GRAPHIC LOG: 80 60 40 20; 2 4 6 8 PER FOOT 10

WEATHERING INDEX: SW FR, MW, HW, CW

STRENGTH INDEX: R6 R5 R4 R3 R2 R1

POINT LOAD INDEX (psi): R1 30, R2 150, R3 300, R4 600, R5 1500, R6

TEST ORIENTATION

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-102-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/14/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066087.7
AZIMUTH: 0

COLLAR ELEV: 482.1
E: 516887.9
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
48	44.6-59.6 ft. Slightly to moderately weathered, thickly bedded, light olive gray, micro-crystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION)								J,I,R-CL						
									J,I,R-CL						Core loss in Run 2 due to problem with barrel
									J,PL,SM (2)						
								30	J,PL,SM						
	48.8-49.0 ft. Glauconitic clay and limestone fragment infilled collapse zone, stylolitic								J,I,R						
								60	J,PL,SM						
50									J,I,R						
									J,PL,,R						
				3	85%				J,I,R						
								60	J,PL,SM-CL-intact						
									J,ST,R-Fe						
								90	J,PL,R-solutioned						
	51.8-52.2 ft. Infilled zone														
52	52.0-52.9 ft. Breciated, collapsed, infilled with limestone fragments, sand and clay														
									Core Loss						Core loss due to fractures/lugging of bit, some rock recovered in this interval, but broken up
54			428.00 / 54.10												
									J,PL,R						
									J,PL,R-Fe						
								60	J,C,SM-CL-intact						
									J,PL,R						
									J,I,R-Fe						
									J,PL,R						
56								90	J,ST,R						
								60	J,I,R-CL						
									J,I,SM						
	56.9-56.9 ft. Collapse, infilling clay								J,PL,SM-CL						Numerous intact, very small, clay filled, irregular fractures 54.7-60.3 ft. Not mapped on graphic log
								90	J,I,R						
				4	100%				J,I,R						
	57.4-57.5 ft. Infilled fraction							60	J,I,R						
	57.6-59.8 ft. Solutioned, infilled with limestone fragments, glauconitic clay, sand								J,PL,SM-Fe						
58								60	J,PL,SM						
								60	J,I,R						
								60	J,I,R						
								0	J,I,SM,CL						
									J,PL,R						
									J,PL,R-CL						
	59.6-80.8 ft. Fresh to moderately weathered, thinly bedded, light olive gray (5Y 6/1), medium crystalline, extremely weak to medium strong, LIMESTONE, (ST. LOUIS FORMATION)							0	J,PL,SM-CL						
60			421.80 / 60.30												
									J,I,R						
	61.8-62.4 ft. Collapse filled with limestone fragments, clay and sand								J,I,R						
62				5	98%										
									J,PL,R						
									J,C,VR						
									J,I,R						
64															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-102-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/14/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068087.7
AZIMUTH: 0

COLLAR ELEV: 482.1
E: 516887.9
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation; PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular; P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough; Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO	CORE RECOVERY	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
64	59.6-80.8 ft. Fresh to moderately weathered, thinly bedded, light olive gray (5Y 6/1), medium crystalline, extremely weak to medium strong, LIMESTONE, (ST. LOUIS FORMATION)				J,PL,R	
					J,I,R-SM	Numerous very small intact, clay and sand filled fractures 65.5-68.6 ft. Not mapped
66	64.0-65.4 ft. Collapse fraction infilled with clay, limestone fragments, sand		5	98%	J,I,R	
					J,I,R	
	67.3-67.4 ft. Clay, sand and limestone fragment infilled fracture				J,I,R-CL and sand filled	
					J,I,R-intact	
68	67.9-68.0 ft. Clay and limestone framgent infilled fracture				J,I,R-CL	
		413.50 / 68.60				
					J,I,R-calcite filled	
					J,PL,R	
					J,I,R	
70	70.1-70.5 ft. Collapse infilled with limestone fragments, black clay, pyrite crystals, sand				J,C,SM	
					J,C,R	
	71.3-71.7 ft. Breccia filled zone, pyrite, limestone fragments, black clay infilling				J,I,R-Fe	
			6	98%	J,I,R	
72	72.1-73.2 ft. Collapse zone					
					J,I,R-CL (3)	Numerous small intact fractures not mapped 73.2-74.9 ft. Infilled clay, sand, limestone fragments
					J,I,R (2)	
74					J,I,R	
		407.20 / 74.90				
76					J,I,R-calcite	
			7	99%	J,I,R-calcite	
78						
					J,I,R-calcite	
80						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-102-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2648
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/14/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068087.7
AZIMUTH: 0

COLLAR ELEV: 482.1
E: 516887.9
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
80	80.3-80.5 ft. Solutioned rock, infilled with limestone fragments, clay 401.30							60	J,I,R						
	80.8-82.3 ft. 80.80 Moderately weathered, interbedded, light gray (N7), weak, SILTY CLAYSTONE, (ST. LOUIS FORMATION) Cherty 399.80							60	J,I,R						
								60	J,I,R						
								60	J,I,R						
82								60	J,I,R						
	82.3-84.0 ft. 82.30 Slightly weathered, thinly bedded, light olive gray (5Y 6/1), finely cyrstalline, medium strong, ARENACEOUS LIMESTONE, (ST. LOUIS FORMATION) 398.10			7	99%			60	J,PL,SM						
								90	J,PL,SM (2)						
84	84.0-84.4 ft. 84.00 Slightly weathered, thinly bedded, very light gray (N8), fine grained, medium strong, SANDSTONE, (ST. LOUIS FORMATION) 397.70 84.40		397.50					60	J,PL,SM						
			84.60					90	J,I,R						
	84.4-87.0 ft. Slightly weathered, thinly bedded, dark gray (N3) to medium gray (N5), weak, CLAYSTONE and SILTY CLAYSTONE, (ST. LOUIS FORMATION) Carbonaceous 395.10							90	J,PL,SM (3)						
86								90	J,PL,SM-CL						
	87.0-89.9 ft. 87.00 Slightly weathered to fresh, light brownish gray (5YR 6/1), microcrystalline, medium strong, CRYSTALLINE LIME-STONE, (ST. LOUIS FORMATION) Upper 1 ft. and lower 3 in. bioturbated, pyrite mineralization 392.20			8	100 %										
88								90	J,PL,SM-CL						
								90	J,I,SM-CL						2/14/95 @ 14:25 Complete drilling
90	89.90 End of Record of Drillhole at 89.9 ft.		89.90												
92															
94															
96															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: J. MILLER
CHECKED: R. BOOTH
DATE: 3/13/95

Golder Associates

LAIDLAW
LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:					BORING NO.	
	4.25 inch I.D. Hollow Stem Auger					PZ-102R-SS	
						SHEET	
	SAMPLING METHOD:					1 OF 3	
LAIDLAW/OU2 RI-FS/MO	SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP)					DRILLING	
WEST LAKE LANDFILL	SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)					START	FINISH
OPERABLE UNIT 2	WATER LEVEL					TIME	TIME
	TIME					8:30	10:45
	DATE					DATE	DATE
NORTHING: 1068131.86	CASING DEPTH					6/15/95	6/15/95
DATUM EASTING: 516858.81 ELEVATION 484.5							

DRILL RIG CME 75 - TRUCK MOUNT

SURFACE CONDITIONS Flat, grass covered area

ANGLE BEARING

SAMPLE HAMMER

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
1	5 5 3 5	1.5'/2.0' (75%)	(0.0-6.0 ft.) Firm, dark yellowish brown (10YR 4/2), CLAYEY SILT, trace organics (fine roots), NR, damp, (CL-ML), (TOPSOIL)	SP 1	
3	2 4 5 5	1.8'/2.0' (90%)		SP 2	
5	2 3 4 5	1.8'/2.0' (90%)	@ 4.0 ft., color changes to moderate yellowish brown (10YR 5/4)	SP 3	
			(478.5) 6.0		
7	2 2 4 5	1.5'/2.0' (75%)	(6.0-14.0 ft.) Loose, mottled, moderate yellowish brown (10YR 5/4) to pale yellowish brown (10YR 6/2), SILT, NR, damp, (ML), (LOESS)	SP 4	
9	5 5 5 5	1.4'/2.0' (70%)		SP 5	
11	4 5 6 9	1.5'/2.0' (75%)	@ 10.0 ft., Silt becomes compact	SP 6	
13	3 5 8 11	1.8'/2.0' (90%)		SP 7	
14	6 6 8 8	2.0'/2.0' (100%)	(14.0-17.8 ft.) Compact, light olive gray (5Y 6/1), SILT, trace iron staining, NR, damp, (ML), (LOESS)	SP 8	

DRILLING CONTR LAYNE-WESTERN

LOGGED BY B. TILTON

DATE 7/14/95 CHK'D BY W. HERST

JOB NO.: 943-2848

FILENAME: PZ102RSS

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD: 4.25 inch I.D. Hollow Stem Auger	BORING NO. PZ-102R-SS
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP) SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	SHEET 2 OF 3
		DRILLING START TIME 8:30 DATE 6/15/95 — FINISH TIME 10:45 DATE 6/15/95
NORTHING: 1068131.86 DATUM EASTING: 516858.81 ELEVATION 484.5	WATER LEVEL / TIME / DATE / CASING DEPTH	
DRILL RIG CME 75 - TRUCK MOUNT	SURFACE CONDITIONS Flat, grass covered area	
ANGLE BEARING		
SAMPLE HAMMER		

DRILLING CONTR LAYNE-WESTERN

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
					(14.0-17.8 ft.) Compact, light olive gray (5Y 6/1), SILT, trace iron staining, NR, damp, (ML), (LOESS)	SP 8	
16	3 4 5 8	1.8'/2.0' (90%)					
17					from 17.0-17.8 ft., Silt becomes wet	SP 9	
					(466.7) 17.8		
18	9 9 6 10	1.6'/2.0' (80%)			(17.8-22.7 ft.) Compact, pale yellowish brown (10YR 6/2), fine SAND, trace Silt, trace iron oxide staining, NR, dry, (SP), (ALLUVIUM)	SP 10	
19							
20	4 6 7 9	1.5'/2.0' (75%)				SP 11	
21							
22	4 4 8 6	1.8'/2.0' (90%)					
					(461.8) 22.7		
23					(22.7-24.0 ft.) Compact, pale yellowish brown (10YR 6/2), fine SANDY SILT, NR, damp, (ML), (LOESS)	SP 12	
24	5 6 6 6	1.6'/2.0' (80%)			(24.0-28.0 ft.) Compact, mottled moderate yellowish brown (10YR 5/4) to light olive gray (5Y 6/1), SILT, some iron oxide staining, NR, damp, (ML), (LOESS)	SP 13	
25							
26	5 3 5 8	1.8'/2.0' (90%)			@ 26.0 ft., color changes to olive gray (5Y 4/1) and Silt becomes moist	SP 14	
27							
					(456.5) 28.0		
28	4 6 10 10	2.0'/2.0' (100%)			(28.0-30.8 ft.) Stiff, olive gray (5Y 4/1) CLAYEY SILT, NR, moist, (CL-ML), (LOESS)	SP 15	
29					@ 29.6 ft., thin silty fine sand seam, damp (<1 in. thick)		

LOGGED BY B. TILTON

DATE 7/14/95 CHK'D BY W. HERST

JOB NO.: 943-2848

FILENAME: PZ102RSS

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD: 4.25 inch I.D. Hollow Stem Auger	BORING NO. PZ-102R-SS
		SHEET 3 OF 3
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP) SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	DRILLING START / FINISH
	WATER LEVEL / TIME / DATE / CASING DEPTH	TIME 8:30 / TIME 10:45
		DATE 6/15/95 / DATE 6/15/95
DATUM NORTHING: 1068131.86 EASTING: 516858.81	ELEVATION 484.5	
DRILL RIG CME 75 - TRUCK MOUNT	SURFACE CONDITIONS Flat, grass covered area	
ANGLE	BEARING	
SAMPLE HAMMER		

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
31	5 5 9 14	1.8'/2.0' (90%)			(28.0-30.8 ft.) Stiff, olive gray (5Y 4/1) CLAYEY SILT, NR, moist, (CL-ML), (LOESS) (453.7) 30.8	SP 16	
					(30.8-32.0 ft.) Compact, olive gray (5Y 4/1), SILT, NR, moist, (ML), (LOESS) (452.5) 32.0		
32	47 44 26 27	1.2'/2.0' (60%)			(32.0-35.0 ft.) Very dense, light olive gray (5Y 6/1), fine GRAVEL and SILTY f-c SAND, trace pieces of lignite, NR, wet, (GP), (WEATHERED BEDROCK)	SP 17	@ 32.0 ft., first water encountered overlying bedrock
34	16 50/2"	0.4'/1.0' (40%)			(449.5) 35.0	SP 18	
35					End of Soil Borehole Log at 35.0 ft. See PZ-102R-SS Record of Drillhole for rock descriptions		
36							
37							
38							
39							
40							
41							
42							
43							
44							

DRILLING CONTR LAYNE-WESTERN

LOGGED BY B. TILTON

DATE 7/14/95

CHK'D BY W. HERST

JOB NO.: 943-2848

FILENAME: PZ102RSS

RECORD OF DRILLHOLE PZ-102R-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 6/15/95 - 6/16/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068087.67
AZIMUTH: 0

COLLAR ELEV: 482.1
E: 516887.97
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO	CORE RECOVERY	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
32	0.0-35.0 ft. See Soil Borehole Log PZ-102R-SS					
34						
	447.10	447.10				
36	35.0-37.0 ft. Highly weathered, thinly bedded, light olive gray (5Y 6/1), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolitic	35.00	1	100 %		6/15/95 @ 11:00 Began coring Highly broken rock due to weathering and drilling
		445.90				
		36.20			J,I,R (6)	
	37.0-55.8 ft. Fresh, thinly bedded, light olive gray (5Y 6/1), micro-crystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION)				J,I,R (6)	
38			2	97%	J,PL,SM	
					J,I,R (3)	
					J,I,R (2)	
		442.60			J,I,R,CL (2)	6/15/95 @ 11:50 End Run 2
		39.50			B,I,R (2)	
40					J,I,R,CL (2)	
					J,I,R (4)	
42					J,I,R	
					J,I,R,CL	
					J,I,R (4)	
					J,I,R (3)	
			3	94%		
44					J,I,R (5)	
					J,I,R,CL	
					J,I,R (2)	
					J,I,R,CL (3)	
46					J,PL,SM	
					J,I,R (4)	
					J,I,R,CL (4)	
					J,I,R (2)	
48					J,I,R,CL (3)	

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: B. TILTON
CHECKED: R. BOOTH
DATE: 7/12/95

Golder Associates

RECORD OF DRILLHOLE PZ-102R-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 6/15/95 - 6/16/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068087.87
AZIMUTH: 0

COLLAR ELEV: 482.1
E: 518887.97
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation; PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular; P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough; Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
48	37.0-55.8 ft. Fresh, thinly bedded, light olive gray (5Y 6/1), micro-crystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION)		3	94%	B,I,R,CL B,I,SM,CL	
		433.20 48.90 432.60				6/15/95 @ 13:45 End Run 3 Core loss possibly due to wash out of clay seams in joints
		49.50			B,I,R (2)	
50					J,I,R-intact J,I,SM B,PL,SM	
					J,I,R (2) J,I,R	
52			4	100 %	B,I,R	
					B,I,R	
54					J,I,R J,I,R (2)	
		426.30				6/15/95 @ 15:00 End Run 3
56	55.8-61.3 ft. Fresh, medium bedded, light olive gray (5Y 6/1), medium crystalline, strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolitic 55.8-56.1 ft. Chert layer	55.80			B,I,R	
			5	100 %	B,I,R	
58	57.8-58.0 ft. Hard, greenish gray (5G 6/1), Siltstone layer				B,I,R (2) J,I,R-intact	
					J,I,R	
		422.60 59.50			J,I,R-intact	6/15/95 @ 16:15 End Run 5 Stop drilling for the day 6/16/95 @ 7:15 Began Run 6
60					B,PL,SM,CL (3)	
62	61.3-70.4 ft. Fresh, thinly bedded, light olive gray (5Y 6/1), finely crystalline, medium strong, FOSSILIFEROUS LIMESTONE, (ST. LOUIS FORMATION) Stylolitic		6	100 %	B,I,R (3) J,PL,SM,Fe	
					J,PL,SM (2)	
64						

Columns: RQD (60 60 40 20); 2 4 FRACTURES PER FOOT 6 8 10; DISCONTINUITY DATA: 0 30 60 90 DIP wrt CORE AXIS; WEATHERING INDEX: SW FR MW HW CW; STRENGTH INDEX: R5 R6 R4 R3 R2 R1; POINT LOAD INDEX (psi): R1 30 R2 150 R3 300 R4 600 R5 1500 R6; TEST ORIENTATION

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: B. TILTON
CHECKED: R. BOOTH
DATE: 7/12/95

Golder Associates

RECORD OF DRILLHOLE PZ-102R-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 6/15/95 - 6/16/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068087.67
AZIMUTH: 0

COLLAR ELEV: 482.1
E: 516887.97
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
64	61.3-70.4 ft. Fresh, thinly bedded, light olive gray (5Y 6/1), finely crystalline, medium strong, FOSSILIFEROUS LIMESTONE, (ST. LOUIS FORMATION) Stylolitic							B,PL,SM					
66								B,PL,SM,CL					
			6	100 %									
68								J,PL,SM					
								B,PL,SM (2)					
		412.60 / 69.50											6/16/95 @ 8:25 End Run 6
70								B,I,SM					
	70.4-75.2 ft. Fresh, thinly bedded, light olive gray (5Y 6/1), finely crystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolitic							B,I,R					
72			7	100 %									
								B,I,SM					
74	@ 74.2 ft. Stiff, dark greenish gray (5G 4/1), clay seam, (~1/2 in. thick)							J,PL,SM,CL					
	75.2-76.0 ft. Fresh, thinly bedded, medium bluish gray (5B 5/1), micro-crystalline, very strong, Silicified Limestone, (ST. LOUIS FORMATION) 406.10	406.90 / 75.20						B,PL,SM					6/16/95 @ 9:15 End Run 7
								J,I,R					
76	76.0-77.4 ft. 76.00 Fresh, medium bedded, brownish gray (5YR 4/1), microcrystalline, strong, DOLOMITE, (ST. LOUIS FORMATION) Moderately porous, (open vugs <1 mm.) 404.70							B,I,SM					
								J,PL,SM					
	77.4-88.6 ft. 77.40 Fresh, very thinly bedded, light olive gray (5Y 6/1), very fine crystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Some very thinly laminated shaley partings		8	98%				J,PL,SM					
78								J,I,R					
								J,I,R					
80													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: B. TILTON
CHECKED: R. BOOTH
DATE: 7/12/95

Golder Associates

RECORD OF DRILLHOLE PZ-102R-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2648
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 8/15/95 - 6/16/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068087.67
AZIMUTH: 0

COLLAR ELEV: 482.1
E: 516887.97
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, X-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP w/t CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
80	77.4-88.6 ft. Fresh, very thinly bedded, light olive gray (5Y 6/1), very fine crystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Some very thinly laminated shaley partings								B,PL,SM						
82				8	98%				J,I,R; B,I,R; J,I,R						
			398.10												6/16/95 @ 12:00 End Run 8
84			84.00												
									J,I,SM; B,I,SM						
86															
				9	100				J,I,R; J,I,R (2)						
88															
	393.50 88.60 88.6-90.0 ft. Fresh, medium bedded, medium dark gray (N4), very weak, CLAYSTONE, (ST. LOUIS FORMATION) 392.10		392.10												6/16/95 @ 15:00 Completed drilling
90	End of Record of Drillhole at 90.0 ft. 90.00		90.00												
92															
94															
96															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: B. TILTON
CHECKED: R. BOOTH
DATE: 7/12/95

Golder Associates

LAIDLAW
LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
	6.25 inch I.D. Hollow Stem Auger	PZ-103-SS
		SHEET 1 OF 4
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP) SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	DRILLING START TIME 07:30 FINISH TIME 12:00
	WATER LEVEL / TIME / DATE / CASING DEPTH	START DATE 2/21/95 FINISH DATE 2/23/95

DATUM NORTHING: 1067660.40 EASTING: 516723.54 ELEVATION 477.8

DRILL RIG CME 75 - TRUCK MOUNT	SURFACE CONDITIONS
ANGLE BEARING	
SAMPLE HAMMER	

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
					(0.0-2.0 ft.) No samples collected due to coarse gravel placed for temporary road		
1							
2					(475.8) 2.0		
	1 2 3 4	1.6'/2.0' (80%)			(2.0-16.0 ft.) Firm, dusky yellowish brown (10YR 2/2), CLAYEY SILT, trace fine Sand, NR, damp, (CL-ML), (LOESS)	SP (2)	
3							
4	2 4 4 4	1.3'/2.0' (65%)			@ 4.0 ft., color changes to pale yellowish brown (10YR 6/2) with moderate amount of iron oxide staining	SP (3)	
5							
6	1 2 2 4	1.3'/2.0' (65%)				SP (4)	
7							
8	1 2 3 4	1.8'/2.0' (90%)				SP (5)	
9							
10	2 3 5 6	2.0'/2.0' (100%)			@ 10.0 ft., intermittent moist zones (<2 inches thick)	SP (6)	
11							
12	1 2 2 3	1.7'/2.0' (85%)			Below 12.0 ft., increase in iron oxide staining (~50%)	SP (7)	
13							
14		1.8'/2.0' (90%)				SH (8)	

DRILLING CONTR LAYNE-WESTERN

LOGGED BY B. TILTON CHK'D BY W. HERST

DATE 2/21/95

JOB NO.: 940-2848

FILENAME: PZ103SS

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD: 6.25 inch I.D. Hollow Stem Auger	BORING NO. PZ-103-SS
		SHEET 2 OF 4
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP) SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	DRILLING
	WATER LEVEL / TIME / DATE / CASING DEPTH	START: TIME 07:30, DATE 2/21/95 FINISH: TIME 12:00, DATE 2/23/95
NORTHING: 1067660.40 DATUM EASTING: 516723.54 ELEVATION 477.8		
DRILL RIG CME 75 - TRUCK MOUNT	SURFACE CONDITIONS	
ANGLE BEARING		
SAMPLE HAMMER		

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
					(2.0-16.0 ft.) Firm, dusky yellowish brown (10YR 2/2), CLAYEY SILT, trace fine Sand, NR, damp, (CL-ML), (LOESS) (461.8) 16.0	SH 8	
16	7 11 10 11	1.3' / 2.0' (65%)			(16.0-20.0 ft.) Loose to compact yellowish orange (10YR 6/6), SILTY fine SAND, NR, damp, (SM), (ALLUVIAL)	SP 9	
17							
18	1 4 3 8	1.1' / 2.0' (55%)			@ 18.0 ft., silty sand becomes moist	SP 10	
19					(457.8) 20.0		
20	2 6 10 10	2.0' / 2.0' (100%)			(20.0-22.0 ft.) Stiff to very stiff, pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4) CLAYEY SILT with silty fine sand layers (<2 inches), WR, moist, (CL-ML), (ALLUVIUM)	SP 11	
21							
22	1 3 6 7	1.1' / 2.0' (55%)			(22.0-28.0 ft.) Stiff, medium dark gray (N4), CLAYEY SILT, some thin silty fine sand zones (<1 inch), SR, damp to moist, (CL-ML), (ALLUVIUM)	SP 12	
23							
24		0.4' / 2.0' (20%)				SH 13	
25							
26	15 47 50/5"	0.9' / 2.0' (45%)			@ 26.0-27.5 ft., limestone boulder or layer encountered, first water identified in borehole	SP 14	Wet zone appears to be isolated
27							
28	2 6 7 10	1.4' / 2.0' (70%)			(28.0-32.0 ft.) Stiff, greenish gray (5G 6/1) CLAYEY SILT, trace to little fine Sand, NR, damp, (CL-ML), (ALLUVIUM)	SP 15	
29							

DRILLING CONTR LAYNE-WESTERN

LOGGED BY B. TILTON CHK'D BY W. HERST

DATE 2/21/95

JOB NO.: 943-284B

FILENAME: PZ103SS

LAIDLAW
LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD: 6.25 inch I.D. Hollow Stem Auger	BORING NO. PZ-103-SS
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP) SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	SHEET 3 OF 4
		DRILLING: START TIME 07:30, DATE 2/21/95; FINISH TIME 12:00, DATE 2/23/95
NORTHING: 1067660.40 DATUM EASTING: 516723.54 ELEVATION 477.8	WATER LEVEL / TIME / DATE / CASING DEPTH	
DRILL RIG CME 75 - TRUCK MOUNT	SURFACE CONDITIONS	
ANGLE BEARING		
SAMPLE HAMMER		

DRILLING CONTR LAYNE-WESTERN

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
31	2 4 7 9	1.5'/2.0' (75%)			(28.0-32.0 ft.) Stiff, greenish gray (5G 6/1) CLAYEY SILT, trace to little fine Sand, NR, damp, (CL-ML), (ALLUVIUM) @ 31.6 ft., moderate reddish brown (10R 4/6) CLAYEY medium SAND layer (~1/2 inch) (445.8) 32.0	SP 16	
32–33	2 4 5 11	1.6'/2.0' (80%)			(32.0-47.5 ft.) Stiff to very stiff, pale yellowish green (10G 7/2) SILTY CLAY, trace to little medium Sand, NR, damp, (CL) @ 33.4-33.8 ft., clayey medium grained sand layer, damp, (SC)	SP 17	
34–35	2 7 8 11	1.8'/2.0' (90%)				SP 18	
36–37	1 3 7 11	1.5'/2.0' (75%)			@ 36.0 ft., color varies from very pale orange (10R 8/2) to moderate yellowish brown (10R 5/4) to pale green (5G 7/2), trace fine gravel	SP 19	
38–39	3 4 6 15	2.0'/2.0' (100%)				SP 20	
40–41	3 5 20 11	2.0'/2.0' (100%)				SP 21	
42–43	9 19 50/5"	1.0'/2.0' (50%)			@ 43.0 ft., extremely weathered limestone boulder or layer encountered	SP 22	
44	3 36 24 50/2"	0.5'/2.0' (25%)				SP 23	

LOGGED BY B. TILTON
DATE 2/21/95 CHK'D BY W. HERST
JOB NO.: 943-2840
FILENAME: PZ103SS

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
	6.25 inch I.D. Hollow Stem Auger	PZ-103-SS
		SHEET 4 OF 4
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP) SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	DRILLING

					START	FINISH
WATER LEVEL					TIME	TIME
TIME					07:30	12:00
DATE					DATE	DATE
CASING DEPTH					2/21/95	2/23/95

DATUM NORTHING: 1067660.40 EASTING: 516723.54 ELEVATION 477.8

DRILL RIG CME 75 - TRUCK MOUNT

ANGLE BEARING

SAMPLE HAMMER

SURFACE CONDITIONS

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL			SAMPLER TYPE	REMARKS
46	4 6 8 50/3"	2.0'/2.0' (100%)			(32.0-47.5 ft.) Stiff to very stiff, pale yellowish green (10G 7/2) SILTY CLAY, trace to little medium Sand, NR, damp, (CL) @ 45.5 ft., weathered limestone boulder or layer encountered			SP 23	
47					@ 47.1 ft., thin silty fine sand layer (~1 inch), moist	(430.3)	47.5	SP 24	
48	23 5 2 48	1.8'/2.0' (90%)			(47.5-48.0 ft.) Hard, dark yellowish orange (10R 6/6), weathered SILTY CLAYSTONE, NR, damp, (CH)	(429.8)	48.0		
49					@ 48.0 ft., weathered limestone boulder encountered (48.0-50.0 ft.) Hard, moderate yellowish brown (10YR 5/4) SILTY CLAY, some weathered limestone pieces (<1 inch), WR-SR, moist, (CL)	(427.8)	50.0	SP 25	
50					End of Soil Borehole Log at 50.0 ft.				
51					See PZ-103-SS Record of Drillhole for rock descriptions				
52									
53									
54									
55									
56									
57									
58									
59									

DRILLING CONTR LAYNE-WESTERN

LOGGED BY B. TILTON CHK'D BY W. HERST

DATE 2/21/95

JOB NO.: 943-2848

FILENAME: PZ103SS

RECORD OF DRILLHOLE PZ-103-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/21/95-2/22/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1067660.4
AZIMUTH: 0

COLLAR ELEV: 477.8
E: 516723.5
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation; PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular; P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough; Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
48	0.0-50.0 ft. See Soil Borehole Log PZ-103-SS 50.0-51.5 ft. No samples collected														
50															
	426.30		426.30												
	51.5-62.7 ft. 51.50 Moderately weathered, medium bedded, yellowish gray (5Y 8/1), medium crystalline, weak to medium strong, LIMESTONE, (ST. LOUIS FORMATION)		51.50						Core Loss						
52	Stylolites with iron oxide staining														Core loss possibly from 51.5-52.7 ft. in highly fractured rock and clay zones on top of bedrock
	53.4-53.9 ft. Pinkish gray (5YR 8/1), siltstone layer								J,I,R						
54	54.7 ft. Oxidized pyrite nodules (<3 mm.)			1	84%										
56	56.4 ft. Vertical calcite filled vein (4 in.) 57.0 ft. Calcite filled vein at 90 degrees (1 in. thick)														
58									J,I,R						
									J,I,R,CL						
			418.80 / 59.00												59.0-60.0 ft. Five breaks that had been spun
60									J,I,R (2)						
				2	69%				J,PL,R						
62	62.7-62.9 ft. Extremely weak, greenish gray (5GY 6/1), glauconite clay layer														
	414.90 / 62.90														
	62.9-71.0 ft. Highly weathered, medium bedded, moderate yellowish brown (10YR 5/4), fine grained, weak, ARGILLACEOUS SANDSTONE, (ST. LOUIS FORMATION)								Core Loss						Core loss in soft formation or possible open void
64															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: B. TILTON
CHECKED: W. HERST
DATE: 3/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-103-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/21/95-2/22/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1067660.4
AZIMUTH: 0

COLLAR ELEV: 477.8
E: 516723.5
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO	CORE RECOVERY	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
64	62.9-71.0 ft. Highly weathered, medium bedded, moderate yellowish brown (10YR 5/4), fine grained, weak, ARGILLACEOUS SANDSTONE, (ST. LOUIS FORMATION)				Core Loss	
66	66.0-66.5 ft. Highly weathered, dark yellowish orange (10YR 6/6) extremely weak, SILTSTONE layer (411.80 / 66.00; 411.30 / 66.50)		2	69%	Core Loss	Core loss in soft formation or possible open void
68		408.80 / 69.00				
70	69.6 ft. Very soft, dark yellowish orange (10YR 6/6), clay layer (2 in. thick)		3	100 %		
	71.0-71.7 ft. Slightly weathered, medium bedded, dark greenish gray (5GY 4/1), very fine crystalline, medium strong, DOLOMITIC LIMESTONE, moderate porosity, (ST. LOUIS FORMATION) (406.80 / 71.00; 406.10 / 71.70)	405.80 / 72.00			J,PL,SM; J,ST,SM; J,PL,SM	Run 3 stopped short, bit plugged off in claystones
72	71.7-78.7 ft. Highly weathered, thinly bedded, medium dark gray (N4) to grayish black (N2), very weak, CLAYEY SILTSTONE, (ST. LOUIS FORMATION) Some disseminated pyrite, some thin layers of claystone (<3 in.)					2/21/95 @ 16:00 Stopped drilling in Run 3 2/22/95 @ 7:30 Began Run 4
74					B,I,R; B,I,R; J,I,R	
	75.6-76.3 ft. Brownish gray (5YR 4/1), argillaceous LIMESTONE layer (402.20 / 75.60; 401.50 / 76.30)		4	100 %	J,PL,SM,CL; J,PL,SM; J,PL,SM; J,PL,SM-intact	
76					J,I,R (2); B,I,R	
78					B,I,R	
	78.7-87.5 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), micro-crystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolitic (399.10 / 78.70; 397.80 / 80.00)	398.60 / 79.20	5	100 %		
80						

Graphic log; RQD (80, 60, 40, 20); Fractures per foot (2, 4, 6, 8, 10); Discontinuity data: Dip wrt core axis (0, 30, 60, 90); Weathering index (SW, FR, MW, HW, CW); Strength index (R5, R6, R4, R3, R2, R1); Point load index (psi) (R1 30, R2 150, R3 300, R4 600, R5 1500, R6); Test orientation

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: B. TILTON
CHECKED: W. HERST
DATE: 3/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-103-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/21/95-2/22/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1067660.4
AZIMUTH: 0

COLLAR ELEV: 477.8
E: 516723.5
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DL SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP w/t CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR, MW, HW, CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30, R2 150, R3 300, R4 600, R5 1500, R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
80	397.80 / 80.00														
	80.0-81.2 ft. Thinly laminated, olive gray (5Y 4/1), CLAYEY SILTSTONE layer														
	396.60 / 81.20														
	78.7-87.5 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), micro-crystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolitic														
82				5	100 %				J,PL,SM,CL (2)						
84															
86			391.80 / 88.00												9:45 Stopped Run 5 short, bit plugged off
									B,PL,SM						
	87.3-87.5 ft. Soft, greenish gray (5GY 6/1), glauconite Clay layer								J,I,R,CL						
88	87.5-103.8 ft. Fresh, thinly bedded, light olive green (5Y 6/1) to olive gray (5Y 4/1), very fine grained, medium strong, ARENACEOUS DOLOMITE, (ST. LOUIS FORMATION) Trace disseminated pyrite								J,I,R (2)						
									J,PL,SM						
	89.0-91.5 ft. Moderate porosity, open vugs (<3 mm.), glauconite in some vugs (<1%) 90.4 ft. Thin silicified zone (~1/2 in.)														
90				6	98%										
									J,PL,SM						
92															
									J,PL,SM,CL						
94			383.30 / 94.50												
									J,I,SM (2)						
				7	98%										
96															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: B. TILTON
CHECKED: W. HERST
DATE: 3/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-103-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/21/95-2/22/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1067660.4
AZIMUTH: 0

COLLAR ELEV: 477.8
E: 516723.5
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
96	87.5-103.8 ft. Fresh, thinly bedded, light olive green (5Y 6/1) to olive gray (5Y 4/1), very fine grained, medium strong, ARENACEOUS DOLOMITE, (ST. LOUIS FORMATION) Trace disseminated pyrite						60	J,I,R					
							90	J,I,SM					
							60	J,I,R					
							60	J,I,R					
98							90	J,P,SM					
							90	J,P,SM					
							60	J,P,SM					
							90	B,I,SM,CL					
100			7	98%									
	101.3-103.6 ft. Moderate porosity, open vugs (<2 mm.)												
102													
	374.00 / 103.80												
104	103.8-105.6 ft. Freshly medium bedded, pale yellowish brown (10YR 6/2) to light brownish gray (5YR 6/1), medium crystalline, medium strong, DOLOMITIC LIMESTONE, (ST. LOUIS FORMATION)	373.30 / 104.50					90	J,U,SM					
							90	J,PL,R					
							0	J,PL,SM-healed with calcite					
	372.10 / 105.70												
106	105.6 ft. Brownish gray (5YR 4/1), Claystone layer, (~1 in. thick)												
	105.7-107.2 ft. Fresh, thickly bedded, olive gray (5Y 4/1), finely grained, strong, ARENACEOUS DOLOMITE, (ST. LOUIS FORMATION)												
	370.60 / 107.20												
108	107.2-109.6 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), finely crstalline, medium strong, DOLOMITIC LIMESTONE, (ST. LOUIS FORMATION) Trace disseminated pyrite		8	100 %			90	J,U,SM					
	109.6-128.4 ft. Fresh, medium bedded, olive gray (5Y 4/1), micro-crystalline, medium strong to strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolites common, some glauconite stringers						90	J,I,SM,CL					
112													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: B. TILTON
CHECKED: W. HERST
DATE: 3/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-103-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/21/95-2/22/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1067660.4
AZIMUTH: 0

COLLAR ELEV: 477.8
E: 516723.5
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD 80 60 40 20	FRACTURES PER FOOT 2 4 6 8 10	DISCONTINUITY DATA: DIP wrt CORE AXIS 0 30 60 90	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX SW FR MW HW CW	STRENGTH INDEX R6 R5 R4 R3 R2 R1	POINT LOAD INDEX (psi) R1 30 R2 150 R3 300 R4 600 R5 1500 R6	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
112	112.0-113.5 ft. Becomes argillaceous 109.6-128.4 ft. Fresh, medium bedded, olive gray (5Y 4/1), micro-crystalline, medium strong to strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolites common, some glauconite stringers			8	100 %										
114									J,I,R,CL						
			363.30 / 114.50												
									J,I,SM						
116															
									J,PL,SM						
									J,I,VR						
									J,PL,SM,CL						
118									J,PL,VR						
	119.2-124.0 ft. Thin chert zone generally less than 2 in. thick			9	100 %										
120	120.0-120.5 ft. Moderate siliceous								J,I,R,CL						
122									J,I,R,CL						
									J,I,SM,CL						
124			353.30 / 124.50												
	Two stylolites														
126				10	100 %										
									J,PL,SM (2)						
									J,P,SM						
128															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: B. TILTON
CHECKED: W. HERST
DATE: 3/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-103-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/21/95-2/22/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1067660.4
AZIMUTH: 0

COLLAR ELEV: 477.8
E: 518723.5
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

SCALE (Feet)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
128	349.40												
	128.4-133.9 ft. 128.40 Slightly weathered, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARENACEOUS DOLOMITE, (ST. LOUIS FORMATION)												
130			10	100									
132	343.90												
134	133.9-136.5 ft. 133.90 Fresh, medium bedded, light olive gray (5Y 5/2), micro-crystalline to fine crystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Trace disseminated pyrite, some thin veins of calcite (<1/4 in.)	343.50 / 134.30					90	J,PL,SM,CL					2/22/95 16:45 Stopped drilling on Run 10 2/23/95 7:40 Resumed drilling Measured water level at 52.15 ft. below ground surface
							60	J,U,SM					
136	341.30						90	B,PL,SM					
	136.5-139.7 ft. 136.50 Slightly weathered, thickly bedded, light olive gray (5Y 6/1), very fine grained, medium strong, ARENACEOUS DOLOMITE, (<1 in.), (ST. LOUIS FORMATION) Thin Limestone layers												
138			11	100									
	338.10												
140	139.7-142.3 ft. 139.70 Slightly weathered, medium bedded, light olive gray (5Y 5/2), fine crystalline, medium strong, DOLOMITIC LIMESTONE, (ST. LOUIS FORMATION)						90	J,C,SM					
							90	J,PL,SM					
							60	J,I,R					
142	335.50						90	J,I,R,CL					
	142.3-144.3 ft. 142.30 Fresh, thickly bedded, light olive gray (5Y 6/1), micro-crystalline, strong, LIMESTONE, (ST. LOUIS FORMATION) 144.0-144.2 ft. Soft, grayish green (5G 5/2), glauconitic clay layer												Highly broken rock.
144													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: B. TILTON
CHECKED: W. HERST
DATE: 3/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-103-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/21/95-2/22/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1067660.4
AZIMUTH: 0

COLLAR ELEV: 477.8
E: 516723.5
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation

PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular

P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough

Fe-Fe Oxide, CL-Clay Infill, CH-Chlorite, H-Heated, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
144			333.50	11	100 %				J,I,SM (2)						
	333.50 End of Record of Drillhole at 144.3 ft. 144.30		144.30												2/23/95 @ 9:00 Finish drilling corehole.
146															
148															
150															
152															
154															
156															
158															
160															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: B. TILTON
CHECKED: W. HERST
DATE: 3/13/95

Golder Associates

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD: 4.25 inch I.D. Hollow Stem Auger	BORING NO. PZ-104-KS
		SHEET 1 OF 3
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP) SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	DRILLING
		START / FINISH
	WATER LEVEL	TIME / TIME
	TIME	15:40 / 17:58
	DATE	DATE / DATE
NORTHING: 1066993.15 DATUM EASTING: 516820.50 ELEVATION 482.3	CASING DEPTH	2/12/95 / 2/12/95

DRILL RIG CME 75 - TRUCK MOUNT	SURFACE CONDITIONS
ANGLE BEARING	
SAMPLE HAMMER	

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
1	4 5 4 4	1.6'/2.0' (80%)	(0.0-2.4 ft.) Stiff, dark yellowish brown (10YR 4/2), homogenous, CLAYEY SILT, rootlets, NR, moist, (ML-CL), (LOESS)	SP (1)	2/12/95 - 15:40 Began drilling
2 3	2 2 2 2	1.2'/2.0' (60%)	(2.4-7.0 ft.) Soft to firm, dusky yellowish brown (10YR 2/2), homogenous, CLAYEY SILT, NR, moist, (ML-CL), (LOESS)	SP (2)	
4 5	2 2 3 3	1.5'/2.0' (75%)		SP (3)	
6 7		2.2'/2.0' (110%)	(7.0-15.4 ft.) Stiff, light olive gray (5Y 6/1) to light brown (5YR 5/6), homogenous, mottled CLAYEY SILT, NR, damp, (ML-CL), (LOESS)	SH (4)	
8 9	3 4 5 8	0.9'/2.0' (45%)		SP (5)	
10 11	3 4 5 7	1.1'/2.0' (55%)		SP (6)	
12 13	4 4 6 7	1.1'/2.0' (55%)		SP (7)	
14	3 5 8 9	1.2'/2.0' (60%)		SP (8)	

DRILLING CONTR LAYNE-WESTERN

LOGGED BY J. MILLER

DATE 2/12/95 CHK'D BY W. HERST

JOB NO.: 943-2848

FILENAME: PZ104KS

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	4.25 inch I.D. Hollow Stem Auger	PZ-104-KS
		SHEET 2 OF 3
	SAMPLING METHOD:	
	SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP)	DRILLING
	SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	START / FINISH
	WATER LEVEL	TIME / TIME
	TIME	15:40 / 17:58
	DATE	DATE / DATE
	CASING DEPTH	2/12/95 / 2/12/95

NORTHING: 1066993.15
DATUM EASTING: 516820.50 ELEVATION 482.3

DRILL RIG CME 75 - TRUCK MOUNT
SURFACE CONDITIONS
ANGLE BEARING
SAMPLE HAMMER

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL			SAMPLER TYPE	REMARKS
			(7.0-15.4 ft.) Stiff, light olive gray (5Y 6/1) to light brown (5YR 5/6), homogenous, mottled CLAYEY SILT, NR, damp, (ML-CL), (LOESS)	(466.9)	15.4	SH 8	
16		1.7'/2.0' (85%)	(15.4-20.8 ft.) Compact, light gray (N7), homogenous, SILT, NR, dry, (ML), (LOESS)			SH 9	
17							
18	6 5 6 8	1.1'/2.0' (55%)				SP 10	
19							
20	4 4 6 8	1.2'/2.0' (60%)		(461.5)	20.8	SP 11	
21			(20.8-22.4 ft.) Stiff, light olive gray (5Y 6/1), homogenous, CLAYEY SILT, SR, dry, (CL-ML), (LOESS)				
22	6 6 7 8	1.6'/2.0' (80%)		(459.9)	22.4	SP 12	
23			(22.4-23.31 ft.) Compact, pale yellowish brown (10YR 6/2), homogenous, SILTY coarse SAND, NR, dry, (SM), (ALLUVIUM)	(459.0)	23.3		
24	6 5 7 9	1.1'/2.0' (55%)	(23.31-24.8 ft.) Compact, light olive gray (5Y 6/1), homogenous, SILT, NR, dry, (ML), (ALLUVIUM)	(457.5)	24.8	SP 13	
25			(24.8-31.0 ft.) Compact to stiff, medium gray (N5), stratified very fine SAND and CLAYEY SILT, NR, dry, (SC), (ALLUVIUM)				
26	2 5 5 6	1.3'/2.0' (65%)				SP 14	
27							
28	4 4 5 4	1.6'/2.0' (80%)	@ 28.0 ft., 5-6 inch clayey silt layers, <0.5-2.0 inch fine SAND layers			SP 15	
29							

DRILLING CONTR LAYNE-WESTERN

LOGGED BY J. MILLER
DATE 2/12/95 CHK'D BY W. HERST

JOB NO.: 943-2848
FILENAME: PZ104KS

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD: 4.25 inch I.D. Hollow Stem Auger	BORING NO. PZ-104-KS
		SHEET 3 OF 3
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP) SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	DRILLING

					START	FINISH
WATER LEVEL					TIME	TIME
TIME					15:40	17:58
DATE					DATE	DATE
CASING DEPTH					2/12/95	2/12/95

NORTHING: 1066993.15
DATUM EASTING: 516820.50 ELEVATION 482.3

DRILL RIG CME 75 - TRUCK MOUNT

SURFACE CONDITIONS

ANGLE BEARING

SAMPLE HAMMER

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
	4 7 7 10	1.6'/2.0' (80%)			(24.8-31.0 ft.) Compact to stiff, medium gray (N5), stratified very fine SAND and CLAYEY SILT, NR, dry, (SC), (ALLUVIUM) (451.3) 31.0	SP (16)	
31					(31.0-33.1 ft.) Compact, medium dark gray (N4), homogenous, f-m SAND, trace Silt and Clay, NR, moist, (SP), (ALLUVIUM)		
32	10 5 4 12	0.9'/2.0' (45%)			@ 28.0 ft., 6 inch clayey silt layer, <0.5-2.0 inch fine SAND layers (449.2) 33.1	SP (17)	
33					(33.1-36.0 ft.) Very stiff, light gray (N7), homogenous, SILTY CLAY, NR, dry, (CL), (WEATHERED BEDROCK)		
34	6 17 28 52	1.6'/2.0' (80%)				SP (18)	
35							
36					(446.3) 36.0 End of Soil Borehole Log at 36.0 ft.		
37					See PZ-104-KS Record of Drillhole for rock descriptions		
38							
39							
40							
41							
42							
43							
44							

DRILLING CONTR LAYNE-WESTERN

LOGGED BY J. MILLER CHK'D BY W. HERST

DATE 2/12/95

JOB NO.: 943-2848

FILENAME: PZ104KS

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516820.50
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation; PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular; P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough; Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R5 R6 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 R2 30 R3 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
32	0.0-36.0 ft. See Soil Borehole Log PZ-104-KS 36.0-38.0 ft. No samples collected														
34															
36															
38	444.30		444.30												
	38.0-84.7 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), f-m grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) 38.00		38.00						J,PL,SM						5/22/95 @ 14:00 Began drilling
									J,PL,R (2)						
									J,PL,R						
									J,PL,R,CL						
40				1	100 %				J,PL,R,Fe						
									J,PL,SM,CL						
42									J,PL,SM,CL						
			439.30						J,P,R,CL						5/22/95 @ 14:40 End of Run 1
			43.00						J,I,R,Fe						
44									J,I,R,Fe						
									J,PL,R,Fe						
									J,PL,R,CL						
	44.9-45.0 ft. Clay layer 437.00 45.3-46.6 ft. Clay layer 45.30			2	100 %										
46	435.70 46.60														
									J,PL,SM,CL						
									J,I,R,CL						
48									J,C,R,Fe						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 518820.50
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation; PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular; P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough; Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
48	38.0-84.7 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), f-m grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION)				J,PL,SM,CL	
	48.0-54.5 ft. Stylolites common, very thinly bedded clay layers common				J,PL,SM,CL (3)	
50			2	100 %	J,PL,SM,CL; J,I,R	
52					J,PL,SM,CL	
		429.30 / 53.00			J,PL,SM,CL	5/22/95 @ 16:00 End of Run 2
	53.5-63.0 ft. Joints have approximately 1/2 in. of clay				B,PL,SM (3)	
54					J,I,R (4)	
					J,PL,SM,CL (7)	
56					J,PL,SM,CL (2); J,PL,SM,CL (4)	
					J,PL,SM,CL (2)	
58			3	100 %	J,PL,SM,CL (4)	
					J,PL,SM,CL (4)	
60					J,I,R,CL; J,PL,R	
					J,PL,SM,CL	
62	61.9-62.6 ft. Abundant argillaceous partings					
	62.6-62.7 ft. Clay layer				J,PL,SM,CL (2)	
		419.30 / 63.00				5/22/95 @ 17:00 End of Run 3
			4	100 %		
64						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516820.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
64	38.0-84.7 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), f-m grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION)				J,PL,SM	
	@ 65.6 ft. Chert layer					
66						
	67.3-73.0 ft. Stylolites common				J,PL,SM,CL	
68			4	100 %	J,PL,SM	
					J,PL,SM,CL (2)	
70					J,PL,SM,CL	
72		409.30 / 73.00				5/22/95 @ 17:45 End of Run 4
	73.4-83.3 ft. Abundant argillaceous partings					
74					J,I,R	
					B,I,SM	
					J,PL,SM,CL	
76			5	100 %	J,PL,SM,CL	
					J,PL,SM,CL	
					J,PL,SM,CL	
78					J,PL,SM,CL	
	79.1-79.2 ft. Clay layer				J,PL,SM,CL (2)	
80						

DISCONTINUITY DATA: DIP wrt CORE AXIS (0, 30, 60, 90)

WEATHERING INDEX: SW, FR, MW, HW, CW

STRENGTH INDEX: R6, R5, R4, R3, R2, R1

POINT LOAD INDEX (psi): R1 30, R2 150, R3 300, R4 600, R5 1500, R6

TEST ORIENTATION

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516820.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE / DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	NOTES, WATER LEVELS, INSTRUMENTATION
80	38.0-84.7 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), f-m grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION)				J,PL,SM,CL	
			5	100 %		
82		399.30				5/22/95 @ 18:30 End of Run 5 Ended drilling for the day 5/23/95 @ 7:25 Began drilling
		83.00				
84					J,I,R,CL	
	84.7-84.9 ft. Medium light gray (N6), fine grained, SANDSTONE layer, (ST. LOUIS FORMATION)				J,I,R,CL	
86	84.9-91.4 ft. Slightly weathered, medium bedded, pale yellowish brown (10YR 6/2), f-m crystalline, medium strong, LIMESTONE (ST. LOUIS FORMATION) Calcite filled fractures, clay filled fractures 86.3-86.6 ft. Clay layer		6	83%	J,I,SM-intact J,I,VR J,I,R,CL J,I,R J,I,R	
88					J,I,R,CL	
		392.90				
		89.40				
90					Core Loss	Core Loss, possible soft rock
		391.60				5/23/95 @ 8:30 End of Run 6
		90.70				
	390.90 / 91.40 91.4-91.9 ft. Slightly weathered, thinly bedded, medium gray (N5), fine grained, medium strong, SANDSTONE, (ST. LOUIS FORMATION) Thickly laminated clay layers 390.40 / 91.90				B,PL,SM (2)	
92	91.9-103.0 ft. Slightly weathered, medium bedded, pale yellowish brown (10YR 6/2), microcrystalline to fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Abundant argillaceous layers				J,I,R,CL	
			7	100 %		
94					J,I,R	
96						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516820.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
96	91.9-103.0 ft. Slightly weathered, medium bedded, pale yellowish brown (10YR 6/2), microcrystalline to fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Abundant argillaceous layers							J,PL,R					
			7	100 %				J,PL,R,CL					
98													
		383.10 / 98.20											5/23/95 @ 9:00 End of Run 7
100													
	101.1-103.0 ft. Abundant chert												
102													
			8	80%									
	379.30 / 103.00												
104	103.0-108.0 ft. Slightly weathered, thickly laminated, medium dark gray (N4), fine grained, very weak, SILTSTONE grades to sandy SILTSTONE with depth, (ST. LOUIS FORMATION)												
106		376.20 / 106.10											Core Loss, soft rock
	374.50 / 107.80	374.50 / 107.80											5/23/95 @ 10:10 End of Run 8
108	108.0-118.2 ft. Fresh, medium bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) Stylolites present							B,PL,SM,CL					
								B,PL,SM,CL (5)					
								J,U,SM,CL					
			9	100 %									
110													
112													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: O. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516820.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
Pl.-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
112	108.0-118.2 ft. Fresh, medium bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) Stylolites present		9	100 %	B,PL,SM,CL	
114		368.10 / 114.20				5/23/95 @ 10:40 End of Run 9
116						
118	364.10 / 118.20 118.2-119.8 ft. Slightly weathered, medium bedded, olive gray (5Y 4/1), medium grained, medium strong, DOLOMITE, (ST. LOUIS FORMATION) 362.50 / 119.80		10	100 %	J,PL,SM,CL	
120	119.8-121.7 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), medium crystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION)				J,PL,SM,CL	
122	121.7-123.2 ft. Fresh, medium bedded, light olive gray (5Y 6/1), m-c grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION)				J,PL,SM,CL (2)	
124	123.2-133.8 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), medium crystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Pyrite at contact	358.10 / 124.20			J,I,R	5/23/95 @ 11:40 End of Run 10
126			11	100 %	J,PL,SM,CL	
128						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516820.50
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation; PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular; P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough; Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
128	123.2-133.8 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), medium crystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Pyrite at contact							J,PL,SM,CL					
130			11	100 %				J,PL,SM,CL					
132								J,I,SM,CL					
134	133.8-135.3 ft. Slightly weathered, thinly bedded, light olive gray (5Y 6/1) fine grained, weak, SANDSTONE, (ST. LOUIS FORMATION) Thickly laminated, argillaceous layers (348.50 / 133.80 / 347.00)	348.10 / 134.20						J,I,SM,CL; B,PL,SM					5/23/95 @ 12:20 End of Run 11
136	135.3-137.5 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolitic (135.30)							J,PL,SM					
138	137.5-140.0 ft. Fresh, thinly bedded, pale yellowish brown (10YR 6/2), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) Includes fine sand and silt		12	100 %				J,PL,SM,CL					
140	140.0-144.7 ft. Fresh, thickly bedded, pale yellowish brown (10YR 6/2), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolitic							J,PL,SM					
142								J,PL,SM					
144													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516820.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DL SCALE (FEET)	ROCK TYPE DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
144		338.10 / 144.20	12	100 %	J,PL,SM J,PL,R	5/23/95 @ 13:00 End of Run 12
	144.7-149.2 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), f-m grained crystalline, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION)					
146						
148					J,PL,R	
	149.2-152.2 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2) to medium gray (N5), fine crystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolites and argillaceous partings common		13	100 %	J,PL,R	
150					B,PL,SM,CL (3)	
					B,PL,SM,CL (2)	
152	152.3-154.6 ft. Fresh, medium bedded, light olive gray (5Y 6/1), f-m grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION)					
154		328.10 / 154.20				5/23/95 @ 14:10 End of Run 13
	154.6-162.3 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolitic, argillaceous partings				B,PL,SM (2)	
156			14	100 %	J,PL,SM	
158						
					B,I,R	
160						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: O. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 518820.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
160	160.2-161.2 ft. Abundant clay zones, slightly weathered rock												
162	162.3-167.6 ft. Fresh, medium bedded, grayish orange (10YR 7/4), f-m crystalline, medium strong, ARENACEOUS LIMESTONE, (SALEM FORMATION) 320.00 / 162.30		14	100 %									@ 162.3 ft. Inferred top of SALEM FORMATION
164		318.10 / 164.20											5/23/95 @ 15:00 End of Run 14
166													
168	167.6-171.7 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), m-c grained, medium strong, ARGILLACEOUS LIMESTONE, (SALEM FORMATION)		15	100 %									
170													
172	171.7-185.0 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), f-m crystalline, medium strong, LIMESTONE, (SALEM FORMATION)							J,I,R					
174		308.10 / 174.20						B,PL,SM,CL (4)					5/23/95 @ 16:00 End of Run 15
	175.3-190.1 ft. Abundant argillaceous layers and partings		16	100 %				B,PL,SM					
176													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516620.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

SCALE (FEET)	ROCK TYPE / DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
176	171.7-185.0 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), fine to medium crystalline, medium strong, LIMESTONE, (SALEM FORMATION)								J,PL,SM						
178	178.4-185.0 ft. Abundant chert layers and nodules														
180				16	100 %										
182									J,PL,R						
									J,PL,R						
184			298.10 / 184.20												5/23/95 @ 16:45 End of Run 16 Finished drilling for the day 5/24/95 @ 7:30 Began drilling Run 17 Water level before drilling @ 112.0 ft.
186	185.0-186.7 ft. Fresh, thickly bedded, pale yellowish brown (10YR 6/2), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (SALEM FORMATION) Chert nodules abundant														
	186.7-189.0 ft. Slightly weathered, thinly bedded, medium gray (N5), fine and medium grained, medium strong LIMESTONE, (SALEM FORMATION) Abundant argillaceous partings and layers								B,PL,SM,CL						
188				17	100 %										
									B,PL,SM,CL (2)						
190	189.0-197.2 ft. Fresh, thinly bedded to thickly bedded (with depth), pale yellowish brown (10YR 6/2), f-m grained, medium strong, ARGILLACEOUS LIMESTONE, (SALEM FORMATION) Abundant chert nodules														
192															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516820.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
192	189.0-197.2 ft. Fresh, thinly bedded to thickly bedded (with depth), pale yellowish brown (10YR 6/2), f-m grained, medium strong, ARGILLACEOUS LIMESTONE, (SALEM FORMATION) Abundant chert nodules			17	100 %										
194			288.10 / 194.20												5/24/95 @ 8:40 End of Run 17
196															
198	197.2-204.0 ft. Fresh, thickly bedded, pale yellowish brown (10YR 6/2) and medium gray (N5), fine grained, medium strong, LIMESTONE, (SALEM FORMATION) Abundant large, strong nodules and layers of chert			18	100 %			90	J,PL,SM,CL						
								90	J,PL,SM,CL						
								90	J,PL,SM						
								90	J,I,R						
								90	J,PL,R						
200			281.70 / 200.60												5/24/95 @ 10:15 End of Run 18
202															
204	204.0-222.7 ft. Fresh, medium bedded, grayish orange (10YR 7/4), medium crystalline, medium strong, LIMESTONE, (SALEM FORMATION) Silicified zones and abundant chert			19	99%			90	J,PL,SM (3)						
206															
								90	J,PL,SM						
208															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2648
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 8/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516820.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
208	204.0-222.7 ft. Fresh, medium bedded, grayish orange (10YR 7/4), medium crystalline, medium strong, LIMESTONE, (SALEM FORMATION) Silicified zones and abundant chert		19	99%	J,PL,SM	
		273.10			J,PL,SM (2)	5/24/95 @ 11:40 End of Run 19
		209.20			J,PL,SM (2)	
210			20	49%	J,I,R	
					J,PL,SM (2)	
		270.80				
	270.80 / 211.50	211.50			Core Loss	
212						Core Loss
		268.40				Core Loss, washed out 5/24/95 @ 13:20 End of Run 20
214		213.90			B,PL,SM (2)	
216			21	92%		
218		263.50				
		218.80 / 263.10				Core Loss (clay ?) 5/24/95 @ 14:00 End of Run 21
		219.20				
220			22	100 %		
222	222.7-228.0 ft. Slightly weathered, medium bedded, grayish orange (10YR 7/4), coarse crystalline, weak, FOSSILIFEROUS LIMESTONE, (SALEM FORMATION) Highly silicious, argillaceous					> 10 mechanical breaks/foot
224						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1086993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 316820.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP w/t CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX (SW, FR, MW, HW, CW)	STRENGTH INDEX (R6, R5, R4, R3, R2, R1)	POINT LOAD INDEX (psi) (R1 30, R2 30, R3 150, R4 300, R5 1500, R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
224	222.7-228.0 ft. Slightly weathered, medium bedded, grayish orange (10YR 7/4), coarse crystalline, weak, FOSSILIFEROUS LIMESTONE, (SALEM FORMATION) Highly silicious, argillaceous												
226			22	100 %									
							90	J,PL,R					
228	228.0-230.7 ft. Slightly weathered, medium bedded, grayish orange (10YR 7/4), f-m crystalline, medium strong, LIMESTONE, (SALEM FORMATION)	253.10 / 229.20											5/24/95 @ 15:30 End of Run 22
230							60	F,U,R (2)					
	230.7-238.9 ft. Slightly weathered, medium bedded, grayish orange (10YR 7/4), m-c crystalline, medium strong, LIMESTONE, (SALEM FORMATION) Argillaceous, silicious												
232							30	J,PL,R					
234			23	100 %									
236													236.0-237.0 ft. Additional mechanical breaks
							30	J,PL,R (2)					
							90	J,PL,R					
238	238.9-247.4 ft. Slightly weathered, medium bedded, grayish orange (10YR 7/4), m-c crystalline, medium strong, LIMESTONE, (SALEM FORMATION) Argillaceous, silicious, includes fossiliferous zones	243.10 / 239.20	24	100 %			90	B,PL,SM,CL					5/24/95 @ 16:00 End of Run 23
240													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516820.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
240	238.9-247.7 ft. Slightly weathered, medium bedded, grayish orange (10YR 7/4), m-c crystalline, medium strong, LIMESTONE, (SALEM FORMATION) Argillaceous, silicious, includes fossiliferous zones														
242															
244				24	100 %										
246									J,PL,R						
248	247.4-256.8 ft. Fresh, medium bedded, light to medium gray (N6 to N5), m-c crystalline, strong, FOSSILIFEROUS LIMESTONE, (SALEM FORMATION)		233.10 / 249.20												5/24/95 @ 16:45 End of Run 24
250															
252				25	100 %										
254															
256															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516820.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-Fe-Oxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (Feet)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
256												
	226.00											
	256.3-258.8 ft. 256.30 Fresh, thinly bedded, medium dark gray (N4), fine grained, medium strong, SILTSTONE, (WARSAW FORMATION)		25	100 %			90	B,PL,SM,CL (2)				256.3 ft. Top of WARSAW FORMATION encountered
258												
	223.50											
	258.8-260.8 ft. 258.80 Fresh, medium bedded, medium gray (N5), m-c crystalline, strong, FOSSILIFEROUS LIMESTONE, (WARSAW FORMATION) Argillaceous, silicious	223.10 / 259.20										5/24/95 @ 17:30 End of Run 25
260												5/26/95 6 in steel casing installed to 257.0 ft. in 9 7/8 in. borehole and sealed with cement Core drilling resumed 6/1/95 @ 11:00
	221.50											
	260.8-264.6 ft. 260.80 Fresh, thinly bedded, olive gray (5Y 4/1), very fine grained, medium strong, SILTSTONE, (WARSAW FORMATION)		26	100 %								
262												
264		218.10 / 264.20										
	217.70											
	264.6-267.2 ft. 264.60 Fresh, thinly bedded, medium dark gray (N4), coarse crystalline, strong, DOLOMITIC LIMESTONE, (WARSAW FORMATION) Chert nodules common (<5 mm.)						90	B,PL,SM (2)				
266							90	J,I,R				
	267.2-271.9 ft. Fresh, medium bedded, olive gray (5Y 4/1), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (WARSAW FORMATION)		27	100 %			60	J,U,SM				
268							90	J,PL,SM				
270												
	271.9-274.0 ft. Fresh, thinly bedded, medium dark gray (N4), coarse crystalline, strong, DOLOMITIC LIMESTONE, (WARSAW FORMATION) Chert nodules common (<5 mm.)											
272												

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516820.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO	CORE RECOVERY	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
272	271.9-274.0 ft. Fresh, thinly bedded, medium dark gray (N4), coarse crystalline, strong, DOLOMITIC LIMESTONE, (WARSAW FORMATION) Chert nodules common (<5 mm.)		27	100 %	J,PL,SM	
274	274.0-279.9 ft. Fresh, thin to medium bedded, olive gray (5Y 4/1), very fine grained, medium strong, ARGILLACEOUS LIMESTONE, (WARSAW FORMATION) Porous, (<1 mm. open vugs) 274.4-275.5 ft. Several partially calcite crystal filled voids (<2 in.)	208.10 / 274.20			J,C,SM; J,I,R; J,I,R; J,I,R (4)	274.4-275.5 ft. Possible high porosity zone
276						
278			28	100 %	B,I,SM	
280	279.9-295.7 ft. Fresh, medium bedded, light olive gray (5Y 6/1), coarse crystalline, medium strong to strong, DOLOMITIC LIMESTONE, (WARSAW FORMATION) Abundant chert nodules (<2 mm.), fossiliferous with some silicified zones, stylolitic				J,I,VR; J,PL,SM,Fe	
282						
284	284.2-285.4 ft. Olive gray (5Y 4/1), Argillaceous Limestone layer	198.10 / 284.20				6/1/95 @ 15:25 End of Run 28
286			29	100 %	J,PL,SM	
288						

GRAPHIC LOG; WEATHERING INDEX (SW FR, MW, HW, CW); STRENGTH INDEX (R5 R6, R4, R3, R2, R1); POINT LOAD INDEX (psi) (R1 30, R2 150, R3 300, R4 600, R5 1500, R6); TEST ORIENTATION

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516820.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP w/r CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
288	279.9-295.7 ft. Fresh, medium bedded, light olive gray (5Y 6/1), coarse crystalline, medium strong to strong, DOLOMITIC LIMESTONE, (WARSAW FORMATION) Abundant chert nodules (<2 mm.) fossiliferous with some silicified zones, stylolitic											
290			29	100 %								
292												
294		188.10 / 294.20										6/1/95 @ 16:20 End of Run 29
296	295.7-303.7 ft. Fresh, thinly bedded, medium dark gray (N4), very fine grained, medium strong, ARGILLACEOUS LIMESTONE, (WARSAW FORMATION)											
298	297.5-299.3 ft. Partially silicified, porous (open vugs <3 mm.)						90	J,PL,SM				
			30	100 %								
	299.3-303.7 ft. Rock becomes weak due to high clay content						90	J,PL,SM,CL				
300												
302												
304	303.7-305.0 ft. Fresh, thinly bedded, medium gray (N5), coarse crystalline, medium strong, LIMESTONE, (WARSAW FORMATION)											

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516820.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
304		178.10 / 304.20	30	100 %									6/1/95 @ 17:00 End of Run 30 Stop drilling 6/2/95 @ 8:30 Begin Run 31
	177.30 305.00 305.0-309.7 ft. Fresh, thinly bedded, medium dark gray (N4), very fine grained, weak, SILTSTONE, (WARSAW FORMATION)												
306													
308			31	100 %									
	172.60 309.70 309.7-313.5 ft. Fresh, thinly bedded, medium gray (N5), m-c crystalline, medium strong, LIMESTONE, (WARSAW FORMATION) Numerous clay partings, stylolitic							B,PL,SM					
310								B,PL,SM					
312								B,PL,SM,CL					
	313.5-322.0 ft. Fresh, thinly to medium bedded, light olive gray (5Y 6/1) to dark gray (N3), very fine to medium grained medium strong, alternating layers of ARGILLACEOUS LIMESTONE and SILTSTONE (2-6 in. thick) (WARSAW FORMATION)							B,U,SM,CL					
314	168.10 314.20	168.10 / 314.20											6/2/95 @ 11:30 End of Run 31 Slow drilling, a lot of rod wobble
	167.30 315.00							B,PL,SM,CL					
	166.30 316.00												
316								B,PL,SM (4)					
	165.30 317.00		32	98%									
	164.30 318.00												
318													
	163.30 319.00												
	162.30 320.00												
320													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LA/DLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516820.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP w/t CORE AXIS	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
320	313.5-322.0 ft. Fresh, thinly to medium bedded, light olive gray (5Y 6/1) to dark gray (N3), very fine to medium grained; medium strong, alternating layers of ARGILLACEOUS LIMESTONE and SILTSTONE (2-6 in. thick) (WARSAW FORMATION) 162.30 / 320.00 / 161.30 / 321.00 / 160.30 / 322.00								B,I,R						
322	322.0-347.4 ft. Fresh, thickly bedded, dark gray (N3), very fine grained, medium strong, SILTSTONE, (WARSAW FORMATION)			32	98%										
324			158.10 / 324.20												6/2/95 @ 12:40 End Run 32
326															
328				33	100 %				J,PL,SM,CL						
330															
332			149.10 / 333.20												6/2/95 @ 14:00 End of Run 33
334				34	100 %										
336															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516820.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Heated, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
336	322.0-347.4 ft. Fresh, thickly bedded, dark gray (N3), very fine grained, medium strong, SILTSTONE, (WARSAW FORMATION)														
				34	100 %										
338	338.0-347.2 ft. Siltstone becomes weak														
			143.10 / 339.20												
	339.3-339.5 ft. Soft, medium gray (N5), Clay seam														
340															
342															
				35	100 %										
344															
346															
	134.90 / 347.40														
348	347.4-358.3 ft. Fresh, thinly bedded, medium dark gray (N4), fine crystalline, medium strong, DOLOMITIC LIMESTONE, (WARSAW FORMATION) Argillaceous, numerous shaley partings, some thin interbeds of Siltstone (<4 in. thick), fossiliferous, coarse chert nodules common		134.10 / 348.20												
350				36	100 %										
352															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLDWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516820.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP w/r CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R5 R6 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 R2 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
352	347.4-358.3 ft. Fresh, thinly bedded, medium dark gray (N4), fine crystalline, medium strong, DOLOMITIC LIMESTONE, (WARSAW FORMATION) Argillaceous, numerous shaley partings, some thin interbeds of Siltstone (<4 in. thick), fossiliferous, coarse chert nodules common														
354				36	100 %										
356															
358			124.00 / 358.30												@ 358.3 ft. Inferred top of KEOKUK FORMATION Drilling rate slows significantly due to chert layers 6/2/95 @ 17:00 End of Run 36
360	358.3-384.7 ft. Fresh, thinly bedded, medium gray (N5), alternating fine crystalline and coarse crystalline layers, medium strong to strong, ARGILLACEOUS LIMESTONE, (KEOKUK FORMATION) Some zones fossiliferous, abundant medium bluish gray (5B 5/1), chert layers, coarse grained chert nodules common, thinly laminated, shaley partings common, trace disseminated pyrite								J,I,R						
362				37	100 %										
364															
366															
368															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 8/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516820.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
368	357.7-384.7 ft. Fresh, thinly bedded, medium gray (N5), alternating fine crystalline and coarse crystalline layers, medium strong to strong, ARGILLACEOUS LIMESTONE, (KEOKUK FORMATION) Some zones fossiliferous, abundant medium bluish gray (5B 5/1), chert layers, coarse grained chert nodules common, thinly laminated, shaley partings, common, trace disseminated pyrite	114.00 / 368.30	37	100 %		6/2/95 @ 18:00 End of Run 37
370			38	98%		
372						
374		108.00 / 374.30				6/2/95 @ 19:15 End of Run 38 Stop drilling 6/3/95 @ 7:00 Drilling resumed
376			39	100 %		
378	Below 378.5 ft. Only occasional shaley partings	103.00 / 379.30			B,U,SM,CL	6/3895 @ 13:30 End of Run 39
380			40	100 %		
382						
384						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516820.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
384		98.00	40	100 %									6/3/95 @ 15:00 End of Run 40 Stop drilling 6/4/95 @ 8:00 Drilling resumed
		384.30											
	384.7-393.8 ft. Slightly weathered, thinly bedded, pinkish gray (5Y 8/1) to light olive gray (5Y 6/1), f-m crystalline, medium strong to strong, LIMESTONE, (KEOKUK FORMATION) Some zones coarse grained, chert layers common (<6 in.), stylolitic, some zones silicified												
386													
388													
			41	100 %									
390													
392	@ 392.0 ft. Three open vugs with quartz crystals (<1 in. dia.)												
		88.50											
394	393.8-408.5 ft. Moderate to highly weathered, thinly bedded, light gray (N7), f-c crystalline, medium strong to weak, SILICIFIED LIMESTONE, (KEOKUK FORMATION) Chert nodules and layers common, stylolitic	393.80											
396			42	94%									
398	398.5-399.1 ft. Highly weathered, very porous, (open vugs <5 mm.), weak rock												
400													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/22/95 - 6/4/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066993.15
AZIMUTH: 0

COLLAR ELEV: 482.3
E: 516820.50
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (FR SW MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
400	393.8-408.5 ft. Moderate to highly weathered, thinly bedded, light gray (N7), f-c crystalline, medium strong to weak, SILICIFIED LIMESTONE, (KEOKUK FORMATION) Chert nodules and layers common, stylolitic			42	94%										
402			79.10												
			403.20												Core Loss in highly weathered rock 6/4/95 @ 14:10 End Run 42
	@ 403.8 ft. Highly weathered, very porous, weak rock		78.50												
404			403.80												
406				43	96%										
408															6/4/95 @ 14:45 Drilling completed
	73.50		73.50												
	End of Record of Drillhole at 408.8 ft. 408.80		408.80												
410															
412															
414															
416															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 7/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-SD

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 6/6/95
DRILL RIG: SCHRAMM

DATUM: MSL
COORDINATES N: 1067013.26
AZIMUTH: 0

COLLAR ELEV: 482.1
E: 516834.43
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (FR SW MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
240	0.0-245.3 ft. No sampling conducted See Soil Borehoole Log and Record of Drillhole for PZ-104-KS														0.0-38.0 ft. Drilling conducted with 6 1/4 in. ID hollow stem augers, then borehole advanced to 245.3 ft. with 5 7/8 in. air rotary bit
242															
244															
	236.80		236.80												
	245.3-252.8 ft. 245.30 Fresh, thickly bedded, medium dark gray (N4), coarse grained, medium strong, FOSSILIFEROUS LIMESTONE, (SALEM FORMATION) Coarse grained calcite crystals common		245.30												6/6/95 @ 8:30 Began coring
246															
	247.4-250.1 ft. Limestone is moderate yellowish brown (10YR 5/4) due to iron oxide														
248															
250				1	94%										
252															
	229.30														
	252.8-255.0 ft. 252.80 Slightly weathered, thinly bedded, moderate yellowish brown (10YR 5/4), very fine grained, weak, SILTSTONE, (WARSAW FORMATION)														
254			227.70												
	254.4-255.0 ft. Siltstone becomes highly weathered 227.10		254.40						Core Loss						Core Loss due to highly weathered SILTSTONE 6/6/95 @ 11:30 Coring completed
	End of Record of Drillhole at 255.0 ft. 255.00														
256															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: M. VOGT

LOGGED: B. TILTON
CHECKED: R. BOOTH
DATE: 7/12/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2648
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 6/4/95
DRILL RIG: SCHRAMM

DATUM: MSL
COORDINATES N: 1067028.01
AZIMUTH: 0

COLLAR ELEV: 481.6
E: 516847.19
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation

PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular

P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough

Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DISCONTINUITY DATA

DEPTH SCALE (FEET)	DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
128	0.0-135.0 ft. No sampling conducted See Record of Drillhole for PZ-104-KS													0.0-38.0 ft. Drilling conducted with 6 1/4 in. ID hollow stem augers, then borehole advanced to 135.0 ft. with 5 7/8 in. air rotary bit
130														
132														
134														
	346.60		346.60											
	135.0-138.1 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), very fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) 135.00		135.00						J,PL,R					6/4/95 @ 9:30 Begin Run 1
136									J,I,R					
									J,P,R					
138	343.50								J,I,R,CL					
	138.1-138.7 ft. Slightly weathered, finely bedded, dark greenish gray (5GY 4/1), very fine grained, very weak, CLAYSTONE (ST. LOUIS FORMATION) 138.10 342.90 138.70								J,I,R,CL					
									J,PL,SM,CL					
									J,I,VR,calcite					
	138.7-145.0 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), very fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION)			1	100 %				J,C,R					
140														
142									J,PL,SM (2)					
									J,I,SM					
144														

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: M. VOGT

LOGGED: E. SWANSON
CHECKED: B. TILTON
DATE: 6/4/95

Golder Associates

RECORD OF DRILLHOLE PZ-104-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 6/4/95
DRILL RIG: SCHRAMM

DATUM: MSL
COORDINATES N: 1067028.01
AZIMUTH: 0

COLLAR ELEV: 481.6
E: 516847.19
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation; PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular; P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough; Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
144	138.7-145.0 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), very fine grained, medium strong, LIMESTONE, 336.60 (ST. LOUIS FORMATION) 145.00		336.60	1	100 %										
	End of Record of Drillhole at 145.0 ft.		145.00												
146															
148															
150															
152															
154															
156															
158															
160															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: M. VOGT

LOGGED: E. SWANSON
CHECKED: B. TILTON
DATE: 6/4/95

Golder Associates

LAIDLAW
LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
	6.25 inch I.D. Hollow Stem Auger	PZ-105-SS
		SHEET 1 OF 3
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP) SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	DRILLING START / FINISH

					START	FINISH
WATER LEVEL					TIME	TIME
TIME					14:20	17:15
DATE					DATE	DATE
CASING DEPTH					5/19/95	5/19/95

NORTHING: 1066421.35
DATUM EASTING: 516230.23 ELEVATION 481.2

DRILL RIG CME 75 - TRUCK MOUNT
SURFACE CONDITIONS Grassy field
ANGLE -90 BEARING NA
SAMPLE HAMMER

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
1	1 3 3 2	1.3' / 2.0' (65%)			(0.0-4.4 ft.) Firm, moderate yellowish brown (10YR 5/4), SILT, with trace fine Sand, NR, moist, (ML), (LOESS)	SP 1	
2	2 2 3 2	1.8' / 2.0' (90%)				SP 2	
4	2 3 5 7	2.0' / 2.0' (100%)			(476.8) 4.4		
5					(4.4-18.5 ft.) Very soft to stiff, moderate yellowish brown (10YR 5/2), SILTY CLAY, NR, moist, (CL), (LOESS)	SP 3	
6	1 2 4 5	1.5' / 2.0' (75%)					
7					from 7.0-16.0 ft., grades to include trace fine sand, color grades to light olive gray (5Y 6/1) and moderate yellowish brown (10YR 5/2) (mottled)	SP 4	
8	0 2 3 2	2.0' / 2.0' (100%)					
9						SP 5	
10	1 2 1 2	2.0' / 2.0' (100%)					
11						SP 6	
12	0 0 1 3	2.0' / 2.0' (100%)					
13						SP 7	
14	2 2 5 8	1.9' / 2.0' (95%)				SP 8	

DRILLING CONTR LAYNE-WESTERN
LOGGED BY D. ALLOWAY
DATE 7/14/95
CHK'D BY W. HERST
JOB NO.: 943-2848
FILENAME: PZ105SS

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:					BORING NO.
	6.25 inch I.D. Hollow Stem Auger					PZ-105-SS
						SHEET 2 OF 3
	SAMPLING METHOD:					DRILLING
LAIDLAW/OU2 RI-FS/MQ	SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP)					START / FINISH
WEST LAKE LANDFILL	SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)					
OPERABLE UNIT 2	WATER LEVEL					TIME / TIME
	TIME					14:20 / 17:15
	DATE					DATE / DATE
NORTHING: 1066421.35	CASING DEPTH					5/19/95 / 5/19/95
DATUM EASTING: 516230.23 ELEVATION 481.2						

DRILL RIG CME 75 - TRUCK MOUNT

SURFACE CONDITIONS Grassy field

ANGLE -90 BEARING NA

SAMPLE HAMMER

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
16	1 4 7 8	1.9'/2.0' (95%)			from 16.0-18.5 ft., grades to little fine sand, color grades to medium light gray (N6)	SP (8)	
17						SP (9)	
18	5 5 8 9	1.5'/2.0' (75%)			(18.5-20.5 ft.) Stiff, olive gray (5Y 4/1), fine SANDY CLAY, NR, wet, (CL), (ALLUVIUM)	SP (10)	
19							
20	3 6 9 13	1.7'/2.0' (85%)			(460.7) 20.5 (20.5-27.1 ft.) Compact, medium gray (N5), f-m poorly graded SAND, NR, wet, (SP), (ALLUVIUM)	SP (11)	
21							
22	1 4 8 9	1.3'/2.0' (65%)			@ 22.5 ft., grades to less silt	SP (12)	
23							
24	4 8 18 19	1.5'/2.0' (75%)			@ 24.7 ft., grades to more silt	SP (13)	
25							
26	1 4 5 9	1.3'/2.0' (65%)			(454.1) 27.1 (27.1-29.6 ft.) Loose to compact, medium gray (N5), SILT with little fine Sand, NR, wet, (ML), (ALLUVIUM)	SP (14)	
27							
28	1 1 3 12	1.7'/2.0' (85%)			(451.6) 29.6 (29.6-33.8 ft.) Very loose to dense, medium gray (N5), f-m poorly graded SAND, NR, wet, (SP), (ALLUVIUM)	SP (15)	
29							

DRILLING CONTR LAYNE-WESTERN

LOGGED BY D. ALLOWAY CHK'D BY W. HERST

DATE 7/14/95

JOB NO.: 943-2848

FILENAME: PZ105SS

LAIDLAW
LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	6.25 inch I.D. Hollow Stem Auger	PZ-105-SS
		SHEET 3 OF 3
	SAMPLING METHOD:	
	SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP)	DRILLING
	SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	START / FINISH
	WATER LEVEL	TIME / TIME
	TIME	14:20 / 17:15
	DATE	DATE / DATE
	CASING DEPTH	5/19/95 / 5/19/95

NORTHING: 1066421.35
DATUM EASTING: 516230.23 ELEVATION 481.2

DRILL RIG CME 75 - TRUCK MOUNT
SURFACE CONDITIONS Grassy field
ANGLE -90 BEARING NA
SAMPLE HAMMER

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
31	2 8 18 29	2.0'/2.0' (100%)			(29.6-33.8 ft.) Very loose to dense, medium gray (N5), f-m poorly graded SAND, NR, wet, (SP), (ALLUVIUM)	SP (16)	
32 33	1 10 37 33	2.0'/2.0' (100%)				SP (17)	
34	45 50/3'	0.5'/1.0' (50%)			(33.8-35.0 ft.) Very dense, light olive gray (5Y 6/1), LIMESTONE GRAVEL, SR, wet, (WEATHERED LIMESTONE BEDROCK) (446.2) 35.0	SP (18)	
35					End of Soil Borehole Log at 35.0 ft. See PZ-105-SS Record of Drillhole for rock descriptions		
36							
37							
38							
39							
40							
41							
42							
43							
44							

DRILLING CONTR LAYNE-WESTERN
LOGGED BY D. ALLOWAY
DATE 7/14/95
CHK'D BY W. HERST
JOB NO.: 943-2848
FILENAME: PZ105SS

RECORD OF DRILLHOLE PZ-105-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NS Core & water
DRILLING DATE: 5/20/95 - 5/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066421.35
AZIMUTH: 0

COLLAR ELEV: 481.2
E: 516230.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R5 R6 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 R2 30 R3 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
32	0.0-35.0 ft. See Soil Borehole Log PZ-105-SS														
34	35.0-39.0 ft. Slightly weathered, thinly bedded, medium light gray (N6), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) 446.20		446.20												
	35.2-35.9 ft. Dark yellowish orange (10YR 6/6), Claystone layer 35.20		35.00												5/20/95 @ 8:20 Began drilling Run 1
36				1	73%										
38									Core Loss						5/20/95 @ 9:00 End of Run 1
	39.0-52.9 ft. Slightly weathered, medium bedded, medium light gray (N6), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Clay filled joints and layers of Claystone		442.20 39.00												
40				2	77%										
42			438.30						Core Loss						5/20/95 @ 9:45 End of Run 2
			42.90												
44									J,I,VR,Fe (2)						43.0-44.0 ft. Healed seam at 0°
				3	93%										
46									J,PL,R,CL (3)						
48															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 6/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-105-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NS Core & water
DRILLING DATE: 5/20/95 - 5/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068421.35
AZIMUTH: 0

COLLAR ELEV: 481.2
E: 516230.23
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
48	39.0-52.9 ft. Slightly weathered, medium bedded, medium light gray (N6), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION)	432.20 / 49.00	3	93%	J,PL,R,CL Core Loss	5/20/95 @ 10:20 End of Run 3
50	49.0 ft. Color grades to pale yellowish brown (10YR 6/2) 50.5 ft. Pyrite present 51.0-51.2 ft. Sandstone layer		4	100 %	J,P,R (2) J,P,R (2)	
52	51.9-52.3 ft. Sandstone layer	428.30 / 52.90				
54	52.9-65.2 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), fine to microcrystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Zones of thin clay or silicous laminations 54.6-54.8 ft. Chert layer				J,PL,VR J,PL,VR	
56			5	98%	J,I,R,CL	
58	57.8-57.9 ft. Clay layer 57.9-58.6 ft. Sandstone layer	422.20 / 59.00				5/20/95 @ 12:00 End of Run 5
60					J,PL,R J,C,SM,CL	
62			6	100 %	J,PL,R (3) J,PL,R (2)	
64					J,PL,R	

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: O. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 6/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-105-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2648
LOCATION: BRIDGETON, MO

BORING METHOD: NS Core & water
DRILLING DATE: 5/20/95 - 5/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066421.35
AZIMUTH: 0

COLLAR ELEV: 481.2
E: 516230.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

L. SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
64	52.9-65.2 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), fine to microcrystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION) 416.00								J,PL,R						
									J,PL,R						
	65.2-79.0 ft. 65.20 Fresh, medium bedded, medium gray (N5), microcrystalline to fine grained, medium strong, ARENACEOUS DOLOMITE, (ST. LOUIS FORMATION) Pyrite and calcite filled fractures								J,PL,R (2)						
66				6	100 %										
68									J,I,R (2)						5/20/95 @ 13:00 End of Run 6
			412.20 / 69.00												
									J,ST,SM						
70															
72															
									J,ST,R						
74				7	100 %										
									J,I,R						
76															
78	77.6-78.5 ft. Clayey layer														
	79.0-80.3 ft. 402.20 / 79.00 Fresh, thinly bedded, light olive gray (5Y 6/1), fine grained, medium strong, SANDSTONE, (ST. LOUIS FORMATION) Includes thickly laminated clay layers		402.20 / 79.00	8	99%										5/20/95 @ 14:00 End of Run 7
80															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 6/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-105-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NS Core & water
DRILLING DATE: 5/20/95 - 5/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068421.35
AZIMUTH: 0

COLLAR ELEV: 481.2
E: 516230.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

Depth Scale (Feet)	Description	Elev / Depth (Ft)	Run No.	Core Recovery	Type and Surface Description	Notes, Water Levels, Instrumentation
80	400.90 / 80.30 80.3-89.3 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), fine to medium crystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION)				J,I,R J,I,SM,CL	
82					J,ST,CL (2)	
					J,I,R,CL (2)	
84	84.0-86.8 ft. Abundant chert, some clay layers (green clay)		8	99%	J,PL,SM J,PL,SM,CL	
86					J,PL,SM,CL	86.7-86.8 ft. Broken zone
					J,PL,SM,CL	
88					J,PL,SM,CL	
		392.20 / 89.00				
	89.3-118.6 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) 89.3-92.7 ft. Silicified				J,I,R	5/20/95 @ 15:00 End of Run 8
90						
92			9	100 %	J,PL,SM,CL	
94						
96						

Graphic log; RQD (80, 60, 40, 20); Fractures per foot (2, 4, 6, 8, 10); Discontinuity data (Dip wrt core axis 0, 30, 60, 90); Weathering index (SW, FR, MW, HW, CW); Strength index (R6, R5, R4, R3, R2, R1); Point load index (psi) (R1 30, R2 150, R3 300, R4 600, R5 1500, R6); Test orientation

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 6/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-105-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NS Core & water
DRILLING DATE: 5/20/95 - 5/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066421.35
AZIMUTH: 0

COLLAR ELEV: 481.2
E: 516230.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
Pl-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
96	89.3-118.6 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), fine grained, medium strong. ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION)			9	100 %			90	J,PL,SM						
98								90	J,PL,SM						5/20/95 @ 15:30 End of Run 9
			382.20 / 99.00												
100								90	J,PL,SM						
	101.5-105.0 ft. Silicified														
102								90	F,PL,SM						
104				10	100 %			90	J,C,SM,CL						
	105.0-115.5 ft. Scattered stylolites, chert														
106								90	J,PL,SM,CL						
								90	J,PL,SM,CL						
108			372.20 / 109.00												5/20/95 @ 16:15 End of Run 10
								90	J,PL,R,CL						
110				11	100 %			90	J,PL,R,CL						
								90	J,PL,SM						
112															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 6/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-105-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2649
LOCATION: BRIDGETON, MO

BORING METHOD: NS Core & water
DRILLING DATE: 5/20/95 - 5/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066421.35
AZIMUTH: 0

COLLAR ELEV: 481.2
E: 516230.23
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation; PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular; P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough; Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
112	89.3-118.6 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION)							J,PL,SM	
								J,PL,SM (3)	
114								J,ST,R	
			11	100 %				J,PL,SM,CL (2)	
118								J,PL,SM	
118								J,PL,SM,CL	5/20/95 @ 17:15 End of Run 11 Ended drilling for the day 5/21/95 @ 7:30 Resume drilling
	118.6-131.5 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), microcrystalline, medium strong, LIMESTONE, fossiliferous, (ST. LOUIS FORMATION)	362.20 / 119.00							
120	120.5-121.4 ft. Claystone layer								
122									
	123.0 ft. Calcite crystals on fracture		12	100 %				B,PL,SM,CL J,PL,R	
124	123.7-125.3 ft. ARGILLACEOUS LIMESTONE 124.0 ft. Calcite crystals on fractures								
126								B,PL,SM,CL	
								B,PL,SM,CL	
128	128.0 ft. Calcite crystals on fractures								

GRAPHIC LOG; WEATHERING INDEX (SW FR, MW, HW, CW); STRENGTH INDEX (R5 R6, R4, R3, R2, R1); POINT LOAD INDEX (psi) (R1 30, R2 150, R3 300, R4 600, R5 1500, R6); TEST ORIENTATION

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 6/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-105-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NS Core & water
DRILLING DATE: 5/20/95 - 5/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066421.35
AZIMUTH: 0

COLLAR ELEV: 481.2
E: 518230.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
128	128.0 ft. Calcite crystals on fractures			12	100 %				J,PL,R; B,PL,SM,CL						5/21/95 @ 8:30 End of Run 12
			352.20 / 129.00												
	129.5 ft. Color grades to light olive gray (5Y 5/2)								B,PL,SM,CL (2)						
130															
	131.5-141.6 ft. Fresh, medium bedded, light olive gray (5Y 5/2), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION)														
132															
134				13	100 %				J,PL,SM,CL						
136															
138									J,PL,SM,CL						5/21/95 @ 9:40 End of Run 13
			342.20 / 139.00												
140															
142	141.6-148.7 ft. Fresh, medium bedded, pale yellowish brown (10Y 6/2) to light olive gray (5Y 5/2), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolitic, clay filled fractures			14	100 %				J,PL,SM,CL; J,PL,SM,CL						
144															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 8/13/95

Golder Associates

RECORD OF DRILLHOLE PZ-105-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NS Core & water
DRILLING DATE: 5/20/95 - 5/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1066421.35
AZIMUTH: 0

COLLAR ELEV: 481.2
E: 516230.23
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation; PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular; P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough; Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
144	141.6-148.7 ft. Fresh, medium bedded, pale yellowish brown (10Y 6/2) to light olive gray (5Y 5/2), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolitic, clay filled fractures							60	J,PL,SM,CL (2)						
146	146.0-147.0 ft. Clay filled vugs and fractures abundant			14	100 %			60	J,PL,SM,CL						
								90	J,PL,SM,CL						
148	148.7-149.0 ft. Slightly weathered, thinly bedded, grayish orange (10YR 7/4), fine grained, medium strong DOLOMITE, very shallow vugs, (ST. LOUIS FORMATION) 332.50 / 148.70 / 332.20		332.20					90	J,PL,SM,CL		SW				5/21/95 @ 10:30 End of drilling
	End of Record of Drillhole at 149.0 ft. 149.00		149.00												
150															
152															
154															
156															
158															
160															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 6/13/95

Golder Associates

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
LAIDLAW\RI-FS\MO WEST LAKE LANDFILL OPERABLE UNIT 2	4.25 inch I.D. Hollow Stem Auger	PZ-106-KS
		SHEET 1 OF 2
	SAMPLING METHOD:	
	SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP)	DRILLING
	SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	START / FINISH
	WATER LEVEL	TIME / TIME
	TIME	10:30 / 13:55
	DATE	DATE / DATE
NORTHING: 1066704.02	CASING DEPTH	2/28/95 / 2/28/95
DATUM EASTING: 515431.62 ELEVATION 460.8		

DRILL RIG CME 75 - TRUCK MOUNT

SURFACE CONDITIONS

ANGLE BEARING

SAMPLE HAMMER

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
					(0.0-2.0 ft.) No sample collected		Note: All depth measured from top of 1 foot thick gravel pad
1							
2					(458.8) 2.0		
	2 2 2 4	1.5'/2.0' (75%)			(2.0-4.7 ft.) Firm, brownish gray (5YR 4/1), CLAYEY SILT, NR, damp, (CL-ML), (LOESS)	SP (2)	
3							
4	2 4 8 10	1.7'/2.0' (85%)			(456.1) 4.7		
5					(4.7-8.8 ft.) Very stiff, brownish gray (5YR 4/1), CLAY, little silt, NR, damp, (CH), (LOESS)	SP (3)	
6		2.0'/2.0' (100%)					
7						SH (4)	
8	3 6 8 9	1.2'/2.0' (60%)					
9					(8.8-11.9 ft.) Very stiff, mottled pale yellowish brown (10YR 6/2) and moderate yellowish brown (10YR 5/4), CLAY, little silt, iron stained, NR, damp, (CL), (LOESS) @ 10.0-12.0 ft., stiff	SP (5)	
10	4 4 6 7	0.1'/2.0' (5%)					
11						SP (6)	
					(448.9) 11.9		
12	1 5 5 5	0.9'/2.0' (45%)			(11.9-15.0 ft.) Stiff, light olive gray (5Y 5/2), CLAYEY SILT, iron stained, NR, damp, (CL-ML), (LOESS)	SP (7)	
13							
14	8 13 23 19	1.0'/2.0' (50%)				SP (8)	

DRILLING CONTR LAYNE-WESTERN

LOGGED BY M. HIRT CHK'D BY W. HERST

DATE 2/28/95

JOB NO.: 943-2848

FILENAME: PZ106KS

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
LAIDLAW\RI-FS\MO WEST LAKE LANDFILL OPERABLE UNIT 2	4.25 inch I.D. Hollow Stem Auger	PZ-106-KS
		SHEET 2 OF 2
	SAMPLING METHOD:	
	SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP)	DRILLING
	SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	START / FINISH
	WATER LEVEL	TIME / TIME
	TIME	10:30 / 13:55
	DATE	DATE / DATE
NORTHING: 1066704.02 DATUM EASTING: 515431.62 ELEVATION 460.8	CASING DEPTH	2/28/95 / 2/28/95

DRILL RIG CME 75 - TRUCK MOUNT	SURFACE CONDITIONS
ANGLE BEARING	
SAMPLE HAMMER	

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
					(15.0-15.5 ft.) Compact, pale yellowish brown (10YR 6/2), fine SAND, to gravel, NR, dry, (SP), (ALLUVIAL) (445.3) 15.5	SP 8	
16	50/5"	0.0'/2.0' (0%)			(15.5-21.2 ft.) Dense, very light gray (N8), LIMESTONE GRAVEL interbedded, with medium dark gray (N4), fine SAND, (SR gravel, NR sand), dry, (GP), (ALLUVIAL)		
17						SP 9	
18	10 26 14 15	0.8'/2.0' (40%)					
19						SP 10	
20	6 15 23 32	1.0'/2.0' (50%)					
21					(439.6) 21.2	SP 11	
					(21.2-27.7 ft.) Hard, medium dark gray (N4), CLAY, NR, damp, (CH), (ALLUVIUM)		
22	8 18 24 30	0.6'/2.0' (30%)					
23						SP 12	
24	6 13 20 29	1.3'/2.0' (65%)					
25					@ 24.7 ft., becoming dark gray (N3)	SP 13	
26	9 17 38 40	0.8'/2.0' (40%)					
27					(433.1) 27.7	SP 14	
					(27.7-29.3 ft.) Hard, medium light gray (N6), SILTY CLAY, NR, dry, (CL), (ALLUVIUM) (431.5) 29.3		
28	19 39 50/3"	0.9'/2.0' (45%)			(29.3-30.0 ft.) Very dense, very light gray, (N8), LIMESTONE GRAVEL, SR, dry, (GP)		
29					End of Soil Borehole Log at 30.0 ft. See PZ-106-KS Record of Drillhole for rock descriptions	SP 15	Auger/split spoon refusal at 30.0 feet

DRILLING CONTR LAYNE-WESTERN

LOGGED BY M. HIRT CHK'D BY W. HERST

DATE 2/28/95

JOB NO.: 943-2848

FILENAME: PZ106KS

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 481.8
E: 515432.1
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation; PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular; P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough; Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R5 R6 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
16	0.0-30.0 ft. See Soil Borehole Log PZ-106-KS														
18															
20															
22															
24															
26															
28															
30	30.0-36.5 ft. Fresh, medium bedded, yellowish gray (5Y 8/1) to light olive gray (5Y 6/1), medium grained, medium strong, ARENACEOUS LIMESTONE, (ST. LOUIS FORMATION)		431.80 / 30.00	1	69%				J,I,R (2); J,ST,R; J,I,R; J,PL,SM						2/28/95 @ 14:45 Begin coring
32															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 461.8
E: 515432.1
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (H1 30 R2 150 R3 150 R4 300 R5 600 R6 1500)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
32	30.0-36.5 ft. Fresh, medium bedded, yellowish gray (5Y 8/1) to light olive gray (5Y 6/1), medium grained, medium strong, ARENACEOUS LIMESTONE, (ST. LOUIS FORMATION)								J,I,R						
	33.5-34.0 ft. Hard clay infilling								J,ST,R						
34	34.0-34.5 ft. ARENACEOUS DOLOMITE 427.30			1	69%				J,PL,R,CL						
	34.50														Core loss probably due to highly fractured nature of rock
									Core Loss						
38			425.30												
	36.5-37.9 ft. Highly weathered, thickly laminated, medium dark gray (N4), fine grained, medium strong, SILTSTONE, (ST. LOUIS FORMATION)		36.50												
	Cross bedded, Limestone 423.90														
38	breccia 37.90														
	37.9-41.5 ft. Completely weathered, thinly laminated, grayish black (N2), very fine grained, extremely weak, CLAYSTONE, (ST. LOUIS FORMATION)														
	38.5-38.8 ft. 60° silt crossbeds, pyrite crystals abundant			2	83%				B,PL,SM (3)						
40									J,I,SM (5)						
	41.0-41.5 ft. Greenish gray (5GY 6/1) clay layer 420.30								J,I,SM (2)						
	41.5-42.7 ft. 41.50 Fresh, medium bedded, light greenish gray (5GY 8/1), medium grained, medium strong, ARENACEOUS LIMESTONE, (ST. LOUIS FORMATION) 419.10								J,I,R B,PL,SM						
42			419.30												
			42.50												Bit getting plugged off
	42.5-42.7 ft. 42.70 Clay infilling														
	42.7-48.4 ft. Fresh, thickly bedded, medium light gray (N6), medium grained, medium strong, SANDSTONE, (ST. LOUIS FORMATION)														
44				3	96%										
46	46.0-46.5 ft. Siltstone														
	46.7-46.8 ft. Claystone								B,I,R						
	46.8-47.1 ft. Chert								J,I,R						
	47.3-47.5 ft. Siltstone		414.50												
	47.5-48.1 ft. Clay layer		47.30	4	96%										
48															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 461.8
E: 515432.1
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

Depth Scale (Feet)	Description	Elev / Depth (Ft)	Run No.	Core Recovery	Type and Surface Description	Notes, Water Levels, Instrumentation
48						
	413.40					
	48.4-52.3 ft. 48.40 Moderately weathered, medium bedded, medium light gray (N6), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolitic					
	49.6-50.6 ft. Chert nodules				J,I,R,CL	
50	50.0-50.1 ft. Claystone 50.3-50.6 ft. Claystone 51.0-51.5 ft. Claystone		4	96%		
52		409.50				
	52.3-55.7 ft. Slightly weathered, medium bedded, light olive gray (5Y 6/1), microcrystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolitic, numerous pyrite crystals	52.30			J,I,R (2)	
					J,I,R	
					J,I,R	
					J,I,R,CL	
					J,I,R (2)	
54						
					J,I,R (2)	
	55.7-59.6 ft. Slightly weathered, medium bedded, medium light gray (N6), fine grained, medium strong, ARENACEOUS LIMESTONE, (ST. LOUIS FORMATION) Porous/vuggy, some pyrite crystals and chert nodules, vugs <1 mm. diameter		5	99%		
56					J,PL,R,CL	
58		402.40				
	402.20	59.40				
	59.6-70.0 ft. 59.60 Slightly weathered, medium bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARENACEOUS DOLOMITE, (ST. LOUIS FORMATION) Porous/vuggy, vugs <1 mm.					
60			6	98%	J,PL,SM	
62	62.2-62.8 ft. Claystone				B,PL,SM	
	62.8-63.4 ft. Calcite crystals				B,PL,SM	
					J,I,R, calcite crystals	
					J,I,R	
64						

Discontinuity data: Dip wrt core axis (0, 30, 60, 90); Graphic log

Weathering index: SW, FR, MW, HW, CW

Strength index: R1, R2, R3, R4, R5, R6

Point load index (psi): R1 30, R2 150, R3 300, R4 600, R5 1500, R6

Test orientation

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 843-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 461.8
E: 515432.1
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
64									J,I,R						
	64.7-65.2 ft. calcite crystals								calcite crystals						
									J,I,R						
									J,I,R						
									J,I,R						
									calcite crystals						
66	65.9-66.9 ft. Calcite crystals and iron staining			6	98%										
			394.20 / 67.60												8:45 End Core Run 6
68	67.8-68.6 ft. Calcite crystals, some iron staining								J,I,SM						
									J,I,R						
									J,I,SM						
									J,PL,SM						
	69.7-70.7 ft. Calcite crystals		391.80						J,PL,SM						
70	70.0-98.0 ft. Fresh, medium bedded, light olive gray (5Y 6/1), medium grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION)		70.00						J,I,SM						
									J,I,R,CL						
									J,I,R,Fe						
				7	99%				J,I,R						
72															
	72.6-73.3 ft. 0° calcite vein														
	73.4-73.6 ft. Arenaceous, slightly weathered								J,I,R,CL (2)						
74			387.40 / 74.40												9:30 End Core Run 7
									J,I,R (2)						
76	76.4-80.9 ft. Microcrystalline, stylolitic								J,I,R						
				8	100%				J,I,SM (3)						
78									J,I,R (2)						
	79.6-79.8 ft. Dolomite layer								J,PL,SM,CL						
80															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 843-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 461.8
E: 515432.1
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

SCALE (FEET)	ROCK TYPE / DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
80	70.0-98.0 ft. Fresh, medium bedded, light olive gray (5Y 6/1), medium grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION)														
	80.9-82.8 ft. Fine grained, arenaceous			8	100 %				J,I,R (2)						
82			379.00 / 82.80												10:15 End Core Run 8
									J,PL,SM,CL; J,I,R						
84	83.9-84.2 ft. Calcite filled vugs														
	85.0-87.1 ft. Microcrystalline, stylolitic								J,I,R						
86				9	100 %				J,PL,SM						
	87.1-88.3 ft. Porous/vuggy Dolomite								J,PL,SM						
88	88.3-90.6 ft. Microcrystalline, stylolitic								B,I,R; J,I,R						
			372.40 / 89.40						J,I,R						11:05 End Core Run 9
90	90.6-92.0 ft. Porous/vuggy Dolomite														
									J,PL,R						
92	92.2-94.1 ft. Microcrystalline, some silty laminae			10	99%				J,I,R,CL; J,I,SM; J,I,R; J,I,R						
94									J,I,R,CL						
									J,I,R,CL						
96	95.9-96.1 ft. Moderately weathered, arenaceous														

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 481.8
E: 515432.1
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
96	70.0-98.0 ft. Fresh, medium bedded, light olive gray (5Y 6/1), medium grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION)							J,PL,SM,CL					
	97.5-97.8 ft. Dolomitic		10	99%									
		363.80 / 98.00											
98	98.0-119.3 ft. Slightly weathered, medium bedded, light olive gray (5Y 6/1), fine grained, medium strong, DOLOMITE, (ST. LOUIS FORMATION) Porous/vuggy												
		362.40 / 99.40											11:55 End Core Run 10
100													
	101.2-104.3 ft. Medium grained Limestone							J,PL,SM,CL					
								J,PL,SM					
								J,I,R					
102													
								J,PL,R					
								J,PL,R (2)					
104								J,PL,SM,CL					
			11	100 %									
106													
	107.1-108.0 ft. Interbedded Limestone and Dolomite												
108	108.0-110.9 ft. Arenaceous Limestone							J,I,R					
								J,I,SM,CL					
		352.40 / 109.40						J,I,R					13:25 End Core Run 11
								J,I,R (2)					
110	110.0-110.3 ft. 45° healed fracture							J,I,R					
			12	98%				J,I,R,CL					
	111.0-111.9 ft. Moderate to highly weathered, arenaceous Dolomite, some chert												
112													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 481.8
E: 515432.1
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, R-Rough, SM-Smooth, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE / DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
112	112.0-112.4 ft. Crystalline Limestone, moderately weathered								J,I,R,CL						
									J,ST,SM						
									J,I,SM (2)						
	113.2-115.0 ft. Crystalline Limestone								J,I,SM,CL (2)						
									J,PL,SM						
114									J,I,SM						
	115.0-115.3 ft. 10° calcite filled vein (2 mm. thick)								J,I,SM						
				12	98%										
116															
									J,I,SM						
	117.0-119.0 ft. 10° calcite filled veins (2 mm. thick)														
118															
	342.50 / 119.30		342.40 / 119.40												14:05 End Core Run 12
	119.3-133.8 ft. Fresh, medium bedded, light olive gray (5Y 5/2), medium grained, medium strong, ARGILLACEOUS LIMESTONE. (ST. LOUIS FORMATION) Some braciopod fossils														
120															
122															
	123.1-124.9 ft. Greenish gray (5GY 6/1) to dark greenish gray (5GY 4/1), Dolomite with calcite veins and vugs			13	98%										
124															
									J,I,R						
	124.9-126.0 ft. 10° calcite filled veins								J,I,R,calcite						
	125.6-133.2 ft. Microcrystalline to fine grained, thinly laminated, Silt and Dolomite interbeds								J,PL,R (2)						
126									J,I,R,CL (2)						
128	127.6-131.7 ft. Large chert nodules														

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 481.8
E: 515432.1
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD 80 60 40 20	FRACTURES PER FOOT 2 4 6 8 10	DISCONTINUITY DATA: DIP wrt CORE AXIS 0 30 60 90	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX SW FR MW HW CW	STRENGTH INDEX R6 R5 R4 R3 R2 R1	POINT LOAD INDEX (psi) R1 30 R2 150 R3 300 R4 600 R5 1500 R6	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
128	119.3-133.8 ft. Fresh, medium bedded, light olive gray (5Y 5/2), medium grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) Some braciopod fossils		332.40	13	98%			90	J,PL,SM						
			129.40												14:50 End Core Run 13
130								90	J,PL,SM						
								90	J,I,SM						
								90	J,I,SM (2)						
132	132.4-132.5 ft. Claystone							90	B,PL,SM						
	328.00 / 133.80														
134	133.8-146.6 ft. Fresh, thinly bedded, light olive gray (5Y 5/2), very coarse grained, medium strong, FOSSILIFEROUS LIMESTONE, (SALEM FORMATION)			14	100 %										@ 133.8 ft. Inferred top of SALEM FORMATION
138															
138	138.7-139.7 ft. Fine to medium grained arenaceous Limestone, cross bedded		322.60					90	J,I,SM						
			139.20					90	J,PL,SM						8:45 End Core Run 14
140	139.7-142.1 ft. Fine grained to microcrystalline														
	140.4-140.7 ft. Chert layer														
								90	J,PL,SM						
				15	99%			90	J,PL,SM,CL						
142	142.1-142.4 ft. Clay layer														
								90	J,I,SM,CL (2)						
	142.5-142.7 ft. Chert nodules														
								90	J,I,R						
	143.4-146.1 ft. Medium grained Limestone														
144															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 108703.9
AZIMUTH: 0

COLLAR ELEV: 461.8
E: 515432.1
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
144	144.0-144.4 ft. Chert layer												
	146.1-146.2 ft. Chert nodule												
146	146.2-146.6 ft. Thinly laminated, arenaceous Limestone, cross bedded 315.20		15	99%			90	J,I,R (2)					
	146.6-152.6 ft. 146.60 Slightly weathered, medium bedded, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2), fine grained, medium strong, ARGILLACEOUS DOLOMITE, (SALEM FORMATION) Slightly porous/vuggy, interbedded chert nodules												
148		313.00											
	148.8-149.0 ft. Chert zone	148.80											9:50 End Core Run 15
150													
	150.4-150.7 ft. Chert zone						90	J,U,R					
			16	100 %			90	J,I,SM					Driller reports rock is very hard
							90	J,I,R (2)					
	151.8-152.0 ft. Chert zone												
152	152.5 ft. 1 in. diameter, black claystone clast 309.20						90	J,I,R					
	152.6-160.5 ft. 152.60 Fresh, thinly laminated, light olive gray (5Y 5/2), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (SALEM FORMATION) Crossbedded, numerous chert nodules/beds	308.70					90	J,PL,SM					
		153.10											10:40 End Core Run 16
							90	J,PL,SM					
154	153.0-153.6 ft. Chert zone												
							90	J,I,R					
													Driller reports rock is very hard
	155.5-155.6 ft. Chert zone												
156	156.1-157.5 ft. Pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2)		17	97%									
	156.4 ft. Brachiopod fossils												
	157.0-157.2 ft. Chert zone												
							90	J,I,SM					
158							90	J,U,SM					
	158.2-158.4 ft. Chert zone						90	J,U,SM (2)					
	159.0-159.4 ft. Chert zone						90	J,U,SM					
		302.50					90	J,PL,SM					
		159.30					90	J,I,SM					11:50 End Core Run 17
	159.6-159.7 ft. Chert nodule		18	100 %									
160													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/F8-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 461.8
E: 515432.1
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
160	160.2-160.4 ft. Chert zone 160.5-174.3 ft. Fresh, thickly laminated, medium light gray (N6), coarse grained, medium strong, FOSSILIFEROUS DOLOMITIC LIMESTONE, (SALEM FORMATION)								J,I,SM						
									J,U,R						
162															
164				18	100 %				J,ST,R						
166															
									J,PL,SM						
168			292.50 / 169.30												13:45 End Core Run 18
170															
172				19	100 %										
174	287.50 / 174.30 174.3-178.8 ft. Fresh, thinly bedded, pale yellowish brown (10YR 6/2) to medium light gray (N6), f-c grained, medium strong, CALCAREOUS DOLOMITE, (SALEM FORMATION) Some fossils, cross bedding														
176															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 461.8
E: 515432.1
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
176	174.3-178.8 ft. Fresh, thinly bedded, pale yellowish brown (10YR 6/2) to medium light gray (N6), fine to coarse grained, medium strong, CALCAREOUS DOLOMITE, (SALEM FORMATION) Some fossils, cross bedding						90	J,PL,SM					
							90	J,PL,R					
			19	100 %									
178	176.9-177.2 ft. Chert zone 178.3-178.5 ft. Chert zone												
	178.8-187.0 ft. Slightly weathered, medium bedded, moderate yellowish brown (10YR 5/4), medium grained, medium strong, DOLOMITE, (SALEM FORMATION) Some fossils, calcite crystals, porous/vuggy 180.2-180.3 ft. Chert nodule	282.50 / 179.30					90	J,I,R					14:30 End Core Run 19
180							90	J,PL,R					
182													
184	183.9-184.1 ft. Chert zone						90	J,I,R					
			20	99%			90	J,I,R					
186													
	274.80						90	J,I,SM (2)					
	187.0-189.3 ft. Fresh, thinly laminated, pale yellowish brown (10YR 6/2), medium grained, medium strong, DOLOMITIC LIMESTONE, (SALEM FORMATION) Some cross bedding, fossils	187.00											
188													
	189.3-201.3 ft. Fresh, thickly laminated, light olive gray (5Y 6/1), interbedded medium and very coarse grained, medium strong, ARGILLACEOUS FOSSILIFEROUS LIMESTONE, (SALEM FORMATION) 190.8-191.4 ft. Brecciated	272.50 / 189.30											15:30 End Core Run 20
190			21	98%									
192													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 481.8
E: 515432.1
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
192	189.3-201.3 ft. Fresh, thickly laminated, light olive gray (5Y 6/1), interbedded medium and very coarse grained, medium strong, ARGILLACEOUS FOSSILIFEROUS LIMESTONE, (SALEM FORMATION)														
194															
	195.4-195.7 ft. Cross bedded, brecciated			21	98%										
196															
198															
			262.50 / 199.30												16:35 End Core Run 21
200															
	200.5-201.2 ft. Cross bedded, brecciated														
	201.2-209.2 ft. Fresh, thinly laminated, medium dark gray (N4), very fine grained, weak, CALCAREOUS CLAYSTONE, (WARSAW FORMATION) Brachiopod fossils		260.60 / 201.20						J,PL,SM,CL						201.9-202.5 ft. GTS-1 collected for perm. testing at laboratory
202															
				22	99%										
204															
	205.1-207.2 ft. Medium gray (N5), fine to medium grained														
206									J,I,R,CL						
	207.1-207.2 ft. Brecciated								J,PL,SM,CL						
	207.3-End of Borehole Olive gray (5Y 4/1), medium strong														
208															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 461.8
E: 515432.1
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
208	201.2-209.2 ft. Fresh, thinly laminated, medium dark gray (N4), very fine grained, weak, CALCAREOUS CLAYSTONE, (WARSAW FORMATION) 252.60			22	99%										17:35 End Core Run 22
	Brachiopod fossils 209.20		252.50 / 209.30												
210	209.2-225.4 ft. Fresh, medium bedded, olive gray (5Y 4/1), very coarse grained, medium strong, FOSSILIFEROUS LIMESTONE, (WARSAW FORMATION)								J,PL,SM						3/11/95 @ 10:15 Begin coring Run 23 after installing 6 in. dia. casing to 204 ft.
212	212.2-213.7 ft. Slightly weathered, porous/vuggy, calcareous Dolomite, some fossils								B,PL,SM						
									J,I,SM (2)						
214									J,I,SM						
				23	98%										
216															
	217.3-218.5 ft. Medium grained														
218			242.50 / 219.30												12:30 End Core Run 23
220	220.1-221.9 ft. Medium grained								J,PL,R						
									J,I,R						
				24	101 %										
222															
224															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 461.8
E: 515432.1
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, X-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
224	209.2-225.4 ft. Fresh, medium bedded, olive gray (5Y 4/1), very coarse grained, medium strong, FOSSILIFEROUS LIMESTONE, (WARSAW FORMATION) 236.40														
	225.4-233.2 ft. 225.40 Fresh, medium bedded, olive gray (5Y 4/1), fine grained, weak, CALCAREOUS CLAYSTONE, (WARSAW FORMATION) Some calcite crystals, fossils 225.4-228.3 ft. Slightly porous/vuggy (<1 mm.)			24	101 %				J,ST,SM,CL						
226															
228			232.50												
			229.30												13:55 End Core Run 24 229.6-230.1 ft. GTS-2 collected for perm. testing at laboratory
230															
232									J,I,SM,CL						
	228.60 233.2-251.3 ft. 233.20 Fresh, medium bedded, olive gray (5Y 4/1), very coarse grained, medium strong, FOSSILIFEROUS LIMESTONE, (WARSAW FORMATION) Stylolitic, some calcite crystals								J,PL,SM						
234				25	98%										
236	235.9-238.3 ft. Slightly weathered								J,I,R						
238															
	239.0-240.0 ft. Slightly weathered		222.50						J,I,R						
			239.30	26	100 %				J,I,R J,I,R						14:50 End Core Run 25
240															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 481.8
E: 515432.1
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
240	233.2-251.3 ft. Fresh, medium bedded, olive gray (5Y 4/1), very coarse grained, medium strong, FOSSILIFEROUS LIMESTONE, (WARSAW FORMATION) Stylolitic, some calcite crystals						90	J,I,R					
242													
244			26	100 %									
248	246.3-246.5 ft. Fine grained, Dolomitic Limestone												
248		212.50 / 249.30											15:40 End Core Run 26
250	250.3-251.3 ft. Medium grained							J,I,R					
	210.50 / 251.30						90	J,I,R					
								J,I,R					
252	251.3-257.7 ft. Slightly weathered, medium bedded, olive gray (5Y 4/1), fine grained, weak, CALCAREOUS CLAYSTONE, (WARSAW FORMATION) Porous/vuggy (<1 mm.)		27	98%			90	J,PL,SM,CL (2)					
254													
256													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 481.8
E: 515432.1
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (FR SW MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 R2 30 R3 150 R4 300 R5 600 R6 1500)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
258	251.3-257.7 ft. Slightly weathered, medium bedded, olive gray (5Y 4/1), fine grained, weak, CALCAREOUS CLAYSTONE, (WARSAW FORMATION) Porous/vuggy (<1 mm.) 204.10								J,PL,SM						
				27	98%										
258	257.7-259.7 ft. 257.70 Fresh, medium bedded, olive gray (5Y 4/1), medium grained, medium strong, FOSSILIFEROUS LIMESTONE, (WARSAW FORMATION) 202.10		202.50 / 259.30						J,PL,SM,CL						16:25 End Core Run 27
260	259.7-263.7 ft. 259.70 Fresh, medium bedded, olive gray (5Y 4/1), fine grained, weak, CALCAREOUS CLAYSTONE, (WARSAW FORMATION)								B,I,SM,CL						
262	261.8-262.3 ft. Calcite crystals, some large vugs (>10 mm.)								J,PL,SM						
									J,I,SM brecciated						
	263.5-163.7 ft. Highly weathered 198.10								B,I,SM (4)						
264	263.7-269.3 ft. 263.70 Fresh, medium bedded, olive gray (5Y 4/1), coarse grained, strong, FOSSILIFEROUS LIMESTONE, (WARSAW FORMATION)			28	98%				J,I,SM,CL						
266	266.3-266.4 ft. Claystone								J,I,SM,CL						
268	268.3-269.3 ft. Calcareous claystone 192.50		192.50						J,I,SM,CL; J,PL,SM						
270	269.3-284.2 ft. 269.30 Fresh, medium bedded, medium dark gray (N4), very fine grained, very weak, CLAYSTONE, (WARSAW FORMATION) Some calcite crystals		269.30	29	96%				J,PL,SM						17:15 End Core Run 28
272	271.3-271.7 ft. Slightly wethered, porous								J,PL,SM (2)						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2648
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 461.8
E: 515432.1
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
272	269.3-284.2 ft. Fresh, medium bedded, medium dark gray (N4), very fine grained, very weak, CLAYSTONE, (WARSAW FORMATION) Some calcite crystals			29	96%				J,PL,SM						
274			187.50 / 274.30												8:45 End Core Run 29 Problems coring, drill string very wobbly due to large diameter casing
	275.1-276.0 ft. Slightly weathered, porous														
276															
	277.6 ft. Calcite filled vug (3 cm.)														
278				30	103 %										
280															
282															
	282.7-283.2 ft. Calcareous, weak														
	283.3-284.1 ft. Slightly weathered, porous														
284	284.2-301.4 ft. Fresh, medium bedded, medium dark gray (N4), fine grained, medium strong, CALCAREOUS CLAYSTONE, (WARSAW FORMATION)		177.60 / 284.20						J,I,SM						10:00 End Core Run 30 Cuttings not coming out with return; flush hole
286				31	100 %				J,PL,SM						
									J,I,SM						
288															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 461.8
E: 515432.1
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation; PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular; P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough; Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
288	284.2-301.4 ft. Fresh, medium bedded, medium dark gray (N4), fine grained, medium strong, CALCAREOUS CLAYSTONE, (WARSAW FORMATION)			31	100 %										
			172.60 / 289.20												12:00 End Core Run 31
	289.2-290.6 ft. Dolomite														
290															
292									J,I,SM; J,I,SM,CL						
294	293.4-295.6 ft. Dolomite			32	99%										
296															
298															
			162.60 / 299.20												13:50 End Core Run 32
300															
	160.40 / 301.40														
302	301.4-346.4 ft. Fresh, thinly bedded, medium dark gray (N4), m-vc grained, medium strong, LIMESTONE, (WARSAW FORMATION) Some Claystone partings			33	100 %										
	302.6-304.3 ft. Dolomitic Claystone, some fossils														
304															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 481.8
E: 515432.1
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
304	301.4-346.4 ft. Fresh, thinly bedded, medium dark gray (N4), m-vc grained, medium strong, LIMESTONE, (WARSAW FORMATION) Some Claystone partings		157.60 / 304.20	33	100 %										14:15 End Core Run 33
306															
308	307.9 ft. Calcite filled vug (3 cm.)			34	99%										
310															
312															
314			147.60 / 314.20												14:50 End Core Run 34
	315.5 ft. Chert zone														
316	316.2 ft. Chert zone			35	100 %										
318									J,U,SM,CL						
320															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 461.8
E: 515432.1
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH (FEET)	ROCK TYPE / DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
320	301.4-346.4 ft. Fresh, thinly bedded, medium dark gray (N4), m-vc grained, medium strong, LIMESTONE, (WARSAW FORMATION) Some Claystone partings														
322				35	100 %										
	323.2-323.3 ft. Chert zone														
324			137.60 / 324.20												15:45 End Core Run 35
	324.8 ft. Chert zone														
	325.3, 325.8, and 326.3 ft. Chert zones														
326															
	327.4 ft. Chert zone														
328															
	328.5 ft. Chert zone														
	329.1 ft. Chert zone			36	99%										
	329.6-329.9 ft. Chert zone														
330															
332															
	333.4 ft. Chert zone								J,I,SM,CL						
334			127.60 / 334.20						J,I,SM						16:40 End Core Run 36
				37	100 %										
336	335.8 ft. Chert zone														

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2648
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 481.8
E: 515432.1
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filed

DEPTH (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
336	301.4-346.4 ft. Fresh, thinly bedded, medium dark gray (N4), m-vc grained, medium strong, LIMESTONE, (WARSAW FORMATION) Some Claystone partings 336.6-346.4 ft. No more claystone partings 336.9 ft. Chert zone														
338	337.9-339.2 ft. Chert zone								J,I,R calcite crystals						
340	339.9 ft. Chert zone			37	100 %										
	340.9-341.3 ft. Chert zone														
342	342.0-342.2 ft. Chert zone 342.3-343.5 ft. Chert zone								J,I,SM,chert						
344	343.8 ft. Chert zone		117.60 / 344.20						J,I,SM J,I,SM						8:30 End Core Run 37
	344.6 ft. Chert zone														
346	115.40								J,I,R,fossils						
	346.4-363.6 ft. 346.40 Slightly weathered, thinly to medium bedded, light gray (N7), medium grained, medium strong, CALCAREOUS DOLOMITE, (KEOKUK FORMATION) Interbedded with chert zones and nodules; porous/vuggy; some filled with calcite crystals; some calcite veins								J,I,R,chert						
348				38	98%										
350									J,I,SM						
352									J,I,SM,chert						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 461.8
E: 515432.1
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH (FEET)	ROCK TYPE DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
352	346.4-363.6 ft. Slightly weathered, thinly to medium bedded, light gray (N7), medium grained, medium strong, CALCAREOUS DOLOMITE (KEOKUK FORMATION) Interbedded with chert zones and nodules; porous/vuggy; some filled with calcite crystals; some calcite veins		38	98%		J,I,R					
354		107.60 / 354.20				J,I,SM; J,I,R					9:30 End Core Run 38
						J,I,R					
358						J,I,R					
358	358.0-361.1 ft. Moderately weathered, very vuggy					J,I,R; J,I,R; calcite crystals; J,I,R					
			39	95%							
360											Drilling rate much slower due to presence of chert
						J,I,R (2)					
362						J,PL,R (2)					
	98.80 / 363.00	98.40 / 363.40				Core Loss					362.9-363.4 ft. Core loss 11:00 End Core Run 39
	363.6-370.1 ft. Slightly weathered, thinly bedded, light gray (N7), m-vc grained, medium strong, DOLOMITIC LIMESTONE, (KEOKUK FORMATION) Slightly vuggy, some chert nodules					J,I,R (3)					
364						J,I,SM					
						J,I,R					
			40	100 %							
368											
368											

DISCONTINUITY DATA: DIP wrt CORE AXIS (0, 30, 60, 90)

RQD (80, 60, 40, 20); 2 4 6 8 10 FRACTURES PER FOOT

WEATHERING INDEX: SW FR, MW, HW, CW

STRENGTH INDEX: R6, R5, R4, R3, R2, R1

POINT LOAD INDEX (psi): R1 30, R2 150, R3 300, R4 600, R5 1500, R6

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 2/28/95-3/13/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 106703.9
AZIMUTH: 0

COLLAR ELEV: 461.8
E: 515432.1
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP w/r CORE AXIS	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
368	363.6-370.1 ft. Slightly weathered, thinly bedded, light gray (N7), m-vc grained, medium strong, DOLOMITIC LIMESTONE, (KEOKUK FORMATION) Slightly vuggy, some chert nodules								J,I,SM,chert						
									J,PL,SM						
370	369.4-370.1 ft. Chert layer 91.70 370.10														
	370.1-373.4 ft. Moderately weathered, medium bedded, medium light gray (N6), fine grained, medium strong, DOLOMITE, (KEOKUK FORMATION) Porous/vuggy, some chert nodules and calcite crystals			40	100 %										
									J,I,SM (2)						
372															3/13/95 @ 12:05 Core Run 40
	88.40		88.40						J,I,SM						
									J,I,SM						
	End of Record of Drillhole at 373.4 ft. 373.40		373.40												
374															
376															
378															
380															
382															
384															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: M. HIRT
CHECKED: R. BOOTH
DATE: 3/29/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-SD

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/24/95
DRILL RIG: SCRAMM

DATUM: MSL
COORDINATES N: 1066715.1
AZIMUTH: 0

COLLAR ELEV: 461.5
E: 515416.0
INCLINATION: -60

ROCK TYPE

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation

PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular

P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough

Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
176	0.0-189.9 ft. No sampling conducted See Record of Drillhole for PZ-106-KS														0.0-30.0 ft. Drilling conducted with 6 1/4 in. ID hollow stem augers, then borehole advanced to 189.9 ft. with 5 7/8 in. air rotary bit
178															
180															
182															
184															
186															
188															
190	189.9-199.9 ft. Fresh, thinly laminated, light olive gray (5Y 6/1), f-m grained, medium strong, ARENACEOUS LIMESTONE, (SALEM FORMATION) Fossiliferous		271.60 / 189.90	1	99%				J,I,R						3/24/95 @ 11:00 Began coring
192															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: M. VOGT

LOGGED: B. TILTON
CHECKED: R. BOOTH
DATE: 5/26/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-SD

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/24/95
DRILL RIG: SCRAMM

DATUM: MSL
COORDINATES N: 1066715.1
AZIMUTH: 0

COLLAR ELEV: 461.5
E: 515416.0
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH (FEET)	ROCK TYPE / DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
192	189.9-199.9 ft. Fresh, thinly laminated, light olive gray (5Y 6/1), f-m grained, medium strong, ARENACEOUS LIMESTONE, (SALEM FORMATION) Fossiliferous								J,I,SM						
									J,I,R						
194															
196				1	99%										
198															
	261.60		261.60												3/24/95 @ 13:15 Finish Run 1
200	End of Record of Drillhole at 208.0 ft. 199.90		199.90												
202															
204															
206															
208															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: M. VOGT

LOGGED: B. TILTON
CHECKED: R. BOOTH
DATE: 5/26/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 4/4/95 - 4/5/95
DRILL RIG: SCHRAMM

DATUM: MSL
COORDINATES N: 1066728.3
AZIMUTH: 0

COLLAR ELEV: 461.0
E: 515399.9
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation; PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular; P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough; Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (60 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (FR SW MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
144	0.0-154.9 ft. No sampling conducted See Record of Drillhole for PZ-106-KS														0.0-30.0 ft. Drilling conducted with 6 1/4 in. ID hollow stem augers, then borehole advanced to 154.9 ft. with 5 7/8 in. air rotary bit
146															
148															
150															
152															
154															
	306.10		306.10												
	154.9-160.3 ft. 154.90 Fresh, thinly bedded to thinly laminated, light olive gray (5Y 6/1), f-m grained, medium strong, AGILLACEOUS LIMESTONE, (SALEM FORMATION) Chert nodules, silt lenses, stylolitic, fossiliferous		154.90												4/4/95 @ 12:20 Begin Run 1 @ 13:30 Rig breaks down
156									J,I,R						
				1	100 %				J,C,R J,I,R						
158															
									J,I,SM						4/5/95 @ 7:30 Resume drilling at 159.5 ft.
160															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: M. VOGT

LOGGED: J. MILLER
CHECKED: B. TILTON
DATE: 5/26/95

Golder Associates

RECORD OF DRILLHOLE PZ-106-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 4/4/95 - 4/5/95
DRILL RIG: SCHRAMM

DATUM: MSL
COORDINATES N: 1066726.3
AZIMUTH: 0

COLLAR ELEV: 481.0
E: 515399.9
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed

DEPTH (FEET)	ROCK TYPE / DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
160	160.3-165.0 ft. Slightly weahtered, thickly laminated, yellowish gray (5Y 7/2), coarse grained, strong, ARENACEOUS LIMESTONE, (SALEM FORMATION)								J,C,SM						
162				1	100 %				J,I,R (2)						
164	Fossil fragments, sandy														4/5/95 @ 10:00 End Run 1
	296.00		296.00												
	End of Record of Drillhole at 165.0 ft. 165.00		165.00												
166															
168															
170															
172															
174															
176															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: M. VOGT

LOGGED: J. MILLER
CHECKED: B. TILTON
DATE: 5/26/95

Golder Associates

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD: 6.25 inch I.D. Hollow Stem Auger	BORING NO. PZ-107-SS
LAIDLAW/OU2 RI-FS/MD WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP) SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	SHEET 1 OF 3
		DRILLING START TIME 13:00 DATE 3/26/95; FINISH TIME 16:25 DATE 3/26/95
NORTHING: 1067163.45 DATUM EASTING: 515254.52 ELEVATION 462.6	WATER LEVEL / TIME / DATE / CASING DEPTH	
DRILL RIG CME 75	SURFACE CONDITIONS	
ANGLE -90° BEARING		
SAMPLE HAMMER		

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
1	3 5 5 5	0.9' / 2.0' (45%)			(0.0-2.0 ft.) Stiff, moderate yellowish brown (10YR 5/4), SILTY CLAY, trace of very fine Sand, WR, damp, (CL), (FILL)	SP 1	
2–3	2 2 4 18	1.0' / 2.0' (50%)			(2.0-4.0 ft.) Firm, yellowish brown (10YR 5/4), SILTY CLAY, little Gravel, trace amount of trash at bottom, WR, damp, (CL), (FILL)	SP 2	
4–5	3 8 11 10	1.1' / 2.0' (55%)			(4.0-6.0 ft.) Very stiff, medium light gray (N5) to dark greenish gray (5GY 4/1), SILTY CLAY, some Gravel, SR, moist, (CL), (FILL)	SP 3	
					(456.6) 6.0		
6–7	4 8 23 5	1.1' / 2.0' (55%)			(6.0-8.0 ft.) Mixed damp waste and silty clay	SP 4	
8–9	7 2 4 1	0.3' / 2.0' (15%)			(8.0-10.0 ft.) Trash	SP 5	
10–11	3 3 4 4	0.0' / 2.0' (0%)			(10.0-12.0 ft.) Waste becomes wet	SP 6	
					(450.6) 12.0		
12–13	8 32 15 9	0.0' / 2.0' (0%)	NO RECOVERY		(12.0-14.0 ft.) No Recovery	SP 7	from 12.0-28.0 ft., no samples recovered, but drilling indicated mixed waste and silty clay layers
14	6 12 8 5	0.0' / 2.0' (0%)			(14.0-15.0 ft.) No Recovery	SP 8	

DRILLING CONTR LAYNE-WESTERN

LOGGED BY S. COSIO CHK'D BY W. HERST

DATE 6/1/95

JOB NO.: 943-2848

FILENAME: PZ107SS

LAIDLAW
LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD: 6.25 inch I.D. Hollow Stem Auger	BORING NO. PZ-107-SS
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP) SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	SHEET 2 OF 3
		DRILLING START TIME 13:00 / FINISH TIME 16:25
	WATER LEVEL / TIME / DATE / CASING DEPTH	DRILLING START DATE 3/26/95 / FINISH DATE 3/26/95
NORTHING: 1067163.45 DATUM EASTING: 515254.52 ELEVATION 462.6		
DRILL RIG CME 75	SURFACE CONDITIONS	
ANGLE -90° BEARING		
SAMPLE HAMMER		

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
					(15.0-16.0 ft.) No Recovery	SP 8	
16	5 8 13 6	0.0' / 2.0' (0%)	NO RECOVERY		(16.0-18.0 ft.) No Recovery	SP 9	
17							
18	5 7 35 41	0.0' / 2.0' (0%)			(18.0-20.0 ft.) No Recovery	SP 10	
19							
20	5 5 5 3	0.0' / 2.0' (0%)			(20.0-22.0 ft.) No Recovery	SP 11	
21							
22	5 4 7 9	0.0' / 2.0' (0%)			(22.0-24.0 ft.) No Recovery	SP 12	
23							
24	6 7 7 10	0.0' / 2.0' (0%)			(24.0-26.0 ft.) No Recovery	SP 13	
25							
26	5 5 9 12	0.4' / 2.0' (20%)			(26.0-28.0 ft.) Waste	SP 14	
27							
28					(434.6) 28.0 (28.0-32.0 ft.) Stiff, dark greenish gray (5GY 4/1), SILTY CLAY, NR, wet, (CL), (LOESS)		
29							

DRILLING CONTR LAYNE-WESTERN

LOGGED BY S. COSIO CHK'D BY W. HERST

DATE 6/1/95

JOB NO.: 943-2848

FILENAME: PZ107SS

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	6.25 inch I.D. Hollow Stem Auger	PZ-107-SS
		SHEET 3 OF 3
	SAMPLING METHOD:	
	SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP)	DRILLING
	SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	START / FINISH
	WATER LEVEL	TIME / TIME
	TIME	13:00 / 16:25
	DATE	DATE / DATE
NORTHING: 1067163.45 DATUM EASTING: 515254.52 ELEVATION 462.6	CASING DEPTH	3/26/95 / 3/26/95

DRILL RIG CME 75	SURFACE CONDITIONS
ANGLE -90° BEARING	
SAMPLE HAMMER	

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE		REMARKS
					(28.0-32.0 ft.) Stiff, dark greenish gray (5GY 4/1), SILTY CLAY, NR, wet, (CL), (LOESS)			
31								
32					(430.6) 32.0 End of Soil Borehole Log at 32.0 ft.			
					See PZ-107-SS Record of Drillhole for rock descriptions below 55.0 ft.			
33								
34								
35								
36								
37								
38								
39								
40								
41								
42								
43								
44								

DRILLING CONTR LAYNE-WESTERN

LOGGED BY S. COSIO CHK'D BY W. HERST

DATE 6/1/95

JOB NO.: 943-2848

FILENAME: PZ107SS

RECORD OF DRILLHOLE PZ-107-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/21/95 - 5/22/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1087183.45
AZIMUTH: 0

COLLAR ELEV: 462.6
E: 515254.52
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation; PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular; P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough; Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R5 R6 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
48	0.0-32.0 ft. See Soil Borehole Log PZ-107-SS 32.0-54.0 ft. No samples collected														5/18/95 - 5/19/95 A 9 7/8 in. borehole (air rotary) was advanced through 10 1/4 in. ID hollow stem augers from 30.0-55.0 ft., and 6 in. steel was sealed in borehole from surface to 55.0 ft. with neat cement. Bedrock was encountered at 51.0 ft. BGS during drilling
50															
52															
54	408.60 54.00 54.0-59.0 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION)		408.60 54.00												5/21/95 @ 15:30 Began coring
56				1	92%				J,PL,SM,CL						
58									J,PL,SM						5/21/95 @ 15:50 End of Run 1
60	59.0-63.5 ft. Slightly weathered, medium bedded, light olive gray (5Y 5/2), medium grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) 60.0 ft. Fossiliferous		403.60 59.00						J,PL,R B,PL,SM						
62				2	98%				J,PL,SM,CL J,PL,R						
64	63.5-82.3 ft. Fresh, medium to thinly bedded, pale yellowish brown (10YR 6/2), m-c grained, medium strong LIMESTONE, (ST. LOUIS FORMATION)								B,PL,SM						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 5/20/95

Golder Associates

RECORD OF DRILLHOLE PZ-107-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/21/95 - 5/22/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1067163.45
AZIMUTH: 0

COLLAR ELEV: 462.6
E: 515254.52
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
64	63.5-82.3 ft. Fresh, medium to thinly bedded, pale yellowish brown (10YR 6/2), m-c grained, medium strong LIMESTONE, (ST. LOUIS FORMATION)								B,PL,SM						
	64.3 ft. Argillaceous layers common, stylolites common								B,PL,SM,CL						
66				2	98%										
									J,PL,SM						
									J,PL,SM,CL						
68															
									J,PL,SM,CL						5/21/95 @ 16:15 End of Run 2
			393.60 / 69.00												
									J,PL,R						
70															
									B,PL,SM,CL (5)						
72	72.1-72.6 ft. Argillaceous layer								B,PL,SM,CL						
									J,I,R						
74				3	100 %										
									B,PL,SM,CL						
76	76.7-77.2 ft. Argillaceous layer														
78	78.4-79.9 ft. Argillaceous layer								J,PL,SM (2)						5/21/95 @ 17:40 End of Run 3
			383.60 / 79.00												
				4	100 %				J,PL,SM						
80															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 6/20/95

Golder Associates

RECORD OF DRILLHOLE PZ-107-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/21/95 - 5/22/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1067163.45
AZIMUTH: 0

COLLAR ELEV: 462.6
E: 515254.52
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH (FEET)	ROCK TYPE / DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP w/r CORE AXIS	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
80	63.5-82.3 ft. Fresh, medium to thinly bedded, pale yellowish brown (10YR 6/2), m-c grained, medium strong LIMESTONE, (ST. LOUIS FORMATION)								J,PL,SM (3)						
									J,PL,SM (2)						
82	82.3-84.6 ft. Slightly weathered, medium bedded, light olive gray (5Y 5/2), medium grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION)														
84	84.6-88.5 ft. Fresh, medium bedded, pale yellowish brown (10YR 6/2), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Thinly laminated Clay layers abundant			4	100 %										
86									J,PL,SM,CL (2)						
									J,C,SM						
88	88.5-94.1 ft. Fresh, medium bedded, light olive gray (5Y 5/2), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) Stylolites abundant		373.60 / 89.00												5/21/95 @ 18:40 End of Run 4 Quit drilling for the day 5/22/95 @ 7:30 Began drilling
90															
92				5	100 %										
94	94.1-97.2 ft. Fresh, thinly bedded, pale yellowish brown (10YR 6/2), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Abundant thinly laminated Clay layers								B,PL,SM,CL (3)						
96															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 6/20/95

Golder Associates

RECORD OF DRILLHOLE PZ-107-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 5/21/95 - 5/22/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1067163.45
AZIMUTH: 0

COLLAR ELEV: 462.6
E: 515254.52
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
96	94.1-97.2 ft. Fresh, thinly bedded, pale yellowish brown (10YR 6/2), fine grained, medium strong, LIMESTONE,(ST. LOUIS FORMATION) Abundant thinly laminated Clay layers		5	100 %	B,PL,SM	
98	97.2-100.7 ft. Slightly weathered, medium bedded, light olive gray (5Y 5/2), fine to medium grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) Calcite filled healed fractures common	363.60 / 99.00				5/22/95 @ 8:10 End of Run 5
100	100.7-104.0 ft. Fresh, thinly bedded, pale yellowish brown (10YR 6/2), f-m grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Abundant thinly laminated clay layers		6	100 %	J,PL,R,CL J,PL,R J,PL,R J,PL,R	5/22/95 @ 8:30 Finished coring
102						
104	End of Record of Borehole at 104.0 ft.	358.60 / 104.00				
106						
108						
110						
112						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: D. ALLOWAY
CHECKED: B. TILTON
DATE: 8/20/95

Golder Associates

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
	6.25 inch I.D. Hollow Stem Auger	PZ-108-SS
		SHEET 1 OF 2
	SAMPLING METHOD:	
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP)	DRILLING
	SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	START / FINISH
	WATER LEVEL	TIME / TIME
	TIME	16:30 / 7:50
	DATE	DATE / DATE
NORTHING: 1067678.37 DATUM EASTING: 515972.61 ELEVATION 454.1	CASING DEPTH	3/21/95 / 3/22/95

DRILL RIG CME 75	SURFACE CONDITIONS
ANGLE BEARING	
SAMPLE HAMMER	

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
1	20 25 13 9	1.2'/2.0' (60%)			(0.0-2.0 ft.) Dense, pale yellowish brown (10YR 6/2), CLAYEY GRAVEL, some fine to coarse Sand, SR, damp, (GC), (FILL)	SP 1	
2					(452.1) 2.0		
3	3 6 7 6	1.0'/2.0' (50%)			(2.0-6.0 ft.) Stiff to very stiff, dark yellowish brown (10YR 4/2), SILTY CLAY, some Gravel, little fine to coarse Sand, SR, damp, (CL), (FILL)	SP 2	
4	6 11 11 11	0.8'/2.0' (40%)				SP 3	
5							
6	3 8 11 15	0.9'/2.0' (45%)			(6.0-12.0 ft.) Stiff to very stiff, dark yellowish brown (10YR 4/2), SILTY CLAY, trace Gravel, trace to some fine to coarse Sand, SR, damp, (CL), (FILL)	SP 4	
7							
8	6 6 8 7	0.5'/2.0' (25%)				SP 5	
9							
10	8 8 10 12	0.4'/2.0' (20%)				SP 6	
11							
12	8 8 12 15	1.6'/2.0' (80%)			(12.0-19.0 ft.) Very stiff, yellowish gray (5Y 7/2), SILTY CLAY, trace fine Gravel consisting of limestone, trace to little fine to coarse Sand, moderate amount of iron oxide staining, SR, damp, (CL), (ALLUVIUM)	SP 7	
13							
14	4 8 11 14	1.8'/2.0' (90%)				SP 8	

DRILLING CONTR LAYNE-WESTERN

LOGGED BY S. COSIO CHK'D BY W. HERST

DATE 6/1/95

JOB NO.: 943-2848

FILENAME: PZ108SS

LAIDLAW
LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	6.25 inch I.D. Hollow Stem Auger	PZ-108-SS
	SAMPLING METHOD:	SHEET 2 OF 2
	SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP)	DRILLING
	SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	START / FINISH
	WATER LEVEL	TIME / TIME
	TIME	16:30 / 7:50
	DATE	DATE / DATE
NORTHING: 1067678.37 DATUM EASTING: 515972.61 ELEVATION 454.1	CASING DEPTH	3/21/95 / 3/22/95

DRILL RIG CME 75	SURFACE CONDITIONS
ANGLE BEARING	
SAMPLE HAMMER	

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
16	5 9 7 9	1.8'/2.0' (90%)			(12.0-19.0 ft.) Very stiff, yellowish gray (5Y 7/2), SILTY CLAY, trace fine Gravel consisting of limestone, trace to little fine to coarse Sand, moderate amount of iron oxide staining, SR, damp, (CL), (ALLUVIUM)	SP 8	
17						SP 9	
18	3 5 9 38	1.2'/2.0' (60%)			(19.0-20.0 ft.) Very stiff, light olive gray (10Y 5/4), SILTY CLAY, little highly weathered limestone, gravel pieces, little fine to coarse Sand, moderate iron oxide staining, NR, damp, (CL), (ALLUVIUM)	SP 10	
19							
20					(434.1) 20.0 End of Soil Borehole Log at 20.0 ft. See PZ-108-SS Record of Drillhole for rock descriptions		Top of weathered bedrock encountered @ 20.0 ft.
21							
22							
23							
24							
25							
26							
27							
28							
29							

DRILLING CONTR LAYNE-WESTERN

LOGGED BY S. COSIO CHK'D BY W. HERST

DATE 6/1/95

JOB NO.: 943-2848

FILENAME: PZ108SS

RECORD OF DRILLHOLE PZ-108-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/22/95-3/23/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1067678.4
AZIMUTH: 0

COLLAR ELEV: 454.1
E: 515972.8
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
16	0.0-20.0 ft. See Soil Borehole Log PZ-108-SS												
18													
20	434.10	434.10											
	20.0-24.4 ft. Highly weathered, thinly bedded, pale olive (10Y 6/2), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Clay infillings 20.2-20.4 ft. Bluish-gray Shale 20.7-20.9 ft. Bluish-gray Shale	20.00											3/22/95 @ 8:30 Started coring Run 1
22			1	59%									
	21.6-22.1 ft. Chert (Brown-angular)							Core Loss					Core loss probably due to highly fractured nature of rock, clay infilling may also be the reason
24		429.70											
	24.4-29.6 ft. Fresh, thickly bedded, light olive gray (5Y 5/2), fine grained, medium strong, FOSSILIFEROUS LIMESTONE, (ST. LOUIS FORMATION)	24.40					J,I,R; J,I,R						
28			2	100 %									
	426.70 27.40 27.4-28.6 ft. Thin layers of bluish-gray Siltstone												
28	425.50 28.60												
		424.50											
30	29.6-36.3 ft. Fresh, thickly bedded, yellowish gray (5Y 7/2), fine grained, medium strong, ARENACEOUS LIMESTONE, (ST. LOUIS FORMATION) Fossils common, stylolitic, little pyrite crystals	29.60	3	99%			J,I,R; J,I,R; J,I,R						
32													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: R. BOOTH
DATE: 5/2/95

Golder Associates

RECORD OF DRILLHOLE PZ-108-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/22/95-3/23/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1067678.4
AZIMUTH: 0

COLLAR ELEV: 454.1
E: 515972.8
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation; PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular; P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough; Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DISCONTINUITY DATA

DEPTH (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	DIP w/r CORE AXIS	TYPE AND SURFACE DESCRIPTION
32	422.00 / 32.10 — 32.1-33.3 ft. Dolomitic Limestone					J,I,CL
						J,I,R
	33.3-35.0 ft. Arenaceous Dolomite					J,I,R
						J,PL,CL
						J,I,CL
34			3	99%		
	419.10 / 35.00 — 35.0-36.2 ft. Bluish-gray Shale layer					
36	417.90 / 36.20	417.80 / 36.30				
	36.3-41.3 ft. Slightly weathered, medium bedded, light olive gray (5Y 6/1), fine grained, strong, LIMESTONE, (ST. LOUIS FORMATION) Scattered pyrite crystals, trace of fossils					J,PL,CL
38	38.1-40.2 ft. Arenaceous Limestone with Shale thin beds					J,PL,CL
			4	96%		
40	40.2-41.3 ft. Arenaceous Dolomite					J,PL,SM
	412.80 / 41.30 — 41.3-50.6 ft. Moderately weathered, medium bedded, light olive gray (5Y 6/1), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Few large (~5 mm.) pyrite crystals, thin layers of bluish-gray Shale, vugs <1 mm., crystals and chert nodules, abundant intact open joints	412.80 / 41.30				
42						J,I,R (6)
						J,I,CL (2)
			5	93%		J,I,R (2)
						J,I,CL
44						J,I,CL (3)
		408.40 / 45.70				
46	45.7-46.1 ft. Arenaceous Limestone 46.1-47.1 ft. Stylolitic with joints, filled with glauconite crystals, Limestone		6	100 %		
		407.00 / 47.10				
	47.1-47.5 ft. Stylolitic, microcrystalline, abundant crystals of quartz		7	100 %		J,I,R (3)
48						

NOTES WATER LEVELS INSTRUMENTATION: This zone may show high permeability due to the open joints intact

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: R. BOOTH
DATE: 5/2/95

Golder Associates

RECORD OF DRILLHOLE PZ-108-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2648
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/22/95-3/23/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1067878.4
AZIMUTH: 0

COLLAR ELEV: 454.1
E: 515972.8
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
48	41.3-50.6 ft. Moderately weathered, medium bedded, light olive gray (5Y 6/1), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Few large (~5 mm.) pyrite crystals, thin layers of bluish-gray Shale, vugs <1 mm., crystals and chert nodules, abundant intact open joints	404.70 / 49.40	7	100 %									Intact open joints observed in bottom 8 inches
50	48.6-49.4 ft. Abundant open intact joints 50.6-54.4 ft. Fresh, medium bedded, light olive gray (5Y 6/1), f-m grained, medium strong, ARENACEOUS LIMESTONE, (ST. LOUIS FORMATION) Porous, vugs up to 3 mm., semi-filled with quartz crystals		8	100 %				J,I,R (2)					
52	Lenses/big crystals of pyrite at 50.9 ft., abundant veins of calcite throughout sample							J,I,CL (2)					
54		399.70 / 54.40						J,I,R (2)					
56	54.4-60.0 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), medium grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) Little veins of calcite <2 mm., few porous areas showing vugs up to 3 mm., trace of pyrite at 58.4 ft.							J,I,R (2)					
58			9	100 %				J,I,R					
60	60.0-66.5 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), medium grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) Few 1-3 mm. calcite veins, stylolitic, few zones showing 1 mm. or less vugs							J,I,R					
62								J,I,R					
64								J,I,R					

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: R. BOOTH
DATE: 5/2/95

Golder Associates

RECORD OF DRILLHOLE PZ-108-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/22/95-3/23/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1067678.4
AZIMUTH: 0

COLLAR ELEV: 454.1
E: 515972.8
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO	CORE RECOVERY	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	NOTES, WATER LEVELS, INSTRUMENTATION
64	60.0-66.5 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), medium grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION), Few 1-3 mm. calcite veins, stylolitic, few zones showing 1 mm. or less vugs	389.70 / 64.40	9	100 %	J,I,R	
	64.4-65.6 ft. Little gray quartzose chert rosettes are observed				J,I,R	
66					J,I,CL	
	66.5-71.2 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Scattered fossils throughout				J,I,R	
68					J,I,R	
			10	99%	J,I,CL (4)	
70					J,I,R	
	71.2-72.7 ft. Fresh, medium bedded, greenish gray (5GY 6/1), f-m grained, medium strong, ARENACEOUS LIMESTONE, (ST. LOUIS FORMATION) Cross bedded				J,I,R (2)	
					J,I,CL	
72					J,I,CL (4)	
	72.7-76.3 ft. Strongly weathered, medium bedded, light olive gray (5Y 6/1), microcrystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolitic, highly laminated					
74		379.70 / 74.40				3/23/95 @ 7:30 Began drilling, water level at start was 11.9 ft. BGS
76	76.3-79.4 ft. Moderately weathered, medium bedded, light olive gray (5Y 6/1), very fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolitic, few intact open joints filled with clayey material, trace of quartz crystals and trace of pyrite		11	100 %	J,I,R (3)	
					J,I,R	
					J,I,CL	
78					J,I,R (4)	
					J,I,CL (2)	
	79.4-93.6 ft. Fresh, medium bedded, yellowish gray (5Y 8/1) to light olive gray (5Y 6/1), fine grained, medium strong, STYLOLITIC LIMESTONE, (ST. LOUIS FORMATION)				J,I,CL (2)	
		374.70 / 79.40	12	98%		
80	79.5 ft. Calcite vein of approximately 5-10 mm. thick					

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: R. BOOTH
DATE: 5/2/95

Golder Associates

RECORD OF DRILLHOLE PZ-108-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/22/95-3/23/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1067678.4
AZIMUTH: 0

COLLAR ELEV: 454.1
E: 515972.6
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
80	79.4-93.6 ft. Fresh, medium bedded, yellowish gray (5Y 8/1) to light olive gray (5Y 6/1), fine grained, medium strong, STYLOLITIC LIMESTONE, (ST. LOUIS FORMATION)				J,I,R	
					J,P,R	
	79.5 ft. Calcite vein of approximately 5-10 mm. thick				J,I,R	
					J,I,R (2)	
82			12	98%		
					J,I,R	
84		369.70 / 84.40			J,I,R	
	84.4-85.8 ft. Crystalline Stylolitic Limestone				J,I,CL	
					J,I,R	
	85.8-87.6 ft. Fine grained, Limestone, stylolitic, abundant quartz and pyrite cyrstals				J,I,R (2)	
86					J,I,R	
					J,I,CL	
88	87.9 ft. 5 mm. joint filled with a dark greenish-gray (5G 4/1), clayey material					
	87.9-93.6 ft. Stylolitic crystalline Limestone		13	99%		
90	90.1-91.9 ft. Abundant silicified fossils				J,I,CL (2)	
92					J,I,CL	
					J,I,R	
	93.6-96.4 ft. Fresh, medium bedded, light olive gray (5Y 6/1), fine grained, strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) Few calcite veins (1 mm.)				J,P,SM	
94		359.70 / 94.40				
			14	100 %		
96						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: R. BOOTH
DATE: 5/2/95

Golder Associates

RECORD OF DRILLHOLE PZ-108-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/22/95-3/23/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1067878.4
AZIMUTH: 0

COLLAR ELEV: 454.1
E: 515972.6
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
96	96.4-109.4 ft. Fresh, thickly bedded, light olive gray (5Y 6/1) to olive gray (5Y 4/1), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolitic, abundant calcite veins, pyrite crystals observed in clay filled joints, large (<4 mm.) calcite crystals at 98.0 ft.				J,I,R; J,I,CL; J,I,R; J,I,R	
98	96.4-104.0 ft. Abundant clayey filled intact joints				J,I,CL (2)	
100	100.0-102.5 ft. Oolitic Limestone		14	100 %	J,I,CL (2)	
102	101.0-102.0 ft. Brecciated Limestone, cemented with greenish-blue clayey material				J,I,CL (2); J,I,R	
104		349.70 / 104.40				
106	104.8-104.9 ft. Layer of bluish-green clayey material, foliated				J,I,R	
108	107.2-107.7 ft. Highly brecciated				J,P,SM	
	100.0-108.4 ft. Scattered calcite veins (1-2 mm.) throughout this core section		15	100 %	J,I,R	
110	109.4-114.8 ft. Fresh, medium to thickly bedded, light olive gray (5Y 6/1), f-m grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) Few chert nodules, banded down to 111.4 ft. with finely crystalline Limestone (.20-1 mm.)				J,I,R; J,I,R; J,I,CL	
112						

DISCONTINUITY DATA: DIP wrt CORE AXIS (0, 30, 60, 90)

WEATHERING INDEX: SW FR, MW, HW, CW

STRENGTH INDEX: R6, R5, R4, R3, R2, R1

POINT LOAD INDEX (psi): R1 30, R2 150, R3 300, R4 600, R5 1500, R6

TEST ORIENTATION

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: R. BOOTH
DATE: 5/2/95

Golder Associates

RECORD OF DRILLHOLE PZ-108-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/22/95-3/23/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1067878.4
AZIMUTH: 0

COLLAR ELEV: 454.1
E: 515972.6
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO	CORE RECOVERY	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
112	109.4-114.8 ft. Fresh, medium to thickly bedded, light olive gray (5Y 6/1), f-m grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) Few chert nodules, banded down to 111.4 ft. with finely crystalline Limestone (.20-1 mm.)		15	100 %		
114	111.9-112.9 ft. Abundant rounded pyrite crystals	339.70 / 114.40				
	114.8-119.4 ft. Fresh, medium to thickly bedded, olive gray (5Y 4/1), fine grained, medium strong, FOSSILIFEROUS LIMESTONE, (SALEM FORMATION) Very large brachiopods from 115.4-118.7 ft.					@ 114.8 ft. top of Salem Limestone encountered
116					J,C,SM	
118	118.3-119.5 ft. Dark greenish gray (5GY 4/1), Oolitic Limestone with calcite veins and large crystals of calcite (10 mm.)		16	100 %	J,I,CL	
					J,I,CL	
120	120.4-120.7 ft. Highly brecciated				J,I,R	
	121.0-121.3 ft. Highly brecciated				J,I,CL	
	121.8-124.4 ft. Dolomitic Limestone				J,I,CL	
122	122.4-124.4 ft. Very large chert nodules				J,PL,SM	
					J,PL,CL	
124	124.4-130.4 ft. Fresh, thickly bedded, olive gray (5Y 4/1), fine grained, medium strong, LIMESTONE, (SALEM FORMATION) Large beds of chert, large chert nodules	329.70 / 124.40			J,I,R	
126			17	100 %	J,PL,SM	
128						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: R. BOOTH
DATE: 5/2/95

Golder Associates

RECORD OF DRILLHOLE PZ-108-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2648
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/22/95-3/23/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1067678.4
AZIMUTH: 0

COLLAR ELEV: 454.1
E: 515972.6
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH (FEET)	ROCK TYPE / DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
128	124.4-130.4 ft. Fresh, thickly bedded, olive gray (5Y 4/1), fine grained, medium strong, LIMESTONE, (SALEM FORMATION) Large beds of chert, large chert nodules														
130	130.4-134.2 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), medium grained, strong, FOSSILIFEROUS LIMESTONE, (SALEM FORMATION)			17	100 %			90	J,I,R						
132															
134	134.2-134.6 ft. Crystalline Limestone 134.6-139.0 ft. Fresh, medium bedded, light olive gray (5Y 6/1), f-m grained, medium strong, LIMESTONE, (SALEM FORMATION) Stylolitic, large (10 mm.) calcite crystals, abundant clay filled intact joints, abundant chert nodules		319.70 / 134.40												
136								90	J,I,CL						
								90	J,I,CL						
138	138.6-139.0 ft. Crinoid fragments 139.0-140.8 ft. Finely grained Arenaceous Limestone			18	100 %										
140	140.8-144.4 ft. Fresh, medium bedded, olive gray (5Y 4/1), fine grained, strong, ARGILLACEOUS LIMESTONE, (SALEM FORMATION) Interbedded with Dolomite							90	J,I,R						
142															
144															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: R. BOOTH
DATE: 5/2/95

Golder Associates

RECORD OF DRILLHOLE PZ-108-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/22/95-3/23/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1067678.4
AZIMUTH: 0

COLLAR ELEV: 454.1
E: 515972.6
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
144	140.8-144.4 ft. Fresh, medium bedded, olive gray (5Y 4/1), fine grained, strong, ARGILLACEOUS LIMESTONE, (SALEM FORMATION) Interbedded with Dolomite (309.70 – 144.40)		309.70 / 144.40	18	100 %			●	J,I,R						3/23/95 @ 16:35 Coring completed
146	End of Record of Drillhole at 144.4 ft.														
148															
150															
152															
154															
156															
158															
160															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: R. BOOTH
DATE: 5/2/95

Golder Associates

LAIDLAW
LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD: 6.25 inch I.D. Hollow Stem Auger	BORING NO. PZ-109-SS
		SHEET 1 OF 2
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP) SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	DRILLING START / FINISH
	WATER LEVEL	TIME 7:48 / TIME 8:48
	TIME	
	DATE	DATE 4/7/95 / DATE 4/7/95
NORTHING: 1068011.70 DATUM EASTING: 516144.36 ELEVATION 456.8	CASING DEPTH	
DRILL RIG CME 75 - TRUCK MOUNT	SURFACE CONDITIONS	
ANGLE -90° BEARING NA		
SAMPLE HAMMER 140 lbs.		

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
1	1 1 1 2	2.0'/2.0' (100%)			(0.0-2.0 ft.) Very loose, light olive gray (5Y 6/1), SILT, trace of fine to coarse Gravel, trace very fine Sand, NR, moist, (ML), (FILL)	SP 1	
2	50/4"	0.4'/2.0' (20%)			(454.8) 2.0 (2.0-6.0 ft.) Very dense, light olive gray (5Y 6/1), f-c GRAVEL, little fines, SR, damp, (GP), (FILL)	SP 2	
3							
4	50/3"	0.2'/2.0' (10%)					
5						SP 3	
6	5 6 8 8	1.8'/2.0' (90%)			(450.8) 6.0 (6.0-12.0 ft.) Stiff, dark yellowish brown (10YR 4/2), mottled CLAYEY SILT, NR, damp, (CL-ML), (LOESS)	SP 4	
7							
8	5 7 8 11	1.6'/2.0' (80%)					
9						SP 5	
10	4 5 6 8	2.0'/2.0' (100%)					
11						SP 6	
12	4 3 5 7	1.8'/2.0' (90%)			(12.0-16.0 ft.) Firm, mottled moderate yellowish brown (10YR 5/4) to light olive gray (5Y 6/1), CLAYEY SILT, NR, damp, (CL-ML), (LOESS)	SP 7	
13							
14	4 8 39 50/2"	1.9'/2.0' (95%)			@ 14.5 ft., little fine Gravel	SP 8	

DRILLING CONTR LAYNE-WESTERN

LOGGED BY S. CDSID CHK'D BY W. HERST

DATE 5/31/95

JOB NO.: 943-2848

FILENAME: PZ109SS

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	6.25 inch I.D. Hollow Stem Auger	PZ-109-SS
		SHEET 2 OF 2
	SAMPLING METHOD:	
	SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP)	DRILLING
	SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	START / FINISH

					START	FINISH
WATER LEVEL					TIME	TIME
TIME					7:48	8:48
DATE					DATE	DATE
CASING DEPTH					4/7/95	4/7/95

DATUM NORTHING: 1068011.70 EASTING: 516144.36 ELEVATION 456.8

DRILL RIG CME 75 - TRUCK MOUNT

ANGLE -90° BEARING NA

SAMPLE HAMMER 140 lbs.

SURFACE CONDITIONS

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE		REMARKS
16					(12.0-16.0 ft.) Firm, mottled moderate yellowish brown (10YR 5/4) to light olive gray (5Y 6/1), CLAYEY SILT, NR, damp, (CL-ML), (LOESS) (440.8) 16.0	SP (8)		Top of weathered bedrock encountered @ 15.7 ft.
					End of Soil Borehole Log at 16.0 ft.			
					See PZ-109-SS Record of Drillhole for rock descriptions			
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								

DRILLING CONTR LAYNE-WESTERN

LOGGED BY S. COSIO

DATE 5/31/95

CHK'D BY W. HERST

JOB NO.: 943-2848

FILENAME: PZ109SS

RECORD OF DRILLHOLE PZ-109-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 4/7/95-4/8/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068011.70
AZIMUTH: 0

COLLAR ELEV: 458.8
E: 518144.36
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation; PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular; P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough; Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	2 4 6 8 FRACTURES PER FOOT 10	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
0	0.0-15.7 ft. See Soil Borehole Log PZ-109-SS														
2															
4															
6															
8															
10															
12															
14	15.7-20.7 ft. Moderately weathered, thickly bedded, light olive gray (5Y 6/1), f-m grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Fossiliferous, pyrite and calcite crystals common, stylolitic, abundant clay filled intact joints		441.10 / 15.70	1	100 %										4/7/95 @ 9:47 Begin coring Run 1
16															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: R. BOOTH
DATE: 5/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-109-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 4/7/95-4/8/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068011.70
AZIMUTH: 0

COLLAR ELEV: 456.8
E: 516144.38
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
18	15.7-20.7 ft. Moderately weathered, thickly bedded, light olive gray (5Y 6/1), f-m grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Fossiliferous, pyrite and calcite crystals common, stylolitic, abundant clay filled intact joints								J,PL,SM (2)						
									J,I,R (2)						
									J,I,R (2)						
									J,PL,SM						
18									J,I,R (2)						
									J,U,R						
	19.8-20.0 ft. Layer of brown chert														
20				1	100 %				J,PL,R (2)						
	20.7-31.5 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), f-m grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Fossiliferous, stylolitic, pyrite and calcite crystals common, abundant argillaceous partings								J,PL,R						
									J,I,R						
22															
24			432.30 / 24.50												4/7/95 @ 10:47 Begin coring Run 2
									J,I,R						
	25.0-25.5 ft. Bioclastic Limestone								J,I,CL						
	25.5-27.2 ft. Microcrystalline Limestone								J,U,SM (2)						
									J,I,R						
26									J,I,R (3)						
									J,PL,R (3)						
									J,I,CL (2)						
28				2	100 %				J,I,CL (2)						
									J,I,R						
									J,I,CL (2)						
	29.9-31.3 ft. Dark greenish gray (5GY 4/1), intraclastic Limestone								J,I,CL (3)						
30	31.3-31.4 ft. Layer of dark greenish yellow clay								J,I,R						
									J,I,CL						
	31.5-32.5 ft. Fresh, thinly bedded, greenish black (5G 2/1), fine grained, medium strong, DOLOMITE, (ST. LOUIS FORMATION) Large (3 mm.) calcite veins		425.30 / 31.50						J,I,CL (2)						
32									J,I,CL						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: R. BOOTH
DATE: 5/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-109-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 4/7/95-4/8/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068011.70
AZIMUTH: 0

COLLAR ELEV: 456.8
E: 518144.38
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	ELEV / DEPTH (FT)	RUN NO	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP w/r CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
32	424.30 / 32.50							J,I,R					
	32.5-34.9 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Little argillaceous partings, pyrite crystals present		2	100 %				J,PL,CL; J,I,CL					
34		422.30 / 34.50											4/7/95 @ 12:55 Begin coring Run 3
36	34.9-40.5 ft. Slightly weathered, thickly bedded, grayish orange (10YR 7/4) to light olive gray (5Y 6/1), f-m grained, strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) Vugs up to 2 mm., calcite crystals and veins up to 3 mm. present, little pyrite crystals												
	35.0-38.7 ft. Very porous material							J,I,R					
38								J,I,CL					
	39.0-39.2 ft. Layer of brown chert		3	99%				J,I,R					
40								J,I,CL					
42	40.5-45.6 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Fossiliferous, chert nodules common, abundant argillaceous partings, calcite veins up to 8 mm., pyrite crystals scattered												
44								J,I,R					
		412.30 / 44.50											4/7/95 @ 13:50 Begin coring Run 4
48	45.6-58.2 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained to microcrystalline, medium strong to strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolitic, abundant calcite crystals and veins up to 2 mm., little pyrite crystals		4	99%				J,I,CL; J,I,CL; J,I,R (2)					
48													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: R. BOOTH
DATE: 5/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-109-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 4/7/95-4/8/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068011.70
AZIMUTH: 0

COLLAR ELEV: 458.8
E: 518144.38
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
48	48.5-51.6 ft. Abundant argillaceous partings and clay filled intact open joints							J,I,R	
	48.9-53.8 ft. Highly brecciated Limestone, cemented with a greenish gray clayey material								
50			4	99%				J,I,CL	
								J,I,CL	
52	52.0-53.3 ft. Intraclastic Limestone							J,PL,SM	
								J,I,R	
54	53.8-54.2 ft. Greenish black (5G 2/1), fine grained Dolomite (403.00, 53.80, 402.60, 54.20)	402.30 / 54.50							4/7/95 @ 14:42 Begin coring Run 5
	54.9-55.3 ft. Intraclastic Limestone								
56	55.5-58.2 ft. Fossiliferous Limestone, abundant argillaceous partings								
58	58.2-74.6 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), f-m grained, strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) Little fossils, vugs up to 8 mm., calcite veins with pyrite common, some calcite crystals							J,I,CL (2)	
								J,I,R	
60	58.2-62.3 ft. Limestone shows high porosity		5	100 %					
								J,I,R	
62								J,I,R	
								J,I,R	
64								J,I,R	

WEATHERING INDEX: SW FR, MW, HW, CW
STRENGTH INDEX: R6, R5, R4, R3, R2, R1
POINT LOAD INDEX (psi): R1 30, R2 150, R3 300, R4 600, R5 1500, R6
TEST ORIENTATION

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: R. BOOTH
DATE: 5/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-109-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 4/7/95-4/8/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068011.70
AZIMUTH: 0

COLLAR ELEV: 456.8
E: 518144.36
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
Pl-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R5 R6 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
64			392.30 / 64.50	5	100 %										4/7/95 @ 15:30 Begin coring Run 6
	65.0-69.4 ft. Apparent low porosity Limestone, vugs <1 mm.														
	65.7-66.7 ft. Stylolitic Limestone, becomes medium strong														
66									J,I,R						
68															
	69.4-72.8 ft. Apparent moderate porosity Limestone, vugs 1-2 mm.			6	100 %				J,PL,SM						
									J,I,R						
70									J,I,R						
									J,I,R						
									J,I,CL						
72	72.0-73.2 ft. Large (25 mm.) calcite crystals observed														
	72.8-74.3 ft. Apparent high porosity Limestone, vugs up to 8 mm.														
									J,I,CL						
74									J,I,R						
	74.6-75.7 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, strong, LIMESTONE, (ST. LOUIS FORMATION) Oolitic, little fossils, abundant calcite crystals, little chert		382.30 / 74.50						J,I,CL (2)						4/7/95 @ 16:21 Begin coring Run 7
									J,I,R						
76	75.7-77.8 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) Vugs up to 5 mm., abundant calcite crystals, glauconite in defined places, Limestone has an apparent moderate to high porosity			7	100 %										
78	77.8-90.8 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained to microcrystalline, medium strong to strong, LIMESTONE, (ST. LOUIS FORMATION) Some fossils, little chert, stylolites, large calcite crystals, some pyrite								J,I,CL						
80															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: R. BOOTH
DATE: 5/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-109-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 4/7/95-4/8/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068011.70
AZIMUTH: 0

COLLAR ELEV: 456.6
E: 518144.36
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP w/r CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
80	80.0-82.4 ft. Some intact joings filled with clayey material								J,I,CL						
	81.1-82.6 ft. Interbedded layers of argillaceous Limestone (5 mm.)								J,I,CL						
									J,PL,CL						
82				7	100 %										
	83.0-84.2 ft. Argillaceous Limestone, large calcite crystals, vugs up to 1 mm., relative low porosity								J,I,R						
84									J,I,R						4/7/95 @ 15:05 Stop coring
			372.30 / 84.50												4/8/95 @ 8:00 Begin coring Run 8
	85.5-87.3 ft. Limestone with numerous argillaceous partings and intact joints filled with clayey material								J,I,R						
86															
	87.3-88.2 ft. Argillaceous Limestone, bioturbated top 2 in.														
88	88.2-89.0 ft. Limestone, stylolitic microcrystalline								J,PL,CL						
	89.4-90.8 ft. Medium bluish gray (5B 5/1), fine grained, Argillaceous Limestone			8	100 %				J,I,R						
90									J,PL,SM						
									J,I,R						
	90.8-93.3 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), micro-crystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION)								J,I,CL						
92	Interbedded with Argillaceous Limestone and bluish gray Limestone, stylolites present, calcite veins and pyrite crystals observed								J,I,CL						
	93.3-95.3 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION)														
94			362.30 / 94.50						J,I,CL						4/8/95 @ 9:04 Begin coring Run 9
	Few layers (up to 20 mm.) of Dolomitic Limestone, argillaceous partings present, pyrite and calcite common			9	100 %										
	95.3-99.8 ft. (see next page)								J,PL,SM						
96															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: R. BOOTH
DATE: 5/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-109-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 4/7/95-4/8/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068011.70
AZIMUTH: 0

COLLAR ELEV: 456.8
E: 516144.36
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

SCALE (FEET)	ROCK TYPE / DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (FR SW MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
96	95.3-99.8 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained to microcrystalline, strong LIMESTONE, (ST. LOUIS FORMATION) Stylolites not common, pyrite anc calcite veins <1 mm. observed, argillaceous partings common, few open joints filled with clayey material								J,PL,CL						
									J,PL,CL						
98									J,I,CL						
									J,I,CL						
100	99.8-104.7 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) Vugs up to 2 mm. present, biourbated in places, calcite crystals common			9	100 %										
102															
									J,U,CL						
104			352.30 / 104.50												4/8/95 @ 9:52 Begin coring Run 10
106	104.7-107.9 ft. Fresh, thickly bedded, olive gray (5Y 6/1), micro-crystalline, strong, LIMESTONE, (ST. LOUIS FORMATION) Pyrite and calcite veins common, few large calcite crystals														
	106.5-106.6 ft. Layer of olive black (5Y 2/1), clayey material, folliated 106.9-107.9 ft. Fossils common								J,C,R						
108	107.9-111.0 ft. Fresh, thickly bedded, olive gray (5Y 6/1), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolites present, vugs up to 1 mm., bioturbated in places, calcite crystals are common, more porous in bottom foot			10	100 %				J,PL,CL						
110	111.0-118.0 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolitic, little fossils, abundant pyrite and calcite crystals, abundant argillaceous partings, intra-clasts common								J,I,CL						
112															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: R. BOOTH
DATE: 5/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-109-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 4/7/95-4/8/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068011.70
AZIMUTH: 0

COLLAR ELEV: 458.8
E: 516144.36
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
112	111.0-118.0 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Stylolitic, little fossils, abundant pyrite and calcite crystals, abundant argillaceous partings, intra-clasts common		343.10 / 113.70	10	100 %										4/8/95 @ 10:55 Begin coring Run 11
114															
	115.3-115.6 ft. Layer of grayish green (10G 4/6) Shale, intra-clastic								J,I,CL						
									J,I,CL						
116									J,I,CL						
									J,I,CL						
	116.5-117.1 ft. Slightly weathered Limestone								J,I,R						
									J,I,R						
									J,I,R						
									J,PL,CL						
118	118.0-123.2 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARENACEOUS LIMESTONE, (ST. LOUIS FORMATION) Banded with fine to medium grained Limestone, large crystals of calcite, few calcite veins and little pyrite			11	100 %										
120									J,I,CL						
122															
	333.60 / 123.20														
	123.2-130.0 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained to microcrystalline, strong to medium strong, LIMESTONE, (SALEM FORMATION) Stylolites observed, abundant fossils, oolitic, chert nodules common, large calcite crystals, little pyrite crystals scattered, calcite veins present but not abundant 125.4-125.5 ft. Bed of chert		333.10 / 123.70						J,PL,SM						123.2 ft. Top of SALEM FORMATION encountered
124															4/8/95 @ 12:50 Begin coring Run 12
									J,I,R						
									J,I,R						
126				12	99%										
									J,I,R						
128	127.6-128.3 ft. Intraclastic Limestone cemented with dark greenish gray (5GY 4/1) clayey material														

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: R. BOOTH
DATE: 5/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-109-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 4/7/95-4/8/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068011.70
AZIMUTH: 0

COLLAR ELEV: 458.8
E: 518144.36
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
128									J,I,CL						
	129.0-129.3 ft. Intraclastic Limestone and chert cemented with dark greenish gray (5Y 4/1) clayey material								J,PL,SM						
									J,PL,SM						
130	130.0-135.7 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, LIMESTONE, (SALEM FORMATION)								J,PL,R						
				12	99%										
	Chert nodules and layers up to 15 mm. are abundant, abundant calcite crystals, pyrite common, some very thin calcite veins								J,PL,SM (2)						
									J,I,R						
132									J,PL,SM						
									J,PL,SM						
									J,PL,R						
															Fragmented rock may be drill induced
			323.10												
			133.70												
134									J,PL,SM						
									J,PL,SM						
				13	100 %				J,I,CL						
									J,I,R						4/8/95 @ 15:30 Coring completed
	321.10		321.10												
	End of Record of Drillhole 135.70		135.70												
136	at 135.7 ft.														
138															
140															
142															
144															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: R. BOOTH
DATE: 5/5/95

Golder Associates

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD: 6.25 inch I.D. Hollow Stem Auger	BORING NO. PZ-110-SS
		SHEET 1 OF 5
LAIDLAW\RI-FS\MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP) SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	DRILLING
		START / FINISH
	WATER LEVEL	TIME / TIME
	TIME	13:30 / 14:00
	DATE	DATE / DATE
NORTHING: 1068336.09 DATUM EASTING: 515919.72 ELEVATION 456.8	CASING DEPTH	3/13/95 / 3/14/95

DRILL RIG SCHRAMM - ROTADRILL	SURFACE CONDITIONS
ANGLE BEARING	
SAMPLE HAMMER	

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
1	7 9 21 19	0.4'/2.0' (20%)			(0.0-4.0 ft.) Dense, pale yellowish brown (10YR 6/2), SANDY CLAY, little Gravel, damp, SR, (CL), (FILL)	SP 1	
2 3	10 11 12 18	0.6'/2.0' (30%)				SP 2	
4					(452.8) 4.0		
5	5 6 7 8	1.7'/2.0' (85%)			(4.0-12.0 ft.) Stiff, mottled medium gray (N5) to moderate yellowish brown (10YR 5/4), CLAYEY SILT, trace fine Sand, trace Gravel, SR, damp, (CL-ML), (LOESS)	SP 3	
6 7	8 8 7 7	1.3'/2.0' (65%)				SP 4	
8 9	4 3 4 4	0.3'/2.0' (15%)				SP 5	
10 11	4 4 4 5	1.3'/2.0' (65%)				SP 6	
12					(444.8) 12.0		
13	5 8 9 16	1.3'/2.0' (65%)			(12.0-15.8 ft.) Compact, pale yellowish brown (10YR 6/2), SILTY fine SAND, trace fine Gravel, SR, moist, (SM), (ALLUVIAL)	SP 7	
14	3 6 6 5	1.5'/2.0' (75%)				SP 8	

DRILLING CONTR LAYNE-WESTERN

LOGGED BY D. TILTON

DATE 3/13/95

CHK'D BY W. HERST

JOB NO.: 943-2848

FILENAME: PZ110SS

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD: 6.25 inch I.D. Hollow Stem Auger	BORING NO. PZ-110-SS
		SHEET 2 OF 5
LAIDLAW\RI-FS\MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP) SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	DRILLING START / FINISH
	WATER LEVEL / TIME / DATE / CASING DEPTH	TIME 13:30 / TIME 14:00
		DATE 3/13/95 / DATE 3/14/95
DATUM NORTHING: 1068336.09 EASTING: 515919.72	ELEVATION 456.8	
DRILL RIG SCHRAMM - ROTADRILL	SURFACE CONDITIONS	
ANGLE	BEARING	
SAMPLE HAMMER		

DRILLING CONTR LAYNE-WESTERN

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
					(12.0-15.8 ft.) Compact, pale yellowish brown (10YR 6/2), SILTY fine SAND, trace fine Gravel, SR, moist, (SM), (ALLUVIAL) (441.0) 15.8	SP 8	
16	3 5 6 4	1.9'/2.0' (95%)			(15.8-16.8 ft.) Stiff, dark yellowish brown (10YR 4/2), CLAYEY SILT, little fine Sand, NR, damp, (CL-ML), (LOESS) From 16.8-16.9 ft., moist, silty fine Sand layer (439.9) 16.9	SP 9	
17					(16.9-18.3 ft.) Stiff, grayish black (N2), CLAY, trace organics consisting of fine roots, NR, damp, (CL), (LOESS) (438.5) 18.3		
18	3 4 5 3	1.5'/2.0' (75%)			(18.3-20.3 ft.) Stiff, olive gray (5Y 4/1), CLAYEY SILT, trace very fine Sand, NR, damp to moist, (CL-ML), (LOESS)	SP 10	
19					(436.5) 20.3		
20	3 4 5 7	2.0'/2.0' (100%)			(20.3-24.5 ft.) Stiff, medium gray (N5), SILTY CLAY, NR, damp, (CL)	SP 11	
21					@ 21.7 ft., silty clay becomes moist		
22	1 3 3 3	2.0'/2.0' (100%)			@ 22.3 ft., thin wet zone (<1 inch)	SP 12	
23							
24	1 2 2 3	1.6'/2.0' (80%)			(432.3) 24.5		
25					(24.5-26.0 ft.) Soft, olive gray (5Y 4/1), SILT, trace Clay, NR, wet, (ML), (LOESS) (430.8) 26.0	SP 13	
26	3 9 19 20	1.2'/2.0' (60%)			(26.0-28.0 ft.) Compact, olive gray (5Y 4/1), SILTY fine SAND, NR, wet, (SM), (LOESS)	SP 14	@ 26.0 feet first groundwater encountered in borehole
27							
28	26 46 46 46	1.3'/2.0' (65%)			@ 28.0 ft., silty fine sand becomes very dense and color changes to dark yellowish brown (10YR 4/2) (28.0-46.0 ft.) Very dense to compact, dark yellowish brown (10YR 4/2), SILTY fine SAND, NR, wet, (SM), (ALLUVIAL)	SP 15	
29							

LOGGED BY B. TILTON
DATE 3/13/95
CHK'D BY W. HERST
JOB NO.: 943-2848
FILENAME: PZ110SS

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD: 6.25 inch I.D. Hollow Stem Auger	BORING NO. PZ-110-SS
		SHEET 3 OF 5
LAIDLAW\RI-FS\MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP) SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	DRILLING START / FINISH
	WATER LEVEL	TIME / TIME
	TIME	13:30 / 14:00
	DATE	DATE / DATE
NORTHING: 1068336.09 DATUM EASTING: 515919.72 ELEVATION 456.8	CASING DEPTH	3/13/95 / 3/14/95

DRILL RIG SCHRAMM - ROTADRILL	SURFACE CONDITIONS
ANGLE BEARING	
SAMPLE HAMMER	

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
31	26 49 >50	1.0'/2.0' (50%)			(28.0-46.0 ft.) Very dense to compact, dark yellowish brown (10YR 4/2), SILTY fine SAND, NR, wet, (SM), (ALLUVIAL)	SP 16	
32 33	4 10 10 12	1.0'/2.0' (50%)				SP 17	
34 35	21 50 >50	1.2'/2.0' (60%)				SP 18	
36 37	7 7 15	1.1'/2.0' (55%)				SP 19	
38 39	7 9 9	1.2'/2.0' (60%)				SP 20	
40 41	6 18 30	1.4'/2.0' (70%)				SP 21	
42 43	7 9 9	1.2'/2.0' (60%)			@ 42.0 ft., color changes to olive gray (5Y 4/1)	SP 22	
44	7 11 12	0.7'/2.0' (35%)				SP 23	

DRILLING CONTR LAYNE-WESTERN

LOGGED BY B. TILTON

CHK'D BY W. HERST

DATE 3/13/95

JOB NO.: 943-2848

FILENAME: PZ110SS

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
	6.25 inch I.D. Hollow Stem Auger	PZ-110-SS
		SHEET 4 OF 5
LAIDLAW\RI-FS\MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP) SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	DRILLING

					START	FINISH
WATER LEVEL					TIME	TIME
TIME					13:30	14:00
DATE					DATE	DATE
CASING DEPTH					3/13/95	3/14/95

NORTHING: 1068336.09
DATUM EASTING: 515919.72 ELEVATION 456.8

DRILL RIG SCHRAMM - ROTADRILL

SURFACE CONDITIONS

ANGLE BEARING

SAMPLE HAMMER

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
					(28.0-46.0 ft.) Very dense to compact, dark yellowish brown (10YR 4/2), SILTY fine SAND, NR, wet, (SM), (ALLUVIAL) (410.8) 46.0	SP 23	
46	7 9 13	1.0' / 2.0' (50%)			(46.0-48.3 ft.) Compact, medium light gray (N6), fine to medium SAND, trace silt, trace fine Gravel, NR, wet, (SP), (ALLUVIAL)	SP 24	
47							
48	7 11 15	1.3' / 2.0' (65%)			(408.5) 48.3 (48.3-59.0 ft.) Compact, olive gray (5Y 4/1), SILTY fine SAND, trace fine Gravel, NR, wet, (SM), (ALLUVIAL)	SP 25	
49							
50	11 25 41	1.4' / 2.0' (70%)				SP 26	
51							
52	12 23 35	1.2' / 2.0' (60%)			from 52.0-52.5 ft., silty medium grained sand layer	SP 27	
53							
54	12 19 23	0.0' / 2.0' (0%)				SP 28	
55							
56	9 13 30	1.3' / 2.0' (65%)				SP 29	
57							
58	4 2 40	1.6' / 2.0' (80%)			(59.0-59.5 ft.) Very stiff, olive gray (5Y 4/1), CLAY, trace Silt, NR, moist, grayish black (N2), fibrous wood piece at 59.5 ft., (CL), (ALLUVIAL) (397.3) 59.5	SP 30	
59					(59.5-60.5 ft.) Hard, light olive gray (5Y 6/1), highly weathered LIMESTONE, SR, (BEDROCK), (ST. LOUIS LIMESTONE)		

DRILLING CONTR LAYNE-WESTERN

LOGGED BY B. TILTON

DATE 3/13/95 CHK'D BY W. HERST

JOB NO.: 943-2848

FILENAME: PZ110SS

LAIDLAW
LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
LAIDLAW\RI-FS\MO WEST LAKE LANDFILL OPERABLE UNIT 2	6.25 inch I.D. Hollow Stem Auger	PZ-110-SS
		SHEET 5 OF 5
	SAMPLING METHOD:	
	SPLIT SPOON: 2.0 inch O.D./1.5 inch I.D. (SP)	DRILLING
	SHELBY TUBE: 3.0 inch O.D./2 13/16 inch I.D. (SH)	START / FINISH

WATER LEVEL					START TIME	FINISH TIME
TIME					13:30	14:00
DATE					DATE 3/13/95	DATE 3/14/95
CASING DEPTH						

DATUM NORTHING: 1068336.09 EASTING: 515919.72 ELEVATION 456.8

DRILL RIG SCHRAMM - ROTADRILL

SURFACE CONDITIONS

ANGLE BEARING

SAMPLE HAMMER

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE	REMARKS
	50	0.5' / 0.5' (100%)			(59.5-60.5 ft.) Hard, light olive gray (5Y 6/1), highly weathered LIMESTONE, SR, (BEDROCK), (ST. LOUIS LIMESTONE) (396.3) 60.5	SP (31)	
61					End of Soil Borehole Log at 60.5 ft.		
62					See PZ-110-SS Record of Drillhole for rock descriptions		
63							
64							
65							
66							
67							
68							
69							
70							
71							
72							
73							
74							

DRILLING CONTR LAYNE-WESTERN

LOGGED BY B. TILTON

DATE 3/13/95

CHK'D BY W. HERST

JOB NO.: 943-2848

FILENAME: PZ110SS

RECORD OF DRILLHOLE PZ-110-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/24/95-3/25/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068336.1
AZIMUTH: 0

COLLAR ELEV: 458.8
E: 515919.7
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE / DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R5 R6 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
48	0.0-60.0 ft. See Soil Borehole Log PZ-110-SS														
50															
52															
54															
56															
58															
60	396.80		396.80												
	60.0-70.4 ft. 60.00 Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARENACEOUS LIMESTONE, (ST. LOUIS FORMATION) Calcite veins and crystals observed throughout core run		60.00						J,PL,SM						3/24/95 @ 15:25 Began coring Run 1
									J,I,R						
62	61.6-63.0 ft. Porous/vuggy (up to 2 mm.)			1	85%				J,I,R						
									J,I,R						
									J,I,R						
									J,I,R						
64									J,I,R						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: O. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 5/24/95

Golder Associates

RECORD OF DRILLHOLE PZ-110-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/24/95-3/25/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068336.1
AZIMUTH: 0

COLLAR ELEV: 458.8
E: 515919.7
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	ELEV / DEPTH (FT)	RUN NO	CORE RECOVERY	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
64	60.0-70.4 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARENACEOUS LIMESTONE, (ST. LOUIS FORMATION) Calcite veins and crystals observed throughout core run				J,I,R (3)	
					J,I,R	
					J,I,R	
	65.0 ft. A 2 mm. pyrite layer				J,I,R	
66			1	85%	J,I,R (2)	
					J,I,R	
	388.80 / 68.00				Core Loss	Core Loss Reason unknown
68		387.40 / 69.40				3/24/95 @ 16:15 Began coring Run 2
	69.4-70.4 ft. Porous/vuggy, voids up to 3 mm., abundant veins of pyrite/calcite				J,I,R	
70					J,I,R	
	70.4-70.9 ft. Light olive brown (5Y 4/4), Claystone					
	70.9-75.0 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), very fine grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) Abundant 1-2 mm. pyrite veins, porous, some small <1 mm. calcite crystals, iron staining in places				J,I,R	
					J,I,R	
72					J,PL,SM (2)	
74			2	100 %	J,I,R	
					J,I,R	
	381.80 / 75.00					
	75.0-80.8 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), f-m grained, medium strong, DOLOMITIC LIMESTONE, (ST. LOUIS FORMATION) Abundant pyrite crystals and calcite veins up to 3 mm., stylolites common				J,I,R (2)	
76					J,I,R (2)	
					J,I,R (3)	
78					J,I,R (3)	
					J,I,R	
		377.60 / 79.20			J,I,R	
	79.7-80.8 ft. Highly weathered, Dolomitic Limestone with very large calcite crystals (up to 15 mm.)		3	100 %	J,I,R (2)	3/24/95 @ 17:15 Began coring Run 3
80						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 5/24/95

Golder Associates

RECORD OF DRILLHOLE PZ-110-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/24/95-3/25/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068336.1
AZIMUTH: 0

COLLAR ELEV: 456.8
E: 515919.7
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
80	79.7-80.8 ft. Highly weathered, Dolomitic Limestone with very large calcite crystals (up to 15 mm.) 376.00 / 80.80				J,I,CL; J,I,CL; J,I,R	
	80.8-93.4 ft. Slightly weathered, thickly bedded, olive gray (5Y 4/1), micro-crystalline, medium strong, LIMESTONE, (ST. LOUIS FORMATION)				J,I,R; J,I,R	
82	Stylolitic, some pyrite crystals in clay filled joints, abundant argillaceous partings				J,I,CL; J,I,CL	
					J,I,R	
84			3	100 %	J,I,R; J,I,CL (2)	
					J,I,R; J,I,R	
86					J,I,R	
	87.0-89.4 ft. Interbedded layers of Argillaceous Limestone and Arenaceous Limestone				J,I,CL	
86		367.60 / 89.20				
	89.2-90.8 ft. Abundant calcite veins (1-2 mm.) and abundant pyrite crystals				J,I,R (2)	3/25/95 @ 8:15 Began coring Run 4
90					J,I,R; J,I,CL	
	90.7-92.8 ft. Fossiliferous with abundant argillaceous partings				J,I,CL; J,I,R; J,I,CL	
92			4	100 %	J,I,R; J,I,R (2)	
	93.4-98.4 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) Few calcite veins and some calcite crystals Few interbedded layers of Dolomitic Limestone				J,PL,SM	
94						
96						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 5/24/95

Golder Associates

RECORD OF DRILLHOLE PZ-110-SS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/24/95-3/25/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068336.1
AZIMUTH: 0

COLLAR ELEV: 458.8
E: 515919.7
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Heated, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE / DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
96	93.4-98.4 ft. Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) Few calcite veins and some calcite crystals Few interbedded layers of Dolomitic Limestone			4	100 %										
98	98.4-112.8 ft. Fresh, medium to thickly bedded, light olive gray (5Y 6/1), fine grained, LIMESTONE, (ST. LOUIS FORMATION) Stylolites common		357.60 / 99.20						J,I,CL; J,I,R						3/25/95 @ 9:10 Began coring Run 5
100	99.7-102.0 ft. Abundant calcite crystals up to 3 mm. 100.4-100.7 ft. Argillaceous partings								J,I,R; J,I,CL (3); J,I,R						
102									J,I,R (2)						
104	103.6-107.5 ft. Slightly weathered Limestone			5	99%				J,I,R; J,PL,SM						
106	104.8-106.8 ft. Abundant pyrite and quartz veins up to 2 mm. 105.0-109.0 ft. Few calcite veins <2 mm., but large (5-10 mm.) calcite crystals								J,I,CL; J,I,R; J,I,R (3)						
108	347.60		347.60												
	End of Record of Drillhole at 109.2 ft. 109.20		109.20												
110															
112															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 5/24/95

Golder Associates

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
	4.25 inch I.D. Hollow Stem Auger	F-1-D
		SHEET 1 OF 6
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: Split Spoon	DRILLING
		START / FINISH
	WATER LEVEL	TIME / TIME
	TIME	unknown / unknown
	DATE	DATE / DATE
NORTHING: 1068600 DATUM EASTING: 515805 ELEVATION ~459.0	CASING DEPTH	8/5/90 / 8/8/90

DRILL RIG	SURFACE CONDITIONS
ANGLE BEARING	
SAMPLE HAMMER	

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE		REMARKS
1					(0.0-5.0 ft.) Top 4 ft., dark yellowish brown (10YR 4/4), lean CLAY with sand, some silt and little gravel, (FILL) Bottom 1 ft., dark gray (5Y 6/1), SILT, with some black colored intermixing			
2								
3								
4								
5					(5.0-10.0 ft.) Intermixed gray silt (as above) with gravel, sand, and some clay, (FILL)			
6								
7								
8								
9								
10					(10.0-15.0 ft.) Mottled dark gray (5Y 4/1), greenish gray (5BG 5/1) and dark yellowish brown (10YR 4/4), lean CLAY, with some silt			
11								
12								
13								
14								

DRILLING CONTR UNKNOWN

LOGGED BY FOTH & VAN DYKE & ASSOCIATES, INC.

DATE 7/17/95 CHK'D BY D. TILTON

JOB NO.: 943-2848

FILENAME: F1D

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	4.25 inch I.D. Hollow Stem Auger	F-1-D
	SAMPLING METHOD: Split Spoon	SHEET 2 OF 6
		DRILLING
		START / FINISH
	WATER LEVEL	TIME: unknown / TIME: unknown
	TIME	
	DATE	DATE: 8/5/90 / DATE: 8/8/90
	CASING DEPTH	

DATUM NORTHING: 1068600 EASTING: 515805 ELEVATION ~459.0

DRILL RIG	SURFACE CONDITIONS
ANGLE BEARING	
SAMPLE HAMMER	

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE		REMARKS
16					(15.0-20.0 ft.) Same as above with increasing silt content with depth			
17								
18					(20.0-25.0 ft.) Top is dark gray (2.5Y 4/0), SILT, with little clay Bottom 2 ft., gray (5Y 4/1), very fine to fine, SAND stratified with darker layers,			
19								
20								
21								
22								
23								
24								
25					(25.0-30.0 ft.) Dark gray (5Y 4/1), fine to very fine SAND, a little coarser than above			
26								
27								
28								
29								

DRILLING CONTR UNKNOWN

LOGGED BY FOTH & VAN DYKE & ASSOCIATES, INC.

DATE 7/17/95 CHK'D BY B. TILTON

JOB NO.: 943-2848

FILENAME: F1D

LAIDLAW
LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD: 4.25 inch I.D. Hollow Stem Auger	BORING NO. F-1-D
		SHEET 3 OF 6
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	SAMPLING METHOD: Split Spoon	DRILLING
		START / FINISH
	WATER LEVEL	TIME: unknown / TIME: unknown
	TIME	
	DATE	DATE: 8/5/90 / DATE: 8/8/90
NORTHING: 1068600 DATUM EASTING: 515805 ELEVATION ~459.0	CASING DEPTH	

DRILL RIG	SURFACE CONDITIONS
ANGLE BEARING	
SAMPLE HAMMER	

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE		REMARKS
					(30.0-32.0 ft.) Same as above			
31								
32								
					(32.5-34.5 ft.) Same as above			
33								
34								
35					(34.5-36.5 ft.) Gray (5Y 5/1), fine to very fine SAND, contains little gravel, up to 1/4 in. in dia. bottom 3 in.			
36								
37								
38					(37.5-39.5 ft.) Gray (5Y 5/1), fine to very fine SAND, very dense (without gravel)			
39								
40					(39.5-41.5 ft.) Same as above, but not as dense, although density seems higher than blow counts indicate			
41								
42								
43					(42.5-44.5 ft.) Gray (5Y 5/1), very fine to coarse, poorly graded SAND, with trace of fine gravel			
44								
					(44.5-46.5 ft.) Same as above			

DRILLING CONTR UNKNOWN

LOGGED BY FOTH & VAN DYKE & ASSOCIATES, INC.

DATE 7/17/95 CHK'D BY B. TILTON

JOB NO.: 943-2848

FILENAME: F1D

LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	4.25 inch I.D. Hollow Stem Auger	F-1-D
	SAMPLING METHOD: Split Spoon	SHEET 4 OF 6
		DRILLING
		START / FINISH
	WATER LEVEL	TIME / TIME
	TIME	unknown / unknown
	DATE	DATE / DATE
NORTHING: 1068600 DATUM EASTING: 515805 ELEVATION ~459.0	CASING DEPTH	8/5/90 / 8/8/90

DRILL RIG	SURFACE CONDITIONS
ANGLE BEARING	
SAMPLE HAMMER	

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE		REMARKS
					(44.5-46.5 ft.) Same as above			
46								
47								
48								
49								
50					(49.5-51.5 ft.) Top is same as above Bottom 12 in., dark gray (5Y 4/1), very fine to fine SAND, with some very dark gray layers(?), stratified or intermixed (?)			
51								
52								
53								
54								
55					(54.5-56.5 ft.) Upper 3 1/2 in., very dark gray (2.5Y 3/0), lean CLAY, with some sand Bottom, very dark gray, very fine to coarse, stratified SAND, fine piece of wood			
56								
57								
58								
59					(59.5-61.5 ft.) Very dark gray (2.5Y 3/0), very fine to coarse, poorly graded SAND			

DRILLING CONTR UNKNOWN

LOGGED BY FOTH & VAN DYKE & ASSOCIATES, INC.

DATE 7/17/95 CHK'D BY B. TILTON

JOB NO.: 943-2848

FILENAME: F1D

LAIDLAW
LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	4.25 inch I.D. Hollow Stem Auger	F-1-D
		SHEET 5 OF 6
	SAMPLING METHOD: Split Spoon	

						DRILLING START	DRILLING FINISH
WATER LEVEL						TIME	TIME
TIME						unknown	unknown
DATE						DATE	DATE
CASING DEPTH						8/5/90	8/8/90

DATUM NORTHING: 1068600 EASTING: 515805 ELEVATION ~459.0

DRILL RIG	SURFACE CONDITIONS
ANGLE BEARING	
SAMPLE HAMMER	

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE		REMARKS
					(59.5-61.5 ft.) Very dark gray (2.5Y 3/0), very fine to coarse, poorly graded SAND			
61								
62								
63								
64					(64.5-66.5 ft.) 2 in. very fine to fine, very dark gray SAND 2 in. very fine to fine, very dark gray SAND 3 in. very dark gray lean CLAY 1/2 in. fine GRAVEL, subrounded 1 in. very coarse to coarse, gray SAND Bottom, fine to very fine, very dark gray SAND			
65								
66								
67								
68								
69					(69.5-71.5 ft.) No recovery			
70								
71								
72					(74.5-76.5 ft.) Top is very dark to dark gray (2.5Y 3/0 to 4/0), medium to very fine SAND Middle 3 in., very fine to very coarse SAND with trace to little very fine gravel Bottom 7 in., is black to very dark gray (2.5Y 2/0 to 3/0), very fine to fine SAND, with silt and organics (black color)			
73								
74								

DRILLING CONTR UNKNOWN

LOGGED BY FOTH & VAN DYKE & ASSOCIATES, INC. CHK'D BY B. TILTON

DATE 7/17/95

JOB NO.: 943-2848

FILENAME: F1D

LAIDLAW
LAIDLAW WASTE SYSTEMS INC.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD:	BORING NO.
LAIDLAW/OU2 RI-FS/MO WEST LAKE LANDFILL OPERABLE UNIT 2	4.25 inch I.D. Hollow Stem Auger	F-1-D
	SAMPLING METHOD: Split Spoon	SHEET 6 OF 6

						DRILLING START	DRILLING FINISH
WATER LEVEL						TIME unknown	TIME unknown
TIME							
DATE						DATE 8/5/90	DATE 8/8/90
CASING DEPTH							

DATUM NORTHING: 1068600 EASTING: 515805 ELEVATION ~459.0

DRILL RIG	SURFACE CONDITIONS
ANGLE BEARING	
SAMPLE HAMMER	

DEPTH IN FEET (ELEVATION)	BLOW/ 6 IN. ON SAMPLER	RECOVERY	SYMBOL	SAMPLER SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER TYPE		REMARKS
76					(74.5-76.5 ft.) Top is very dark to dark gray (2.5Y 3/0 to 4/0), medium to very fine SAND Middle 3 in., very fine to very coarse SAND with trace to little very fine gravel Bottom 7 in., is black to very dark gray (2.5Y 2/0 to 3/0), very fine to fine SAND, with silt and organics (black color)			
77								
78					(78.5-79.5 ft.) Fine to coarse, poorly graded GRAVEL, (round to angular), with very fine to coarse sand			
79								
80					End of Soil Borehole Log at 79.5 ft. NOTE: Golder received faxed copy of original borehole log from Foth & Van Dyke. Golder re-typed log and this version may not exactly duplicate original due to format change and readibility of copy received by Golder.			
81								
82								
83								
84								
85								
86								
87								
88								
89								

DRILLING CONTR UNKNOWN

LOGGED BY FOTH & VAN DYKE & ASSOCIATES, INC.

DATE 7/17/95 CHK'D BY B. TILTON

JOB NO.: 943-2848

FILENAME: FID

RECORD OF DRILLHOLE PZ-111-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/15/95-3/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068620.78
AZIMUTH: 0

COLLAR ELEV: 459.2
E: 515850.23
INCLINATION: -90

ROCK TYPE: J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation; PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular; P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough; Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
80	0.0-79.5ft. No sampling conducted See Foth & Van Dyke log F-1-D dated 9/1/90 79.5-80.0 ft. No samples collected												0.0-84.0 ft. Borehole advanced with 14 3/4 in. tricone bit using mud rotary, then 10 in. steel casing set in borehole to seal off saturated alluvial deposits. Extremely weathered bedrock encountered @ ~79.0 ft. and bedrock encountered @ 84.0 ft.
82													
84		374.60											
	84.6-86.8 ft. 84.60 Slightly weathered, medium bedded, light olive gray (5Y 5/2), very fine grained, medium strong, DOLOMITE, (ST. LOUIS FORMATION) 85.1-85.3 ft. Limestone 85.7 ft. Calcite crystals	84.60						Broken Zone J,U,SM					3/15/95 @ 7:45 Began coring
86	372.40							J,PL,SM					
	86.8-91.5 ft. 86.80 Fresh, medium bedded, light olive gray (5Y 5/2), very fine grained, strong, DOLOMITIC LIMESTONE, (ST. LOUIS FORMATION)		1	96%									
88								J,PL,SM J,I,R J,PL,SM,CL					
		369.80						J,I,R					End core Run 1 @ 8:20
		89.40											
90	90.4-90.5 ft. Argillaceous partings							J,I,SM (2)					
	367.70												
	91.5-96.8 ft. 91.50 Fresh, medium bedded, light olive gray (5Y 5/2), very fine grained, medium strong, DOLOMITE, (ST. LOUIS FORMATION) 92.1-93.6 ft. Slightly porous/vuggy, some calcite crystals		2	100 %									
92													
94													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 6/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-111-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/15/95-3/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068820.78
AZIMUTH: 0

COLLAR ELEV: 459.2
E: 515850.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
96	362.40 / 96.80 — 96.8-99.5 ft. Fresh, medium bedded, light olive gray (5Y 5/2), very fine grained, strong DOLOMITIC LIMESTONE, (ST. LOUIS FORMATION)		2	100 %	J,U,SM	
98	98.7-98.9 ft. Argillaceous partings				J,PL,SM; J,PL,SM,CL (2)	
	359.70 / 99.50 — 99.5-103.7 ft. Fresh, medium bedded, light olive gray (5Y 5/2), very fine grained, medium strong, DOLOMITE, (ST. LOUIS FORMATION) Some calcite filled veins, pyrite crystals	359.80 / 99.40				End core Run 2 @ 9:20
100						
102						
	355.50 / 103.70 — 103.7-106.9 ft. Fresh, medium bedded, light olive gray (5Y 5/2), medium grained, medium strong, DOLOMITIC LIMESTONE, (ST. LOUIS FORMATION) Some stylolites, argillaceous partings		3	98%	J,I,SM,CL	
104						
106	106.9-110.0 ft. Fresh, medium bedded, light olive gray (5Y 6/1), micro-crystalline, strong, LIMESTONE, (ST. LOUIS FORMATION)				J,I,R	
108	108.1-108.5 ft. Slightly weathered, some stylolites, argillaceous partings	349.80 / 109.40			J,U,SM; J,I,SM,CL (2)	
110	110.0-112.1 ft. Fresh, medium bedded, light olive gray (5Y 6/1), medium grained, medium strong, DOLOMITIC LIMESTONE, (ST. LOUIS FORMATION)		4	100 %	J,I,SM (2)	End Core Run 3 @ 10:25
112						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 6/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-111-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/15/95-3/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068620.78
AZIMUTH: 0

COLLAR ELEV: 459.2
E: 515850.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
112	347.10 / 112.10 112.1-115.8 ft. Fresh, medium bedded, light olive gray (5Y 6/1), very fine grained, weak, ARGILLACEOUS DOLOMITE, (ST. LOUIS FORMATION)							J,I,SM	
114									
	343.40 / 115.80		4	100 %					
116	115.8-120.6 ft. Fresh, medium bedded, olive gray (5Y 4/1), fine grained, medium strong, DOLOMITIC LIMESTONE, (ST. LOUIS FORMATION)								
118									
	119.0-119.4 ft. Some calcite filled vugs (<2 mm) 119.4-120.3 ft. Argillaceous, weak	339.80 / 119.40							
120								J,I,SM J,I,SM	
	120.6-127.0 ft. Fresh, thinly bedded, light olive gray (5Y 6/1), very fine grained, medium strong, LIMESTONE, (ST. LOUIS FORMATION) Some calcite crystals							J,I,R J,PL,SM,CL	
122									
	123.0-127.0 ft. Thinly laminated argillaceous partings		5	98%				J,U,SM,CL J,PL,SM	
124									
								J,PL,SM	
								J,PL,SM J,I,R	
126									
	127.0-136.9 ft. Fresh, medium bedded, light olive gray (5Y 6/1), fine to medium grained, medium strong, DOLOMITIC LIMESTONE, (SALEM FORMATION) 127.0-128.5 ft. Numerous chert zones	332.20 / 127.00							127.0 ft. Inferred top of SALEM FORMATION encountered

WEATHERING INDEX: SW FR, MW, HW, CW
STRENGTH INDEX: R6, R5, R4, R3, R2, R1
POINT LOAD INDEX (psi): R1 30, R2 150, R3 300, R4 600, R5 1500, R6
TEST ORIENTATION

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 6/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-111-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/15/95-3/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068620.78
AZIMUTH: 0

COLLAR ELEV: 459.2
E: 515850.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
128	127.0-136.9 ft. Fresh, medium bedded, light olive gray (5Y 6/1), fine to medium grained, medium strong, DOLOMITIC LIMESTONE, (SALEM FORMATION)		329.80 / 129.40	5	98%										
130									J,PL,SM						
132									J,I,SM (2)						
									J,I,SM (2)						
134	134.4-135.4 ft. Chert zones (<1/2 in. thick)			6	99%										
									B,P,SM (2)						
136	136.9-144.3 ft. Fresh, medium bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (ST. LOUIS FORMATION) 322.00														
	137.2-137.7 ft. 137.20 ARGILLACEOUS DOLOMITE layer								J,I,R,CL						
	137.0 ft. Stylolites								J,PL,R						
138	138.0-139.4 ft. Numerous stylolites								J,I,SM,CL						
									J,I,R						
	139.4-141.8 ft. Four chert zones (1-5 in. thick)		319.80 / 139.40						B,PL,SM						139.4-141.8 ft. Very slow drilling
140				7	100 %				J,I,SM (2)						3/15/95 @ 15:00 Stop drilling for the day 3/20/95 @ 7:30 Began Run 8
			317.40 / 141.80												
142									B,I,R						
									B,U,SM						
	142.9 and 143.8 ft. Light olive gray (5Y 6/1), arenaceous DOLOMITE layers (<4 in. thick)			8	92%				J,I,R						
144															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 6/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-111-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/15/95-3/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068620.78
AZIMUTH: 0

COLLAR ELEV: 459.2
E: 515850.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
144	314.90	314.90	8	92%		
	144.3-147.5 ft. 144.30 Fresh, thinly bedded, olive gray (5Y 4/1), fine grained, strong, CHERT, (SALEM FORMATION) Arenaceous	144.30			J,I,SM	
146	146.5 and 146.8 ft. Thin olive gray (5Y 4/1), arenaceous Dolomite layers (<3 in. thick)		9	100 %	J,I,R	
	311.70					
	147.5-157.5 ft. 147.50 Fresh, thinly bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARENACEOUS DOLOMITE, (SALEM FORMATION) Some chert nodules (5-10 mm. dia.), some thin chert layers (<2 in. thick)				J,I,R J,I,R	
148		309.90				
	149.3-149.6 ft. Chert layers 149.7 ft. Coarse calcite crystals (<1/2 in. dia.)	149.30			B,PL,SM B,I,R	
150						
152					J,I,R (2) J,I,SM	
	152.5-153.5 ft. Porous zone, open vugs (<1 in. dia.)					
	153.4 and 154.2 ft. Chert layers (<5 in.)				J,C,SM	
154			10	100 %		
156	155.8 and 156.9 ft. Chert layers (<5 in.)				J,I,R J,I,R J,I,R	
158	157.5-174.5 ft. Fresh, thinly bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARENACEOUS DOLOMITE, (SALEM FORMATION) Few chert nodules, (~5 mm.), scattered chert (thin layers of chert <3 mm.)				J,PL,SM J,PL,SM	
		299.70				
	159.5-159.8 ft. Chert layer	159.50	11	100 %		
160						

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 6/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-111-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/15/95-3/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068620.78
AZIMUTH: 0

COLLAR ELEV: 459.2
E: 515850.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

LENGTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
160	157.5-174.5 ft. Fresh, thinly bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARENACEOUS DOLOMITE, (SALEM FORMATION) Few chert nodules, (~5 mm.), scattered chert (thin layers of chert <3 mm.)						J,PL,SM (3)		Most fractures observed are characterized as drill induced
162	160.5-160.7 ft. Chert layer 161.5-161.7 ft. Chert layer		11	100 %					
	163.3-163.6 ft. Calcite crystals layer (large crystals)						J,I,R (2)		
164		294.70 / 164.50					J,I,R		
	294.20 / 165.00 165.0-167.0 ft. Fresh, thinly bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (SALEM FORMATION)								165.1-169.5 ft. 4-6 breaks per foot that were drill incuded
166									
168			12	100 %					
170	Scattered chert clasts throughout the sample 170.0-171.5 ft. Zone showing moderate porosity, open vugs (<2 mm.)								
172	172.8-173.2 ft. Conglomerate limestone with shale fragments 173.2-174.5 ft. Abundant fossil fragments replaced by silica								
174	174.5-176.6 ft. Fresh, thickly bedded, pale olive (10Y 6/2), fine to medium crystalline, strong, ARGILACEOUS LIMESTONE, (SALEM FORMATION) Abundant fossil fragments	284.70 / 174.50	13	100 %					
176									

WEATHERING INDEX: FR, SW, MW, HW, CW
STRENGTH INDEX: R6, R5, R4, R3, R2, R1
POINT LOAD INDEX (psi): R1 30, R2 150, R3 300, R4 600, R5 1500, R6
TEST ORIENTATION

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 6/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-111-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/15/95-3/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068620.78
AZIMUTH: 0

COLLAR ELEV: 459.2
E: 515850.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP w/r CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R5 R6 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
176															
	176.6-179.1 ft. Fresh, medium bedded, pale olive (10Y 6/2), fine to medium grained, strong, SILICEOUS LIMESTONE, (SALEM FORMATION) Abundant fossil fragments														
178															
	179.1-184.5 ft. Fresh, thickly bedded, pale olive (10Y 6/2), fine to medium coarse, strong, ARENACEOUS LIMESTONE, (SALEM FORMATION) Abundant fossil fragments Some layers of grayish yellow (5Y 8/4), clay material			13	100 %										
180															
182															
184															
	184.5-188.5 ft. Fresh, medium bedded, yellowish gray (5Y 7/2), f-c grained, strong ARENACEOUS LIMESTONE, (SALEM FORMATION) Some fossil fragments, and some grayish yellow (5Y 2/4), clay material layers		274.70 / 184.50												
186															
188				14	100 %										
	188.5-194.5 ft. Slightly weathered, pale olive (10Y 6/2), medium bedded, very coarse, strong, BIOCLASTIC LIMESTONE, (SALEM FORMATION) Few chert nodules, few stylolites in bottom 4 ft., abundant layers of grayish yellow (5Y 8/4) clay, fossiliferous								B,PL,SM B,PL,SM						Stopped drilling for the day
190															
192															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 6/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-111-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/15/95-3/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068620.78
AZIMUTH: 0

COLLAR ELEV: 459.2
E: 515850.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

Depth Scale (Feet)	Description	Elev / Depth (Ft)	Run No.	Core Recovery	RQD	Fractures per Foot	Dip wrt Core Axis	Type and Surface Description	Weathering Index	Strength Index	Point Load Index (psi)	Test Orientation	Notes / Water Levels / Instrumentation
192	188.5-194.5 ft. Slightly weathered, pale olive (10Y 6/2), medium bedded, very coarse, strong, BIOCLASTIC LIMESTONE, (SALEM FORMATION) Few chert nodules, few stylolites in bottom 4 ft., abundant layers of grayish yellow (5Y 8/4) clay, fossiliferous		14	100 %									
194	194.5-197.5 ft. Fresh, thinly bedded, light olive gray (5Y 6/1), fine grained, strong, ARGILLACEOUS LIMESTONE, (SALEM FORMATION) Few chert nodules stylolitic, abundant fossil fragments	264.70 / 194.50											3/21/95 @ 7:30 Water level = 20.1 ft. BGS
196													
198	197.5-204.5 ft. Fresh, thinly bedded, light olive gray (5Y 4/1), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (SALEM FORMATION) Few chert nodules, few stylolites, abundant fossil fragments and abundant layers of grayish yellow (5Y 8/4) clay throughout sample		15	100 %									
200													
202													
204	204.5-210.8 ft. Fresh, thinly bedded, dark greenish gray (5GY 4/1), f-c grained, medium strong, LIMESTONE, (SALEM FORMATION) Few chert nodules, stylolites, few clay layers of a grayish yellow color, <3 mm. vugs, with calcite crystals	254.70 / 204.50											
206			16	100 %									
208													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 8/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-111-KS

PROJECT: LA/DLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/15/95-3/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068620.78
AZIMUTH: 0

COLLAR ELEV: 459.2
E: 515850.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
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Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

L. SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
208	204.5-210.8 ft. Fresh, thinly bedded, dark greenish gray (5GY 4/1), f-c grained, medium strong, LIMESTONE, (SALEM FORMATION) Few chert nodules, stylolites, few clay layers of a grayish yellow color, <3 mm. vugs, with calcite crystals														
210															
	248.40 / 210.80														210.8 ft. Encountered top of WARSAW FORMATION
	210.8-212.8 ft. Fresh, thickly bedded, dark greenish gray (5GY 4/1) to greenish black (5GY 2/1), very fine grained, weak, SILTSTONE, (WARSAW FORMATION)			18	100 %										
212															
	246.40 / 212.80														
	212.8-219.7 ft. Fresh, thinly bedded, light olive gray, fine to coarse grained, medium strong, DOLOMITIC LIMESTONE, (WARSAW FORMATION) Fossiliferous, few chert nodules, stylolites		244.70 / 214.50												
214															
216				17	100 %										
218															3/21/95 @ 11:00 End Run 17 Drilling stopped until surface casing installed to top of WARSAW FORMATION 4/9/95 Borehole reamed out to 84.0 ft. with 14 3/4 in. tricone bit and mud rotary then 10 in. casing set in hole
	239.50 / 219.70		239.50 / 219.70												
220	220.2-224.3 ft. Slightly weathered, thickly bedded, light olive gray (5Y 6/1), finely crystalline, medium strong, DOLOMITE, (WARSAW FORMATION)								J,PL,SM,CL						
222				18	100 %										4/9/95 6 in. steel casing set to 215.3 ft. and sealed with neat cement. A 10 in. air rotary bit was used to drill borehole. 4/22/95 @ 11:02 Begin drilling Run 18 with NX core
									J,U,SM-calcite						
224															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 8/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-111-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/15/95-3/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068820.78
AZIMUTH: 0

COLLAR ELEV: 459.2
E: 515850.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
224	234.90												
	224.3-227.4 ft. 224.30 Fresh, thickly bedded, light brownish gray (5YR 6/1) to medium gray (N5), coarse grained, medium strong, FOSSILIFEROUS LIMESTONE, (WARSAW FORMATION) Not porous, sandy, fine fossil debris, clast supported							J,I,SM					
226			18	100 %				J,U,SM,CL					
	231.80												
	227.4-231.6 ft. 227.40 Slightly weathered, thickly bedded, light olive gray (5Y 6/1), finely crystalline, medium strong, DOLOMITE, (WARSAW FORMATION) Porous-vuggy, crystallized, numerous calcite filled vugs and veins							J,I,R					
228		230.10											
		229.10											
230													
								J,I,R					
	227.60												
	231.6-233.3 ft. 231.60 Fresh, thickly bedded, light olive gray (5Y 6/1), fine grained, medium strong, ARGILLACEOUS LIMESTONE, (WARSAW FORMATION) Bioturbated												
232								J,I,SM,CL					
	233.3-236.1 ft. Fresh, thickly laminated, medium dark gray (N4), very fine grained, weak, ARGILLACEOUS LIMESTONE, (WARSAW FORMATION) Bioturbated, almost Claystone												
234			19	100 %									
236	223.10												
	236.1-239.4 ft. 236.10 Fresh, thickly laminated to thinly bedded, medium gray (N5), very fine grained, medium strong, ARGILLACEOUS CALCAREOUS DOLOMITE, (WARSAW FORMATION) Stylolitic, greenish clay infilled vug and vein @ 238.6 ft.							J,PL,SM,CL					
238													
	239.4-243.5 ft. Fresh, thickly bedded, medium dark gray (N4), coarse grained, medium strong, FOSSILIFEROUS LIMESTONE, (WARSAW FORMATION) Few stylolites, <0.1 ft. clay seams							J,PL,R-calcite					
	219.80	220.10											
	239.40	239.10						J,I,SM,CL					
			20	100 %									
240													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 6/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-111-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/15/95-3/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1088620.78
AZIMUTH: 0

COLLAR ELEV: 459.2
E: 515850.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE / DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO	CORE RECOVERY	RQD (80 60 40 20)	FRACTURES PER FOOT (2 4 6 8 10)	DISCONTINUITY DATA: DIP wrt CORE AXIS (0 30 60 90)	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX (SW FR MW HW CW)	STRENGTH INDEX (R6 R5 R4 R3 R2 R1)	POINT LOAD INDEX (psi) (R1 30 R2 150 R3 300 R4 600 R5 1500 R6)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
240															
242															
	215.70														
244	243.5-244.0 ft. Fresh, thickly bedded, medium dark gray (N4), fine grained, medium strong, ARGILLACEOUS DOLOMITE, (WARSAW FORMATION) 243.50 / 215.20 / 244.00			20	100 %										
246	244.0-250.3 ft. Fresh, thickly bedded, medium dark gray (N4), coarse grained, medium strong, FOSSILIFEROUS LIMESTONE, (WARSAW FORMATION) 246.1-246.5 ft. Argillaceous Limestone, stylolitic							90	J,PL,SM,CL						
248			210.00 / 249.20												
250															
	208.50														
252	250.7-251.3 ft. Fresh, thinly to thickly laminated, medium gray (N5), very fine grained, medium strong, ARGILLACEOUS DOLOMITE, (WARSAW FORMATION) 250.70 / 207.90 / 251.30							60	J,I,SM,CL						
	251.3-256.5 ft. Fresh, thickly bedded, medium light gray (N6) to light olive gray (5Y 2/1), coarse grained, medium strong, FOSSILIFEROUS LIMESTONE, (WARSAW FORMATION)			21	100 %										
254															
	Fossil fragments at 255.6 ft., few Clay partings, some porosity, vugs in lower 2 in.							90	J,I,SM						
256															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 8/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-111-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/15/95-3/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068620.78
AZIMUTH: 0

COLLAR ELEV: 459.2
E: 515050.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
256					J,I,R,CL					
	202.70									
	256.5-260.1 ft. 256.50 Slightly weathered, thickly bedded, medium gray (N5), very finely crystalline, medium strong, ARGILLACEOUS DOLOMITE, (WARSAW FORMATION)		21	100%	J,PL,SM,CL					
258										
	Some porosity, large vug @ 258.8 ft., some smaller vugs elsewhere, some calcite filled, black organic laminae	200.10 / 259.10								4/22/95 @ 17:45 End Run 21 Quit drilling for the day 4/23/95 @ 7:30 Begin Run 22
260	260.1-265.5 ft. Fresh, thinly to thickly laminated, greenish black (5GY 2/1), very fine grained, weak, DOLOMITIC SILTSTONE, (WARSAW FORMATION)				J,I,SM,CL					
262										
264			22	98%						
	193.70				J,PL,SM,CL					
	265.5-269.0 ft. 265.50 Fresh, thickly bedded, medium light gray (N6) to light olive gray (5Y 6/1), coarse grained, medium strong, FOSSILIFEROUS LIMESTONE, (WARSAW FORMATION)									
266										
268										
	190.20	190.10 / 269.10								
	269.0-272.8 ft. 269.00 Fresh, thickly laminated to thinly bedded, medium dark gray (N4), very fine grained, medium strong, DOLOMITIC SILTSTONE, (WARSAW FORMATION) Abundant 0.1-0.4 ft. interbeds of coarse crystalline arenaceous Dolomite		23	98%						
270					J,PL,SM,CL					
272										

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 6/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-111-KS

PROJECT: LA/DLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/15/95-3/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068820.78
AZIMUTH: 0

COLLAR ELEV: 459.2
E: 515850.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
272	186.40						J,PL,SM,CL					
	272.8-274.0 ft. 272.80 Fresh, thickly laminated, greenish black (5GY 2/1), very fine grained, weak, CLAYSTONE, (WARSAW FORMATION) 185.20						J,PL,SM,CL (2)					
274	274.0-290.2 ft. 274.00 Fresh, thickly laminated to medium bedded, medium light gray (N6) to medium dark gray (N4), vf-m grained, weak to medium strong, SILTSTONE, (WARSAW FORMATION) Calcite filled vugs, interbeds of Silty to Sandy Dolomitic Siltstone		23	98%			J,U,SM,CL					
276												
278		180.20 / 279.00										
280												
282			24	100 %								
284							J,I,SM					
286												
288												

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 6/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-111-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/15/95-3/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068820.78
AZIMUTH: 0

COLLAR ELEV: 459.2
E: 515850.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

SCALE (FEET)	DESCRIPTION	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
288	274.0-290.2 ft. Fresh, thickly laminated to medium bedded, medium light gray (N6) to medium dark gray (N4), vf-m grained, weak to medium strong, SILTSTONE, (WARSAW FORMATION) Calcite filled vugs, interbeds of Silty to Sandy Dolomitic Siltstone	170.30	24	100 %									
		288.90	25	100 %									
290	290.2-293.7 ft. Fresh, thickly laminated to thinly bedded, medium gray (N5), finely crystalline, medium strong, ARENACEOUS DOLOMITE, (WARSAW FORMATION) Dark gray (N3) argillaceous laminae, bioturbated	169.00 / 290.20											
292		165.50											
294	293.7-295.2 ft. Fresh, thinly laminated, medium dark gray (N8), very fine grained, weak, SILTSTONE, (WARSAW FORMATION)	293.70 / 164.00	26	100 %									
296	295.2-306.8 ft. Fresh, thickly laminated to thinly bedded, medium gray (N5), finely crystalline, medium strong, ARENACEOUS DOLOMITE, (WARSAW FORMATION) Argillaceous laminae, no porosity	295.20						J,U,SM					
298		160.20											
300		299.00	27	100 %									
302	302.8-303.6 ft. Fossiliferous Dolomite interbed												
304													

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 8/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-111-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2648
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/15/95-3/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068620.78
AZIMUTH: 0

COLLAR ELEV: 459.2
E: 515850.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
304	295.2-306.8 ft. Fresh, thickly laminated to thinly bedded, medium gray (N5), finely crystalline, medium strong, ARENACEOUS DOLOMITE, (WARSAW FORMATION) Argillaceous laminae, no porosity														
306				27	100 %										
	152.40 306.8 ft. Fresh, thickly laminated to thinly bedded, very light gray (N8) to dark greenish gray (5GY 4/1), f-m grained, medium strong, FOSSILIFEROUS LIMESTONE and DOLOMITIC SILTSTONE, (WARSAW FORMATION) Interbedded fossiliferous beds and shaley beds														
308			150.30 308.90												
310															
								90	J,PL,SMC,L						
312															
								90	J,PL,SM,CL						
								90	J,PL,SM,CL						
314				28	100 %										
	315.2-328.7 ft. Fresh, thickly laminated to medium bedded, medium light gray (N6) to olive gray (5Y 4/1), ? to medium sand, medium strong, FOSSILIFEROUS LIMESTONE and CALCAREOUS SILTSTONE, (WARSAW FORMATION)							90	J,PL,SM						
316															
318								90	J,PL,SM,CL						4/23/95 @ 15:02 End Run 28 Quit drilling for the day 4/24/95 @ 12:00 Begin Run 29
			140.10 319.10												
				29	100 %										
320															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 6/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-111-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/15/95-3/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068620.78
AZIMUTH: 0

COLLAR ELEV: 459.2
E: 515850.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slikensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE / DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
320	315.2-328.7 ft. Fresh, thickly laminated to medium bedded, medium light gray (N6) to olive gray (5Y 4/1), medium sand, medium strong, FOSSILIFEROUS LIMESTONE and CALCAREOUS SILTSTONE, (WARSAW FORMATION)								J,PL,R						
322	Calcareous Shale interbeds <0.1-0.5 ft. thick, some lithographic textures, commonly silicified														
324				29	100 %										
326															
328															
	328.7-330.8 ft. Fresh, thickly laminated, light gray (N7) to light olive gray (5Y 6/1), clay sized to coarse silt sized, medium strong, ARGILLACEOUS LIMESTONE, (WARSAW FORMATION) Chert common, calcite vugs		130.10 / 329.10												
330									J,I,SM,CL						
	330.8-336.4 ft. Fresh, thickly laminated to medium bedded, medium light gray (N6), clay sized to very coarse sand sized, medium strong, LITHOCLASTIC LIMESTONE and CALCAREOUS SILTSTONE, (WARSAW FORMATION) Interbedded <0.1-0.3 lithoclastic beds with clayey shales, silicification common, few stylolites														
332				30	100 %										
334									J,I,R-open						
									J,U,SM						
336															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 6/5/95

Golder Associates

RECORD OF DRILLHOLE PZ-111-KS

PROJECT: LAIDLAW/RI-FS
PROJECT NO: 943-2848
LOCATION: BRIDGETON, MO

BORING METHOD: NX Core & water
DRILLING DATE: 3/15/95-3/21/95
DRILL RIG: CME 75

DATUM: MSL
COORDINATES N: 1068620.78
AZIMUTH: 0

COLLAR ELEV: 459.2
E: 515850.23
INCLINATION: -90

J-Joint, F-Fault, S-Shear, B-Bedding, F-Foliation
PL-Planar, C-Curved, U-Undulating, ST-Stepped, I-Irregular
P-Polished, K-Slickensided, SM-Smooth, R-Rough, VR-V. Rough
Fe-FeOxide, CL-Clay Infill, CH-Chlorite, H-Healed, GRF-Gravel Filled

DEPTH SCALE (FEET)	ROCK TYPE DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: DIP wrt CORE AXIS	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	POINT LOAD INDEX (psi)	TEST ORIENTATION	NOTES WATER LEVELS INSTRUMENTATION
336															
	336.4-343.7 ft. Fresh, thickly laminated to medium bedded, medium light gray (N6), clay sized to very coarse sand sized, medium strong, ARENACEOUS LIMESTONE and ARGILLACEOUS LIMESTONE, (WARSAW FORMATION) Highly silicified, some lithographic textures			30	100 %			90	J,PL,SM			R5 R4 R3 R2 R1			
338								90	J,U,SM,CL						
			120.10 / 339.10												
340															
342															
	115.50 / 343.70 343.7-368.8 ft. Fresh, thickly laminated to medium bedded, very light gray (N8) to medium light gray (N6), fine silt sized to coarse silt sized, medium strong, SILICEOUS LIMESTONE and ARENACEOUS LIMESTONE, (KEOKUK FORMATION) Diseminated chert abundant, calcareous dolomitic, silty Clay interbeds, differential compaction features			31	100 %										343.7 ft. Top of KEOKUK FORMATION encountered
344															
346															
								90	J,I,R						
348			110.60 / 348.60												
350				32	100 %										
	350.5-350.9 ft. Porous							90	J,I,R						
	351.6-363.8 ft. Porous, vuggy														
352															

DEPTH SCALE: 1:2
DRILLING CONTRACTOR: LAYNE-WESTERN
DRILLER: D. MAHURIN

LOGGED: S. COSIO
CHECKED: B. TILTON
DATE: 6/5/95

Golder Associates