APPENDIX 3.5-J

Geologic Logs, Soil Test Data, Well Construction Diagrams,
and Well Development Forms for the
Type II Waste Rock Storage Area, 1988

LOG OF TEST BORING NO.: B-SP1

CLIENT: Kennecott
PROJECT: Stockpile Borings
PROJECT NUMBER: 87K10
LOCATION: Ladysmith, Wisconsin
COORDINATES: 40812 N 40889 E

SURFACE ELEVATION: 1142.50

BORING DEPTH: 71.0

DATE: 11/10/88

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLING NOTES
1142.5	--0.0	0.0-1.5	ss	1	5	1.4	Top 3" is blk fgr sandy SILT w/ org, moist, loose - humus rest is lt br to red br to yel br banded silty fgr SAND, moist, firm mottled	OL/SM		
1137.5	--5.0	4.5-6.0	ss	2	16	1.3	Lt br silty fgr-mgr SAND w/ 6" layer of fgr SAND w/ grvl at 4.5 to 5', moist, dense			
1132.5	--10.0	9.5-11.0	ss	3	46	1.0	Red br silty SAND to clayey SAND w/ fgr-cgr grvl, moist, dense, w/ layers of lt br mgr-cgr SAND, drilled boulder 8.5-9.0, drove rock end of SS#3, hard drilling	SM, SP		
1127.5	--15.0	14.5-16.0	ss	4	17	1.5	due to cobbles and coarse grvl			
1122.5	--20.0	19.5-21.0	ss	5	48	1.7	1.3' layer of water bearing mgr-cgr SAND(20-20.3'), silty SAND w/ clay (Till) becoming v dense, drove rock in SS#6			
1117.5	--25.0	24.5-26.0	ss	6	59	0.4		SM		
1112.5	--30.0	29.5-31.0	ss	7	46	1.4	Red br silty SAND w/ fgr-cgr ang to subang grvl, tr clay, moist to wet, v dense - (Till)			
1107.5	--35.0	34.5-36.0	ss	8	25	1.2	Same.			
1102.5	--40.0	39.5-41.0	ss	9	56	1.1	Same.			
1097.5	--45.0	44.5-46.0	ss	10	43	1.2	Same except more clay.			
1092.5	--50.0	49.5-51.0	ss	11	28	1.5	Same except dk red brn clayey/ silty SAND (5YR 3/4)	SC/SM	%g-s-si-cl 6-56-22-16 LL=20 PI=8	
1087.5	--55.0									

DRILLING DATA

START DATE: 11/10/88 @ 12:00 pm
COMPLETION DATE: 11/11/88 @ 9:10 am
LOGGED BY: REM
DRILLING METHOD: Tricone and mud RIG: CME 850 - All Terrain
DRILLING CONTRACTOR: Twin City Testing

WATER LEVEL INFORMATION

DEPTH AT COMPLETION: NA
LATER TIME/DEPTH: NA
LATER TIME/DEPTH: NA
CAVE IN DEPTH: NA
DRILLING LOSSES: NA

LOG OF TEST BORING NO.: B-SP1

CLIENT: Kennecott
PROJECT: Stockpile Borings
PROJECT NUMBER: 87K10
LOCATION: Ladysmith, Wisconsin
COORDINATES: 40812 N 40889 E

SURFACE ELEVATION: 1142.50
BORING DEPTH: 71.0
DATE: 11/10/88

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLING NOTES
1087.5	--55.0	54.5-56.0	ss	12	30	1.5	Same.	SC/SM		
1082.5	--60.0	59.5-61.0	ss	13	54	1.1	Same except more clay. Cobbles and bldrs.	SC	%g-s-si-cl 6-48-27-19 LL=34 PI=16	
1077.5	--65.0	65.0-65.5	ss	14	55 /.5	0.4	Brown poorly graded SAND, med to cse w/fn and cse gvl, and dense, saturated. Cobbles and bldrs at 67 and 68.5 ft	SP (SS)		
1142.5	--	65.5-65.8	ss	15	100 1.3	NR	Trace white sand, fn, in tips of barrel, (sandstone).			
1072.5	--70.0	69.5-71.0	ss	16	78	1.2	Gray green SILT, fn grained, massive w/chert gravel, moist, v. dense, greasy feel. Weathered, altered, precambrian schist.	ML		
1067.5	--75.0						End of Boring at 71.0 feet			
1062.5	--80.0									
1057.5	--85.0									
1052.5	--90.0									
1047.5	--95.0									
1042.5	--100.0									
1037.5	--105.0									

DRILLING DATA

START DATE: 11/10/88 @ 12.00 pm
COMPLETION DATE: 11/11/88 @ 9:10 am
LOGGED BY: REM
DRILLING METHOD: Tricone and mud RIG: CME 850 - All Terrain
DRILLING CONTRACTOR: Twin City Testing

WATER LEVEL INFORMATION

DEPTH AT COMPLETION: NA
LATER TIME/DEPTH: NA
LATER TIME/DEPTH: NA
CAVE IN DEPTH: NA
DRILLING LOSSES: NA

3.5-J-2

Foth & Van Dyke and Associates Inc.
2737 S. Ridge Road P. O. Box 19012 Green Bay, WI 54307-9012 414/497-2500

REPORT OF:

SIEVE ANALYSIS OF COARSE TO FINE AGGREGATES

PROJECT: Proposed Waste Rock Storage

SCOPE I.D. #: 87K10
DATE TYPED: 12-27-88
REPORT NUMBER: 1

REPORTED TO: Kennecott Explorations

TEST PERFORMED IN GENERAL ACCORDANCE OF ASTM: D1140

GENERAL DATA:

SAMPLE LOCATION:
SAMPLE NUMBER: B-SP1
DEPTH OF SAMPLE: 49.5' - 51.0'
SAMPLED BY: BJ Socha at F&VD

DATE SAMPLED: 11/10/88
DATED RECEIVED: 12/6/88
SOURCE OF SAMPLE:
MUNSELL COLOR CODE: 5 YR. 3/4

LABORATORY DATA:

DATE TESTED: December 6-8, 1988
TESTED PERFORMED BY: KAS
REVIEWED BY: (POK 12-12-88)

24 HRS. TURN AROUND ____YES _x_NO
WASHED GRADATION _x_YES ____NO
WEIGHT OF TEST SAMPLE 154.4 GRAMS

SIEVE SIZE	WEIGHT RETAINED (gms)	% RETAINED	% PASSING	PROJECT SPECIFICATION % PASSING BY WEIGHT	SOURCE OF SPECIFICATION
3"					
1½					
1					
3/4					
1/2	0	0	100		
3/8	6.2	4.0	96.0		
#4	3.9	2.5	93.5		
10	7.3	4.7	88.8		
40	22.5	14.6	74.2		
100	40.6	26.3	47.9		
200	15.0	9.7	38.2		
PAN	58.8	38.1			

REMARKS:

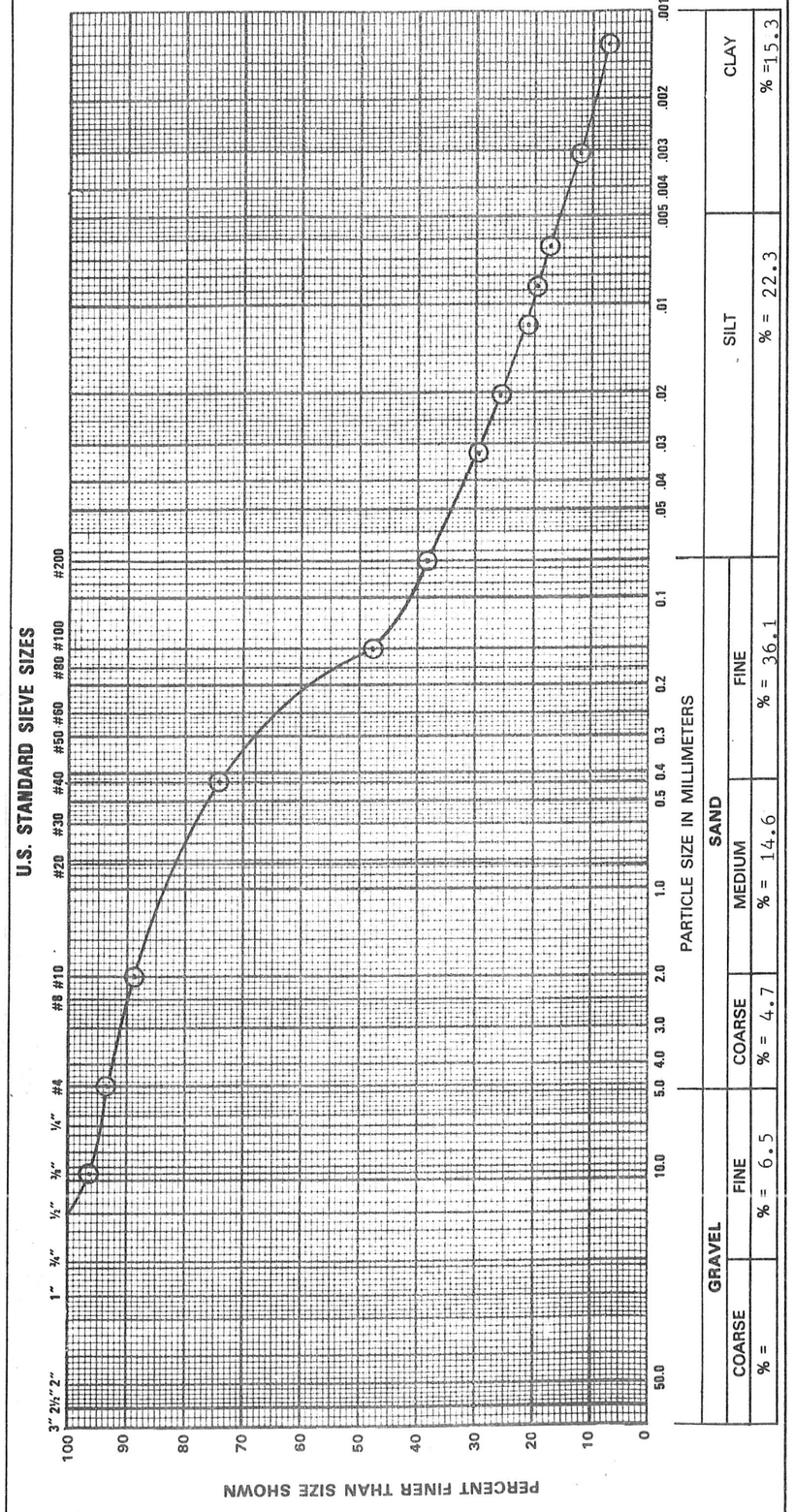
FORM #329 SLB (Rev. 4/88)

BY: Robert R. Rouse

3.5-J-3

Foth & Van Dyke and Associates Inc.

GRAIN SIZE DISTRIBUTION CURVE



PROJECT: Kennecott - Proposed Waste Rock Storage ELEV. OR DEPTH: 49.5'-51.0' SAMPLE NO.: 1

LOCATION SAMPLED: Boring: SP1 DRAWN BY: POK DATE: 12-12-88

ATTERBERG LIMITS: LL 20.4 PL 12.3 PI 8.1 COEFFICIENTS: Cc = Cu =

SAMPLE SOURCE: SAMPLED MOISTURE CONTENT (%): 11.8

SOIL CLASSIFICATION (ASTM: D2487) CLAYEY SAND, fine to medium grained, a little gravel, dark reddish brown, (SC/SM) MUNSELL COLOR CODE: 5 YR. 3/4 DATE SAMPLED: 11-10-88

APPROVED BY: R.R.R.

FORM #411 SL (2/87)

3.5-I-4

Foth & Van Dyke and Associates Inc.

2737 S. Ridge Road P. O. Box 19012 Green Bay, WI 54307-9012 414/497-2500

REPORT OF:

SIEVE ANALYSIS OF COARSE TO FINE AGGREGATES

PROJECT: Proposed Waste Rock Storage

SCOPE I.D. #: 87K10

DATE TYPED: 12-27-88

REPORTED TO: Kennecott Explorations

REPORT NUMBER: 2

TEST PERFORMED IN GENERAL ACCORDANCE OF ASTM: D1140

GENERAL DATA:

SAMPLE LOCATION:

SAMPLE NUMBER: B-SP1

DEPTH OF SAMPLE: 59.5'-61.0'

SAMPLED BY: B.J. Socha of F&VD

DATE SAMPLED: 11/10/88

DATED RECEIVED: 12/6/88

SOURCE OF SAMPLE:

MUNSELL COLOR CODE: 5 YR. 3/4

LABORATORY DATA:

DATE TESTED: December 6-8, 1988

TESTED PERFORMED BY: KAS

REVIEWED BY: POK (12-12-88)

24 HRS. TURN AROUND ___ YES _x_ NO

WASHED GRADATION _x_ YES ___ NO

WEIGHT OF TEST SAMPLE 162.7 GRAMS

SIEVE SIZE	WEIGHT RETAINED (gms)	% RETAINED	% PASSING	PROJECT SPECIFICATION % PASSING BY WEIGHT	SOURCE OF SPECIFICATION
3"					
1½					
1					
3/4					
1/2	0	0	100		
3/8	3.2	2.0	98.0		
#4	6.7	4.1	93.9		
10	8.5	5.2	88.7		
40	19.6	12.0	76.7		
100	34.5	21.2	55.5		
200	16.0	9.8	45.7		
PAN	74.4	45.7			

REMARKS:

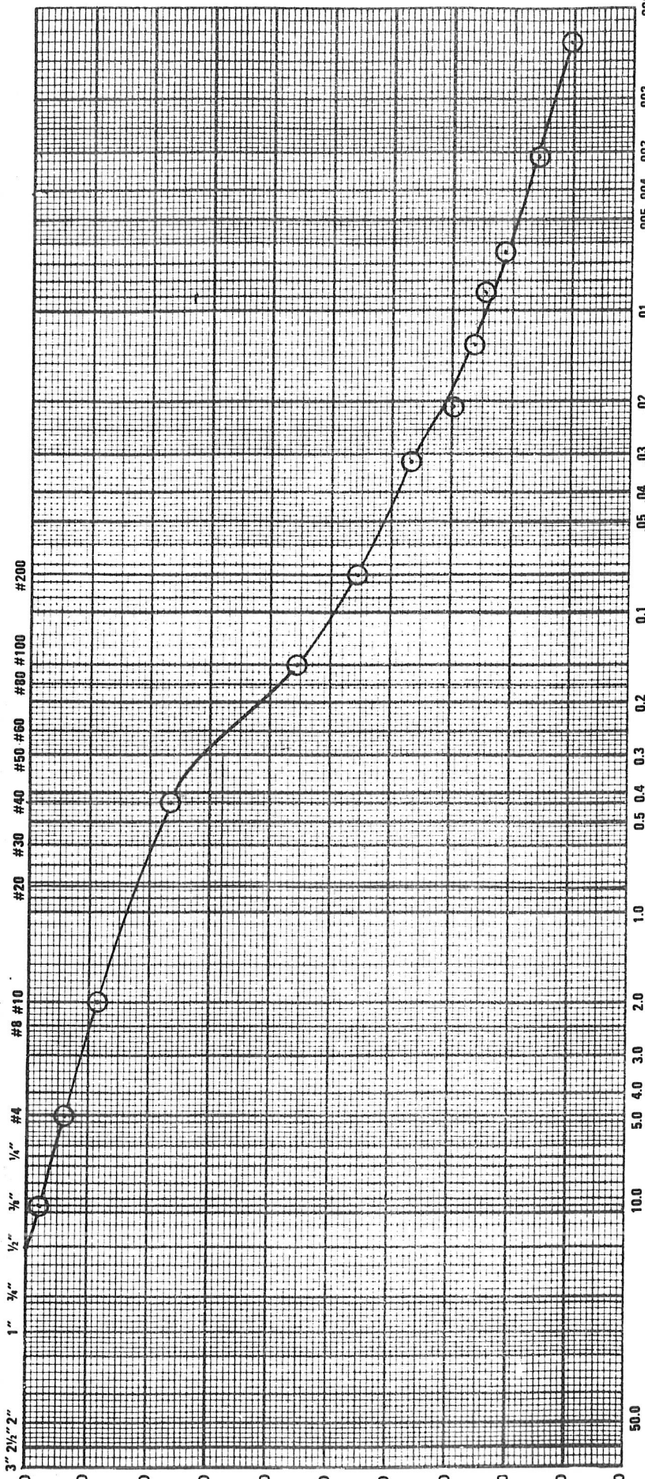
FORM #329 SLB (Rev. 4/88)

BY: Robert R. Rouse

3.5-I-5

Foth & Van Dyke and Associates Inc.

GRAIN SIZE DISTRIBUTION CURVE



PROJECT: Kennecott - Proposed Waste Rock Storage

LOCATION SAMPLED: Boring: SP1

ATTERBERG LIMITS: LL 34.0 PL 17.6 PI 16.4 SAMPLED MOISTURE CONTENT (%): 12.5 COEFFICIENTS: Cc = Cu =

SAMPLE SOURCE: MUNSELL COLOR CODE: 5 YR. 3/4 DATE SAMPLED: 11-10-88

SOIL CLASSIFICATION (ASTM: D2487) CLAYEY SAND, fine to medium grained, a little gravel, dark reddish brown (SC)

DATE: 12-12-88 SAMPLE NO.: 2

ELEV. OR DEPTH: 59.5'-61.0 DRAWN BY: POK APPROVED BY: RRR

FORM #411 SL (2/87)

LOG OF TEST BORING NO.: B-SP2

CLIENT: Kennecott
PROJECT: Stockpile Borings
PROJECT NUMBER: 87K10
LOCATION: Ladysmith, Wisconsin
COORDINATES: 40005 N 40005 E

SURFACE ELEVATION: 1155.31
BORING DEPTH: 60.0
DATE: 11/07/88

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLING NOTES
1155.3	--0.0	0.0-1.5	ss	1	4	1.5	Dk br org SILT w/ fgr sand, tr clay (top 4"?); rest is red br SILT w/ fgr sand, tr fgr-cgr grvl	ML		
1150.3	--5.0	4.5-6.0	ss	2	21	1.5	Red br silty fgr-cgr SAND, tr fgr-cgr grvl, med dense, firm	SM		
1145.3	--10.0	9.5-11.0	ss	3	51	1.5	Red br SILT w/ fgr sand, tr fgr grv., dense, non-plastic			
1140.3	--15.0	14.5-16.0	ss	4	64	1.4	Same as above	ML		
1135.3	--20.0	19.5-21.0	ss	5	32	1.5	Red br SILT w/ clay, tr fgr-mgr sand, cohesive, firm to hard			
1130.3	--25.0	24.5-26.0	ss	6	82	0.5	Red br silty fgr-cgr SAND, tr fgr grvl, dense			
1125.3	--30.0	29.5-31.0	ss	7	113	1.5	Same as above	SM		
1120.3	--35.0	34.5-36.0	ss	8	86	1.4	Same as above			
1115.3	--40.0	39.5-41.0	ss	9	101	1.4	Top of sample is same as above, rest is br tan fgr SANDSTONE, poorly cemented, sugary texture to grains, dense	SP		
1110.3	--45.0	44.5-46.0	ss	10	100 /.4	0.7	Br tan fgr SANDSTONE, poorly cemented to uncemented, slightly sugary texture to grains, dense	(SS)		
1105.3	--50.0	49.5-51.0	ss	11	200 /.3	0.0	No recovery (Sandstone?)			
1100.3	--55.0									

DRILLING DATA

START DATE: 11/07/88
COMPLETION DATE: 11/08/88
LOGGED BY: KAD
DRILLING METHOD: RIG: CME 850 - All Terrain HSA to 29', Mud to 60'
DRILLING CONTRACTOR: Twin City Testing

WATER LEVEL INFORMATION

DEPTH AT COMPLETION: NA
LATER TIME/DEPTH: NA
LATER TIME/DEPTH: NA
CAVE IN DEPTH: NA
DRILLING LOSSES: NA

LOG OF TEST BORING NO.: B-SP2

CLIENT: Kennecott
PROJECT: Stockpile Borings
PROJECT NUMBER: 87K10
LOCATION: Ladysmith, Wisconsin
COORDINATES: 40005 N 40005 E

SURFACE ELEVATION: 1155.31
BORING DEPTH: 60.0
DATE: 11/07/88

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLING NOTES
1100.3	--55	54.5-56.0	ss	11	200 /.7	0.1	Tan br fgr-cgr SANDSTONE, partly cemented to uncemented, well rounded grains, dense	SS		
	-									
	-									
	-				150		Blue, pink, tan schistose bedrock,			
	-	59.5-60.0	ss	12	/.5	0.1	soft, "greasy", some qtz	ML		
1095.3	--60						phenocrysts, schistosity perpend. to ground surface			
	-						End of Boring at 60.0 feet			
	-									
	-									
1090.3	--65									
	-									
	-									
	-									
1085.3	--70									
	-									
	-									
	-									
1080.3	--75									
	-									
	-									
	-									
1075.3	--80									
	-									
	-									
	-									
1070.3	--85									
	-									
	-									
	-									
1065.3	--90									
	-									
	-									
	-									
1060.3	--95									
	-									
	-									
	-									
1055.3	--100									
	-									
	-									
	-									
1050.3	--105									
	-									
	-									
	-									
1045.3	--110									

DRILLING DATA

START DATE: 11/07/88
COMPLETION DATE: 11/08/88
LOGGED BY: KAD
DRILLING METHOD: RIG: CME 850 - All Terrain
DRILLING CONTRACTOR: Twin City Testing

WATER LEVEL INFORMATION

DEPTH AT COMPLETION: NA
LATER TIME/DEPTH: NA
LATER TIME/DEPTH: NA
CAVE IN DEPTH: NA
DRILLING LOSSES: NA

LOG OF TEST BORING NO.: B-SP3

CLIENT: Kennecott
PROJECT: Stockpile Borings
PROJECT NUMBER: 87K10
LOCATION: Ladysmith, Wisconsin
COORDINATES: 40255 N 40396 E

SURFACE ELEVATION: 1148.96
BORING DEPTH: 36.0
DATE: 11/08/88

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLING NOTES
1149.0	--0.0	0.0-1.5	ss	1	5	1.0	Top 5" is topsoil - br blk org SILT, tr fgr sand, next 7" is red br grey mottled SILT, tr fgr sand, non organic, loose, soft	ML		
	-									
	-									
	-									
	-									
1144.0	--5.0	4.5-6.0	ss	2	18	1.3	Red br silty fgr SAND, tr fgr grvl med dense, dry, non cohesive, non plastic			
	-									
	-									
	-									
	-									
1139.0	--10.0	9.5-11.0	ss	3	23	1.2	Same as above w/ more grvl, dry, non cohesive, non plastic			
	-									
	-									
	-									
	-									
1134.0	--15.0	14.5-16.0	ss	4	30	1.1	Same as above w/ less grvl, 1" thick sand			
	-									
	-									
	-									
	-									
1129.0	--20.0	19.5-21.0	ss	5	42	1.2	Red br silty fgr-cgr SAND, tr fgr grvl and clay, dense, slightly cohesive, damp	SM		
	-									
	-									
	-									
	-									
1124.0	--25.0	24.5-26.0	ss	6	62	1.2	Red br fgr-mgr SAND w/ silt, tr fgr grvl, dense, damp			
	-									
	-									
	-									
	-									
1119.0	--30.0	29.5-31.0	ss	7	73 /.5	0.7	Same as above exc. w/ fgr-cgr grvl, damp to v damp			
	-									
	-									
	-									
	-									
1114.0	--35.0	34.5-36.0	ss	8	78	1.1	Same as above, damp to v damp			
	-						End of Boring at 36.0 feet			
	-									
	-									
	-									
1109.0	--40.0									
	-									
	-									
	-									
	-									
1104.0	--45.0									
	-									
	-									
	-									
	-									
1099.0	--50.0									
	-									
	-									
	-									
	-									
1094.0	--55.0									

DRILLING DATA

START DATE: 11/08/88
COMPLETION DATE: 11/09/88
LOGGED BY: KAD
DRILLING METHOD: RIG: CME 850 - All Terrain HSA to 15', Mud to 36'
DRILLING CONTRACTOR: Twin City Testing

WATER LEVEL INFORMATION

DEPTH AT COMPLETION: NA
LATER TIME/DEPTH: NA
LATER TIME/DEPTH: NA
CAVE IN DEPTH: NA
DRILLING LOSSES: NA

LOG OF TEST BORING NO.: B-SP4

CLIENT: Kennecott
PROJECT: Stockpile Borings
PROJECT NUMBER: 87K10
LOCATION: Ladysmith, Wisconsin
COORDINATES: 40362 N 40895 E

SURFACE ELEVATION: 1142.15
BORING DEPTH: 36.0
DATE: 11/10/88

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLING NOTES
1142.2	--0.0	0.0-1.5	ss	1	8	1.5	Blk fgr sandy SILT w/ org, moist, very loose	OL		
	-						Greyish br silty fgr SAND, tr clay moist, loose	SM		
	-									
	-									
	-									
1137.2	--5.0	4.5-6.0	ss	2	23	1.25	Br yellowish to reddish br fgr sandy SILT/ silty fgr SAND, tr clay, moist to wet, mottled, firm	SM/ML		
	-									
	-									
	-									
	-									
1132.2	--10.0	9.5-11.0	ss	3	113	0.25	Reddish br silty SAND w/ fgr-cgr grvl, tr clay, moist to saturated, dense to v dense, drove rock w/ sampler			
	-									
	-									
	-									
	-									
1127.2	--15.0	14.5-16.0	ss	4	49	1.25	Same.			
	-									
	-									
	-									
	-									
1122.2	--20.0	19.5-21.0	ss	5	45	1.25	Seams of water bearing mgr-cgr SAND at 19-21'	SM		
	-									
	-									
	-									
	-									
1117.2	--25.0	24.5-26.0	ss	6	55	1.2	Lt reddish br silty SAND w/ fgr-cgr grvl, water bearing, dense			
	-									
	-									
	-									
	-									
1112.2	--30.0	29.5-31.0	ss	7	46	1.3	Lt reddish br silty SAND w/ fgr-mgr grvl, tr clay, moist to wet, dense			
	-						Multicolored br, red, green, blue, silty mgr-cgr SAND w/ fgr-mgr grvl - mainly qtz and weathered ig/meta lithologics.	____	%g-s-si-cl	
	-							SM	10-72-10-8	
	-									
1107.2	--35.0	34.5-36.0	ss	8	92	1.3				
	-						End of Boring @ 36.0 feet			
	-									
	-									
	-									
1102.2	--40.0									
	-									
	-									
	-									
	-									
1097.2	--45.0									
	-									
	-									
	-									
	-									
1092.2	--50.0									
	-									
	-									
	-									
1087.2	--55.0									

DRILLING DATA

START DATE: 11/10/88 @ 7:00 am
COMPLETION DATE: 11/10/88 @ 11:30 am
LOGGED BY: REM
DRILLING METHOD: Tricone bit and mud RIG: CME 850 - All Terrain
DRILLING CONTRACTOR: Twin City Testing

WATER LEVEL INFORMATION

DEPTH AT COMPLETION: NA
LATER TIME/DEPTH: NA
LATER TIME/DEPTH: NA
CAVE IN DEPTH: NA
DRILLING LOSSES: NA

Foth & Van Dyke and Associates Inc.
2737 S. Ridge Road P. O. Box 19012 Green Bay, WI 54307-9012 414/497-2500

REPORT OF:

SIEVE ANALYSIS OF COARSE TO FINE AGGREGATES

PROJECT: Proposed Waste Rock Storage

SCOPE I.D. #: 87K10
DATE TYPED: 12-27-88

REPORTED TO: Kennecott Explorations

REPORT NUMBER: 3

TEST PERFORMED IN GENERAL ACCORDANCE OF ASTM: D1140

GENERAL DATA:

SAMPLE LOCATION:
SAMPLE NUMBER: B-SP4
DEPTH OF SAMPLE: 34.5'-36.0'
SAMPLED BY: B.J. Socha of F&VD

DATE SAMPLED: 11/10/88
DATED RECEIVED: 12/6/88
SOURCE OF SAMPLE:
MUNSELL COLOR CODE: 7.5 YR. 3/4

LABORATORY DATA:

DATE TESTED: December 6-8, 1988
TESTED PERFORMED BY: KAS
REVIEWED BY: POK (12-12-88)

24 HRS. TURN AROUND ____ YES __x__ NO
WASHED GRADATION __x__ YES ____ NO
WEIGHT OF TEST SAMPLE 2522 GRAMS

SIEVE SIZE	WEIGHT RETAINED (gms)	% RETAINED	% PASSING	PROJECT SPECIFICATION % PASSING BY WEIGHT	SOURCE OF SPECIFICATION
3"					
1½					
1					
3/4	0	0	100		
1/2	9.5	3.8	96.2		
3/8	3.2	1.3	94.9		
#4	12.9	5.1	89.8		
10	16.7	6.6	83.2		
40	64.8	25.7	57.5		
100	78.3	31.0	26.5		
200	20.6	8.2	18.3		
PAN	46.0	18.2			

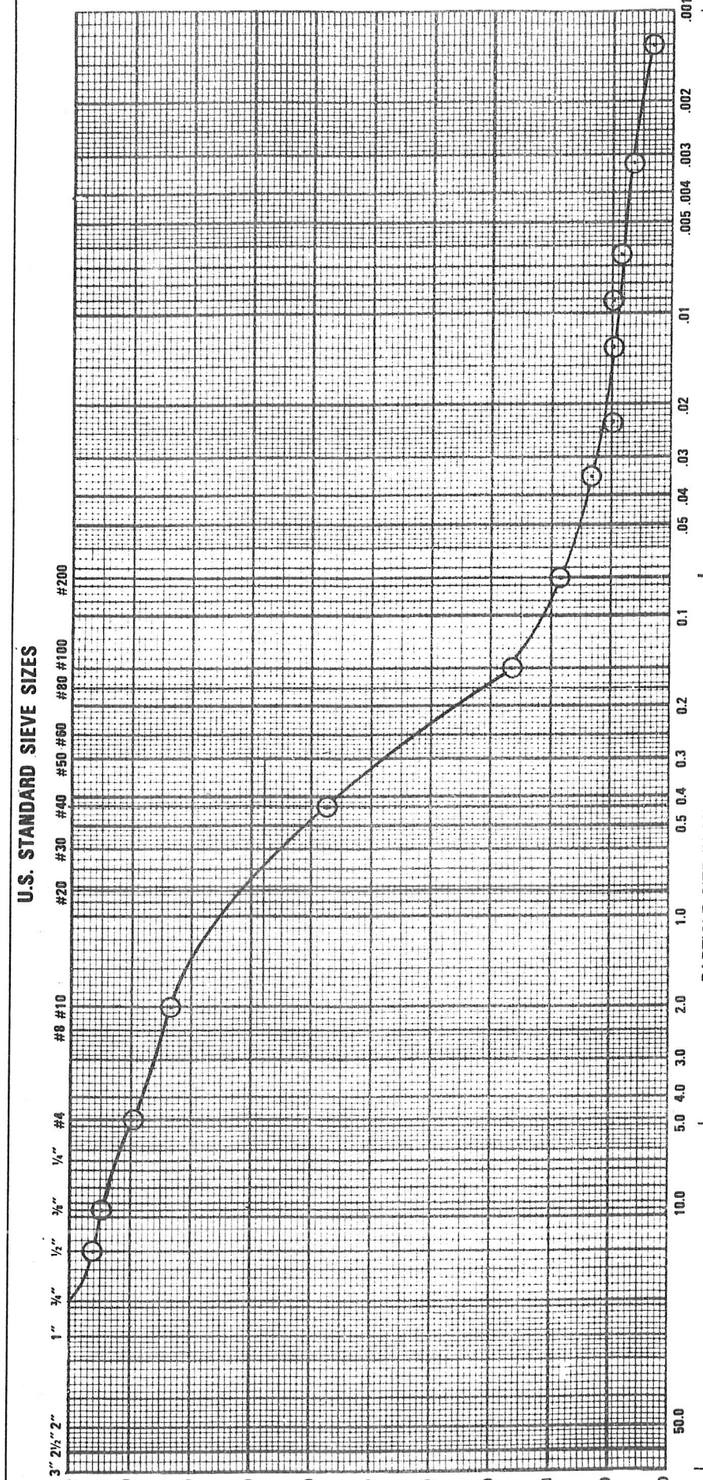
REMARKS:

FORM #329 SLB (Rev. 4/88)

BY: Robert R. Rouse

Foth & Van Dyke and Associates Inc.

GRAIN SIZE DISTRIBUTION CURVE



PROJECT: Kennecott - Proposed Waste Rock Storage

LOCATION SAMPLED: Boring: SP4 ELEV. OR DEPTH: 34.5-36.0' DRAWN BY: POK APPROVED BY: RRR

ATTERBERG LIMITS: LL ____ PL ____ PI ____ SAMPLED MOISTURE CONTENT (%): 12.7 COEFFICIENTS: Cc = ____ Cu = ____

SAMPLE SOURCE: ____ MUNSELL COLOR CODE: 7.5 YR. 3.4 DATE SAMPLED: 11-10-88

SOIL CLASSIFICATION (ASTM: D2487) SILTY SAND, fine to medium grained, a little gravel, dark brown (SM)

DATE: 12-12-88 SAMPLE NO.: 3

FORM #411 SL (2/87)

LOG OF TEST BORING NO.: B-SP5

CLIENT: Kennecott
PROJECT: Stockpile Borings
PROJECT NUMBER: 87K10
LOCATION: Ladysmith, Wisconsin
COORDINATES: 39957 N 40501 E

SURFACE ELEVATION: 1148.77
BORING DEPTH: 36.0
DATE: 11/09/88

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLING NOTES
1148.8	--0.0	0.0-1.5	ss	1	6	0.8	Blk br org SILT, tr clay and fgr sand, loose, dry - topsoil(4") rest is red br Fe-stained SILT	ML		
1143.8	--5.0	4.5-6.0	ss	2	24	1.5	Red br fgr-cgr gravelly fgr-mgr SAND, loose, dry	SP		
1138.8	--10.0	9.5-11.0	ss	3	62	1.4	Same as above w/ less grvl plus silt, v damp to wet	SM		
1133.8	--15.0	14.5-16.0	ss	4	37	0.8	Red br clayey fgr-mgr SAND, tr fgr grvl, dense, wet	SC		
1128.8	--20.0	19.5-21.0	ss	5	33	1.0	Red br silty fgr-cgr SAND, tr fgr grvl, wet, dense			
1123.8	--25.0	24.5-26.0	ss	6	15	0.0	No recovery			
1118.8	--30.0	29.5-31.0	ss	7	15	1.5	Red br silty fgr-mgr SAND, tr fgr grvl, soft, wet, med loose	SM		
1113.8	--35.0	34.5-36.0	ss	8	36	1.5	Same as above			
							End of Boring at 36.0 feet			
1108.8	--40.0									
1103.8	--45.0									
1098.8	--50.0									
1093.8	--55.0									

DRILLING DATA

START DATE: 11/09/88
COMPLETION DATE: 11/09/88
LOGGED BY: KAD
DRILLING METHOD: RIG: CME 850 - All Terrain Mud rotary
DRILLING CONTRACTOR: Twin City Testing

WATER LEVEL INFORMATION

DEPTH AT COMPLETION: NA
LATER TIME/DEPTH: NA
LATER TIME/DEPTH: NA
CAVE IN DEPTH: NA
DRILLING LOSSES: NA

LOG OF TEST BORING NO.: PZ-SP6

CLIENT: Kennecott
PROJECT: Stockpile Borings
PROJECT NUMBER: 87K10
LOCATION: Ladysmith, Wisconsin
COORDINATES: 39652 N 40205 E

SURFACE ELEVATION: 1154.81
BORING DEPTH: 36.0
DATE: 11/08/88

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLING NOTES
1154.8	--0.0	0.0-1.5	ss	1	6	1.4	Br org SILT, tr fgr sand, topsoil, loose, dry (top 4"?), rest is br fgr sandy SILT, dry, loose, non-plastic, non cohesive, very soft	ML		
1149.8	--5.0	4.5-6.0	ss	2	22	1.2	Br silty fgr-mgr SAND, loose, dry, subang to ang, some Fe-stained sand grains			
1144.8	--10.0	9.5-11.0	ss	3	53	1.3	Same as above only tending to be more fgr, dense, dry	SM		
1139.8	--15.0	14.5-16.0	ss	4	99	1.2	Same as above, dense, damp			
1134.8	--20.0	19.5-21.0	ss	5	51	1.3	Br fgr sandy SILT, non plastic, saturated(wet), dense, becoming more plastic and cohesive w/ depth			
1129.8	--25.0	24.5-26.0	ss	6	58	1.0	Dk red brn (5YR 3/8) fgr sandy SILT, tr clay, slightly plastic, cohesive, wet, dense, firm, more grvl and sand w/ depth	ML	%g-s-si-cl 5-32-46-17 LL=14 PI=0.6	
1124.8	--30.0	29.5-31.0	ss	7	30	1.5	Br fgr sandy SILT w/ fgr grvl and mgr-cgr sand, wet, dense, firm			
1119.8	--35.0	34.5-36.0	ss	8	74	1.4	Br red silty fgr-mgr SAND w/ fgr grvl and cgr sand, damp, firm, dense	SM		
1114.8	--40.0						End of Boring at 36.0 feet			
1109.8	--45.0									
1104.8	--50.0									
1099.8	--55.0									

DRILLING DATA

START DATE: 11/08/88
COMPLETION DATE: 11/08/88
LOGGED BY: KAD
DRILLING METHOD: RIG: CME 850 - All Terrain Mud rotary
DRILLING CONTRACTOR: Twin City Testing

WATER LEVEL INFORMATION

DEPTH AT COMPLETION:
LATER TIME/DEPTH:
LATER TIME/DEPTH:
CAVE IN DEPTH:
DRILLING LOSSES:

Foth & Van Dyke and Associates Inc.
2737 S. Ridge Road P. O. Box 19012 Green Bay, WI 54307-9012 414/497-2500

REPORT OF:

SIEVE ANALYSIS OF COARSE TO FINE AGGREGATES

PROJECT: Proposed Waste Rock Storage

SCOPE I.D. #: 87K10
DATE TYPED: 12-27-88

REPORTED TO: Kennecott Explorations

REPORT NUMBER: 4

TEST PERFORMED IN GENERAL ACCORDANCE OF ASTM: D1140

GENERAL DATA:

SAMPLE LOCATION:
SAMPLE NUMBER: B-SP6
DEPTH OF SAMPLE: 24.5'-26.0'
SAMPLED BY: B.J. Socha at F&VD

DATE SAMPLED: 11/8/88
DATED RECEIVED: 12/6/88
SOURCE OF SAMPLE:
MUNSELL COLOR CODE: 5 YR. 3/3

LABORATORY DATA:

DATE TESTED: December 6-8, 1988
TESTED PERFORMED BY: KAS
REVIEWED BY: POK (12-12-88)

24 HRS. TURN AROUND ____ YES __xx__ NO
WASHED GRADATION __x__ YES ____ NO
WEIGHT OF TEST SAMPLE 201.8 GRAMS

SIEVE SIZE	WEIGHT RETAINED (gms)	% RETAINED	% PASSING	PROJECT SPECIFICATION % PASSING BY WEIGHT	SOURCE OF SPECIFICATION
3"					
1½					
1					
3/4	0	0	100		
1/2	3.5	1.7	98.3		
3/8	2.1	1.0	97.3		
#4	5.5	2.7	94.6		
10	7.4	3.7	90.9		
40	19.1	9.5	81.4		
100	26.6	13.2	68.2		
200	11.9	5.9	62.3		
PAN	125.9	62.4			

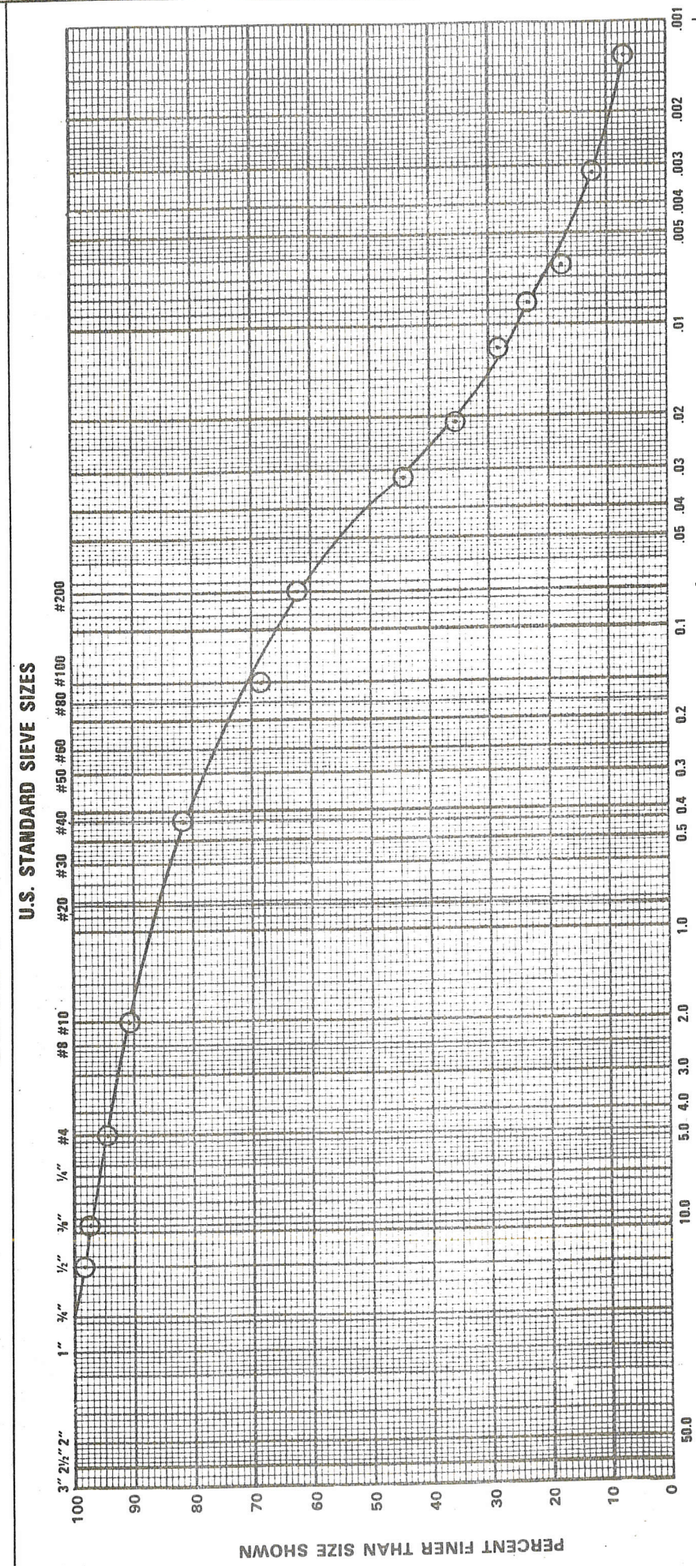
REMARKS:

FORM #329 SLB (Rev. 4/88)

 BY: Robert K. Rowe

Foth & Van Dyke and Associates Inc.

GRAIN SIZE DISTRIBUTION CURVE



GRAVEL		SAND			SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE		
% =	% = 19.0	% = 5.4	% = 3.7	% = 9.5	% = 45.6	% = 16.8

PROJECT: Kennecott – Proposed Waste Rock Storage

LOCATION SAMPLED: Boring: SP-6 ELEV. OR DEPTH: 24.5'-26.0' DRAWN BY: POK APPROVED BY: RRR

ATTERBERG LIMITS: LL 14.0 PL 13.4 PI 0.6 SAMPLED MOISTURE CONTENT (%): 12.8 COEFFICIENTS: Cc = Cu =

SAMPLE SOURCE: MUNSELL COLOR CODE: 5 YR 3/3 DATE SAMPLED: 11-8-88

SOIL CLASSIFICATION (ASTM: D2487) SANDY SILT, a little gravel, dark reddish brown, (ML)

DATE: 12-12-88 SAMPLE NO.: 4

FORM #411 SL (2/87)

LOG OF TEST BORING NO.: B-SP7

CLIENT: Kennecott
PROJECT: Stockpile Borings
PROJECT NUMBER: 87K10
LOCATION: Ladysmith, Wisconsin
COORDINATES: 40111 N 40799 E

SURFACE ELEVATION: 1142.32
BORING DEPTH: 36.0
DATE: 11/09/88

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLING NOTES
1142.3	--0.0	0.0-1.5	ss	1	5	1.4	Top 3" is org rich blk SILT, rest is red br (Fe-stained) SILT, tr clay and fgr sand	ML		
1137.3	--5.0	4.5-6.0	ss	2	16	1.3	Red br (Fe-stained) SILT, tr clay, fgr sand, med loose, damp			
1132.3	--10.0	9.5-11.0	ss	3	35	1.2	Red br fgr-mgr SAND w/ silt, faint laminations, very damp to wet, med dense	SM		
1127.3	--15.0	14.5-16.0	ss	4	21	1.2	Red br clayey fgr-cgr SAND, tr fgr grvl, wet, dense			
1122.3	--20.0	19.5-21.0	ss	5	11	1.5	Red br mottled SILT, tr clay, fgr sand, damp, dense	ML		
1117.3	--25.0	24.5-26.0	ss	6	14	1.4	Red br silty fgr-cgr SAND, tr clay damp	SM		
1112.3	--30.0	29.5-31.0	ss	7	39	0.5	Same as above			
1107.3	--35.0	34.5-36.0	ss	8	29	1.4	Same as above			
1102.3	--40.0						End of Boring at 36.0 feet			
1097.3	--45.0									
1092.3	--50.0									
1087.3	--55.0									

DRILLING DATA

START DATE: 11/09/88
COMPLETION DATE: 11/10/88
LOGGED BY: KAD
DRILLING METHOD: RIG: CME 850 - All Terrain Mud rotary
DRILLING CONTRACTOR: Twin City Testing

WATER LEVEL INFORMATION

DEPTH AT COMPLETION: NA
LATER TIME/DEPTH: NA
LATER TIME/DEPTH: NA
CAVE IN DEPTH: NA
DRILLING LOSSES: NA

LOG OF TEST BORING NO.: PZ-SP8

CLIENT: Kennecott
PROJECT: Stockpile Borings
PROJECT NUMBER: 87K10
LOCATION: Ladysmith, Wisconsin
COORDINATES: 39662 N 40905 E

SURFACE ELEVATION: 1142.79
BORING DEPTH: 36.0
DATE: 11/11/88

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLING NOTES
1142.8	--0.0	0.0-1.5	ss	1	10	1.5	Top .9' is blk fgr sandy SILT w/ org, moist to wet, very soft, next .6' is lt grey to red br mottled fgr sandy SILT, tr fgr-cgr grvl, moist, loose, 2.5-4.5 is red br	OL / ML / ML/CL		
1137.8	--5.0	4.5-6.0	ss	2	42	1.3	sandy, silty CLAY w/ fgr-cgr grvl, moist, v stiff Reddish br to lt br to grey silty SAND w/ fgr-cgr grvl, tr clay, moist, firm to dense, mottled,	SM		
1132.8	--10.0	9.5-11.0	ss	3	17	1.2	cgr grvl/cobbles @ 6' Reddish br clayey SAND w/ silt and fgr-cgr grvl, moist, dense	SC		
1127.8	--15.0	14.5-16.0	ss	4	12	1.5	Reddish br layered silty SAND and clayey SAND w/ fgr-cgr grvl and 1-2" seams of mgr-cgr SAND @ 11.8' & 14.5', saturated, firm to loose, cgr grvl and cobbles @ 10.0-11.5	SC/SM SP		
1122.8	--20.0	19.5-21.0	ss	5	15	1.5	Same.			
1117.8	--25.0	24.5-26.0	ss	6	9	1.1	Red br clayey fgr-cgr SAND, tr silt, firm, dense, plastic, cohesive	SC		
1112.8	--30.0	29.5-31.0	ss	7	7	0.8	Red br fgr-cgr SAND w/ clay and silt, plastic, soft, cohesive			
1107.8	--35.0	34.5-36.0	ss	8	7	0.5	Grey lean CLAY w/ fgr-cgr sand, tr fgr grvl, cohesive, soft, plastic	CL		
							End of Boring at 36.0 feet			
1102.8	--40.0									
1097.8	--45.0									
1092.8	--50.0									
1087.8	--55.0									

DRILLING DATA

START DATE: 11/11/88 @ 10:10 am
COMPLETION DATE: 11/11/88 @ 2:10 pm
LOGGED BY: REM/KAD
DRILLING METHOD: RIG: CME 850 - All Terrain HSA to 19', Mud to 36'
DRILLING CONTRACTOR: Twin City Testing

WATER LEVEL INFORMATION

DEPTH AT COMPLETION: 14.4' @ 16.0'
LATER TIME/DEPTH: 19.3' @ 21.0'
LATER TIME/DEPTH: NA
CAVE IN DEPTH: NA
DRILLING LOSSES: NA