

APPENDIX 3.5-F

Geologic Logs and Soil Test Data for the Waste  
Characterization Borings, 1987

LOG OF TEST BORING NO.: B-WC1							SURFACE ELEVATION: 1111.5'			
CLIENT: Kennecott PROJECT: Waste Characterization PROJECT NUMBER: 87K10-6 LOCATION: South end of pit, Section 403, 25' North baseline COORDINATES: 39964 N, 39112 E (Approx.)							BORING DEPTH: 19.5'			
							DATE: 12/06/87			
MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLE NOTES
1111.5	--0.0	0.0-2.0	ss	1		2.0	Brown silty SAND, fn, poorly graded, soft, slightly cohesive, moist, (very fine sand) (Aeolian). At 1.8' cse gvl, weathered dk bldr	SM		
		2.0-4.0	ss	2		2.0	Weath. dk bldr to about 3.5'			
1109.0	--2.5						3.5-4.0: Red brn silty SAND, fn w/med & cse sand, fn & cse gvl, loose to dense, cohesive, moist, diamict	SM		
		4.0-6.0	ss	3		2.0	Brn well graded GRAVEL w/silt, layered w/silty SAND w/gvl, fn & cse gvl, dense			
1106.5	--5.0									
		6.0-8.0	ss	4		2.0	Same as above, purple & red volcanics, dark igneous & metamorphic	GW-GM		
1104.0	--7.5									
		10.0-12.0	ss	5		2.0	Same to 11', then red brn silty SAND, fn well graded w/fn & cse gvl (diamict), dense, cohesive, satur., uniform (till)			
1099.0	--12.5	12.0-14.0	ss	6		2.0	As above w/few sand layers <2" thick. Very dk gray coating on sand in shoe	SM		
1096.5	--15.0	14.0-16.0	ss	7		0.5	Bldrs to about 14.5' w/black coating. Cuttings at 14.5-16.5', yel brn (sericite?) schist, hard			
		16.5-18.0	ss	8		1.5	Yel brn altered rock (tuff?), hard	RK		
1094.0	--17.5	18.0-19.5	ss	9		1.5	Same except crumbly, saturated.			
1091.5	--20.0						19.5'-End of Boring in altered rock			
1089.0	--22.5									
1086.5	--25.0									
1084.0	--27.5									

DRILLING DATA

START DATE: 12/06/87  
 COMPLETION DATE: 12/06/87  
 LOGGED BY: BJS  
 DRILLING METHOD: Air rotary  
 DRILLING CONTRACTOR: Luiser Drilling, Inc.

WATER LEVEL INFORMATION

DEPTH AT COMPLETION: 16 ft  
 LATER TIME/DEPTH:  
 LATER TIME/DEPTH:  
 CAVE IN DEPTH:  
 DRILLING LOSSES:

LOG OF TEST BORING NO.: B-WC1A

CLIENT: Kennecott  
 PROJECT: Waste Characterization  
 PROJECT NUMBER: 87K10-6  
 LOCATION: South end of pit Section 403, 25' North baseline  
 COORDINATES: 39964 N, 39112 E (Approx.)

SURFACE ELEVATION: 1111.5'  
 BORING DEPTH: 19.5'  
 DATE: 12/06/87

LOG OF TEST BORING NO.: B-WC1B

CLIENT: Kennecott  
 PROJECT: Waste Characterization  
 PROJECT NUMBER: 87K10-6  
 LOCATION: South end of pit, Section 403, 20' North baseline  
 COORDINATES: 39964 N, 39112 E (Approx.)

SURFACE ELEVATION: 1111.5'  
 BORING DEPTH: 18.5'  
 DATE: 12/06/87

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLE NOTES
1111.5	--0.0	0.0-2.0	ss	1		2.0	Brn silty SAND, fn, poorly graded, w/org (topsoil), cohesive, slightly moist (bldr at 2'-moved rig over)	SM		
1109.0	--2.5	2.0-4.0	ss	2		2.0	Brn well graded GRAVEL, well graded SAND fn & cse gvl, fn to cse sand, layered 4-6", loose to cohesive, slightly moist	GW, SW		
1106.5	--5.0	4.0-6.0	ss	3		2.0	Brn well graded GRAVEL, cse w/fn, well rounded (broken w/sampler). Much volc. w/igneous & metamorphic	GW		
		6.0-8.0	ss	4		1.8	Same			
1104.0	--7.5	8.0-9.0	ss	5		1.0	Same			
		9.0-11.0	ss	6		1.0	Same, wet			
1099.0	--12.5	12.0-14.0	ss	7		2.0	Red brn silty SAND, fn w/med & cse sand, fn & cse gvl, well graded (diamict), moist, dense, cohesive (till)	SM		
		14.0-16.0	ss	8		2.0	Same except saturated			
1096.5	--15.0	16.0-16.3	ss	9		0.3	Same w/weath. rock, on bedrock? Hard, drilled through to 18.5'			
1094.0	--17.5	18.5-19.5	ss	10		0.7	Yel brn (limonite?) coating on silicious (tuff?) rock, crumbly, saturated 19.5'-End of Boring in altered rock	RK		

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLE NOTES
1111.5	--0.0	0.0-2.0	ss	1		2.0	Brn silty SAND, fn, poorly graded, soft, cohesive (fn & vy fn sand) (Aeolian sand w/organics, topsoil)	SM		
1109.0	--2.5						Boulders from 2 to 5'-Hammer drilled			
1106.5	--5.0	5.0-7.0	ss	2		2.0	Brn well graded GRAVEL w/silt, cse w/fn (broken by sampler)	GW-GM		
		7.0-9.0	ss	3		2.0	As above, bldrs in diamict matrix			
1104.0	--7.5	9.0-11.0	ss	4		2.0	Same to 10', then red brn silty SAND, diamict w/much cse gvl (cobbles)			
1101.5	--10.0	11.0-12.0	ss	5		0.9	Red brn silty SAND w/cobbles, loose			
1099.0	--12.5	12.0-14.0	ss	6		2.0	Red brn silty SAND, diamict, layered, variable texture (sandier than usual till), dense, saturated	SM		
1096.5	--15.0	14.0-16.0	ss	7		2.0	Same to 14.5', then well graded GRAVEL w/silt (w/yel brn altered bedrock, soft)	GW-GM		
		@ 16.0	ss	8		0.0	At 15.5'-yel brn altered rock siliceous (tuff?), dense, crumbly, soft.			
		16.0-16.4	ss	9		0.0	@ 16'-No recovery, cave (till)	RK		
1094.0	--17.5	17.5-18.5	ss	10		1.0	Drove 16-16.4'-Hard, cracked shoe on split spoon. Drilled through to 17.5' Vy pale yel altered rock, siliceous (tuff?), crumbly, vy dense, w/vy hard pieces rock			
1091.5	--20.0						18.5'-End of Boring in rock			
1089.0	--22.5									
1086.5	--25.0									
1084.0	--27.5									

**DRILLING DATA**  
 START DATE: 12/06/87  
 COMPLETION DATE: 12/06/87  
 LOGGED BY: BJS  
 DRILLING METHOD: Air rotary  
 DRILLING CONTRACTOR: Luiser Drilling, Inc.

**WATER LEVEL INFORMATION**  
 DEPTH AT COMPLETION:  
 LATER TIME/DEPTH:  
 LATER TIME/DEPTH:  
 CAVE IN DEPTH:  
 DRILLING LOSSES:

**DRILLING DATA**  
 START DATE: 12/06/87  
 COMPLETION DATE: 12/06/87  
 LOGGED BY: BJS  
 DRILLING METHOD: Air rotary  
 DRILLING CONTRACTOR: Luiser Drilling, Inc.

**WATER LEVEL INFORMATION**  
 DEPTH AT COMPLETION:  
 LATER TIME/DEPTH:  
 LATER TIME/DEPTH:  
 CAVE IN DEPTH:  
 DRILLING LOSSES:

LOG OF TEST BORING NO.: B-WC2										SURFACE ELEVATION: 1134.9'		
CLIENT: Kennecott PROJECT: Waste Characterization PROJECT NUMBER: 87K10-6 LOCATION: Center of pit, Section 415, 50' South baseline COORDINATES: 40669 N, 39990 E (Approx.)										BORING DEPTH: 40.5'		
										DATE: 12/05/87		
MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLE NOTES		
1134.9	--0.0	0.0-2.0	ss	1		2.0	Brn silty SAND, fn, poorly graded, cohesive, soft, moist, saturated. (Aeolian sand)	SM				
1132.4	--2.5	2.0-4.0	ss	2		2.0	Same to 3', then red brn silty SAND, diamict w/fn gvl, clayey layers	SM				
1129.9	--5.0	4.0-6.0	ss	3		2.0	Brn silty SAND, fn, poorly graded, soft, cohesive, laminated to 5', then silty SAND as above.	SM				
1127.4	--7.5	6.0-8.0	ss	4		1.5	Brn well graded SAND w/silt, med, w/fine gravel, loose, moist to wet	SP				
1124.9	--10.0	8.0-10.0	ss	5		1.0	Brn poorly graded SAND, fn, laminated, loose, dry	SP				
1122.4	--12.5	10.0-13.0	ss	6		2.5	As above. (Pushed rock, no recovery; drove 10-13')					
1119.9	--15.0	13.0-15.0	ss	7		1.0	(Drove to 16') Brown poorly graded SAND as above w/silty SAND layer at 13.5', dry					
1117.4	--17.5	15.0-17.0	ss	8		2.0	(Drove 15-18.5') As above, dry					
1114.9	--20.0	17.0-20.0	ss	9		2.0	Same to 18.5', then layered red brn silty SAND, sandy lean CLAY, laminated diamict w/fn gravel	SM, CL				
1112.4	--22.5	20.0-22.0	ss	10		2.0	Silty sand, fn, loose to 20.2', then red brn silty SAND, fn, w/med & cse gvl, diamict, dense, cohesive, moist, (till)	SM				
1109.9	--25.0	22.0-24.0	ss	11		2.0	Same as above, saturated at about 23', soft, cohesive					
1107.4	--27.5	24.0-26.0	ss	12		2.0	Same to 25', then lt yel brn & white poorly graded SAND, fn w/med, loose, dense, saturated. Blk stain on horz. layers (ss)	SP (SS)	%g - s - si&el 1 -98 - 1			
		26.0-28.0	ss	13		1.8	Sandstone as above w/few weakly cemented layers					

DRILLING DATA	WATER LEVEL INFORMATION
START DATE: 12/05/87 COMPLETION DATE: 12/05/87 LOGGED BY: BJS DRILLING METHOD: Mud rotary DRILLING CONTRACTOR: Luisier Drilling, Inc.	DEPTH AT COMPLETION: LATER TIME/DEPTH: LATER TIME/DEPTH: CAVE IN DEPTH: DRILLING LOSSES:

LOG OF TEST BORING NO.: B-WC2										SURFACE ELEVATION: 1134.9'		
CLIENT: Kennecott PROJECT: Waste Characterization PROJECT NUMBER: 87K10-6 LOCATION: Center of pit; Section 415, 50' South baseline COORDINATES: 40669 N, 39990 E (Approx.)										BORING DEPTH: 40.5'		
										DATE: 12/05/87		
MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLE NOTES		
1107.4	--27.5	28.0-28.5	ss	14		0.5	Sandstone, vy dense, could not drive. Drill to 29', cuttings cse qtz sand, w/white clay (kaolinite)					
1104.9	--30.0	29.0-29.5	ss	15		0.5	Vy lt brn SANDSTONE, fn w/med & cse sand vy dense, loose cemented, cohesive, w/kaol. coating. Drill to 33', cuttings cse qtz sand; at 33' green sandy lean clay (incorp. saprolite)	SP-SM (SS)				
1102.4	--32.5											
1099.9	--35.0	34.0-34.5	ss	16		0.5	Lt brn sandstone, fn w/med & cse sand, cemented, brittle, kaolinite matrix					
1097.4	--37.5	34.5-39.5	c	17		1.2	Lt yel brn & lt gray brn ( 2.5Y 6/2 & 6/4) SANDSTONE, fn w/med & med w/cse, layered, cemented w/kaolinite in matrix. Few green gray (5G 5/1) vy fn sandstone layers w/much silt in matrix. (Pieces 1/2-4" long)	SS				
1094.9	--40.0						Hard at 39.5'. Drilled w/roller bit to 40.5'. Cuttings red & yellow chert (gossan).	RK				
1092.4	--42.5						End of Boring at 40.5' in gossan.	=====				
1089.9	--45.0											
1087.4	--47.5											
1084.9	--50.0											
1082.4	--52.5											
1079.9	--55.0											

DRILLING DATA	WATER LEVEL INFORMATION
START DATE: 12/05/87 COMPLETION DATE: 12/05/87 LOGGED BY: BJS DRILLING METHOD: Mud rotary; carbide bit 34.5-39.5' DRILLING CONTRACTOR: Luisier Drilling, Inc.	DEPTH AT COMPLETION: LATER TIME/DEPTH: LATER TIME/DEPTH: CAVE IN DEPTH: DRILLING LOSSES:

# Foth & Van Dyke

Engineers/Architects

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

PROJECT NO.: \_\_\_\_\_

JOB NO.: 87K10

DATE: February 2-3, 1988

REPORT NO.: SB6

LOG OF TEST BORING NO.: B-WC2A

SURFACE ELEVATION: 1134.9'

BORING DEPTH: 26.0'

DATE: 12/05/87

CLIENT: Kennecott  
PROJECT: Waste Characterization  
PROJECT NUMBER: 87K10-6  
LOCATION: Center of pit; Section 415, 50' South baseline  
COORDINATES: 40669 N, 39990 E (Approx)

## REPORT OF ANALYSIS OF AGGREGATES

ARCHITECT/ENGINEER: Foth & Van Dyke CONTRACTOR: \_\_\_\_\_

PROJECT: Kennecott Geotechnical - Granular Blanket SOURCE: \_\_\_\_\_

REPORT OF TESTS OF: Verification of Proposed Granular Blanket Material

RECEIVED AT LABORATORY: February 2, 1988

QUANTITY REPRESENTED: 286.5 grams

SUBMITTED BY: Betty Socha of F&VD

SAMPLED FROM: Boring No.: B-WC2A

IDENTIFICATION: Sample No.: WC2A Depth: 24'-26'

DATE SAMPLED: December 1987

INTENDED USE: Granular Blanket

WASHED GRADATION: No

PERCENT PASSING NO. 200 SIEVE 1.0 %

COLOR: 10 YR. 7/2 - light gray

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLE NOTES
1134.9	--0.0	0.0-2.0	ss	1		2.0	Brn silty SAND, fn, poorly graded, w/organics, massive			
1132.4	--2.5	2.0-4.0	ss	2		2.0	Same, cohesive, moist, soft, massive to weakly laminated	SM		
1129.9	--5.0	4.0-6.0	ss	3		2.0	Same except wet. At 5', brn well graded SAND/well graded GRAVEL, fn & med sand w/cse sand, & fn & cse gvl, loose, dry			
1127.4	--7.5	6.0-8.0	ss	4		2.0	As above except slightly moist	SW/GW		
1124.9	--10.0	8.0-10.0	ss	5		2.0	Same to 9', then red brn silty SAND, fn w/med & cse sand, fn & cse gvl (diamict w/variable texture)	SM		
1122.4	--12.5	10.0-12.0	ss	6		2.0	Same to 10.5', then well graded SAND, med w/cse sand, fn gvl, loose, dry, bedded w/layers silty SAND, fn	SP		
1119.9	--15.0	12.0-14.0	ss	7		2.0	Lt brn poorly graded SAND w/silt, fn, loose, dry, laminated	SP-SM		
1117.4	--17.5	14.0-16.0	ss	8		2.0	Lt brn silty SAND, layered w/poorly graded SAND (vy fn sand) irreg. laminated, dry			
1114.9	--20.0	16.0-18.0	ss	9		2.0	Same to 17.5', then laminated w/med brn lean CLAY, vy stiff, cohesive	SM, SP-SM, SP		
1112.4	--22.5	18.0-20.0	ss	10		2.0	Poorly graded SAND, fn, loose, dry to 18.5'. Weath. cse grained granite bldr (much k-feldspar) at 18.5-19', then red brn silty SAND, fn, diamict, vy firm, slightly moist			
1109.9	--25.0	20.0-22.0	ss	11		2.0	Brn poorly graded SAND w/silt, med, loose, wet. At 21', brn silty SAND, diamict, variable texture, angular fn & cse gvl, vy dense to soft, moist			
1107.4	--27.5	22.0-24.0	ss	12		2.0	Brn silty SAND, fn, poorly graded (vy fn sand), massive to indistinctly layered, saturated at 23'	SM		
		24.0-26.0	ss	13		2.0	Red brn silty SAND, fn, diamict. At 24.3', white poorly graded SAND, fn w/med, loose, dense, qtz (sandstone), saturated End of Boring at 26' in sandstone	SP (SS) =====		

DRILLING DATA

START DATE: 12/05/87  
COMPLETION DATE: 12/05/87  
LOGGED BY: BJS  
DRILLING METHOD: Air rotary  
DRILLING CONTRACTOR: Luisier Drilling, Inc.

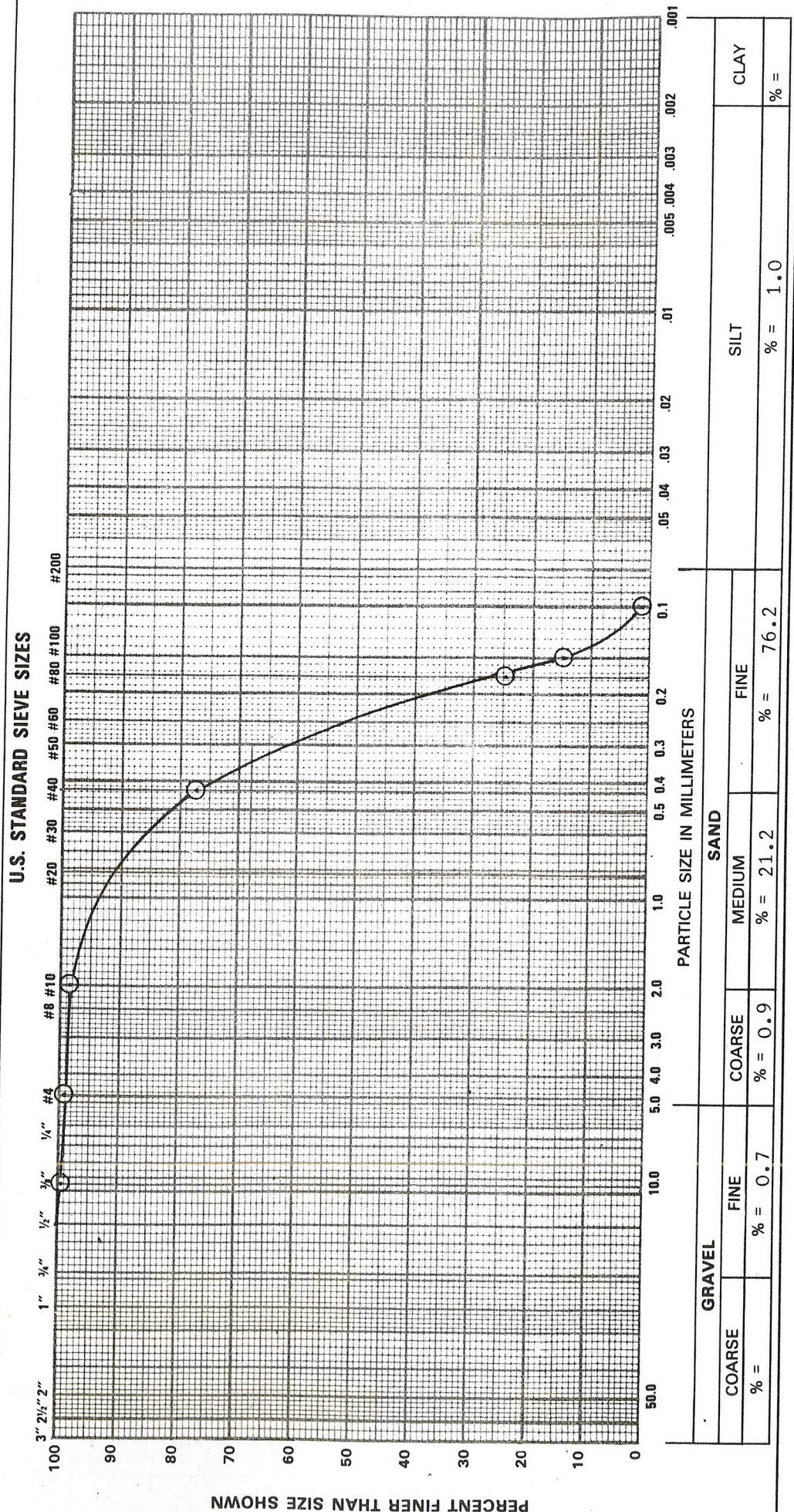
WATER LEVEL INFORMATION

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

Sieve Size or No.	Weight Retained	% Retained	% Passing	Specifications
3-Inch				
2-Inch				
1 1/2-Inch				
1-Inch				
3/4-Inch				
1/2-Inch	0	0	100	
3/8-Inch	1.5	0.5	99.5	
No. 4	0.5	0.2	99.3	
No. 8				
No. 10	2.7	0.9	98.4	
No. 16				
No. 20				
No. 30				
No. 40	60.8	21.2	77.2	
No. 50				
No. 80	151.0	52.7	24.5	
No. 100	29.0	10.1	14.4	
No. 200	38.1	13.3	1.1	
Pan	2.9	1.0		

CHECKED BY: RRR

# GRAIN SIZE DISTRIBUTION CURVE



PROJECT: Kennecott Geotechnical - Granular Blanket DATE: 2/3/88 SAMPLE NO.: SB6

LOCATION SAMPLED: Boring No.: B-WC2A ELEV. OR DEPTH: 24'-26' DRAWN BY: POK APPROVED BY: RRR

ATTERBERG LIMITS: LL PL PI PI SAMPLED MOISTURE CONTENT (%): 0.8 COEFFICIENTS: Cc = 0.8 Cu = 2.1

MUNSELL COLOR CODE: 10 YR. 7/2 DATE SAMPLED: December 1987

SOIL CLASSIFICATION (ASTM: D2487) SAND, fine to medium grained, light gray (SP)

FORM #411 SL (2/87)

Foth & Van Dyke & Associates, Inc.

LOG OF TEST BORING NO.: B-WC3							SURFACE ELEVATION: 1140.3'			
CLIENT: Kennecott PROJECT: Waste Characterization PROJECT NUMBER: 87K10-6 LOCATION: North end; Section 422, 2' North baseline COORDINATES: 41293 N, 40505 E (Approx.)							BORING DEPTH: 48.0'  DATE: 12/02/87			
MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLE NOTES
1140.3	--0.0									
		1.0-2.5	ss	1	P	1.5	Yel brn silty SAND, fn, poorly graded, slightly moist, cohesive (Aeolian sand w/soil horizons)	SM		
1137.8	--2.5									
		5.0-7.5	ss	2	P	1.2	Brn well graded SAND, med w/fn & cse sand, fn gravel, loose, dry. (Fluvial sand & gravel)	SW		
1135.3	--5.0									
		10.0-11.5	ss	3	P	1.5	Brn poorly sorted SAND w/silt, fn, layered w/well graded SAND, med w/fn & cse sand, fn & cse gvl <2" dia, loose, moist	SP-SM SW		
1132.8	--7.5									
		15.0-16.5	ss	4	P	1.2	Red brn silty SAND, fn w/med & cse sand, fn gvl, dense, cohesive, wet, w/weath. igneous/meta. pebbles, diamict (till)	SM		
1127.8	--12.5									
		20.0-21.5	ss	5	P	1.1	Same as above			
1125.3	--15.0									
		25.0-26.5	ss	6	P	1.5	Brn poorly graded SAND w/silt, fn & med layered, loose, saturated. 4" silty SAND, fn (vy fn sand) cohesive, very slightly moist at 26.5'	SP-SM		P - Pushed D - Drove
1122.8	--17.5									
1120.3	--20.0									
1117.8	--22.5									
1115.3	--25.0									
1112.8	--27.5									

**DRILLING DATA**

START DATE: 12/02/87  
 COMPLETION DATE: 12/04/87  
 LOGGED BY: BJS  
 DRILLING METHOD: Mud rotary  
 DRILLING CONTRACTOR: Luisier Drilling, Inc.

**WATER LEVEL INFORMATION**

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

# Foth & Van Dyke

Engineers/Architects

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

PROJECT NO.: \_\_\_\_\_

JOB NO.: 87K10

DATE: February 2-3, 1988

REPORT NO.: SB5

LOG OF TEST BORING NO.: B-WC3  
CLIENT: Kennecott  
PROJECT: Waste Characterization  
PROJECT NUMBER: 87K10-6  
LOCATION: North end; Section 422, 2', North baseline  
COORDINATES: 41293 N, 40505 E (Approx.)

SURFACE ELEVATION: 1140.3'  
BORING DEPTH: 48.0'  
DATE: 12/02/87

MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLE NOTES
1112.8	--27.5									
1110.3	--30.0	30.0-31.5	ss	7	P	1.5	Lt yel & white layered (1-2") poorly graded SAND, fn w/med, loose, saturated, dense (sandstone)		%g - s - si&cl 0 -96 - 4 K(L)=2.8x0.001 (Recompacted)	
		31.5-34.0	ss	8	D	2.0	As above, except cse at 33.8'			
1107.8	--32.5									
		34.0-35.5	ss	9	D	1.5	As above w/few thin (<2") cse sand layers	SP (SS)		
1105.3	--35.0	35.5-38.5	ss	10	D	2.5	Vy lt brn poorly graded SAND, med w/cse, vy dense, unconsol. (Sandstone)			
1102.8	--37.5									
		38.5-39.5	ss	11	D	1.0	Lt gray w/lt brn poorly graded SAND, med w/cse, unconsol w/few consol pieces, weakly cemented at 39-39.5'. Dk gray coating on horz layers 2-3" thick			Broke drive head on air hammer
1100.3	--40.0	39.5-41.5	st	12	D	0.0	Sample taken w/24" length of (3.0 ID) galvanized pipe. Med sandstone w/vy dark gray coating on sampler.			Tube ripped off when pulling up
		41.5-42.0	st	13		0.0	Cuttings yel, white SILT, silty CLAY. Drilled hard, couldn't drive pipe	SS		
1097.8	--42.5	42.0-44.0	c	14		2.0	42-42.5'-Brn horz lamin. sandstone, fn & med, iron stain on some laminae, vy hard			
		44.0-47.5	c	15		0.0	42.5-43'-Cemented w/green yel CLAY laminae (much incorp. saprolite)			
1095.3	--45.0						43-44'-White & yel altered (sericite) schist/saprolite, hard, brittle, iron stained, near vert. foliation apparent	RK		
							44-47.5'-Cored like alternating hard & soft layers			
1092.8	--47.5	47.5-48.0	ss	16	D	0.0	Drove to 48', very hard	=====		
							48'-End of Boring in altered schist			
1090.3	--50.0									
1087.8	--52.5									
1085.3	--55.0									

<b>DRILLING DATA</b>	<b>WATER LEVEL INFORMATION</b>
START DATE: 12/02/87	DEPTH AT COMPLETION:
COMPLETION DATE: 12/04/87	LATER TIME/DEPTH:
LOGGED BY: BJS	LATER TIME/DEPTH:
DRILLING METHOD: Mud rotary	CAVE IN DEPTH:
DRILLING CONTRACTOR: Luisier Drilling, Inc.	DRILLING LOSSES:

## REPORT OF ANALYSIS OF AGGREGATES

ARCHITECT/ENGINEER: Foth & Van Dyke CONTRACTOR: \_\_\_\_\_

PROJECT: Kennecott Geotechnical - Granular Blanket SOURCE: \_\_\_\_\_

REPORT OF TESTS OF: Verification of Proposed Granular Blanket Material

Sieve Size or No.	Weight Retained	% Retained	% Passing	Specifications
3-Inch				
2-Inch				
1 1/2-Inch				
1-Inch				
3/4-Inch				
1/2-Inch				
3/8-Inch	0	0	100	
No. 4	1.7	0.5	99.5	
No. 8				
No. 10	5.3	1.4	98.1	
No. 16				
No. 20				
No. 30				
No. 40	83.0	22.7	75.4	
No. 50				
No. 80	179.1	49.0	26.4	
No. 100	34.7	9.5	16.9	
No. 200	49.3	13.5	3.4	
Pan	12.7	3.5		

RECEIVED AT LABORATORY: February 2, 1988

QUANTITY REPRESENTED: 365.8 grams

SUBMITTED BY: Betty Socha of F&VD

SAMPLED FROM: Boring No.: B-WC3

IDENTIFICATION: Sample No.: WC3 Depth: 31'-34'

DATE SAMPLED: December 1987

INTENDED USE: Granular Blanket

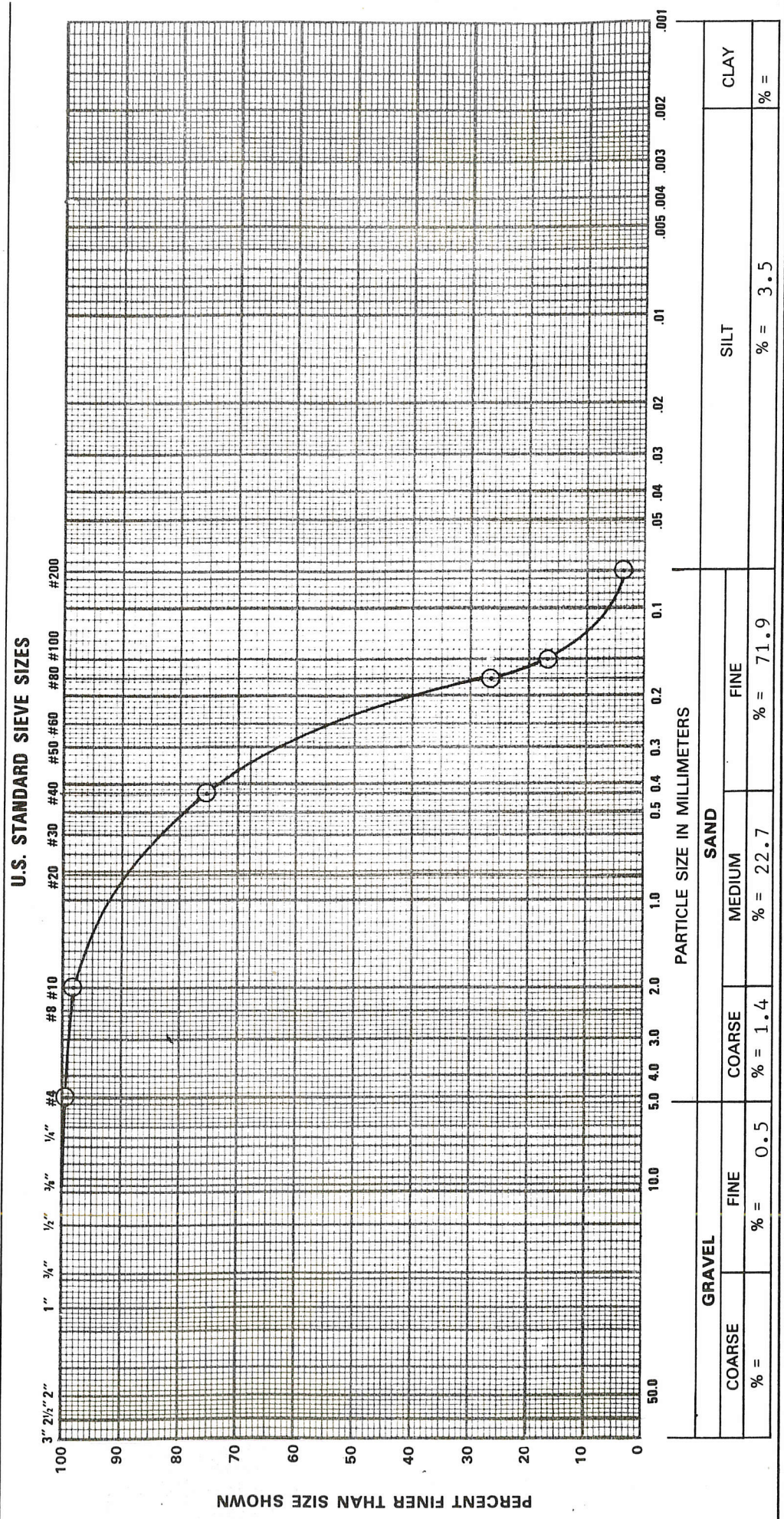
WASHED GRADATION: No

PERCENT PASSING NO. 200 SIEVE 3.5 %

COLOR: 10 YR. 6/3 - pale brown

CHECKED BY: RRR

**GRAIN SIZE DISTRIBUTION CURVE**



PROJECT: Kennecott Geotechnical - Granular Blanket DATE: 2/3/88 SAMPLE NO.: SB5

LOCATION SAMPLED: Boring No. B-WC3 ELEV. OR DEPTH: 31'-34' DRAWN BY: POK APPROVED BY: RRR

ATTERBERG LIMITS: LL PL PI PL SAMPLED MOISTURE CONTENT (%): PL COEFFICIENTS: Cc = 1.0 Cu = 2.3

SAMPLE SOURCE: 10 YR. 6/3 MUNSSELL COLOR CODE: 10 YR. 6/3 DATE SAMPLED: December 1987

SOIL CLASSIFICATION (ASTM: D2487) SAND, fine to medium grained, pale brown (SP)

FORM #411 SL (2/87)

**Foth & Van Dyke**  
 Engineers/Architects  
 2737 S. Ridge Road  
 P. O. Box 19012  
 Green Bay, Wisconsin 54307-9012  
 414/497-2500

PROJECT: Kennecott Geotechnical  
 JOB NO.: 87K10  
 DATE: February 10 to 12, 1988

**PERMEABILITY TEST  
 CONSTANT HEAD**

SAMPLE NO.: Boring: B-WC3 Depth: 31'-34'

SOIL DESCRIPTION: SAND, fine to medium grained, pale brown (SP)

% COMPACTION 90.0

COMPACTED DRY DENSITY = 102.5 pcf

MOISTURE = 11.7%

SAMPLE DIAMETER = 4.00"

SAMPLE HEIGHT = 4.25"

RUN NO.	HEAD, cm	DURATION, Seconds	PERMEABILITY, CM/SEC.	REMARKS
1	175	30	2.94 x 10 <sup>-3</sup>	
2	175	30	2.98 x 10 <sup>-3</sup>	
3	175	30	3.02 x 10 <sup>-3</sup>	
4	175	30	2.81 x 10 <sup>-3</sup>	
5	175	30	2.74 x 10 <sup>-3</sup>	
6	175	30	2.68 x 10 <sup>-3</sup>	
7	175	30	2.62 x 10 <sup>-3</sup>	

Average of Perm Readings = 2.8 x 10<sup>-3</sup>  
 Project Specification = 1.0 x 10<sup>-3</sup> or faster

REMARKS: Based on the results of the sample submitted and tested, this material would meet the permeability rate as noted above.



LOG OF TEST BORING NO.: B-WC3A										SURFACE ELEVATION: 1140.3'	
CLIENT: Kennecott PROJECT: Waste Characterization PROJECT NUMBER: 87K10-6 LOCATION: North end; Section 422, 2' N baseline about 10' N of B-WC3 COORDINATES: 41293 N, 40505 E (Approx.)										BORING DEPTH: 28.0'	
										DATE: 12/04/87	
MSL ELEV	DEPTH FR LND SURF	SAMP DEPTH INTERVAL	TYPE	#	N	REC (ft)	DESCRIPTION OF MATERIAL	CLASS	LABORATORY TESTS	DRILLING AND SAMPLE NOTES	
1140.3	--0.0										
1137.8	--2.5	2.5-4.5	ss	1	P	2.0	Brn silty SAND, fn, poorly graded, slightly cohesive, moist. (Aeolian sand w/B-horizon at 2.5-3.5')	SM			
1135.3	--5.0	4.5-7.0	ss	2	P	2.0	As above to 6', then poorly graded SAND w/silt, fn w/med & cse sand, fn gvl., loose, dry. (Fluvial sand & gvl)				
1132.8	--7.5	7.0-9.0	ss	3	P	2.0	As above except layered fn & med, loose, dry	SP-SM			
1130.3	--10.0	9.0-9.5	ss	4	P	0.5	As above (pushed bldr)				
		9.5-10.0	ss	5	P	0.5	Brn poorly graded SAND w/silt, fn, loose (Bldr at 10')				
1127.8	--12.5	10.0-12.0	ss	6	D	2.0	As above w/layers well graded SAND w/silt, med w/fn & cse sand, fn & cse gvl, saturated, (w/drilling water)	SP-SM SW-SM			
		12.0-14.0	ss	7	D	2.0	As above, loose, dry, silty SAND layer (2" thick) at 13'				
1125.3	--15.0	14.0-16.0	ss	8	D	1.5	Brn well graded SAND w/silt, cse, w/fn & med, fn gvl, loose, saturated, much feldspar	SW-SM			
1122.8	--17.5	16.0-18.0	ss	9	D	2.0	As above to 17', then red brn silty SAND, well graded (diamict), firm, cohesive, moist, (till)				
		18.0-20.0	ss	10	D	2.0	As above to 19', then brn poorly graded SAND, fn, saturated, slightly cohesive	SM			
1120.3	--20.0	20.0-22.0	ss	11	D	2.0	As above to 21', then red brn silty SAND, fn, well graded (diamict), firm, cohesive, moist (till)	SP-SM			
1117.8	--22.5	22.0-24.0	ss	12	D	2.0	As above, uniform, dense, cohesive	SM			
1115.3	--25.0	24.0-26.0	ss	13	D	2.0	Same to 25.5', then red brn layered, well graded SAND, fn w/med & fn gvl, saturated				
		26.0-28.0	ss	14	D	2.0	Red brn silty SAND (till) as above to 27.7', then vy pale yel poorly graded SAND, fn, loose, saturated (sandstone)	SW SM		P - Pushed D - Drove	
1112.8	--27.5						28'-End of Boring in sandstone	SP =====			

DRILLING DATA

START DATE: 12/04/87  
 COMPLETION DATE: 12/04/87  
 LOGGED BY: BJS  
 DRILLING METHOD: Mud rotary  
 DRILLING CONTRACTOR: Luisier Drilling, Inc.

WATER LEVEL INFORMATION

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