APPENDIX A

RECORDS OF BOREHOLES

Project No. 802-1073

RECORD OF BOREHOLE #1 T-2

LOCATION (See Figure 2) BORING DATE July 27-29, 1980

BOREHOLE TYPE Rotary BOREHOLE DIAMETER 4 1/2 in.

SAMPLER HAMMER WEIGHT 140 LB. DROP 30 IN. DATUM Ker Preistman & Associates

SOIL PROFILE								PIEZOMETER OR STANDPIPE INSTALLATION
ELEV. / DEPTH	DESCRIPTION	STRATIGRAPHY PLOT	SAMPLE NUMBER	SAMPLE TYPE	BLOWS / FOOT	ELEVATION SCALE	WATER CONTENT PERCENT W_P W W_L	ADDITIONAL LAB. TESTING
2841.1	Ground Surface							
0.0	Sandy GRAVEL with occ. cobbles & boulders							
2791.0								
50.0'	End of Borehole.							

VERTICAL SCALE
1 inch to 10 feet

Golder Associates

DRAWN
CHECKED

Project No. 802-1073

RECORD OF BOREHOLE #2 T-2

LOCATION (See Figure 2) BORING DATE July 30-Aug. 2, 1980

BOREHOLE TYPE Rotary BOREHOLE DIAMETER 4½ in.

SAMPLER HAMMER WEIGHT 140 LB. DROP 30 IN. DATUM Ker Preistman & Associates

SOIL PROFILE ELEV. / DEPTH	DESCRIPTION	STRATIGRAPHY PLOT	SAMPLE NUMBER	SAMPLE TYPE	BLOWS / FOOT	ELEVATION SCALE	UNDRAINED SHEAR STRENGTH (IN SITU: □ UNDISTURBED, △ REMOULDED; LAB: ■ UNDISTURBED, ▲ REMOULDED) 1000 2000 3000 4000 psf / WATER CONTENT PERCENT Wp W WL 20 40 60 80	PIEZOMETER OR STANDPIPE INSTALLATION / ADDITIONAL LAB. TESTING
2846.2	Ground Surface							
0.0	Sandy GRAVEL with occ. cobbles							
2830.7								
15.5'	Very stiff, dark grey silty CLAY		1	3½" T.O.	PH		▲ ■	
			2	"	"		▲ ■	
			3	"	"		▲ ■ ⊠ Q Test	
2799.2			4	"	"			
47.0'	Sandy GRAVEL with occ. cobbles							
2786.2								
60.0'	End of Borehole.							

VERTICAL SCALE

Golder Associates

DRAWN

B. 100

RECORD OF BOREHOLE #3 T-2

Project No. 802-1073

LOCATION (See Figure 2) BORING DATE Aug. 3-5, 1980

BOREHOLE TYPE Rotary BOREHOLE DIAMETER 4 1/2 in.

SAMPLER HAMMER WEIGHT 140 LB. DROP 30 IN. DATUM Ker Preistman & Associates

SOIL PROFILE ELEV. / DEPTH	DESCRIPTION	STRATIGRAPHY PLOT	SAMPLE NUMBER	SAMPLE TYPE	BLOWS / FOOT	ELEVATION SCALE	UNDRAINED SHEAR STRENGTH (IN SITU: □ UNDISTURBED, △ REMOULDED; LAB: ■ UNDISTURBED, ▲ REMOULDED; 1000 2000 3000 4000 psf) / WATER CONTENT PERCENT (Wp W WL; 20 40 60 80)	PIEZOMETER OR STANDPIPE INSTALLATION / ADDITIONAL LAB. TESTING
2843.4	Ground Surface							
0.0	Sandy GRAVEL with occ. cobbles & boulders							
2834.9								
8.5	Very stiff, dark grey silty CLAY		1	3 1/2" T.O.	PH		▲ ■	Aug. 24 Seal
			2	"	"		△ □	Seal
2805.9							△ □	
37.5'	Sandy GRAVEL with occ. cobbles							Seal
2796.4								
47.0'	End of Borehole.							

VERTICAL SCALE

Golder Associates

DRAWN

Project No. 802-1073

RECORD OF BOREHOLE #4 T-2

LOCATION (See Figure 2) BORING DATE Aug. 6-9, 1980

BOREHOLE TYPE Rotary BOREHOLE DIAMETER 4½ in.

SAMPLER HAMMER WEIGHT 140 LB. DROP 30 IN. DATUM Ker Preistman & Associates

SOIL PROFILE ELEV. / DEPTH	DESCRIPTION	STRATIGRAPHY PLOT	SAMPLE NUMBER	SAMPLE TYPE	BLOWS / FOOT	Temperature Profile (°C)	UNDRAINED SHEAR STRENGTH (IN SITU / LAB) 1000 2000 3000 4000 psf; WATER CONTENT PERCENT Wp W WL 20 40 60 80	PIEZOMETER OR STANDPIPE INSTALLATION / ADDITIONAL LAB. TESTING
2842.3	Ground Surface					Sept. 2, 1980		
0.0	SAND and GRAVEL with occ. cobbles					11.0		Aug. 24, 1980
						7.8		Seal
						5.4		
2820.3						3.8		Seal
22.0'	Hard, dark grey silty CLAY					3.6		
			1	3½" T.O.	Ph	3.6		
						3.6		Seal
2797.8								
44.5'	Sandy GRAVEL with occ. cobbles and boulders							
2768.3								
74.0'	End of Borehole.							

VERTICAL SCALE

Golder Associates

DRAWN

RECORD OF BOREHOLE #5 T-2

Project No. 802-1073

LOCATION (See Figure 2)

BOREHOLE TYPE Rotary

SAMPLER HAMMER WEIGHT 140 LB. DROP 30 IN.

BORING DATE Aug. 10-12, 1980

BOREHOLE DIAMETER 4½ in.

DATUM Ker Preistman & Associates

ELEV. / DEPTH	DESCRIPTION	STRATIGRAPHY PLOT	SAMPLE NUMBER	SAMPLE TYPE	BLOWS / FOOT	ELEVATION SCALE	UNDRAINED SHEAR STRENGTH (IN SITU: □ UNDISTURBED, △ REMOULDED; LAB: ■ UNDISTURBED, ▲ REMOULDED; 1000 2000 3000 4000 psf) / WATER CONTENT PERCENT (Wp W WL; 20 40 60 80)	PIEZOMETER OR STANDPIPE INSTALLATION / ADDITIONAL LAB. TESTING
2851.5	Ground Surface							
0.0	SAND and GRAVEL with trace clay & occ. boulders							
2829.0								
22.5'	Very stiff, dark grey silty CLAY		1	3½" T.O.	PH		▲ ■ △ □	
			2	"	"		▲ ■	
2804.5								
47.0'	Sandy GRAVEL with occ. cobbles							
2793.5								
58.0'	End of Borehole.							

VERTICAL SCALE

Project No. 802-1073

RECORD OF BOREHOLE #6 T-3

LOCATION (See Figure 4)
BORING DATE Aug. 13-14, 1980
BOREHOLE TYPE Rotary
BOREHOLE DIAMETER 4½ in.
SAMPLER HAMMER WEIGHT 140 LB. DROP 30 IN.
DATUM Ker Preistman & Associates

SOIL PROFILE ELEV. / DEPTH	DESCRIPTION	STRATIGRAPHY PLOT	SAMPLE NUMBER	SAMPLE TYPE	BLOWS / FOOT	ELEVATION SCALE	UNDRAINED SHEAR STRENGTH (IN SITU: □ UNDISTURBED △ REMOULDED; LAB: ■ UNDISTURBED ▲ REMOULDED) 1000 2000 3000 4000 psf / WATER CONTENT PERCENT Wp W WL	PIEZOMETER OR STANDPIPE INSTALLATION / ADDITIONAL LAB. TESTING
2810.7	Ground Surface							
0.0	SAND and GRAVEL with trace silt and occ. cobbles							▼ Aug. 24, 198 (Open Hole.
2799.2								
11.5'	Very stiff, dark grey CLAY		1	3½"	Ph			
				T.O.				
			2	"				
2766.7								
44.0'	Sandy GRAVEL with occ. cobbles							
2754.7								
56.0'	End of Borehole.							

VERTICAL SCALE 1 inch to 10 feet

Golder Associates

DRAWN
CHECKED DTS

RECORD OF BOREHOLE #7 T-3

Project No. 802-1073

LOCATION (See Figure 4) BORING DATE Aug. 15-17, 1980

BOREHOLE TYPE Rotary BOREHOLE DIAMETER 4 1/2 in.

SAMPLER HAMMER WEIGHT 140 LB. DROP 30 IN. DATUM Ker Preistman & Associates

ELEV. / DEPTH	DESCRIPTION	STRATIGRAPHY PLOT	SAMPLE NUMBER	SAMPLE TYPE	BLOWS / FOOT	Temperature Profile (°C)	UNDRAINED SHEAR STRENGTH (IN SITU / LAB): □ UNDISTURBED, △ REMOULDED, ■ UNDISTURBED, ▲ REMOULDED; 1000 2000 3000 4000 psf; WATER CONTENT PERCENT Wp W WL; 20 40 60 80	PIEZOMETER OR STANDPIPE INSTALLATION / ADDITIONAL LAB. TESTING
2806.3	Ground Surface					Sept. 2, 1980		
0.0	Sandy GRAVEL with trace silt and occ. cobbles					8.7		
2791.8						6.2		Seal
14.5'	Very stiff, dark grey CLAY		1	3 1/2" T.O.	Ph	3.9	△ □	
						3.2		
						3.3	△ □	Seal
			2	"	"	3.1		
						3.2	△ □	
2762.3							▲ □	
44.0'	Sandy GRAVEL with occ. cobbles							
2752.3								
54.0'	End of Borehole.							Aug. 24, 1980

VERTICAL SCALE 1 inch to 10 feet

Golder Associates

DRAWN CHECKED DJS

RECORD OF BOREHOLE # B T-3

Project No. 802-1073

LOCATION (See Figure 4) BORING DATE Aug. 18, 1980

BOREHOLE TYPE Rotary BOREHOLE DIAMETER 4½ in.

SAMPLER HAMMER WEIGHT 140 LB. DROP 30 IN. DATUM Ker Preistman & Associates

SOIL PROFILE ELEV. / DEPTH	DESCRIPTION	STRATIGRAPHY PLOT	SAMPLE NUMBER	SAMPLE TYPE	BLOWS / FOOT	ELEVATION SCALE	WATER CONTENT PERCENT Wp W WL	PIEZOMETER OR STANDPIPE INSTALLATION / ADDITIONAL LAB. TESTING
2802.4	Ground Surface							
0.0	SAND and GRAVEL with occ. cobbles & boulders							▼ Aug. 24, 19 (Open Hole
2793.4			1	H CORE				
9.0'	BEDROCK							
10.0'	End of Borehole.							

VERTICAL SCALE 1 inch to 4 feet

Golder Associates

DRAWN CHECKED DJS

B. 100

Project No. 802-1013

RECORD OF BOREHOLE #9 T-3

LOCATION (See Figure 4) BORING DATE Aug. 19-21, 1980

BOREHOLE TYPE Rotary BOREHOLE DIAMETER 4½ in.

SAMPLER HAMMER WEIGHT 140 LB. DROP 30 IN. DATUM Ker Preistman & Associates

SOIL PROFILE ELEV. / DEPTH	DESCRIPTION	STRATIGRAPHY PLOT	SAMPLE NUMBER	SAMPLE TYPE	BLOWS / FOOT	ELEVATION SCALE	UNDRAINED SHEAR STRENGTH (IN SITU □ UNDISTURBED △ REMOULDED; LAB ■ UNDISTURBED ▲ REMOULDED; 1000 2000 3000 4000 psf) / WATER CONTENT PERCENT W_P W W_L	PIEZOMETER OR STANDPIPE INSTALLATION / ADDITIONAL LAB. TESTING
2805.3	Ground Surface							
0.0	SAND and GRAVEL with trace silt and occ. cobbles							Aug. 2[illegible] 1980 Seal
2788.3								
17.0'	Very stiff, dark grey CLAY		1	3½" T.O.	Ph			Seal
			2	"	"			
2760.3								
45.0'	SAND and GRAVEL with occ. cobbles							
2750.3								
55.0'	End of Borehole.							

VERTICAL SCALE 1 inch to 10 feet

Golder Associates

DRAWN

Project No. 802-1013

RECORD OF BOREHOLE #10 Mill

LOCATION (See Figure 3) BORING DATE Aug. 22-25, 1980

BOREHOLE TYPE Rotary BOREHOLE DIAMETER 4½ in.

SAMPLER HAMMER WEIGHT 140 LB. DROP 30 IN. DATUM Ker Preistman

ELEV. / DEPTH	DESCRIPTION	STRATIGRAPHY PLOT	SAMPLE NUMBER	SAMPLE TYPE	BLOWS / FOOT	Temperature Profile (°C)	WATER CONTENT PERCENT W_P W W_L	PIEZOMETER OR STANDPIPE INSTALLATION / ADDITIONAL LAB. TESTING
2834.9	Ground Surface					Sept. 2, 1980		
0.0	GRAVEL with some sand and occ. cobbles and boulders					-7.2		Seal Aug. 25, 1980
						-7.2		
						-5.9		
						-5.6		
						-5.4		
						-4.8		
2791.9						-4.6		
43.0'	BEDROCK		1	1 7/8" NQ CORE				
2782.9								
52.0'	End of Borehole.							

VERTICAL SCALE Golder Associates DRAWN

Project No. 802-1073

RECORD OF BOREHOLE #11 Mill

LOCATION (See Figure 3)

BOREHOLE TYPE Rotary

SAMPLER HAMMER WEIGHT 140 LB. DROP 30 IN.

BORING DATE Aug. 26-27, 1980

BOREHOLE DIAMETER 4½ in.

DATUM Ker Preistman & Associates

SOIL PROFILE ELEV. / DEPTH	DESCRIPTION	STRATIGRAPHY PLOT	SAMPLE NUMBER	SAMPLE TYPE	BLOWS / FOOT	ELEVATION SCALE	WATER CONTENT PERCENT W_P W W_L	PIEZOMETER OR STANDPIPE INSTALLATION / ADDITIONAL LAB. TESTING
2836.4	Ground Surface							
0.0	SAND & GRAVEL with trace silt & occ. cobbles							▼ Aug. 24, 1980 (Open Hole)
2785.4								
51.0'	BEDROCK							
2781.4								
55.0'	End of Borehole.							

VERTICAL SCALE

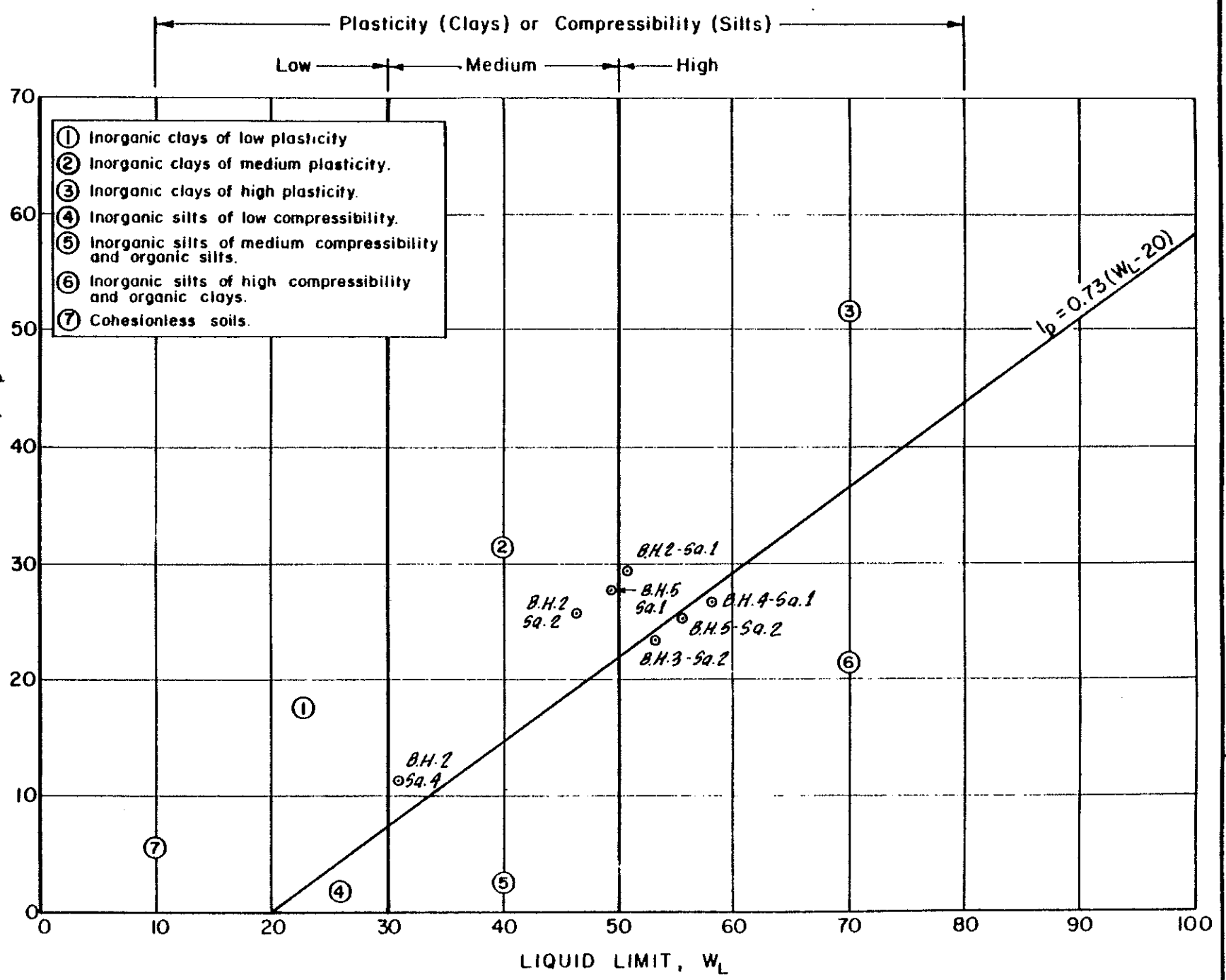
Golder Associates

DRAWN

APPENDIX B

LABORATORY TEST RESULTS

Project No. 802-1073



PLASTICITY CHART

FIGURE B-1

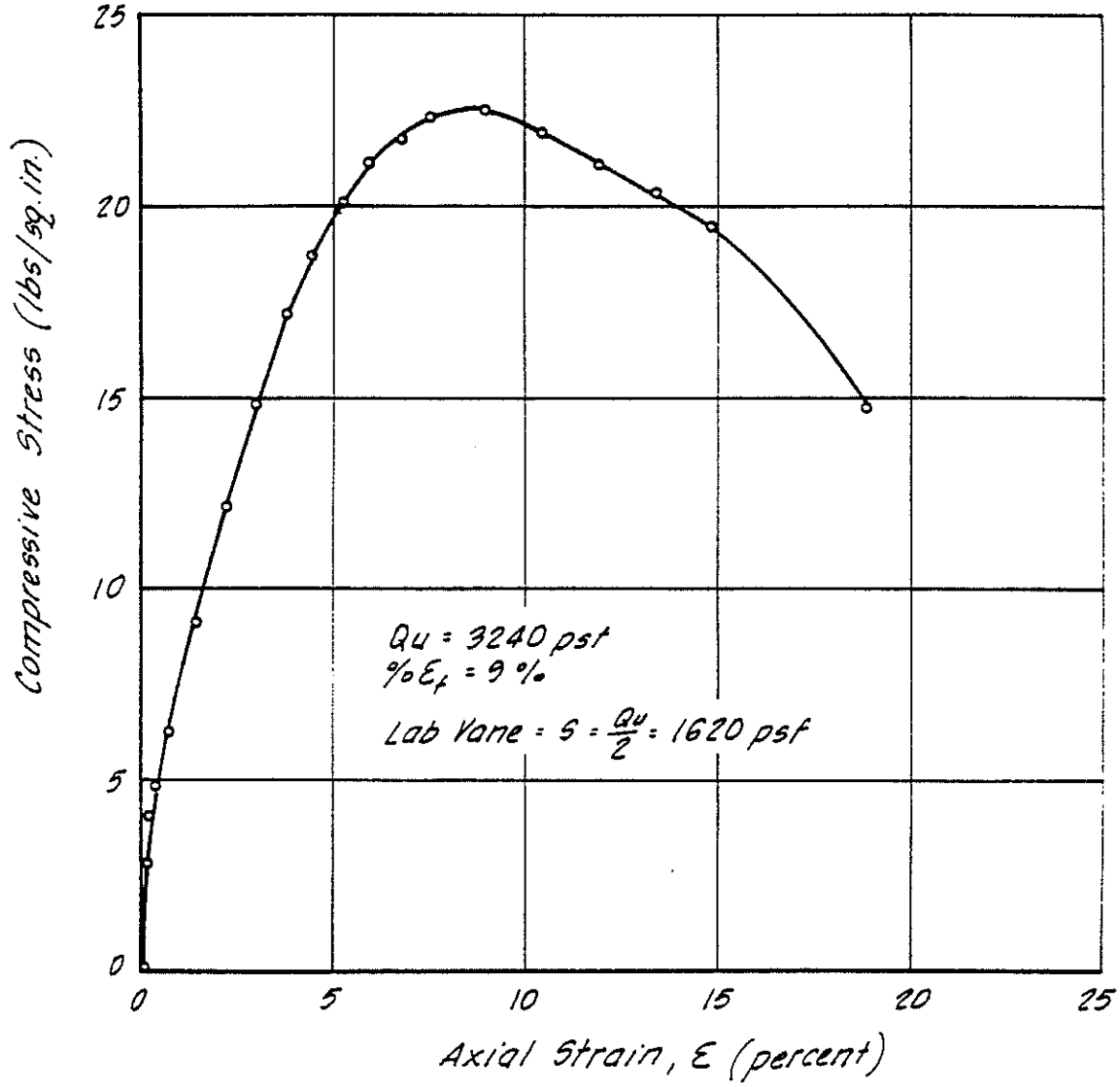
Golder Associates

Drawn
App'd
Date

UNCONFINED COMPRESSION TEST RESULT

Figure B - 2

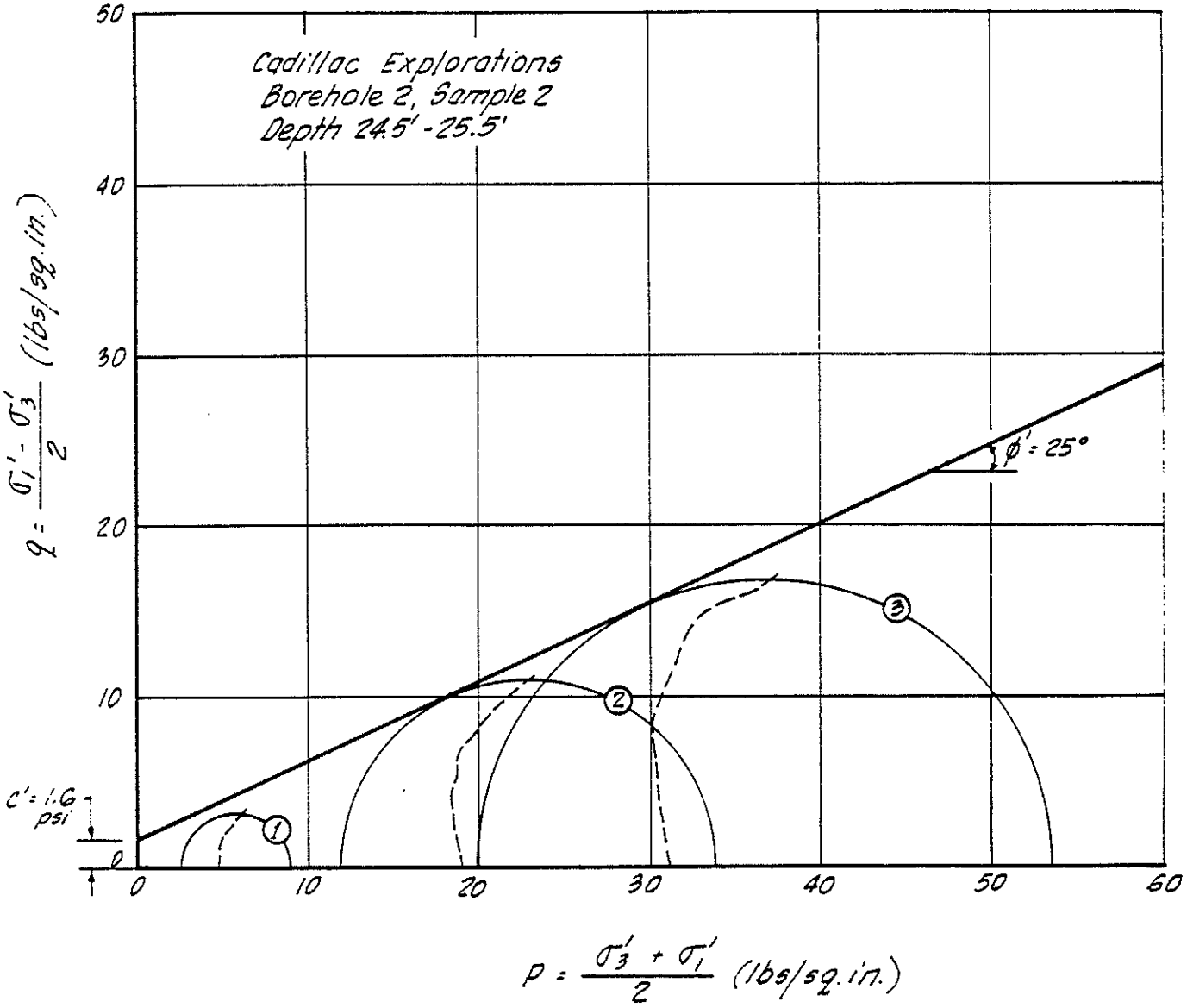
Cadillac Mines
B.H. 2, Sample 3, Depth 35'-37'



Project No. 802-1073 Drawn KJ Reviewed [illegible] Date Sept. 18

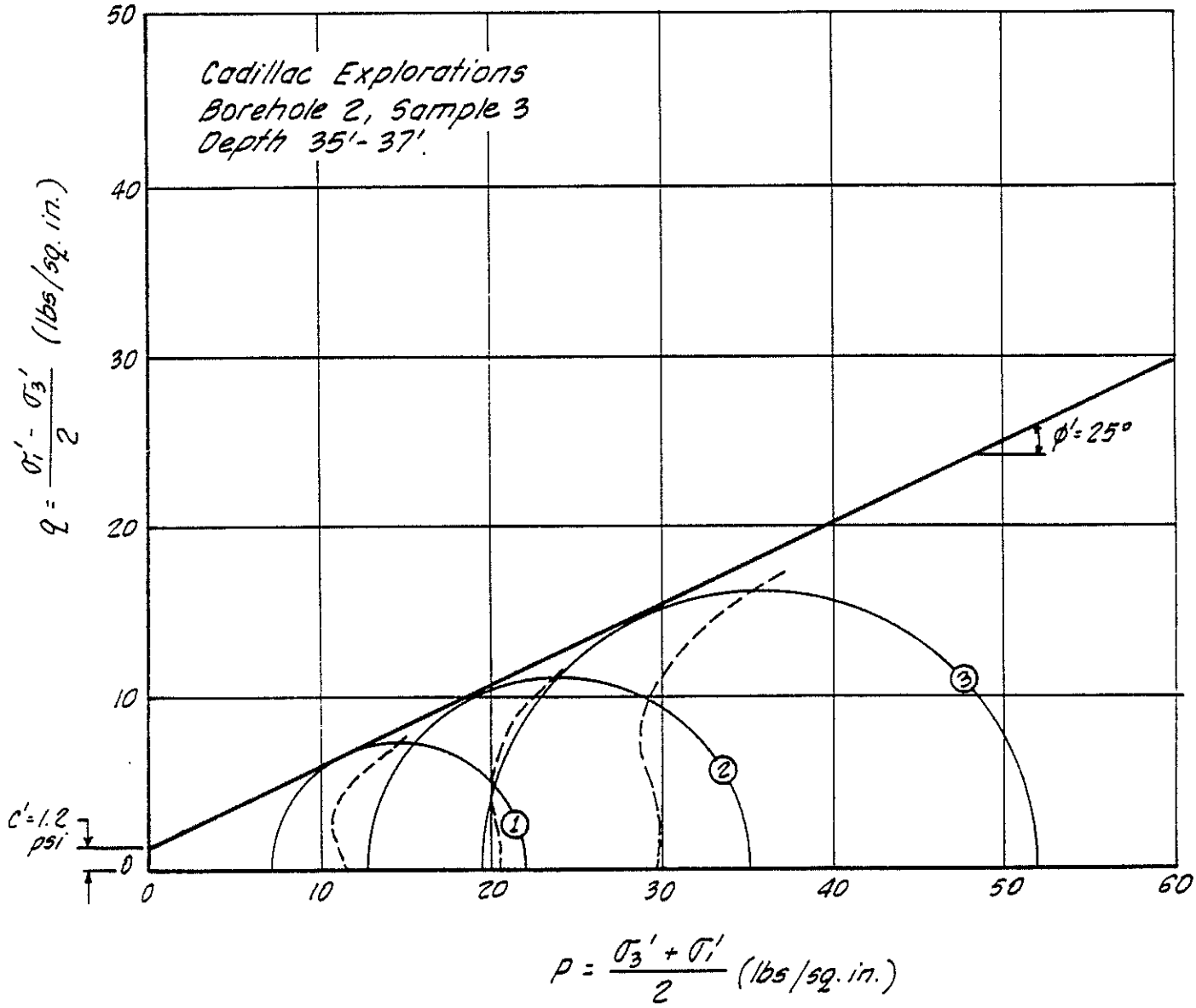
CONSOLIDATED UNDRAINED TRIAXIAL TESTING WITH PWP MEASUREMENT FAILURE ENVELOPE

Figure B-3



CONSOLIDATED UNDRAINED TRIAXIAL TESTING
WITH PWP MEASUREMENT FAILURE ENVELOPE

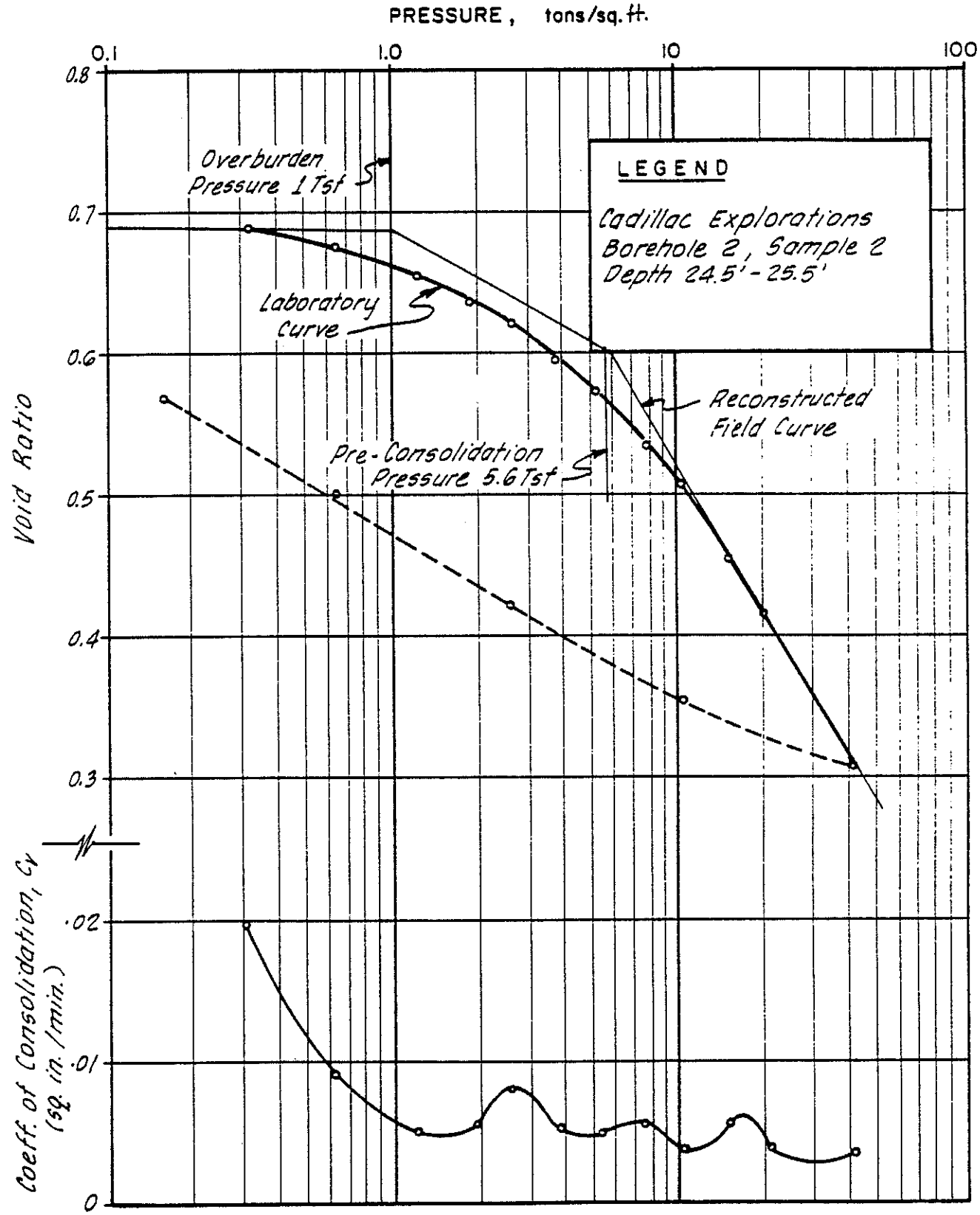
Figure B - 4



Project No. _____

VOID RATIO - PRESSURE CURVES
CONSOLIDATION TEST

FIGURE B-5



Golder Associates

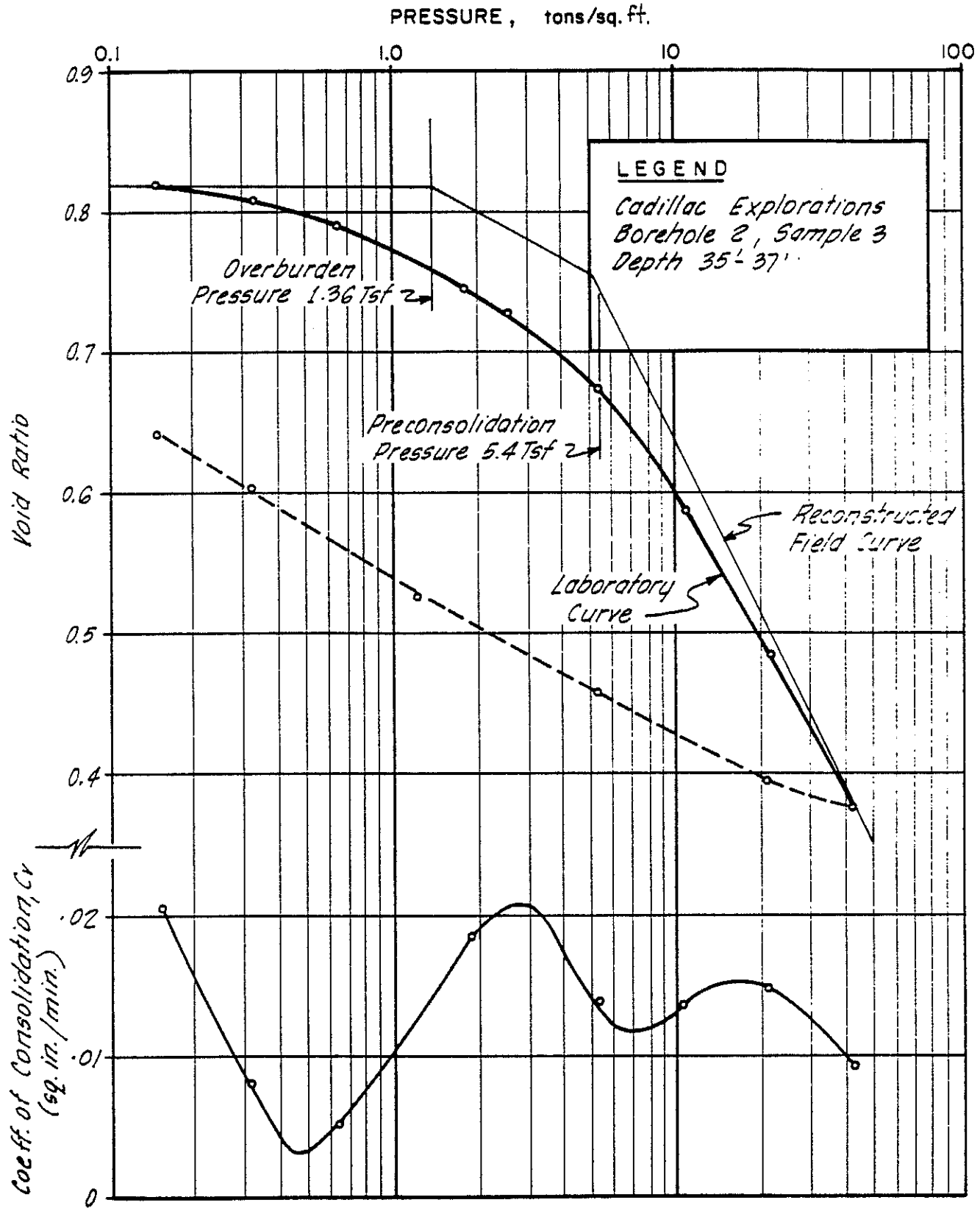
Drawn _____
App'd _____
Date Sept. 18

106

Project No. _____

VOID RATIO - PRESSURE CURVES
CONSOLIDATION TEST

FIGURE B-6



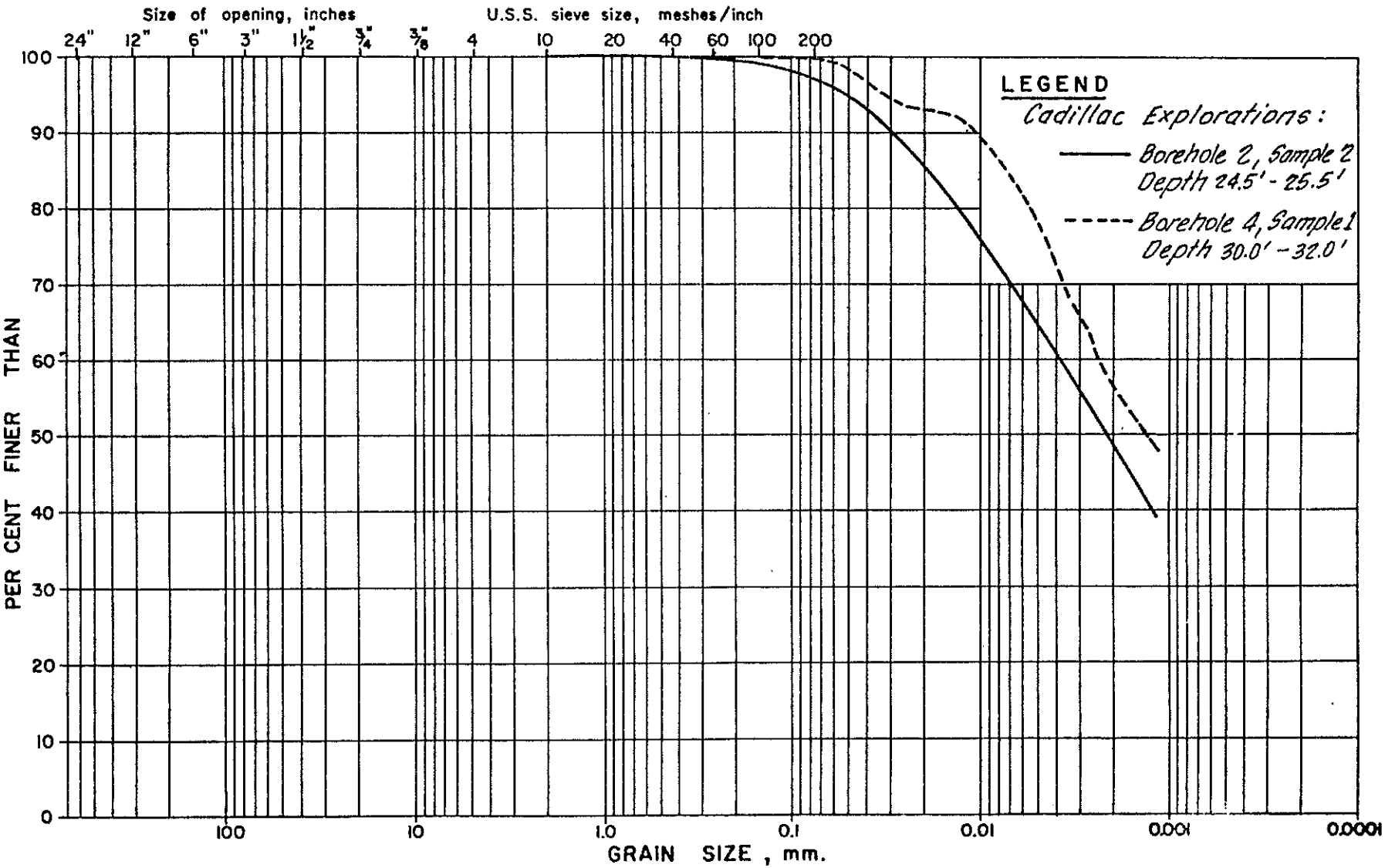
Golder Associates

Drawn _____
App'd _____
Date Sept. '80

106

Project No. 802-1073 Drawn [illegible] Reviewed [illegible] Date Sept. '80

M.I.T. GRAIN SIZE SCALE



BOULDER SIZE	COBBLE SIZE	coarse	medium	fine	coarse	medium	fine	fine grained	
		GRAVEL SIZE			SAND SIZE			SILT SIZE	CLAY SIZE

GRAIN SIZE DISTRIBUTION

Figure B - 7

Golder Associates

APPENDIX C

B.H. LEVELTON & ASSOCIATES LTD. - CONCRETE AGGREGATE EVALUATION

B. H. LEVELTON & ASSOCIATES LTD. 8805 Osler St., Vancouver, B.C. V6P 4G1 • 266-1411

September 24, 1980

File 80-514C

Golder & Associates
224 West 8th Avenue
Vancouver, B.C. V5Y 1N5

Attention: Mr. D. Shirley

PROJECT: Job 802-1073 Cadillac Explorations

SUBJECT: Concrete Aggregate Evaluation

Dear Sirs:

On September 10, 1980, B.H. Levelton & Associates Ltd. was commissioned to carry out aggregate quality assessment of material received that date from three identified sources related to Cadillac Explorations Ltd. The samples were not divided to coarse and fine aggregate fractions but were identified as "No. 1", "No. 2" and "No. 3". The bulk of process testing related to aggregate qualification and has been completed at this writing and this consitutes B.H. Levelton & Associates' interim report.

SAMPLE "NO. 1" (50 ft. N.E. of Borehole 9; alluvial sands & gravels)

Grading analysis of the sample as received is detailed on our Plate 1 attached. Thirty-eight percent of the material represents sand sizes less than 5 mm with 96 percent of the sample finer than 40 mm (industrially accepted upper limit for portland cement concretes). The fine aggregate fraction of the sample is detailed on Plate 4, showing generally acceptable concrete sand grading except that the material is at the highest limit of coarseness permitted by CSA A23.1 Table 1. The sample had a relative density of 2.60 for fine aggregate with an absorption of 2.8%. Organic impurities test on the sand fraction yielded a No. 1 colour, meeting the general requirements of Clause 5.3.3.2.2. of CSA A23.1. Magnesium sulphate soundness tests on the fine aggregate fraction are in progress at this writing and will be reported upon when complete.

The coarse aggregate fraction on the basis of material finer than 40 mm is shown on Plate 7 attached. For coarse aggregate, it can be assumed that 5 percent of the sample as received is oversize. The sample had a relative density of 2.687 and an absorption of 1.07 percent. Los Angeles Abrasion test results (CSA A23.2. - 16(a)) for Grading B yielded a total loss of 23.1 percent. CSA A23.1. specifies a maximum loss of 50 percent except where significant wear may occur when the loss shall be less than 35 percent. On the coarse aggregate fraction magnesium sulphate soundness tests are also in progress and will be reported upon under separate cover.

SAMPLE "NO. 2" (50 ft. West of Borehole 6; alluvial sands & gravels)

Grading analyses for the sample as received are detailed on Plate 2 attached. Thirty-seven percent of the sample is finer than 5 mm and 93 percent is finer than 40 mm.

The fine aggregate fraction grading is shown on Plate 5 attached. The sample does not meet the requirements of CSA A23.1. Table 1, being outside the limits of coarseness for concrete sands and having a fineness modulus of 3.40 (CSA limits between 2.3 and 3.1). The organic colour is No. 1 meeting the general requirements of Clause 5.3.3.2.2. of CSA A23.1. The sample had a relative density of 2.60 and an absorption of 2.6 percent. Magnesium sulphate soundness tests are in progress at this writing and will be reported upon when complete.

The coarse aggregate fraction finer than 40 mm demonstrated an oversize of 24 percent and generally conforms to the requirements of CSA A23.1. Group 1 for 40 mm x 5 mm aggregates with the sample being slightly finer than the grain size limit. Los Angeles abrasion test results (CSA A23.2. - 16A Grading B) yielded a percent loss of 25.9; within the significant wear maximum limits specified by CSA A23.1. Magnesium sulphate soundness tests on the coarse aggregate fraction are in process at this writing and will be reported upon when complete.

SAMPLE "NO. 3" (200 ft. North of 2850 ft. portal; mine waste)

The grading of this sample as received is detailed on Plate 3. The sample contained 22 percent finer than 5 mm and 93 percent finer than 40 mm. (This is the industrially considered upper limit for aggregate in portland cement concrete.) Please note that this sample contained a very small fraction of sand in contrast to the other samples. This would result in significant difficulties in creating a densely graded product without wastage in the sizes between 40 and 5 mm.

The fine aggregate fraction is shown on Plate 6. The grading is outside the CSA A23.1. Table 1 limits for fine aggregate, below the limits of coarseness for concrete sand. It is also notable that the fine aggregate contained more than 8 percent finer than 80 μm by wash (decant) method. The sample had a relative density of 2.73 and an absorption of 0.99 percent. Magnesium sulphate soundness tests are in progress at this writing and will be reported upon when complete. The organic impurity test for the fine aggregate fraction yielded a No. 1 colour, within the general requirement of Clause 5.3.3.2.2. of CSA A23.1.

A coarse aggregate fraction for 40 x 5 mm sizes is detailed on Plate 8 attached. The sample is within the grain size limits for that concrete aggregate fraction and demonstrated a relative density of 2.774 and an absorption of 0.76 percent. Eleven percent of the sample was oversize material. Los Angeles abrasion test results (CSA A23.2. - 16(a)) for Grading B yielded a loss of 21.8 percent, within the limits for concrete where significant wear may occur. Magnesium sulphate soundness tests are in process at this writing and will be reported upon when complete.

GENERAL REMARKS

The sand grading for all three sources of material as received indicates that they are at the extreme limits of coarseness for the manufacture of portland cement concrete. In the case of Sample 3, a high percentage of fines is also present. It is expected that washing of concrete aggregates or other separation techniques may be required in order to prepare the fine aggregate fraction, and further that a blending sand (fineness modulus approximating 2.0) may be required in quantity in order to improve the placement, finishing and strength improvement characteristics of the material.

Pending the results of sand sulphate tests, test program absorptions for Samples 1 and 2 indicate reasonably higher than usual values. While it is unlikely that sulphate losses will exceed those specified in CSA A23.1., the use of fine aggregates with fine absorptions, such as those demonstrated by these samples, suggests some expansive and reactive difficulties might be experienced in severe environments where portland cement concretes are manufactured. B.H. Levelton & Associates will be able to comment further on this parameter when sulphate tests have been concluded.

Coarse aggregate fractions for Samples 1 and 2 are round to subround and contain significant portions of oversize material. These samples may to some extent benefit from crushing operations to improve grading and strength characteristics of manufactured

concrete. Sample 3 is subangular to angular and may produce difficulties in bleeding and finishing for portland cement concrete manufacture. This is also the source of material from which a small sand fraction was obtained (see remarks above).

After the magnesium sulphate soundness tests are reported, B.H. Levelton & Associates will be pleased to discuss separation equipment and techniques for the material preparation. It is stressed that our remarks herein are limited only in scope to the materials as received in the Vancouver laboratory.

Yours very truly,

B.H. LEVELTON & ASSOCIATES LTD.

M.E. Seymour, P.Eng.

MERS/mn

B. H. LEVELTON & ASSOCIATES LTD. 8805 Osler St., Vancouver, B.C. V6P 4G1 • 266-1411

COPY

October 8, 1980

File 80-514C

Golder & Associates
224 West 8th Avenue
Vancouver, B. C.
V5Y 1N5

Attention: Mr. D. Shirley

PROJECT: Job 802-1073 Cadillac Explorations

SUBJECT: Concrete Aggregate Evaluation

CROSS REFERENCE: Ours dated 24 September 1980

Dear Sirs:

Magnesium sulfate soundness tests referenced in our letter report of 24 September 1980 for aggregates received in connection with the evaluation of Cadillac Explorations Ltd. granular material for portland cement concrete manufacture.

Sample "#1" evidenced a weighted percent loss for coarse aggregate fractions of 2.5% and for fine aggregate fractions, 3.1%. Sample "#2" demonstrated a weighted percent loss for coarse aggregate of 1.42%, and for fine aggregate, 5.1%. Sample "#3" showed a weighted percent loss for coarse aggregate of 2.3% and for fine aggregate, 8.2%.

All these values are within the maximum guidelines specified by CSA A23.1 for all class exposure of portland cement manufactured concrete.

We trust that this completed the information requirements you have in connection with this project.

Yours very truly

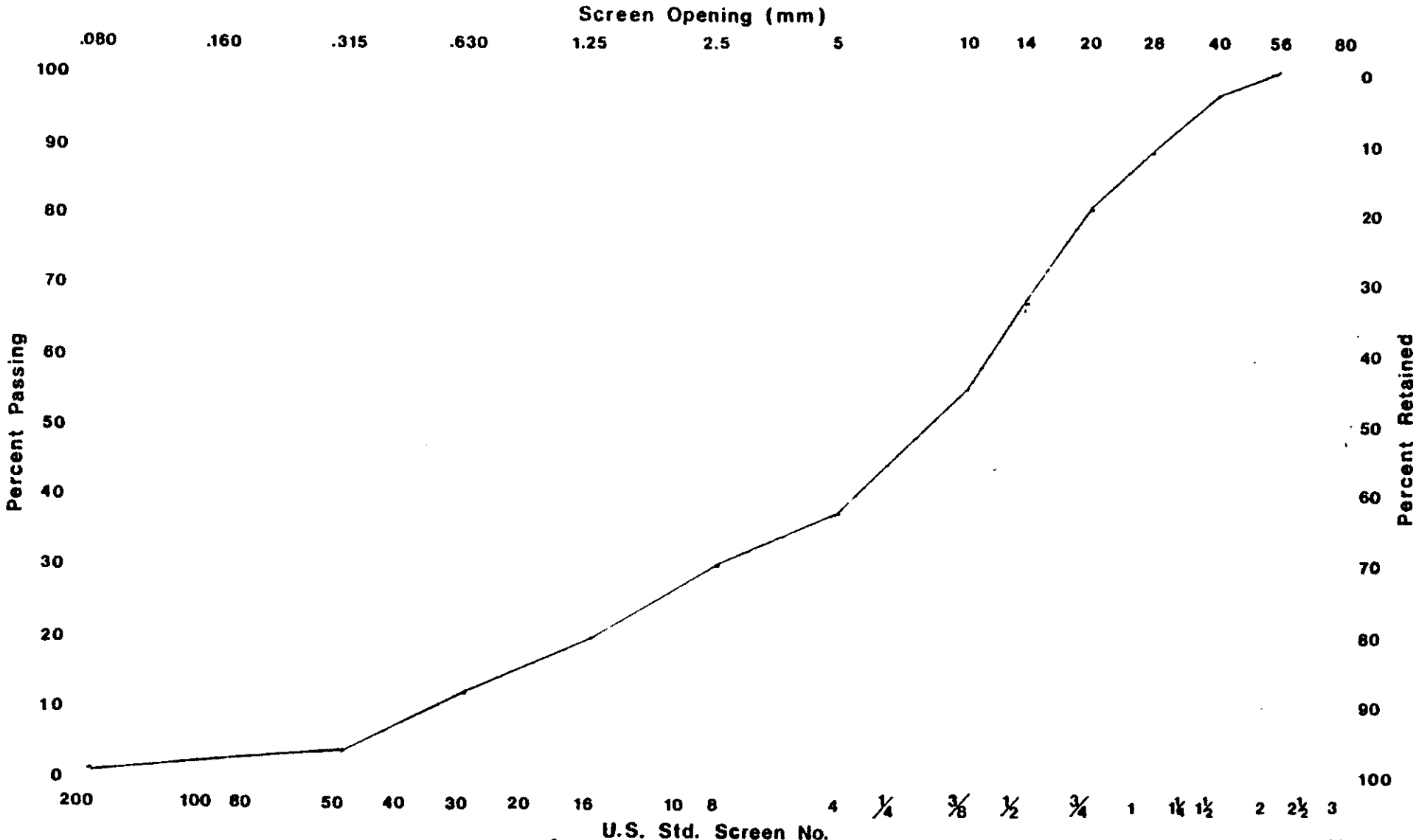
B. H. LEVELTON & ASSOCIATES LTD.

per /for.

M. E. Seymour, P.Eng.

MES:ml

AGGREGATE GRADATION CHART



Project: Cadillac Explorations (Golder)

Material: Gravel Sandy (As Received)

Date Sampled: Submitted

Sample No.: # 1

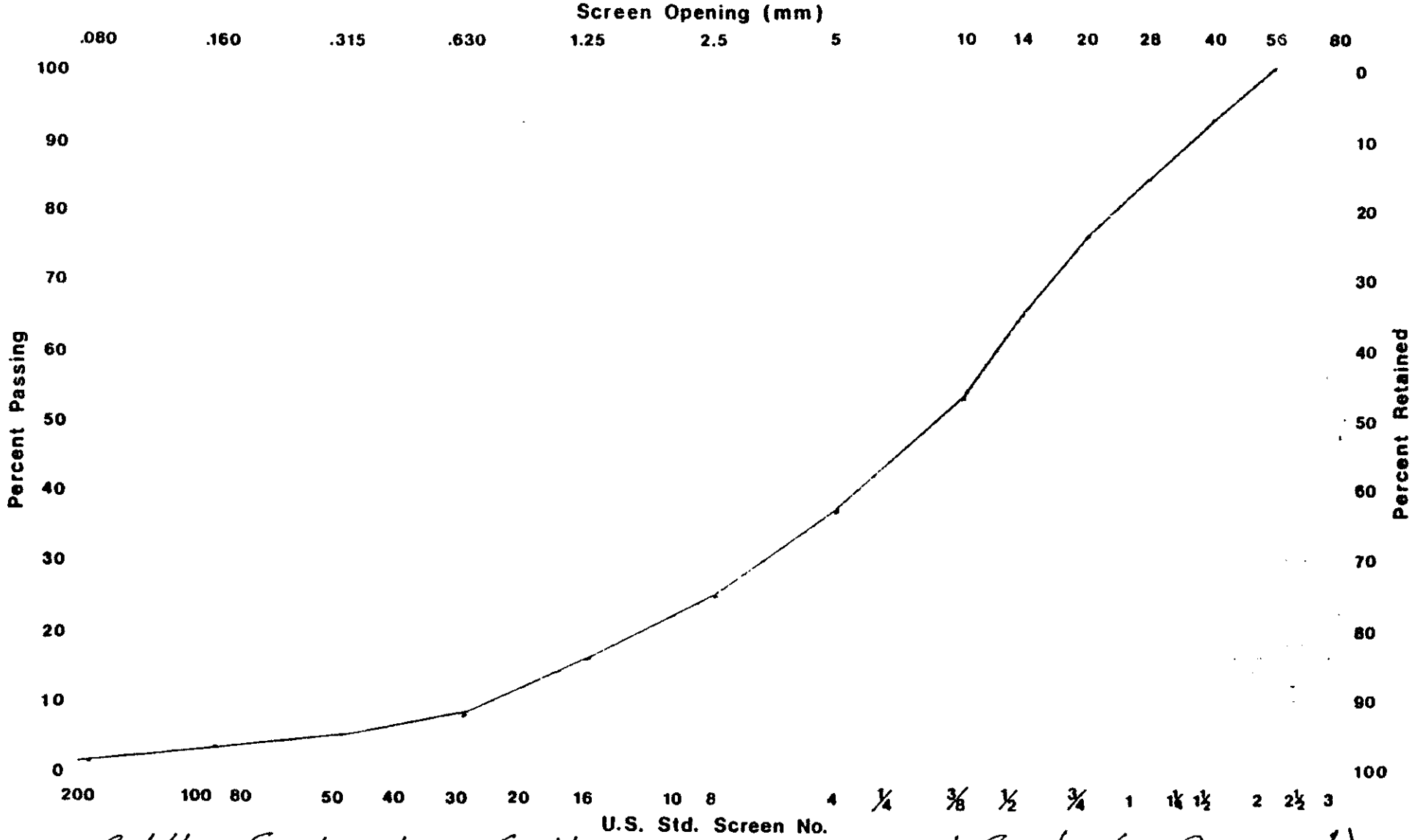
File No.: 80-514C

Specification: n/c

B. H. LEVELTON & ASSOCIATES LTD.

VANCOUVER VICTORIA

AGGREGATE GRADATION CHART



Project: Cadillac Explorations Golder

Material: Gravel, Sandy (As Received)

Date Sampled: Submitted

Sample No.: #2

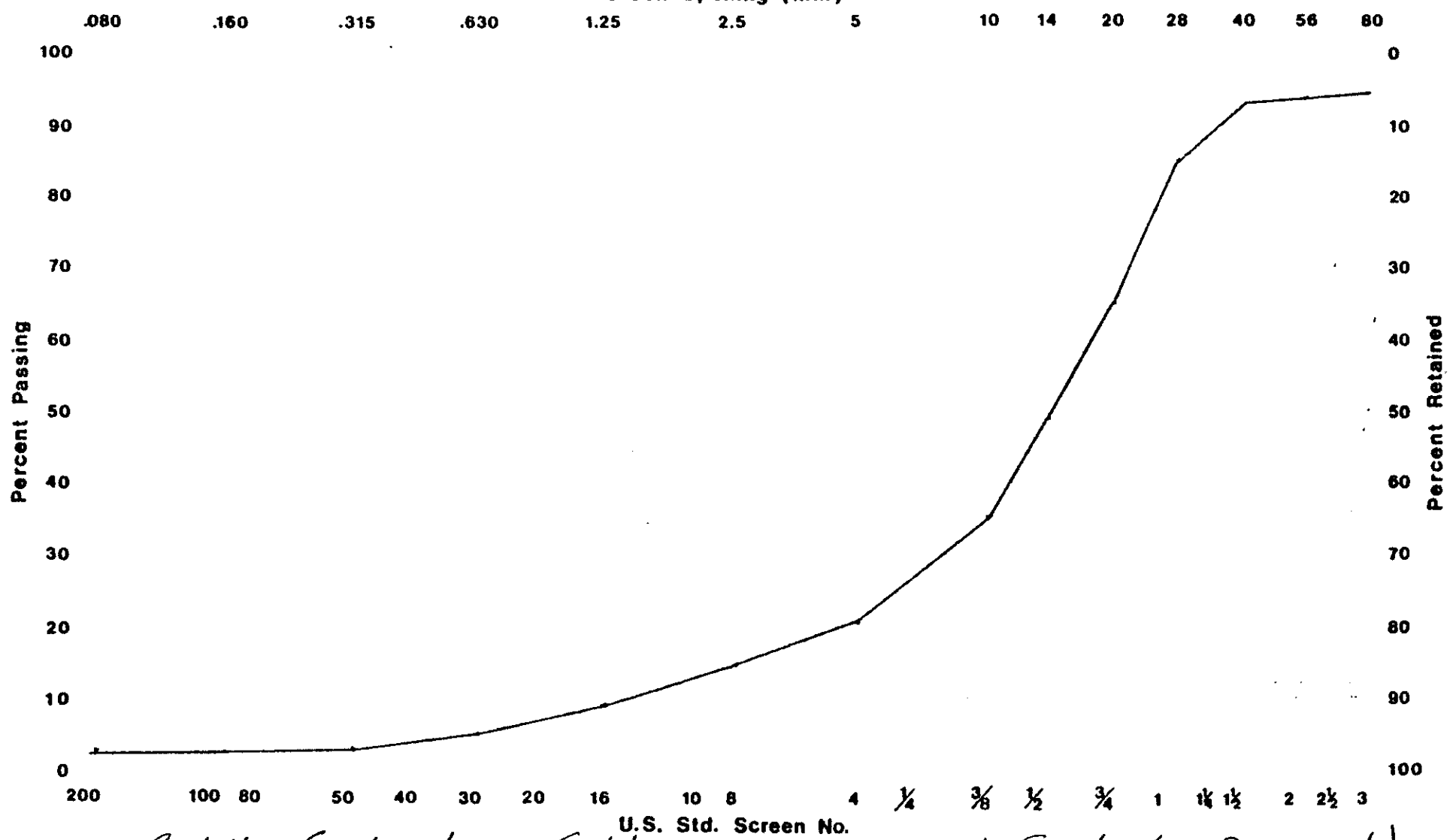
File No.: EO 514C

Specification: nil

B. H. LEVELTON & ASSOCIATES LTD.

VANCOUVER VICTORIA

AGGREGATE GRADATION CHART



Project: Cadillac Explorations Golder

Material: Gravel Sandy (As Received)

Date Sampled: Submitted

Sample No.: A3

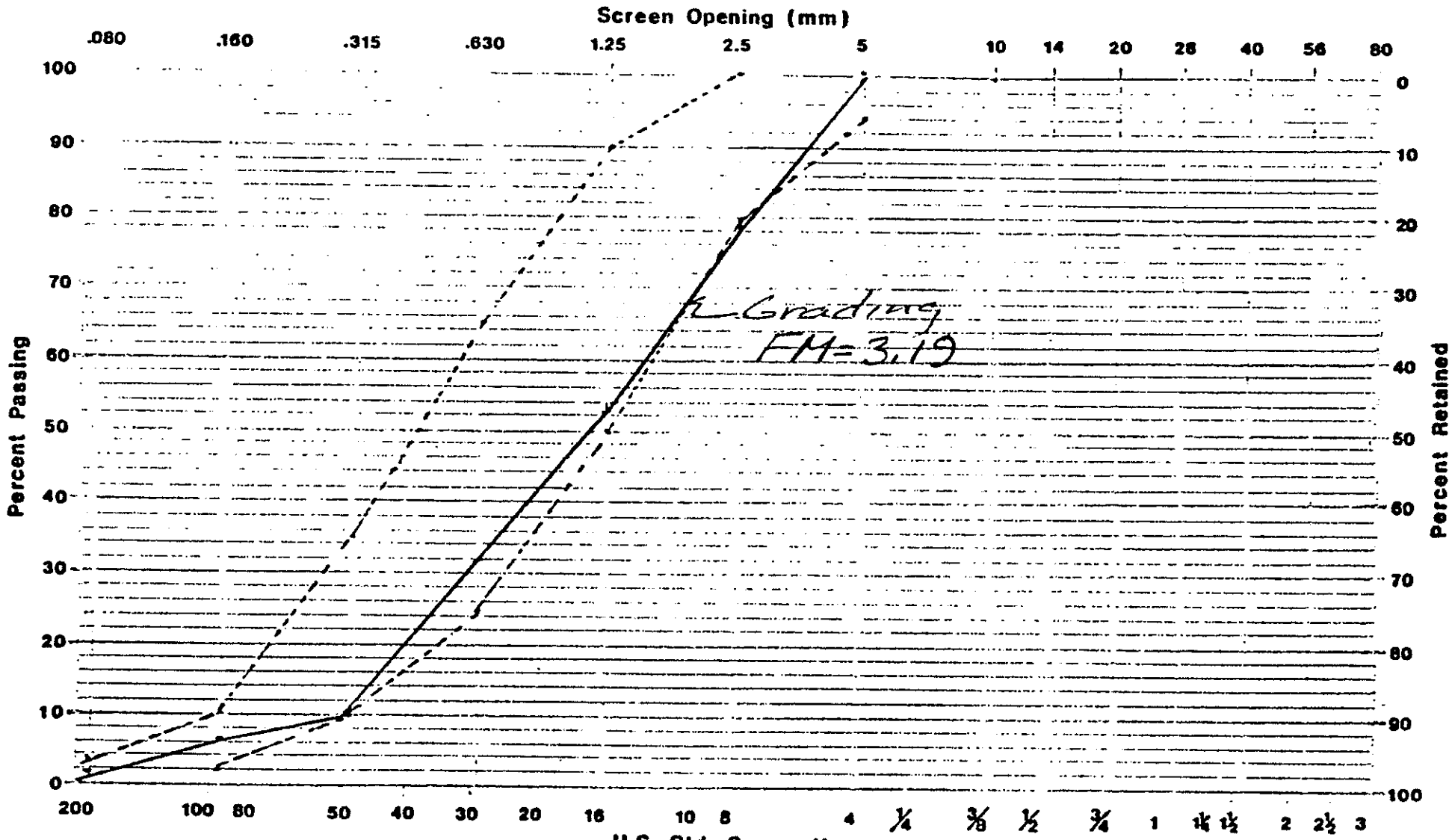
File No.: 20-514C

Specification: na

B. H. LEVELTON & ASSOCIATES LTD.

VANCOUVER VICTORIA

AGGREGATE GRADATION CHART



Project: Cadillac Explorations Golder

Date Sampled: Submitted.

File No.: EO 514C

Specification: CSA A23.1 Table 1

Material: Sand Fraction RD=2.60, A=2.8

Sample No.: #1; Organic No.1

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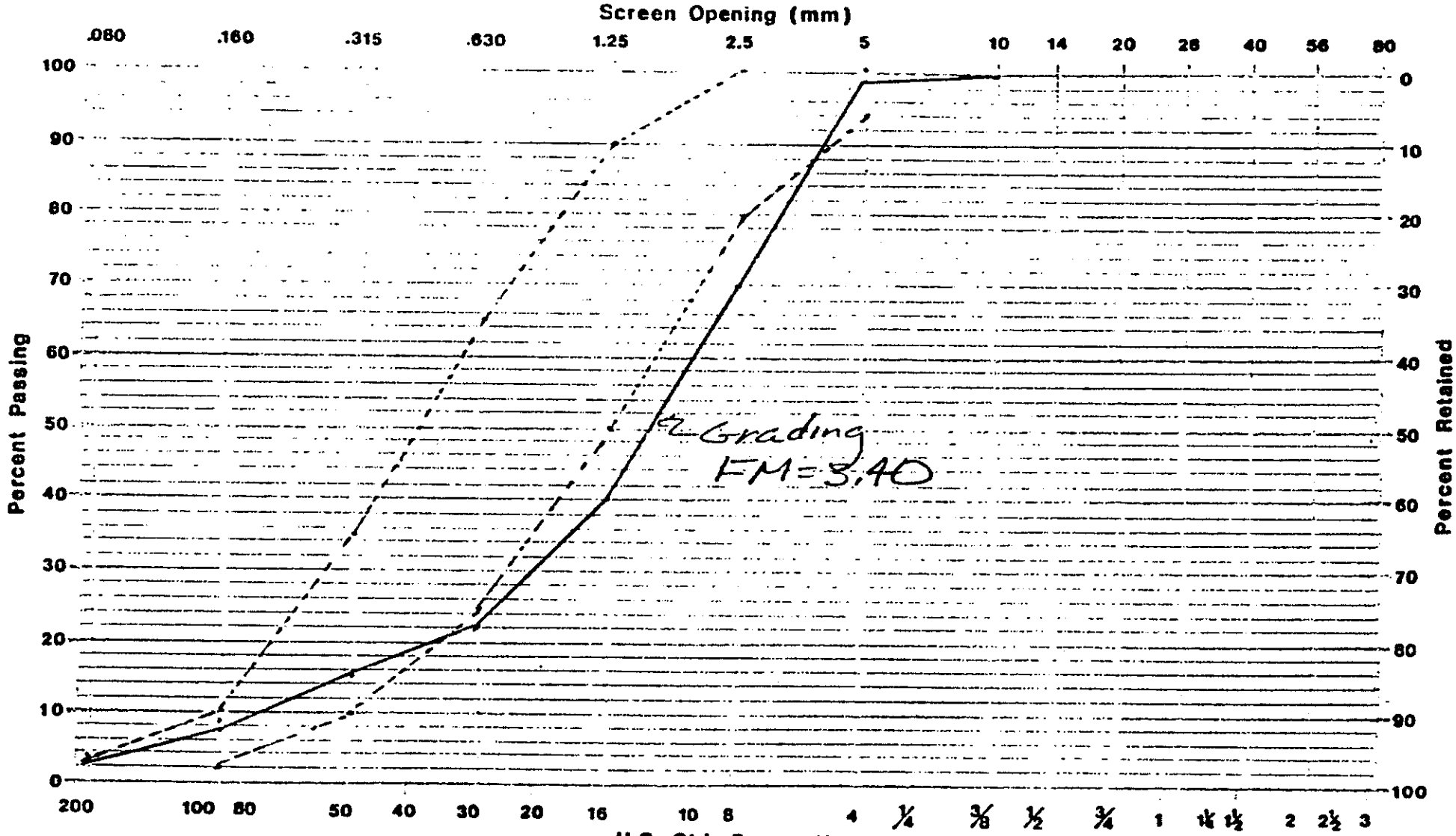
AGGREGATE GRADATION CHART



Project: Cadillac Explorations Golder

Date Sampled: Submitted

File No.: EO 514C

Specification: CSA A23.1 Table 1

Material: Sand Fraction RD=2.60, A=7.6

Sample No.: #2 & Organic #1

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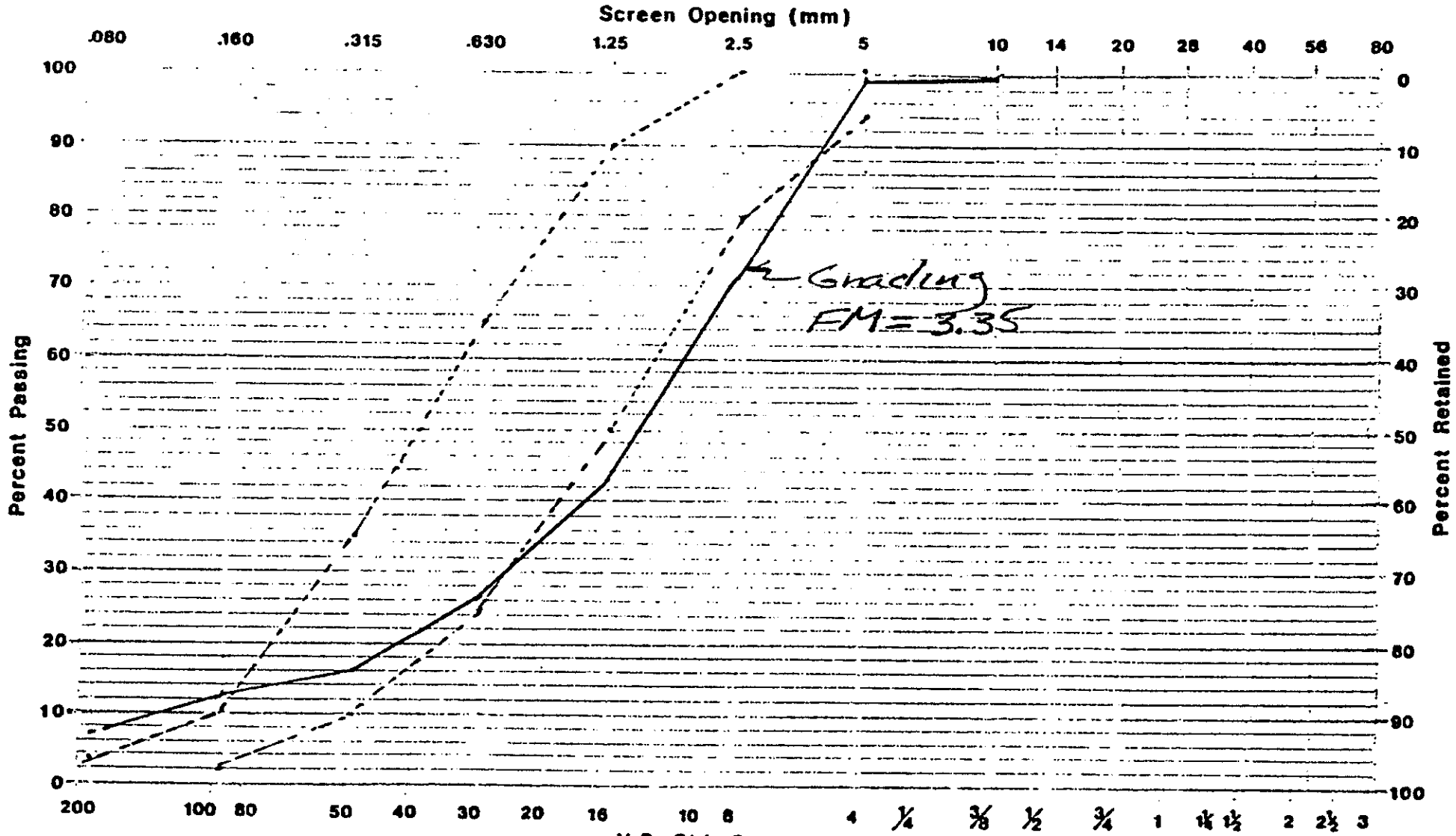
AGGREGATE GRADATION CHART



Project: Cadillac Explorations Golder

Date Sampled: Submitted

File No.: 80 514C

Specification: CSA A23.1 Table 1

Material: Sand Fraction

Sample No.: #3: Organic No. 1

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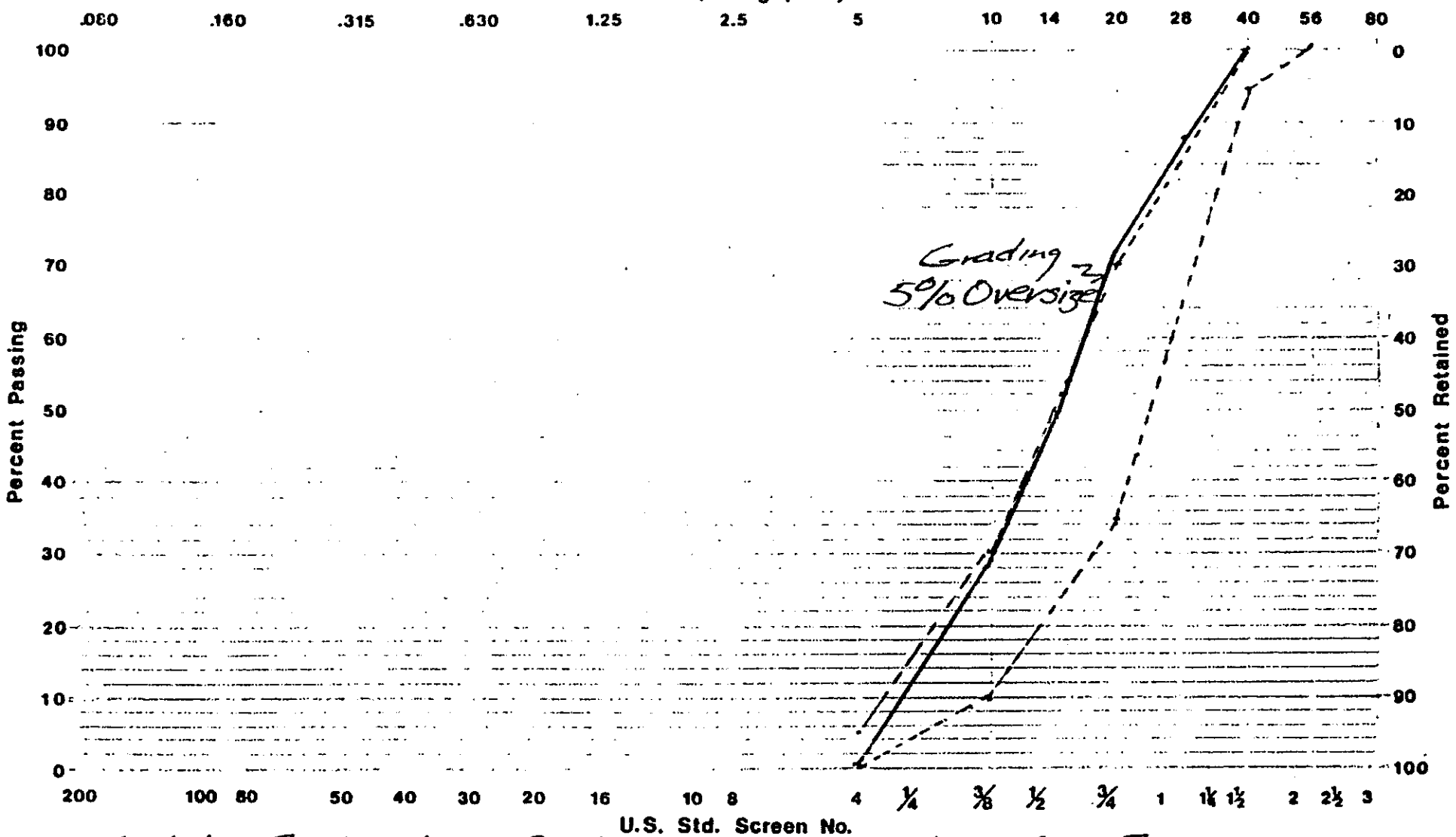
VANCOUVER VICTORIA

AGGREGATE GRADATION CHART



Project: Cadillac Explorations Golder

Material: Fraction 40 x 5mm

Date Sampled: Submitted

Sample No.: #1; RD = 2.687, A = 1.07%

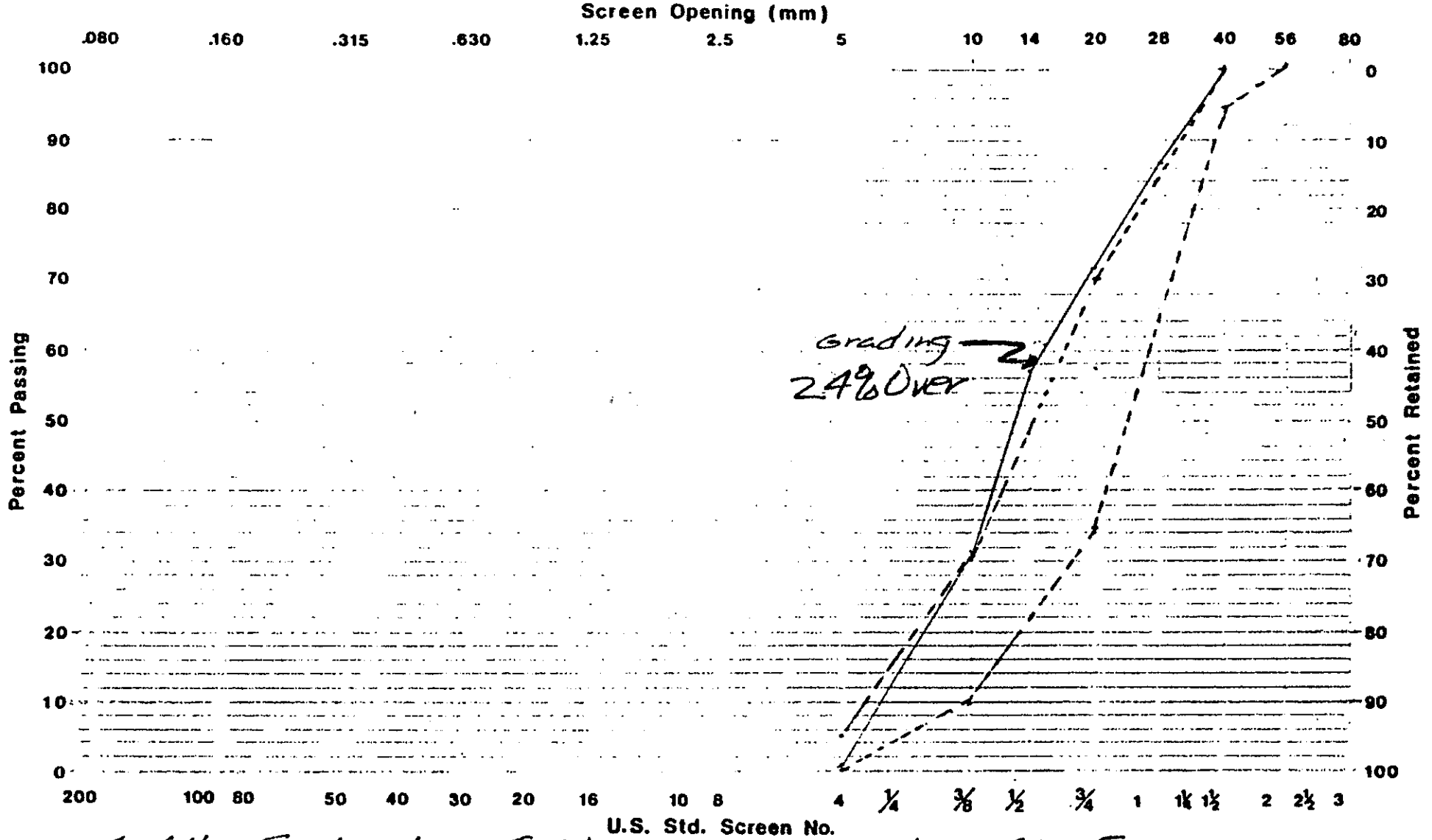
File No.: 80514C

Specification: CSA A23.1 Group I.

B. H. LEVELTON & ASSOCIATES LTD.

VANCOUVER VICTORIA

AGGREGATE GRADATION CHART



Project: Cadillac Explorations Golder

Material: Fraction 40x5mm

Date Sampled: Submitted

Sample No.: #2 RD2705A =.83

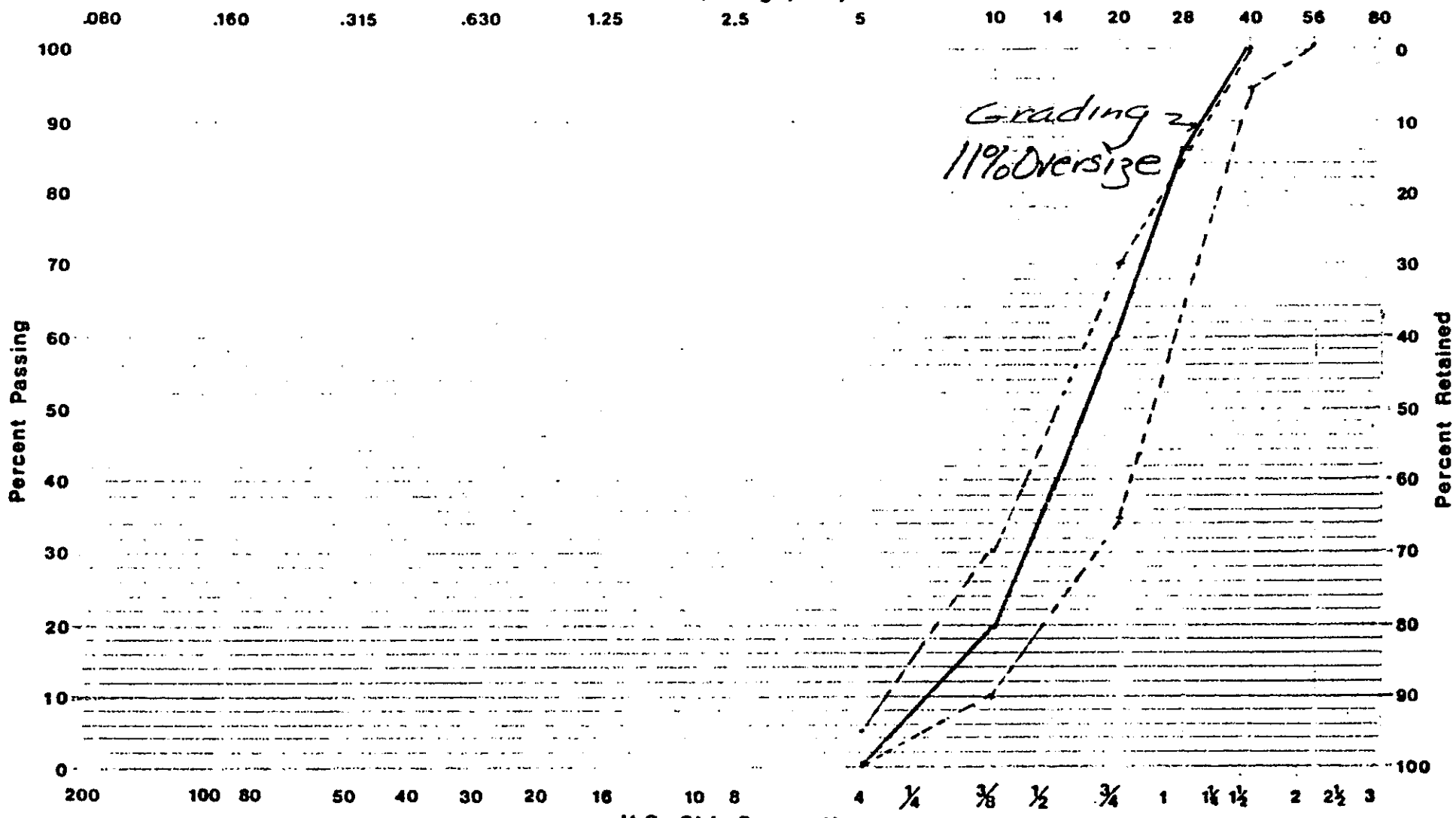
File No.: 80514C

Specification: CSA A23.1 Group I.

B. H. LEVELTON & ASSOCIATES LTD.

VANCOUVER VICTORIA

AGGREGATE GRADATION CHART



Project: Cadillac Explorations Golder

Date Sampled: Submitted

File No.: 80514C

Specification: CSA A23.1 Group I.

Material: Fraction 40x5mm

Sample No.: #3; RD=2.774 A=.78%

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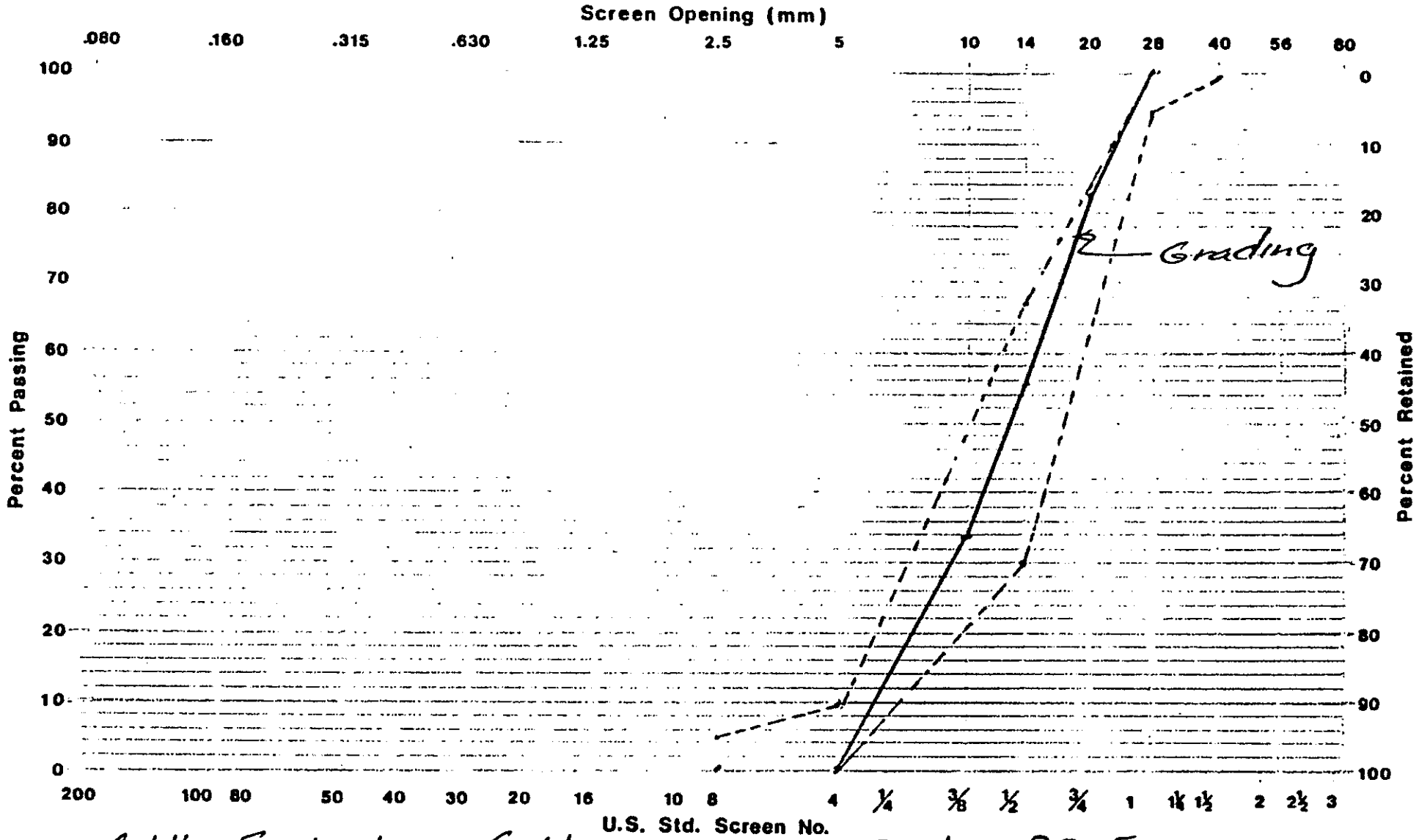
VANCOUVER VICTORIA

AGGREGATE GRADATION CHART



Project: Cadillac Explorations Golder

Date Sampled: Submitted

File No.: 80 514C

Specification: CSA A23.1 Table 3 Group I

Material: Fraction 28x5mm.

Sample No.: #1, 17% Oversize

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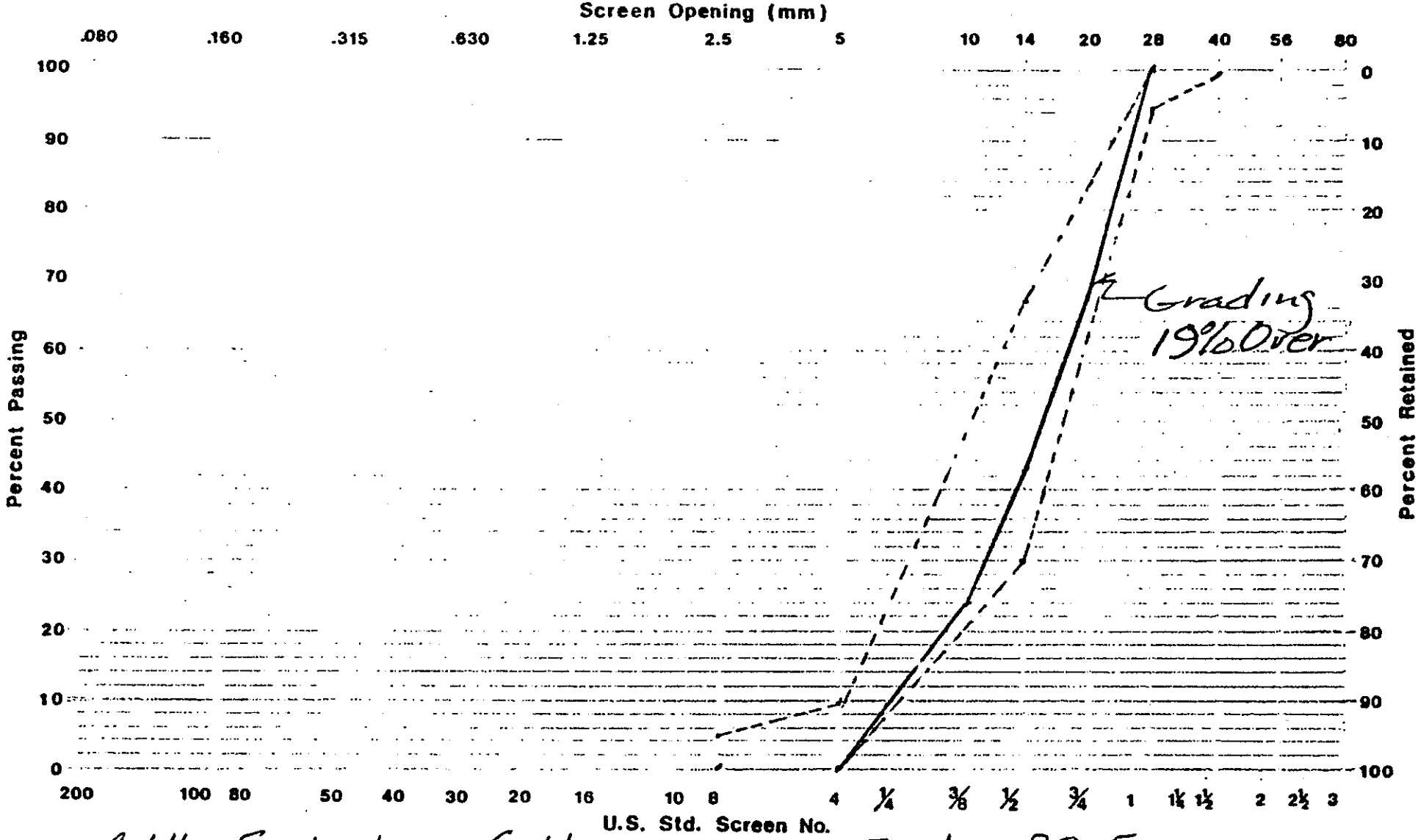
VANCOUVER VICTORIA

AGGREGATE GRADATION CHART



Project: Cadillac Explorations Golder

Material: Fraction 28x5mm.

Date Sampled: Submitted

Sample No.: #2

File No.: 80 514C

Specification: CSA A23.1 Table 3 Group I

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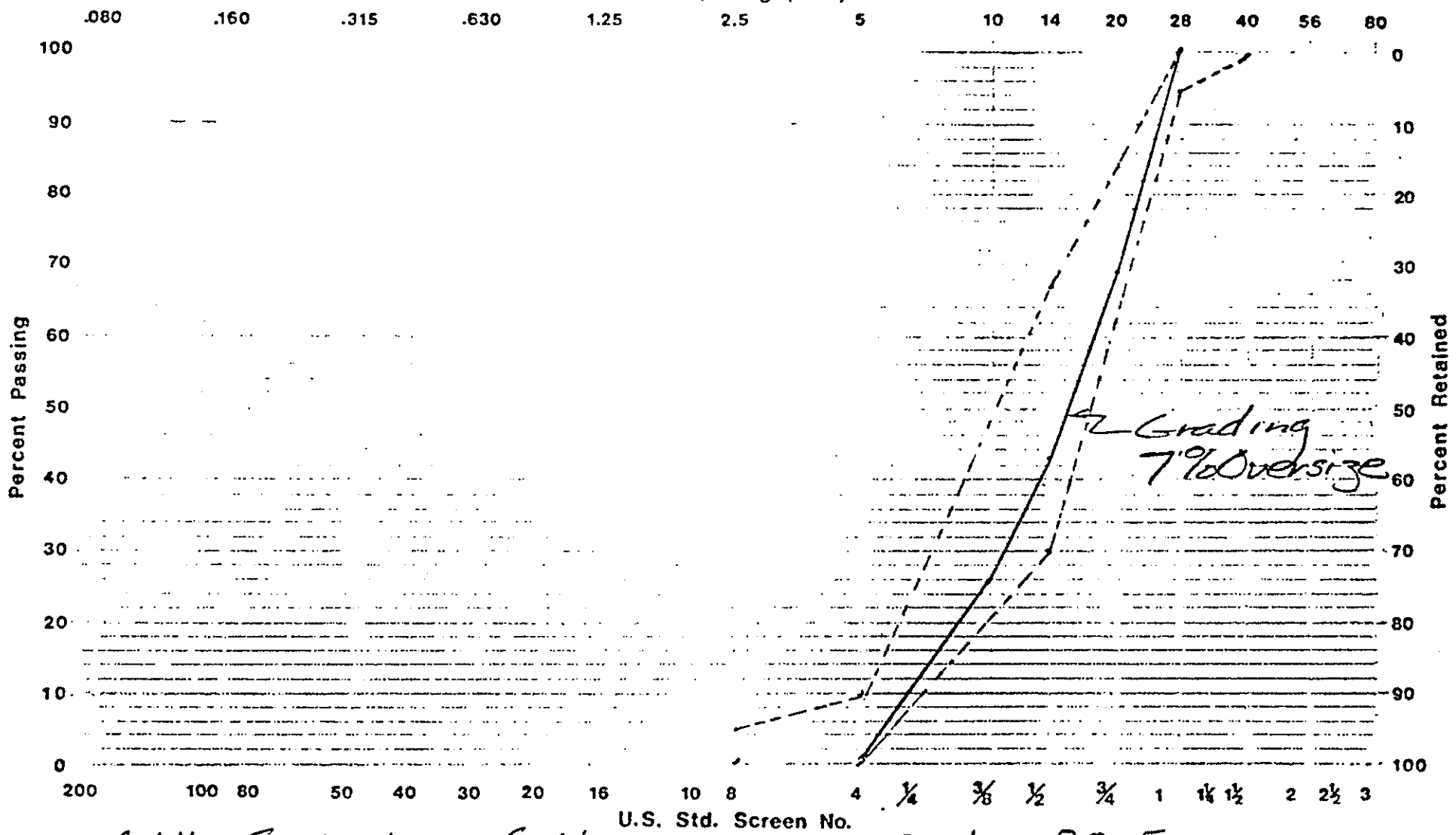
AGGREGATE GRADATION CHART



Project: Cadillac Explorations Golder

Material: Fraction 28x5mm.

Date Sampled: Submitted

Sample No.: #3

File No.: 80 514C

Specification: CSA A23.1 Table 3 Group I

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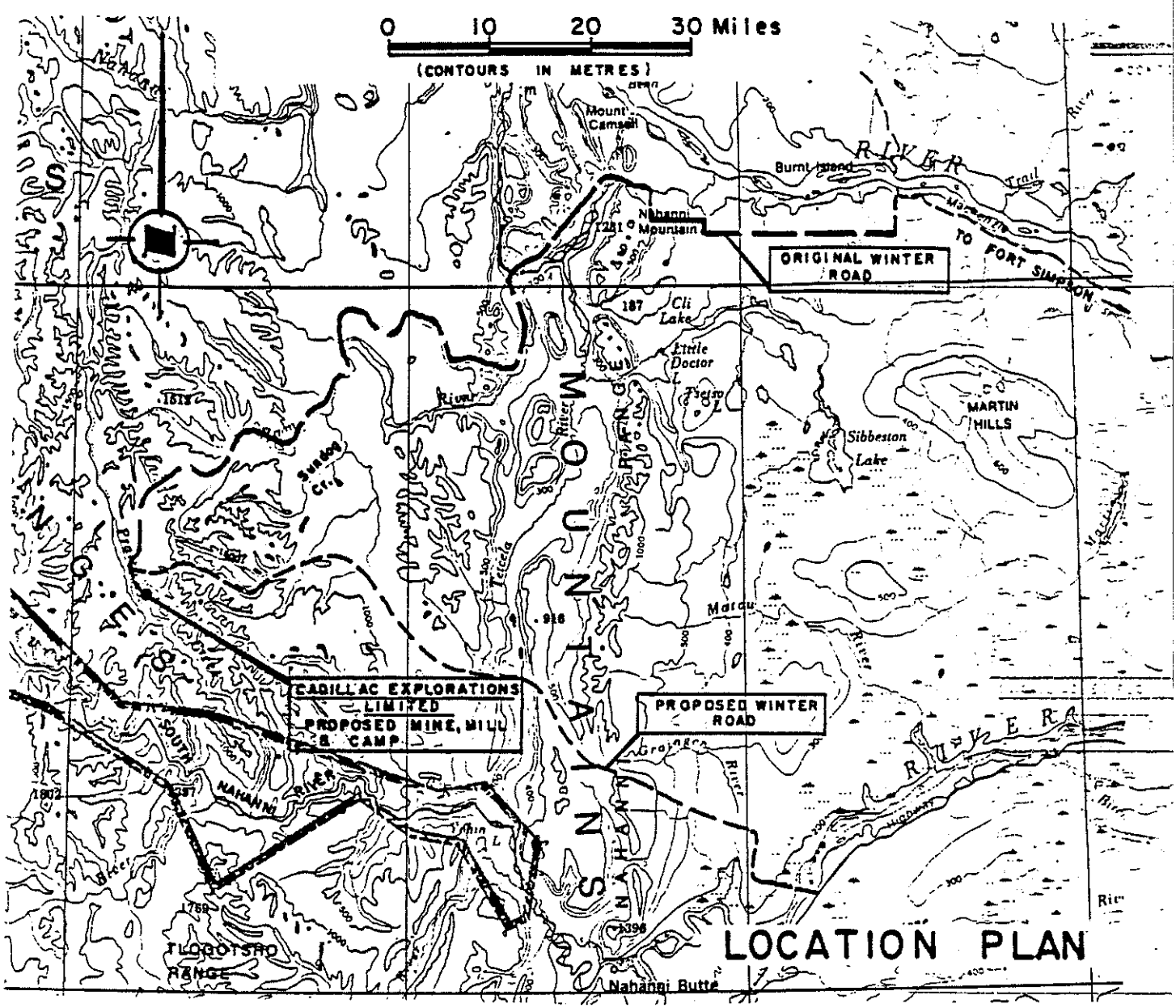
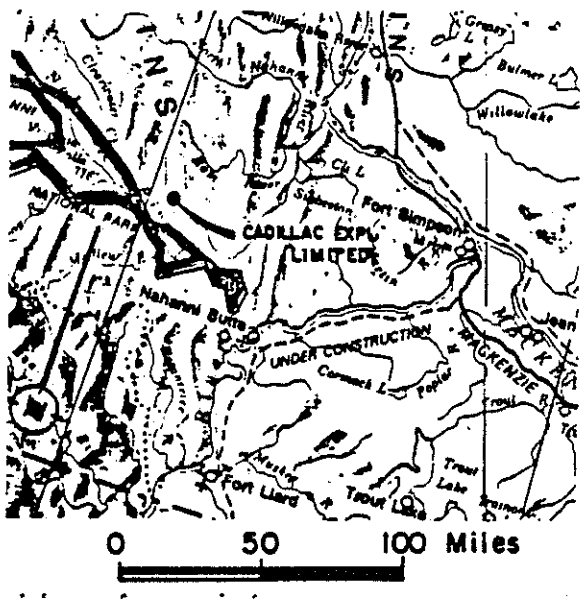
VANCOUVER VICTORIA

LOCATION PLAN AND KEY PLAN

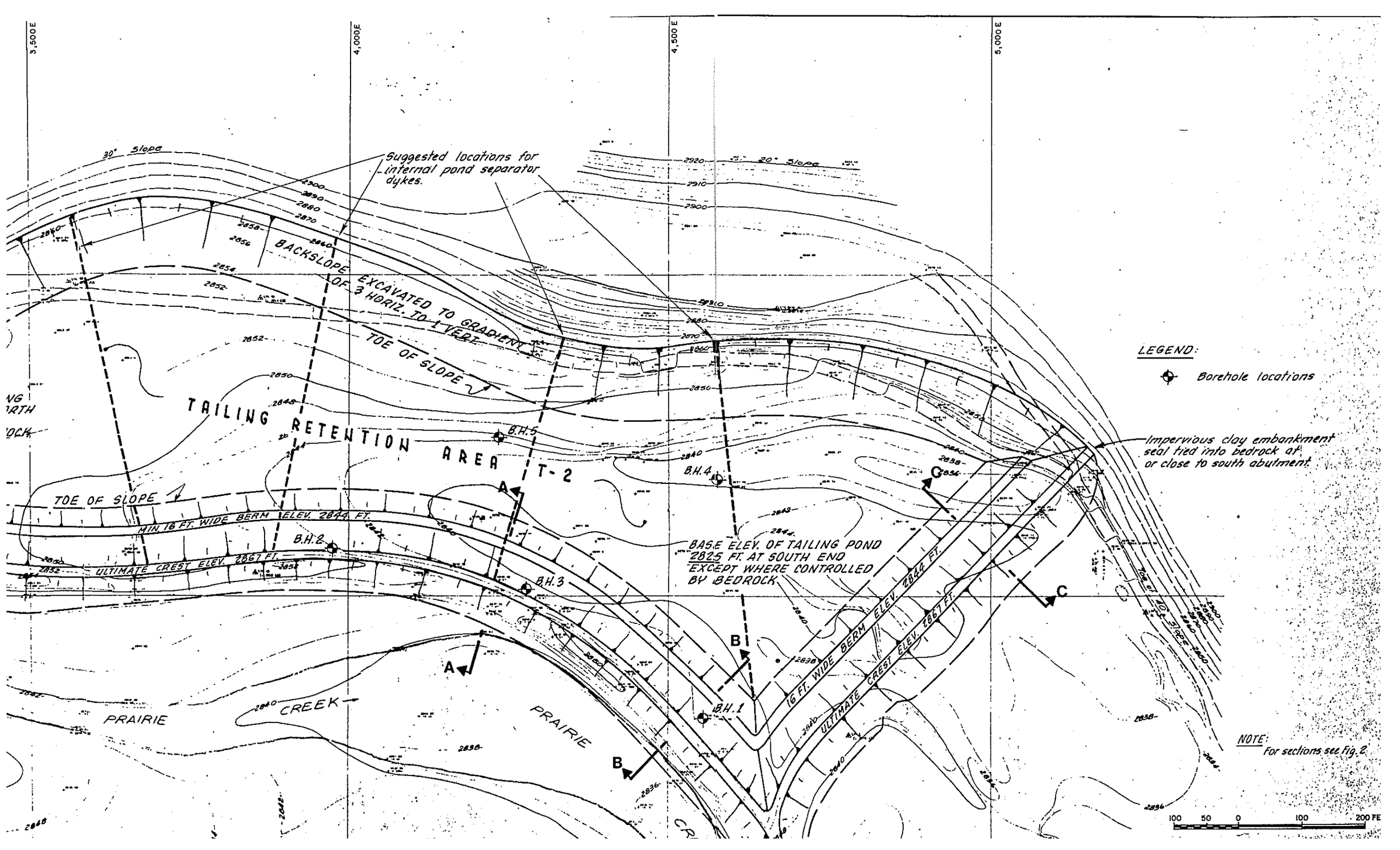
Figure

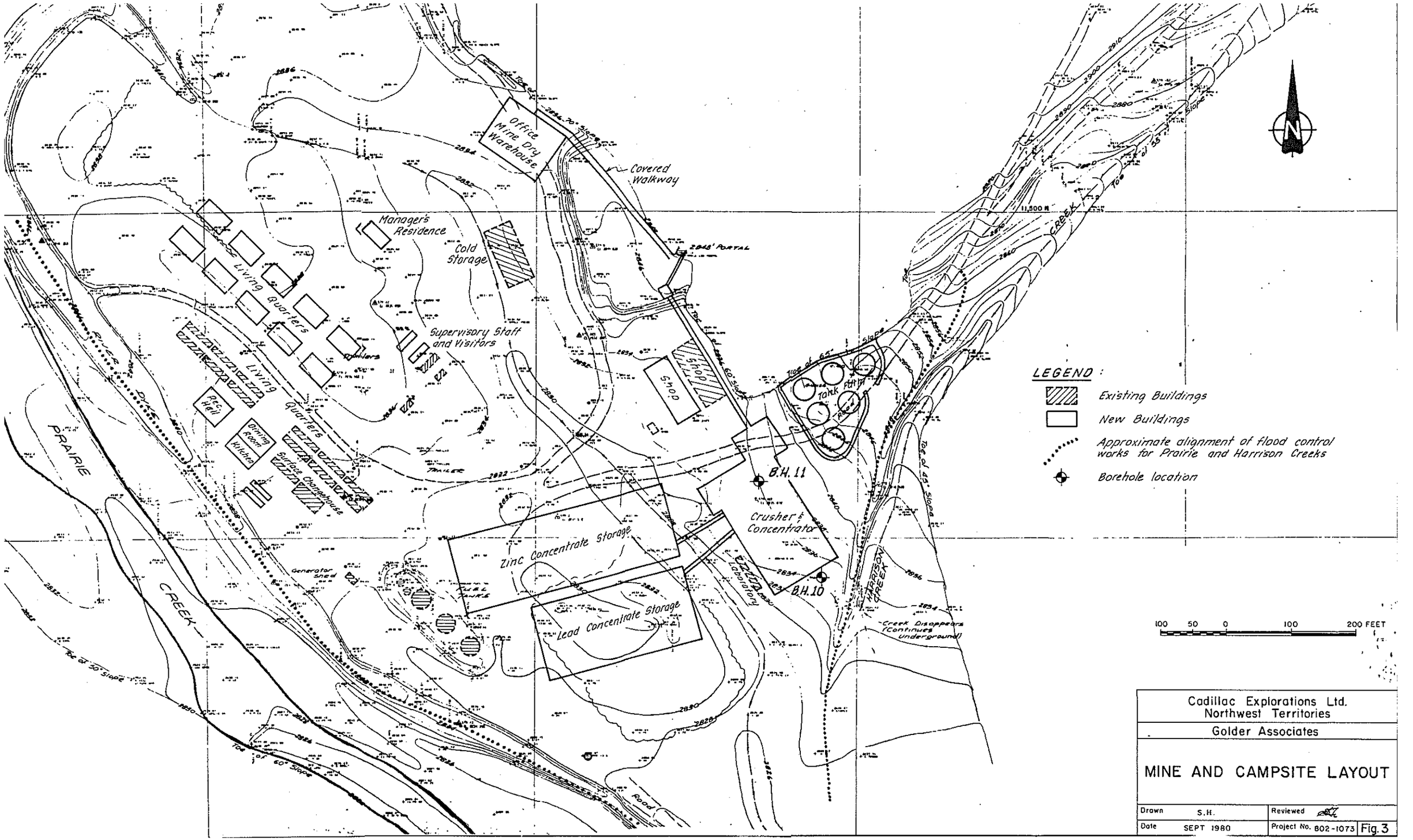




KEY PLAN

PROJECT No. 862/1073


3,500 E
4,000 E
4,500 E
5,000 E
30° Slope
20° Slope
Suggested locations for internal pond separator dykes.
BACKSLOPE EXCAVATED TO GRADIENT OF 3 HORIZ. TO 1 VERT.
TOE OF SLOPE
TAILING RETENTION AREA T-2
B.H.5
B.H.4
B.H.2
B.H.3
B.H.1
TOE OF SLOPE
MIN 16 FT. WIDE BERM ELEV. 2844 FT.
ULTIMATE CREST ELEV. 2867 FT.
BASE ELEV. OF TAILING POND 282.5 FT. AT SOUTH END EXCEPT WHERE CONTROLLED BY BEDROCK
16 FT. WIDE BERM ELEV. 2844 FT.
ULTIMATE CREST ELEV. 2867 FT.
Impervious clay embankment seal tied into bedrock at or close to south abutment
PRAIRIE CREEK
PRAIRIE
A
B
C
LEGEND:
Borehole locations
NOTE:
For sections see Fig. 2
100 50 0 100 200 FE



Cadillac Explorations Ltd. Northwest Territories	
Golder Associates	
MINE AND CAMPSITE LAYOUT	
Drawn S.H.	Reviewed
Date SEPT 1980	Project No. 802-1073 Fig. 3

Approximate alignment of flood control works for Prairie and Harrison Creek.

PRAIRIE CREEK

HARRISON CREEK

APPROXIMATE PROBABLE LIMIT OF TAILING RETENTION AREA T-3

TAILING RETENTION AREA T-3

B.H.6

B.H.7

B.H.8

B.H.9

Approx. location of "Mid-Point" Stream

NOTE : A large area south of the "Mid-Point" Stream is available for development for tailing storage.

6,000E

6,500E

7,000E

7,500E

8,000E

8,500E

9,000N

8,500N

8,000N

100 50 0 100 200 FEET

Cadillac Explorations Ltd.
Northwest Territories

Golder Associates

POTENTIAL TAILING AREA T-3

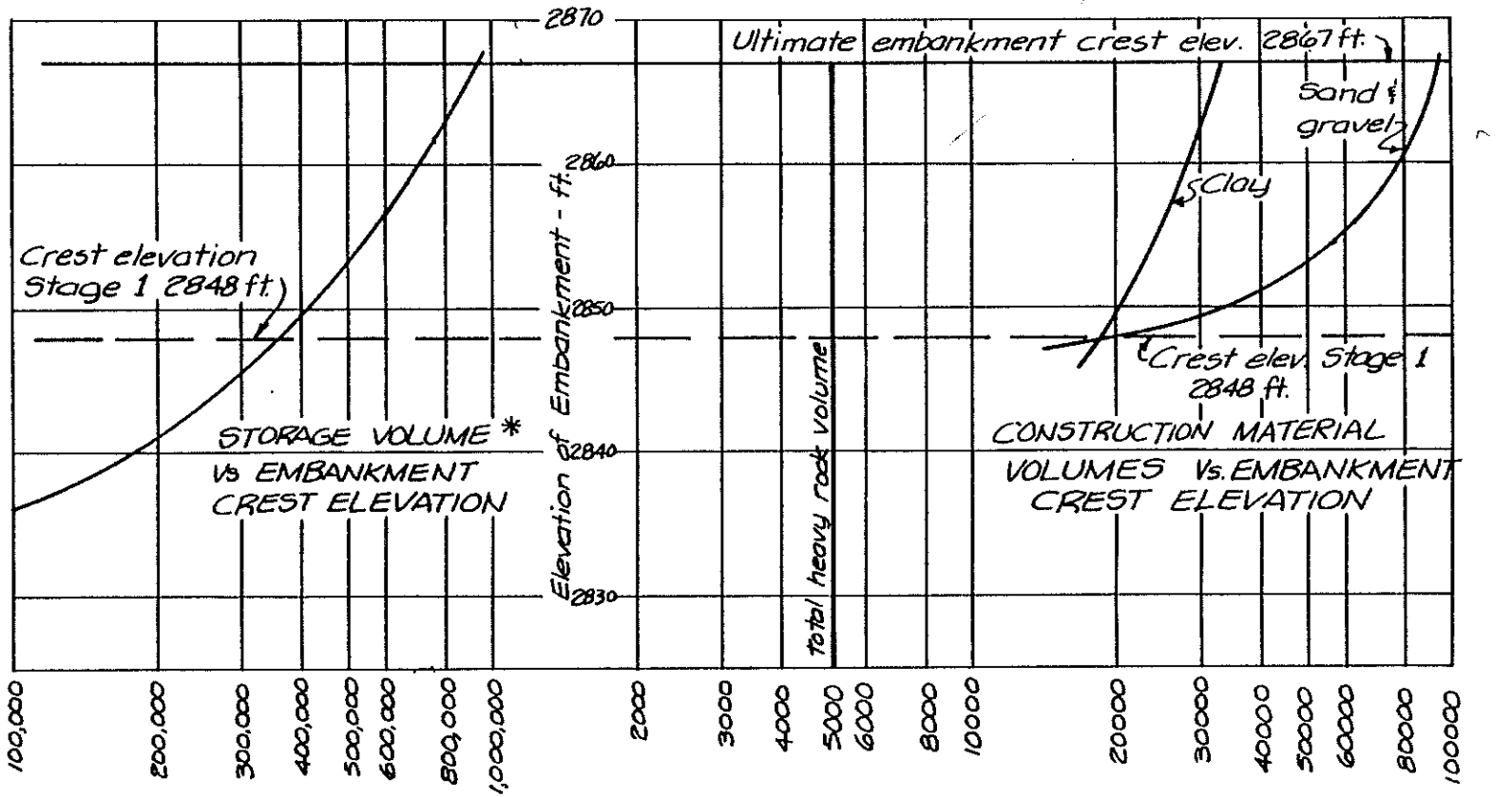
Drawn S.H. | Reviewed

Date SEPT. 1980 | Project No. 802-1073 | Fig.

Project 802-1073 Drawn R.O. Reviewed * Date Sept '80

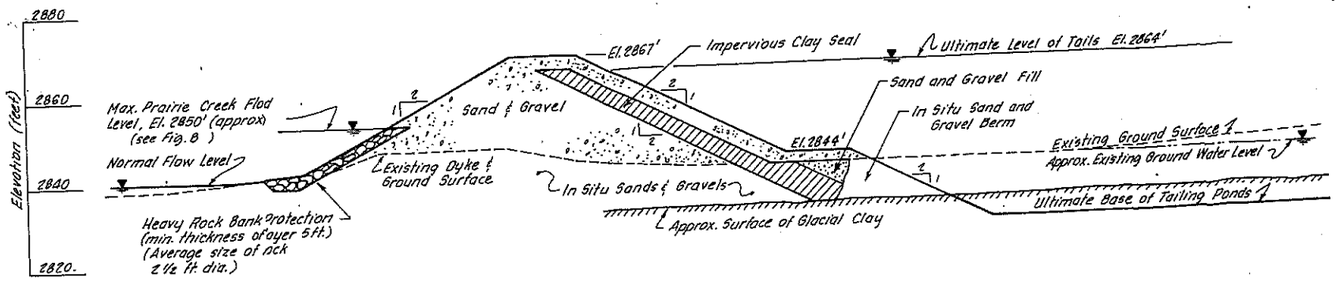
Figure 5

T2 STORAGE VOLUMES AND CONSTRUCTION MATERIAL VOLUMES VS EMBANKMENT CREST ELEVATION

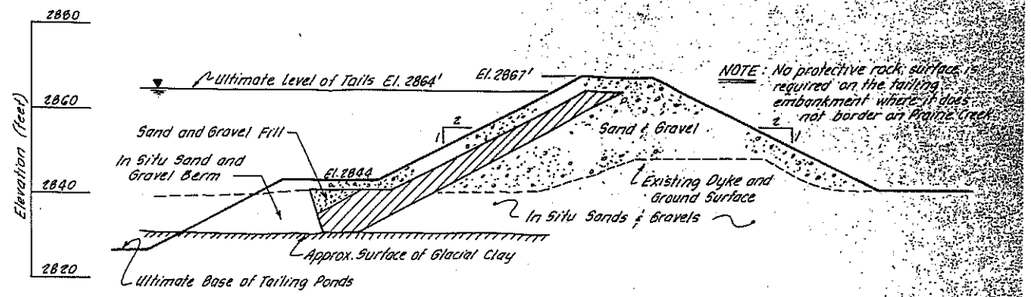


* Storage to 3' below crest.

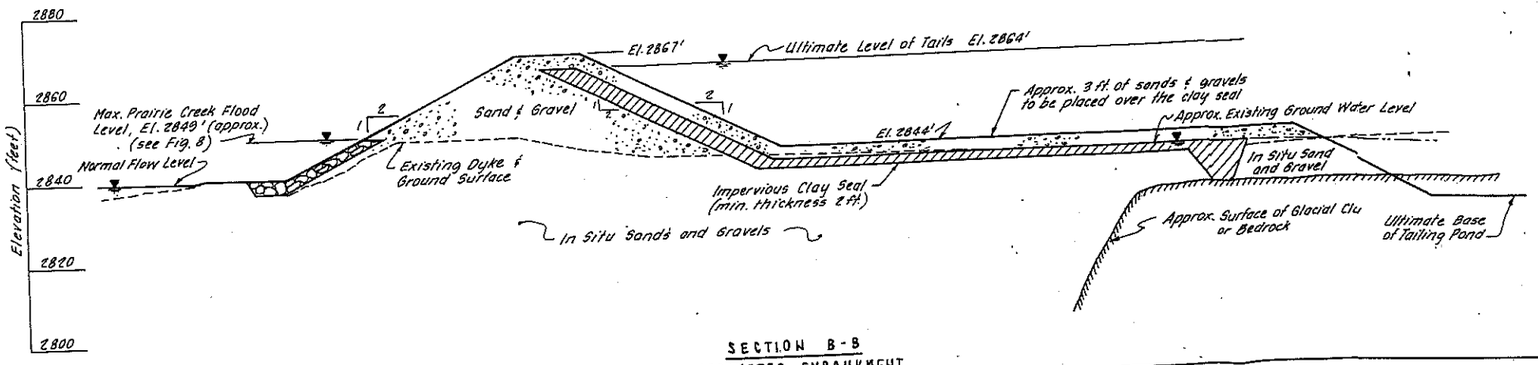
Folder Associates



SECTION A-A
PERIMETER EMBANKMENT



SECTION C-C
PERIMETER EMBANKMENT

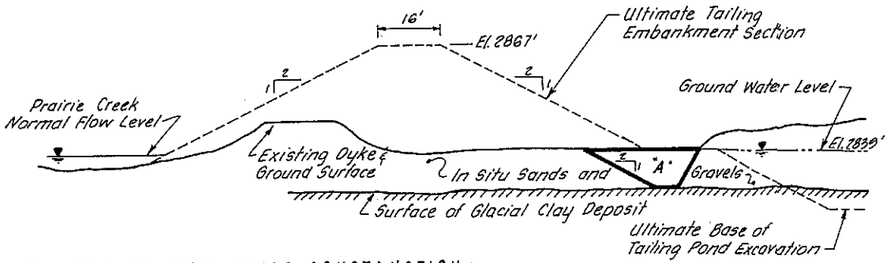


SECTION B-B
PERIMETER EMBANKMENT

Note: For location of sections see Fig. 2.

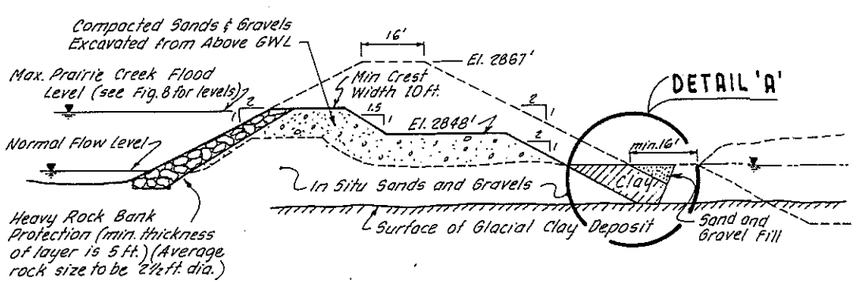
Cadillac Explorations Ltd. Northwest Territories	
Golder Associates	
TYPICAL ULTIMATE EMBANKMENT SECTIONS	
Drawn: S.H.	Reviewed:
Date: SEPT. 1980	Project No. 80-1095

Fig. 5



PHASE 1 OF FIRST STAGE CONSTRUCTION:

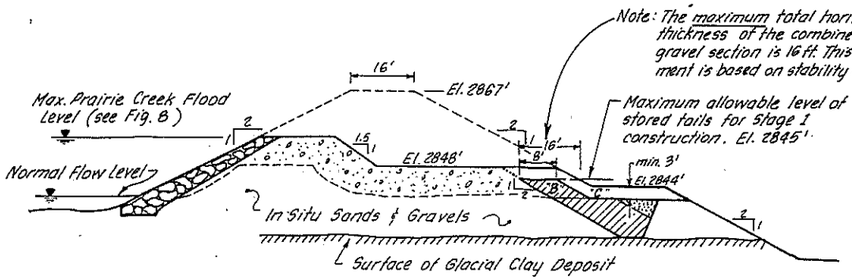
a) Excavate "A" to surface of clay (or bedrock) maintaining the outside slope of the excavation as steep as possible. Maintain water level to flood excavation so that sloughing of excavation sides is minimized.
b) Fill the excavation with clay excavated from within the pond area to a level above that of ground water.



PHASE 2 OF FIRST STAGE CONSTRUCTION:

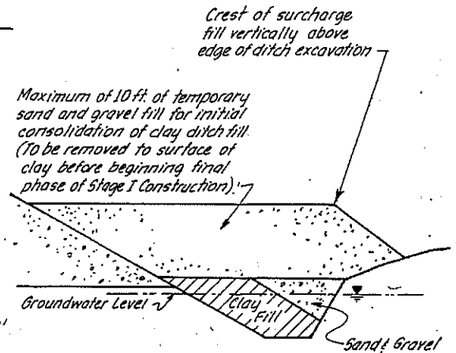
a) Excavate alluvial sands and gravels from within pond area and place as shown.
b) Place heavy rock on outside face of embankment to maximum Prairie Creek flood level.

Note: For those portions of the tailing embankments not bordering Prairie Creek, the rock armour is not required. However, all portions of the construction must be capable of resisting maximum flow levels in Prairie Creek.

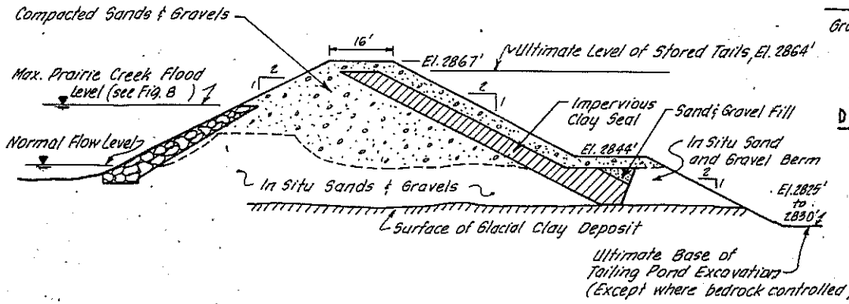


FINAL PHASE OF FIRST STAGE CONSTRUCTION:

a) Dewater and continue excavation of the pond area.
b) Place clay and sands and gravels at "B" and "C" respectively.
c) Excavated materials in excess of those required for First Stage construction can be stockpiled for construction of subsequent stages of the embankment and/or used for other construction requirements.



DETAIL 'A': TEMPORARY SURCHARGE FOR CONSOLIDATION OF CLAY FILL
(Not to Scale)



ULTIMATE EMBANKMENT SECTION AFTER ALL STAGES COMPLETED

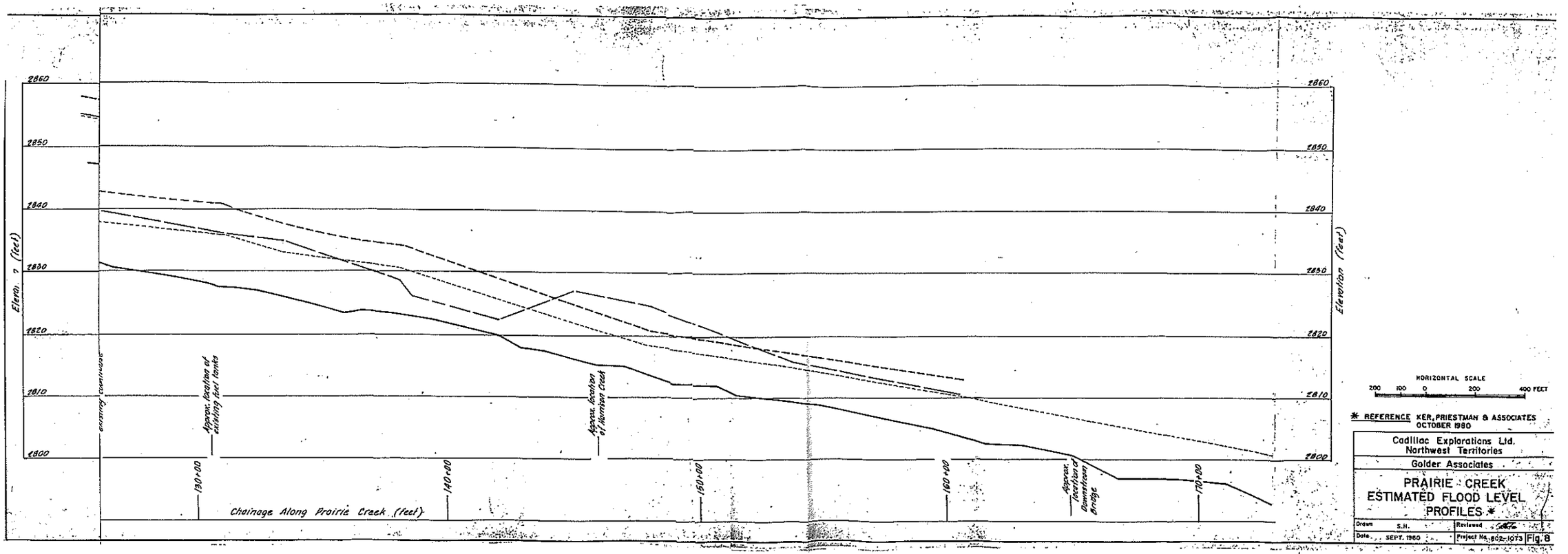
Cadillac Explorations Ltd.
Northwest Territories

Golder Associates

SCHEMATIC SECTIONS FOR PHASES OF STAGE I EMBANKMENT CONSTRUCTION

Drawn	S. H.	Reviewed	
Date	SEPT. 1980	Project No.	802-1073

Fig. 7



* REFERENCE KER, PRIESTMAN & ASSOCIATES OCTOBER 1980

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Northwest Territories

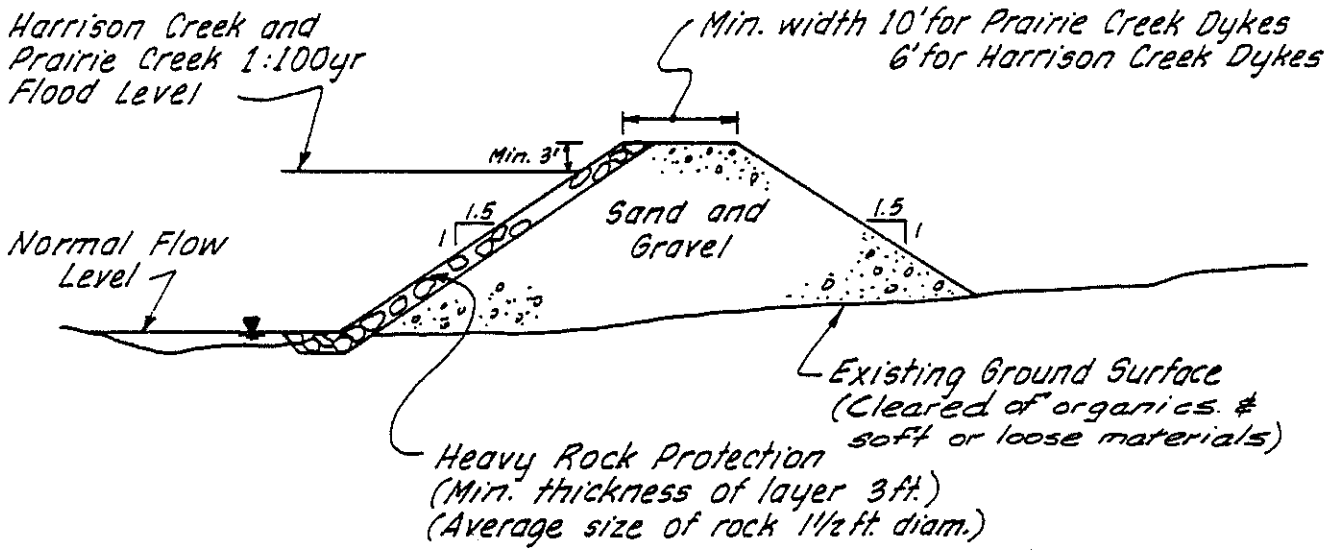
Golder Associates

PRAIRIE CREEK
ESTIMATED FLOOD LEVEL
PROFILES *

Drawn	S.H.	Reviewed	
Date	SEPT. 1980	Project No. 802-1073	Fig. 8

TYPICAL SECTION - PRAIRIE CREEK & HARRISON CREEK FLOOD PROTECTION DYKES

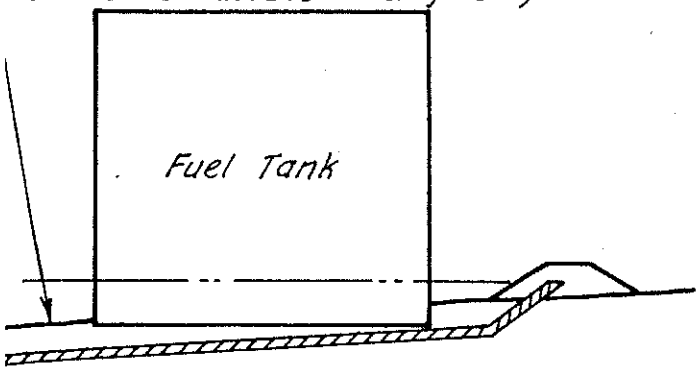
Figure 9



Scale: 1 inch to 20 feet

Project No. ..... Drawn ..... Reviewed ..... Date .....

- Sand and gravel finished grade inside tank farm (min. thickness 3ft. above surface of clay seal)

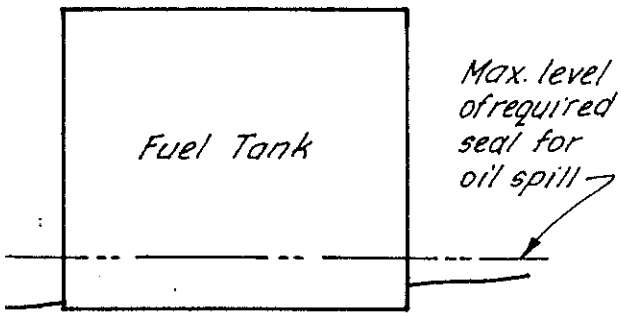


Constructed clay seal (min. thickness 1 ft.)

d/or Bedrock

SEAL SPILL PROTECTION WHERE ERVIOUS MEDIA

founded in
and gravels



's and Gravels

rcial Clays

SPILL PROTECTION FOR CASE WHERE ACCESS FROM GROUND SURFACE

Cadillac Explorations Ltd.
Northwest Territories

Golder Associates

FUEL TANK FARM SPILL CONTROL WORKS

Drawn	S.H.	Reviewed	
Date	SEPT. 1980	Project No. 802-1073	Fig. 10

Registration
SOR/77-178 25 February, 1977

FISHERIES ACT

Metal Mining Liquid Effluent Regulations

P.C. 1977-388 24 February, 1977

His Excellency the Governor General in Council, on the recommendation of the Minister of Fisheries and the Environment, pursuant to sections 33 and 34 of the Fisheries Act, is pleased hereby to make the annexed Regulations respecting deleterious substances in liquid effluents from metal mines.

REGULATIONS RESPECTING DELETERIOUS SUBSTANCES IN LIQUID EFFLUENTS FROM METAL MINES

Short Title

1. These Regulations may be cited as the *Metal Mining Liquid Effluent Regulations.*

Interpretation

2. In these Regulations,

"Act" means the *Fisheries Act*; (*Loi*)

"arithmetic mean" means the average value of the concentrations in composite or grab samples collected over the time period required by section 7; (*moyenne arithmétique*)

"composite sample" means

(*a*) a quantity of undiluted effluent consisting of a minimum of three equal volumes of effluent or three volumes proportionate to flow that have been collected at approximately equal time intervals over a sampling period of not less than 7 hours and not more than 24 hours, or

(*b*) a quantity of undiluted effluent collected continually at an equal rate or at a rate proportionate to flow over a sampling period of not less than 7 hours and not more than 24 hours;

(*échantillon composite*)

"deposit" means to deposit or permit the deposit into water frequented by fish; (*rejeter*)

"effluent" includes mine water effluent, mill process effluent, tailings impoundment area effluent, treatment pond or treatment facility effluent, seepage and surface drainage; (*effluent*)

"existing mine" means a mine that came into commercial production before the date of coming into force of these Regulations and that operated on a commercial basis for at least two months in the twelve months immediately prior to that date; (*mine existante*)

"expanded mine" means an existing mine that has increased its production rate by more than 30% of its reference mine production rate; (*mine à production accrue*)

"final discharge point" means the point beyond which the operator of a mine exercises no further control over an effluent; (*point de rejet final*)

"gold mine" means a mine where the gold produced from the mine is recovered in the operation area by the process of cyanidation and accounts for more than 50% of the value of the output of the mine; (*mine d'or*)

"grab sample" means a quantity of undiluted effluent collected at any given time; (*échantillon pris au hasard*)

"metal" includes antimony, bismuth, cadmium, cobalt, copper, chromium, gold, iron, lead, magnesium, mercury, molybdenum, nickel, niobium, silver, tantalum, tin, thorium, titanium, tungsten, uranium and zinc; (*métal*)

"mill process effluent" includes tailing slurries and all other effluent discharged from a milling operation; (*effluents des installations de préparation du minerai*)

"mine" includes all metal mining and milling facilities that are used to produce a metal concentrate or an ore from which a metal or metal concentrate may be produced and all associated smelters, pelletizing plants, sintering plants, refineries, acid plants, and any similar operation where any effluent from such operation is combined with the effluents from mining and milling; (*mine*)

"mine water effluent" means water pumped or flowing out of any underground workings or open pit; (*effluents d'eau minière*)

"Minister" means Minister of the Environment; (*Ministre*)

"new mine" means a mine that did not start commercial production prior to the date of coming into force of these Regulations and that commences commercial production on or after that date; (*mine nouvelle*)

"operation area" includes all the land and works that are used or have been used in conjunction with mining or milling activity and, without limiting the generality of the foregoing, includes open pits, underground mines, buildings, ore storage areas, active and abandoned waste rock dumps, active and abandoned tailings impoundment areas and treatment ponds, cleared or disturbed areas adjacent to those places, structures or areas and ditches, watercourses or water bodies the character of which have been altered by mining activity; (*chantier*)

"reference mine production rate" means the greater of the design rated capacity and the maximum average annual production rate ever achieved during the operating life of a mine prior to the date of coming into force of these Regulations; (*rythme de production de référence*)

"reopened mine" means a mine that resumes production on or after the date of coming into force of these Regulations and that had not been in operation for more than two months in the twelve month period immediately prior to the date of coming into force of these Regulations; (*mine remise en exploitation*)

"surface drainage" includes all surface run-off that flows over, through or out the operation area of a mine and that is contaminated as a result of flowing over, through or out of that area; (*eau de drainage superficiel*)

"tailings impoundment area" means a limited disposal area that is confined by man-made or natural structures or by both; (*dépôt de stériles*)

"total suspended matter" means the non-filterable residue that results from the operation of a mine, that is contained in liquid effluent from the mine; (*matière totale en suspension*)

"treatment pond" means a pond, lagoon or other confined area, other than a tailings impoundment area, used to treat an effluent; (*étang de traitement*)

"undiluted" means not having water added primarily for the purposes of meeting the limits of authorized deposits prescribed by section 5. (*non dilué*)

Application

3. These Regulations apply to every new mine, expanded mine and reopened mine, other than a gold mine.

Substances Prescribed as Deleterious Substances

4. For the purpose of paragraph (*c*) of the definition "deleterious substance" in subsection 33(11) of the Act, the following substances from the operations or processes of a mine to which these Regulations apply are hereby prescribed as deleterious substances:

(*a*) arsenic;
(*b*) copper;
(*c*) lead;
(*d*) nickel;
(*e*) zinc;
(*f*) total suspended matter; and
(*g*) radium 226.

Authorized Deposit of Deleterious Substances

5. (1) Subject to these Regulations, the operator of a mine may deposit a deleterious substance prescribed by section 4 if

(*a*) the monthly arithmetic mean of the concentration in each undiluted effluent of that substance described in an item of Part 1 of Schedule 1 does not exceed the concentration in column I of that item and the monthly arithmetic mean pH of that effluent is not less than the value set out in column I of Part 2 of that schedule;

(*b*) the concentration in a composite sample of each undiluted effluent of that substance described in an item of Part 1 of Schedule 1 does not exceed the concentration in column II of that item and the pH of the composite sample is not less than the value set out in column II of Part 2 of that schedule; and

(*c*) the concentration in a grab sample of each undiluted effluent of that substance described in an item of Part 1 of Schedule 1 does not exceed the concentration in column III of that item and the pH of the grab sample is not less than the value set out in column III of Part 2 of that schedule.

(2) Notwithstanding subsection (1), the operator of a mine may deposit the deleterious substances prescribed by section 4 in any quantity or concentration into a tailings impoundment area designated in writing by the Minister.

ADDITIONAL CONDITIONS OF AUTHORIZATION

General

6. An operator of a mine shall

(*a*) install and maintain facilities of such type as the Minister may in writing approve for sampling and analysing effluents for the purpose of enabling the Minister to determine whether the operator is complying with the limits of authorized deposits prescribed by section 5;

(*b*) take grab or composite samples of each undiluted effluent at its final discharge point on the regular basis prescribed by section 7;

(*c*) analyse the samples referred to in paragraph (*b*) on the regular basis prescribed by section 7;

(*d*) where possible measure or in any other case estimate the volume of each undiluted effluent deposited per month at its final discharge point on the regular basis prescribed by section 9; and

(*e*) within 30 days after the end of each month, send to the Minister a report, in such form as the Minister may in writing approve, containing the information prescribed by section 10.

Frequency of Sampling and Analysis

7. (1) Subject to subsection (2), the sampling and analysis referred to in paragraphs 6(*b*) and (*c*) shall be made

(*a*) once a week, where the arithmetic mean of the concentration in undiluted effluent of a substance described in an item of Schedule 2 in the immediately preceding six months was equal to or greater than the arithmetic mean set out in column I of that item;

(*b*) once every two weeks, where the arithmetic mean of the concentration in undiluted effluent of a substance described in an item of Schedule 2 in the immediately preceding six months was equal to or greater than the arithmetic mean set out in column II of that item but less than that set out in column I of that item;

(*c*) once a month, where the arithmetic mean of the concentration in undiluted effluent of a substance described in an item of Schedule 2 in the immediately preceding six months was equal to or greater than the arithmetic mean set out in column III of that item but less than that set out in column II of that item;

(*d*) once every six months, where the arithmetic mean of the concentration in undiluted effluent of a substance described in an item of Schedule 2 in the immediately preceding six months was less than the arithmetic mean set out in column III of that item; and

(*e*) once a week for the first six months of operation of a mine.

(2) The sampling and analysis of undiluted effluent to determine its pH level shall be made

(*a*) once a week, where the pH of the undiluted effluent was less than 5.0 at any time in the immediately preceding six months;

(*b*) once every two weeks, where the pH of the undiluted effluent was between 5.0 and 5.5 at any time in the immediately preceding six months;

(*c*) once a month, where paragraph (*a*) or (*b*) does not apply; or

(*d*) once a week for the first six months of operation of a mine.

Analytical Test Methods

8. (1) For the purposes of section 5, the concentration in undiluted effluent of a substance described in column I of an item of Schedule 3 shall be determined using

(*a*) the test method referred to in column II of that item as modified by the directions in columns III and IV for procedure and sample preservation respectively; or

(*b*) any other method, approved in writing by the Minister, the results of which can be confirmed by the method referred to in paragraph (*a*).

(2) For the purposes of section 5, the pH of undiluted effluent shall be determined using

(*a*) the test method prescribed by section 221 of the publication "Standard Methods for the Examination of Water and Waste Water", 13th Edition (1971), published jointly by the American Public Health Association, American Water Works Association and the Water Pollution Control Federation; or

(*b*) any other method, approved in writing by the Minister, the results of which can be confirmed by the method referred to in paragraph (*a*).

Flow Measurement

9. The measurement or estimation of volume of undiluted effluent referred to in paragraph 6(*d*) shall be made monthly, unless the lowest frequency of sampling and analysis prescribed by subsection 7(1) is every six months, in which case the measurement or estimation shall be made every six months.

Reporting

10. A report referred to in paragraph 6(*e*) shall contain the following information respecting the month in respect of which the report is made:

(*a*) the arithmetic mean concentrations (in milligrams per liter or picocuries per liter) of the deleterious substances in each undiluted effluent deposited and the arithmetic mean pH of undiluted effluents deposited;

(*b*) the concentrations of deleterious substances in all samples used to determine the arithmetic mean concentrations referred to in paragraph (*a*);

(*c*) the pH of all samples used to determine the arithmetic mean pH referred to in paragraph (*a*);

(*d*) the volume (in Imperial gallons per month) of each undiluted effluent deposited; and

(*e*) the type of sample collection (composite or grab) used for each effluent deposited.

Permitted Variations in Additional Conditions

11. Where the operator of a mine establishes to the satisfaction of the Minister that for scientific and technical reasons a scheme of sampling and analysis, measurement or estimation or reporting referred to in sections 7, 8, 9 and 10 other than at the regular time interval frequencies required by those sections, is sufficient to enable the Minister to determine whether the operator is complying with the limits of authorized deposits prescribed by section 5, the Minister may, in writing, permit the operator to

(*a*) take and analyse samples of each undiluted effluent in accordance with the scheme on a regular basis specified in the permit,

(*b*) measure or estimate the volume of each effluent in accordance with the scheme on a regular basis specified in the permit, or

(*c*) report to the Minister in accordance with the scheme on a regular basis specified in the permit,

and sections 7, 8, 9 and 10 do not apply to the operator if he complies with the scheme on the regular basis specified in the permit.

SCHEDULE 1

PART 1

AUTHORIZED LEVELS OF SUBSTANCES

Item	Substance	Column I Maximum Authorized Monthly Arithmetic Mean Concentration	Column II Maximum Authorized Concentration in a Composite Sample	Column III Maximum Authorized Concentration in a Grab Sample
1.	Arsenic	0.5 mg/l	0.75 mg/l	1.0 mg/l
2.	Copper	0.3 mg/l	0.45 mg/l	0.6 mg/l
3.	Lead	0.2 mg/l	0.3 mg/l	0.4 mg/l
4.	Nickel	0.5 mg/l	0.75 mg/l	1.0 mg/l
5.	Zinc	0.5 mg/l	0.75 mg/l	1.0 mg/l
6.	Total Suspended Matter	25.0 mg/l	37.5 mg/l	50.0 mg/l
7.	Radium 226	10.0 pCi/l	20.0 pCi/l	30.0 pCi/l

NOTE: The concentrations are given as total values with the exception of Radium 226 which is a dissolved value after filtration of the sample through a 3 micron filter.

PART 2

AUTHORIZED LEVELS OF pH

Parameter	Column I Minimum Authorized Monthly Arithmetic mean pH	Column II Minimum Authorized pH in a Composite Sample	Column III Minimum Authorized pH in a Grab Sample
pH	6.0	5.5	5.0

SCHEDULE 2

DETERMINATION OF FREQUENCY WITH WHICH UNDILUTED EFFLUENTS ARE TO BE SAMPLED AND ANALYSED FOR PARTICULAR SUBSTANCES

Item	Substance	Column I At least Weekly If Concentration Is Equal To Or Greater Than	Column II At Least Every Two Weeks If Concentration Is Equal To Or Greater Than	Column III At Least Monthly If Concentration Is Equal To Or Greater Than
1.	Arsenic	0.5 mg/l	0.2 mg/l	0.10 mg/l
2.	Copper	0.3 mg/l	0.1 mg/l	0.05 mg/l
3.	Lead	0.2 mg/l	0.1 mg/l	0.05 mg/l
4.	Nickel	0.5 mg/l	0.2 mg/l	0.10 mg/l
5.	Zinc	0.5 mg/l	0.2 mg/l	0.10 mg/l
6.	Total Suspended Matter	25 mg/l	20 mg/l	15 mg/l
7.	Radium 226	10.0 pCi/l	5.0 pCi/l	2.5 pCi/l

NOTE: All concentrations given are total values with the exception of Radium 226 which is a dissolved value after filtering the sample through a 3 micron filter. Radium 226 need be measured in only those mines in which there is radioactive ore.

TABLE 1: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Grainger River - downstream of crossing location

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 3 ORGANISMS							
EPHEMEROPTERA							
Heptageniidae							
Cinygmula sp.(p?)	1	-	4	2	7	1.75	18.82
Heptageniidae indeterminate	-	-	-	1	1	0.25	2.69
Baetidae							
Baetis spp.	1	-	1	3	5	1.25	13.44
TRICHOPTERA							
Brachycentridae							
Brachycentrus cf. *americanus*	1	1	-	4	6	1.50	16.13
Hydropsychidae							
Hydropsyche sp.	-	-	1	1	2	0.50	5.38
Philopotamidae							
Wormaldia sp. (cf. *W.* (=*Polophimus*) *moestus*)	-	-	4	9	13	3.25	34.95
Psychomyiidae							
Psychomyia sp.	1	-	-	-	1	0.25	2.69
Trichoptera pupae indeterminate	-	-	-	1	1	0.25	2.69
PLECOPTERA							
Chloroperlidae	-	1	-	-	1	0.25	2.69

TABLE 1 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Grainger River - downstream of crossing location

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 2 ORGANISMS							
DIPTERA							
Chironomidae							
Tanypodinae							
Pentaneura (? *minima* group of Roback, 1957) - larvae	-	2	-	1	3	0.75	8.06
P. sp. - pupae	1	-	-	-	1	0.25	2.69
Chironominae							
Tanytarsus sp. 7 (of Roback, 1957) - larvae	1	-	-	-	1	0.25	2.69
Chironominae larvae	-	1	-	-	1	0.25	2.69
Chironomidae larvae	3	-	1	-	4	1.00	10.75
Orthocladiinae							
Orthocladius Van der Wulp (sens. lat.)	3	6	3	5	17	4.25	45.70
O. (Orthocladius) Soponis, 1977	1	3	1	2	7	1.75	18.82
O. (Euorthocladius) Soponis, 1977	-	-	1	3	4	1.00	10.75
O. (Orthocladius) cf. *trigonolabis* (Edwards) after Soponis - pupae	-	1	-	-	1	0.25	2.69
Eukiefferiella sp. (after Roback, 1957) - larvae	-	1	2	-	3	0.75	8.06
E. sp.1(after Roback, 1957) - larvae	-	2	-	-	2	0.50	5.38
Orthocladiinae - larvae	18	18	19	13	68	17.00	182.80
Empididae							
Hemerodromia sp. - larvae	-	1	-	-	1	0.25	2.69

APPENDIX 3 - Cont'd.

TABLE 1 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Grainger River - downstream of crossing location

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 1 ORGANISMS							
HIRUDINEA							
Glossophonia complanata	1	-	-	-	1	0.25	2.69
TOTAL NUMBER OF ORGANISMS	32	37	37	45	151	37.75	405.94
TOTAL NUMBER OF TAXA	11	11	10	12	22	11	
Other Organisms Present:							
COPEPODA	12	21	6	1	40		

APPENDIX 3 - Cont'd.

TABLE 2: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Grainger River - upstream of crossing location

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 3 ORGANISMS							
EPHEMEROPTERA							
Heptageniidae							
Cinygmula sp.(p?)	-	3	1	1	5	1.25	13.44
Rhithrogena sp.	-	-	2	-	2	0.50	5.38
Baetidae							
Baetis spp.	2	2	-	-	4	1.00	10.75
B. pluto	-	1	-	-	1	0.25	2.69
TRICHOPTERA							
Brachycentridae							
Brachycentrus cf. *americanus*	2	2	1	2	7	1.75	18.82
Hydropsychidae							
Hydropsyche sp.	-	-	-	1	1	0.25	2.69
GROUP 2 ORGANISMS							
DIPTERA							
Chironomidae							
Chironominae							
Chironomus sp. - pupae	-	1	-	-	1	0.25	2.69
Tanytarsus (Rheotanytarsus) sp. - larvae	-	1	-	-	1	0.25	2.69

APPENDIX 3 - Cont'd.

TABLE 2 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Grainger River - upstream of crossing location

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 2 ORGANISMS Cont'd.							
Chironominae larvae	-	-	1	-	1	0.25	2.69
Diamesinae larvae	-	-	-	1	1	0.25	2.69
Orthocladiinae							
Orthocladius Van der Wulp (sens. lat.) - larvae	-	1	-	-	1	0.25	2.69
O. (Orthocladius) Soponis, 1977 - larvae	-	-	1	1	2	0.50	5.38
Eukiefferiella sp. 1 (after Roback, 1957) - larvae	-	-	-	1	1	0.25	2.69
E. sp. (?) - pupae	1	-	-	-	1	0.25	2.69
Orthocladiinae - larvae	-	2	-	1	3	0.75	8.06
Simuliidae							
Simulium sp. - larvae	1	-	4	-	5	1.25	13.44
GROUP 1 ORGANISMS							
HIRUDINEA							
Glossophonia complanata	-	-	-	2	2	0.50	5.38

APPENDIX 3 - Cont'd.

TABLE 2 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Grainger River - upstream of crossing location

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 1 ORGANISMS Cont'd.							
OLIGOCHAETA							
Lumbriculidae	-	-	-	1	1	0.25	2.69
TOTAL NUMBER OF ORGANISMS	6	13	10	11	40	10.00	107.55
TOTAL NUMBER OF TAXA	4	8	6	9	18	7	
Other Organisms Present:							
COPEPODA	5	17	11	2	35		

TABLE 3: Identification of Benthic Invertebrates, Cadillac Mines Ekman Samples
Fish Trap Creek

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 3 ORGANISMS							
EPHEMEROPTERA							
Ephemerellidae							
Caenis sp.	2	-	1	1	4	1.00	43.48
Ephemeroptera indeterminate	1	-	-	-	1	0.25	10.87
TRICHOPTERA							
Brachycentridae							
Brachycentrus sp.	-	-	1	-	1	0.25	10.87
Hydroptilidae							
Agraylea cf. *multipunctata*	-	-	3	-	3	0.75	32.61
Oxyethira sp.	3	-	-	-	3	0.75	32.61
ODONATA							
Libellulidae							
Perithemis sp.	-	-	-	1	1	0.25	10.87
Libellula sp.	1	-	-	-	1	0.25	10.87
Aeshnidae							
Aeshna sp.	1	-	-	-	1	0.25	10.87
Aeshnidae indeterminate	1	-	-	-	1	0.25	10.87
COLEOPTERA							
Agabus sp.	1	-	-	-	1	0.25	10.87
Haliplus sp.	2	-	1	-	3	0.75	32.61

APPENDIX 3 - Cont'd.

TABLE 3 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines Ekman Samples
Fish Trap Creek

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 2 ORGANISMS							
DIPTERA							
Chironomidae							
Chironominae							
Chironomus sp. - larvae	6	1	-	4	11	2.75	119.57
Paratendipes (?) sp. - larvae	-	1	-	-	1	0.25	10.87
Tanytarsus (= Calopsectra) sp. - larvae	-	1	2	5	8	2.00	86.96
T. sp. 3 (of Roback, 1957) - larvae	1	-	-	-	1	0.25	10.87
T. sp. 6 (of Roback, 1957) - larvae	2	-	1	-	3	0.75	32.61
T. (Paratanytarsus) sp. - larvae	-	-	1	1	2	0.50	21.74
T. sp. - pupae	-	-	1	-	1	0.25	10.87
Zavrelia sp. ((*Zavrelia*) cf. sp. of Roback, 1957) - larvae	-	-	-	1	1	0.25	10.87
Orthocladiinae							
Orthocladius Van der Wulp (sens. lat.)	-	-	1	3	4	1.00	43.48
Corynoneura sp. - larvae	-	2	1	2	5	1.25	54.35
C. cf. *toris* (after Roback, 1957) - larvae	-	-	3	-	3	0.75	32.61
Orthocladiinae - larvae	3	2	3	-	8	2.00	86.96
Ceratopogonidae							
Palpomyia type of Johannsen - larvae	4	-	2	3	9	2.25	97.83
Stillobezzia cf. *bulla* Thomsen after Johannsen - larvae	-	1	-	-	1	0.25	10.87

APPENDIX 3 - Cont'd.

TABLE 3 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines Ekman Samples
Fish Trap Creek

Taxa	Replicate 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 2 ORGANISMS Cont'd.							
AMPHIPODA							
Hyalella azteca	62	6	9	17	94	23.50	1021.74
COELENTERATA							
Hydra sp.	-	-	1	-	1	0.25	10.87
GASTROPODA							
Physa sp.	19	5	4	3	31	7.75	336.96
Valvata tricarinata	6	4	2	2	14	3.50	152.17
OLIGOCHAETA							
Naididae	-	3	-	1	4	1.00	43.48
Pristina osbourni	-	-	1	-	1	0.25	10.87
Stylaria lacustris	1	2	1	3	7	1.75	76.09
S. fossularis	4	2	3	2	11	2.75	119.57
GROUP 1 ORGANISMS							
HIRUDINEA							
Glossophonia complanata	15	51	15	20	101	25.25	1097.83

APPENDIX 3 - Cont'd.

TABLE 3 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines Ekman Samples
Fish Trap Creek

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 1 ORGANISMS Cont'd.							
OLIGOCHAETA							
Lumbriculidae							
Lumbriculus spp.	-	1	-	1	2	0.50	21.74
Tubificidae	1	2	-	1	4	1.00	43.48
Aeolosomatidae							
Aeolosoma sp.	-	3	1	-	4	1.00	43.48
Naididae							
Chaetogaster sp.	-	6	1	2	9	2.25	97.83
TOTAL NUMBER OF ORGANISMS	136	93	59	73	361	90.25	3923.97
TOTAL NUMBER OF TAXA	20	17	22	19	37	20	
Other Organisms Present:							
TARDIGRADA	-	-	5	-	5		
BRANCHIOPODA	6	5	7	206	224		
COPEPODA	12	198	9	254	473		
CRUSTACEA NAUPLII	-	-	5	-	5		

APPENDIX 3 - Cont'd.

TABLE 4: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Tetcela River - Site R5, downstream of crossing

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 3 ORGANISMS							
EPHEMEROPTERA							
Baetidae							
Baetis lapponicus	1	-	-	-	1	0.25	2.69
TRICHOPTERA							
Brachycentridae							
Brachycentrus sp.	1	-	1	-	2	0.50	5.38
PLECOPTERA							
Chloroperlidae							
Alloperla sp.	-	1	-	-	1	0.25	2.69
GROUP 2 ORGANISMS							
NEMATODA	-	-	1	-	1	0.25	2.69

APPENDIX 3 - Cont'd.

TABLE 4 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Tetcela River - Site R5 , downstream of crossing

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 1 ORGANISMS							
OLIGOCHAETA							
Lumbriculidae	-	-	-	1	1	0.25	2.69
TOTAL NUMBER OF ORGANISMS	2	1	2	1	6	1.50	16.14
TOTAL NUMBER OF TAXA	2	1	2	1	5	2	

APPENDIX 3 - Cont'd.

TABLE 5: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Tetcela River - Site R5 , upstream of crossing location

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 3 ORGANISMS							
EPHEMEROPTERA							
Heptageniidae							
Rhithrogena sp.	1	-	3	-	4	1.00	10.75
Ephemerellidae							
Ephemerella inermis	-	-	-	1	1	0.25	2.69
TRICHOPTERA							
Hydropsychidae	1	-	-	-	1	0.25	2.69
GROUP 2 ORGANISMS							
DIPTERA							
Chironomidae							
Orthocladiinae							
Orthocladius Van der Wulp (sens. lat.) - larvae	-	-	1	-	1	0.25	2.69
Eukiefferiella sp. 2 (Roback, 1957) - larvae	-	-	1	-	1	0.25	2.69
Chironomidae larvae	-	-	-	1	1	0.25	2.69
Simuliidae							
Simulium sp. - larvae	4	1	1	1	7	1.75	18.82
NEMATODA	-	1	-	-	1	0.25	2.69
TOTAL NUMBER OF ORGANISMS	6	2	6	3	17	4.25	45.71
TOTAL NUMBER OF TAXA	3	2	4	3	8		

APPENDIX 3 - Cont'd.

TABLE 6: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Tetcela River - Site R4, downstream of crossing location

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 3 ORGANISMS							
EPHEMEROPTERA							
Heptageniidae							
Rhithrogena sp.	1	1	1	4	7	1.75	18.82
Ephemerellidae							
Ephemerella doddsi	-	-	-	1	1	0.25	2.69
GROUP 2 ORGANISMS							
DIPTERA							
Simuliidae larvae	-	2	-	-	2	0.50	5.38
Simuliidae adult	-	-	-	1	1	0.25	2.69
Nematocera adult	-	-	1	-	1	0.25	2.69
TOTAL NUMBER OF ORGANISMS	1	3	2	6	12	3.00	32.37
TOTAL NUMBER OF TAXA	1	2	2	3	4	2	
Other Organisms Present:							
PISCES - Cottidae	-	1	-	-	1		

APPENDIX 3 - Cont'd.

TABLE 7: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Tetcela River - Site R4 , upstream of crossing

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 3 ORGANISMS							
EPHEMEROPTERA							
Heptageniidae	-	1	1	3	5	1.25	13.44
Rhithrogena sp.	5	1	2	2	10	2.50	26.88
Baetidae							
Baetis lapponicus	-	-	-	1	1	0.25	2.69
GROUP 2 ORGANISMS							
DIPTERA							
Orthocladiinae							
Orthocladiinae larvae	-	2	-	-	2	0.50	5.38
Simuliidae							
Simulium sp. - larvae	-	-	-	1	1	0.25	2.69
TOTAL NUMBER OF ORGANISMS	5	4	3	7	19	4.75	51.08
TOTAL NUMBER OF TAXA	1	3	2	4	5	3	
Other Organisms Present:							
ROTATORIA - *Keratella* sp.	-	-	25	-	5		

APPENDIX 3 - Cont'd.

TABLE 8: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Site R2

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 3 ORGANISMS							
EPHEMEROPTERA							
Heptageniidae							
Cinygmula sp.(p?)	2	-	-	2	4	1.00	10.75
Epeorus deceptivus	2	1	-	2	5	1.25	13.44
Rhithrogena sp.	1	-	2	-	3	0.75	8.06
Baetidae							
Baetis spp.	1	-	1	-	2	0.50	5.38
B. lapponicus	1	1	-	1	3	0.75	8.06
Ephemerellidae							
Caenis sp.	-	1	-	-	1	0.25	2.69
PLECOPTERA							
Chloroperlidae							
Isogenus sp.	-	-	3	-	3	0.75	8.06
GROUP 2 ORGANISMS							
DIPTERA							
Chironomidae							
Chironominae							
Chironominae larvae	-	-	-	1	1	0.25	2.69
Chironomidae larvae	2	-	1	-	3	0.75	8.06
Orthocladiinae							
Eukiefferiella sp. (after Roback, 1957) - larvae	-	1	-	-	1	0.25	2.69

APPENDIX 3 - Cont'd.

TABLE 8 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Site R2

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 2 ORGANISMS Cont'd.							
Ceratopogonidae							
Palpomyia type of Johannsen - larvae	2	-	-	-	2	0.50	5.38
Simuliidae							
Prosimulium sp. - larvae	123	91	45	154	413	103.25	1110.22
P. sp. - pupae	-	3	-	1	4	1.00	10.75
Simulium sp. - larvae	2	1	-	-	3	0.75	8.06
TOTAL NUMBER OF ORGANISMS	136	99	52	161	448	112.00	1204.29
TOTAL NUMBER OF TAXA	9	6	5	5	13	6	

TABLE 9: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Site R3

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 3 ORGANISMS							
EPHEMEROPTERA							
Heptageniidae							
Cinygmula sp.(p?)	3	2	6	-	11	2.75	29.57
Epeorus deceptivus	-	-	1	-	1	0.25	2.69
Heptageniidae indeterminate	1	-	1	1	3	0.75	8.06
Baetidae							
Baetis lapponicus	4	-	1	-	5	1.25	13.44
PLECOPTERA							
Nemouridae							
Leuctra sp.	-	-	-	1	1	0.25	2.69
Nemoura (?) sp.	-	-	1	-	1	0.25	2.69
GROUP 2 ORGANISMS							
DIPTERA							
Chironomidae							
Chironominae larvae	2	-	-	1	3	0.75	8.06
Chironomidae larvae	-	-	-	1	1	0.25	2.69
Simuliidae							
Prosimulium sp. - larvae	3	4	-	3	10	2.50	26.88
TOTAL NUMBER OF ORGANISMS	14	7	10	7	38	9.50	96.76
TOTAL NUMBER OF TAXA	6	3	5	5	10	5	

APPENDIX 3 - Cont'd.

TABLE 10: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Site R1

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 3 ORGANISMS							
EPHEMEROPTERA							
Heptageniidae	-	-	1	2	3	0.75	8.06
Cinygmula sp.	1	1	1	5	8	2.00	21.51
Epeorus deceptivus	9	10	12	48	79	19.75	212.37
Rhithrogena sp.	-	3	3	4	10	2.50	26.88
Baetidae							
Baetis sp.	1	-	-	1	2	0.50	5.38
B. lapponicus	-	-	1	1	2	0.50	5.38
PLECOPTERA							
Chloroperlidae							
Kathoperla perdita	-	-	1	1	2	0.50	5.38
Nemouridae							
Leuctra sp.	-	1	1	-	2	0.50	5.38
Nemoura oregonensis	-	-	-	4	4	1.00	10.75
GROUP 2 ORGANISMS							
DIPTERA							
Chironomidae							
Diamesinae larvae	2	-	1	-	3	0.75	8.06

APPENDIX 3 - Cont'd.

TABLE 10 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Site R1

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 2 ORGANISMS Cont'd.							
Orthocladiinae							
Trichocladius sp. 3 (Roback, 1957) - larvae	-	-	-	1	1	0.25	2.69
Chironomidae larvae	-	1	-	-	1	0.25	2.69
NEMATODA	-	-	2	100*	102	25.50	274.19
TOTAL NUMBER OF ORGANISMS	13	16	23	167	219	54.75	588.72
TOTAL NUMBER OF TAXA	4	5	8	10	13	7	

* 1/5 of total sample counted for Nematoda and extrapolated to represent whole sample

TABLE 11: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Prairie Creek - M-1

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 3 ORGANISMS							
EPHEMEROPTERA							
Heptageniidae							
Cinygmula sp.	3	1	1	3	8	2.00	21.51
Epeorus deceptivus	6	5	8	13	32	8.00	86.02
Rhithrogena sp.	-	-	2	-	2	0.50	5.38
Baetidae							
Baetis spp.	-	1	-	-	1	0.25	2.69
B. lapponicus	1	-	-	-	1	0.25	2.69
Ephemerellidae							
Ephemerella doddsi	-	-	1	1	2	0.50	5.38
TRICHOPTERA							
Hydropsychidae							
Arctopsyche ladogensis Kolenati	2	-	2	-	4	1.00	10.75
GROUP 2 ORGANISMS							
DIPTERA							
Chironomidae							
Orthocladiinae							
Orthocladius Van der Wulp (sens. lat.) - larvae	-	-	1	-	1	0.25	2.69

APPENDIX 3 - Cont'd.

TABLE 11 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Prairie Creek - M-1

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 2 ORGANISMS Cont'd							
O. (Orthocladius) sp. Soponis, 1977 - larvae	-	1	-	-	1	0.25	2.69
O. (Euorthocladius) sp. Soponis, 1977 - larvae	-	-	1	-	1	0.25	2.69
Orthocladiinae pupae	-	1	-	-	1	0.25	2.69
Orthocladiinae larvae	-	1	-	-	1	0.25	2.69
Chironomidae larvae	1	-	-	-	1	0.25	2.69
Simuliidae							
Simuliium sp. - pupa	1	-	-	-	1	0.25	2.69
Blephariceridae							
Bibiocephala sp. - larvae	1	-	-	-	1	0.25	2.69
TOTAL NUMBER OF ORGANISMS	15	10	6	17	58	14.50	155.94
TOTAL NUMBER OF TAXA	7	5	7	3	14	6	

TABLE 12: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Prairie Creek - M-2

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 3 ORGANISMS							
EPHEMEROPTERA							
Heptageniidae							
Cinygmula sp.	-	1	2	2	5	1.25	13.44
Epeorus deceptivus	2	5	5	7	19	4.75	51.08
Baetidae							
Baetis bicaudatus (cf. *foemina*)	1	-	-	-	1	0.25	2.69
B. lapponicus	-	1	2	1	4	1.00	10.75
PLECOPTERA							
Perlodidae							
Isogenoides frontalis	-	-	1	-	1	0.25	2.69
GROUP 2 ORGANISMS							
DIPTERA							
Chironomidae							
Chironominae							
Tanytarsus (= Calopsectra) sp. - larvae	1	-	-	-	1	0.25	2.69
T. sp. 7 (Roback, 1957) - larvae	1	-	-	-	1	0.25	2.69
Orthocladiinae							
Orthocladiinae - pupae	-	-	1	-	1	0.25	2.69
Orthocladiinae - larvae	2	-	-	-	2	0.50	5.38
TOTAL NUMBER OF ORGANISMS	7	7	11	10	35	8.75	94.10
TOTAL NUMBER OF TAXA	5	3	5	3	8	4	

APPENDIX 3 - Cont'd.

TABLE 13: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Harrison Creek - M-3

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 3 ORGANISMS							
EPHEMEROPTERA							
Heptageniidae							
Cinygmula sp.(p?)	11	2	8	5	26	6.50	69.89
Epeorus deceptivus	10	2	9	5	26	6.50	69.89
Baetidae							
Baetis bicaudatus (cf. *foemina*)	2	-	-	2	4	1.00	10.75
PLECOPTERA							
Chloroperlidae	1	-	-	-	1	0.25	2.69
Nemouridae							
Nemoura cinctipes	3	-	5	3	11	2.75	29.57
N. oregonensis	-	1	2	-	3	0.75	8.06
Taenionyma sp.	1	-	-	-	1	0.25	2.69
Perlodidae	1	1	1	3	6	1.50	16.13
GROUP 2 ORGANISMS							
DIPTERA							
Chironomidae							
Orthocladiinae							
Orthocladius Van der Wulp (sens. lat.) - larvae	1	-	1	-	2	0.50	5.38

APPENDIX 3 - Cont'd.

TABLE 13 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Harrison Creek - M-3

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 2 ORGANISMS Cont'd.							
O. (Orthocladius) Soponis, 1977 - larvae	1	-	-	1	2	0.50	5.38
O. (Euorthocladius) Soponis, 1977 - larvae	1	2	3	7	13	3.25	34.95
O. (Euphaenocladius) cf. Thienemann - pupae	1	-	-	-	1	0.25	2.69
O. (Synorthocladius) cf. Thienemann - larvae	3	-	-	1	4	1.00	10.75
O. (Orthocladius) appersoni Soponis, 1977 - pupae	-	-	1	-	1	0.25	2.69
Corynoneura celeripes (after Roback, 1957) - larvae	1	-	-	-	1	0.25	2.69
Orthocladiinae - larvae	-	1	5	-	6	1.50	16.13
Empididae *Hemerodromia* sp. - larvae	2	4	3	2	11	2.75	29.57
GASTROPODA *Valvata tricarinata*	1	-	-	-	1	0.25	2.69

APPENDIX 3 - Cont'd.

TABLE 13 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Harrison Creek - M-3

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 1 ORGANISMS							
OLIGOCHAETA							
Lumbriculidae	-	1	-	-	1	0.25	2.69
Aeolosomatidae							
Aeolosoma sp.	-	1	2	-	3	0.75	8.06
TOTAL NUMBER OF ORGANISMS	40	15	40	29	124	31.00	333.34
TOTAL NUMBER OF TAXA	15	9	11	9	20	11	

APPENDIX 3 - Cont'd.

TABLE 14: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Prairie Creek - M-4

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 3 ORGANISMS							
EPHEMEROPTERA							
Heptageniidae							
Cinygmula sp.	-	1	3	-	4	1.00	10.75
Epeorus deceptivus	6	3	1	8	18	4.50	48.39
Rhithrogena sp.	-	-	1	-	1	0.25	2.69
Baetidae							
Baetis spp.	-	-	-	1	1	0.25	2.69
B. lapponicus	-	-	-	1	1	0.25	2.69
TRICHOPTERA							
Hydropsychidae							
Arctopsyche grandis	-	-	1	-	1	0.25	2.69
PLECOPTERA							
Chloroperlidae							
Alloperla sp.	-	1	-	-	1	0.25	2.69
Perlodidae	-	-	1	-	1	0.25	2.69
GROUP 2 ORGANISMS							
DIPTERA							
Chironomidae larvae	-	25*	-	-	25	6.25	67.20

APPENDIX 3 - Cont'd.

TABLE 14 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Prairie Creek - M-4

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 2 ORGANISMS Cont'd.							
Simuliidae							
Prosimulium (?) sp. - larvae	-	-	1	-	1	0.25	2.69
NEMATODA	25*	-	-	-	25	6.25	67.20
GROUP 1 ORGANISMS							
OLIGOCHAETA							
Lumbriculidae	-	1	-	-	1	0.25	2.69
TOTAL NUMBER OF ORGANISMS	31	31	8	10	80	20.00	215.06
TOTAL NUMBER OF TAXA	2	5	6	3	12	4	
Other Organisms Present:							
PISCES - Cottidae	-	1	-	-	1		

* 1/5 of total sample counted for Nematoda & Chironomidae and extrapolated to represent whole sample

TABLE 15: Identification of Benthic Invertebrates, Cadillac Mines Surber Samples
Prairie Creek - M-5

Taxa	Replicate No. 1	2	3	4	Total No. Organisms	Mean No. per sample	Mean No. per m^2
GROUP 3 ORGANISMS							
EPHEMEROPTERA							
Heptageniidae							
Cinygmula sp.	4	8	1	3	16	4.00	43.01
Epeorus deceptivus	10	19	-	1	30	7.50	80.65
Rhithrogena sp.	3	1	-	1	5	1.25	13.44
Baetidae							
Baetis spp.	-	1	1	-	2	0.50	5.38
GROUP 2 ORGANISMS							
DIPTERA							
Chironomidae larvae	-	-	1	-	1	0.25	2.69
Blephariceridae							
Bibiocephala sp. - larvae	1	-	-	-	1	0.25	2.69
NEMATODA	-	75*	-	-	75	18.75	201.61
TOTAL NUMBER OF ORGANISMS	18	104	3	5	130	32.50	349.47
TOTAL NUMBER OF TAXA	4	5	3	3	7	4	

* 1/5 of total sample counted for Nematoda and extrapolated to represent whole sample

APPENDIX 3 - Cont'd.

TABLE 16: Identification of Benthic Invertebrates, Cadillac Mines

Taxa	Life Stage	Mean No. Organisms/m^2 STATION Prairie Cr. Tributary	Tetcela R.[1]	Tetcela R.[2]	Tetcela R.[3]	Tetcela R.[4]
GROUP 3 ORGANISMS						
EPHEMEROPTERA						
Heptageniidae	N	8.06	-	-	13.44	-
Cinygmula sp.	N	21.51	-	-	-	-
Epeorus deceptivus	N	212.37	-	-	-	-
Rhithrogena sp.	N	26.88	18.82	10.75	26.88	-
Baetidae						
Baetis spp.	N	5.38	-	-	-	-
B. lapponicus	N	5.38	-	-	2.69	2.69
Ephemerellidae						
Ephemerella doddsi	N	-	2.69	-	-	-
E. inermis	N	-	-	2.69	-	-
TRICHOPTERA						
Brachycentridae						
Brachycentrus sp.	L	-	-	-	-	5.38
Hydropsychidae	L	-	-	2.69	-	-
PLECOPTERA						
Chloroperlidae						
Alloperla sp.	N	-	-	-	-	2.69
Kathoperla perdita	N	5.38	-	-	-	-
Nemouridae						
Leuctra sp.	N	5.38	-	-	-	-
Nemoura oregonensis	N	10.75	-	-	-	-

APPENDIX 3 - Cont'd.

TABLE 16 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines

Taxa	Life Stage	Mean No. Organisms/m^2 STATION Prairie Cr. Tributary	Tetcela R.[1]	Tetcela R.[2]	Tetcela R.[3]	Tetcela R.[4]
GROUP 2 ORGANISMS						
DIPTERA						
Chironomidae						
Diamesinae	L	8.06	-	-	-	-
Orthocladiinae						
Orthocladius Van der Wulp (sens. lat.)	L	-	-	2.69	-	-
Eukiefferiella sp. 2 (Roback, 1957)	L	-	-	2.69	-	-
Trichocladius sp. 3 (Roback, 1957)	L	2.69	-	-	-	-
Orthocladiinae	L	-	-	-	5.38	-
Chironomidae	L	2.69	-	2.69	-	-
Simuliidae						
Simulium sp.	L	-	-	18.82	2.69	-
Simuliidae	L	-	5.38	-	-	-
Simuliidae	A	-	2.69	-	-	-
Nematocera	A	-	2.69	-	-	-
NEMATODA		274.19	-	2.69	-	2.69

TABLE 16 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines

Taxa	Life Stage	Mean No. Organisms/m^2 STATION Prairie Cr. Tributary	Tetcela R.[1]	Tetcela R.[2]	Tetcela R.[3]	Tetcela R.[4]
GROUP 1 ORGANISMS						
OLIGOCHAETA						
Lumbriculidae		-	-	-	-	2.69
TOTAL NUMBER OF ORGANISMS		588.72	32.27	45.71	51.08	16.14
TOTAL NUMBER OF TAXA		13	4	8	5	5

[1] Site R4, downstream of crossing
[2] Site R5, upstream of crossing
[3] Site R4, upstream of crossing
[4] Site R5, downstream of crossing

Life Stage: A = adult; L = larvae; P = pupae

APPENDIX 3 - Cont'd.

TABLE 17: Identification of Benthic Invertebrates, Cadillac Mines

Taxa	Life Stage	Mean No. Organisms/m^2 STATION Prairie Cr.[1]	Prairie Cr.[2]	Prairie Cr.[3]	Prairie Cr.[4]
GROUP 3 ORGANISMS					
EPHEMEROPTERA					
Heptageniidae					
Cinygmula sp.	N	21.51	13.44	10.75	43.01
Epeorus deceptivus	N	86.02	51.08	48.39	80.65
Rhithrogena sp.	N	5.38	-	2.69	13.44
Baetidae					
Baetis spp.	N	2.69	-	2.69	5.38
B. bicaudatus (cf. *foemina*)	N	-	2.69	-	-
B. lapponicus	N	2.69	10.75	2.69	-
Ephemerellidae					
Ephemerella doddsi	N	5.38	-	-	-
TRICHOPTERA					
Hydropsychidae					
Arctopsyche ladogensis Kolenati	L	10.75	-	-	-
A. grandis	L	-	-	2.69	-
PLECOPTERA					
Chloroperlidae					
Alloperla sp.	N	-	-	2.69	-
Perlodidae	N	-	-	2.69	-
Isogenoides frontalis	N	-	2.69	-	-

APPENDIX 3 - Cont'd.

TABLE 17 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines

Taxa	Life Stage	Mean No. Organisms/m^2 STATION Prairie Cr.[1]	Prairie Cr.[2]	Prairie Cr.[3]	Prairie Cr.[4]
GROUP 2 ORGANISMS					
DIPTERA					
Chironomidae					
Chironominae					
Tanytarsus (= Calopsectra) sp.	L	-	2.69	-	-
T. sp. 7 (Roback, 1957)	L	-	2.69	-	-
Orthocladiinae					
Orthocladius Van der Wulp (sens. lat.)	L	2.69	-	-	-
O. (Orthocladius) sp. Soponis, 1977	L	2.69	-	-	-
O. (Euorthocladius) sp. Soponis, 1977	L	2.69	-	-	-
Orthocladiinae	P	2.69	2.69	-	-
Orthocladiinae	L	2.69	5.38	-	-
Chironomidae	L	2.69	-	67.20	2.69
Simuliidae					
Prosimulium (?) sp.	L	-	-	2.69	-
Simulium sp.	P	2.69	-	-	-
Blephariceridae					
Bibiocephala sp.	L	2.69	-	-	2.69
NEMATODA		-	-	67.20	201.61

TABLE 17 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines

Taxa	Life Stage	Mean No. Organisms/m^2 STATION Prairie Cr.[1]	Prairie Cr.[2]	Prairie Cr.[3]	Prairie Cr.[4]
GROUP 1 ORGANISMS					
OLIGOCHAETA					
Lumbriculidae		-	-	2.69	-
TOTAL NUMBER OF ORGANISMS		155.94	94.10	215.06	349.47
TOTAL NUMBER OF TAXA		14	8	12	7

[1] M-1
[2] M-2
[3] M-4
[4] M-5

Life Stage: A = adult; L = larvae; P = pupae

TABLE 18: Identification of Benthic Invertebrates, Cadillac Mines

Taxa	Life Stage	Mean No. Organisms/m^2 STATION Unnamed Creek 1	Unnamed Creek 2	Grainger River 3	Grainger River 4	Harrison[5]	Fish Trap[6]
GROUP 3 ORGANISMS							
EPHEMEROPTERA							
Heptageniidae							
Cinygmula sp.(p?)	N	10.75	29.57	18.82	13.44	69.89	-
Epeorus deceptivus	N	13.44	2.69	-	-	69.89	-
Rhithrogena sp.	N	8.06	-	-	5.38	-	-
Heptageniidae indeterminate	N	-	8.06	-	-	-	-
Baetidae							
Baetis spp.	N	5.38	-	13.44	10.75	-	-
B. bicaudatus (cf. *foemina*)	N	-	-	-	-	10.75	-
B. lapponicus	N	8.06	13.44	-	-	-	-
B. pluto	N	-	-	-	2.69	-	-
Ephemerellidae							
Caenis sp.	N	2.69	-	-	-	-	43.48
Ephemeroptera indeterminate	N	-	-	-	-	-	10.87
TRICHOPTERA							
Brachycentridae							
Brachycentrus cf. *americanus*	L	-	-	16.13	18.82	-	-
B. sp.	L	-	-	-	-	-	10.87
Hydropsychidae							
Hydropsyche sp.	L	-	-	5.38	2.69	-	-
Hydroptilidae							
Agraylea cf. *multipunctata*	L	-	-	-	-	-	32.61
Oxyethira sp.	L	-	-	-	-	-	32.61

APPENDIX 3 - Cont'd.

TABLE 18 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines

Taxa	Life Stage	Mean No. Organisms/m^2 STATION Unnamed Creek 1	Unnamed Creek 2	Grainger River 3	Grainger River 4	Harrison[5]	Fish Trap[6]
GROUP 3 ORGANISMS Cont'd.							
Philopotamidae							
Wormaldia sp. (cf. *W.*(= *Polophimus*) *moestus*)	L	-	-	34.95	-	-	-
Psychomyiidae							
Psychomyia sp.	L	-	-	2.69	-	-	-
Trichoptera indeterminate	P	-	-	2.69	-	-	-
PLECOPTERA							
Chloroperlidae	N	-	-	2.69	-	2.69	-
Isogenus sp.	N	8.06	-	-	-	-	-
Nemouridae							
Leuctra sp.	N	-	2.69	-	-	-	-
Nemoura (?) sp.	N	-	2.69	-	-	-	-
N. cinctipes	N	-	-	-	-	29.57	-
N. oregonensis	N	-	-	-	-	8.06	-
Taenionyma sp.	N	-	-	-	-	2.69	-
ODONATA							
Libellulidae							
Perithemis sp.	N	-	-	-	-	-	10.87
Libellula sp.	N	-	-	-	-	-	10.87
Aeshnidae							
Aeshna sp.	N	-	-	-	-	-	10.87
Aeshnidae indeterminate	N	-	-	-	-	-	10.87

TABLE 18 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines

Taxa	Life Stage	Mean No. Organisms/m^2 STATION: Unnamed Creek 1	Unnamed Creek 2	Grainger River 3	Grainger River 4	Harrison[5]	Fish Trap[6]
GROUP 3 ORGANISMS Cont'd.							
COLEOPTERA							
Agabus sp.	L	-	-	-	-	-	10.87
Haliplus sp.	L	-	-	-	-	-	32.61
GROUP 2 ORGANISMS							
DIPTERA							
Chironomidae							
Tanypodinae							
Pentaneura (? minima group of Roback, 1957)	L	-	-	8.06	-	-	-
P. sp.	P	-	-	2.69	-	-	-
Chironominae							
Chironomus sp.	L	-	-	-	-	-	119.57
C. sp.	P	-	-	-	2.69	-	-
Paratendipes (?) sp.	L	-	-	-	-	-	10.87
Tanytarsus (= Calopsectra) sp.	L	-	-	-	-	-	86.96
T. (Rheotanytarsus) sp.	L	-	-	-	2.69	-	-
T. sp. 3 (of Roback, 1957)	L	-	-	-	-	-	10.87
T. sp. 6 (of Roback, 1957)	L	-	-	-	-	-	32.61
T. sp. 7 (of Roback, 1957)	L	-	-	2.69	-	-	-
T. (Paratanytarsus) sp.	L	-	-	-	-	-	21.74
T. sp.	P	-	-	-	-	-	10.87
Zavrelia sp. ((*Zavrelia*) cf. sp. of Roback, 1957)	L	-	-	-	-	-	10.87

TABLE 18 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines

Taxa	Life Stage	Mean No. Organisms/m^2 STATION Unnamed Creek 1	Unnamed Creek 2	Grainger River 3	Grainger River 4	Harrison[5]	Fish Trap[6]
GROUP 2 ORGANISMS Cont'd.							
Chironominae	L	2.69	8.06	2.69	2.69	-	-
Chironomidae	L	8.06	2.69	10.75	-	-	-
Diamesinae	L	-	-	-	2.69	-	-
Orthocladiinae							
Orthocladius Van der Wulp (sens. lat.)	L	-	-	45.70	2.69	5.38	43.48
O. (Orthocladius) Soponis, 1977	L	-	-	18.82	5.38	5.38	-
O. (Euorthocladius) Soponis, 1977	L	-	-	10.75	-	34.95	-
O. (Euphaenocladius) cf. Thienemann	P	-	-	-	-	2.69	-
O. (Synorthocladius) cf. Thienemann	L	-	-	-	-	10.75	-
O. (Orthocladius) appersoni Soponis, 1977	P	-	-	-	-	2.69	-
O. (Orthocladius) cf. *trigonolabis* (Edwards) after Soponis	P	-	-	2.69	-	-	-
Corynoneura sp.	L	-	-	-	-	-	54.35
C. cf. *celeripes* (after Roback, 1957)	L	-	-	-	-	2.69	-
C. cf. *taris* (after Roback, 1957)	L	-	-	-	-	-	32.61
Eukiefferiella sp. (after Roback, 1957)	L	2.69	-	8.06	-	-	-
E. sp. 1 (after Roback, 1957)	L	-	-	5.38	2.69	-	-
E. sp. (?)	P	-	-	-	2.69	-	-

APPENDIX 3 - Cont'd.

TABLE 18 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines

Taxa	Life Stage	Mean No. Organisms/m^2 STATION Unnamed Creek 1	Unnamed Creek 2	Grainger River 3	Grainger River 4	Harrison[5]	Fish Trap[6]
GROUP 2 ORGANISMS Cont'd.							
Orthocladiinae Ceratopogonidae	L	-	-	182.80	8.06	16.13	86.96
Palpomyia type of Johannsen	L	5.38	-	-	-	-	97.83
Stillobezzia cf. *bulla* Thomsen after Johannsen	L	-	-	-	-	-	10.87
Simuliidae							
Prosimulium sp.	L	1110.22	26.88	-	-	-	-
P. sp.	P	10.75	-	-	-	-	-
Simulium sp.	L	8.06	-	-	13.44	-	-
Empididae							
Hemerodromia sp.	L	-	-	2.69	-	29.57	-
AMPHIPODA							
Hyalella azteca	A	-	-	-	-	-	1021.74
COELENTERATA							
Hydra sp.		-	-	-	-	-	10.87
GASTROPODA							
Physa sp.	A	-	-	-	-	-	336.96
Valvata tricarinata	A	-	-	-	-	2.69	152.17
OLIGOCHAETA							
Naididae		-	-	-	-	-	43.48
Pristina osbourni		-	-	-	-	-	10.87
Stylaria lacustris		-	-	-	-	-	76.09
S. fossularis		-	-	-	-	-	119.57

APPENDIX 3 - Cont'd.

TABLE 18 Cont'd: Identification of Benthic Invertebrates, Cadillac Mines

Taxa	Life Stage	Mean No. Organisms/m^2 STATION Unnamed Creek [1]	[2]	Grainger River [3]	[4]	Harrison[5]	Fish Trap[6]
GROUP 1 ORGANISMS							
HIRUDINEA							
Glossophonia complanata		-	-	2.69	5.38	-	1097.83
OLIGOCHAETA							
Lumbriculidae		-	-	-	2.69	2.69	-
Lumbriculus spp.		-	-	-	-	-	21.74
Tubificidae		-	-	-	-	-	43.48
Aeolosomatidae							
Aeolosoma sp.		-	-	-	-	8.06	43.48
Naididae							
Chaetogaster sp.		-	-	-	-	-	97.83
TOTAL NUMBER OF ORGANISMS		1204.29	102.15	405.94	107.55	333.34	3923.97
TOTAL NUMBER OF TAXA		13	10	22	18	20	37

[1] Unnamed Creek - Site R2
[2] Unnamed Creek - Site R3
[3] Grainger River - downstream of crossing location - Site R7
[4] Grainger River - upstream of crossing location - Site R7
[5] Harrison Creek - M-3
[6] Fish Trap Creek - Site R6

Life Stage: A = adult; L = larvae; P = pupae