APPENDIX "A"

SUBSURFACE EXPLORATIONS **To** LABORATORY TEST DATA

CONTRACT DOCUMENTS

For

LOVE CANAL
BLACK AND BERGHOLTZ CREEKS
REMEDIATION

City of Niagara Falls, New York

Site Number 9-32-020

Prepared for:

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

50 WOLF ROAD, ALBANY, NEW YORK 12233

THOMAS C. JORLING, COMMISSIONER

DIVISION OF SOLID WASTE

NORMAN H. NOSENCHUCK, P.E., DIRECTOR

STATE OF NEW YORK
ANTHONY R. DOLCIMASCOLO
No. 56560
LICENSED PROFESSIONAL ENGINEER

DECEMBER 1987

TAMS Consultants, Inc. - New York, N.Y.
Goldberg-Zoino Associates of New York, P.C. - Buffalo, N.Y.

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LOVE CANAL
BLACK AND BERGHOLTZ CREEKS REMEDIATION

APPENDIX A

SUBSURFACE EXPLORATIONS AND LABORATORY TEST DATA

APPENDIX A

BLACK AND BERGHOLTZ CREEKS REMEDIATION
SUBSURFACE EXPLORATIONS AND LABORATORY TEST DATA

Subsurface explorations and soils laboratory tests have been made at the Love Canal site in 1986 and 1987. This information, presented on the following pages, is for examination by the bidders but it is not part of the contract documents.

Previous subsurface explorations and test data are also available at the offices of the Department. The bidder should contact the Department to review this additional data.

Bidder is responsible for any conclusions drawn from the subsurface explorations and laboratory test data. The Department and Engineer are not guaranteeing continuity of conditions indicated at the subsurface exploration locations.

APPENDIX A SECTIONS

A1: TEST BORINGS/MONITORING WELLS MADE IN NOVEMBER 1986

Buffalo Drilling Company, Inc. (BDC) made 15 test borings at the Love Canal site between November 6, 1986 and November 20, 1986. These borings designated GZA-1 through GZA-6, GZA-8, GZA-9, GZA-9A and GZA-10 through GZA-15 (Note: There is no boring GZA-7.) are shown on the drawings.

These borings were done in two general areas of Love Canal. Borings GZA-1 through GZA-11 were done to evaluate subsurface conditions at the proposed Dewatering Containment Facility (DCF) location, formerly identified as the proposed Interim Containment Facility (ICF) location. Borings GZA-12 through GZA-15 were done along Black and Bergholtz Creeks to evaluate subsurface conditions in this area.

The borings were made using a truck mounted Diedrich Model D-50 drill rig. Each boring was made entirely within the overburden soils and no rock core was collected. The borings were advanced using 3 3/4 inch inside diameter (I.D.) hollow stem augers. Soil samples were generally collected, at the depths indicated on the boring logs, by driving a 1 3/8 inch I.D. split spoon sampler with a 140 pound weight falling 30 inches according to ASTM method number 1586. The blows required to drive the split spoon sampler 6 inches are recorded on the boring logs. These logs also include the N-value (the summation of blows required to drive the sampler for the second and third 6 inch interval of each soil sample) and the percent of sample recovered for each sample interval.

Undisturbed soil samples were collected in three borings (GZA-3, GZA-4 and GZA-5) by augering to the top of the desired sample location and pushing a 3 inch diameter Shelby tube sampler with the drill rig (see boring logs for undisturbed sample depth).

The boring logs include a description of the soil samples collected in each boring. The soil types are described, based on visual observation by a Goldberg-Zoino Associates of New York, P.C. (GZA) representative and soil laboratory test results, using a modified version of the Burmiester description system. A legend for the boring logs follows. The soils laboratory test results are included in A4 of Appendix A.

Following drilling, the majority of the borings (GZA-1 through GZA-15) were backfilled. However, a monitoring well was installed in one of the borings (GZA-12) following drilling. Details of the installation of this monitoring well are presented on the boring log.

LEGEND FOR BORING LOGS

Notes:

1. Descriptions and classifications are based on visual inspection of samples and boring operations, unless otherwise noted in the text.

2. The stratum lines are based upon interpolation between samples and may not represent actual subsurface conditions.

3. Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of the groundwater may occur due to factors other than those present at the time measurements were made.

4. Disturbed samples of the overburden were obtained by driving a 2 inch O.D. split spoon sampler into undisturbed material beneath the casing with a 140 pound weight, free falling 30 inches. This operation is the Standard Penetration Test and is described in greater detail in ASTM D-1586. The Standard Penetration Number (N), as defined in this standard, can be obtained by combining blow counts from the second and third 6 inch increment of each sample run. These values are shown as the "N" values on the logs.

Key to Density and Consistency Description of Granular and Cohesive Soils

Number of Blows Per Foot, N	Relative Density	Number of Blows Per Foot, N	Consistency
		Below 2	Very Soft
0-4	Very Loose	2-4	Soft
4-10	Loose	4-8	Medium
10-30	Medium	8-15	Stiff
30-50	Dense	15-30	Very Stiff
Over 50	Very Dense	Over 30	Hard

Identification of soil type is made on the basis of an estimate of particle sizes and, in the case of fine-grained soils, also on the basis of plasticity.

Soil Type	Particle Size
Boulder	>6 inch
Cobble	3-6 inch
Gravel:	
Coarse	3-3/4 inch
Fine	3/4-No. 4

Sand:	
Coarse	No. 4-10
Medium	No. 10-40
Fine	No. 40-200
Silt-Nonplastic (Granular)	<No. 200
Clay-Plastic (Cohesive)	<No. 200

Key to Soil Types

The major constituent is listed first. Lesser constituents follow the major soil type in order of decreasing percentages.

The following terms are used in classifying soils consisting of mixtures of two or more soil types. The estimate is based on weight of total sample.

Term	Percent of Total Sample
"and"	35-50
"some"	20-35
"little"	10-20
"trace"	less than 10

It is noted that when sampling gravelly soils with a standard standard split spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter. It is often not possible to identify the presence of cobbles and boulders.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation Niagara Falls, New York

BORING No. GZA-1
SHEET 1 OF 1
FILE No. R5719.12
REVISED 12/14/87

CONTRACTOR Buffalo Drilling Company, Inc.
DRILLER K. Danser
GZA ENGINEER G. Klawinski

BORING LOCATION ICF Facility (see location plan)
SURFACE ELEV. 574.5 DATUM USGS
DATE: START 11/13/86 COMPLETE 11/12/86

DRILLING METHODS
TYPE OF DRILL RIG Diedrich D-50
CASING 3 3/4 inch I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8 inch I.D. Split Spoon Sampler (ASTM 1586)
ROCK DRILLING None
REMARKS

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ___
OVERBURDEN SAMPLES: DISTURBED 7 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS --
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 14 BOTTOM OF HOLE ELEVATION 560.5

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
0	4	S-1	0-2	14	20	0		Black-brown, Clayey SILT, some fine to coarse Sand, little Cinders with Organics, moist, overall slightly plastic (FILL)			Clayey SILT (FILL)
	10										
	4										
	6							Stiff, light brown, Clayey SILT and fine to medium SAND, trace coarse Sand, moist, medium plasticity			Stiff, Clavey SILT
	5	S-2	2-4	17	40						
	8										
	9							. . . grades; very stiff, brown			
	10										
	6	S-3	4-6	21	55						
5	7							. . . grades; wet			
	14										
	22							Very stiff, red-brown, varved CLAY & SILT, trace fine to medium Sand, moist, medium plasticity			Very Stiff to Stiff, CLAY and SILT
	5	S-4	6-8	19	65						
	8										
	11										
	16										
	4	S-5	8-10	21	75			Same as above			
	9										
	12										
10	16										
	3	S-6	10-12	14	100			. . . grades; stiff, gray, wet			
	7										
	7										
	8										
	1	S-7	12-14	3	100			. . . grades; soft, mottled red brown-gray			Soft, CLAY and SILT
	1										
	2										
	2										
15								BOTTOM OF HOLE AT 14.0 FT.			No groundwater in open hole ten minutes after completion of drilling

REMARKS:

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation Niagara Falls, New York

BORING No. GZA-2
SHEET 1 OF 2
FILE No. R5719.12
REVISED 12/12/87

CONTRACTOR Buffalo Drilling Company, Inc.
DRILLER K. Danser
GZA ENGINEER G. Klawinski

BORING LOCATION ICF Facility (see location plan)
SURFACE ELEV. 574.0 DATUM USGS
DATE: START 11/6/86 COMPLETE 11/6/86

DRILLING METHODS
TYPE OF DRILL RIG Diedrich D-50 REMARKS
CASING 3 3/4 inch I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8 inch I.D. Split Spoon Sampler (ASTM 1586)
ROCK DRILLING None

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL
OVERBURDEN SAMPLES: DISTURBED 18 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS --
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION --
TOTAL DEPTH OF HOLE 35.0 BOTTOM OF HOLE ELEVATION 539.0

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
0	4	S-1	0-2	10	25	0		Black, Clayey SILT, some fine to coarse Sand, little Cinders with organics, moist, overall slightly plastic with rock fragments from .4 to .5' (FILL)			Clayey SILT (FILL)
	4										
	6										
	9										
	10	S-2	2-4	14	25			Medium dense, gray-brown, fine to coarse SAND, some Silt, little fine Gravel, moist, nonplastic			Medium Dense fine to coarse SAND
	6										
	8							Medium dense, brown, fine to medium SAND, some Silt, wet, nonplastic			Medium Dense fine to medium SAND
	9										
	4	S-3	4-6	16	75						
5	5										
	11							Very stiff, red brown, varved, CLAY and SILT, trace fine to coarse Sand, moist, medium plasticity			Very Stiff to Stiff, CLAY and SILT
	13										
	6	S-4	6-8	25	100						
	11										
	14										
	14										
	4	S-5	8-10	21	85			Same as above			
	7										
	14										
10	11										
	4	S-6	10-12	10	100			. . . grades; stiff			
	4										
	6										
	6										
	1	S-7	12-14	3	100			. . . grades; soft, wet			Soft, CLAY and SILT
	1										
	2										
	3										
	1/1.0	S-8	14-16	1	100			. . . grades; very soft			Very Soft, CLAY and SILT
15	--										
	1										
	2										
	WOH	S-9	16-18	WOH	100			Same as above			
	WOH										

REMARKS: WOH = Split spoon sampler advanced by weight of 140 pound hammer applied to drill rods.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation
Niagara Falls, New York

BORING No. GZA-2
SHEET 2 OF 2
FILE No. R5719.12
REVISED 12/12/87

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
	WOH	S-9	16-18	WOH	100						
	2										
	WOH										Very Soft, CLAY and SILT
	WOH	S-10	18-20	WOH	100			. . . grades; little fine to coarse sand			
	WOH										
20	WOH										
	WOH							lens of fine to medium sand at 20.4'			
	WOH	S-11	20-22	WOH	100						
	2										
	WOH							Same as above.			
	WOH	S-12	22-24	1	100			. . . grades; some fine to coarse Sand, trace Gravel			
	1										
	2										
	WOH										
25	WOH	S-13	24-26	1	100						
	1										
	3							. . .grades; little Gravel			
	5										
	11	S-14	26-28	33	50			Hard, Brown, Clayey SILT, little fine to coarse Sand, trace fine Gravel, moist, overall slightly plastic			Hard, Clayey SILT
	22										
	56										
	18										
	47	S-15	28-30	97	50						
	50										
30	63										
	17										
	27	S-16	30-32	56	60			. . . rock fragment at 30.7'			
	29							. . . grades; little Gravel			
	37										
	29							. . . rock fragment at 32.4'			
	47	S-17	32-34	110	70						
	63										
	91										
	24	S-18	34-35	--	100					①	
	60										
35	100+/ 0.0							Auger & Split Spoon Refusal 35.0' BOTTOM OF HOLE		②	
40											

REMARKS: ① No groundwater in augers 10 minutes after completion of drilling.
② Hole open to 29.0' after augers removed.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creek Remediation
Niagara Falls, New York

BORING No. GZA-3
SHEET 1 OF 2
FILE No. R5719.12
REVISED 12/12/87

CONTRACTOR Buffalo Drilling Company
DRILLER K. Danser
GZA ENGINEER G. Klawinski

BORING LOCATION ICF Facility (see location plan)
SURFACE ELEV. 573.5 DATUM USGS
DATE: START 11/7/86 COMPLETE 11/7/86

DRILLING METHODS
TYPE OF DRILL RIG Diedrich D-50 REMARKS
CASING 3 3/4 inch I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8 inch I.D. Split Spoon Sampler (ASTM 1586)
ROCK DRILLING None

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL [X] INCLINED [ ] DEGREES FROM VERTICAL
OVERBURDEN SAMPLES: DISTURBED 8 UNDISTURBED 2
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS --
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 26.0 BOTTOM OF HOLE ELEVATION 547.5

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR ROD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
0	2	S-1	0-2	14	50	0		Black, Clayey SILT and fine to medium Sand, with organics (wood fragments, roots), moist, overall slightly plastic (FILL)			Clayey SILT (FILL)
	5										
	9										Medium Dense SILT
	8							Medium dense, brown, SILT and fine to medium SAND, moist, nonplastic			
	8	S-2	2-4	19	100			. . . grades; wet			
	8							Very stiff, red brown, varved CLAY and SILT, trace fine to medium Sand, moist, overall medium plasticity			Very Stiff, CLAY and SILT
	11										
5	6	S-3	4-6	24	80						
	11										
	13										
	16										
	3	S-4	6-8	23	95			Same as above			
	9										
	14										
	15										
	3	S-5	8-10	19	75			Same as above			
	8										
	11										
10	12										
	2	S-6	10-12	5	100			. . . grades: medium, wet, medium plasticity			Medium, CLAY and SILT
	2										
	3										
	3										
	1	S-7	12-14	3	100			Soft, red-brown, Silty CLAY, wet, overall medium plasticity			Soft, Silty CLAY
	1										
	2										
	2										
	--	U-1	14-16	--	100			Same as previous sample		(1)	
15	--										
	--										
	--										

REMARKS: (1) Pushed 3" diameter undisturbed "Shelby Tube" sample from 14 to 16 feet.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GZA
GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation
Niagara Falls, New York

BORING No. GZA-3
SHEET 2 OF 2
FILE No. R5719.12
REVISED 12/12/87

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
											Silty CLAY
20	--									(2)	
	--	U-2	20-22	--	100			Same as previous sample			
	--										
	--										
	12							Stiff, mottled red brown-brown, SILT and CLAY, little fine to coarse Sand, wet, low plasticity			Stiff, SILT and CLAY
25	75	S-8	24-26	100+	100						
	83							Hard, red-brown, Clayey SILT, some fine to coarse Sand, some fine Gravel, moist, slight plasticity			Hard, Clayey SILT (ML)
	30									(3)	
								BOTTOM OF HOLE AT 26.0 FT.			

REMARKS: (2) Pushed 3" diameter undisturbed "Shelby Tube" sample from 20 to 22 feet.
(3) Augers removed, hole open to 29.0 feet. No groundwater in open borehole 10 minutes after augers were removed.

GZA
GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation, Niagara Falls, New York

BORING No. GZA-4
SHEET 1 OF 2
FILE No. R5719.12
REVISED 12/12/87

CONTRACTOR Buffalo Drilling Company
DRILLER K. Danser
GZA ENGINEER G. Klawinski

BORING LOCATION ICF Facility (see location plan)
SURFACE ELEV. 575.3 DATUM USGS
DATE: START 11/11/86 COMPLETE 11/11/86

DRILLING METHODS

TYPE OF DRILL RIG Diedrich D-50 REMARKS
CASING 3 3/4 inch I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8 inch I.D. Split Spoon Sampler (ASTM 1586)
ROCK DRILLING None

DRILLING SUMMARY

DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL
OVERBURDEN SAMPLES: DISTURBED 11 UNDISTURBED 1
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS --
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 30.0 BOTTOM OF HOLE ELEVATION 545.3

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
0	2	S-1	0-2	11	35	0		Brown, medium Sand, with occasional organics (woods, roots) moist, overall slight plasticity (FILL)			Clayey SILT (FILL)
	5										
	6										
	7										
	10	S-2	2-4	21	25			Medium dense, brown, SILT and CLAY, some fine to medium SAND, moist, slight plasticity			Medium Dense to Loose, SILT and CLAY
	13										
	18										
	20										
5	3	S-3	4-6	8	60			. . . grades; loose, wet			
	4										
	4										
	8										
	6	S-4	6-8	15	75			Stiff, red brown, varved Silty CLAY, trace fine to medium Sand, moist, overall high plasticity			Stiff to Very Stiff, Silty CLAY
	8										
	7										
	16										
	1	S-5	8-10	15	80			Same as above			
	5										
	10										
10	16										
	5	S-6	10-12	23	75			. . . grades; very stiff			
	11										
	12										
	16										
	1	S-7	12-14	6	100			. . . grades; medium, mottled red brown-gray, CLAY and SILT, wet, medium plasticity			Medium, CLAY and SILT
	2										
	4										
	4										
	WOR	S-8	14-16	3	100			Same as above			
15	1										
	2										
	3										
	--	U-1	16-18	--	100			Soft, red-brown, Silty CLAY, wet, high plasticity		(1)	Soft Silty CLAY
	--										

REMARKS: (1) Pushed 3" diameter undisturbed "Shelby Tube" sample from 16 to 18 feet.

WOR = Split spoon sampler advanced by weight of drill rods.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation
Niagara Falls, New York

BORING No. GZA-4
SHEET 2 OF 2
FILE No. R5719.20
REVISED 12/12/87

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
	--	U-1	16-18	--	100						
	--										Soft, Silty CLAY
20											
	1										
	3	S-9	24-26	7	0			No recovery			
25	4										
	6										
	3							Same as Sample U-1			
	5	S-10	26-28	13	40						
	8							Very stiff, mottled red brown-brown, Clayey SILT, some fine to coarse Sand, little fine Gravel, moist, slight plasticity			Very Stiff to Hard, Clayey SILT
	15										
	5										
	10	S-11	28-30	37	50			. . . grades; hard			
	27										
30	30									②	
								BOTTOM OF HOLE 30.0 FT.			

REMARKS: ② No groundwater in borehole 10 minutes after completion of drilling.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation, Niagara Falls, New York

BORING No. GZA-5
SHEET 1 OF 2
FILE No. R5719.12
REVISED 12/12/87

CONTRACTOR Buffalo Drilling Company, Inc.
DRILLER K. Danser
GZA ENGINEER G. Klawinski

BORING LOCATION ICF Facility (see location plan)
SURFACE ELEV. 575.0 DATUM USGS
DATE: START 11/7/86 COMPLETE 11/10/86

DRILLING METHODS
TYPE OF DRILL RIG Diedrich D-50
CASING 3 3/4 inch I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8 inch I.D. Split Spoon Sampler (ASTM 1586)
ROCK DRILLING None
REMARKS

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ____
OVERBURDEN SAMPLES: DISTURBED 9 UNDISTURBED 1
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS --
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 26.0' BOTTOM OF HOLE ELEVATION 549.0

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
0	3	S-1	0-2	12	35	0		Brown, Clayey SILT and fine to coarse SAND, trace organics (wood fragments, brick), moist, slight plasticity (FILL)			Clayey SILT (FILL)
	5										
	7										
	6										
	8	S-2	2-4	26	55			Medium dense, light brown, fine to coarse SAND and Clayey SILT, moist,			Medium Dense SAND and Clayey SILT
	13										
	13										
	13										
5	4	S-3	4-6	11	60			. . . grades: stiff			
	5										
	6										
	11										
	4	S-4	6-8	20	70			Very stiff, red brown, varved CLAY and SILT, trace fine to medium Sand, damp, medium plasticity			Very Stiff, CLAY and SILT
	7										
	13										
	15										
	4	S-5	8-10	19	65			Same as above			
	7										
	12										
10	21										
	8	S-6	10-12	22	80			. . . grades: moist			
	10										
	12										
	15										
	--	U-1	12-14	--				Same as above		①	
	--										
	--										
	--										
	WOH	S-7	14-16	5	100			. . . grades: medium, wet, medium plasticity			Medium, CLAY and SILT
15	2										
	3										
	2										

REMARKS: ① Pushed 3" diameter undisturbed "Shelby Tube" sample from 14 to 16 feet.
WOH = Split spoon sampler advanced with weight of 140 pound hammer applied to drill rods.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation Niagara Falls, New York

BORING No. GZA-5
SHEET 2 OF 2
FILE No. R5719.12
REVISED 12/12/87

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR ROD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
											Soft, CLAY and SILT
20	WOH 1 2 2	S-8	19-21	3	100			Same as above			
											Hard, Clayey SILT
25	WOH 16 23 27	S-9	24-26	39	40			Hard, red brown, Clayey SILT, some fine to coarse Sand, little fine Gravel, moist, slight plasticity		2	
								BOTTOM OF HOLE 26.0 FT.			

REMARKS: 2. No groundwater in borehole 10 minutes after completion of drilling.

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GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation Niagara Falls, New York

BORING No. GZA-6
SHEET 1 OF 2
FILE No. R5719.12
REVISED 12/12/87

CONTRACTOR Buffalo Drilling Company, Inc.
DRILLER K. Danser
GZA ENGINEER G. Klawinski

BORING LOCATION ICF Facility (see location plan)
SURFACE ELEV. 575.6 DATUM USGS
DATE: START 11/7/86 COMPLETE 11/10/86

DRILLING METHODS
TYPE OF DRILL RIG Diedrich D-50
CASING 3 3/4 inch I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8 inch I.D. Split Spoon Sampler
ROCK DRILLING None

REMARKS

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL
OVERBURDEN SAMPLES: DISTURBED 16 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS --
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 31.2' BOTTOM OF HOLE ELEVATION 544.4

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
0						0					
	3							Black, topsoil with intermixed organics (roots, wood fragments) moist, slight plasticity (TOPSOIL)			TOPSOIL
	6	S-1	0-2	14	50						Stiff to Hard, Clayey SILT
	8							Stiff, light brown, Clayey Silt and fine to medium Sand, moist, slight plasticity (FILL)			
	10										
	12										
	15	S-2	2-4	33	60			. . . grades; hard			
	18							0.1' thick layer of black, organics (cinders, roots) at 3.0'			
	14										
	4										
5	7	S-3	4-6	16	100			. . . grades; very stiff, wet			
	9										
	8										
	8										
	11	S-4	6-8	25	65						
	14							Very stiff, red brown, varved SILT & CLAY, trace fine to medium Sand, moist, medium plasticity			Very Stiff CLAY and SILT
	15										
	8										
	10	S-5	8-10	21	75						
	11										
10	13										
	4										
	8	S-6	10-12	20	55			Same as above			
	12										
	10										
	3										
	2	S-7	12-14	5	100			. . . grades: medium, gray, wet			Medium, CLAY and SILT
	3										
	4										
	1										Soft, CLAY and SILT
15	1	S-8	14-16	3	100			. . . grades: soft			
	2										
	2										
	WOH	S-9	16-17	1	100			. . . grades: very soft			Very Soft, CLAY and SILT
	WOH										

REMARKS: WOH = Split spoon sampler advanced with weight of 140 pound hammer applied to drill rods.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation
Niagara Falls, New York

BORING No. GZA-6
SHEET 2 OF 2
FILE No. R5719.12
REVISED 12/12/87

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
	1 2	S-9	16-18	1	100						
	WOH WOH WOH 1	S-10	18-20	WOH	100			Same as above			
20	WOH WOH 1 2	S-11	20-22	1	100			Same as above			Very Soft, CLAY and SILT
	WOH WOH 1 1	S-12	22-24	1	100			. . . grades: mottled red brown-gray			
25	WOR WOH 1 2	S-13	24-26	1	100			. . . grades: little fine to coarse Sand, trace Gravel, medium plasticity Very soft, red-brown Clayey SILT, little fine to coarse Sand, trace Gravel, wet, low plasticity			Very Soft, SILT and CLAY
	27 21 14 15	S-14	26-28	35	25			Hard, red brown, Clayey SILT, some fine to coarse Sand, little fine Gravel, moist, slight plasticity			Hard, Clayey SILT
	5 8 14 24	S-15	28-30	22	0			. . . grades very stiff (No Recovery)			
30	45 75 52/.2	S-16		100+	10			. . . grades hard Auger and Split Spoon Refusal at 31.2' BOTTOM OF HOLE		①	

REMARKS: ① Hole open to 26.0 feet after auger removal.

GZA
GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
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-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation Niagara Falls, New York

BORING No. GZA-8
SHEET 1 OF 2
FILE No. R5719.12
REVISED 12/12/87

CONTRACTOR Buffalo Drilling Company, Inc.
DRILLER K. Danser
GZA ENGINEER G. Klawinski

BORING LOCATION ICF Facility (see location plan)
SURFACE ELEV. 574.6 DATUM USGS
DATE: START 11/14/86 COMPLETE 11/14/86

DRILLING METHODS
TYPE OF DRILL RIG Diedrich D-50
CASING 3 3/4 inch I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8 inch I.D. Split Spoon Sampler
ROCK DRILLING None

REMARKS

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL
OVERBURDEN SAMPLES: DISTURBED 9 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS --
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 27.0' BOTTOM OF HOLE ELEVATION 547.6

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
0						0					
	3 8 7 10	S-1	0-2	15	40			Brown, Clayey SILT and fine to coarse SAND, trace organics (wood fragments, bricks), moist, slight plasticity (FILL)			Clayey SILT and SAND (FILL)
	8 8 10 15	S-2	2-4	18	40			Very stiff, light brown, Clayey SILT, some fine to medium Sand, moist			Very Stiff Clayey SILT
5	8 10 18 25	S-3	4-6	28	55						
	4 8 12 18	S-4	6-8	20	50			Very stiff, red brown, varved CLAY and SILT, trace fine to medium Sand, damp, medium plasticity			Very Stiff to Stiff CLAY and SILT
	3 5 9 14	S-5	8-10	14	80			. . . grades: stiff, moist			
10	3 6 8 9	S-6	10-12	14	100			Same as above			
	1 2 3 2	S-7	12-14	5	100			. . . grades: medium, wet, medium plasticity			Medium, CLAY and SILT
15											

REMARKS:

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation
Niagara Falls, New York

BORING No. GZA-8
SHEET 2 OF 2
FILE No. R5719.12
REVISED 12/12/87

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR ROD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
	WOH										Very Soft, CLAY and SILT
20	WOH	S-8	19-21	1	100			. . . grades: very soft mottled gray-red brown, medium plasticity			
	1										
	2										
											Very Stiff, Clayey SILT
25	3										
	14	S-9	25-27	28	50			Very stiff, red brown, Clayey SILT some fine to coarse SAND, little fine Gravel, moist, overall slight plasticity			
	14										
	20										
								BOTTOM OF HOLE AT 27.0 FT.			

REMARKS: ① No groundwater in borehole 10 minutes after completion of drilling.
WOH = Split spoon sampler advanced with weight of 140 pound hammer applied to drill rods.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation Niagara Falls, New York

BORING No. GZA-9
SHEET 1 OF 1
FILE No. R5719.12

CONTRACTOR Buffalo Drilling Company, Inc.
DRILLER K. Danser
GZA ENGINEER G. Klawinski

BORING LOCATION ICF Facility (see location plan)
SURFACE ELEV. 575.7 DATUM USGS
DATE: START 11/10/86 COMPLETE 11/10/86

DRILLING METHODS
TYPE OF DRILL RIG Diedrich D-50 REMARKS
CASING 3 3/4 inch I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8 inch I.D. Split Spoon Sampler (ASTM 1586)
ROCK DRILLING

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL
OVERBURDEN SAMPLES: DISTURBED 1 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS --
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 5.2' BOTTOM OF HOLE ELEVATION 570.5

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
0	6 8 1 3	S-1	0-2	9	50	0		Black-brown, Clayey SILT, some fine to coarse Sand, little organics (wood fragments, roots), moist (TOPSOIL)			TOPSOIL
								Black-brown, soils mixed with frequent wood fragments, metal, bricks, moist (MISCELLANEOUS FILL)			MISCELLANEOUS FILL AND DEBRIS
5								Auger Refusal at 5.2 ft. BOTTOM OF HOLE		(1)	

REMARKS (1) No water in borehole 5 minutes after completion of drilling.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation
Niagara Falls, New York

BORING No. GZA-9A
SHEET 1 OF 1
FILE No. R5719.12

CONTRACTOR Buffalo Drilling Company, Inc.
DRILLER K. Danser
GZA ENGINEER G. Klawinski

BORING LOCATION ICF Facility (see location plan)
SURFACE ELEV. 575.7 DATUM USGS
DATE: START 11/10/86 COMPLETE 11/10/86

DRILLING METHODS
TYPE OF DRILL RIG Diedrich D-50 REMARKS
CASING 3 3/4 inch I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8 inch I.D. Split Spoon Sampler (ASTM 1586)
ROCK DRILLING None

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL
OVERBURDEN SAMPLES: DISTURBED 0 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS --
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 5.2' BOTTOM OF HOLE ELEVATION 570.5

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
0						0					
								(MISCELLANEOUS FILL) wood, metal		(1)	MISCELLANEOUS FILL AND DEBRIS
5											
								Auger Refusal at 5.2 ft. BOTTOM OF HOLE		(2)	

REMARKS: (1) Sample description based on auger spoil.
(2) No groundwater in borehole 5 minutes after completion of drilling.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation
Niagara Falls, New York

BORING No. GZA-10
SHEET 1 OF 1
FILE No. R5719.12

CONTRACTOR Buffalo Drilling Company, Inc.
DRILLER K. Danser
GZA ENGINEER G. Klawinski

BORING LOCATION ICF Facility (see location plan)
SURFACE ELEV. 574.9 DATUM USGS
DATE: START 11/13/86 COMPLETE 11/13/86

DRILLING METHODS
TYPE OF DRILL RIG Diedrich D-50 REMARKS
CASING 3 3/4 inch I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8 inch I.D. Split Spoon Sampler (ASTM 1586)
ROCK DRILLING None

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ___
OVERBURDEN SAMPLES: DISTURBED 2 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS --
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 3.3' BOTTOM OF HOLE ELEVATION 571.6

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
0	3					0					
	8	S-1	0-2	18	40			Black-brown, Clayey SILT, some fine to coarse Sand, little organics (wood fragments, roots), moist (TOPSOIL)			TOPSOIL
	10										
	14										
	10							Black-brown, soils mixed with frequent wood fragments, metal, glass, bricks, concrete, moist (MISCELLANEOUS FILL)			MISCELLANEOUS FILL AND DEBRIS
	38	S-2	2-3.6	42	30						
	14										
	13/.1							Auger and Split Spoon Refusal at 3.6' BOTTOM OF HOLE		(1)	
5											

REMARKS: (1) Water at 3.4 feet in borehole 5 minutes after completion of drilling.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation Niagara Falls, New York

BORING No. GZA-11
SHEET 1 OF 1
FILE No. R5719.12

CONTRACTOR Buffalo Drilling Company, Inc.
DRILLER K. Danser
GZA ENGINEER G. Klawinski

BORING LOCATION ICF Facility (see location plan)
SURFACE ELEV. 574.8 DATUM USGS
DATE: START 11/14/86 COMPLETE 11/14/86

DRILLING METHODS
TYPE OF DRILL RIG Diedrich D-50
CASING 3 3/4 inch I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8 inch I.D. Split Spoon Sampler (ASTM 1586)
ROCK DRILLING None
REMARKS

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ____
OVERBURDEN SAMPLES: DISTURBED 2 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS --
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION --
TOTAL DEPTH OF HOLE 3.7 BOTTOM OF HOLE ELEVATION 571.1

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
0	4, 6, 8, 9	S-1	0-2	14	10	0		Black, Clayey SILT, some fine to coarse Sand, some organics (wood fragments, roots), moist (TOPSOIL)			TOPSOIL
	8, 10, 10	S-2	2-3.7	20	50			Black-brown, soils mixed with frequent, (wood, bricks, wire, glass), moist (Miscellaneous FILL)			MISCELLANEOUS FILL AND DEBRIS
	26/.2							Auger and Split Spoon Refusal BOTTOM OF HOLE 3.7 FT.		(1)	
5											

REMARKS: (1) No groundwater in borehole 5 minutes after completion of drilling.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholt Creeks Remediation Niagara Falls, New York

BORING No. GZA-12
SHEET 1 OF 2
FILE No. R5719.12
REVISED 12/12/87

CONTRACTOR Buffalo Drilling Company, Inc.
DRILLER K. Danser
GZA ENGINEER G. Klawinski

BORING LOCATION Creek Bank (see location plan)
SURFACE ELEV. _____ DATUM USGS
DATE: START 11/18/86 COMPLETE 11/18/86

DRILLING METHODS
TYPE OF DRILL RIG Diedrich D-50
CASING 3 3/4 inch I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8 inch I.D. Split Spoon Sampler (ASTM 1586)
ROCK DRILLING None

REMARKS Top of Casing Elevation 573.4.

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL _____
OVERBURDEN SAMPLES: DISTURBED 9 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS --
AMOUNT OF ROCK DRILLED 0
TOTAL DEPTH OF HOLE 21.1'
TOP OF ROCK ELEVATION _____
BOTTOM OF HOLE ELEVATION _____

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
0	6	S-1	0-2	44	25	0		Brown, Clayey Silt, little fine to medium Sand, occasional roots, moist, overall slight plasticity (FILL)			Clayey Silt (FILL)
	22										
	22										
	22							Brown-black, fine to coarse Sand and Gravel, trace Silt with occasional brick fragments, and slag, moist, non-plastic (FILL)			Sand and Gravel (FILL)
	22	S-2	2-4	100+	30						
	90										ROCK FRAGMENTS (FILL)
	67							Gray, rock fragment, damp (FILL)			
	17							Medium dense, brown, fine to coarse SAND, and fine GRAVEL, little Silt, moist, non-plastic			Medium Dense SAND and fine GRAVEL
	5										
5	5	S-3	4-6	10	25			. . . grades: loose			
	5										
	5							. . . grades: trace fine Gravel			
	WOH										
	WOH	S-4	6-8	3	35						
	3										
	3							. . . grades: to wet			
	2							Stiff, red-brown, varved Silty CLAY, trace fine to medium Sand, moist, medium plasticity			Silty CLAY
	4	S-5	8-9	10	60						
	6										
10	8										
	2							Medium, red brown, Clayey SILT and fine to coarse SAND, trace fine Gravel, moist, slight plasticity			Medium Clayey SILT and fine to coarse SAND
	3	S-6	10-12	8	80						
	5										
	9							. . . grades: little fine Gravel			
	1										
	3	S-7	12-14	5	75			. . . grades: wet			
	2										
	2										
	1										
15	4	S-8	14-16	15	65						
	11										
	26							. . . grades: stiff, trace fine Gravel			

REMARKS:

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation Niagara Falls, New York

BORING No. GZA-12
SHEET 2 OF 2
FILE No. R5719.12
REVISED 12/12/87

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
											Hard, Clayey SILT
20	6 18 100 70	S-9	19-21	100+	10			Hard, brown, Clayey SILT, some fine to coarse Sand, little fine Gravel, moist, overall slightly plastic (GLACIAL TILL)			GLACIAL TILL

Auger and Split Spoon Refusal
BOTTOM OF HOLE 21.1 FT.

WELL INSTALLATION DESCRIPTION

I. WELL

A. Ground Surface to 13.5'
1-1/2" diameter PVC flush coupled riser

B. 13.5' to 18.5'
1-1/2" diameter PVC slotted well screen

II. BACKFILL

A. Ground Surface
Protective casing with locking cap

B. Ground Surface to 10.0'
Cement grout

C. 10.0' to 13.0'
Bentonite pellets

D. 13.0' to 19.0'
Filter sand

E. 19.0' to 21.1'
Bentonite pellets

REMARKS: 1. No groundwater in augers 30 minutes after completion of drilling and prior to well installation.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation Niagara Falls, New York

BORING No. GZA-13
SHEET 1 OF 2
FILE No. R5719.12
REVISED 12/12/87

CONTRACTOR Buffalo Drilling Company, Inc.
DRILLER K. Danser
GZA ENGINEER G. Klawinski

BORING LOCATION Creek Bank (see location plan)
SURFACE ELEV. 568.1 DATUM USGS
DATE: START 11/18/86 COMPLETE 11/18/86

DRILLING METHODS
TYPE OF DRILL RIG Diedrich D-50 REMARKS See Note ①
CASING 3 3/4 inch I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8 inch I.D. Split Spoon Sampler (ASTM 1586)
ROCK DRILLING None

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ____
OVERBURDEN SAMPLES: DISTURBED 8 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS --
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION --
TOTAL DEPTH OF HOLE 18.1' BOTTOM OF HOLE ELEVATION 550.0

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
0	3	S-1	0-2	14	25	0		Black, soil with organics (roots, wood fragments), moist, overall slight plasticity (TOPSOIL)			TOPSOIL
	6							Brown, Clayey Silt and fine to coarse Sand, little Gravel, with occasional bricks, glass, asphalt, moist, slightly plastic (FILL)			Clayey Silt (FILL)
	8										
	4										
	5	S-2	2-4	8	35						
	3										
	5							. . . grades: with occasional slag			
	7										
	2	S-3	4-6	4	30			Loose, black-brown, fine to coarse Gravel, and fine to coarse Sand, some Silt, with occasional organics, wood, bricks and asphalt, wet, non-plastic (FILL)			Gravel and fine to coarse Sand (FILL)
5	2										
	2										
	2										
	1	S-4	6-8	2	100			Very soft, gray, Silty CLAY, trace fine to medium Sand, wet, medium plasticity			Very Soft to Soft Silty CLAY
	1										
	1										
	1										
	WOH	S-5	8-10	1	90			. . . grades: mottled red brown-gray			
	WOH										
	1										
10	2										
	WOH	S-6	10-12	3	90			. . . grades: soft			
	1										
	2										
	1										
	WOR	S-7	12-14	WOH	100			. . . grades: very soft			
	WOH										
	WOH										
	1							. . . grades: little fine to coarse Sand			
	WOH	S-8	14-16	WOH	100			Same as above			
15	WOH										
	WOH										
	3										

REMARKS: ① Depth from top of head wall west of 91st Street to Bergholtz Creek water surface during boring was 4.6 ft.
WOH = Split spoon sampler advanced with weight of 140 pound hammer applied to drill rods.
WOR = Split spoon sampler advanced with weight of drill rods.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation
Niagara Falls, New York

BORING No. GZA-13
SHEET 2 OF 2
FILE No. R5719.12

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR ROD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
										②	
20								Auger and Split Spoon Refusal BOTTOM OF HOLE 18.1 FT.			

REMARKS: ② Borehole open to 17.6 feet after augers were removed. No groundwater inside augers 10 minutes after completion of drilling.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation, Niagara Falls, New York

BORING No. GZA-14
SHEET 1 OF 2
FILE No. R5719.12
REVISED 12/12/87

CONTRACTOR Buffalo Drilling Company, Inc.
DRILLER K. Danser
GZA ENGINEER G. Klawinski

BORING LOCATION Creek Bank (see location plan)
SURFACE ELEV. 572.3 DATUM USGS
DATE: START 11/19/86 COMPLETE 11/19/86

DRILLING METHODS
TYPE OF DRILL RIG Diedrich D-50 REMARKS
CASING 3 3/4 inch I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8 inch I.D. Split Spoon Sampler (ASTM 1586)
ROCK DRILLING

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL
OVERBURDEN SAMPLES: DISTURBED 9 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS --
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 25.1 BOTTOM OF HOLE ELEVATION 547.2

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
0	2	S-1	0-2	7	20	0		Black, topsoil with organics (roots, wood fragments), moist, slight plasticity (TOPSOIL)			TOPSOIL
	3							Medium dense, brown, SILT, little fine to medium Sand, moist, non-plastic			Medium Dense SILT
	4										
	6										
	8	S-2	2-4	22	55						
	12										
	10										
	11										
	8	S-3	4-6	28	50						
5	12							Very stiff, red brown varved CLAY and SILT, trace fine to medium Sand, damp, medium plasticity			Very Stiff to Medium CLAY and SILT
	16										
	19										
	9	S-4	6-8	38	55						
	16										
	22										
	23										
	7	S-5	8-10	17	90			. . . grades: moist			
	8										
	9										
10	12										
	2	S-6	10-12	8	100			. . . grades: medium			
	3										
	5										
	6										
	1	S-7	12-14	2	100			Soft, mottled red brown-gray, Silty CLAY, wet, high plasticity			Soft, Silty CLAY
	1										
	1										
	1										
	WOH	S-8	14-16	2	100			1/8 inch lense of fine to medium SAND and SILT			
15	1							Same as above			
	1										
	2										

REMARKS: WOH = Split spoon sampler advanced with weight of 140 pound hammer applied to drill rods.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation
Niagara Falls, New York

BORING No. GZA-14
SHEET 2 OF 2
FILE No. R5719.12
REVISED 12/12/87

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
	3										
20	6	S-9	19-21	10	25			Stiff, red brown, Clayey SILT, some fine to coarse SAND, little fine Gravel, moist, slight plasticity			Stiff, Clayey SILT
	4										
	7										
25								Auger and Split Spoon Refusal BOTTOM OF HOLE 25.1 FT.		①	

REMARKS: ① No groundwater in borehole 10 minutes after completion of drilling.

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GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation, Niagara Falls, New York

BORING No. GZA-15
SHEET 1 OF 2
FILE No. R5719.12
REVISED 12/12/87

CONTRACTOR Buffalo Drilling Company, Inc.
DRILLER K. Krieger
GZA ENGINEER G. Klawinski

BORING LOCATION Creek Bank (see location plan)
SURFACE ELEV. 572.8 DATUM USGS
DATE: START 11/20/86 COMPLETE 11/20/86

DRILLING METHODS
TYPE OF DRILL RIG Diedrich D-50 REMARKS
CASING 3 3/4 inch I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8 inch I.D. Split Spoon Sampler (ASTM 1586)
ROCK DRILLING None

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL
OVERBURDEN SAMPLES: DISTURBED 10 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS --
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 23.0' BOTTOM OF HOLE ELEVATION 549.8

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
0	2	S-1	0-2	9	35	0		Black, topsoil with organics (roots, wood fragments), moist, slight plasticity (TOPSOIL)			TOPSOIL
	3										
	6							Medium dense, brown, SILT, trace fine Sand, damp, non-plastic			Medium Dense SILT
	6										
	6	S-2	2-4	17	35						
	9										
	8										
	8										
	10										
5	11	S-3	4-6	24	60			. . . grades: to light brown with frequent 1/16 inch thick lenses of fine SAND and SILT			
	13										
	13							Very stiff, red brown, varved Silty CLAY, trace fine to medium Sand, damp, high plasticity			Very Stiff to Stiff Silty CLAY
	8										
	12	S-4	6-8	28	80						
	16										
	16										
	6										
	6	S-5	8-10	14	80			. . . grades: stiff			
	8										
10	8										
	3										
	4	S-6	10-12	8	100			. . . grades: medium			Medium Silty CLAY
	4										
	5										
	3										
	2	S-7	12-14	6	100			. . . grades: mottled red brown-gray, wet, medium plasticity			
	4										
	4										
	2										
15	5	S-8	14-16	8	100						
	3							Rock fragment 15.6-15.8'			Soft, Silty CLAY
	3										
	WOH	S-9	16-18	3	100			. . . grades: to soft, gray, medium plasticity			
	2										

REMARKS: WOH = Split spoon sampler advanced with weight of 140 pound hammer applied to drill rods.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GZA
GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation
Niagara Falls, New York

BORING No. GZA-15
SHEET 2 OF 2
FILE No. R5719.12
REVISED 12/12/87

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
	1 2	S-9	16-18	3	100						
20											
	2 4 11 16	S-10	21-23	15	60			Stiff, red brown, Clayey SILT, some fine to coarse Sand, little fine Gravel, moist, slight plasticity		①	Stiff Clayey SILT
								BOTTOM OF HOLE 23.0 FT.			
25											

REMARKS: ① No groundwater in borehole 10 minutes after completion of drilling.

A2: TEST BORINGS MADE IN JUNE 1987

Buffalo Drilling Company, Inc. (BDC) made six test borings at the Love Canal site between June 16, 1987 and June 19, 1987. These borings were done in two areas of the Love Canal. Borings DDSF-1 through DDSF-4 were done to evaluate subsurface conditions at the proposed Decontamination Drum Storage Facility (DDSF). Borings BB-1 and BB-2 were done at the existing footbridge over Bergholtz Creek at 93rd Street to evaluate subsurface conditions in this area. The boring locations are shown on the drawings and/or boring logs.

The borings were made using a truck mounted Mobile B-34S drill rig. Each boring was made entirely within the overburden soils and no rock core was collected. The borings were advanced using 3 3/4 inch inside diameter (I.D.) hollow stem augers. Soil samples were generally collected, at the depths indicated on the boring logs, by driving a 1 3/8 inch I.D. split spoon sampler with a 140 pound weight falling 30 inches according to ASTM method number 1586. The blows required to drive the split spoon sampler 6 inches are recorded on the boring logs. These logs also include the N-value (the summation of blows required to drive the sampler for the second and third 6 inch interval of each soil sample) and the percent of sample recovered for each sample interval.

The boring logs include a description of the soil samples collected in each boring. The soil types are described, based on visual observation by a Goldberg-Zoino Associates of New York, P.C. (GZA) representative and soil laboratory test results, using a modified version of the Burmiester description system. A legend for the boring logs is included with the section for test borings/monitoring wells made in November 1986 in Appendix A. The soils laboratory test results are included in A4 of Appendix A.

Following drilling, the majority of the borings (GZA-1 through GZA-15) were backfilled. However, a monitoring well was installed in one of the borings (GZA-12) following drilling. Details of the installation of this monitoring well are presented on the boring log.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Love Canal Remediation
Decontamination/Drum Storage Facility

BORING No. DDSF-1
SHEET 1 OF 1
FILE No. R5719.60

CONTRACTOR Buffalo Drilling Company, Inc.
DRILLER K. Danser
GZA ENGINEER D. Abrams

BORING LOCATION Existing Drum Storage Area
SURFACE ELEV. _____ DATUM _____
DATE: START 6/18/87 COMPLETE 6/18/87

DRILLING METHODS
TYPE OF DRILL RIG Mobile B-34S
CASING 3-3/4" I.D. Hollow Stem Augers
SAMPLING METHOD Standard Split Spoon (ASTM D1586)
ROCK DRILLING Not Encountered

REMARKS _____

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL _____
OVERBURDEN SAMPLES: DISTURBED 7 UNDISTURBED _____
ROCK CORE: NUMBER OF BOXES --
OVERBURDEN THICKNESS 16.0'
AMOUNT OF ROCK DRILLED --
TOTAL DEPTH OF HOLE 16.0'
TOP OF ROCK ELEVATION --
BOTTOM OF HOLE ELEVATION _____

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE	RECOVERY	DEPTH (FT.)	LEGEND	SOIL & ROCK DESCRIPTIONS	WELL INSTALLATION LOG	WELL INSTALLATION REMARKS
0						0				
1	23 18 10	S-1		28	0.8'			Medium dense, brown fine to coarse SAND and fine to coarse GRAVEL, trace silty Clay, moist (FILL)		
2	11 9								No Observation Water Well Installed	
3	32 2	S-2	(Note 1)	34	0.2'			Grades to black/brown, wood fragments		
4	1 6									
5	50/.2	S-3		50/.2'	0.2'			Grades to black, wood, little metal, organics, wet Concrete slab (Note 2)		
6								Void 0.4'		
7								Concrete slab (Note 3) Crushed Stone		
8	5							Very stiff, reddish-brown CLAY and SILT, varved with medium to fine Sand and Silt lenses, medium plasticity, moist (Lacustrine Deposit)		
9	8 10	S-4		18	1.0'					
10	11 3									
11	4	S-5		7	1.8'			Grades to medium gray-brown		
12	3 4									
13	WOH 2	S-6		4	1.9'			Grades to soft		
14	2 2									
15	WOH 1	S-7		3	1.9'					
16	2 1									
17								BORING COMPLETE AT 16.0' (Note 4)		

REMARKS: 1. Split spoon bouncing on wood. Slight sewer odor.
2. Difficult augering to 5.0'; wood chips returned on auger; possible basement wall/concrete slab of abandoned house.
3. Drill with hollow stem auger through 0.8' concrete slab; 0.4' void beneath slab; another possible slab at about 6.2', about 0.8' thick.
4. Free-standing water measured at 9.0' at completion of boring with augers set at 14.0'.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Love Canal Remediation
Decontamination/Drum Storage Facility

BORING No. DDSF-2
SHEET 1 OF 1
FILE No. R5719.60

CONTRACTOR Buffalo Drilling Company, Inc.
DRILLER K. Danser
GZA ENGINEER D. Abrams

BORING LOCATION Existing Drum Storage Area
SURFACE ELEV. _____ DATUM _____
DATE: START 6/18/87 COMPLETE 6/18/87

DRILLING METHODS

TYPE OF DRILL RIG Mobile B-34S
CASING 3-3/4" I.D. Hollow Stem Augers
SAMPLING METHOD Standard Split Spoon (ASTM D1586)
ROCK DRILLING Not Encountered

REMARKS _____

DRILLING SUMMARY

DIRECTION OF HOLE: VERTICAL ☑ INCLINED ☐ DEGREES FROM VERTICAL _____
OVERBURDEN SAMPLES: DISTURBED 8 UNDISTURBED _____
ROCK CORE: NUMBER OF BOXES --
OVERBURDEN THICKNESS 16.0'
AMOUNT OF ROCK DRILLED --
TOTAL DEPTH OF HOLE 16.0'
TOP OF ROCK ELEVATION --
BOTTOM OF HOLE ELEVATION _____

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE	RECOVERY	DEPTH (FT.)	LEGEND	SOIL & ROCK DESCRIPTIONS	WELL INSTALLATION LOG	WELL INSTALLATION REMARKS
0						0				
1	12, 15, 12, 12	S-1		27	0.8'			Medium dense, brown, Silty fine SAND, trace Silty Clay, little fine to coarse Gravel, moist (FILL)		
2								Organics (TOPSOIL)	No Observation Water Well Installed	
3	5, 5, 7, 7	S-2		12	0.8'			Stiff, gray-brown, Clayey SILT, trace fine Sand, mottled, moist		
4										
5	5, 8, 12, 17	S-3		20	1.2'			Stiff, reddish-gray CLAY and SILT, layered, medium plasticity, moist (Lacustrine Deposit)		
6										
7	5, 7, 12, 16	S-4		19	1.2'			Grades to varved with fine to coarse sand and silt lenses		
8										
9	5, 8, 10, 12	S-5		18	1.1'					
10										
11	4, 4, 4, 5	S-6		8	1.2'			Grades to medium, wet		
12										
13	WOH, 1, 1, 2	S-7		2	1.5'			Grades to very soft, gray, silty CLAY		
14										
15	1, 1, 1, 2	S-8		2	1.8'			Grades to reddish-gray		
16								BORING COMPLETE AT 16.0'	(Note 1)	
17										

REMARKS:
1. No free-standing water measured inside hollow stem augers at completion with augers set at 14.0'.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

BORING No. DDSF-2

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Love Canal Remediation
Decontamination/Drum Storage Facility

BORING No. DDSF-3
SHEET 1 OF 2
FILE No. R5719.60

CONTRACTOR Buffalo Drilling Company, Inc.
DRILLER K. Danser
GZA ENGINEER D. Abrams

BORING LOCATION Existing Drum Storage Area
SURFACE ELEV. _____ DATUM _____
DATE: START 6/17/87 COMPLETE 6/17/87

DRILLING METHODS
TYPE OF DRILL RIG Mobile B-34S
CASING 3-3/4" I.D. Hollow Stem Augers
SAMPLING METHOD Standard Split Spoon (ASTM D1586)
ROCK DRILLING Not Encountered

REMARKS _____

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL _____
OVERBURDEN SAMPLES: DISTURBED 11 UNDISTURBED _____
ROCK CORE: NUMBER OF BOXES --
OVERBURDEN THICKNESS 27.8'
AMOUNT OF ROCK DRILLED --
TOTAL DEPTH OF HOLE 27.8'
TOP OF ROCK ELEVATION --
BOTTOM OF HOLE ELEVATION _____

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE	RECOVERY	DEPTH (FT.)	LEGEND	SOIL & ROCK DESCRIPTIONS	WELL INSTALLATION LOG	WELL INSTALLATION REMARKS
0						0				
1	10 11 11 10	S-1		22	0.5'			Medium dense, brown SILT and fine SAND, trace Silty Clay, moist (FILL)		
2	6							Organic material (TOPSOIL)		
3	6 6 7	S-2		12	0.8'			Stiff, gray-brown Clayey SILT, trace fine to medium Sand, mottled, moist (FILL)	No Observation Water Well Installed	
4	4							Medium brown SILT and fine to medium SAND, trace Silty Clay, wet		
5	4 8 11	S-3		12	1.2'			Stiff, gray-brown Silty CLAY, trace fine to medium Sand, mottled, moist		
6	4									
7	7 10 12	S-4		17	1.7'			Very stiff, reddish-brown CLAY and SILT, varved, moist, medium plasticity (Lacustrine Deposit)		
8	4									
9	7 11 13	S-5		18	1.8'			Grades to gray-brown		
10	4									
11	6 8 10	S-6		14	1.8'			Grades to stiff		
12	1									
13	2 2 2	S-7		4	1.9'			Grades to soft		
14	WOH									
15	WOH WOH 2	S-8		WOH	2.0'			Grades to very soft		
16										
17										

REMARKS:

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Love Canal Remediation
Decontamination/Drum Storage Facility

BORING No. DDSF-3
SHEET 2 OF 2
FILE No. R5719.60

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE	RECOVERY	DEPTH (FT.)	LEGEND	SOIL & ROCK DESCRIPTIONS	WELL INSTALLATION LOG	WELL INSTALLATION REMARKS
17										
18										
19	WOH									
20	WOH	S-9		WOH	2.0'					
	WOH									
21	2									
22										
23										
24										
	WOH									
25	WOH	S-10		WOH	2.0'					
	WOH							Grades to trace fine Gravel		
26	2							Soft, reddish-brown Silty CLAY, trace fine to medium Sand, trace fine Gravel, wet (REWORKED GLACIAL TILL)		
27										
	50/.3	S-11		50/.3'	0.3'			REFUSAL WITH SPLIT SPOON		
28								REFUSAL WITH AUGERS AT 27.8'		
								BORING COMPLETE AT 27.8'	(Note 1)	
29										

REMARKS:
1. No free-standing water measured inside hollow stem augers at boring completion with augers set at 27.8'.

GZA
GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Love Canal Remediation
Decontamination/Drum Storage Facility

BORING No. DDSF-4
SHEET 1 OF 2
FILE No. R5719.60

CONTRACTOR Buffalo Drilling Company, Inc.
DRILLER K. Danser
GZA ENGINEER D. Abrams

BORING LOCATION Existing Drum Storage Area
SURFACE ELEV. _____ DATUM _____
DATE: START 6/19/87 COMPLETE 6/19/87

DRILLING METHODS
TYPE OF DRILL RIG Mobile B-34S
CASING 3-3/4" I.D. Hollow Stem Augers
SAMPLING METHOD Standard Split Spoon (ASTM D1586)
ROCK DRILLING Not Encountered

REMARKS _____

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☑ INCLINED ☐ DEGREES FROM VERTICAL _____
OVERBURDEN SAMPLES: DISTURBED 11 UNDISTURBED _____
ROCK CORE: NUMBER OF BOXES --
OVERBURDEN THICKNESS 28.3'
AMOUNT OF ROCK DRILLED --
TOP OF ROCK ELEVATION --
TOTAL DEPTH OF HOLE 28.3'
BOTTOM OF HOLE ELEVATION _____

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE	RECOVERY	DEPTH (FT.)	LEGEND	SOIL & ROCK DESCRIPTIONS	WELL INSTALLATION LOG	WELL INSTALLATION REMARKS
0						0				
1	12, 12, 7, 8	S-1		19	0.3'			Medium dense, brown fine to medium SAND and SILT, trace silty Clay, trace cobble, moist (FILL)		
2	4, 5, 5, 7	S-2		10	1.0'			Stiff, brown-gray Clayey SILT, trace fine to medium Sand, mottled, moist (FILL)	No Observation Water Well Installed	
4	1, 2, 3, 3	S-3		5	0.6'			Stiff, reddish-brown CLAY and SILT, little fine Sand, layered, moist		
6	1, 2, 11, 30	S-4		13	1.1'			Grades to medium, brown-greenish/gray, layered with some fine to coarse SAND and SILT, trace black Silt layers		
8	8, 8, 8, 8	S-5		16	1.0'			Very stiff, reddish-brown CLAY and SILT varved with fine Sand and Silt lenses, medium plasticity, moist (Lacustrine Deposit)		
10	4, 3, 4, 4	S-6		7	1.3'			Grades to medium, gray-brown, wet		
12	WOH, 1, 2, 1	S-7		3	2.0'			Grades to soft		
14	WOH, 2, 2, 1	S-8		4	2.0'					
16										
17										

REMARKS:

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Love Canal Remediation
Decontamination/Drum Storage Facility

BORING No. DDSF-4
SHEET 2 OF 2
FILE No. R5719.60

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE	RECOVERY	DEPTH (FT.)	LEGEND	SOIL & ROCK DESCRIPTIONS	WELL INSTALLATION LOG	WELL INSTALLATION REMARKS
17										
18										
19										
20	WOH WOH 2	S-9		2	1.9'			Grades to very soft, reddish-gray		
21	1									
22										
23										
24	2							Medium, reddish-brown Silty CLAY, trace fine to coarse Sand, little fine to coarse Gravel, wet (REWORKED GLACIAL TILL)		
25	6 3	S-10		9	1.9'					
26	17							(Note 1)		
27										
28	45 50/.3	S-11		50/.3'	0.5'			Grades to hard REFUSAL WITH SPLIT SPOON REFUSAL WITH HOLLOW STEM AUGERS AT 28.3' BORING COMPLETE AT 28.3'	(Note 2)	
29										

REMARKS:
1. Difficult augering from about 26.5' to 27.5'.
2. No free-standing water measured inside hollow stem augers ta completion with augers set at 27.5'.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation

BORING No. BB-1
SHEET 1 OF 2
FILE No. R5719.60

CONTRACTOR Buffalo Drilling Company, Inc.
DRILLER K. Danser
GZA ENGINEER D. Abrams

BORING LOCATION 93rd Street Side of Bergholtz Creek
SURFACE ELEV. _____ DATUM _____
DATE: START 6/16/87 COMPLETE 6/16/87

DRILLING METHODS
TYPE OF DRILL RIG Mobile B-34S
CASING 3-3/4" I.D. Hollow Stem Augers
SAMPLING METHOD Standard Split Spoon (ASTM D1586)
ROCK DRILLING Not Encountered

REMARKS _____

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☑ INCLINED ☐ DEGREES FROM VERTICAL _____
OVERBURDEN SAMPLES: DISTURBED 10 UNDISTURBED _____
ROCK CORE: NUMBER OF BOXES --
OVERBURDEN THICKNESS 23.3'
AMOUNT OF ROCK DRILLED --
TOTAL DEPTH OF HOLE 23.3'
TOP OF ROCK ELEVATION --
BOTTOM OF HOLE ELEVATION _____

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE	RECOVERY	DEPTH (FT.)	LEGEND	SOIL & ROCK DESCRIPTIONS	WELL INSTALLATION LOG	WELL INSTALLATION REMARKS
0						0				
0	2							TOPSOIL 0.5'		
1	3	S-1		7	1.3'			Loose, light brown fine SAND and SILT, trace silty Clay, moist (FILL)		
1	4									
2	3									
2	1									
3	1	S-2		3	2.0'			Soft brown-gray Silty CLAY, mottled, trace fine Sand, moist		
3	2									
4	5									
4	4									
5	6	S-3		16	1.4'			Grades to very stiff	No Observation Water Well Installed	
5	10									
6	13									
6	5							Stiff, brown CLAY and SILT, varved, trace fine Sand, medium plasticity, moist (Lacustrine Deposit)		
7	7	S-4		14	1.9'					
7	7									
8	8									
8	3									
9	3	S-5		7	1.8'			Grades to medium		
9	4									
10	6									
10	1							Very soft, gray CLAY and SILT, varved, medium plasticity, wet (Lacustrine Deposit)		
11	1	S-6		2	1.8'					
11	1									
12	2									
12	WOH									
13	WOH	S-7		1	1.9'					
13	1									
14	1									
14	WOH									
15	WOH	S-8		WOH	1.8'					
15	WOH									
16	1									
16										
17										

REMARKS:

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

BORING No. BB-1

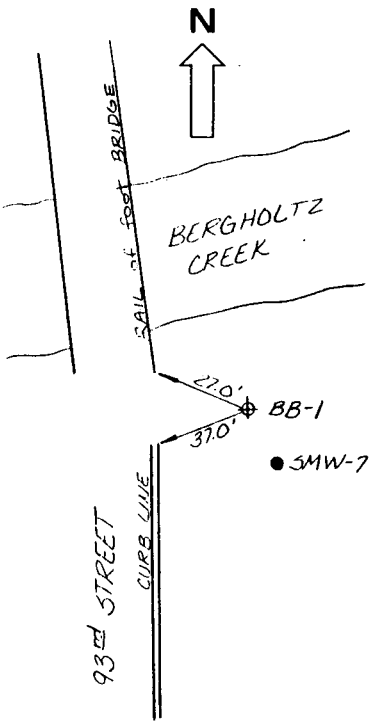
GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation

BORING No. BB-1
SHEET 2 OF 2
FILE No. R5719.60

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE	RECOVERY	DEPTH (FT.)	LEGEND	SOIL & ROCK DESCRIPTIONS	WELL INSTALLATION LOG	WELL INSTALLATION REMARKS
17										
18										
19	WOH									
20	3	S-9		7	1.8'			Medium, reddish-brown Clayey SILT and fine to coarse SAND, little fine to medium Gravel, wet (REWORKED GLACIAL TILL)		
21	4									
22	4								(Note 1)	
23										
24	50/.3	S-10		50/.3	0.1'			REFUSAL WITH SPLIT SPOON REFUSAL WITH HOLLOW STEM AUGERS AT 23.3' BORING COMPLETE AT 23.3'	(Note 2) (Note 3)	
25										
26										
27										
28										
29										



REMARKS:
1. Driller noted difficult drilling from 22.0' to 23.0'.
2. Free-standing water measured at 16.0' at completion with augers set at 23.0'.
3. Hole cave-in to 7.5' after augers withdrawn.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation

BORING No. BB-2
SHEET 1 OF 2
FILE No. R5719.60

CONTRACTOR Buffalo Drilling Company, Inc.
DRILLER K. Danser
GZA ENGINEER D. Abrams

BORING LOCATION Cayuga Road Side of Bergholtz Creek
SURFACE ELEV. _____ DATUM _____
DATE: START 6/16/87 COMPLETE 6/16/87

DRILLING METHODS
TYPE OF DRILL RIG Mobile B-34S
CASING 3-3/4" I.D. Hollow Stem Augers
SAMPLING METHOD Standard Split Spoon (ASTM D1586)
ROCK DRILLING Not Encountered

REMARKS _____

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☑ INCLINED ☐ DEGREES FROM VERTICAL _____
OVERBURDEN SAMPLES: DISTURBED 10 UNDISTURBED _____
ROCK CORE: NUMBER OF BOXES --
OVERBURDEN THICKNESS 22.1'
AMOUNT OF ROCK DRILLED --
TOTAL DEPTH OF HOLE 22.1'
TOP OF ROCK ELEVATION --
BOTTOM OF HOLE ELEVATION _____

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE	RECOVERY	DEPTH (FT.)	LEGEND	SOIL & ROCK DESCRIPTIONS	WELL INSTALLATION LOG	WELL INSTALLATION REMARKS
0	4					0		TOPSOIL		
1	6	S-1		10	0.3'			Medium, brown Clayey SILT, trace fine to coarse Sand, trace fine Gravel, trace organics, moist (FILL)		
	4									
2	4									
	7								No Observation Water Well Installed	
3	13	S-2		22	0.6'			Grades to cinders and slag		
	9									
4	5									
	2									
5	2	S-3		5	0.8'			Grades to soft		
	3									
6	5							Soft brown-gray Silty CLAY, trace fine to medium Sand, mottled, trace wood and organics (FILL)		
	2									
7	2	S-4		3	1.1'					
	1									
8	2									
	1							Very soft, gray-brown Silty CLAY, varved, trace fine Sand, medium plasticity, wet (Lacustrine Deposit)		
9	1	S-5		2	1.2'					
	1									
10	2									
	WOH									
11	WOH	S-6		2	1.8'					
	2									
12	2									
	WOH									
13	WOH	S-7		WOH	1.8'					
	WOH									
14	1									
	WOH									
15	WOH	S-8		WOH						
	WOH									
16	1									
17										

REMARKS:

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

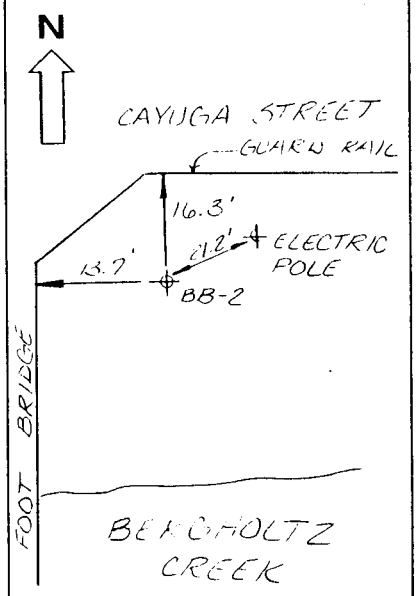
GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Black and Bergholtz Creeks Remediation

BORING No. BB-2
SHEET 2 OF 2
FILE No. R5719.60

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SOIL & ROCK DESCRIPTIONS	WELL INSTALLATION LOG	WELL INSTALLATION REMARKS
17									(Note 1)	
18								Stiff, reddish-brown Clayey SILT and fine to coarse SAND, little fine to coarse Gravel, wet (REWORKED GLACIAL TILL)		
19	6									
20	6	S-9		18				Grades to hard (GLACIAL TILL)		
21	12 24									
22	50/.1	S-10		50/.1'	None			REFUSAL WITH AUGERS AND SPLIT SPOON AT 22.1' BORING COMPLETE AT 22.1'		(Note 2)
23								(Note 3)		
24										
25										
26										
27										
28										
29										



REMARKS:
1. Drilling became more difficult at about 17.5' as noted by driller.
2. S-10 22.0'-22.1'.
3. No free-standing water measured at boring completion with augers set at 22.0'. Borehole open to 22.0' after augers withdrawn.

BORING No. BB-2

A3: SEDIMENT SAMPLING

Thirty-five sediment sampling locations were established along Black and Bergholtz Creeks by Goldberg-Zoino Associates of New York, P.C. (GZA) to collect samples of the sediments for classification and soils laboratory testing. As shown on the sediment sampling logs, included on the following pages, no samples could be obtained at 2 sample locations and thus, a total of 33 sediment samples were collected by GZA. These sediment sample locations are referenced to the stations shown on the drawings.

The sediment samples were collected by GZA from either the approximate center line of the creeks using a small pontoon boat provided by the Department or from the shoreline. Typically the samples were collected at 200 foot intervals beginning at the confluence of Cayuga and Bergholtz Creeks (designated Station 0+00). The sampling procedure used consisted of inserting a 4 inch diameter Schedule 40 PVC tube through the standing water into the top of the sediments. This tube was approximately 7 feet long for center line samples and approximately 3 feet long for near shore samples. A 3 1/4 inch diameter coring device with 10 inch long inner stainless steel tube samples (manufactured by Art's Machine Shop) was then inserted to collect the sediment samples. Typically, two 10 inch samples (designated 0 to 10 inch and 10 to 20 inch) were collected beginning at the top of the sediments. Following retrieval of the sediment samples a photoionization detector (make: Analytical Instruments, Inc. Model 580) was used to scan the samples for the presence of volatile organics. Following screening, the amount of sediment recovery was measured (see sediment sampling log) and was visually examined to identify the material according to the Burmeister Classification system. The samples were then placed in a double plastic bag and sealed for subsequent soils laboratory testing.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/12/87

LOCATION Sta. 0+00 creek center line

DATE SAMPLED 10/30/86
TIME SAMPLED 4:00 p.m.

SEDIMENT SURFACE ELEV. 560.1 GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0	S-1	100%	Black, SILT and fine to coarse SAND, little fine Gravel, with inclusions of wood fragments and organics	
6			Gray, Clayey SILT, some fine to coarse Sand, little Gravel, overall slight to moderate plasticity, wet	
12	S-2	100%	Brown, Clayey SILT, some fine to coarse Sand, trace fine Gravel, slight plasticity, wet	
18				
			BOTTOM OF SAMPLE AT 20"	
24				

REMARKS/NOTES

2.7 feet from water surface to creek sediments.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

GZA

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 2+00 creek center line

DATE SAMPLED 10/31/86
TIME SAMPLED 9:20 a.m.

SEDIMENT SURFACE ELEV. 559.3' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0			Black, organics (wood, leaves, acorns, glass, etc.), wet	1 2
6	S-1	60%	Gray, Clayey SILT, little fine to medium Sand, mixed with trace Organics, slight plasticity, wet	
			Red brown, Clayey SILT and fine to medium SAND, trace Gravel, slight plasticity, wet	
12	S-2	90%		3
18				
			BOTTOM OF SAMPLE AT 20"	
24				

REMARKS/NOTES
3.5 feet from water surface to creek sediments.

1. Tree limbs and other debris at creek bottom.
2. Casing hand driven to depth of 6 inches.
3. Auger grinding at 15 inches.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 4+00 creek center line

DATE SAMPLED 10/31/86
TIME SAMPLED 10:10 a.m.

SEDIMENT SURFACE ELEV. 558.9' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0				1
			Red brown, SILT and CLAY, some fine to coarse Sand, trace fine Gravel, low plasticity, wet	
	S-1	100%		
6				
				2
			. . . Grades: little fine Gravel	
12				
	S-2	80%		
18				
			AUGER REFUSAL AT 20"	
			BOTTOM OF SAMPLE AT 20"	
24				

REMARKS/NOTES
3.9 feet from water surface to creek sediments.

1. Casing was hand driven to depth of 8 inches.
2. Auger grinding at 10 inches.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

GZA

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 6+00 creek center line

DATE SAMPLED 10/31/86
TIME SAMPLED 11:05 a.m.

SEDIMENT SURFACE ELEV. 558.6' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0			Black, organics and debris (wood, plastic, roots), wet	1
			Brown, SILT and fine to coarse SAND, little fine Gravel, non-plastic, wet	
6	S-1	100%		
12	S-2	90%	Same as above	
18				2
			BOTTOM OF SAMPLE AT 20"	
24				

REMARKS/NOTES

4.2' from water surface to creek sediments.

1. Casing hand driven to depth of 1 inch.
2. When auger was removed, an oil film floated to the surface (OVM reading 25 ppm).

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

GZA

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 8+00 creek center line

DATE SAMPLED 10/31/86
TIME SAMPLED 1:40 p.m.

SEDIMENT SURFACE ELEV. 558.5' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0			Black, organics (wood fragments) mixed with some medium to fine Sand and Silt, wet	1
6	S-1	100%	Gray-brown, Silty CLAY, trace fine to coarse Sand, trace fine Gravel, medium plasticity, wet	
12	S-2	100%	Same as above	
18				
24				

REMARKS/NOTES

4.3 feet from water surface to creek sediments.

1. Casing hand driven to a depth of 4 inches.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 10+00 creek center line

DATE SAMPLED 10/31/86
TIME SAMPLED 2:30 p.m.

SEDIMENT SURFACE ELEV. 558.9' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0			Black, organics (roots, wood fragments, etc.), wet	1
	S-1	80%	Gray-brown, CLAY and SILT, trace fine to medium Sand, trace Organics (wood, roots, leaves), medium plasticity, wet . . . Grades: little fine to coarse Sand	
6				
12	S-2	100%	. . . Grades: trace fine Gravel	
18				
			BOTTOM OF SAMPLE AT 20"	
24				

REMARKS/NOTES

3.8 feet from water surface to creek sediments.

1. Casing hand driven to a depth of 6 inches.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

GZA

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 12+00 creek center line

DATE SAMPLED 10/31/86
TIME SAMPLED 3:40 p.m.

SEDIMENT SURFACE ELEV. Not Determin. GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0				1
			Black, organics (roots, wood fragments, etc.), wet.	
			Gray-brown, CLAY and SILT, trace fine to coarse Sand, trace fine Gravel, medium plasticity, wet	
6	S-1	100%		
			Piece of glass at 8"	
12				
	S-2	100%	Same as above	
18				
			BOTTOM OF SAMPLE AT 20"	
24				

REMARKS/NOTES

No water surface to creek bottom depth recorded.

1. Casing hand driven to a depth of 6 inches.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

GZA

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 14+00 creek center line

DATE SAMPLED 11/1/86
TIME SAMPLED 8:30 a.m.

SEDIMENT SURFACE ELEV. 559.9 GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0			Black, Organics (leaves, wood fragments, roots), wet	1
	S-1	100%	Gray-brown, Silty CLAY, trace fine to medium Sand, medium plasticity, wet	
6				
12	S-2	100%	Same as above	
18				
			BOTTOM OF SAMPLE AT 20"	
24				

REMARKS/NOTES

3.3 feet from water surface to creek sediments

1. Casing hand driven to a depth of 8 inches.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

GZA

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 16+00 creek center line

DATE SAMPLED 11/1/86
TIME SAMPLED 9:30 a.m.

SEDIMENT SURFACE ELEV. 560.1' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0	S-1	100%	Black, Organics (leaves, roots, wood), wet	1
6			Gray-brown, Silty CLAY, trace fine to coarse Sand, trace fine Gravel, medium plasticity, wet	
			. . . Grades: little fine to coarse Sand	
12	S-2	90%	. . . Grades: trace fine to coarse Sand, trace Gravel	
18				
24				

REMARKS/NOTES

3.1 feet from water surface to creek sediments.

1. Casing hand driven to a depth of 10 inches.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 18+00 creek center line

DATE SAMPLED 11/1/86
TIME SAMPLED 10:15 a.m.

SEDIMENT SURFACE ELEV. 560.7' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0			Black, Organics (leaves, wood, fragments),wet	1
	S-1	100%	Gray-brown, CLAY and SILT, trace fine to coarse Sand, medium plasticity, wet	
6				
12			Piece of metal at 12"	
	S-2	100%	Same as above	
18				
			BOTTOM OF SAMPLE AT 20"	
24				

REMARKS/NOTES

2.5 feet from water surface to creek sediments.

1. Casing hand driven to a depth of 8 inches.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and soil laboratory test results.

GZA

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 20+00 creek center line

DATE SAMPLED 11/1/86
TIME SAMPLED 11:00 a.m.

SEDIMENT SURFACE ELEV. 560.0' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0			Black, Organics (wood fragments, leaves), wet	1
			Golf ball at 2"	
			Gray-brown, Silty CLAY, trace fine to coarse Sand, trace fine Gravel, medium plasticity, wet	
6	S-1	100%		
12	S-2	100%	Same as above	
18				
			BOTTOM OF SAMPLE AT 20"	
24				

REMARKS / NOTES

3.2 feet from water surface to creek sediments

1. Casing hand driven to a depth of 2 inches.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 22+00 creek center line

DATE SAMPLED 11/1/86
TIME SAMPLED 11:30 a.m.

SEDIMENT SURFACE ELEV. 560.2' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0			Black, Organics (leaves, wood fragments), wet	1
6	S-1	100%	Gray-brown, CLAY and SILT, trace fine to coarse Sand, medium plasticity, wet	
12	S-2	100%	Same as above	
18				
24			BOTTOM OF SAMPLE AT 20"	

REMARKS/NOTES

3.0 feet from water surface to creek sediments.

1. Casing hand driven to a depth of 10 inches.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

GZA

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 24+00 creek center line

DATE SAMPLED 11/1/86
TIME SAMPLED 1:00 p.m.

SEDIMENT SURFACE ELEV. 559.62' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0			Black, Organics (leaves, wood fragments, roots) wet	1
	S-1	100%	Gray-brown, CLAY and SILT, trace fine to coarse Sand, medium plasticity, wet	
6				
12	S-2	100%	Same as above.	
18				
			BOTTOM OF SAMPLE AT 20"	
24				

REMARKS/NOTES

3.6 feet from water surface to creek sediments.

1. Casing hand driven to a depth of 6 inches.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

GZA

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 26+00 creek center line

DATE SAMPLED 11/1/86
TIME SAMPLED 1:45 p.m.

SEDIMENT SURFACE ELEV. 560.6' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0			Black, Organics (wood fragments, leaves) with trace fine Gravel, trace fine to coarse Sand, wet	1
	S-1	100%	Gray-brown, CLAY and SILT, trace fine to coarse Sand, medium plasticity, wet	
6				
12	S-2	90%	Same as above	
18				
			BOTTOM OF SAMPLE AT 20"	
24				

REMARKS / NOTES

2.6 feet from water surface to creek sediments

1. Casing hand driven to a depth of 3 inches.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 28+00 creek center line

DATE SAMPLED 11/1/86
TIME SAMPLED 2:05 p.m.

SEDIMENT SURFACE ELEV. 560.7' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0	S-1	100%	Black, Organics (leaves, wood fragments), wet trace fine to coarse Sand at 4" Gray-brown, CLAY and SILT, trace fine to coarse Sand, trace fine Gravel, medium plasticity, wet	1
6				
12	S-2	80%	Same as above	
18				
			BOTTOM OF SAMPLE AT 20"	
24				

REMARKS/NOTES

2.5 feet from water surface to creek sediments.

1. Casing hand driven to a depth of 6 inches.
2. Obstruction encountered during augering at 10 inches.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

GZA

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 30+00 creek center line

DATE SAMPLED 12/11/86
TIME SAMPLED 1:45 p.m.

SEDIMENT SURFACE ELEV. 561.7' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0			Black Organics (leaves, roots), wet	
			Gray-brown, CLAY and SILT, little fine to coarse Sand mixed with trace Organics (wood, leaves), medium plasticity, wet	
6	S-1	100%	. . . Grading: No organics	
12				1
	S-2	100%	. . . Grading: Brown.	
18				
			BOTTOM OF SAMPLE AT 20"	
24				

REMARKS/NOTES

2.5 feet from water surface to creek sediments.

1. No casing used to collect sample No. 2.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

GZA

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 32+00 creek center line

DATE SAMPLED 12/11/86
TIME SAMPLED 2:17 p.m.

SEDIMENT SURFACE ELEV. 561.7' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0			Black, Organics (wood, roots, leaves), wet	
			Gray-brown, CLAY and SILT, trace fine to coarse Sand, medium plasticity, wet	
6	S-1	100%		
12	S-2	100%	Same as above	1
18				
			BOTTOM OF SAMPLE AT 20"	
24				

REMARKS/NOTES

2.5 feet from water surface to creek sediments.

1. No casing used to collect Sample No. 2.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

GZA

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 34+00 creek center line

DATE SAMPLED 11/1/86
TIME SAMPLED 2:30 p.m.

SEDIMENT SURFACE ELEV. 560.4' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0			Black, Organics (leaves, wood fragments), wet, trace fine to coarse Sand at 2"	1
	S-1	100%	Gray-grown, CLAY and SILT, trace fine to coarse Sand, medium plasticity, wet	
6				
12	S-2	40%	Black, Organics (leaves, wood fragments), little intermixed gray brown, Silty CLAY, some fine to coarse Sand, overall medium plasticity	
18			trace debris below 17" (glass, wood)	
			AUGER REFUSAL AT 20"	
			BOTTOM OF SAMPLE AT 20"	
24				

REMARKS/NOTES

2.8 feet from water surface to creek sediments.

1. Casing hand driven to a depth of 12 inches.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

GZA

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 2+00 north bank

DATE SAMPLED 12/11/86
TIME SAMPLED 11:00 a.m.

SEDIMENT SURFACE ELEV. 564.2' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0				1
	S-1	100%	Black, Clayey SILT and fine to coarse SAND, some fine Gravel mixed with little Organics (roots, wood fragments, leaves), slight plasticity, wet . . . Grades: trace Organics.	
6				
12			BOTTOM OF SAMPLE AT 10"	
18				
24				

REMARKS/NOTES

1. Sample collected from creek bank at water surface.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 6+00 north bank

DATE SAMPLED 12/11/86
TIME SAMPLED 11:30 a.m.

SEDIMENT SURFACE ELEV. 564.2' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0			Black, Organics (leaves, roots), wet	1
6	S-1	100%	Black, Clayey Silt and fine to coarse Sand, some fine Gravel, mixed with little Organics (roots, wood fragments, leaves), overall slight plasticity, wet AUGER REFUSAL AT 7" BOTTOM OF SAMPLE AT 7"	
12				
18				
24				

REMARKS/NOTES

1. Sample collected from creek bank at water surface.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 14+00 north bank

DATE SAMPLED 12/11/86
TIME SAMPLED 4:00 p.m.

SEDIMENT SURFACE ELEV. 564.2' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0			Black, Organics (leaves, roots), little Clayey Silt, little fine to coarse Sand, slight plasticity, wet	1
6	S-1	80%		
			BOTTOM OF SAMPLE AT 10"	
12				
18				
24				

REMARKS / NOTES

1. Sample collected from creek bank at water surface.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 18+00 north bank

DATE SAMPLED 12/11/86
TIME SAMPLED 3:25 p.m.

SEDIMENT SURFACE ELEV. 564.2' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0	S-1	80%	Black, Organics (leaves, roots), little Clayey Silt, little fine to coarse Sand, slight plasticity, wet	1
6				
12			BOTTOM OF SAMPLE AT 10"	
18				
24				

REMARKS / NOTES

1. Sample collected from creek bank at water surface.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 2+00 south bank

DATE SAMPLED 12/9/86
TIME SAMPLED 10:50 a.m.

SEDIMENT SURFACE ELEV. ≈563.2 GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0	S-1	100%	Black, SILT and CLAY, trace fine to coarse Sand, trace fine Gravel, trace Organics (roots, wood fragments), overall low plasticity, wet . . . grades: gray-black, little fine to medium Sand, moist	1
6				
12			BOTTOM OF SAMPLE ≈10"	
18				
24				

REMARKS/NOTES

1. Sample collected from creek bank at water surface.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 4+00 south bank

DATE SAMPLED 12/9/86
TIME SAMPLED 11:09 a.m.

SEDIMENT SURFACE ELEV. ≈563.2 GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0	S-1	100%	Black-gray, Silt and Clay, trace fine to coarse Sand, trace fine Gravel, trace Organics (roots, wood fragments), overall low plasticity, wet . . . grades: moist . . . grades: medium plasticity	1
6				
12			BOTTOM OF SAMPLE ≈10"	
18				
24				

REMARKS/NOTES

1. Sample collected from creek bank at water surface.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 6+00 south bank

DATE SAMPLED 12/9/86
TIME SAMPLED 11:25 a.m.

SEDIMENT SURFACE ELEV. ≈563.2 GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0	S-1	100%	Black, clayey SILT, some fine to coarse Sand, little Organics (leaves, roots), overall slight plasticity, wet . . . grades: gray-black, trace of Gravel, medium plasticity, moist . . . grades: gray, trace Organics	1
6				
12			BOTTOM OF SAMPLE AT ≈10"	
18				
24				

REMARKS/NOTES

1. Sample collected from creek bank at water surface.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 8+00 south bank

DATE SAMPLED 12/9/86
TIME SAMPLED 11:30 a.m.

SEDIMENT SURFACE ELEV. --- GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0			No sample could be obtained.	
6				
12				
18				
24				

REMARKS/NOTES

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 10+00 south bank

DATE SAMPLED 12/9/86
TIME SAMPLED 11:40 a.m.

SEDIMENT SURFACE ELEV. _____ GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0	S-1	100%	Light brown, CLAY and SILT, little fine to coarse Sand, little Organics (roots), medium plasticity, wet	1
6			Black, Clayey SILT and fine to coarse SAND, trace fine Gravel, little Organics (leaves, roots), overall slight plasticity, wet	
12			BOTTOM OF SAMPLE AT ≈10"	
18				
24				

REMARKS/NOTES

1. Sample collected from creek bank at water surface.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 12+00 south bank

DATE SAMPLED 12/9/86
TIME SAMPLED 11:45 a.m.

SEDIMENT SURFACE ELEV. --- GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0			No sample could be obtained.	
6				
12				
18				
24				

REMARKS/NOTES

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 14+00 south bank

DATE SAMPLED 12/9/86
TIME SAMPLED 1:15 p.m.

SEDIMENT SURFACE ELEV. ≈563.2 GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0	S-1	100%	Black, SILT and CLAY, some Gravel, trace fine to coarse Sand, trace Organics (roots, leaves), overall low plasticity, wet	1
6				
12			BOTTOM OF SAMPLE ≈10"	
18				
24				

REMARKS/NOTES

1. Sample collected from creek bank at water surface.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 16+00 south bank

DATE SAMPLED 12/9/86
TIME SAMPLED 1:30 p.m.

SEDIMENT SURFACE ELEV. ≃563.2 GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0	S-1	100%	Black, Organics (leaves, roots), trace, Clayey Silt, trace fine to medium Sand, overall slight plasticity, wet	1
6				
12	S-2	100%	Same as above	
18				
			BOTTOM OF SAMPLE AT ≃20"	
24				

REMARKS/NOTES

1. Sample collected from creek bank at water surface.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 18+00 south bank

DATE SAMPLED 12/9/86
TIME SAMPLED 1:40 p.m.

SEDIMENT SURFACE ELEV. ≈563.2 GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0	S-1	100%	Brown-black, Clayey SILT, some fine to coarse Sand, little Gravel, trace Organics (leaves), overall slight plasticity, wet	1
6			. . . grades: brown, no organics	
12			BOTTOM OF SAMPLE ≈10"	
18				
24				

REMARKS/NOTES

1. Sample collected from creek bank at water surface.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 20+00 south bank

DATE SAMPLED 12/9/86
TIME SAMPLED 2:00 p.m.

SEDIMENT SURFACE ELEV. 563.2' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0			Gray-brown, CLAY and SILT, trace fine to coarse Sand, medium plasticity, wet	1
6	S-1	100%		
			BOTTOM OF SAMPLE AT 10"	
12				
18				
24				

REMARKS/NOTES
1. Sample collected from creek bank at water surface.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

GZA

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 22+00 south bank

DATE SAMPLED 12/9/86
TIME SAMPLED 3:00 p.m.

SEDIMENT SURFACE ELEV. 563.2' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0			Brown-black, Clayey SILT and fine to medium SAND, some Organics (leaves, roots), slight plasticity, wet	1
6	S-1	100%	. . . Grades: gray-black, trace Organics	
			BOTTOM OF SAMPLE AT 10"	
12				
18				
24				

REMARKS/NOTES

1. Sample collected from creek bank at water surface.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 26+00 south bank

DATE SAMPLED 12/11/86
TIME SAMPLED 1:00 p.m.

SEDIMENT SURFACE ELEV. 564.2' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0	S-1	100%	Gray-brown, Silty Clay, trace fine to coarse Sand, little Organics (leaves, wood, roots), overall high plasticity, wet	1
6				
12			BOTTOM OF SAMPLE AT 10"	
18				
24				

REMARKS/NOTES

1. Sample collected from creek bank at water surface.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

SEDIMENT SAMPLING LOG

PROJECT Black and Bergholtz Creeks Remediation
Love Canal, Niagara Falls, New York

FILE NO. R5719.20
REVISED 12/14/87

LOCATION Sta. 28+00 south bank

DATE SAMPLED 12/11/86
TIME SAMPLED 1:25 p.m.

SEDIMENT SURFACE ELEV. 564.2' GZA ENGINEERING TECH G. Klawinski

DATUM NGVD

SAMPLING METHOD 3-1/4" diameter x 10" hand-operated sediment plug sampler

DEPTH (INCHES)	SAMPLE NO.	% REC.	SOIL DESCRIPTION	REMARK / NOTE NO.
0	S-1	100%	Gray-black, Silty Clay, trace fine to medium Sand, little Organics (roots, leaves), overall high plasticity, wet . . . Grades: gray-red brown, no rganics, moist	1
6				
12			BOTTOM OF SAMPLE AT 10"	
18				
24				

REMARKS/NOTES

1. Sample collected from creek bank at water surface.

Soil descriptions are based on visual observations made and manual techniques done by GZA at the time the samples were obtained in the field and the soil laboratory test results.

NOTE: THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

A4: SOILS LABORATORY TEST RESULTS

The following section presents a summation of the soils laboratory test results done on samples collected from the test borings and sediment sampling locations discussed previously. These samples were tested by Goldberg-Zoino Associates of New York, P.C. (GZA) at a temporary soils laboratory set up within the fenced limits of the Love Canal site.

This section is divided into three subsections based upon the general location of the samples collected. The subsections include.

-- Samples from test borings at the proposed DCF location formerly identified as the proposed Interim Containment Facility (ICF) location;

-- Samples from test borings adjacent to Black and Bergholtz Creeks;

-- Sediment samples collected from the approximate center line and banks of the creeks; and

-- Samples from test borings at the proposed DDSF location.

The reader should refer to the appropriate figures and stratigraphic logs for the exact location/depth of the test samples.

The tests done and applicable test procedure are summarized below.

Test	Test Method
Moisture Content Determination	ASTM D2216
Atterberg Limit Determination	ASTM D4318
Torvane Shear Strength (undisturbed samples only)	Manufacturer's Instructions (Soil Test, Inc.)
Grain Size Determination (sieve and hydrometer fraction)	ASTM D422
Paint Filter Liquids Test (sediment samples only)	Method 9095 designated to satisfy the equivalence of 40 CFR 264.314 and 265.314

PROJECT: Black and Bergholtz Creeks
Remediation, Love Canal
Niagara Falls, New York

March 5, 1987
File: R5719.30

INTERIM CONTAINMENT FACILITY SITE BORINGS
LABORATORY DATA SUMMARY

Moisture Content (ASTM D2216)

Boring No.	Sample No.	Depth (Feet)	Moisture Content (% by Weight)
GZA-2	S-2	2-4	20.2
GZA-2	S-15	28-30	8.4
GZA-3	S-1	0-2	17.9
GZA-3	S-2	2-4	19.7
GZA-3	S-3	4-6	25.0
GZA-3	S-4	6-8	25.6
GZA-3	S-5	8-10	25.1
GZA-3	S-6	10-12	34.1
GZA-3	S-7	12-14	35.9
GZA-3	U-1	14.1	34.2
GZA-3	U-1	14.8	43.9
GZA-3	U-1	15.5	39.7
GZA-3	U-2	20.5	43.3
GZA-3	U-2	21.0	45.9
GZA-3	U-2	21.5	40.6
GZA-3	S-8	24-26	8.7
GZA-4	S-1	0-2	21.3
GZA-4	S-2	2-4	28.4
GZA-4	S-3	4-6	22.6
GZA-4	S-4	6-8	30.4
GZA-4	S-5	8-10	29.3
GZA-4	S-6	10-12	28.9
GZA-4	S-7	12-14	32.2
GZA-4	S-8	14-16	33.9
GZA-4	U-1	16.5	39.2
GZA-4	U-1	17.0	32.3
GZA-4	U-1	17.5	36.2
GZA-4	S-9	24-26	18.7
GZA-4	S-10	26-28	10.8
GZA-4	S-11	28-30	11.3
GZA-5	U-1	12.5	33.5
GZA-5	U-1	13.0	34.9
GZA-5	U-1	13.5	34.0

A4: SOILS LABORATORY TEST RESULTS

The following section presents a summation of the soils laboratory test results done on samples collected from the test borings and sediment sampling locations discussed previously. These samples were tested by Goldberg-Zoino Associates of New York, P.C. (GZA) at a temporary soils laboratory set up within the fenced limits of the Love Canal site.

This section is divided into three subsections based upon the general location of the samples collected. The subsections include.

-- Samples from test borings at the proposed DCF location formerly identified as the proposed Interim Containment Facility (ICF) location;

-- Samples from test borings adjacent to Black and Bergholtz Creeks;

-- Sediment samples collected from the approximate center line and banks of the creeks; and

-- Samples from test borings at the proposed DDSF location.

The reader should refer to the appropriate figures and stratigraphic logs for the exact location/depth of the test samples.

The tests done and applicable test procedure are summarized below.

Test	Test Method
Moisture Content Determination	ASTM D2216
Atterberg Limit Determination	ASTM D4318
Torvane Shear Strength (undisturbed samples only)	Manufacturer's Instructions (Soil Test, Inc.)
Grain Size Determination (sieve and hydrometer fraction)	ASTM D422
Paint Filter Liquids Test (sediment samples only)	Method 9095 designated to satisfy the equivalence of 40 CFR 264.314 and 265.314

GZA-6	S-2	2-4	25.9
GZA-6	S-4	6-8	23.2
GZA-6	S-6	10-12	25.9
GZA-6	S-8	14-16	35.2
GZA-6	S-10	18-20	36.9
GZA-6	S-11	20-22	40.1
GZA-6	S-13	24-26	23.2
GZA-6	S-14	26-28	9.2
GZA-8	S-2	2-4	23.4

Atterberg Limits (ASTM D4318)

Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)	LL (%)	PL (%)	PI	Identification
GZA-3	S-4	6-8	25.6	41.2	25.2	16.0	Medium plasticity CLAY & SILT
GZA-3	S-7	12-14	35.9	41.5	22.9	18.6	Medium plasticity CLAY & SILT
GZA-3	U-1	14.8	43.9	44.1	25.8	18.3	Medium plasticity CLAY & SILT
GZA-3	U-2	21.0	45.9	44.8	25.6	19.2	Medium plasticity CLAY and SILT
GZA-4	S-4	6-8	30.4	47.2	25.3	21.9	High Plasticity Silty CLAY
GZA-4	S-8	14-16.	33.9	41.0	22.6	18.4	Medium plasticity CLAY & SILT
GZA-4	U-1	17.0	32.3	34.4	21.8	12.6	Medium Plasticity CLAY & SILT
GZA-5	U-1	13.5	34.0	42.7	24.8	17.9	Medium plasticity CLAY & SILT

LL = liquid limit
PL = plastic limit
PI = plasticity index

PROJECT: Black and Bergholtz Creeks
Remediation, Love Canal
Niagara Falls, New York

March 5, 1987
File: R5719.30

INTERIM CONTAINMENT FACILITY SITE BORINGS
LABORATORY DATA SUMMARY

Moisture Content (ASTM D2216)

Boring No.	Sample No.	Depth (Feet)	Moisture Content (% by Weight)
GZA-2	S-2	2-4	20.2
GZA-2	S-15	28-30	8.4
GZA-3	S-1	0-2	17.9
GZA-3	S-2	2-4	19.7
GZA-3	S-3	4-6	25.0
GZA-3	S-4	6-8	25.6
GZA-3	S-5	8-10	25.1
GZA-3	S-6	10-12	34.1
GZA-3	S-7	12-14	35.9
GZA-3	U-1	14.1	34.2
GZA-3	U-1	14.8	43.9
GZA-3	U-1	15.5	39.7
GZA-3	U-2	20.5	43.3
GZA-3	U-2	21.0	45.9
GZA-3	U-2	21.5	40.6
GZA-3	S-8	24-26	8.7
GZA-4	S-1	0-2	21.3
GZA-4	S-2	2-4	28.4
GZA-4	S-3	4-6	22.6
GZA-4	S-4	6-8	30.4
GZA-4	S-5	8-10	29.3
GZA-4	S-6	10-12	28.9
GZA-4	S-7	12-14	32.2
GZA-4	S-8	14-16	33.9
GZA-4	U-1	16.5	39.2
GZA-4	U-1	17.0	32.3
GZA-4	U-1	17.5	36.2
GZA-4	S-9	24-26	18.7
GZA-4	S-10	26-28	10.8
GZA-4	S-11	28-30	11.3
GZA-5	U-1	12.5	33.5
GZA-5	U-1	13.0	34.9
GZA-5	U-1	13.5	34.0

Sample No. Designations

S = split spoon sample
U = 3" diameter undisturbed Shelby tube sample

Torvane Shear Strength
(3" Diameter Undisturbed Shelby Tube Samples)

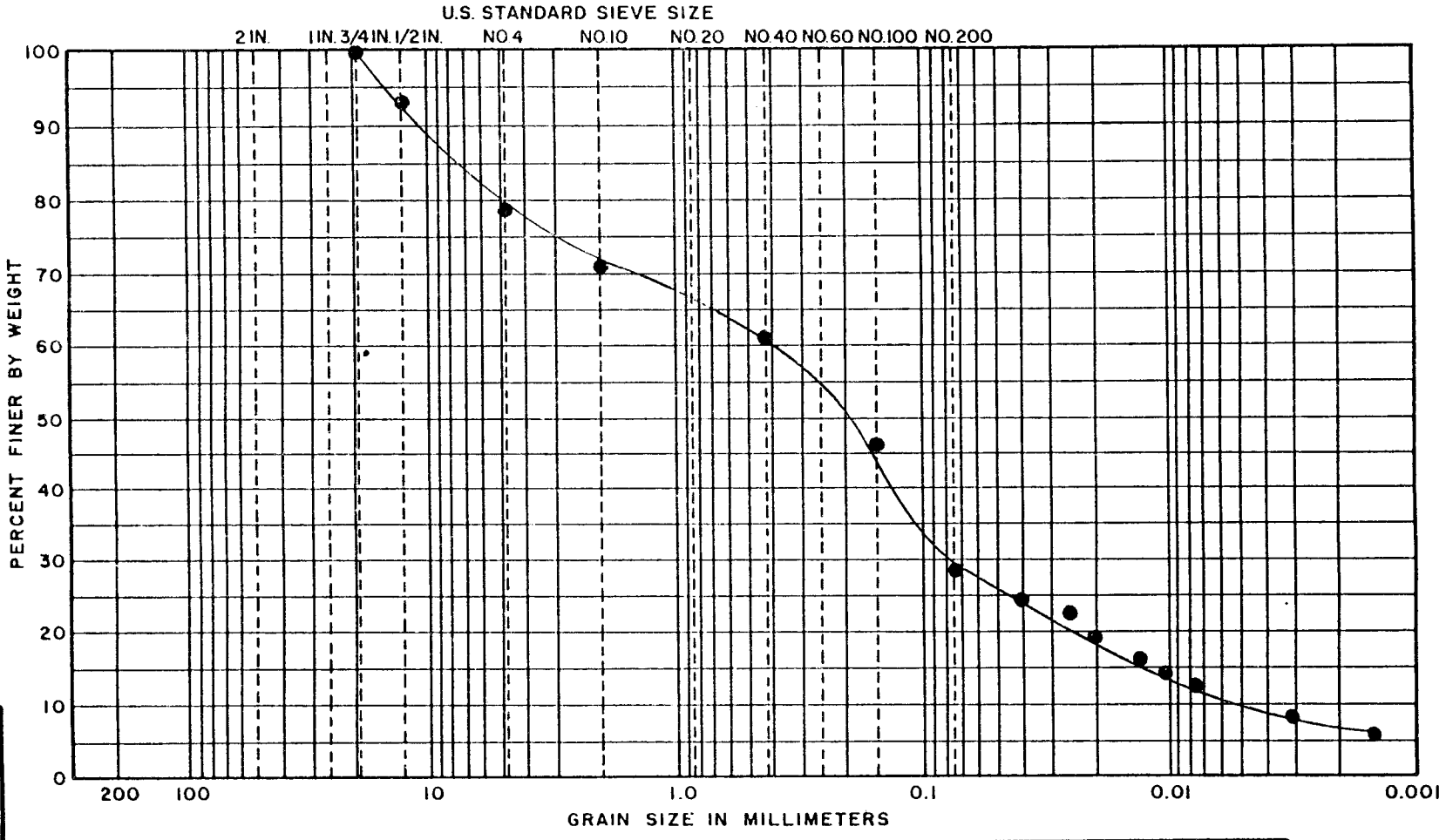
Boring No.	Sample No.	Depth (Feet)	Undisturbed Shear Strength (psf)	Remolded Shear Strength (psf)*
GZA-3	U-1	14.3	320	80
GZA-3	U-1	14.6	180	
GZA-3	U-1	14.8	200	
GZA-3	U-1	15.1	200	
GZA-3	U-1	15.3	200	
GZA-3	U-1	15.5	200	
GZA-3	U-2	20.3	200	124
GZA-3	U-2	20.5	212	100
GZA-3	U-2	20.8	236	60
GZA-3	U-2	21.0	264	124
GZA-3	U-2	21.3	220	120
GZA-3	U-2	21.5	252	84
GZA-3	U-2	21.8	192	
GZA-4	U-1	16.3	156	36
GZA-4	U-1	16.5	108	40
GZA-4	U-1	16.8	144	44
GZA-4	U-1	17.0	120	60
GZA-4	U-1	17.3	360	80
GZA-4	U-1	17.5	280	
GZA-4	U-1	17.8	288	80
GZA-5	U-1	12.5	780	
GZA-5	U-1	13.0	760	
GZA-5	U-1	13.5	800	500
GZA-5	U-1	13.6	820	600

*Remolded Shear Strength obtained two minutes after undisturbed shear strength.

PROJECT: Black and Bergholtz Creeks Remediation (Interim Containment Facility)
Love Canal
Niagara Falls, New York

GRADATION TESTS

FILE NO. R5719.30 DATE 2/28/87



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

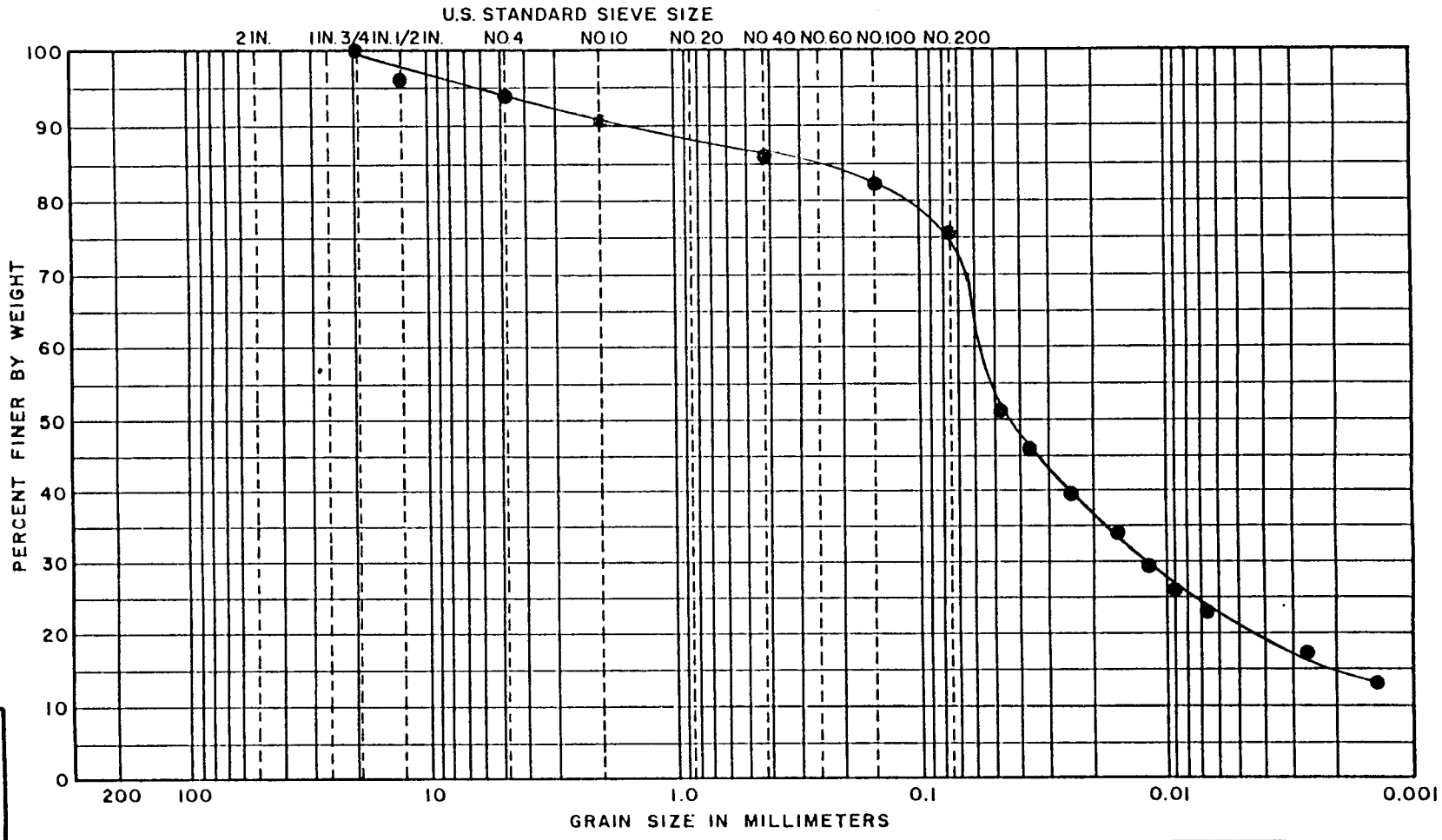
UNIFIED SOIL CLASSIFICATION SYSTEM

BORING NO.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
GZA-2	S-2	●	Gray-brown, fine to coarse SAND, some Silt, little fine Gravel
			Sample depth: 2' to 4'

PROJECT:
Black and Bergholtz Creeks
Remediation (Interim Containment
Facility)
Love Canal
Niagara Falls, New York

GRADATION TESTS

FILE NO. R5719.30 DATE 2/28/87



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

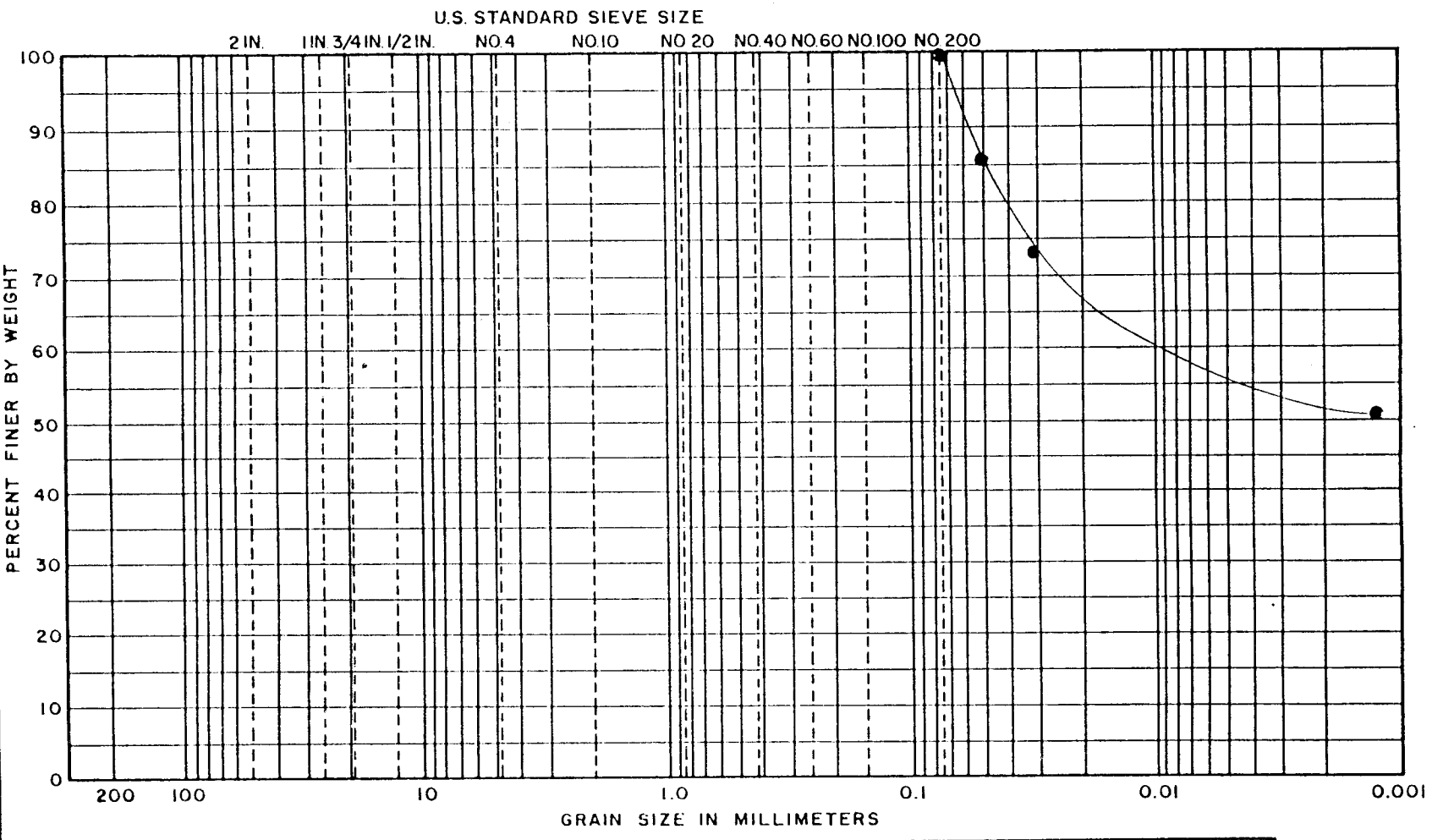
UNIFIED SOIL CLASSIFICATION SYSTEM

BORING NO.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
GZA-2	S-15	●	Brown Clayey SILT, little fine to coarse Sand, trace fine gravel
			Sample depth: 28' to 30'

PROJECT:
Black and Bergholtz Creeks
Remediation (Interim Containment
Facility)
Love Canal
Niagara Falls, New York

GRADATION TESTS

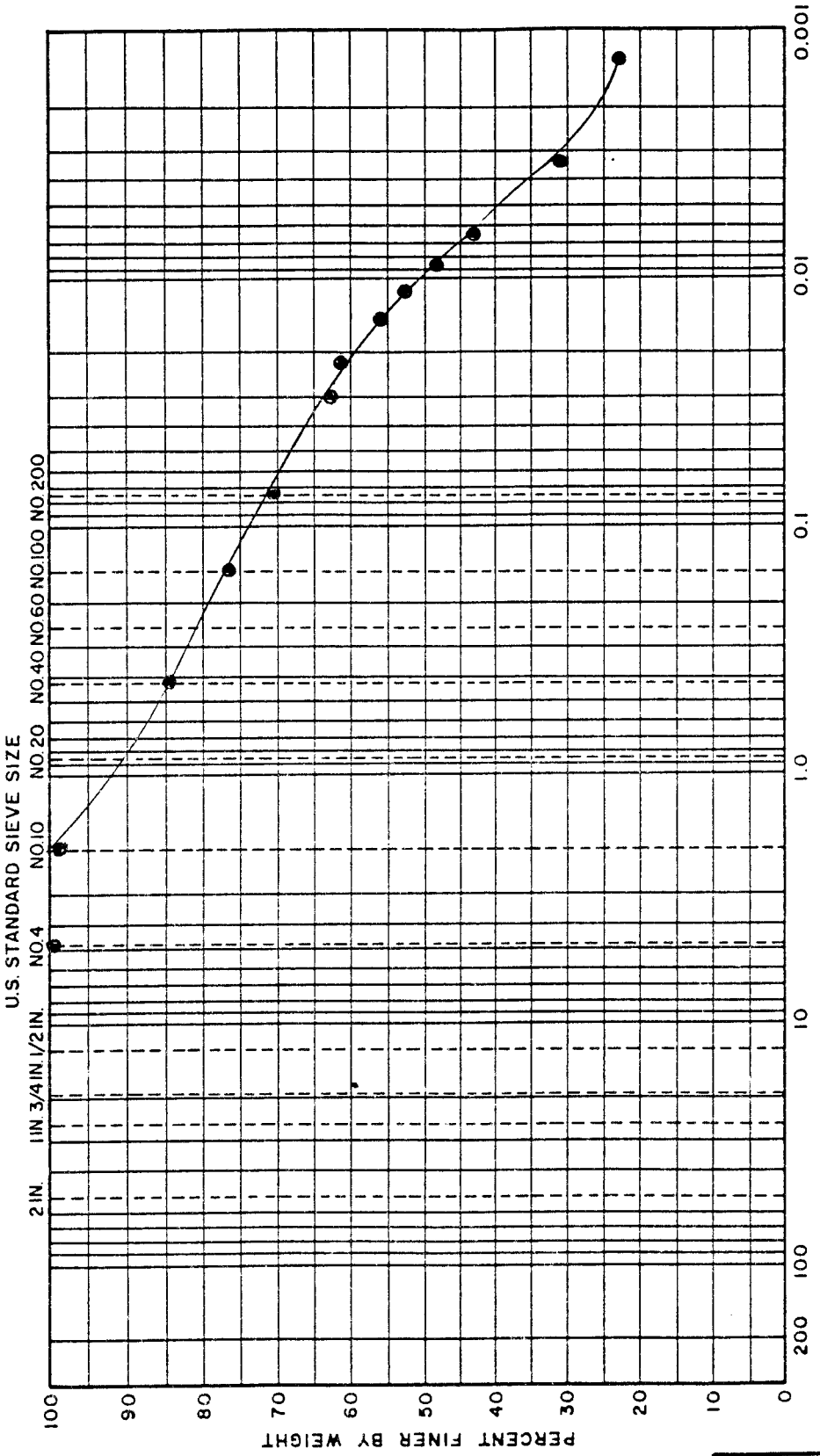
FILE NO. R5719.30 DATE 2/28/87



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

BORING NO.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
GZA-3	S-7	●	Red-brown CLAY and SILT
			Sample depth: 12' to 14'



BORING NO.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
GZA-4	S-2	●	Brown SILT and CLAY, some fine to medium Sand
			Sample depth: 2' to 4'

PROJECT: Black and Bergholtz Creeks Remediation (Interim Containment-Facility)
Love Canal
Niagara Falls, New York

GZA

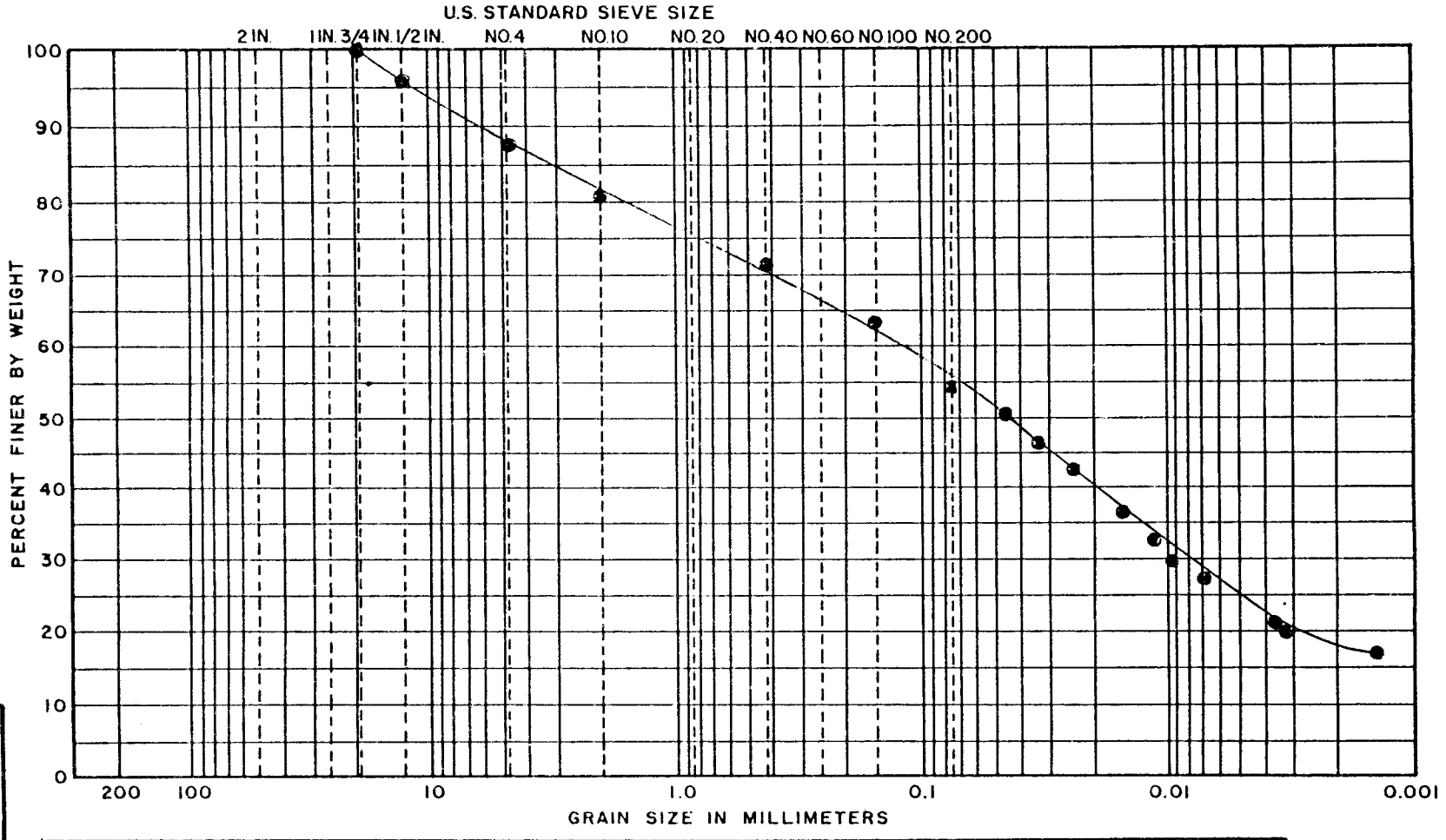
GRADATION TESTS

FILE NO. R5719.30 DATE 2/28/87

PROJECT:
Black and Bergholtz Creeks
Remediation (Interim Containment
Facility)
Love Canal
Niagara Falls, New York

GRADATION TESTS

FILE NO. R5719.30 DATE 2/28/87

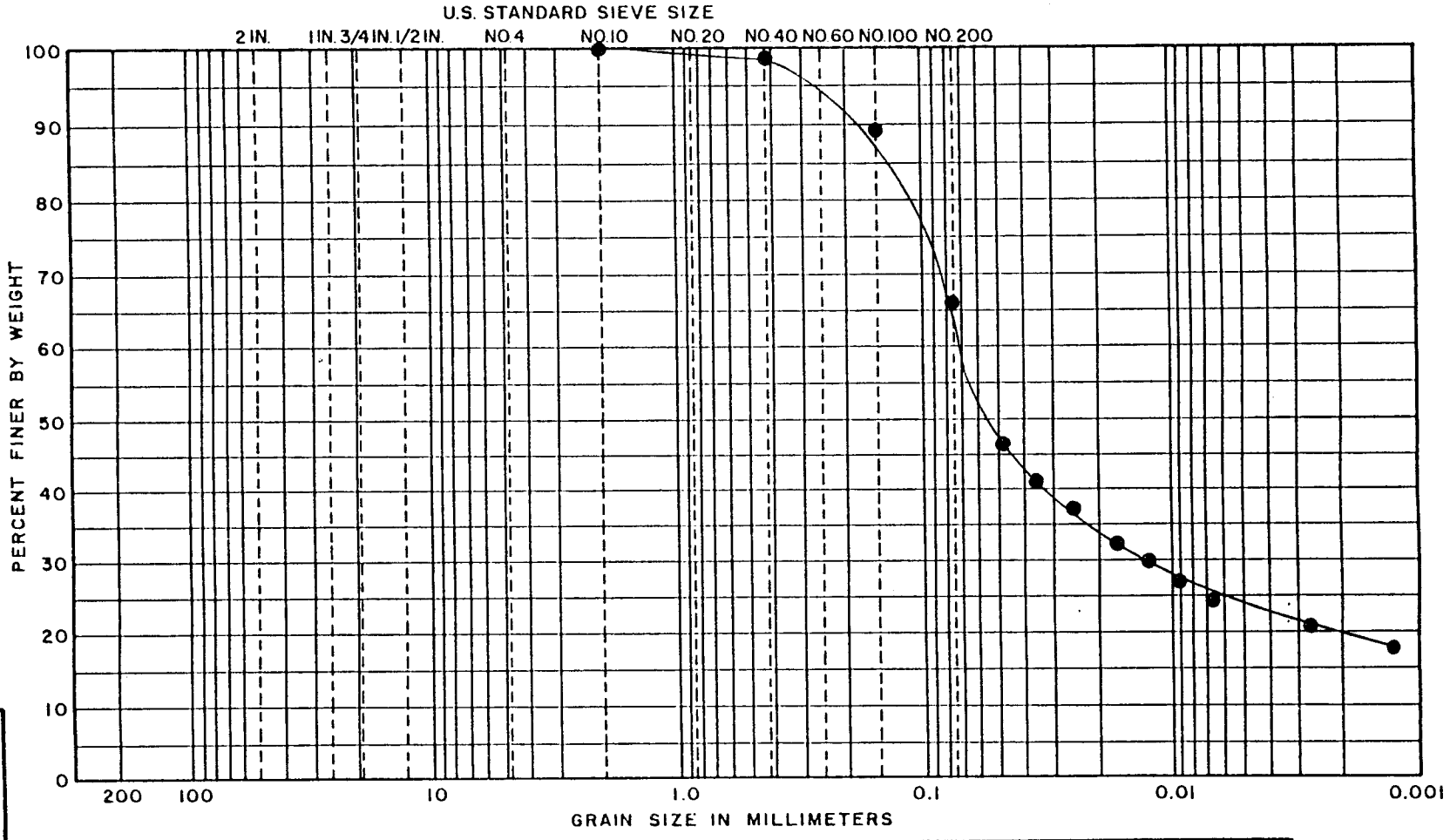


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

BORING NO.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
GZA-4	S-11	●	Red brown Clayey SILT, some fine to coarse Sand, little fine Gravel
			Sample depth: 28' to 30'

PROJECT: Black and Bergholtz Creeks Remediation (Interim Containment Facility)
Love Canal
Niagara Falls, New York



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

BORING NO.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
GZA-8	S-2	●	Brown Clayey SILT, some fine to medium Sand
			Sample depth: 2' to 4'

GRADATION TESTS

FILE NO. R5719.30 DATE 2/28/87

PROJECT: Black and Bergholtz Creeks
Remediation, Love Canal
Niagara Falls, New York

March 5, 1987
File: R5719.23

CREEKS REMEDIATION BORINGS
LABORATORY DATA SUMMARY

Moisture Content (ASTM D2216)

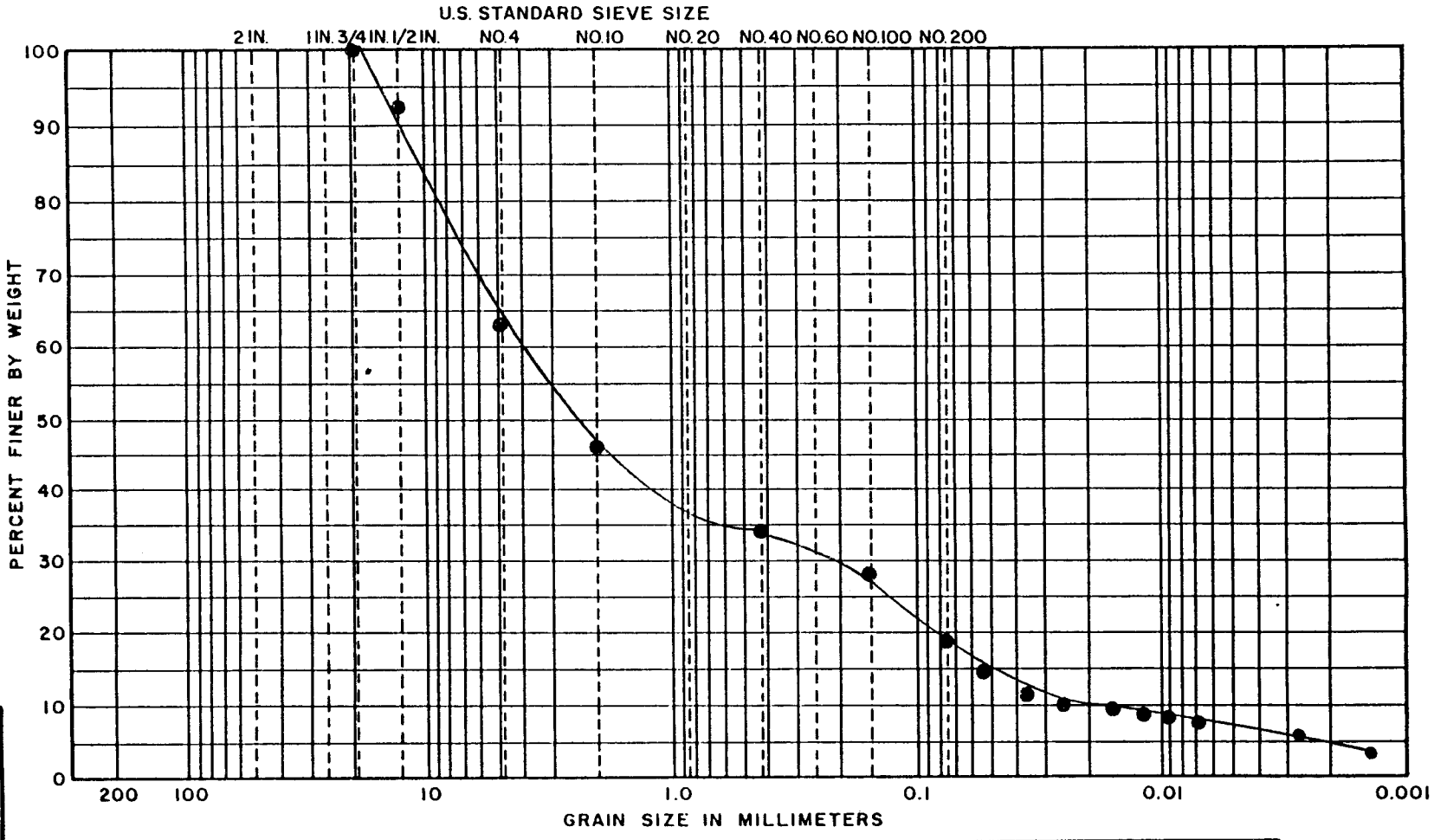
Boring No.	Sample No.	Depth (Feet)	Moisture Content (% by Weight)
GZA-12	S-3	4-6	16.3
GZA-12	S-4	6-8	26.3
GZA-12	S-5	8-10	24.4
GZA-12	S-6	10-12	36.1
GZA-12	S-7	12-14	17.0
GZA-12	S-8	14-16	12.4
GZA-13	S-3	4-6	43.8
GZA-13	S-4	6-8	37.9
GZA-13	S-5	8-10	43.3
GZA-13	S-6	10-12	40.4
GZA-13	S-7	12-14	35.6
GZA-13	S-8	14-16	46.3
GZA-14	S-2	2-4	13.1
GZA-14	S-3	4-6	22.0
GZA-14	S-4	6-8	23.8
GZA-14	S-5	8-10	25.1
GZA-14	S-6	10-12	33.6
GZA-14	S-7	12-14	30.6
GZA-14	S-8	14-16	36.6
GZA-14	S-9	19-21	12.5
GZA-15	S-2	2-4	14.3
GZA-15	S-4	6-8	25.8
GZA-15	S-5	8-10	30.5
GZA-15	S-6	10-12	32.5
GZA-15	S-7	12-14	33.8
GZA-15	S-8	14-16	33.6
GZA-15	S-9	16-18	38.6

Atterberg Limits (ASTM D4318)

Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)	LL (%)	PL (%)	PI	Identification
GZA-12	S-5	8-10	24.4	40.0	21.0	19.0	Medium plasticity CLAY & SILT
GZA-12	S-8	14-16	12.4	15.8	11.8	4.0	Slight plasticity Clayey SILT
GZA-13	S-4	6-8	37.9	40.4	21.5	18.9	Medium plasticity CLAY & SILT
GZA-14	S-7	12-14	30.6	52.0	25.7	26.3	High plasticity Silty CLAY
GZA-15	S-4	6-8	25.8	48.3	26.0	22.3	High Plasticity Silty CLAY
GZA-15	S-7	12-14	33.8	40.6	22.9	17.7	Medium plasticity CLAY & SILT

LL = liquid limit
PL = plastic limit
PI = plasticity index

PROJECT:
Black and Bergholtz Creeks
Remediation (Creek Remediation)
Love Canal
Niagara Falls, New York



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

BORING NO.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
GZA-12	S-3	●	Brown fine to coarse SAND and fine Gravel, little Silt
			Sample depth: 4' to 6'

GRADATION TESTS

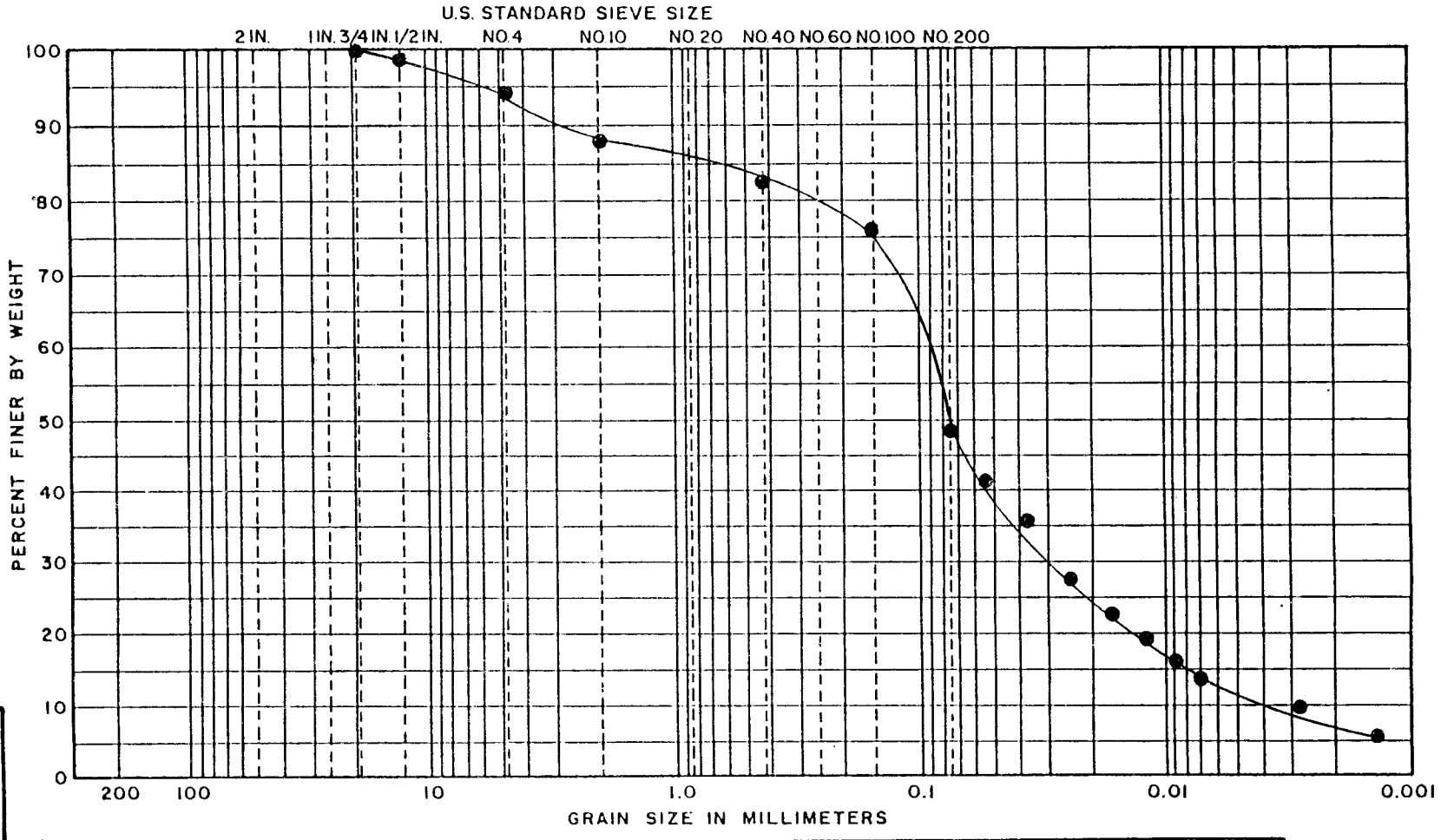
FILE NO. R5719.23 DATE 2/28/87

PROJECT:

Black and Bergholtz Creeks
Remediation (Creek Remediation)
Love Canal
Niagara Falls, New York

GRADATION TESTS

FILE NO. R5719.23 DATE 2/28/87

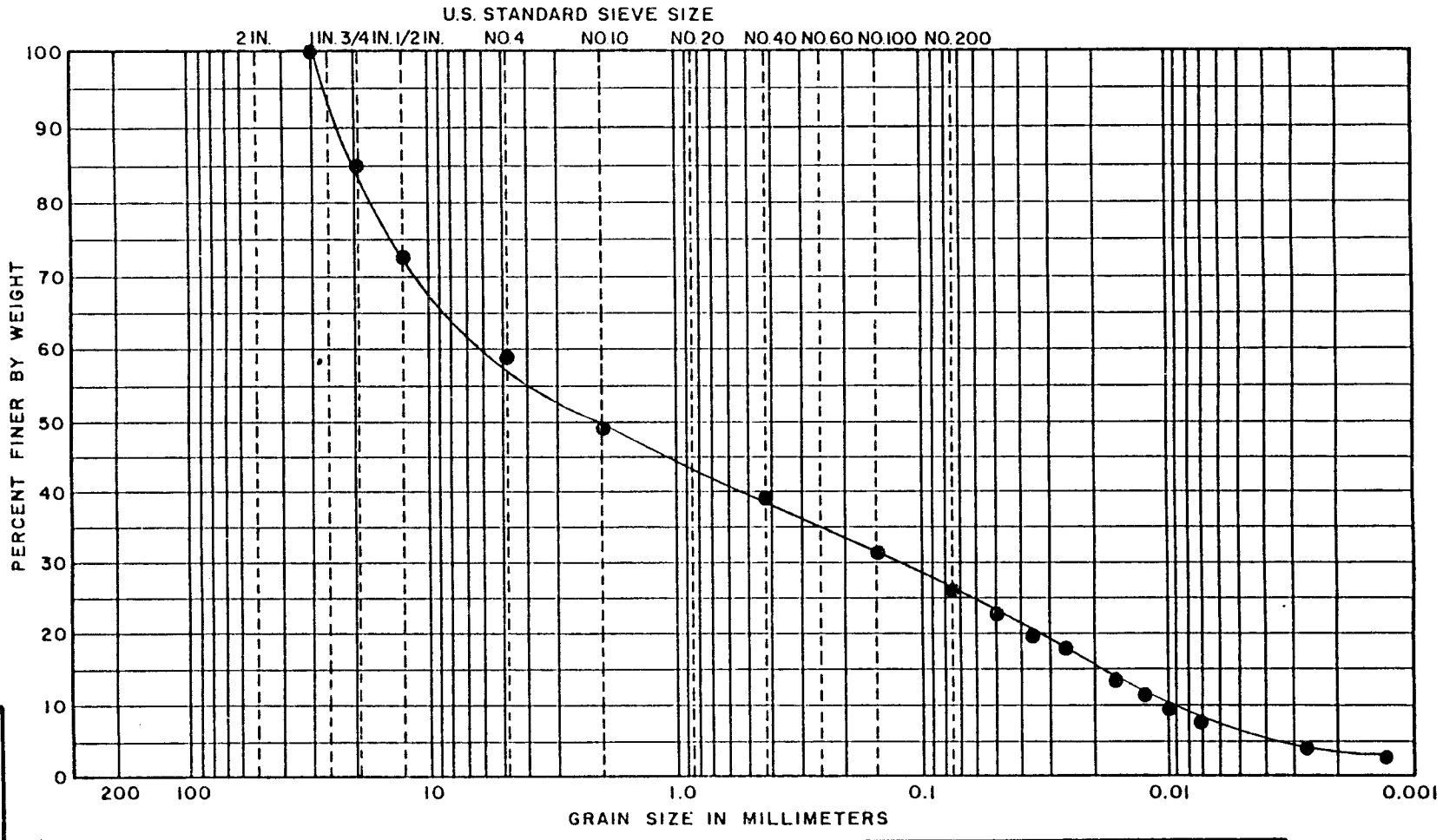


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

BORING NO.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
GZA-12	S-8	●	Red brown Clayey SILT and fine to coarse Sand, trace fine gravel
			Sample Depth: 14' to 16'

PROJECT: Black and Bergholtz Creeks
Remediation (Creek Remediation)
Love Canal
Niagara Falls, New York



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

BORING NO.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
GZA-13	S-3	❶	Black-brown fine to coarse GRAVEL and fine to coarse Sand with little Silt.
			Sample depth: 4' to 6'

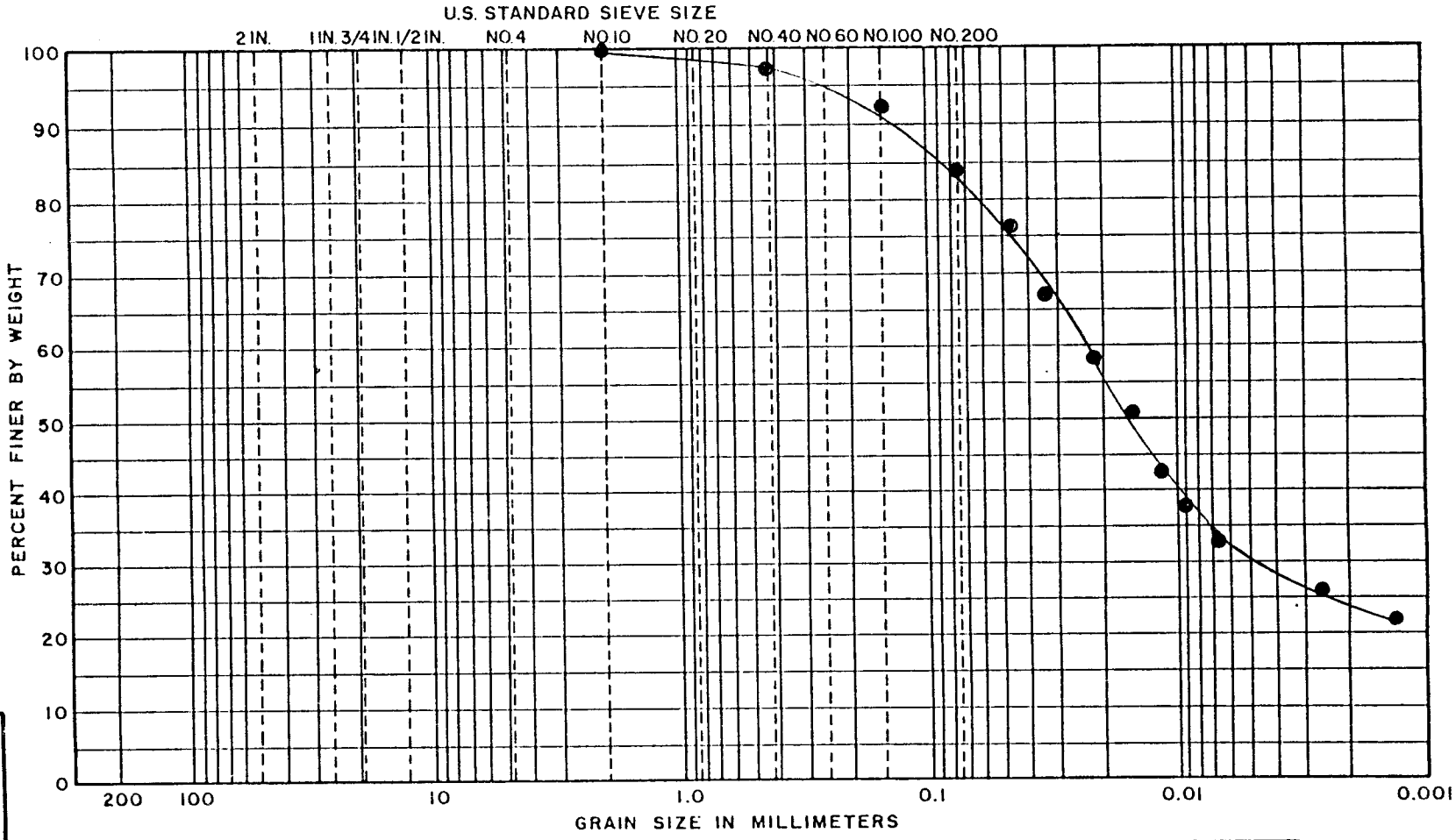
GRADATION TESTS

FILE NO. R5719.23 DATE 2/28/87

PROJECT:
Black and Bergholtz Creeks
Remediation (Creek Remediation)
Love Canal
Niagara Falls, New York

GRADATION TESTS

FILE NO. R5719.23 DATE 2/28/87

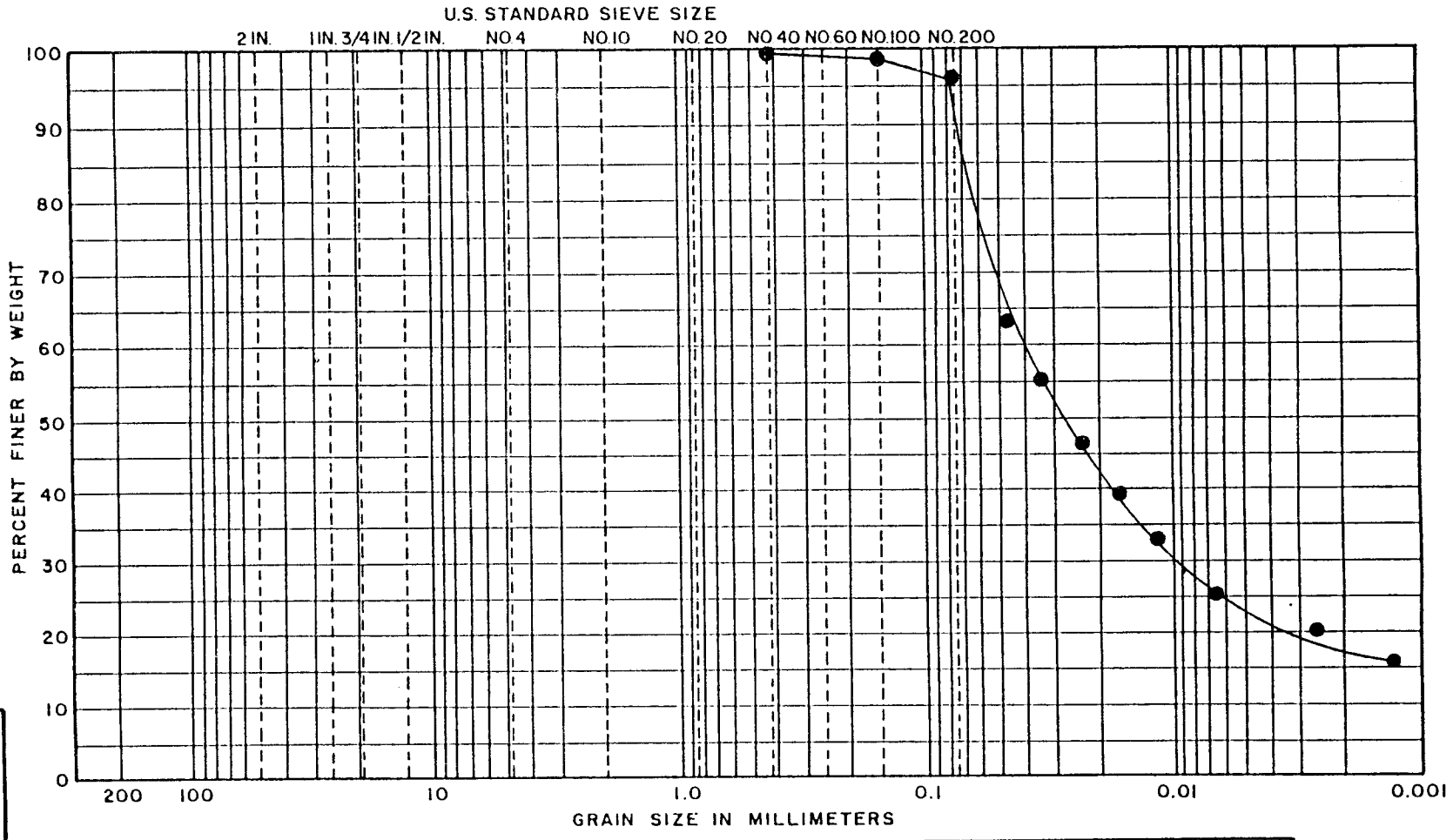


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

BORING NO.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
GZA-14	S-2	●	Brown SILT, little fine to medium Sand.
			Sample depth = 2' to 4'

PROJECT:
Black and Bergholtz Creeks
Remediation (Creek Remediation)
Love Canal
Niagara Falls, New York



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

BORING NO.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
GZA-15	S-2	●	Brown SILT, trace fine sand.
			Sample depth: 2' to 4'

GRADATION TESTS

FILE NO. R5719.23 DATE 2/28/87

PROJECT: Black and Bergholtz Creeks
Remediation, Love Canal
Niagara Falls, New York

March 5, 1987
File: R5719.23

CREEKS REMEDIATION SEDIMENT SAMPLES
LABORATORY DATA SUMMARY

Moisture Content (ASTM D2216)

Location	Sample No.	Depth (Inches)	Moisture Content (% by Weight)
CL Sta. 0+00	S-1	0-10	24.2
	S-2	10-20	26.8
CL Sta. 2+00	S-1	0-10	27.8
	S-2	10-20	20.7
CL Sta. 4+00	S-1	0-10	45.3
	S-2	10-20	17.2
CL Sta. 6+00	S-1	0-10	12.4
	S-2	10-20	14.7
CL Sta. 8+00	S-1	0-10	52.5
	S-2	10-20	42.9
CL Sta. 10+00	S-1	0-10	32.2
	S-2	10-20	51.0
CL Sta. 12+00	S-1	0-10	40.9
	S-2	10-20	44.3
CL Sta. 14+00	S-1	0-10	51.7
	S-2	10-20	50.5
CL Sta. 16+00	S-1	0-10	53.6
	S-2	10-20	40.5
CL Sta. 18+00	S-1	0-10	35.6
	S-2	10-20	42.4
CL Sta. 20+00	S-1	0-10	41.4
	S-2	10-20	38.2
CL Sta. 22+00	S-1	0-10	50.3
	S-2	10-20	49.3
CL Sta. 24+00	S-1	0-10	38.7
	S-2	10-20	43.2
CL Sta. 26+00	S-1	0-10	38.6

	S-2	10-20	42.8
CL Sta. 28+00	S-1	0-10	55.4
	S-2	10-20	44.8
CL Sta. 30+00	S-1	0-10	53.5
	S-2	10-20	38.4
CL Sta. 32+00	S-1	0-10	39.8
	S-2	10-20	37.1
CL Sta. 34+00	S-1	0-10	33.9
	S-2	10-20	58.4

Atterberg Limits (ASTM D4318)

CL Sta. Location	Sample No.	Depth (in.)	Moisture Content (%)	LL (%)	PL (%)	PI	Identification
8+00	S-2	10-20	42.9	38.5	22.1	16.4	Medium plasticity CLAY & SILT
14+00	S-2	10-20	50.5	39.7	21.5	18.2	Medium plasticity CLAY & SILT
16+00	S-2	10-20	40.5	34.4	20.4	14.0	Medium plasticity CLAY & SILT
20+00	S-2	10-20	38.2	33.0	20.4	12.6	Medium plasticity CLAY & SILT
22+00	S-1	0-10	50.3	43.8	24.7	19.1	Medium Plasticity CLAY & SILT

LL = liquid limit
PL = plastic limit
PI = plasticity index

Paint Filter Liquids Test (Method 9095)[1,2]

CL Sta. Location	Sample No.	Depth (in.)	Volume of Sample (ML)	Water[3] Added	Volume[4] of Free Water (ML)	Final Moisture Content After Test (%)
0+00	S-1	0-10	200	No	4.0	37.9
2+00	S-1	0-10	350	No	2.5	34.0
4+00	S-1	0-10	350	No	2.0	44.9
4+00	S-2	10-20	300	Yes	3.0	18.9
8+00	S-2	10-20	100	Yes	3.0	52.3
10+00	S-1	0-10	600	No	6.0	45.0
12+00	S-1	0-10	150	Yes	1.0	55.9
24+00	S-1	0-10	200	Yes	2.0	52.4

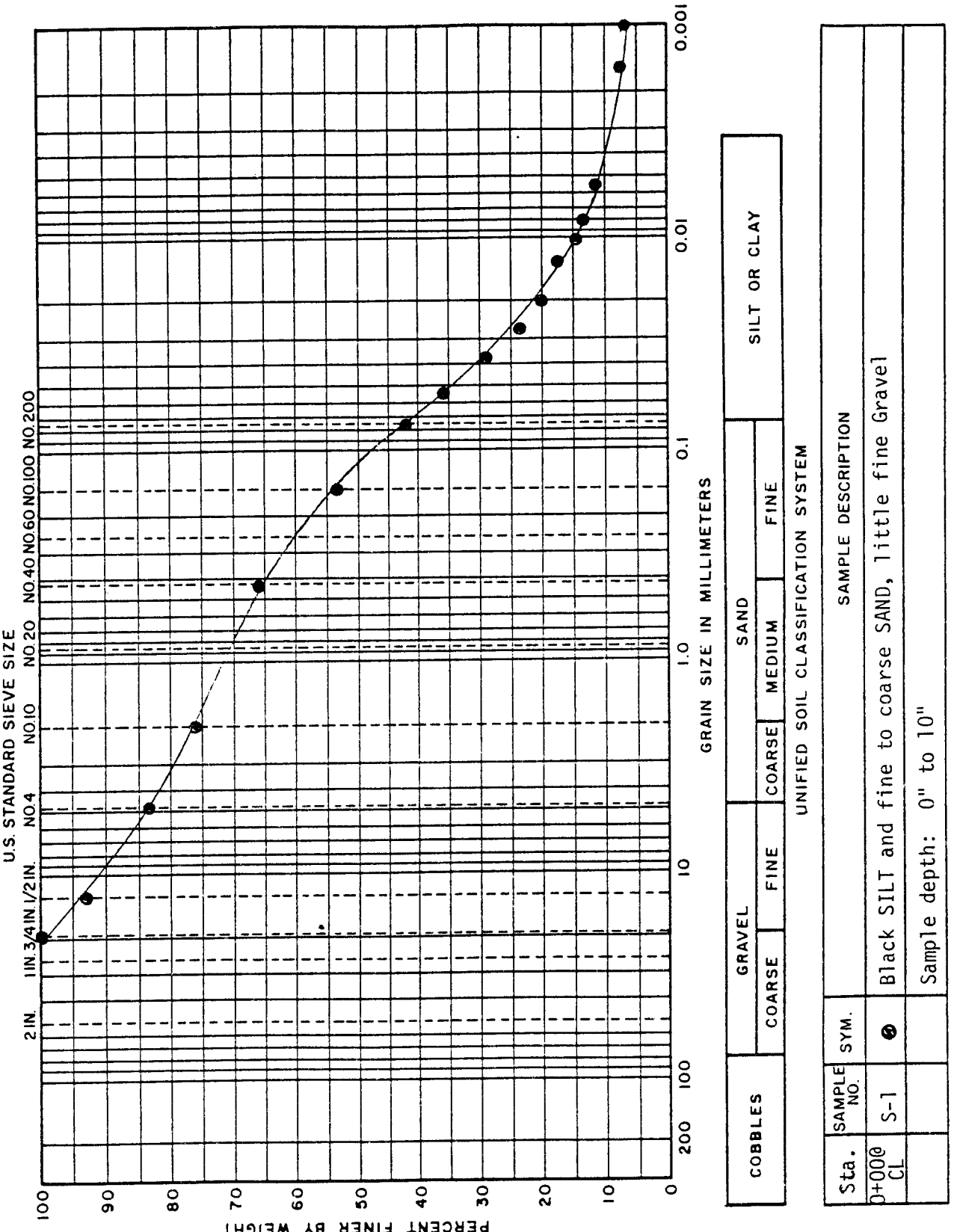
Notes:

(1) Test method used to determine compliance with 40 CFR 264.314 and 265.314.

(2) Tests and procedures run as directed by TAMS Consultants, Inc.

(3) Water was added to sample only if initial sample did not drain any free water.

(4) Volume of free water recorded after sample was allowed to drain for five minutes.



Sta.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
0+000 CL	S-1	●	Black SILT and fine to coarse SAND, little fine Gravel
			Sample depth: 0" to 10"

PROJECT:

Black and Bergholtz Creeks
Remediation (Creek Remediation)
Love Canal
Niagara Falls, New York

GZA

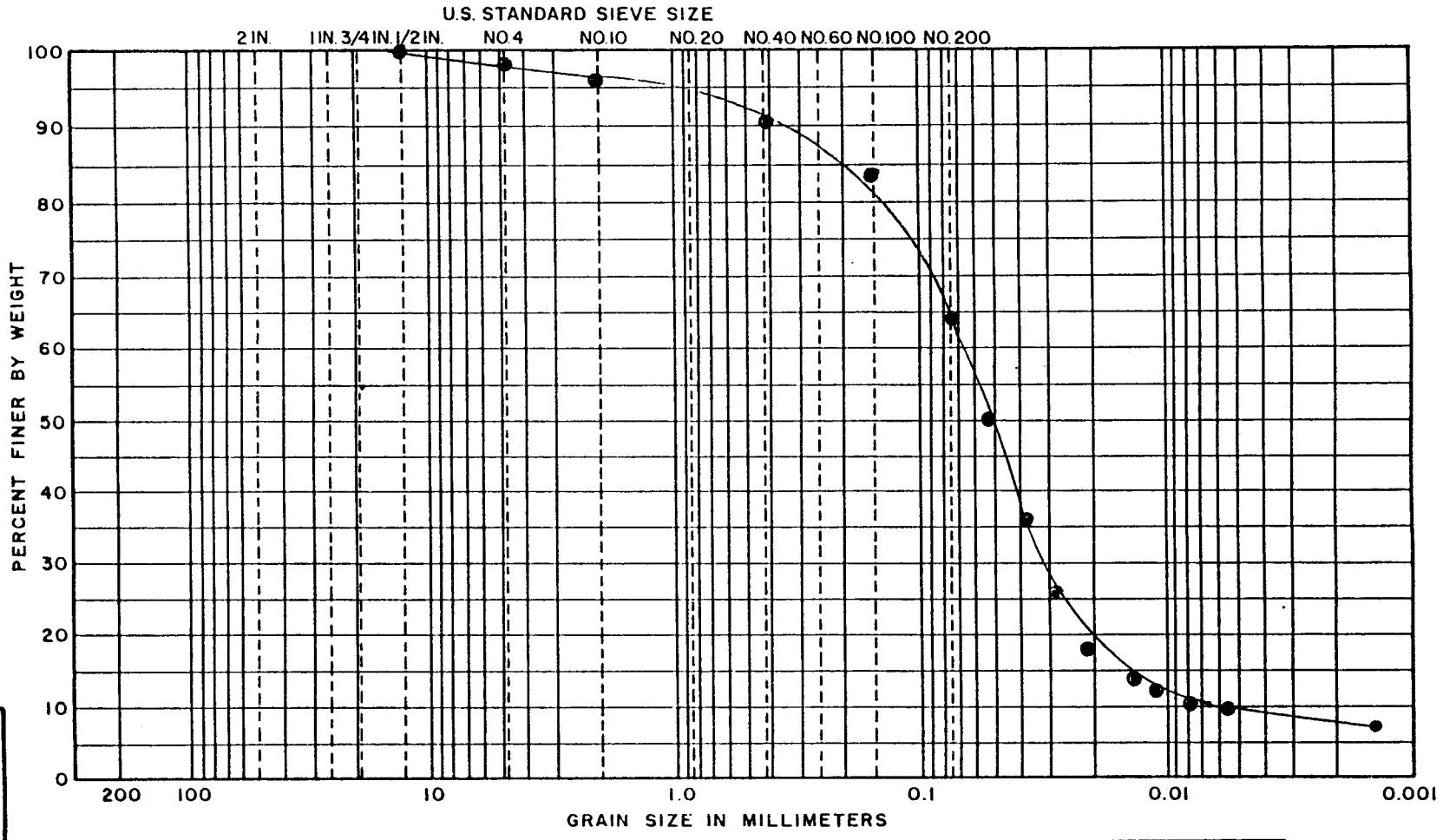
GRADATION TESTS

FILE NO. R5719.23 DATE 3/4/87

PROJECT:
Black and Bergholtz Creeks
Remediation (Creek Remediation)
Love Canal
Niagara Falls, New York

GRADATION TESTS

FILE NO. R5719.23 DATE 3/4/87

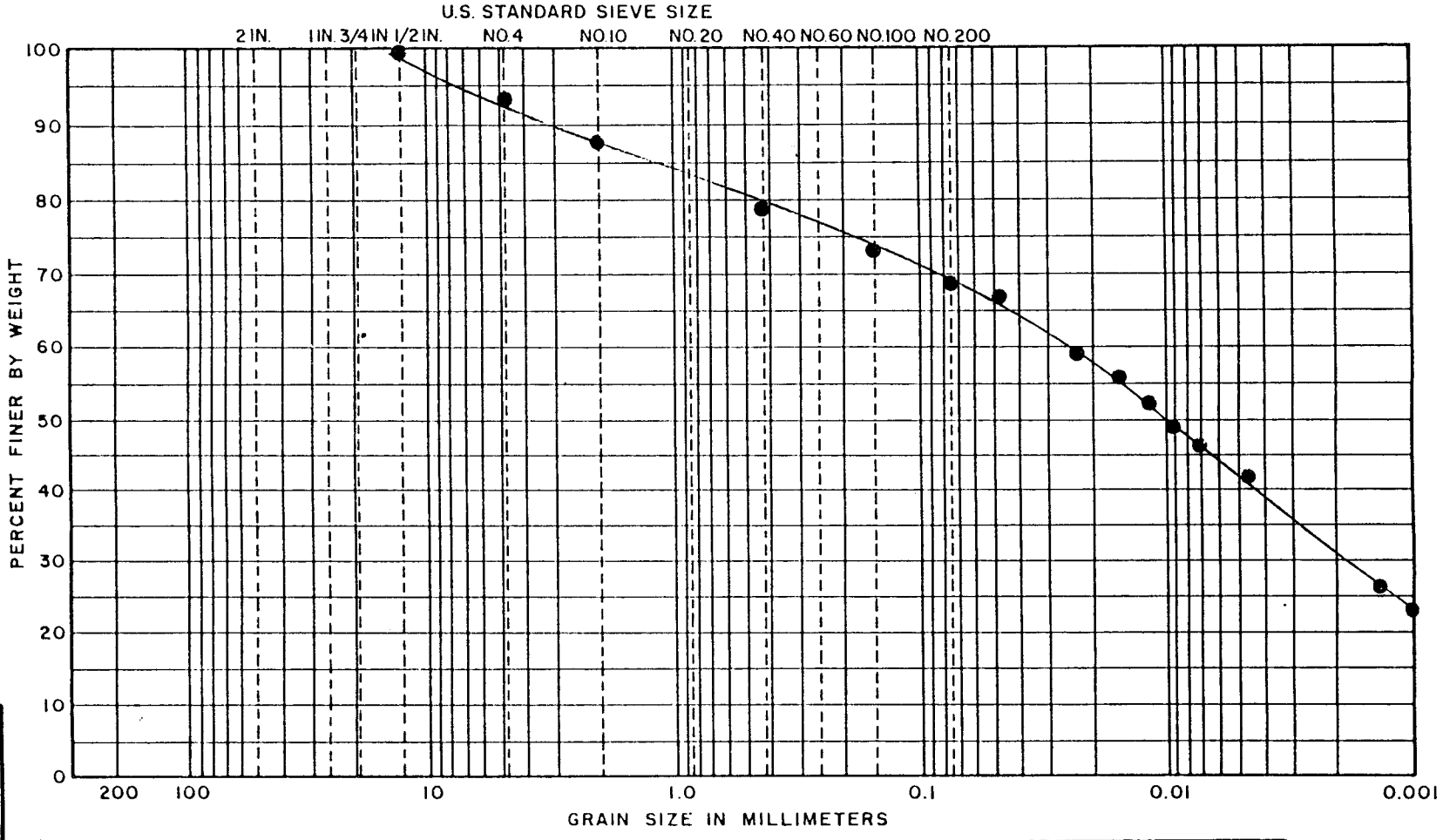


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

Sta.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
0+00 @ CL	S-2	●	Brown Clayey SILT, some fine to coarse Sand, trace fine Gravel
			Sample depth: 10" to 20"

PROJECT: Black and Bergholtz Creeks Remediation (Creek Remediation)
Love Canal
Niagara Falls, New York



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

Sta.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
4+00 @ CL	S-1	●	Red-brown SILT and CLAY, some fine to coarse Sand, trace fine gravel.
			Sample depth: 0" to 10"

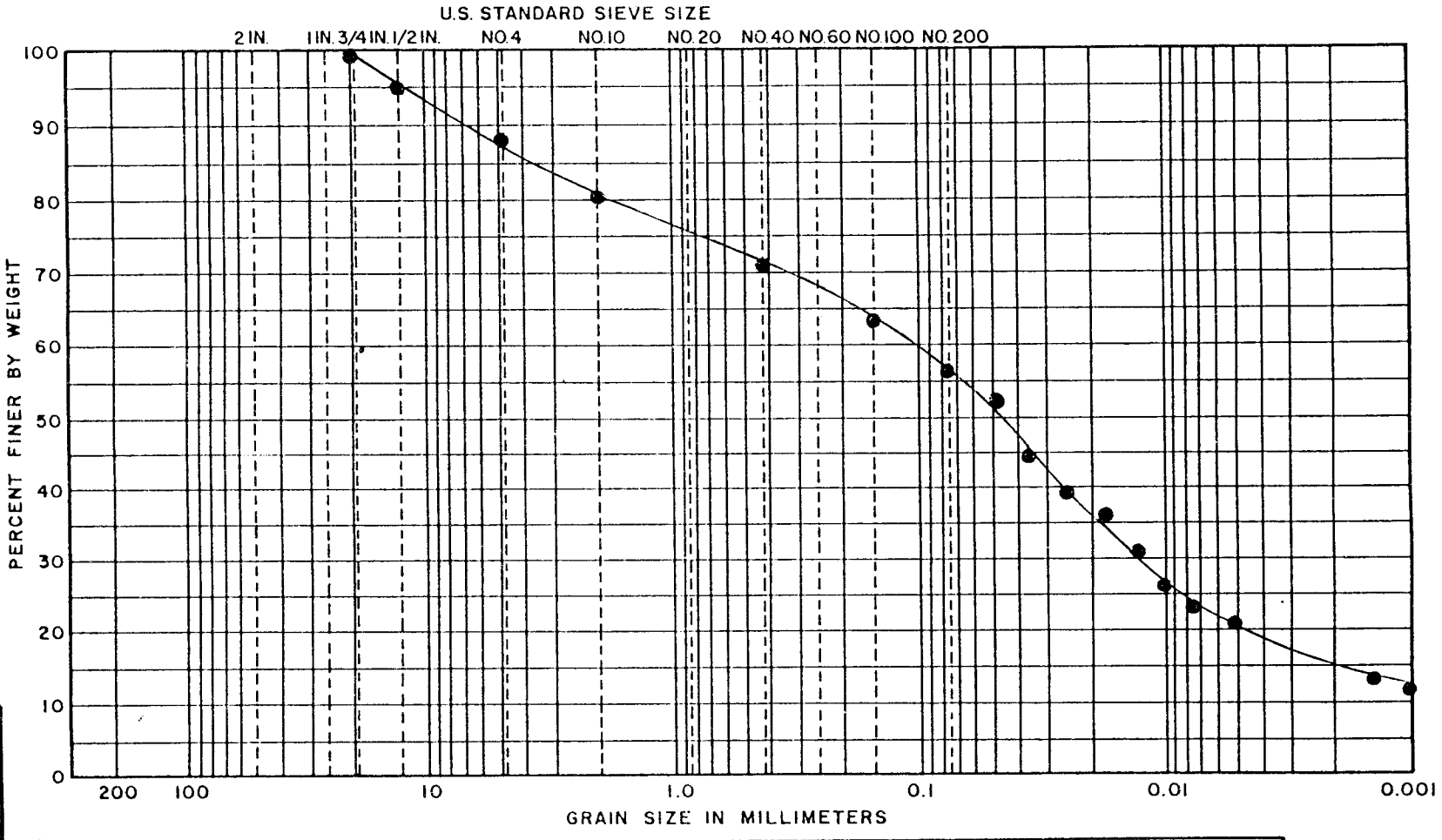
GRADATION TESTS

FILE NO. R5719.23 DATE 3/4/87

PROJECT:
Black and Bergholtz Creeks
Remediation (Creek Remediation)
Love Canal
Niagara Falls, New York

GRADATION TESTS

FILE NO. R5719.23 DATE 3/4/87

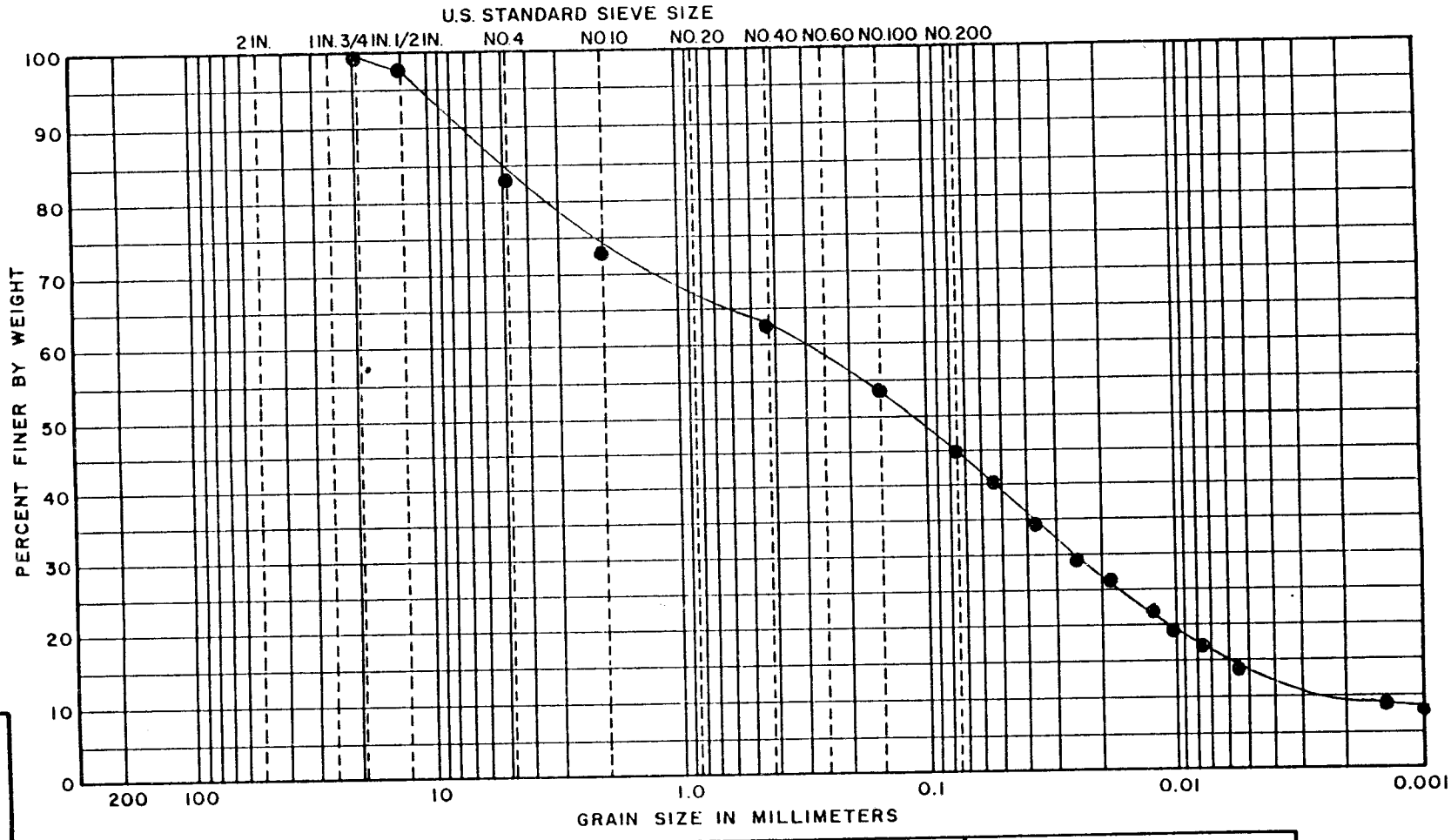


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

Sta.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
4+00 @ CL	S-2	●	Red-brown Clayey SILT, some fine to coarse Sand, little fine gravel
			Sample depth: 10" to 20"

PROJECT:
Black and Bergholtz Creeks
Remediation (Creek Remediation)
Love Canal
Niagara Falls, New York



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

Sta.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
6+00 @ CL	S-2	●	Brown SILT and fine to coarse Sand, little fine Gravel
			Sample depth: 10" to 20"

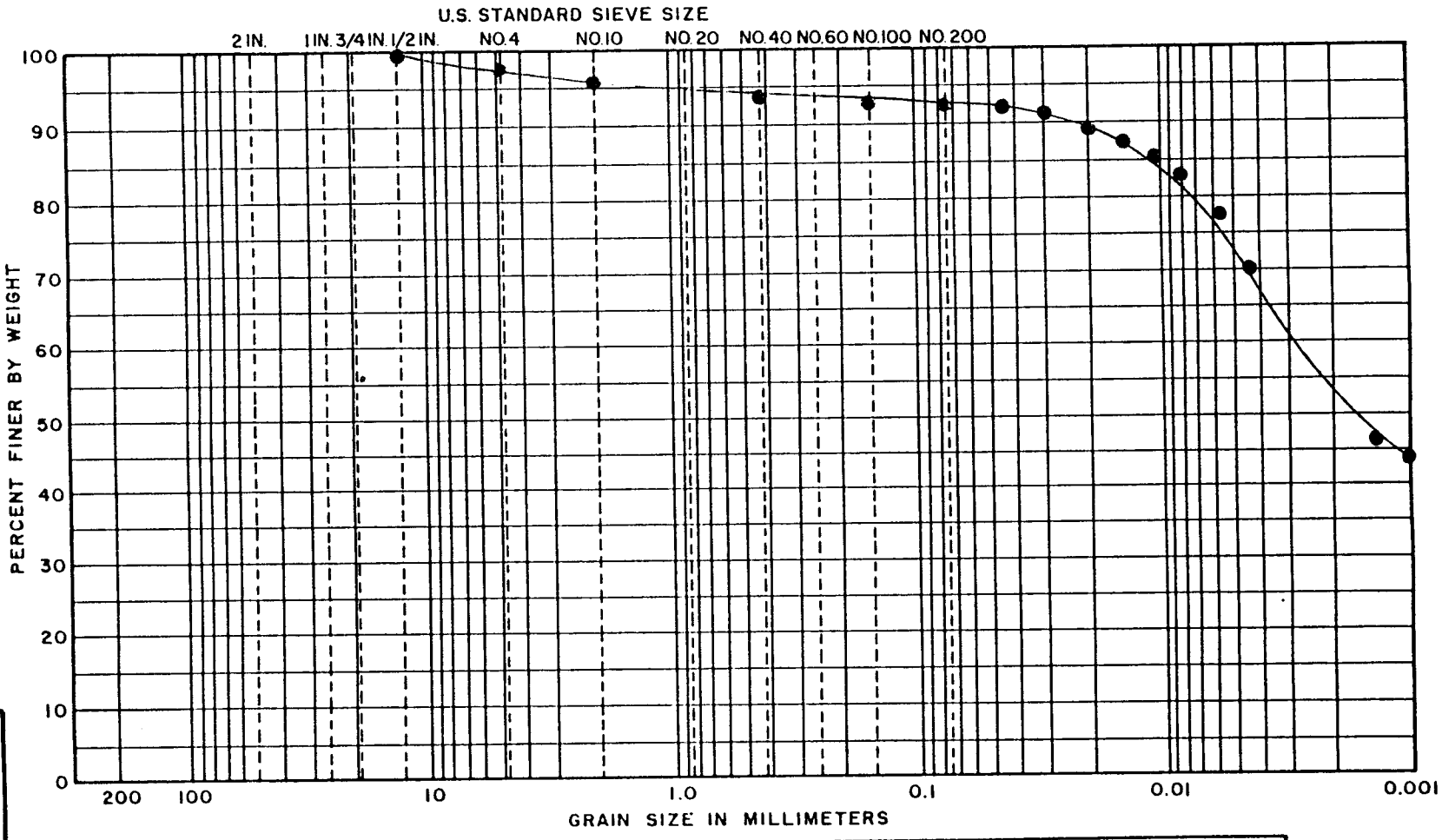
GRADATION TESTS

FILE NO. R5719.23 DATE 3/4/87

PROJECT:
Black and Bergholtz Creeks
Remediation (Creek Remediation)
Love Canal
Niagara Falls, New York

GRADATION TESTS

FILE NO. R5719.23 DATE 3/4/87



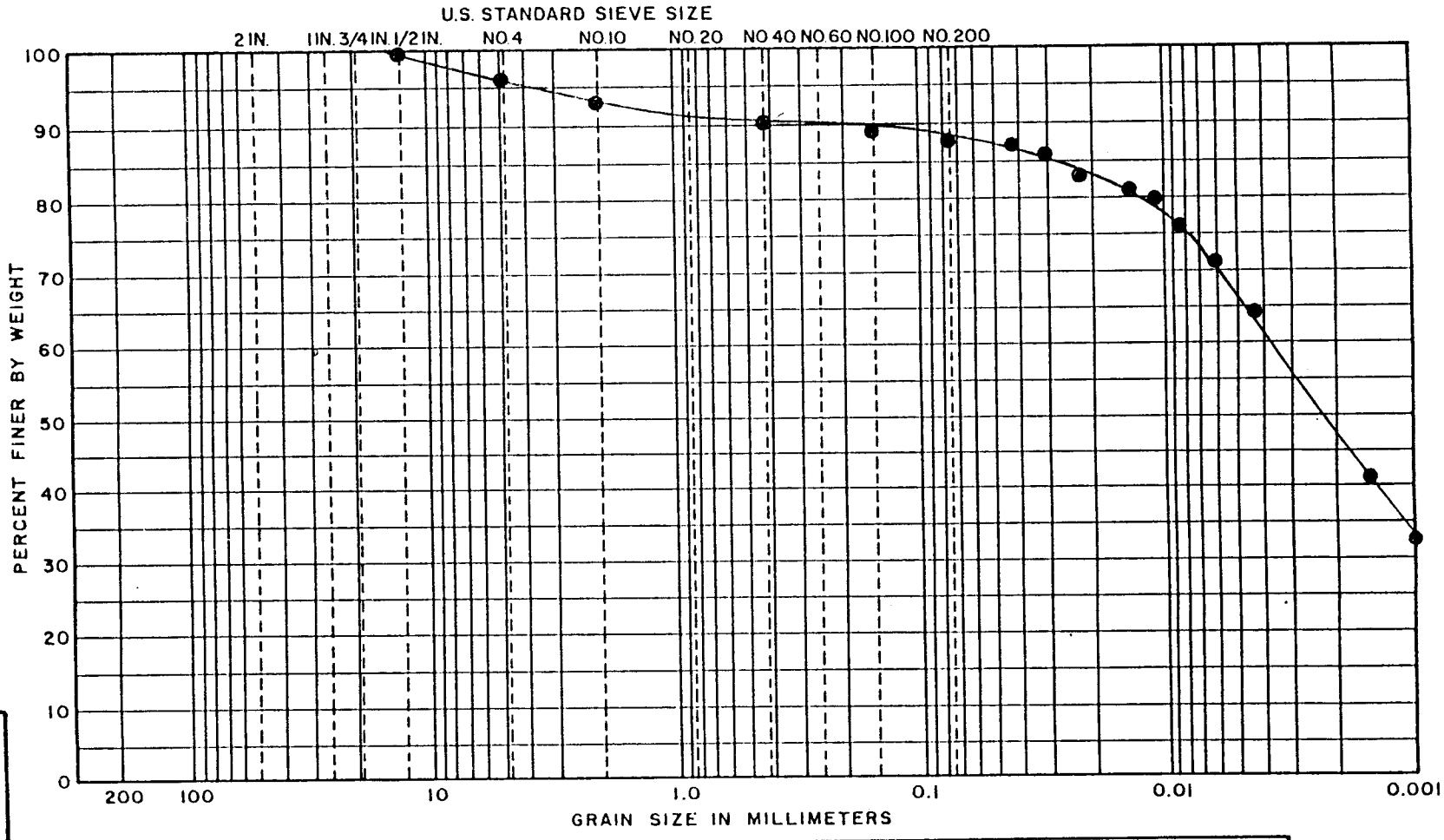
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

Sta.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
8+00 @ CL	S-2	●	Gray brown CLAY and SILT, trace fine to coarse sand, trace fine gravel
			Sample depth: 10" to 20"

PROJECT:

Black and Bergholtz Creeks
Remediation (Creek Remediation)
Love Canal
Niagara Falls, New York



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

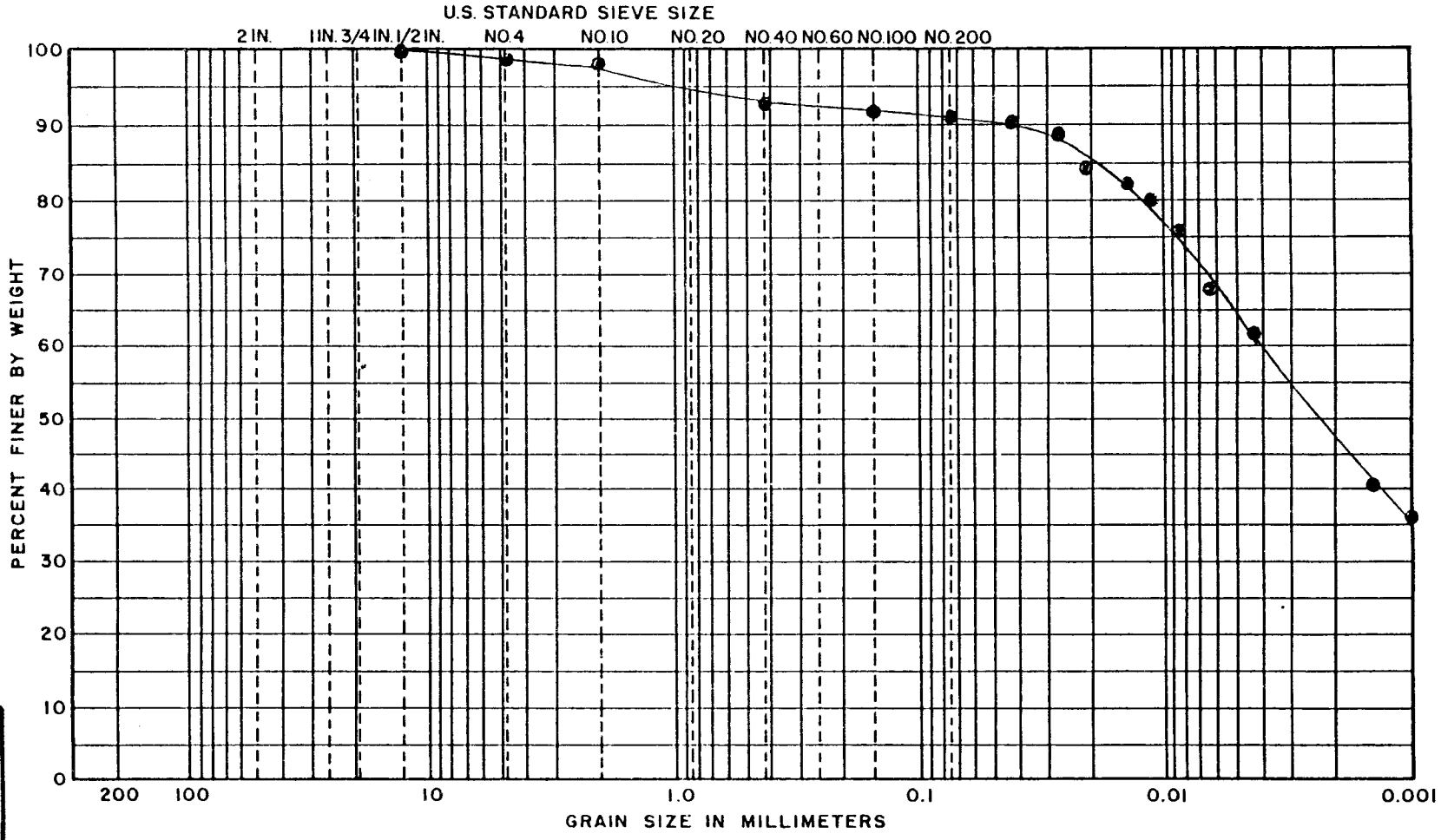
UNIFIED SOIL CLASSIFICATION SYSTEM

Sta.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
12+00 @ CL	S-1	●	Gray brown CLAY and SILT, trace fine to coarse sand, trace fine gravel
			Sample depth: 0" to 10"

GRADATION TESTS

FILE NO. R5719.23 DATE 3/4/87

PROJECT: Black and Bergholtz Creeks
Remediation (Creek Remediation)
Love Canal
Niagara Falls, New York



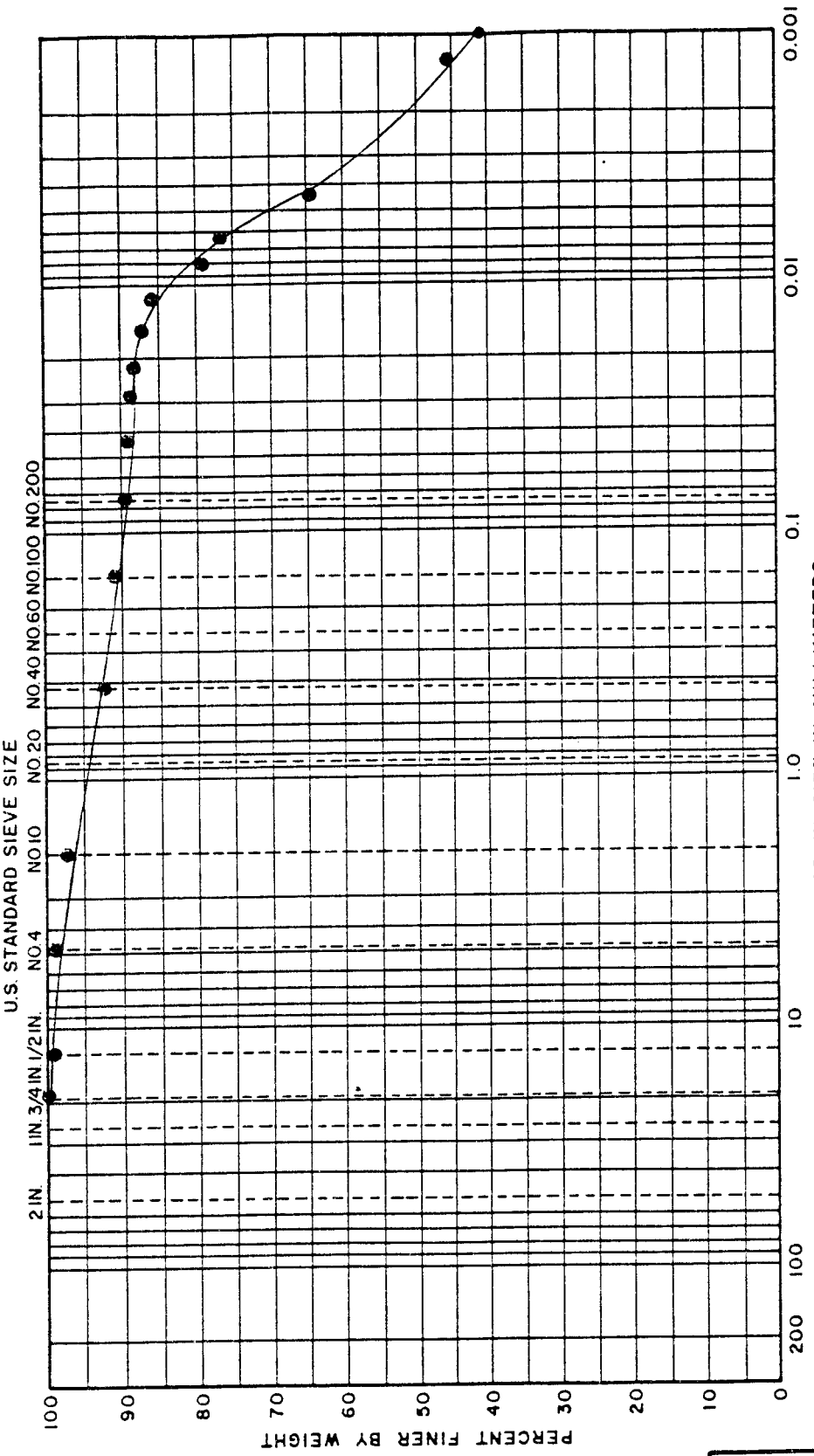
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

Sta.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
20+00 @ CL	S-2	●	Gray brown CLAY and SILT, trace fine to coarse sand, trace fine gravel
			Sample depth: 10" to 20"

GRADATION TESTS

FILE NO. R5719.23 DATE 3/4/87



Sta.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
28+00 @ CL	S-2	●	Gray brown CLAY and SILT, trace fine to coarse sand, trace fine gravel
			Sample depth: 10" to 20"

PROJECT: Black and Bergholtz Creeks
Remediation (Creek Remediation)
Love Canal
Niagara Falls, New York

GZA

GRADATION TESTS

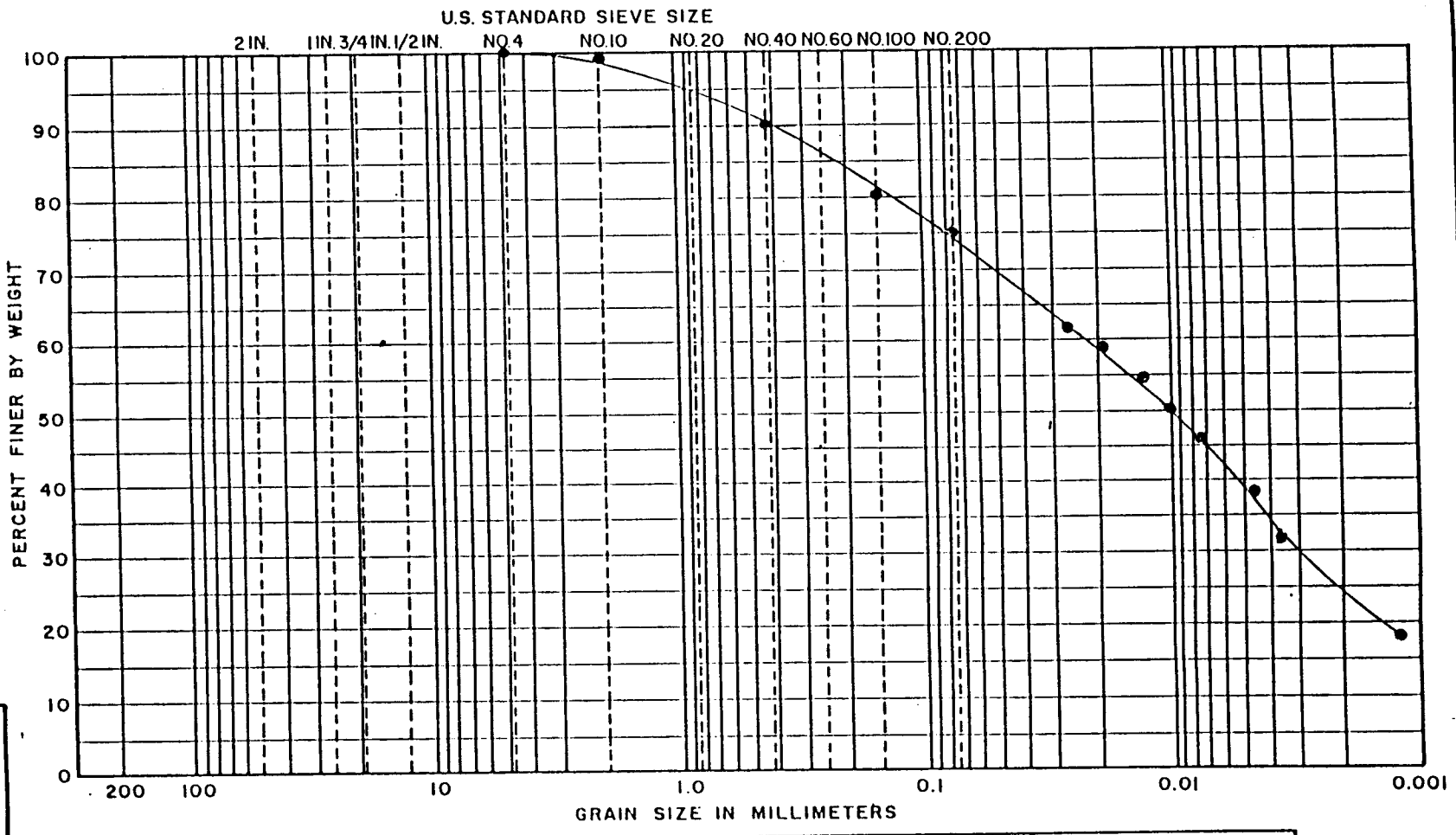
FILE NO. R5719.23 DATE 3/4/87

PROJECT: Black and Bergholtz Creeks
Remediation, Love Canal
Niagara Falls, New York

July, 1987
File: R5719.30

SOILS LABORATORY TEST DATA SUMMARY

Boring No.	DDSF 2	DDSF 2	DDSF 2	DDSF 3	DDSF 4	DDSF 4	DDSF 4
Sample No.	S-3	S-4	S-7	S-3	S-3	S-4	S-8
ASTM D2216							
Natural Moisture Content, %	24.9	31.1	40.7	16.7	27.3		33.2
ASTM D4318							
Liquid Limit	33		42		36		39
Plastic Limit	22		20		20		23
Plasticity Index	11		22		16		16
ASTM D422							
%>No. 4 Sieve		0		0		0	
%<No. 4 Sieve, > No. 200 Sieve		25		44		27	
%<No. 200 Sieve		75		56		73	
%<2 Microns		24		6		25	



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

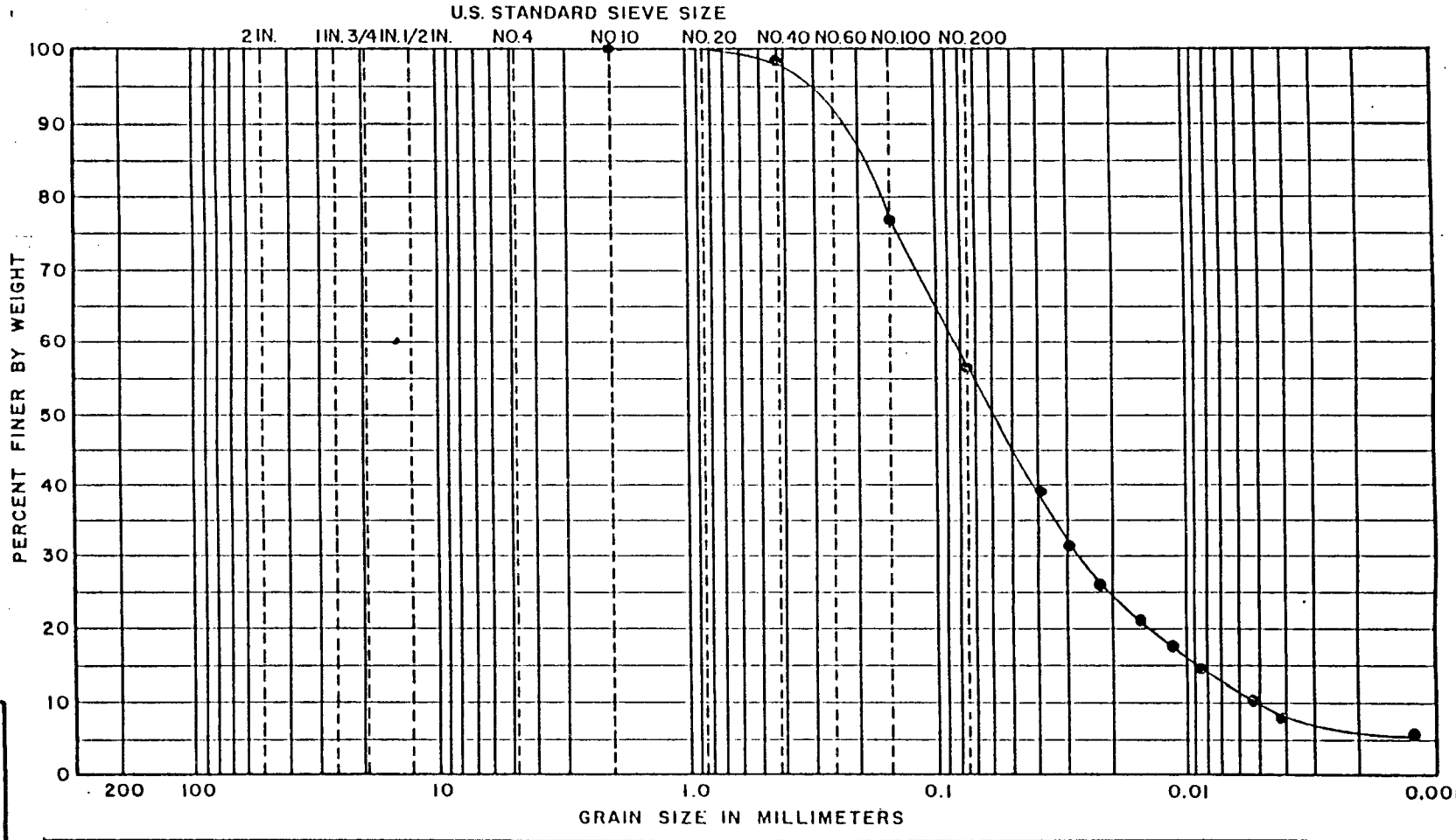
UNIFIED SOIL CLASSIFICATION SYSTEM

EXPLORATION NO.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
DDSF #2	S-4	●	Red-gray CLAY and SILT, some fine to coarse Sand
			% Gravel = 0; % Sand = 25; % <200 Sieve = 75; % <2 Microns = 24

LOVE CANAL DDSF BORINGS

GRADATION TESTS

FILE NO. R5719.60 DATE 7/87



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

EXPLORATION NO.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
DDSF #3	S-3	●	Brown SILT and fine to medium SAND, trace Clay
			% Gravel = 0; % Sand = 44; % <200 Sieve = 56; % <2 Microns = 6

LOVE CANAL DDSF BORINGS

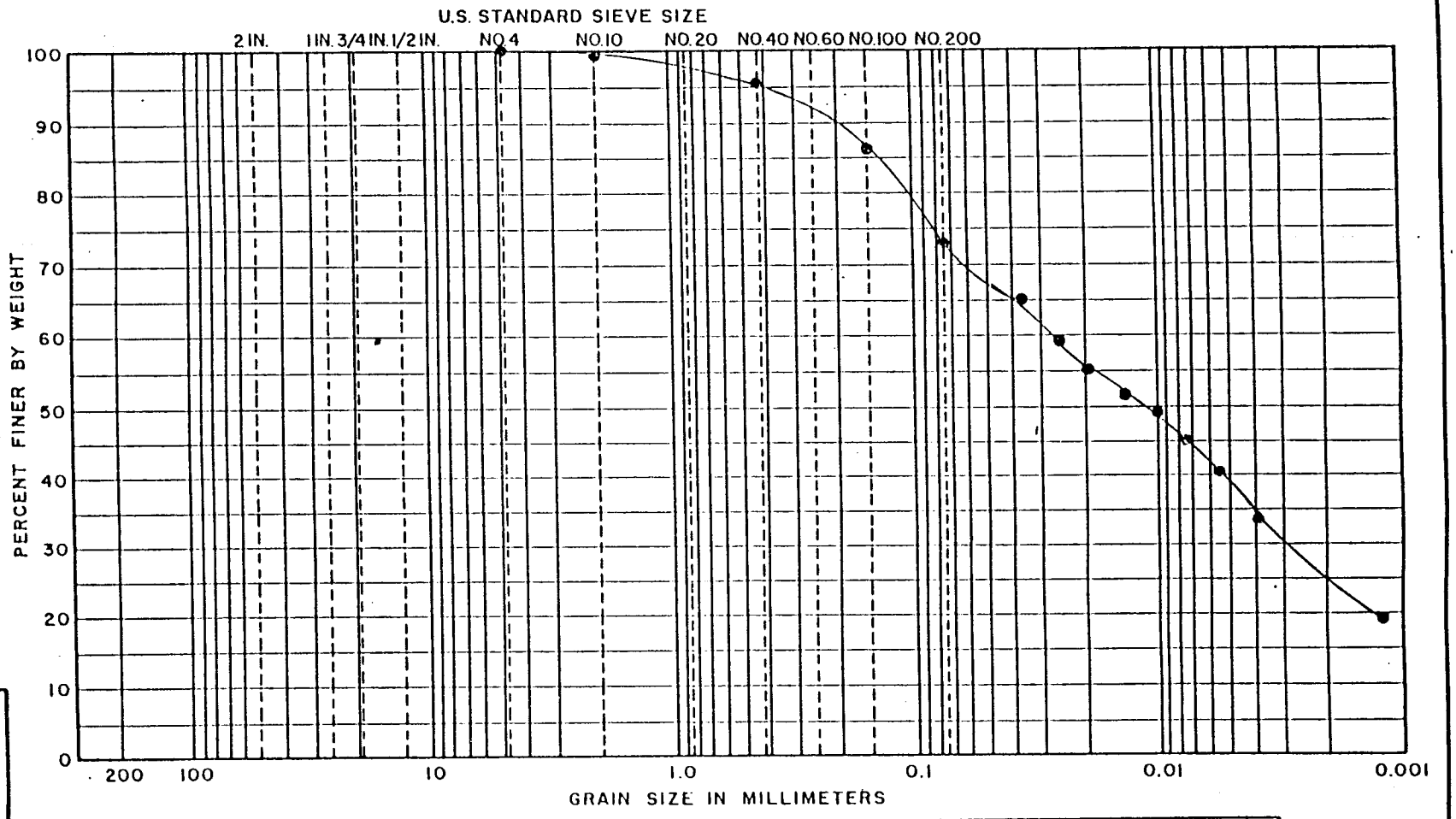
GRADATION TESTS

FILE NO. R5719.60 DATE 7/87

LOVE CANAL DDSF BORINGS

GRADATION TESTS

FILE NO. R5719.60 DATE 7/87



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

EXPLORATION NO.	SAMPLE NO.	SYM.	SAMPLE DESCRIPTION
DDSF #4	S-4	●	Brown-gray CLAY and SILT, some fine to coarse Sand
			% Gravel = 0; % Sand = 27; % <200 Sieve = 73; % <2 Microns = 25