

**OCCIDENTAL CHEMICAL CORPORATION
OLIN CORPORATION**

ENGINEERING REPORT

FINAL

VOLUME III

APPENDIX B

TECHNICAL SPECIFICATIONS

ATTACHMENT A

Niagara River Borehole Drilling Program, Rev. 1 May 1988

Bathymetric Survey of the Niagara River, July 1988

Monitoring Well/Borehole Stratigraphic and Instrumentation Log, April 1987

102nd STREET LANDFILL SITE

NIAGARA FALLS, NEW YORK

SEPTEMBER 9, 1995

Revised: FEBRUARY 5, 1996

**FLUOR DANIEL, INC.
MARLTON, NEW JERSEY**



Occidental Chemical Corporation



**NIAGARA RIVER BOREHOLE
DRILLING PROGRAM**

102nd Street Landfill

Niagara Falls, New York

REVISION 1

MAY 5 - 1988

bcc: A. Young, B. Morrissey, J. Kay, A. Weston, D. Cummings, M. Wasser,
A. Hirsch, K. Rubin

FILE COPY



Occidental Chemical Corporation

RECEIVED

MAY 11 1988

D. L. CUMMINGS

May 6, 1988

Paul J. Olivo
Project Manager
U.S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10278

APPROVED

6/15/89

Thomas R. Christoffel, P.E.
Bureau of Remedial Actions
N.Y.S. Dept. of Environmental Conservation
50 Wolf Road - Room 222
Albany, New York 12233

Dear Messrs. Olivo and Christoffel:

Enclosed are five copies for each of you of Revision 1 of the Niagara River
Borehole Drilling Program.

David L. Cummings/g.c.
David L. Cummings
OLIN CORPORATION

Jay A. Cull
Jay A. Cull
OCCIDENTAL CHEMICAL CORPORATION

JAC018bma
Enclosures

*Agencies stated
verbally on 11/29 or 30
that this borehole
report was approved
and they simply forgot
to put it in their
last letter as approved
D L C*

OxyChem

Special Environmental Programs

Occidental Chemical Center

360 Rainbow Boulevard South, Box 728, Niagara Falls, New York 14302 716/286-3000

FILE COPY

RECEIVED

JUN 15 1989

D. L. CUMMINGS



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, NEW YORK 10278

JUN 14 1989

Alan F. Weston, Ph.D.
Occidental Chemical Corporation
360 Rainbow Boulevard
Niagara Falls, NY 14302

(EXPRESS MAIL)

David L. Cummings
Olin Corporation
P.O. Box 248
Charleston, TN 37310

(EXPRESS MAIL)

Re: 102nd Street Landfill;
Niagara Falls, New York

Gentlemen:

The U.S. Environmental Protection Agency and N.Y. State (the "Governments") have completed their review of the following submittals, and have found them to be acceptable. These documents are accordingly approved as written.

- Niagara River Borehole Investigation, Revision No. 1.
- Assessment Chemical Monitoring Program, Revision No. 2.

If you have any questions regarding either document, please contact one of the undersigned.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "Paul J. Olivo".

Paul J. Olivo
Project Manager
U.S. Environmental
Protection Agency

A handwritten signature in dark ink, appearing to read "Murray E. Sharkey".

Murray E. Sharkey, P.E.
Project Engineer
N.Y. State Department of
Environmental Conservation

cc: A. Wakeman, NYSDOH
N. Spiegel, NYSDOL
D. Payne, USEPA
M. Giuliani, USDOJ

RBH
B. Frank
LMM
JCB



Occidental Chemical Corporation

APPROVED
6/15/89

Olin
CHEMICALS GROUP

**NIAGARA RIVER BOREHOLE
DRILLING PROGRAM
102nd Street Landfill
Niagara Falls, New York**

REVISION 1

April 1988
Ref. No. 1431

CRA / WCC

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1.0 INTRODUCTION

In order to supplement existing information and to define the geologic stratigraphy beneath the Niagara River adjacent to the Occidental Chemical Corporation/Olin Corporation (OCC/Olin) 102nd Street Landfill Site, a drilling program was conducted in the Niagara River between the eastern and western boundaries of the Landfill. This program took place during the period December 18 - 22, 1987. As an additional benefit of the drilling program, the completion of the borings provided valuable information with regards to defining the areal limit of NAPL presence and the factors influencing NAPL migration at the Site.

The purpose of this report is to present the results of the drilling program.

2.0 PURPOSE

The primary purpose of this drilling program was to gather additional information regarding the elevation of the top of the clay/till stratum off-shore and adjacent to the OCC/Olin 102nd Street Landfill Site. The main area of concern is in the vicinity of the clay/till depression in the lowland area of the Site. The extent of the clay/till depression has been a topic of discussion for several years. The only way to resolve the issue was through investigation of overburden stratigraphy beneath the Niagara River in close proximity to the shoreline.

In addition, the off-shore drilling program was designed to provide essential stratigraphic and physical property data necessary for future evaluation of potential remedial alternatives for the southern Site boundary.

In accordance with the Site Operations Plan, all soil samples recovered during drilling were examined by visual and olfactory means for the presence of NAPL and chemical contamination. This was of particular interest due to the fact that NAPL had been previously observed in certain boreholes in close proximity to the Niagara River shoreline.

3.0 PROCEDURES

To drill the boreholes in the River, a river barge was used to bring a drill rig to the Site. On Friday, December 18, 1987, a 100x50 ft. flat deck spud barge was brought to the Site. Mounted on the back of this barge was a Diedrich D-50 truck-mounted drill rig. All equipment and supplies were also located on the barge. The barge was equipped with a rowboat to gain access to and from the Site for field personnel.

Prior to commencing the drilling, buoys were set in the River to mark the proposed drilling locations. A total of seven buoys were set to mark the initially proposed drilling locations with the understanding that the need for subsequent drilling locations would be based upon the findings of the initial seven borings.

The initial seven locations were set along primary vectors of the sediment survey and at distances from shore that ensured that the borehole locations would be beyond the identified limits of chemical presence in the sediment as defined by the sediment survey. This precaution ensured that no sediment containing site specific chemicals was disturbed during the course of drilling the boreholes.

Depending upon River conditions, the barge was maneuvered into position as close as possible to each of the initial buoys by use of a tugboat. In cases where the markers could not be reached due to the barge draft and shallow water conditions, alternate locations were chosen which were as close to the proposed position as possible and still along the vector line. This was accomplished by sighting from the barge to a preset baseline marker on the shoreline using the buoy as an intermediate point of alignment.

Based upon the information collected from the initial seven boreholes, it was determined that three additional boreholes would be drilled. The locations of all ten boreholes are presented in Figure 1.

The drill rig was situated on a platform which extended off the back of the barge. Prior to commencement of each borehole, the distance from the top of this platform to the top of the water surface and the depth of the water were measured. At the same time, the water level elevation was measured at the stilling basin located at the sewer discharge headwall on-site. Using these measurements, the elevation of the River bottom at the drilling location was calculated.

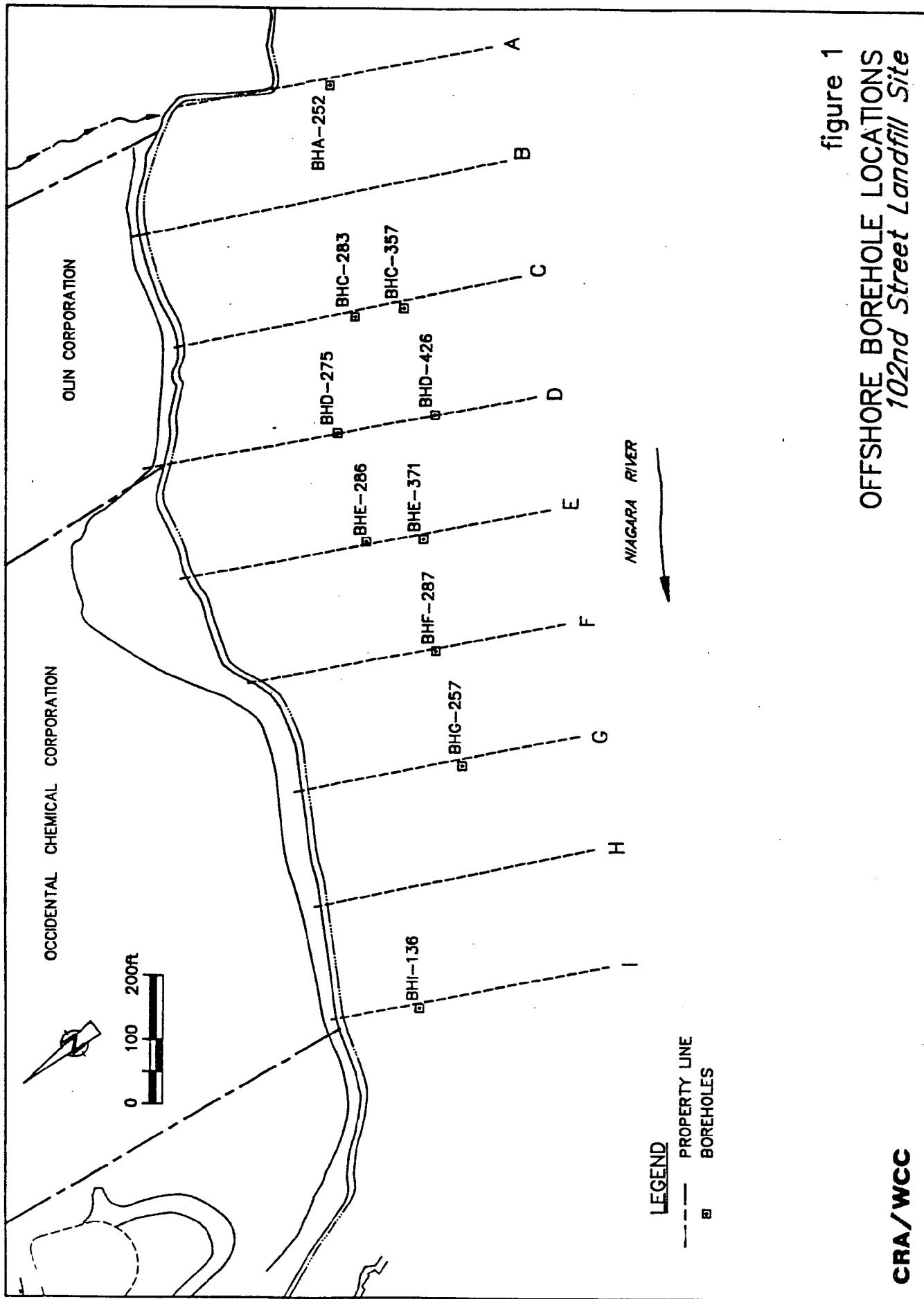


figure 1
OFFSHORE BOREHOLE LOCATIONS
102nd Street Landfill Site

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Drilling was accomplished using hollow stem augers (8-inch OD, 4 1/4-inch ID). Continuous split spoon samples were collected in advance of the augering operation. These samples were logged for geologic stratigraphy and examined for visual and olfactory evidence of chemical presence. Soil record samples were retained and are presently stored at the OCC Niagara Plant.

Typically, each borehole extended 4 to 6 feet into the clay or till stratum, whichever was first encountered. None of the boreholes extended to the top of the bedrock surface. Upon completion, each borehole was backfilled with cement/bentonite grout before the augers were removed.

Before proceeding to the next drilling location, a buoy was placed at the completed borehole. These completed locations were later surveyed by a licensed New York State Surveyor to obtain accurate Site grid coordinates. A complete list of location information is presented in Table 1.

At four locations (A-252, E-286, G-257 and I-136) undisturbed Shelby tube samples of the fine grained stratigraphic units were collected. The four samples were submitted to Woodward Clyde Consultants (WCC) for physical testing including grain size distribution analysis, natural

TABLE 1
BOREHOLE SUMMARY

<u>BOREHOLE NUMBER</u>	<u>DATE COMPLETED</u>	<u>ELEVATION TOP OF SEDIMENT</u>	<u>GRID COORDINATE SOUTH</u>	<u>LOCATION EAST</u>
A-252	Dec. 21/87	561.3	762.329	1929.098
C-283	Dec. 18/87	560.8	802.624	1572.609
C-357	Dec. 22/87	560.4	875.950	1585.784
D-275	Dec. 21/87	561.4	776.431	1391.996
D-426	Dec. 22/87	560.0	924.790	1420.432
E-286	Dec. 18/87	561.6	821.096	1223.205
E-371	Dec. 22/87	560.7	907.050	1226.88
F-287	Dec. 22/87	560.8	926.627	1053.357
G-257	Dec. 19/87	560.8	967.830	874.445
I-136	Dec. 21/87	561.2	901.514	498.274

water content, unit dry weight, specific gravity, Atterburg Limits and laboratory permeability. In addition, each sample was described and classified according to the Unified Soil Classification System.

4.0 RIVER CONDITIONS

During the period while the Niagara River Borehole Drilling Program was taking place, the U.S. Army Corps of Engineers was conducting an erosion control study on Lake Erie. As part of their study, the water level of the Niagara River was to be varied from one foot above its normal elevation of 563 ft. AMSL (as measured at the Grass Island Pool) to one foot below this normal elevation. Water levels measured at the site during the drilling program ranged from 563.59 ft. AMSL to 565.11 ft. AMSL (based on USGS datum). To the extent practicable, efforts were made to drill the boreholes in shallower water while the River was highest. As previously mentioned, even with the high water levels, the draft of the barge precluded reaching all of the desired drilling locations. Consequently most drilling locations are further from shore than originally desired.

5.0 GEOLOGIC STRATIGRAPHY

In general, the natural geologic stratigraphy beneath the Niagara River and adjacent to the Site was consistent with the observed on-site geologic stratigraphy in terms of composition, depth and thickness of each unit present. The fill unit is absent from the offshore stratigraphy. Stratigraphic and Instrumentation Logs for each borehole are included in Appendix A.

A summary of each of the stratigraphic units encountered is presented in the following sections.

5.1 ALLUVIAL RIVER SEDIMENTS

The uppermost overburden unit observed consists of alluvial river sediments. These alluvial river sediments typically consist of gray silty fine sand. This stratum ranges in thickness from approximately 4 feet to 17 feet. As observed on-site, these sediments are thickest in the central area of the site in the vicinity of vectors D and E. Along these two vectors, it also appears that the thickness of the alluvial material decreases as the distance from shore increases.

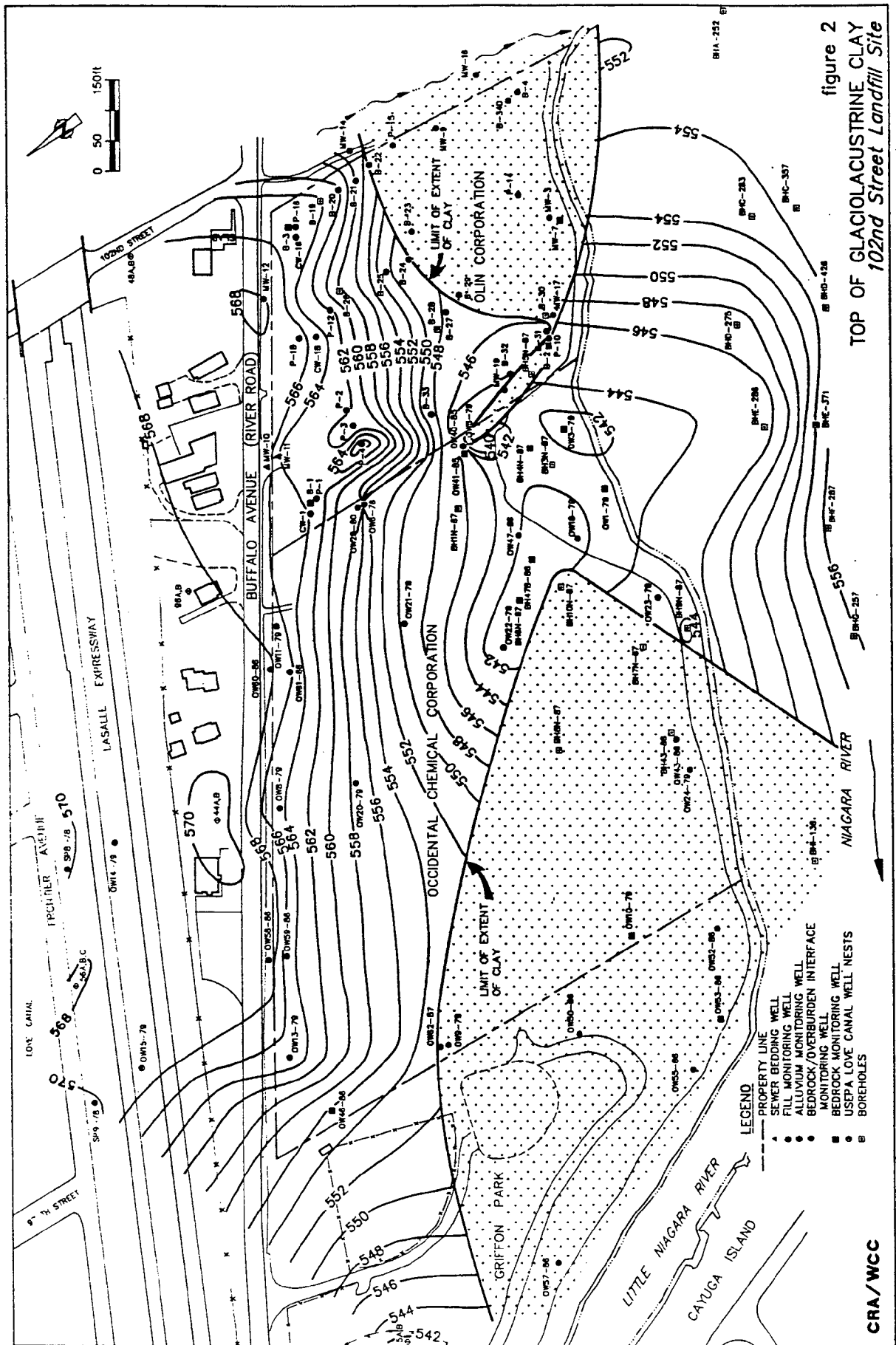
5.2 GLACIOLACUSTRINE CLAY

Underlying the alluvial river sediments is the glaciolacustrine clay. The glaciolacustrine clay is generally a soft, red-brown and gray silty clay. The observed thickness of the clay varies from not present to greater than six feet. It is thinnest at the east and west ends of the site in the vicinity of vectors A and I. In fact, there was no clay present at the I-136 drilling location. The thickest clay layer was observed along vectors F and G and at the furthest boreholes from shore along vectors D and E. Throughout this central area, the clay was in excess of 5 feet in thickness.

Figures 2 and 3 illustrate the elevation of the top of the clay stratum and an isopach map of clay thickness respectively.

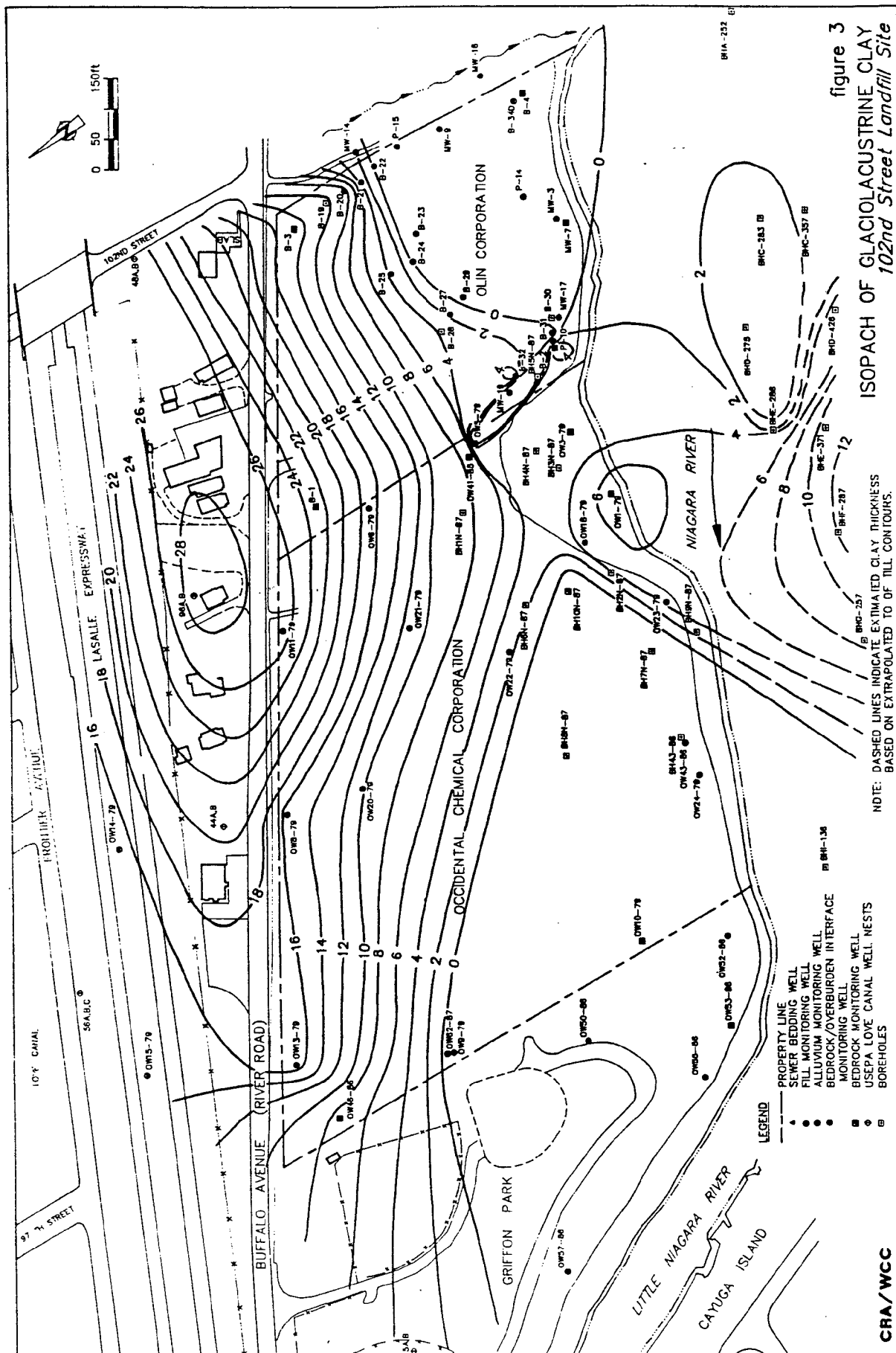
5.3 GLACIAL TILL

The glacial till which underlies the glaciolacustrine clay was encountered in six of the ten boreholes completed. Four of the boreholes were terminated in the clay without encountering the till. The till is comprised of a red-brown to brown sandy silt with clay and gravel. Although no information was collected regarding the



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1431-18/01/88-44-D-2 (P-62)



NOTE: DASHED LINES INDICATE ESTIMATED CLAY THICKNESS
BASED ON EXTRAPOLATED TO OF TILL CONTOURS.

CRA/WCC

1431-3/03/88--44-D... 1 (P-79)

thickness of the till regime, the contours of the top of the glacial till (Figure 4) closely resemble those seen on site. Figure 5 presents an isopach map of the thickness of the till stratum as it is now defined. It is to be noted that since the top of bedrock was not defined under the River, it was necessary to extrapolate the on-site top of bedrock contours out into the River for the purpose of estimating the thickness of the till layer along the shoreline.

Review of the top of bedrock contours beneath the Site and the extrapolation thereof into the River identified one probable interpretation error in the historical data. One of the initial boreholes installed in 1977 (BL2-77) encountered refusal at 32 feet below ground resulting in a bedrock elevation of approximately 537.6. This information does not appear consistent with the top of bedrock elevation (approximately 532) encountered at OW24-79 and confirmed at OW44-86 and OW45-86 which are located in the same vicinity. In fact, the stratigraphy at all of the 1977 well installations identifies slight but consistent differences with adjacent wells and boreholes. Consequently, the stratigraphy from these borings was not included in the contour maps generated.

Using the combined maps of clay and till, the top elevation of the low permeable layer underlying the Site has been generated and is presented in Figure 6. Similarly,

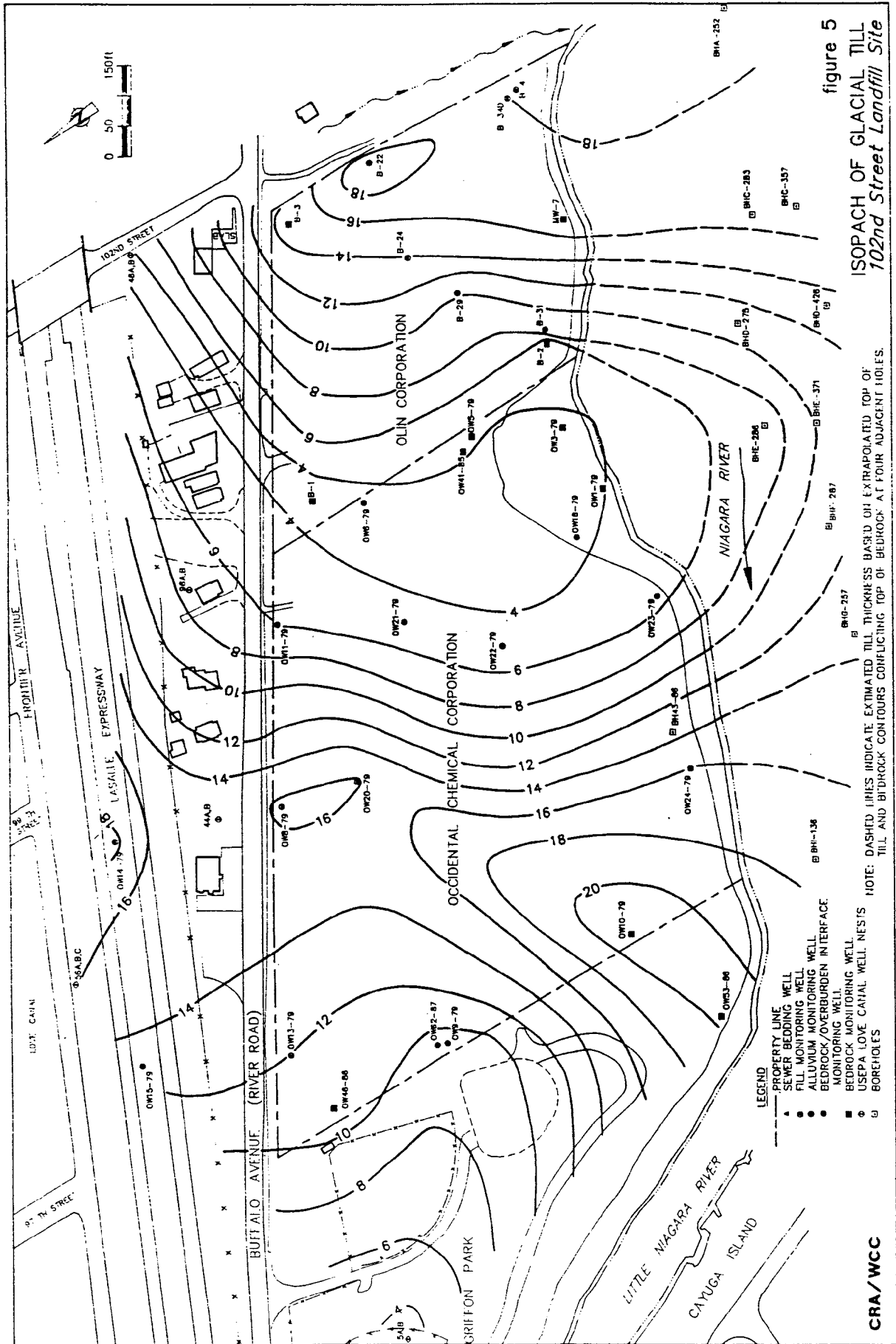


figure 5
ISOPACH OF GLACIAL TILL
102nd Street Landfill Site

CRA/WCC

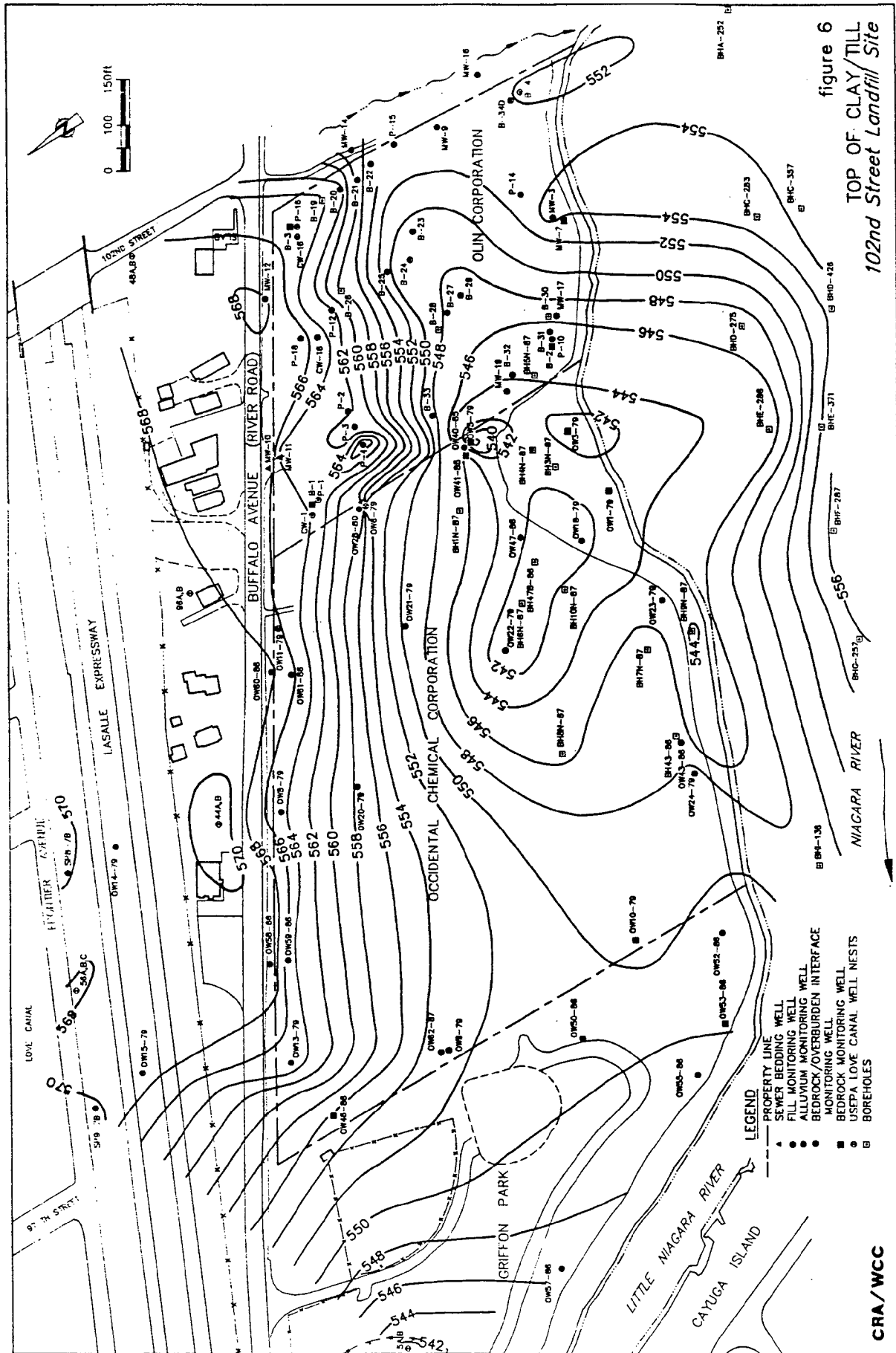


figure 6
TOP OF CLAY/TILL
102nd Street Landfill Site

- LEGEND**
- PROPERTY LINE
 - SEWER BEDDING WELL
 - FILL MONITORING WELL
 - ALLUVIUM MONITORING WELL
 - BEDROCK/OVERBURDEN INTERFACE
 - MONITORING WELL
 - BEDROCK MONITORING WELL
 - USEPA LOVE CANAL WELL NESTS
 - BOREHOLES

CRA/WCC

an isopach map identifying the combined thickness of the clay and till strata is presented in Figure 7.

Table 2 summarizes the stratigraphic details of each of the Niagara River boreholes. To better conceptualize the stratigraphy beneath the Site, three north-south geologic cross-sections have been prepared through the alignments shown on Figure 8. The cross-sections are presented in Figures 9, 10 and 11.

TABLE 2
STRATIGRAPHIC SUMMARY
NIAGARA RIVER BOREHOLES

Borehole No.	Sampled Depth (ft. BG)	Alluvium			Clay			Till		
		Depth (ft. BG)	Elev. (ft. AMSL)	Thickness (ft.)	Depth (ft. BG)	Elev. (ft. AMSL)	Thickness (ft.)	Depth (ft. BG)	Elev. (ft. AMSL)	Thickness (ft.)
A-252	9.8	0	561.3	8.5	8.5	552.8	0.5	9.0	552.3	>0.8
C-283	15.0	0	560.8	6.0	6.0	554.8	3.0	9.0	551.8	>6.0
C-357	11.0	0	560.4	7.0	7.0	553.4	1.5	8.5	551.9	>2.5
D-275	17.0	0	561.4	14.0	14.0	547.4	2.5	16.5	544.9	>0.5
D-426	11.0	0	560.0	5.5	5.5	554.5	>5.5	--	--	--
E-286	22.0	0	561.6	17.0	17.0	544.6	2.0	19.0	542.6	>3.0
E-371	11.0	0	560.7	6.0	6.0	554.7	>5.0	--	--	--
F-287	9.0	0	560.8	3.8	3.8	557.0	>5.2	--	--	--
G-257	11.0	0	560.8	5.0	5.0	555.8	>6.0	--	--	--
I-136	15.0	0	561.2	12.0	--	--	--	12.0	549.2	>3.0

All elevations are based on USGS datum.

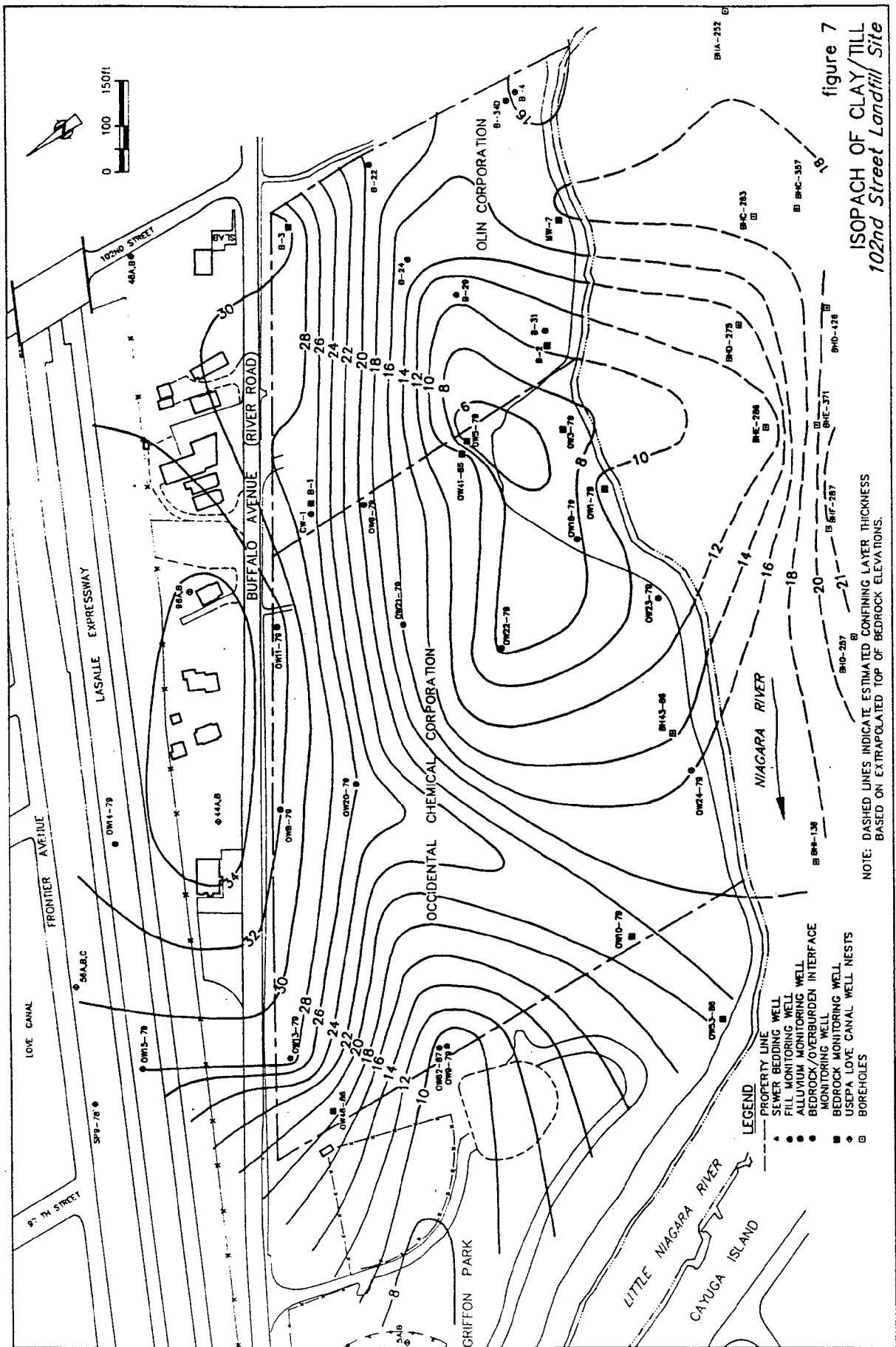
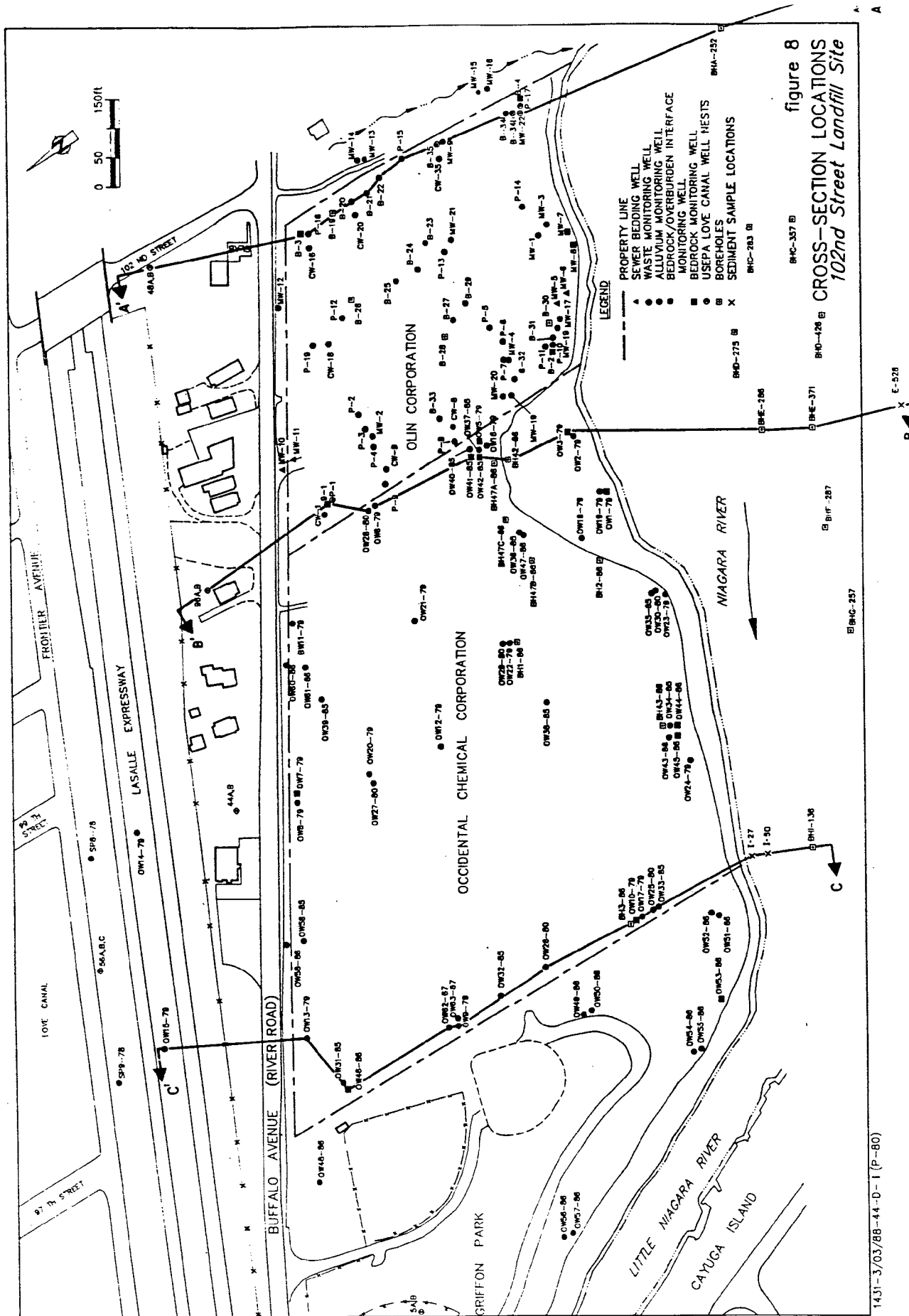
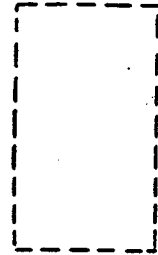


figure 7
ISOPACH OF CLAY/TILL
102nd Street Landfill Site



RUN NO. : 229
 SAMPLE NUMBER : A250
 SAMPLE DEPTH, FT. : 9.65'
 SPECIFIC GRAVITY : 2.75
 INIT. W.C. % : 10.48974
 TOTAL DENSITY PCF : 148.4205
 DRY DENSITY PCF : 134.3297
 INIT. VOID RATIO : .2768681
 INIT SATURATION, % : 104.1896

LT-16



EFFECT. PRESS., TSF : .36
 FINAL W.C. % : 0.55111
 FINAL VOID RATIO : .2637122
 FINAL SATURATION % : 99.98864
 TOTAL DENSITY PCF : 148.8106
 DRY DENSITY PCF : 135.7904

17.5

0.25

0.875

8 24 78 40.75 19.5 38

RUN NO. : 1
 INIT. GRAD. : 26.22921
 FINAL GRAD. : 21.1068
 PERM. AT TEMP 24 DEG. CEN. : 7.046941E-08 CM/SEC
 PERM. AT 20 DEG. CEN. : 6.412716E-08 CM/SEC

20.9

2.75

8 24 96 41.5 19.15 38.4

RUN NO. : 2
 INIT. GRAD. : 27.58696
 FINAL GRAD. : 21.34709
 PERM. AT TEMP 24 DEG. CEN. : 8.133325E-08 CM/SEC
 PERM. AT 20 DEG. CEN. : 5.631813E-08 CM/SEC

20.7

8 24 152 41.3 19.35 36.95

RUN NO. : 3
 INIT. GRAD. : 27.09323
 FINAL GRAD. : 19.1319
 PERM. AT TEMP 24 DEG. CEN. : 5.914015E-08 CM/SEC
 PERM. AT 20 DEG. CEN. : 5.381754E-08 CM/SEC

21.45

8 24 89 41 19.4 38.4

RUN NO. : 4
 INIT. GRAD. : 26.66122
 FINAL GRAD. : 21.90911
 PERM. AT TEMP 24 DEG. CEN. : 5.690259E-08 CM/SEC
 PERM. AT 20 DEG. CEN. : 5.185234E-08 CM/SEC

20.65 ACKPRESSURE

1L SAMPLE MEASUREMENTS

HEIGHT 1009.2

LENGTH 4.013

PERIMETER _____ TOP

_____ MIDDLE

_____ BOTTOM

VOLUME _____ CC

AVERAGE PERM. OF 4 TRIALS : 5.65288E-08

Checked by _____

CRA/WCC

1431-3/03/88-44-0-1 (X-26)

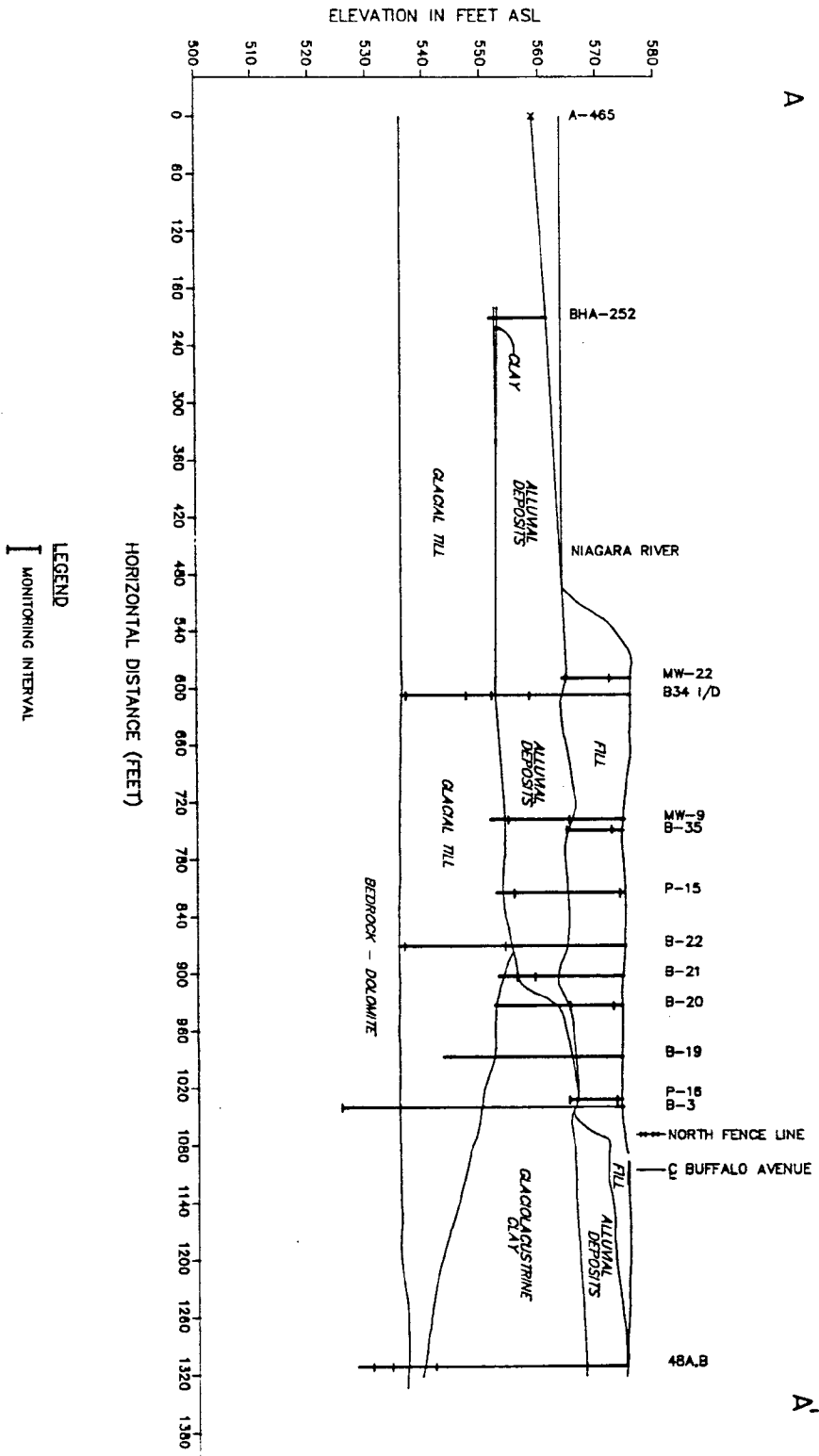


figure 9
CROSS-SECTION A-A'
102nd Street Landfill Site

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1431-3/03/88-44-D-1 (X-25)

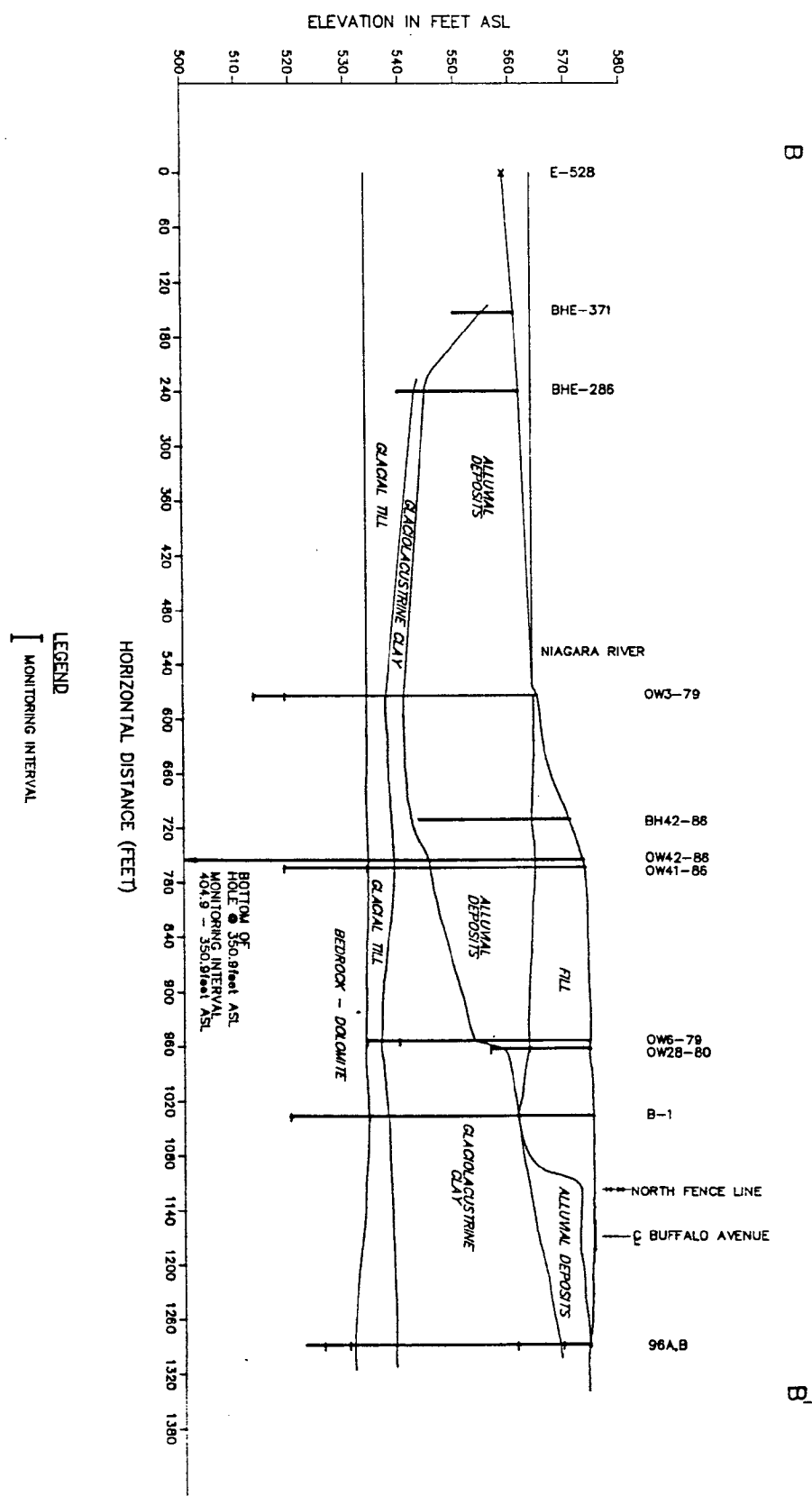
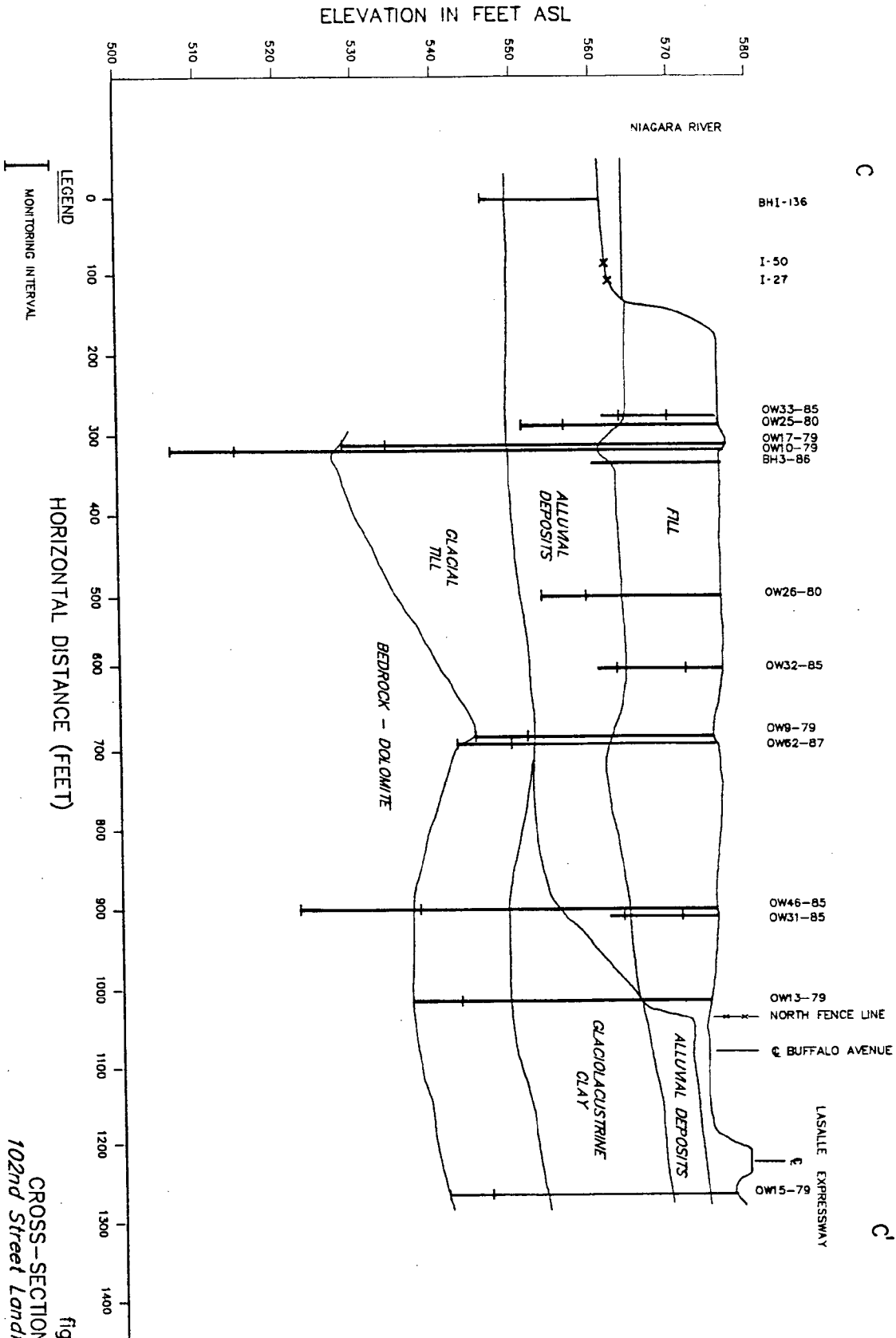


figure 10
CROSS-SECTION B-B'
102nd Street Landfill Site

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6.0 PHYSICAL TESTING OF SHELBY TUBE SAMPLES

The four Shelby Tube samples of clay/till collected during the borehole program were tested for physical characteristics by WCC. The results of these tests are presented in Table 3. As can be seen on the Table, all of the permeabilities are on the order of 6×10^{-8} cm/sec. Although three of the samples (A-252, E-286 and I-136) contained coarser material, suggesting that they are samples of till rather than clay, the fine-grained nature of the samples is evident from the fact that in excess of 54 percent of the soils from all tested samples pass the #200 sieve. While there is a large range in density (75 to 137 lb/cf) this does not appear to have affected the permeabilities although as expected, the moisture content values are inversely proportionate to the densities (47 to 9 percent). The testing results are presented in Appendix B.

TABLE 3

PHYSICAL CHARACTERISTICS - SHELBY TUBE SAMPLES

Borehole No.	Sample Depth Tested (feet)	Specific Gravity	Moisture Content (%)	Density (lb/cf)	Plastic		Liquid		Laboratory Permeability (cm/sec)
					Limit	Limit	Limit	Limit	
A-252	9.0	2.75	10.5	134.2	23		50		5.65 x 10 ⁻⁸
E-286	19.9	2.85	35	88.2	16		29		7.42 x 10 ⁻⁸
G-257	7.8	2.75	46.6	74.8	22		36		6.97 x 10 ⁻⁸
I-136	13.5	2.74	9.4	136.5	14		17		5.96 x 10 ⁻⁸

7.0 NAPL/CHEMICAL PRESENCE

As previously mentioned, the installation of the ten Niagara River borings provided the Companies with an opportunity to learn more about the presence and migration of NAPL and chemical contamination emanating from the 102nd Street Landfill. Each split spoon sample of soil was carefully examined for visual and olfactory evidence of NAPL/chemical presence. NAPL was not identified in any sample collected, nor was there even the slightest trace of chemical odor.

This finding is significant in that it shows that NAPL has not migrated along the top of the clay/till stratum or any other low permeability stratum as far as the river boring locations. While there may be some potential that NAPL is migrating past the shoreline, the extent of this migration is limited. This is consistent with the findings of the on-site boreholes in which the presence of NAPL in the borings along the River shoreline has indicated that either NAPL was not present at all or there was only a small thickness of NAPL presence as was evident at BH9N-87. This is also consistent with the NAPL migration theories and clay/till basin postulations discussed in previous Milestone Report No. 14 and other NAPL reports.

8.0 SUMMARY

The completion of the ten boreholes in the Niagara River provided two major pieces of information for the 102nd Street Remedial Investigation. These pieces are:

- 1) that the top of clay/till in the south-central section of the site and area immediately off shore is, in fact, a bowl-shaped depression and will influence the migration of HNAPL;
- 2) that neither NAPL nor any chemical presence are evident in the sediment underlying the River at the sampled distance from shore.

APPENDIX A

STRATIGRAPHIC AND INSTRUMENTATION LOGS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: A-252
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: DECEMBER 21, 1987
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: NIAGARA RIVER
 GEOLOGIST/ENGINEER: P. SMITH GROUND ELEVATION: * 561.3 TOP OF PIPE ELEVATION: * N/A

PROFILE		MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	
0	AUGERS ADVANCED TO 1.0'	561.3	1	SS	13
		8" Ø BH			18
	Gray silty fine SAND (NATIVE) Wet	CEM/BEN BKFL	2	SS	10
					7
5			3	SS	3
					3
	Gray silty fine SAND - some coarse to medium sand Wet		4	SS	92
	Red silty CLAY - plastic Moist				16
	SHELBY TUBE (TILL)		5	U	
10	Borehole terminated at 9.75'.	551.5			

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS

▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: C-283
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: DECEMBER 18, 1987
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: NIAGARA RIVER
 GEOLOGIST/ENGINEER: P. SMITH GROUND ELEVATION: 560.8 TOP OF PIPE ELEVATION: N/A

PROFILE		MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	
0		560.79			
	AUGERS ADVANCED TO 1.0'	8" Ø BH CEM/BEN BKFL	1	SS	10
	Dark gray fine sandy SILT - trace shell fragments (NATIVE) Wet				12
			2	SS	8
	Dark gray silty medium to fine SAND Wet				20
5	Dark gray silty coarse SAND Wet		3	SS	27
	Red silty CLAY - plastic Moist				6
	Red silty CLAY - plastic, with occasional silt seams Moist		4	SS	WOR
					5
10			5	SS	1
					10
	Red-brown to brown medium to fine sandy SILT - trace clay, trace coarse to fine gravel (TILL) Moist		6	SS	8
					27
			7	SS	19
					59
15	Borehole terminated at 15.0'.	545.8			

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS

▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: C-357
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: DECEMBER 22, 1987
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: NIAGARA RIVER
 GEOLOGIST/ENGINEER: P. SMITH GROUND ELEVATION: 560.4 TOP OF PIPE ELEVATION: N/A

PROFILE		MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT	20	40	60	80
0	AUGERS ADVANCED TO 1.0'	560.4							
	Gray silty fine SAND (NATIVE) Wet	8" Ø BH	1	SS	9				
	Gray silty coarse to fine SAND - some coarse to fine gravel, stone in tip of spoon Wet		2	SS	49				
5	Gray silty fine SAND - trace gravel Wet	CEM/BEN BKFL	3	SS	7				
	Gray-red silty CLAY - plastic Moist		4	SS	WOP				
	Red medium to fine sandy SILT - some clay, little fine gravel (TILL) Moist		5	SS	5				
10	Red medium to fine sandy SILT - some fine gravel, little clay Moist				14				
	Borehole terminated at 11.0'.	549.4							

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▽ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: D-275
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: DECEMBER 21, 1987
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: NIAGARA RIVER
 GEOLOGIST/ENGINEER: P. SMITH GROUND ELEVATION*: 561.4 TOP OF PIPE ELEVATION*: N/A

DEPTH (ELEVATION)	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
			NUMBER	TYPE	BLOWS / FOOT	20	40	60	80
0	AUGERS ADVANCED TO 1.0'	561.4							
	Gray silty fine SAND - trace shells, trace plant fibers (NATIVE) Wet	8" Ø BH	1	SS	7				
					11				
	Gray silty fine SAND Wet		2	SS	3				
					7				
5			3	SS	19				
	Gray silty fine SAND - trace coarse to fine gravel, trace sand Wet	CEM/BEN BKFL			17				
			4	SS	17				
					32				
			5	SS	9				
10	Gray silty fine SAND - coarse sand lense at 12.5'-12.9'. Wet				3				
			6	SS	7				
					17				
	Gray silty coarse to fine SAND Wet		7	SS	22				
					85				
15	Red silty CLAY		8	SS	6				
	Red sandy silt - some clay, trace coarse to fine gravel (TILL)				3				
	Borehole terminated at 17.0'	544.4							

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS

▼ WATER FOUND ▽ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: D-426
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: DECEMBER 22, 1987
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: NIAGARA RIVER
 GEOLOGIST/ENGINEER: P. SMITH GROUND ELEVATION: * 560.0 TOP OF PIPE ELEVATION: * N/A

PROFILE		MONITOR INSTALLATION		SAMPLE		PENETRATION TEST BLOWS / FOOT				
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS			NUMBER	TYPE	BLOWS / FOOT				
							20	40	60	80
			560.0							
0	AUGERS ADVANCED TO 1.0'									
	Gray silty medium to fine SAND - some fine gravel (NATIVE) Wet	8" Ø BH		1	SS	12				
						9				
				2	SS	16				
						9				
5	Gray silty medium to fine SAND Wet			3	SS	WOR				
		CEM/BEN BKFL				WOR				
	Red-gray silty CLAY Moist			4	SS	WOR				
						WOR				
				5	SS	WOR				
10						4				
	Borehole terminated at 11.0'.		549.0							

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS

▼ WATER FOUND ▽ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: E-286
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: DECEMBER 18, 1987
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: NIAGARA RIVER
 GEOLOGIST/ENGINEER: P. SMITH GROUND ELEVATION: 561.6 TOP OF PIPE ELEVATION: N/A

PROFILE		MONITOR INSTALLATION		SAMPLE			PENETRATION TEST BLOWS / FOOT			
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS			NUMBER	TYPE	BLOWS / FOOT				
							20	40	60	80
0		561.6								
	AUGERS ADVANCED TO 1.0'	8" Ø BH	1	SS	6					
					11					
	Dark gray silty fine SAND (NATIVE) Wet		2	SS	3					
					36					
5	Dark gray silty medium to coarse SAND Wet		3	SS	17					
					24					
	Dark gray silty fine SAND - trace shells Wet		4	SS	12					
				CEM/BEN BKFL	29					
10			5	SS	16					
					26					
	Dark gray silty fine SAND Wet		6	SS	5					
				15						
		7	SS	17						
				24						
15	Dark gray silty fine SAND - some medium sand & plant fiber Wet	8	SS	22						
				32						
	Red CLAY - plastic, little silt	9	SS	7						
				15						
20	SHELBY TUBE (TILL)	10	U							
		11	SS	100+						
	Red clayey SILT - trace fine sand (TILL) Moist									
	Gray gravelly SILT & SAND (TILL) Moist-Dry									
	Borehole terminated at 22.0'.		542.6							

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS

▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: E-371
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: DECEMBER 22, 1987
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: NIAGARA RIVER
 GEOLOGIST/ENGINEER: P. SMITH GROUND ELEVATION: 560.7 TOP OF PIPE ELEVATION: N/A

PROFILE		MONITOR INSTALLATION		SAMPLE		PENETRATION TEST BLOWS / FOOT					
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS			NUMBER	TYPE	BLOWS / FOOT					
							20	40	60	80	
0			560.7								
	AUGERS ADVANCED TO 1.0'		8" Ø BH	1	SS	7					
	Gray silty fine SAND (NATIVE) Wet					6					
	Gray silty fine SAND - trace shell fragments Wet		CEM/BEN BKFL	2	SS	37					
						33					
5	Gray silty coarse to fine SAND Wet			3	SS	WOR					
						WOR					
	Gray silty CLAY - plastic, becoming red at 10.5' Moist			4	SS	WOR					
						WOR					
10				5	SS	WOR					
						WOR					
	Borehole terminated at 11.0'.		549.7								

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▽ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: F-287
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: DECEMBER 22, 1987
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: NIAGARA RIVER
 GEOLOGIST/ENGINEER: P. SMITH GROUND ELEVATION: * 560.8 TOP OF PIPE ELEVATION: * N/A

PROFILE		MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLDWS / FOOT			
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT	20	40	60	80
0	AUGERS ADVANCED TO 1.0'	560.8							
	Gray silty fine SAND (NATIVE) Wet	8" Ø BH	1	SS	7				
					3				
			2	SS	18				
		CEM/BEN BKFL			6				
5	Red silty CLAY Moist		3	SS	WOR				
					WOR				
			4	SS	WOR				
					WOR				
		551.8							
10	Borehole terminated at 9.0'								

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS

▼ WATER FOUND ▽ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: G-257
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: DECEMBER 19, 1987
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: NIAGARA RIVER
 GEOLOGIST/ENGINEER: P. SMITH GROUND ELEVATION: * 560.8 TOP OF PIPE ELEVATION: * N/A

PROFILE		MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	
0	AUGERS ADVANCED TO 1.0'	560.8			
-	Gray silty fine SAND - trace plant fiber. trace fine gravel (NATIVE) Wet	8" Ø BH	1	SS	4
-					6
-	Gray silty coarse to fine SAND - trace shells Wet	CEM/BEN BKFL	2	SS	8
-					11
5	Gray silty CLAY - plastic Moist		3	SS	WOR
-					WOR
-	SHELBY TUBE (CLAY)		4	U	
-					
10	Gray silty CLAY - plastic, alternating red and gray silty seams at 9.8' Moist		5	SS	WOR
-					WOR
-	Borehole terminated at 11.0'.	549.8			

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS

▼ WATER FOUND ▽ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: 1-136
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: DECEMBER 21, 1987
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: NIAGARA RIVER
 GEOLOGIST/ENGINEER: P. SMITH GROUND ELEVATION: * 561.2 TOP OF PIPE ELEVATION: * N/A

PROFILE		MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT				
						20	40	60	80
		561.2							
0	AUGERS ADVANCED TO 1.0'	8" Ø BH 							

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

APPENDIX B

PHYSICAL TESTING RESULTS

Woodward Clyde Hydrometer Test Results

CAL ANALYSIS

A-28

E-286 SAMPLE No 19-21 DEPTH 19.60' DISH No B-85
 Wt SOIL (oven dry) 606.4
 HYDR No H OVEN DRY (Wt) 75
 $\frac{G}{1-G_1} = () (R-G_1)$ SPECIFIC GRAVITY 2.75 (G)

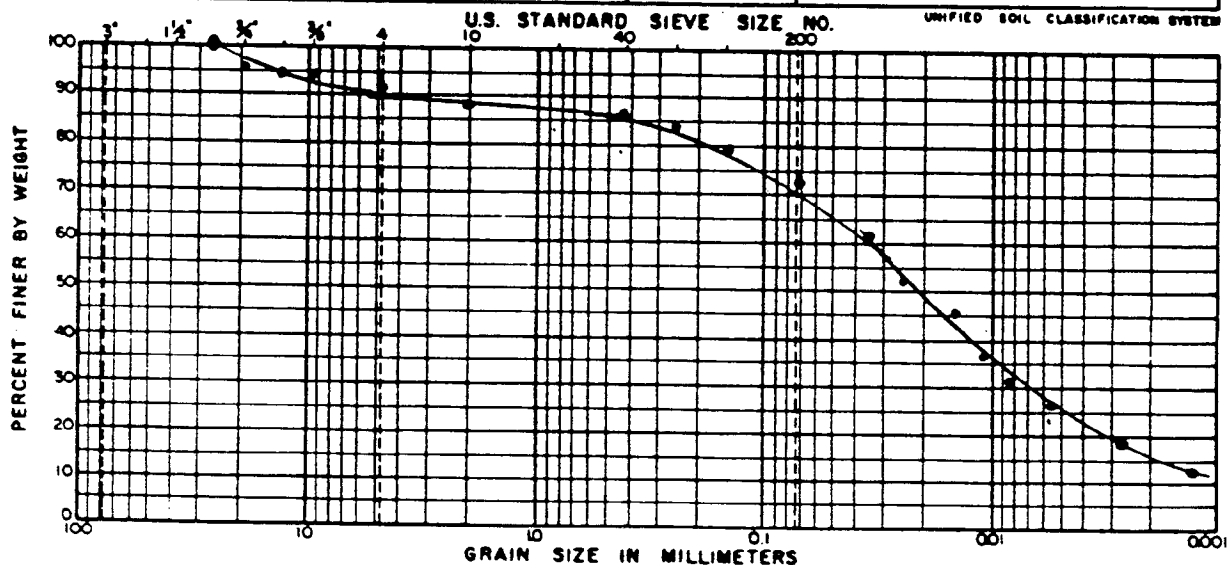
Project Number 8702758
 Boring Number E-286
 Sample Number 19-21
 Specific Gravity 2.75
 Total Weight Grams 75

Elapsed Time (Min)	Temp. Degrees (CEN.)	Hydro. Reading (CC/gr)	Particle Size (MM)	Per Cent Finer (I)
1.0	24.0	1.03600	0.0349	61.861
2.0	24.0	1.03050	0.0269	51.528
5.0	24.3	1.02750	0.0177	45.968
15.0	24.8	1.02250	0.0108	36.702
30.0	24.7	1.02000	0.0079	31.980
60.0	24.5	1.01700	0.0058	26.291
250.0	24.5	1.01350	0.0029	19.715
1440.0	23.2	1.01000	0.0013	12.005

C°	HYDR. READ.	CORREC.	CORRECTED HYDR. READING (R)	R - G ₁	PARTIC SIZE (mm)	% FINER (P)
24	1.0360					
24	1.0305					
24	1.0275					
24.8	1.0225					
24.7	1.0200					
24.5	1.0170					
24.5	1.0135					
32	1.0100					

20	4.59	93.8	84.1
40	8.74	88.3	79.2
60	11.50	84.3	75.0
100	15.36	79.5	71.3
200	20.23	73.0	65.5
PAN			

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



BORING	SAMPLE	DEPTH	SYMBOL	CLASSIFICATION	MC	LL	PL
				Coarse to fine sand		29	16
				Silty clay (CL) - Th. fine gravel			

TESTED _____ COMPUTED _____ CHECKED _____ DATE _____

TICAL ANALYSIS

G-257

SAMPLE No

78

DEPTH

DISH No

A-17

B-37

WT SOIL (oven dry)

258.3

DATE

11/

HYDR No

OVEN DRY (W_o)

75

$$\times \frac{G}{G - G_1} = ($$

(R - G₁)

SPECIFIC GRAVITY

2.75

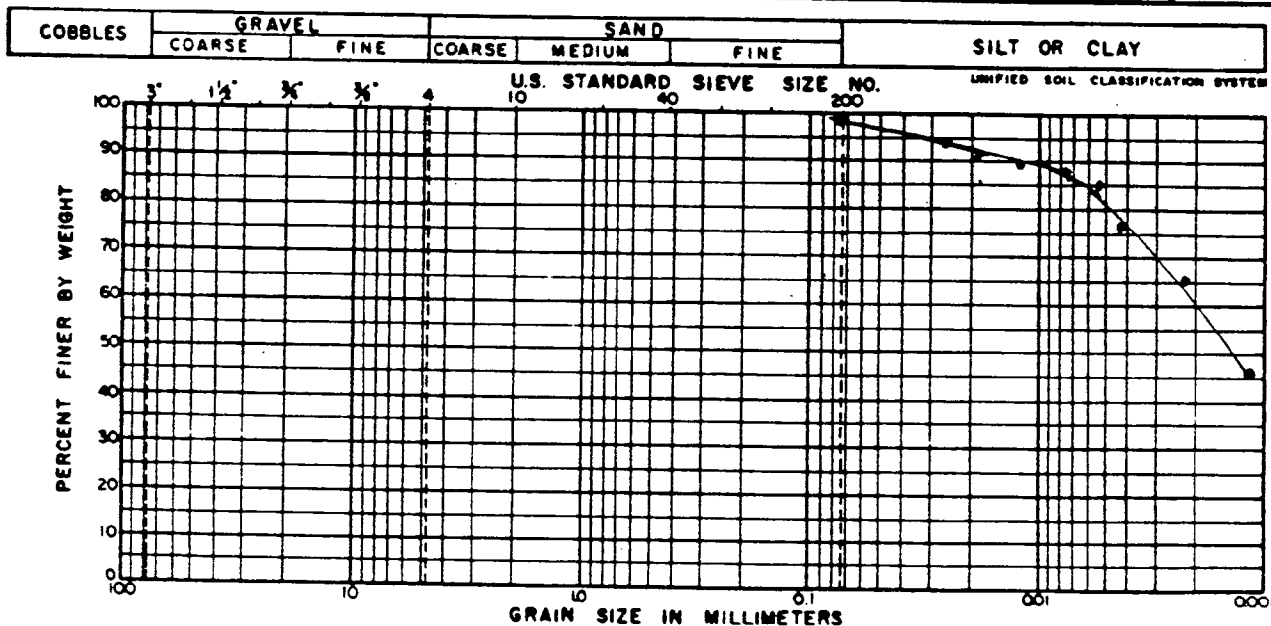
(G)

Project Number 8702758
 Boring Number G-257
 Sample Number 78
 Specific Gravity 2.75
 Total Weight Grams 75

Elapsed Time (Min)	Temp. Degrees (CEN.)	Hydro. Reading (CC/gr)	Particle Size (MM)	Per Cent Finer (I)
1.0	23.5	1.04850	0.0254	95.832
2.0	23.5	1.04800	0.0190	93.984
5.0	23.5	1.04650	0.0125	90.842
15.0	23.5	1.04550	0.0074	88.746
30.0	23.5	1.04350	0.0055	84.556
60.0	23.8	1.03950	0.0042	76.261
250.0	24.0	1.03450	0.0023	65.842
1440.0	23.5	1.02500	0.0011	45.794

IS. 4E n)	C°	HYDR. READ.	CORREC.	ADJUSTED HYDR. READING (R)	R - G ₁	PARTIC SIZE (mm)	% FINER (P)
0							
1	23.5	1.0485					
2	23.5	1.0480					
3	23.5	1.0465					
15	23.5	1.0455					
30	23.5	1.0435					
60	23.8	1.0395					
250	24.0	1.0345					
1440	23.5	1.0250					

10				
20				
40				
60				
100				
200	—	—	100%	
PAN				



BORING	SAMPLE	DEPTH	SYMBOL	CLASSIFICATION	MC	LL	PL
				Brown Silty clay (CL)		30	22

TESTED _____ COMPUTED _____ CHECKED _____ DATE _____

ANALYSIS

A-22

Woodward Clyde Hydrometer Test Results

I-136 SAMPLE No. _____ DEPTH _____ DISH No. 0-57

Project Number 8702758
Boring Number I-136
Sample Number -
Specific Gravity 2.74
Total Weight Grams 75

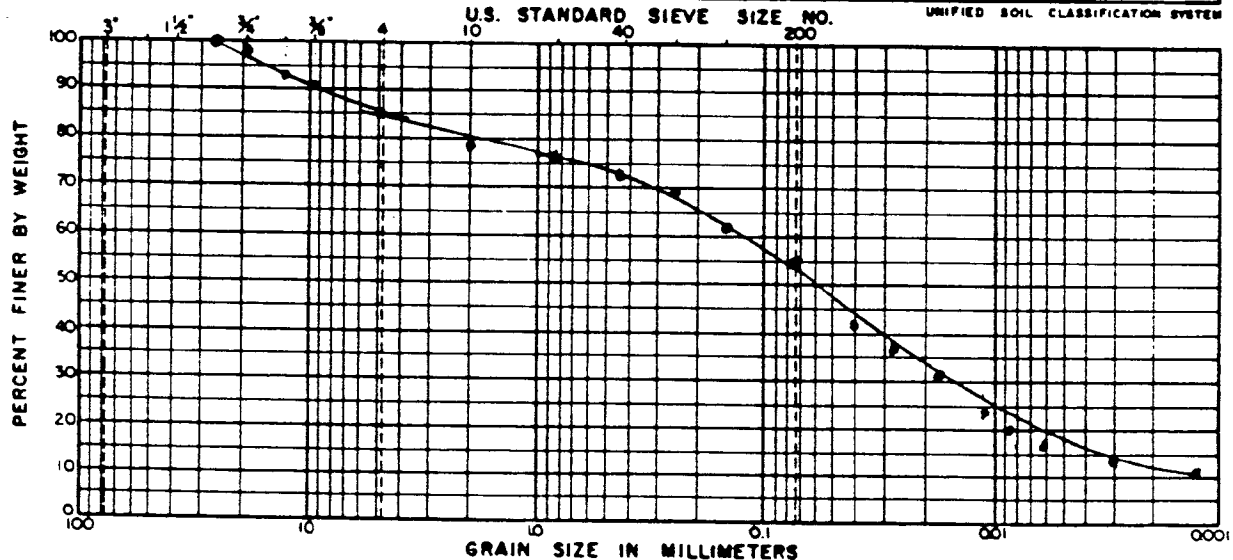
DATE 4 HYDR No. _____ OVEN DRY(W_o) 75
 $\left[\frac{10}{0.01} \right] = () (R-G_1)$ SPECIFIC GRAVITY 2.74 (G)

Elapsed Time (Min)	Temp. Degrees (CEN.)	Hydro. Reading (CC/gr)	Particle Size (MM)	Per Cent Finer (%)
1.0	23.3	1.02800	0.0399	41.471
2.0	23.3	1.02500	0.0294	36.460
5.0	23.3	1.02150	0.0194	30.614
15.0	23.4	1.01800	0.0116	24.791
30.0	23.5	1.01550	0.0084	20.638
60.0	23.5	1.01350	0.0061	17.298
250.0	23.5	1.01150	0.0030	13.957
1440.0	23.3	1.00950	0.0013	10.571

P.S. ME (in)	C°	HYDR. READ.	CORREC.	CORRECTED HYDR. READING (R)	R - G ₁	PARTIC SIZE (mm)	% FINER (P)
0							
1	23°	1.0280					
2	23°	1.0250					
5	23°	1.0215					
15	23°	1.0180					
30	23°	1.0155					
60	23°	1.0135					
250	23°	1.0115					
1440	23°	1.0095					

20	3.25	77.0
40	6.26	76.1
60	9.27	73.0
100	17.15	69.7
200	23.33	61.4
PAN		54.9

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



BORING	SAMPLE	DEPTH	SYMBOL	CLASSIFICATION	MC	LL	PL
				Medium fine Gravelly coarse to fine sand (G-C-M)		17	14

TESTED _____ COMPUTED _____ CHECKED _____ DATE _____

870278-7C

Summary of permeability Tests

Drilling No.	Depth ft	M.C. %	γ_d pcf	S_0 %	$\bar{\sigma}_c$ tsf	M.C. %	S_f %	K cm/sec
F-286	19.9	35.9	88.2	100 -	6.60	30.6	100.0	7.42×10^{-8}
I-136	13.5	9.4	136.5	100 -	0.42	8.5	100 -	5.96×10^{-8}
G-257	7.8	46.6	74.8	99.3	0.40	45.1	99.6	6.97×10^{-8}

- where:
- M.C. = Initial or final water content
 - γ_d = Initial dry density
 - S = Initial or final degree of saturation
 - K = coefficient of permeability corrected to 20°C



Occidental Chemical Corporation

Industrial & Specialty Chemicals



CHEMICALS GROUP

**BATHYMETRIC SURVEY OF THE
NIAGARA RIVER
102nd Street Landfill Site**

DRAFT

JUL 16 1986

**BATHYMETRIC SURVEY OF THE NIAGARA RIVER
- 102ND STREET LANDFILL SITE**

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2.0 102ND STREET MEAN WATER LEVEL	2
3.0 NIAGARA RIVER BATHYMETRIC SURVEY	5
4.0 SUMMARY	6

1.0 INTRODUCTION

The Work Plan detailing the remedial investigation programs to be performed at the 102nd Street Landfill Site include a sediment survey of the Niagara River along the shoreline of the Site. The Work Plan description of this survey specifies the sampling methodology to be employed in water depths of less than five feet. However, due to the cyclic nature of the River level, the reference to the five foot water depth is ambiguous as it will vary with the River cycle. As a result, CRA has undertaken the task of establishing an appropriate reference elevation to be used in determining the five foot depth of water at the Site.

In addition, a bathymetric survey of the sediment level of the Niagara River adjacent to the Site has been undertaken to determine the approximate alignment of the five foot water depth contour.

This report presents the results of the study of the five foot water depth contour and the bathymetric survey.

2.0 102ND STREET MEAN WATER LEVEL

To determine the 102nd Street mean water level elevation, local water level data from the past 21 years was obtained from the "US Department of Commerce - NOAA - National Ocean Survey - Lake Survey Center - Monthly and Annual Mean Elevations of Niagara River." One of the recording stations included in the Niagara River monitoring program is the Lasalle Gage which is located approximately 2.0 miles downstream of the 102nd Street Site. Table 1 presents the water level data from the Lasalle Gage. Figure 1 presents the location of the Niagara River Gage Stations.

Utilizing the available data in Table 1, it is determined that the mean water level at the Lasalle Gage for the past 21 years is 561.89. (SUM OF YEARLY MEANS $\div$ 21) It should be noted that this elevation is based on the International Great Lakes Datum (IGLD - 1955), and that the 102nd Street surveys utilize USGS established benchmarks. In order to compare elevation data, it is necessary to add 1.22 feet to the IGLD to match USGS Datum. This conversion factor has been confirmed by three different sources in the Niagara Falls area. The sources contacted were:

- i) US Army Corps of Engineers
Buffalo Office (+1.22 Ft);

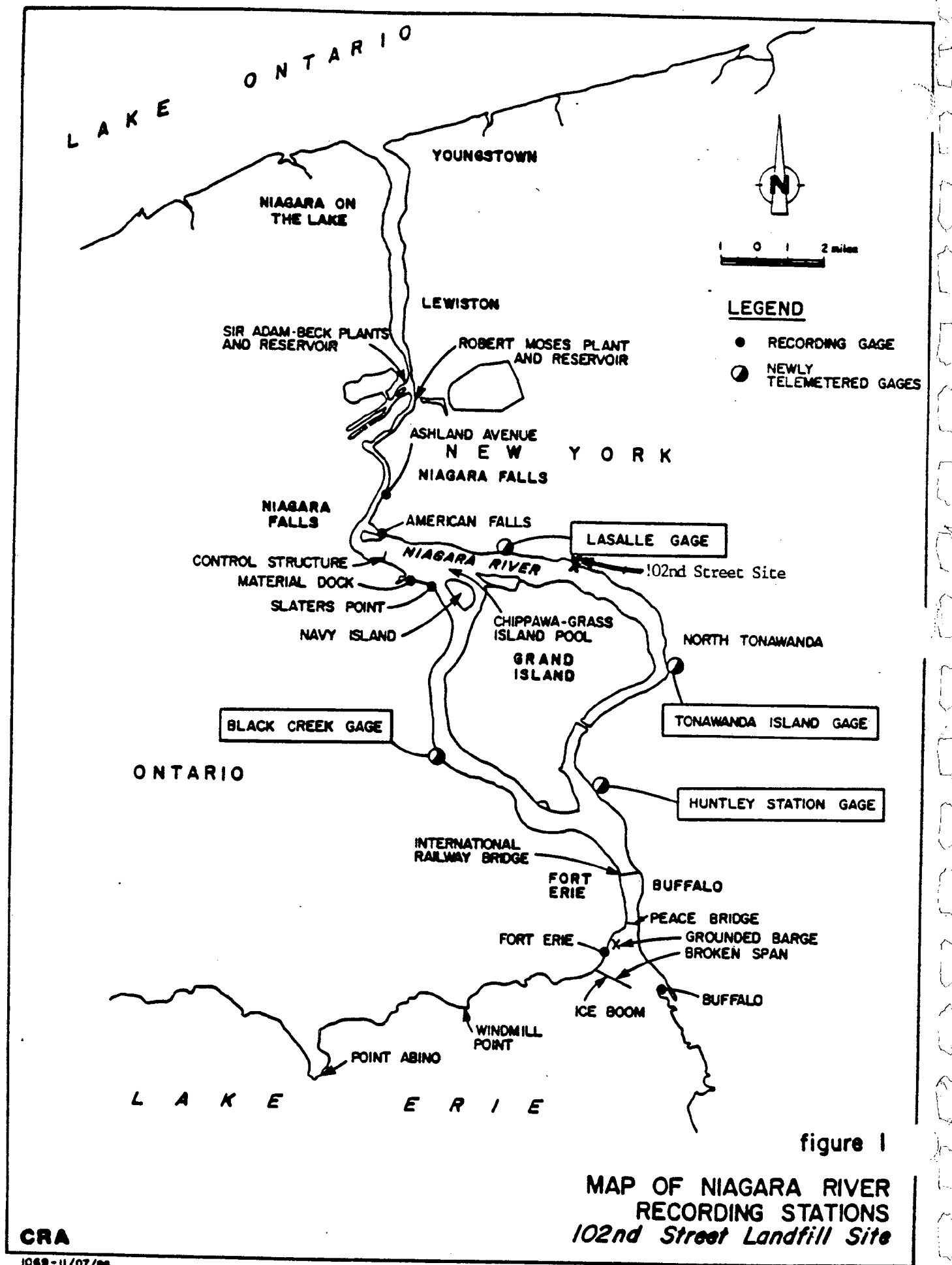


figure 1

TABLE 1
MONTHLY AND ANNUAL MEAN ELEVATIONS OF NIAGARA RIVER
LASALLE GAGE

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
1965		560.48*	560.80	561.00	561.35*	561.41*	561.17*	561.08	560.97	561.06*	560.96	561.04	561.03*
1966	561.01*	561.07*	561.20	561.46	561.58	561.96	561.87*	561.77	561.48	561.26*	561.04	561.34*	561.42*
1967	561.28*	561.26	561.12	561.51*	561.76*	561.89	561.98	561.93	561.70	561.63	561.65	561.51*	561.60*
1968	--	--	--	562.00*	561.87	562.15	562.14	562.17	561.95*	561.86*	561.55	561.79*	561.94*
1969	561.82	561.71	561.74	562.10	562.48	562.72	562.76	562.83	562.44	562.26	561.94	561.79	562.22
1970	561.75	561.47	561.48	561.87	562.02	562.12	562.35	562.26	562.05	561.93	561.83*	561.86	561.92*
1971	562.10	561.70	561.95	562.17	562.19	562.34	562.37	562.28	562.09	561.99	561.78	561.82	562.06
1972	562.13	561.80	561.98	562.27	562.59	562.67	562.86	562.79*	562.70	562.64	562.57*	562.87	562.49*
1973	563.05	562.61	562.31	562.32	562.28*	562.41	562.33	562.34	562.05	561.93	562.04	561.90	562.30*
1974	562.13	562.29	562.33	562.37*	562.21	562.14	562.08	561.95	561.96	562.00*	561.64	561.82	562.08*
1975	561.95*	562.20*	562.42	561.90*	561.71	561.98	561.91	561.90*	561.96*	561.77	562.84	561.52*	561.92*
1976	562.40*	561.99	562.56*	562.27	562.08	561.95*	--	561.88*	561.83*	561.72	561.29	561.41*	561.94*
1977	561.86*	561.89*	561.59*	561.93	561.91*	561.83*	561.96*	562.00	562.05*	561.84*	561.67	561.90	561.87*
1978	562.87*	561.73	561.55*	561.84	562.39	561.77*	561.82	561.82	561.62*	561.57	561.59*	561.57	561.84
1979	561.81*	561.22	561.49	--	561.64*	561.81*	561.95	561.92	561.76	561.74	561.80	561.68*	561.71*
1980	561.97*	561.74	561.64	561.89	561.75*	561.93	561.91*	562.02	561.90	561.91	561.60	561.75	561.83*
1981	561.62*	561.52	561.25*	561.91*	561.86	561.97	561.97	562.03	561.93	561.89	561.52	561.68	561.76*
1982	562.57*	561.30*	561.80*	562.33*	562.06	561.84*	561.87	561.85	561.73	561.72	561.49	561.20*	561.81*
1983	561.53*	561.47	561.45	561.77*	561.97	--	562.14*	562.04	561.18*	561.85*	561.83	562.71	561.81*
1984	561.95	561.55*	561.95*	562.02	562.03	562.40	562.11	562.04*	561.89*	561.66	561.87	561.86*	561.94*
1985	562.40*	562.97*	562.26*	562.68*	562.02*	562.04	561.97	561.80	561.80	561.82	562.01*	562.81*	562.22*

Remarks:

Elevations are in feet above mean water level at Father Point, Quebec, International Great Lakes Datum (1955).

Station Number 3013

* Partial Record

Not Available

Source - US Department of Commerce - NOAA - National Ocean Survey - Lake Survey Centre

- ii) Occidental Chemical Corporation
Niagara Plant survey datum
conversions (+1.22 Ft.);
- iii) McIntosh & McIntosh-Land
Surveyor (+1.22 Ft.)

Based on this information, the mean water level at Lasalle Station is 563.11 based on the USGS datum. (561.89 + 1.22 Ft. = 563.11 USGS)

Once the Lasalle Gage mean water level was determined (563.11 USGS) concurrent river stage readings at the Lasalle Gage and the 102nd Street Site, were collected to determine the elevation difference between the Landfill and the Lasalle Gage. The results of these concurrent measurements indicate that the 102nd Street Landfill water level (as measured at the stilling basin attached to the 100 Street Storm Sewer Headwall) is 0.73 feet above the water level at the Lasalle Gage. The concurrent readings were taken on a "calm" day to minimize wind effects which can influence local water levels along the Niagara River.

Based on the measured difference between the Gage Station and the Site Stilling Basin, the Mean 102nd Street Water Level is 563.84 USGS. (563.11 + 0.73 = 563.84 USGS)

In addition to the "measured" determination of elevation difference between the Lasalle Gage and the 102nd Street Site, it was also possible to calculate the mean 102nd Street water level by extrapolating between the Lasalle Gage and the next station upstream of the 102nd Street Landfill; the Tonawanda Island Gage. Using the recorded 21 yearly water levels for the Tonawanda Island Gage, the mean water level at this gage was calculated and found to be 565.58 USGS. Based on these mean elevations, the difference between the two gage stations is 2.47 feet. The straight line distance (per USGS Topographical Mapping - Tonawanda West) from the gage stations is as follows:

Lasalle Gage to 102nd Street	= 2.0 miles
102nd Street to Tonawanda Gage	= <u>4.5</u> miles
TOTAL	= 6.5 miles

Using a linear interpolation between the Gage Stations, the mean water level at the Landfill would be 0.76 feet above the Lasalle Gage mean water level. This compares favorably with the "measured" determination of elevation difference (0.73 feet).

It is therefore established that the mean water level at the 102nd Street Landfill for the past 21 years is approximately 563.84 USGS.

3.0 NIAGARA RIVER BATHYMETRIC SURVEY

Having established the 102nd Street mean water level, it is now possible to calculate the elevation at which the Niagara River bottom is five feet below the mean water level. This elevation is 558.84 USGS.

In order to determine the alignment of the 558.8 elevation contour, a bathymetric survey of the top of sediment elevation was undertaken on May 28, 1986.

To complete the survey, instruments (i.e. level and distomat) were positioned along the shoreline with the survey rod/reflector handled by personnel operating from a motor boat. Control points locating each primary vector location were previously placed along the river bank to provide a line of sight to direct the personnel collecting the elevation information. Along each sediment survey primary vector, (A-thru H) shots were taken to "zero" in the 558.8 contours. Primary vector I, and the first $\pm$ 290 ft. of vector H, was manually sounded. Once the 558.8 elevation was determined, a white marker (buoy) was placed at this point along vectors A, B, C, E and F. Plan 1 presents the survey points and river bottom contours generated from the survey information. It should be noted that the contours in the area of vector H and vector I are tentative pending additional survey shots to evaluate the east bank of the "Little River" channel. This will be completed during the sediment survey program if required.

4.0 SUMMARY

The investigation undertaken has identified that the mean water level at the 102nd Street Landfill Site is approximately at elevation 563.8 USGS and therefore the elevation of the top of sediment at the five foot depth of water is approximately 558.8 USGS.

The bathymetric survey indicates that the sediment surface gradually slopes away from the shoreline at an approximate slope of 0.01 feet per foot. The alignment of the five foot depth of water is approximately 500 feet from shore, with the exception of along the Little Niagara River where a navigable channel is present and the sediment surface slopes away from the shoreline at a much steeper angle.

All of which is respectfully submitted,

CONESTOGA-ROVERS & ASSOCIATES LIMITED

David C. Millard, C.E.T.

James K. Kay, P. Eng.



Occidental Chemical Corporation

Industrial & Specialty Chemicals



CHEMICALS GROUP

**MONITORING WELL / BOREHOLE
STRATIGRAPHIC & INSTRUMENTATION LOGS**

**102nd Street Landfill
Remedial Investigation
Niagara Falls, New York**

CRA
Consulting Engineers

COPY
CONESTOGA-ROVERS & ASSOCIATES LIMITED
651 Colby Drive,
Waterloo, Ontario, Canada N2V 1C2
(519) 884-0510

April 15, 1987

Reference No. 1431

RECEIVED

APR 20 1987

D. L. CUMMINGS

Mr. Alan A. Fuchs
Bureau of Remedial Action
NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION
50 Wolf Road
Room 414
Albany, NY 12233

Mr. Kevin J. Lynch
U.S. ENVIRONMENTAL PROTECTION AGENCY
Region II
26 Federal Plaza
New York, NY 10278

Dear Messrs. Fuchs and Lynch:

On behalf of the Occidental Chemical Corporation and the Olin Chemicals Group we are submitting to you five copies of the report entitled "Monitoring Well/Borehole Stratigraphic & Instrumentation Logs, 102nd Street Landfill, Remedial Investigation, Niagara Falls, New York".

Should you have any questions regarding this report please do not hesitate to contact me.

Yours very truly,

CONESTOGA-ROVERS & ASSOCIATES

James Kay
James K. Kay, P. Eng.

JKK:jd
Enclosures
cc: J. Cull, OCC
D. Cummings, Olin
A. Hirsch, WCC
B. Morrissey, OCC

KAR
RBT

rec'd 4/20/87



Occidental Chemical Corporation

Industrial & Specialty Chemicals



CHEMICALS GROUP

**MONITORING WELL / BOREHOLE
STRATIGRAPHIC & INSTRUMENTATION LOGS**

**102nd Street Landfill
Remedial Investigation
Niagara Falls, New York**

**April 1987
Ref. No. 1431**

CRA / WCC

1.0 INTRODUCTION

This report represents all of the borehole and monitoring well installations undertaken in conjunction with the Remedial Investigation for the 102nd Street Landfill Site. Stratigraphic and instrumentation logs for both the Olin Corporation and the Occidental Chemical Corporation portions of the landfill are enclosed herein.

102ND STREET LANDFILL
STRATIGRAPHIC AND INSTRUMENTATION LOGS
REMEDIAL INVESTIGATION
OCCIDENTAL CHEMICAL CORPORATION

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: BH1-86 (BOREHOLE)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: DECEMBER 2, 1986
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: NEAR WELL OW22-79 (CENTRAL AREA OF SITE)
 CRA SUPERVISOR: R. HOEKSTRA GROUND ELEVATION: * TOP OF PIPE ELEVATION: *

PROFILE		MONITOR INSTALLATION		SAMPLE			PENETRATION TEST BLOWS / FOOT				
DEPTH	STRATIGRAPHY DESCRIPTION & REMARKS				NUMBER	TYPE	BLOWS / FOOT				
								20	40	60	80
0	-	Light brown silty CLAY - much vegetation, Moist some pebbles (FILL)	4 3/4" Ø BH	1	SS	7					
	-	Red-brown silty CLAY - much vegetation, Moist grading to sandy clay (FILL)				14					
	-	Brown silty SAND - some plastic, pebbles Moist increasing with depth (FILL)		2	SS	11					
	-	Black silty CLAY - some white flyash (FILL) Moist				19					
	-	Brown silty SAND - some flyash, many large Moist stones, 2" pocket of white waste material at 5.5' (FILL)	CEM/BEN BKFL	3	SS	22					
5	-					12					
	-			4	SS	2					
	-					2					
	-	Gray-black sandy SILT - much flyash, many Wet pebbles & stones, some white waste material, trace vegetation, white ceramic material at 7.5', trace wood, trace newspaper, trace glass, becoming saturated with depth (FILL)		5	SS	4					
	-					5					
10	-			6	SS	7					
	-					10					
	-		7	SS	5						
	-	Gray-brown CLAY - some silt, trace Wet vegetation (NATIVE)			6						
	-	Gray-brown silty SAND - trace clay, Wet trace vegetation, some black staining 14.0'-16.0'	16.0'	8	SS	5					
	-					5					
15	-										
	-	NOTES: - Borehole grouted to surface.									
	-										
	-										
20	-										

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: BH2-86
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: NOVEMBER 26, 1986
 HOLE TYPE: HOLLOW STEM AUGER (4-3/4" DIAMETER) LOCATION: TOP OF EMBANKMENT WEST OF OW47-85
 CRA SUPERVISOR: C. PADGINGTON GROUND ELEVATION: * TOP OF PIPE ELEVATION: *

PROFILE		MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT
DEPTH (FEET)	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT	
0	Red-brown silty CLAY - some vegetation, some gravel, becoming siltier with depth, brown & black mottling 2.0'-4.0' (FILL) Wet	4 3/4" Ø BH	1	SS	20	
			2	SS	5	
			3	SS	52	
5	Gray-brown clayey, sandy SILT - some gravel (FILL) Wet		4	SS	15	
	Black-gray sandy SILT - some clay, some crushed red stone (FILL) Wet		5	SS	13	
	Black SILT - some vegetation (FILL) Wet		6	SS	4	
10	Black sandy SILT - some crushed pink stone, some white waste material (FILL)	CEM/BEN BKFL	7	SS	65	
	Black SILT - some vegetation, crushed pink stone, orange brick pieces, small white stones & large stones (FILL) Wet		8	SS	4	
			9		9	
15	Dark gray-black silty CLAY - some vegetation (NATIVE)	14.0'				
	Brown sandy SILT - trace vegetation, trace black clay					
20	NOTES: - Auger refusal at 10.8', move rig & auger to 10.0'; second refusal, repeat twice. - Borehole grouted to surface.					

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS

▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: BH3-86 (BOREHOLE)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: NOVEMBER 25, 1986
 HOLE TYPE: HOLLOW STEM AUGER (4-3/4" DIAMETER) LOCATION: NORTH OF OW10-79 (WEST SIDE OF SITE)
 CRA SUPERVISOR: C. PADGINION GROUND ELEVATION: * TOP OF PIPE ELEVATION: *

DEPTH	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT
			NUMBER	TYPE	
0	Dark brown sandy SILT - some clay, some vegetation, trace gravel, rock in end of spoon (FILL) Wet	4 3/4" Ø BH CEM/BEN BKFL 16.0'	1	SS	4
	Gray gravelly SAND (FILL) Dry		2	SS	70
			3	SS	13
5	Mottled white, brown, black, green, & gray FLYASH - some white waste material, some gravel, some brick, becoming saturated with depth (FILL) Wet		4	SS	8
			5	SS	9
10	Green-black clayey SILT - some vegetation some wood pieces, plastic (FILL) Wet		6	SS	3
	Green-black clayey SILT - some vegetation many fine roots (NATIVE) Wet		7	SS	4
			8	SS	3
15	Gray fine silty SAND Wet				7
20	NOTES: - Borehole grouted to surface.				

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW31-85 (FILL WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: OCTOBER 17, 1985
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: NORTHWEST CORNER OF SITE
 CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: 575.8 TOP OF PIPE ELEVATION: 579.13

PROFILE		MONITOR INSTALLATION	SAMPLE		PENETRATION TEST	
DEPTH	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT	BLOWS / FOOT
						20
0	Dark brown TOPSOIL - trace vegetation (FILL) Moist	579.13 Locking cap	1	SS	12	
	Brown SILT - some clay, some fine sand, gray stone in spoon tip (FILL) Moist	575.8 13" Ø BH			26	
	Gray FLYASH/CINDER material - occasional stone (FILL) Dry	CEM/BEN seal	2	SS	26	
		3.0'			17	
5	Gray-black CINDERS & FLYASH - occasional gravel, occasional fibrous material (FILL) Dry	BEN seal	3	SS	10	
		5.0'			8	
	Black CINDER/FLYASH - some hardened tar, trace fibrous material (FILL) Dry	BS pipe	4	SS	6	
		Sand pack	5	SS	1	
	Black CINDER/FLYASH - some fibrous material (FILL) Dry-moist	Well screen			1	
10	Black FLYASH - irridescant sheen on water (FILL) Moist-wet		6	SS	1	
	Black TOPSOIL - some silt, some vegetation (NATIVE) Wet				1	
	Dark gray SILT - some clay, some fine sand, some clay, occasional vegetation Moist	11.5'	7	SS	4	
	Gray very fine SAND - some silt, occasional vegetation Moist	12.0'			6	
		12.5'				
15		14.0' BEN seal				
NOTES: Well Pipe: 2" diameter black steel Well Screen: 2" diameter, 5' length. #6 slot, stainless steel Sand Pack: Special coarse blend Ottawa sand						

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS

▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW32-85 (FILL WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: OCTOBER 21, 1985
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: NORTHWEST BOUNDARY OF SITE
 CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: * 576.6 TOP OF PIPE ELEVATION: * 579.46

PROFILE		MONITOR INSTALLATION	SAMPLE			PENETRATION TEST
DEPTH	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT	BLOWS / FOOT
0	Dark brown TOPSOIL - trace vegetation Moist (FILL)	579.46 Locking cap	1	SS	8	
	Mottled red-brown & brown silty CLAY - Moist trace sand (FILL)	576.6 13" Ø BH			18	
	Yellow-brown SILT & fine SAND (FILL) Moist-dry	CEM/BEN seal	2	SS	16	
					13	
5	Black FLYASH - some cinders, occasional stone, trace fibrous material, trace brick, trace slag (FILL) Dry	4.0' BEN seal	3	SS	13	
		5.0'			7	
	Black FLYASH & CINDERS - occasional slag, occasional brick, trace fibrous material (FILL) Dry	8S pipe	4	SS	4	
					6	
	Black FLYASH & CINDERS - occasional slag, occasional brick, some cinders, trace fibrous material (FILL) Dry-moist	Sand pack	5	SS	10	
10		Well screen			3	
	Black FLYASH - trace glass, occasional vegetation (FILL) Wet		6	SS	1	
					2	
	Dark gray clayey SILT - some fine sand, occasional vegetation (NATIVE) Wet-moist	12.1'	7	SS	4	
	Mottled gray & dark gray fine SAND - some silt, occasional vegetation Moist				6	
15		13.5'	8	SS	1	
	Gray fine SAND - some silt, occasional vegetation Moist-wet	14.0' BEN/sand seal			3	
		16.0'				
NOTES: Well Pipe: 2" diameter black steel Well Screen: 2" diameter, 5' length, #6 slot, stainless steel Sand Pack: Special coarse blend Ottawa sand						

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▽ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW33-85 (FILL WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: OCTOBER 12, 1985
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: SOUTHWEST CORNER OF SITE
 GEOLOGIST/ENGINEER: D. MILLARD GROUND ELEVATION: * 575.4 TOP OF PIPE ELEVATION: * 579.53

PROFILE			MONITOR INSTALLATION		SAMPLE		PENETRATION TEST				
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS				NUMBER	TYPE	BLOWS / FOOT	BLOWS / FOOT			
								0	40	60	80
			Locking cap								
			579.53								
			575.4								
0	-	Dark brown TOPSOIL & VEGETATION (FILL) Moist-dry	13" Ø BH		1	SS	5				
	-	Brown TOPSOIL & silty SAND - occasional stone, occasional cinder (FILL) Moist-dry					17				
	-	Black & white FLYASH (FILL) Moist	CEM/BEN seal		2	SS	19				
	-	Gray-white soft WASTE MATERIAL - occasional blue discoloration (FILL) Moist					26				
	-	Light gray FLYASH - occasional stone, fissile red-brown rock fragments in tip (FILL) Moist	3.9'		3	SS	23				
	-	Mottled black & white WASTE MATERIAL & FLYASH (FILL) Moist	BEN seal				12				
5	-		5.9'		4	SS	5				
	-	White chalk-like WASTE MATERIAL - becoming wet at 8.0' (FILL) Moist	Sand pack		5	SS	7				
	-		Well screen				7				
10	-		10.9'		6	SS	4				
	-	Black fibrous VEGETATION & silty TOPSOIL - black wood fragment at 11.5' (NATIVE) Moist	11.5'				8				
	-		12.0'		7	SS	3				
	-	Dark gray SILT with fibrous roots Moist	BEN seal				12				
	-		14.0'								
15	-										
NOTES:											
Well Pipe: 2" diameter black steel											
Well Screen: 2" diameter, 5' length, #5 slot, stainless steel											
Sand Pack: Special coarse blend Ottawa Sand											

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS

▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW34-85 (FILL WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: OCTOBER 24, 1985
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: TOP OF RIVER BANK - WEST SIDE
 CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: * 577.4 TOP OF PIPE ELEVATION: * 580.23

DEPTH	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT
			NUMBER	TYPE	BLOWS / FOOT	
		580.23 Locking cap				20 40 60 80
0	Brown TOPSOIL - some vegetation (FILL) Moist	577.4 13" Ø BH	1	SS	20	
	Red-brown & black silty CLAY - some stone, some cinders, occasional vegetation, occasional brick (FILL)	CEM/BEN seal	2	SS	6	
	Stone or boulder at 1.5', hard augering to 2.1'	3.1'			13	
	Brown silty CLAY with black CINDERS - occasional stone, trace fine sand (FILL) Moist	BEN seal	3	SS	5	
5	Black FLYASH - occasional brown silty clay, occasional cinder (FILL) Moist	5.0'			9	
	Brown, dark brown & black FLYASH, SILT, CLAY, & CINDERS - occasional stone (FILL) Moist	BS pipe	4	SS	13	
	Black FLYASH - occasional yellow nodule, occasional gray lense of soft material, piece of wood (FILL) Moist	Well screen	5	SS	5	
	Black FLYASH - occasional cinder, occasional stone, occasional brown clayey lense, piece of wood (FILL) Moist	Sand pack	6	SS	7	
10	Black FLYASH - some sand, occasional brown cinder, occasional stone, trace clay, some gravel at 11.8' (FILL) Moist	12.0'			8+	
	Augered through to 13.0'	12.5'				
	Dark gray silty CLAY with vegetation (NATIVE) Moist	13.0'	7	SS	5	
	Dark gray silty fine SAND with vegetation Moist	BEN seal			8	
15	Dark gray SILT - some fine sand Wet	15.0'				
NOTES: Split spoon bouncing at 11.8' and 12.0', augered to 13.0'. NOTES: Well Pipe: 2" diameter black steel Well Screen: 2" diameter, 5' length, #6 slot, stainless steel Sand Pack: Special coarse blend Ottawa sand						

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW35-85 (FILL WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: OCTOBER 28, 1985
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: TOP OF RIVER BANK - CENTRAL AREA
 CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: * 575.9 TOP OF PIPE ELEVATION: *578.38

DEPTH	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
			NUMBER	TYPE	BLOWS / FOOT	20	40	60	80
		578.38 Locking cap							
0	Brown fine sandy SILT - some vegetation, Moist-dry trace clay (FILL)	575.9 13"-Ø BH	1	SS	13				
	Black FLYASH - occasional stone (FILL) Moist-dry				21				
	Brown sandy SILT - some vegetation (FILL) Moist-dry	CEM/BEN seal	2	SS	9				
	Black FLYASH, occasional cinder (FILL) Dry	2.5'			9				
	Black FLYASH (FILL) Dry	BEN seal	3	SS	10				
		4.5'			11				
5	Black & rust colored FLYASH & hardened tarlike WASTE MATERIAL - occasional cinder, trace yellow powder (FILL) Dry	BS pipe	4	SS	6				
	Black & red-brown FLYASH - occasional stone, occasional brick fragment, wood & plastic in tip of spoon (FILL) Moist	Sand pack	5	SS	7				
	Black CINDERS & FLYASH - some wood, some tarlike waste material, white waxlike waste material at 9.5' (FILL) Moist	Well screen	6	SS	12				
10	Black conglomerate of FLYASH & VEGETATION - occasional stone (FILL) Wet				8				
	Black FLYASH, WOOD & VEGETATION - occasional stone (FILL) Wet		7	SS	3				
	Dark gray silty CLAY - occasional vegetation (NATIVE) Wet-moist	12.5'			8				
	Dark gray fine sandy SILT - occasional vegetation, iridescent sheen on water Moist	13.0'							
15		13.5'							
		BEN seal 14.0'							
NOTES: Resampled 10.0-12.0' at EPA request; 1" recovery of stone and flyash. Well Pipe: 2" diameter black steel Well Screen: 2" diameter, 5' length, #6 slot, stainless steel Sand Pack: Special coarse blend Ottawa sand									

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW36-85 (FILL WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: OCTOBER 29, 1985
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: TOP OF RIVER BANK - CENTRAL AREA
 CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: 575.4 TOP OF PIPE ELEVATION: 579.45

DEPTH	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
			NUMBER	TYPE	BLOWS / FOOT	20	40	60	80
0	Brown sandy TOPSOIL - some vegetation, occasional stone (FILL) Moist-dry	579.45 Locking cap	1	SS	10				
	Brown silty CLAY - some sand, some stone (FILL) Moist-dry	575.4 13" Ø BH			12				
	Gray-brown fine SAND & SILT - trace vegetation (FILL) Moist-dry	CEM/BEN seal 2.0'	2	SS	9				
	Brown-black & white conglomerate of FLYASH, CLAY & SILT - occasional white waste material, trace vegetation, trace stone (FILL) Moist-dry	BEN seal 14" Ø			9				
5	Grinding during augering at 3.0-4.0'.	SC 4.5'	3	SS	WOR				
	No recovery	BS pipe	4	SS	WOR				
		Sand pack							
		Well screen							
10	Black FLYASH - occasional stone, occasional paper, trace oily globules, iridescent sheen on water surface (FILL) Wet	11.0'	5	SS	2				
	Dark gray clayey SILT with vegetation - trace NAPL in soil partings (NATIVE) Wet	11.5'			4				
		12.0' BEN seal							

NOTES:
 Apparent void from 4.0-10.0'; recovered 1" wet black flyash at 9.5'. During well placement began losing sand at 4.6', installed 14" Ø steel casing 6" into sand pack, installed well inside large casing.

Well Pipe: 2" diameter black steel
 Well Screen: 2" diameter, 5' length, #6 slot, stainless steel
 Sand Pack: Special coarse blend Ottawa sand

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▽ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: CW37-85 (FILL WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: OCTOBER 31, 1985
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: ALONG TOP OF BANK AT SOUTHEAST CORNER OF SITE
 GEOLOGIST/ENGINEER: D. MILLARD GROUND ELEVATION: * 573.7 TOP OF PIPE ELEVATION: * 576.77

DEPTH (ELEVATION)	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT
			NUMBER	TYPE	BLOWS / FOOT	
0	Dark gray SILT - some gravel, some flyash, Moist trace vegetation (FILL)	Locking cap 576.77	1	SS	9	
	Black CINDERS & FLYASH (FILL) Moist	573.7 13" Ø BH CEM/BEN seal 2.0'	2	SS	12	
	Black FLYASH & CINDERS - piece of plastic, Moist 1/4" lense of gray material at 5.9' (FILL)	BEN seal 3.0'	3	SS	53	
5	Black FLYASH & CINDERS - occasional stone, Wet trace gray material at 6.8', 3" wood at 7.6' (FILL)	BS pipe	4	SS	26	
	Dark gray FLYASH & fine SAND - trace fine gravel, wood fibers & steel fragments at 8.0-8.2', 3" concrete at 9.8' (FILL)	Sand pack	5	SS	33	
10	Mottled dark gray & black clayey SILT & VEGETATION (NATIVE) Moist	Well screen	6	SS	5	
	Dark gray sandy SILT Moist	10.0'			8	
		11.5'				
		12.0' BEN seal				

NOTES:
 Well Pipe: 2" diameter black steel
 Well Screen: 2" diameter, 5' length,
 #6 slot, stainless steel
 Sand Pack: Special coarse blend Ottawa Sand

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (57) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW38-85 (FILL WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: NOVEMBER 1, 1985
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: SOUTH CENTRAL AREA OF SITE ("FORMER DITCH")
 CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: 576.2 TOP OF PIPE ELEVATION: 579.34

DEPTH	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT
			NUMBER	TYPE	BLOWS / FOOT	
0	Red-brown silty CLAY - trace vegetation, Moist trace topsoil (FILL)	579.34 Locking cap	1	SS	8	
	Mottled brown & gray-brown clayey SILT & Moist fine SAND - occasional stone (FILL)	576.2 13" Ø BH	2	SS	6	
	Gray SILT - occasional cinder, occasional Moist coal pieces, occasional medium stone (FILL)	CEM/BEN seal			19	
	Black FLYASH (FILL) Dry	BS pipe	3	SS	3	
	Black FLYASH - trace paper, trace glass, Wet trace stone (FILL)	4.5'			3	
	Black & red-brown FLYASH - occasional Wet piece of glass, occasional paper (FILL)	BEN seal	4	SS	1	
	Black FLYASH - occasional piece of glass, Wet trace iridescent sheen on water (FILL)	6.5'			1	
	Black FLYASH - piece of plastic (FILL)	Sand pack	5	SS	18	
	Black clayey SILT - some fine sand, Moist occasional vegetation (NATIVE)	Well screen	6	SS	1	
	Black fine SAND - some silt Moist		7	SS	2	
	Black fine SAND & SILT - occasional Wet vegetation, occasional minor lense of saturated coarse sand	14.0'	8	SS	5	
	Black fine SAND & SILT - becoming gray at Wet tip, occasional vegetation, occasional saturated lense, iridescent sheen on water	14.5'			6	
		BEN seal	9	SS	4	
		18.0'	10	SS	4	
		20.0'			4	
NOTES: 14.0-16.0' split spoon sample lost before EPA examination; made two unsuccessful attempts to resample. Well Pipe: 2" diameter black steel Well Screen: 2" diameter, 5' length. #6 slot. stainless steel Sand Pack: Special coarse blend Ottawa sand						

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▽ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW39-85 (FILL WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: NOVEMBER 7, 1985
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: NORTH SIDE OF SITE - 200' E. OF FORMER DITCH
 CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: 574.1 TOP OF PIPE ELEVATION: 577.22

DEPTH	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
			NUMBER	TYPE	BLOWS / FOOT	20	40	60	80
0	Brown silty TOPSOIL - occasional vegetation Moist piece of concrete, piece red clay tile (FILL)	577.22 Locking cap 574.1 13" - Ø BH CEM/BEN seal	1	SS	25				
	White soft WASTE MATERIAL (FILL) Moist	2.0'	2	SS	1				
	Gray-brown coarse to medium SAND - Moist some stone (FILL)	BEN seal			2				
	Mottled red-brown silty CLAY - trace Moist cinders (FILL)	2.5'	3	SS	1				
5	Mottled silty CLAY - trace cinders, Moist trace gravel, trace sand (FILL)	BS pipe			2				
	Gray coarse to medium SAND & CINDERS - Wet trace silty clay (FILL)	Sand pack	4	SS	5				
	Gray-white soft WASTE MATERIAL - piece Wet of wood (FILL)	Well screen			10				
	Black sandy TOPSOIL - occasional Moist vegetation (NATIVE)	8.5'	5	SS	4				
	Gray silty fine SAND Moist	9.0'			7				
10	Mottled red-brown silty CLAY Moist	BEN seal 10.5'							
NOTES: Well Pipe: 2" diameter black steel Well Screen: 2" diameter, 5' length, #6 slot, stainless steel Sand Pack: Special coarse blend Ottawa sand									

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW40-85 (ALLUVIUM WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: NOVEMBER 13, 1985
 HOLE TYPE: HOLLOW STEM AUGER (8-1/4" ID/13" OD) LOCATION: ALONG TOP OF BANK AT SOUTHEAST CORNER OF SITE
 GEOLOGIST/ENGINEER: D. MILLARD GROUND ELEVATION: 573.7 TOP OF PIPE ELEVATION: 576.76

DEPTH (ELEVATION)	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
			NUMBER	TYPE	BLOWS / FOOT	20	40	60	80
0	Dark gray SILT - some gravel, some flyash, Moist trace vegetation (FILL)	Locking cap 576.76							
		573.7							
	Black CINDERS & FLYASH (FILL) Moist	BS pipe							
	Black FLYASH & CINDERS - piece of plastic, Moist 1/4" lense of gray material at 5.9' (FILL)	CEM/BEN BKFL							
5	Black FLYASH & CINDERS - occasional stone, Wet trace gray material at 6.8', 3" wood at 7.6' (FILL)	13" Ø BH							
	Dark gray FLYASH & fine SAND - trace fine gravel	8.0'							
	Mottled brown-black TOPSOIL & VEGETATION, Moist becoming clayey silt (NATIVE)	BEN seal	1	SS	3				
10	Mottled brown & dark gray SAND & SILT Moist with vegetation				3				
	Mottled brown & dark gray fine sandy SILT Moist-wet with vegetation throughout	11.0'	2	SS	6				
	Gray-brown fine sandy SILT with vegetation Moist-wet throughout, occasional fine sandy lense				6				
	Gray fine SAND & SILT -some vegetation Moist-wet throughout, occasional shell fragment	SD pack	3	SS	2				
15	Dark gray fine SAND & SILT with occasional Wet black layering				6				
			4	SS	1				
					1				
	Gray & dark gray fine SAND & SILT -small Wet stone, trace shell, trace silt		5	SS	WOR				
					5				
20			6	SS	2				
					3				
			7	SS	10				
					22				
	Gray medium to coarse SAND & GRAVEL - Wet occasional white shell, trace silt		8	SS	7				
25		SS screen			11				
			9	SS	6				
					11				
	Dark gray coarse SAND & GRAVEL - Wet occasional white shell		10	SS	17				
		28.2'			11				
	Red-brown CLAY, plastic - iridescent Wet sheen on water at clay contact	28.7'							
30		29.0'							
NOTES: Well Pipe: 2" diameter black steel Well Screen: 2" diameter, 5' length, #6 slot, stainless steel Sand Pack: Special coarse blend Ottawa Sand Stratigraphy 0-9.0' from OW37-85.									

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (57) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW41-85 (SHALLOW BEDROCK)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: APRIL 2, 1986
 HOLE TYPE: HOLLOW STEM AUGER (6-1/4" ID/11" OD) LOCATION: ALONG TOP OF BANK AT SOUTHEAST CORNER OF SITE
 GEOLOGIST/ENGINEER: D. MILLARD GROUND ELEVATION: 573.7 TOP OF PIPE ELEVATION: 576.16

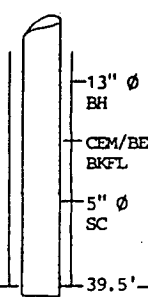
DEPTH (ELEVATION)	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
			NUMBER	TYPE	BLOWS / FOOT	20	40	60	80
0		576.16							
-	Dark gray SILT - some gravel, some flyash, Moist trace vegetation (FILL)	573.7							
-	Black CINDERS & FLYASH (FILL) Moist	CEM/BEN BKFL							
5	Black FLYASH & CINDERS - piece of plastic, Moist 1/4" lense of gray material at 5.9' (FILL)								
-	Black FLYASH & CINDERS - occasional stone, Wet trace gray material at 6.8', 3" wood at 7.6' (FILL)	5" Ø SC							
-	Dark gray FLYASH & fine SAND - trace fine gravel (FILL)								
-	Mottled brown-black TOPSOIL & VEGETATION, Moist becoming clayey silt (NATIVE)								
10	Mottled brown & dark gray SAND & SILT Moist with vegetation	13" Ø BH							
-	Mottled brown & dark gray fine sandy SILT Moist-wet with vegetation throughout								
-	Gray-brown fine sandy SILT with vegetation Moist-wet throughout - occasional fine sandy lense								
-	Gray fine SAND & SILT -some vegetation Moist-wet throughout, occasional shell fragment								
15	Dark gray fine SAND & SILT with occasional Wet black layering								
-	Gray & dark gray fine SAND & SILT -small Wet stone, trace shell, trace silt								
20	Gray medium to coarse SAND & GRAVEL - Wet occasional white shell, trace silt								
-	Dark gray coarse SAND & GRAVEL - Wet occasional white shell		1	SS	42				
-	Red-brown CLAY Wet Augered to 30.0'				3				
30	Red-brown CLAY -occasional silty lenses Wet increasing with depth, occasional small stone		2	SS	WOR				
-					WOR				
-			3	SS	WOR				
-					WOR				

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS

▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW41-85 Page 2. of 3
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: NOVEMBER 25, 1985
 HOLE TYPE: HOLLOW STEM AUGER (6-1/4" ID/11" OD) LOCATION: ALONG TOP OF BANK AT SOUTHEAST CORNER OF SITE
 GEOLOGIST/ENGINEER: D. MILLARD GROUND ELEVATION: * 573.7 TOP OF PIPE ELEVATION: * 576.16

PROFILE		MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT
DEPTH	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT
35	Red-brown CLAY - occasional silty lenses Wet increasing with depth, occasional small stone		4	SS WOF	4
	Red-brown SAND, SILT & CLAY -some gravel (TILL) Wet		5	SS 66	66
	Brown SAND, SILT & GRAVEL -trace clay Wet		6	SS 36	36
40	NOTES: Stratigraphy 0-28.0' from OW40-85. Well Pipe: 5" diameter black steel	39.5'			100+

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: 102ND STREET LANDFILL

HOLE DESIGNATION: OW41-85 PAGE 3 OF 3

PROJECT NO.: 9-1431

DATE COMPLETED: APRIL 2, 1986

CLIENT: OCCIDENTAL CHEMICAL CORPORATION

DRILLING METHOD: 3" Ø NX CORE

LOCATION: TOP OF BANK AT SOUTHEAST CORNER OF SITE

CRA SUPERVISOR: D. MILLARD/C. PADGINTON

DEPTH	DESCRIPTION OF STRATA	R U N N O.	I N T E R V A L	R E C C O O R D I N A T E	R Q D	D R I W E L A T I O N	WATER PRESSURE TEST	E L E V A T I O N	MONITOR INSTALLATION
ft BG				%	%	%	cm/s	ft AMSL	
40	DOLOMITE (LOCKPORT GROUP - OAK ORCHARD FORMATION): gray, fine to medium grained, thinly bedded, numerous shaly & carbonaceous partings, vuggy and pitted with some secondary gypsum replacement - bioherm from 54.1'-54.3'	1	39.7	100	48.6	18		534.0	13" Ø BH
45		2	45.7	91	20.3	12		528.0	5" Ø SC
50		3	49.0	110	43.0	75		524.7	CEM/BEN BKFL
55		4	53.3	96	28.9	83		520.4	3" Ø BH
			55.3					518.4	

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

WATER FOUND

STATIC WATER LEVEL

NM - NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: BH42-86
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: MARCH 10, 1986
 HOLE TYPE: HOLLOW STEM AUGER (8-1/4" ID/13" OD) LOCATION: RIPRAP TERRACE, SOUTHEAST CORNER OF SITE
 GEOLOGIST/ENGINEER: D. MILLARD GROUND ELEVATION: 570.4 TOP OF PIPE ELEVATION: *

PROFILE		MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT
0		570.4			
	Augered through				
	Red-brown & dark brown SILT - some vegetation, some fine sand, some gravel (FILL)		1	SS	44
					81
5	Gray-green STONE & ROCK -occasional white shell, becoming gray-white at 6.0' (FILL)		2	SS	100+
	Black FLYASH & VEGETATIVE MATTER - rotting organic odor (FILL)				23
	Dark brown SILT & VEGETATIVE MATTER - strong rotting vegetation odor (NATIVE)				17
	Gray fine SAND & SILT - vegetation throughout, black mottling decreasing with depth	13" Ø BH	3	SS	4
					3
10			4	SS	3
	Gray SILT & fine SAND - occasional vegetation decreasing with depth, occasional pebble	CEM/BEN BKFL			6
			5	SS	5
					WOR
					WOH
15			6	SS	2
					6
	Gray fine to medium SAND - some silt, occasional pebble, trace vegetation (roots)		7	SS	7
	No recovery				WOR
20			8	SS	13
					17
	Dark gray coarse to medium SAND - some sub-rounded gravel, occasional white shell fragment				34
			9	SS	7
					7
25	Gray, brown & black fine sub-rounded GRAVEL - some coarse sand, occasional white shell fragment		10	SS	15
	Gray & brown-gray medium SAND & sub-rounded GRAVEL - some silt, some white shell fragments, brown-gray fine gravel & coarse sand lense at 27.5', NAPL present in lense only (0.15' depth), chemical odor				37
					67
		29.0'	11	SS	100+
30	NOTES: Auger refusal at 28.0'; grinding slow augering to 29.0'. Abandoned borehole and grouted to surface.				

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▽ STATIC WATER LEVEL 37 GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW42-85 (DEEP BEDROCK)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: JANUARY 15, 1987
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: ALONG TOP OF BANK AT SOUTHEAST CORNER OF SITE
 GEOLOGIST/ENGINEER: D. MILLARD GROUND ELEVATION: * 573.6 TOP OF PIPE ELEVATION: * 577.04

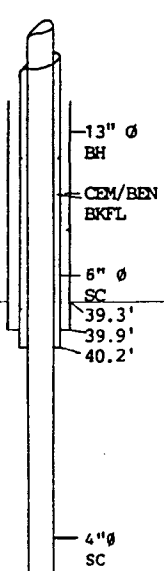
PROFILE		MONITOR INSTALLATION		SAMPLE			PENETRATION TEST			
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS			NUMBER	TYPE	BLOWS / FOOT	BLOWS / FOOT			
							20	40	60	80
0	Dark gray SILT - some gravel, some flyash, Moist trace vegetation (FILL)		577.04							
			573.6							
	Black CINDERS & FLYASH (FILL) Moist		CEM/BEN BKFL							
5	Black FLYASH & CINDERS - piece of plastic, 1/4" lense of gray material at 5.9' (FILL) Moist									
	Black FLYASH & CINDERS - occasional stone, trace gray material at 6.8', 3" wood at 7.6' (FILL) Wet		6" Ø SC							
	Dark gray FLYASH & fine SAND - trace fine gravel (FILL)									
	Mottled brown-black TOPSOIL & VEGETATION, becoming clayey silt (NATIVE) Moist									
10	Mottled brown & dark gray SAND & SILT with vegetation Moist									
	Mottled brown & dark gray fine sandy SILT with vegetation throughout Moist-wet		13" Ø BH							
	Gray-brown fine sandy SILT with vegetation throughout - occasional fine sandy lense Moist-wet									
	Gray fine SAND & SILT, some vegetation throughout - occasional shell fragment Moist-wet									
15	Dark gray fine SAND & SILT with occasional black layering Wet									
	Gray & dark gray fine SAND & SILT, small stone, trace shell, trace silt Wet									
20										
	Gray medium to coarse SAND & GRAVEL, occasional white shell, trace silt Wet		4" Ø SC							
25										
	Dark gray coarse SAND & GRAVEL, occasional white shell Wet									
	Red-brown CLAY Augered through Wet									
30										
	Red-brown CLAY, occasional silty lense increasing with depth, occasional small stone Wet									

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS

▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW42-85 Page 2 of 6
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: JANUARY 15, 1987
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: ALONG TOP OF BANK AT SOUTHEAST CORNER OF SITE
 CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: * 573.6 TOP OF PIPE ELEVATION: * 577.04

PROFILE		MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT				
DEPTH	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT				
						20	40	60	80
35	Red-brown CLAY - occasional silty lenses Wet increasing with depth, occasional small stone								
	Red-brown SAND, SILT & CLAY, some gravel (TILL) Wet								
	Brown SAND, SILT & GRAVEL, trace clay Wet								
40	NOTES: Stratigraphy from OW41-85.								

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BED ROCK)

PROJECT NAME: 102ND STREET LANDFILL

HOLE DESIGNATION: OW42-86 PAGE 3 OF 6

PROJECT NO.: 9-1431

DATE COMPLETED: JANUARY 15, 1987

CLIENT: OCCIDENTAL CHEMICAL CORPORATION

DRILLING METHOD: 3" DIA. NX CORE

LOCATION: SOUTHEAST AREA OF SITE

CRA SUPERVISOR: R HOEKSTRA/C PADGINTON

DEPTH	DESCRIPTION OF STRATA	R U N N O.	I N T E R V A L	R E C C O R D E E R Y	R Q D	D R I L L I N G T U B E	WATER PRESSURE TEST	E L E V A T I O N	MONITOR INSTALLATION
ft BG				%	%	%	cm/s	ft AMSL	
40	DOLOMITE (LOCKPORT GROUP-OAK ORCHARD FORMATION): medium to dark gray, aphanitic to medium grained; some banding, medium bedding, bituminous, few fractures, gypsum filled, trace partings, fossiliferous - trace weathered fractures - highly fractured, slight weathering - highly fractured 62.9' to 68.75' - trace weathered fractures - several gypsum masses, stromatolites - calcite & sphalerite filled vugs at 81.25'	1	39.3	90	72			534.3 533.7 533.4	13"Ø BH
45									6"Ø SC
50		2	48.6	74				525.0	CEM/ BEN BKFL
55		3	55.1	131	100	60		518.5	5-3/4" Ø BH
60		4	62.9	100	29	22		510.7	4"Ø SC
65									
70		5	70.2	102	100	37		503.4	
75									
80		6	78.3	91	100	23		495.3	
85		7	85.0	110	100	98		488.6	
90									

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

WATER FOUND

STATIC WATER LEVEL

NM - NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: 102ND STREET LANDFILL

HOLE DESIGNATION: OW42-86 PAGE 4 OF 6

PROJECT NO.: 9-1431

DATE COMPLETED: JANUARY 15, 1987

CLIENT: OCCIDENTAL CHEMICAL CORPORATION

DRILLING METHOD: 3" DIA. NX CORE

LOCATION: SOUTHEAST AREA OF SITE

CRA SUPERVISOR: R HOEKSTRA/C PADGINTON

DEPTH	DESCRIPTION OF STRATA	R U N N O.	I N T E R V A L	R E C C O O R D I N A T E	R Q D	D R I W E L A T I O N	WATER PRESSURE TEST	E L E V A T I O N	MONITOR INSTALLATION
ft BG				%	%	%	cm/s	ft AMSL	
- 90	Dolomite (as above)	8	93.3	99	100	93		480.3	5-3/4"Ø BH
- 95									
- 100		9	100.0	95	92	97		473.6	
- 105									
- 110		10	108.4	102	100	94		465.2	
- 115	DOLOMITE (LOCKPORT GROUP - ERAMOSA FORMATION): light to olive gray, fine to medium grained, very thin to medium bedding, frequent carbonaceous partings, trace weathered fractures	11	115.0	98	99	87		458.6	CEM/BEN BKFL
- 120									
- 125		12	123.3	101	100	93		450.3	
- 130		13	130.0 130.5	98	70	65		443.6 443.5	
- 135									
- 140	- cherty	14	139.3	107	100	86		434.3	4"Ø SC
- 145		15	145.0	83	100	67		428.6	

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

WATER FOUND

STATIC WATER LEVEL

NM - NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: 102ND STREET LANDFILL

HOLE DESIGNATION: OW42-86 PAGE 5 OF 6

PROJECT NO.: 9-1431

DATE COMPLETED: JANUARY 15, 1987

CLIENT: OCCIDENTAL CHEMICAL CORPORATION

DRILLING METHOD: 3" DIA. NX CORE

LOCATION: SOUTHEAST AREA OF SITE

CRA SUPERVISOR: R HOEKSTRA/C PADGINTON

DEPTH	DESCRIPTION OF STRATA	R U N N O.	I N T E R V A L	R E C C O R D E R Y	R Q D	D R I W E L A T I O N R N G	WATER PRESSURE TEST	E L E V A T I O N	MONITOR INSTALLATION
ft BG				%	%	%	cm/s	ft AMSL	
- 145	- cherty;								-5-3/4" Ø BH
- 150	- massive chert nodules								4" Ø SC
			152.5					421.1	
- 155	DOLOMITE (LOCKPORT GROUP - GOAT ISLAND FORMATION): light to medium gray, fine to medium grained, thick bedded, stylolitic, cherty, vuggy with gypsum or carbonate or limonite coatings, frequent shaly partings	16	154.0	120	100	99		419.6	
- 160	- sharp conformable contact								CEM/BEN BKFL
	DOLOMITE (LOCKPORT GROUP - GASPORT FORMATION): gray to olive gray, fine to medium grained, thin to thick bedding bituminous, fossiliferous, numerous shaly partings, vuggy	17	160.0	113	96	88		413.6	
- 165	& pitted; few fractures		162.0					411.6	
- 170	DOLOMITIC SHALE: black, very fine to fine grained, thin to thick bedding, vugs with gypsum &/or sphalerite, trace weathering on fractures	18	169.3	93	52	86		404.3	
- 175			170.0					403.6	3" Ø NX
- 180		19	178.9	75	--	72		394.7	
		20	179.3	106	86	100		394.3	
- 185		21	184.3	96	100	100		389.3	
	DOLOMITE: as above, coarse grained, some porosity, banded		186.0					387.6	
- 190	- trace limonitic staining								
- 195	- weathered fracture at 194.75'	22	194.3	40	30	100		379.3	
- 200		23	195.9	112	100	86		377.7	

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

WATER FOUND

STATIC WATER LEVEL

NM - NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: 102ND STREET LANDFILL

HOLE DESIGNATION: OW42-86 PAGE 6 OF 6

PROJECT NO.: 9-1431

DATE COMPLETED: JANUARY 15, 1987

CLIENT: OCCIDENTAL CHEMICAL CORPORATION

DRILLING METHOD: 3" DIA. NX CORE

LOCATION: SOUTHEAST AREA OF SITE

CRA SUPERVISOR: R HOEKSTRA/C PADGINGTON

DEPTH	DESCRIPTION OF STRATA	R U N N O.	I N T E R V A L	R E C O R D E R Y	R Q D	D R I W E L A T I O N G	WATER PRESSURE TEST	E L E V A T I O N	MONITOR INSTALLATION
ft BG							cm/s	ft AMSL	
- 200	Dolomite (as above)								
- 205	- conformable, gradational contact		204.8					368.8	-3"Ø NX
- 210	DOLOMITE (CLINTON GROUP - DECEW FORMATION): gray to dark gray, fine to medium grained, argillaceous, massive bedding	25	209.3	192	100	85		364.3	
- 215	- few carbonaceous partings from 209.3', occasional vug, - clay seam		213.8					359.8	
- 220	- clay seam contact		216.8					356.8	
- 225	SHALE (CLINTON GROUP - ROCHESTER FORMATION): black fine grained, dolomitic, massive bedding, several fractured & weathered zones		223.3					350.3	

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

WATER FOUND

STATIC WATER LEVEL

NM - NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: BH43-85
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: DECEMBER 4, 1985
 HOLE TYPE: HOLLOW STEM AUGER (3-3/4" ID, 8" OD) LOCATION: ALONG TOP OF BANK AT SOUTHEAST CORNER OF SITE
 GEOLOGIST/ENGINEER: D. MILLARD GROUND ELEVATION: 577.2 TOP OF PIPE ELEVATION: *

DEPTH (ELEVATION)	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
			NUMBER	TYPE	BLOWS / FOOT				
						20	40	60	80
0	Brown TOPSOIL - some vegetation (FILL) Moist	577.2							
	Red-brown & black silty CLAY - some stone, some cinders, occasional vegetation, occasional brick (FILL) Moist	8" Ø BH							
	Brown silty CLAY with black CINDERS - occasional stone, trace fine sand (FILL) Moist								
5	Black FLYASH - occasional brown silty clay, occasional cinder (FILL) Moist								
	Brown, dark brown & black FLYASH, SILT, CLAY, & CINDERS - occasional stone (FILL) Wet								
	Black FLYASH - occasional yellow nodule, occasional gray lense of soft waste material, piece of wood (FILL) Moist	CEM/BEN BKFL							
	Black FLYASH - occasional cinder, occasional stone, occasional brown clayey lense, piece of wood (FILL) Moist								
10	Black FLYASH - some sand, occasional brown cinder, occasional stone, trace clay, some gravel at 11.8' (FILL) Moist								
	Augered through to 13.0'								
	Dark gray silty CLAY with vegetation (NATIVE) Moist								
	Dark gray silty fine SAND with vegetation Moist								
15	Dark gray SILT - some fine sand Wet								
	Gray clayey SILT - vegetation throughout Moist-wet		1	SS	7				
	Gray fine sandy SILT - vegetation throughout Moist-wet				11				
	Gray silty fine SAND - occasional pebble, vegetation throughout Moist		2	SS	11				
					13				
			3	SS	6				
20	Gray fine SAND - trace silt, trace vegetation Wet				5				
	Gray medium to coarse SAND & GRAVEL - trace silt Wet		4	SS	14				
	Gray SAND - trace silt Wet				11				
			5	SS	12				
					17				
25	Gray fine SAND & SILT Wet		6	SS	8				
					16				
			7	SS	11				
					14				
30	Gray medium SAND - some shells Wet		8	SS	10				
					8				
	Brown clayey SILT - trace fine gravel (TILL) Wet		9	SS	47				
					30				
	Red-brown SAND, SILT & CLAY - fine gravel throughout (TILL) Wet		10	SS	17				

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (57) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: BH43-85 Page 2 of 2
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: DECEMBER 4, 1985
 HOLE TYPE: HOLLOW STEM AUGER (3-3/4" ID, 8" OD) LOCATION: ALONG TOP OF BANK AT SOUTHEAST CORNER OF SITE
 CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: 577.2 TOP OF PIPE ELEVATION: *

DEPTH	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITDR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
			NUMBER	TYPE	BLOWS / FOOT				
						20	40	60	80
35	Red-brown SAND, SILT & CLAY - fine gravel throughout (TILL) Wet	8" Ø BH CEM/BEN BKFL 43.8' 44.3	11	SS	15				
			12	SS	42				
			13	SS	49				
40	Gray-brown silty CLAY - trace fine sand, trace small pebbles Wet		14	SS	26				
	Gray medium to fine SAND Moist								
	Gray silty, sandy CLAY Moist								
	Gray SILT, fine to medium SAND & STONE Moist-wet								
	Gray GRAVEL & medium SAND Wet								
	Gray fine to medium SAND & GRAVEL Wet		15	SS	100				
45	NOTES: Stratigraphy 0-15.0' from OW34-85. Grouted borehole to surface.								

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW43-86 (ALLUVIUM WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: JANUARY 30, 1986
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: ALONG TOP OF BANK AT SOUTHEAST CORNER OF SITE
 GEOLOGIST/ENGINEER: D. MILLARD GROUND ELEVATION: 577.2 TOP OF PIPE ELEVATION: 580.22

DEPTH (ELEVATION)	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT			
			NUMBER	TYPE	BLOWS / FOOT	20	40	60
		Locking cap 580.22						
0	Brown TOPSOIL - some vegetation (FILL) Moist	577.2						
	Red-brown & black silty CLAY - some stone, Moist some cinders, occasional vegetation, occasional brick (FILL)	13" Ø BH						
	Brown silty CLAY with black CINDERS - Moist occasional stone, trace fine sand (FILL)	CEM/BEN BKFL						
5	Black FLYASH - occasional brown silty clay, Moist occasional cinder (FILL)	BS pipe						
	Brown, dark brown & black FLYASH, SILT, Wet CLAY, & CINDERS - occasional stone (FILL)							
	Black FLYASH - occasional yellow nodule, Moist occasional gray lense of soft waste material, piece of wood (FILL)							
10	Black FLYASH - occasional cinder, occasional Moist stone, occasional brown clayey lense, piece of wood (FILL)							
	Black FLYASH - some sand, occasional brown Moist cinder, occasional stone, trace clay, some gravel at 11.8' (FILL)							
	Augered through to 13.0'	12.0'						
	Dark gray silty CLAY with vegetation Moist (NATIVE)	BEN seal						
	Dark gray silty fine SAND with vegetation Moist	14.0'						
15	Dark gray SILT - some fine sand Wet							
	Gray clayey SILT - vegetation throughout Moist-wet							
	Gray fine sandy SILT - vegetation Moist-wet throughout	SD pack						
	Gray silty fine SAND - occasional pebble, Moist vegetation throughout							
20	Gray fine SAND - trace silt, trace Wet vegetation							
	Gray medium to coarse SAND & GRAVEL - Wet trace silt							
	Gray SAND - trace silt Wet							
25	Gray fine SAND & SILT Wet							
		26.5'						
		SS screen						
30	Gray fine to medium SAND & GRAVEL - Wet		1	SS	40			
					16			
	Red-brown SILT & fine SAND - trace clay, Moist occasional gravel (TILL)	31.5' 32.0'			20			

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS

▼ WATER FOUND ▼ STATIC WATER LEVEL (57) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW43-86 Page 2 of 2
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: JANUARY 30, 1986
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: ALONG TOP OF BANK AT SOUTHEAST CORNER OF SITE
 CRA SUPERVISOR : D. MILLARD GROUND ELEVATION: * 577.2 TOP OF PIPE ELEVATION: * 580.20

PROFILE		MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
DEPTH	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT				
						20	40	60	80
	NOTES: Well Pipe: 2" diameter black steel Well Screen: 2" diameter, 5' length, #6 slot, stainless steel Sand Pack: Special coarse blend Ottawa sand Stratigraphy 0-29.0' from BH43-85.								

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (57) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW44-86 (DEEP BEDROCK)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: OCTOBER 27, 1986
 HOLE TYPE: HOLLOW STEM AUGER (8-1/4" ID, 13" OD) LOCATION: ALONG TOP OF BANK AT SOUTHEAST CORNER OF SITE
 GEOLOGIST/ENGINEER: D. MILLARD GROUND ELEVATION: 577.2 TOP OF PIPE ELEVATION: 579.93

DEPTH (ELEVATION)	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
			NUMBER	TYPE	BLOWS / FOOT				
						20	40	60	80
0	Brown TOPSOIL - some vegetation (FILL) Moist	579.93							
	Red-brown & black silty CLAY - some stone, Moist some cinders, occasional vegetation, occasional brick (FILL)	577.2							
		13" Ø BH							
	Brown silty CLAY with black CINDERS - Moist occasional stone, trace fine sand (FILL)								
5	Black FLYASH - occasional brown silty clay, Moist occasional cinder (FILL)	6" Ø SC							
	Brown, dark brown & black FLYASH, SILT, Wet CLAY, & CINDERS - occasional stone (FILL)								
	Black FLYASH - occasional yellow nodule, Moist occasional gray lense of soft waste material, piece of wood (FILL)								
10	Black FLYASH - occasional cinder, occasional Moist stone, occasional brown clayey lense, piece of wood (FILL)								
	Black FLYASH - some sand, occasional brown Moist cinder, occasional stone, trace clay, some gravel at 11.8' (FILL)								
	Augered through to 13.0'								
	Dark gray silty CLAY with vegetation Moist (NATIVE)								
	Dark gray silty fine SAND with vegetation Moist								
15	Dark gray SILT - some fine sand Wet								
	Gray clayey SILT - vegetation throughout Moist-wet								
	Gray fine sandy SILT - vegetation Moist-wet throughout	CEM/BEN BKFL							
	Gray silty fine SAND - occasional pebble, Moist vegetation throughout								
20	Gray fine SAND - trace silt, trace Wet vegetation								
	Gray medium to coarse SAND & GRAVEL - Wet trace silt								
	Gray SAND - trace silt Wet	4" Ø SC							
25	Gray fine SAND & SILT Wet								
30	Gray medium SAND - some shells Wet								
	Brown clayey SILT - trace fine gravel Wet (TILL)								
	Red-brown SAND, SILT & CLAY - fine Wet gravel throughout (TILL)								

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS

▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW44-86 Page 2 of 6
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: OCTOBER 27, 1986
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: ALONG TOP OF BANK AT SOUTHEAST CORNER OF SITE
 CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: 577.2 TOP OF PIPE ELEVATION: 579.93

PROFILE		MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
DEPTH	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT	20	40	60	80
35	Red-brown SAND, SILT & CLAY - fine gravel throughout (TILL) Wet	CEM/BEN BKFL							
		13" Ø BH							
40	Gray-brown silty CLAY - trace fine sand, trace small pebbles Wet	6" Ø SC							
	Gray medium to fine SAND Moist								
	Gray silty, sandy CLAY Moist								
	Gray SILT, fine to medium SAND & STONE Moist-wet	4" Ø SC							
	Gray GRAVEL & medium SAND Wet								
	Gray fine to medium SAND & GRAVEL Wet	44.0'							
45	NOTES: Well Casing: 4" and 6" diameter black steel Stratigraphy from BH43-85.	44.5'							

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (57) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: 102ND STREET LANDFILL

HOLE DESIGNATION: OW44-86 PAGE 3 OF 6

PROJECT NO.: 9-1431

DATE COMPLETED: OCTOBER 27, 1986

CLIENT: OCCIDENTAL CHEMICAL CORPORATION

DRILLING METHOD: 3" DIA. NX CORE

LOCATION: TOP OF EMBANKMENT, SOUTHWEST QUADRANT

CRA SUPERVISOR: C PADGINGTON

DEPTH	DESCRIPTION OF STRATA	R U N N O.	I N T E R V A L	R E C O O R D I N A T E	R Q D	D R I L L I N G L A T I T U D I N E	WATER PRESSURE TEST	E L E V A T I O N	MONITOR INSTALLATION
ft BG				%	%	%	cm/s	ft AMSL	
45	DOLOMITE (LOCKPORT GROUP - OAK ORCHARD FORMATION): dark gray & brown-gray, some banding, weathers light gray, very fine to fine grained, thick bedding, carbonaceous, occasional weathered zone, highly fractured, close to very close spacing, fracture surfaces weathered or with calcareous coatings, slightly pitted, fossiliferous - becomes shaly, argillaceous shaly partings, calcite & gypsum coatings, close to very close spacing - weathered fractures - fine to medium grained inclined medium bedding - bituminous, saccharoidal stylolitic, thick to massive bedding, banded, fewer fractures, close to moderate spacing - secondary galena, fluorite in cavities, highly fossiliferous - less vugs & pitting at 87' - vugs & pitting return	1	44.4	97		32		533.2 532.8	13" Ø BH 6" Ø SC CEM/ BEN BKFL
50		2	53.7	113	6	0		523.5	
55		3	59.4	93	68	43		517.8	5-3/4" Ø BH
60		4	67.2	102	75	0		510.0	
65		5	74.4	97	97	03		502.8	4" Ø SC
70		6	83.7	104	100	0		493.5	
75		7	89.4	102	100	100		487.8	
80									
85									
90									
95									

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

WATER FOUND

STATIC WATER LEVEL

NM - NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: 102ND STREET LANDFILL

HOLE DESIGNATION: OW44-86 PAGE 4 OF 6

PROJECT NO.: 9-1431

DATE COMPLETED: OCTOBER 27, 1986

CLIENT: OCCIDENTAL CHEMICAL CORPORATION

DRILLING METHOD: 3" DIA. NX CORE

LOCATION: TOP OF EMBANKMENT, SOUTHWEST QUADRANT

CRA SUPERVISOR: C PADGINGTON

DEPTH	DESCRIPTION OF STRATA	R U N N O.	I N T E R V A L	R E C C O R D E E R Y	R Q D	D R I W E L A T I T U D E	WATER PRESSURE TEST	E L E V A T I O N	MONITOR INSTALLATION
ft BG				%	%	%	cm/s	ft AMSL	
-	DOLOMITE (as above)								
100	- vugs, fossils decrease with depth	8	98.7	70	100	97		478.5	5-3/4" BH
105		9	104.4	115	100	100		472.8	
110									
115		10	113.3	110	100	96		463.9	
120	- vertical fracture/joint, open, secondary calcite coatings (117'-122')	11	119.4	102	100	96		457.8	CEM/BEN BKFL
125	- calcite filled voids								
130	- calcite & sphalerite deposits 128.4'-140.0'								
135	- occasional stromatolites	13	134.4	91	95	92		442.8	4" Ø SC
140	- lower unit contact, sharp, conformable		140.0					437.2	
145	DOLOMITE (LOCKPORT GROUP - ERAMOSA FORMATION): dark gray, fine grained, thin to medium bedding, saccharoidal, banded, bituminous, frequent shaley partings. occasional galena mineralization	14	142.7	108	100	94		434.5	
150		15	149.4	98	91	97		427.8	

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

WATER FOUND

STATIC WATER LEVEL

NM - NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: 102ND STREET LANDFILL

HOLE DESIGNATION: OW44-86 PAGE 5 OF 6

PROJECT NO.: 9-1431

DATE COMPLETED: OCTOBER 27, 1986

CLIENT: OCCIDENTAL CHEMICAL CORPORATION

DRILLING METHOD: 3" DIA. NX CORE

LOCATION: TOP OF EMBANKMENT, SOUTHWEST QUADRANT

CRA SUPERVISOR: C PADGINTON

DEPTH	DESCRIPTION OF STRATA	R U N N O.	I N T E R V A L	R E C C O V E R Y	R Q D	D R I W E L A T I O N R N	WATER PRESSURE TEST	E L E V A T I O N	MONITOR INSTALLATION
ft BG				%	%	%	cm/s	ft AMSL	
- 150	DOLOMITE (as above)		152.1					425.1	5-3/4" Ø BH
- 155	DOLOMITE (LOCKPORT GROUP - GOAT ISLAND FORMATION): dark gray, fine to medium grained, thin to medium bedded, saccharoidal, carbonaceous, shaly partings, fossiliferous, oolitic	16	158.7	101	99	84		418.5	
- 160									
- 165	- gradational contact DOLOMITE (LOCKPORT GROUP - GASPORT FORMATION): light to medium gray, fine to medium grained, medium to thick bedded	17	163.7	97	86	96		413.5	CEM/ BEN BKFL
- 170	LIMESTONE: medium gray, thin to medium bedding, aphanitic, some gypsum, biohermic		166.4					410.8	
- 175	DOLOMITE: olive gray, fine grained to aphanitic, shaly partings & fractures, stylolites, gypsum seams, bioherm	18	173.3	61	57	96		409.3	4" Ø SC
- 180			174.2					403.9	
- 185								403.0	
- 190		19	179.4	144	100	82		397.8	
- 195	DOLOMITE: medium to dark gray to brown-gray medium to coarse grained, medium to thick bedding, some pitting, no evidence of fossils, banded - fossiliferous, gypsum replacement (198')								
- 200		20	186.9	100	85	88		390.3	
			192.7					384.5	3" Ø NX
		21	196.7	99	99	92		380.5	
		22	201.7	100	100	87		375.5	

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

WATER FOUND

STATIC WATER LEVEL

NM - NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: 102ND STREET LANDFILL

HOLE DESIGNATION: OW44-86 PAGE 6 OF 6

PROJECT NO.: 9-1431

DATE COMPLETED: OCTOBER 27, 1986

CLIENT: OCCIDENTAL CHEMICAL CORPORATION

DRILLING METHOD: 3" DIA. NX CORE

LOCATION: TOP OF EMBANKMENT, SOUTHWEST QUADRANT

CRA SUPERVISOR: C. PADGINGTON

DEPTH	DESCRIPTION OF STRATA	R U N N O.	I N T E R V A L	R E C C O R D E E R Y	R Q D	D R I W E L L T U I E R N G	WATER PRESSURE TEST	E L E V A T I O N	MONITOR INSTALLATION
ft BG				%	%	%	cm/s	ft AMSL	
- 205	DOLOMITE (as above)								
- 210	- conformable, sharp contact DOLOMITE (CLINTON GROUP-DECEW FORMATION): medium to dark gray, thick to massive bedding fine to medium grained, few partings, trace fossils	23	210.0 211.7	60	100	87		367.2 365.5	3" Ø NX
- 215		24	216.7	124	100	71		360.5	
- 220	- void with gypsum & sphalerite	25	221.7	91	79	90		355.5	
- 225	- gradational contact SHALE (CLINTON GROUP - ROCHESTER FORMATION): black, fine grained, dolomitic. massive bedding, several fractured & weathered zones		224.0					353.2	
- 230			230.7					346.5	
- 235									

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

WATER FOUND

STATIC WATER LEVEL

NM - NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO.: OW45-86 (SHALLOW BEDROCK)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: APRIL 1, 1986
 HOLE TYPE: HOLLOW STEM AUGER (6-1/4" ID/11" OD) LOCATION: ALONG TOP OF BANK AT SOUTHEAST CORNER OF SITE
 GEOLOGIST/ENGINEER: D. MILLARD GROUND ELEVATION: 577.2 TOP OF PIPE ELEVATION: 579.10

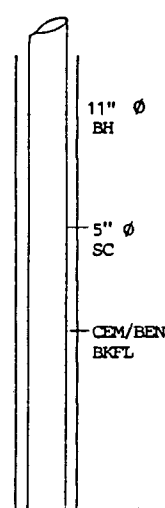
PROFILE		MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT				
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT	20	40	60	80
0	Brown TOPSOIL - some vegetation (FILL) Moist	579.10							
	Red-brown & black silty CLAY - some stone, Moist some cinders, occasional vegetation, occasional brick (FILL)	577.2							
		11" Ø BH							
	Brown silty CLAY with black CINDERS - Moist occasional stone, trace fine sand (FILL)								
5	Black FLYASH - occasional brown silty clay, Moist occasional cinder (FILL)	5" Ø SC							
	Brown, dark brown & black FLYASH, SILT, Wet CLAY, & CINDERS - occasional stone (FILL)								
	Black FLYASH - occasional yellow nodule, Moist occasional gray lense of soft waste material, piece of wood (FILL)								
10	Black FLYASH - occasional cinder, occasional Moist stone, occasional brown clayey lense, piece of wood (FILL)								
	Black FLYASH - some sand, occasional brown Moist cinder, occasional stone, trace clay, some gravel at 11.8' (FILL)								
	Augered through to 13.0'								
	Dark gray silty CLAY with vegetation Moist (NATIVE)								
	Dark gray silty fine SAND with vegetation Moist								
15	Dark gray SILT - some fine sand Wet								
	Gray clayey SILT - vegetation throughout Moist-wet								
	Gray fine sandy SILT - vegetation Moist-wet throughout	CEM/BEN BKFL							
	Gray silty fine SAND - occasional pebble, Moist vegetation throughout								
20	Gray fine SAND - trace silt, trace Wet vegetation								
	Gray medium to coarse SAND & GRAVEL - Wet trace silt								
	Gray SAND - trace silt Wet								
25	Gray fine SAND & SILT Wet								
	Gray medium SAND - some shells Wet								
30	Brown clayey SILT - trace fine gravel Wet (TILL)								
	Red-brown SAND, SILT & CLAY - fine Wet gravel throughout (TILL)								

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS

▼ WATER FOUND ▼ STATIC WATER LEVEL (57) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW45-86 Page 2. of 3
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: FEBRUARY 5, 1986
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: ALONG TOP OF BANK AT SOUTHEAST CORNER OF SITE
 CRA SUPERVISOR : D. MILLARD GROUND ELEVATION: * 577.2 TOP OF PIPE ELEVATION: * 579.10

PROFILE		MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
DEPTH	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT	20	40	60	80
35	Red-brown SAND, SILT & CLAY - fine gravel throughout (TILL) Wet	 11" Ø BH 5" Ø SC CEM/BEN BKFL 45.0'							
40	Gray-brown silty CLAY - trace fine sand, trace small pebbles Wet								
	Gray medium to fine SAND Moist								
	Gray silty, sandy CLAY Moist								
	Gray SILT, fine to medium SAND & STONE Moist-wet								
	Gray GRAVEL & medium SAND Wet								
	Gray fine to medium SAND & GRAVEL Wet								
45	NOTES: Well Casing: 6" diameter black steel Stratigraphy from BH43-85								

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: 102ND STREET LANDFILL

HOLE DESIGNATION: OW45-86 PAGE 3 OF 3

PROJECT NO.: 9-1431

DATE COMPLETED: APRIL 1, 1986

CLIENT: OCCIDENTAL CHEMICAL CORPORATION

DRILLING METHOD: 3" Ø NX CORE

LOCATION: TOP OF BANK AT SOUTHEAST CORNER OF SITE

CRA SUPERVISOR: D. MILLARD/C. PADGINTON

DEPTH	DESCRIPTION OF STRATA	R U N O.	I N T E R V A L	R E C O R D E R Y	R Q D	D R I W E L A T L T U D I E R N G	WATER PRESSURE TEST	E L E V A T I O N	MONITOR INSTALLATION
ft BG				%	%	%	cm/s	ft AMSL	
45	DOLOMITE (LOCKPORT GROUP - OAK ORCHARD FORMATION): brown-gray, medium grained, thinly bedded, numerous weathered partings, few shaly laminations, few vugs, occasional thin zones with weathered dolostone or stromatolite fragments	1	45.7	93	0	0		531.5	
50		2	47.4	93	15.6	0		529.8	
55		3	52.4	95	13.3	0		524.8	
60		4	57.4	87.5	12.6	0		519.8	
65			60.9					516.3	3" Ø BH
70									

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

WATER FOUND

STATIC WATER LEVEL

NM - NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW46-85 (SHALLOW BEDROCK)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: DECEMBER 7, 1985
 HOLE TYPE: HOLLOW STEM AUGER (8-1/4" ID/13" OD) LOCATION: NORTHWEST CORNER OF SITE
 GEOLOGIST/ENGINEER: D. MILLARD GROUND ELEVATION: * 575.6 TOP OF PIPE ELEVATION: * 578.89

DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT
			NUMBER	TYPE	
					20 40 60 80
		578.89			
0	Dark brown TOPSOIL - trace vegetation (FILL) Moist	575.6			
	Brown SILT - some clay, some fine sand, gray stone in spoon tip (FILL) Moist	13" Ø BH			
	Gray FLYASH/CINDER material - occasional stone (FILL) Dry				
5	Gray-black CINDERS & FLYASH - occasional gravel, occasional fibrous material (FILL) Dry				
	Black CINDER/FLYASH - some hardened tar, trace fibrous material (FILL) Dry				
	Black CINDER/FLYASH - some fibrous material (FILL) Dry-moist				
10	Black FLYASH - iridescent sheen on water (FILL) Moist-wet	5" Ø SC			
	Black TOPSOIL - some silt, some vegetation (NATIVE) Wet				
	Dark gray SILT - some clay, some fine sand, some clay, occasional vegetation Moist		1	SS	WOR
	Gray fine SAND - some silt, occasional vegetation Moist				
15	Gray SILT & fine SAND Wet				
	Gray SILT & fine SAND - becoming black, occasional vegetation decreasing with depth Wet	CEM/BEN BKFL	2	SS	8
			3	SS	3
			4	SS	5
20					
			5	SS	WOR
	Red-brown CLAY - highly plastic, occasional gray silty lense Wet				
			6	SS	WOR
25			7	SS	WOR
	Brown & red-brown CLAY Wet				
			8	SS	WOR
			9	SS	47
30	Red-brown SILT, fine SAND & GRAVEL, trace clay (TILL) Moist				
			10	SS	72
			11	SS	40

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS

▼ WATER FOUND ▼ STATIC WATER LEVEL (57) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW46-85 Page 2 of 3
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: DECEMBER 7, 1985
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: NORTHWEST CORNER OF SITE OF SITE
 CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: 575.6 TOP OF PIPE ELEVATION: 578.89

PROFILE		MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
DEPTH	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT				
						20	40	60	80
35	Red-brown & brown-gray SILT, fine SAND & Moist GRAVEL - trace clay (TILL)		12	SS	44 41 100				
	Augered to 37.0'								
	Brown-gray silty SAND Wet								
	Augered to 37.6'								
	Gray angular GRAVEL (Dolomite) Wet								
	Augered to 38.6'								
NOTES: Well Casing: 5" diameter black steel Stratigraphy 0-13.0' from OW31-85.									

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: 102ND STREET LANDFILL

HOLE DESIGNATION: OW46-85 PAGE 3 OF 3

PROJECT NO.: 9-1431

DATE COMPLETED: APRIL 4, 1986

CLIENT: OCCIDENTAL CHEMICAL CORPORATION

DRILLING METHOD: 3" Ø NX CORE

LOCATION: NORTHWEST CORNER OF SITE

CRA SUPERVISOR: D. MILLARD/C. PADGINGTON

DEPTH	DESCRIPTION OF STRATA	R U N N O.	I N T E R V A L	R E C C O R D E R Y	R Q D	D R I N G I N T E R N A L T U I E R N A L	WATER PRESSURE TEST	E L E V A T I O N	MONITOR INSTALLATION
ft BG				%	%	%	cm/s	ft AMSL	
35									13" Ø BH
									5" Ø SC
		1	38.0	90	0	100		537.6	CEM/BEN BKFL
40		2	39.2	100	48.5	100		536.4	
	DOLOMITE (LOCKPORT GROUP - OAK ORCHARD FORMATION): medium gray, thinly bedded, shaly laminations & partings, occasional calcareous shale pebbles								
45									3" Ø BH
	- becomes brown-gray, fine to medium grained								
		3	49.2	94.2	10.4	100		526.4	
50									
			53.2					522.4	
55									

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

WATER FOUND

STATIC WATER LEVEL

NM - NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW47-85 (ALLUVIUM WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: DECEMBER 14, 1985
 HOLE TYPE: HOLLOW STEM AUGER (8-1/4" ID/13" OD) LOCATION: SOUTHEAST CORNER OF SITE
 GEOLOGIST/ENGINEER: D. MILLARD GROUND ELEVATION: 575.4 TOP OF PIPE ELEVATION: 578.14

DEPTH (ELEVATION)	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT
			NUMBER	TYPE	
		Locking cap 578.14 575.4 13" Ø BH BS pipe			
0	Augered through				
5	Dark gray CINDERS & FLYASH - wood chips Moist-wet brick fragments (FILL)	CEN/BEN BKFL	1	SS	10
					8
	Dark gray CINDERS & SLAG - some flyash, Wet white brine sludge (FILL)		2	SS	17
					9
	Dark gray CINDERS, SAND & GRAVEL (FILL) Wet		3	SS	5
					50+
10	Dark gray CINDERS - fibrous waste material Wet (FILL)	10.0'	4	SS	5
	Dark gray to black SILT - vegetation Wet throughout (NATIVE)	BEN seal			10
		12.0'	5	SS	6
					10
15	Dark gray to black fine to medium SAND - Wet some silt	SD pack	6	SS	7
					13
			7	SS	8
					14
			8	SS	1
					5
20	Dark gray to black SILT & fine to medium Moist SAND - trace vegetation		9	SS	6
					17
			10	SS	2
					11
			11	SS	15
					18
25	Gray fine to medium SAND - some silt, Wet trace vegetation		12	SS	12
					21
	Gray medium SAND - some fine sand Wet		13	SS	3
					14
30	Gray medium to coarse SAND & GRAVEL - Wet trace silt, iridescent sheen on water, trace brown oily liquid, strong chemical odor (NAPL)	SS screen	14	SS	15
					45
	Red-brown CLAY Wet	33.0'	15	SS	43
					17

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW47-85 Page 2 of 2
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: DECEMBER 14, 1985
 HOLE TYPE: HOLLOW STEM AUGER (8-1/4" ID/13" OD) LOCATION: SOUTHEAST CORNER OF SITE
 CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: * 575.4 TOP OF PIPE ELEVATION: * 578.14

PROFILE		MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT				
DEPTH	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT				
						20	40	60	80
35	Red-brown CLAY	SD pack 13" Ø BH 35.5'							
	Wet								
	NOTES: Well Pipe: 2" diameter black steel Well Screen: 2" diameter, 5' length, #6 slot, stainless steel Sand Pack: Special coarse blend Ottawa sand								

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: BH47B-86 (BOREHOLE)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: APRIL 30, 1986
 HOLE TYPE: HOLLOW STEM AUGER (3-3/4" ID) LOCATION: 50' WEST OF OW47-86
 CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: 574.7 TOP OF PIPE ELEVATION: *

DEPTH	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT
			NUMBER	TYPE	BLOWS / FOOT	
0	Red-brown silty CLAY, VEGETATION & GRAVEL (FILL) Moist	574.7	1	SS	13	
	Dark gray & white FLYASH - some sand, some gravel (FILL) Moist				22	
	Mottled brown & yellow-brown SILT - some clay, some sand, occasional gravel (FILL) Dry				30	
	Dark gray FLYASH & white WASTE MATERIAL - piece of slag or steel in tip of spoon (FILL) Dry		2	SS	12	
	White WASTE MATERIAL - dark gray & dark brown flyash, some dark brown sand (FILL) Moist-dry				6	
5	No recovery Water level encountered at approximately 5.0', iridescent sheen on water surface		3	SS	WOF	
					1	
					2	
			4	SS	WOF	
					WOF	
10	Black & gray FLYASH & white WASTE MATERIAL - iridescent sheen, piece of plastic (FILL) Wet		5	SS	6	
	Dark gray mat of ROOTS & LEAVES decreasing with depth - some silt, trace sand, trace clay (NATIVE) Moist				12	
	Gray-brown SILT - some sand, occasional pebble, occasional root fiber Moist		6	SS	4	
	Mottled golden brown & gray-brown fine SAND & SILT, vegetation throughout Moist				7	
15	Gray fine SAND - some silt, occasional rounded & sub-rounded pebble, occasional root fibers decreasing with depth Wet	CEM/BEN BKFL	7	SS	10	
					10	
					15	
			8	SS	5	
	Gray fine SAND - trace silt Wet				3	
20			9	SS	7	
					6	
					10	
			10	SS	8	
					14	
25	Gray fine SAND - trace silt, white shell fragments (23-25'), occasional fine gravel lense (25-28'), occasional pebble (28-30') Wet	8" Ø BH	11	SS	16	
					29	
					39	
			12	SS	14	
					36	
30	Fine, medium & coarse SAND & fine GRAVEL - occasional fine gravel lense, occasional white shell fragments, trace NAPL at tip, trace red-brown silt Wet		13	SS	12	
					54	
					100	
	Coarse SAND & GRAVEL - occasional white shell fragment, brown NAPL Wet	35.0'	14	SS	12	
35	Red-brown CLAY - some silt, highly plastic Wet				13	

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: BH47B-86 Page 2 of 2
CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: APRIL 30, 1986
HOLE TYPE: HOLLOW STEM AUGER (3-3/4" ID) LOCATION: 50' WEST OF OW47-86
CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: 574.7 TOP OF PIPE ELEVATION: *

PROFILE		MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
DEPTH	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT	20	40	60	80
	NOTES: Borehole terminated at 35.0' grouted to surface.								

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
▼ WATER FOUND ▽ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: BH47C-86 (BOREHOLE)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: MAY 2, 1986
 HOLE TYPE: HOLLOW STEM AUGER (3-3/4" ID) LOCATION: 50' EAST OF OW47-86
 GEOLOGIST/ENGINEER: D. MILLARD GROUND ELEVATION: 575.1 TOP OF PIPE ELEVATION: *

DEPTH (ELEVATION)	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
			NUMBER	TYPE	BLOWS / FOOT	20	40	60	80
0	Brown & red-brown CLAY - vegetation & silty Moist topsoil at surface, occasional stone & brick fragment, some fine sand (FILL)	575.1 8" Ø BH CEM/BEN BKFL 15.0'	1	SS	16				
					31				
	Gray FLYASH - occasional stone (FILL) Dry				33				
			2	SS	6				
					4				
			3	SS	2				
5	Gray & dark gray FLYASH &/or FOUNDRY SAND Wet - occasional small stone, light brown NAPL (10-13') similar to hydraulic fluid				2				
					2				
			4	SS	2				
					3				
10			5	SS	28				
					10				
					16				
	Gray fine SAND - some silt, occasional Moist yellow & dark gray mottling, some root fibers, occasional rounded pebble (NATIVE)		6	SS	7				
15					11				
NOTES: Borehole terminated at 15.0', grouted to surface.									

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW48-86 (FILL WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: FEBRUARY 12, 1986
 HOLE TYPE: HOLLOW STEM AUGER (8 1/2" ID, 13" OD) LOCATION: NORTHEAST CORNER OF GRIFFON PARK
 CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: 572.6 TOP OF PIPE ELEVATION: 572.28

DEPTH	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT
			NUMBER	TYPE	
0	Mottled brown SILT, trace clay, trace vegetation Rry	Protective cover	1	SS	17
	Black, brown & white FLYASH & CINDERS, some Dry green glass, some slag, trace coal (FILL)	Locking cap 572.6			6
	Brown, red-brown & black SILT & CINDERS, slag Dry & flyash throughout, occasional stone, some glass, trace fine sand, wet at 3.8' (FILL)	572.28 CEM/BEN BKFL	2	SS	25
	Black & dark gray CINDERS & FLYASH, occasional Moist brown silt, some fine sand, some stone, trace glass (FILL)	BS pipe 3.0'			35
5	Black FLYASH, some stone, piece red clay tile, Wet trace iridescent sheen on water (FILL)	BEN seal 4.0'	3	SS	6
	Black FLYASH, trace stone, trace glass, trace Wet iridescent sheen on water (FILL)	13" Ø BH SD PK	4	SS	1
	Dark gray fine sandy SILT, trace vegetation Moist (NATIVE)	SS screen			3
10	Mottled brown & gray-brown silty CLAY, plastic Moist stiff	9.5' 10.0'	5	SS	5
					13

NOTES:
 Well Pipe: 2" diameter black steel
 Well Screen: 2" diameter stainless steel, #6 slot,
 5' length
 Sand Pack: Special coarse blend Ottawa sand

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW49-86 (FILL WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: FEBRUARY 18, 1986
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: EAST CENTRAL AREA OF GRIFFON PARK
 GEOLOGIST/ENGINEER: D. MILLARD GROUND ELEVATION: 572.4 TOP OF PIPE ELEVATION: 572.28

DEPTH (ELEVATION)	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT
			NUMBER	TYPE	
0		Protective cover Locking cap 572.4			
-	Brown SILT - some fine sand, some gray rock, Dry red clay tile fragments, trace vegetation (FILL)	572.28 CEM/BEN BKFL	1	SS	39
-	Black, dark gray, brown, & white FLYASH & CINDERS - some glass, silt, wood fragments, piece of porcelain, rusty metal fragments, piece of concrete in tip (FILL)	2.6'			15
-	Red-brown, white, gray, & black FLYASH & CINDERS - some glass, occasional wood fragments occasional piece of rusted metal, moist at 4.0' (FILL)	BEN seal 3.7'	2	SS	10
5		.85 pipe SD PK			4
-	Black CINDERS & FLYASH - some glass & wood fragments, iridescent sheen on water, asphalt odor (FILL)	13" Ø BH	3	SS	4
-	Dark gray SILT - fibrous roots & vegetation, rotting odor (NATIVE)	SS screen			3
10		9.5'	4	SS	4
-	Gray SILT - dark gray discoloration along some root channels, some fine sand, root fibers & occasional small stone	10.0'			5
-		12.0'			11
NOTES: Well Pipe: 2" diameter black steel Well Screen: 2" diameter stainless steel, #6 slot, 5' length Sand Pack: Special coarse blend Ottawa Sand					

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW50-86 (ALLUVIUM WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: FEBRUARY 20, 1986
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: EAST CENTRAL AREA OF GRIFFON PARK
 GEOLOGIST/ENGINEER: D. MILLARD GROUND ELEVATION: 572.4 TOP OF PIPE ELEVATION: 572.19

DEPTH (ELEVATION)	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT
			NUMBER	TYPE	
		Protective cover			
		Locking cap			
		572.4			
0	Brown SILT - some fine sand, some gray rock, Dry red clay tile fragments, trace vegetation (FILL)	572.19			
		13" Ø BH			
	Black, dark gray, brown, & white FLYASH & Dry CINDERS - some glass, silt, wood fragments, piece of porcelain, rusty metal fragments, piece of concrete in tip (FILL)	CEM/BEN BKFL			
	Red-brown, white, gray, & black FLYASH & Dry CINDERS - some glass, occasional wood fragments occasional piece of rusted metal, moist at 4.0' (FILL)	BS pipe			
	Black CINDERS & FLYASH - some glass & wood Wet fragments, iridescent sheen on water asphalt odor (FILL)	7.3'			
	Dark gray SILT - fibrous roots & vegetation, Wet rotting odor (NATIVE)	BEN seal			
10	Gray SILT - dark gray discoloration along Wet some root channels, some fine sand, root fibers & occasional small stone	10.0'			
	Dark gray SILT - root fibers throughout with Wet slight yellow mottling along root fibers to 13.0', fine sand & silt occasional pebble	SD PK	1	SS 10	
				12	
				12	
15			2	SS 4	
				5	
	Dark gray fine SAND & SILT - occasional darker Wet gray lenses, occasional small pebble, trace root fibers, increasing sand with depth, iridescent sheen on water	SS screen	3	SS 5	
				8	
				2	
20	Dark gray coarse SILT & fine SAND - some gravel Wet at 21.0', trace red-brown silt & sand (TILL) at tip, alluvium/till contact at ± 21.5' based on increasing blow counts	21.5'	4	SS 2	
		22.0'		70+	
NOTES: - Sampled 20.0-22.0' interval twice; once with 2' spoon and once with 3' spoon. - Stratigraphy 0-12.0' from OW49-86. - Stainless steel tape weight was lost in the well installation during sand placement. Well Pipe: 2" diameter black steel Well Screen: 2" diameter stainless steel, #6 slot, 5' length Sand Pack: Special coarse blend Ottawa Sand					

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW51-86 (FILL WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: FEBRUARY 20, 1986
 HOLE TYPE: HOLLOW STEM AUGER (8 1/2" ID, 13" OD) LOCATION: SOUTHEAST SECTOR OF GRIFFON PARK
 CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: * 572.2 TOP OF PIPE ELEVATION: * 572.00

PROFILE		MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT
DEPTH	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	
0	Brown & red-brown SILT, some sand, some clay, some vegetation, occasional pebble, metal fragments, cinders (FILL) Moist		1	SS	16
					11
	Red-brown SILT, cinders, some stone, piece of glass (FILL) Wet		2	SS	5
					3
	Gray, black & brown FLYASH, PAPER, & SILT, piece of tinfoil (FILL) Wet		3	SS	WOR
5					4
	Black PAPER, multilayered & very thin, piece of wood (FILL) Dry		4	SS	6
					6
	Black SILT, flyash, some wood, some paper, some glass fragments, trace iridescent sheen odor (asphalt) (FILL) Wet		5	SS	3
					4
10	Dark brown sandy SILT, vegetation (NATIVE) Moist				
NOTES: - Augers became entangled in steel cable at 5.0', moved ahead 3.0'; resampled 2.0-4.0' interval. Well Pipe: 2" diameter, black steel Well Screen: 2" diameter stainless steel, #6 slot, 5' length Sand Pack: Special coarse blend Ottawa sand.					

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▽ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW52-86 (ALLUVIUM WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: FEBRUARY 21, 1986
 HOLE TYPE: HOLLOW STEM AUGER (8 1/2" ID, 13" OD) LOCATION: SOUTHEAST SECTOR OF GRIFFON PARK
 CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: 572.2 TOP OF PIPE ELEVATION: 571.97

DEPTH	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
			NUMBER	TYPE	BLOWS / FOOT	20	40	60	80
0	Brown & red-brown SILT, some sand, some clay, some vegetation, occasional pebble, metal fragments, cinders (FILL) Moist	Protective casing Locking cap 572.2 571.97 13" Ø BH							
	Red-brown SILT, cinders, some stone, piece of glass (FILL) Wet	BS pipe CEM/BEN BKFL							
5	Gray, black & brown FLYASH, PAPER & SILT, piece of tinfoil (FILL) Wet								
	Black PAPER, multilayered & very thin, piece of glass, piece of wood (FILL) Dry								
	Black SILT, flyash, some wood, some paper, some glass fragments, trace iridescent sheen odor (asphalt) (FILL) Wet	9.0' BEN seal	1	SS	3				
10	Dark brown sandy SILT, vegetation (NATIVE) Moist	11.0'							
	Dark brown SILT & fine sand increasing with depth, vegetation throughout, occasional small pebble, iridescent sheen on water Wet		2	SS	15				
	Gray-brown medium-coarse SAND & silt, occasional root fiber, shell fragment Wet	SD pack							
15	Gray fine to medium SAND & silt, occasional pebble, occasional black coarse sand lense Wet		3	SS	4				
	Dark brown coarse SAND & gravel, some silt, occasional shell fragment Wet	SS screen	4	SS	12				
20	Red-brown sandy SILT, occasional gravel (TILL) Wet	20.5' 21.0' 22.0'	5	SS	18				
	NOTES: - Stratigraphy 0-10.0' from well OW51-86. Augered to 10.0' and began split spoon sampling. - At ± 17.0' a steel pipe wrench was lost in the borehole, recovery attempts were unsuccessful. Well Pipe: 2" diameter black steel Well Screen: 2" diameter stainless steel, #6 slot, 5' length Sand Pack: Special coarse blend Ottawa sand								

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS

▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW53-86 (BEDROCK WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: JANUARY 31, 1986
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: SOUTH SECTOR OF GRIFFON PARK
 GEOLOGIST/ENGINEER: D. MILLARD/D. OSCAR GROUND ELEVATION: * 571.6 TOP OF PIPE ELEVATION: * 571.10

DEPTH (ELEVATION)	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
			NUMBER	TYPE	BLOWS / FOOT	20	40	60	80
0	Dark gray SILT - some sand, some vegetation Moist (FILL)	Protective cover Locking cap 571.6	1	SS	39				
	Orange & dark gray SILT & FLYASH - Moist some slag (FILL)	571.10 11" Ø BH			30				
					16				
	Dark gray & orange SILT & flyash, trace Moist-wet gravel (FILL)		2	SS	3				
					4				
5	Black & dark gray SILT, sand & gravel, some clay, cloth (FILL)		3	SS	17				
					19				
	Black & dark gray coarse SAND & GRAVEL, Wet some silt, some concrete fragments, some paper (FILL)	5" Ø SC	4	SS	6				
					5				
10	Dark gray-brown SILT, some sand, trace Wet vegetation, increasing sand with depth, trace gravel, occasional dropstone (NATIVE)		5	SS	11				
					12				
					11				
			6	SS	3				
					6				
15	Dark gray fine to medium SAND, some silt, Wet some gravel, trace shell fragments	CEM/BEN BKFL	7	SS	6				
					8				
					12				
			8	SS	23				
					5				
20	Dark gray medium to coarse SAND & fine Wet gravel, trace white shell fragments		9	SS	8				
					13				
			10	SS	9				
					20				
25			11	SS	39				
					64				
					94				
	Red-brown fine sandy SILT, some gravel Moist trace clay, increasing gravel with depth (TILL) Large stone blocking spoon at 31.3', auger to 31.5', becoming dry at 31.5'		12	SS	30				
					62				
30			13	SS	100+				
					100+				
			14	SS	100+				
					100+				
					100+				
			15	SS	100+				

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS

▼ WATER FOUND ▼ STATIC WATER LEVEL (57) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW53-86 Page 2 of 3
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: JANUARY 31, 1986
 HOLE TYPE: HOLLOW STEM AUGER (6 1/2" ID, 11" OD) LOCATION: SOUTH SECTOR OF GRIFFON PARK
 CRA SUPERVISOR: D. MILLARD/D. OSCAR GROUND ELEVATION: 571.6 TOP OF PIPE ELEVATION: 571.10

PROFILE		MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT			
DEPTH	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT	20	40	60
35	Red-brown fine sandy SILT, some gravel, trace clay. Spoon refusals at 36.8', 38.3', 39.4', 40.8', & 41.3' Dry	11" Ø BH	16	SS	100+			
		5" Ø SC	17	SS	100+			
		CEM/BEN BKFL	18	SS	100+			
40		40.9' 41.3'	19	SS	100+			
	Red-brown fine sandy SILT & gravel, becoming gray rock fragments Wet		20	SS	100+			
	Auger refusal - 41.3'							
	NOTES: Well Casing: 5" diameter black steel							

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

(BEDROCK)

PROJECT NAME: 102ND STREET LANDFILL

HOLE DESIGNATION: OW53-86 Page 3 of 3

PROJECT NO.: 9-1431

DATE COMPLETED: APRIL 8, 1986

CLIENT: OCCIDENTAL CHEMICAL CORPORATION

DRILLING METHOD: 3" DIAMETER NX CORE

LOCATION: SOUTH SECTOR OF GRIFFON PARK

CRA SUPERVISOR: D OSCAR/C PADGINTON

DEPTH	DESCRIPTION OF STRATA	R U N N O.	I N T E R V A L	R E C O R D E E R Y	R Q D	D R I W E L A T U I E R N R G	WATER PRESSURE TEST	E L E V A T I O N	MONITOR INSTALLATION
ft BG				%	%	%	cm/s	ft AMSL	
40									13" Ø BH
		1	41.3	100	0.76	0		530.3	5" Ø SC
45	DOLOMITE (LOCKPORT GROUP - OAK ORCHARD FORMATION): brownish-gray, medium grained argillaceous, numerous shaly partings, very thin to medium bedding, few thin gypsum seams								CEM/BEN BKFL
50		2	50.0	100	0.46	0			3" Ø BH
55									
			57.3					514.3	
60									

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

WATER FOUND

STATIC WATER LEVEL

NM - NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW54-86 (FILL WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: FEBRUARY 17, 1986
 HOLE TYPE: HOLLOW STEM AUGER (8 1/2" ID, 13" DD) LOCATION: SOUTHWEST SECTOR OF GRIFFON PARK
 CRA SUPERVISOR: D BLACK/D MILLARD GROUND ELEVATION: * 571.0 TOP OF PIPE ELEVATION: * 570.71

PROFILE		MONITOR INSTALLATION	SAMPLE		PENETRATION TEST			
DEPTH	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT	20	40	60
0	Brown silty TOPSOIL, some vegetation, Dry some pebbles (FILL)	Protective cover Locking cap 571.0 570.71 13" Ø BH	1	SS	15			
					14			
	Brown SILT, some slag, some orange coloring, Dry some cinders, some wood, becoming wet (FILL)	CEM/BEN BKFL 3.0' BEN seal 4.0'	2	SS	7			
					5			
5	Black burned PAPER, some ashes, some silt Wet (FILL)	BS pipe	3	SS	3			
		SD pack	4	SS	18			
	Black CINDERS & silt, some pebbles, Wet some wood (FILL)				6			
		SS screen	5	SS	2			
		9.5' 10.0'			5			
10	Brown fine sandy SILT, some vegetation Wet (NATIVE)							
NOTES: Well Pipe: 2" diameter black steel Well Screen: 2" diameter stainless steel, #6 slot, 5' length Sand Pack: Special coarse blend Ottawa sand								

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▽ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW55-86 (ALLUVIUM WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: FEBRUARY 19, 1986
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: SOUTHWEST SECTOR OF GRIFFON PARK
 GEOLOGIST/ENGINEER: D. MILLARD GROUND ELEVATION: 571.1 TOP OF PIPE ELEVATION: 570.88

DEPTH (ELEVATION)	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
			NUMBER	TYPE	BLOWS / FOOT	20	40	60	80
0	Brown silty TOPSOIL - some vegetation, some pebbles (FILL) Dry	Protective casing Locking cap 571.1 570.88 13" Ø BH							
5	Brown SILT - some slag, some orange coloring, some cinders, some wood, becoming wet with depth (FILL) Dry	CEM/BEN BKFL BS pipe							
	Black burned PAPER - some ashes, some silt (FILL) Wet	7.7'							
	Black CINDERS & SILT - some pebbles, some wood (FILL) Wet								
10	Brown fine sandy SILT - some vegetation (NATIVE) Wet	BEN seal 10.0'	1	SS	1				
					9				
			2	SS	2				
					8				
			3	SS	7				
15	Dark gray SILT & fine SAND - occasional root fiber Wet				6				
			4	SS	6				
					6				
	Dark gray fine to medium SAND - some silt Wet	SD pack	5	SS	6				
20	Dark gray coarse to medium SAND - some silt, occasional shell fragment, occasional pebble Wet	SS screen	6	SS	41				
	Light gray fine to medium SAND - some silt, some small pebbles, occasional shell fragment Wet	22.5'			36				
	Dark gray fine to medium SAND & SILT Wet		7	SS	6				
	Red-brown SILT - some fine sand, trace pebbles, trace clay (TILL) Wet	24.0'			6				
25	NOTES: - Stratigraphy 0-10.0' from well OW54-86. Well Pipe: 2" diameter black steel Well Screen: 2" diameter stainless steel, #6 slot, 5' length Sand Pack: Special coarse blend Ottawa Sand								

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (57) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW56-86 (FILL WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: FEBRUARY 14, 1986
 HOLE TYPE: HOLLOW STEM AUGER (8 1/2" ID, 13" OD) LOCATION: WEST SIDE GRIFFON PARK
 CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: * 573.0 TOP OF PIPE ELEVATION: * 572.65

DEPTH	STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
			NUMBER	TYPE	BLOWS / FOOT	20	40	60	80
0	Brown & dark brown SILT & fine SAND, some vegetation, some glass, occasional stone some flyash, some cinders (FILL)	Protective casing Locking cap 573.0 572.65 13" Ø BH CEM/BEN seal	1	SS	39				
	Brown & rust-brown CINDERS, flyash, fine sand & silt, increasing flyash & cinder at 2.6' (FILL)				26				
					28				
	Brown SILT, gray plastic, some glass, piece of net fabric, some stone (FILL)	3.0' BEN seal 4.0'	2	SS	8				
					3				
5	Piece of gray PLASTIC, some CINDERS, some flyash (FILL)	BS pipe	3	SS	8				
		SD pack			5				
					3				
	Black & dark gray FLYASH & cinders, some glass, some wood, some plastic, some blue paper (FILL)	SS screen	4	SS	5				
					5				
10	Dark gray fine sandy SILT, occasional vegetation (NATIVE)	9.5' 10.0'	5	SS	1				
NOTES: Stratigraphy from OW57-86. Well Pipe: 2" diameter black steel Well Screen: 2" diameter, 5' long, #6 slot, stainless steel Sand Pack: Special coarse blend Ottawa sand									

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW57-86 (ALLUVIUM WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: FEBRUARY 14, 1986
 HOLE TYPE: HOLLOW STEM AUGER (8 1/2" ID, 13" OD) LOCATION: WEST SIDE GRIFFON PARK
 CRA SUPERVISOR: D. MILLARD/C. DUNNIGAN GROUND ELEVATION: 573.1 TOP OF PIPE ELEVATION: 573.05

DEPTH	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT
			NUMBER	TYPE	
0	Brown & dark brown SILT & fine SAND, some vegetation, some glass, occasional stone some flyash, some cinders (FILL)	Protective casing Locking cap 573.1 573.05 13" Ø BH	1	SS	39
	Brown & rust-brown CINDERS, flyash, fine sand & silt, increasing flyash & cinder at 2.6' (FILL)				26
	Brown SILT, gray plastic, some glass, piece of net fabric, some stone (FILL)	CEM/BEN BKFL	2	SS	8
5	Piece of gray PLASTIC, some cinders, some flyash (FILL)		3	SS	8
	Black & dark gray FLYASH & CINDERS, some glass, some wood, some plastic, some blue paper (FILL)	BS pipe	4	SS	5
10	Dark gray sandy SILT, increasing fine sand trace small pebbles, trace root fibers (NATIVE)	10.5' BEN seal 12.0'	5	SS	1
			6	SS	WOH
15			7	SS	WOR
			8	SS	WOR
20	Gray fine SAND & silt, trace vegetation	SD pack	9	SS	WOR
			10	SS	1
			11	SS	4
25	Gray fine to medium SAND, some stone, occasional white shell	SS screen	12	SS	8
	Gray coarse to medium SAND, some shell, occasional pebble	25.5'			2
	Red-brown SILT, occasional pebble, trace fine sand (TILL)	27.0'	13	SS	WOR
30	NOTES: Well Pipe: 2" diameter black steel Well Screen: 2" diameter stainless steel, #6 slot, 5' length Sand Pack: Special coarse blend Ottawa sand	29.0'			WOR

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (57) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: CWS8-86 (ALLUVIUM WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: FEBRUARY 5, 1986
 HOLE TYPE: HOLLOW STEM AUGER (8-1/4" ID/13" OD) LOCATION: SOUTH SIDE BUFFALO AVENUE
 CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: 573.7 TOP OF PIPE ELEVATION: 573.56

DEPTH	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT
			NUMBER	TYPE	
0	Dark brown SILT - some fine sand, trace - Moist-dry red-brown clay, occasional vegetation, trace wood fragments (FILL)	Protective cover Locking cap 573.7 573.56 CEM/BEN BKFL 2.0' 2.5'	1	SS	9
	Black & dark gray FLYASH - some slag, Moist occasional red brick fragment, piece of glass (FILL)		2	SS	18
	White WASTE MATERIAL - chunky, loose (FILL) Moist Yellow-brown & red-brown layered SILT - Moist slight mottling, some fine sand, occasional roots (NATIVE)	BEN seal BS pipe	3	SS	8
5	Mottled brown, red-brown & yellow CLAY - Moist occasional thin silt lense	SD pack			24
	Red-brown silty CLAY - occasional gray Moist silty lense	SS screen	4	SS	23
					50
	Red-brown silty CLAY - occasional gray Moist silty lense, occasional pebble, becoming more plastic with depth	13" Ø BH	5	SS	21
10		9.5' 10.0'			39
NOTES: Well Pipe: 2" diameter black steel Well Screen: 2" diameter, 5' long, #6 slot, stainless steel Sand Pack: Special coarse blend Ottawa sand					

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW59-86 (ALLUVIUM WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: FEBRUARY 7, 1986
 HOLE TYPE: HOLLOW STEM AUGER (8-1/4" ID/13" OD) LOCATION: NORTHWEST AREA OF SITE
 CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: 573.1 TOP OF PIPE ELEVATION: 576.11

DEPTH	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
			NUMBER	TYPE	BLOWS / FOOT	20	40	60	80
0	Dark brown silty TOPSOIL & VEGETATION - Moist trace fine sand, occasional gravel (FILL)	576.11 Locking cap	1	SS	7				
	Gray-brown sandy SILT - trace clay, Moist occasional gravel, trace vegetation, trace white waste material at tip (FILL)	573.1 CEM/BEN BKFL BS pipe 1.9' BEN seal 3.0'	2	SS	6				
	Light brown sandy SILT - trace clay, Moist occasional vegetation (FILL)				21				
	White WASTE MATERIAL with black & Moist yellow layers, silt size particles (FILL)	13" ø BH	3	SS	7				
5	Black CINDERS & FLYASH -trace red brick Wet fragments (FILL)	SD pack	4	SS	3				
	Dark brown CINDERS & black FLYASH -some Wet fine sand & silt, some red brick fragments (FILL)	SS screen			2				
	Dark gray FLYASH, CINDER, SILT & fine to Moist coarse SAND -trace brick fragment (FILL)	8.5'	5	SS	12				
	Slightly mottled brown & gray-brown silty Moist CLAY, plastic (NATIVE)	9.0'			26				
10	NOTES: Well Pipe: 2" diameter black steel Well Screen: 2" diameter, 5' length, #6 slot, stainless steel Sand Pack: Special coarse blend Ottawa sand								
		10.0'							

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW60-86 (ALLUVIUM WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: FEBRUARY 5, 1986
 HOLE TYPE: HOLLOW STEM AUGER (8-1/4" ID, 13" OD) LOCATION: SOUTH SIDE BUFFALO AVENUE
 CRA SUPERVISOR: D. MILLARD GROUND ELEVATION: 573.4 TOP OF PIPE ELEVATION: 573.18

DEPTH	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT
			NUMBER	TYPE	
		Protective - cover			
		Locking cap			
		573.4			
0	Dark brown SILT & CINDERS - some slag, occasional piece of glass & stone, trace root fibers (FILL) Moist	573.18	1	SS	7
	Gray-brown SILT & STONE - some cinders, occasional wood fragment, (FILL) Moist	CEM/BEN BKFL			6
	Mottled gray & yellow-brown clayey SILT - layering, occasional vegetation (FILL) Moist	2.0'	2	SS	17
	Mottled brown & yellow-brown clayey SILT - occasional root fiber (NATIVE) Moist	2.5'			22
5	Brown & red-brown silty CLAY - occasional silty nodule Moist	BEN seal			
		BS pipe	3	SS	6
		SD pack			26
		13" Ø BH	4	SS	30
					60
		SS screen	5	SS	21
					43
10		9.5'			
		10.0'			
NOTES: Well Pipe: 2" diameter black steel Well Screen: 2" diameter, 5' length, #6 slot, stainless steel Sand Pack: Special coarse blend Ottawa sand					

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW61-86 (ALLUVIUM WELL)
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: FEBRUARY 11, 1986
 HOLE TYPE: HOLLOW STEM AUGER (8-1/4" ID, 13" OD) LOCATION: NORTHEAST SECTOR OF LANDFILL
 CRA SUPERVISOR : D. MILLARD GROUND ELEVATION: * 573.6 TOP OF PIPE ELEVATION: * 576.95

DEPTH	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE		PENETRATION TEST BLOWS / FOOT
			NUMBER	TYPE	
		576.95 Locking cap			
0	Dark brown sandy SILT & VEGETATION - Dry-moist occasional pebble (FILL)	573.6	1	SS	13
	White WASTE MATERIAL - silt size (FILL) Dry	13" Ø BH			
	Red-brown fine SAND & SILT - occasional Dry	CEM/BEN			17
	pebble & cinder (FILL)	BKFL	2	SS	2
	White WASTE MATERIAL - occasional black, Moist-dry yellow & brown color, trace silt, trace fine sand, occasional root fiber, becoming wet (FILL)	2.5' BEN seal			2
		3.5' BS pipe	3	SS	3
5	Gray CINDERS & FLYASH - occasional red Wet brick fragment (FILL)				2
	Dark gray CINDERS & FLYASH - trace white Wet waste material (FILL)	SD pack	4	SS	2
	Gray-brown silty CLAY - trace root fibers, Dry-moist increasing plasticity with depth (NATIVE)	SS screen			13
			5	SS	14
	Brown silty CLAY, plastic Moist				38
10		9.5' 10.0'			
NOTES: Well Pipe: 2" diameter black steel Well Screen: 2" diameter, 5' length, #6 slot, stainless steel Sand Pack: Special coarse blend Ottawa sand Well could not be installed in original borehole due to repeated bridging of sand in augers. Moved approximately 5' south, reaugered and installed well. Grouted original borehole.					

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▽ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW62-87
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: MARCH 16, 1987
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: WEST SIDE OF LANDFILL
 GEOLOGIST/ENGINEER: D. OSCAR GROUND ELEVATION: * TOP OF PIPE ELEVATION: *

DEPTH (ELEVATION)	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
			NUMBER	TYPE	BLOWS / FOOT	20	40	60	80
0	Gray fine to coarse GRAVEL - some sand, Wet trace silt (FILL)	Locking cap	1	SS	9				
	Black SILT - some fine sand, trace gravel, Moist occasional sand & silt nodule (FILL)	13" Ø BH			12				
	Mottled red-brown CLAY - some silt, trace Moist-wet fine sand, gravel, pebbles (FILL)		2	SS	4				
					7				
	Black FLYASH - trace brick fragments, Dry vegetation, gravel (FILL)		3	SS	8				
5	Light brown WASTE MATERIAL - trace gravel Moist ceramic fragments (FILL)				6				
	Black FLYASH - trace gravel, stone Moist fragment, brick fragment (FILL)		4	SS	1				
		BS pipe			3				
	Black FLYASH - some vegetation, trace Wet gravel, brick fragments, paper (FILL)		5	SS	1				
	Black & dark brown FLYASH - some stone Wet fragments, trace vegetation, gravel (FILL)				10				
10			6	SS	1				
	Black FLYASH - trace gravel, brick Wet fragments (FILL)				1				
			7	SS	1				
	Black VEGETATION - some wood, flyash, Wet one stone fragment (FILL)	CEM/BEN BKFL			3				
	Black FLYASH - trace sand, vegetation (FILL) Wet		8	SS	2				
15					5				
	Mottled gray & olive-gray fine SAND - Moist-wet some silt, trace vegetation (NATIVE)		9	SS	4				
	No recovery				4				
			10	SS	3				
					2				
20	Gray fine to medium SAND - some silt, Wet trace vegetation, trace pebbles at 22.0'-24.0'		11	SS	1				
					2				
			12	SS	1				
					25				
25	Gray fine to coarse SAND & fine to medium Wet GRAVEL - some silt, trace shells & shell fragments, stone fragments, gravel is angular to rounded	25.0' BEN seal	13	SS	22				
	Red-brown SILT - some clay, fine to medium Wet subangular gravel, trace fine to medium sand increasing with depth	27.1'	14	SS	2				
					19				
	Dark gray fine to medium SAND - some silt, Wet trace gravel & shell fragments	SS screen	15	SS	44				
30	Red-brown SILT - some fine to medium sand, Wet stone fragments, trace clay, fine to medium gravel, stone & gravel ranges from angular to rounded at 30.0'-33.2', layer of stone fragments at 32.2'-32.3'	SD pack	16	SS	29				
					63				
			18	SS	88				
					100				
	Spoon refusal - 33.2'; auger refusal - 33.3'	33.3'							

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▽ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW62-87 Page 2 of 2
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: MARCH 16, 1987
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: WEST SIDE OF LANDFILL
 GEOLOGIST/ENGINEER: D. OSCAR GROUND ELEVATION: * TOP OF PIPE ELEVATION: *

PROFILE		MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT			
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT				
						20	40	60	80
	NOTES: Well Pipe: 2" diameter black steel Well Screen: 2" diameter stainless steel, #6 slot, 5' length Sand Pack: Special coarse blend Ottawa sand								

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▽ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: 102ND STREET LANDFILL JOB NO: 9-1431 HOLE NO: OW63-87
 CLIENT: OCCIDENTAL CHEMICAL CORPORATION DATE COMPLETED: MARCH 18, 1987
 HOLE TYPE: HOLLOW STEM AUGER LOCATION: WEST SIDE OF LANDFILL
 GEOLOGIST/ENGINEER: D. OSCAR GROUND ELEVATION: * TOP OF PIPE ELEVATION: *

DEPTH (ELEVATION)	PROFILE STRATIGRAPHY DESCRIPTION & REMARKS	MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLDWS / FDOT			
			NUMBER	TYPE	BLOWS / FOOT	20	40	60	80
0	Gray fine to coarse GRAVEL - some sand, Wet trace silt (FILL)	Locking cap							
	Black SILT - some fine sand, trace gravel, Moist occasional sand & silt nodule (FILL)	13" Ø BH							
	Mottled red-brown CLAY - some silt, trace Moist-wet fine sand, gravel, pebbles (FILL)	BS pipe							
	Black FLYASH - trace brick fragments, Dry vegetation, gravel (FILL)	CEM/BEN BKFL							
5	Light brown WASTE MATERIAL - trace gravel Moist ceramic fragments (FILL)	4.4'							
	Black FLYASH - trace gravel, stone Moist fragment, brick fragment (FILL)	BEN seal 5.8							
	Black FLYASH - some vegetation, trace Wet gravel, brick fragments, paper (FILL)	SD pack							
	Black & dark brown FLYASH - some stone Wet fragments, trace vegetation, gravel (FILL)								
10	Black FLYASH - trace gravel, brick Wet fragments (FILL)	SS screen							
	Black VEGETATION - some wood, flyash, Wet one stone fragment (FILL)								
	Black FLYASH - trace sand, vegetation (FILL) Wet								
15		14.4' 14.5'							
NOTES: Stratigraphy from OW62-87 Well Pipe: 2" diameter black steel Well Screen: 2" diameter stainless steel, #6 slot, 5' length Sand Pack: Special coarse blend Ottawa sand									

* REFER TO "WATER ELEVATIONS" TABLE FOR CURRENT REFERENCE ELEVATIONS
 ▼ WATER FOUND ▼ STATIC WATER LEVEL (37) GRAIN SIZE ANALYSIS

102ND STREET LANDFILL
STRATIGRAPHIC AND INSTRUMENTATION LOGS
REMEDIAL INVESTIGATION
OLIN CORPORATION

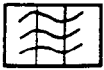
Key to Symbols



FILL



FILL, WITH RUBBLE



CHEMICAL WASTE FILL



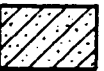
SEWER BEDDING MATERIAL



ALLUVIUM WITH VEGATIVE
MATTER



ALLUVIUM - POORLY GRADED
SAND AND GRAVELLY SAND



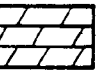
ALLUVIUM - SAND/SILT MIXTURES



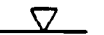
GLACIAL TILL



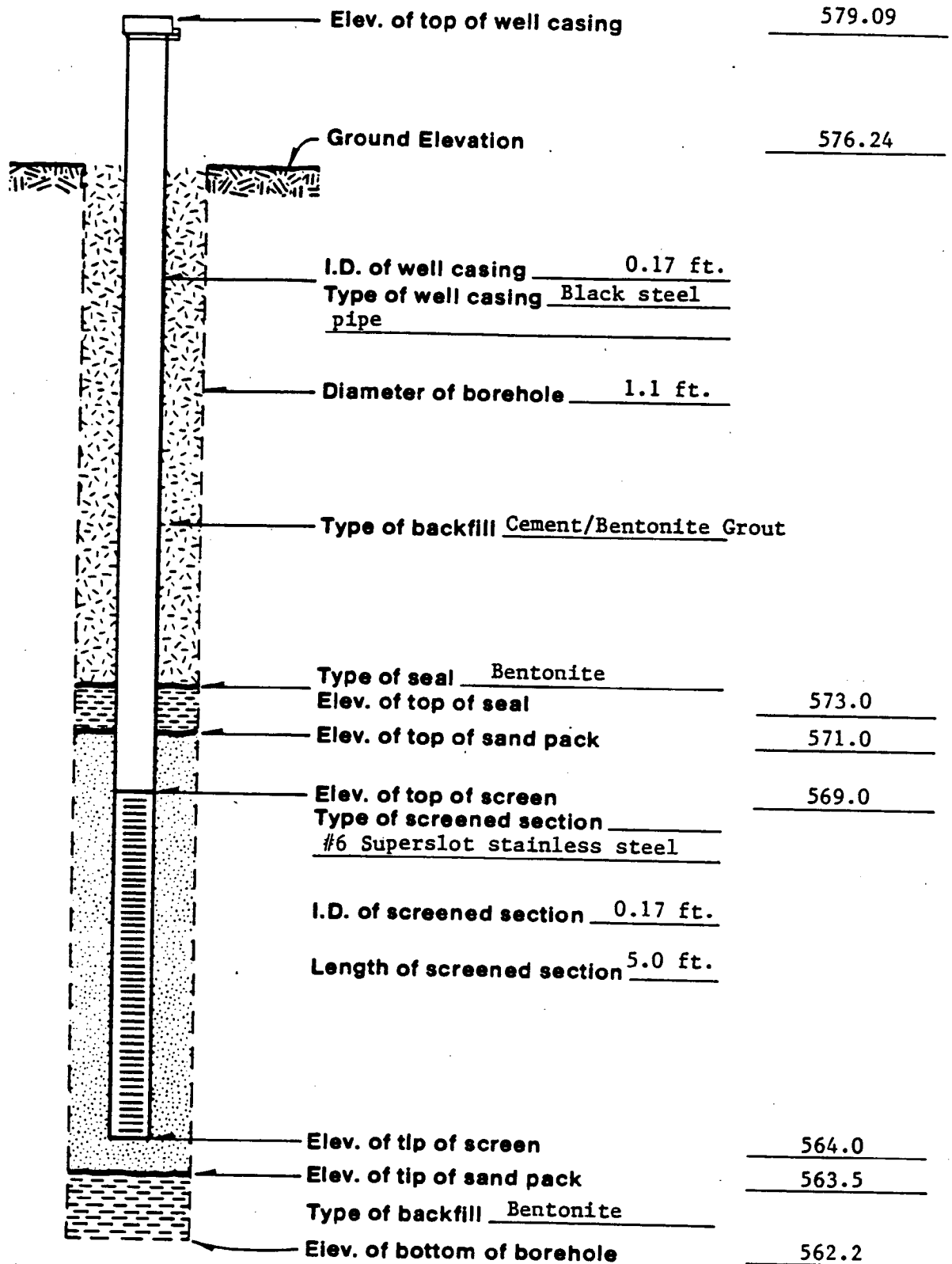
GLACIOLUCUSTRINE CLAY



LOCKPORT DOLOMITE



WATER ELEVATION AT TIME
OF DRILLING

**REPORT OF MONITORING WELL NO. MW-1**

DRAWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2136-10

DATE: 8/15/86

FIGURE NO:

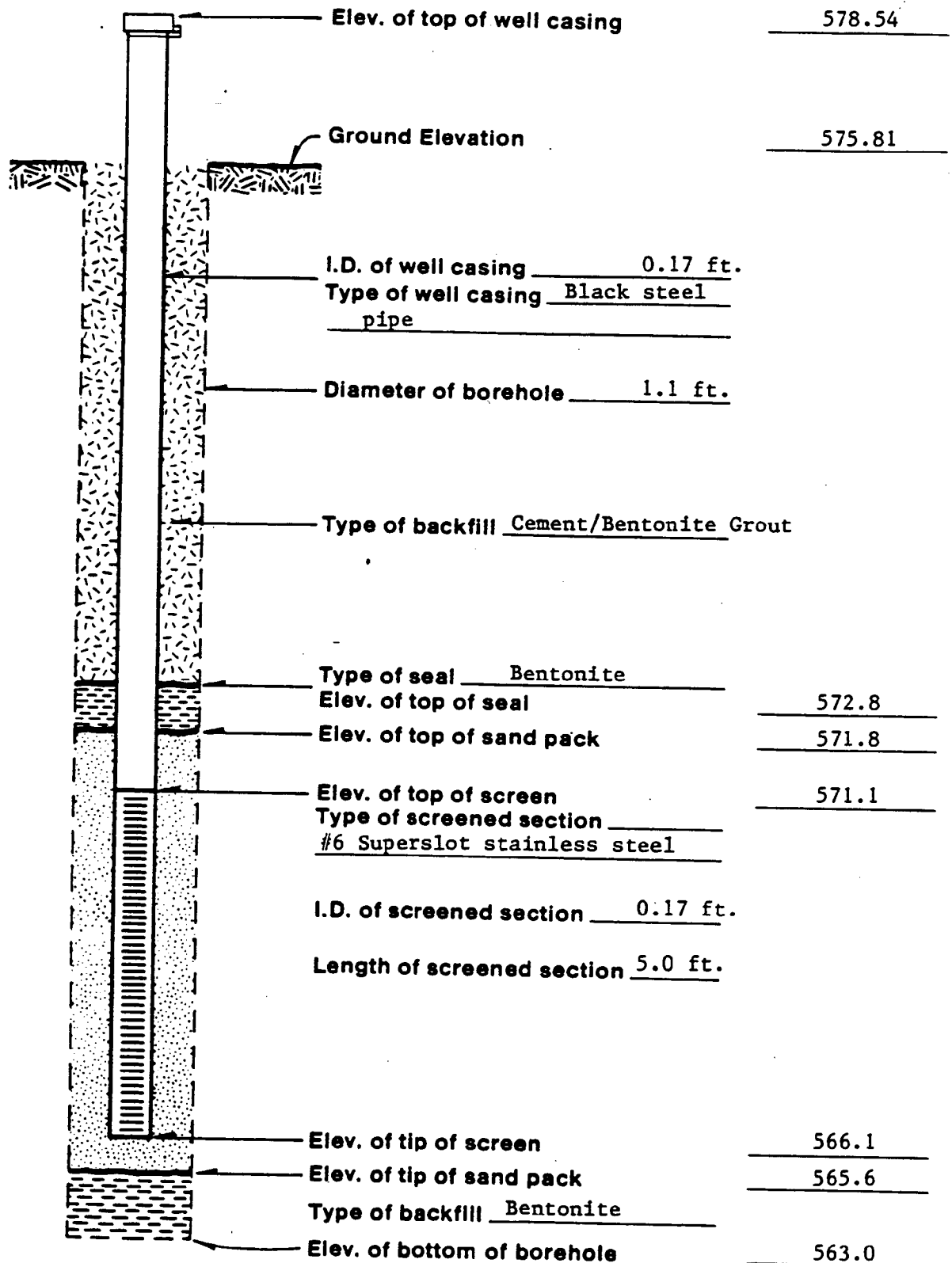
LOG of BORING No. MW-1

102nd St. Landfill

DATE 11/8/85 SURFACE ELEVATION 576.24 LOCATION Niagara Falls, NY

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRAPHIC LOG
0					
	16		Stiff, medium brown to medium red-brown SILTY CLAY with cinders, brick chips and subrounded gravel, moist, low plastic (CL CLAY CAP FILL)	573.74	
	10		Very stiff medium red brown SILTY CLAY with trace coarse sand and cinders, moist, medium to high plastic (CL Clay Cap Fill)	572.74	
5	53				
	80/3"				
	7		Dense, light gray to light gray-brown FLYASH, very fine grained with 1 mm laminations, dry (FILL)		
10	10		- becoming dark gray and moist at 9 feet to 10 feet		
			- brick chips and gravel at 12 feet, becoming saturated	564.9	
	12			563.74	
	2				
15			Soft, olive brown SILTY CLAY with abundant vegative matter and trace fine sand, saturated, low plastic (CL ALLUVIUM)		

Completion Depth 562.24 Feet Water Depth 564.9 Feet ATD Date
 Project Name 01in 102nd Street Landfill Project Number 84C2136

**REPORT OF MONITORING WELL NO. MW-2**

DRAWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2136-10

DATE: 8/15/86

FIGURE NO:

LOG of BORING No. MW-2

Niagara Falls

DATE 8-19-86

SURFACE ELEVATION 575.81

LOCATION New York

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRAPHIC LOG
0					
	11		Stiff medium yellow brown SILTY CLAY with trace fine sand, brick chips, cinders, slightly moist, low plastic (CL CLAY CAP FILL)	574.81	
	67		Very stiff becoming firm dark grey to black fine sandy SILTY CLAY containing chemical waste, brick chips and wood, low plastic, wet to saturated (Fill)	571.81	
5	9			569.81	
	13		Firm, dark gray to black very fine grained FLY ASH with medium to coarse sand and fine gravel, wood fragments, metal drum shrap, and fibrous material, wet becoming saturated. Samples have oily sheen (Fill)		
10	25		- At 8 feet to 10 feet becoming very black, oily sludge with abundant metal shrap	565.41	
	13				
15			Stiff light to medium mottled olive gray to olive brown SANDY SILT with trace clay, wet to saturated, low plastic (SM ALLUVIUM)		

Completion Depth 563.81 Feet

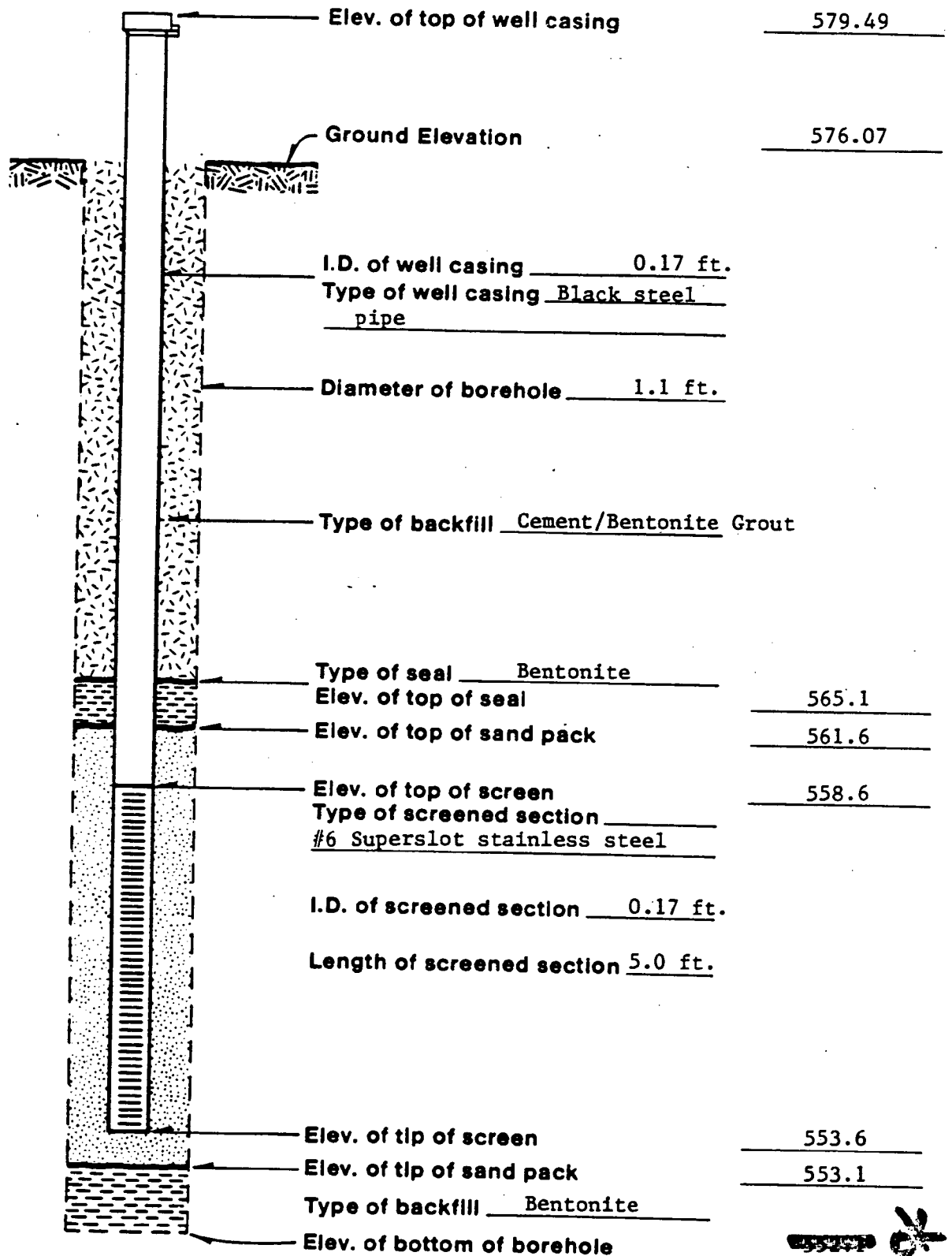
Water Depth 569.81 Feet

ATD

Date

Project Name Olm 102nd Street Landfill

Project Number 84C2136

**REPORT OF MONITORING WELL NO. MW-3**

DRAWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2136-10

DATE: 8/15/86

FIGURE NO:

LOG of BORING No. MW-3

Niagara Falls
New York

DATE 12/16/85

SURFACE ELEVATION 576.07

LOCATION

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRAPHIC LOG
0					
	20		Stiff, dark red-brown SILTY CLAY with brick chips, moist, low to medium plastic (CL CLAY CAP FILL)	574	
	14		Firm to stiff, dark red-brown to dark brown SILTY CLAY with abundant 1 to 2 cm angular rock clasts, wood and plastic, Brick chips and cement fragments, moist, low plastic (CL DEMOLITION DEBRIS FILL)		
5	7				
	6			567.8	
10	10		Firm dark gray to black SLAG (chemical waste), moist nonplastic (FILL)	566.0	
	71		Hard, dark gray to black very fine grained FLY AND with brick, rock and wood fragments, dry, nonplastic (FILL)	563.5	
	3				
15	13		Firm, medium gray-brown to medium gray, fine SILTY SAND with trace clay, wet, low plastic, abundant vegetative matter in upper 2 feet (SM ALLUVIUM)		
	9				
	4			556.0	
20	39		Medium dense, dark gray fine to coarse SAND with rounded fine gravel, saturated (SP/SW ALLUVIUM)	555.2	
	4				
25	4		Firm to stiff, salmon, SANDY SILTY CLAY with 1 mm to 2 mm angular to sub-angular gravel, saturated, low to medium plastic (CL, GLACIAL TILL)		

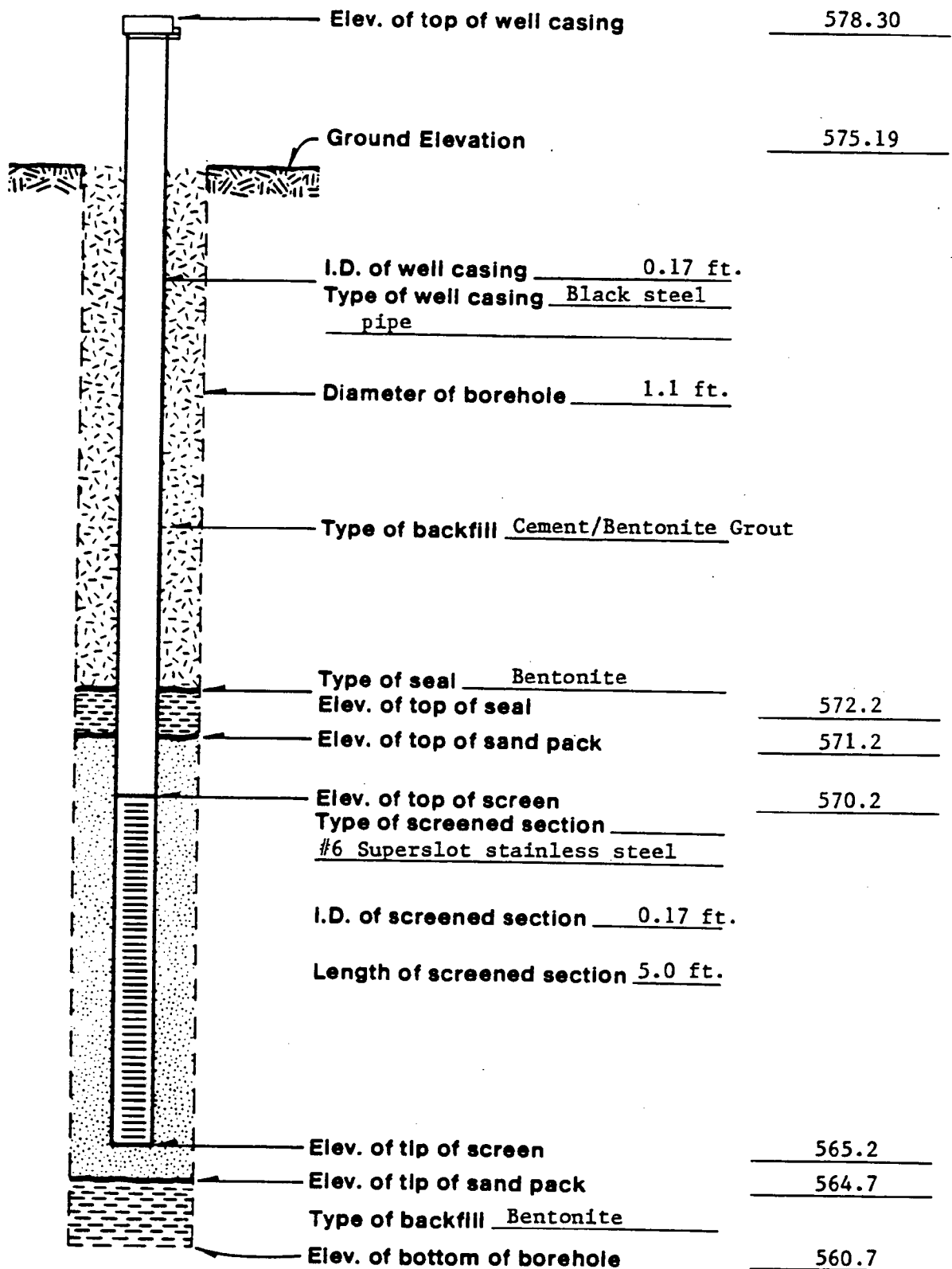
Completion Depth 549.5 Feet

Water Depth 566.0 Feet

Date

Project Name Olin 102nd Street Landfill

Project Number 84C2136

**REPORT OF MONITORING WELL NO. MW-4**

DRAWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2136-10

DATE: 8/15/86

FIGURE NO:

LOG of BORING No. MW-4

Niagara Falls
New York

DATE 12-17-85

SURFACE ELEVATION 575.19

LOCATION

New York

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRAPHIC LOG
0					
		37	Hard, dark gray CLAYEY SILT with fly ash intermixed and rock fragments, moist, low plastic (CL CLAY CAP FILL)	571.9	
		90			
5		5	Firm, dark gray to black CLAYEY SILT with fly ash, rounded pebbles, concrete fragments, brick fragments, moist, low plastic, oily sheen (FILL)	568.2	
		12			
10		1	Soft, black oily SLUDGE with concrete and paper fragments, wet, strong odor (FILL)	564.2	
		6			
		3	Firm, brown to red brown organic SILTY CLAY with trace fine sand, wet, low plastic (CL/OL ALLUVIUM)		
15					

Completion Depth 561.20 Feet

Water Depth 568.2 Feet

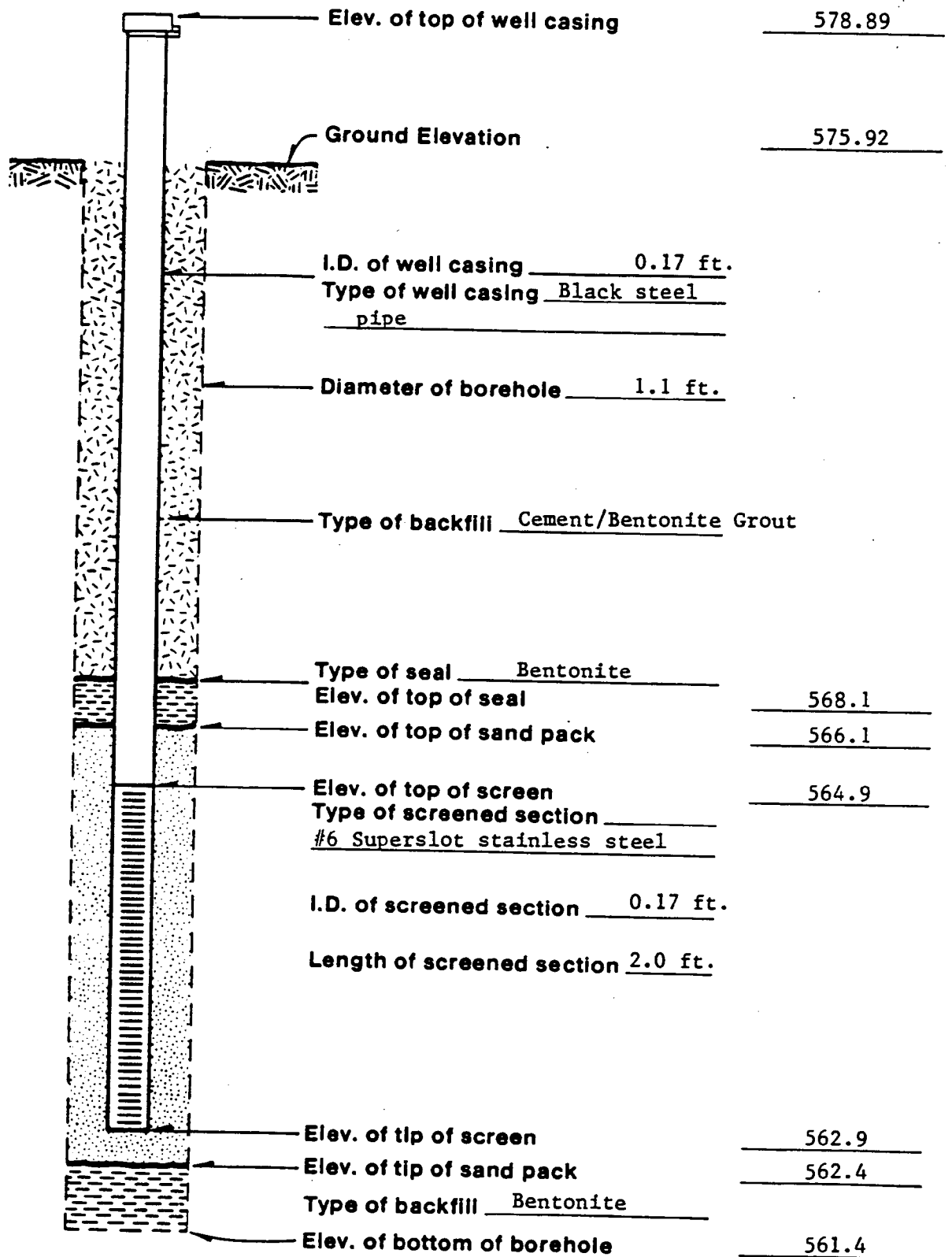
AT0

Date

Project Name 01 in 102nd Street Landfill

Project Number 84C2136



**REPORT OF MONITORING WELL NO. MW-5**

DRAWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2136-10

DATE: 8/15/86

FIGURE NO:

GROUND WATER OBSERVATION

At _____ Ft. at Completion
 At _____ Ft. after _____ hrs.
 At _____ Ft. after _____ hrs.
 At _____ Ft. after _____ hrs.

JOB 102nd Street NO. 84C2136
 DRILLING RIG Acker AD3
 OPERATOR Russell Waddel - PA Drlg.
 INSPECTOR Tim Giles

BORING NUMBER MW-8
 BORING OFFSET _____
 SURFACE ELEVATION 576.5
 DATE START 12/5/86 FINISH 1/20

DEPTH	CORE RUN		RQ D		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	DIP
136										2		
137										2	15°	
138										0		
139										1		
140	Run 1 139.0' - 145.5'	72.5" 78.0"	7.0' 6.5'						Medium grey, medium grained. medium to thick bedded mottled Dolomite with stylolites	1		
	Interval G	=93%	=108%						Oak Orchard	1		
141										3		
142									Medium to light grey, medium grained medium bedded, sparsely Crynoidal Dolomite with stromatolite and carbonaceous seams	1		
143									Eramosa	2		
144										3	15° 45°	
145										1		
146	Run 16 145.5' - 154.0'	99.2" 102"	7.9 8.5							0		
147	Interval H	=98%	=93%							0		
148												

GENERAL NOTES:

bedding dip horizontal unless otherwise noted.

Total Depth _____

'ROCK' Drilling _____

portions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO.

At _____ Ft. after _____ hrs.

INSPECTOR Tim Giles

DATE START 12/5/86 FINISH 1/20

HOLE NO.	
----------	--



GROUND WATER OBSERVATION

At _____ Ft. at Completion

At _____ Ft. after _____ hrs.

At _____ Ft. after _____ hrs.

At _____ Ft. after _____ hrs.

JOB 102nd Street NO. 84C2136

DRILLING RIG Acker AD3

OPERATOR Russell Waddel - PA Drlg.

INSPECTOR Tim Giles

BORING NUMBER MW-8

BORING OFFSET _____

SURFACE ELEVATION 576.5

DATE START 12/5/86 FINISH 1/20

CORE RUN	RQ D	RECOVERY	Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
						No./Ft.	DIP	
From	To	Inch	%	Inch	%			
Run 18	160.5' - 169.0'	98.4"	=96%	8.5'	=100%			
Interval	I							
						1		
						2		
						4		
						3		
						1		
						1		
						0		
						1		
						1		
						0		
Run 19	169.0' - 173.3'	42"	=81%	4.3'	=100%			
Interval	I							
						3		
						3		

GENERAL NOTES:

bedding dip horizontal unless otherwise noted

Total Depth _____

"ROCK" Drilling _____

portions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO.

LOG of BORING No. MW-5

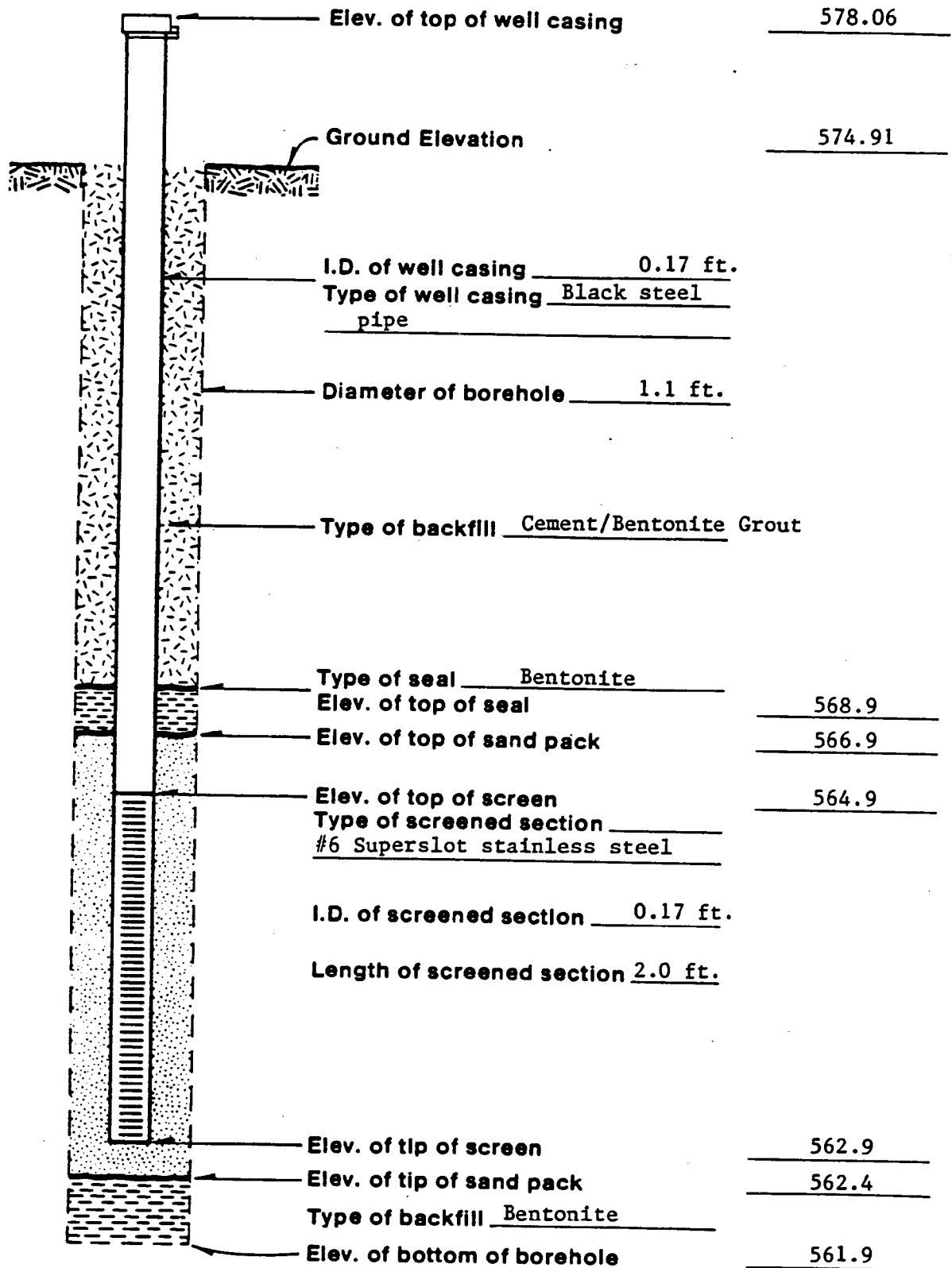
Niagara Falls

DATE 12-19-86 SURFACE ELEVATION 575.92 LOCATION New York

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRAPHIC LOG
0					
		22	Hard, red brown to orange, sandy SILTY CLAY with brick, coal and rock fragments, moist, low plastic (CL	573.4	
		11	CLAY CAP FILL)		
5		10	Firm, dark gray to black fine grained FLY ASH with coal brick fragments and cinders intermixed with black sludge, moist, nonplastic (FILL)	569.9	
		42	Hard, dark gray very fine grained FLY ASH with brick, coal and cinder fragments, dry (FILL)	565.9	
10		37		564.91	
		17	Wood fragments, clay tile fragments, brick chips and gravel (SEWER BEDDING MATERIAL)		
15		4	Soft, black SILTY SAND with vegative matter, wet, low plastic, NAPL present in upper 1 to 1.5 feet (SM ALLUVIUM)		

Completion Depth 561.9 Feet Water Depth 565.9 Feet ATD Date _____
 Project Name Olin 102nd Street Landfill Project Number 84C2136



**REPORT OF MONITORING WELL NO. MW-6**

DRAWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2136-10

DATE: 8/15/86

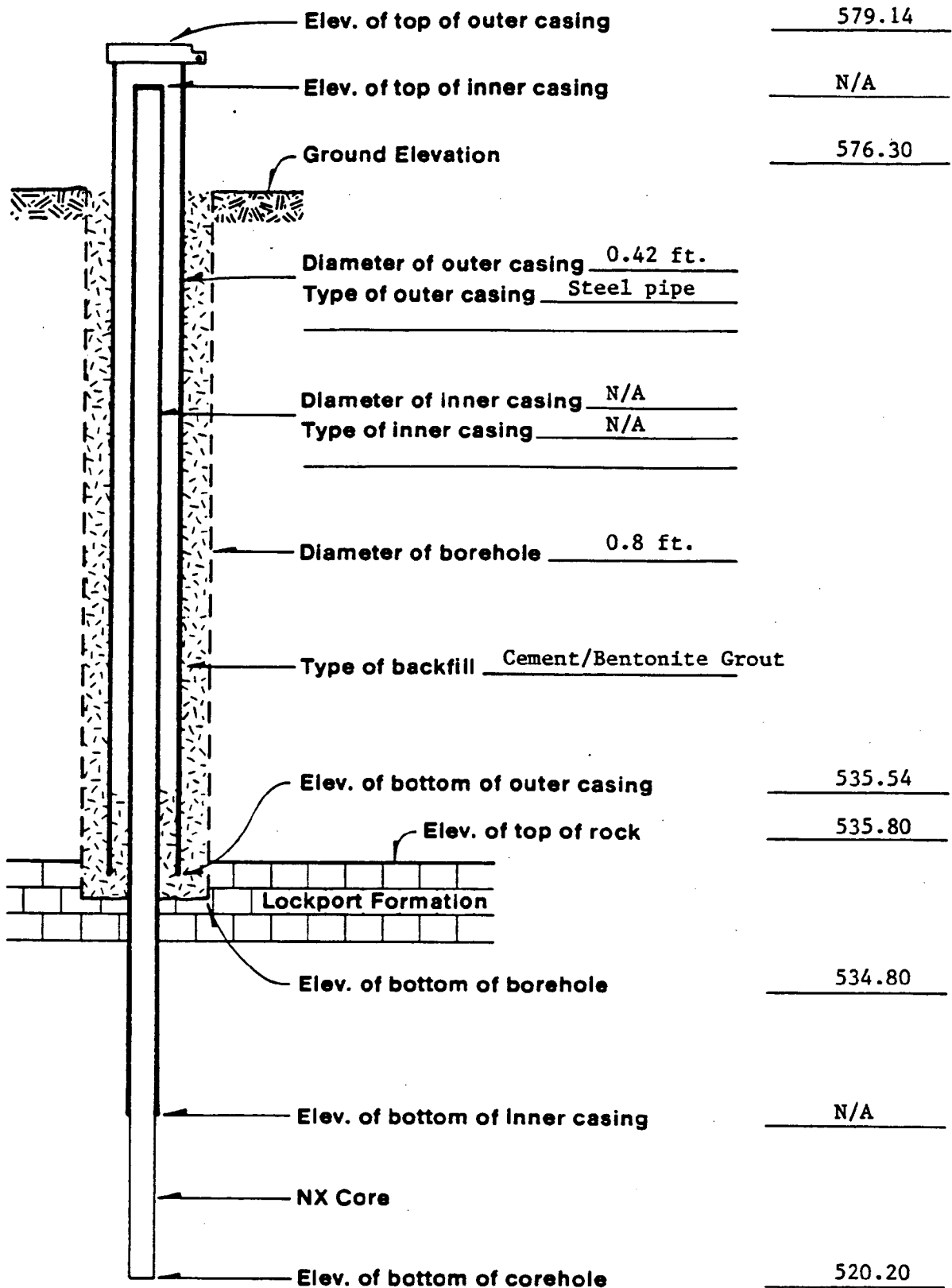
FIGURE NO:

LOG of BORING No. MW-6

DATE 1-7-86 SURFACE ELEVATION 574.91 LOCATION Niagara Falls New York

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRAPHIC LOG
0					
		18	Stiff, medium red brown to medium brown SILTY CLAY with trace coarse sand, moist, low plastic (CL CLAY CAP FILL)	572.5	
		18	Stiff, medium brown SILTY CLAY with trace medium to coarse sand and root debris, moist, low plastic (CL Fill)	570.4	
5		15	Firm to stiff, dark gray with red brown mottling SILTY CLAY with fly ash, rock fragments, cement fragments and abundant demolition rubble, moist, low plastic (CL LEVY FILL WITH RUBBLE)	565.1	
10		65/3"			
		30	2 inches fine to coarse sand over whole brick (SEWER BEDDING)	564.4	
15			Firm to stiff, dark gray to blue gray SILTY CLAY with trace fine sand, abundant vegative matter, moist to wet, low plastic (CL/OH ALLUVIUM)		

Completion Depth 562.9 Feet Water Depth NONE Feet ATD Date _____
 Project Name 011n 102nd Street Landfill Project Number 84C2136



REPORT OF MONITORING WELL NO. MW-7

DRAWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2136-10

DATE: 8/15/86

FIGURE NO:

LOG of BORING No. MW-7

Niagara Falls
New York

DATE 1-13-86

SURFACE ELEVATION 576.30

LOCATION

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRAPHIC LOG
0			Clean crushed limestone GRAVEL (DRILLING PLATFORM BERM FILL) - Augers advanced to 4 feet without sampling	572.3	
5	27		Firm to stiff, medium red brown SILTY CLAY with demolition debris and large riprap rock intermixed, moist, low plastic (LEVY FILL)		
	11				
10	60/3"		- split spoon refusal from 9.5 feet to 13 feet due to large debris	▽ 563.3	
15	13		Soft to firm, dark gray to olive gray very fine SANDY SILTY, wet, low plastic, abundant vegetative matter in upper portions (SM ALLUVIUM)		
	12				
20	3			554.8	
	9		Loose, dark gray fine SAND and fine to medium, well rounded gravel with trace silt, wet (SP ALLUVIUM)	553.8	
25	9				
	10		Firm, red brown to salmon, sandy SALTY CLAY with 1 to 5 cm. sub angular gravel, wet, low plastic (CL GLACIAL TILL)		
30	19				
	48		Becoming firm to stiff at 29 feet. Becoming hard at 32 feet.		
35	137				
	56				
40	53			535.8	
			Lockport Dolomite		

Completion Depth 535.8 Feet

Water Depth 563.3 Feet

ATD Date

Project Name 01in 102nd Street Landfill

Project Number 84C2136



GROUND WATER OBSERVATION

At _____ Ft. at Completion
 At 564.85 Ft. after 18 hrs.
 At _____ Ft. after _____ hrs.
 At _____ Ft. after _____ hrs.

JOB 01 in 102nd St. NO. 84C2136-5DRILLING RIG CME 55 w/10'NX BarrelOPERATOR Darryl AltroggeINSPECTOR R. KarrBORING NUMBER MW-7BORING OFFSET N/ASURFACE ELEVATION 576.30DATE START 4-16-86 FINISH 4-16-86

DEPTH BELOW SURFACE	CORE RUN		RQ D		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED DIP
	From	To	Inch	%	Inch	%				No./Ft.	DIP	
								39.6'	Airspace in casing			
-40	39.6/ 44.6		43%		96%		NX					
-41							13 min. /ft.	41.4'	Grout at casing bottom	N/A		
-42							7 min. /ft.	42.9'	Dolomite, medium gray to dark gray brown, slight weathering in first 18 inches, thin to very thin bedding, numerous solution vugs, gypsum crystals in vugs, very fine crystalline structure	8		
-43							17 min. /ft.		Becoming light to olive-gray, fewer fractures, solution vugs and gypsum crystals absent, bedding thin, non-weathered	2.6		
-44												
-45	44.6/ 54.6		59.5%		98%		17 min. /ft.		Medium gray, thin bedded, non-weathered, fracture surfaces are oxidized, a very fine crystalline texture, gypsum lining some fractures.	5		
-45												

GENERAL NOTES:

Fracture and bedding dip is near horizontal or very slight

 Total Depth _____
 'ROCK' Drilling _____

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO.



GROUND WATER OBSERVATION				JOB <u>01 in 102nd St.</u> NO <u>84C2136</u>		BORING NUMBER <u>MW-7</u>	
At _____ Ft. at Completion				DRILLING RIG <u>CME 55 w/NX 10'</u>		BORING OFFSET <u>N/A</u>	
At _____ Ft. after _____ hrs.				OPERATOR <u>Darryl Altrogge</u>		SURFACE ELEVATION <u>576.30</u>	
At _____ Ft. after _____ hrs.				INSPECTOR <u>R. Karr</u>		DATE START <u>4/16/86</u> FINISH <u>4/16/</u>	

DEPTH BELOW SURFACE	CORE RUN		RQ D		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BE
	From	To	Inch	%	Inch	%				No./Ft.	DIP	
46							NX			5		
47												
48									Some very small solution pits or vugs at fracture boundaries	1		
49										4		
50										1		
51									Massive, with -Solution pits and vugs throughout	3		
52										5		

GENERAL NOTES:

Total Depth _____

'ROCK' Drilling _____

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. _____

GROUND WATER OBSERVATION				JOB <u>01in 102nd St.</u> NO. <u>84C2136</u>		BORING NUMBER <u>MW-7</u>	
At _____ Ft. at Completion				DRILLING RIG <u>CME 55W/10' NX</u>		BORING OFFSET <u>N/A</u>	
At _____ Ft. after _____ hrs.				OPERATOR <u>Darryl Attrogge</u>		SURFACE ELEVATION <u>576.30</u>	
At _____ Ft. after _____ hrs.				INSPECTOR <u>R. Karr</u>		DATE START <u>4/16/86</u> FINISH <u>4/16</u>	
At _____ Ft. after _____ hrs.							

DEPTH BELOW SURFACE	CORE RUN		RQ D		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		
	From	To	Inch	%	Inch	%				No./Ft.	DIP	Dir
52							NX					
53												
54												
55	54.6/ 56.1		39%		120%		NX					
56												
									Bottom of core at 56.1 feet			

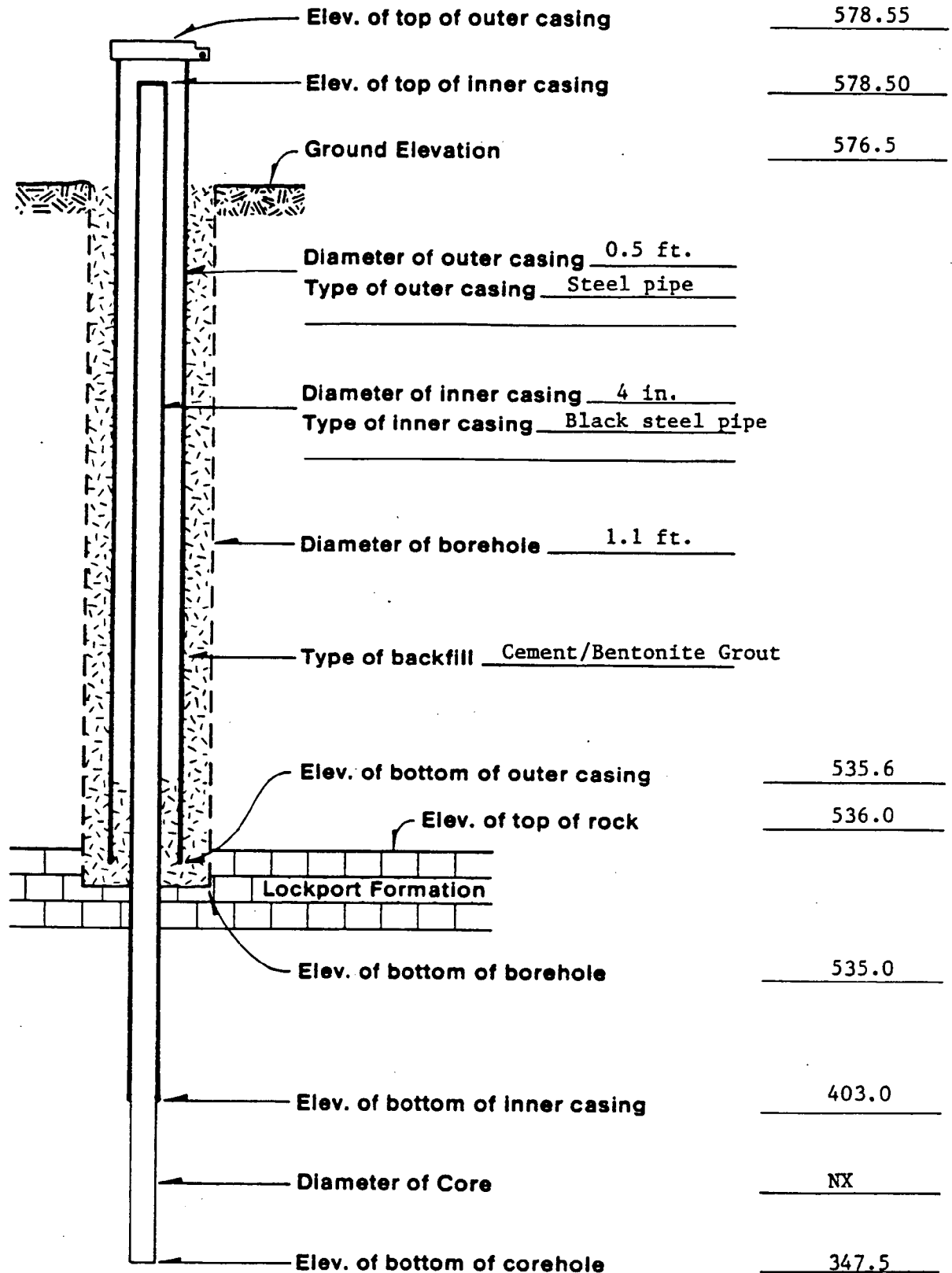
GENERAL NOTES:

Total Depth _____

'ROCK' Drilling _____

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. _____

**REPORT OF MONITORING WELL NO. MW-8**

DRAWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2136-10

DATE: 8/15/86

FIGURE NO:

LOG of BORING No. MW-8

Niagara Falls

DATE 1/20/86SURFACE ELEVATION 576.5LOCATION New York

DEPTH, ft. SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRAPHIC LOG
0		Clean crushed limestone GRAVEL (DRILLING PLATFORM BERM FILL)	572.3	
5		Firm to stiff, medium red-brown SILTY CLAY with demolition debris and large riprap rock intermixed, moist, low plastic (LEVY FILL)		
10			▽ 563.3	
15		Soft to firm, dark gray to olive gray very fine SANDY SILT, wet, low plastic, abundant vegetative matter in upper portions (SM ALLUVIUM)		
20			554.8	
25		Loose, dark gray fine SAND and fine to medium well rounded gravel with trace silt, wet (SP ALLUVIUM)	553.8	
30		Firm, red-brown to salmon, sandy SILTY CLAY with 1 to 5cm subangular gravel, wet, low plastic (CL GLACIAL TILL)		
35		-Becoming firm to stiff at 29 feet -Becoming hard at 32 feet		
40			536.0	
		Lockport Dolomite		

Completion Depth 535.0 FeetWater Depth 563.3 Feet

Date _____

Project Name Olin 102nd Street LandfillProject Number 84C2136



GROUND WATER OBSERVATION

At _____ Ft. at Completion

At _____ Ft. after _____ hrs.

At _____ Ft. after _____ hrs.

At _____ Ft. after _____ hrs.

JOB 102nd Street NO. 84C2136DRILLING RIG Acker AD3OPERATOR Russell Waddel - PA Drlg.INSPECTOR Tim GilesBORING NUMBER MW-8

BORING OFFSET _____

SURFACE ELEVATION 576.5DATE START 12/5/86 FINISH 1/20

CORE RUN		RQ D		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		
From	To	Inch	%	Inch	%				No./Ft.	DIP	DIP
Run 1						4 3/4'		Light to medium gray, medium to fine grained, thin to thick bedded uniform Dolomite with some gypsum healed fractures and occasional stylolites	4		
40.5'		5.6'		8.7'							
-		8.7'		8.7'							
49.2'		=		=							
Interval A								Oak Orchard	3	15°	
		64%		100%							
Run 2									6		
49.2'		2.2"		5.2'							
-		6.3"		6.3'							
55.5'		=		=							
Interval A									5		
		35%		83%							

GENERAL NOTES:

Adding dip horizontal unless otherwise noted

Total Depth _____

'ROCK' Drilling _____

portions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. _____



GROUND WATER OBSERVATION

At _____ Ft. at Completion

At _____ Ft. after _____ hrs.

At _____ Ft. after _____ hrs.

At _____ Ft. after _____ hrs.

JOB 102nd Street NO. 83C2136DRILLING RIG Acker AD3OPERATOR Russell Waddel-PA Drlg.INSPECTOR Tim GilesBORING NUMBER MW 8

BORING OFFSET _____

SURFACE ELEVATION 576.5DATE START 12/5/86 FINISH 1/20

DEPTH	CORE RUN		RQ D		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	DIP
52							4 3/4"		Oak Orchard	1		
53										5		
54										3		
55										4		
56	Run 3 55.5'		31.5"		5.6'					6		
57	- 61.5'		= 44%		= 93%					6		
58	Interval B									6		
59										3		
60										2		
61										3		
62	Run 4 61.5'		48"		9.6'					4		15°
63	- 70.5'		= 44%		= 107%					4		15°
64	Interval B											

GENERAL NOTES:

Bedding dip horizontal unless otherwise noted

Total Depth _____

'ROCK' Drilling _____

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO.



GROUND WATER OBSERVATION

At _____ Ft. at Completion
At _____ Ft. after _____ hrs.
At _____ Ft. after _____ hrs.
At _____ Ft. after _____ hrs.

JOB 102nd Street NO. 84C2136
DRILLING RIG Acker AD3
OPERATOR Russell Waddel-PA Drlg.
INSPECTOR Tim Giles

BORING NUMBER MW 8
BORING OFFSET _____
SURFACE ELEVATION 576.5
DATE START 12/5/86 FINISH 1/20

DEPTH Feet	CORE RUN		RQD		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED DIP
	From	To	Inch	%	Inch	%				No./Ft.	DIP	
54							4 3/4"		Light to medium gray, fine to medium grained, thinly bedded stromatolitic Dolomite with gypsum and carbonaceous partings	5		15°
55									Oak Orchard	3		15°
56										8		15°
57										5		15°
58									Light gray, medium grained, thinly bedded uniform Dolomite with minor stromatolites	1		
59									Oak Orchard	5		
60										3		
61	Run 5								Dark gray to black, coarse grained massive bedded, uniform Dolomite with stylolites and gypsum filled fractures. Locally some areas of stromatolites	1		45°
62	70.5'	102"	8.5'		8.5'					1		
63	-	=	=		=					1		
64	79.0'	100%	100%						Oak Orchard	1		
65	Interval									1		
66	C									2		15°
67										0		
68												

GENERAL NOTES:

Adding dip horizontal unless otherwise noted

Total Depth _____

'ROCK' Drilling _____

portions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO.



GROUND WATER OBSERVATION

At _____ Ft. at Completion

At _____ Ft. after _____ hrs.

At _____ Ft. after _____ hrs.

At _____ Ft. after _____ hrs.

JOB 102nd Street NO. 84C2136

DRILLING RIG Acker AD3

OPERATOR Russell Waddel-PA Drlg.

INSPECTOR Tim Giles

BORING NUMBER MW 8

BORING OFFSET _____

SURFACE ELEVATION 576.5

DATE START 12/5/86 FINISH 1/21

DEPTH	CORE RUN		RQ D		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	
76							4 3/4"			0		
77										0		
78										1		
79	Run 6											
80	79.0'		36"		3.2'				Oak Orchard	2	15°	
	-		38.4"		3.2'						15°	
	-		=		=					1	30°	
81	82.2'		94%		100%							
82	Interval C									2		
83	Run 7									1		
84	82.2'		31.2"		3.3'							
	-		39.6"		3.3'					4		
	-		=		=							
85	85.5'		79%		100%					2		
86	Interval C											
87	Run 8									2		
88	85.5'		99.6"		8.6'					0		
	-		99.6"		8.3'							
	-		=		=					0		
89	93.8'		100%		104%				Medium gray fine to medium grained, massi- vely bedded, porous Dolomite with stylo- lites and calcite crystals in vugs	0		
90	Interval D											

GENERAL NOTES:

bedding dip horizontal unless otherwise noted

Total Depth _____

'ROCK' Drilling _____

portions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO.



GROUND WATER OBSERVATION

At _____ Ft. at Completion
 At _____ Ft. after _____ hrs.
 At _____ Ft. after _____ hrs.
 At _____ Ft. after _____ hrs.

JOB 102nd Street NO. 84C2136
 DRILLING RIG Acker AD3
 OPERATOR Russell Waddel-PA Drlg.
 INSPECTOR Tim Giles

BORING NUMBER MW-8
 BORING OFFSET _____
 SURFACE ELEVATION 576.5
 DATE START 12/5/86 FINISH 1/20

DEPTH	CORE RUN		RQ D		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	DIP
38									Oak Orchard	1		
39									Dark gray, medium grained, massive bedded stylolitic Dolomite	0		
40										0		
41									Oak Orchard	0		
42										0		
43									Dark gray to brown, medium to coarse grained porous Dolomite with Favosites, gypsum, sphalarite and stylolites	1		
44	Run 9									1		
45	93.8'		78"		6.5'				Oak Orchard	0		
46	-		80.4"		6.7'					0		
47	100.5'		=		=					0		
48	Interval		97%		97%					0		
49	D									1		
50												
51									Dark gray to black, medium to coarse grained, thick to massive bedded uniform Dolomite with stylolites, calcite healed vertical fractures and pinhole porosity	0		
52										0		
53												
54									Oak Orchard	1		
55												

GENERAL NOTES:

bedding dip horizontal unless otherwise noted

Total Depth _____
 'ROCK' Drilling _____

portions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO.



GROUND WATER OBSERVATION

At _____ Ft. at Completion

At _____ Ft. after _____ hrs.

At _____ Ft. after _____ hrs.

At _____ Ft. after _____ hrs.

JOB 102nd Street NO. 83C2136DRILLING RIG Acker AD3OPERATOR Russell Waddel-PA Drlg.INSPECTOR Tim GilesBORING NUMBER MW-8

BORING OFFSET _____

SURFACE ELEVATION 576.5DATE START 12/5/86 FINISH 1/20

DEPTH	CORE RUN		RQ D		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		
	From	To	Inch	%	Inch	%				No./Ft.	DIP	Dir
00												
01	Run 10											
	100.5'		84"		8.3'							
			102"		8.5'							
02	-		=		=							
	108.8'		82%		98%							
03	Interval											
	E											
04									Light gray, coarse grained, thinly bedded uniform Dolomite			
05									Oak Orchard			
06									Medium gray and brown, medium to coarse grained, thick to massive bedded Dolomite with locally abundant stromatolites, carbonaceous partings, stylolites, calcite and occasional vugs			
07												
08									Oak Orchard			
09	Run 11											
	108.8'		80.4"		6.9'							
			80.9"		6.7'							
10	-		=		=							
	115.5'		100%		103%							
11	Interval											
	E											
12												

GENERAL NOTES:

Adding dip horizontal unless otherwise noted

Total Depth _____

'ROCK' Drilling _____

portions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO.

BORING NUMBER MW-8

BORING OFFSET

SURFACE ELEVATION 576.5

DATE START 12/5/86 FINISH 1/20

in 12
 5.5'
 -
 4.0'
 erval
 F

3 dip horizontal unless otherwise noted

'ROCK' Drilling _____

HOLE NO.	
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GROUND WATER OBSERVATION

At _____ Ft. at Completion
At _____ Ft. after _____ hrs.
At _____ Ft. after _____ hrs.
At _____ Ft. after _____ hrs.

JOB 102nd Street NO. 86C2136
DRILLING RIG Acker AD3
OPERATOR Russell Waddel - PA Drlg.
INSPECTOR Tim Giles

BORING NUMBER MW-8
BORING OFFSET _____
SURFACE ELEVATION 576.5
DATE START 12/5/86 FINISH 1/20

DEPTH	CORE RUN		RQ D		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	
24												
	Run 13		70.8"		6.5'					1		
	124.0'-		78"		6.5'							
25	130.5'		=91%		=100%							
26	Interval F								Medium grey, medium to coarse grained, thin to thick wavy bedded, gypsum Dolomite with stylolites, calcite and sphalerite	0		
27										1		
28									Oak Orchard	1		
29										1		
30										4		
31	Run 14		112"		8.3'					0		
	130.5'-		102"		8.5'							
	139.0'		=89%		=98%					2		
32	Interval G									2		
33										2		
34										3		
35										1		
36												

GENERAL NOTES:

bedding dip horizontal unless otherwise noted

Total Depth _____
'ROCK' Drilling _____

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO.

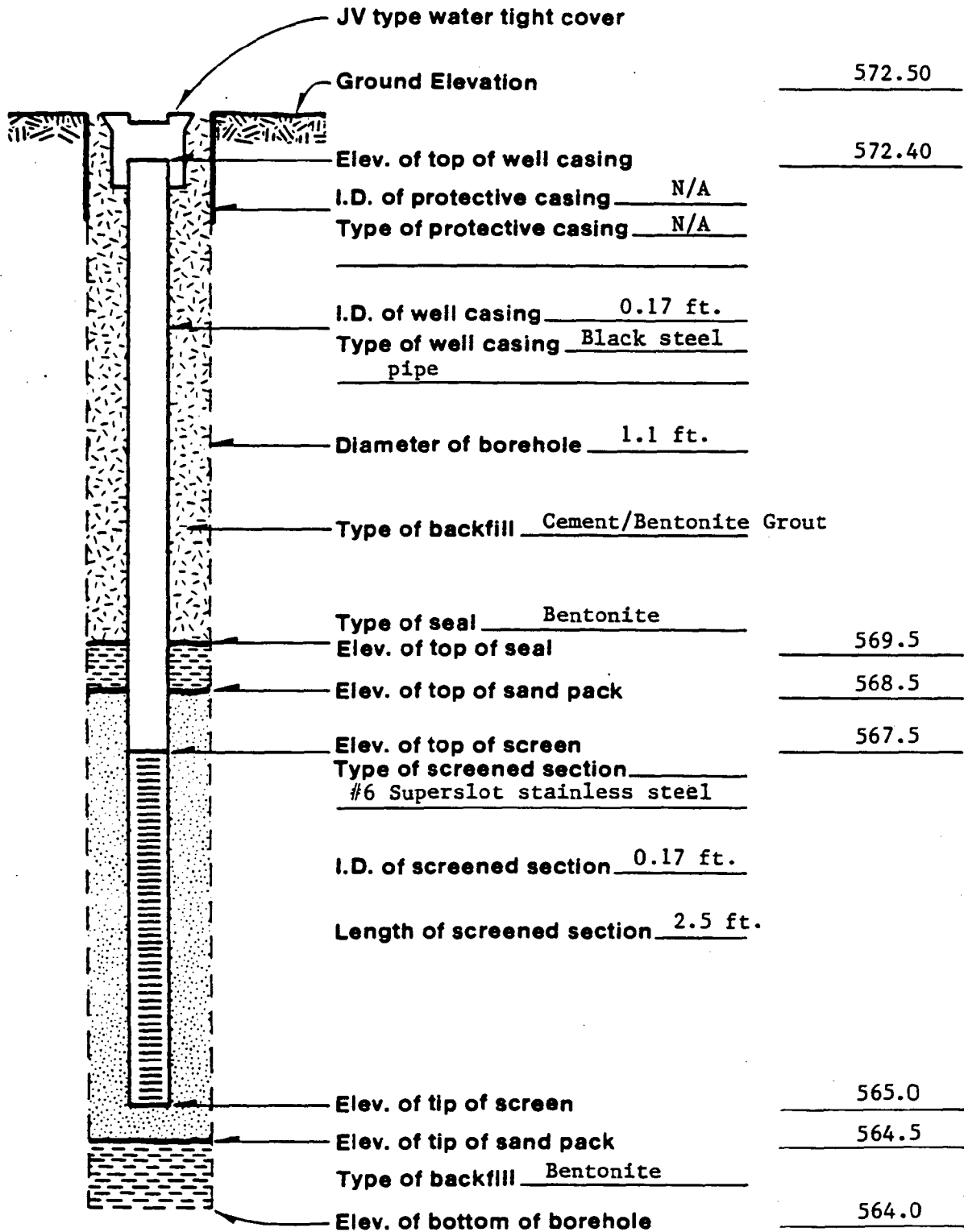
LOG of BORING No. MW-12

Niagara Falls
New York

DATE 1-16-86 SURFACE ELEVATION 574.2 LOCATION _____

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRAPHIC LOG
0			Stiff, medium red brown, SILTY CLAY with cinders asphalt fragments, sand, moist, low plastic (CL ROAD FILL)	573.2	
	36				
5			Firm, olive gray with gray brown mottling SILTY CLAY with charcoal and wood debris, moist, low plastic (CL ALLUVIUM)	570.2	
	11				
			Dense, medium gray becoming yellow brown, fine to coarse SILTY SAND with trace clay, wet, nonplastic (SM ALLUVIUM)	568.2	
	46				
10			Very stiff, medium red brown with grey mottling SILTY CLAY, varved, moist, high plastic, (CH GLACIOLACUS-TRINE CLAY)		

Completion Depth 566.2 Feet Water Depth 570.2 Feet Date _____
Project Name 01in 102nd Street Landfill Project Number 84C2136

**REPORT OF MONITORING WELL NO. MW-13**

DRAWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2136-10

DATE: 8/15/86

FIGURE NO:

LOG of BORING No. MW-13

Niagara Falls

DATE 4/11/86

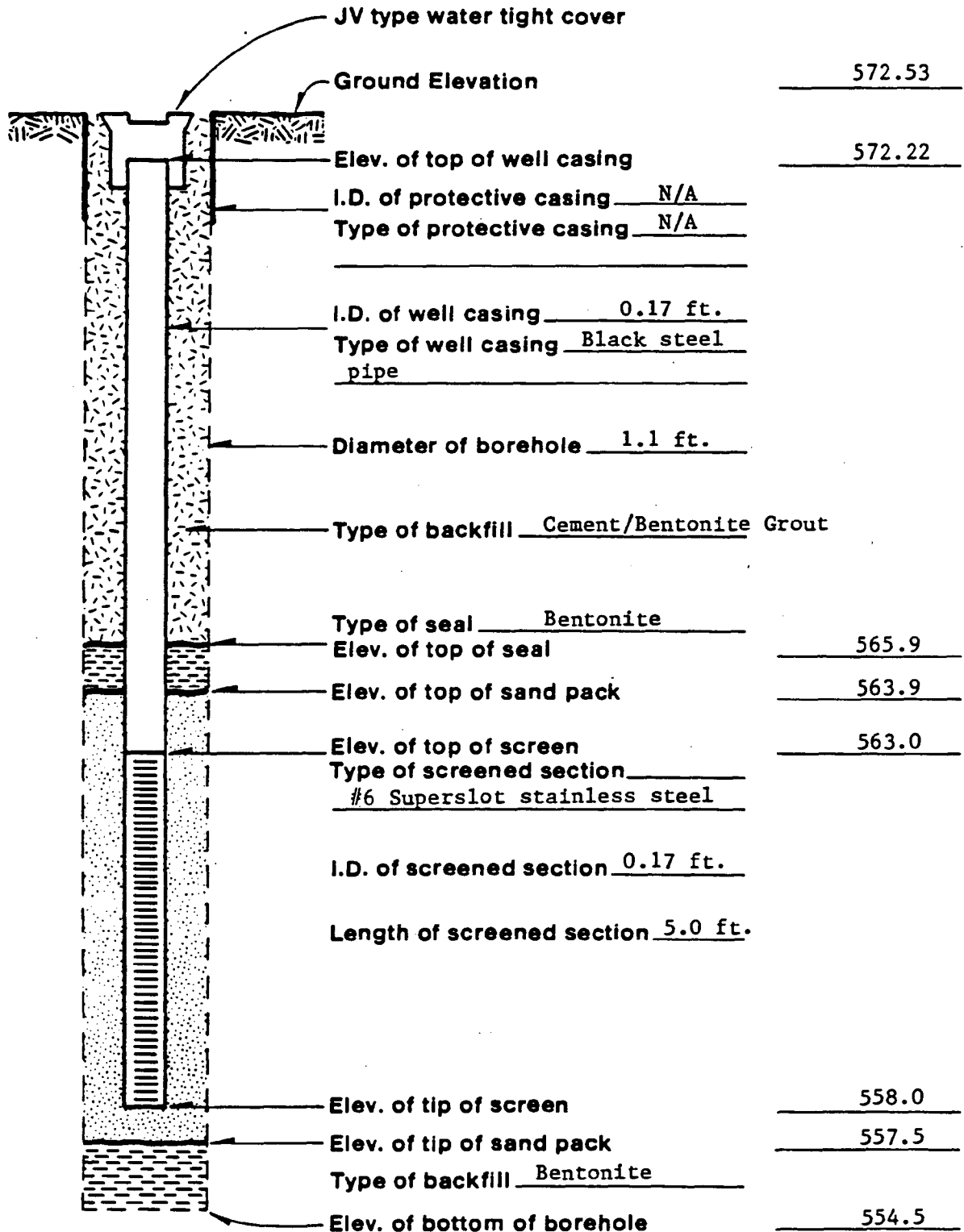
SURFACE ELEVATION 572.5

LOCATION New York

DEPTH, ft. SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRA- PHIC LOG
0		Soft, dark gray, sandy SILTY CLAY with vegative mat- ter (CL CLAY CAP FILL)	572.0	
5		Firm to stiff, brown and dark gray SILTY CLAY with coarse gravel; wood, glass, rubber, roofing shingles fragments, and tar debris; low plastic, moist becoming wet and hard at 5 feet (DEMOLITION RUBBLE FILL)	▽ 567.5	
10		Firm, tan to gray, with brown mottling, fine very SILTY SAND, nonplastic wet	564.5	
15				
20				
25				
30				
35				

Completion Depth 564.0 Feet Water Depth 567.5 Feet ATD Date

Project Name Olin 102nd Street Landfill Project Number 84C2136

**REPORT OF MONITORING WELL NO. MW-14**

DRAWN BY: D.B.	CHECKED BY: R.K.	PROJECT NO: 84C2136-10	DATE: 8/15/86	FIGURE NO:
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LOG of BORING No. MW-14

Niagara Falls,

DATE 4-11-86

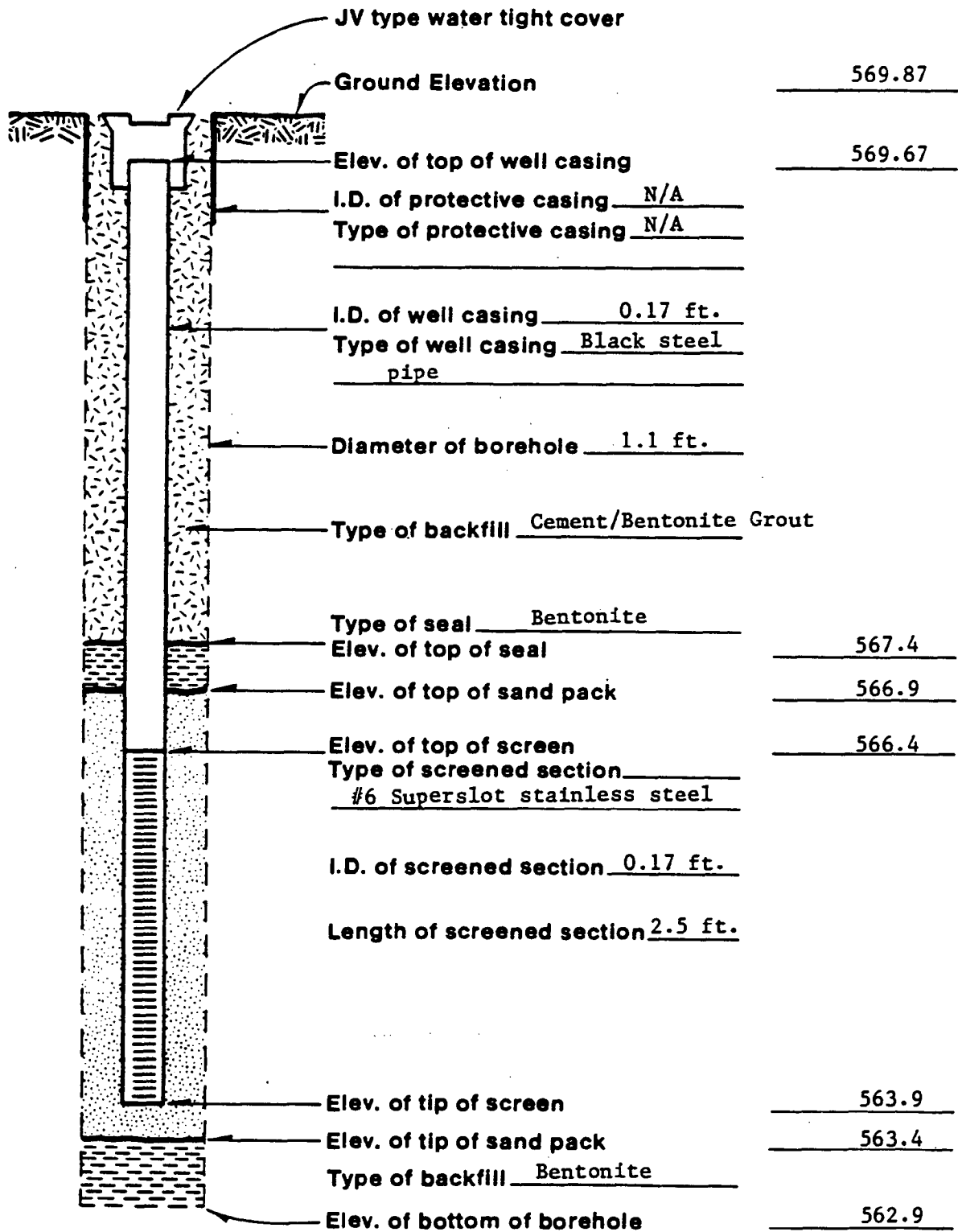
SURFACE ELEVATION 572.5'

LOCATION New York

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRAPHIC LOG
0			Soft, dark gray, sandy SILTY CLAY with vegative matter. (CL CLAY CAP FILL)	572.0	
17			Firm to stiff, brown and dark gray SILTY CLAY with coarse gravel; wood, glass, rubber, roofing shingles fragments, and tar debris; low plastic, moist, becoming wet and hard at 5 feet. (DEMOLITION RUBBLE FILL)		
32				567.5	
54				564.5	
6			Firm, tan to grey, with brown mottling, fine very SILTY SAND, nonplastic wet. - vegative matter below 9.5 feet - becoming more silty with depth (SM, ALLUVIUM)		
6					
3				557.3	
10			Very stiff, medium red-brown, CLAY with small silty pockets, medium to high plastic, wet. (CH GLACIOLACUSTRINE CLAY)		
10				555.3	
20			Firm to stiff, red-brown, SILTY SANDY CLAY with angular medium gravel, low plastic, wet. (SC/CL GLACIAL TILL)		
25					
30					
35					

Completion Depth 554.5 Feet Water Depth 567.5 Feet ATD Date
 Project Name Olin 102nd Street Landfill Project Number 84C2136





REPORT OF MONITORING WELL NO. MW-15

DRAWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2136-10

DATE: 8/15/86

FIGURE NO:

LOG of BORING No. MW-15

Niagara Falls

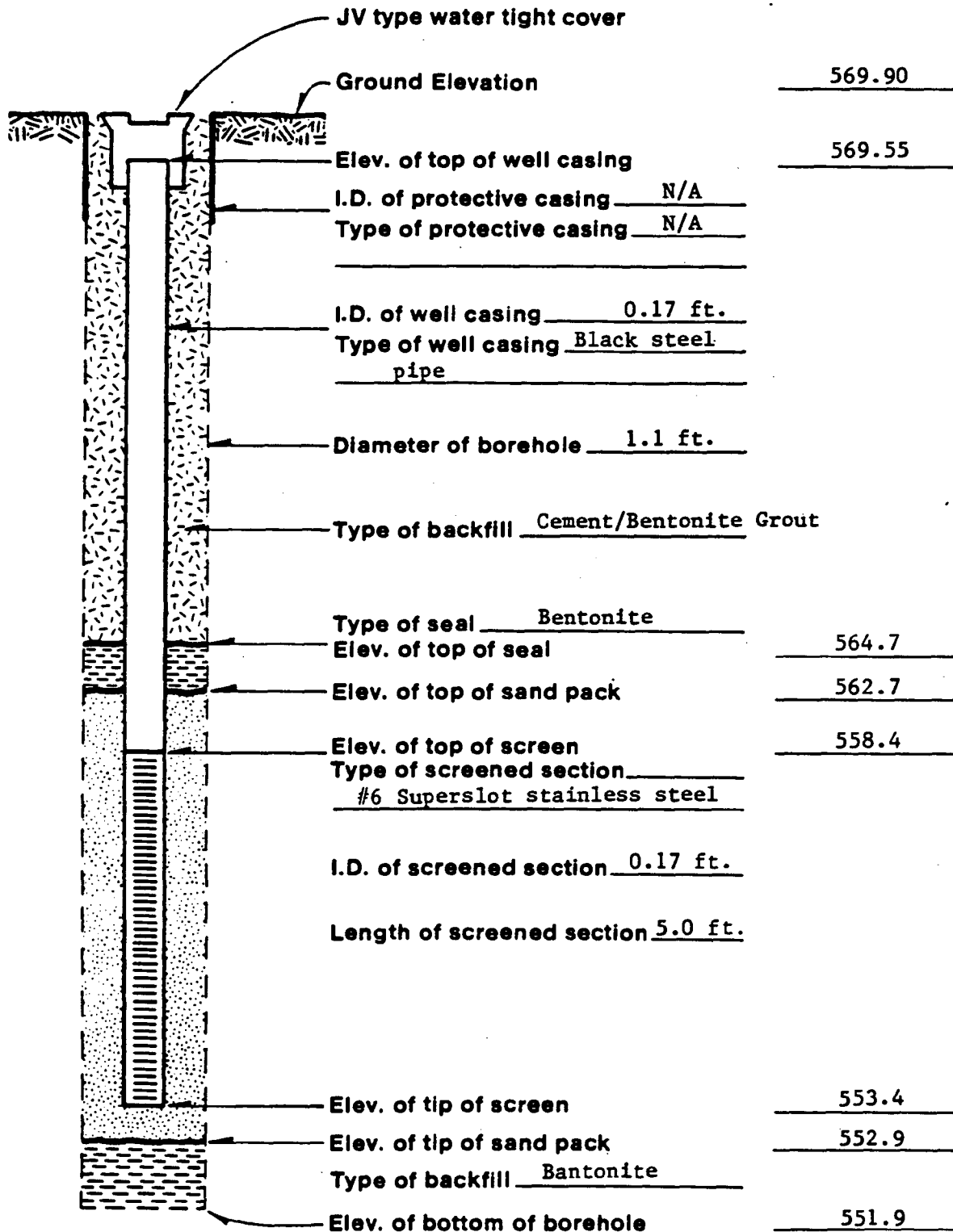
DATE 4/10/86

SURFACE ELEVATION 569.90

LOCATION New York

DEPTH, ft. SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRA- PHIC LOG
0		Soft, dark brown, sandy SILTY CLAY with vegative matter (CL CLAY CAP FILL)	569.4	
5		Stiff, medium-dark brown to gray SILTY CLAY with coarse gravel, wood fragments and vegative matter, low plastic, moist (CL FILL) -becoming sandy and wet at 4 feet	565.9 563.4	
10		Firm, olive gray, fine SILTY SAND with trace coarse gravel and vegative matter, nonplastic, wet		
15				
20				
25				
30				
35				

Completion Depth 562.9 Feet Water Depth 565.9 Feet Date _____
 Project Name Olin 102nd Street Landfill Project Number 84C2136



REPORT OF MONITORING WELL NO. MW-16

AWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2136-10

DATE: 8/15/86

FIGURE NO:

LOG of BORING No.MW-16

Niagara Falls

DATE 4/10/86

SURFACE ELEVATION 569.90

LOCATION New York

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRAPHIC LOG
0					
	27		Soft, dark brown, sandy SILTY CLAY with vegative matter (CL CLAY CAP FILL)	569.4	
	10		Stiff, medium dark brown to gray SILTY CLAY with coarse gravel, wood fragments and vegative matter, low plastic, moist (CL FILL)	565.9	
5	8		-becoming sandy and wet at 4 feet	563.4	
	2		Firm, olive gray, fine SILTY SAND with trace coarse gravel and vegative matter, nonplastic, wet		
10	5		-becoming loose and more silty below 13 feet		
	2		-becoming fine to medium sand with subrounded gravel and shell fragments below 16 feet		
15	21			552.9	
			Stiff, red-brown, fine sandy SILTY CLAY with angular gravel, medium plastic, wet (CL GLACIAL TILL)		
20					
25					
30					
35					

Completion Depth 571.7 Feet

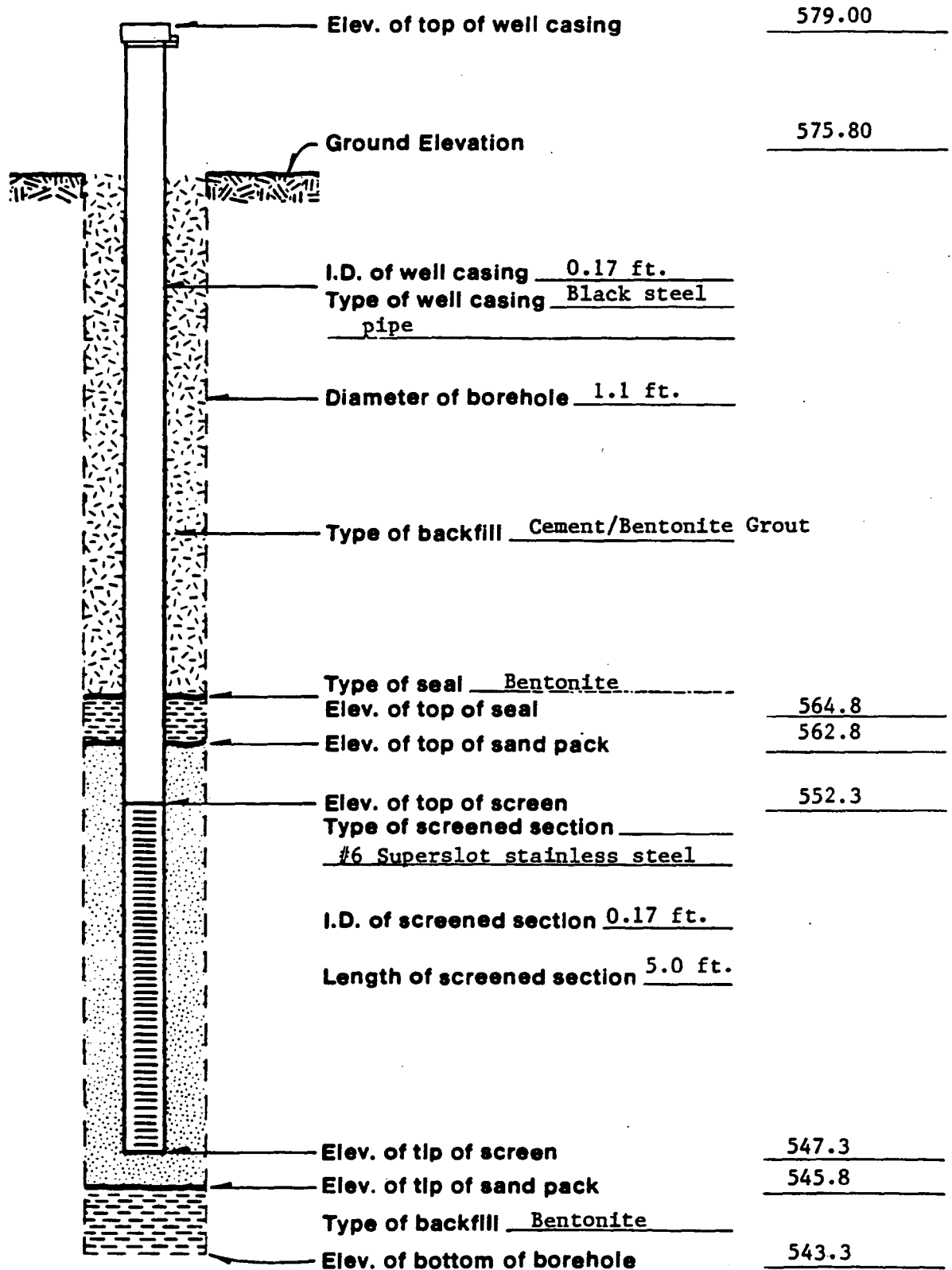
Water Depth 565.9 Feet

Date

Project Name 01in 102nd Street Landfill

Project Number 84C2136





REPORT OF MONITORING WELL NO. MW-17

DRAWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2136-10

DATE: 8/15/86

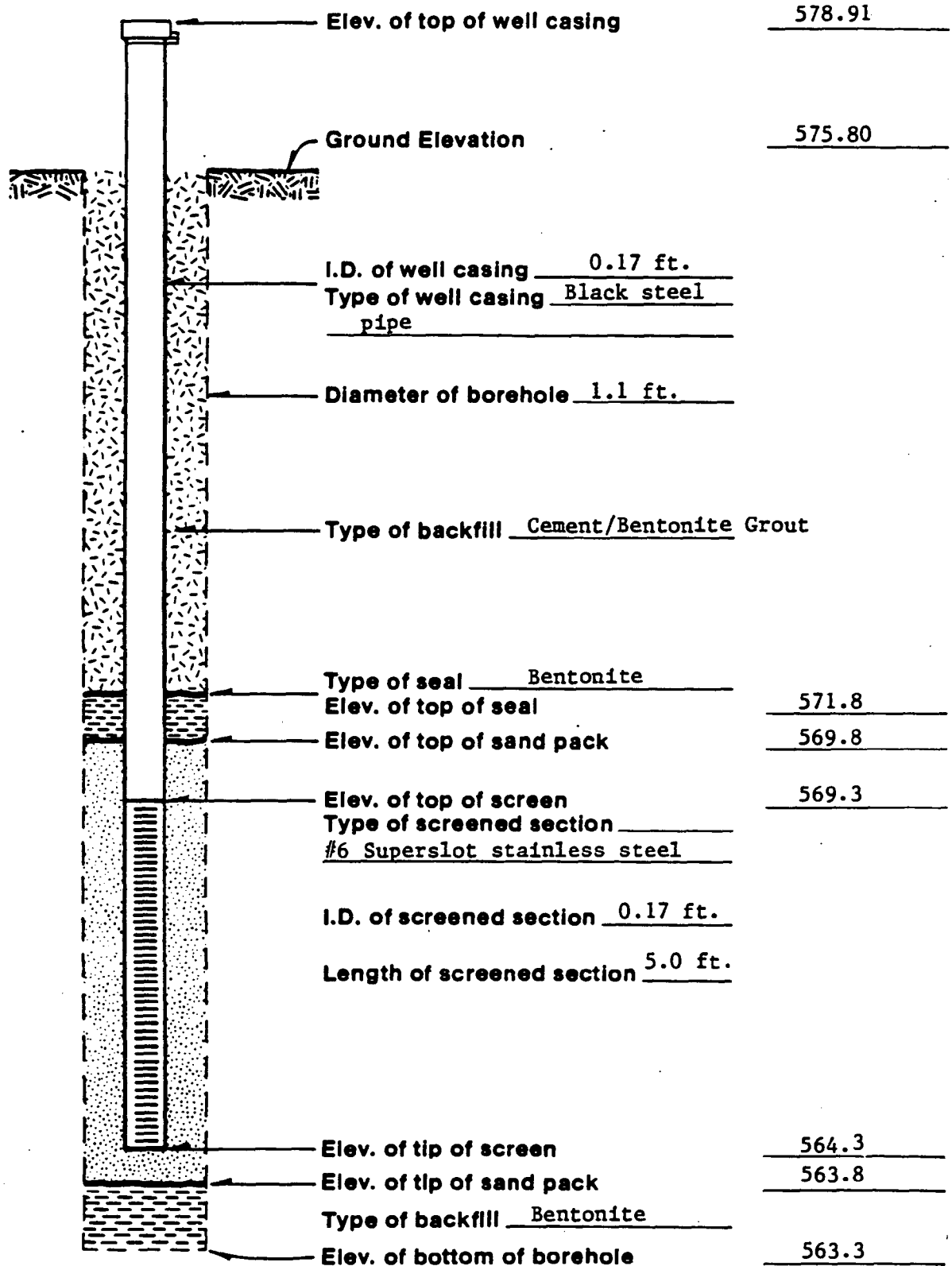
FIGURE NO:

LOG of BORING No. MW-17

DATE April 17, 1986 SURFACE ELEVATION 575.8 LOCATION Niagara Falls, NY

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRAPHIC LOG
			Stiff, red brown, SILTY CLAY with vegative matter, low plastic, moist. (CL CLAY CAP FILL)	575.3	
		22	Stiff, tan to gray, SILTY CLAY and large angular gravel low plastic, dry.		
5		16	(CL FILL with RUBBLE) - becoming red-brown and slightly moist with gravel absent below 4 feet	568.3	
		12			
10		3	Loose, black, SILTY CLAY with cinders, fly ash, glass and wood fragments intermixed, low plastic, moist. (FILL)	563.3	
		12			
15		3	Firm, olive gray with gray brown mottling, fine SILTY SAND with vegative matter, low plastic, wet. (SM/CL ALLUVIUM)	▽ 562.8	
		14	- becoming loose below 18 feet		
		5	- becoming firm with some coarse sand below 22 feet.		
20		6	- becoming dense, coarse sand and rounded gravel with shell fragments below 25 feet. (SP ALLUVIUM)		
		18			
25		53			
		4		546.8	
30			Stiff, medium red-brown, sandy SILTY CLAY with trace angular gravel, medium plastic, wet. (CL GLACIAL TILL)		
35					

Completion Depth 542.3 Feet Water Depth 562.8 Feet Date _____
 Project Name Olin 102nd Street Landfill Project Number 84C2136



REPORT OF MONITORING WELL NO. MW-18

DRAWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2136-10

DATE: 8/15/86

FIGURE NO:

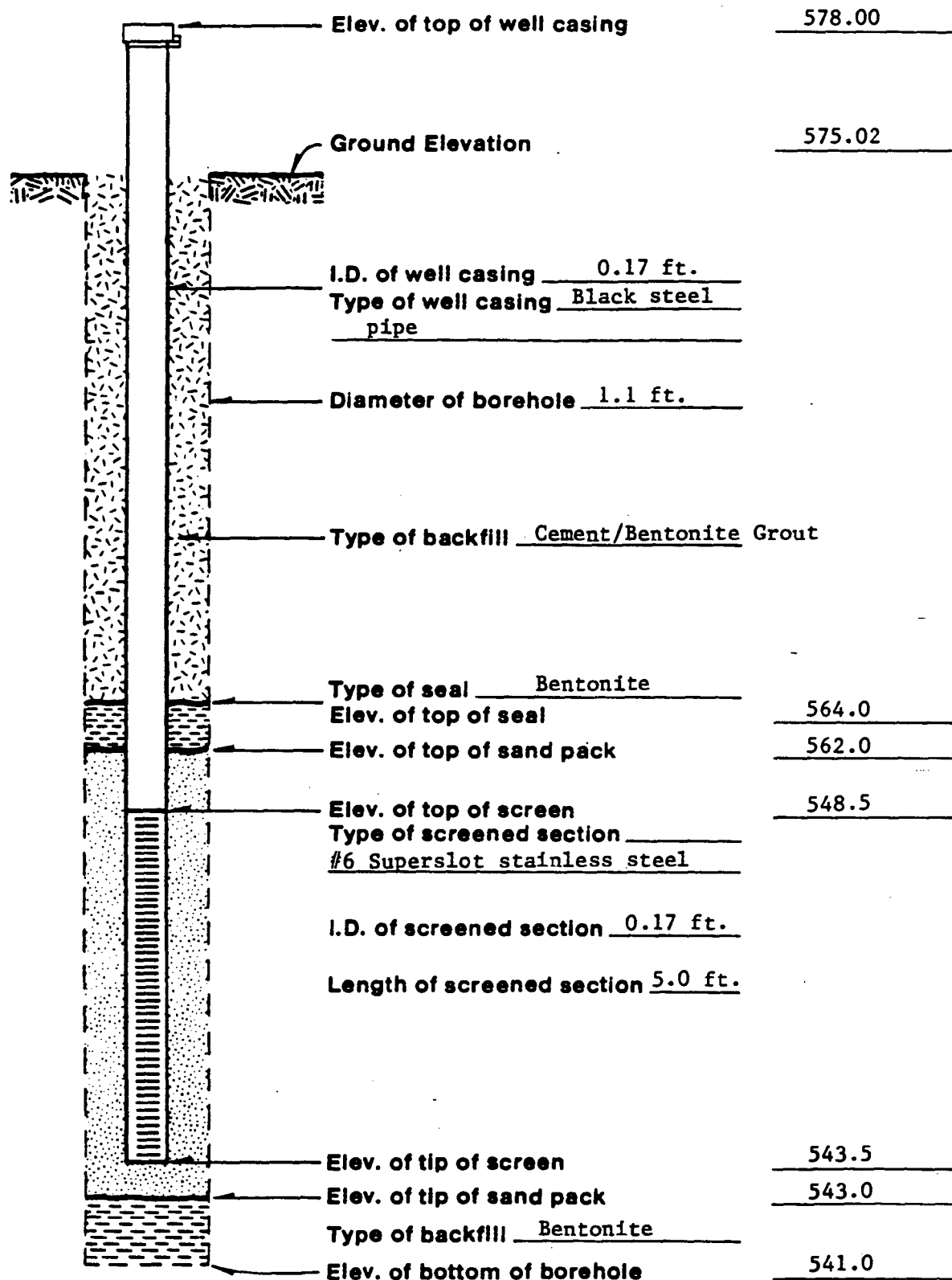
LOG of BORING No. MW-18

Niagara Falls

DATE 4/17/86 SURFACE ELEVATION 575.8 LOCATION New York

DEPTH, ft. SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRA- PHIC LOG
0		Stiff, red-brown, SILTY CLAY with vegative matter, low plastic, moist (CL CLAY CAP FILL)	575.3	
5		Stiff, tan to gray, SILTY CLAY and large angular gravel low plastic, dry (CL FILL with RUBBLE)		
		-becoming red-brown and slightly moist with gravel absent below 4 feet	568.3	
10		Loose, black, SILTY CLAY with cinders, fly ash, glass and wood fragments intermixed, low plastic, moist (FILL)	563.3	
15		Firm, olive gray with gray brown mottling, fine SILTY SAND with vegative matter, low plastic, wet (SM/CL ALLUVIUM)	▽ 562.8	
20				
25				
30				
35				

Completion Depth 563.3 Feet Water Depth 562.8 Feet Date _____
 Project Name Olin 102nd Street Landfill Project Number 84C2136

**REPORT OF MONITORING WELL NO. MW-19**

DRAWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2136-10

DATE: 8/15/86

FIGURE NO:

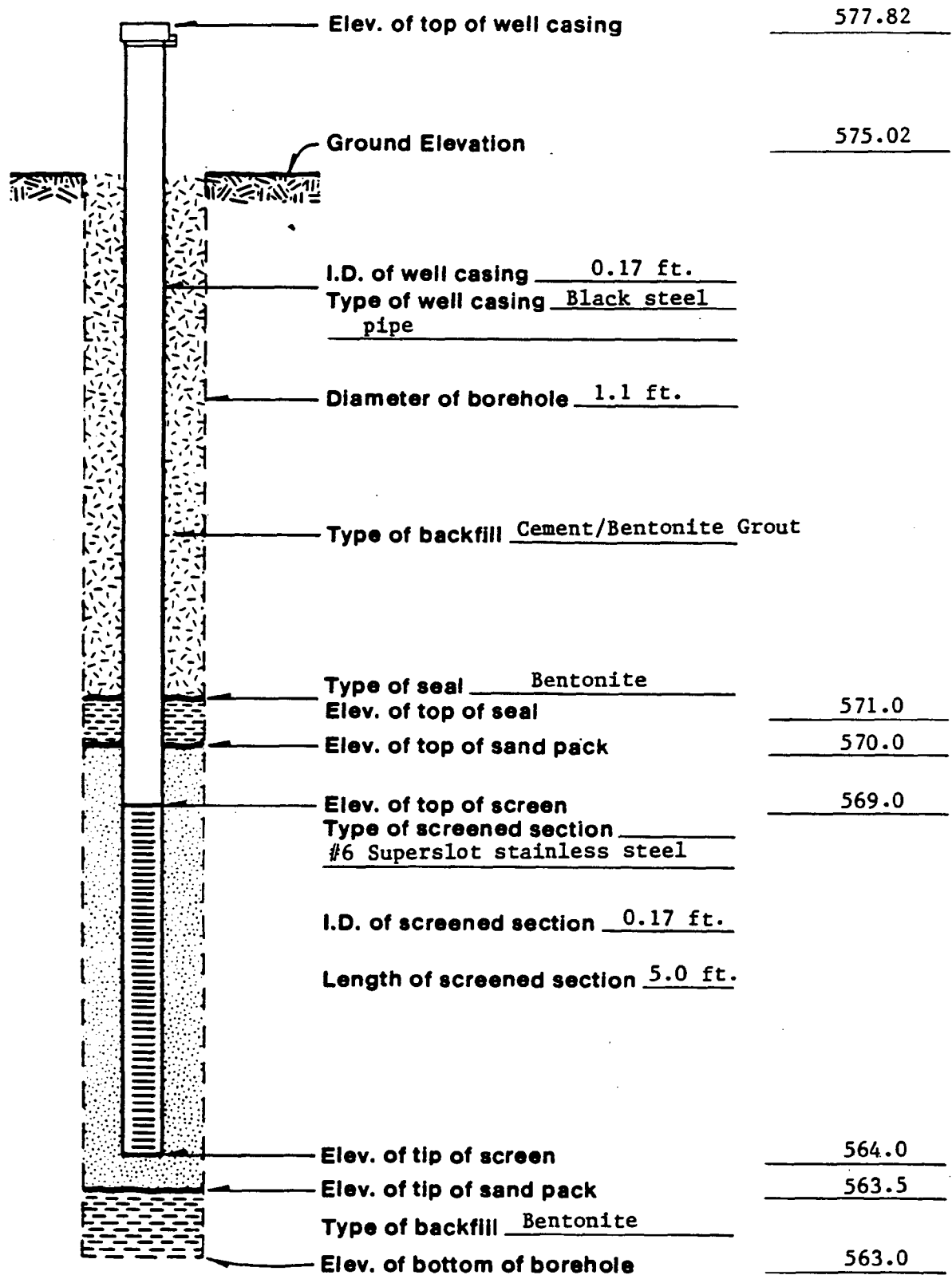
LOG of BORING No. MW-19

Niagara Falls

DATE - 4-24-86 SURFACE ELEVATION 575.02 LOCATION New York

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRAPHIC LOG
0			Hard, red brown, SILTY CLAY with vegative matter, low plastic, dry (CL CLAY CAP FILL)	574.5	
	76				
	10		Dense, tan to red-brown, very SILTY SAND and gravel, nonplastic, dry (FILL)	570.5	
5					
	5		Firm, dark gray, SILTY CLAY with white fly ash, cinders, wood chips, low plastic, moist (FILL)	567.0	
	2				
10			- Oily black NAPL below 10 feet	563.5	
	11				
15			Firm, olive gray with brown mottling SILTY SAND with trace clay and vegative matter, low plastic, wet. (SM/CL ALLUVIUM)		
	2		- becoming loose with shell fragments and vegative matter absent below 14 feet		
	7				
			- becoming firm, coarse sand and rounded gravel interbedded below 26.5 feet.		
20					
	4				
			- brown, very odorous NAPL below 31 feet.		
	30				
25					
	10				
	28				
30					
	32			543.5	
	8		Stiff, medium red-brown, sandy SILTY CLAY with subrounded to angular gravel, medium plastic, wet. (GLACIAL TILL)		
35					

Completion Depth 541.0 Feet Water Depth 567.0 Feet Date
 Project Name Olin 102nd Street Landfill Project Number 84C2136



REPORT OF MONITORING WELL NO. MW-20

DRAWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2136-10

DATE: 8/15/86

FIGURE NO:

LOG of BORING No. MW-20

Niagara Falls
New York

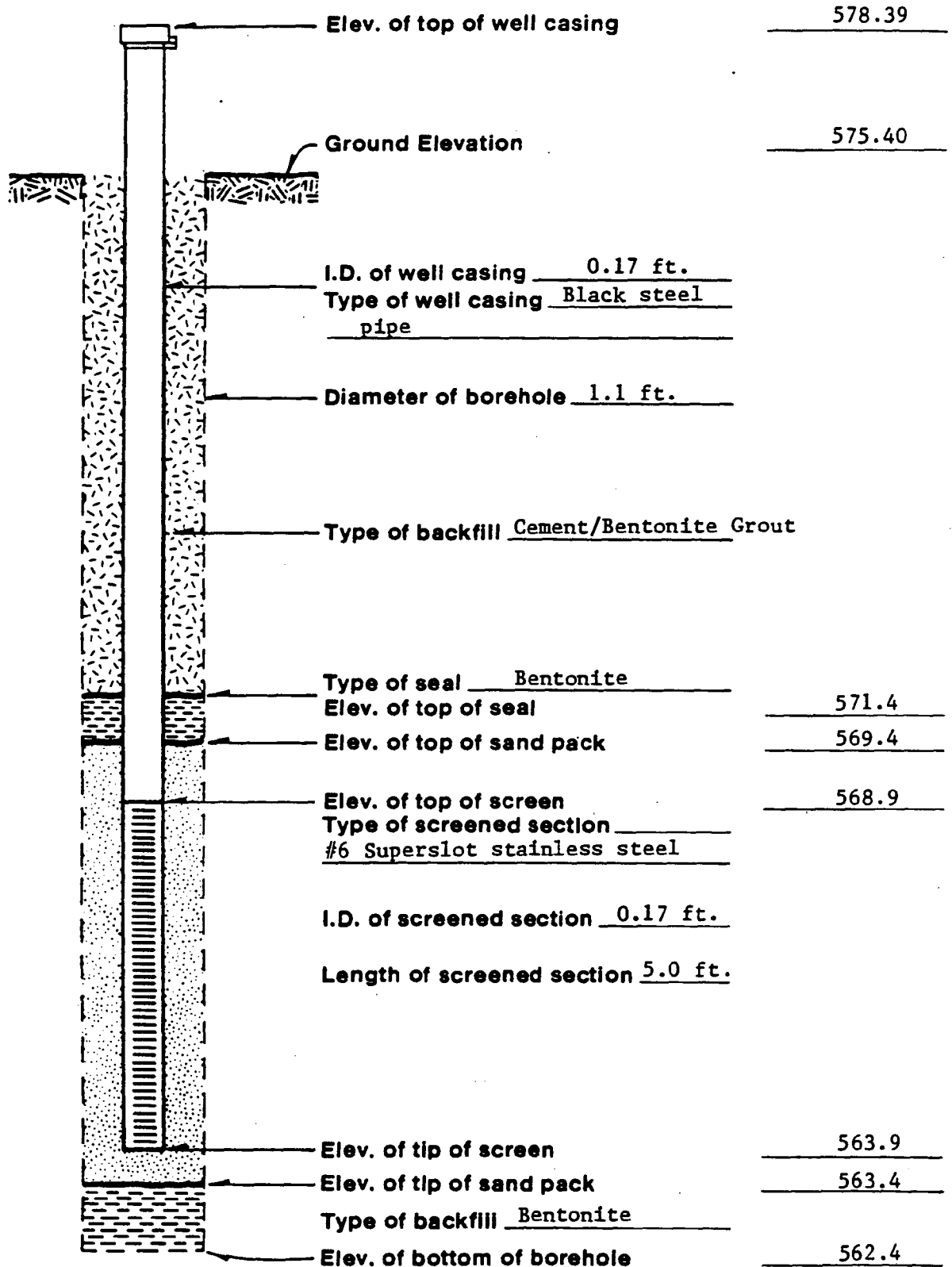
DATE 4/24/86

SURFACE ELEVATION 575.02

LOCATION

DEPTH, ft. SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRA- PHIC LOG
0		Hard, red brown, SILTY CLAY with vegative matter, low plastic, dry (CL CLAY CAP FILL)	574.5	
		Dense, tan to red-brown, very SILTY SAND and gravel, nonplastic, dry (FILL)	570.5	
5		Firm, dark gray, SILTY CLAY with white fly ash, cin- ders, wood chips, low plastic, moist (FILL)	▽ 567.0	
10		- oily black NAPL below 10 feet	563.5	
15		Firm, olive gray with brown mottling SILTY SAND with trace clay and vegative matter, low plastic, wet (SM/CL ALLUVIUM)		
20				
25				
30				
35				

Completion Depth 563.0 Feet Water Depth 567.0 Feet Date _____
Project Name Olin 102nd Street Landfill Project Number 84C2136



REPORT OF MONITORING WELL NO. MW-21

DRAWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2135-10

DATE: 8/15/86

FIGURE NO:

LOG of BORING No. MW-21

Niagara Falls

DATE 4-22-86

SURFACE ELEVATION 575.4

LOCATION New York

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRAPHIC LOG
0			Stiff, red brown, SILTY CLAY with vegative matter, low plastic, moist. (CL CLAY CAP FILL)	574.6	
	23				
	14		Stiff, dark gray, SILTY CLAY with white ash, cinders glass and rubber fragments, low plastic, moist. (FILL)	570.4 569.9	
5					
	8		Firm, tan, SILTY SAND with abundant gravel, cinders, fly ash, wood and rubber fragments, nonplastic, wet. (FILL)		
	2				
10				563.6	
	7		Firm, olive gray, SILTY SAND with a trace clay, abundant vegative matter, low plastic, wet (SM/CL ALLUVIUM)		
15					
20					
25					
30					
35					

Completion Depth _____ Feet

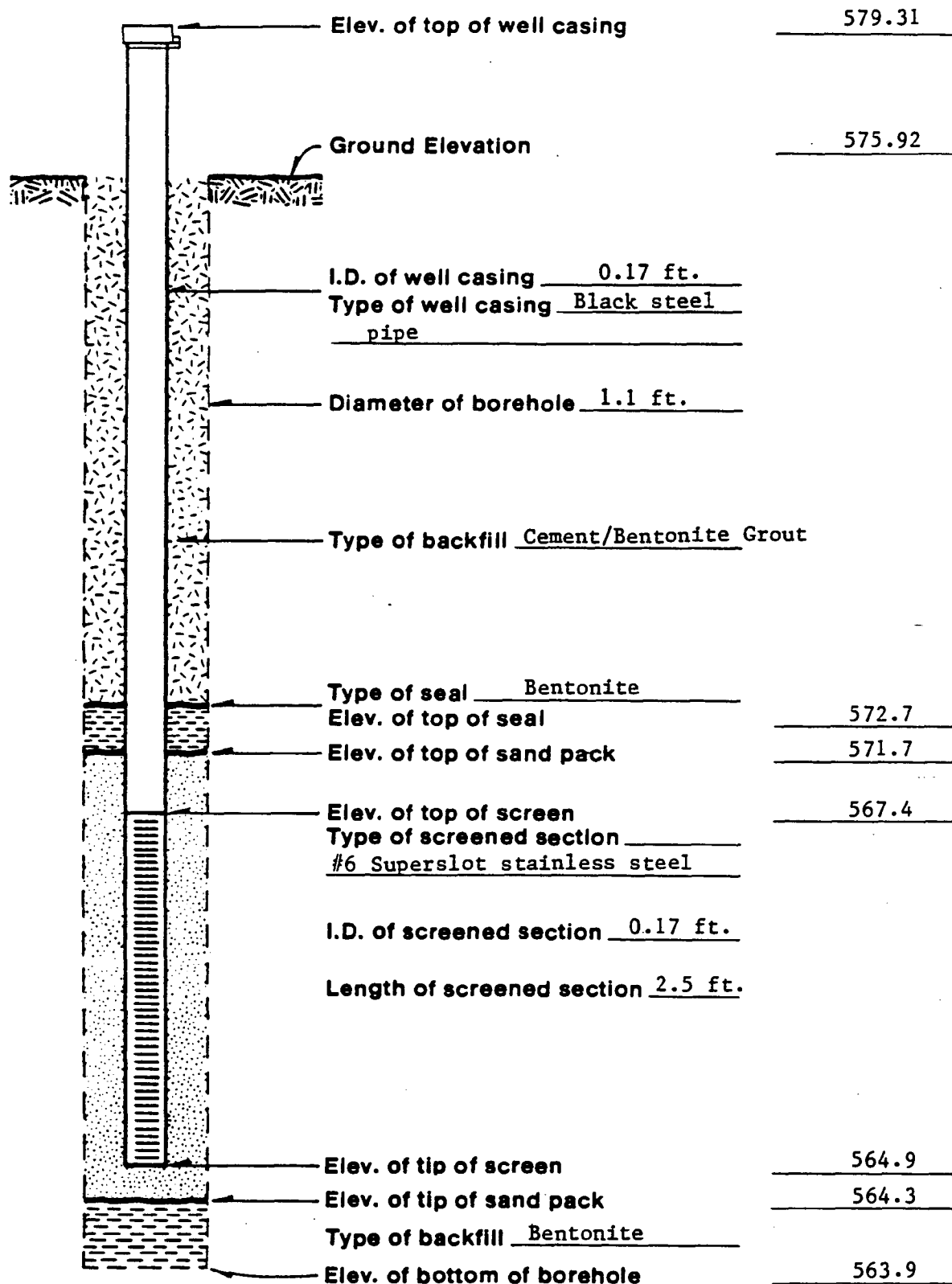
Water Depth _____ Feet

Date _____

Project Name _____

Project Number _____



**REPORT OF MONITORING WELL NO. MW-22**

DRAWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2136-10

DATE: 8/15/86

FIGURE NO:

LOG of BORING No. MW-22

Niagara Falls

DATE 4-25-86

SURFACE ELEVATION 575.9

LOCATION New York

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRAPHIC LOG
0			Very stiff, gray brown, SILTY CLAY with negative matter, low plastic, moist. (CL CLAY CAP FILL)	574.7	
26			Stiff, red brown, sandy SILTY CLAY with gravel, cinders, fly ash, brick and glass fragments, low plastic, moist		
5		9	- becoming firm (FILL)	569.9	
23			Stiff, olive gray with brown mottling, SILTY CLAY low plastic, moist. (CL FILL)	567.2	
10		7	Firm, dark gray, sandy SILTY CLAY with gravel and cinders, low plastic, moist. (CL FILL)	564.9	
15			Firm, olive gray with brown mottling, SILTY SAND with negative matter, low plastic, moist. (SM/CL ALLUVIUM)		
20					
25					
30					
35					

Completion Depth 563.9 Feet

Water Depth none enters Feet ATD Date

Project Name Olin 102nd Street Landfill

Project Number 84C2136



LOG of BORING No. MW-11

Niagara Falls
New York

DATE 1/24/86

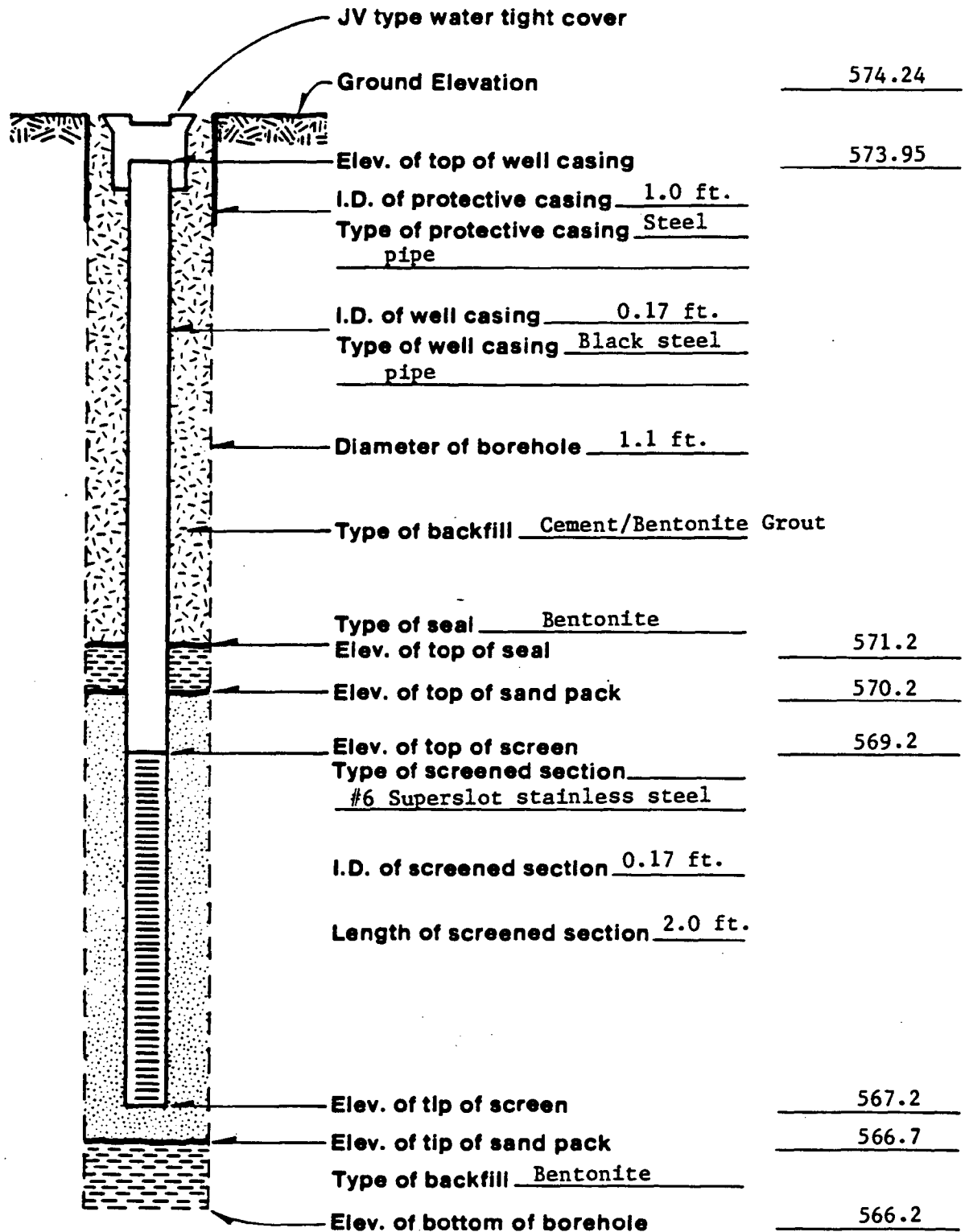
SURFACE ELEVATION 574.7

LOCATION

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRAPHIC LOG
0			Clean crushed limestone GRAVEL over geotextile (DRIVE-WAY FILL)	574.2	
	17		Red brown to black, CINDER with Fly ash intermixed (FILL)	572.7	
5	7		Firm, medium yellow brown with gray mottling, fine sandy SILTY CLAY, moist, low plastic, contaminated materials at base (CL SEWER BACKFILL)		
	4			567.7	
10	9			563.7	
	13		Stiff, red brown with gray mottling, SILTY CLAY varved, moist, high plastic (CH GLACIOLACUSTRINE CLAY)		
15					

Completion Depth 561.7 Feet Water Depth 567.7 Feet ATD Date
Project Name Olin 102nd Street Landfill Project Number 84C2136





REPORT OF MONITORING WELL NO. MW-12

DRAWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2136-10

DATE: 8/15/86

FIGURE NO:

GROUND WATER OBSERVATION

At _____ Ft. at Completion

At _____ Ft. after _____ hrs.

At _____ Ft. after _____ hrs.

At _____ Ft. after _____ hrs.

JOB 102nd Street NO. 84C2136DRILLING RIG Acker AD3OPERATOR Russell Waddel - PA Drig.INSPECTOR Tim GilesBORING NUMBER MW-8

BORING OFFSET _____

SURFACE ELEVATION 576.5DATE START 12/5/86 FINISH 1/20

DEPTH	CORE RUN		RQ D		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BEC
	From	To	Inch	%	Inch	%				No./Ft.	DIP	DIP
72										2		
73										2		
74	Run 20 173.3' - 175.5'	28.8" 26.4" =109%	2.4' 2.2 =109%							2		
75	Interval I									0		
76	Run 21 175.5' - 184.0'	96" 102" =94%	8.3 8.5 =92%				NX			2		
77	Interval J							Medium grey, medium grained, medium to thick bedded uniform Dolomite with carbonaceous partings		1		
78										2		
79								Gasport		1		
30										0		
31										1		
32										1		
33										0		
34												

GENERAL NOTES:

bedding dip horizontal unless otherwise noted.

Total Depth _____

'ROCK' Drilling _____



GROUND WATER OBSERVATION

At _____ Ft. at Completion
 At _____ Ft. after _____ hrs.
 At _____ Ft. after _____ hrs.
 At _____ Ft. after _____ hrs.

JOB 102nd Street NO. 84C2136

DRILLING RIG Acker AD3

OPERATOR Russell Waddel - PA Drlg.

INSPECTOR Tim Giles

BORING NUMBER MW-8

BORING OFFSET _____

SURFACE ELEVATION 576.5

DATE START 12/5/86 FINISH 1/20

DEPTH	CORE RUN		RQ D		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	
84	Run 22 184.0' - 190.5'	79.2" - 78"	=102%	6.8' - 6.5'	=105%			Medium grey and white, medium grained, thick to massive bedded fossiliferous Dolomite with stylolites	1			
85												
86												
87	Interval J							Gasport	2			
88												
89												
90	Run 23 190.5' - 199.0'	94.8" - 102"	=93%	7.9' - 8.5'	=93%				1			
91												
92												
93	Interval K								0			
94												
95												
96									0			

GENERAL NOTES:

Bedding dip horizontal unless otherwise noted.

Total Depth _____
 "ROCK" Drilling _____

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. _____

GROUND WATER OBSERVATION

At _____ Ft. at Completion
 At _____ Ft. after _____ hrs.
 At _____ Ft. after _____ hrs.
 At _____ Ft. after _____ hrs.

JOB 102nd Street NO. 84C2136
 DRILLING RIG Acker AD3
 OPERATOR Russell Waddel - PA Drlg.
 INSPECTOR Tim Giles

BORING NUMBER MW-8
 BORING OFFSET _____
 SURFACE ELEVATION 576.5
 DATE START 12/5/86 FINISH 1/20

DEPTH	CORE RUN		RQD		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	DIP
96										0		
97										1		
98									Gasport	1		
99	Run 24	64.8"	5.4'							0		
00	199.0' - 205.5'	78"	6.5'	=83%	=83%					0		
01	Interval K									0		
02										1		
03										0		
04										0		
05										1		
06	Run 25	118.8"	9.9'							0		
07	205.5' - 214.5'	108"	9.0'	=110%	=110%					0		
08	Interval L									0		

GENERAL NOTES:

Lost core in run #24 (204.35 to 205.5)
 recovered in run #25

Total Depth _____
 'ROCK' Drilling _____

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO.



GROUND WATER OBSERVATION

At _____ Ft. at Completion
At _____ Ft. after _____ hrs.
At _____ Ft. after _____ hrs.
At _____ Ft. after _____ hrs.

JOB 102nd Street NO. 86C2136
DRILLING RIG Acker AD3
OPERATOR Russell Waddel - PA Drlg.
INSPECTOR Tim Giles

BORING NUMBER MW-8
BORING OFFSET _____
SURFACE ELEVATION 576.5
DATE START 12/5/86 FINISH 1/20

DEPTH	CORE RUN		RQ D		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	
08												
09									Medium grey, medium to fine grained, massive bedded uniform Dolomite	1		
10									DECEW	0		
11										1		
12										0		
13										0		
14										0		
15	Run 26 214.5' - 220.5'	85.8" 72" =119%			7.15 6.0 =119%					0		
16	Interval L									0		
17										0		
18										0		
19										1		
20										1	15°	

GENERAL NOTES:

Bedding dip horizontal unless otherwise noted

Total Depth _____
'ROCK' Drilling _____

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO.



GROUND WATER OBSERVATION

At _____ Ft. at Completion

At _____ Ft. after _____ hrs.

At _____ Ft. after _____ hrs.

At _____ Ft. after _____ hrs.

JOB 102nd Street NO. 86C2136DRILLING RIG Acker AD3OPERATOR Russell Waddel - PA Drlg.INSPECTOR Tim GilesBORING NUMBER MW-8

BORING OFFSET _____

SURFACE ELEVATION 576.5DATE START 12/5/86 FINISH 1/20

CORE RUN		RQ D		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
From	To	Inch	%	Inch	%				No./Ft.	DIP	
						NX					
Run 27		72"		6.5				Black, fine grained, thinly bedded dolomite shale	4		
220.5' -		102"		8.5							
229.0' =		70%		76%					4		
Interval								Rochester Shale			
M									2		
									3		
									1		
									2		
									2		
									1		
								Bottom of Boring at 229.0			

GENERAL NOTES:

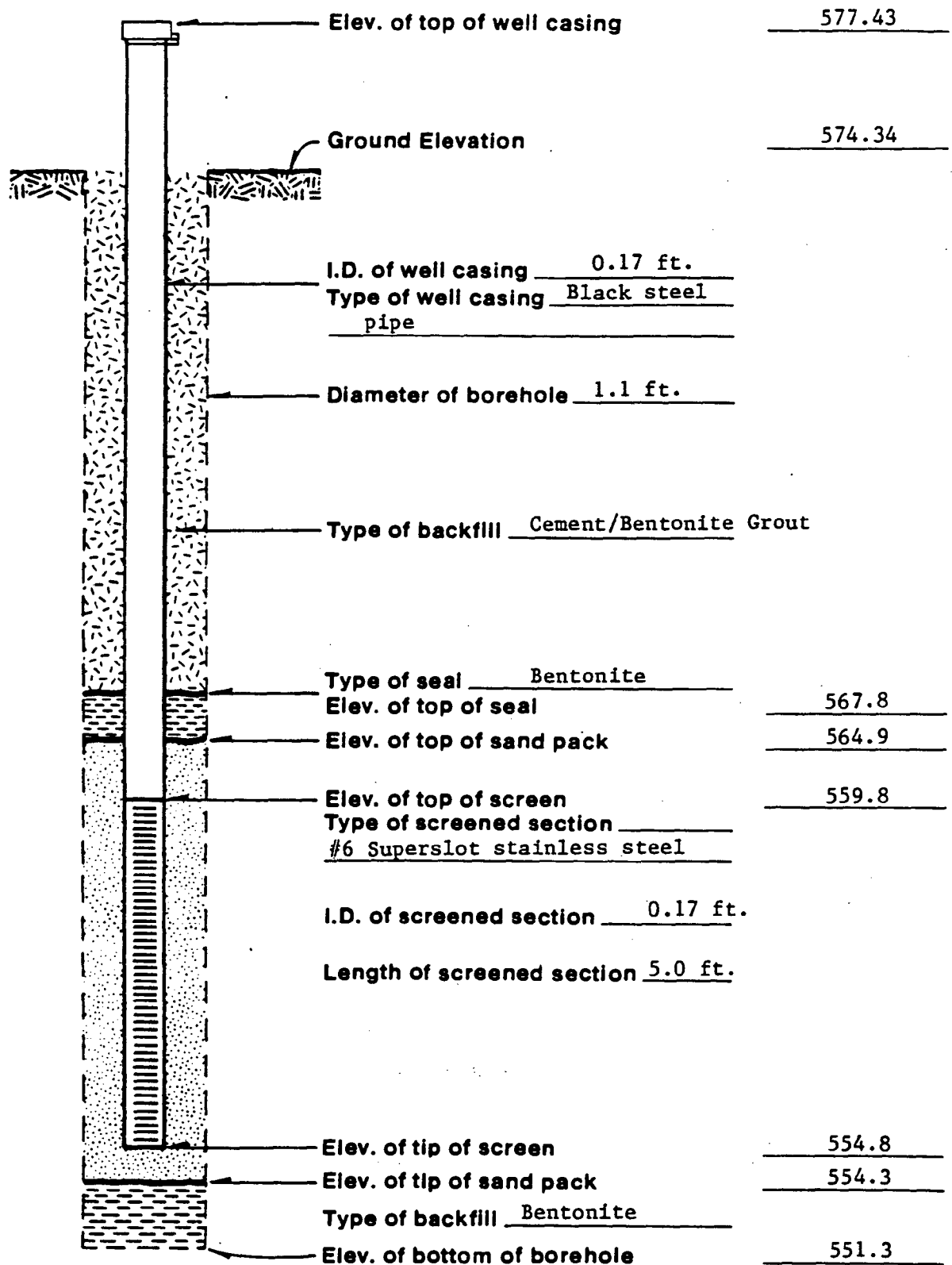
bedding dip horizontal unless otherwise noted.

Total Depth _____

'ROCK' Drilling _____

portions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. _____

**REPORT OF MONITORING WELL NO. MW-9**

DRAWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2136-10

DATE: 8/15/86

FIGURE NO:

LOG of BORING No. MW-9

Niagara Falls
New York

DATE 1/22/86

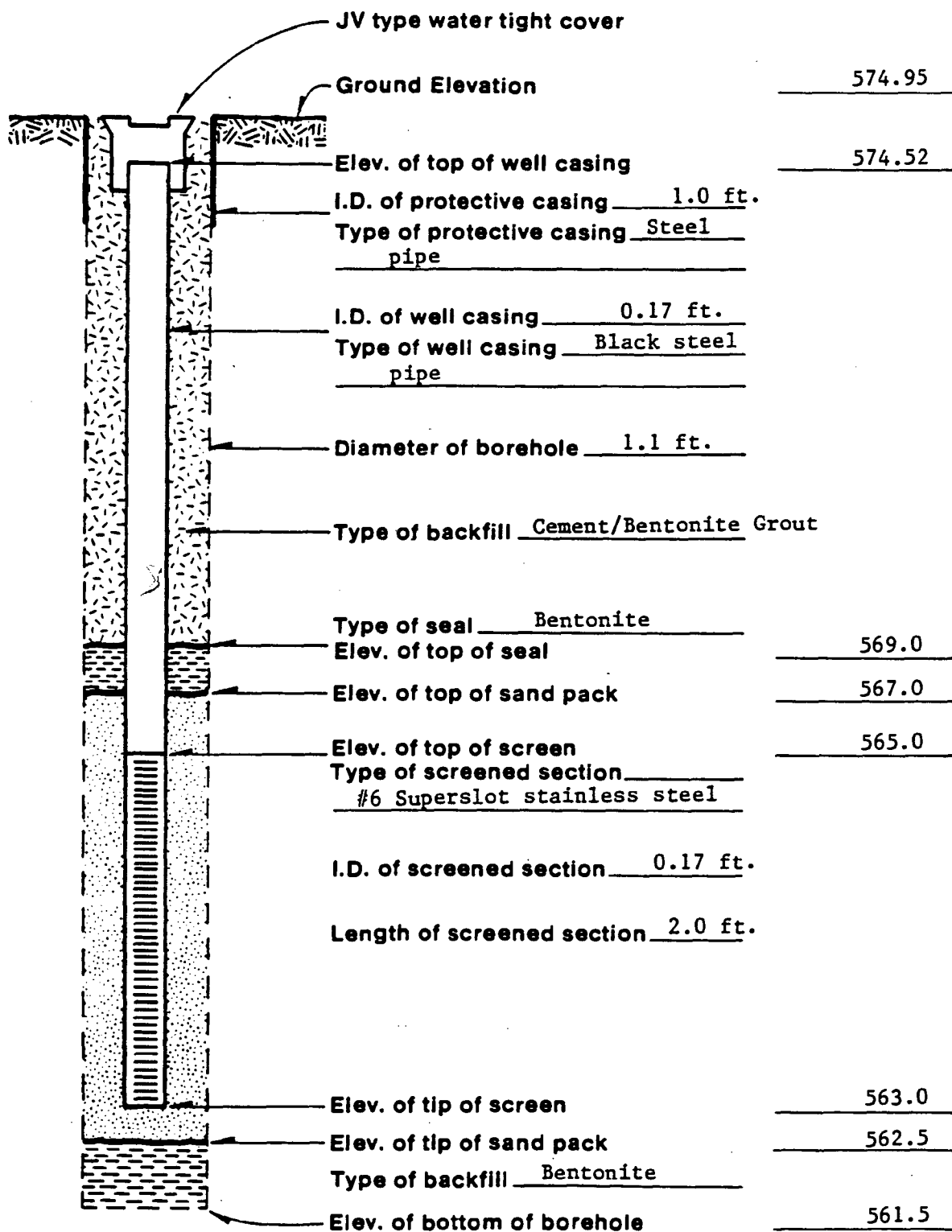
SURFACE ELEVATION 574.3

LOCATION

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRAPHIC LOG
0			Firm to Stiff, medium red-brown SILTY CLAY with some angular gravel and abundant root debris, moist, low plastic (CL CLAY CAP FILL)	573.3	
55			Firm, dark gray SANDY GRAVELLY SILT with wood, coal and brick fragments, moist, low plastic (DEMOLITION FILL)	569.8	
6			Soft, black, silty SLUDGE, saturated, nonplastic, with brick, tar paper fragments and NAPL (FILL)	565.7	
7			Firm, dark gray to medium olive-gray SILTY SAND with trace clay and organic debris in upper 1 to 2 feet, wet, low plastic (SM ALLUVIUM)		
17					
3					
5					
6			Medium dense medium to dark gray, fine to coarse SAND with subangular fine gravel, wet (SP ALLUVIUM)	554.8	
18				553.8	
18			Stiff, medium red-brown SILTY CLAY with some fine to coarse sand and fine subangular gravel, wet, medium plastic (CL GLACIAL TILL)		

Completion Depth 551.3 Feet Water Depth 569.8 Feet Date
Project Name Olin 102nd Street Landfill Project Number 84C2136



**REPORT OF MONITORING WELL NO. MW-10**

RAWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2136-10

DATE: 8/15/86

FIGURE NO:

LOG of BORING No. MW-10

Niagara Falls

DATE 1/14/86 SURFACE ELEVATION 575 LOCATION New York

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRAPHIC LOG
			Clean crushed limestone GRAVEL (DRIVEWAY FILL)	574	
			Hard, dark red brown fine sandy SILTY CLAY with abundant fine to medium gravel and brick chips, moist, low plastic (DRIVEWAY FILL)	573.5	
	31			▽ 570	
	17		Stiff, medium yellow brown with orange and light gray mottling, fine sandy SILTY CLAY, moist becoming saturated, low plastic (CL ALLUVIUM)	567.5	
			Very stiff, red brown with white and yellow brown mottling, SILTY CLAY, varved, moist, high plastic (CL/CH GLACIOLACUSTRINE CLAY)		

Completion Depth 567 Feet Water Depth 570 Feet ATD Date _____
Project Name 01in 102nd Street Landfill Project Number 84C2136

LOG of BORING No. MW-10A

Niagara Falls

DATE 1/14/86

SURFACE ELEVATION 575

LOCATION New York

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	STRATIGRAPHIC LOG
0			Clean crushed limestone GRAVEL (DRIVEWAY FILL)	573	
			Hard, dark red brown sandy SILTY CLAY with abundant rock fragments and brick chips, moist, low plastic (CL DRIVEWAY FILL)	572.5	
5	41		Stiff, medium yellow brown with gray mottling, fine sandy SILTY CLAY with pockets of silty sand intermixed, moist, medium to high plastic (CL with SM SEWER BACK-FILL)		
	14				
10	18				
	20		Very stiff, medium red brown SILTY CLAY, varved, moist, medium to high plastic (CL/CH GLACIOLACUSTRINE CLAY)	▽ 563.5	
15	19				

Completion Depth 561.5 Feet

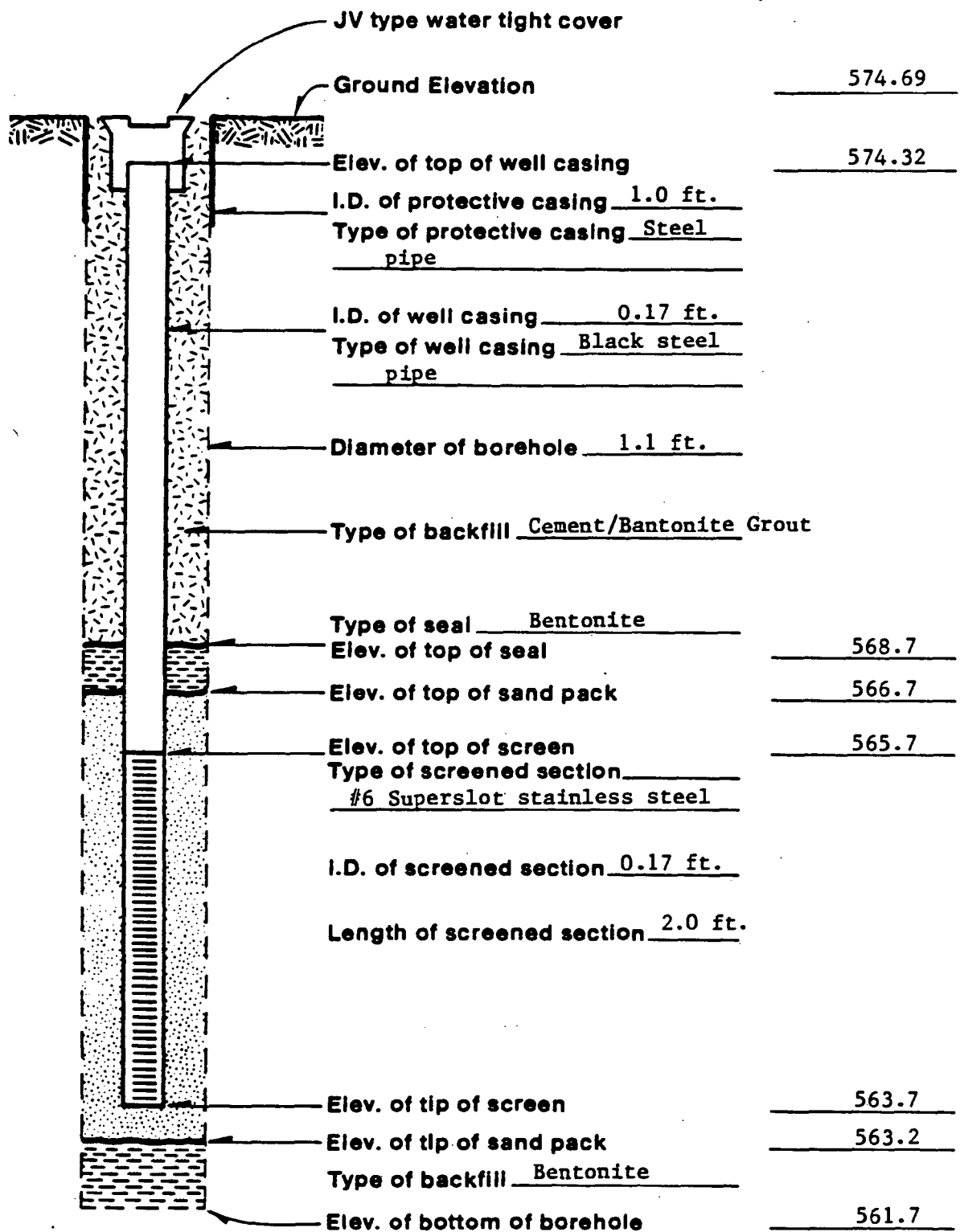
Water Depth 563.5 Feet ATD

Date

Project Name 01in 102nd Street Landfill

Project Number 84C2136





REPORT OF MONITORING WELL NO. MW-11

DRAWN BY: D.B.

CHECKED BY: R.K.

PROJECT NO: 84C2136-10

DATE: 8/15/86

FIGURE NO: