STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

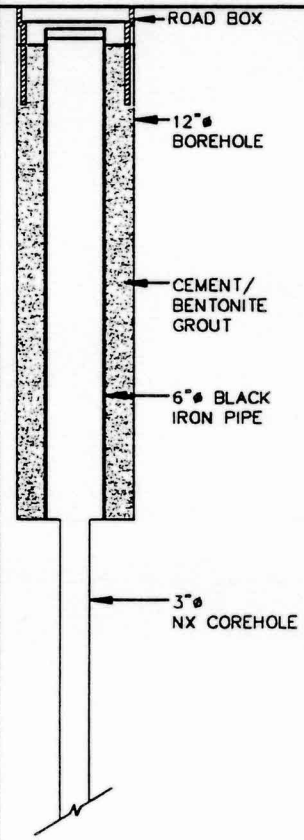
(L291)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – NIAGARA PLANT
LOCATION: CASCADES

HOLE DESIGNATION: OW656 (Page 1 of 3)
DATE COMPLETED: SEPTEMBER 10, 1991
DRILLING METHOD: 12" OD HSA
CRA SUPERVISOR: A.P. KISIEL

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEVATION ft AMSL	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
	REFERENCE POINT (Top of Riser)	569.32			
	GROUND SURFACE	569.6			
	Black gray and brown, fine to medium SAND, some silt, little clay and fine gravel, dry to moist, FILL	567.7	1SS		17
2.5	Gray and brown CLAY, some silt, little sand, moist, NATIVE		2SS		14
	Same, dark to gray	566.0			
5.0	Light gray mottled brown SAND, some silt		3SS		12
	Same, little silt				
7.5	Same, trace round gravel, trace clay		4SS		8
	Brown fine to medium SAND, wet	561.6			
		560.3	5SS		47
10.0	Brown SILT, some sand and gravel, little clay	559.6			
	Red brown SAND, some gravel and silt		6SS		>50
12.5			7SS		>50
	BEDROCK – augered to 13.3 ft BGS and set casing	556.3			
15.0	END OF OVERBURDEN HOLE @ 13.3 FT. BGS				
17.5					
20.0					
22.5					
25.0					
27.5					
30.0					
32.5					

MONITOR INSTALLATION



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

CHEMICAL ANALYSIS ⬭ WATER FOUND ▽ STATIC WATER LEVEL ▼

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

(L292)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – NIAGARA PLANT
LOCATION: CASCADES

HOLE DESIGNATION: OW656 (Page 2 of 3)
DATE COMPLETED: OCTOBER 17, 1991
DRILLING METHOD: NX
CRA SUPERVISOR: A.P. KISIEL

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BIENDTRECORCVKAL	RNUUNMBER	CORE RECOVERY	ROD	WATER RETURN
ft BGS		ft. AMSL				%	%	%
	Overburden		12"ø BOREHOLE; 6"ø BLACK IRON PIPE; CEMENT/ BENTONITE GROUT; 3"ø NX COREHOLE					
12.5		556.5						
	DOLOSTONE(Oak Orchard Formation): bituminous, light to dark gray, very thin to medium bedded, fine to medium grained, saccharoidal, carbonaceous partings – weathered, solution pitting, fragmented (13.1 to 15.9 ft BGS) – slighlty weathered, trace stylolites, trace gypsum lined fractures and veinlets, trace solution pitting (15.9 to 23.7 ft BGS)				1	29	0	100
15.0								
17.5								
20.0					2	94	94	0
22.5	– moderately weathered, some small to large gypsum filled vugs (23.7 to 30.5 ft BGS)							
25.0								
27.5					3	96	82	0
30.0	– fossiliferous (coral) zone, solution pitting, trace gypsum filled vugs (29.1 to 33.0 ft BGS)							
32.5	– slightly weathered, trace stylolites, trace gypsum and sphalerite, trace coral, trace calcite filled vugs (33.0 to 43.9 ft BGS)							
35.0					4	102	100	0
37.5								
40.0								
					5	101	101	0

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

▽ WATER FOUND ▼ STATIC WATER LEVEL NM – NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

(L292)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – NIAGARA PLANT
LOCATION: CASCADES

HOLE DESIGNATION: OW656 (Page 3 of 3)
DATE COMPLETED: OCTOBER 17, 1991
DRILLING METHOD: NX
CRA SUPERVISOR: A.P. KISIEL

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BIT RECOVERY	RUN NUMBER	CORE RECOVERY	RQD	WATER RETURN
ft BGS		ft. AMSL				%	%	%
42.5					5	101	101	0
45.0	– moderately weathered fossiliferous zone, trace gypsum and sphalerite (44.8 to 45.2 ft BGS) – slightly weathered, trace coral, gypsum, sphalerite, trace stylolites (45.2 to 48.3 ft BGS)		3"ø NX COREHOLE					
47.5	– gypsum lined parting (@ 48.0 and 48.3 ft BGS) – small gypsum lined vertical fracture (@ 47.5 to 47.8ft BGS)							
50.0	– medium grained, moderately weathered, small to medium vugs, trace stylolites, trace coral, trace gypsum (48.3 to 53.7 ft BGS)				6	95	91	0
52.5	– small inclined fracture (52.0 to 52.4 ft BGS) – slightly weathered, medium to dark gray, trace stylolites, trace gypsum and coral (53.7 to 60.2 ft BGS)							
55.0								
57.5					7	98	92	0
60.0	– moderately weathered fractures (@ 59.3 ft BGS) END OF HOLE @ 60.2 FT. BGS	509.4						
62.5								
65.0								
67.5								
70.0								

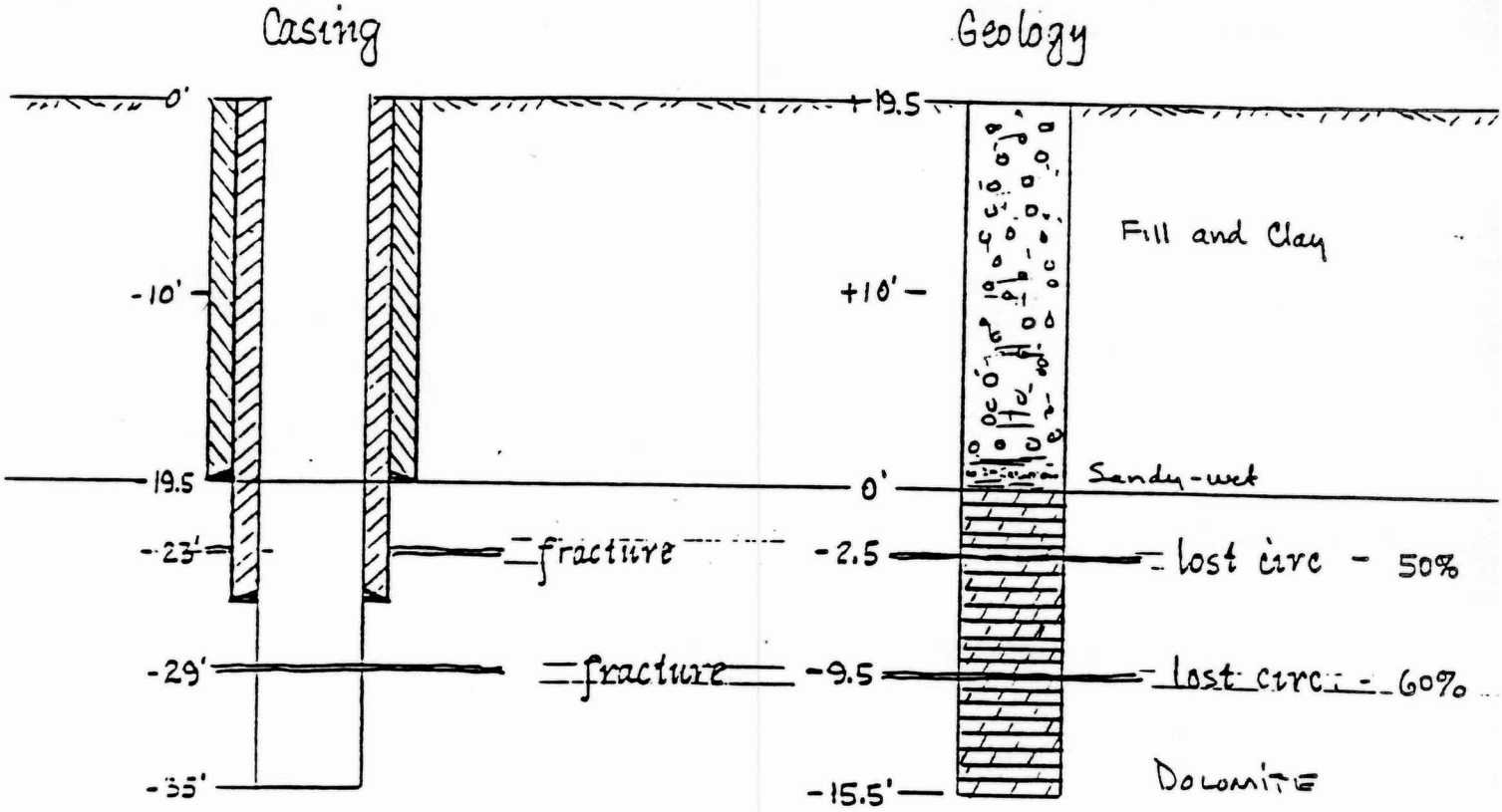
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ▼ STATIC WATER LEVEL NM – NOT MEASURED

Dupont Exploratory Drilling Program 23-B

Well No. 23-B

Spud 4-24-84 Hassell E. Hunter 4-25 84



Spud 4-24-84 under surface casing
Complete 4-25-84

No odor detected while drilling.

HEH 4/25/84

Woodward-Clyde Consultants

FIELD ROCK DESCRIPTION LO

Sheet 1 of 2

GROUND WATER OBSERVATION
At _____ Ft. at Completion
_____ Ft. after _____ hrs.
At _____ Ft. after _____ hrs.
At _____ Ft. after _____ hrs.

JOB DuPont Niagara Plant NO: _____
DRILLING RIG CME-55
OPERATOR Rochester Drilling Co
INSPECTOR Hassell Hunter - Conoco

BORING NUMBER 23-B
BORING OFFSET _____
SURFACE ELEVATION _____
DATE START _____ FINISH _____

DEPTH	CORE RUN From	CORE RUN To	RQD Inch	RQD %	RECOVERY Inch	RECOVERY %	Core Type & Hoist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES No./Ft.	FRACTURES DIP	BED DIP
19	Box 1								Fill & Clay Top Competent Dolomite (Bedrock) @	19.5'		
20 21 22	Run No. 1 19.5' to 22.8'		33" / 46"	46" / 46"	72%	100%	NX	Free	DOLOMITE, coarsegrain, grey-brn, scattered gyp, dense 19'11" - Jt <5° Jt 20'11" 25° fracture prob Hio 20'1" - <5° " 21'1" 15° " " " 20'3" - <5° " 21'6" <5° joint 20'6" <5° " 22'1 <5° " 20'7" <5° " 22'4 <5° "	1 5 2 2	5° 5° 5° 5° 5°	
23 5	Run No 2 22.3 to 25.5'		27" / 32"	32" / 32"	84%	100%			Dolomite, grey-brn, med. grain, dense 22'10" <5° joint 23'10" <5° " 24'0" 30° " 25'0' 60° - mech. frac in barrel	1 1 1 1	5° 5° 30° 60	
6												

GENERAL NOTES:

Total Depth 25.5'
"ROCK" Drilling 6'

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

HOLE NO. 23-B

Woodward-Clyde Consultants

FIELD ROCK DESCRIPTION LO

Sheet 2 of 2

GROUND WATER OBSERVATION
At _____ Ft. at Completion
_____ Ft. after _____ hrs.
At _____ Ft. after _____ hrs.
At _____ Ft. after _____ hrs.

JOB DuPont Niagara Plant NO. _____
DRILLING RIG CME-55
OPERATOR Rochester Drilling
INSPECTOR Hassell Hunter - CONOCO

BORING NUMBER 23-B
BORING OFFSET _____
SURFACE ELEVATION _____
DATE START _____ FINISH _____

DEPTH	CORE RUN From	CORE RUN To	RQD Inch	RQD %	RECOVERY Inch	RECOVERY %	Core Type & Hoist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES No./Ft.	FRACTURES DIP	BED DIP
25	Box 2											
26	Run No 3 25.5' to 35'		100 / 114	88%	114 / 114	100%	NX		Dolomite, grey-brn, dense, fine-med grain, occasional gyp nodule	1	5°	
27									25'8" <5° Joint	6	5	0
									26'1" <5° "		5	
28									26'3" } broken 26'6" }	2	5	
									26'8" <5° Joint		5	
29									26'9" <5° "	3	5	
									27'4" <5° "		5	
									27'9" <5° "	3	5	
									28'5" 10° "			
									28'7" <5° "			
									28'11" <5° "	0		
31									29'2" <5° "		5	
									29'2" <5° "	2	5	
32									29'6" 15° - major fracture - Lost circ		5	
									31'1" <5° Joint	3	5	
33									31'6" <5° "			0
									32'1" <5° "	0		
34									32'2" <5° "			
									32'5" <5° "		5	
35									34'0" <5° " Total Depth = 35'	2	5	
								Lockport Group Dolomite	34'6" <5° "			

GENERAL NOTES:

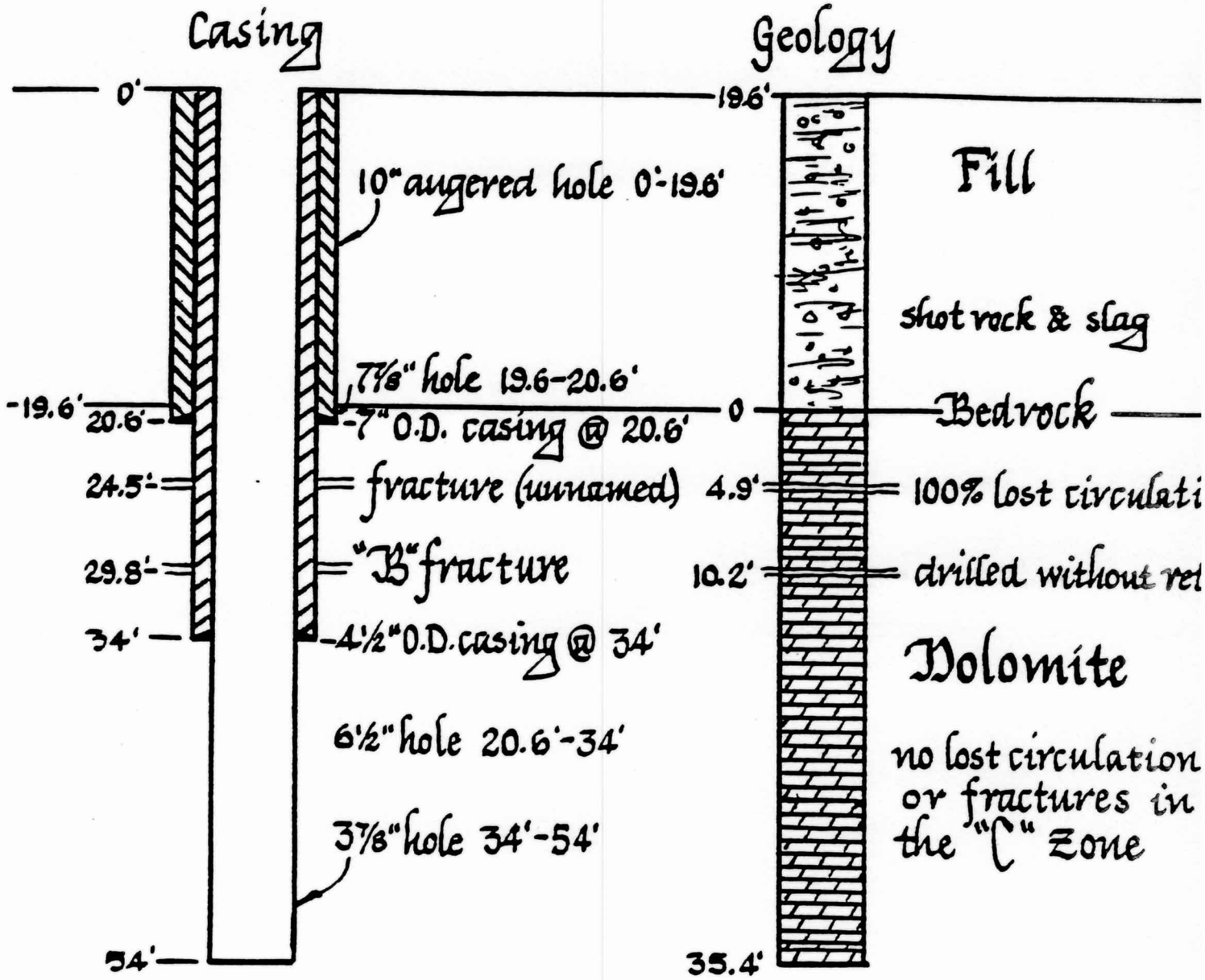
Total Depth 35'
"ROCK" Drilling 9.5

PROPORTIONS USED: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. 23-B

Du Pont Monitoring Wells 7-C (
Plan. Well No. 7-C (R) Plant Site
Spudded January 20, '86 Hassell Hunter Jan. 23, 198

Plant Well No. 7-C (R)



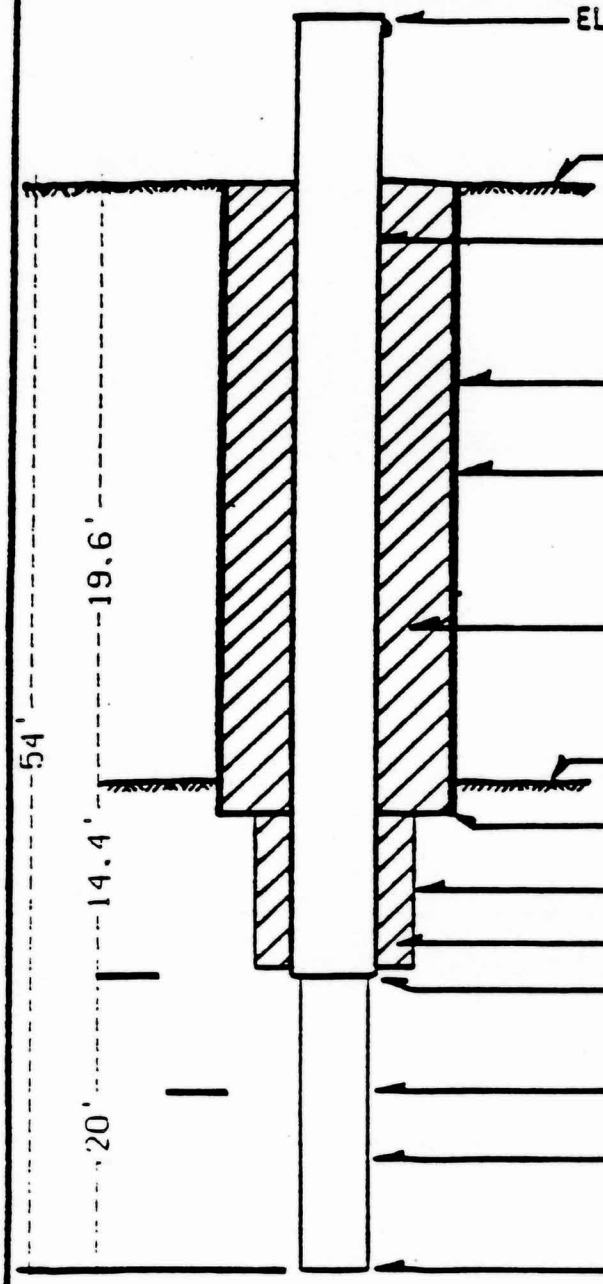
Total Depth 54'

Core #1 20.6'-30.6'
Core #2 30.6'-32'
Core #3 32-34'
Core #4 34-44'
Core #5 44'-54'

Vertical Scale 1" = 10'

(R) = Replacement Well

PLANT WELL #7-C (R)



ELEVATION OF TOP OF CASING _____

GROUND ELEVATION _____

I.D. OF WELL CASING 4"

TYPE OF WELL CASING Steel, J-55, ST&C 9.5 lb

DIAMETER OF BOREHOLE 10"

O.D. OF OUTER CASING 7"

TYPE OF OUTER CASING Steel, Schedule 40

TYPE OF BACKFILL Cement, neat 15.6 lb/gal

DEPTH TO BEDROCK SURFACE 19.6'

DEPTH TO BOTTOM OF OUTER CASING 20.6'

DIAMETER OF BOREHOLE 6 1/2"

TYPE OF BACKFILL Cement, neat, 15.6 lb/gal

DEPTH TO BOTTOM OF WELL CASING 34'

DEPTH(S) TO FRACTURE no fracture

DIAMETER OF BOREHOLE 3 7/8"

DEPTH TO BOTTOM OF WELL 54'

DEPTH TO BOTTOM OF BOREHOLE 54'

100% lost circ at 24.5' unnamed fracture
"B" fracture at 23.8'
no lost circulation in "C" zone

REPORT OF MONITORING WELL

Drawn by:	Checked by:	Project No.:	Date: 1-23-86	Figure No.:

Hassell E. Hunter, P.E.
Consulting Drilling Engineer

Sheet 1 of 4

GROUND WATER OBSERVATION
At _____ Ft. at Completion
At _____ Ft. after _____ hrs.
At _____ Ft. after _____ hrs.
At _____ Ft. after _____ hrs.

JOB Ala Point Wells NO. _____
DRILLING RIG Rochester CME 75
OPERATOR Carl
INSPECTOR Hassell E. Hunter

BORING NUMBER 7-C (K)
BORING OFFSET _____
SURFACE ELEVATION _____
DATE START 1-8-86 FINISH 1-14-

DEPTH	CORE RUN From	CORE RUN To	RQD Inch	RQD %	RECOVERY Inch	RECOVERY %	Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.			FRACTURES No./Ft.	FRACTURES DIP
20													
21	Core #1		90"		9.5'		NX		20.95'	0°	6' solid gypsum	1	0
	20.6		114"		10.0				21.45	0°		1	0
22	to		79%		95%				23.76	0°	mechanical break		
	30.6								24.44	10°	along stylolite	0	
23									24.48	10°	" "		
									24.64	0°	Fracture } lost 100%	1	
24									24.68	0°	Fracture } circ.		0
									24.96	50	joint		10
									25.20	0	joint	5	0
25									25.50	10°	weathered joint		5
									25.60	10°	weathered joint		0
									26.18	0	joint	3	10
26									26.25	0	joint		0
									26.43	0	joint	5	0
27									26.93	50	joint along gyp plane		
									27.45	0°	" along gyp band	1	
28									29.10	0°	joint		
									29.75	0°	Fracture "B" - wedge		0
									29.98	0°	joint in gyp		
29									30.10	—	end of core		0
												2	0
30													
31													

GENERAL NOTES:

"B" fracture at 28.75' cored without returns. Circ. was lost in stray fracture at 24.64' and was not regained.

Total Depth _____
"ROCK" Drilling _____

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

HOLE NO. 7CR

Hassell E. Hunter, P.E.
Consulting Drilling Engineer

GROUND WATER OBSERVATION
At _____ Ft. at Completion
At _____ Ft. after _____ hrs.
t _____ Ft. after _____ hrs.
At _____ Ft. after _____ hrs.

JOB Hutton Wells NO. _____
DRILLING RIG Rochester CME 75
OPERATOR Cole
INSPECTOR Hassell Hunter

BORING NUMBER 7-C (R)
BORING OFFSET _____
SURFACE ELEVATION _____
DATE START 1-8-86 FINISH 1-14-8

DEPTH	CORE RUN From	CORE RUN To	RQD Inch	RQD %	RECOVERY Inch	RECOVERY %	Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES No./Ft.	FRACTURES DIP	BI D
30												
31	Core #2 30.6 to	32.0'	21.5' / 21.5'	100%	1.8 / 1.4	129%			31.62 0° joint		0	
32												
33	Core #3 32' to	34'	20.5" / 20.5"	100%	1.7 / 2.0	85%			no joints			
34												
									Cores #1 & 5 next page			
									No lost circulation or fractures in Cores #2 & 3			

GENERAL NOTES:

Total Depth _____
"ROCK" Drilling _____

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

HOLE NO. 7-C

Hassell E. Hunter, P.E.
Consulting Drilling Engineer

Sheet 3 of 4

GROUND WATER OBSERVATION		
At _____ Ft. at Completion	JOB DuPont Wells NO. _____	BORING NUMBER 7-C (R)
At _____ Ft. after _____ hrs.	DRILLING RIG Rockester CME 75	BORING OFFSET _____
t _____ Ft. after _____ hrs.	OPERATOR Cook	SURFACE ELEVATION _____
At _____ Ft. after _____ hrs.	INSPECTOR Hassell Hunter	DATE START 1-8-88 FINISH 1-14-

DEPTH	CORE RUN From	CORE RUN To	RQD Inch	RQD %	RECOVERY Inch	RECOVERY %	Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.			FRACTURES No./Ft.	FRACTURES DIP
34													
	Core #4		121"		10.1		Nt	Nuge				0	
35	34'		121"		10.0				35.95	5°	joint	1	5
	to		100%		101%				39.95	0°	joint		
36	44'								40.75	10°	joint		
									41.65	0°	joint	0	
37									42.52	15°	joint stylolite		
									43.35	5	joint - in coral		
38								Vert fract @ 37.5	44.1		end of core	0	
39												0	
40												0	5
41									No lost circulation or fractures in Core # 4			1	10
42												1	0
43												1	15
44								Coral Rut			1/2" cubic crystal of calcium flourite at 43.35'	1	5

GENERAL NOTES:

Total Depth _____
"ROCK" Drilling _____

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

HOLE NO. 7-C

Hassell E. Hunter, P.E.
Consulting Drilling Engineer

Sheet 4 of 4

GROUND WATER OBSERVATION			
At _____ Ft. at Completion			
At _____ Ft. after _____ hrs.			
At _____ Ft. after _____ hrs.			
At _____ Ft. after _____ hrs.			

JOB Alutout NO. _____
DRILLING RIG Forbertin CME75
OPERATOR Carl
INSPECTOR Farrell Hunter

BORING NUMBER 7-C (R
BORING OFFSET _____
SURFACE ELEVATION _____
DATE START 1-8-86 FINISH 1-14-

DEPTH	CORE RUN From	CORE RUN To	RQD Inch	RQD %	RECOVERY Inch	RECOVERY %	Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES No./Ft.	FRACTURES DIP
44											
	Core #5						NX	Cored Not	44.10 30° weathered jt in reef		30
									45.05 5° weathered jt in reef	1	
45	44		109"		10.1				47.22 0 joint		0
	to		121"						47.90 0 joint	1	
	54'				10.0				49.45 5° joint		
46			90%		101%				51.10 0° mechanical break		
									52.04 10° joint	0	
47									52.30 5° joint		
									52.37 <5° joint		0
									52.60 20° joint	2	
48									52.85 10° joint		0
									54.10 end of core	0	
49											
										1	5
50											
										0	
51									No lost circulation or visable fractures in Core #5		0
										1	
52											10
										5	90
											30
53											10
										0	
54											

GENERAL NOTES:

Total Depth _____
"ROCK" Drilling _____

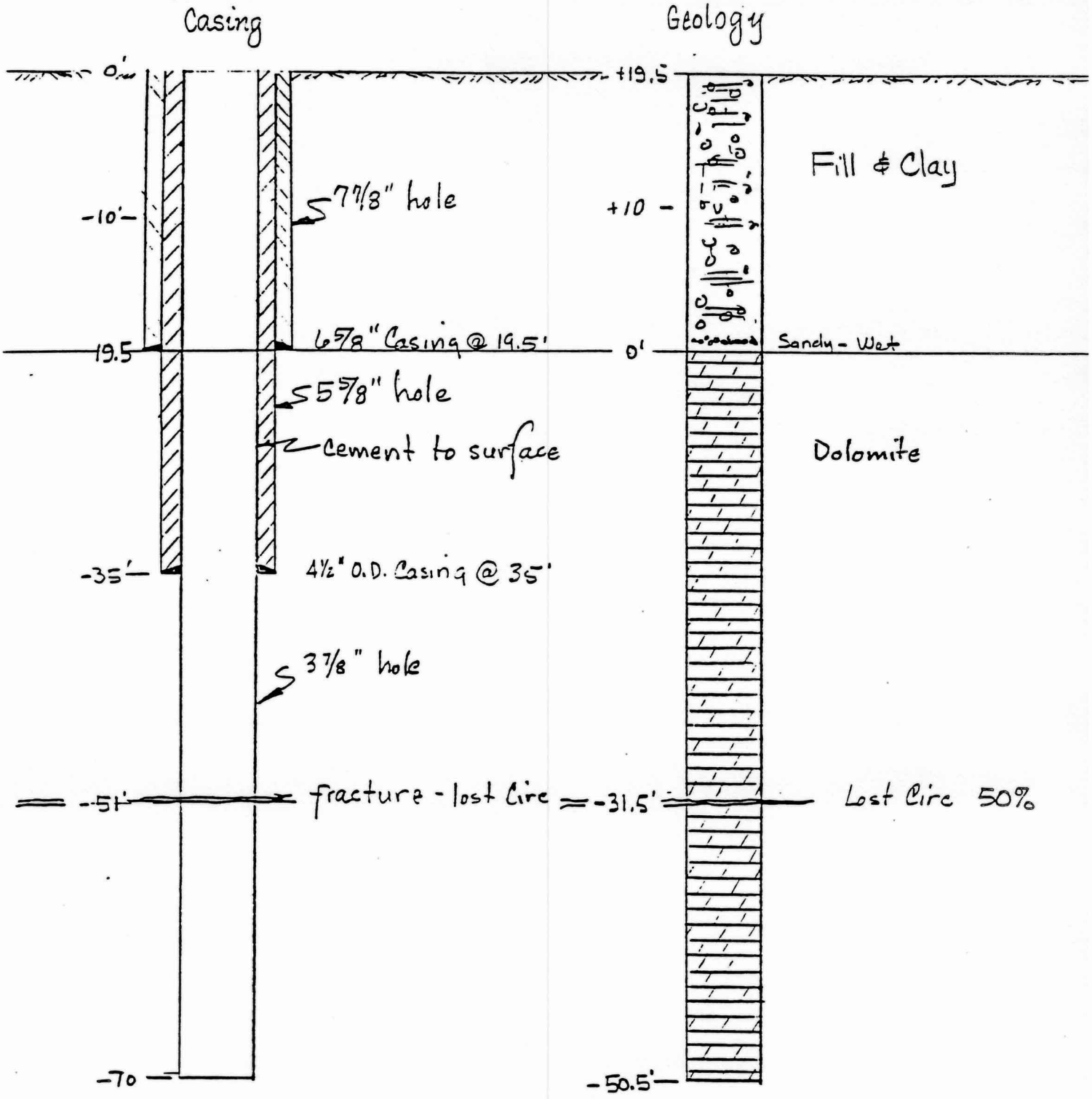
Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. 7 C

TITLE OF PROJ OR STUDY DuPont Exploratory Drilling Program PROJ OR STUDY NO 23-C

SUBJECT Well 23-C WHERE Plant Site

Spud 4-25-84 COMPUTED Hassell E. Hunter 4-27 84



4-27-84

No other [illegible] outside casing

Woodward-Clyde Consultants

FIELD ROCK DESCRIPTION LOG

Sheet 1 of 3

GROUND WATER OBSERVATION		
At _____ Ft. at Completion	JOB DuPont Niagara Plant NO: _____	BORING NUMBER 23-C
_____ Ft. after _____ hrs.	DRILLING RIG CME-55	BORING OFFSET _____
At _____ Ft. after _____ hrs.	OPERATOR Rochester Drilling	SURFACE ELEVATION _____
At _____ Ft. after _____ hrs.	INSPECTOR Hassell Hunter-CONOCO	DATE START 4-25-91 FINISH 4-27-91

DEPTH	CORE RUN From	CORE RUN To	RQD Inch	RQD %	RECOVERY Inch	RECOVERY %	Core Type & Hole Sl.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES No./Ft.	FRACTURES DIP	BED DIP
35	Box 1											
36	Run No 1		157' / 174'		174' / 174'		NX		Dolomite, grey-brn, med grain, occasional gyp nodule	1	5	
37	35.5'		90%		100%			Gyp		1	5	
38	to 50'								5° Joint 35'8"	2	15/5	
									5° " 36'4"			
									15° " 37'7"	0		
									5° " 37'11"			
39								Gyp	5° Break. 40'7"			
									5° Joint 41'4"	0		
									5° " 41'6"			
									5° " 44'5"	1	5	
1									5° " 44'9"			
									5° " 44'11"		5/5	
									5° " 45'1" Broken	2		
2								Run	5° " 45'2"			
									5° " 45'3"	0		
3								Vugs	5° " 45'7			10°
									5° " 45'11"	0		
4									5° " 46'5			
									10° " 47.5'		5/5	
45									5° " 48'0" Poss. fracture	3		
									5° 48'9"		5	
46										5		
								Porous				
47										1		

GENERAL NOTES:

Total Depth 70'

"ROCK" Drilling _____

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

HOLE NO. 23-C

Woodward-Clyde Consultants

FIELD ROCK DESCRIPTION LO

Sheet 2 of 3

GROUND WATER OBSERVATION		
At _____ Ft. at Completion	JOB Dupont Niagara Plant NO: _____	BORING NUMBER 23-C
_____ Ft. after _____ hrs.	DRILLING RIG CME-55	BORING OFFSET _____
At _____ Ft. after _____ hrs.	OPERATOR Rochester Drilling Co	SURFACE ELEVATION _____
At _____ Ft. after _____ hrs.	INSPECTOR Hassell Hunter	DATE START 4-25-81 FINISH 4-27-8

DEPTH	CORE RUN From	CORE RUN To	RQD Inch	RQD %	RECOVERY Inch	RECOVERY %	Core Type & Hole Sizl.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES No./Ft.	FRACTURES DIP	BED DIP
48	Run No. 1 Cont.									1	10°	
										2	5 5	
49												
50	Box 2									0		
51	RUN No. 2 50' to 65'		165' / 180'	180" / 180"			NX	o o o VUGS	Dolomite grey brn, dense, little vugs	2	5 5	
			92%	100%				Broken			5	
52									5° Joint 50'8"	6		
									5° " 50'9"			
									5° Joint 51'0"	0		
									5° " 51'3" } Possible fracture.			
									10° " 51'4"	1	20°	
									10° " 51'6"			
									10° " 51'9"			
									10° " 51'10"	0		
55									20° " 53'6"			
									5° " 56'6"	0		
									5° " 58'0"			
									10° " 58'4"	1	5°	
									10° " 64'8"			
58										0		
										1	10°	
60												

GENERAL NOTES:

Total Depth 70'

"ROCK" Drilling _____

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

HOLE NO. 22-C

Woodward-Clyde Consultants

FIELD ROCK DESCRIPTION LO

Sheet 3 of 3

GROUND WATER OBSERVATION		
At _____ Ft. at Completion	JOB DuPont Niagara Plant NO: _____	BORING NUMBER 23C
At _____ Ft. after _____ hrs.	DRILLING RIG CME-55	BORING OFFSET _____
At _____ Ft. after _____ hrs.	OPERATOR Rochester Drilling	SURFACE ELEVATION _____
At _____ Ft. after _____ hrs.	INSPECTOR Hassell Hunter/Conoco	DATE START _____ FINISH [illegible]

DEPTH	CORE RUN From	CORE RUN To	RQD Inch	RQD %	RECOVERY Inch	RECOVERY %	Core Type & Hole Sl.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES No./Ft.	FRACTURES DIP	BED DIP
	Run 2 Cont.								Data on previous page			
61										0		
62										0		
63										0		
64										0		
65	Box 3									1	10°	
	Run No 3		60"		60"		NX		Dolomite, grey w/brn, dense some vuggular porosity			
	65'		60"		60"							
67	to		100%		100%				5° Joint @ 68'0'			
	70'											
68										1	8°	
									Total Depth 70'			

GENERAL NOTES:

Total Depth _____

"ROCK" Drilling _____

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

HOLE NO

8-24-88
9-1-88
1 OF 1

ecco Inc.

The Environmental Consulting Company

SUBSURFACE LOG

HOLE NO.	MW-88-6A
SUFACE ELEV.	570.89
G.W. ELEV.	———
CASING ELEV.	573.44

ECT Frontier Chemical Waste Process, Inc. LOCATION 47th Street Niagara Falls, NY
Project No. 88-041SC

DEPTH	LOG	SAMPLE TYPE	SAMPLE NO	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	DESCRIPTION	NOTES
		AG	-	-	-	-	-	Gray-brown Crushed Stone, Slag (moist, FILL)	HNu = 0.1 ppm
		SS	1	6	4	5	5	Gray Clayey SILT, trace sand, trace gravel (moist, FILL)	HNu = 2.0 ppm Chemical odors noted
5		SS	2	4	5	6	8	Becomes gray-brown, contains little f-c Gravel (wet)	HNu = 1.4 ppm
		SS	3	8	14	15	16	Gray Clayey SILT, Gravel	SS sample #3, no recovery. HNu = 3.0 ppm, LEL = 2%
10		SS	4	9	10	12	15	Red-brown laminated SILT, occ. Clay partings (moist)	HNu = 1.2 ppm SS#5 no recovery
		SS	5	5	6	8	10		WOH = Weight of Hammer
		SS	6	WOH	1	3	14	Red-brown Clayey SILT, some f-c Sand, little f-c Gravel (moist-wet)	HNu = 1.1 ppm
15		SS	7	WOH	6	6	50/.4	Red-brown SILT and f-c Sand, some f-c Gravel (moist-wet)	HNu = 0.8 ppm
		5-7/8" RB						Weathered Bedrock	Roller bit (5-7/8")
20		HQ	RUN 1					Hard, gray. Dolostone ROCK, bedded to thin bedded	REC - 60% RQD - 28% Core water return 0% at 19'
25								Boring Complete at 22.4'	Temporary 6" dia. steel casing installed at 16.4'.
30									4" dia. casing installed (grouted) at 17.4'
35									

CLASSIFICATION Visual-Manual Identification as per ASTM D-2488
Andrew J. Kucserik

METHOD OF INVESTIGATION Catoh Environmental Company Truck Mounted Drill Rig (CME-750ATV) w/Hollow Stem Augers (HSA). ASTM D-1586

DATE		ecco Inc.	HOLE NO.	MW-88-6B
STARTED	8-24-88	The Environmental Consulting Company	SUFACE ELEV.	571.35
FINISHED	9-16-88		G.W. ELEV.	———
SHEET 1	OF 1	SUBSURFACE LOG	CASING ELEV.	573.98

PROJECT **Frontier Chemical Waste Process, Inc.** LOCATION **47th Street**
Project No. 88-041SC **Niagara Falls, NY**

DEPTH-FT	LOG	SAMPLE TYPE	SAMPLE NO	BLOWS ON SAMPLER 0/6 6/12 12/18 18/24	DESCRIPTION	NOTES
		Aug			Overburden Fill/Soils	For description of subsurface see boring log MW-88-6A
5						HNu = 1.5 ppm
						HNu = 22.5 ppm
						6" Dia. casing installed (grouted) at 17.0'
10						HNu = 3.8 ppm
						HNu = 95 ppm
15						Auger refusal at 17.0'
		6"	1		Hard, gray, Dolostone ROCK, thin bedded to bedded, minor solution pitting at 19.8'-20.3', minor vertical fracturing	REC - 100% RQD - 0%
20						REC - 48% RQD - 41% BOH - 3.8'
						Core barrel lost in hole on 9/1/88, recovered 9/9/88
		6" Core	RUN 2			Roller bit (5-7/8") at 22.6' to 26.0'
25					Becomes thick-bedded at 26.0' - 29.2'	
		HQ	RUN 5		Becomes bedded to thin bedded at 29.2-32.0, black staining and chemical odor noted at 29.1'	REC - 80% RQD - 63% Core water return 0% at 27'
30						
					Boring Complete at 32.0'	4" Dia. casing installed (grouted) at 26.0'
35						

CLASSIFICATION **Visual-Manual Identification as per ASTM D-2488 Andrew J. Kucserik**

METHOD OF INVESTIGATION **Catoh Environmental Company Truck Mounted Drill Rig (CME-750ATV) w/Hollow Stem Augers (HSA). ASTM D-1586**

APPENDIX C

STRATIGRAPHIC DATABASE

7/30/92

TABLE C1
STRATIGRAPHIC DATABASE
OFF-SITE INVESTIGATION PROGRAM

WELL/BH #	GROUND ELEVATION (AMSL)	GRID CO-ORDINATES NORTH	EAST	DEPTH TO ALLUVIUM (feet)	ELEV OF ALLUVIUM (AMSL)	DEPTH TO CLAY (feet)	ELEVATION OF CLAY (AMSL)	DEPTH TO TILL (feet)	ELEVATION OF TILL (AMSL)	DEPTH TO BEDROCK (feet)	ELEVATION OF BEDROCK (AMSL)	NAPL/SHEEN DEPTH OBSERVED (feet)
OW553	573.9	2313.42	582.84	6.9	567.0	7.5	566.4					n7.7-8.0
OW554	573.0	2213.98	290.38	--	--	4.6	568.4					
OW555	571.5	2105.90	-37.11	2.0	569.5	6.0	565.5					
OW556	571.7	1998.52	-349.84	4.2	567.5	7.0	564.7					
OW557	572.3	1795.36	-930.35	4.2	568.1	--	--	6.7	565.6			
OW558	571.4	1639.40	-1377.37	2.4	569.0	7.0	564.4					
OW559	570.4	1443.29	-1903.71	0.6	569.8	6.1	564.3					
OW560	568.1	379.51	-2092.29	5.4	562.7	6.5	561.6					
OW561	580.0	-139.37	-1964.64									
OW649C	567.69	281.98	-2406.79	3.7	564.0	5.5	562.2	14.3	553.4	17.8	549.9	
OW650	568.98	1806.13	-3289.70	2.0	567.0	5.0	564.0	8.6	560.4	11.8	557.2	
OW651C	568.85	1962.48	-2981.22	--	--	--	--	--	--	14.9	554.0	
OW652	570.15	2250.79	-2257.25	1.9	568.2	7.9	562.2	10.5	559.6	14.4	555.8	
OW653	573.8	2668.46	-772.31	10.5	563.3	14.3	559.5	17.4	556.4	20.8	553.0	
OW654B	569.8	2699.95	-2436.64	--	--	1.8	568.0	8.7	561.1	13.2	556.6	
OW655	571.41	3258.94	-1731.25	--	--	6.0	565.4	--	--	18.0	553.4	
OW656	569.64	3005.74	-2610.61	--	--	1.9	567.7	9.3	560.3	13.3	556.3	

LEGEND:

ND	-NON-DETECT
BLANK	-SAMPLING NOT PERFORMED
--	-UNIT NOT PRESENT
n	-NAPL PRESENT
s	-SHEEN PRESENT

7/30/92

TABLE C2
OVERBURDEN STRATIGRAPHIC THICKNESS
OFF-SITE INVESTIGATION PROGRAM

WELL/BH #	GROUND ELEV (AMSL)	GRID CO-ORDINATES NORTH	EAST	THICKNESS OF FILL (feet)	THICKNESS OF ALLUV. (feet)	THICKNESS OF CLAY (feet)	THICKNESS OF TILL (feet)	THICKNESS CONF. LAYER (feet)
OW553	573.94	2313.42	582.84	6.9	0.6	1.5		
OW554	572.96	2213.98	290.38	4.6	--	5.6		
OW555	571.49	2105.90	-37.11	2.0	4.0	2.0		
OW556	571.71	1998.52	-349.84	4.2	2.8	2.0		
OW557	572.26	1795.36	-930.35	4.2	2.5	--	3.3	
OW558	571.37	1639.40	-1377.37	2.4	4.6	2.0		
OW559	570.35	1443.29	-1903.71	0.6	5.5	2.9		
OW560	568.06	379.51	-2092.29	5.4	1.1	2.5		
OW561	579.95	-139.37	-1964.64	34.9				
OW649D	658.44	284.40	-2381.51	94.4	1.8	8.8	3.5	12.3
OW650	568.98	1806.13	-3289.70	2.0	3.0	3.6	3.2	6.8
OW651D	568.72	1982.07	-2993.28	14.7				
OW652	570.15	2250.79	-2257.25	1.9	6.0	2.6	3.8	6.4
OW653	573.80	2668.46	-772.31	10.5	3.8	3.1	3.4	6.5
OW654D	570.31	2741.79	-2459.04	2.3	--	6.9	4.5	11.4
OW655	571.41	3258.94	-1731.25	6.0	--	12.0	--	12.0
OW656	569.64	3005.74	-2610.61	1.9	--	7.4	4.0	11.4

7/30/92

TABLE C3
BEDROCK STRATIGRAPHIC THICKNESS
OFF-SITE INVESTIGATION PROGRAM INFORMATION

WELL/BH #	GROUND ELEVATION (AMSL)	GRID CO-ORDINATES NORTH	EAST	DEPTH TO BEDROCK (FEET)	ELEV.OF BEDROCK (AMSL)	DEPTH TO ERAMOSA (FEET)	ELEV.OF ERAMOSA (AMSL)	DEPTH TO GOAT ISLAND (FEET)	ELEV.OF GOAT ISLAND (AMSL)	DEPTH TO GASPORT (FEET)	ELEV.OF GASPORT (AMSL)	DEPTH TO DECEW (FEET)	ELEV.OF DECEW (AMSL)	DEPTH TO ROCHESTER (FEET)	ELEV.OF ROCHESTER (AMSL)	BOTTOM OF WELL (FEET)	ELEV.OF BOTTOM (AMSL)
OW649D	568.44	284.40	-2381.51	19.4	549.0	98.6	469.8	117.4	451.0	128.9	439.5	--	--	--	--	140.34	428.1
OW650	568.98	1806.13	-3289.70	11.8	557.2	--	--	--	--	--	--	--	--	--	--	58.48	510.5
OW651D	568.72	1982.07	-2993.28	15.0	553.7	87.5	481.2	107.1	461.6	120.8	447.9	--	--	--	--	138.02	430.7
OW652	570.15	2250.79	-2257.25	17.5	552.7	--	--	--	--	--	--	--	--	--	--	60.45	509.7
OW653	573.80	2668.46	-772.31	21.8	552.0	--	--	--	--	--	--	--	--	--	--	70.20	503.6
OW654D	570.31	2741.79	-2459.04	13.5	556.8	89.6	480.7	107.1	463.2	122.5	447.8	--	--	--	--	124.81	445.5
OW655	571.41	3258.94	-1731.25	18.0	553.4	--	--	--	--	--	--	--	--	--	--	64.01	507.4
OW656	569.64	3005.74	-2610.61	12.4	557.2	--	--	--	--	--	--	--	--	--	--	60.24	509.4

7/31/92

TABLE C4
BEDROCK MONITORING INTERVALS
OFF-SITE INVESTIGATION INFORMATION

WELL/BH #	GROUND ELEVATION (AMSL)	GRID CO-ORDINATES NORTH	EAST	DEPTH TO BEDROCK (feet)	ELEV.OF BEDROCK (AMSL)	MONITORED INTERVAL (BGS)			MONITORED INTERVAL (AMSL)			MONITORED UNIT
OW649C	567.69	281.98	-2406.79	16.8	550.9	79.2	-	109.6	488.5	-	458.1	Oak Orchard/Eramosa
OW649D	568.44	284.40	-2381.51	19.4	549.0	19.4	-	58.0	549.0	-	510.4	Oak Orchard
OW650	568.98	1806.13	-3289.70	11.8	557.2	12.3	-	58.5	556.7	-	510.5	Oak Orchard
OW651C	568.85	1962.48	-2981.22	15.0	553.9	61.0	-	91.3	507.9	-	477.6	Oak Orchard/Eramosa
OW651D	568.72	1982.07	-2993.28	15.0	553.7	15.5	-	61.0	553.2	-	507.7	Oak Orchard
OW652	570.15	2250.79	-2275.25	17.5	552.7	14.4	-	60.5	555.8	-	509.7	Oak Orchard
OW653	573.80	2668.46	-772.31	21.8	552.0	22.2	-	70.2	551.6	-	503.6	Oak Orchard
OW654B	569.80	2699.95	-2436.64	13.2	556.6	91.0	-	125.5	478.8	-	444.3	Eramosa/Goat Island/Gasport
OW654C	570.25	2720.33	-2448.41	13.6	556.6	60.6	-	88.5	509.7	-	481.8	Oak Orchard
OW654D	570.31	2741.79	-2459.04	13.5	556.8	14.3	-	59.6	556.0	-	510.7	Oak Orchard
OW655	571.41	3258.94	-1731.25	18.0	553.4	18.7	-	64.0	552.7	-	507.4	Oak Orchard
OW656	569.64	3005.74	-2610.61	12.4	557.2	13.1	-	60.2	556.5	-	509.4	Oak Orchard

APPENDIX D

INJECTION TEST RESULTS

TABLE D1

OW 649

Depth Below Ground Surface (ft)	*Depth Below Top of Rock (ft)*	*Hydraulic * Conductivity (cm/sec)*	*Waterbearing*	*Depth to Static Water Level (ft. BGS)*	*Date*
23.8 - 39.0	4.4 - 19.6	>2.0E-03	Yes	NA (1)	8/30/91
33.6 - 48.8	19.6 - 29.4	2.1E-03 - 5.5E-03	Yes	7.9	8/30/91
48.8 - 64.0	29.4 - 44.6	1.2E-02 - 8.7E-03	Yes	9.3	8/30/91
64.0 - 79.2	44.6 - 59.8	4.2E -06 - 7.9E-06	No	8.9	8/30/91
79.2 - 94.4	59.8 - 75.0	1.7E-02 - 2.6E-02	Yes	11.5	8/29/91
94.4 - 109.6	75.0 - 90.2	3.9E-04 - 7.5E-04	Yes	10.5	8/29/91
109.6 - 124.8	90.2 - 105.4	<1E-07	No	-2.0 (2)	8/29/91
124.8 - 140.0	105.4 - 120.6	<1E-07	No	9.1	8/29/91

Notes:

* Hydraulic conductivity calculated assuming R/ro = 10.

(1) Transducer readings remained static during successive flow increases of 5, 10, 15 and 20 GPM. Subsequently, a static water level was not available and the hydraulic conductivity has been estimated.

(2) Possible gas presence.