

PROJECT: Esso Cardlock Bulk Plant

GD ELEV.: 98.981 m

HOLE No.: BH1

LOCATION: Regina, SK

TPC ELEV.: 99.750 m

DRILL: Auger

SAMPLE TYPE: SHELBY SPLIT SPOON CORE DISTURBED NO RECOVERY OTHER

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations				N	OTHER TESTS
				● %LEL	▲ ppm	100	200		
	SAND (FILL) - brown, medium grained, some silt, damp, loose, well sorted								
1	CLAY - brown, trace silt and sand, damp, stiff to very stiff		5						
2	- less stiff, more moist at 2.4 m								
3	- mottled light and dark brown, organic at 3.0 m		10						
4	- fractures at 3.3 m								
5	- getting siltier with depth, stiffer at 4.3 m		15						
6	SILT - light brown, some clay, damp, very stiff to hard, low plasticity		20						
7	- mottled light and dark brown, very firm to stiff at 6.1 m								
8	- trace fine grained gravel, trace boulder at 7.3 m		25						
9	- silt layer (1 mm thick), very firm to stiff, damp at 7.9 m								
	- moist at 9.7 m		30						

O'CONNOR ASSOCIATES



DATE: 89/06/27

JOB No.: 10-1202

LOGGED BY: JKL

DWG.No.: A-1

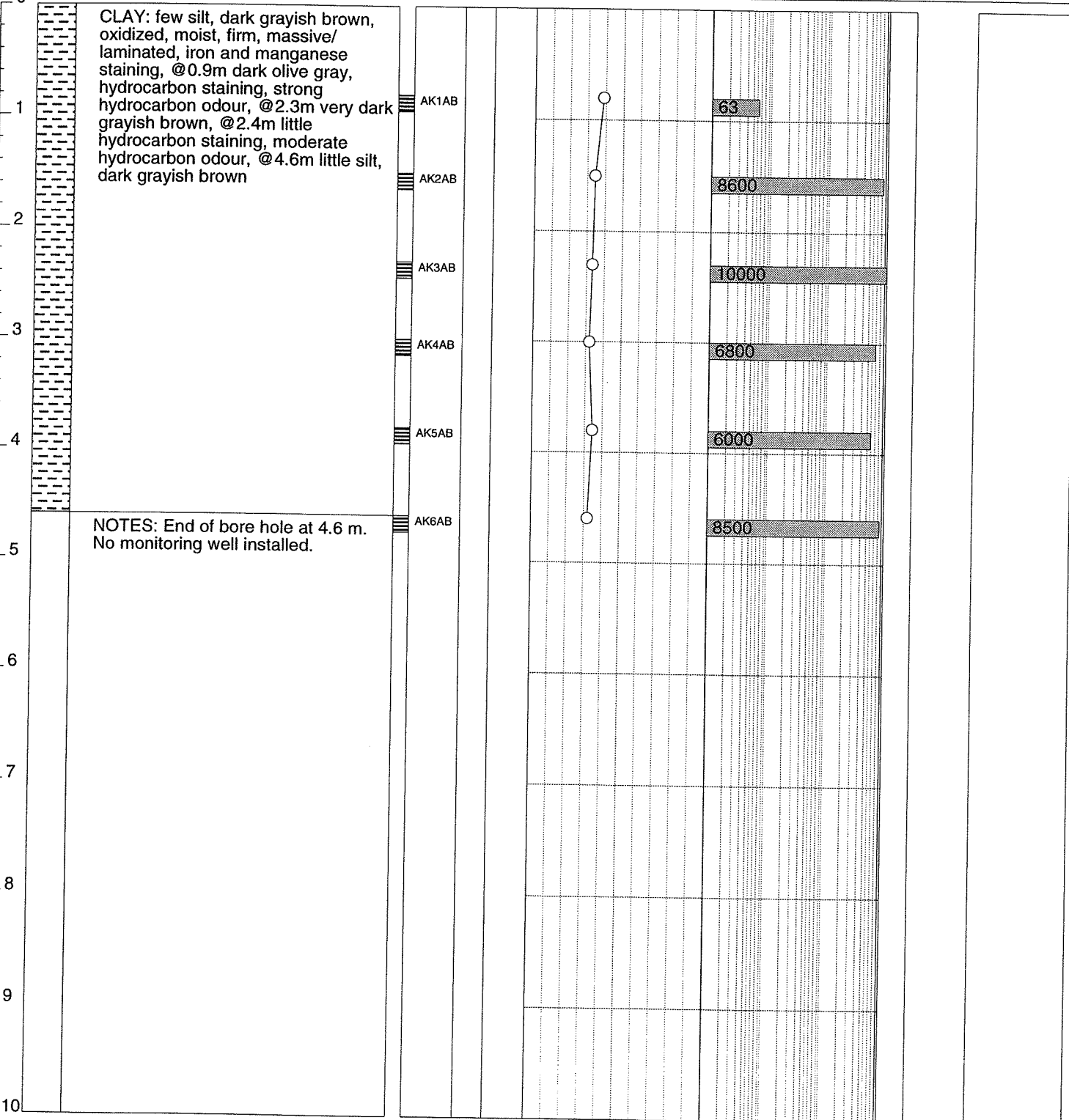


Client: Imperial Oil Ltd.
 Project: Environmental Assessment
 Location: Right-Of-Way, IPL
 Project No: R1700

Northing: 0
 Easting: 0
 Ground Elev.: 582.573
 Top Casing Elev.: 0

Date Drilled: 28 October 1993
 Drill: Brat 22
 Drilling Method: Solid Stem Auger
 Logged by: AJK

Depth (m)	Symbol	Soil Description	Sample		Moisture Content percent			Headspace Vapour ppm				Monitor Well Construction Detail
			Type	No.	SPT 'N'	USC	Plastic Limit +	Natural Moisture O	Liquid Limit Diamond	10	100	



ENV BH m elev CAL v03.lgr



Clifton Associates Ltd.
engineering science technology

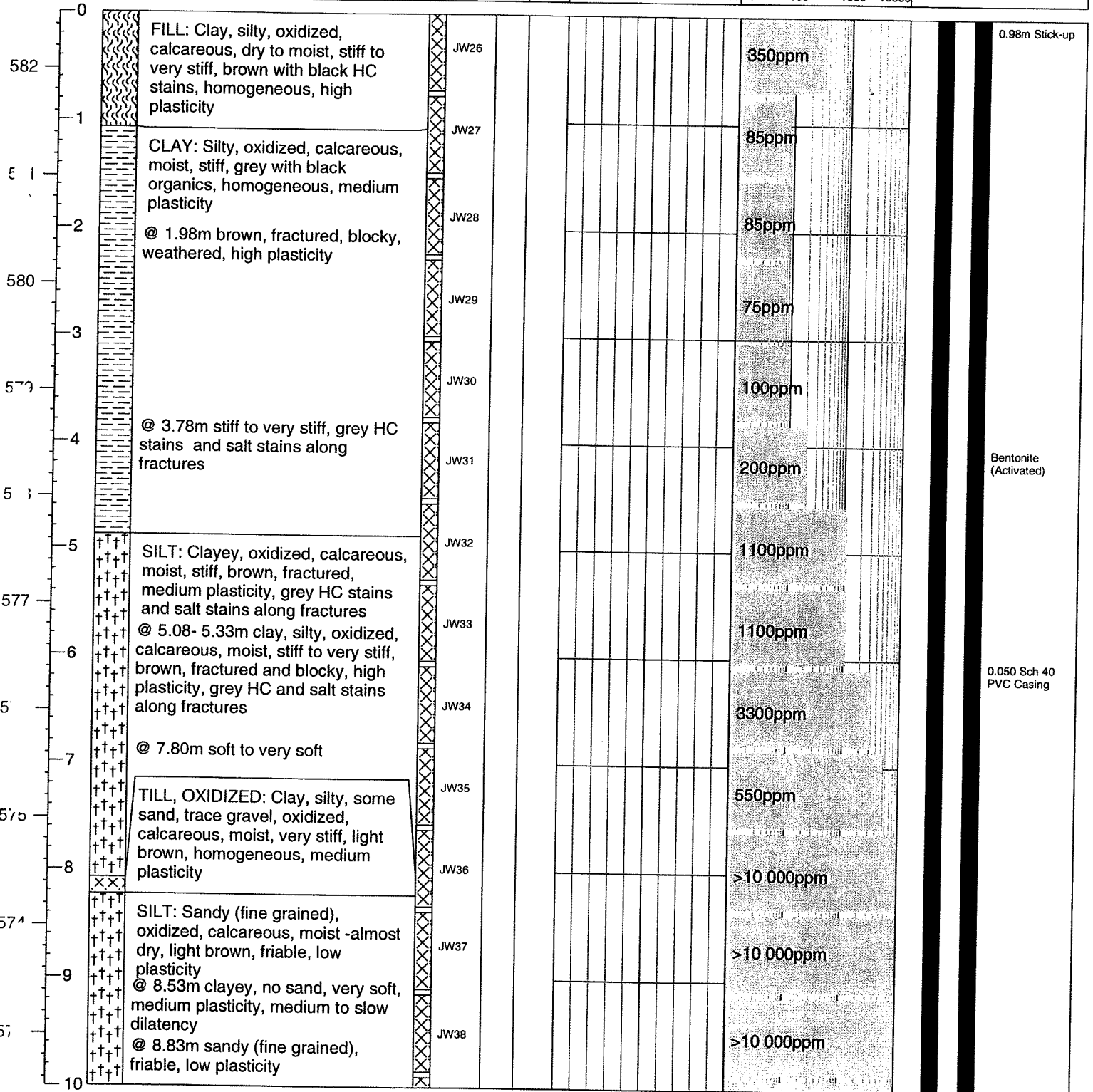
BORE HOLE LOG

Bore Hole: 301

Page: 1 of 2

Client: Imperial Oil Ltd.	Northing: -	Date: 23 November 2004
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.: 582.52	Method: Hollow Stem
Project No.: R3667	Top Casing Elev.: 583.50	Logged by: JDW

Elev (m)	Depth (m)	Symbol	Soil Description	Sample		Moisture Content			Headspace Vapour				Monitor Well Construction Detail
				Type	No.	SPT 'N'	USC	Plastic Limit	percent Natural Moisture	Liquid Limit	ppm		



0.98m Stick-up

Bentonite (Activated)

0.050 Sch 40 PVC Casing



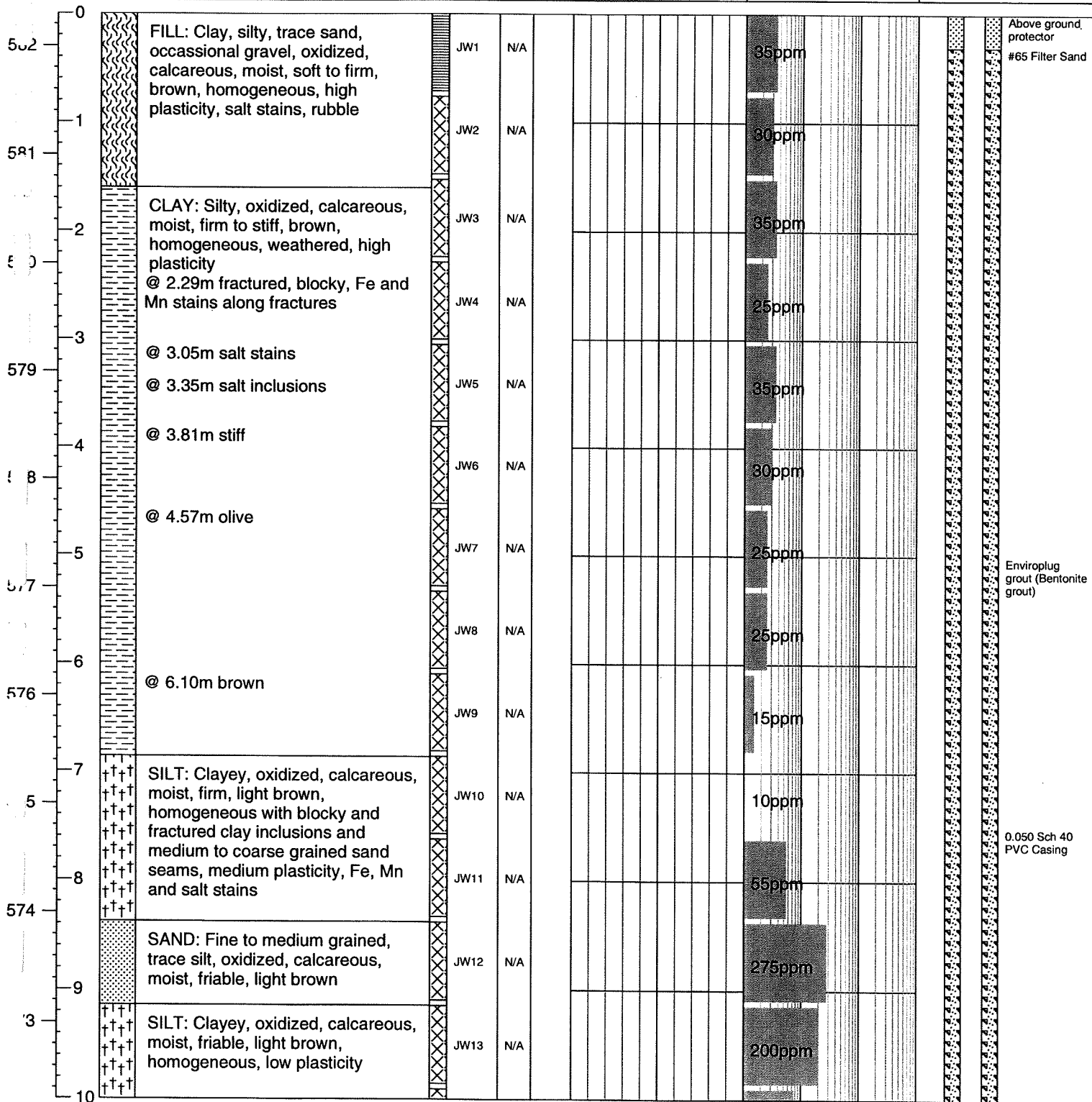
BORE HOLE LOG

Bore Hole: 401

Page: 1 of 3

Client: Imperial Oil Ltd.	Northing: -	Date: 03 Aug 2005
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.: 582.30	Method: Hollow Stem
Project No.: R3667.1	Top Casing Elev.: 583.14	Logged by: JDW

Elev (m) Depth (m)	Symbol	Soil Description	Sample Type No.	SPT 'N'	USC	Moisture Content percent			Headspace Vapour ppm				Monitor Well Construction Detail
						Plastic Limit ▲	Natural Moisture ●	Liquid Limit ◆	10	100	1000	10000	

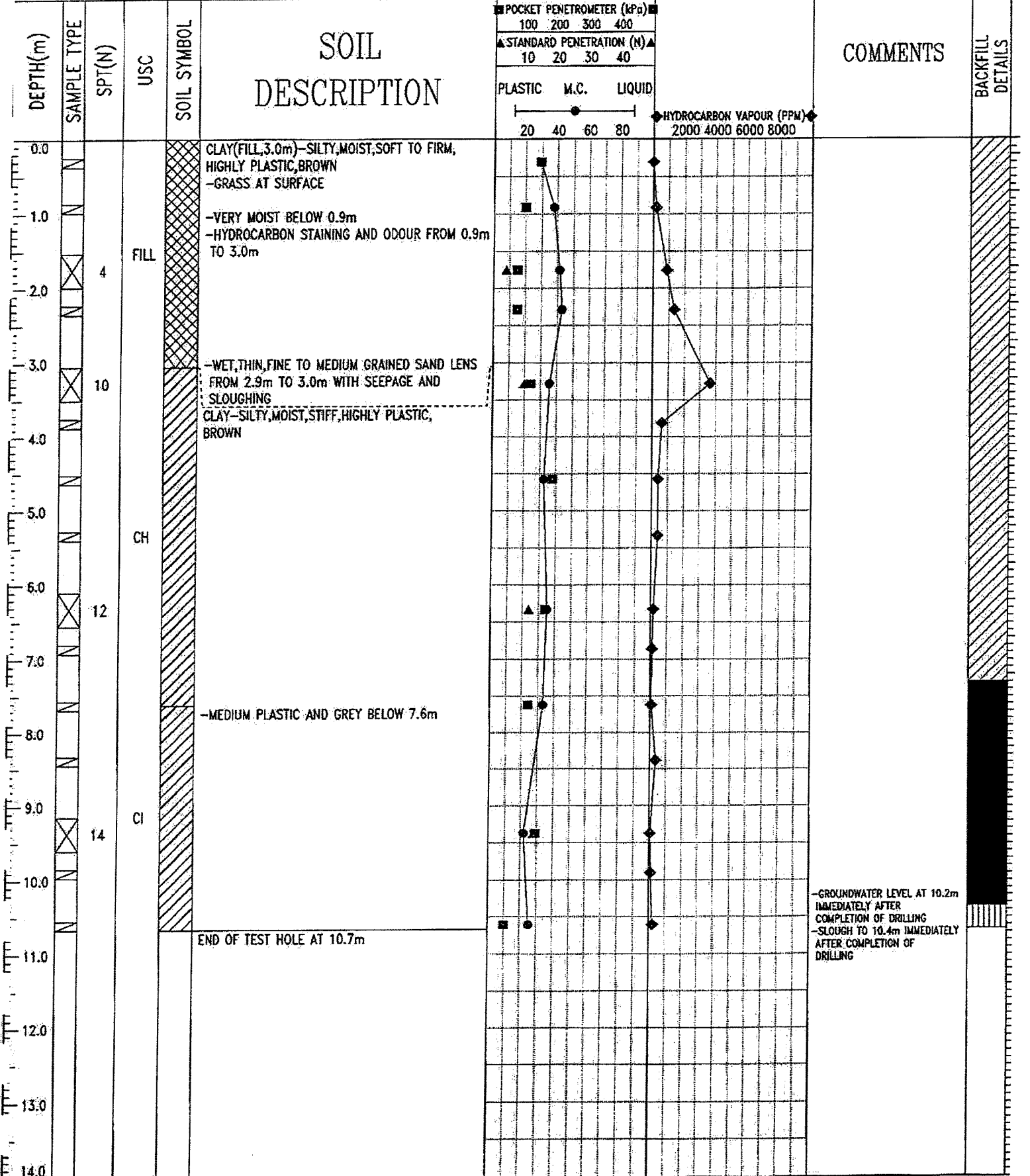


Above ground protector
#65 Filter Sand

Enviroplug grout (Bentonite grout)

0.050 Sch 40 PVC Casing

SAMPLE TYPE	THIN WALL TUBE	DISTURBED	SPT	A-CASING	HOLLOW STEM	CORE
BACKFILL TYPE	BENTONITE	PEA GRAVEL	SLOUGH	GROUT	DRILL CUTTINGS	SAND



470

NE09-30-17-19-W2

SASKATCHEWAN WATER CORPORATION
ELECTRIC LOG
TEST DRILLING ASSISTANCE PROGRAM

ACQUISITION NO. **87410**
 GROUP NO. **0000**

DRILLING CONTRACTOR: COMPANY NAME
Andrews & Sons Drilling Ltd

CONTRACTOR'S TELEPHONE NUMBER
328543-1202

CONTRACTOR'S ADDRESS
**237 Smith St
 Regina Sask**

OWNER'S NAME
Sask Water

OWNER'S TELEPHONE NUMBER
328694-1320

OWNER'S ADDRESS
111, Eastford St. East

TESTHOLE: MUNICIPAL LAND LOCATION
WE 9301-17-19-W2

DATE TESTHOLE COMPLETED
7/7/87

LOGGING OPERATOR'S NAME
Andrews & Sons

DATE TESTHOLE LOGGED
7/7/87

DEPTH DRILLED
1200

DEPTH LOGGED
186

TRADE NAME OF LOGGER
Widca

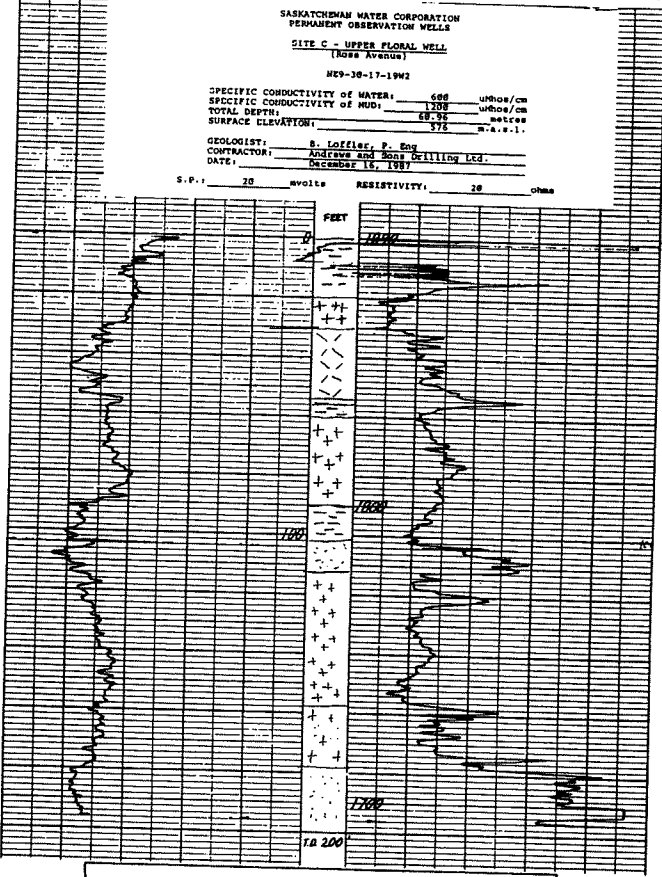
TYPE OR MODEL OF LOGGER
USA

SIGNAL NO. OF LOGGER
264

ACCREDITATION DATE
17/1/87

LOG SCALES
 SINGLE-POINT RESISTANCE **4**

Acq 13253
Saskatchewan Research Council
SEDIMENTARY RESOURCES



TESTHOLE: MUNICIPAL LAND LOCATION
WE 9301-17-19-W2

DATE TESTHOLE COMPLETED
7/7/87

LINE NO.	FROM (FT)	TO (FT)	MILLER'S LOG AND PROCEDURE RECORD
	0	30	Clay - silty, silty with depth
	30	56	Clay - silty, gray, fine plastic
	56	60	Till - very silty, silty, non oxidized dark gray, calc
	60	90	Clay - silty, silty with depth dark gray
	90	103	Silt, clayey - silt, light gray
	103	112	Clay - silty, tan to fine gray
	112	158	Sand - silty, fine med. gray
	158	178	Silt, clayey, greenish gray consolidated with base sand
	178	200	Sand - med. coarse, calc. with depth base - non oxidized

Well description
 PVC casing dia 4" bottom @ 105'
 Screen dia 3" length 5', set 0.25'
 Well bottom @ 111'
 Water level - 60'
 Drawdown - 19' after 2 hrs @ 10 GPM

Complete water analysis available

CONTRACTOR: **Andrews & Sons Drilling Ltd**

BOREHOLE LOG

PROJECT NO. 88-177

BOREHOLE NO. T1

PROJECT NAME GROUND WATER MONITORING

DATE May 5-6/88

IMPERIAL OIL REFINERY - REGINA

GEOLOGIST GAM

CLIENT IMPERIAL OIL LIMITED

ELEVATION

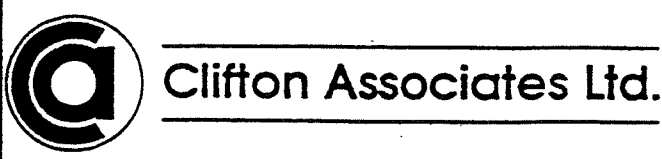
DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)	
			INTERVAL	NO.	TYPE	N' VALUE		% WATER	W _p
0.02	TOPSOIL			1	SS	13			
	FILL Dark brown silt and clay fill, W.T.P.L., stiff to very stiff			2	SS	17			
				3	SS	20			
2.3	SILTY CLAY Medium brown, with grey and light brown mottling down to + 4.3 m, some secondary gypsum and crystalline deposition, W.T.P.L., stiff			4	SS	14			
				5	SS	11			
				6	SS	13			
	Noticeable decrease in clayey fraction with thin laminated silt seams from + 7.6 m			7	SS	13			
				8	SS	14			
				9	SS	12			
8.6	INTERBEDDED SILT & TILL Grey silt and clayey silt with thin sandy silt seams and clayey silt till layers, till becomes more predominant and sandy with decrease in clayey fraction from + 7.6 m, generally wet with occasional thin saturated zones, loose to compact			10	SS	9			

TEST HOLE LOG

DATE <u>27 May 1991</u>	GROUND ELEV. <u>100.09 m</u>	TEST HOLE NO. <u>101</u>
DRILL <u>Brat 22</u>	LOCATION _____	SHEAR STRENGTH - kPa <input type="checkbox"/> UNCONF. <input type="checkbox"/> POCKET PEN. <input checked="" type="checkbox"/> LAB VANE <small>50 100 150 200</small>
LOGGED BY <u>R. Donahue</u>		

DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	ppm	SAMPLE	USC	PLASTIC LIMIT WATER CONTENT LIQUID LIMIT			
						10	30	50	70
1		0.05 - ASPHALT	310						
		0.3 - SAND - with gravel	225						
2		CLAY - little silt - mottled brown and black - oxidized, calcareous - moist, firm - 1.5 m brown	60						
		- moist, stiff - @ 2.3 m moist, very stiff - fractured - salt crystals	90						
3		- @ 7.6 m some silt - silt lenses	75						
			45						
4			50						
			50						
5			50						
			50						
6			50						
			50						
7			50						
			60						
8		7.9 - SILT - little clay - brown - oxidized, calcareous - moist, soft	25						
		- @ 8.4 m gray, unoxidized - layered, fractured							
9									

1500 1500 1700 1900 2100
▲ DRY DENSITY - kg/m³



PROJECT <u>ESSO TERMINAL 550 McDONALD</u>
LOCATION <u>REGINA, SASKATCHEWAN</u>
PROJECT NO. <u>R1087</u> PAGE NO. <u>1 of 2</u>

TEST HOLE LOG

DATE 27 May 1991
 DRILL Brat 22
 LOGGED BY R. Donahue

GROUND ELEV. 100.09 m
 LOCATION _____

TEST HOLE NO. 101
 SHEAR STRENGTH - kPa
 UNCONF. POCKET PEN. LAB VANE
 50 100 150 200

DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	ppm	SAMPLE	USC	PLASTIC LIMIT			WATER CONTENT			LIQUID LIMIT						
						10	30	50	70	90%	10	30	50	70	90%			
10	+	SILT - continued... - @ 10.3 m little sand	10															
11	.	10.9 SAND - very fine grained, little silt - gray - unoxidized - moist to dry - variable moisture with depth - @ 12.0m dry	10															
12	-	12.1 E.O.H.	0															
13																		
14		Notes: 1) 150 mm diameter continuous flight solid stem auger used. 2) No seepage or sloughing noted during drilling. 3) Piezometer installed in Test Hole.																
15																		
16																		
17																		
18																		



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PROJECT ESSO TERMINAL 550 McDONALD
 LOCATION REGINA, SASKATCHEWAN
 PROJECT NO. R1087 PAGE NO. 2 of 2

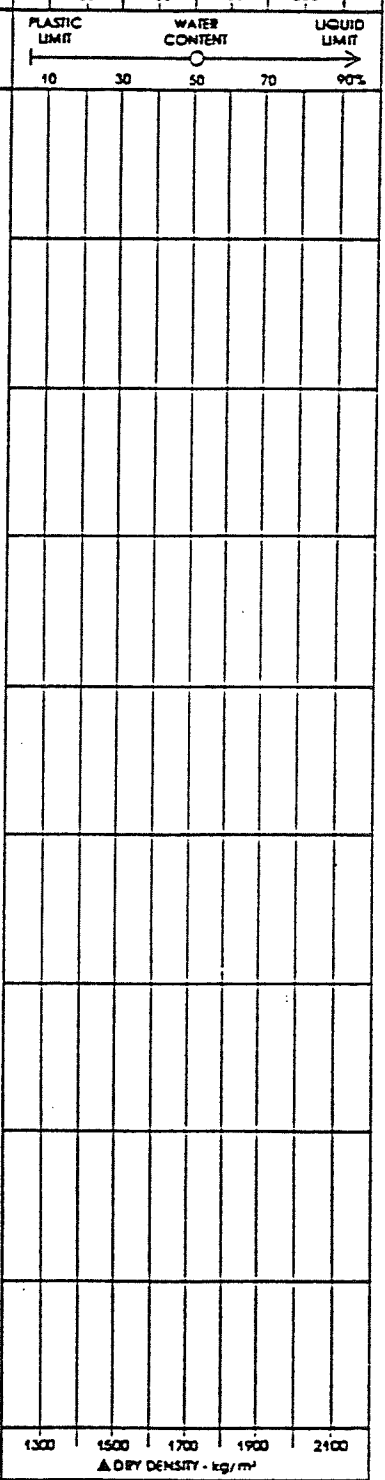
TEST HOLE LOG

DATE 27 May 1991
 DRILL Brat 22
 LOGGED BY R. Donahue

GROUND ELEV. 99.53 m
 LOCATION _____

TEST HOLE NO. 102
 SHEAR STRENGTH - kPa
 UNCONF. POCKET PEN. LAB VANE
 50 100 150 200

DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	ppm	SAMPLE	USC	PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT
		0.05 — ASPHALT	10					
		0.3 — SAND - with gravel						
1		CLAY - few silt - dark brown - oxidized, calcareous - laminated, fractured - moist, firm	50					
2			60					
3			75					
4			75					
5								
6								
7								
8		7.9 — SILT - little clay - gray - unoxidized, calcareous - moist, soft - layered, fractured	45					
9		- @ 9.1 m dry	20					



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PROJECT ESSO TERMINAL 550 McDONALD
 LOCATION REGINA, SASKATCHEWAN
 PROJECT NO. R1087 PAGE NO. 1 of 2

TEST HOLE LOG

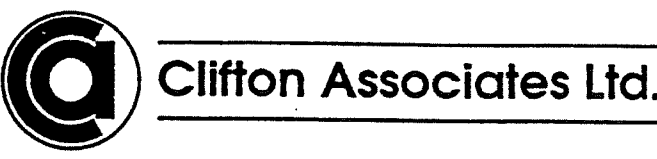
DATE <u>27 May 1991</u>	GROUND ELEV. <u>99.53 m</u>	TEST HOLE NO. <u>102</u>
DRILL <u>Brat 22</u>	LOCATION _____	
LOGGED BY <u>R. Donahue</u>	_____	

SHEAR STRENGTH - kPa

UNCONF. POCKET PEN. LAB VANE
50 100 150 200

DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	ppm	SAMPLE	USC	SHEAR STRENGTH - kPa			
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT	
10	+	SILT - continued...	30						
11	.	10.4 SAND - very fine grained, little silt - gray - unoxidized, calcareous - variable moisture with depth - soft, loose	25						
12	.	12.2 E.O.H.	25						
13		Notes: 1) 150 mm diameter continuous flight solid stem auger used. 2) No seepage or sloughing noted during drilling. 3) Piezometer installed in Test Hole.							
14									
15									
16									
17									
18									

1300 1500 1700 1900 2100
▲ DRY DENSITY - kg/m³



PROJECT	<u>ESSO TERMINAL 550 McDONALD</u>
LOCATION	<u>REGINA, SASKATCHEWAN</u>
PROJECT NO.	<u>R1087</u>
PAGE NO.	<u>2 of 2</u>

TEST HOLE LOG

DATE 27 May 1991
 DRILL Brat 22
 LOGGED BY R. Donahue

GROUND ELEV. 100.18 m
 LOCATION _____

TEST HOLE NO. 103
 SHEAR STRENGTH - kPa
 UNCONF. POCKET PEN. LAB VANE
 50 100 150 200

DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	ppm	SAMPLE	USC	PLASTIC LIMIT WATER CONTENT LIQUID LIMIT								
						10	30	50	70	90%				
		0.05 ASPHALT	30											
		0.3 SAND - with gravel												
1		CLAY - few silt - dark grayish brown - oxidized, calcareous - layered, fractured - moist, very stiff - @ 2.3 m brown	60											
2		- @ 3.8 m fractured - iron staining - salt crystals - @ 6.8 m some silt - silt lenses	50											
3			30											
4			40											
5			45											
6			60											
7			45											
8		7.3 SILT - little clay - brown - oxidized, calcareous - moist, soft - @ 7.9 m gray, unoxidized - layered, fractured - variable moisture with depth	55											
9		- @ 8.8 m till seams	10											

1300 1500 1700 1900 2100
 ▲ DRY DENSITY - kg/m³




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PROJECT ESSO TERMINAL 550 McDONALD
 LOCATION REGINA, SASKATCHEWAN
 PROJECT NO. R1087 PAGE NO. 1 of 2

TEST HOLE LOG

DATE <u>27 May 1991</u>	GROUND ELEV. <u>100.18 m</u>	TEST HOLE NO. <u>103</u>
DRILL <u>Brat 22</u>	LOCATION _____	
LOGGED BY <u>R. Donahue</u>		

DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	ppm	SAMPLE	USC	SHEAR STRENGTH - kPa								
						UNCONF.	POCKET PEN.	LAB VANE	PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT			
10	+	SILT - continued...	10											
10.4			10											
11	.	SAND - very fine grained, little silt - gray - unoxidized - moist to dry - variable moisture with depth	10											
12			5											
12.2		E.O.H.	25											
13														
14		Notes: 1) 150 mm diameter continuous flight solid stem auger used. 2) No seepage or sloughing noted during drilling. 3) Piezometer installed in Test Hole.												
15														
16														
17														
18														

	PROJECT <u>ESSO TERMINAL 550 McDONALD</u>
	LOCATION <u>REGINA, SASKATCHEWAN</u>
	PROJECT NO. <u>R1087</u> PAGE NO. <u>2 of 2</u>

TEST HOLE LOG

 DATE 27 May 1991

 GROUND ELEV. 99.68 m

 TEST HOLE NO. 104

 DRILL Brat 22

LOCATION _____

 LOGGED BY R. Donahue

 SHEAR STRENGTH - kPa
 UNCONF. POCKET PEN. LAB VANE
 50 100 150 200

DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	ppm	SAMPLE	USC	SHEAR STRENGTH - kPa				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT		
						10	30	50	70	90%
0.3	■	TOPSOIL- clay - black - moist, soft - rootlets	40							
1	▨	CLAY - few silt - brown - oxidized, calcareous - laminated, fractured - moist, soft - @ 3.0 m very stiff - iron and manganese staining - @ 3.8 m some silt - salt crystals - @ 7.3 m silt seam	25							
2	▨		40							
3	▨		50							
4	▨		55							
5	▨		45							
6	▨		40							
7	▨	SILT - little clay - gray - unoxidized - moist, soft - layered, fractured - variable moisture with depth	40							
7.3	+		30							
7.9	•	SAND - very fine grained, little silt - gray - unoxidized - moist to dry - variable moisture with depth	20							
9	•		10							

 1300 1500 1700 1900 2100
 ▲ DRY DENSITY - kg/m³

Clifton Associates Ltd.

 PROJECT ESSO TERMINAL 550 McDONALD

 LOCATION REGINA, SASKATCHEWAN

 PROJECT NO. R1087 PAGE NO. 1 of 2

TEST HOLE LOG

DATE 27 May 1991
 DRILL Brat 22
 LOGGED BY R. Donahue

GROUND ELEV. 99.68 m
 LOCATION _____

TEST HOLE NO. 104
 UNCONF. POCKET PEN. LAB VANE
 50 100 150 200

DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	ppm	SAMPLE	USC	SHEAR STRENGTH - kPa PLASTIC LIMIT WATER CONTENT LIQUID LIMIT 10 30 50 70 90%
10	•••••	SAND - continued...	25			
11	•••••		10			
12	•••••	12.2 E.O.H.	10			
13		Notes: 1) 150 mm diameter continuous flight solid stem auger used. 2) No seepage or sloughing noted during drilling. 3) Piezometer installed in Test Hole.	25			
14						
15						
16						
17						
18						

1300 1500 1700 1900 2100
 ▲ DRY DENSITY - kg/m³




Clifton Associates Ltd.

PROJECT ESSO TERMINAL 550 McDONALD
 LOCATION REGINA, SASKATCHEWAN
 PROJECT NO. R1087 PAGE NO. 2 of 2

TEST HOLE LOG

DATE <u>27 May 1991</u>	GROUND ELEV. <u>102.19 m</u>	TEST HOLE NO. <u>105</u>
DRILL <u>Brat 22</u>	LOCATION _____	SHEAR STRENGTH - kPa <input type="checkbox"/> UNCONF. <input type="checkbox"/> POCKET PEN <input checked="" type="checkbox"/> LAB VANE <small>50 100 150 200</small>
LOGGED BY <u>R. Donahue</u>		

DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	ppm	SAMPLE	USC	PLASTIC LIMIT WATER CONTENT LIQUID LIMIT				
						10	30	50	70	90%
		TOPSOIL- clay - black - moist, soft - rootlets	50							
1		0.9	30							
2		CLAY - few silt - brown - oxidized, calcareous - fractured - moist, stiff - iron and manganese staining	50							
3			40							
4			40							
5			30							
6			40							
7		6.4	40							
8		SILT - little clay - brown - oxidized, calcareous - moist, soft - @ 9.1 m till seam	50							
9			50							

	Clifton Associates Ltd.	PROJECT <u>ESSO TERMINAL 550 McDONALD</u>
		LOCATION <u>REGINA, SASKATCHEWAN</u>
		PROJECT NO. <u>R1087</u> PAGE NO. <u>1 of 2</u>

TEST HOLE LOG

DATE <u>27 May 1991</u>	GROUND ELEV. <u>102.19 m</u>	TEST HOLE NO. <u>105</u>
DRILL <u>Brat 22</u>	LOCATION _____	<small>SHEAR STRENGTH - kPa</small> <input type="checkbox"/> UNCONF. <input type="checkbox"/> POCKET PEN. <input checked="" type="checkbox"/> LAB VANE <small>50 100 150 200</small>
LOGGED BY <u>R.Donahue</u>		

DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	ppm	SAMPLE	USC	<small>SHEAR STRENGTH - kPa</small> <small>PLASTIC LIMIT WATER CONTENT LIQUID LIMIT</small>		
						50	100	150
10	+	SILT - continued... - @ 10.9 m few sand - gray, unoxidized	40					
11	+		25					
12	.	11.6 SAND - very fine grained with silt - gray - unoxidized 12.2 E.O.H. - variable moisture with depth - loose	10					
13		Notes: 1) 150 mm diameter continuous flight solid stem auger used. 2) No seepage or sloughing noted during drilling. 3) Piezometer installed in Test Hole.						
14								
15								
16								
17								
18								

1300 1500 1700 1900 2100
▲ DRY DENSITY - kg/m³




Clifton Associates Ltd.

PROJECT	<u>ESSO TERMINAL 550 McDONALD</u>
LOCATION	<u>REGINA, SASKATCHEWAN</u>
PROJECT NO.	<u>R1087</u>
PAGE NO.	<u>2 of 2</u>

TEST HOLE LOG

DATE <u>27 May 1991</u>	GROUND ELEV. <u>102.12 m</u>	TEST HOLE NO. <u>106</u>
DRILL <u>Brat 22</u>	LOCATION _____	
LOGGED BY <u>R. Donahue</u>	_____	

DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	ppm	SAMPLE	USC	SHEAR STRENGTH - kPa				
						UNCONF. 50	POCKET PEN. 100	LAB VANE 150 200		
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT		
						10	30	50	70	90%
0.3	[Symbol]	TOPSOIL- clay - black - moist, soft - rootlets	60							
1	[Symbol]	CLAY - few silt - brown - oxidized, calcareous - laminated, fractured - moist, soft	50							
2	[Symbol]		25							
3	[Symbol]		25							
4	[Symbol]		30							
5	[Symbol]		40							
6	[Symbol]	SILT - little clay - brown - oxidized, calcareous - moist, soft - layered, fractured - variable moisture with depth - @ 8.8 m gray - unoxidized - moist, soft - variable moisture with depth	40							
7	[Symbol]		50							
7.5	[Symbol]		50							
8	[Symbol]	Notes: 1) 150 mm diameter continuous flight solid stem auger used. 2) No seepage or sloughing noted during drilling.	20							
9	[Symbol]		20							

	Clifton Associates Ltd.	PROJECT <u>ESSO TERMINAL 550 McDONALD</u>
		LOCATION <u>REGINA, SASKATCHEWAN</u>
		PROJECT NO. <u>R1087</u> PAGE NO. <u>1 of 1</u>

TEST HOLE LOG

DATE <u>27 May 1991</u>	GROUND ELEV. <u>101.68 m</u>	TEST HOLE NO. <u>107</u>
DRILL <u>Brat 22</u>	LOCATION _____	
LOGGED BY <u>R. Donahue</u>	SHEAR STRENGTH - kPa <input type="checkbox"/> UNCONF. <input type="checkbox"/> POCKET PEN. <input checked="" type="checkbox"/> LAB VANE 50 100 150 200	

DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	ppm	SAMPLE	USC	PLASTIC LIMIT WATER CONTENT LIQUID LIMIT 10 30 50 70 90%
	0.4	TOPSOIL- clay - black - moist, soft - rootlets	30			
1		CLAY - few silt - brown - oxidized, calcareous - laminated, fractured - moist, stiff - iron and manganese staining - @ 3.8 m silt lenses - @ 5.3 m salt crystals	25			
2			25			
3			25			
4			25			
5			40			
6			30			
7			40			
8	7.2	SILT - little clay - brown - oxidized, calcareous - moist, soft - layered, fractured - @ 8.7 m till seams	25			
9			40			
			40			
						1300 1500 1700 1900 2100 Δ DRY DENSITY - kg/m ³



Clifton Associates Ltd.

PROJECT	<u>ESSO TERMINAL 550 McDONALD</u>
LOCATION	<u>REGINA, SASKATCHEWAN</u>
PROJECT NO.	<u>R1087</u>
PAGE NO.	<u>1 of 2</u>

TEST HOLE LOG

DATE <u>27 May 1991</u>	GROUND ELEV. <u>101.68 m</u>	TEST HOLE NO. <u>107</u>
DRILL <u>Brat 22</u>	LOCATION _____	SHEAR STRENGTH - kPa <input type="checkbox"/> UNCONF. <input type="checkbox"/> POCKET PEN. <input checked="" type="checkbox"/> LAB VANE 50 100 150 200
LOGGED BY <u>R. Donahue</u>		


DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	ppm	SAMPLE	USC	PLASTIC LIMIT WATER CONTENT LIQUID LIMIT 10 30 50 70 90%
10	+	SILT - continued... - @ 9.4 m gray - unoxidized - moist, soft - variable moisture with depth	45			
11	+		20			
12	+		40			
13	.	SAND - very fine grained, little silt - gray - unoxidized - moist to dry - variable moisture with depth	0			
14	.		10			
15	.		10			
16	X	TILL - silt with sand - gray - unoxidized - massive - variable moisture with depth	170			
17	X	Notes: 1) 150 mm diameter continuous flight solid stem auger used. 2) No seepage or sloughing noted during drilling. 3) Piezometer installed in Test Hole.	25			
18	X	18.4 E.O.H.	10			1300 1500 1700 1900 2100 ▲ DRY DENSITY - kg/m ³

<b style="font-size: 1.2em;">Clifton Associates Ltd.	PROJECT <u>ESSO TERMINAL 550 McDONALD</u>
	LOCATION <u>REGINA, SASKATCHEWAN</u>
	PROJECT NO. <u>R1087</u> PAGE NO. <u>2 of 2</u>

TEST HOLE LOG

DATE <u>27 May 1991</u>	GROUND ELEV. <u>99.95 m</u>	TEST HOLE NO. <u>108</u>
DRILL <u>Brat 22</u>	LOCATION _____	SHEAR STRENGTH - kPa <input type="checkbox"/> UNCONF. <input type="checkbox"/> POCKET PEN. <input checked="" type="checkbox"/> LAB VANE 50 100 150 200
LOGGED BY <u>R. Donahue</u>		


DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	ppm	SAMPLE	USC	SHEAR STRENGTH - kPa			PLASTIC LIMIT			WATER CONTENT			LIQUID LIMIT			
						50	100	150	10	30	50	70	90%	10	30	50	70	90%
0.15	[Dotted Pattern]	TOPSOIL- clay - black - moist, soft - rootlets	10															
1	[Horizontal Lines]	CLAY - few silt - brown - oxidized, calcareous - laminated, fractured	30															
2	[Horizontal Lines]	- moist, stiff - iron and manganese staining - silt lenses - salt crystals	25															
3	[Horizontal Lines]		40															
4	[Horizontal Lines]		40															
5	[Horizontal Lines]		50															
6	[Horizontal Lines]	SILT - little clay - gray - unoxidized - moist, soft - layered, fractured - variable moisture with depth	50															
7	[Cross Pattern]	TILL - silt with sand - gray - unoxidized - massive - variable moisture with depth - @ 8.4 m silt seam	30															
8	[Cross Pattern]		30															
9	[Cross Pattern]	Notes: 1) 150 mm diameter continuous flight solid stem auger used. 2) No seepage or sloughing noted during drilling.	10															
9.1	[Cross Pattern]	E.O.H.																

	PROJECT <u>ESSO TERMINAL 550 McDONALD</u>	PAGE NO. <u>1 of 1</u>
	LOCATION <u>REGINA, SASKATCHEWAN</u>	
	PROJECT NO. <u>R1087</u>	

TEST HOLE LOG

DATE <u>27 May 1991</u>	GROUND ELEV. <u>102.79 m</u>	TEST HOLE NO. <u>109</u>
DRILL <u>Brat 22</u>	LOCATION _____	<input type="checkbox"/> UNCONF. <input type="checkbox"/> POCKET PEN <input checked="" type="checkbox"/> LAB VANE <small>50 100 150 200</small>
LOGGED BY <u>R. Donahue</u>	_____	

DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	ppm	SAMPLE	USC	SHEAR STRENGTH - kPa				
						PLASTIC LIMIT	WATER CONTENT		LIQUID LIMIT	
						10	30	50	70	90%
	0.3	TOPSOIL- clay - black - moist, soft - rootlets	40							
1			25							
		CLAY - few silt - brown - oxidized, calcareous - laminated, fractured - moist, soft - @ 2.3 m iron and manganese staining - salt crystals	25							
2			30							
3			30							
4			40							
5			40							
6			40							
	6.7		25							
7		SILT - little clay - brown - oxidized, calcareous - moist, soft - @ 8.2 m till seam	30							
8			30							
9			30							

	Clifton Associates Ltd.	PROJECT <u>ESSO TERMINAL 550 McDONALD</u>
		LOCATION <u>REGINA, SASKATCHEWAN</u>
		PROJECT NO. <u>R1087</u> PAGE NO. <u>1 of 2</u>

TEST HOLE LOG

DATE <u>27 May 1991</u>	GROUND ELEV. <u>102.79 m</u>	TEST HOLE NO. <u>109</u>
DRILL <u>Brat 22</u>	LOCATION _____	
LOGGED BY <u>R. Donahue</u>	_____	

SHEAR STRENGTH - kPa

UNCONF. POCKET PEN. LAB VANE
50 100 150 200

DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	ppm	SAMPLE	USC	PLASTIC LIMIT WATER CONTENT LIQUID LIMIT							
						10	30	50	70	90%			
10	++++	SILT - continued... - @ 11.2 m mottled gray and brown	60										
11	++++		30										
12	++++	12.1 E.O.H.	25										
13		Notes: 1) 150 mm diameter continuous flight solid stem auger used. 2) No seepage or sloughing noted during drilling. 3) Piezometer installed in Test Hole.											
14													
15													
16													
17													
18													

1300 1500 1700 1900 2100
▲ DRY DENSITY - kg/m³

	Clifton Associates Ltd.	PROJECT <u>ESSO TERMINAL 550 McDONALD</u>
		LOCATION <u>REGINA, SASKATCHEWAN</u>
		PROJECT NO. <u>R1087</u> PAGE NO. <u>2 of 2</u>

TEST HOLE LOG

DATE 27 May 1991
 DRILL Brat 22
 LOGGED BY R. Donahue

GROUND ELEV. 102.52 m
 LOCATION _____

TEST HOLE NO. 110
 SHEAR STRENGTH - kPa
 UNCONF. POCKET PEN. LAB VANE
 50 100 150 200

DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	ppm	SAMPLE	USC	PLASTIC LIMIT			WATER CONTENT			LIQUID LIMIT								
						10	30	50	70	90%	10	30	50	70	90%					
0.3	[Symbol: Dotted]	TOPSOIL- clay - black - moist, soft - rootlets	20																	
1	[Symbol: Horizontal dashes]	CLAY - few silt - brown - oxidized, calcareous - moist, soft - iron and manganese staining	40																	
2			55																	
3			50																	
4			50																	
5			50																	
6.4	[Symbol: Vertical dashes]	SILT - little clay - brown - oxidized, calcareous - moist, soft	30																	
7			40																	
8			40																	
9.1	[Symbol: Crosses]	Notes: 1) 150 mm diameter continuous flight solid stem auger used. 2) No seepage or sloughing noted during drilling.	40																	
E.O.H.																				



Clifton Associates Ltd.

PROJECT ESSO TERMINAL 550 McDONALD
 LOCATION REGINA, SASKATCHEWAN
 PROJECT NO. R1087 PAGE NO. 1 of 1

BOREHOLE LOG

PROJECT NO. 88-177

BOREHOLE NO. T1

PROJECT NAME GROUND WATER MONITORING
IMPERIAL OIL REFINERY - REGINA

DATE May 5, 6/88

GEOLOGIST GAM

CLIENT IMPERIAL OIL LIMITED

ELEVATION

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE 'N' VALUE (BLOWS/0.3m)	WATER CONTENT (%) W _p W _L
			INTERVAL NO.	TYPE	'N' VALUE	% WATER		
	<p><u>INTERBEDDED SILT & TILL</u> (cont'd)</p> <p>Grey silt and clayey silt with thin sandy silt seams and clayey silt till layers, till becomes more predominant and sandy with decrease in clayey fraction from 7.6 ± m, generally wet with occasional, thin saturated zones, loose to compact</p>		11	SS	6			
			12	SS	14			
			13	SS	8			
			14	SS	11			
16.2			<p><u>SILT TILL</u></p> <p>Grey, trace sand, occasional thin clayey silt layers and coarse sand seams, wet, dense to compact</p>	15	SS	38		
18.75	16	SS		26				
	Borehole terminated in silt till at ± 18.75 m							

P-Piezometer S- Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>T-1B</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL REFINERY - REGINA</u>		DATE <u>May 3, 1988</u>
CLIENT <u>IMPERIAL OIL LIMITED</u>		GEOLOGIST <u>DCF</u>
		ELEVATION _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE 'N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)			
				INTERVAL	NO.	TYPE	'N' VALUE		% WATER	W _p	W _t	
7.9	<u>SILTY CLAY</u> Mottled brown, silty clay, laminated (1-3 mm), soft, fractured in upper 4 m											
					1	4WC						
					2	WC						
					3	WC						
					4	WC						
					5	WC						
					6	WC						
					7	WC						
	<u>SANDY SILT</u> Grey, fine sand and silt with clay, trace stones, layered, poorly sorted											

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>T-1B</u>
PROJECT NAME <u>GROUND WATER MONITORING</u>		DATE <u>May 3, 1988</u>
<u>IMPERIAL OIL REFINERY - REGINA</u>		GEOLOGIST <u>DCF</u>
CLIENT <u>IMPERIAL OIL LIMITED</u>	ELEVATION _____	

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS & NUMBER B	SAMPLE				PENETRATION RESISTANCE N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)	
				INTERVAL	NO.	TYPE	N' VALUE		% WATER	W _p
15.5	<u>SANDY SILT</u> continued									
				8	WC					
				9	WC					
				10	WC					
				11	WC					
				12	WC					
				13	WC					
19.2	<u>SANDY SILT TILL</u> Grey, sandy silt till with same clay, trace stones (2% >2 mm), massive			14	WC					

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>T-1B</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL REFINERY - REGINA</u>		DATE <u>May 3, 1988</u>
CLIENT <u>IMPERIAL OIL LIMITED</u>		GEOLOGIST <u>DCF</u>
		ELEVATION _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE 'N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)	
			INTERVAL	NO.	TYPE	'N' VALUE		% WATER	W _p
24.7	<u>GRAVELLY SAND</u> Greyish brown medium to fine sand with gravel, moderately well sorted								
			15	WC					
			16	WC					
			17	WC					
27.4	<u>CLAYEY SILT TILL</u> Grey clayey silt till with some sand and stones (3% > 2mm)		18	CWC					
			19	WC					
27.4	<u>SAND</u> Grey, fine to medium sand with interbeds of clayey silt till		20	WC					

P-Piezometer S-Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG		PROJECT NO. 88-177	BOREHOLE NO. T-1B
PROJECT NAME GROUND WATER MONITORING IMPERIAL OIL REFINERY - REGINA		DATE May 3, 1988	
CLIENT IMPERIAL OIL LIMITED		GEOLOGIST DCF	
		ELEVATION	

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)	
				INTERVAL	NO.	TYPE	N' VALUE		% WATER	W _p
					21	WC				
					22	WC				
					23	WC				
35.7	Borehole terminated at 35.7 m in sand									

BOREHOLE LOG

PROJECT NO. 88-177

BOREHOLE NO. T2

PROJECT NAME GROUND WATER MONITORING

DATE April 28, 1988

IMPERIAL OIL REFINERY - REGINA

GEOLOGIST GAM

CLIENT IMPERIAL OIL LIMITED

ELEVATION

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)	
				INTERVAL	NO.	TYPE	N' VALUE		% WATER	W _p
0.02	<u>TOPSOIL</u> Dark brown, silty, moist				1	SS	9			
	<u>FILL</u> Dark brown silt and clay fill, trace gravel and cinder fragments in upper + 0.5 m, occasional whitish granules and crystalline particles, W.T.P.L., stiff				2	SS	12			
					3	SS	12			
					4	SS	14			
3.1	<u>SILTY CLAY</u> Medium brown, with some light brown and grey mottling, some rust staining, occasional crystalline particles, W.T.P.L., stiff				5	SS	13			
					6	SS	12			
					7	SS	13			
					8	SS	14			
	Noticeable more plastic from + 7.6 m									
	<u>INTERBEDDED SILT & TILL</u> Grey silt with numerous thin clayey till layers, till becomes more predominant and also shows decrease in clayey fraction with some sand from + 13.7 m, complex is wet with occasional thin saturated zones, compact				9	SS	11			
8.6										
					10	SS	15			
10.0										

P-Piezometer S- Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>T2</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL REFINERY - REGINA</u>		DATE <u>April 28, 1988</u>
CLIENT <u>IMPERIAL OIL LIMITED</u>	GEOLOGIST <u>GAM</u> ELEVATION _____	

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)		
			INTERVAL	NO.	TYPE	N' VALUE		% WATER	W _p	W _i
10							5	10	15	20
	INTERBEDDED SILT & TILL (cont'd) Grey silt with numerous thin clayey till layers, till becomes more predominant and also shows decrease in clayey fraction with some sand from ± 13.7 m, complex is wet with occasional thin saturated zones, compact									
			11	SS	12					
				12	SS	14				
				13	SS	11				
				14	SS	12				
			15	SS	14					
17.8										
18.5	SAND Grey-brown fine to medium sand, occasional pebbles, saturated, very dense									
	SANDY SILT TILL Grey, wet, very dense									
20										

P-Piezometer S- Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG	PROJECT NO. 88-177	BOREHOLE NO. T2
PROJECT NAME GROUND WATER MONITORING IMPERIAL OIL REFINERY - REGINA		DATE April 28, 1988
CLIENT IMPERIAL OIL LIMITED		GEOLOGIST GAM
		ELEVATION _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE				WATER CONTENT (%)			
				INTERVAL	NO.	TYPE	N VALUE	% WATER	N VALUE (BLOWS/0.3m)				W _p	W _i	
										5	10	15	20		
20.6	SANDY SILT TILL (cont'd) Grey, wet, very dense														
20.8	SAND Light brown, medium sand, uniform, moist, very dense				17	SS	73								
	Borehole terminated in medium sand at \pm 20.87 m														

P-Piezometer S-Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>T3</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL REFINERY - REGINA</u>	DATE <u>April 26, 27/88</u>	
CLIENT <u>IMPERIAL OIL LIMITED</u>	GEOLOGIST <u>GAM</u>	
	ELEVATION _____	

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE (BLOWS/0.3m)				WATER CONTENT (%)			
				INTERVAL	NO.	TYPE	'N' VALUE	% WATER	5	10	15	20	W _p	W _t	
1.2	<u>FILL</u> Dark green brown silt and clay fill with thin silty cover material in upper + 150 mm, colour change to medium brown from + 0.8 m, W.T.P.L., firm to very stiff <u>SILTY CLAY</u> Dark to medium brown, some rust staining, occasional gypsum and crystalline inclusions down to + 4.6 m, W.T.P.L., stiff Noticeable decrease in clayey fraction and thin silt layers from + 7.6 m			1	SS	6									
				2	SS	19									
				3	SS	12									
				4	SS	12									
				5	SS	10									
				6	SS	12									
				7	SS	12									
				8	SS	10									
				9	SS	13									
				10	<u>SILT</u> Grey, stratified, some clay and sand, wet, loose to compact			10	SS	10					

P-Piezometer S-Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>T3</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL REFINERY - REGINA</u>		DATE <u>April 26, 27/88</u>
CLIENT <u>IMPERIAL OIL LIMITED</u>		GEOLOGIST <u>GAM</u>
		ELEVATION _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)		
			INTERVAL	NO.	TYPE	N' VALUE		% WATER	W _p	W _i
									5	10
10.1	<u>SILT (cont'd)</u> Grey, stratified, some clay and sand, wet, loose to compact	▲								
	<u>SANDY SILT TO SILTY VERY FINE SAND</u> Grey, wet becoming saturated from + 13.4, compact to loose	▲								
		▲	11	SS	10					
		▲	12	SS	15					
		▲	13	SS	6					
15.5	<u>SANDY SILT TILL</u> Grey, saturated, very dense	▲								
16.31	Borehole terminated in sandy silt till at + 16.31 m	S	14	SS	54					
20										

P-Piezometer S- Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>T4</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL REFINERY - REGINA</u>		DATE <u>April 26, 27/88</u>
CLIENT <u>IMPERIAL OIL LIMITED</u>		GEOLOGIST <u>GAM</u>
		ELEVATION _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE				WATER CONTENT (%)			
				INTERVAL	NO.	TYPE	N' VALUE	% WATER	N' VALUE (BLOWS/0.3m)				W _p	W _i	
									5	10	15	20			
3.1	<u>FILL</u> Medium brown and grey mottled silt and clay fill, some green-brown discolouration and black mottling from + 1.5 to + 2.7 m, slight fuel odour detected from surface down to + 4.0 m, W.T.P.L., firm to stiff			1	SS	8									
				2	SS	10									
				3	SS	8									
				4	SS	15									
				5	SS	10									
				6	SS	10									
				7	SS	10									
				8	SS	11									
				9	SS	14									
				10	<u>SANDY SILT TO SILTY VERY FINE SAND</u> Light to medium brown, changing to grey from + 11.0 m, occasionally stratified, detectable fuel odour from + 7.8 m to + 8.1 m, wet becoming saturated from + 14.3 m, compact to loose			10	SS	17					

P-Piezometer S-Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>T4</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL REFINERY - REGINA</u>	DATE <u>April 26,27/88</u>	
CLIENT <u>IMPERIAL OIL LIMITED</u>	GEOLOGIST <u>GAM</u>	
	ELEVATION _____	

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)		
			INTERVAL	NO.	TYPE	N' VALUE		% WATER	W _p	W _i
									5	10
10	<u>SANDY SILT TO SILTY VERY FINE SAND (Cont'd)</u> Light to medium brown, changing to grey from + 11.0 m, occasionally stratified, detectable fuel odour from + 7.8 m to + 8.1 m, wet becoming saturated from + 14.3 m, compact to loose									
			11	SS	9					
			12	SS	12					
			13	SS	14					
			14	SS	5					
17.1	<u>SILT SAND TILL</u> Grey with thin medium to coarse sand seams, saturated, very dense		15	SS	81					
17.83										
	Borehole terminated in silt sand till at + 17.83 m									
20										

P-Piezometer S- Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>T5</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL REFINERY - REGINA</u>		DATE <u>May 7-9/88</u>
CLIENT <u>IMPERIAL OIL LIMITED</u>	GEOLOGIST <u>GAM</u>	
		ELEVATION _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE (BLOWS/0.3m)	WATER CONTENT (%)	
				INTERVAL	NO.	TYPE	N' VALUE		% WATER	W _p
0.4	<u>TOPSOIL</u> Dark brown, silty, moist, loose				1	SS	4			
	<u>FILL</u> Medium to dark brown silt and clay fill, occasional small stones and cinder fragments, W.T.P.L., firm to stiff				2	SS	7			
					3	SS	12			
2.3	<u>SILTY CLAY</u> Medium brown, with some light brown and grey mottling, minor fractures down to ± 5.0 m, fracture faces show some secondary crystalline deposition, occasional crystalline inclusions, W.T.P.L., stiff to very stiff				4	SS	19			
					5	SS	18			
					6	SS	14			
					7	SS	13			
					8	SS	13			
	Noticeable decrease in clayey fraction with occasional thin silt seams and inclusions from ± 6.1 m				9	SS	11			
8.6	<u>SILT</u> Light brown changing to grey from ± 10.7 m, occasional thin clayey silt till layers, generally wet with thin saturated zones, compact				10	SS	17			

P-Piezometer S-Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>T6</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL REFINERY - REGINA</u>		DATE <u>May 6, 7/88</u>
CLIENT <u>IMPERIAL OIL LIMITED</u>	GEOLOGIST <u>GAM</u>	
		ELEVATION _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE N' VALUE (BLOWS/0.3m)				WATER CONTENT (%) W _p _____ W _i _____		
				INTERVAL	NO.	TYPE	N' VALUE	% WATER	5	10	15	20		
0.03	<u>TOPSOIL</u> Medium brown, silty, moist				1	SS	6							
	<u>FILL</u> Medium brown silt and clay fill, some light brown and orange cemented angular fragments mixed with cinders and granular-like asphalt fill in upper + 1.2 m, clayey fill shows black and green-grey discolouration with strong gas odour from + 0.8 m to + 2.0 m, W.T.P.L., stiff				2	SS	13							
					3	SS	11							
					4	SS	14							
					5	SS	13							
3.8	<u>SILTY CLAY</u> Medium brown with some rust staining and grey mottling, minor fractures down to + 8.1 m, W.T.P.L., stiff to very stiff				6	SS	10							
					7	SS	14							
	Noticeable decrease in clayey fraction with thin silt seams and clayey silt till layers from + 9.1 m				8	SS	13							
	<u>SILT AND SANDY SILT</u> Grey, laminated with thin clayey silt layers, sandy fraction from + 13.7 to + 15.7 m, wet becoming saturated from + 15.2 m, compact to loose				9	SS	14							
9.9														

P-Piezometer S-Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>T6</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL REFINERY - REGINA</u>		DATE <u>May 6, 7/88</u>
CLIENT <u>IMPERIAL OIL LIMITED</u>	GEOLOGIST <u>GAM</u>	
		ELEVATION _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE 'N' VALUE (BLOWS/0.3m)	WATER CONTENT (%) W _p _____ W _f _____
			INTERVAL NO.	TYPE	'N' VALUE	% WATER		
	<u>SILT AND SANDY SILT (cont'd)</u> Grey, laminated with thin clayey silt layers, sandy fraction from + 13.7 m to + 15.7 m, wet becoming saturated from + 15.2 m, compact to loose							
			11	SS	10			
			12	SS	18			
			13	SS	19			
			14	SS	6			
			15	SS	9			
17.83	Borehole terminated in silt at + 17.83 m	S						
20								

P-Piezometer S-Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG	PROJECT NO. 08-177	BOREHOLE NO. T7
PROJECT NAME GROUND WATER MONITORING IMPERIAL OIL REFINERY - REGINA		DATE May 9, 10/88
CLIENT IMPERIAL OIL LIMITED		GEOLOGIST GAM
		ELEVATION

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE 'N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)		
				INTERVAL NO.	TYPE	'N' VALUE	% WATER		W _p	W _i	
0.02	<u>TOPSOIL</u> Medium brown, silty			1	SS	9		5	10	15	20
2.3	<u>FILL</u> Dark brown silt and clay fill, occasional cinder fragments, some rust staining, shows green-grey and black discolouration with strong fuel odour from + 0.8 to + 2.0 m, W.T.P.L., firm to stiff			2	SS	11					
				3	SS	8					
				4	SS	14					
				5	SS	14					
	<u>SILTY CLAY</u> Medium brown, some grey mottling and rust staining down to + 5.0 m, occasional secondary crystalline and gypsum deposition, W.T.P.L., stiff			6	SS	10					
				7	SS	11					
				8	SS	11					
8.6	Noticeable decrease in clayey fraction from + 7.6 m			9	SS	8					
	<u>SILT</u> Grey, some clay and sand, occasional thin clayey silt till layers, wet becoming saturated from + 13.7 m, loose										

P-Piezometer S-Standpipe G-Gas Monitor

Gartner Lee Limited



BOREHOLE LOG	PROJECT NO. 88-177	BOREHOLE NO. T7
PROJECT NAME GROUND WATER MONITORING IMPERIAL OIL REFINERY - REGINA		DATE May 9, 10/88
CLIENT IMPERIAL OIL LIMITED		GEOLOGIST GAM
		ELEVATION _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE N' VALUE (BLOWS/0.3m)	WATER CONTENT (%) W _p _____ W _t _____
			INTERVAL	NO.	TYPE	N' VALUE		
	SILT (cont'd) Grey, some clay and sand, occasional thin clayey silt till layers, wet becoming saturated from + 13.7 m, loose							
				10	SS	8		
				11	SS	9		
				12	SS	6		
14.7	SANDY SILT TO SILTY VERY FINE SAND Grey, increase in sandy fraction from + 16.8 m, saturated, loose to compact			13	SS	7		
				14	SS	16		
18.0	SILT TILL Grey, some sand, wet, dense			15	SS	41		
18.50	Borehole terminated in silt till + 18.50 m							

P-Piezometer S-Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>T8</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL REFINERY - REGINA</u>		DATE <u>May 9, 1988</u>
CLIENT <u>IMPERIAL OIL LIMITED</u>		GEOLOGIST <u>GAM</u>
		ELEVATION _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE				WATER CONTENT (%)					
				INTERVAL	NO.	TYPE	N' VALUE	% WATER	N' VALUE (BLOWS/0.3m)				W _p	W _i			
										5	10	15	20				
3.0	<u>FILL</u> Medium to dark brown, some small stones and brick fragments down to + 1.2 m, A.P.L. becoming W.T.P.L. from + 0.8 m, stiff to very stiff			1	SS	12											
				2	SS	12											
				3	SS	15											
				4	SS	17											
7.1	<u>SILTY CLAY</u> Medium brown, minor fractures down to + 5 m, fracture faces show some rust staining and secondary crystalline deposition, W.T.P.L., stiff Noticeable decrease in clayey fraction from + 6.1 m			5	SS	12											
				6	SS	11											
				7	SS	12											
				8	SS	15											
				9	SS	17											
				10	SS	17											
	<u>SILT</u> Light brown changing to grey from + 12.2 m, occasional thin clayey layers down to + 8.1 m, sandy fraction from + 10.7 to + 12.7 m mostly in form at thin sandy silt layers, wet becoming saturated from + 12.2 m, compact to loose																




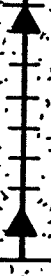
P-Piezometer S- Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>T8</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL REFINERY - REGINA</u>		DATE <u>May 9, 1988</u>
CLIENT <u>IMPERIAL OIL LIMITED</u>		GEOLOGIST <u>GAM</u>
		ELEVATION _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE				WATER CONTENT (%)		
			INTERVAL	NO.	TYPE	N VALUE	% WATER	N VALUE (BLOWS/0.3m)				W _p	W _I
								5	10	15	20		
13.2	<u>SILT (cont'd)</u> Light brown changing to grey from + 12.2 m, occasional thin clayey layers down to + 8.1 m, sandy fraction from + 10.7 m to + 12.7 m, mostly in form of thin sandy silt layers, wet becoming saturated from + 12.2 m, compact to loose												
			11	SS	17								
			12	SS	8								
18.75	<u>SILTY FINE TO VERY FINE SAND</u> Grey, saturated, compact to loose												
			13	SS	18								
			14	SS	12								
			15	SS	9								
	Borehole terminated in silty fine to very fine sand at + 18.75 m	S											

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>T8B</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL REFINERY - REGINA</u>		DATE <u>May 5, 1988</u>
CLIENT <u>IMPERIAL OIL LIMITED</u>		GEOLOGIST <u>DCF</u>
		ELEVATION _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)		
			INTERVAL	NO.	TYPE	N' VALUE		% WATER	W _p	W _i
23.8	<u>SILT TILL</u> continued									
29.6	<u>GRAVELLY SAND</u> Brown, gravelly medium to coarse sand (30% > 2 mm), moderately well sorted	  								
	Borehole terminated at 29.6 m in gravelly sand									

P-Piezometer S-Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>T9</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL REFINERY - REGINA</u>		DATE <u>May 10, 1988</u>
CLIENT <u>IMPERIAL OIL LIMITED</u>	GEOLOGIST <u>GAM</u>	
		ELEVATION _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE 'N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)			
			INTERVAL	NO.	TYPE	'N' VALUE		% WATER	W _p	W _i	
									5	10	15
0.02	<u>TOPSOIL</u> Medium brown, silty, moist			1	SS	10					
	<u>FILL</u> Medium to dark brown with some black mottling, W.T.P.L., stiff			2	SS	13					
				3	SS	14					
2.3	<u>SILTY CLAY</u> Medium brown, some rust staining, W.T.P.L., stiff			4	SS	16					
				5	SS	13					
				6	SS	12					
				7	SS	12					
5.6	<u>SILT</u> Light brown, occasional laminations and sandy partings, some thin clayey silt till layers, wet, compact			8	SS	11					
				9	SS	18					
				10	SS	17					

P-Piezometer S- Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>T9</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL REFINERY - REGINA</u>		DATE <u>May 10, 1988</u>
CLIENT <u>IMPERIAL OIL LIMITED</u>		GEOLOGIST <u>GAM</u>
		ELEVATION _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE				WATER CONTENT (%)			
				INTERVAL	NO.	TYPE	N' VALUE	% WATER	N' VALUE (BLOWS/0.3m)				W _p	W _i	
										5	10	15	20		
	<u>SILT (cont'd)</u> Light brown, occasional laminations and sandy partings, some thin clayey silt till layers, wet, compact														
13.2					11	SS	18								
					12	SS	9								
	<u>SANDY SILT TO SILTY VERY FINE SAND</u> Medium brown changing to grey from <u>+ 15.2 m</u> , wet becoming saturated from <u>+ 14.3</u> , compact to loose				13	SS	18								
					14	SS	4								
17.98					15	SS	3								
	Borehole terminated in sandy silt to silty very fine sand at <u>+ 17.98 m</u>		S												

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>C7</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL REFINERY - REGINA</u>		DATE <u>Apr.30-May 3, 1988</u>
CLIENT <u>IMPERIAL OIL LIMITED</u>	GEOLOGIST <u>GAM</u>	
		ELEVATION _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)		
				INTERVAL	NO.	TYPE	N' VALUE		% WATER	W _p	W _t
									5	10	15
3.8	<u>FILL</u> Dark brown silt and clay fill, shows dark grey to green-grey discolouration from <u>+ 0.8 m</u> to <u>+ 2.7 m</u> , some cinder fragments and asphalt material in upper <u>+ 0.5 m</u> , strong gas odour from <u>+ 0.8 m</u> to <u>+ 2.0 m</u> , odour gradually diminishes but still detectable to <u>+ 3.8 m</u>			1	SS	19					
				2	SS	9					
				3	SS	8					
				4	SS	6					
				5	SS	7					
				6	SS	8					
	<u>SILTY CLAY</u> Medium brown, some grey mottling, occasional fractures observed to <u>+ 7.3 m</u> , some crystalline and gypsum deposition along fracture faces, slight gas odour detected from <u>+ 3.8 m</u> to <u>+ 7.3 m</u> , W.T.P.L., firm to stiff Noticeable decrease in clayey fraction with thin till-like layers and silt seams from <u>+ 6.9 m</u>			7	SS	9					
				8	SS	10					
				9	SS	10					
				10	SS	10					
				11	SS	11					
				12	SS	14					

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>C7</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL LIMITED REFINERY - REGINA</u>		DATE <u>APRIL 30-MAY 3/88</u>
CLIENT <u>IMPERIAL OIL LIMITED</u>	GEOLOGIST <u>GAM</u>	
		ELEVATION _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)		
				INTERVAL	NO.	TYPE	N' VALUE		% WATER	W _p	W _i
10								5	10	15	20
	<u>SILTY CLAY</u> (Cont'd) Medium brown, some grey mottling, occasional fractures observed to + 7.3 m, some crystalline and gypsum deposition along fracture faces, slight gas odour detected from + 3.8 m to + 7.3 m.										
11.7	W.T.P.L., firm to stiff noticeable decrease in clayey fraction with thin till-like layers and silt seams from + 6.9 m										
	<u>SILT</u> Grey, laminated, generally wet with occasional thin saturated zones, compact.										
14.7	<u>SANDY SILT</u> Grey, laminated, wet becoming saturated from + 15.6 m, compact to loose.										
	<u>SAND SILT TILL</u> Grey; occasional thin sand seams, very dense, wet.										
17.7											
8.59	Borehole terminated in sand silt till at + 18.59 m.		S								
20											

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>C9</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL LIMITED REFINERY - REGINA</u>		DATE <u>APRIL 30-MAY 3/88</u>
CLIENT <u>IMPERIAL OIL LIMITED</u>		GEOLOGIST <u>GAM</u>
		ELEVATION _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)		
				INTERVAL	NO.	TYPE	N' VALUE		% WATER	W _p	W _l
0								5	10	15	20
	<u>FILL</u> Medium to dark brown silt and clay fill, occasional cinder and brick fragments and whitish granules, A.P.L. becoming W.T.P.L. from ± 0.8 m, soft to very stiff.			1	SS	14					
				2	SS	11					
				3	SS	5					
				4	SS	4					
3.5	<u>SILTY CLAY</u> Medium to dark brown with some grey mottling, minor fractures, occasional crystalline particles, W.T.P.L., stiff.			5	SS	25					
				6	SS	9					
				7	SS	10					
	Noticeable decrease in clayey fraction with occasional thin saturated silt seams from ± 6.1 m.			8	SS	7					
7.1	<u>SILT</u> Light to medium brown changing to grey from ± 9.5 m, laminated with thin clayey layers from ± 10.7 m to ± 13.2 m, moist to wet.			9	SS	12					
				10	SS	10					
10											

P-Piezometer S-Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>C9</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL LIMITED REFINERY - REGINA</u>		DATE <u>APRIL 30-MAY 3/88</u>
CLIENT <u>IMPERIAL OIL LIMITED</u>	GEOLOGIST <u>GAM</u>	
		ELEVATION _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)	
				INTERVAL	NO.	TYPE	N' VALUE		% WATER	W _p
10	<u>SILT (Cont'd)</u> Light to medium brown, changing to grey from + 9.5 m, laminated with thin clayey layers from + 10.7 m to + 13.2 m, moist to wet, loose to compact.									
				11	SS	16				
				12	SS	14				
13.2	<u>SANDY SILT</u> Grey with thin clayey silt layers, saturated, compact to very loose.									
				13	SS	18				
				14	SS	4				
16.5	<u>SAND SILT TILL</u> Grey, dense, saturated.									
				15	SS	47				
17.99	Borehole terminated in sand silt till at + 17.99 m.	S								

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>C-9B</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL LIMITED REFINERY - REGINA</u>	DATE <u>88/05/02</u>	
CLIENT <u>IMPERIAL OIL LIMITED</u>	GEOLOGIST <u>D.C.F.</u>	
	ELEVATION _____	

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)	
			INTERVAL	NO.	TYPE	N' VALUE		% WATER	W _p
	<u>SILTY CLAY</u> Mottled, greyish brown silty clay, becoming grey below 3 m, laminated (1.3 mm) trace stones, soft.								
				1	WC				
				2	WC				
				3	WC				
				4	WC				
	Black, tar-like chunks with petroleum odour at 6 m.			5	WC				
7.6	<u>SILT</u> Mottled, brownish grey sandy silt to clayey silt with fine sand and trace stones (2% > 2 mm), layered, poorly sorted.			6	WC				
				7	WC				

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>C-9B</u>
PROJECT NAME <u>GROUND WATER MONITORING</u>	DATE <u>88/05/02</u>	
<u>IMPERIAL OIL LIMITED REFINERY - REGINA</u>	GEOLOGIST <u>D.C.F.</u>	
CLIENT <u>IMPERIAL OIL LIMITED</u>	ELEVATION _____	

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)	
				INTERVAL	NO.	TYPE	N' VALUE		% WATER	W _p
	<u>SILT</u> (Cont'd)									
					8	WC				
					9	WC				
	Becomes sandier with depth.									
					10	WC				
					11	WC				
15.8	<u>SAND</u>									
	Grey, fine to medium sand with some gravel, trace silt, moderately well sorted.									
					12	WC				
					13	WC				
17.4	<u>SILT TILL</u>									
	Grey, sandy silt till and trace clay and stones (3% >2 mm).									
					14	WC				

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>C-9B</u>
PROJECT NAME <u>GROUND WATER MONITORING</u>		DATE <u>88/05/02</u>
<u>IMPERIAL OIL LIMITED REFINERY - REGINA</u>		GEOLOGIST <u>D.C.F.</u>
CLIENT <u>IMPERIAL OIL LIMITED</u>	ELEVATION _____	

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE 'N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)	
			INTERVAL	NO.	TYPE	'N' VALUE		% WATER	W _p
	<u>SILT TILL</u> (Cont'd)								
2.26	<u>SAND AND GRAVEL</u> Brown fine to medium sand and gravel, moderately well sorted, 30% > 2 mm.			15	WC				
				16	WC				
				17	WC				
				18	WC				
				19	WC				
29.0	Borehole terminated at 29.0 metres in sand and gravel.	S CAVED							

P-Piezometer S- Standpipe G-Gas Monitor

Gartner Lee Limited

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>C11</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL LIMITED REFINERY - REGINA</u>	DATE <u>MAY 2-MAY 5/88</u>	
CLIENT <u>IMPERIAL OIL LIMITED</u>	GEOLOGIST <u>GAM</u>	
	ELEVATION _____	

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE 'N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)		
				INTERVAL	NO.	TYPE	'N' VALUE		% WATER	W _p	W _l
								5	10	15	20
3.0	<u>FILL</u> Medium brown silt and clay fill, some block asphalt material in upper \pm 0.5 m, shows green-grey and black discolouration with detectable gas odour from \pm 0.8 m to \pm 2.7 m, W.T.P.L., firm to very stiff.	0.0	0.0	1	SS	12					
				2	SS	8					
				3	SS	5					
				4	SS	17					
				5	SS	11					
8.6	<u>SILTY CLAY</u> Medium brown with grey mottling, occasional fractures down to \pm 8.1 m, some secondary gypsum and crystalline deposition, very slight gas odour detected from \pm 3.0 to \pm 3.5 m, W.T.P.L., stiff. Noticeable decrease in clayey fraction with occasional thin silt seams from \pm 7.6 m.	8.6	8.6	6	SS	11					
				7	SS	12					
				8	SS	12					
				9	SS	10					
				10	SS	10					
	<u>SILT</u> Grey, some clay, occasional thin till-like layers, wet becoming saturated from \pm 12.2 m, compact to loose.										

BOREHOLE LOG	PROJECT NO. _____	BOREHOLE NO. <u>C11</u>
PROJECT NAME <u>GROUND WATER MONITORING</u> <u>IMPERIAL OIL LIMITED REFINERY - REGINA</u>		DATE <u>MAY 2-MAY 5/88</u>
CLIENT <u>IMPERIAL OIL LIMITED</u>		GEOLOGIST <u>GAM</u>
		ELEVATION _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE 'N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)	
			INTERVAL	NO.	TYPE	'N' VALUE		% WATER	W _p
	<u>SILT</u> (Cont'd) Grey, some clay, occasional thin till-like layers, wet becoming saturated from <u>± 12.2 m</u> , compact to loose.	▲							
				11	SS	11			
				12	SS	4			
				13	SS	5			
14.7	<u>SANDY SILT</u> Grey, occasional thin silty sand till layers, saturated, loose.	▲		14	SS	6			
				15	SS	5			
18.0	<u>COARSE SAND AND GRAVEL</u> Medium brown, saturated, very dense.	▲		16	SS	68			
18.4	<u>SILT TILL</u> Grey, trace sand, wet, very dense.	S		17	SS	58			
19.36	Borehole terminated in silt till at <u>± 19.36 m</u> .								

BOREHOLE LOG	PROJECT NO. <u>88-177</u>	BOREHOLE NO. <u>C12</u>
PROJECT NAME <u>GROUND WATER MONITORING</u>	DATE <u>MAY 2-MAY 5/88</u>	
<u>IMPERIAL OIL LIMITED REFINERY - REGINA</u>	GEOLOGIST <u>GAM</u>	
CLIENT <u>IMPERIAL OIL LIMITED</u>	ELEVATION _____	

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)	
				INTERVAL	NO.	TYPE	N' VALUE		% WATER	W _p
2.3	<u>FILL</u> Rusty brown sand fill with occasional cinder and cement fragments, wet, compact, changes to a medium brown silt and clay, fill from + 0.5 m, detectable gas odour with green-grey discolouration from + 0.8 m to + 2.0 m, W.T.P.L., firm to very stiff.			1	SS	17				
				2	SS	6				
				3	SS	12				
				4	SS	12				
				5	SS	15				
				6	SS	12				
				7	SS	12				
				8	SS	13				
				9	SS	12				
				10	SS	13				
8.6	<u>SILTY CLAY</u> Medium brown with grey mottling, occasional fractures observed down to + 8.1 m, some secondary crystalline deposition, W.T.P.L., stiff.									
10	<u>SILT</u> Medium brown changing to grey from + 9.4 m, occasional thin till-like and clayey layers and sandy silt seams, wet becoming saturated from + 12.2 m, loose to compact.									

BOREHOLE LOG	PROJECT NO. 88-177	BOREHOLE NO. C12
PROJECT NAME GROUND WATER MONITORING IMPERIAL OIL LIMITED REFINERY - REGINA	DATE MAY 2-MAY 5/88	
CLIENT IMPERIAL OIL LIMITED	GEOLOGIST GAM	
	ELEVATION	

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS & NUMBER	SAMPLE				PENETRATION RESISTANCE N' VALUE (BLOWS/0.3m)	WATER CONTENT (%)	
				INTERVAL	NO.	TYPE	N' VALUE		% WATER	W _p
	<u>SILT</u> (Cont'd) Medium brown changing to grey from + 9.4 m, occasional thin till-like and clayey layers and sandy silt seams, wet becoming saturated from + 12.2 m, loose to compact.									
					11	SS	7			
					12	SS	8			
					13	SS	7			
					14	SS	14			
					15	SS	12			
18.3	<u>SAND SILT TILL</u> Grey with occasional thin, saturated gravelly coarse sand seams, wet, dense.		S		16	SS	36			
18.75	Borehole terminated in sand silt till at + 18.75 m.									

H 12

NW 05-8-18-19-W2

SASKATCHEWAN WATER CORPORATION
ELECTRIC LOG
 TEST DRILLING ASSISTANCE PROGRAM

ACQUISITION NO. **87411**
 GROUP NO. **0000**

72-1/4

DRILLING CONTRACTOR: COMPANY NAME
01 Andrews & Sons Drilling Ltd

CONTRACTOR'S TELEPHONE NUMBER
02 302694-1202 OR **181**

CONTRACTOR'S ADDRESS
2237 Smith St

SIGNATURE: NAME AND DATE
Regina Sask

OWNER'S NAME
03 Sask Water

OWNER'S TELEPHONE NUMBER
04 302694-13900 OR **181**

OWNER'S ADDRESS
111 Fairford St East

SIGNATURE: NAME AND DATE
Moose Jaw Sask

TESTHOLE: MUNICIPAL LAND LOCATION
W 5-8-18-19-W2

DRILLER'S NAME
06 Andrews & Sons

DATE TESTHOLE COMPLETED
4/7/78

LOGGER OPERATOR'S NAME
07 Andrews & Sons

DATE TESTHOLE LOGGED
4/7/78

CONDUCTIVITY DRILLING FLUID
08 1200 ohm-cm at 25°C

CONDUCTIVITY DRILLING WATER
Widesa

DEPTH DRILLED
09 210 feet

TYPE OR MODEL OF LOGGER
1501

BIT DIAMETER
10 4.75 inches

CONDUCTIVITY WELL WATER
266 ohm-cm

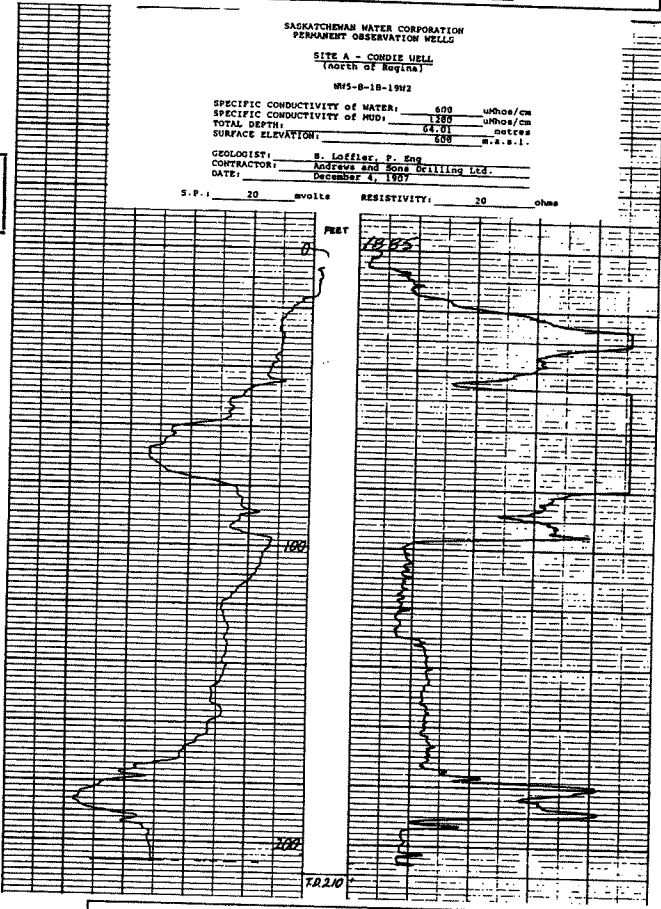
SERIAL NO. OF LOGGER
264

ACCREDITATION DATE
4/7/78

SPONTANEOUS POTENTIAL
4 millivolts/inch

LOG SCALES
 SINGLE-POINT RESISTANCE
4 ohm-ft/m

Acq 13254
 Saskatchewan Research Council
 SEDIMENTARY RESOURCES



TESTHOLE: MUNICIPAL LAND LOCATION
W 5-8-18-19-W2

DATE TESTHOLE COMPLETED
4/7/78

LINE NO	FROM (ft)	TO (ft)	DESCRIPTION
0	7		Till - silty - non oxidized dark greenish grey
7	48		Silt - soft - clayey - iron stains olive brown
48	70		Sand - fine med coarse - clean coarse with depth
70	86		Sand - med to coarse
86	96		Sand - fine silty
96	98		Gravel - medium - boulder pavement
98	177		Till - deep sandy - non ox - silty - dark grey - calc. water after 130
177	192		Gravel - coarse - sub angular - tan
192	210		Till - light olive brown, very sandy fine - oxidized - iron stains

Well description

PVC casing - dia 4" - bottom @ 91'
 Screen - dia 5" - length 5ft, slot .025"
 Casing - dia 4" - bottom @ 102'
 Well - bottom - 102'
 Water level - 81'
 Drawdown - after 2 hrs @ 4 TGM

CONTRACTOR: **Andrews & Sons Drilling Ltd**

DR # 043123

Client # 843071

Completion 01/09/1974

RM

05

23

NTSMAP 72I00

DOE

513

72

REGINA

SASKATCHEWAN

Well Location

LSD	Qtr	Sec Twp	Rge	M Reserve	RL	Location of Well (in Quarter)	
	SW1/4	32 17	19	2		0 ft from N/S Boundary	N/S Boundary
Line Easting	Northing	Source	Accuracy			0 ft from E/W Boundary	E/W Boundary

Well Information

Driller #	002245	HAYTER DRILLING LTD	
Water Use	Research	Well Use	Water Test Hole
Well #	513	Length (ft)	Btm (ft) Dia (in) Description
Installation Method	Drilled	Well Casings	
Depth	780 ft		
Water Level	ft		
Blow	inches	Length (ft)	Btm (ft) Dia (in) Slot (in) Description
Struck	ft	Screens	
Flowing Head	ft		
Completion Method			
Pump Test		Recommended	
Draw Down	ft	Rec Pumping Rate	igpm
Duration	hrs	Intake	ft
Pumping Rate	igpm	Aquifer	
Temp	deg. F	E-Log	Yes
Elevation	1905 ft	Phys	E02

Lithology List

Depth to Base of (ft)	Material	Colour	Description
20	Clay	Grey	Silty
45	Silt	Grey	Unknown
57	Sand	Grey	Fine
71	Till	Grey	Unknown
77	Sand & Gravel	Unknown	Unknown
84	Silt	Unknown	Unknown
92	Sand	Grey	Unknown
103	Silt	Grey	Unknown
118 36.0	Sand	Unknown	Unknown
220 67.1	Silt	Grey	Sand Streaks
251 76.5	Sand & Gravel	Unknown	Unknown
270 82.3	Silt	Grey	Unknown
486 148.1	Sand & Gravel	Grey	Unknown
536 163.4	Till	Grey	Hard
558 170.1	Till	Unknown	Oxidized
570 173.7	Till	Grey	Unknown
626 190.8	Till	Unknown	Oxidized
728 221.9	Till	Grey	Unknown
732 223.1	Silt	Unknown	Unknown
745 227.1	Silt	Unknown	Unknown
752 229.2	Sand & Gravel	Unknown	Unknown
760 231.6	Sand	Unknown	Unknown
780 237.7	Silt	Grey	Noncalcareous

up to then

IDR # 087411

Client # 882290

Completion 04/12/1987

RM

SASK WATER

111 FAIRFORD ST EAST

3 05

23

NTSMAP 72I00

MOOSE JAW

SASKATCHEWAN

S6H 7X9

Well Location

LSD	Qtr	Sec Twp	Rge	M Reserve	RL	Location of Well (in Quarter)	
	SW1/4	08 18	19	2		0 ft from N/S Boundary	N/S Boundary
Zone Easting	Northing	Source	Accuracy			0 ft from E/W Boundary	E/W Boundary

Well Information

Driller #	002255	ANDREWS & SONS DRILLING LTD
Water Use	Research	Well Use Observation
File #	1	
Installation Method	Drilled	
Depth	210 ft	
Water Level	81 ft	
Bit	4.8 inches	
Struck	ft	
Flowing Head	ft	
Completion Method	Well Screen And Gravel Pack	
Pump Test		
Flow Down	ft	Recommended
Duration	2 hrs	Rec Pumping Rate
Pumping Rate	4.0 igpm	Intake
Temp	deg. F	Aquifer
Elevation	1968 ft	E-Log
		Phys

Lithology List

Depth to Base of (ft)	Material	Colour	Description
7	Till	Grey	Silty
48	Silt	Brown	Clayey
70	Sand	Unknown	Fine-medium
86	Sand	Unknown	Medium-coarse
96	Sand	Unknown	Silty
98	Gravel	Unknown	Medium
177	Till	Grey	Sandy
192	Gravel	Unknown	Coarse
210	Till	Brown	Sandy

72177 DOE 1974

REGINA 513

NW4 32-17-19 W2

13:528900/5591000

TESTHOLE

CO₂ Evolved:

-rx with HCL

594

72

CONTRACTOR
MAYTER DRILLING LTD

DRILLER
CARL HIGGINS

SURFACE ELEV.

1905 FT

ELEV. FROM

Level survey of practical well
point south of testhole site

SP COND MUD

1500 MILLION PAS PER

SP COND WATER

800 ml CO₂/gm

SP IO MV

10 OHMS 20 30 40 50

Samples: Sidewall cores

SIDEWALL CORE DESCRIPTION

CUTTINGS SAMPLE DESCRIPTION
DRILLER'S LOG

Clay, silty, calc, gray

Clay, silty, calc, thin sandy
50% of gray with yellow stains

Silt, calc. & st. calc, heavily
v. fine sandy, of gray
and st. of heavy, locally
interbedded

Sand, silty, silty, calc, gray,
gray, friable

Fine, calc, gray, in sand
Fills calc, gray, in sand
Reset because of drift

Silt, silty, calc, st. gray

Silt, silty, sandy, st. calc,
gray to silty, calc

Silt, silty, sandy, st. calc,
gray to silty, calc

Silt, silty, sandy, st. calc,
gray to silty, calc

Silt, silty, sandy, st. calc,
gray to silty, calc

Silt, silty, sandy, st. calc,
gray to silty, calc

Silt, silty, sandy, st. calc,
gray to silty, calc

Silt, silty, sandy, st. calc,
gray to silty, calc

Silt, silty, sandy, st. calc,
gray to silty, calc

Silt, silty, sandy, st. calc,
gray to silty, calc

Silt, silty, sandy, st. calc,
gray to silty, calc

Silt, silty, sandy, st. calc,
gray to silty, calc

Silt, silty, sandy, st. calc,
gray to silty, calc

Silt, silty, sandy, st. calc,
gray to silty, calc

Silt, silty, sandy, st. calc,
gray to silty, calc

Silt, silty, sandy, st. calc,
gray to silty, calc

Silt, silty, sandy, st. calc,
gray to silty, calc

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gray to silty, calc

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Silt, silty, sandy, st. calc,
gray to silty, calc

Silt, silty, sandy, st. calc,
gray to silty, calc

Silt, silty, sandy, st. calc,
gray to silty, calc

Silt, silty, sandy, st. calc,
gray to silty, calc

1905

1800

1700

1600

1500

Sand, silty, calc, gray

Sand, silty, calc, gray

Sand, silty, calc, gray

Sand, silty, calc, gray

Sand, silty, calc, gray

Sand, silty, calc, gray

Sand, silty, calc, gray

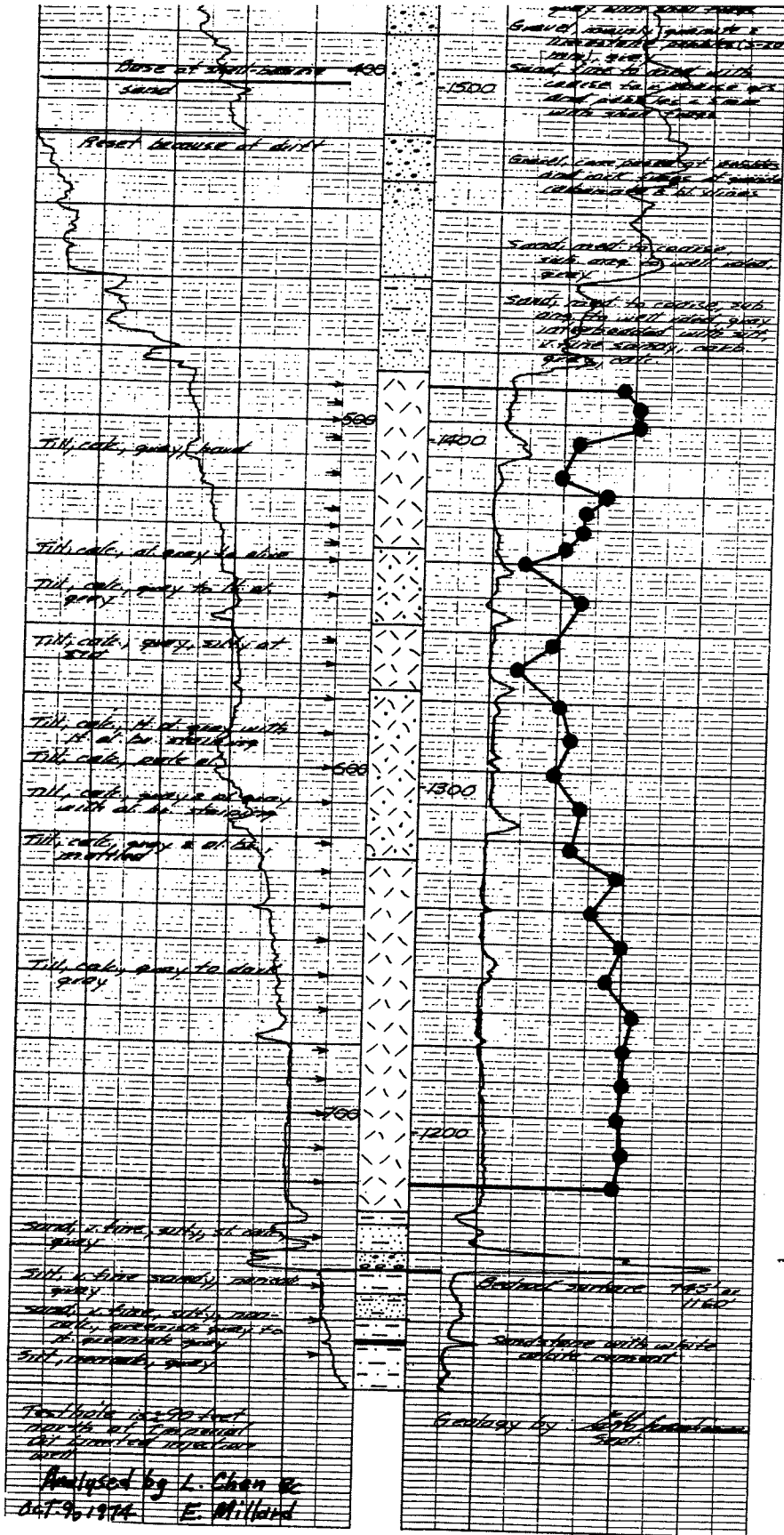
Sand, silty, calc, gray

Sand, silty, calc, gray

Sand, silty, calc, gray

Sand, silty, calc, gray

DOE 513



745 BS

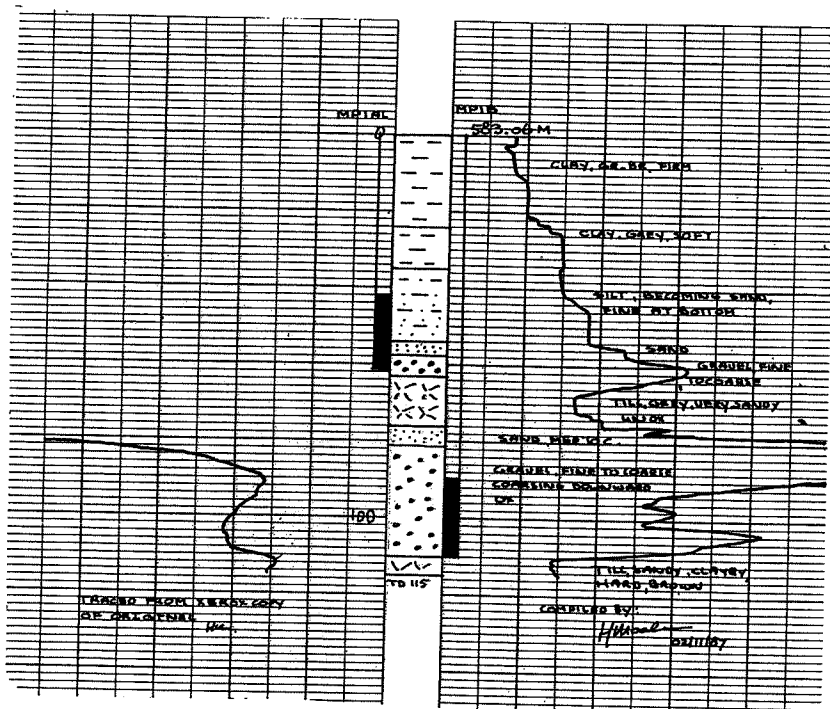
NW 4-32-17-19 W2

NE 01-06-18-19-W2

BOREHOLE NO. <u>M.P. 1</u> NTS <u>72117</u>	PROJECT <u>BECKIE MOUNT PLEASANT</u>
LAND LOCATION <u>NE-01-06-18-19-W2</u>	CUTTING SAMPLE INTERVAL _____
UTM COORD. _____	CORE SAMPLE INTERVAL _____
GRD. ELEV. <u>583.06</u> DEPTH <u>115 FT</u>	FROM _____
DATE DRILLED <u>JULY</u> TO <u>4</u> 19 <u>89</u>	CASING DEPTH _____
COND. WATER _____ MICROSIEMENS/CM AT 25° C	CASING WALL THICKNESS _____
COND. MUD _____ MICROSIEMENS/CM AT 25° C	WATER OR MUD LEVEL _____
SPECIFIC GRAVITY MUD _____	ABANDONMENT _____
SUPERVISOR _____	BIT SIZE _____ INTERVAL _____
ASST. SUPERVISOR _____	BIT SIZE _____ INTERVAL _____
LOGGED BY _____	BIT SIZE _____ INTERVAL _____
INSTRUMENT _____	TYPE OF DRILL RIG _____
PROBE ELECTRIC _____	
PROBE GAMMA _____	
PROBE CALIPER _____	
DATE LOGGED _____ 19 _____	
TIME OF LOGGING _____ TO _____	
DRILL OPERATOR _____	
CONTRACTOR <u>SOLIS DRILLING LTD</u>	
REMARKS _____	
<u>BECKIE HYDROGEOLOGISTS 1986</u>	

	DEPTH	SCALE	SPEED
SP.		<u>20</u>	
RES.		<u>20</u>	
GAMMA			
CAL			

GAMMA TIME CONSTANT (T.C.) _____ SECONDS
GEOLOGY BY <u>B. LOFFLER</u>



(21)

Project: Condie Aquifer Date: October 12 / 93 50295

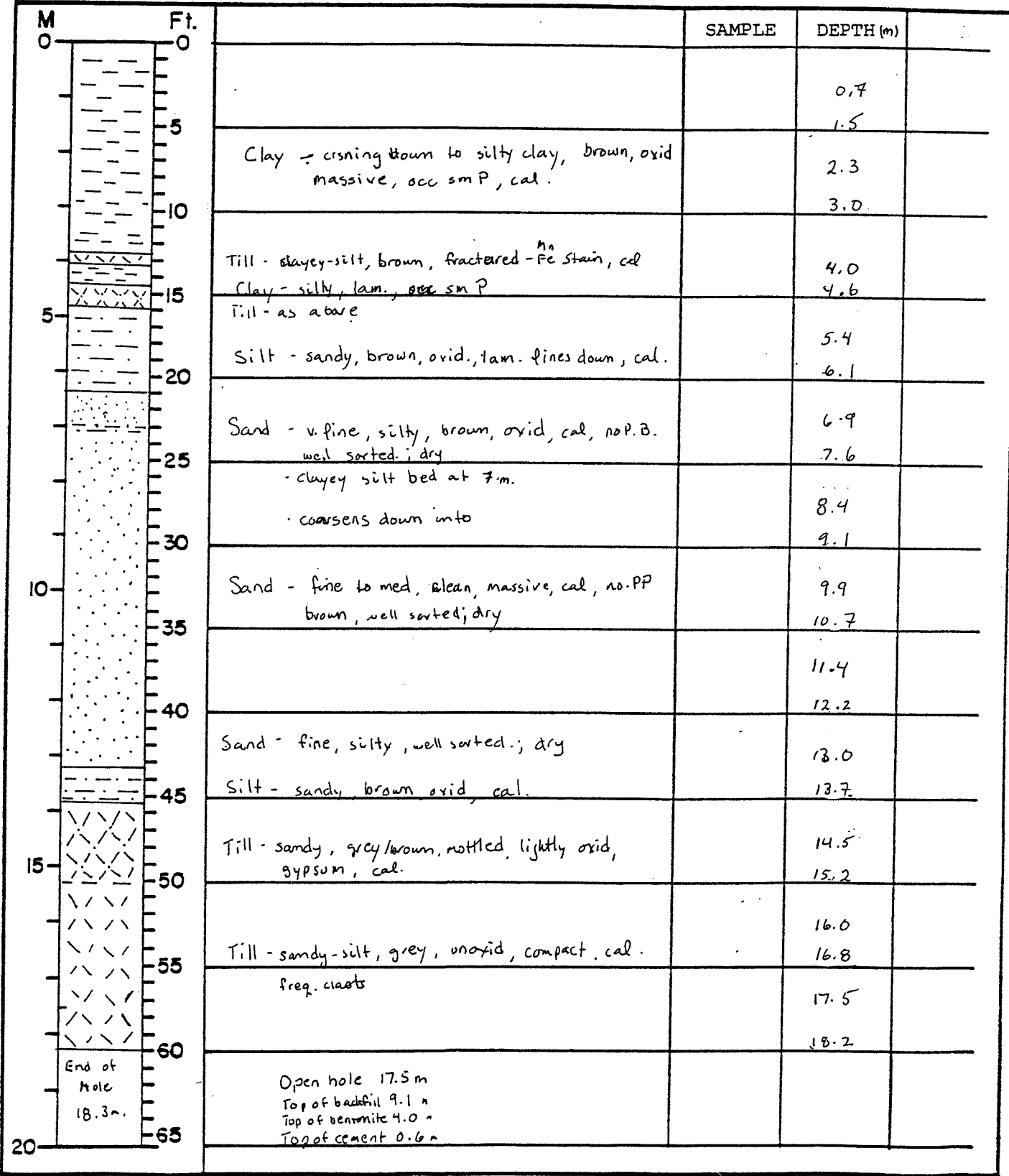
Name Testhole/Piezometer: C93-01

NTS: 72 I / 10 Land Location: NW 13-8-18-19W2 528780E
WTM 5595430N

Contractor: Probe Drilling Co. Ltd.

Ground Elevation: 590 m asl (10m contour interval) Geology By: Janet Campbell

Measuring Point: _____ Elevation Measuring Point: _____



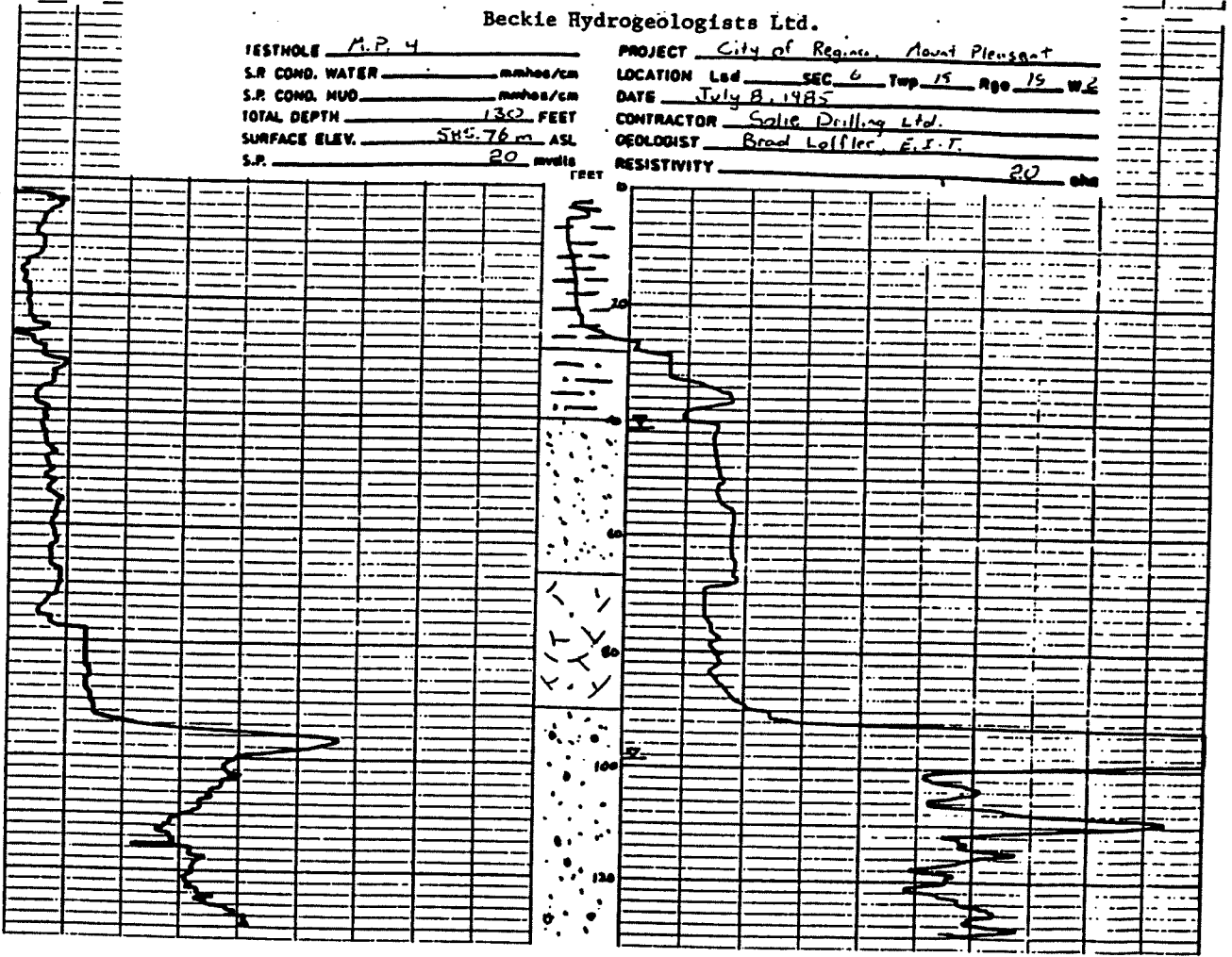
NE 8-6-18-19-W2

77
77

Beckie Hydrogeologists Ltd.

TESTHOLE M.P. 4
S.R COND. WATER _____ mhos/cm
S.R COND. MUD _____ mhos/cm
TOTAL DEPTH 130 FEET
SURFACE ELEV. 585.76 m ASL
S.P. 20 mvdls

PROJECT City of Regina, Mount Pleasant
LOCATION Ltd SEC. 6 Twp. 15 Rge. 15 W. 2
DATE July 8, 1985
CONTRACTOR Salie Drilling Ltd.
GEOLOGIST Brad Laffler, E.I.T.
RESISTIVITY _____ 20 ohm



Beckie, 1986.

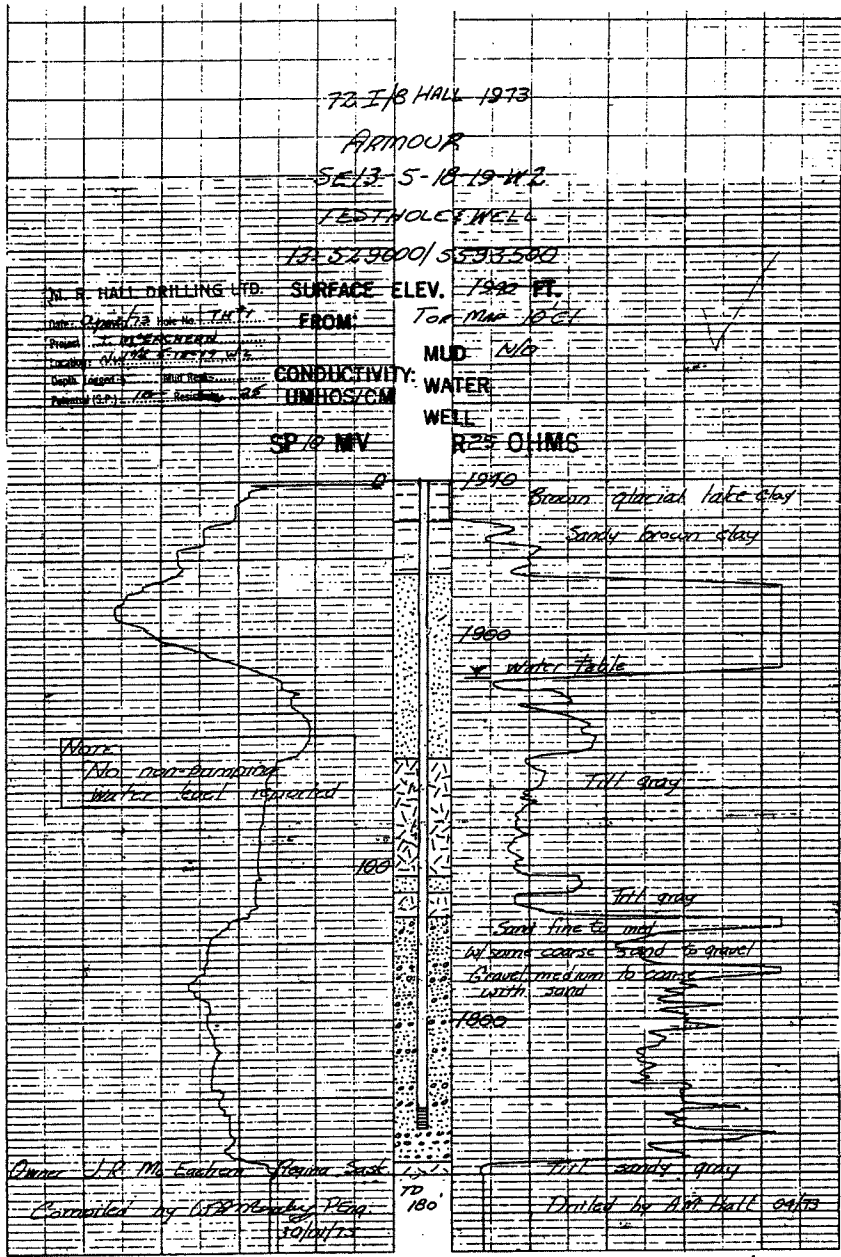
Interim Report on Installation of
Mount Pleasant - Imperial Oil
Ground Water Monitoring Systems

acq # 42232

78

601
P

72 I/7



SASKATCHEWAN WATER RESOURCES COMMISSION
WATER WELL DRILLER'S REPORT

DRILLER'S NAME J.R. McEachern	LOCATION Regina, Sask.	QUANTITY 18	SECTION 5	DATE 1973
DATE COMPLETED 5/18/73	DRILLER'S SIGNATURE J.R. McEachern	WELL DEPTH 168'	DIAMETER 4"	TYPE OF SCREEN S.S. Strapping

DEPTH (FT)	DESCRIPTION OF MATERIAL ENCOUNTERED
0	12 Clay brown glacial lake
12	20 Clay silty sandy brown
20	75 Sand fine silty brown
75	115 Silt gray
115	136 Sand fine med. w/ coarse sand
136	140 Brown med. & coarse sand
140	170 Sand coarse & gravel
170	175 Mud and stones
175	180 Silt sandy gray 2' logged for 180 ft.

RETURNED TO OWNER IMMEDIATELY.

RECOMMENDED PUMPING RATE
PUMP HEAD SET AT 137 FT

TOTAL COST OF WELL \$
DRILLER'S SIGNATURE
J.R. McEachern

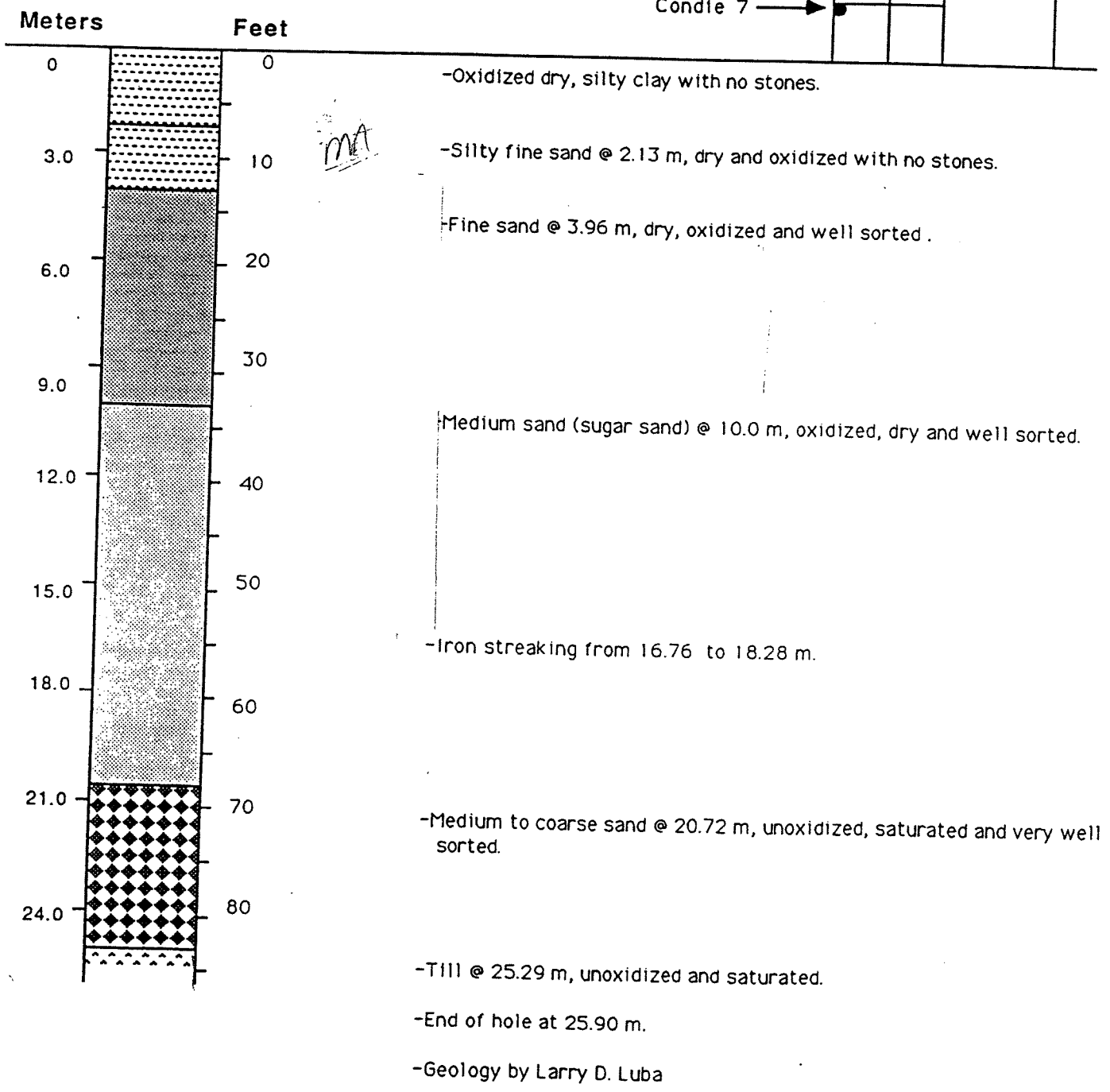
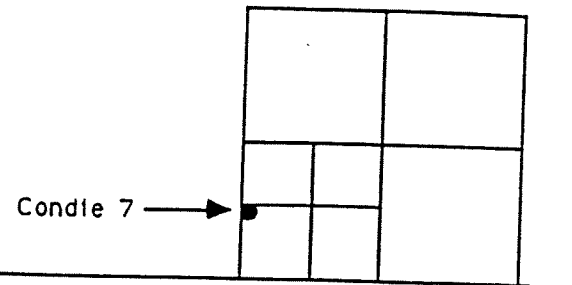
79

Name: Condie 7 Driller: Probe Drilling Regina, Sask.
Legal Land Location (L.S.D): NW 04-08-18-19-W2
Surface Land Elevation: 594.99 m (1952.06 ft.)

NTS: 72 I
Date: Aug. 01, 1989

RA23

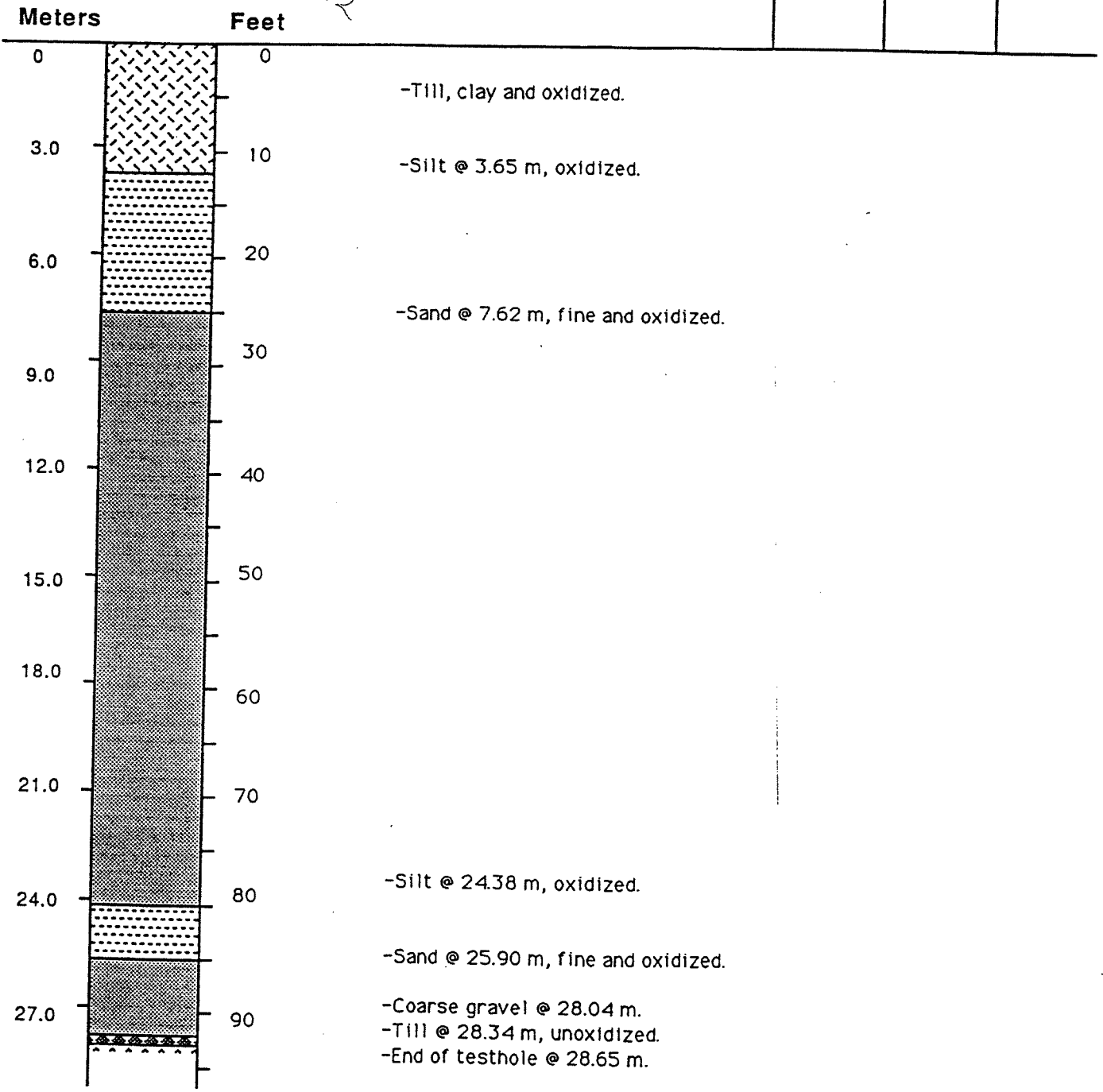
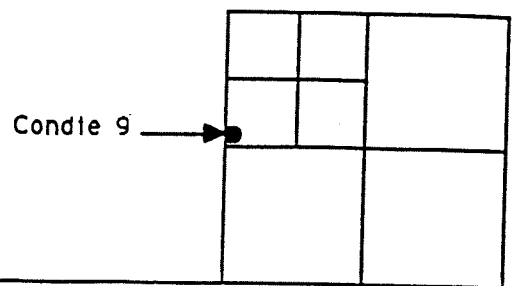
S0386



research conducted on the Condie Aquifer
Larry Luba

RA 29

55392



-Geology by Larry D. Luba.
 -NOTE: Chloride concentration of water at bottom of hole is 17.66 ppm.

Research conducted on the Condle Aquifer.

Larry Luba.

BOREHOLE NO. H-21 NTS 72110
 LAND LOCATION NW-12-08-18-19-W2
 UTM COORD. _____
 GRD. ELEV. 592.2 M DEPTH 115.2 M
 DATE DRILLED MARCH 25 19 83
 COND. WATER _____ MICROSIEMENS/CM AT 25° C
 COND. MUD _____ MICROSIEMENS/CM AT 25° C
 SPECIFIC GRAVITY MUD _____
 SUPERVISOR _____
 ASST SUPERVISOR _____
 LOGGED BY _____
 INSTRUMENT _____
 PROBE ELECTRIC _____
 PROBE GAMMA _____
 PROBE CALIPER _____
 DATE LOGGED _____ 19 _____
 TIME OF LOGGING _____ TO _____
 DRILL OPERATOR _____
 CONTRACTOR _____
 REMARKS _____
ROTARY HOLE BUT NO E LOG

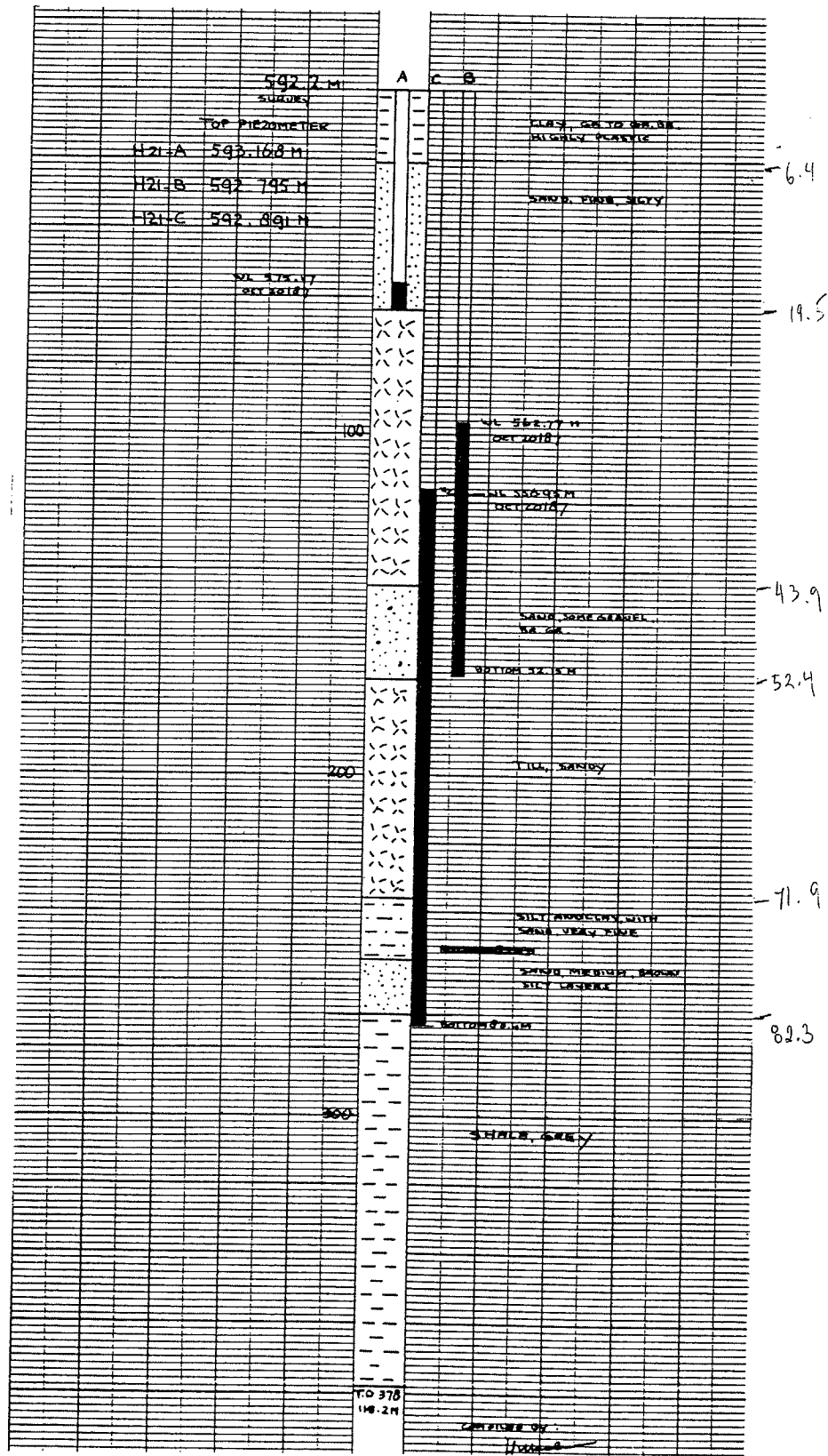
PROJECT REGINA RAILWAY RELOC
 CUTTING SAMPLE INTERVAL _____
 CORE SAMPLE INTERVAL _____
 FROM _____
 CASING DEPTH _____
 CASING WALL THICKNESS _____
 WATER OR MUD LEVEL _____
 ABANDONMENT _____
 BIT SIZE _____ INTERVAL _____
 BIT SIZE _____ INTERVAL _____
 BIT SIZE _____ INTERVAL _____
 TYPE OF DRILL RIG _____

	DEPTH	SCALE	SPEED
SP.			
RES.			
GAMMA			
CAL.			

GAMMA TIME CONSTANT (T.C.) _____ SECONDS
 GEOLOGY BY HARDY ASSOCIATES

2801

11-12-08-18-19-W2



BS 1873

Name Testhole/Piezometer: C 93-02

NTS: 725 / 10 Land Location: NW 9-17-18-19 W2 / UTM 528775 E 5595825 N

Contractor: Probe Drilling Co. Ltd

Ground Elevation: 589 m (10 m contour interval) Geology By: Janet Campbell

Measuring Point: 50287 Elevation Measuring Point: _____

KA51

M	Ft.	DESCRIPTION	SAMPLE	DEPTH (m)
0	0	Topsoil		0.7
	5	Clay - brown, occ sm P, lam., cal., oxid		1.5
	10	Till - 2.1 to 2.3 m clayey-silt, brown, oxid	Qssd AT 0	2.3
	15	Clay - as above	Qavm AT 21	3.0
	20	Clay - as above interbedded with Till - clayey brown, freq. clasts, soft, cal.	Quf AT 41	3.8
	25	Silt - clayey, brown, lam., occ sm P, cal.		4.6
	30	Till - sandy-silt, brown, oxid, freq. clasts, cal.		5.4
	35	Silt - sandy, brown, lam, rare sm P, cal		6.1
	40	Sand - fine to v. fine, silty, dry, brown, well sorted silt interbed at 3.5 m.		6.9
	45	Silt - sandy, lam. oxid, brown, cal, no P.B.		7.6
	50	Sand - fine to v. fine, clean, dry, lightly oxid, cal. well sorted		8.4
	55	Till - sandy-silt, compact, stoney, cal, lightly oxid		8.9
	60	Gravel - fair sorting; matrix - coarse sand		9.1
	65	Till - sandy-silt, brown, oxid, stoney, cal, gypsum, hard		10.1
	70	End of hole 15.2 m		10.7
	75	Open hole 15.0 m		11.4
	80	Top of backfill 8.8		12.2
	85	Top of bentonite 3.0		13.0
	90	Top of cement 0.7		13.7

Project: Condie Aquifer Date: October 12/93

528775E
Campbell
Mathews
R-1220-4-E-94

Name Testhole/Piezometer: C-93-03/03A

NTS: 72I/10 Land Location: NW 5-17-18-19 W2/UTM 5596225N

Contractor: Probe Drilling Co Ltd

Ground Elevation: 590.5 m (10m G.I. Map) Geology By: Janet Campbell

Measuring Point: _____ Elevation Measuring Point: _____

RA 52

5229#

M	Ft.		SAMPLE	DEPTH (m)
0	0			0.7
	5			1.5
	10	Clay - silty, brown, oxid, occ → freq P cal; diamicton inclusions - 1-3cm thick.	Qssd A70 Qbat 21	2.3 3.0
	15	becomes lam. with depth.; occ. gypsum	Qarm 36 Q... FAT 44	3.8 4.6
	20	Silt - clayey, lam, brown, ox.; becomes interbedded with sandy silt.		5.4 6.1
	25	Till - sandy-silt to silty-sand, brown, ox., soft		6.9 7.2
	30	dry freq. P, massive, cal - interbedded with silt diamicton - sandy, lam, brown freq. P., cal.		8.4 9.1
	35			9.9 10.7
	40	Sand - v. fine, silty, well sorted, oxid, cal, dry fill interbedded at 11.6-11.8 m.		11.4 12.2
	45	Till - sandy-silt, brown, ox., compact, hard, Silt - sandy, brown, oxid, lam, cal		13.0 13.7
	50	Till - as above		14.5
	55	Till - sandy, brown, ox., loose, dry, cal.		15.2
	60	03 - Open hole 10.4 m Backfill top 10.4 m Bentonite top 3.4 m Cement top 0.6 m		
	65	03A Open hole 14.2 Backfill top 12.7 Bentonite top 3.7 Cement top 0.6 m		

6.2m

Condie fill

Condie

8.2

Boulder
End of
hole
15.2 m

Project: Stemp works Campbell, Meathurs Date: K-1220-4-E-94
Condie Aquifer Date: October 12/93

Name Testhole/Piezometer: C93-04

NTS: 72E/10 Land Location: NW12-17-18-19W2 / UTM 529775 E
5596600 N

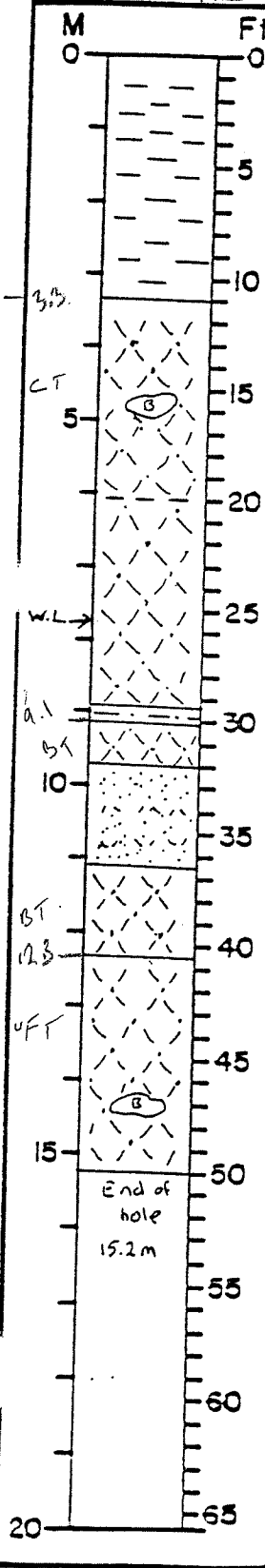
Contractor: Probe Drilling Co. Ltd.

Ground Elevation: 590.5 m (10 m CE map) Geology By: Janet Campbell

Measuring Point: 50292 Elevation Measuring Point: _____

KA 53

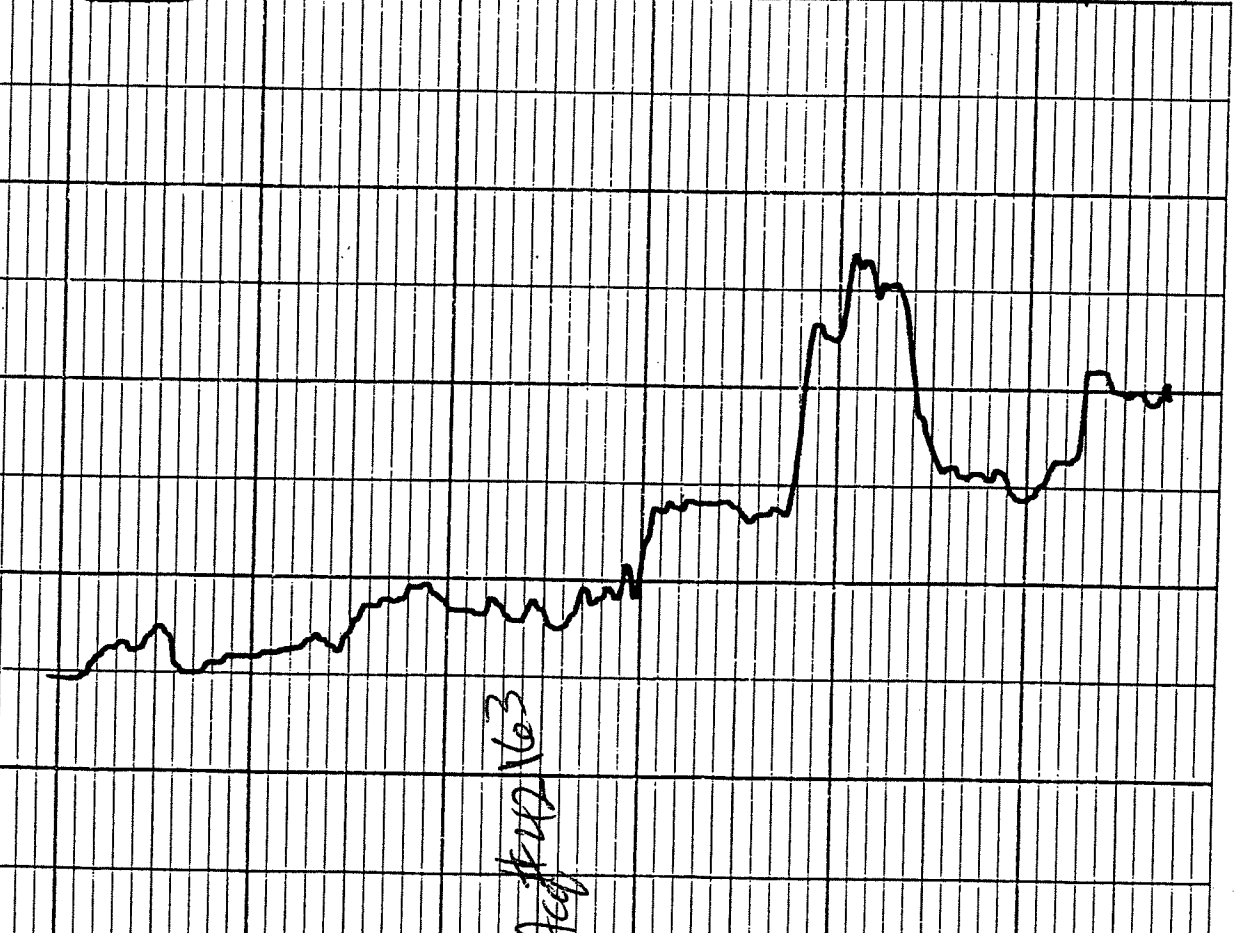
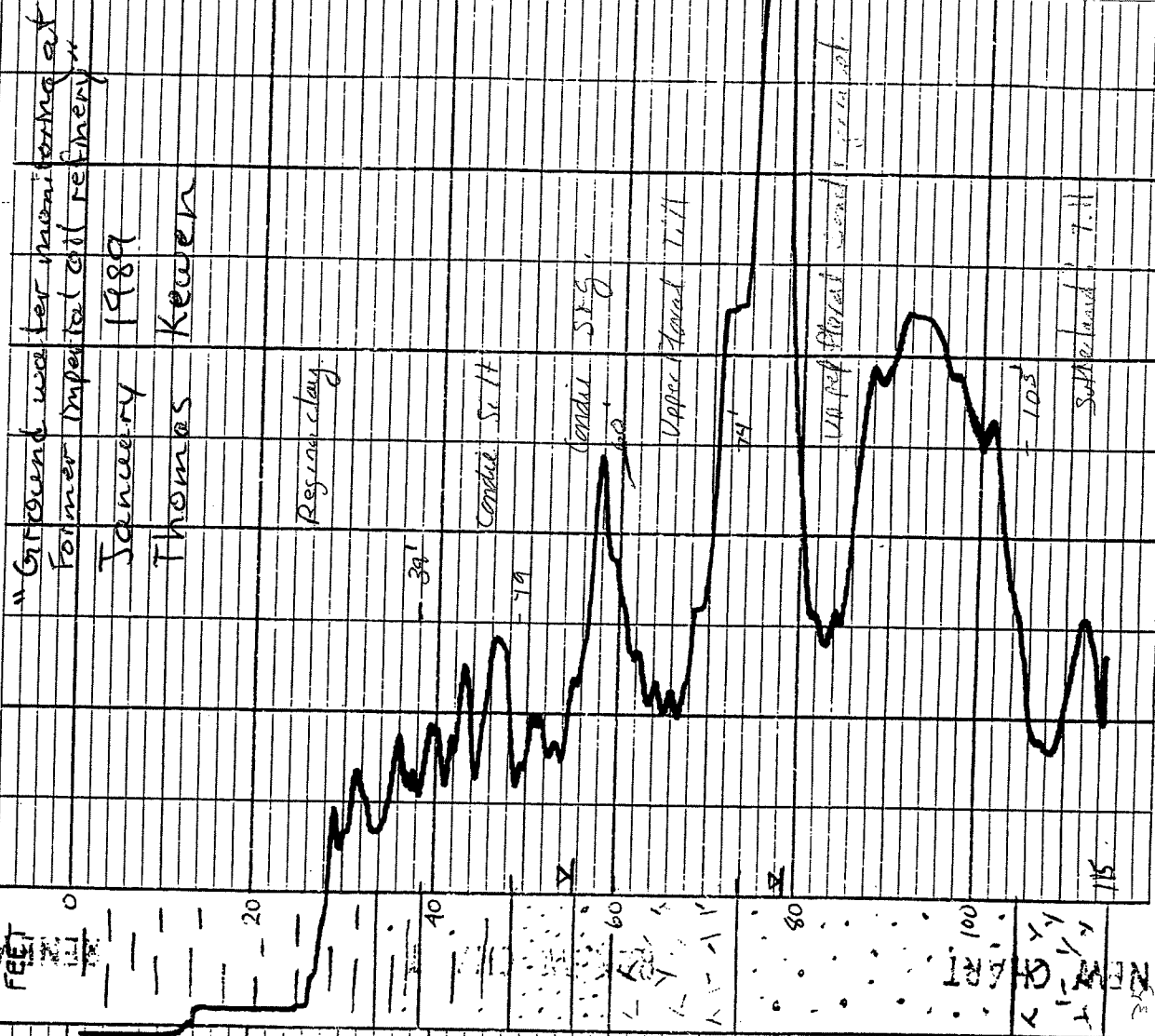
M	Ft.	DESCRIPTION	SAMPLE	DEPTH
0	0			
	0.7			0.7
	1.5	Clay - becoming silty-clay with depth, cal;		1.5
	2.3	lam., rare sm P, Fe stain spotty, occ	QSSD AT 0	2.3
	3.0	gypsum between 1.5 and 3.0 m, ox., brown	Qlat 11	3.0
	3.8		Qlat 32	3.8
	4.6	Till - clayey-silt, low grit, brown, oxid	Ref AT 36	4.6
	5.2	cal		5.2
	6.1	grades into		6.1
	6.9			6.9
	7.6	Till - sandy-silt, brown, oxid, cal, stoney, compact		7.6
	8.4	moist		8.4
	9.9	Silt - lam. with v.p. sand occ sm. P brown ox. cal		9.9
	9.9	Till - silty-sand, moist, loose, brown, oxid, cal.		9.9
	10.7	Sand - med to fine, clean, sorting, occ. sm P, cal.		10.7
	11.4	oxid, wet		11.4
	12.2	till interbed at 10.4 and 10.9 m		12.2
	13.0	Till - silty-sand, brown, oxid, moist, stoney, mod.		13.0
	13.7	compact, str. cal,		13.7
	14.5	Till - sandy-silt to silt, mottled brownish/gray		14.5
	15.2	fractured with Fe staining, compact, hard, cal, dry, gypsum.		15.2
	15.2	End of hole 15.2 m		15.2
	15.2	Open hole 15.2 m		15.2
	10.4	Top of Backfill 10.4 m		10.4
	9.0	Top of Bentonite 9.0 m		9.0
	0.7	Top of Cement 0.7 m		0.7
	7.9	Water level in hole 7.9 m		7.9



TESTHOLE I.O. 4 (13)
 S.P. COND. WATER _____ mmhos/cm
 S.P. COND. MUD _____ mmhos/cm
 TOTAL DEPTH 115 FEET
 SURFACE ELEV. 580.60 m ASL
 S.P. _____ 10 mvolts

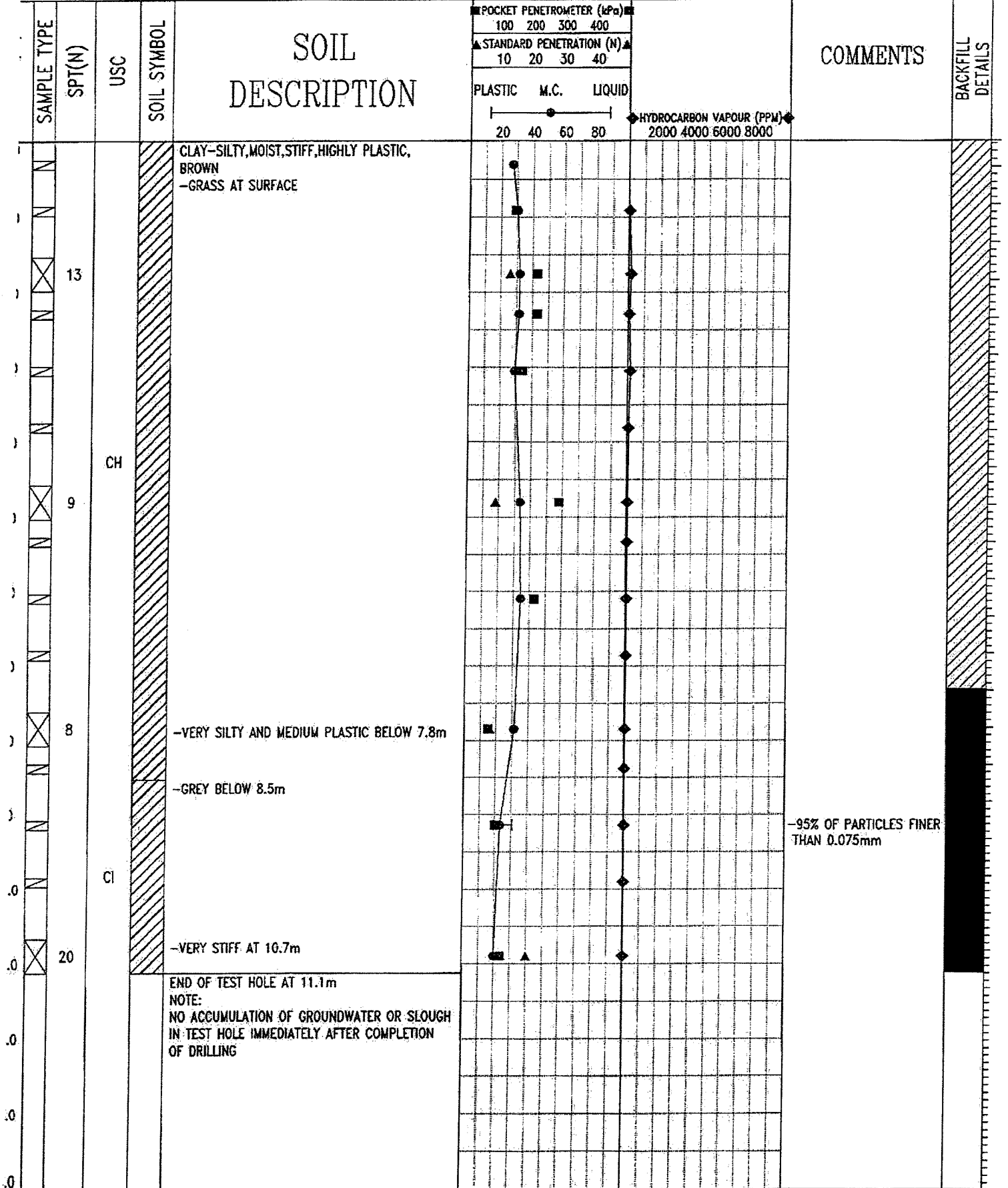
ECT City of Regina, Imperial Oil Site
 LOCATION Lsd SEC 32 Twp 17 R90 19 W2M
 DATE July 11 1985
 CONTRACTOR Solie Drilling Ltd.
 GEOLOGIST Brad Loffler E.L.T.

RESISTIVITY _____ 10 ohms



Acid #112 163

PILE TYPE	<input checked="" type="checkbox"/> THIN WALL TUBE	<input type="checkbox"/> DISTURBED	<input checked="" type="checkbox"/> SPT	<input type="checkbox"/> A-CASING	<input type="checkbox"/> HOLLOW STEM	<input type="checkbox"/> CORE
BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE	<input type="checkbox"/> PEA GRAVEL	<input type="checkbox"/> SLOUGH	<input type="checkbox"/> GROUT	<input type="checkbox"/> DRILL CUTTINGS	<input type="checkbox"/> SAND



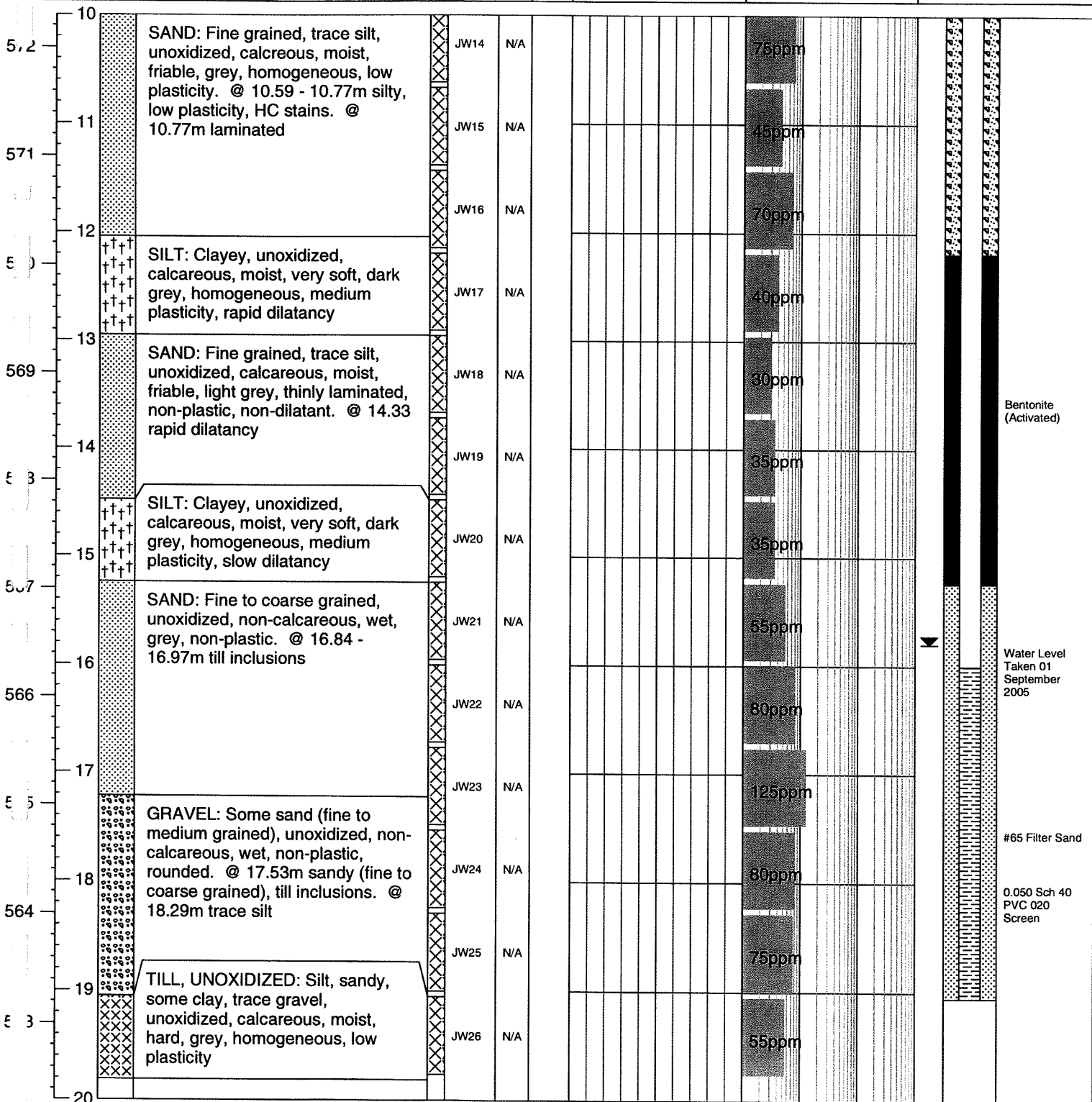
ENV 101 m elev CAL v03.001



BORE HOLE LOG

Client: Imperial Oil Ltd.	Northing: -	Date: 03 Aug 2005
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.: 582.30	Method: Hollow Stem
Project No.: R3667.1	Top Casing Elev.: 583.14	Logged by: JDW

Elev (m) Depth (m)	Symbol	Soil Description	Sample		Moisture Content percent			Headspace Vapour ppm				Monitor Well Construction Detail
			Type	No.	SPT 'N'	USC	Plastic Limit ▲	Natural Moisture ●	Liquid Limit ◆	10	100	



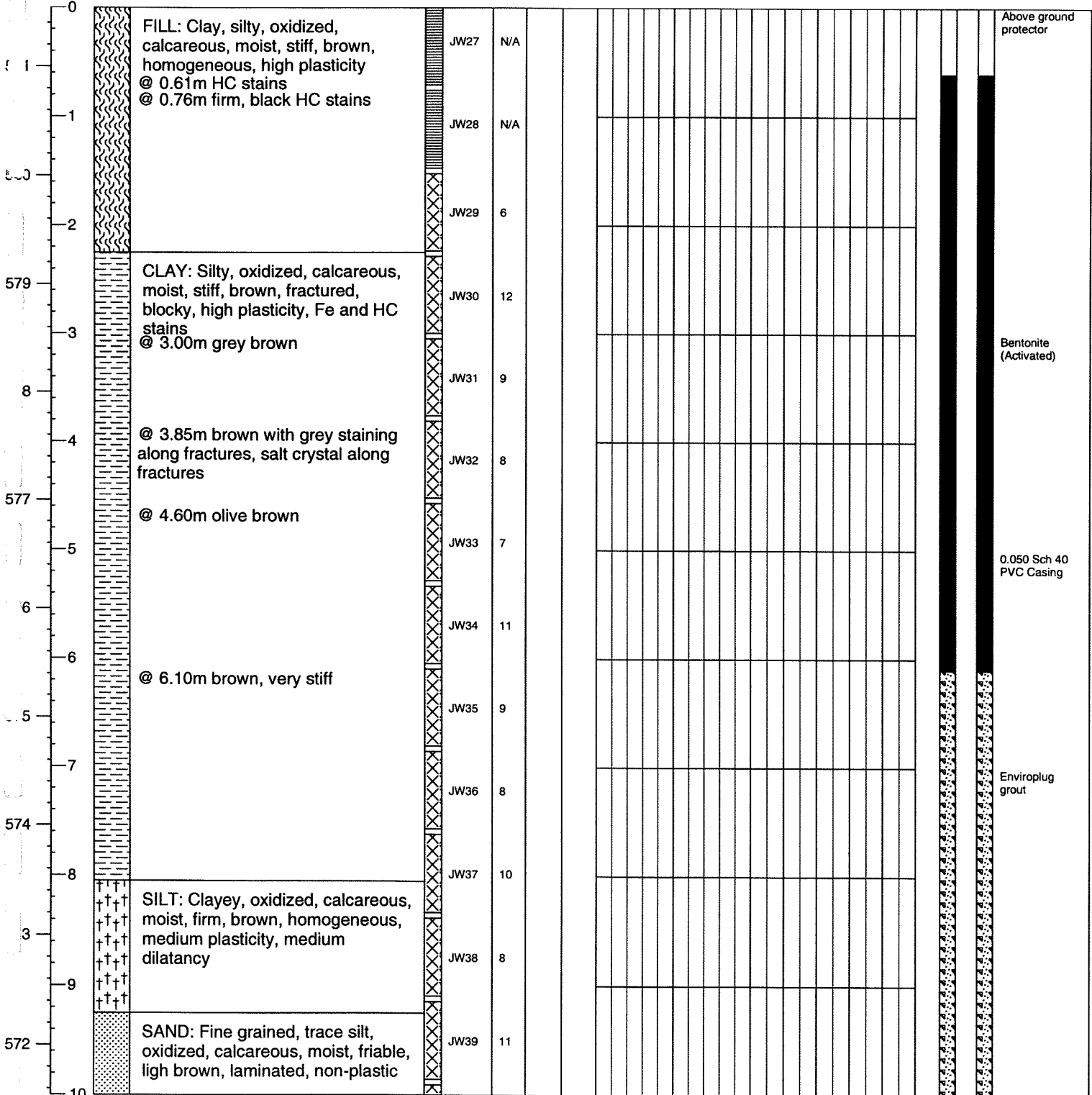
Geotech Borehole Elev. CAL-V03-01



BORE HOLE LOG

Client: Imperial Oil Ltd.	Northing: -	Date Drilled: 04 Aug 2005
Project: Environmental Investigation	Easting: -	Drill: Canterra 250
Location: Regina, SK	Ground Elev.: 581.54	Drilling Method: Hollow Stem
Project No.: R3667.1	Top Casing Elev.: 582.53	Logged by: JDW

Elev (m)	Depth (m)	Symbol	Soil Description	Sample		USC	% Sulphate	Moisture Content			Piezometer Construction Detail		
				Type	No.			Plastic Limit	Natural Moisture	Liquid Limit	Dry Density - kg/m ³	Shear Strength - kPa	Unconf. Pocket Pen.





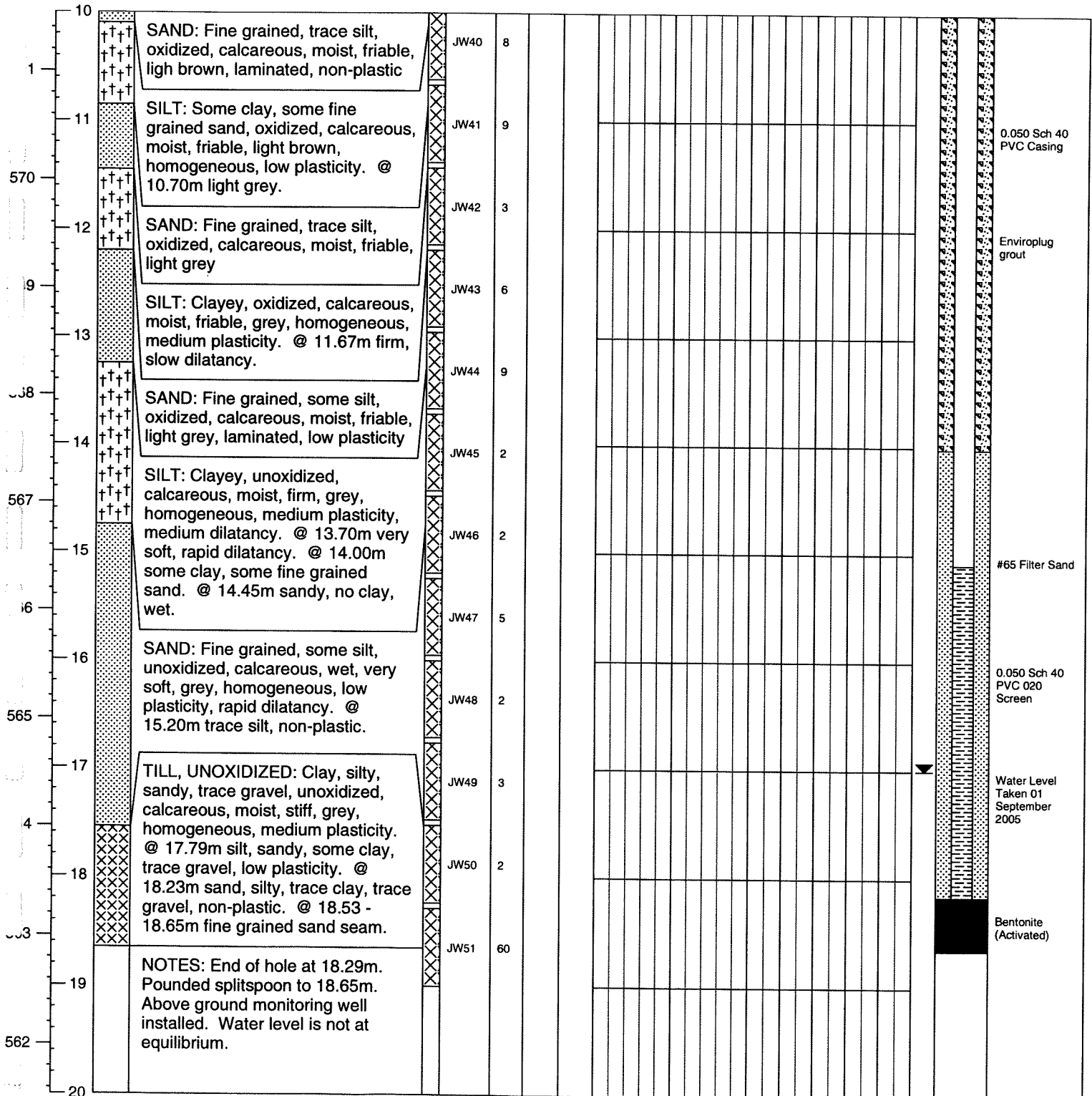
BORE HOLE LOG

Bore Hole: **402**

Page: **2 of 2**

Client: Imperial Oil Ltd.	Northing: -	Date Drilled: 04 Aug 2005
Project: Environmental Investigation	Easting: -	Drill: Canterra 250
Location: Regina, SK	Ground Elev.: 581.54	Drilling Method: Hollow Stem
Project No.: R3667.1	Top Casing Elev.: 582.53	Logged by: JDW

Elev (m) Depth (m)	Symbol	Soil Description	Sample Type No.	SPT 'N'	USC	% Sulphate	Moisture Content percent			Dry Density - kg/m ³				Piezometer Construction Detail
							Plastic Limit	Natural Moisture	Liquid Limit	1600	2000	Shear Strength - kPa		



NOTES: End of hole at 18.29m. Pounded splitspoon to 18.65m. Above ground monitoring well installed. Water level is not at equilibrium.



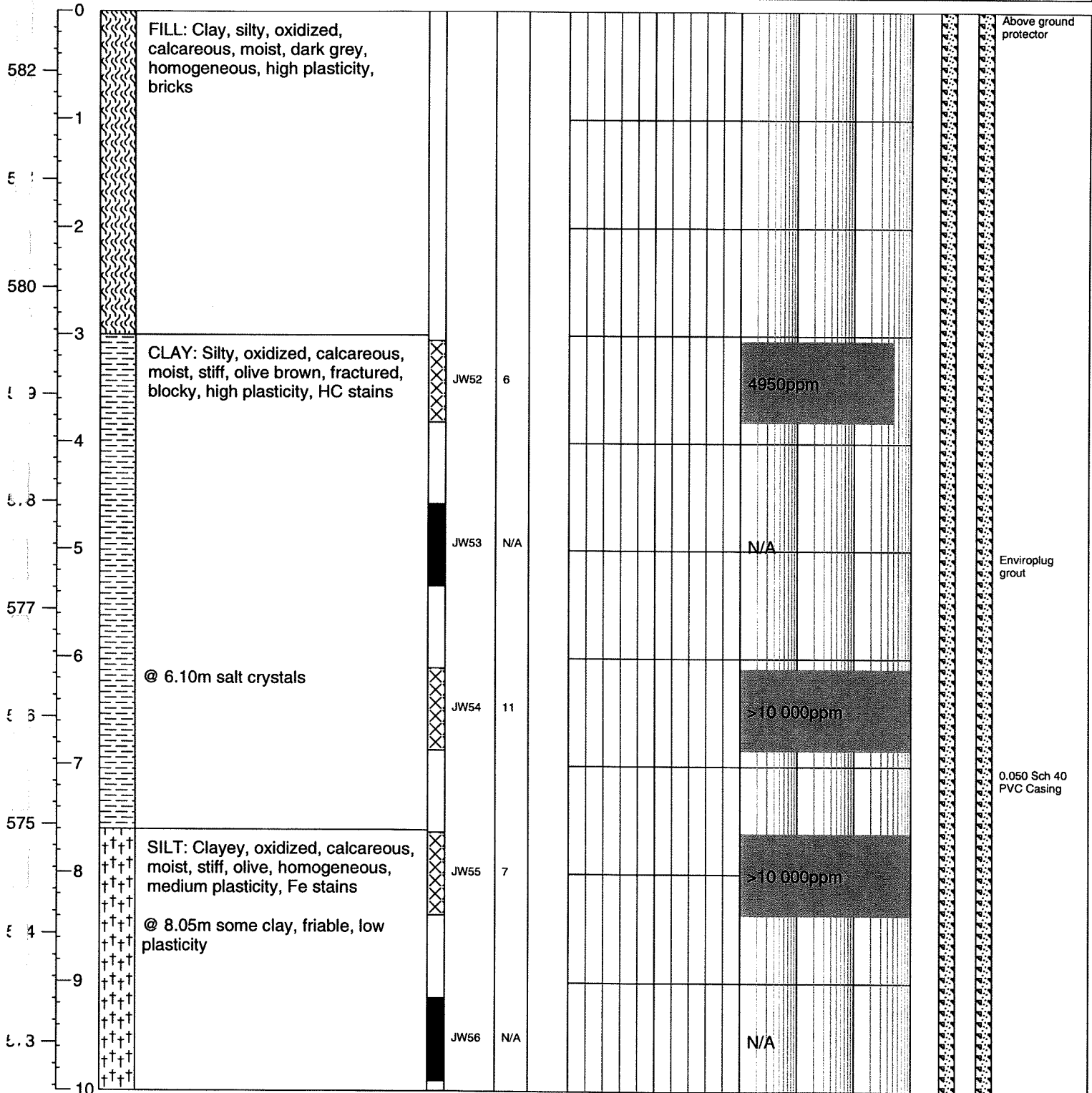
BORE HOLE LOG

Bore Hole: **403**

Page: 1 of 3

Client: Imperial Oil Ltd.	Northing: -	Date: 05 Aug 2005
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.: 582.56	Method: Hollow Stem
Project No.: R3667.1	Top Casing Elev.: 583.50	Logged by: JDW

Elev (m)	Depth (m)	Symbol	Soil Description	Sample		Moisture Content percent			Headspace Vapour ppm				Monitor Well Construction Detail
				Type	No.	SPT 'N'	USC	Plastic Limit	Natural Moisture	Liquid Limit	10	100	

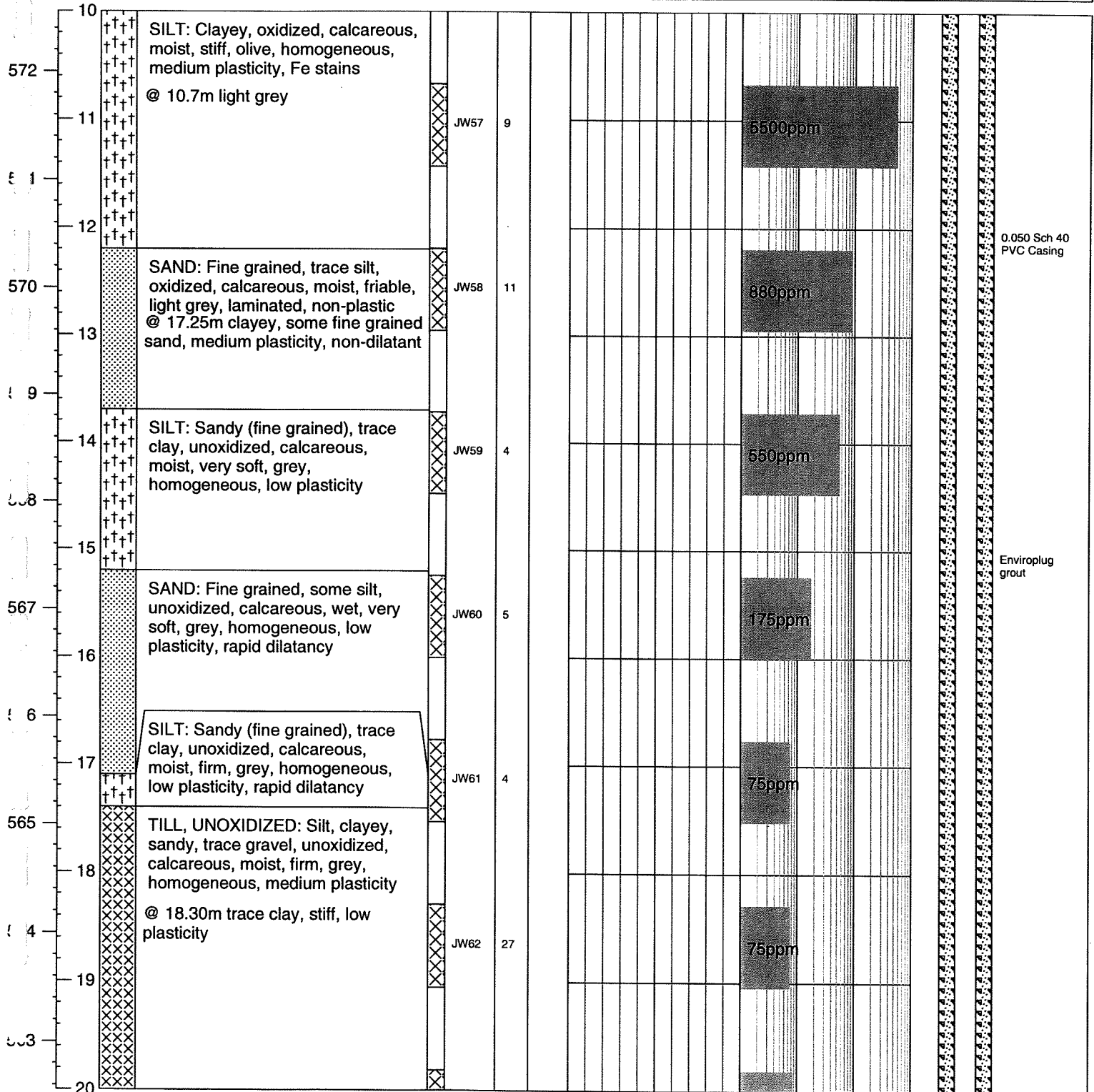




BORE HOLE LOG

Client: Imperial Oil Ltd.	Northing: -	Date: 05 Aug 2005
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.: 582.56	Method: Hollow Stem
Project No.: R3667.1	Top Casing Elev.: 583.50	Logged by: JDW

Elev (m)	Depth (m)	Symbol	Soil Description	Sample		Moisture Content			Headspace Vapour				Monitor Well Construction Detail
				Type	No.	SPT 'N'	USC	Plastic Limit	percent Natural Moisture	Liquid Limit	ppm	100	



Env BH (m elev CAL v03.01)



Clifton Associates Ltd.
engineering science technology

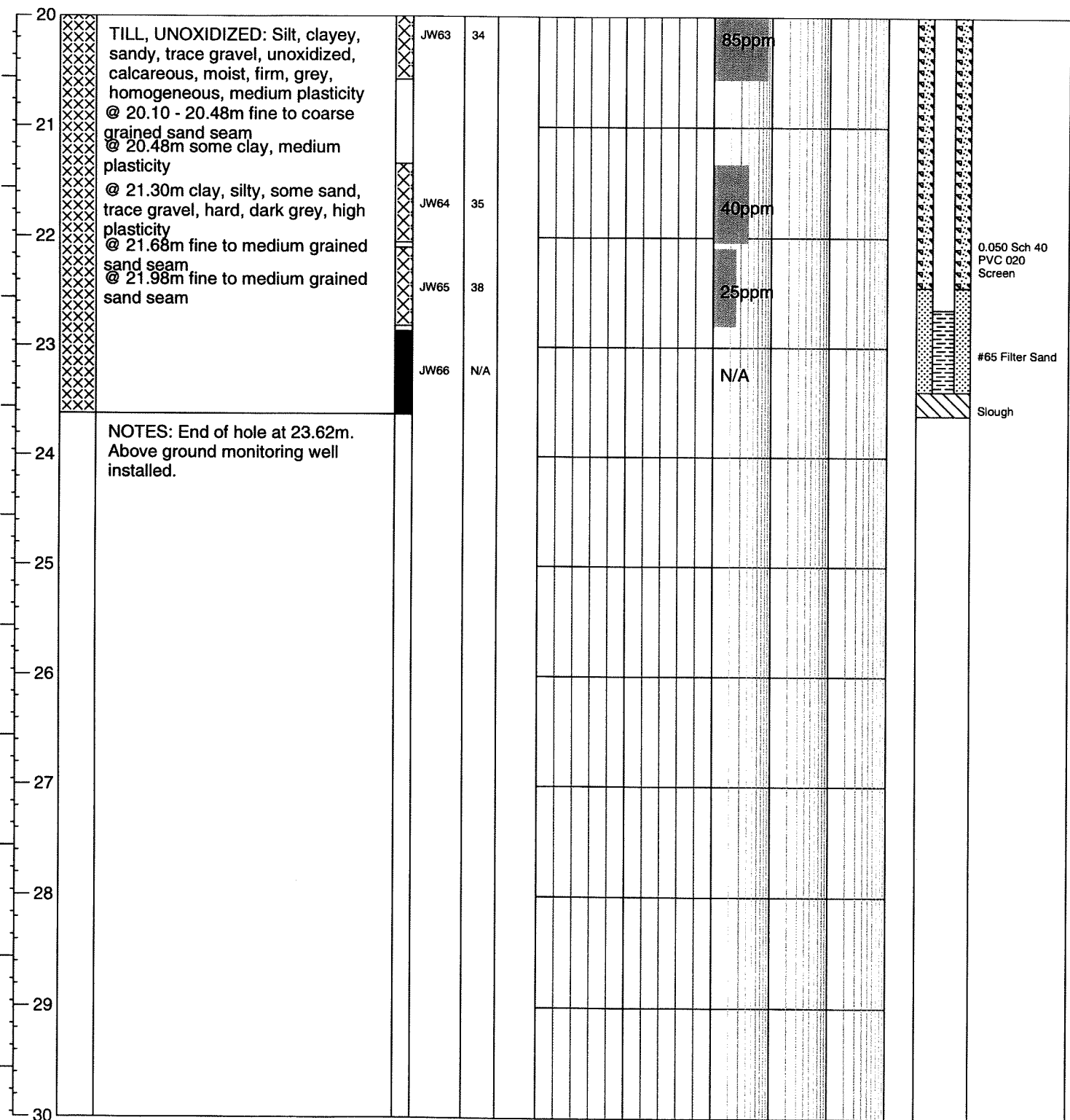
BORE HOLE LOG

Bore Hole: 403

Page: 3 of 3

Client: Imperial Oil Ltd.	Northing: -	Date: 05 Aug 2005
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.: 582.56	Method: Hollow Stem
Project No.: R3667.1	Top Casing Elev.: 583.50	Logged by: JDW

Elev (m) Depth (m)	Symbol	Soil Description	Sample		Moisture Content percent			Headspace Vapour ppm	Monitor Well Construction Detail
			Type	No.	Plastic Limit ▲	Natural Moisture ●	Liquid Limit ◆		



EM 001 11 1000 CAL. 1000mm



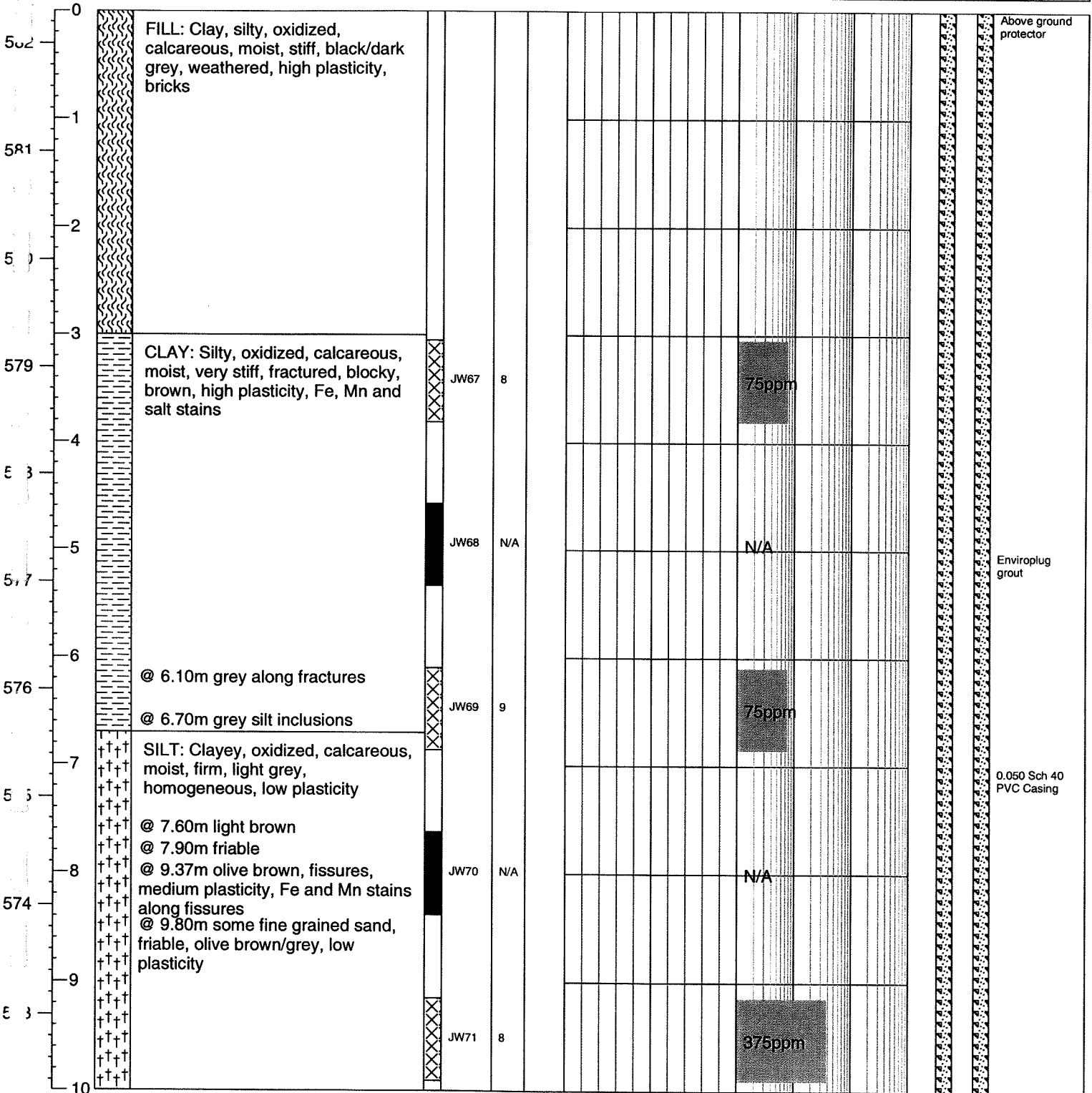
Clifton Associates Ltd.
engineering science technology

BORE HOLE LOG

Bore Hole: **404**
Page: 1 of 3

Client: Imperial Oil Ltd.	Northing: -	Date: 06 Aug 2005
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.: 582.30	Method: Hollow Stem
Project No.: R3667.1	Top Casing Elev.: 583.10	Logged by: JDW

Elev (m) Depth (m)	Symbol	Soil Description	Sample		Moisture Content			Headspace Vapour				Monitor Well Construction Detail
			Type	No.	SPT 'N'	USC	Plastic Limit	percent Natural Moisture	Liquid Limit	ppm	10	



Above ground protector

Enviroplug grout

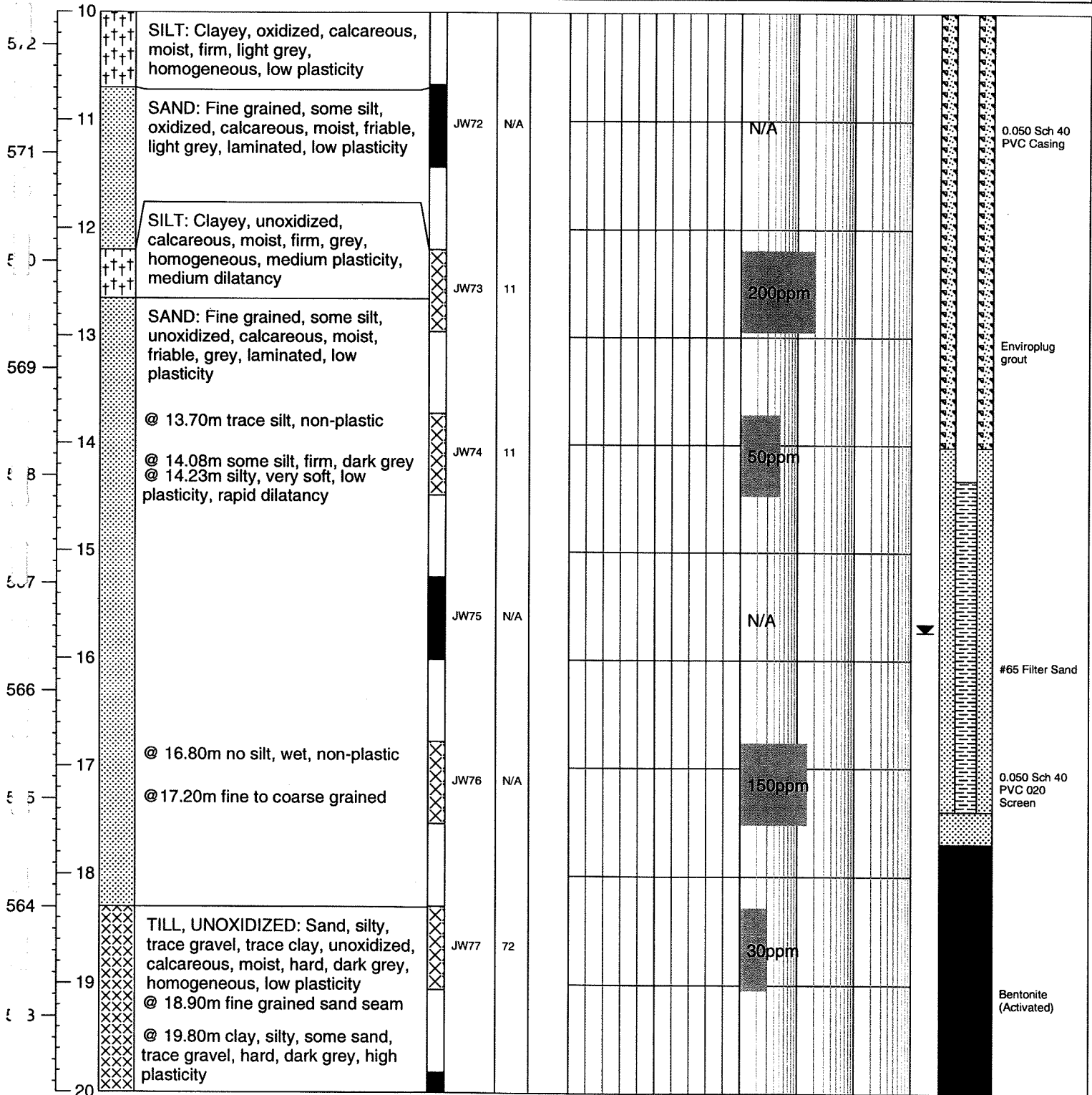
0.050 Sch 40 PVC Casing



BORE HOLE LOG

Client: Imperial Oil Ltd.	Northing: -	Date: 06 Aug 2005
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.: 582.30	Method: Hollow Stem
Project No.: R3667.1	Top Casing Elev.: 583.10	Logged by: JDW

Elev (m)	Depth (m)	Symbol	Soil Description	Sample Type	No.	SPT 'N'	USC	Moisture Content percent			Headspace Vapour ppm				Monitor Well Construction Detail
								Plastic Limit ▲	Natural Moisture ●	Liquid Limit ◆	100	1000	10000	100000	



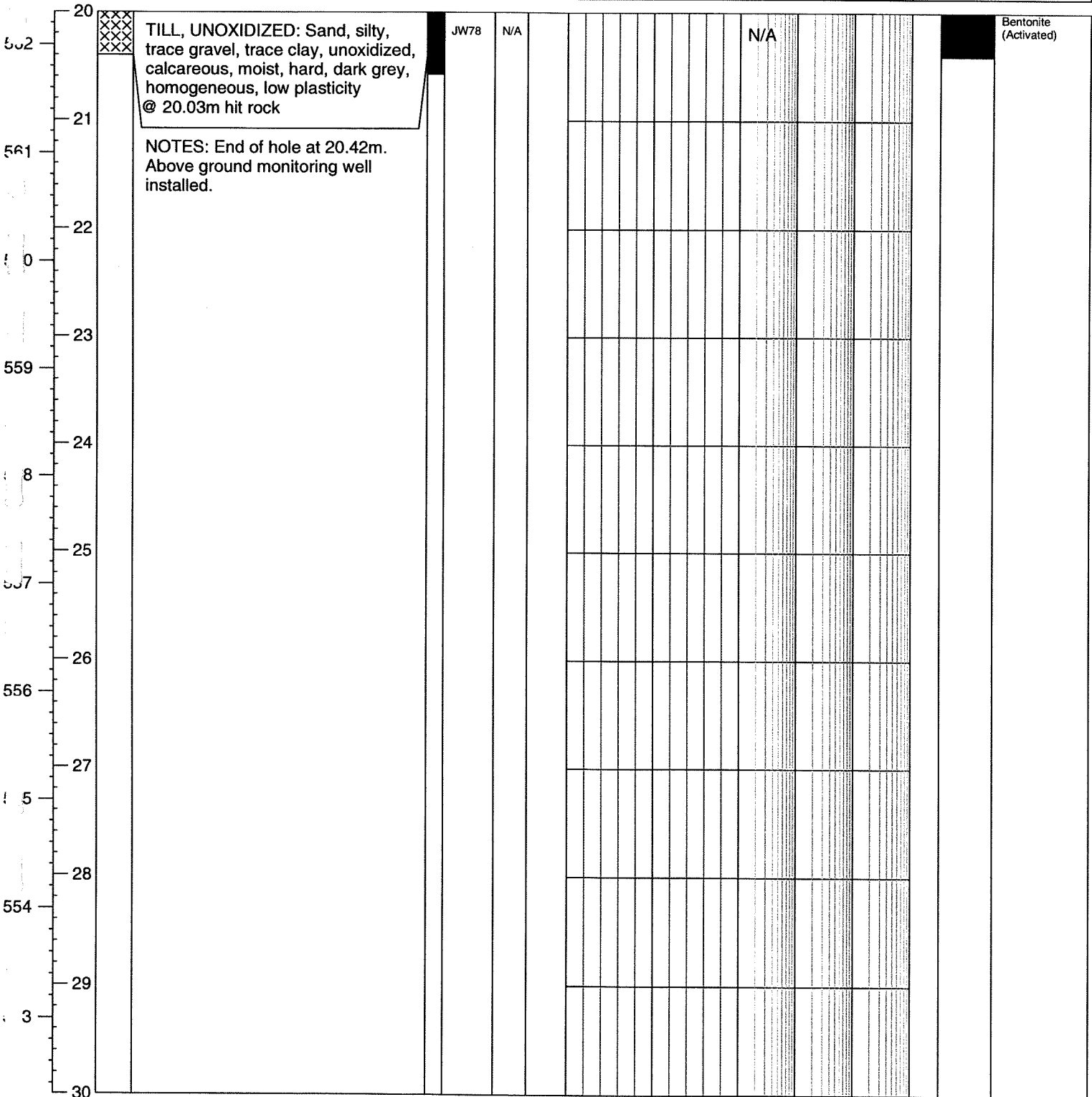
E:\BH m elev CAL v03.kdf



BORE HOLE LOG

Client: Imperial Oil Ltd.	Northing: -	Date: 06 Aug 2005
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.: 582.30	Method: Hollow Stem
Project No.: R3667.1	Top Casing Elev.: 583.10	Logged by: JDW

Elev (m)	Depth (m)	Symbol	Soil Description	Sample		Moisture Content			Headspace Vapour ppm	Monitor Well Construction Detail
				Type	No.	SPT 'N'	USC	Plastic Limit		

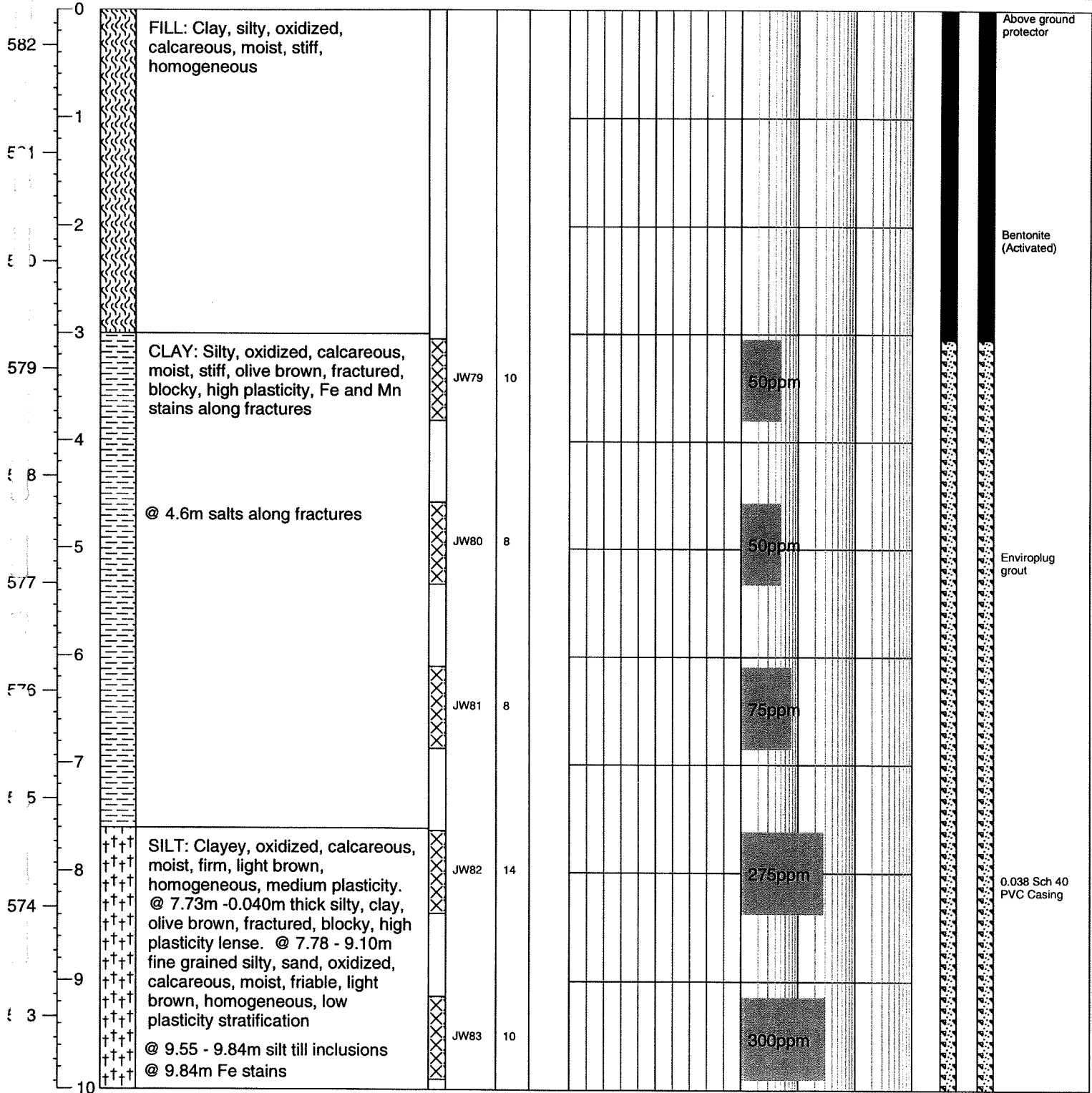




BORE HOLE LOG

Client: Imperial Oil Ltd.	Northing: -	Date: 08 Aug 2005
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.: 582.33	Method: HSA/Casing Adv.
Project No.: R3667.1	Top Casing Elev.: 583.08	Logged by: JDW

Elev (m)	Depth (m)	Symbol	Soil Description	Sample		Moisture Content			Headspace Vapour				Monitor Well Construction Detail
				Type	No.	SPT 'N'	USC	Plastic Limit	percent Natural Moisture	Liquid Limit	ppm	100	

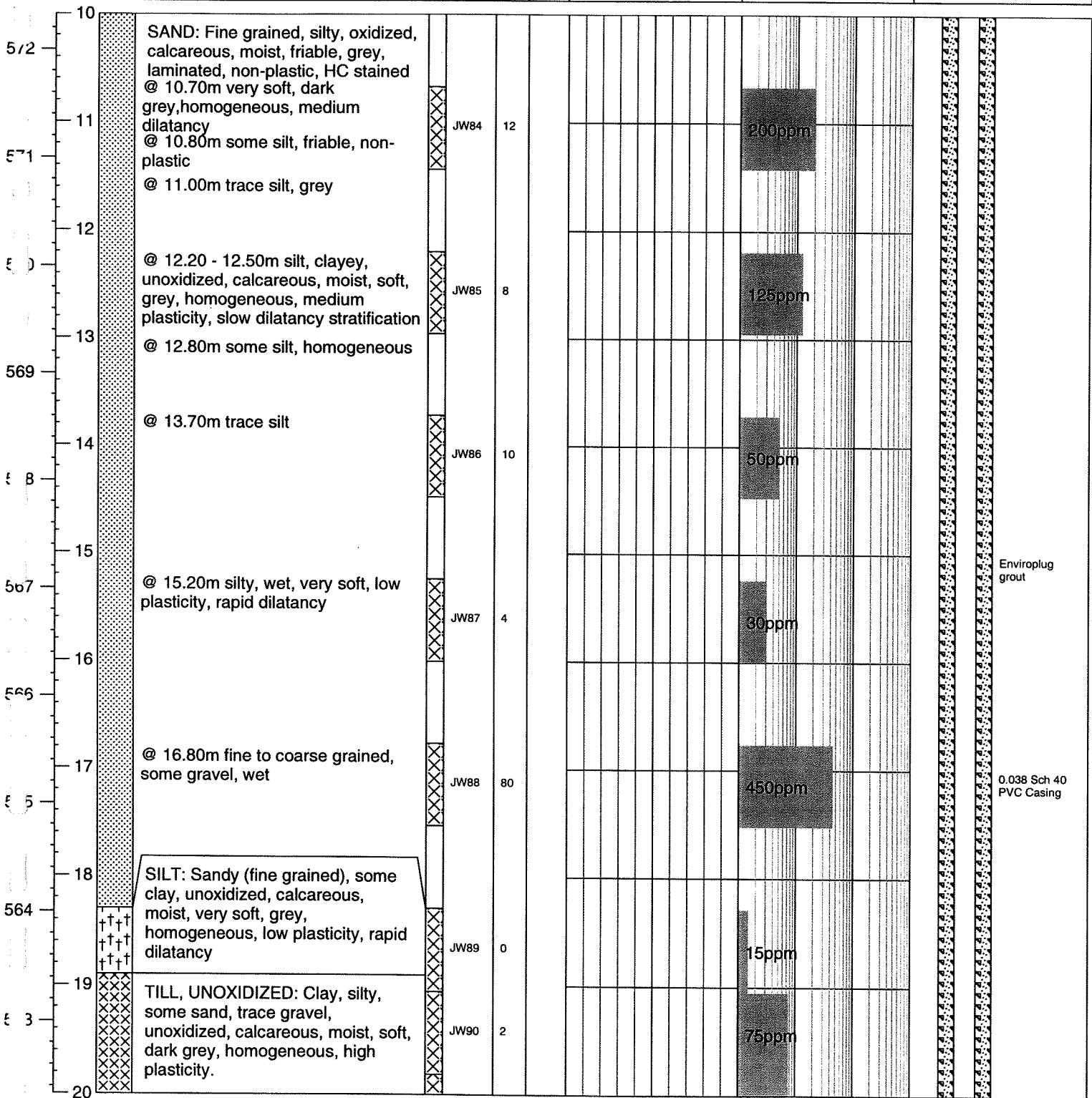




BORE HOLE LOG

Client: Imperial Oil Ltd.	Northing: -	Date: 08 Aug 2005
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.: 582.33	Method: HSA/Casing Adv.
Project No.: R3667.1	Top Casing Elev.: 583.08	Logged by: JDW

Elev (m) Depth (m)	Symbol	Soil Description	Sample		Moisture Content			Headspace Vapour				Monitor Well Construction Detail
			Type	No.	plastic Limit	percent Natural Moisture	Liquid Limit	ppm	100	1000	10000	



Enviroplug grout

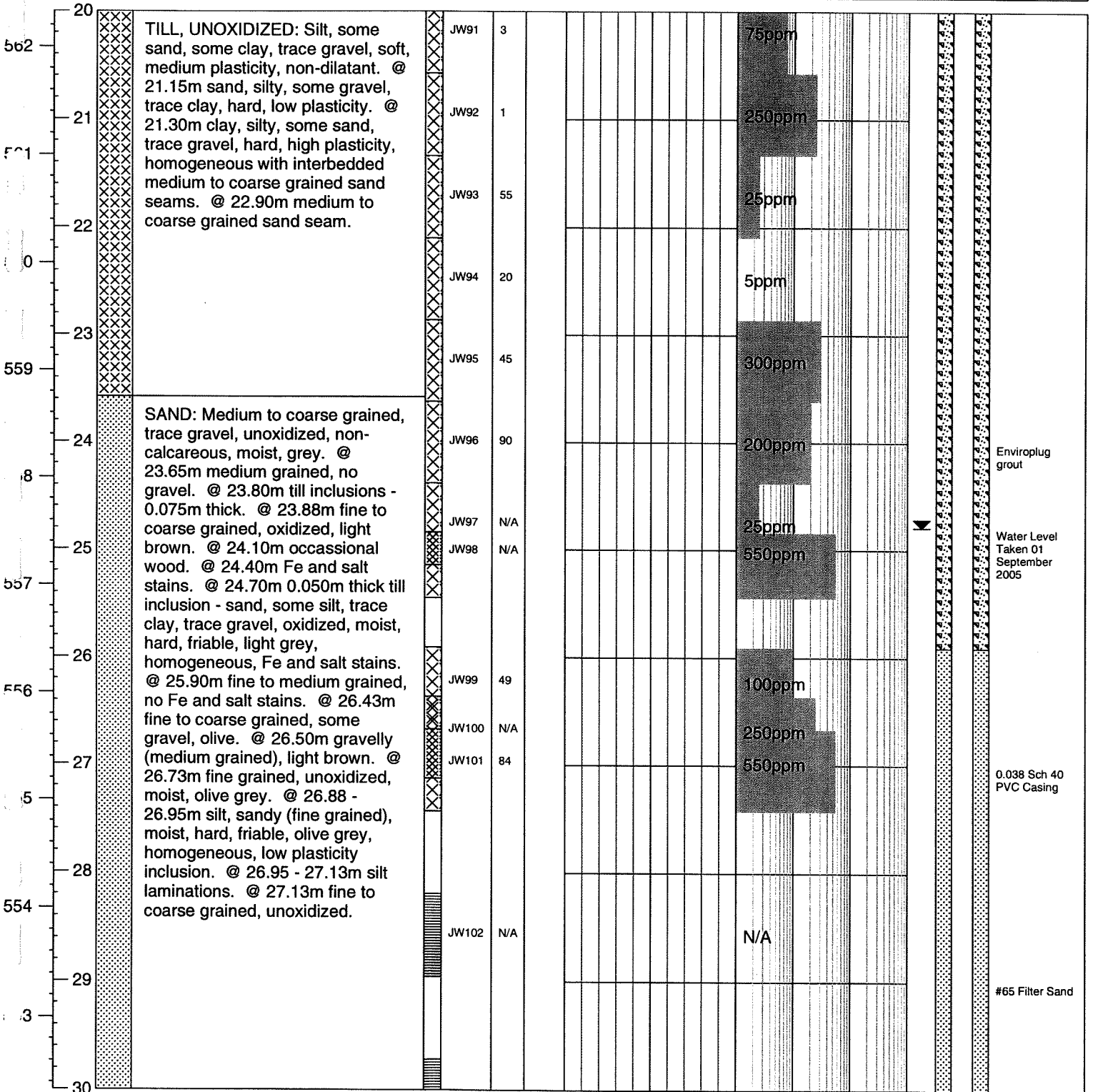
0.038 Sch 40 PVC Casing



BORE HOLE LOG

Client: Imperial Oil Ltd.	Northing: -	Date: 08 Aug 2005
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.: 582.33	Method: HSA/Casing Adv.
Project No.: R3667.1	Top Casing Elev.: 583.08	Logged by: JDW

Elev (m)	Depth (m)	Symbol	Soil Description	Sample		USC	Moisture Content percent			Headspace Vapour ppm				Monitor Well Construction Detail
				Type	No.		SPT 'N'	Plastic Limit	Natural Moisture	Liquid Limit	10	100	1000	





BORE HOLE LOG

Bore Hole: **405**

Page: 4 of 4

Client: Imperial Oil Ltd.
Project: Environmental Investigation
Location: Regina, SK
Project No.: R3667.1

Northing: -
Easting: -
Ground Elev.: 582.33
Top Casing Elev.: 583.08

Date: 08 Aug 2005
Equipment: Canterra 250
Method: HSA/Casing Adv.
Logged by: JDW

Elev (m)	Depth (m)	Symbol	Soil Description	Sample				Moisture Content percent				Headspace Vapour ppm				Monitor Well Construction Detail	
				Type	No.	SPT 'N'	USC	Plastic Limit ▲	Natural Moisture ●	Liquid Limit ◆							
552	30		SAND: Medium to coarse grained, trace gravel, unoxidized, non-calcareous, moist, grey. @ 23.65m medium grained, no gravel. @ 23.80m till inclusions - 0.075m thick. @ 23.88m fine to coarse grained, oxidized, light brown. @ 24.10m occasional wood. @ 24.40m Fe and salt stains. @ 24.70m 0.050m thick till inclusion - sand, some silt, trace clay, trace gravel, oxidized, moist, hard, friable, light grey, homogeneous, Fe and salt stains. @ 25.90m fine to medium grained, no Fe and salt stains. @ 26.43m fine to coarse grained, some gravel, olive. @ 26.50m gravelly (medium grained), light brown. @ 26.73m fine grained, unoxidized, moist, olive grey. @ 26.88 - 26.95m silt, sandy (fine grained), moist, hard, friable, olive grey, homogeneous, low plasticity inclusion. @ 26.95 - 27.13m silt laminations. @ 27.13m fine to coarse grained, unoxidized.	JW103	N/A												#65 Filter Sand
549	31																0.038 Sch 40 PVC 020 Screen
547	32																
544	33																
543	34																
543	35																
	36																
	37																
	38																
	39																
	40																

NOTES: End of hole at 32.6m.
Above ground monitoring well installed.

#65 Filter Sand

0.038 Sch 40 PVC 020 Screen



BORE HOLE LOG

Bore Hole: 406

Page: 1 of 3

Client: Imperial Oil Ltd.
Project: Environmental Investigation
Location: Regina, SK
Project No.: R3667.1

Northing: -
Easting: -
Ground Elev.: 582.35
Top Casing Elev.: 583.30

Date Drilled: 11 Aug 2005
Drill: Canterra 250
Drilling Method: Hollow Stem
Logged by: JDW

Depth (m)	Symbol	Soil Description	Sample				Moisture Content percent			Headspace Vapour ppm				Monitor Well Construction Detail
			Type	No.	SPT 'N'	USC	Plastic Limit ▲	Natural Moisture ●	Liquid Limit ◆	10	100	1000	10000	

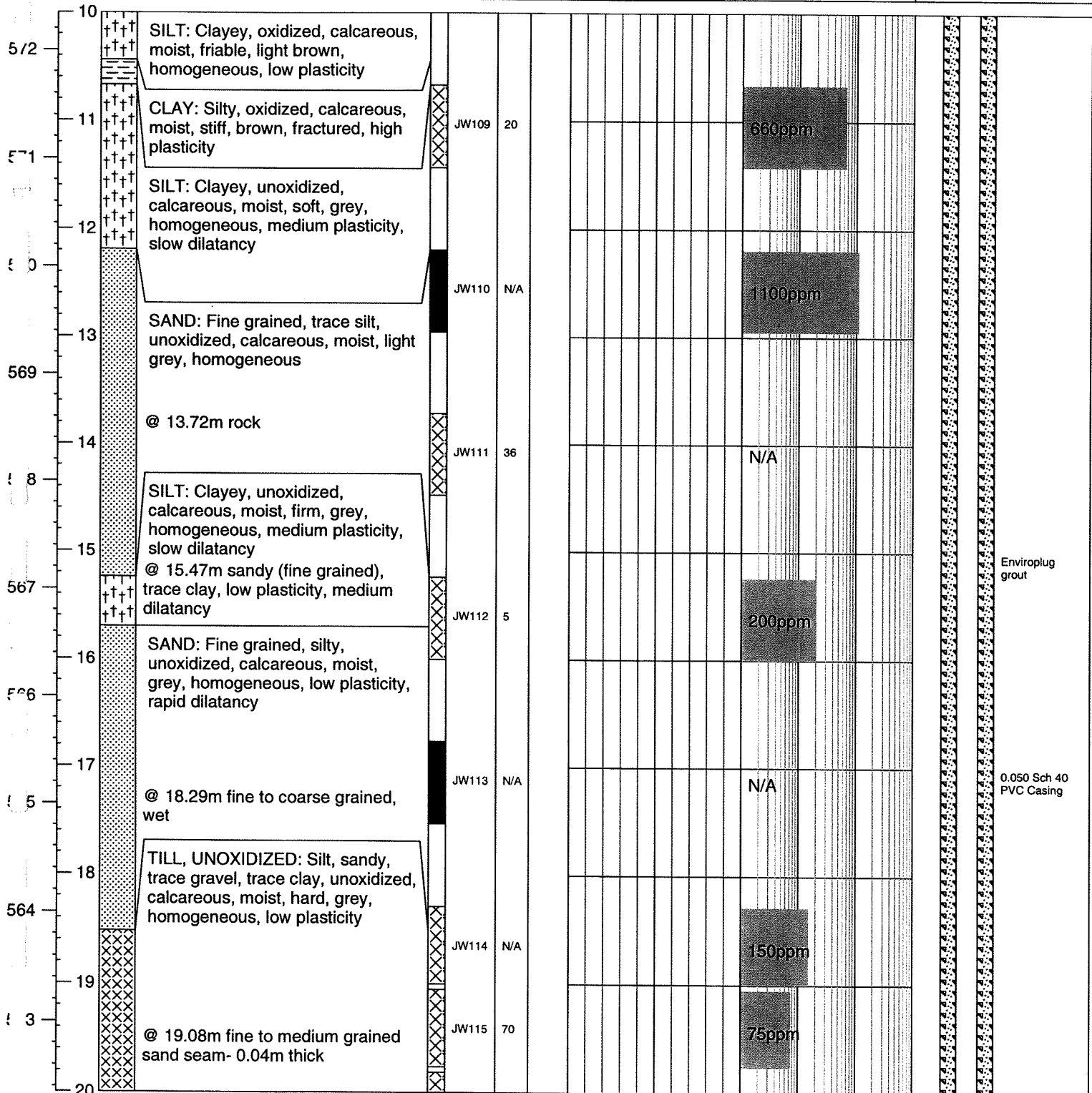
0		FILL: Clay, silty, oxidized, calcareous, moist, stiff, weathered, high plasticity, bricks												Above ground protector
1														
2														
3														
4		CLAY: Silty, oxidized, calcareous, moist, stiff, olive, fractured, blocky, high plasticity, HC stains along fractures	JW104	8						1100ppm				
5		@ 4.57m salt stains and crystals	JW105	N/A						N/A				Enviroplug grout
6		@ 6.10m brown, no salt crystals	JW106	12						50ppm				
7														
8		SILT: Clayey, oxidized, calcareous, moist, friable, light brown, homogeneous, low plasticity	JW107	14						> 10,000ppm				0.050 Sch 40 PVC Casing
9														
10			JW108	N/A						1100ppm				



BORE HOLE LOG

Client: Imperial Oil Ltd.	Northing: -	Date: 11 Aug 2005
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.: 582.35	Method: Hollow Stem
Project No.: R3667.1	Top Casing Elev.: 583.30	Logged by: JDW

Elev (m)	Depth (m)	Symbol	Soil Description	Sample				Moisture Content				Headspace Vapour				Monitor Well Construction Detail
				Type	No.	SPT 'N'	USC	Plastic Limit	percent Natural Moisture	Liquid Limit	ppm	ppm	ppm	ppm		

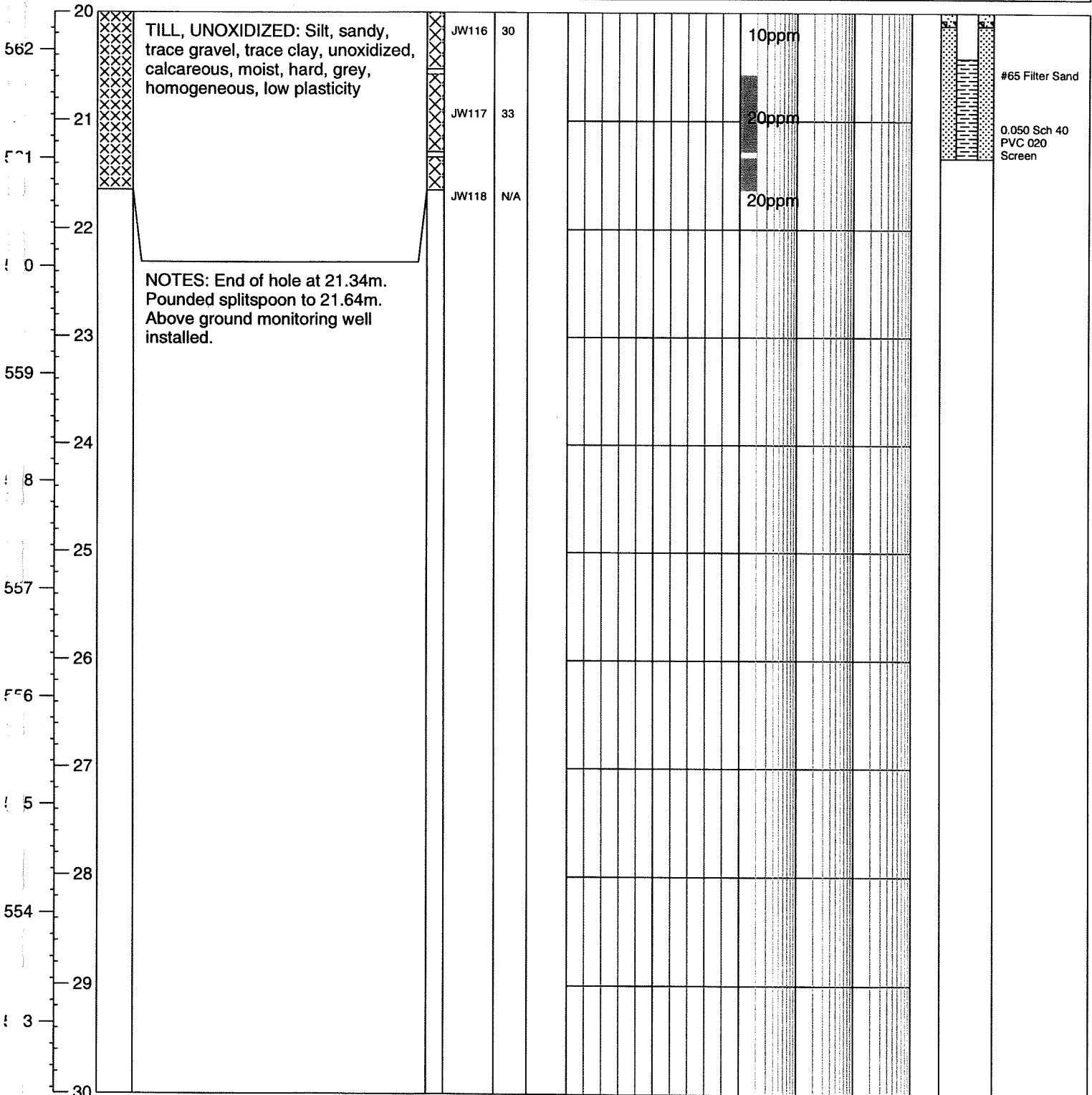




BORE HOLE LOG

Client: Imperial Oil Ltd.	Northing: -	Date: 11 Aug 2005
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.: 582.35	Method: Hollow Stem
Project No.: R3667.1	Top Casing Elev.: 583.30	Logged by: JDW

Elev (m) Depth (m)	Symbol	Soil Description	Sample				Moisture Content				Headspace Vapour				Monitor Well Construction Detail
			Type	No.	SPT 'N'	USC	Plastic Limit	Natural Moisture	Liquid Limit	ppm	ppm	ppm	ppm		



Env. BH m elev. CAL. v03.04



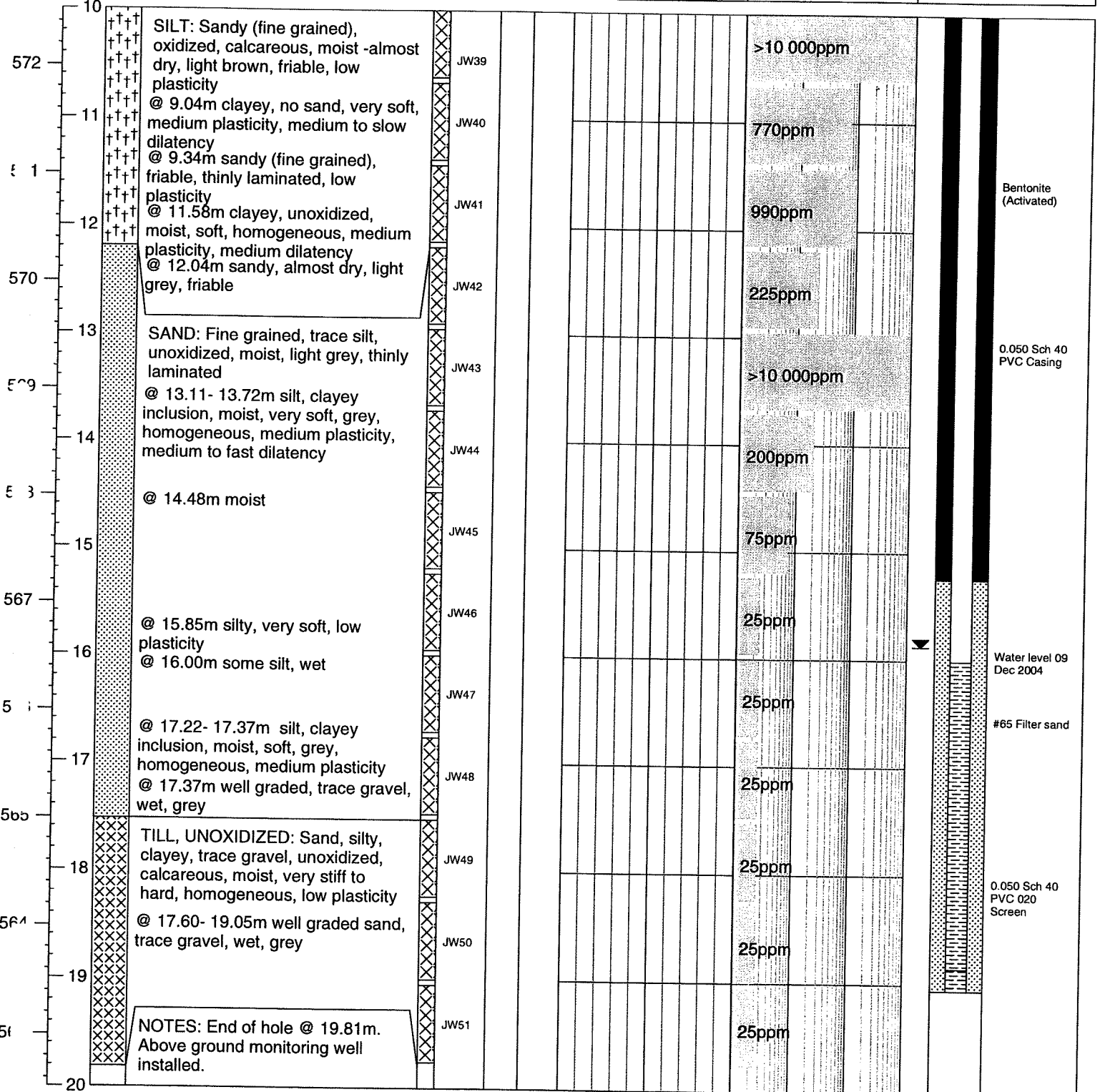
BORE HOLE LOG

Bore Hole: **301**

Page: 2 of 2

Client: Imperial Oil Ltd.	Northing: -	Date: 23 November 2004
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.: 582.52	Method: Hollow Stem
Project No.: R3667	Top Casing Elev.: 583.50	Logged by: JDW

Elev (m)	Depth (m)	Symbol	Soil Description	Sample		Moisture Content			Headspace Vapour		Monitor Well Construction Detail
				Type	No.	SPT 'N'	USC	Plastic Limit	percent Natural Moisture	Liquid Limit	



Elev BH m elev CAL v03.td



BORE HOLE LOG

Bore Hole: **302**

Page: 1 of 2

Client: Imperial Oil Ltd.
Project: Environmental Investigation
Location: Regina, SK
Project No.: R3667

Northing: -
Easting: -
Ground Elev.: 582.31
Top Casing Elev.: 582.20

Date: 22 November 2004
Equipment: Canterra 250
Method: Hollow Stem
Logged by: JDW

Elev (m)	Depth (m)	Symbol	Soil Description	Sample		Moisture Content			Headspace Vapour				Monitor Well Construction Detail
				Type	No.	SPT 'N'	USC	Plastic Limit	Natural Moisture	Liquid Limit	ppm		

0			FILL: Clay, silty, oxidized, calcareous, moist, very stiff, dark brown, homogeneous, brick, cinder blocks, concrete rubble	JW1														Road Box
582	0.2			JW2														
581	1		CLAY: Silty, oxidized, calcareous, moist, stiff, grey, homogeneous, high plasticity	JW3														
	2		@ 2.29m fractured, blocky, weathered, HC stains	JW4														
	3		@ 3.05m olive, not weathered	JW5														
579	4			JW6														Bentonite (Activated)
	5		@ 4.57m medium to high plasticity	JW7														
	6			JW8														
	7		@ 6.10m stiff, to very stiff, olive with grey staining along fractures, salts along fractures, medium to high plasticity	JW9														
576	8			JW10														
	9		SILT: Clayey, oxidized, calcareous, moist, firm to soft, olive brown, homogeneous, medium plasticity, slow to medium dilatency	JW11														
	10		@ 7.77m almost dry, friable, light brown, low plasticity	JW12														
574	11			JW13														
	12		@ 8.99m moist, firm, olive brown, homogeneous, medium plasticity, slow to medium dilatency															
	13		@ 9.14m sandy (fine grained), no clay, almost dry, friable, light brown, low plasticity															
	14		@ 9.91m clayey, oxidized, moist, soft to very soft, grey, homogeneous medium plasticity															

0.050 Sch 40 PVC Casing



BORE HOLE LOG

Bore Hole: **302**

Page: **2 of 2**

Client: Imperial Oil Ltd.	Northing: -	Date: 22 November 2004
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.: 582.31	Method: Hollow Stem
Project No.: R3667	Top Casing Elev.: 582.20	Logged by: JDW

Elev (m) Depth (m)	Symbol	Soil Description	Sample Type No. SPT 'N' USC	Moisture Content percent			Headspace Vapour ppm	Monitor Well Construction Detail
				Plastic Limit ▲	Natural Moisture ●	Liquid Limit ◆		
10								
5.2	†††	SILT: Clayey, oxidized, calcareous, moist, firm to soft, olive brown, homogeneous, medium plasticity, slow to medium dilatancy	JW14				400ppm	
11	†††	@ 10.06m sandy (fine grained), no clay, friable, light greyish white, thinly laminated, low plasticity	JW15				260ppm	
571	†††	@ 11.13m clayey, moist, very soft, grey, medium plasticity, medium to fast dilatancy	JW16				230ppm	
12	†††	@ 11.43- 12.27m sand inclusion, fine grained, trace silt, oxidized, moist- almost dry, friable, light grey, thinly laminated, non-plastic	JW17				340ppm	
5)	†††	@ 12.27m sandy (fine grained), moist-almost dry, friable, light grey, homogeneous, low plasticity	JW18				50ppm	
569	†††	@ 12.70m clayey, trace sand, moist, very soft, grey, medium plasticity, fast dilatancy	JW19				45ppm	
14	†††	SAND: Fine grained, trace silt, oxidized, moist- almost dry, friable, light grey, homogeneous, non-plastic	JW20				25ppm	
5)	†††	@ 13.72m moist	JW21				25ppm	
15	†††	@ 14.63m some silt, unoxidized, moist, very soft, grey, fast dilatancy	JW22				25ppm	
5.)	†††	@ 15.24- 15.85m silt inclusion, clayey, unoxidized, calcareous, moist, firm, grey, thinly laminated, low to medium plasticity	JW23				30ppm	
16	†††	@ 15.85m trace silt	JW24				70ppm	
566	†††	@ 16.46m fine to coarse grained sand, trace gravel, trace silt, wet	JW25				25ppm	
17	†††	@ 16.76m well graded, no silt, wet						
5)	†††	TILL, UNOXIDIZED: Sand, some silt, some clay, trace gravel, unoxidized, calcareous, moist, hard, grey, homogeneous, low plasticity						
18	†††							
564	†††							
19	†††	NOTES: End of hole @ 19.05m. Flush mount monitoring well installed.						
20								



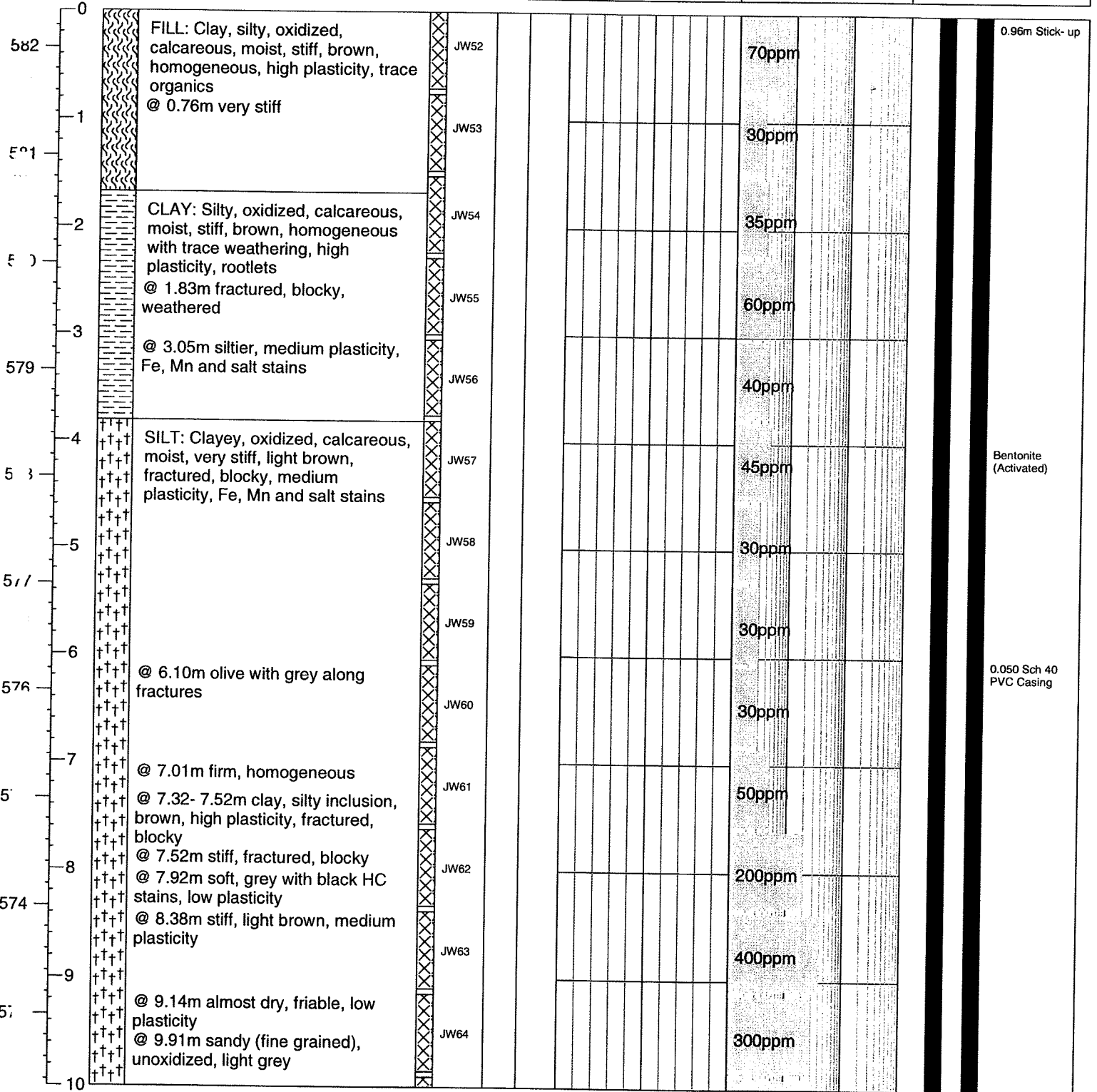
BORE HOLE LOG

Bore Hole: **303**

Page: 1 of 2

Client: Imperial Oil Ltd.	Northing: -	Date: 24 November 2004
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.: 582.34	Method: Hollow Stem
Project No.: R3667	Top Casing Elev.: 583.30	Logged by: JDW

Elev (m) Depth (m)	Symbol	Soil Description	Sample		Moisture Content			Headspace Vapour		Monitor Well Construction Detail
			Type	No.	Plastic Limit	percent Natural Moisture	Liquid Limit	ppm	ppm	



0.96m Stick-up

Bentonite (Activated)

0.050 Sch 40 PVC Casing



BORE HOLE LOG

Bore Hole: **303**

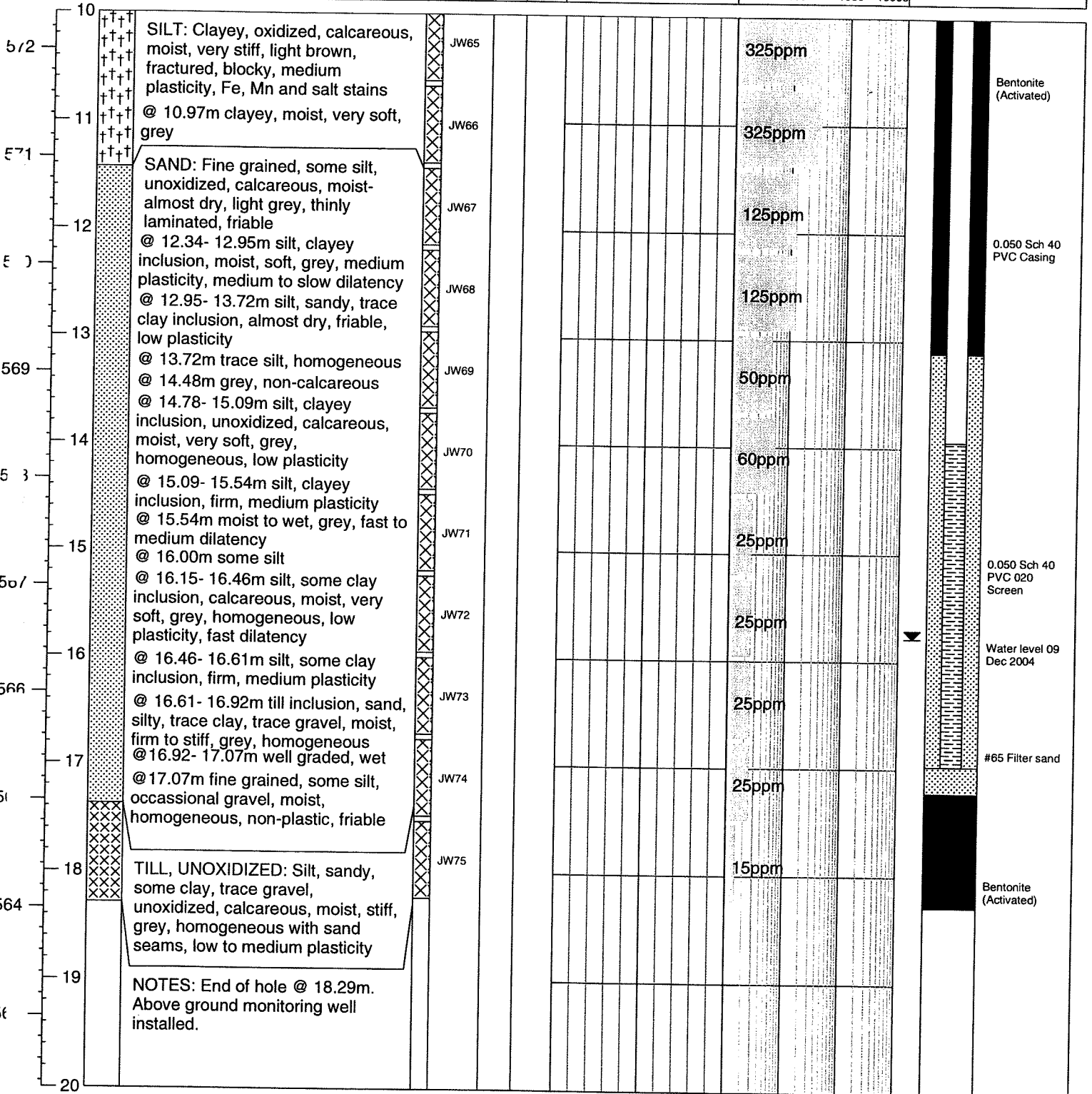
Page: 2 of 2

Client: Imperial Oil Ltd.
Project: Environmental Investigation
Location: Regina, SK
Project No.: R3667

Northing: -
Easting: -
Ground Elev.: 582.34
Top Casing Elev.: 583.30

Date: 24 November 2004
Equipment: Canterra 250
Method: Hollow Stem
Logged by: JDW

Elev (m)	Depth (m)	Symbol	Soil Description	Sample		Moisture Content			Headspace Vapour		Monitor Well Construction Detail
				Type	No.	SPT 'N'	USC	Plastic Limit	Natural Moisture	Liquid Limit	

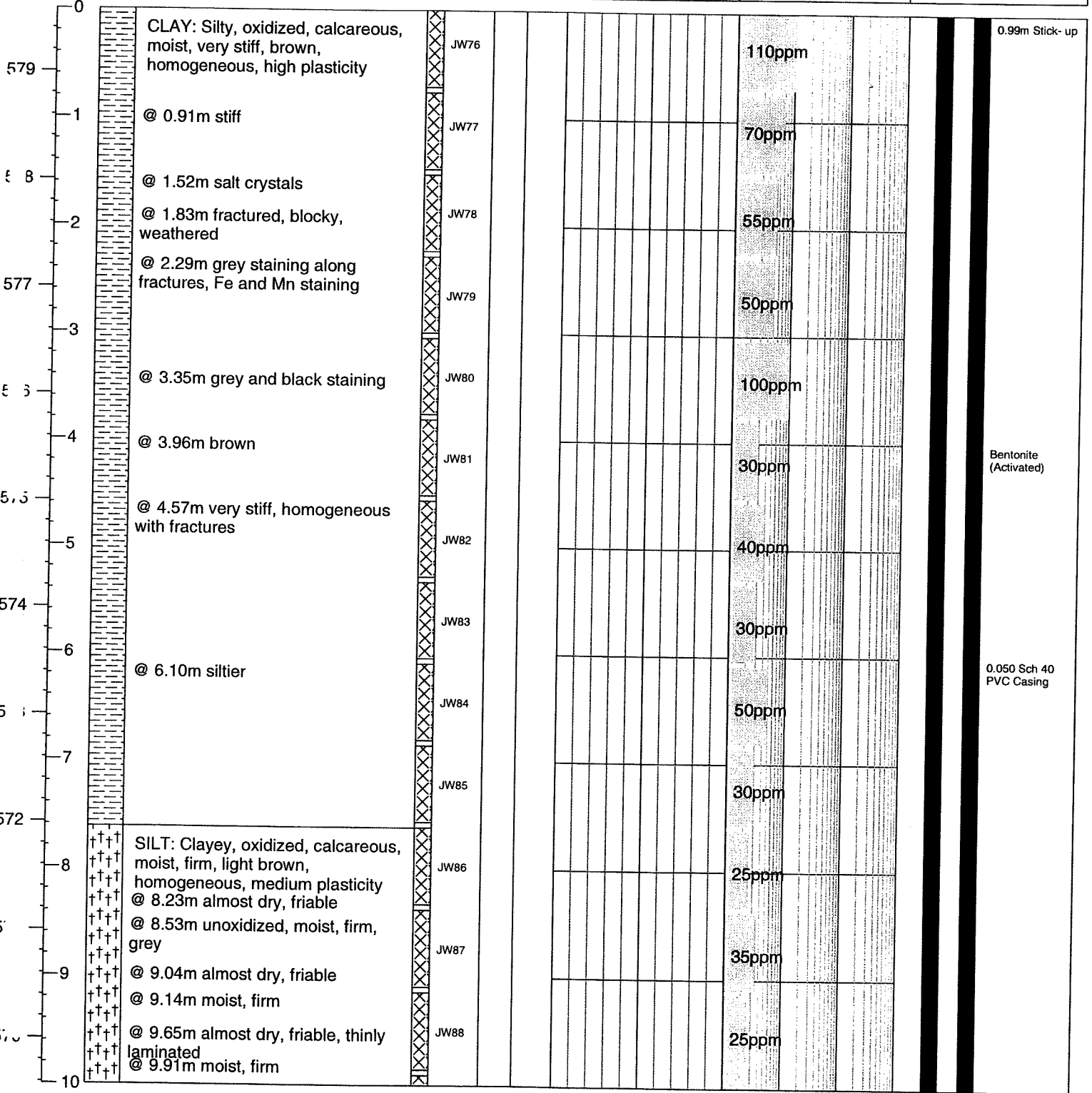




BORE HOLE LOG

Client: Imperial Oil Ltd.	Northing: -	Date: 25 November 2004
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.: 579.58	Method: Hollow Stem
Project No.: R3667	Top Casing Elev.: 580.57	Logged by: JDW

Elev (m) Depth (m)	Symbol	Soil Description	Sample		Moisture Content			Headspace Vapour				Monitor Well Construction Detail
			Type	No.	Plastic Limit	percent Natural Moisture	Liquid Limit	ppm				



0.99m Stick-up

Bentonite (Activated)

0.050 Sch 40 PVC Casing



BORE HOLE LOG

Bore Hole: **304**

Page: 2 of 2

Client: Imperial Oil Ltd.	Northing: -	Date: 25 November 2004
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.: 579.58	Method: Hollow Stem
Project No.: R3667	Top Casing Elev.: 580.57	Logged by: JDW

Elev (m) Depth (m)	Symbol	Soil Description	Sample		Moisture Content percent			Headspace Vapour ppm				Monitor Well Construction Detail		
			Type	No.	SPT 'N'	USC	Plastic Limit ▲	Natural Moisture ●	Liquid Limit ◆	10	100		1000	10000
10														
569		SILT: Clayey, oxidized, calcareous, moist, firm, light brown, homogeneous, medium plasticity @ 10.21- 10.67m sand lense, fine grained, silty, unoxidized,	JW89									25ppm		
11		calcareous, moist- almost dry, friable, light grey, thinly laminated @ 10.67m sandy (fine grained), trace clay, moist- almost dry, friable, grey, homogeneous, low plasticity @ 11.58m some clay, moist, firm @ 12.04m clayey, no sand, medium plasticity @ 12.19m almost dry, friable, low plasticity @ 12.65m moist @ 12.95m medium plasticity @ 13.41m almost dry, friable, low plasticity	JW90									30ppm		
5			JW91									50ppm		
12			JW92									25ppm		
567			JW93									25ppm		
13			JW94									30ppm		
14		SAND: Fine grained, unoxidized, non-calcareous, moist- almost dry, light grey, non-plastic	JW95									10ppm		
5			JW96									35ppm		
15		SILT: Some clay, unoxidized, calcareous, moist, firm, grey, homogeneous, low plasticity, slow to medium dilatency @ 15.24m sandy (fine grained), no clay, medium dilatency	JW97									30ppm		
564			JW98									30ppm		
16		SAND: Fine to coarse grained, trace gravel, unoxidized, non-calcareous, wet, grey, non-plastic												
17		TILL, UNOXIDIZED: Silt, sandy, some clay, trace gravel, unoxidized, calcareous, moist, very stiff to hard, grey, homogeneous, low plasticity @ 16.92- 16.94m fine grained sand inclusion												
562														
18														
5		NOTES: End of hole @ 17.48m. Above ground monitoring well installed.												
19														
56														
20														

Bentonite (Activated)

0.050 Sch 40 PVC Casing

0.050 Sch 40 PVC 020 Screen

Water level 09 Dec 2004

#65 Filter sand



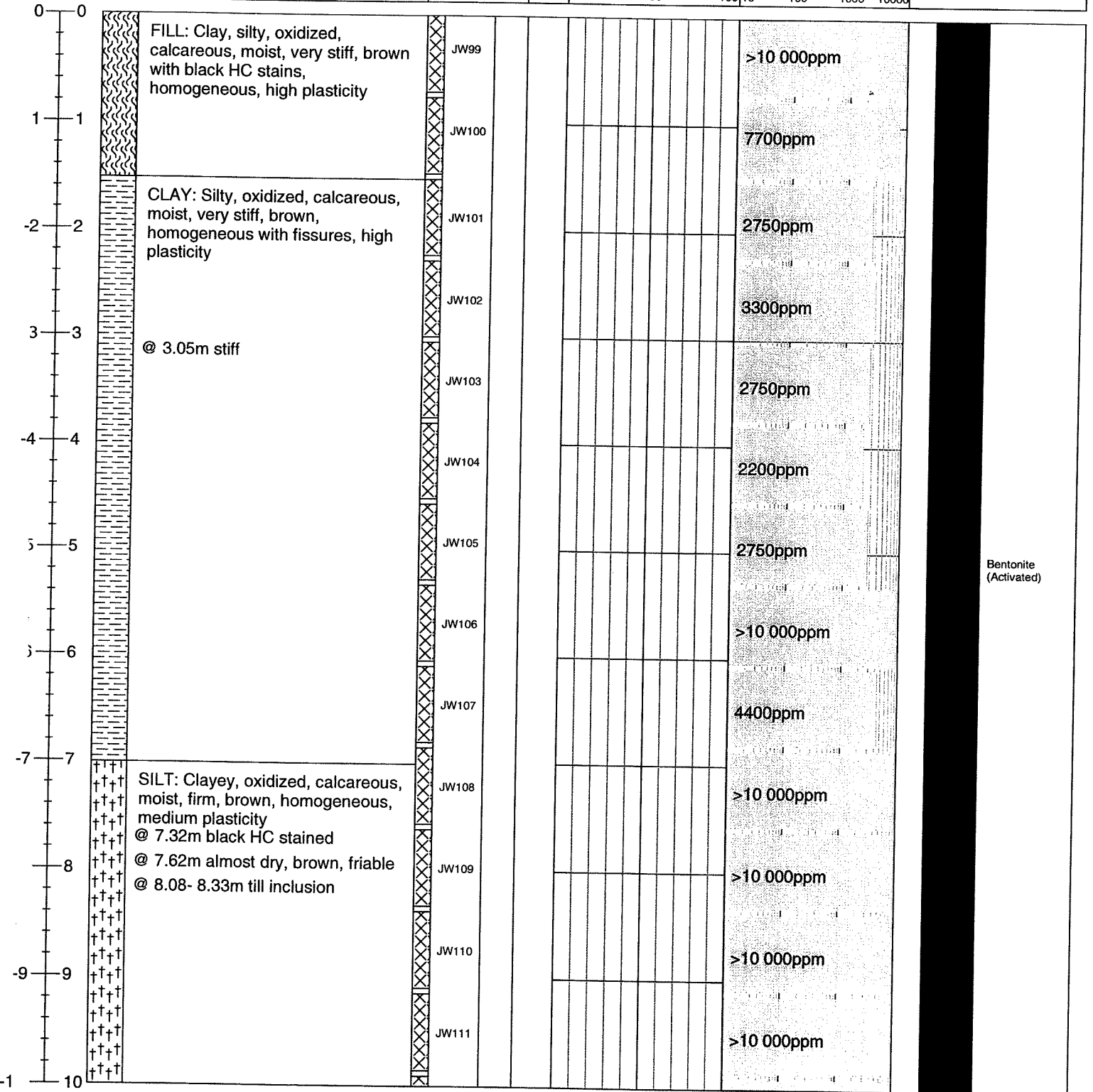
BORE HOLE LOG

Bore Hole: **305**

Page: 1 of 2

Client: Imperial Oil Ltd.	Northing: -	Date: 26 November 2004
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.: -	Method: Hollow Stem
Project No.: R3667	Top Casing Elev.:	Logged by: JDW

Elev (m)	Depth (m)	Symbol	Soil Description	Sample		Moisture Content			Headspace Vapour ppm	Monitor Well Construction Detail
				Type	No.	SPT 'N'	USC	Plastic Limit ▲		



Bentonite (Activated)



BORE HOLE LOG

Bore Hole: 305

Page: 2 of 2

Client: Imperial Oil Ltd.	Northing: -	Date: 26 November 2004
Project: Environmental Investigation	Easting: -	Equipment: Canterra 250
Location: Regina, SK	Ground Elev.:	Method: Hollow Stem
Project No.: R3667	Top Casing Elev.:	Logged by: JDW

Elev (m)	Depth (m)	Symbol	Soil Description	Sample Type	No.	SPT 'N'	USC	Moisture Content			Headspace Vapour				Monitor Well Construction Detail
								Plastic Limit	percent Natural Moisture	Liquid Limit	ppm				

0	10	††††	SILT: Clayey, oxidized, calcareous, moist, firm, brown, homogeneous, medium plasticity	JW112											
-11	11	††††	@ 10.36m unoxidized, moist, soft, grey	JW113											
		††††	@ 11.28m light grey, friable	JW114											
-12	12	††††	SAND: Fine grained, unoxidized, non-calcareous, moist, light grey	JW115											
3	13	††††	SILT: Clayey, unoxidized, calcareous, moist, soft, grey, homogeneous, medium plasticity	JW116											
-14	14	††††	SAND: Fine grained, trace silt, unoxidized, non-calcareous, moist, grey	JW117											
5	15	††††	SILT: Some clay, unoxidized, calcareous, moist, soft, grey, homogeneous, low plasticity	JW118											
-6	16	††††	@ 15.70m sandy (fine grained), no clay	JW119											
		††††		JW120											
-17	17		NOTES: End of hole @ 16.76m. Backfilled hole with bentonite.												
-3	18														
-19	19														
-	20														

Bentonite (Activated)



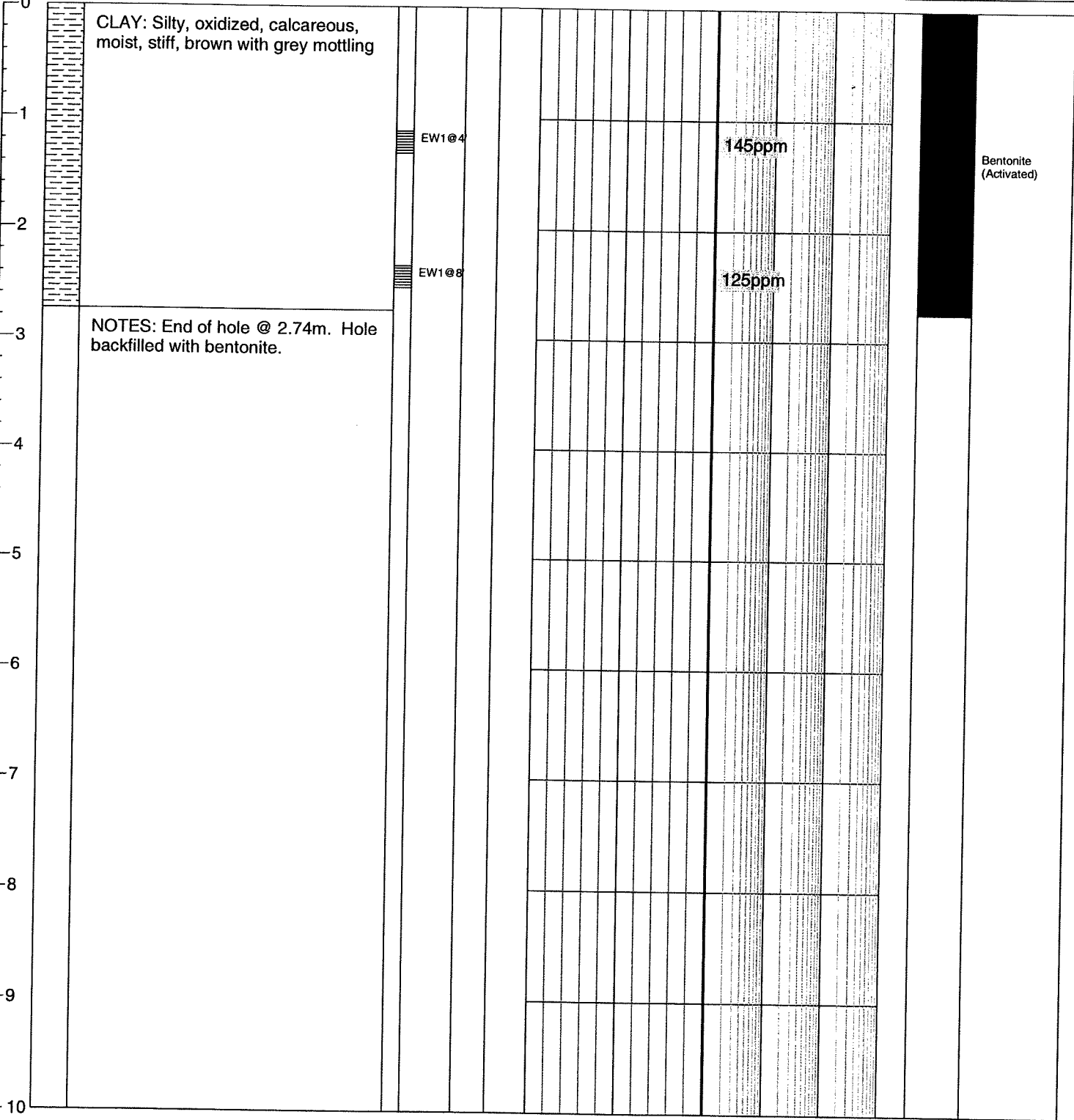
BORE HOLE LOG

Bore Hole: 306

Page: 1 of 1

Client: Imperial Oil Ltd.	Northing: -	Date Drilled: 19 Nov 2004
Project: Environmental Investigation	Easting: -	Drill: Hand auger
Location: Regina, SK	Ground Elev.: -	Drilling Method: Hand auger
Project No.: R3667	Top Casing Elev.: -	Logged by: GMK/EW

Depth (m)	Symbol	Soil Description	Sample		Moisture Content			Headspace Vapour				Monitor Well Construction Detail
			Type	No.	SPT 'N	USC	Plastic Limit	Natural Moisture	Liquid Limit	ppm		





TEST PIT LOG

Test Pit: 101
Page: 1 of 1

Client: Imperial Oil Ltd.	Northing: -	Date: 16 November 2004
Project: Environmental Investigation	Easting: -	Equipment: Track Hoe
Location: Regina, SK	Ground Elev.: -	Method: Test Pit
Project No.: R3667	Top Casing Elev.: -	Logged by: GMK/EW

Depth (m)	Symbol	Soil Description	Sample		USC	Moisture Content			Headspace Vapour				Monitor Well Construction Detail	
			Type	No.		SPT 'N'	Plastic Limit ▲	percent Natural Moisture ●	Liquid Limit ◆	ppm				
									0	10	100	1000	10000	

0		CLAY: Some silt, soft, moist												
0.61		@ 0.61 m clay fill, black staining	TH1@2'											
1.68		@ 1.68 m product line encountered	TH1@4'											
2.14		NOTES: End of hole at 2.14 m.	TH1@6'											
2.14														Backfilled with cuttings
3														
4														
5														
6														
7														
8														
9														
10														

>10000

>10000

3850



TEST PIT LOG

Test Pit: 102
Page: 1 of 1

Client: Imperial Oil Ltd.	Northing: -	Date: 16 November 2004
Project: Environmental Investigation	Easting: -	Equipment: Track Hoe
Location: Regina, SK	Ground Elev.: -	Method: Test Pit
Project No.: R3667	Top Casing Elev.: -	Logged by: GMK/EW

Depth (m)	Symbol	Soil Description	Sample		Moisture Content			Headspace Vapour				Monitor Well Construction Detail
			Type	No.	SPT 'N'	USC	Plastic Limit	percent Natural Moisture	Liquid Limit	ppm	100	

0		CLAY: Fill, soft, moist, some oxidation,											
0.61		@ 0.61 m slight staining	TH2@2'						70				
0.91		@ 0.91 m staining	TH2@4'						100				
1.37		@ 1.37 m product line encountered, pipe sitting on concrete	TH2@6'						100				
2.14		NOTES: End of hole at 2.14 m.											
3													
4													
5													
6													
7													
8													
9													
10													



Backfilled with cuttings



TEST PIT LOG

Test Pit: 103
Page: 1 of 1

Client: Imperial Oil Ltd.	Northing: -	Date: 17 November 2004
Project: Environmental Investigation	Easting: -	Equipment: Track Hoe
Location: Regina, SK	Ground Elev.: -	Method: Test Pit
Project No.: R3667	Top Casing Elev.: -	Logged by: GMK/EW

Depth (m)	Symbol	Soil Description	Sample				Moisture Content				Headspace Vapour				Monitor Well Construction Detail
			Type	No.	SPT 'N'	USC	Plastic Limit	percent Natural Moisture	Liquid Limit						

0		TOPSOIL													
		CLAY: Olive brown, firm, moist													
1			TH3@2'							20					
2			TH3@4'							40					
3			TH3@6'							45					
4			TH3@8'							35					
5			TH3@10'							45					
6			TH3@12'							40					
7			TH3@14'							20					
8															
9															
10															

NOTES: End of hole at 4.57 m.

Backfilled with cuttings



TEST PIT LOG

Client: Imperial Oil Ltd.	Northing: -	Date: 17 November 2004
Project: Environmental Investigation	Easting: -	Equipment: Track Hoe
Location: Regina, SK	Ground Elev.: -	Method: Test Pit
Project No.: R3667	Top Casing Elev.: -	Logged by: GMK/EW

Depth (m)	Symbol	Soil Description	Sample		USC	Moisture Content percent			Headspace Vapour ppm			Monitor Well Construction Detail
			Type	No.		SPT 'N'	Plastic Limit ▲	Natural Moisture ●	Liquid Limit ◆	100	1000	

0		TOPSOIL											
1		CLAY: Dark olive brown, firm, damp	TH5@2'										
2			TH5@4'										
3			TH5@6'										
4			TH5@8'										
5			TH5@10'										
6			TH5@12'										
7			TH5@14'										
8													
9													
10													

NOTES: End of hole at 4.27 m.

Backfilled with cuttings

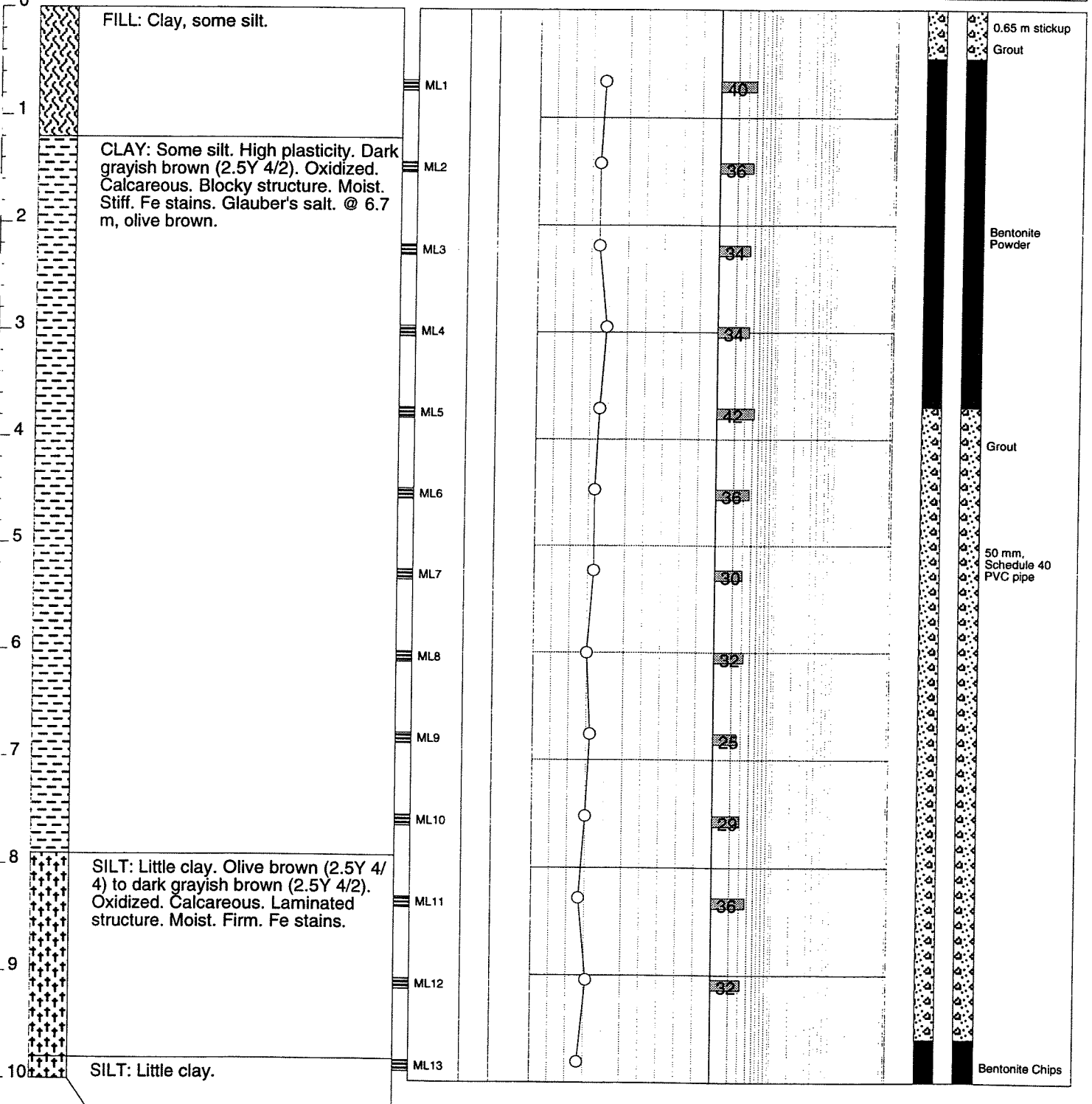


Client: Imperial Oil Limited
 Project: Groundwater Monitoring
 Location: ESSO Terminal Regina
 Project No: R1885

Northing: -
 Easting: -
 Ground Elev.: 582.85 m
 Top Casing Elev.: 583.50 m

Date Drilled: October 19, 1994
 Drill: Brat 22
 Drilling Method: Hollow Stem Auger
 Logged by: MXL

Depth (m)	Symbol	Soil Description	Sample				Moisture Content				Headspace Vapour				Monitor Well Construction Detail
			Type	No.	SPT 'N'	USC	Plastic Limit	Natural Moisture	Liquid Limit		ppm				



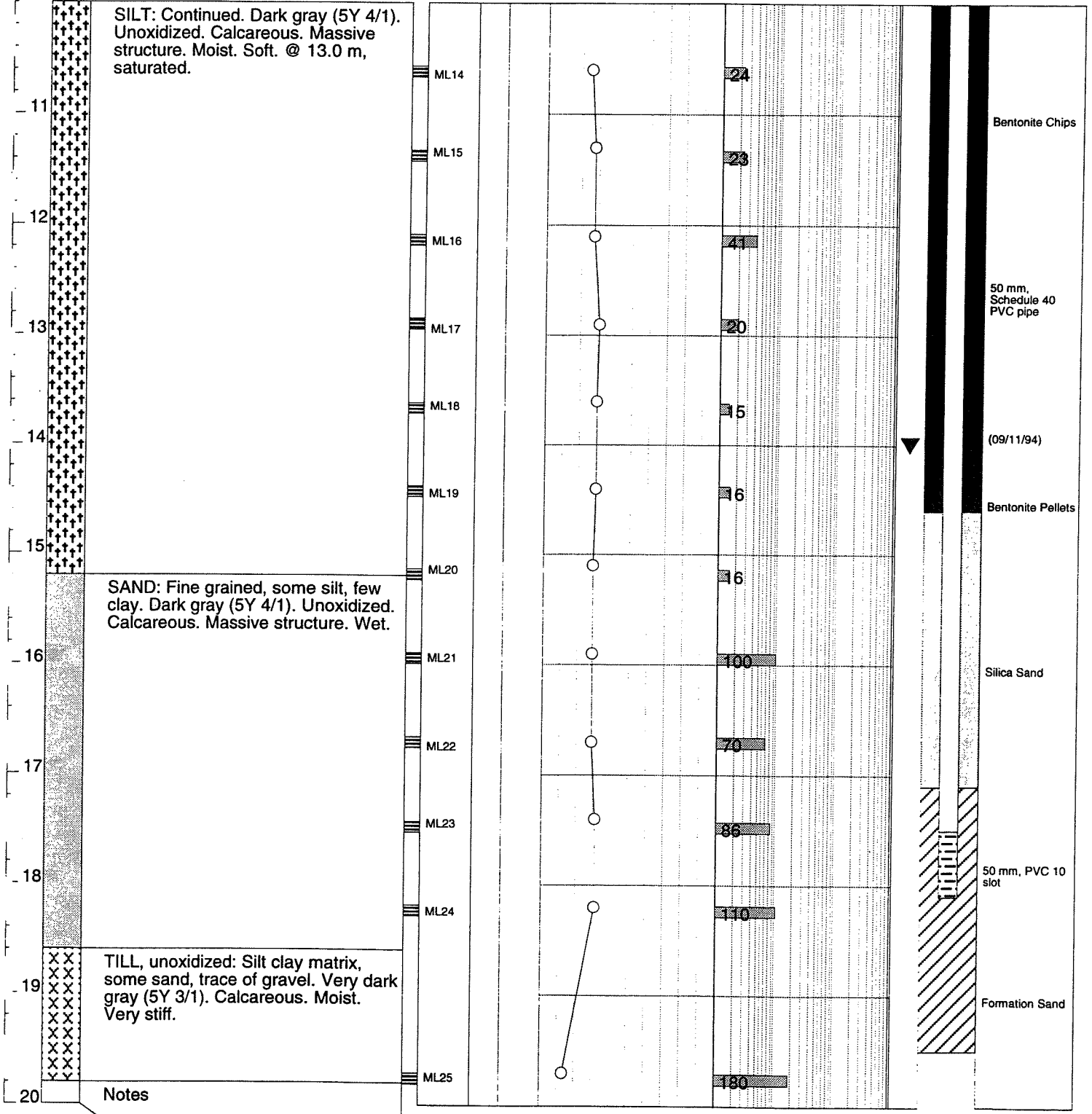


Client: Imperial Oil Limited
Project: Groundwater Monitoring
Location: ESSO Terminal Regina
Project No: R1885

Northing: -
Easting: -
Ground Elev.: 582.85 m
Top Casing Elev.: 583.50 m

Date Drilled: October 19, 1994
Drill: Brat 22
Drilling Method: Hollow Stem Auger
Logged by: MXL

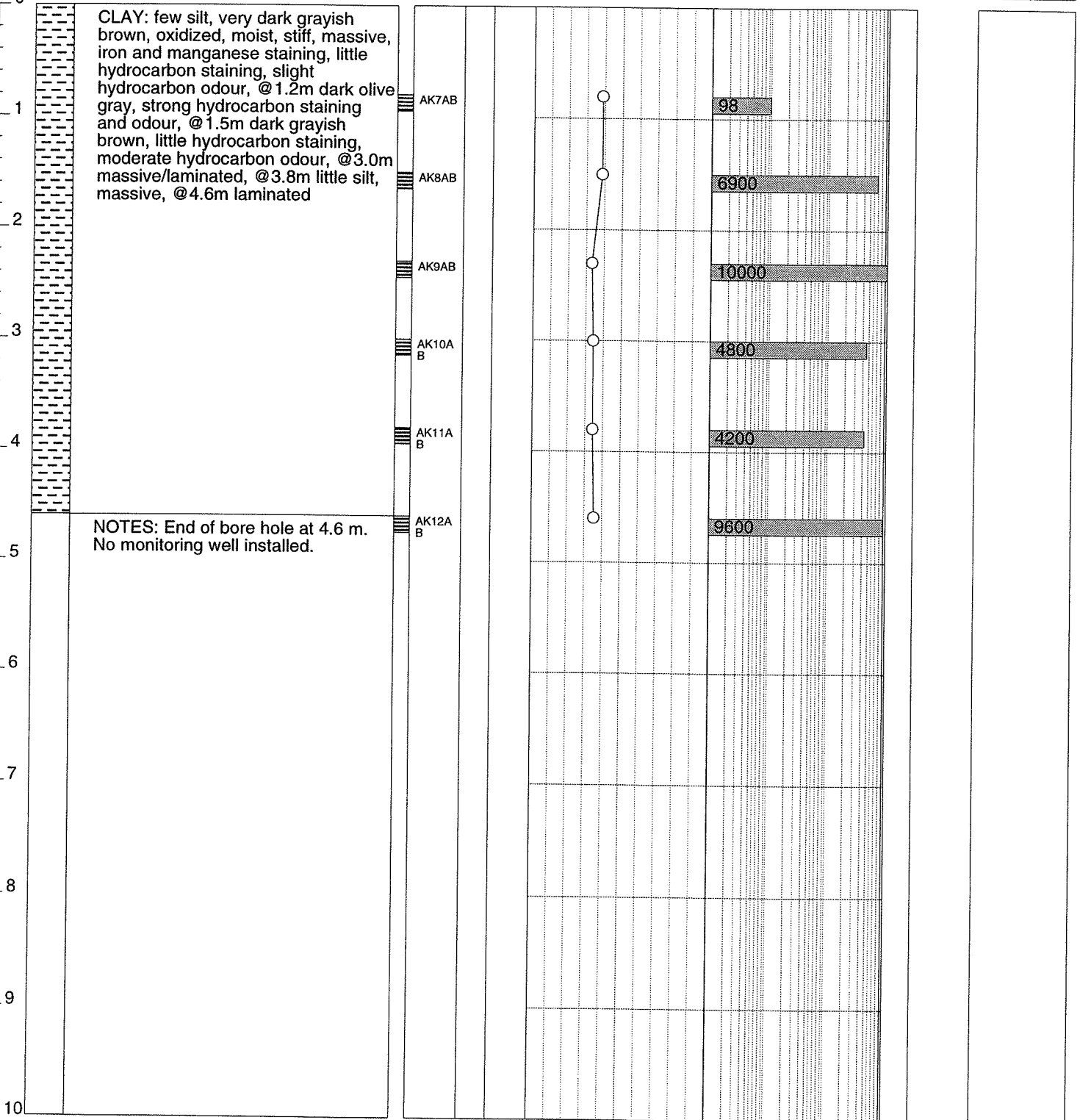
Depth (m)	Symbol	Soil Description	Sample				Moisture Content percent			Headspace Vapour ppm				Monitor Well Construction Detail
			Type	No.	SPT 'N'	USC	Plastic Limit +	Natural Moisture ○	Liquid Limit ◇	10	100	1000	10000	





Client: Imperial Oil Ltd.	Northing: 0	Date Drilled: 28 October 1993
Project: Environmental Assessment	Easting: 0	Drill: Brat 22
Location: Right-Of-Way, IPL	Ground Elev.: 583.792	Drilling Method: Solid Stem Auger
Project No: R1700	Top Casing Elev.: 0	Logged by: AJK

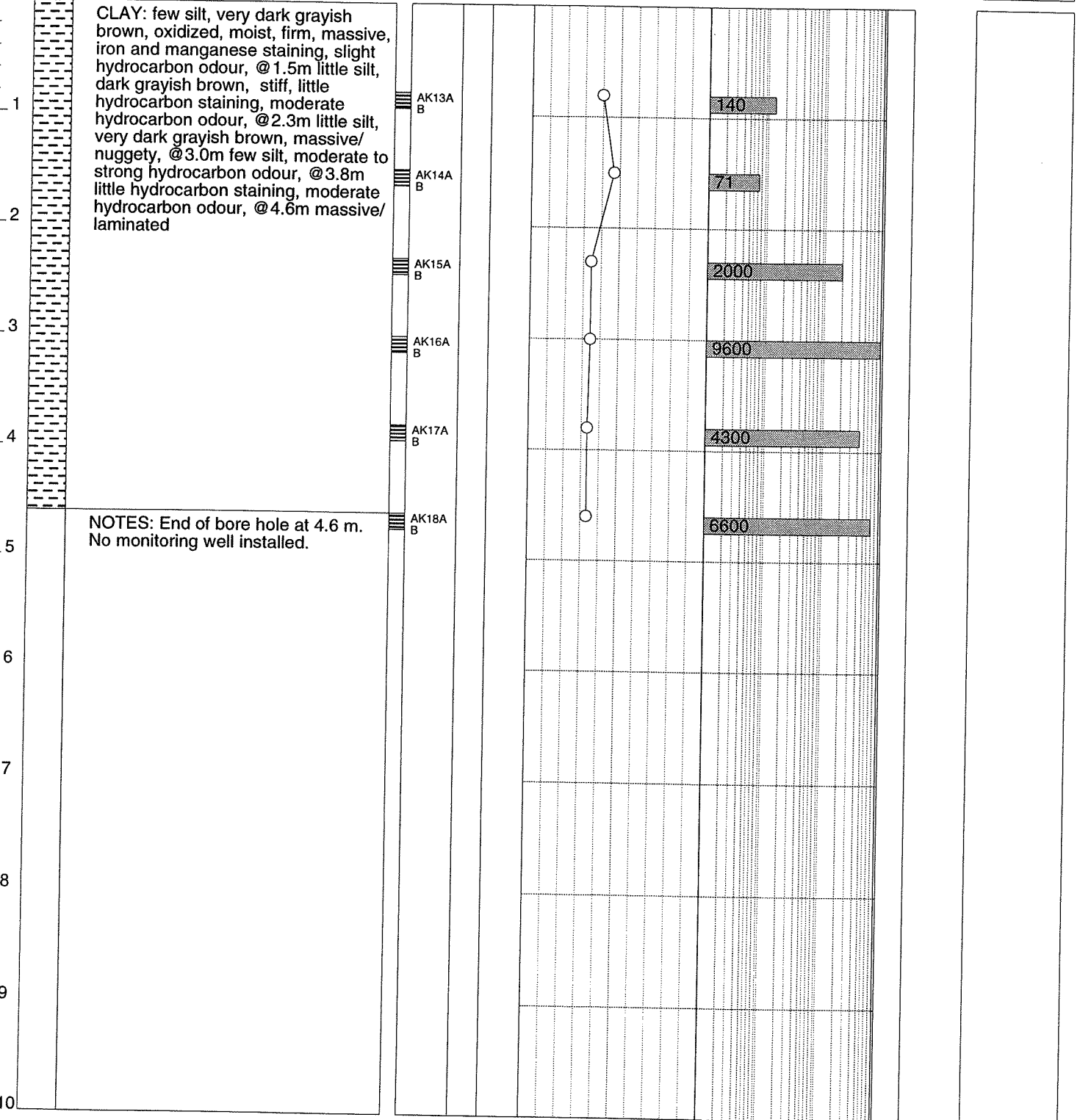
Depth (m)	Symbol	Soil Description	Sample		Moisture Content percent			Headspace Vapour ppm				Monitor Well Construction Detail
			Type	No.	Plastic Limit +	Natural Moisture O	Liquid Limit ◇	10	100	1000	10000	





Client: Imperial Oil Ltd.	Northing: 0	Date Drilled: 28 October 1993
Project: Environmental Assessment	Easting: 0	Drill: Brat 22
Location: Right-Of-Way, IPL	Ground Elev.: 584.641	Drilling Method: Solid Stem Auger
Project No: R1700	Top Casing Elev.: 0	Logged by: AJK

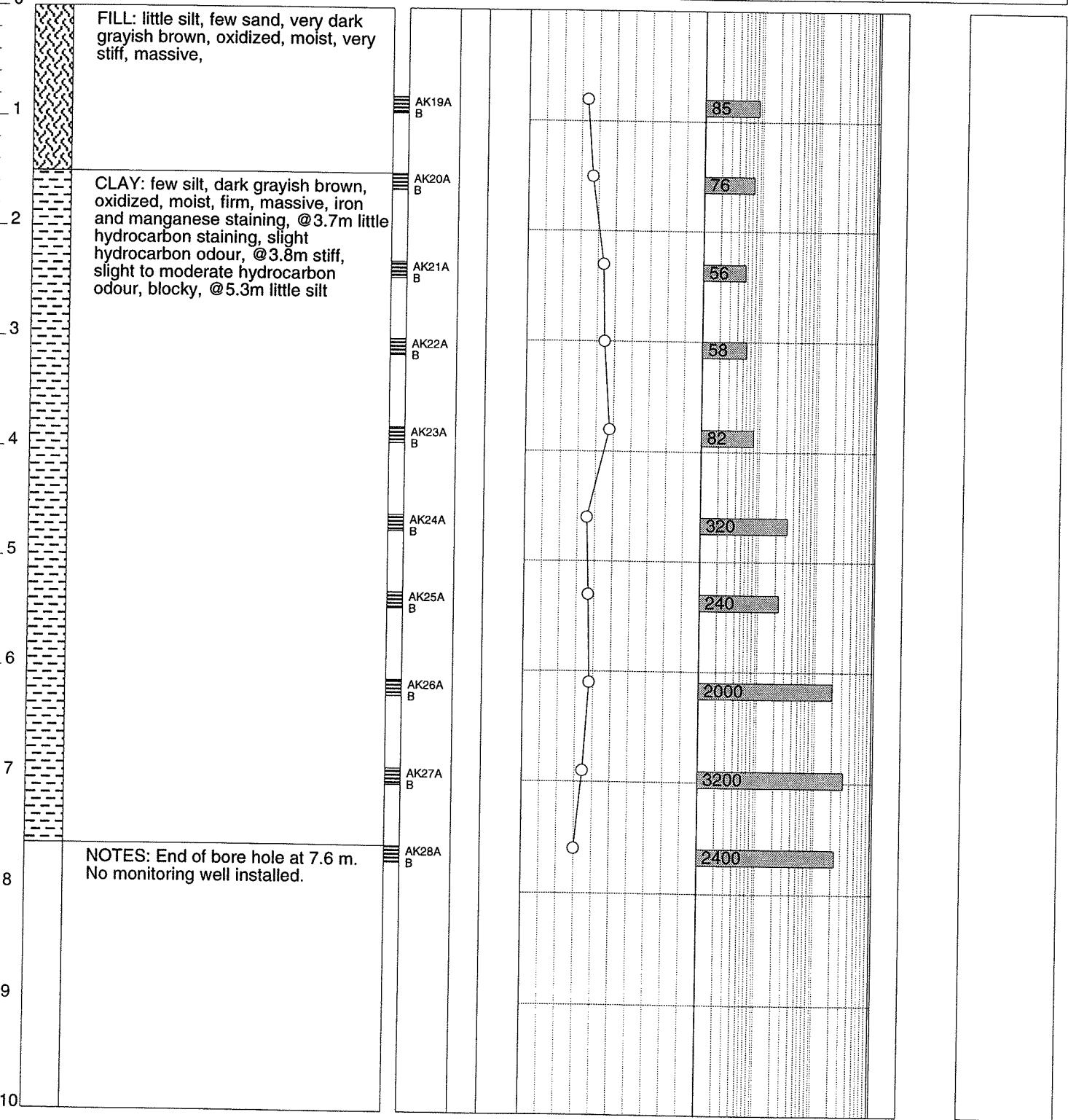
Depth (m)	Symbol	Soil Description	Sample		Moisture Content percent			Headspace Vapour ppm	Monitor Well Construction Detail
			Type	No.	Plastic Limit +	Natural Moisture ○	Liquid Limit ◇		





Client: Imperial Oil Ltd.	Northing: 0	Date Drilled: 28 October 1993
Project: Environmental Assessment	Easting: 0	Drill: Brat 22
Location: Right-Of-Way, IPL	Ground Elev.: 583.252	Drilling Method: Solid Stem Auger
Project No: R1700	Top Casing Elev.: 0	Logged by: AJK

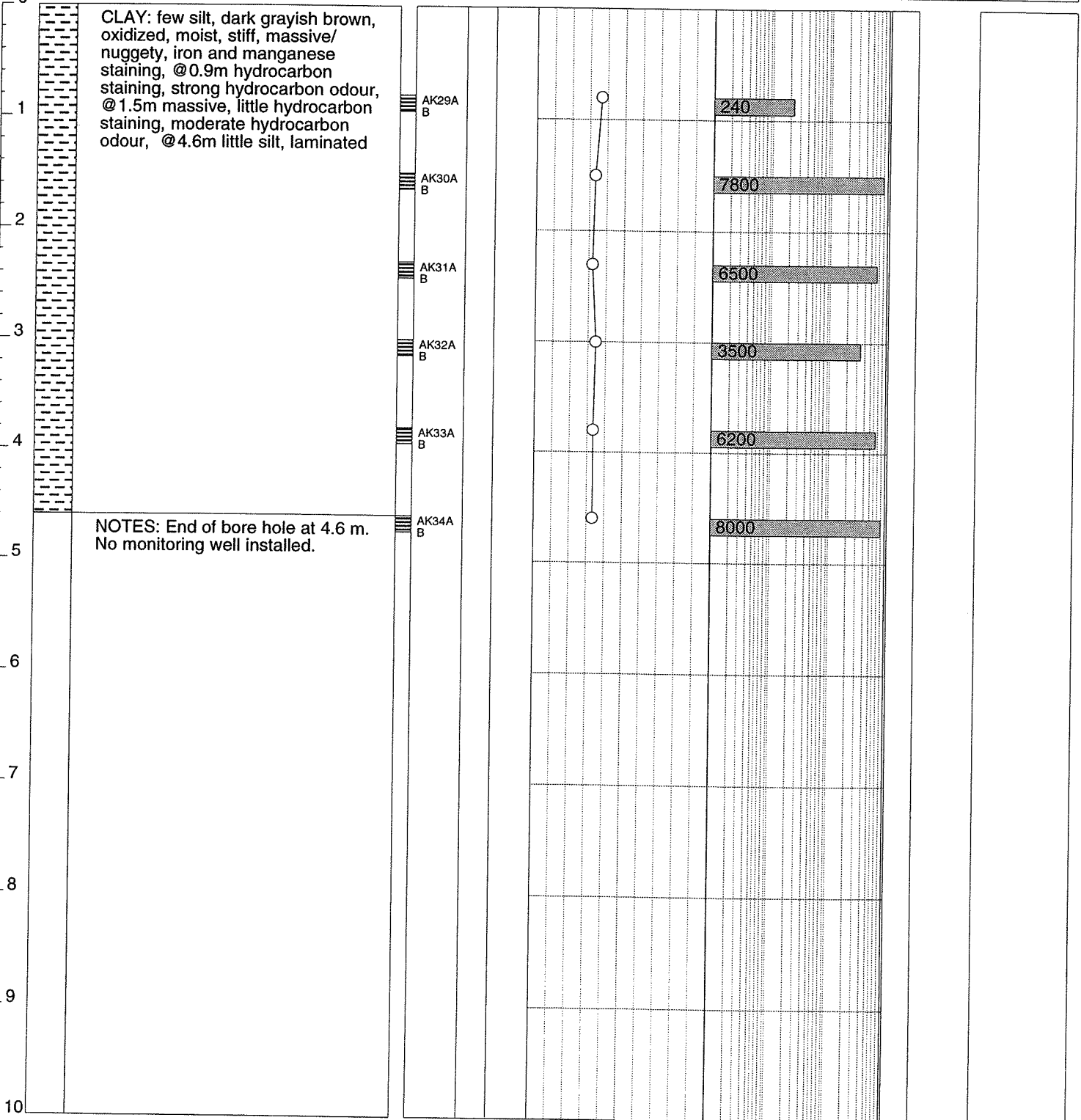
Depth (m)	Symbol	Soil Description	Sample		Moisture Content percent			Headspace Vapour ppm				Monitor Well Construction Detail
			Type	No.	SPT 'N'	USC	Plastic Limit +	Natural Moisture ○	Liquid Limit ◇	10	100	





Client: Imperial Oil Ltd.	Northing: 0	Date Drilled: 28 October 1993
Project: Environmental Assessment	Easting: 0	Drill: Brat 22
Location: Right-Of-Way, IPL	Ground Elev.: 582.577	Drilling Method: Solid Stem Auger
Project No: R1700	Top Casing Elev.: 0	Logged by: AJK

Depth (m)	Symbol	Soil Description	Sample				Moisture Content percent			Headspace Vapour ppm				Monitor Well Construction Detail
			Type	No.	SPT 'N'	USC	Plastic Limit +	Natural Moisture O	Liquid Limit ◇	10	100	1000	10000	



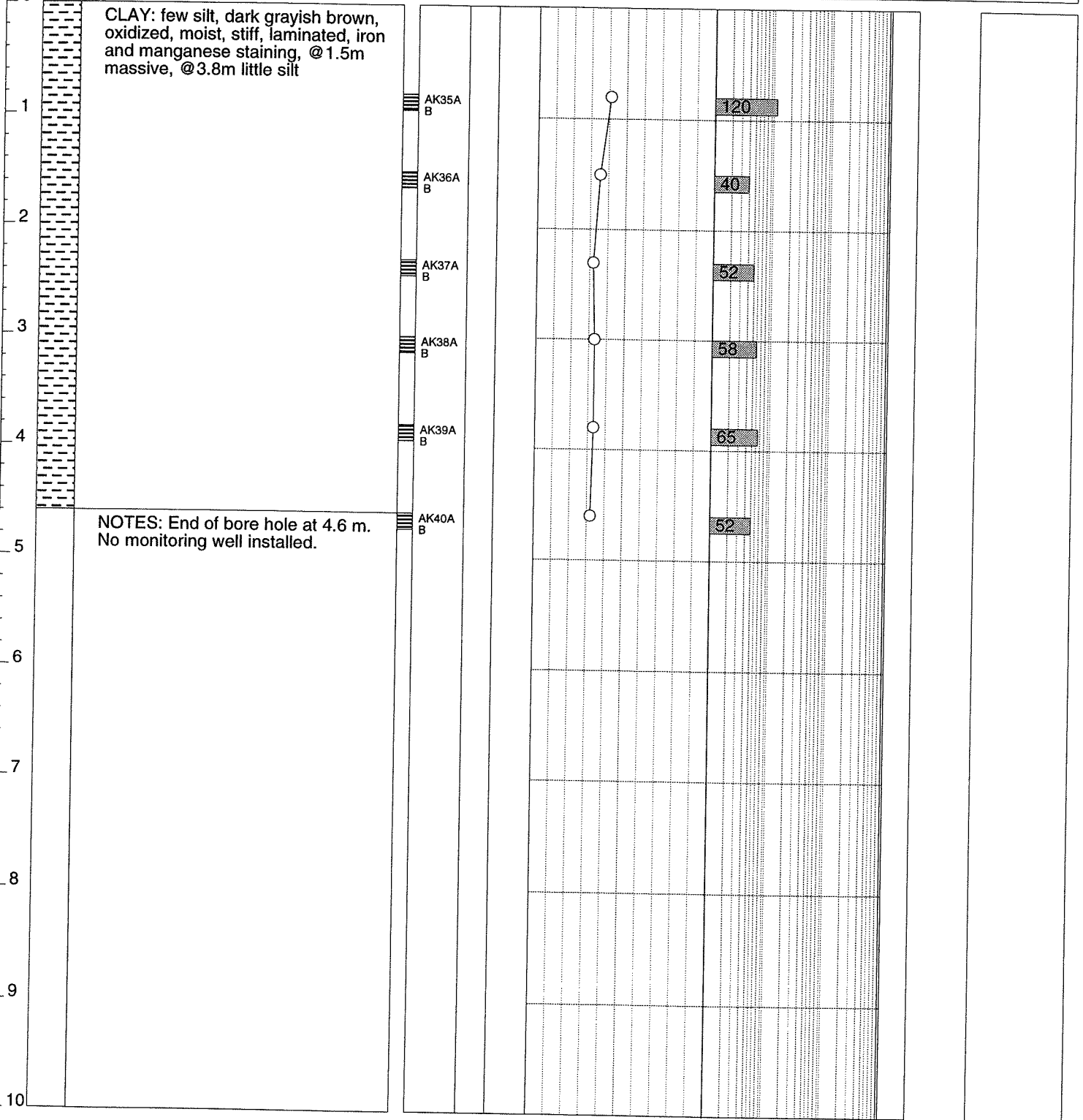


Client: Imperial Oil Ltd.
 Project: Environmental Assessment
 Location: Right-Of-Way, IPL
 Project No: R1700

Northing: 0
 Easting: 0
 Ground Elev.: 582.868
 Top Casing Elev.: 0

Date Drilled: 28 October 1993
 Drill: Brat 22
 Drilling Method: Solid Stem Auger
 Logged by: AJK

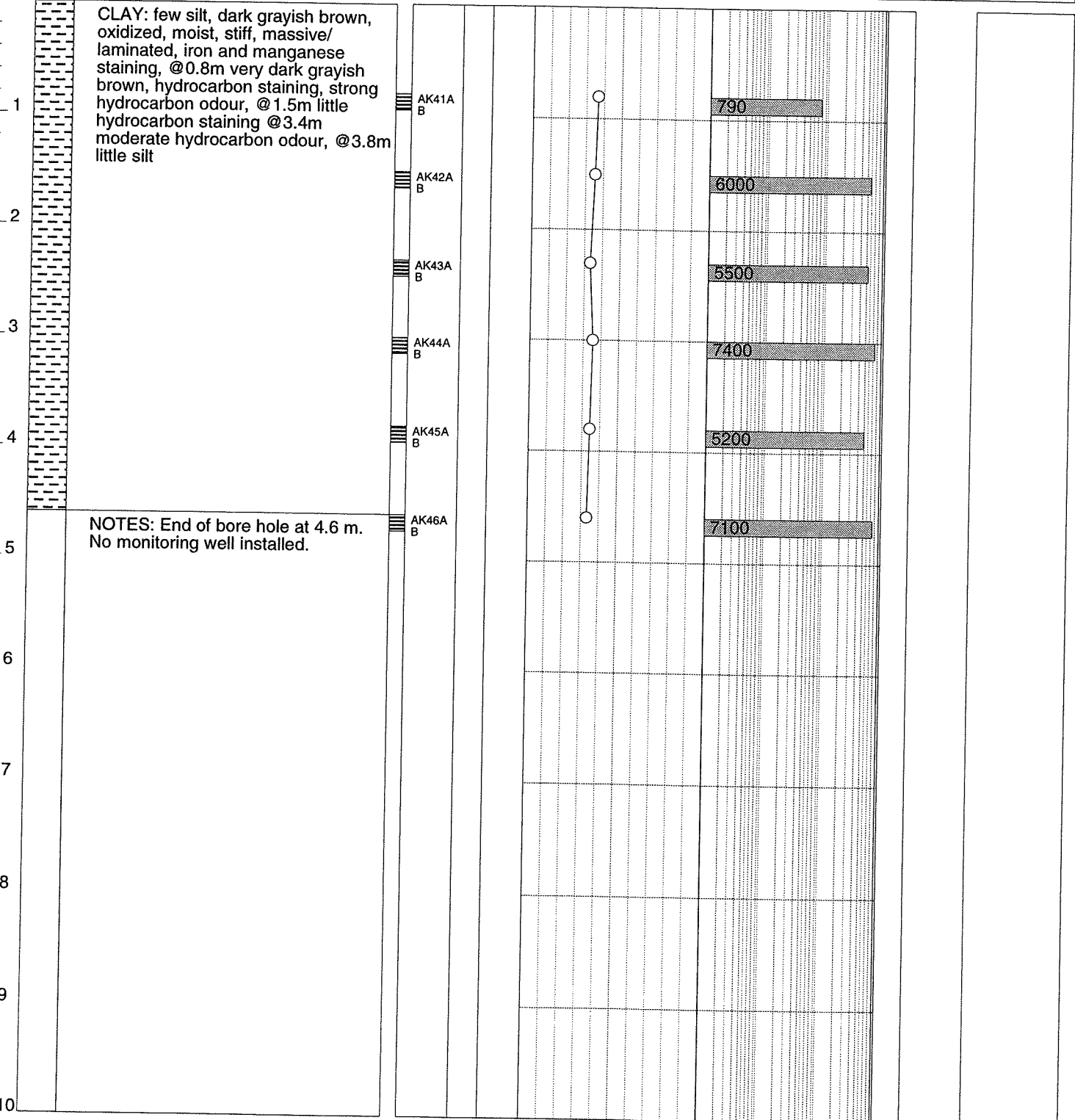
Depth (m)	Symbol	Soil Description	Sample				Moisture Content percent			Headspace Vapour ppm				Monitor Well Construction Detail
			Type	No.	SPT N'	USC	Plastic Limit +	Natural Moisture ○	Liquid Limit ◇	10	100	1000	10000	





Client: Imperial Oil Ltd.	Northing: 0	Date Drilled: 28 October 1993
Project: Environmental Assessment	Easting: 0	Drill: Brat 22
Location: Right-Of-Way, IPL	Ground Elev.: 583.175	Drilling Method: Solid Stem Auger
Project No: R1700	Top Casing Elev.: 0	Logged by: AJK

Depth (m)	Symbol	Soil Description	Sample				Moisture Content percent			Headspace Vapour ppm				Monitor Well Construction Detail
			Type	No.	SPT 'N'	USC	Plastic Limit +	Natural Moisture ○	Liquid Limit ◇	10	100	1000	10000	



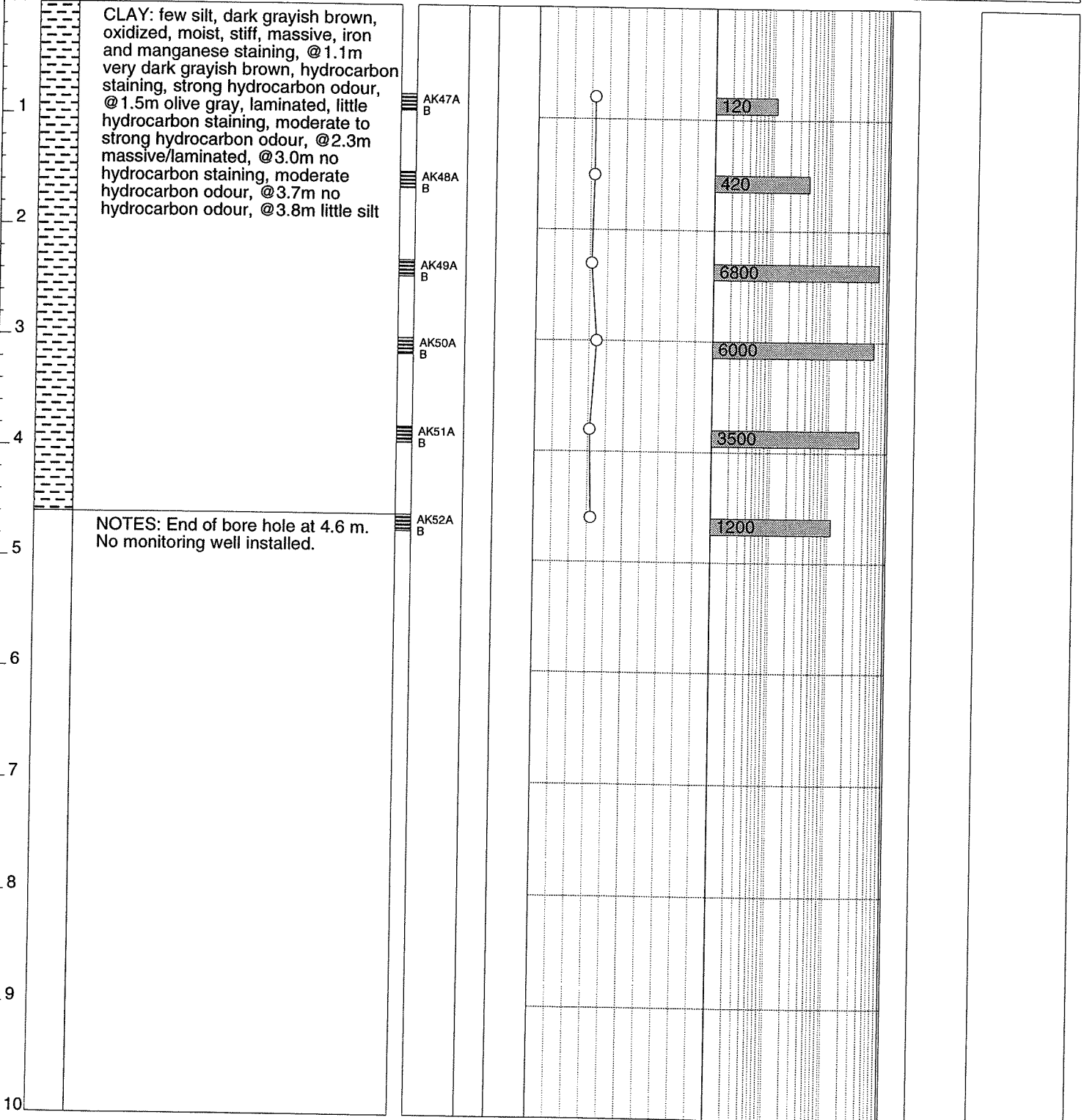


Client: Imperial Oil Ltd.
 Project: Environmental Assessment
 Location: Right-Of-Way, IPL
 Project No: R1700

Northing: 0
 Easting: 0
 Ground Elev.: 582.575
 Top Casing Elev.: 0

Date Drilled: 28 October 1993
 Drill: Brat 22
 Drilling Method: Solid Stem Auger
 Logged by: AJK

Depth (m)	Symbol	Soil Description	Sample		Moisture Content percent			Headspace Vapour ppm				Monitor Well Construction Detail
			Type	No.	SPT 'N'	USC	Plastic Limit +	Natural Moisture ○	Liquid Limit ◇	10	100	



PROJECT: Esso Cardlock Bulk Plant	GD ELEV.: 98.981 m	HOLE No.: BH1
LOCATION: Regina, SK	TPC ELEV.: 99.750 m	DRILL: Auger
SAMPLE TYPE: <input type="checkbox"/> SHELBY <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> CORE <input type="checkbox"/> DISTURBED <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> OTHER		

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations				N	OTHER TESTS
				● %LEL	▲ ppm	100	200		
	Same as above								
-11	SAND - light brown, fine grained, silty, dry to damp, dense to medium dense	X	35	▲					
-12	SILT - brown, sandy, trace clay, damp, medium dense			▲					
-13	CLAY - brown, silty, damp, very stiff	X	40	▲					
-14	SAND - gray, fine grained, some silt, damp, medium dense			▲					
-15	SILT - light and dark brown mottled, some clay, damp, very stiff, low plasticity	X	45	▲					
-16	SAND - gray to black laminae, fine grained, dry to damp, medium dense			▲					
-17	SILT - olive brown, some sand and clay, trace gravel, stiff, damp	X	50	▲					
-18	SAND - olive gray, silty, fine grained, wet, medium dense - water at 16.1 m			▲					
-19	- brown, coarse grained, trace gravel, medium dense, water-bearing at 17.1 m	X	55	▲					
-20	CLAY - olive gray, some silt, sand and gravel, moist, very stiff to hard			▲					
-21	- boulder at 19.8 m			▲					
			60	▲					
				▲					
			65	▲					

▽ 89/07/13

O'CONNOR ASSOCIATES 	DATE: 89/06/27	JOB No.: 10-1202
	LOGGED BY: JKL	DWG. No.: A-1(a)

PROJECT: Esso Cardlock Bulk Plant	GD ELEV.: 98.981 m	HOLE No.: BH1
LOCATION: Regina, SK	TPC ELEV.: 99.750 m	DRILL: Auger
SAMPLE TYPE: <input type="checkbox"/> SHELBY <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> CORE <input type="checkbox"/> DISTURBED <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> OTHER		

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations ● %LEL ▲ ppm ▲ 100 200 300 400 ● 20 40 60 80	N	OTHER TESTS
-21	- medium to coarse grained gravel, moist, boulder at 20.3 m.		70	▲		
-22	END OF HOLE AT 21.3 m. Monitoring piezometer installed from 17.4 m to 20.4 m. Borehole was sealed with Bentonite above piezometer.					
			-65			

O'CONNOR ASSOCIATES 	DATE: 89/06/27	JOB No.: 10-1202
	LOGGED BY: JKL	DWG. No.: A-1(b)

PROJECT: Esso Cardlock Bulk Plant

GD ELEV.: 100.021 m

HOLE No.: BH2

LOCATION: Regina, SK

TPC ELEV.: 99.961 m

DRILL: Auger

SAMPLE TYPE: SHELBY SPLIT SPOON CORE DISTURBED NO RECOVERY OTHER

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations				N	OTHER TESTS
				● % LEL	▲ ppm	100	200		
	ASPHALT								
	SAND AND GRAVEL (FILL) - light brown, damp								
1	CLAY - olive brown, some silt, trace sand, damp, stiff, plastic								
2	- black staining, noticeable petroleum odour at 1.2 m - trace sand at 1.7 m	X	5						
3	- mottled light and dark patches, fractures at 3.2 m - softer, more moist at 3.6 m	X	10						
4	- mottled light brown, some silt, moist, black organic inclusions, oxides								
5	SILT - olive brown, some clay, trace sand, firm to stiff, moist	X	15						
6	- laminated at 6.1 m	X	20						
7	END OF HOLE AT 6.7 m. Monitoring piezometer installed to 6.7 m.								▽ 89/07/13
8									
9									

O'CONNOR ASSOCIATES



DATE: 89/06/27

JOB No.: 10-1202

LOGGED BY: JKL

DWG.No.: A-2

PROJECT: Esso Cardlock Bulk Plant	GD ELEV.: 100.127 m	HOLE No.: BH3
LOCATION: Regina, SK	TPC ELEV.: 100.040 m	DRILL: Auger
SAMPLE TYPE: <input type="checkbox"/> SHELBY <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> CORE <input type="checkbox"/> DISTURBED <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> OTHER		

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations ● %LEL ▲ ppm	N	OTHER TESTS
				▲ 100 200 300 400 ● 20 40 60 80		
1	ASPHALT					
	SAND AND GRAVEL (FILL) - olive brown, damp, loose, medium dense			▲		
	CLAY - olive brown, trace silt in nuggets, stiff, damp, medium plastic	X	5	▲		
2	- black staining, noticeable petroleum odour at 1.0 m			▲		
	- trace gravel, sand partings at 1.7 m			▲		
3	- organics, oxide staining, nuggety, damp at 3.3 m	X	10	▲		
				▲		
4				▲		
		X	15	▲		
5	- trace gravel, silt lense, damp, oxidized, laminae at 5.0 m			▲		
6	SILT - olive brown, some clay, trace sand, damp	X	20	▲		
	- uniform silt at 6.1 m to 6.5 m			▲		
7	END OF HOLE AT 6.7 m.					
	Monitoring piezometer installed to 6.7 m.					▽ 89/07/13
8						
9						

O'CONNOR ASSOCIATES		DATE: 89/06/27	JOB No.: 10-1202
		LOGGED BY: JKL	DWG.No.: A-3

PROJECT: Esso Cardlock Bulk Plant	GD ELEV.: 100.197 m	HOLE No.: BH4
LOCATION: Regina, SK	TPC ELEV.: 100.133 m	DRILL: Auger
SAMPLE TYPE: <input checked="" type="checkbox"/> SHELBY <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> CORE <input type="checkbox"/> DISTURBED <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> OTHER		

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations				N	OTHER TESTS
				● %LEL	▲ ppm				
	ASPHALT								
	SAND AND GRAVEL (FILL) - brown, damp, medium dense								
-1	CLAY - olive brown, trace silt, damp, medium plastic								
	- black staining, noticeable petroleum odour at 1.0 m								
-2		X	5						
		X							
-3		X	10						
		X							
-4									
		X	15						
-5		X							
		X	20						
-6	SILT - olive brown, some clay, firm to stiff, low plasticity								
		X							
-7	END OF HOLE AT 6.7 m.								
	Monitoring piezometer installed to 6.7 m.								
-8									
-9									

▽ 89/07/13

O'CONNOR ASSOCIATES 	DATE: 89/06/27	JOB No.: 10-1202
	LOGGED BY: JKL	DWG.No.: A-4

PROJECT: Esso Cardlock Bulk Plant	GD ELEV.: 100.097 m	HOLE No.: BH5
LOCATION: Regina, SK	TPC ELEV.: 100.009 m	DRILL: Auger
SAMPLE TYPE: <input checked="" type="checkbox"/> SHELBY <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> CORE <input type="checkbox"/> DISTURBED <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> OTHER		

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations				N	OTHER TESTS
				● %LEL	▲ ppm	100	200		
	ASPHALT								
	SAND AND GRAVEL (FILL) - light brown, damp								
1	CLAY - olive brown, some silt inclusions, damp, stiff to hard								
2	- black staining, noticeable petroleum odour at 1.0 m	X	5						
	- sand layer (2 cm thick) at 1.7 m								
3		X	10						
4									
5	- silt lenses, oxide staining at 4.9 m	X	15						
	SILT - olive brown, some clay, firm to stiff, low plasticity								
6		X	20						
7	END OF HOLE AT 6.7 m. Monitoring piezometer installed to 6.7 m.								▽ 89/07/13
8									
9									

O'CONNOR ASSOCIATES 	DATE: 89/06/27	JOB No.: 10-1202
	LOGGED BY: JKL	DWG.No.: A-5

PROJECT: Esso Cardlock Bulk Plant **GO ELEV.:** 99.823 m **HOLE No.:** BH6
LOCATION: Regina, SK **TPC ELEV.:** 99.754 m **DRILL:** Auger
SAMPLE TYPE: SHELBY SPLIT SPOON CORE DISTURBED NO RECOVERY OTHER

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations				N	OTHER TESTS
				● %LEL	▲ ppm	100	200		
0	SAND (FILL) - light brown, some gravel, damp, loose								
1	CLAY - olive brown, trace silt inclusions, very stiff, medium to high plastic								
2	- black streaks at 1.0 m								
3	- fractured below 3.0 m								
4									
5									
6	SILT - olive brown, clayey, damp to dry, very stiff								
7	END OF HOLE AT 6.7 m. Monitoring piezometer installed to 6.7 m.								
8									
9									

O'CONNOR ASSOCIATES



DATE: 89/06/27 **JOB No.:** 10-1202
LOGGED BY: JKL **DWG.No.:** A-6

PROJECT: Esso Cardlock Bulk Plant

GD ELEV.: 98.957 m

HOLE No.: BH7

LOCATION: Regina, SK

TPC ELEV.: 98.894 m

DRILL: Auger

SAMPLE TYPE: SHELBY SPLIT SPOON CORE DISTURBED NO RECOVERY OTHER

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations				N	OTHER TESTS
				● %LEL	▲ ppm	▲ 100	● 200		
	CONCRETE								
-1	SAND AND GRAVEL (FILL) - gray, loose - water, noticeable petroleum odour at 1.0 m	X	5						▽ 89/07/13
-2	CLAY (FILL) - olive brown, disturbed, mixed with sand and gravel								
-3	SAND (FILL)								
-3	CLAY - olive brown, nuggety, oxides	X	10						
-4	END OF HOLE AT 4.0 m. Monitoring piezometer installed to 3.6 m.		15						
-5									
-6			20						
-7									
-8			25						
-9			30						

O'CONNOR ASSOCIATES



DATE: 89/06/27

JOB No.: 10-1202

LOGGED BY: JKL

DWG.No.: A-7

PROJECT: Esso Cardlock Bulk Plant

GD ELEV.: 100.031 m

HOLE No.: BH8

LOCATION: Regina, SK

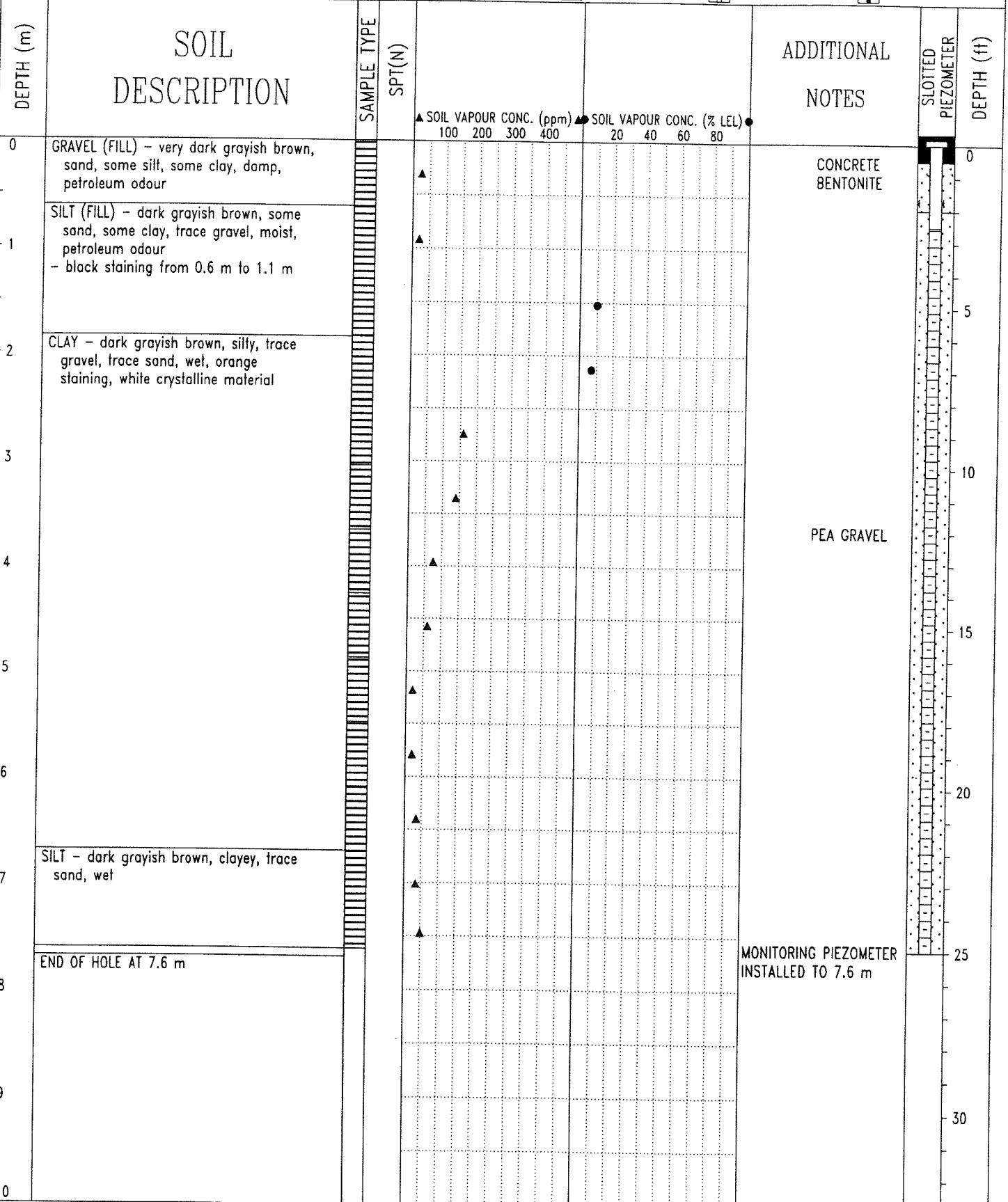
TPC ELEV.: 99.929 m

DRILL: Auger

SAMPLE TYPE: SHELBY SPLIT SPOON CORE DISTURBED NO RECOVERY OTHER

METRES	SOIL DESCRIPTION	SAMPLE TYPE	FEET	Vapour Concentrations				N	OTHER TESTS
				● %LEL	▲ ppm	100	200		
0	TOPSOIL								
0.5	SAND AND GRAVEL - medium grained, wet, gray and black stained, noticeable petroleum odour								
1.5	CLAY - olive brown, stiff to very stiff, moist, nuggety								
2.5		<input checked="" type="checkbox"/>	5						
3.2	- moist at 3.2 m								
4.5		<input checked="" type="checkbox"/>	10						
5.5	SILT - olive brown, fine grained, some sand, moist								
6.5		<input checked="" type="checkbox"/>	15						
6.7	END OF HOLE AT 6.7 m.								
6.7	Monitoring piezometer installed to 3.6 m.								
7.5		<input checked="" type="checkbox"/>	20						
8.5									
9.5									

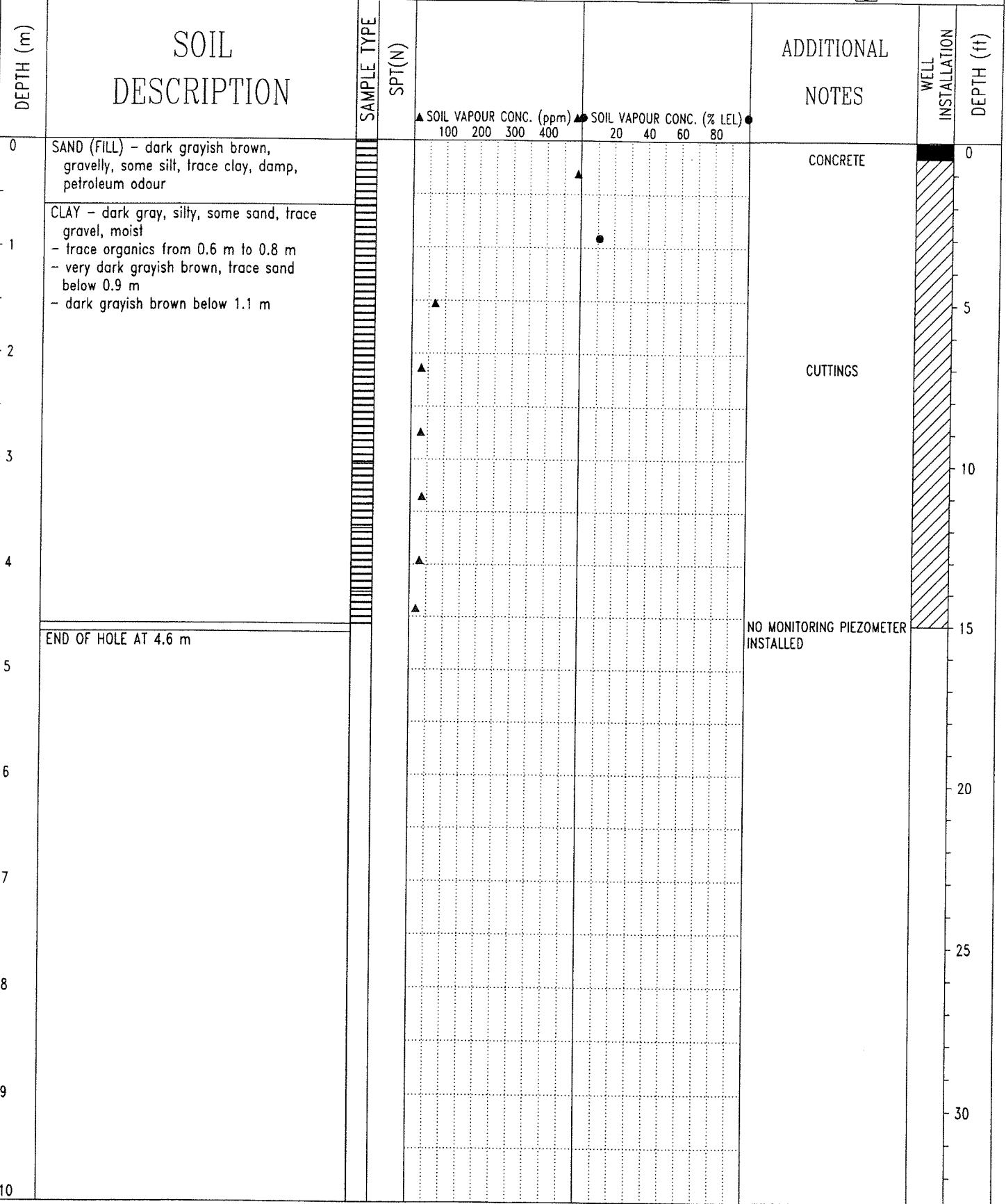
PROJECT: ESSO BULK	TPC: N/A	BOREHOLE NO: BH9
LOCATION: REGINA, SASKATCHEWAN	GRADE: N/A	JOB NO: 10-1202.1N
CLIENT: IMPERIAL OIL	COMPLETION DATE: 96/09/14	DRILL: AUGER
SAMPLE TYPE <input type="checkbox"/> OTHER	<input checked="" type="checkbox"/> SHELBY TUBE	<input checked="" type="checkbox"/> SPLIT SPOON
	<input type="checkbox"/> CORE	<input type="checkbox"/> DISTURBED
		<input type="checkbox"/> NO RECOVERY



O'CONNOR ASSOCIATES ENVIRONMENTAL INC.
Calgary, Alberta

LOGGED BY: MBW
REVIEWED BY: MBW
DRAWING NO: A-1

PROJECT: ESSO BULK	TPC: N/A	BOREHOLE NO: BH10
LOCATION: REGINA, SASKATCHEWAN	GRADE: N/A	JOB NO: 10-1202.1N
CLIENT: IMPERIAL OIL	COMPLETION DATE: 96/09/14	DRILL: AUGER
SAMPLE TYPE <input checked="" type="checkbox"/> OTHER	<input checked="" type="checkbox"/> SHELBY TUBE	<input checked="" type="checkbox"/> SPLIT SPOON
	<input type="checkbox"/> CORE	<input type="checkbox"/> DISTURBED
		<input type="checkbox"/> NO RECOVERY



O'CONNOR ASSOCIATES ENVIRONMENTAL INC.
Calgary, Alberta

LOGGED BY: MBW
REVIEWED BY: MBW
DRAWING NO: A-2