

**PALL LIFE SCIENCES
WESTERN AREA GROUNDWATER MONITORING PLAN
ANN ARBOR, MICHIGAN
April 2011**

BACKGROUND

The purpose of this monitoring plan is to collect data necessary to verify the effectiveness of the Western Area System in meeting the Western Area Non-Expansion Cleanup Objective set forth in Section V.B.1. of the Consent Judgment (CJ) (applicable portions summarized below).

Western Area System Non-Expansion Cleanup Objective. The Defendant shall prevent the horizontal extent of the groundwater contamination in the Western Area from expanding. The horizontal extent shall be the maximum horizontal areal extent of groundwater contamination regardless of the depth of the groundwater contamination (as established under Section V.B.2.c. of this Consent Judgment). Continued migration of groundwater contamination into the Prohibition Zone or Expanded Prohibition Zone shall not be considered expansion and is allowed. A change in the horizontal extent of groundwater contamination resulting solely from the Court's application of a new cleanup criterion shall not constitute expansion. Nothing in this Section prohibits the Plaintiffs from seeking additional response activities pursuant to Section XVIII.E of this Consent Judgment. Compliance with the Non-Expansion Cleanup Objective shall be established and verified by the Compliance Well Network to be developed by the Parties as provided in Sections V.B.2.c and d., below ("Compliance Well Network"). There is no independent mass removal requirement or a requirement that the Defendant operate any particular extraction well(s) at any particular rate beyond what is necessary to prevent the prohibited expansion, provided that Defendant's ability to terminate all groundwater extraction in the Western Area is subject to Section V.D.1.c. and the establishment of property use restrictions as required by Section V.B.2.e. If prohibited expansion occurs, Defendant shall undertake additional response activities to return the groundwater contamination to the boundary established by the Compliance Well Network (such response activities may include recommencement of extraction at particular locations).

* * *

The monitoring program shall be continued until terminated pursuant to Section V.E.

PROPOSED MONITORING LOCATIONS

PLS has been installing monitoring wells and collecting groundwater samples in the Western Area for approximately 25 years. Wells have been installed from shallow depths to the bedrock surface allowing for the monitoring of all key hydrostratigraphic units. Numerous isoconcentration maps have been prepared over the years depicting the extent of 1,4-dioxane in various hydrostratigraphic units.

Recently, PLS has installed a series of borings/wells to further define the extent of 1,4-dioxane in the Western Area. These wells include: MW-125, MW-126s, MW-126d, MW-127s, MW-127d, MW-128s, MW-128d, MW-131s, MW-131d, MW-133s, MW-133i, MW-133d, MW-134s, MW-134i and MW-134d. PLS also drilled another boring, PLS-11-04, near the University of Michigan - Saginaw Forest Caretaker's Cabin. The locations for these wells and boring were mutually agreed upon by PLS and the MDEQ. Borings at all of these well locations reached the bedrock surface, and vertical groundwater samples were collected at 10 foot intervals in water-bearing units. Boring logs, elevation/coordinate data and water level data for the newest wells (MW-133/134 and PLS-11-04) are provided in Appendix 1. Data from these borings/wells in concert with the extensive existing well network has sufficiently defined the extent of 1,4-dioxane in the Western area in all hydrostratigraphic units from ground elevation to the bedrock surface. Based on the data obtained from the agreed upon investigation, the extent of groundwater contamination has been delineated within the compliance well network identified on Figure 1.

PLS has carefully selected approximately 125 locations to periodically collect groundwater samples for 1,4-dioxane analysis and water level measurements. The locations, along with other relevant information, are listed on Table 1. Figure 1 identifies wells included in the monitoring well network, and highlights wells in the Compliance Well Network (green).

Groundwater Quality Sampling

Purpose Designations

The monitoring locations have been assigned the following purpose designations:

Compliance Monitoring (CM) – With the exception of MW-134, these wells will be used to determine compliance with the Non-Expansion Cleanup Objective in the CJ. Because of its proximity to the boundaries of both the Prohibition Zone and the edge of the plume above 85 ppb and because groundwater contamination above 85 ppb has historically been detected in this area, the detection of 1,4-dioxane above 85 ppb in MW-134 in the future may indicate prohibited expansion or it may simply indicate “continued migration of groundwater contamination into the Prohibition Zone or Expanded

Prohibition Zone”, which is specifically allowed under the CJ. PLS proposes to designate MW-134 as a provisional compliance point. If 1,4-dioxane above 45 ppb is detected in any of the MW-134 wells, PLS will undertake an investigation to determine whether groundwater contamination in this area is flowing toward the Prohibition Zone or if flow is in a direction that constitutes prohibited expansion. PLS will submit an investigation report to the MDEQ for review and approval. If this investigation demonstrates that the 1,4-dioxane detected in MW-134 is migrating into the Prohibition Zone/Expanded Prohibition Zone, this will mean that MW-134 is not an appropriate location for monitoring the Non-Expansion Cleanup Objective. In this event, PLS will install an additional monitoring well nest north of MW-134, roughly on a line between MW-133 and MW-66/35, which will then be the Compliance Monitoring point that will be used to determine compliance with the Non-Expansion Cleanup Objective in this area. If, on the other hand, PLS’ investigation demonstrates that groundwater in this area is not flowing toward the Prohibition Zone/Expanded Prohibition Zone, MW-134 will be used as a Compliance Monitoring point to determine compliance with the Non-Expansion Cleanup Objective.

General Monitoring (GM) – These wells will be monitored to track the general distribution of 1,4-dioxane in the Western Area. Data from these wells will be used to evaluate the potential effects of changes in the purge rates of PLS’ Western Area groundwater extraction wells.

Monitoring Locations

The locations of the monitoring wells that will be part of this plan are shown on Figure 1.

Monitoring Frequencies

PLS has reviewed the past water quality data and position of the wells relative to the boundaries of the plumes and has assigned each well with a monitoring frequency. These frequencies are:

Quarterly (Q) – Quarterly sampling frequencies have been assigned to many wells since it is anticipated that there will be significant extraction rate changes in the near future. It is anticipated that many wells assigned a quarterly frequency will be changed to longer frequencies in the next revision of this plan.

Semi-annual (S) – Semi-annual sampling frequencies were generally assigned to locations where routine data are important, but either due to historic trends or location, monitoring at slightly less frequent basis than quarterly will be adequate to identify significant trends or changes.

Annual (A) – Annual sampling frequencies were generally assigned to locations where routine data are important, but either due to historic trends or location, monitoring at slightly less frequent basis than semi-annual will be adequate to identify significant trends or changes.

Biennial (B) – Biennial sampling frequencies were generally assigned to locations where historic concentrations have shown that trends indicate subtle/negligible changes over time and frequent monitoring is not warranted.

Omit (O) – PLS is proposing the elimination of selected wells from the monitoring program. Historic trends at these locations have shown that 1,4-dioxane concentrations at these locations have consistently been below 85 ppb, alternative nearby locations can and will be monitored, or the wells are no longer functional.

Water Level Measurements

Objectives

The overall objectives of measuring water levels are:

1. Assessing groundwater flow patterns.
2. Evaluating potential changes in groundwater flow from changes in extraction rates and locations.

Locations

The wells to be monitored for water levels are shown on Figure 1.

Frequencies

Water level measurements in this plan will be made on a quarterly basis. This will allow for changes to be observed tracked during periods where extraction rates in many wells will be changed. It is anticipated that this frequency will be changed in many wells in the next version of this monitoring plan.

Sampling Methods and Analysis

Groundwater samples collected from monitoring wells will be collected by PLS in a manner consistent with PLS sampling protocols and sample handling procedures that are currently being used for PLS' routine monitoring. These sampling methods generally employ a 3 to 5 casing volume purge prior to sample collection, strict equipment decontamination procedures, and standard sample handling and documentation procedures.

Groundwater samples will be analyzed for 1,4-dioxane by the PLS laboratory using a U.S. Environmental Protection Agency-approved modified GC/MS method capable of detection levels of 1 ppb.

REPORTING AND PLAN UPDATES

Data from the monitoring will be made digitally available to the Michigan Department of Environmental Quality (MDEQ) via the PLS water quality database. The database can be used by the MDEQ and others having access to prepare reports and trend graphs.

On a semi-annual basis, PLS will prepare and submit to the MDEQ isoconcentration and potentiometric surface maps for the various aquifers, similar to those currently being provided to MDEQ.

On an annual basis, starting with the approval date of this plan, PLS may propose to adjust sampling and submittal frequencies and submit revisions to the MDEQ for review and comment before implementation.

Table 1 - Western Area Groundwater Monitoring Program (to be revised annually)

Well Name	Aquifer	Site Area	Most Recent 1,4-Dioxane Result (ppb)	Date Sampled	Purpose for Sampling	Current Sampling Frequency	Revised Groundwater Sampling Frequency	Water Level Measurement Frequency
AMW-1	Marshy	Western	342	8/11/10	GM	A	A	Quarterly
AMW-2	Marshy	Western	7	8/5/10	GM	A	A	Quarterly
HZ-S	D2	Western	958	3/7/11	GM-E	M	M*	NM
MOW-1	Marshy	Western	565	8/5/10	GM	A	A	Quarterly
MW-1	C3	Western	1,017	10/20/10	GM	S	Quarterly	Quarterly
MW-2s	Shallow	Western	10	11/7/07	-	R	O	NM
MW-2d	C3	Western	42	7/16/10	GM	A	Quarterly	Quarterly
MW-3s	Shallow	Western	5	8/18/93	-	R	O	NM
MW-3d	C3	Western	ND	8/7/08	-	A	O	Quarterly
MW-4s	Sh	Western	3	8/8/08	-	A	O	Quarterly
MW-4d	D2	Western	836	10/28/10	GM	S	Quarterly	Quarterly
MW-5s	Shallow	Western	4	7/20/04	-	A	O	NM
MW-5d	Sh	Western	8,618	2/18/11	GM	Quarterly	Quarterly	Quarterly
MW-8d	C3	Western	ND	8/13/08	-	A	O	Quarterly
MW-9d	D2	Western	ND	8/7/08	-	A	O	NM
MW-10s	Southwest	Western	ND	8/10/10	-	A	O	Quarterly
MW-10d	Southwest	Western	1,505	10/19/10	GM	S	Quarterly	Quarterly
MW-11s	Shallow	Western	ND	8/10/10	-	S	O	Quarterly
MW-11i	C3	Western	1	10/19/10	-	S	O	Quarterly
MW-11d	D2	Western	194	10/19/10	GM	S	Quarterly	Quarterly
MW-12d	C3	Western	ND	7/21/10	-	A	O	Quarterly
MW-13	D2	Western	ND	7/16/10	-	A	O	Quarterly
MW-14d	D2	Western	ND	7/22/10	-	A	O	Quarterly
MW-18s	Shallow	Western			-	R	O	NM
MW-18d	C3	Western	226	10/19/10	GM	S	Quarterly	Quarterly
MW-20	C3	Western	ND	7/29/08	CM	A	Quarterly	Quarterly
MW-22	C3	Western	1,312	10/20/10	GM	S	Quarterly	Quarterly
MW-23	C3	Western	184	8/5/10	GM	A	A	Quarterly
MW-24	C3	Western	958	8/11/10	GM	A	A	Quarterly
MW-25s	Shallow	Western	834	8/10/10	GM	A	Quarterly	Quarterly
MW-25d	C3	Western	423	4/16/03	-	A	O	NM
MW-26	Shallow	Western	5	8/10/10	-	A	O	Quarterly
MW-27	Shallow	Western	16	8/5/10	-	A	O	Quarterly
MW-28	C3	Western	ND	8/4/10	GM	A	Quarterly	Quarterly
MW-32	C3	Western	16	8/6/10	GM	A	Quarterly	Quarterly
MW-34s	C3	Western	ND	7/15/08	CM	A	Quarterly	Quarterly
MW-34d	D2	Western	ND	8/6/10	CM	A	Quarterly	Quarterly
MW-35	C3	Western	8	8/6/10	CM	A	Quarterly	Quarterly
MW-36	C3	Western	ND	8/6/10	GM	A	A	Quarterly
MW-37	C3	Western	249	10/19/10	GM	S	Quarterly	Quarterly
MW-38s	C3	Western	ND	8/6/10	-	A	O	Quarterly
MW-38d	D2	Western	94	1/18/11	GM	Quarterly	Quarterly	Quarterly
MW-39s	C3	Western	22	1/5/11	GM	Quarterly	Quarterly	Quarterly
MW-39d	D2	Western	242	1/5/11	GM	Quarterly	Quarterly	Quarterly
MW-44	D2	Western	ND	8/4/10	-	A	O	Quarterly
MW-45s	Southwest	Western	13	10/19/10	GM	S	S	Quarterly
MW-45d	Southwest	Western	1,953	10/19/10	GM	S	S	Quarterly
MW-46	Southwest	Western	53	8/5/10	GM	A	S	Quarterly
MW-48	Southwest	Western	133	10/20/10	GM	S	S	Quarterly
MW-49	Southwest	Western	ND	8/4/10	GM	A	S	Quarterly
MW-50	Southwest	Western	697	10/28/10	GM-E	M	M*	Quarterly
MW-52s	Southwest	Western	1,305	8/10/10	GM	S	S	Quarterly
MW-52i	Southwest	Western	ND	8/10/10	-	A	A	Quarterly
MW-52d	Southwest	Western	ND	8/10/10	-	A	A	Quarterly
MW-56s	D2	Western	118	4/2/09	GM	Quarterly	Quarterly	Quarterly
MW-56d	E	Western	ND	8/4/10	GM	A	Quarterly	Quarterly
MW-57	Southwest	Western	ND	8/13/08	CM	A	Quarterly	Quarterly
MW-58s	Southwest	Western	182	10/15/08	CM	S	S	Quarterly
MW-58d	Southwest	Western	9	8/12/08	CM	A	S	Quarterly
MW-59s	C3	Western	ND	7/20/10	GM	A	A	Quarterly
MW-59d	D2	Western	ND	7/20/10	GM	A	A	Quarterly
MW-62s	D2	Western	ND	7/11/08	CM	A	S	Quarterly
MW-62i	D2	Western	ND	7/17/08	CM	A	S	Quarterly
MW-62d	E	Western	ND	7/11/08	GM	A	S	Quarterly
MW-63s	D2	Western	ND	8/4/10	CM	A	S	Quarterly
MW-63i	D2	Western	ND	8/4/10	CM	A	S	Quarterly
MW-63d	E	Western	ND	8/4/10	GM	A	A	Quarterly

Table 1 - Western Area Groundwater Monitoring Program (to be revised annually)

Well Name	Aquifer	Site Area	Most Recent 1,4-Dioxane Result (ppb)	Date Sampled	Purpose for Sampling	Current Sampling Frequency	Revised Groundwater Sampling Frequency	Water Level Measurement Frequency
MW-64	E	Western	66	10/19/10	GM	S	Quarterly	Quarterly
MW-65s	E	Western	25	7/30/10	GM	A	S	Quarterly
MW-65i	E	Western	2	7/30/10	GM	A	S	Quarterly
MW-65d	E	Western	31	11/8/10	GM	S	S	Quarterly
MW-66	E	Western	2	8/10/10	CM	A	Quarterly	Quarterly
MW-68	E	Western	ND	7/21/10	CM	A	S	Quarterly
MW-75	C3	Western	30	10/20/10	GM	S	S	Quarterly
MW-78	C3	Western	22	10/18/10	GM	S	S	Quarterly
MW-94s	D2	Western	1,294	1/27/11	GM	Quarterly	Quarterly	Quarterly
MW-94d	E	Western	ND	1/27/11	GM	Quarterly	S	Quarterly
MW-95	E	Western	73	1/27/11	GM	Quarterly	S	Quarterly
MW-96	E	Western	79	1/27/11	GM	Quarterly	S	Quarterly
MW-125	C3	Western	276	1/5/11	GM	-	Quarterly	Quarterly
MW-126s	D2	Western	ND	1/5/11	CM	-	Quarterly	Quarterly
MW-126d	E	Western	ND	1/5/11	CM	Quarterly	Quarterly	Quarterly
MW-127s	C3	Western	ND	1/5/11	CM	-	Quarterly	Quarterly
MW-127d	E	Western	ND	1/5/10	CM	-	Quarterly	Quarterly
MW-128s	C3	Western	ND	2/14/11	CM	-	Quarterly	Quarterly
MW-128d	E	Western	ND	2/14/11	CM	-	Quarterly	Quarterly
MW-131s	D2	Western	ND	3/21/11	CM	-	Quarterly	Quarterly
MW-131d	E	Western	ND	3/21/11	CM	-	Quarterly	Quarterly
MW-133s	ND	Western	ND	3/22/11	CM	-	Quarterly	Quarterly
MW-133i	ND	Western	ND	3/22/11	CM	-	Quarterly	Quarterly
MW-133d	ND	Western	ND	3/22/11	CM	-	Quarterly	Quarterly
MW-134s	ND	Western	7	3/30/11	PCM	-	Quarterly	Quarterly
MW-134i	ND	Western	5	3/30/11	PCM	-	Quarterly	Quarterly
MW-134d	ND	Western	3	3/30/11	PCM	-	Quarterly	Quarterly
NMW-1s	Marshy	Western	1,577	8/11/10	CM	A	Quarterly	Quarterly
NMW-1d	Marshy	Western	639	8/11/10	GM	A	A	Quarterly
NMW-2s	Marshy	Western	1,684	8/11/10	CM	A	Quarterly	Quarterly
NMW-2d	Marshy	Western	597	8/11/10	GM	A	A	Quarterly
NMW-3s	Marshy	Western	1,010	8/11/10	GM	A	A	Quarterly
NMW-3d	Marshy	Western	918	8/11/10	GM	A	A	Quarterly
PMW-1	Marshy	Western	162	8/11/10	GM	A	A	Quarterly
PMW-2	Marshy	Western	5,708	8/5/10	GM	A	A	Quarterly
PMW-3	Marshy	Western	7,348	8/5/10	GM	A	A	Quarterly
PMW-4	Marshy	Western	930	8/5/10	GM	A	A	Quarterly
PW-1	Marshy	Western	1,112	3/7/11	GM-E	M	M*	NM
Surface Water-1M	Marshy	Western	ND	7/30/08	GM	A	O	NM
Surface Water-2M	Marshy	Western	ND	7/30/08	GM	A	O	NM
Surface Water-3M	Marshy	Western	ND	7/30/08	GM	A	O	NM
SW-COMB	Southwest	Western	546	1/6/09	GM-E	M	M*	NM
TW-1	C3	Western	121	3/7/10	GM-E	S	M*	NM
TW-3	C3	Western	5	11/11/10	-	S	M*	NM
TW-4	Southwest	Western	28	11/11/10	-	S	M*	NM
TW-5	D2	Western	872	11/11/10	GM-E	M	M*	NM
TW-6	C3	Western	66	5/21/10	GM-E	M	M*	NM
TW-8	Southwest	Western	503	3/7/11	GM-E	M	M*	NM
TW-9	D2	Western	981	3/7/11	GM-E	M	M*	NM
TW-10	C3	Western	751	3/7/10	GM-E	M	M*	NM
TW-11	E	Western	223	3/7/11	GM-E	M	M*	NM
TW-12	E	Western	23	11/11/10	-	S	M*	NM
TW-13	Southwest	Western	736	12/7/10	GM-E	M	M*	NM
TW-14	C3	Western	129	3/7/10	GM-E	M	M*	NM
TW-17	E	Western	89	3/7/11	GM-E	M	M*	NM
TW-18	E	Western	384	3/7/11	GM-E	M	M*	NM
TW-20	C3	Western	1,487	3/7/11	GM-E	M	M*	NM
TW-21	D2	Western	286	2/7/11	GM-E	M	M*	NM
TW-22	Southwest	Western	760	3/7/11	GM-E	M	M*	NM
170 April	C3	Western	18	7/16/10	-	A	A	NM
175 Jackson Plaza	D2	Western	706	11/8/10	GM	S	S	Quarterly
333 Jackson Plaza	C3	Western	49	7/16/10	-	A	O	NM
371 Parkland Plaza #1	E	Western	ND	10/19/10	-	R	R	NM
371 Parkland Plaza #2	E	Western	ND	10/19/10	-	R	R	NM
Sag. Forest Cabin #1	E	Western	27	8/6/10	GM	A	S	Quarterly
Sag. Forest Cabin #2	E	Western	2	8/6/10	GM	A	S	Quarterly
Sag. Forest Cabin #4	C3	Western	ND	7/31/08	-	A	O	NM

Frequency Codes:

O = No longer sample (statics if applicable)

Table 1 - Western Area Groundwater Monitoring Program (to be revised annually)

Well Name	Aquifer	Site Area	Most Recent 1,4-Dioxane Result (ppb)	Date Sampled	Purpose for Sampling	Current Sampling Frequency	Revised Groundwater Sampling Frequency	Water Level Measurement Frequency
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M = Monthly

M*=Monthly while operating, otherwise randomly sampled

S = Semi-Annually

A = Annually

B = Biannually

R = Randomly

Measured

Analytical Codes:

ND = Non-Detect

Sampling Purpose Codes:

CM = Compliance Monitoring

PCM = Provisional Compliance Monitoring

GM = General Monitoring

GM-E = General Monitoring - Extraction Well



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ENGINEERING, INC.
Offices in Michigan and Indiana

Project: Pall Life Sciences

Location: Saginaw Forest, West of MW-125

Project No.: 806500

Logged By: Kirk Wagenvelt, Geologist

LOG OF BORING / WELL: PLS-11-04

Start Date: 4/4/2011

End Date: 4/8/2011

Drilling Co.: Boart Longyear

Drilling Method: Rotosonic

Sampling Methods: Temp. Wells

Notes: All water samples analyzed by PLS for 1,4 Dioxane. ND = <1.0 µg/L

Total Depth (ft.): 220

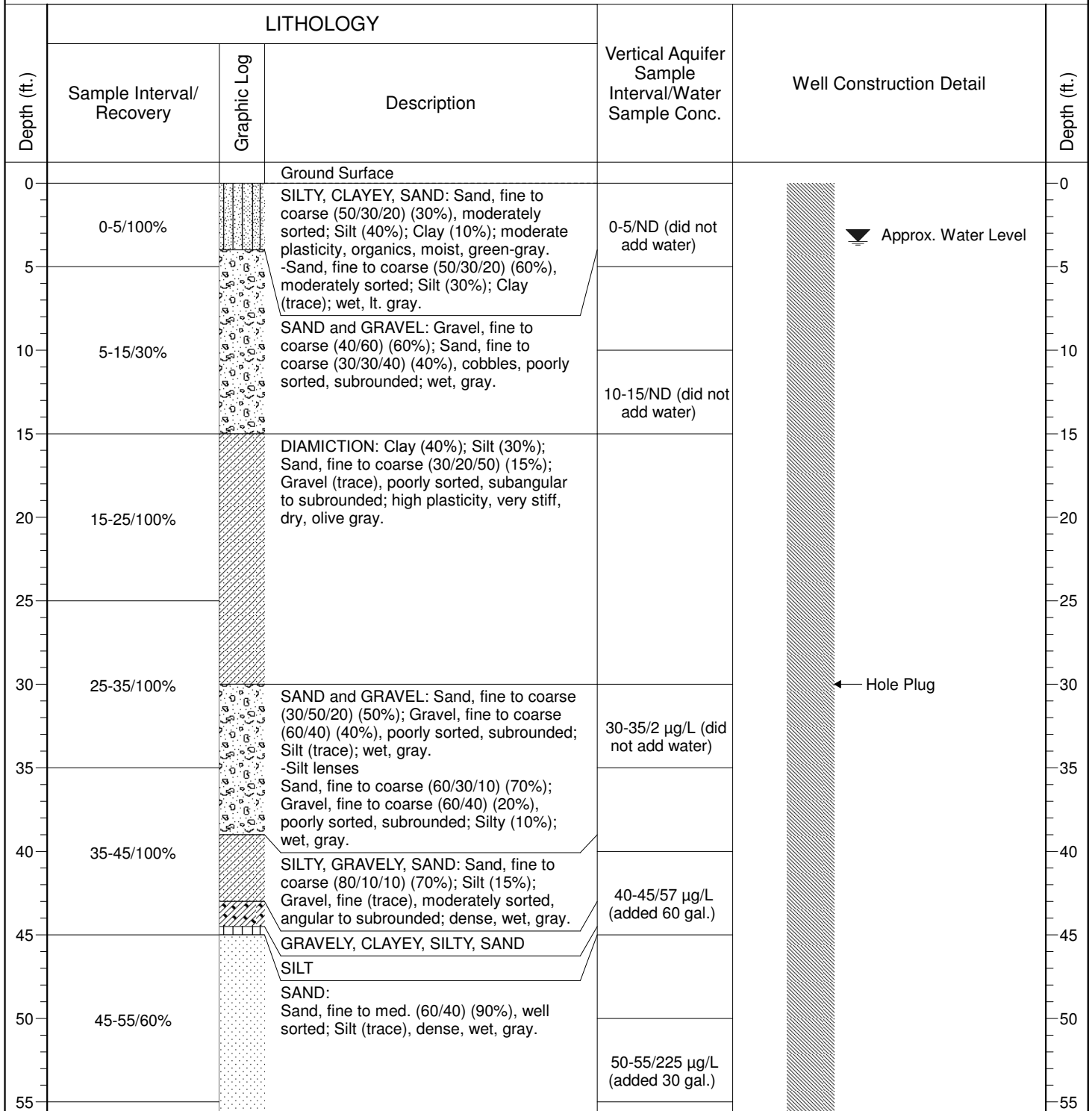
Static Water Level (ft.): approx. 3.5

TOC Elev.: N/A

Ground Elev.: approx. 910.0 Feet NAVD88

GPS: Approx. 15' W/NW of MW-125

SUBSURFACE PROFILE





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Offices in Michigan and Indiana

LOG OF BORING / WELL: PLS-11-04

Start Date: 4/4/2011

Total Depth (ft.): 220

End Date: 4/8/2011

Static Water Level (ft.): approx. 3.5

Project: Pall Life Sciences

Drilling Co.: Boart Longyear

TOC Elev.: N/A

Location: Saginaw Forest, West of MW-125

Drilling Method: Rotosonic

Ground Elev.: approx. 910.0 Feet NAVD88

Project No.: 806500

Sampling Methods: Temp. Wells

GPS: Approx. 15' W/NW of MW-125

Logged By: Kirk Wagenvelt, Geologist

Notes: Six inch casing drilled to T.D. Four inch cores were observed to determine the geology.

SUBSURFACE PROFILE

Depth (ft.)	LITHOLOGY			Vertical Aquifer Sample Interval/Water Sample Conc.	Well Construction Detail	Depth (ft.)
	Sample Interval/Recovery	Graphic Log	Description			
60	55-65/50%					60
65			CLAYEY SAND: Sand, fine to coarse (60/20/20) (50%); Clay (30%); Silt (10%); Gravel (trace), poorly sorted, subangular to rounded; moderate plasticity, very stiff, dry.	60-65/910 µg/L (added 50 gal.)		65
70	65-75/100%		DIAMICTON: Silt (60%); Clay (30%); Sand, fine to coarse (50/30/20) (trace); Gravel, fine (trace), poorly sorted, subangular to rounded; moderate plasticity, very stiff, dry.			70
75						75
80	75-85/100%		Silt (70%); Sand, fine to coarse (50/40/10) (20%); Clay (10%); Gravel, fine (trace), poorly sorted, subangular to rounded; low plasticity, hard, dry, olive gray.			80
85			Silt (60%); Clay (30%); Sand fine to coarse (20/20/60) (trace); Gravel (trace), poorly sorted, angular-rounded; moderate plasticity, hard, dry, olive gray.			85
90	85-95/100%		SILTY SAND: Sand, fine (70%); Silt (30%); low plasticity, dense, non cohesive, moist, olive gray.			90
95			Diamiction interbed			95
			Sand, fine (80%); Silt (20%); low plasticity, dense, dry, olive gray			
100	95-105/70%		SANDY SILT: Silt (70%); Sand, fine to coarse (80/10/10) (20%), well sorted; Clay (trace); low plasticity, very stiff, dry, gray.			100
105			DIAMICTON: Silt (80%); Sand, fine to coarse (70/10/20) (10%); Clay (trace); Gravel, fine (trace), poorly sorted; low plasticity, hard, dry, olive gray.			105
110	105-115/100%		Silt (60%); Clay (20%); Sand, fine to coarse (60/20/20) (10%); Gravel, fine			110



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Offices in Michigan and Indiana

Project: Pall Life Sciences

Location: Saginaw Forest, West of MW-125

Project No.: 806500

Logged By: Kirk Wagenvelt, Geologist

LOG OF BORING / WELL: PLS-11-04

Start Date: 4/4/2011

End Date: 4/8/2011

Drilling Co.: Boart Longyear

Drilling Method: Rotosonic

Sampling Methods: Temp. Wells

Notes: Five foot vertical aquifer sampling intervals indicate the use of a temporary well.

Total Depth (ft.): 220

Static Water Level (ft.): approx. 3.5

TOC Elev.: N/A

Ground Elev.: approx. 910.0 Feet NAVD88

GPS: Approx. 15' W/NW of MW-125

SUBSURFACE PROFILE

Depth (ft.)	LITHOLOGY			Vertical Aquifer Sample Interval/Water Sample Conc.	Well Construction Detail	Depth (ft.)
	Sample Interval/Recovery	Graphic Log	Description			
115	105-115/100%		(trace), poorly sorted, subangular to rounded; moderate plasticity, hard, dry, olive gray.			115
120	115-125/70%		SANDY SILT			120
125			SAND and GRAVEL: Gravel, fine to coarse (60/40) (60%); Sand, fine to coarse (10/30/60) (40%), poorly sorted, subrounded to well rounded; loose, wet, brown. -Sand, fine to coarse (30/40/30) (60%); Gravel, fine to coarse (70/30) (20%), poorly sorted, subrounded to well rounded; Silt (15%); Clay (trace); loose, wet, gray-brown.	120-125/18 µg/L (added 60 gal.)		125
130	125-135/100%		-Sand, fine to med. (40/60) (90%), well sorted; Silt (trace); loose, wet, gray. -Sand, fine to coarse (20/30/50) (60%); Gravel, fine to coarse (80/20) (35%), moderately sorted, subrounded; Silt (trace); loose, wet, gray.	130-135/14 µg/L (added 100 gal.)		130
135			-Gravel, fine to coarse (50/50) (60%); Sand, fine to coarse (30/30/40) (40%), cobbles, poorly sorted, subangular to rounded; Silt (40%); loose, wet, gray.			135
140	135-145/80%		Sand, fine to coarse (20/40/20) (65%); Gravel, fine to coarse (70/30) (30%), poorly sorted, subangular to rounded; Silt (trace); loose, wet, gray.	140-145/5 µg/L (added 40 gal.)		140
145					← Hole Plug	145
150	145-155/30%			150-155/6 µg/L (added 60 gal.)		150
155			Gravel, fine to coarse (40/60) (60%); Sand, fine to coarse (20/20/60) (20%), cobbles, poorly sorted, subangular to subrounded; Silt (20%); loose, wet, gray.			155
160	155-165/100%			160-165/3 µg/L (added 60 gal.)		160
165						165



FLEIS & VANDENBRINK
ENGINEERING, INC.
Offices in Michigan and Indiana

Project: Pall Life Sciences

Location: Saginaw Forest, West of MW-125

Project No.: 806500

Logged By: Kirk Wagenvelt, Geologist

LOG OF BORING / WELL: PLS-11-04

Start Date: 4/4/2011

End Date: 4/8/2011

Drilling Co.: Boart Longyear

Drilling Method: Rotosonic

Sampling Methods: Temp. Wells

Notes: Four inch cores were observed to determine the geology. Blue-gray shale was first observed on 3/27/11 at 212' BGS.

Total Depth (ft.): 220

Static Water Level (ft.): approx. 3.5

TOC Elev.: N/A

Ground Elev.: approx. 910.0 Feet NAVD88

GPS: Approx. 15' W/NW of MW-125

SUBSURFACE PROFILE

Depth (ft.)	LITHOLOGY			Vertical Aquifer Sample Interval/Water Sample Conc.	Well Construction Detail	Depth (ft.)
	Sample Interval/Recovery	Graphic Log	Description			
170	165-175/30%		Sand, fine to coarse (10/50/40) (45%); Gravel, fine to coarse (60/40) (45%), cobbles, poorly sorted, subangular to well rounded; loose, brown-gray, wet.			170
175				170-175/ND (added 40 gal.)		175
180	175-185/20%		Gravel, fine to coarse (50/50) (50%); Sand, fine to coarse (10/20/70) (40%), cobbles, poorly sorted, subangular to well rounded; Silt (10%); loose, wet, gray.			180
185						185
190	185-195/100%		DIAMICTON: Silt (70%); Sand, fine to coarse (40/20/40) (15%); Gravel, fine (10%), poorly sorted, subangular; Clay (trace); low plasticity, hard, dry, olive gray.	190-195/ND (added 50 gal.)		190
195						195
200	195-205/100%		SAND and GRAVEL: Sand, fine to coarse (30/50 /20) (35%); Silt (30%); Clay (20%); Gravel, fine to coarse (70/30) (15%), poorly sorted, subangular to rounded; very dense, moist, olive gray. -Diamicton interbed at 193'.			200
205				202-207/2 µg/L (added 60 gal.)		205
210	205-220/70%		SHALE: Blue-Gray (30/60/10) (50%); Gravel, fine to coarse (70/30) (40%), cobbles, poorly sorted, subrounded; Silt (10%); med. density, moist, olive gray.			210
215						215
220						220



FLEIS & VANDENBRINK
ENGINEERING, INC.
Offices in Michigan and Indiana

Project: Pall Life Sciences

Location: GM, Bradley Car Dealership

Project No.: 806500

Logged By: Kirk Wagenvelt, Geologist

LOG OF BORING / WELL: PLS-11-05 / MW-133d

Start Date: 3/9/2011

End Date: 3/18/2011

Drilling Co.: Stearns Drilling

Drilling Method: Rotasonic

Sampling Methods: Simulprobe and Temp wells.

Total Depth (ft.): 220

Static Water Level (ft.): 54.23

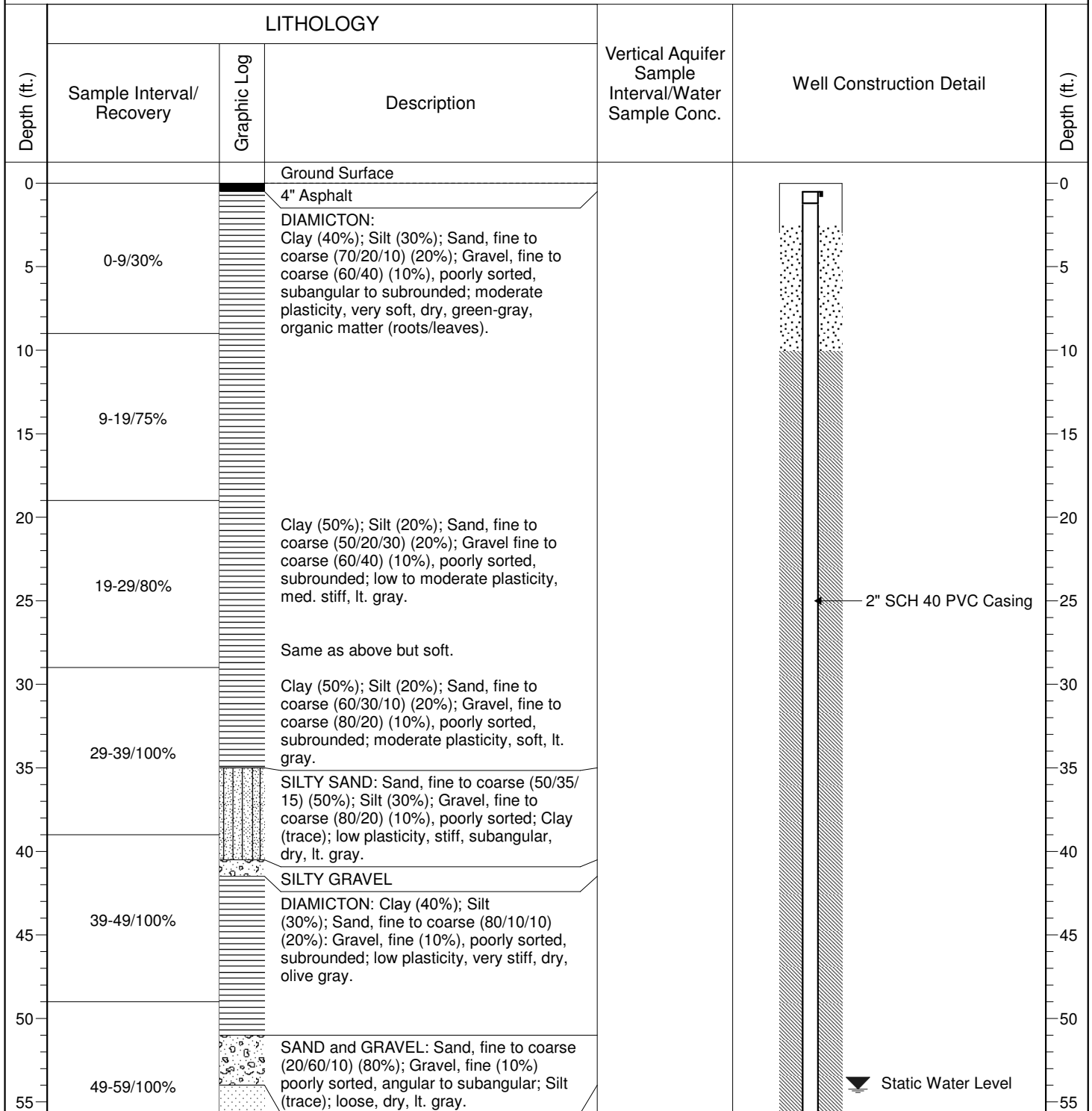
TOC Elev.: 928.94 Feet NAVD88

Ground Elev.: approx. 929.50 Feet NAVD88

GPS: N 042.286894, W 083.800420

Notes: MW-133s,i & d were all set in the same boring. Geology, recovery information and vertical sampling results were taken from Log of Boring MW-133d. All water samples analyzed by PLS for 1,4 Dioxane. ND = <1.0 µg/L

SUBSURFACE PROFILE





FLEIS & VANDENBRINK
ENGINEERING, INC.
Offices in Michigan and Indiana

LOG OF BORING / WELL: PLS-11-05 / MW-133d

Start Date: 3/9/2011

Total Depth (ft.): 220

End Date: 3/18/2011

Static Water Level (ft.): 54.23

Project: Pall Life Sciences

Drilling Co.: Stearns Drilling

TOC Elev.: 928.94 Feet NAVD88

Location: GM, Bradley Car Dealership

Drilling Method: Rotosonic

Ground Elev.: approx. 929.50 Feet NAVD88

Project No.: 806500

Sampling Methods: Simulprobe and Temp wells.

GPS: N 042.286894, W 083.800420

Logged By: Kirk Wagenvelt, Geologist

Notes: An unquantified volume of water was used during drilling of this boring. Water use was minimized to the extent possible to help ensure groundwater integrity. Eight inch casing was drilled to 90'. Six inch casing continued to T.D

SUBSURFACE PROFILE

Depth (ft.)	LITHOLOGY			Vertical Aquifer Sample Interval/Water Sample Conc.	Well Construction Detail	Depth (ft.)
	Sample Interval/Recovery	Graphic Log	Description			
			SAND: Sand, fine to med. (90/10) (90%); Gravel, fine (10%), well sorted, subrounded; dense, moist, lt. gray.			
60	59-69/90%		SILTY, GRAVELY, SAND: Sand, fine to coarse (60/30/10) (40%); Silt (30%); Gravel, fine (25%), poorly sorted, subrounded; Clay (trace); low plasticity, soft, moist, olive gray.			60
65			Sand, fine to coarse (40/50/10) (80%); Gravel, fine (10%), well sorted; Silt (trace); med. density, wet, lt. gray.			65
70	69-79/80%		-Sand, fine to coarse (50/30/20) (60%); Silt (20%); Gravel, fine to coarse (70/30) (20%), poorly sorted, rounded; med. density, low plasticity, wet, lt. gray.	69-70.5/ND		70
75			DIAMICTON: Interbedded			75
80	79-89/85%		SAND: Sand, fine to med. (40/60) (90%), well sorted, subangular to subrounded; Silt (trace); med. dense, wet, lt. gray.	79-80.5/ND		80
85					← Bentonite Slurry Seal	85
90	89-99/90%		Sand, fine to med. (50/50) (100%), well sorted; dense, wet, lt. gray.	89-90.5/ND		90
95				94-99/ND	← 2" SCH 40 PVC Casing	95
100	99-109/100%		Sand, fine to med. (90/10) (90%), well sorted; Silt (10%); very dense, wet, lt. gray.			100
105				104-109/ND		105
110						110



FLEIS & VANDENBRINK
ENGINEERING, INC.
Offices in Michigan and Indiana

Project: Pall Life Sciences

Location: GM, Bradley Car Dealership

Project No.: 806500

Logged By: Kirk Wagenvelt, Geologist

LOG OF BORING / WELL: PLS-11-05 / MW-133d

Start Date: 3/9/2011

End Date: 3/18/2011

Drilling Co.: Stearns Drilling

Drilling Method: Rotasonic

Sampling Methods: Simulprobe and Temp wells.

Notes: Five foot vertical aquifer sampling intervals indicate the use of a temporary well.

Total Depth (ft.): 220

Static Water Level (ft.): 54.23

TOC Elev.: 928.94 Feet NAVD88

Ground Elev.: approx. 929.50 Feet NAVD88

GPS: N 042.286894, W 083.800420

SUBSURFACE PROFILE

Depth (ft.)	LITHOLOGY			Vertical Aquifer Sample Interval/Water Sample Conc.	Well Construction Detail	Depth (ft.)
	Sample Interval/ Recovery	Graphic Log	Description			
115	109-119/100%		Sand, fine (95%), well sorted; Silt (trace); dense, wet, lt. gray.			115
120						120
125	119-129/100%		Sand, fine to med. (40/60) (100%), well sorted, subangular; dense, wet, lt. gray.	114-119/ND		125
130						130
135	129-139/60%		Sand, fine to med. (90/10) (90%), well sorted; Silt (10%); med. density, wet, lt. gray.	124-129/ND		135
140						140
145	139-149/100%		Sand, fine (100%), well sorted; med. density, wet, lt. gray.	134-139/ND		145
150						150
155	149-159/100%		Sand, fine to med. (85/15) (90%), well sorted; Silt (10%); med. density, wet, lt. gray.	144-149/ND		155
160						160
165	159-169/70%		Sand, fine to med. (75/25) (80%), well sorted; Silt (20%); med. density, low plasticity, olive gray.	154-159/ND		165



FLEIS & VANDENBRINK
ENGINEERING, INC.
Offices in Michigan and Indiana

Project: Pall Life Sciences

Location: GM, Bradley Car Dealership

Project No.: 806500

Logged By: Kirk Wagenvelt, Geologist

LOG OF BORING / WELL: PLS-11-05 / MW-133d

Start Date: 3/9/2011

End Date: 3/18/2011

Drilling Co.: Stearns Drilling

Drilling Method: Rotosonic

Sampling Methods: Simulprobe and Temp wells.

Notes: Four inch cores were observed to determine the geology.

Total Depth (ft.): 220

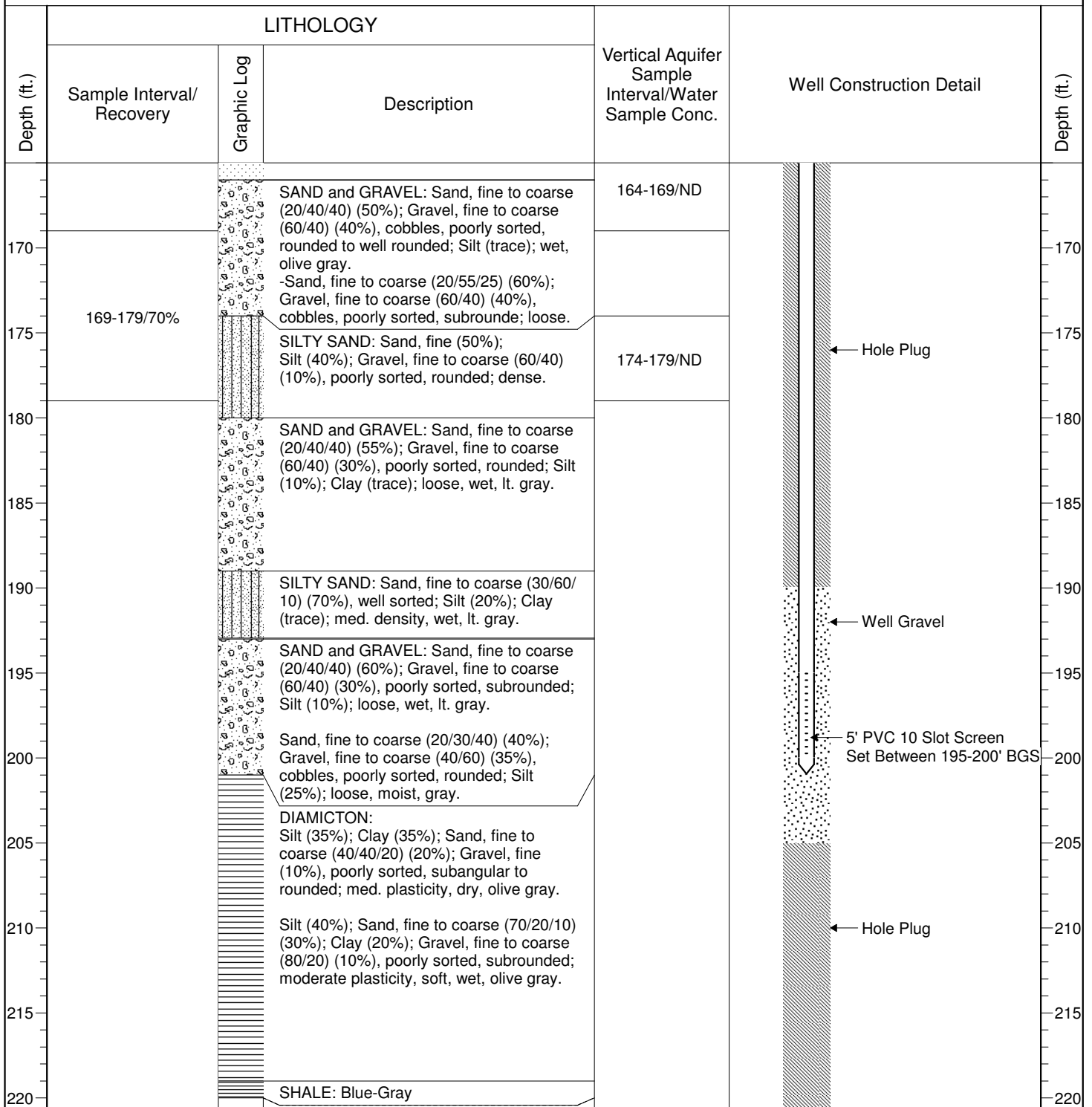
Static Water Level (ft.): 54.23

TOC Elev.: 928.94 Feet NAVD88

Ground Elev.: approx. 929.50 Feet NAVD88

GPS: N 042.286894, W 083.800420

SUBSURFACE PROFILE





FLEIS & VANDENBRINK
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Offices in Michigan and Indiana

LOG OF BORING / WELL: PLS-11-05 / MW-133i

Start Date: 3/9/2011

Total Depth (ft.): 220

End Date: 3/18/2011

Static Water Level (ft.): 54.58

Project: Pall Life Sciences

Drilling Co.: Stearns Drilling

TOC Elev.: 929.03 Feet NAVD88

Location: GM, Bradley Car Dealership

Drilling Method: Rotasonic

Ground Elev.: approx. 929.50 Feet NAVD88

Project No.: 806500

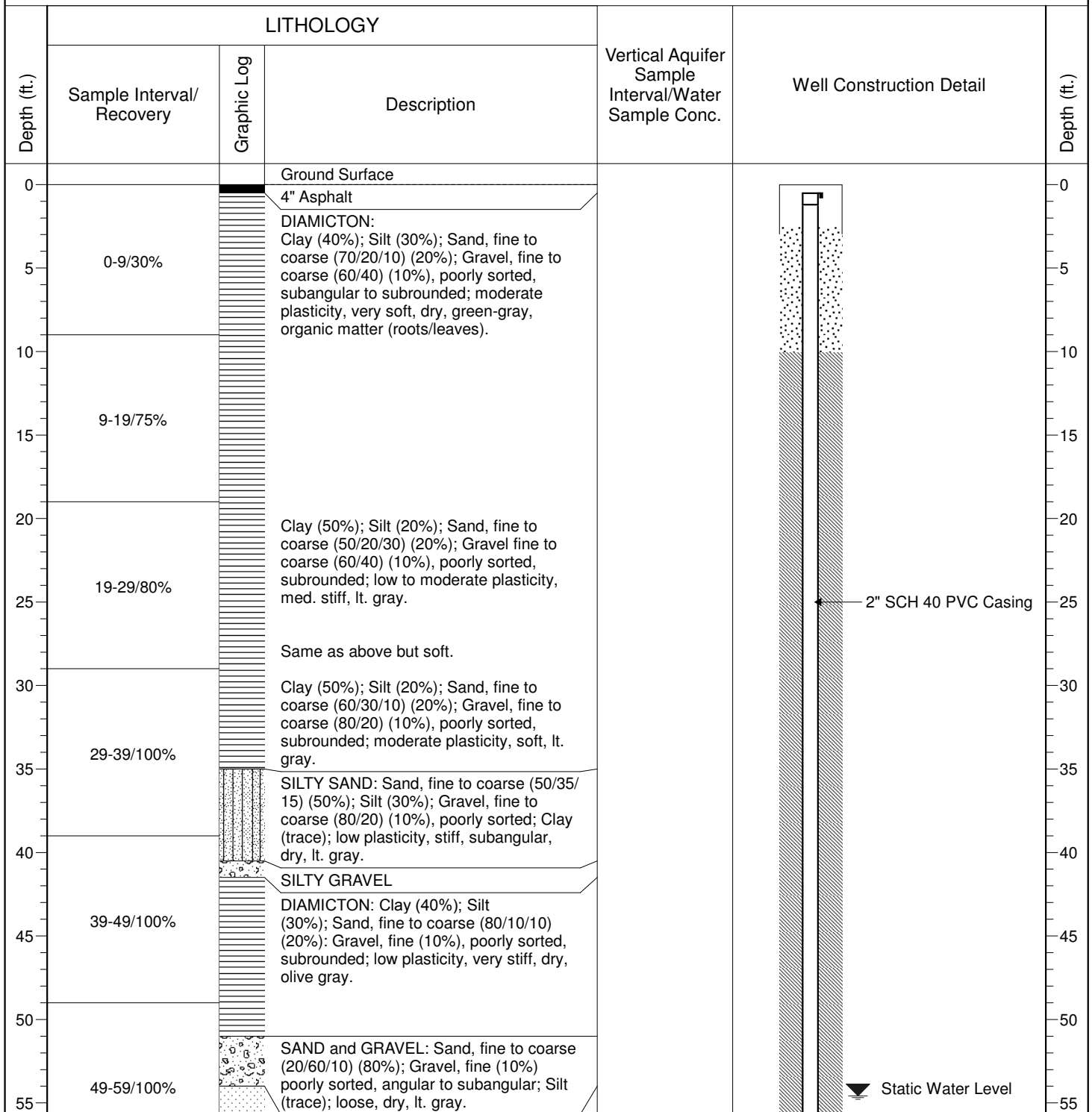
Sampling Methods: Simulprobe and Temp wells.

GPS: N 042.286894, W 083.800421

Logged By: Kirk Wagenvelt, Geologist

Notes: MW-133s,i & d were all set in the same boring. Geology, recovery information and vertical sampling results were taken from Log of Boring MW-133d. All water samples analyzed by PLS for 1,4 Dioxane. ND = <1.0 µg/L

SUBSURFACE PROFILE





FLEIS & VANDENBRINK
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LOG OF BORING / WELL: PLS-11-05 / MW-133i

Start Date: 3/9/2011

Total Depth (ft.): 220

End Date: 3/18/2011

Static Water Level (ft.): 54.58

Project: Pall Life Sciences

Drilling Co.: Stearns Drilling

TOC Elev.: 929.03 Feet NAVD88

Location: GM, Bradley Car Dealership

Drilling Method: Rotasonic

Ground Elev.: approx. 929.50 Feet NAVD88

Project No.: 806500

Sampling Methods: Simulprobe and Temp wells.

GPS: N 042.286894, W 083.800421

Logged By: Kirk Wagenvelt, Geologist

Notes: An unquantified volume of water was used during drilling of this boring. Water use was minimized to the extent possible to help ensure groundwater integrity. Eight inch casing was drilled to 90'. Six inch casing continued to T.D

SUBSURFACE PROFILE

Depth (ft.)	LITHOLOGY			Vertical Aquifer Sample Interval/Water Sample Conc.	Well Construction Detail	Depth (ft.)
	Sample Interval/Recovery	Graphic Log	Description			
			SAND: Sand, fine to med. (90/10) (90%); Gravel, fine (10%), well sorted, subrounded; dense, moist, lt. gray.			
60	59-69/90%		SILTY, GRAVELY, SAND: Sand, fine to coarse (60/30/10) (40%); Silt (30%); Gravel, fine (25%), poorly sorted, subrounded; Clay (trace); low plasticity, soft, moist, olive gray.			60
65			Sand, fine to coarse (40/50/10) (80%); Gravel, fine (10%), well sorted; Silt (trace); med. density, wet, lt. gray.			65
70	69-79/80%		-Sand, fine to coarse (50/30/20) (60%); Silt (20%); Gravel, fine to coarse (70/30) (20%), poorly sorted, rounded; med. density, low plasticity, wet, lt. gray.	69-70.5/ND		70
75			DIAMICTON: Interbedded			75
80	79-89/85%		SAND: Sand, fine to med. (40/60) (90%), well sorted, subangular to subrounded; Silt (trace); med. dense, wet, lt. gray.	79-80.5/ND		80
85					← Bentonite Slurry Seal	85
90	89-99/90%		Sand, fine to med. (50/50) (100%), well sorted; dense, wet, lt. gray.	89-90.5/ND		90
95				94-99/ND	← 2" SCH 40 PVC Casing	95
100	99-109/100%		Sand, fine to med. (90/10) (90%), well sorted; Silt (10%); very dense, wet, lt. gray.			100
105				104-109/ND		105
110						110



FLEIS & VANDENBRINK
ENGINEERING, INC.
Offices in Michigan and Indiana

Project: Pall Life Sciences
Location: GM, Bradley Car Dealership
Project No.: 806500
Logged By: Kirk Wagenvelt, Geologist

LOG OF BORING / WELL: PLS-11-05 / MW-133i

Start Date: 3/9/2011

End Date: 3/18/2011

Drilling Co.: Stearns Drilling

Drilling Method: Rotasonic

Sampling Methods: Simulprobe and Temp wells.

Notes: Five foot vertical aquifer sampling intervals indicate the use of a temporary well.

Total Depth (ft.): 220

Static Water Level (ft.): 54.58

TOC Elev.: 929.03 Feet NAVD88

Ground Elev.: approx. 929.50 Feet NAVD88

GPS: N 042.286894, W 083.800421

SUBSURFACE PROFILE

Depth (ft.)	LITHOLOGY			Vertical Aquifer Sample Interval/Water Sample Conc.	Well Construction Detail	Depth (ft.)
	Sample Interval/Recovery	Graphic Log	Description			
115	109-119/100%		Sand, fine (95%), well sorted; Silt (trace); dense, wet, lt. gray.			115
120			Sand, fine to med. (40/60) (100%), well sorted, subangular; dense, wet, lt. gray.	114-119/ND		120
125	119-129/100%		Sand, fine to med. (90/10) (90%), well sorted; Silt (10%); med. density, wet, lt. gray.			125
130				124-129/ND		130
135	129-139/60%		Sand, fine (100%), well sorted; med. density, wet, lt. gray.			135
140				134-139/ND		140
145	139-149/100%		Sand, fine to med. (85/15) (90%), well sorted; Silt (10%); med. density, wet, lt. gray.			145
150				144-149/ND		150
155	149-159/100%		Sand, fine to med. (75/25) (80%), well sorted; Silt (20%); med. density, low plasticity, olive gray.			155
160				154-159/ND		160
165	159-169/70%					165

← Bentonite Slurry Seal

← Well Gravel



FLEIS & VANDENBRINK
ENGINEERING, INC.
Offices in Michigan and Indiana

LOG OF BORING / WELL: PLS-11-05 / MW-133i

Start Date: 3/9/2011

Total Depth (ft.): 220

End Date: 3/18/2011

Static Water Level (ft.): 54.58

Project: Pall Life Sciences

Drilling Co.: Stearns Drilling

TOC Elev.: 929.03 Feet NAVD88

Location: GM, Bradley Car Dealership

Drilling Method: Rotosonic

Ground Elev.: approx. 929.50 Feet NAVD88

Project No.: 806500

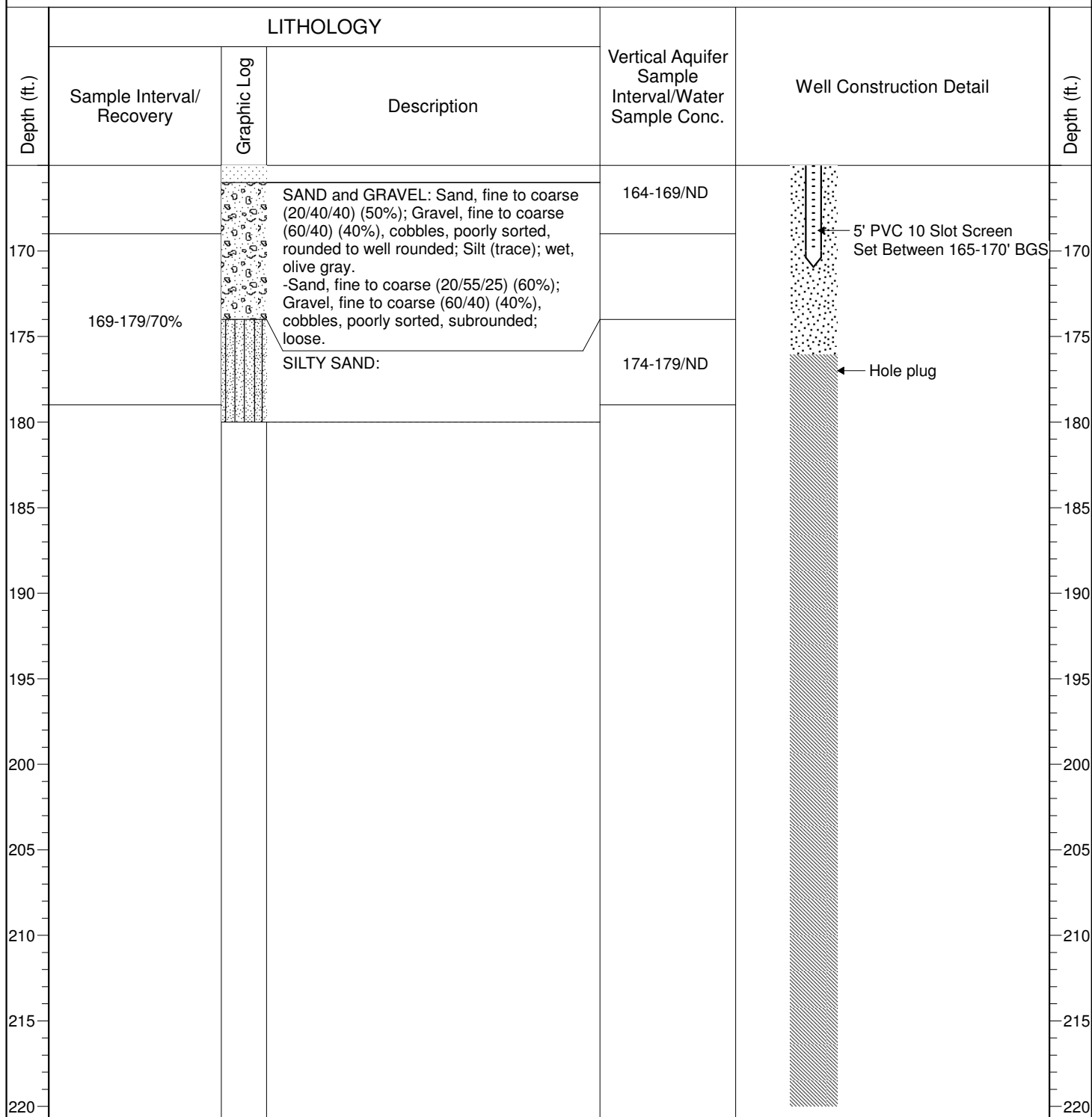
Sampling Methods: Simulprobe and Temp wells.

GPS: N 042.286894, W 083.800421

Logged By: Kirk Wagnervelt, Geologist

Notes: Four inch cores were observed to determine the geology.

SUBSURFACE PROFILE





FLEIS & VANDENBRINK
ENGINEERING, INC.
Offices in Michigan and Indiana

LOG OF BORING / WELL: PLS-11-05 / MW-133s

Start Date: 3/9/2011

Total Depth (ft.): 220

End Date: 3/18/2011

Static Water Level (ft.): 54.73

Project: Pall Life Sciences

Drilling Co.: Stearns Drilling

TOC Elev.: 929.16 Feet NAVD88

Location: GM, Bradley Car Dealership

Drilling Method: Rotasonic

Ground Elev.: approx. 929.50 Feet NAVD88

Project No.: 806500

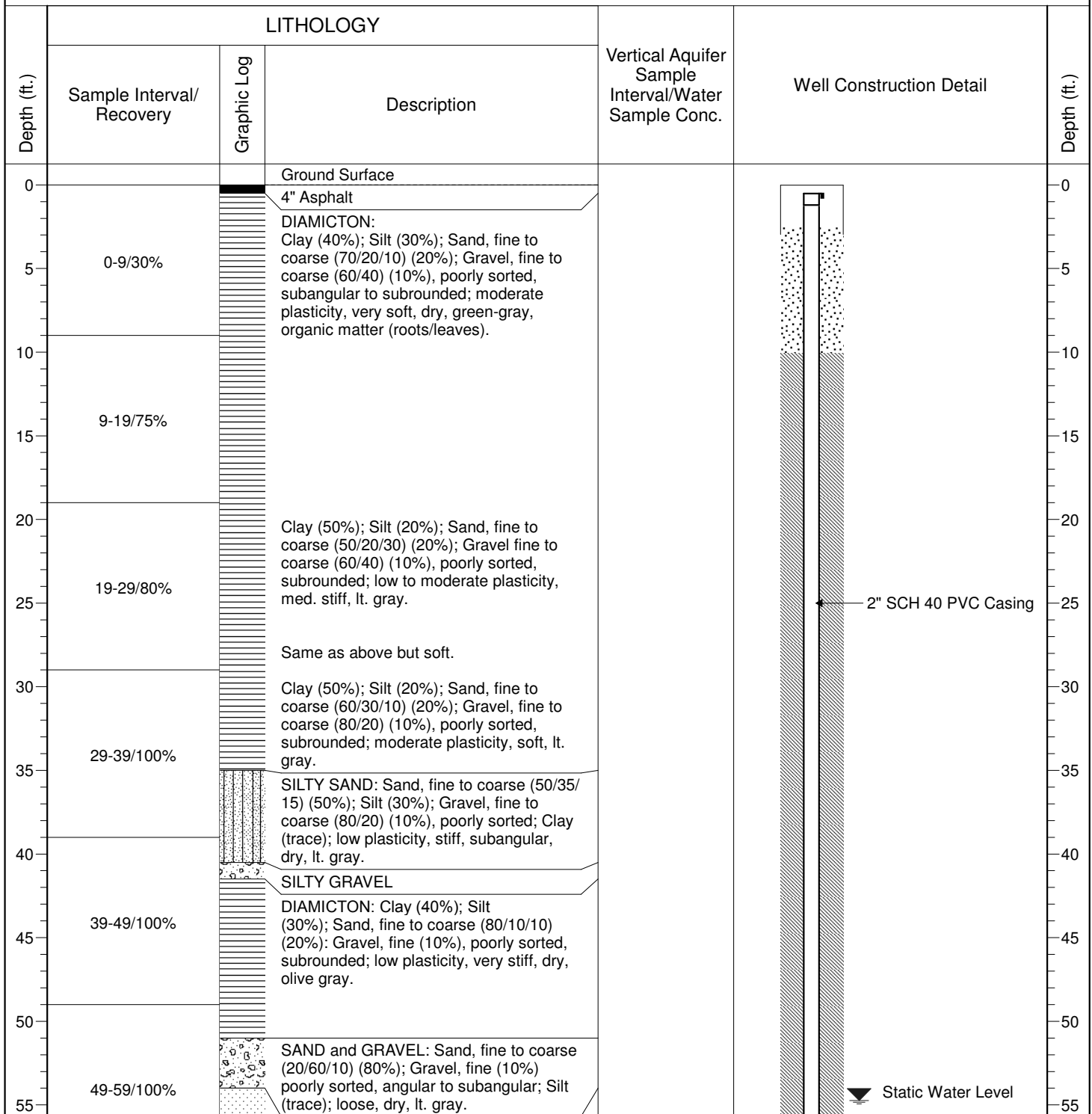
Sampling Methods: Simulprobe and Temp wells.

GPS: N 042.286894, W 083.800421

Logged By: Kirk Wagenvelt, Geologist

Notes: MW-133s,i & d were all set in the same boring. Geology, recovery information and vertical sampling results were taken from Log of Boring MW-133d. All water samples analyzed by PLS for 1,4 Dioxane. ND = <1.0 µg/L

SUBSURFACE PROFILE





FLEIS & VANDENBRINK
ENGINEERING, INC.
Offices in Michigan and Indiana

LOG OF BORING / WELL: PLS-11-05 / MW-133s

Start Date: 3/9/2011

Total Depth (ft.): 220

End Date: 3/18/2011

Static Water Level (ft.): 54.73

Project: Pall Life Sciences

Drilling Co.: Stearns Drilling

TOC Elev.: 929.16 Feet NAVD88

Location: GM, Bradley Car Dealership

Drilling Method: Rotosonic

Ground Elev.: approx. 929.50 Feet NAVD88

Project No.: 806500

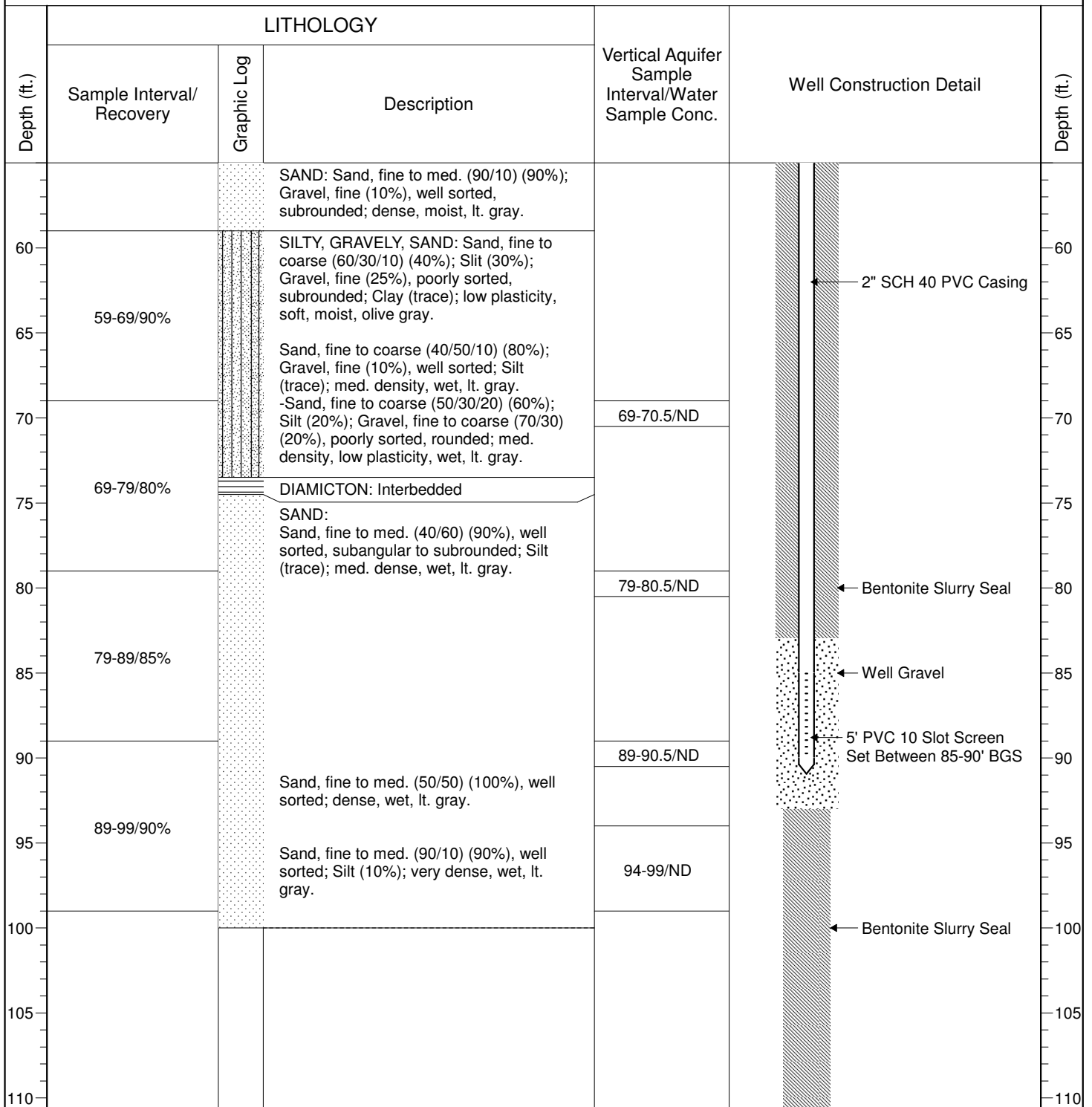
Sampling Methods: Simulprobe and Temp wells.

GPS: N 042.286894, W 083.800421

Logged By: Kirk Wagenvelt, Geologist

Notes: An unquantified volume of water was used during drilling of this boring. Water use was minimized to the extent possible to help ensure groundwater integrity. Eight inch casing was drilled to 90'. Six inch casing continued to T.D

SUBSURFACE PROFILE





FLEIS & VANDENBRINK
ENGINEERING, INC.
Offices in Michigan and Indiana

Project: Pall Life Sciences

Location: 112 Jackson Plaza

Project No.: 806500

Logged By: Kirk Wagenvelt, Geologist

LOG OF BORING / WELL: PLS-11-06 / MW-134d

Start Date: 3/21/2011

End Date: 3/29/2011

Drilling Co.: Boart Longyear

Drilling Method: Rotasonic

Sampling Methods: Push Ahead and Temp. Wells

Total Depth (ft.): 218

Static Water Level (ft.): 46.12

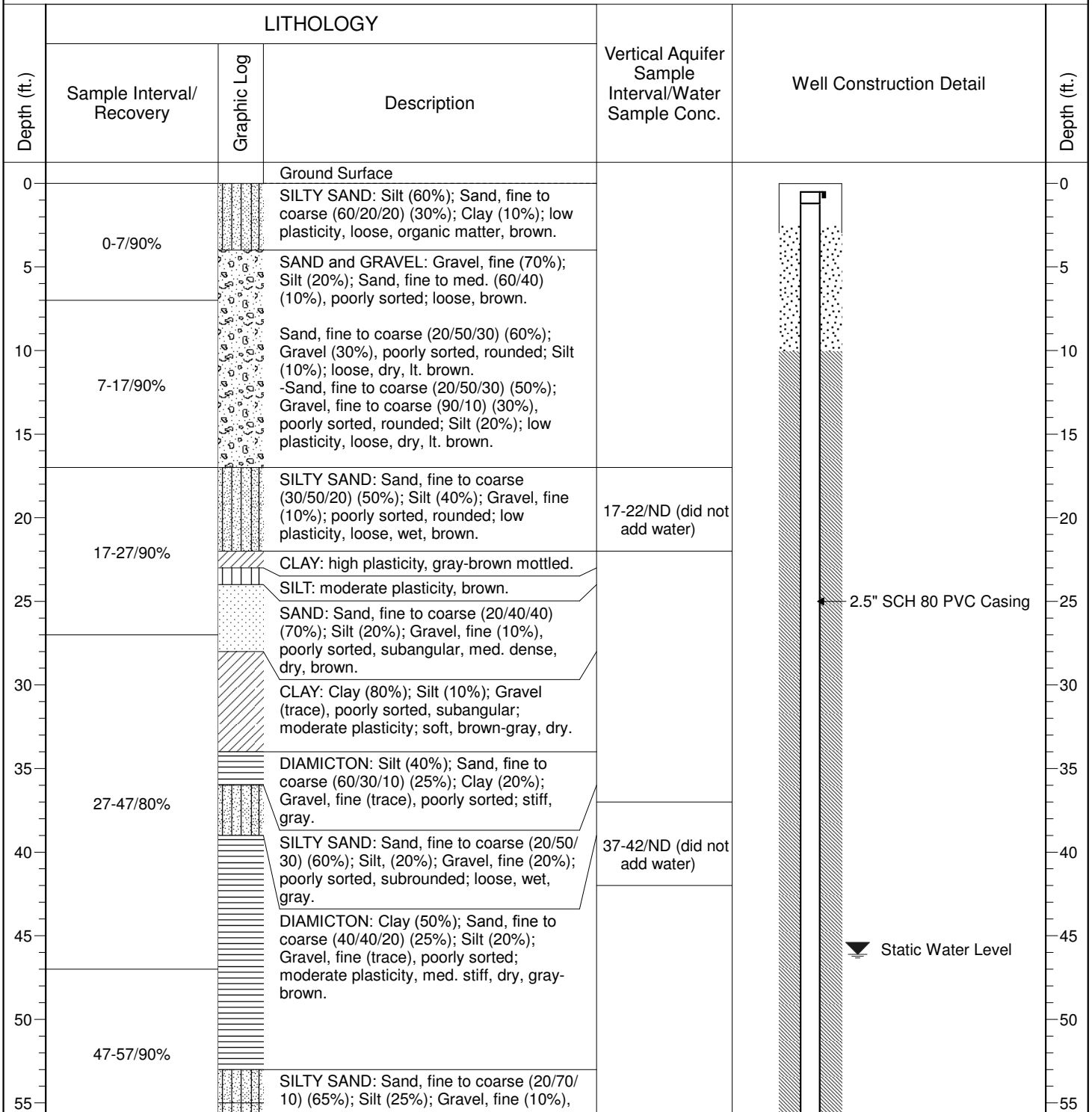
TOC Elev.: 920.07 Feet NAVD88

Ground Elev.: approx. 920.50 Feet NAVD88

GPS: N 042.283190, W 083.802331

Notes: MW-134s,i & d were all set in the same boring. Geology, recovery information and vertical sampling results were taken from Log of Boring MW-134d. All water samples analyzed by PLS for 1,4 Dioxane. ND = <1.0 µg/L

SUBSURFACE PROFILE





FLEIS & VANDENBRINK
ENGINEERING, INC.
Offices in Michigan and Indiana

Project: Pall Life Sciences

Location: 112 Jackson Plaza

Project No.: 806500

Logged By: Kirk Wagenvelt, Geologist

LOG OF BORING / WELL: PLS-11-06 / MW-134d

Start Date: 3/21/2011

End Date: 3/29/2011

Drilling Co.: Boart Longyear

Drilling Method: Rotosonic

Sampling Methods: Push Ahead and Temp. Wells

Notes: Eight inch casing was drilled to 100'. Six inch casing continued to T.D.

Total Depth (ft.): 218

Static Water Level (ft.): 46.12

TOC Elev.: 920.07 Feet NAVD88

Ground Elev.: approx. 920.50 Feet NAVD88

GPS: N 042.283190, W 083.802331

SUBSURFACE PROFILE

Depth (ft.)	LITHOLOGY			Vertical Aquifer Sample Interval/Water Sample Conc.	Well Construction Detail	Depth (ft.)
	Sample Interval/Recovery	Graphic Log	Description			
			poorly sorted, subangular; low plasticity, med. density, moist, lt. brown.			
60	57-67/100%		DIAMICTON: Silt (50%); Clay (30%); Sand, fine to coarse (20/40/40) (10%); Gravel, fine (10%), poorly sorted, subrounded to rounded; low plasticity, very stiff, olive gray.			60
65						65
70	67-77/100%		SAND: Sand, fine to coarse (30/60/10) (90%); Silt (10%); Gravel (trace), well sorted, subrounded; med. density, greenish gray, wet.			70
75						75
80	77-97/100%		SAND: Sand, fine to coarse (30/60/10) (90%); Silt (10%); Gravel (trace), well sorted, subrounded; med. density, greenish gray, wet.	76-81/7 µg/L (did not add water)	 ← Bentonite Slurry Seal	80
85						85
90	97-117/100%		SAND and GRAVEL: Sand, fine to coarse (20/40/40) (50%); Gravel, fine to coarse (60/40) (30%), poorly sorted, subrounded to rounded; Silt (20%), loose, wet, gray.	85-87/9 µg/L		90
95						95
100						100
105				102-107/7 µg/L (added 50 gal.)		105
110						110



FLEIS & VANDENBRINK
ENGINEERING, INC.
Offices in Michigan and Indiana

Project: Pall Life Sciences
Location: 112 Jackson Plaza
Project No.: 806500
Logged By: Kirk Wagenvelt, Geologist

LOG OF BORING / WELL: PLS-11-06 / MW-134d

Start Date: 3/21/2011

End Date: 3/29/2011

Drilling Co.: Boart Longyear

Drilling Method: Rotosonic

Sampling Methods: Push Ahead and Temp. Wells

Notes: Five foot vertical aquifer sampling intervals indicate the use of a temporary well.

Total Depth (ft.): 218

Static Water Level (ft.): 46.12

TOC Elev.: 920.07 Feet NAVD88

Ground Elev.: approx. 920.50 Feet NAVD88

GPS: N 042.283190, W 083.802331

SUBSURFACE PROFILE

Depth (ft.)	LITHOLOGY			Vertical Aquifer Sample Interval/Water Sample Conc.	Well Construction Detail	Depth (ft.)
	Sample Interval/ Recovery	Graphic Log	Description			
115			SANDY SILT: Silt (90%); Sand (trace); Gravel (trace), subrounded; low plasticity, stiff, dry, olive gray.			115
120			SILT: Silt (90%); Clay (10%); low plasticity, stiff, moist, olive gray.			120
125	117-127/100%		Clay lenses. Silt (40%); Sand, fine to coarse (50/30/20) (25%); Gravel, fine to coarse (40/60) (25%), cobbles, poorly sorted, rounded; Clay (10%); gray.			125
130			SAND and GRAVEL: Sand, fine to coarse (20/30/50) (50%); Gravel, fine to coarse (60/40) (35%); poorly sorted, subrounded to rounded; Silt (10%); Clay (trace), loose, wet, gray.			130
135	127-137/70%		Color changes to brown.	132-137/2 µg/L (added 50 gal.)	← Hole Plug	135
140			Sand, fine to coarse (40/40/20) (65%); Gravel, fine to coarse (80/20) (25%), moderately sorted, subangular to rounded; Silt (10%); loose, wet, dk. brown.		← 2.5" SCH 80 PVC Casing	140
145	137-147/100%		Sand, fine to coarse (50/40/10) (60%); Silt (20%); Gravel, fine to coarse (80/20) (10%); poorly sorted, subrounded; Clay (10%); med. density, low plasticity, moist, lt. gray.	142-147/4 µg/L (added 300 gal.)		145
150			Sand, fine to coarse (40/40/20) (50%); Gravel, fine to coarse (60/40) (40%); poorly sorted, subrounded; Silt (10%); loose, moist, gray.	152-157/9 µg/L (added 200 gal.)		150
155	147-157/40%		Gravel, fine to coarse (50/50) (50%), cobbles, poorly sorted, subrounded; Sand, fine to coarse (20/50/30) (40%); Silt (10%); loose, wet, gray.			155
160						160
165	157-167/30%			162-167/3 µg/L		165



FLEIS & VANDENBRINK
ENGINEERING, INC.
Offices in Michigan and Indiana

Project: Pall Life Sciences

Location: 112 Jackson Plaza

Project No.: 806500

Logged By: Kirk Wagenvelt, Geologist

LOG OF BORING / WELL: PLS-11-06 / MW-134d

Start Date: 3/21/2011

End Date: 3/29/2011

Drilling Co.: Boart Longyear

Drilling Method: Rotasonic

Sampling Methods: Push Ahead and Temp. Wells

Total Depth (ft.): 218

Static Water Level (ft.): 46.12

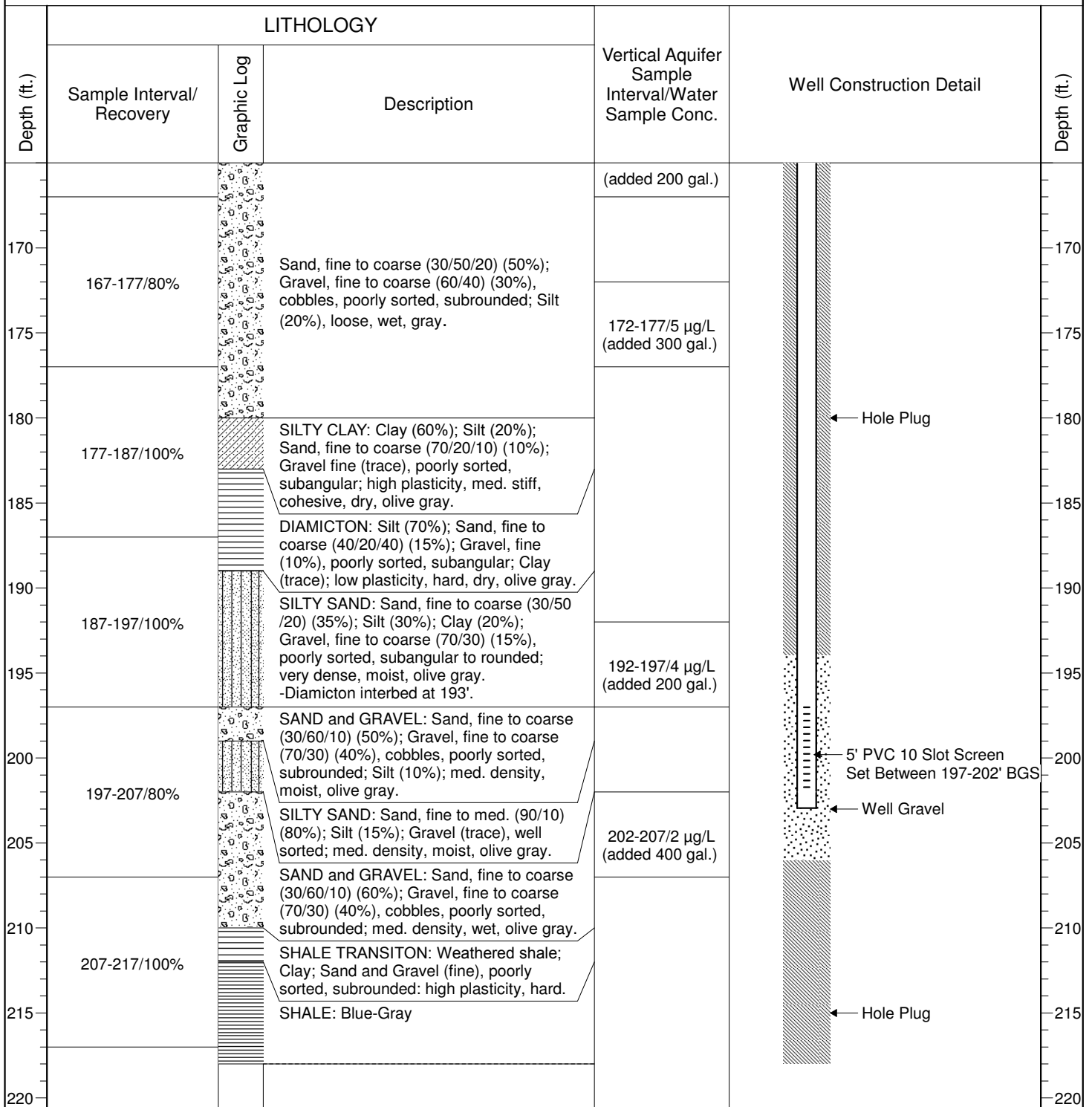
TOC Elev.: 920.07 Feet NAVD88

Ground Elev.: approx. 920.50 Feet NAVD88

GPS: N 042.283190, W 083.802331

Notes: Four inch cores were observed to determine the geology. Blue-gray shale was first observed on 3/27/11 at 212' BGS.

SUBSURFACE PROFILE





FLEIS & VANDENBRINK
ENGINEERING, INC.
Offices in Michigan and Indiana

Project: Pall Life Sciences

Location: 112 Jackson Plaza

Project No.: 806500

Logged By: Kirk Wagenvelt, Geologist

LOG OF BORING / WELL: PLS-11-06 / MW-134i

Start Date: 3/21/2011

End Date: 3/29/2011

Drilling Co.: Boart Longyear

Drilling Method: Rotasonic

Sampling Methods: Push Ahead and Temp. Wells

Total Depth (ft.): 218

Static Water Level (ft.): 46.03

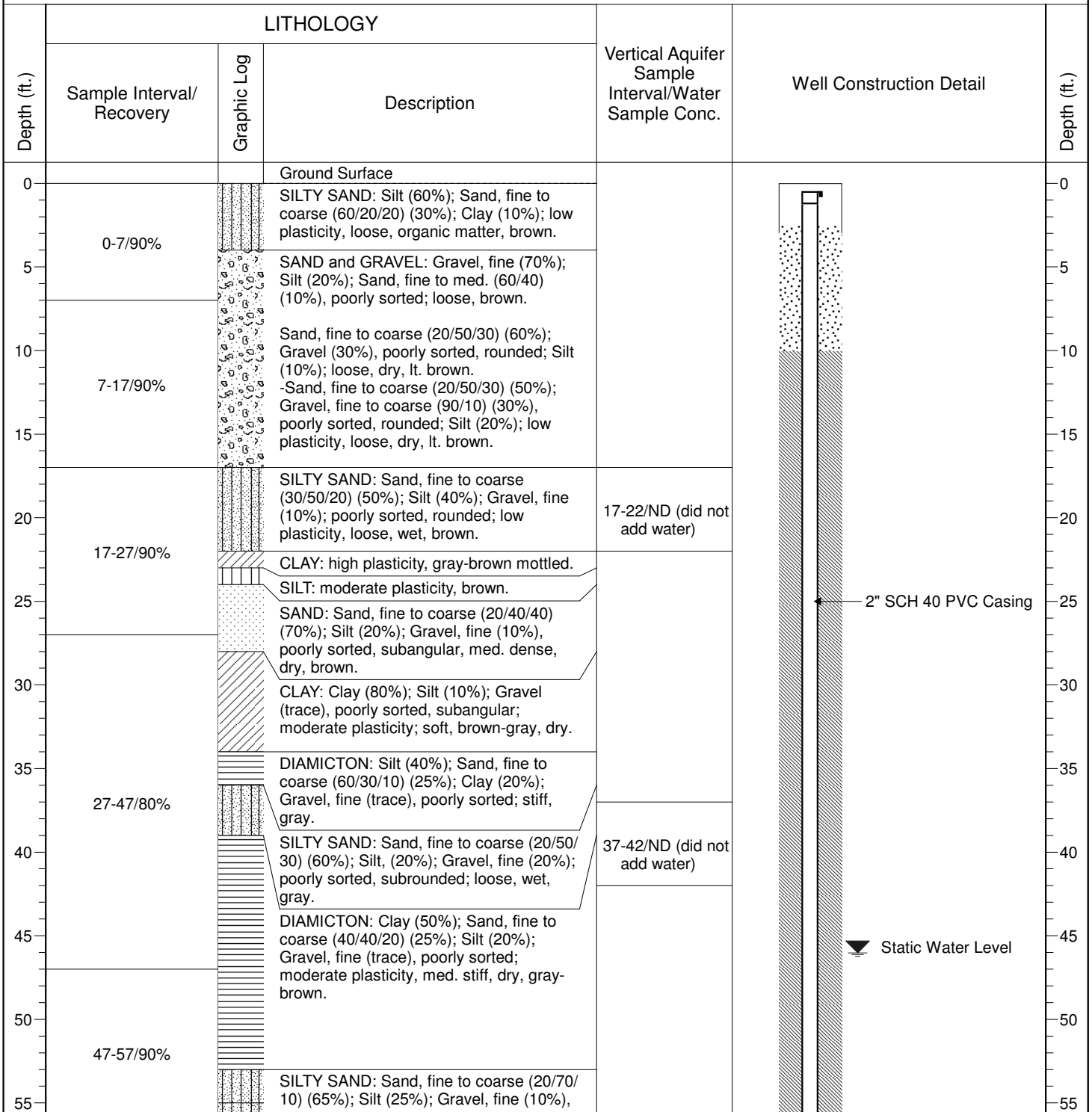
TOC Elev.: 920.04 Feet NAVD88

Ground Elev.: approx. 920.50 Feet NAVD88

GPS: N 042.283189, W 083.802330

Notes: MW-134s,i & d were all set in the same boring. Geology, recovery information and vertical sampling results were taken from Log of Boring MW-134d. All water samples analyzed by PLS for 1,4 Dioxane. ND = <1.0 µg/L

SUBSURFACE PROFILE





FLEIS & VANDENBRINK
ENGINEERING, INC.
Offices in Michigan and Indiana

Project: Pall Life Sciences
Location: 112 Jackson Plaza
Project No.: 806500
Logged By: Kirk Wagenvelt, Geologist

LOG OF BORING / WELL: PLS-11-06 / MW-134i

Start Date: 3/21/2011

End Date: 3/29/2011

Drilling Co.: Boart Longyear

Drilling Method: Rotosonic

Sampling Methods: Push Ahead and Temp. Wells

Notes: Eight inch casing was drilled to 100'. Six inch casing continued to T.D.

Total Depth (ft.): 218

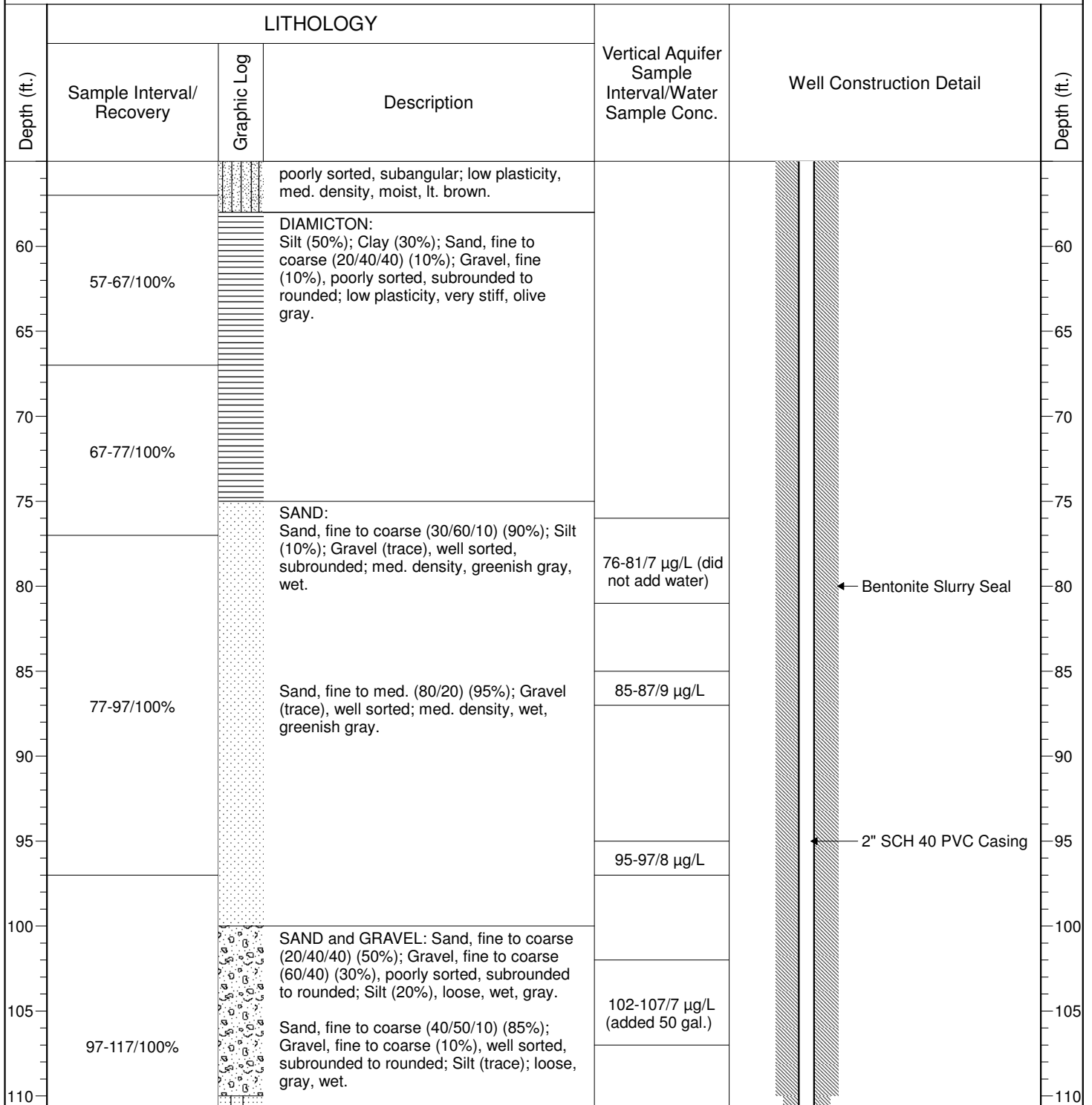
Static Water Level (ft.): 46.03

TOC Elev.: 920.04 Feet NAVD88

Ground Elev.: approx. 920.50 Feet NAVD88

GPS: N 042.283189, W 083.802330

SUBSURFACE PROFILE





FLEIS & VANDENBRINK
ENGINEERING, INC.
Offices in Michigan and Indiana

Project: Pall Life Sciences

Location: 112 Jackson Plaza

Project No.: 806500

Logged By: Kirk Wagenvelt, Geologist

LOG OF BORING / WELL: PLS-11-06 / MW-134i

Start Date: 3/21/2011

End Date: 3/29/2011

Drilling Co.: Boart Longyear

Drilling Method: Rotasonic

Sampling Methods: Push Ahead and Temp. Wells

Notes: Five foot vertical aquifer sampling intervals indicate the use of a temporary well.

Total Depth (ft.): 218

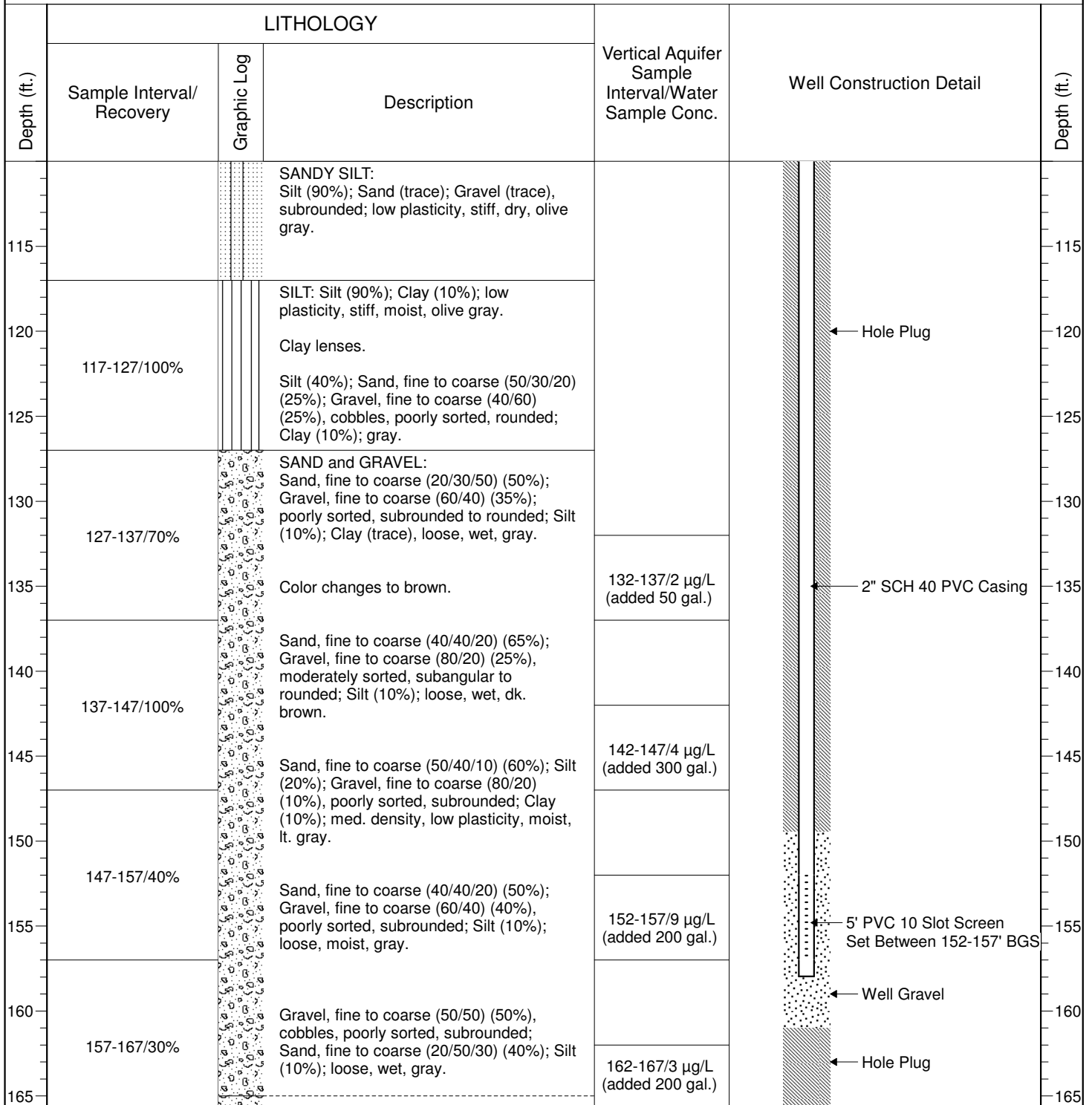
Static Water Level (ft.): 46.03

TOC Elev.: 920.04 Feet NAVD88

Ground Elev.: approx. 920.50 Feet NAVD88

GPS: N 042.283189, W 083.802330

SUBSURFACE PROFILE





FLEIS & VANDENBRINK
ENGINEERING, INC.
Offices in Michigan and Indiana

Project: Pall Life Sciences

Location: 112 Jackson Plaza

Project No.: 806500

Logged By: Kirk Wagenvelt, Geologist

LOG OF BORING / WELL: PLS-11-06 / MW-134s

Start Date: 3/21/2011

End Date: 3/29/2011

Drilling Co.: Boart Longyear

Drilling Method: Rotosonic

Sampling Methods: Push Ahead and Temp. Wells

Total Depth (ft.): 218

Static Water Level (ft.): 46.48

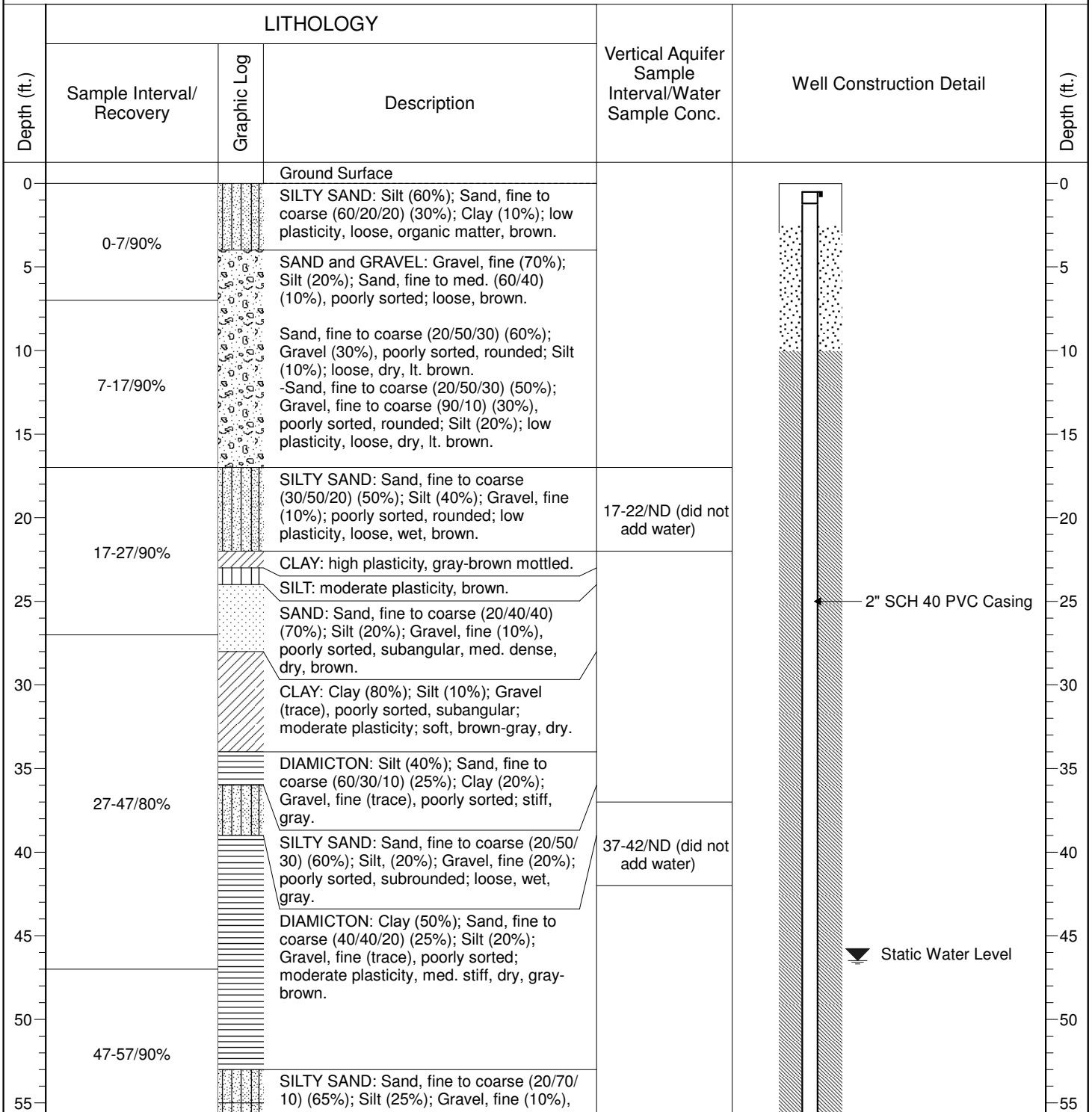
TOC Elev.: 920.00 Feet NAVD88

Ground Elev.: approx. 920.50 Feet NAVD88

GPS: N 042.283190, W 083.802331

Notes: MW-134s,i & d were all set in the same boring. Geology, recovery information and vertical sampling results were taken from Log of Boring MW-134d. All water samples analyzed by PLS for 1,4 Dioxane. ND = <1.0 µg/L

SUBSURFACE PROFILE





FLEIS & VANDENBRINK
ENGINEERING, INC.
Offices in Michigan and Indiana

Project: Pall Life Sciences

Location: 112 Jackson Plaza

Project No.: 806500

Logged By: Kirk Wagenvelt, Geologist

LOG OF BORING / WELL: PLS-11-06 / MW-134s

Start Date: 3/21/2011

End Date: 3/29/2011

Drilling Co.: Boart Longyear

Drilling Method: Rotosonic

Sampling Methods: Push Ahead and Temp. Wells

Notes: Eight inch casing was drilled to 100'. Six inch casing continued to T.D.

Total Depth (ft.): 218

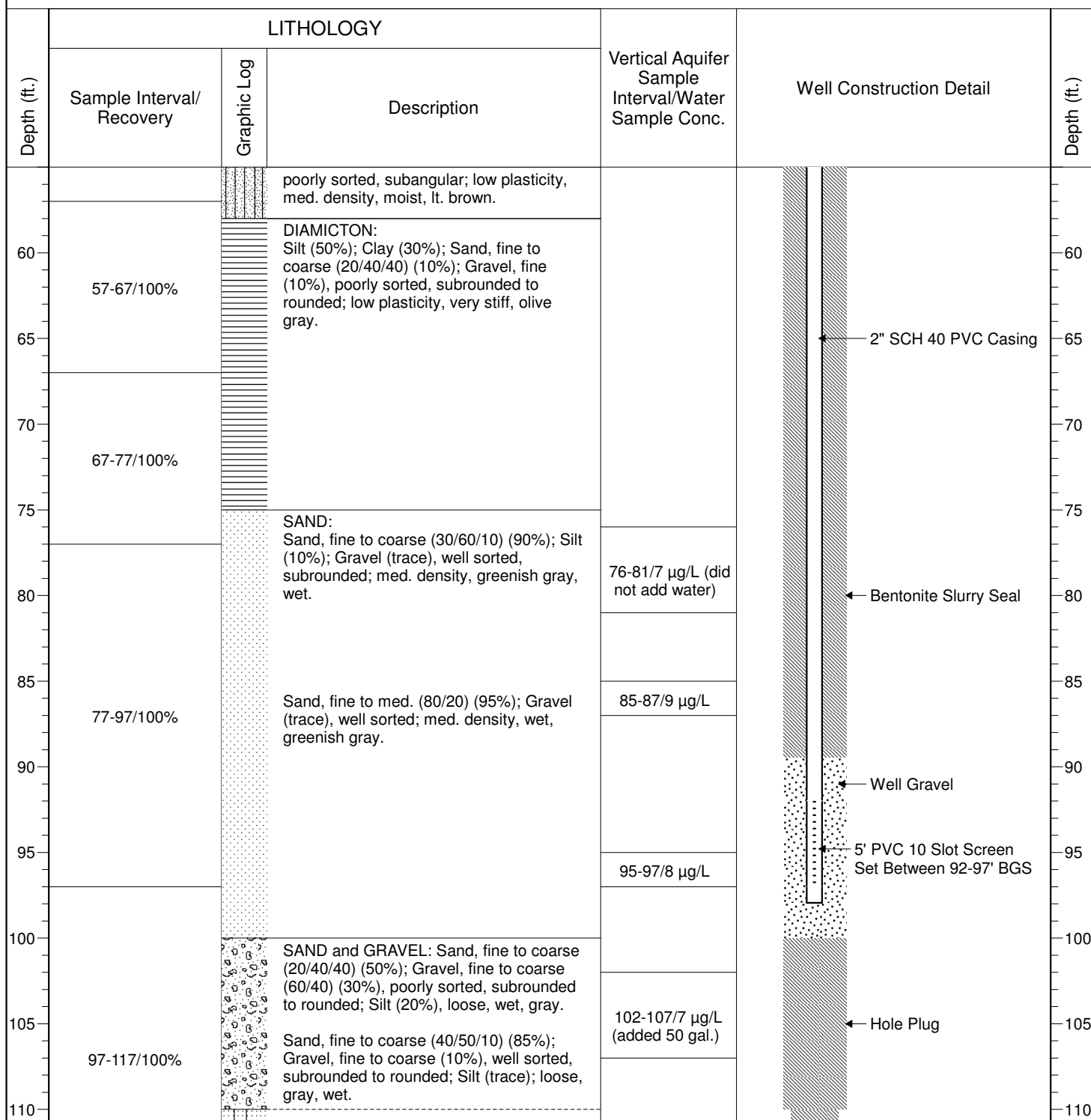
Static Water Level (ft.): 46.48

TOC Elev.: 920.00 Feet NAVD88

Ground Elev.: approx. 920.50 Feet NAVD88

GPS: N 042.283190, W 083.802331

SUBSURFACE PROFILE











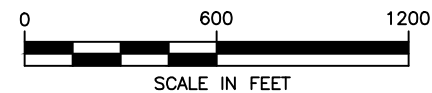


NORTH

FLEIS & VANDENBRINK ENGINEERING, INC.

LEGEND

-  - COMPLIANCE MONITOR WELL
 - PROVISIONAL COMPLIANCE MONITOR WELL
 - MONITORING WELL
 - EXTRACTION WELL
 - TEST BORING
 PROHIBITION ZONE BOUNDARY
 - EXPANDED PROHIBITION ZONE BOUNDARY
 - LITTLE LAKE AREA SYSTEM



PALL LIFE SCIENCES
WASHTENAW COUNTY, MI

Hard copy is intended to be 11"x17" when plotted

WESTERN AREA SYSTEM MONITORING PLAN

APRIL 2011

806500

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