

**Demonstration of Steam Injection/Extraction Treatment
of a DNAPL Source Zone at Launch Complex 34
in Cape Canaveral Air Force Station**

Final Innovative Technology Evaluation Report

Appendix B: Hydrogeologic Measurements

B.1 Data Analysis Methods and Results for the Slug Tests

Slug tests were performed on well clusters PA-13 and PA-14 within the resistive heating plot for pre-demonstration and post-demonstration to determine if the remediation system affected the permeability of the aquifer. The tests consisted of placing a pressure transducer and 1.5-inch-diameter by 5-ft-long solid PVC slug within the well. After the water level reached an equilibrium, the slug was removed rapidly. Removal of the slug created approximately 1.6 ft of change in water level within the well. Water level recovery was then monitored for 10 minutes using a TROLL pressure transducer/data logger. The data was then downloaded to a notebook computer. Replicate tests were performed for each well.

The recovery rates of the water levels were analyzed with the Bouwer (1989) and Bouwer and Rice (1976) methods for slug tests in unconfined aquifers. Graphs were made showing the changes in water level versus time and curve fitted on a semi-logarithmic graph. The slope of the fitted line then was used in conjunction with the well parameters to provide a value of the permeability of the materials surrounding the well. Tests showed very high coefficient of determinations (R^2), with all R^2 s above 0.95. The results also showed a very good agreement between the replicate tests. However, in wells PA-14S and PA-14I some unclear response was observed, where the water levels never returned to the original levels or started decreasing again after reaching equilibrium. It should be noted that during the demonstration, the wells became pressurized, and some residual effects of the pressurization may still be present within the resistive heating plot wells.

The tests are subject to minor variations. As such, a change of more than a magnitude of order would be required to indicate a change in the permeability of the sediments. Keeping this in mind, no tests showed a substantial change in permeability as shown on Table 1. However, five of the six tests indicated a net increase in permeability. Overall, this would suggest that the resistive heating plot technology had a small effect on the sediments in the test plot, increasing the overall permeability of the plot, but not significantly.

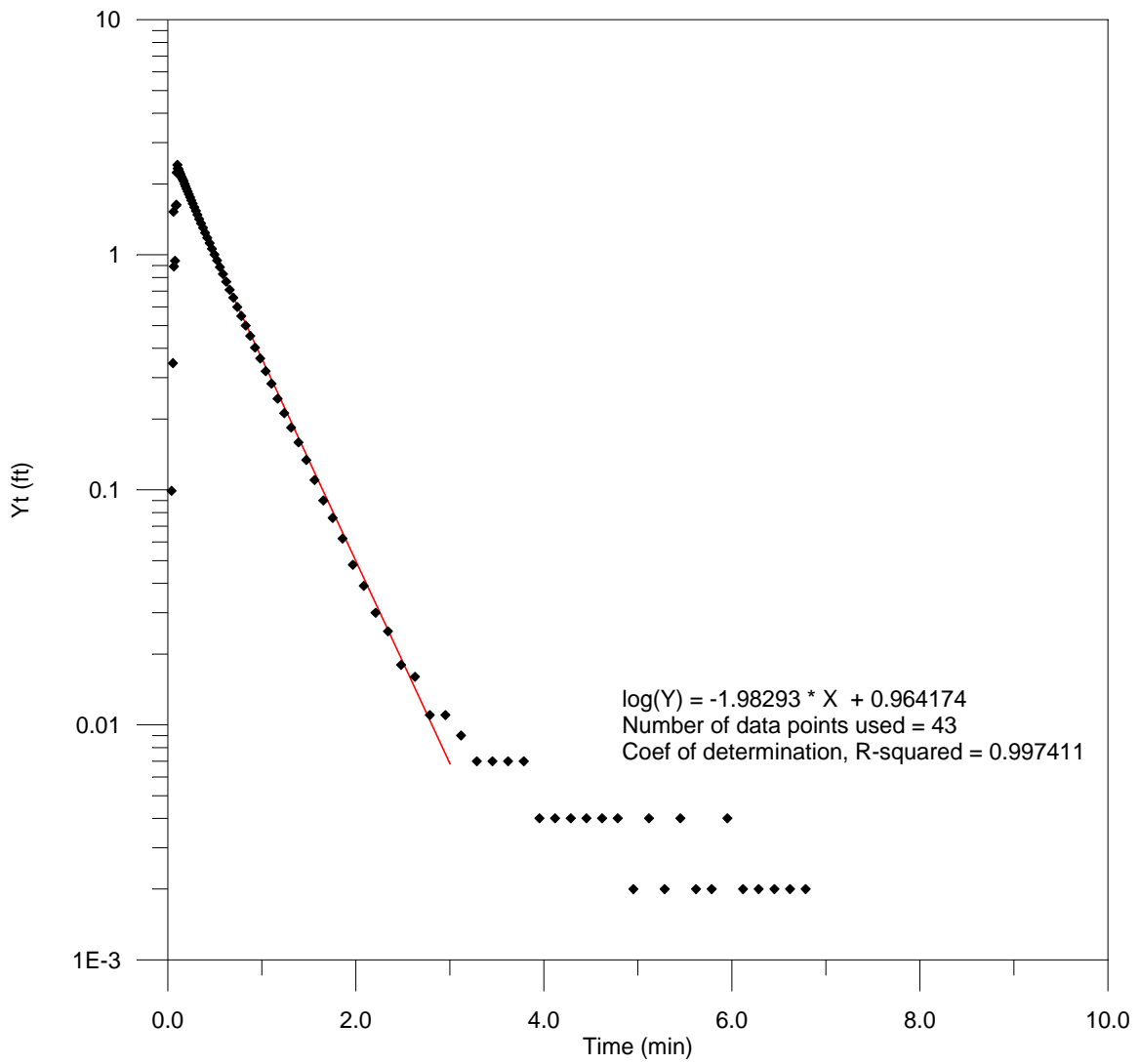
Table 1. Slug Test Results in Resistive Heating Plot

Well	Predemo	Postdemo	Change	Response
PA-13S	14.1	17.4	negligible	excellent
PA-13I	2.4	1.2	(slight decrease)	good
PA-13D	1.1	5.4	(slight increase)	excellent
PA-14S	10.3	23.6	(slight increase)	excellent
PA-14I	4.1	11.4	(slight increase)	good
PA-14D	1.9	7.3	(slight increase)	good

Bouwer, H., and R.C. Rice, 1976, A slug test for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells, *Water Resources Research*, v.12, n.3, pp. 423-428.

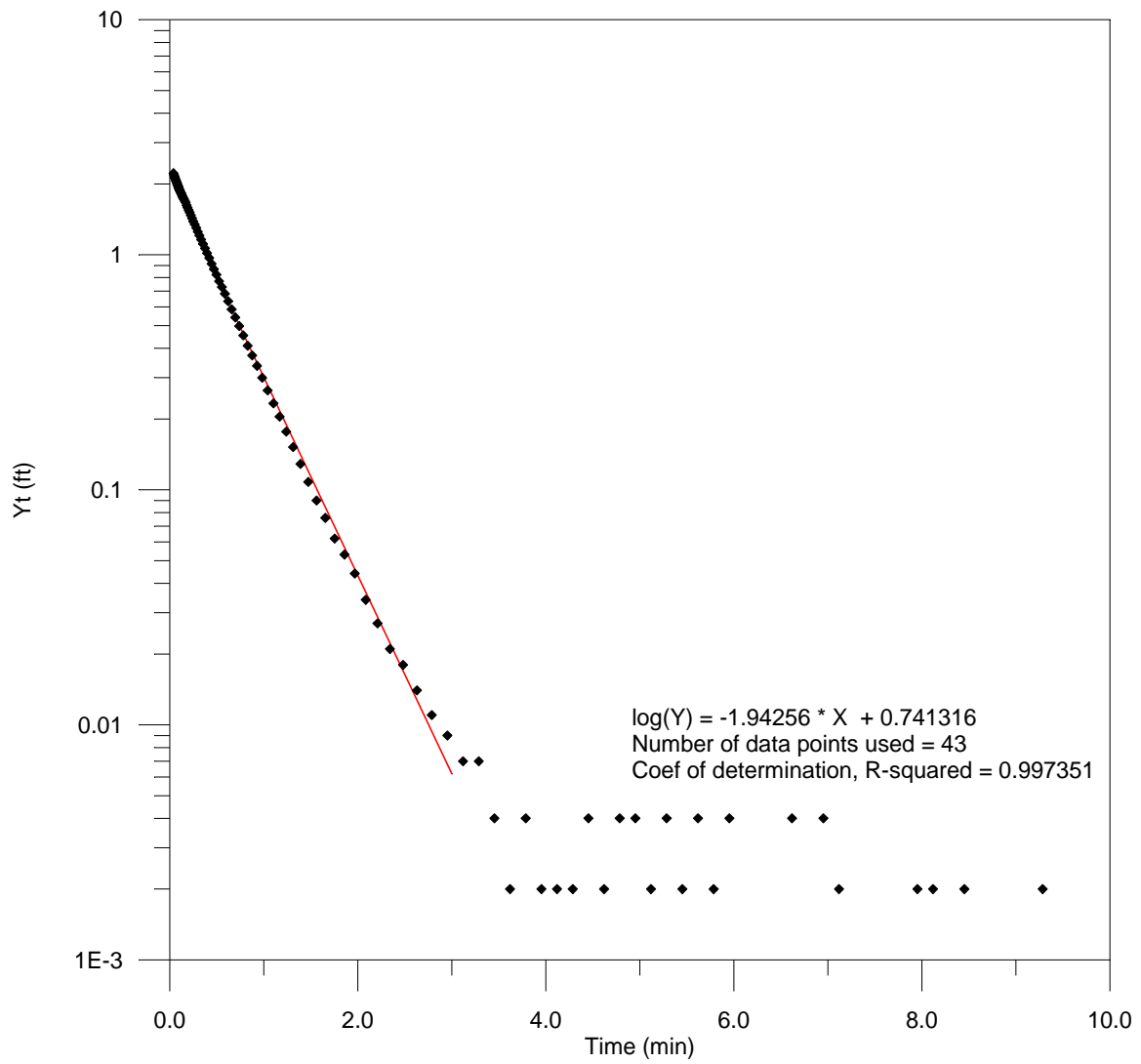
Bouwer, H., 1989, The Bouwer and Rice slug test- an update, *Ground Water*, v. 27, n.3., pp. 304-309.

Well PA-13S: Replicate A



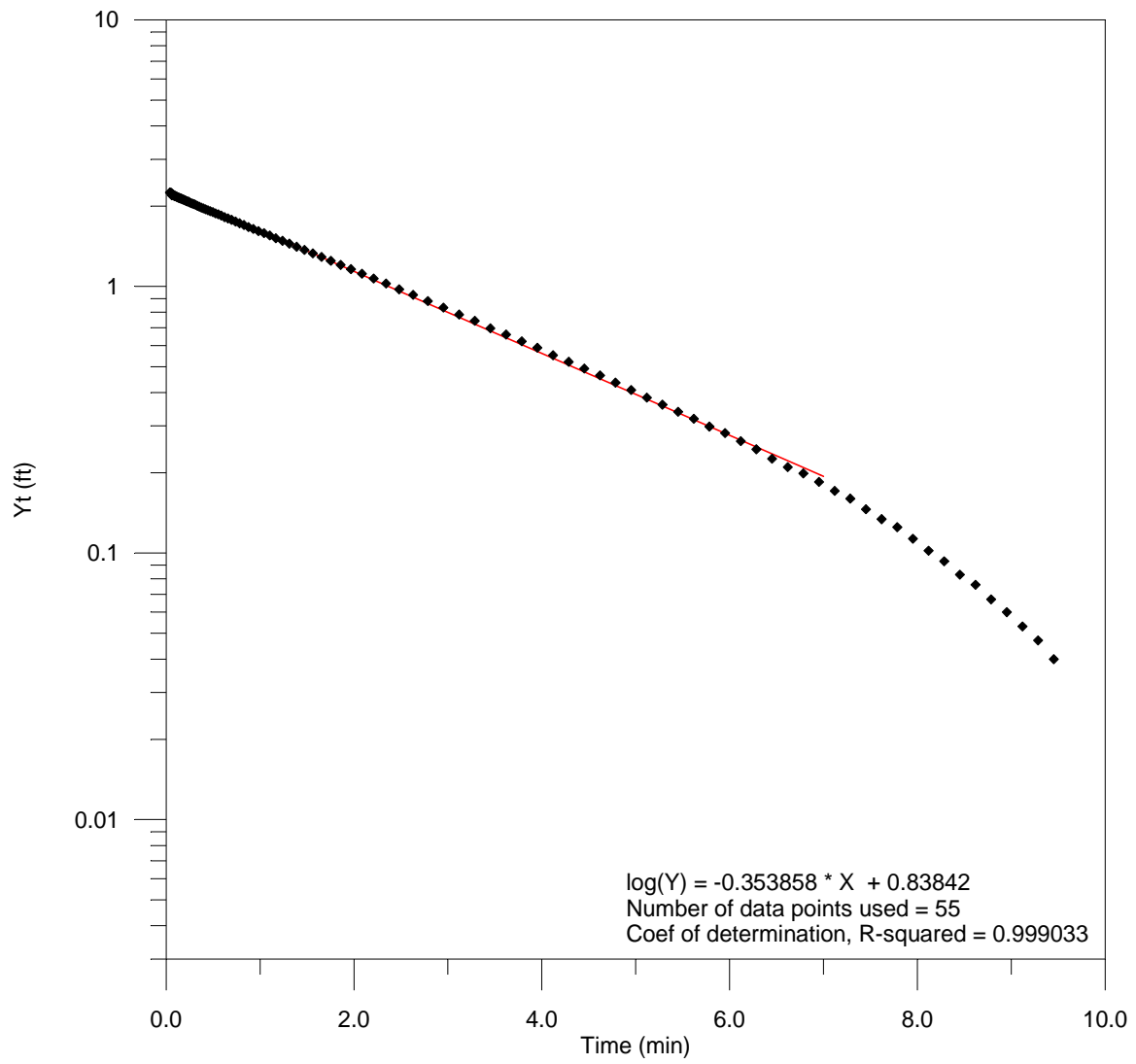
Pre-demonstration Slug Test Results: Well PA-13S.

Well PA-13S: Replicate B



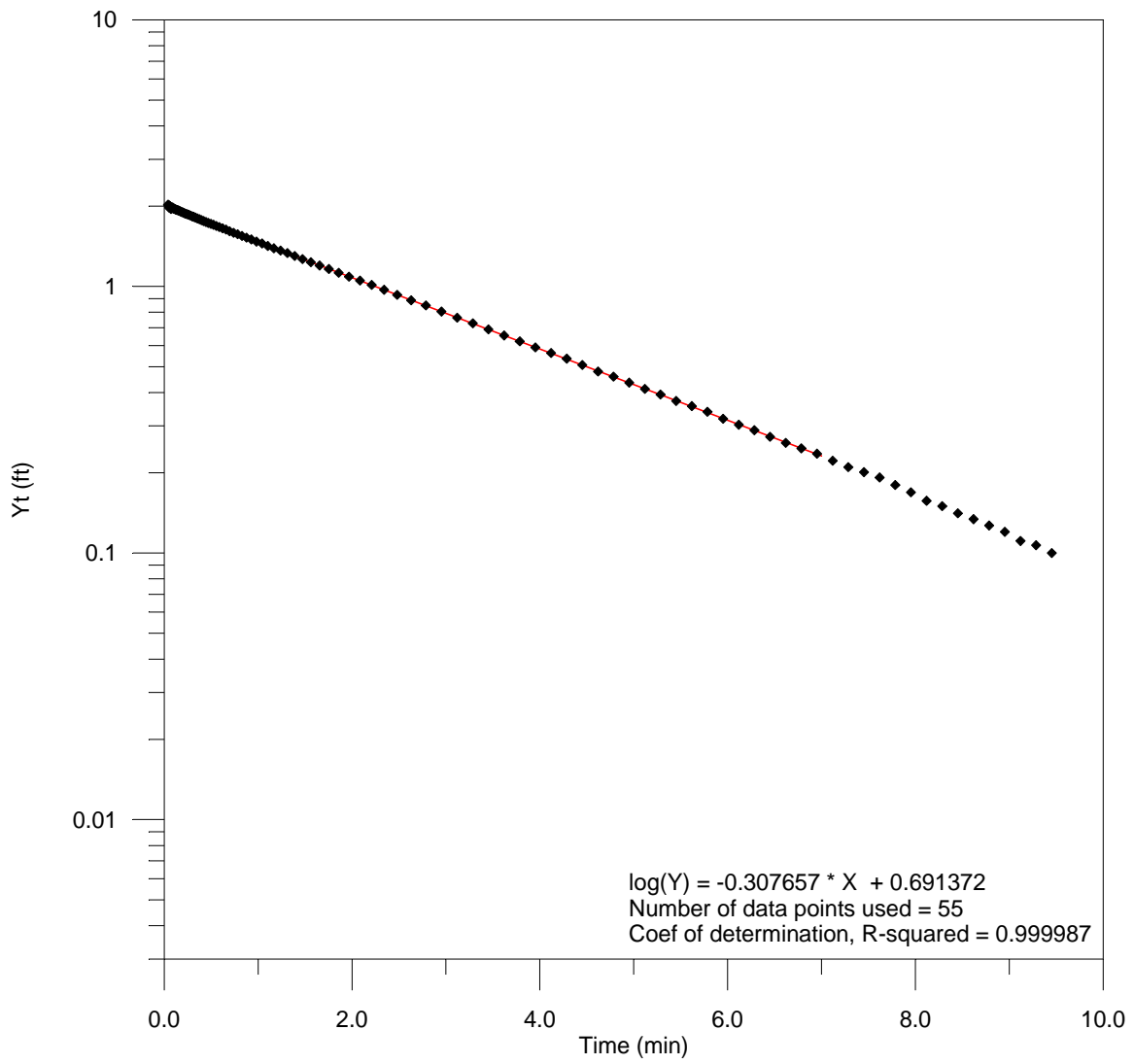
Pre-demonstration Slug Test Results: Well PA-13S.

Well PA-13I: Replicate A



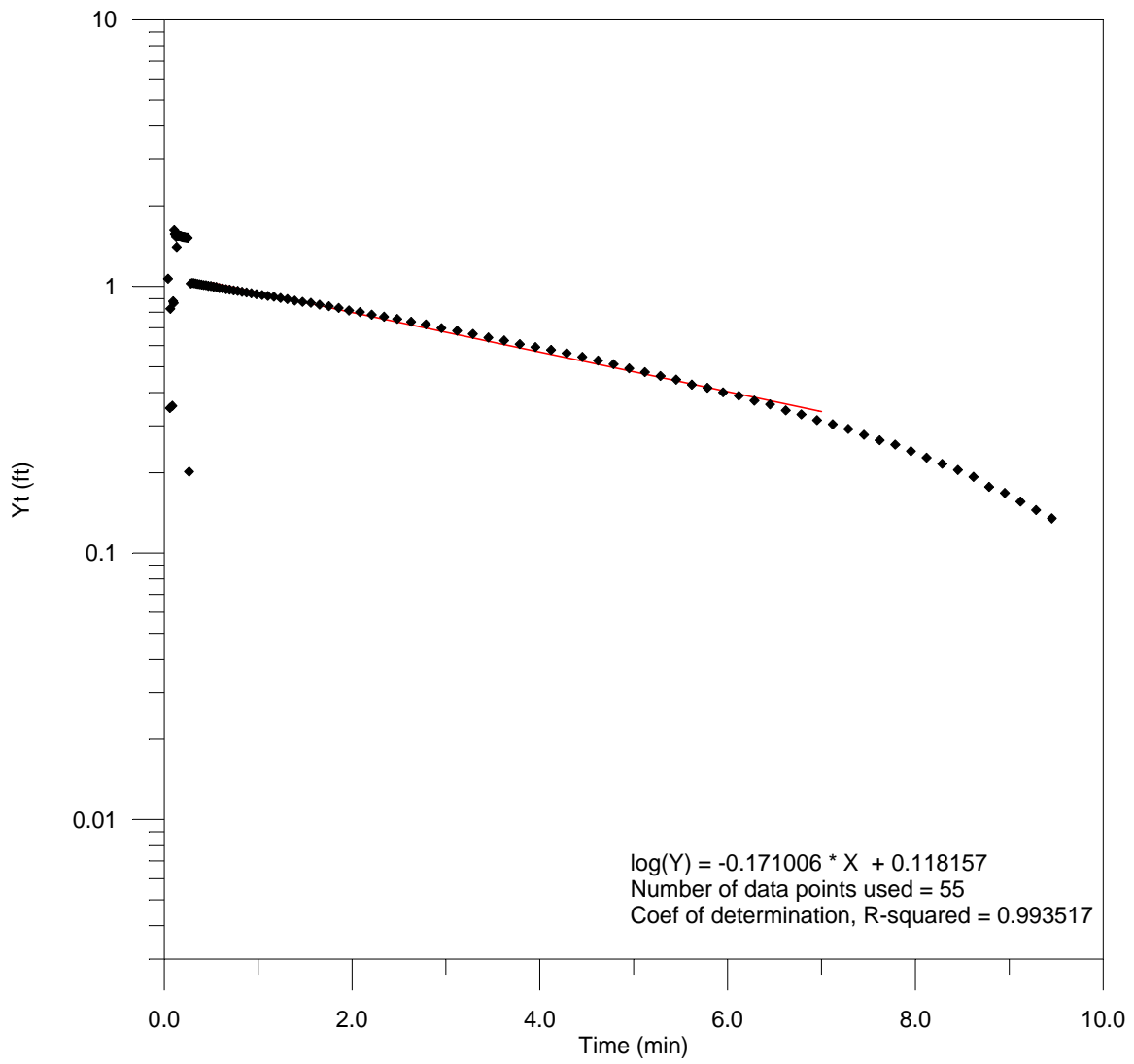
Pre-demonstration Slug Test Results: Well PA-13I.

Well PA-13I: Replicate B



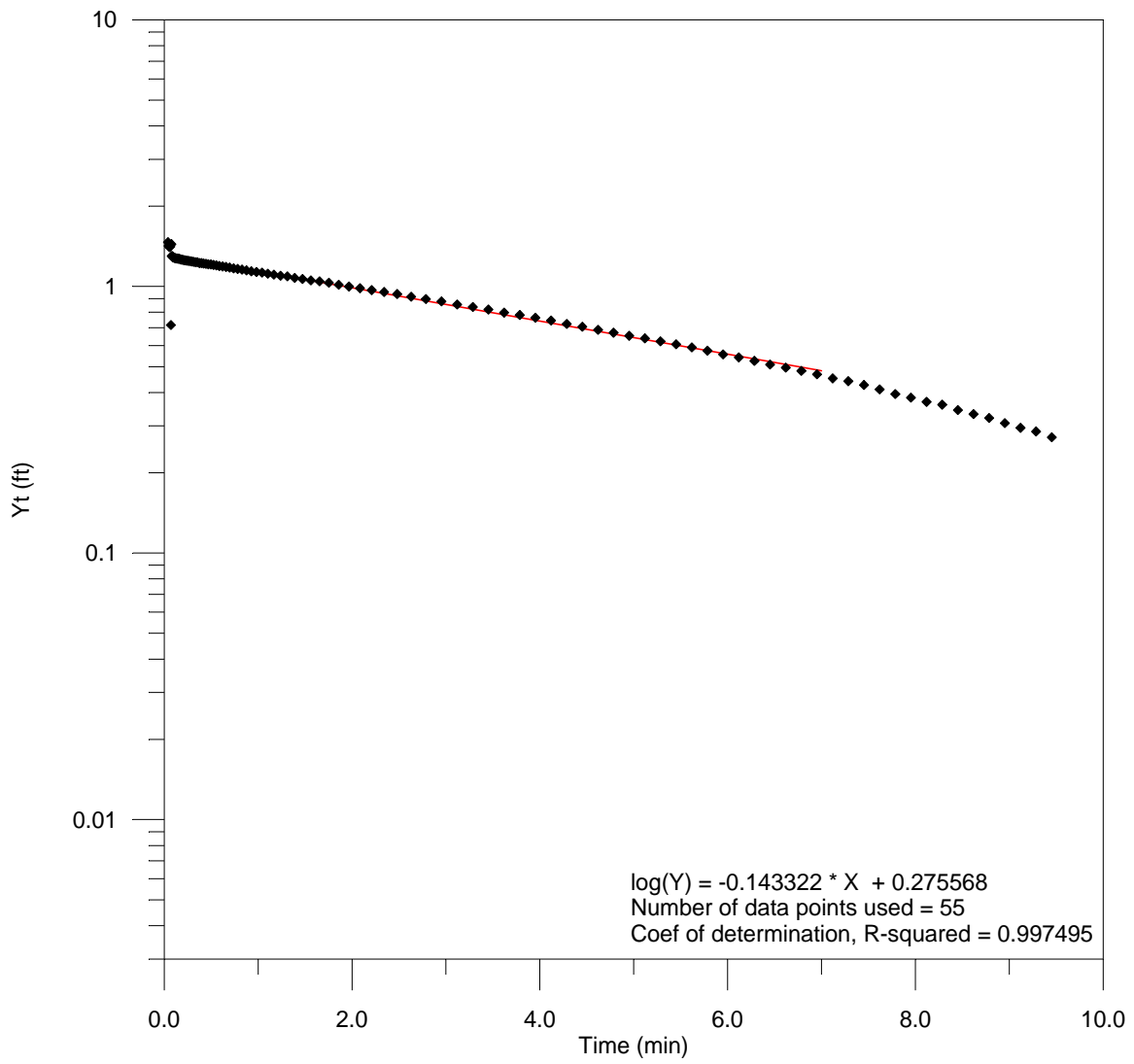
Pre-demonstration Slug Test Results: Well PA-13I.

Well PA-13D: Replicate A



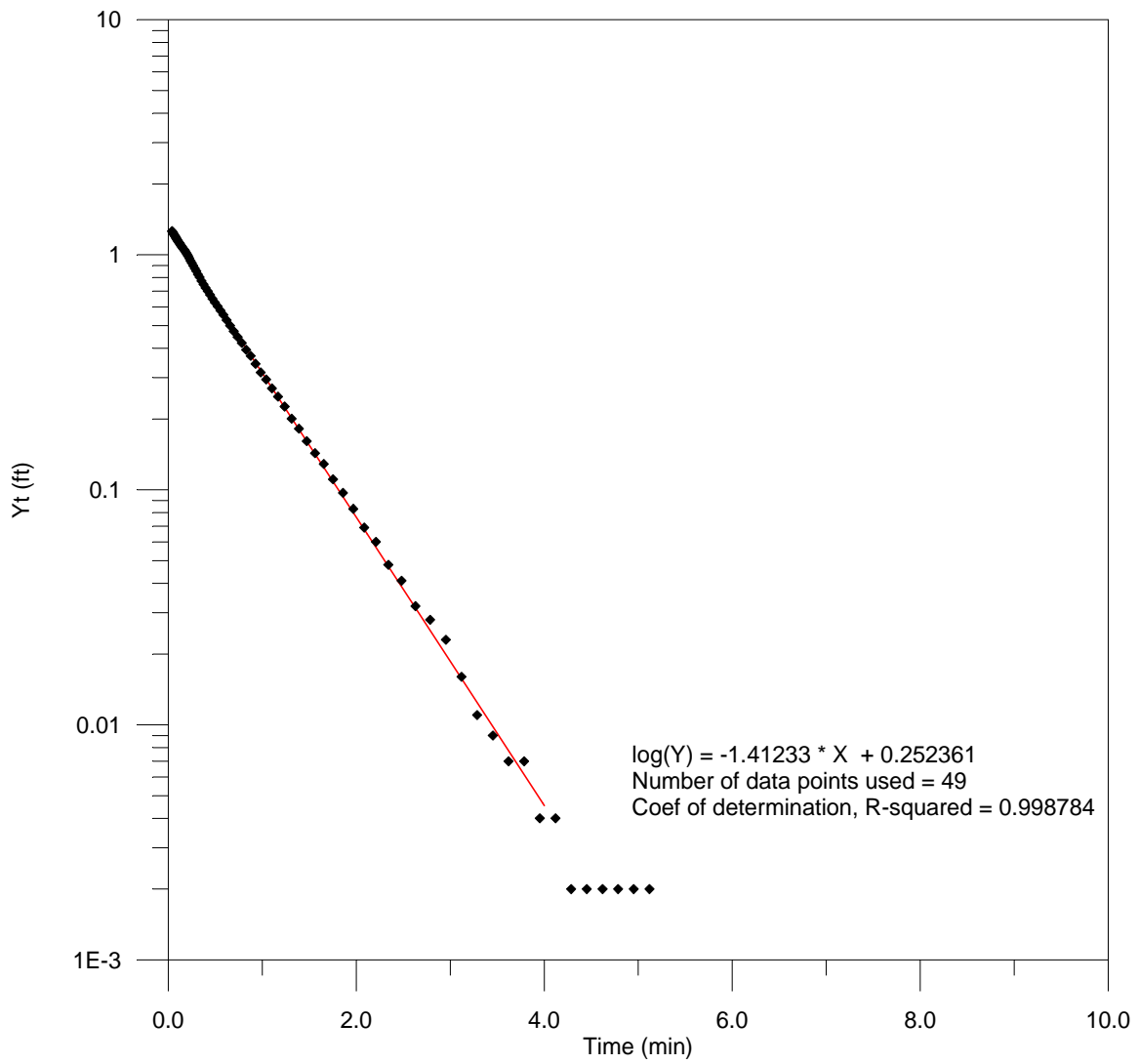
Pre-demonstration Slug Test Results: Well PA-13D.

Well PA-13D: Replicate B



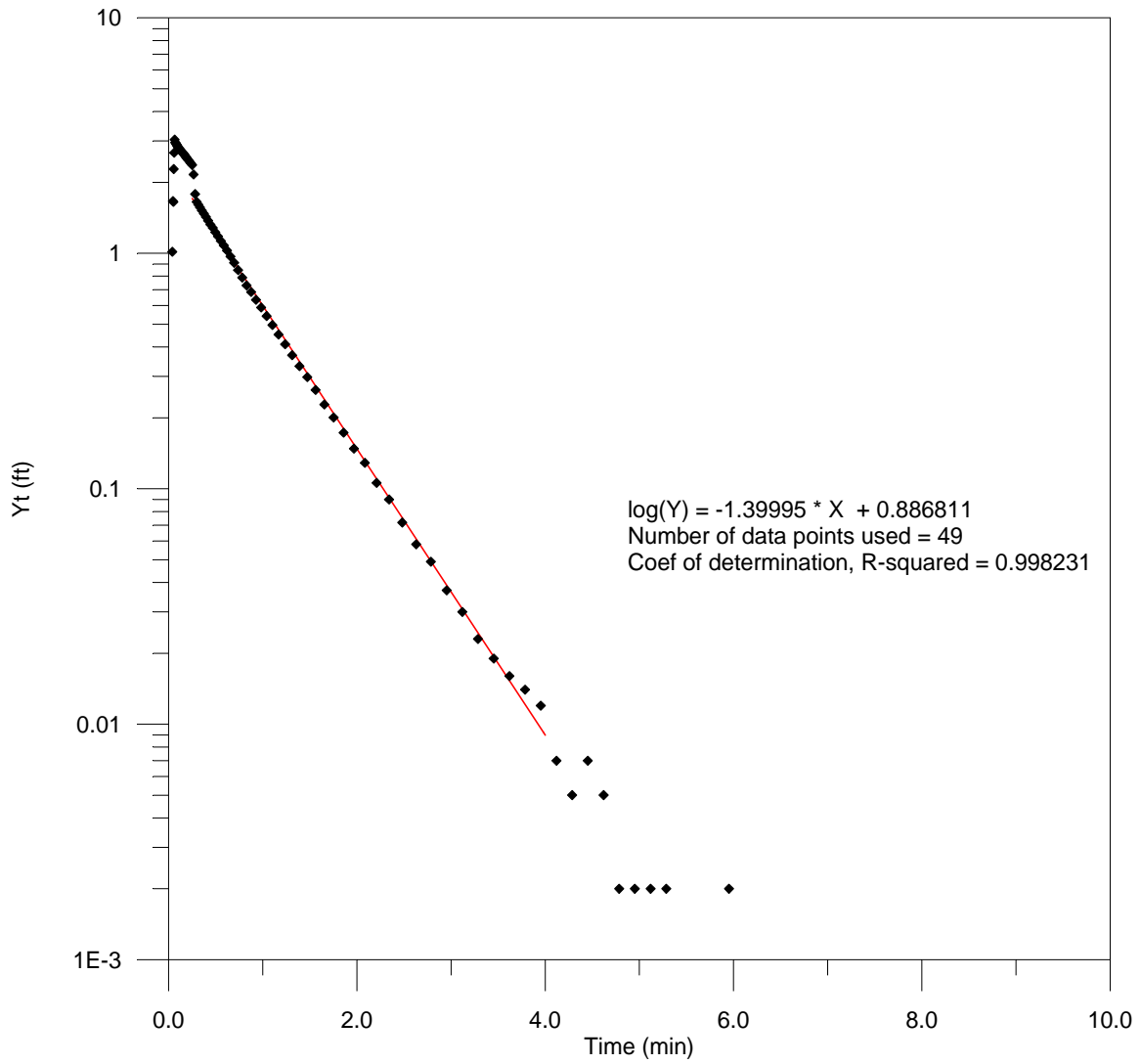
Pre-demonstration Slug Test Results: Well PA-13D.

Well PA-14S: Replicate A



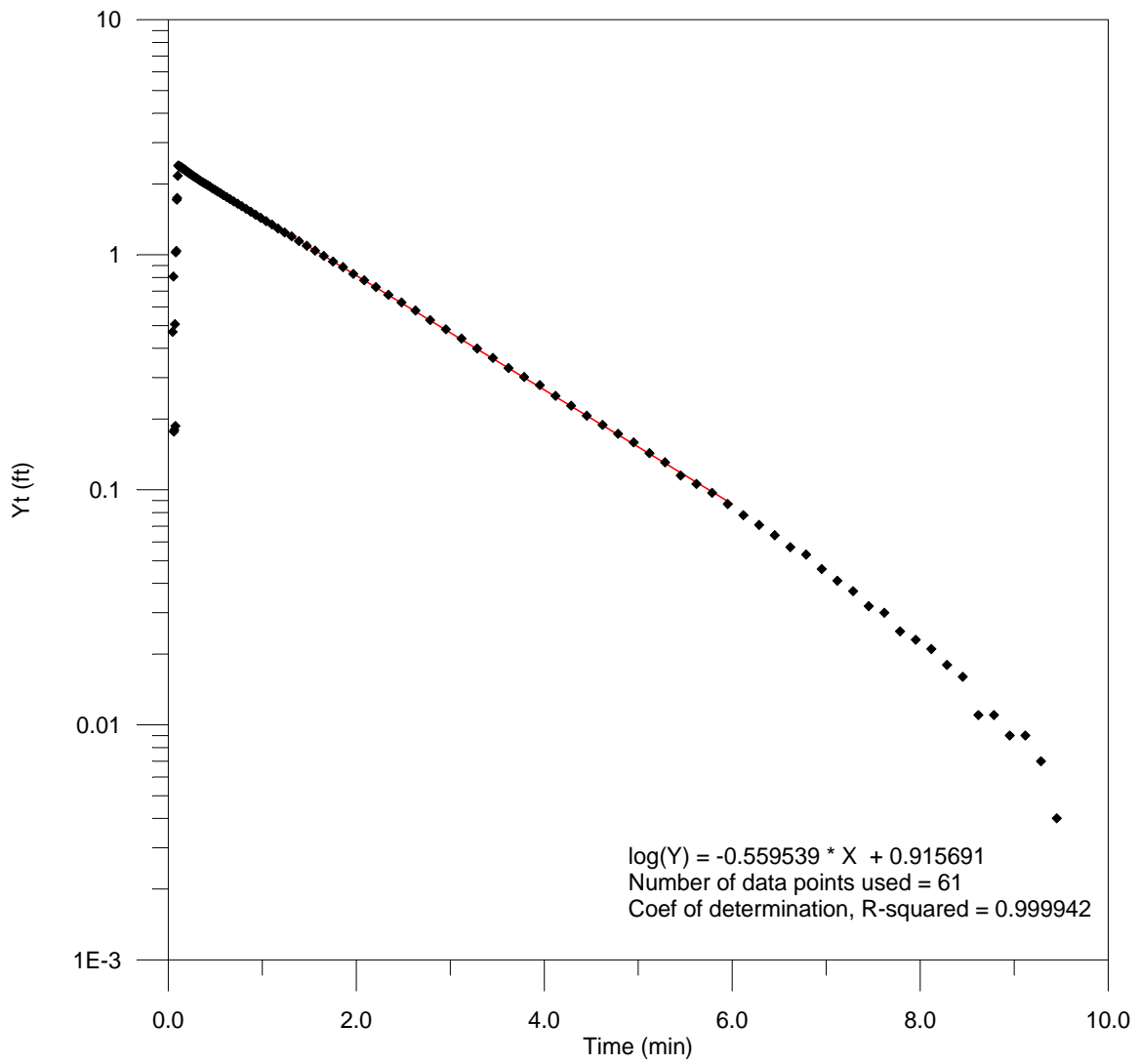
Pre-demonstration Slug Test Results: Well PA-14S.

Well PA-14S: Replicate B



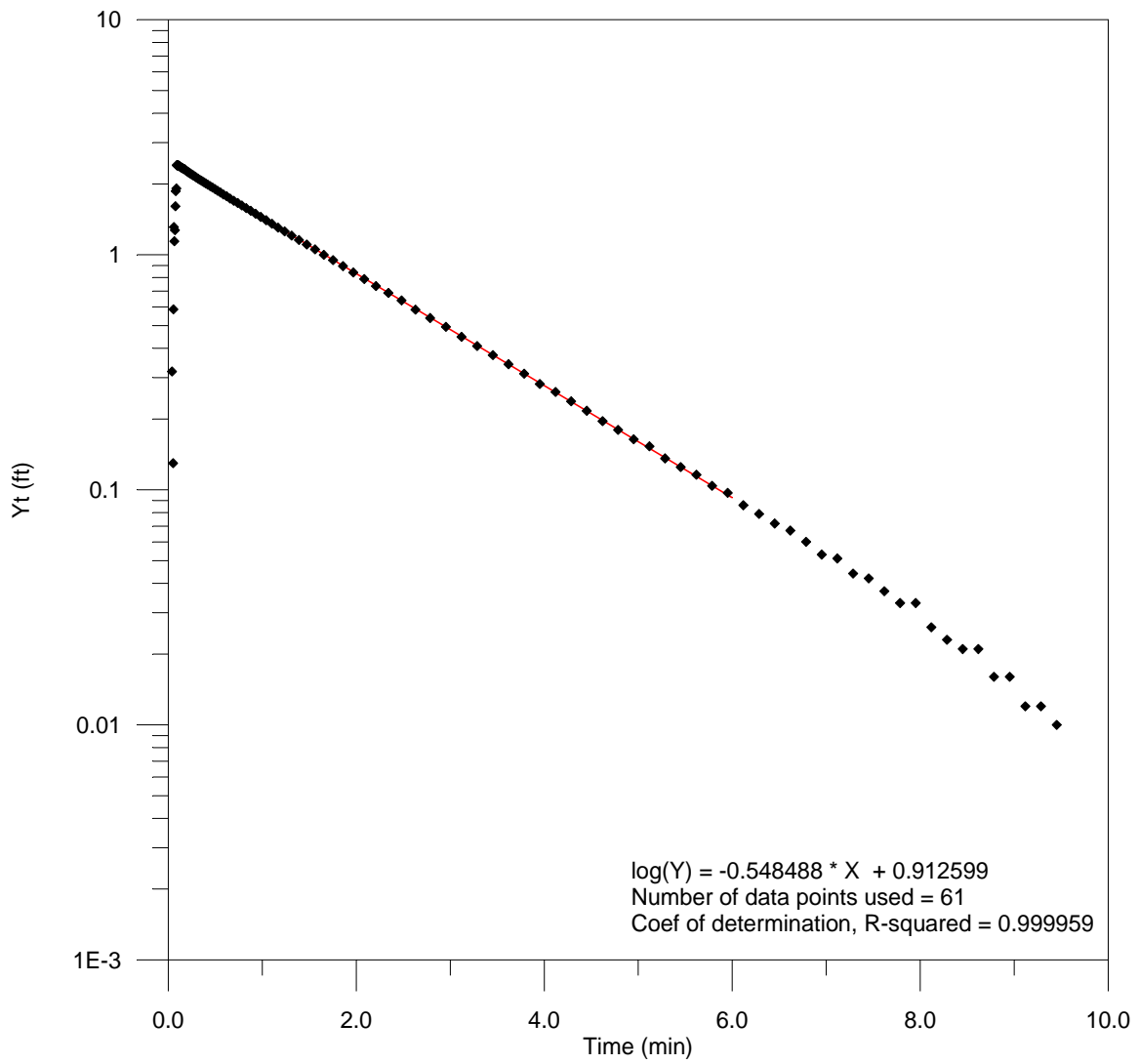
Pre-demonstration Slug Test Results: Well PA-14S.

Well PA-14I: Replicate A



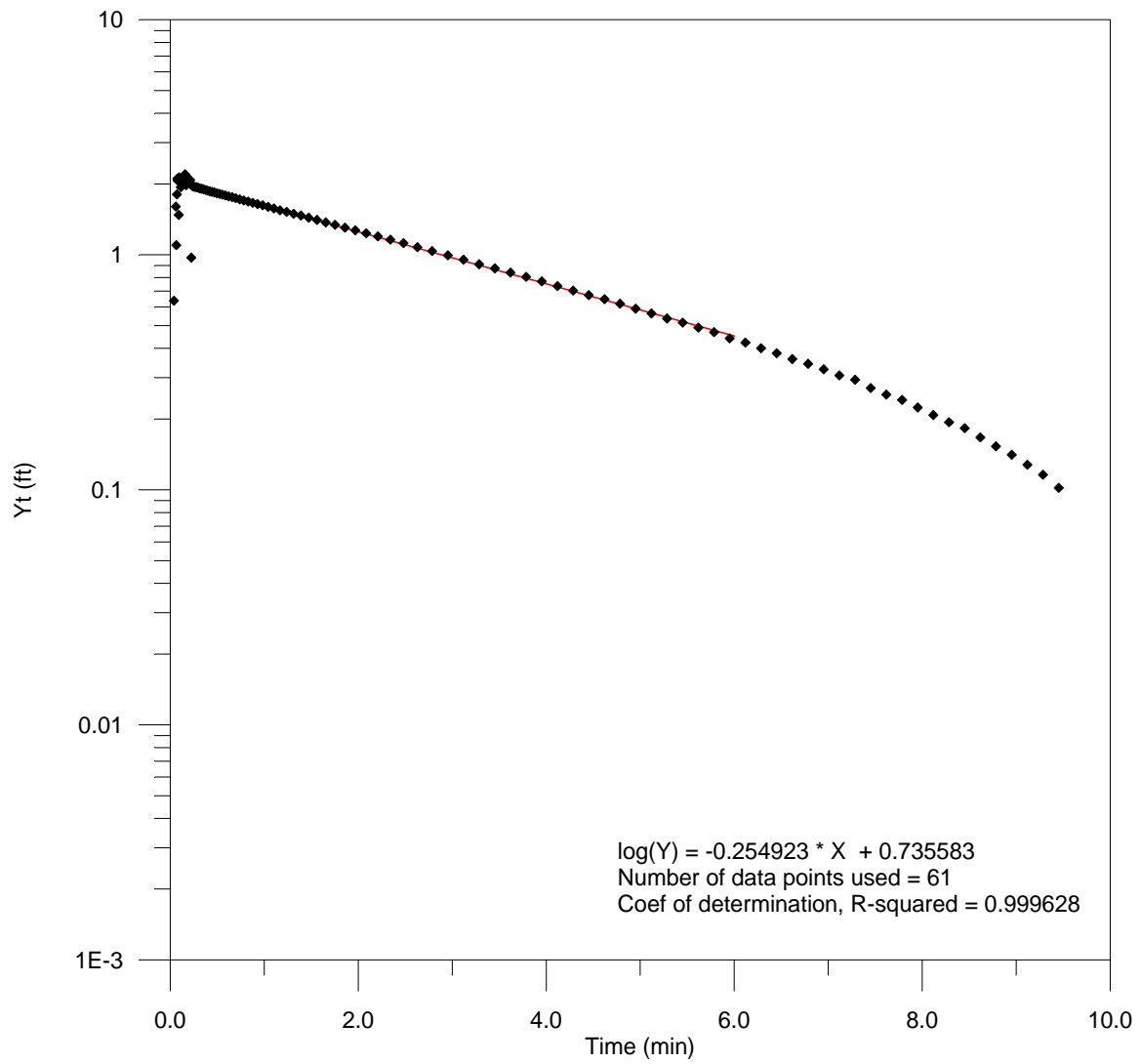
Pre-demonstration Slug Test Results: Well PA-14I.

Well PA-14I: Replicate B



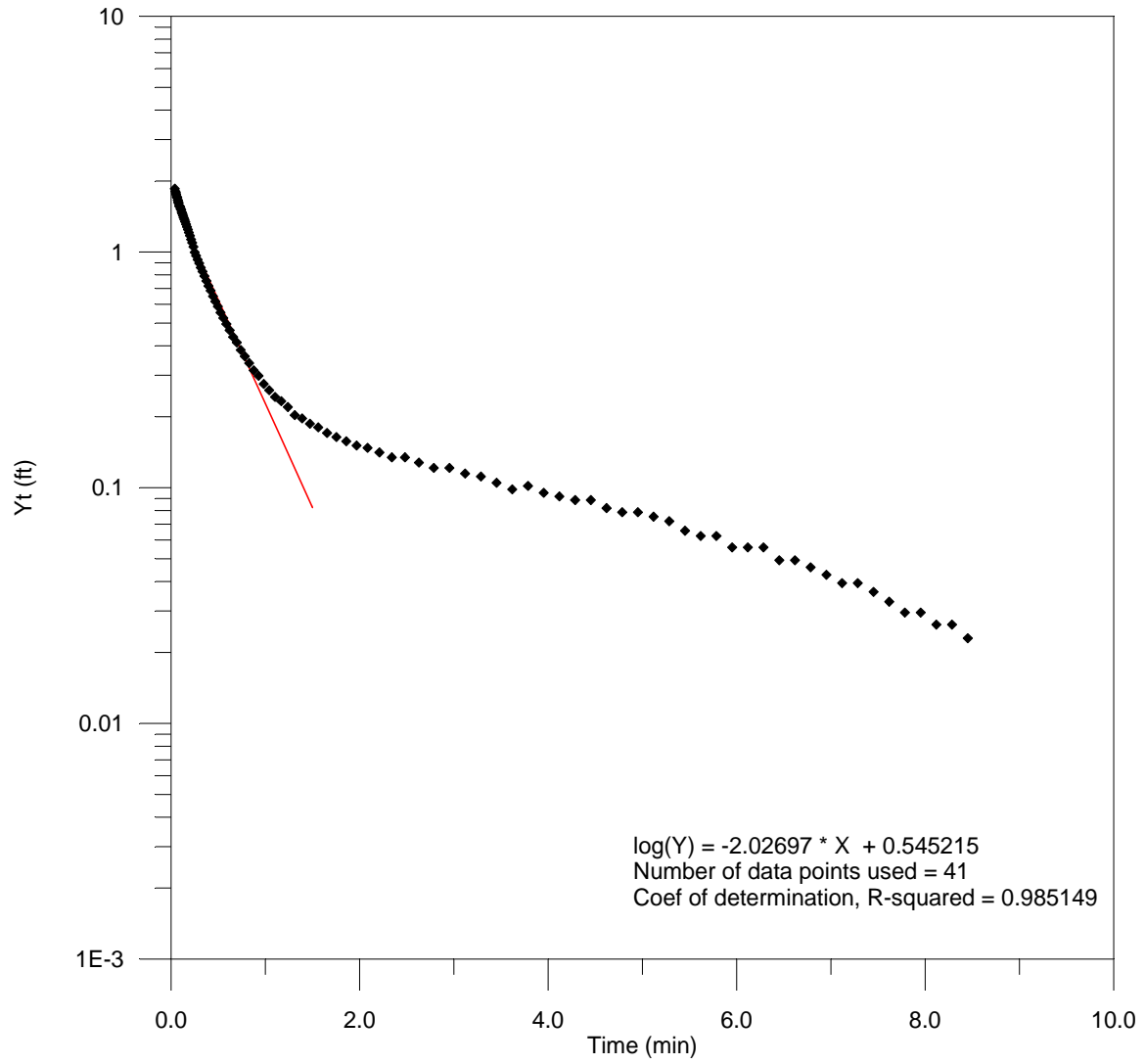
Pre-demonstration Slug Test Results: Well PA-14I.

Well PA-14D: Replicate A



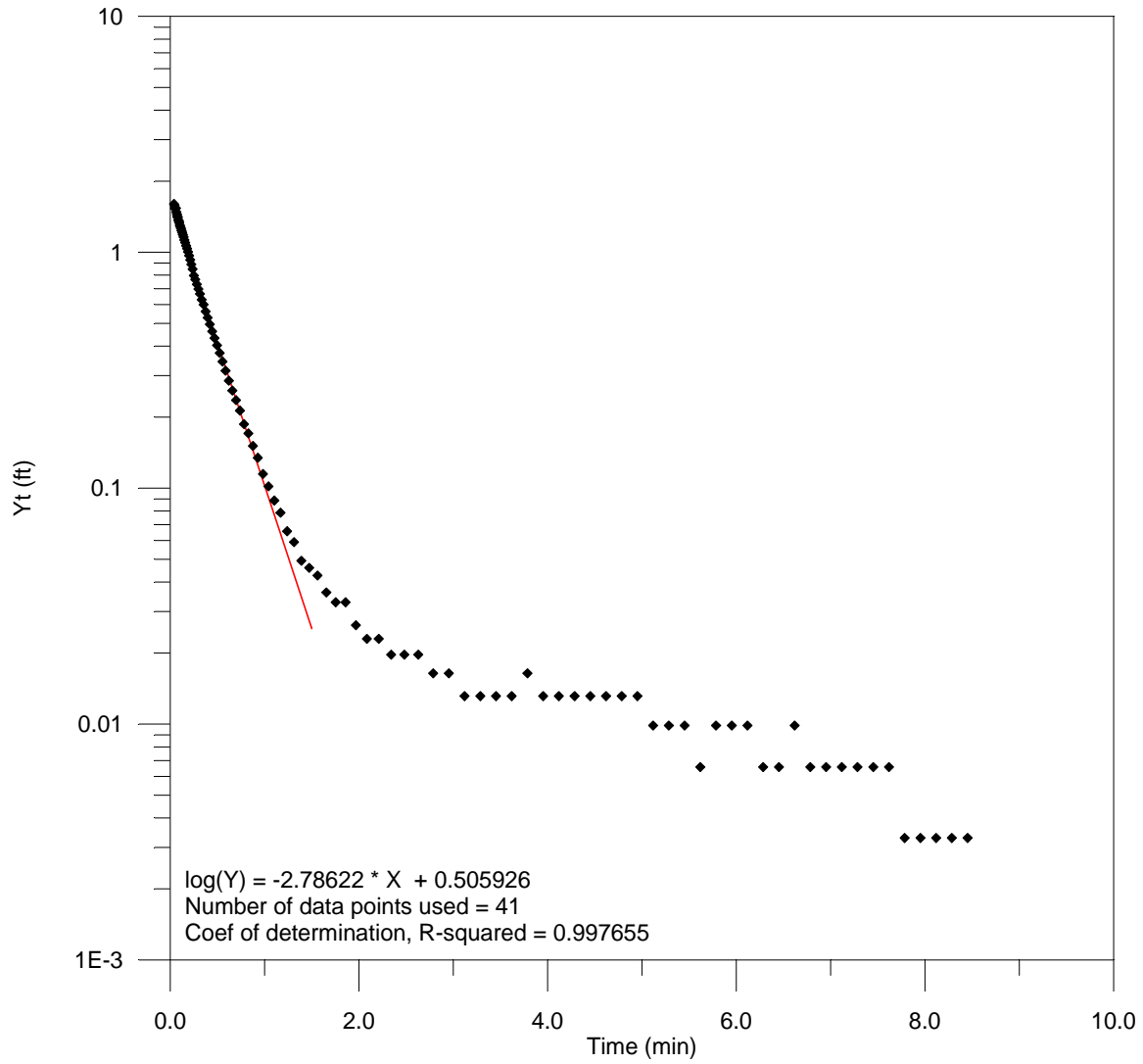
Pre-demonstration Slug Test Results: Well PA-14D.

Well PA-13S: Replicate A



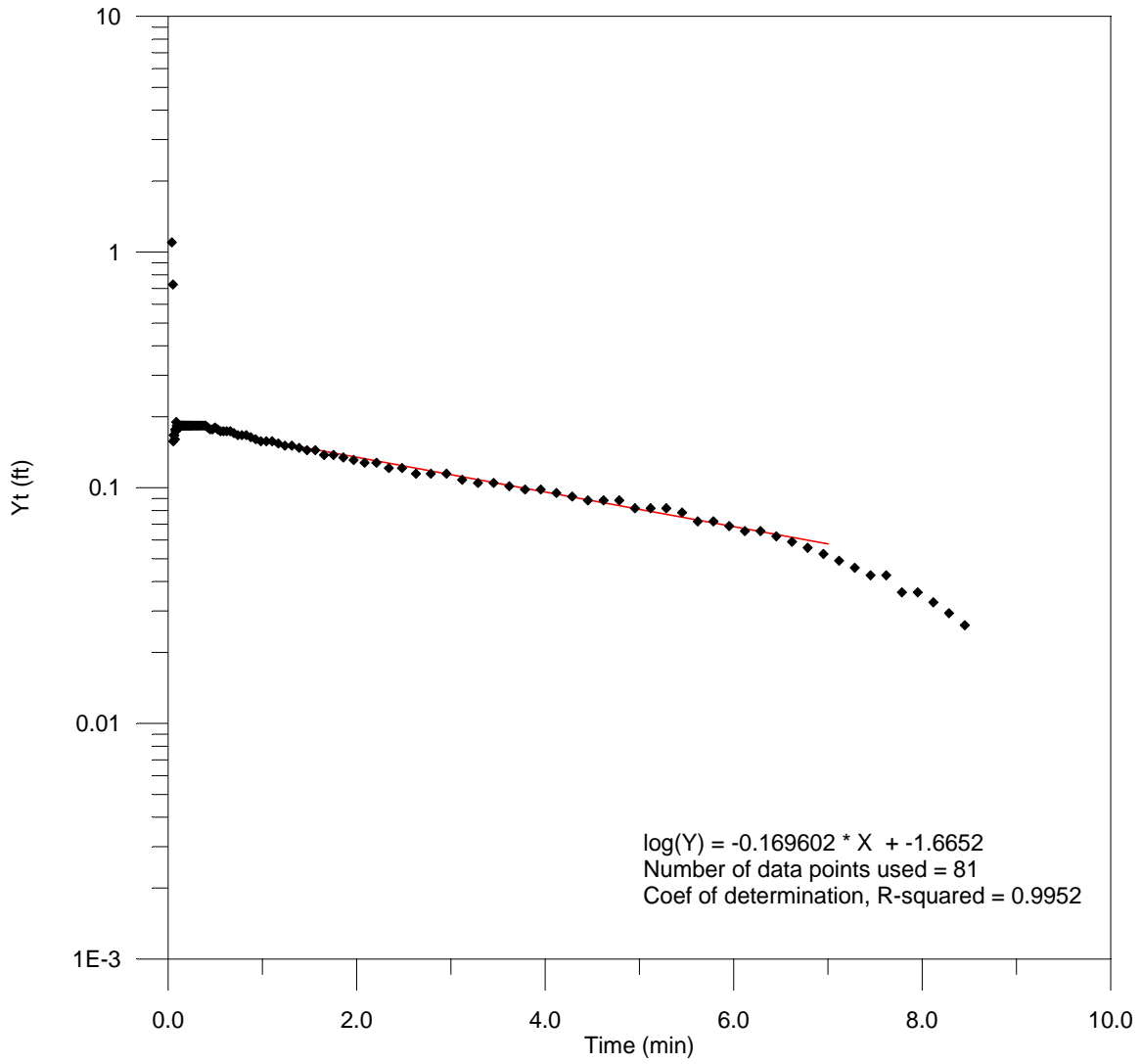
Post-demonstration Slug Test Results: Well PA-13S.

Well PA-13S: Replicate B



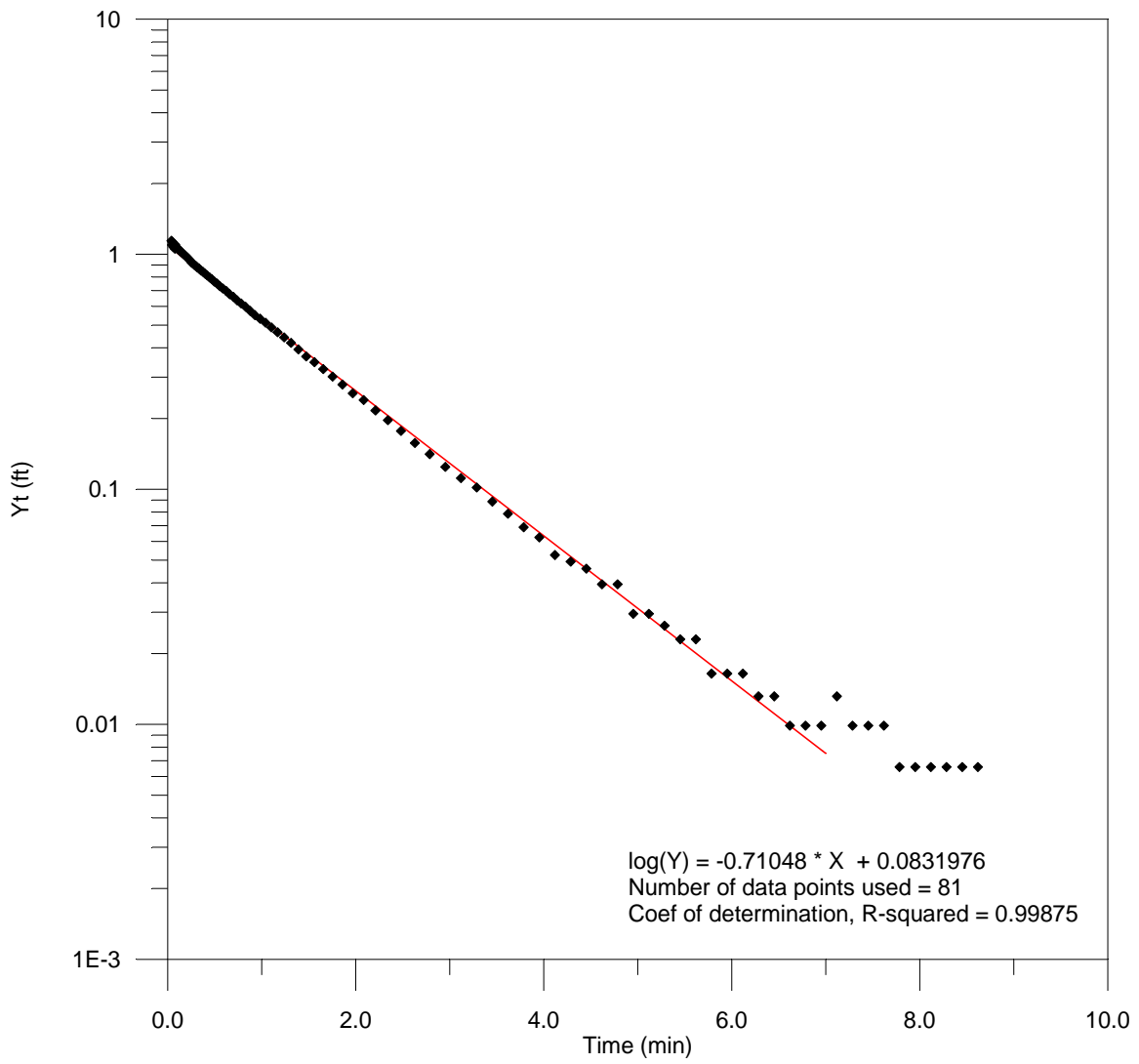
Post-demonstration Slug Test Results: Well PA-13S.

Well PA-13I: Replicate A



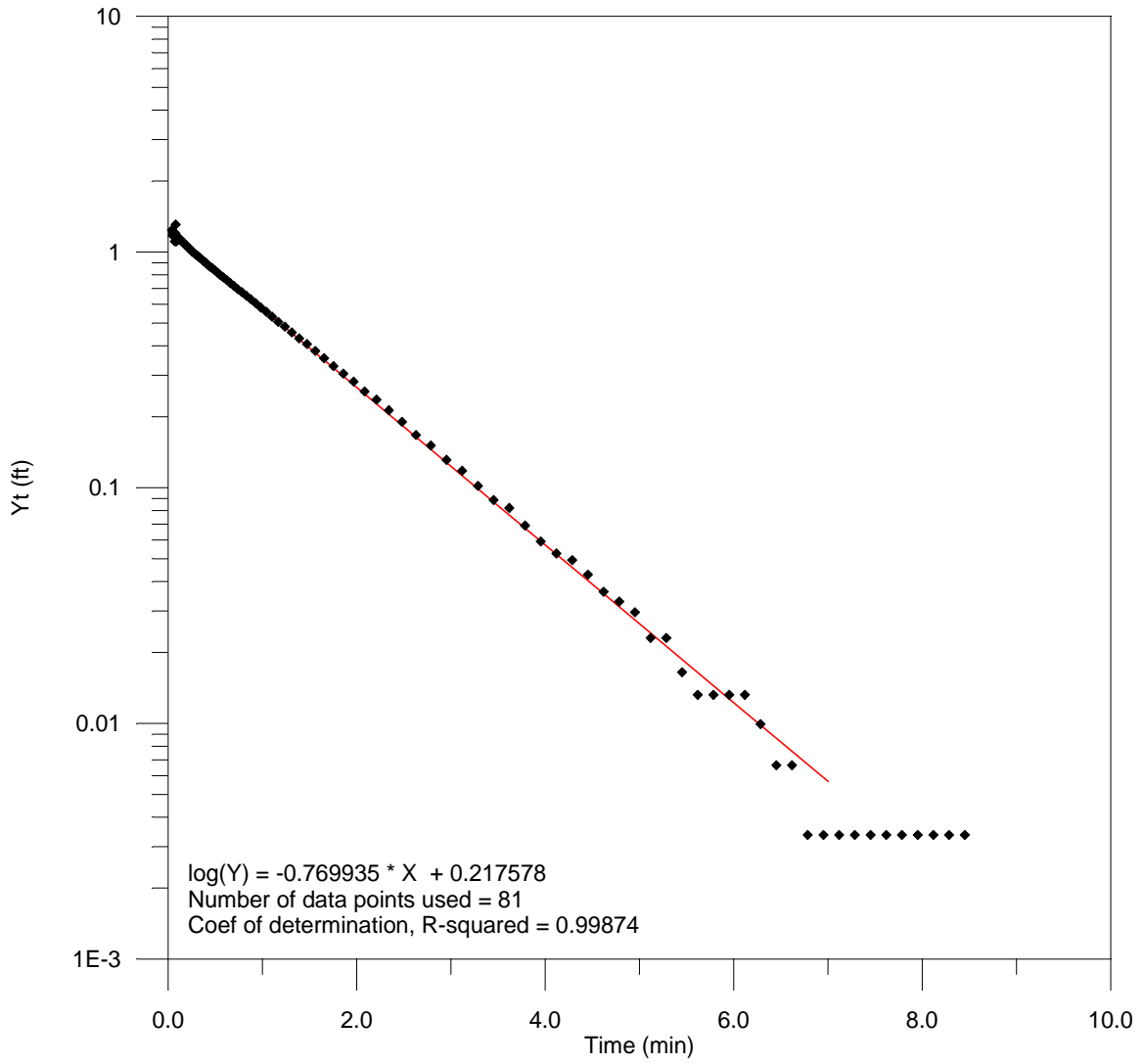
Post-demonstration Slug Test Results: Well PA-13I.

Well PA-13D: Replicate A



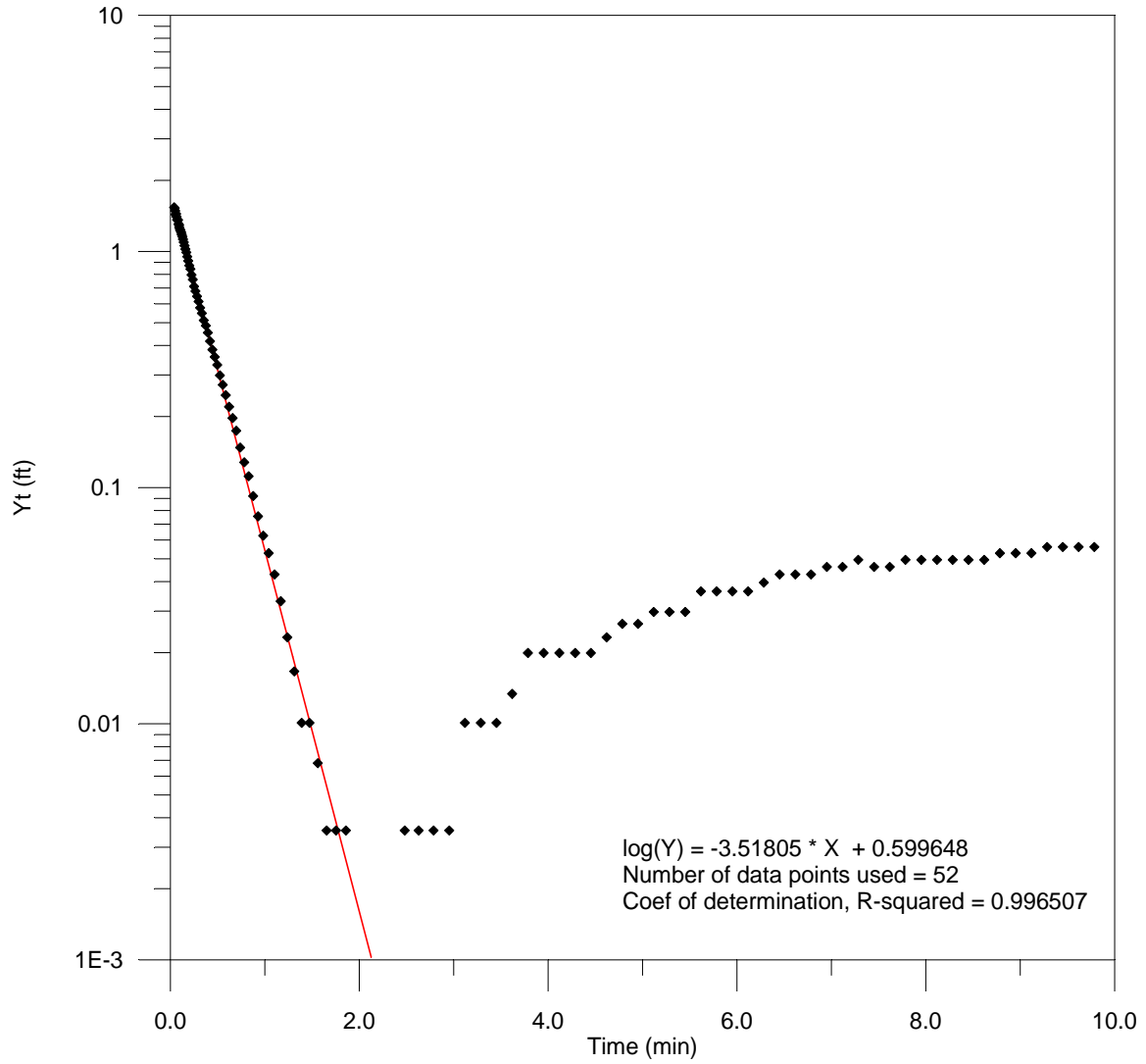
Post-demonstration Slug Test Results: Well PA-13D.

Well PA-13D: Replicate B



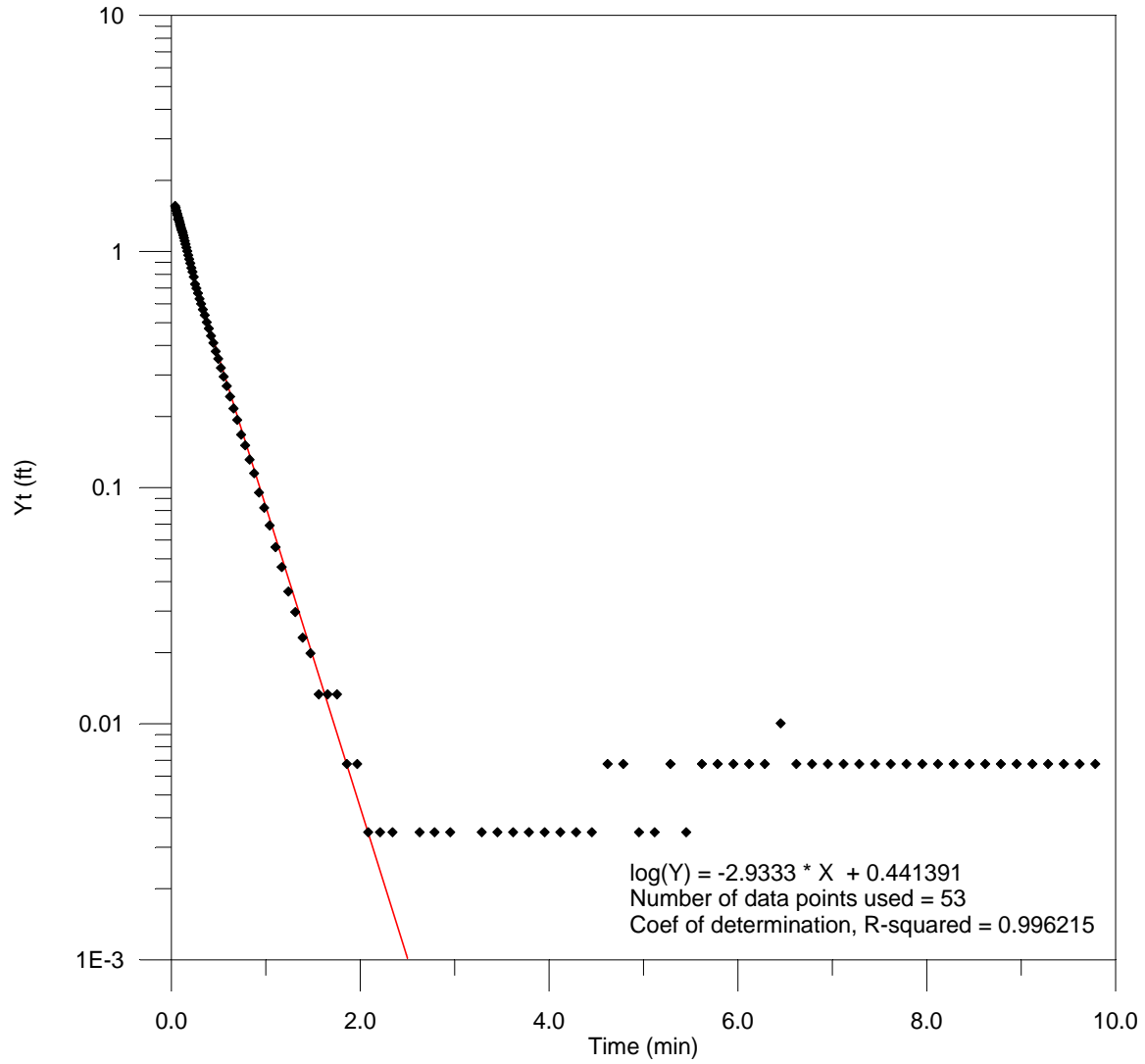
Post-demonstration Slug Test Results: Well PA-13D.

Well PA-14S: Replicate A



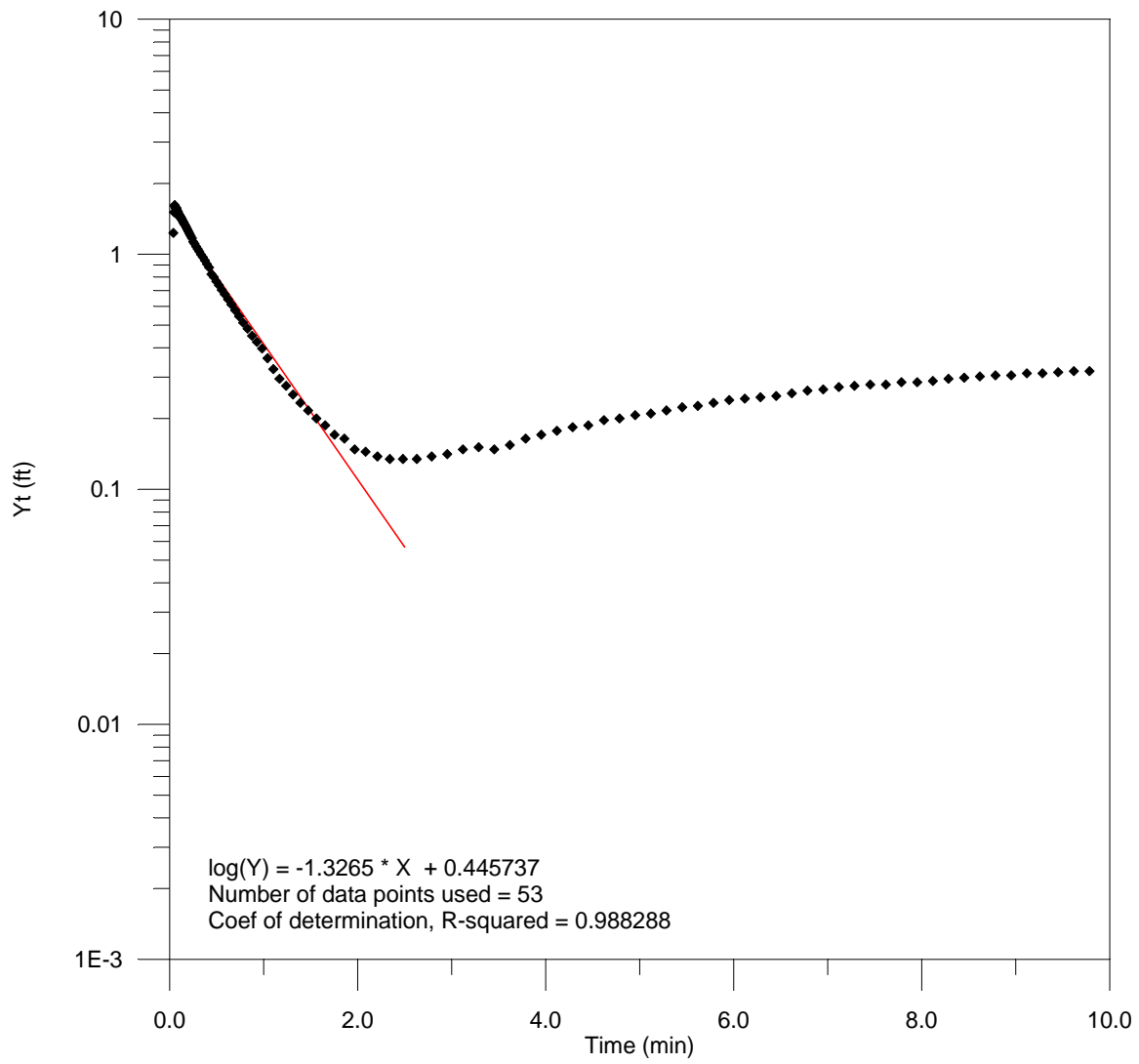
Post-demonstration Slug Test Results: Well PA-14S.

Well PA-14S: Replicate B



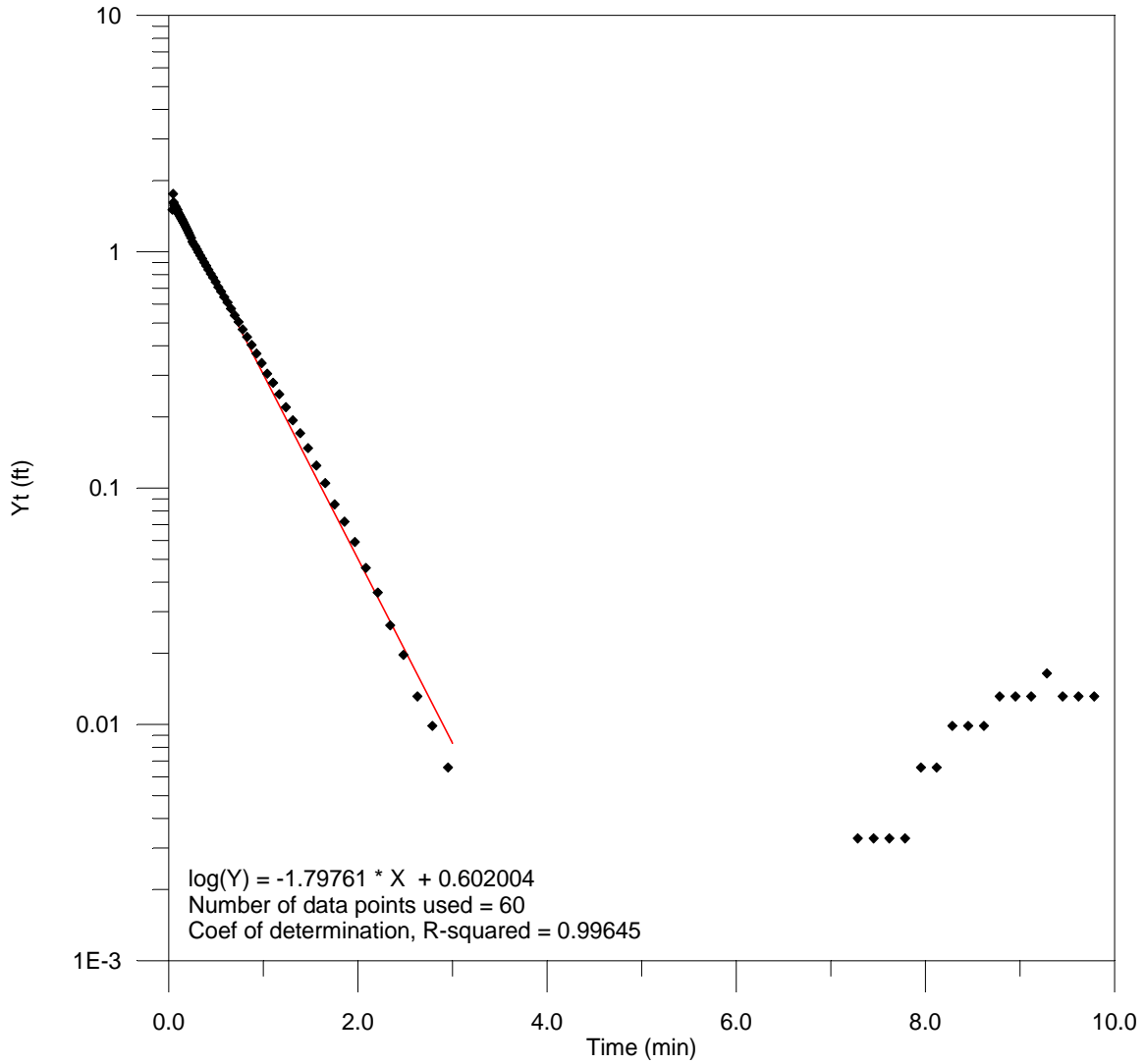
Post-demonstration Slug Test Results: Well PA-14S.

Well PA-14I: Replicate A



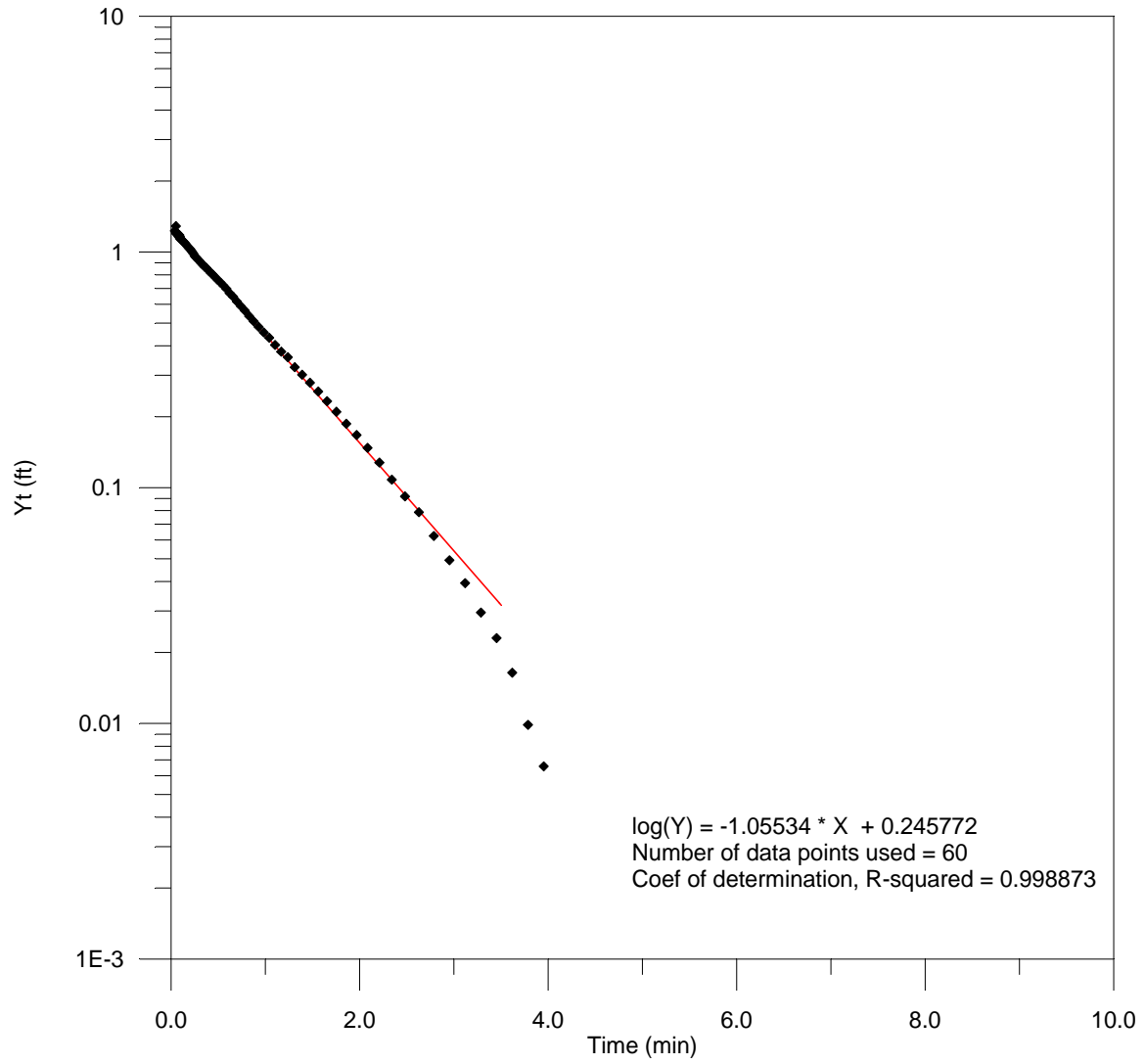
Post-demonstration Slug Test Results: Well PA-14I.

Well PA-14I: Replicate B



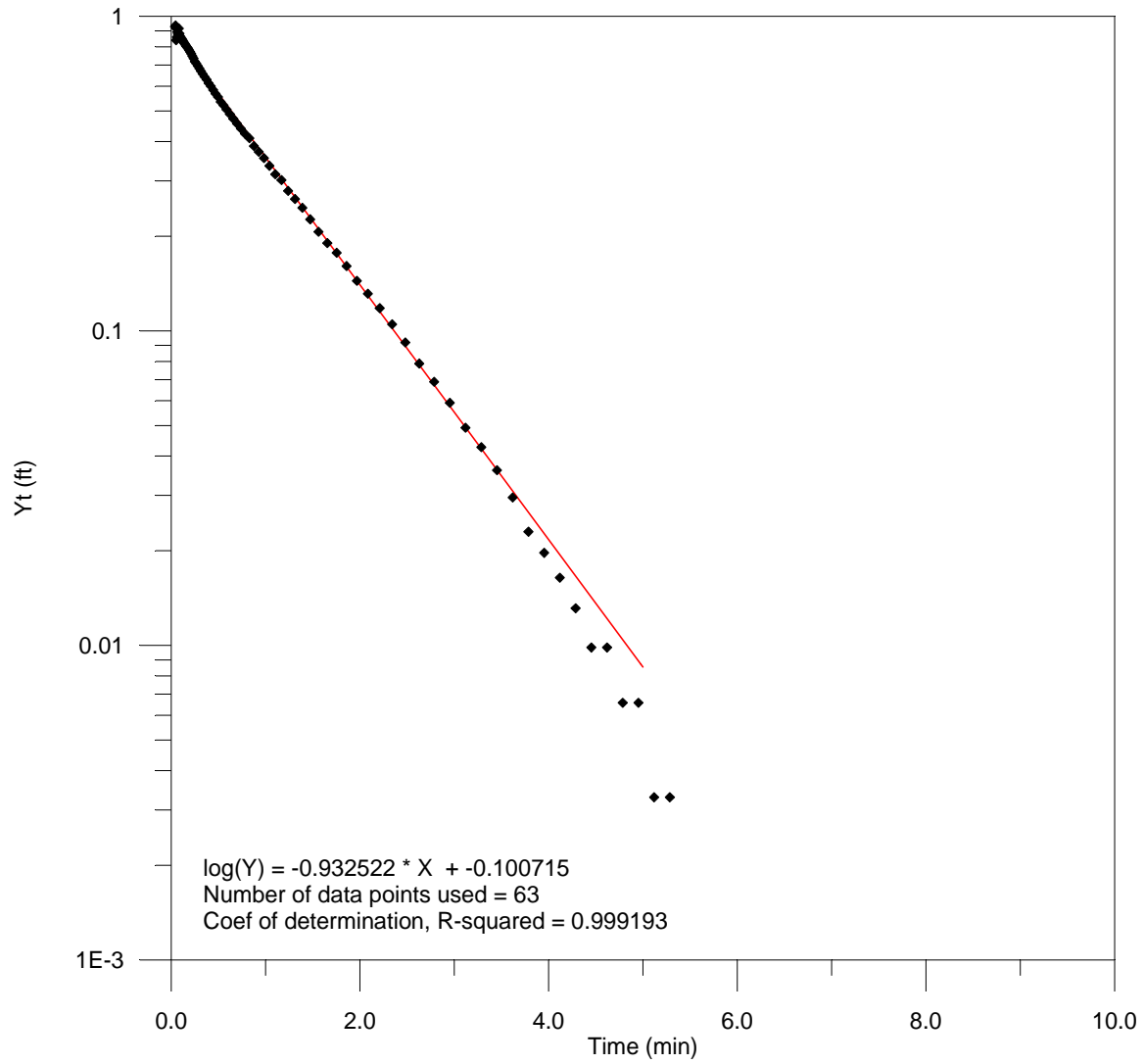
Post-demonstration Slug Test Results: Well PA-14I.

Well PA-14D: Replicate A

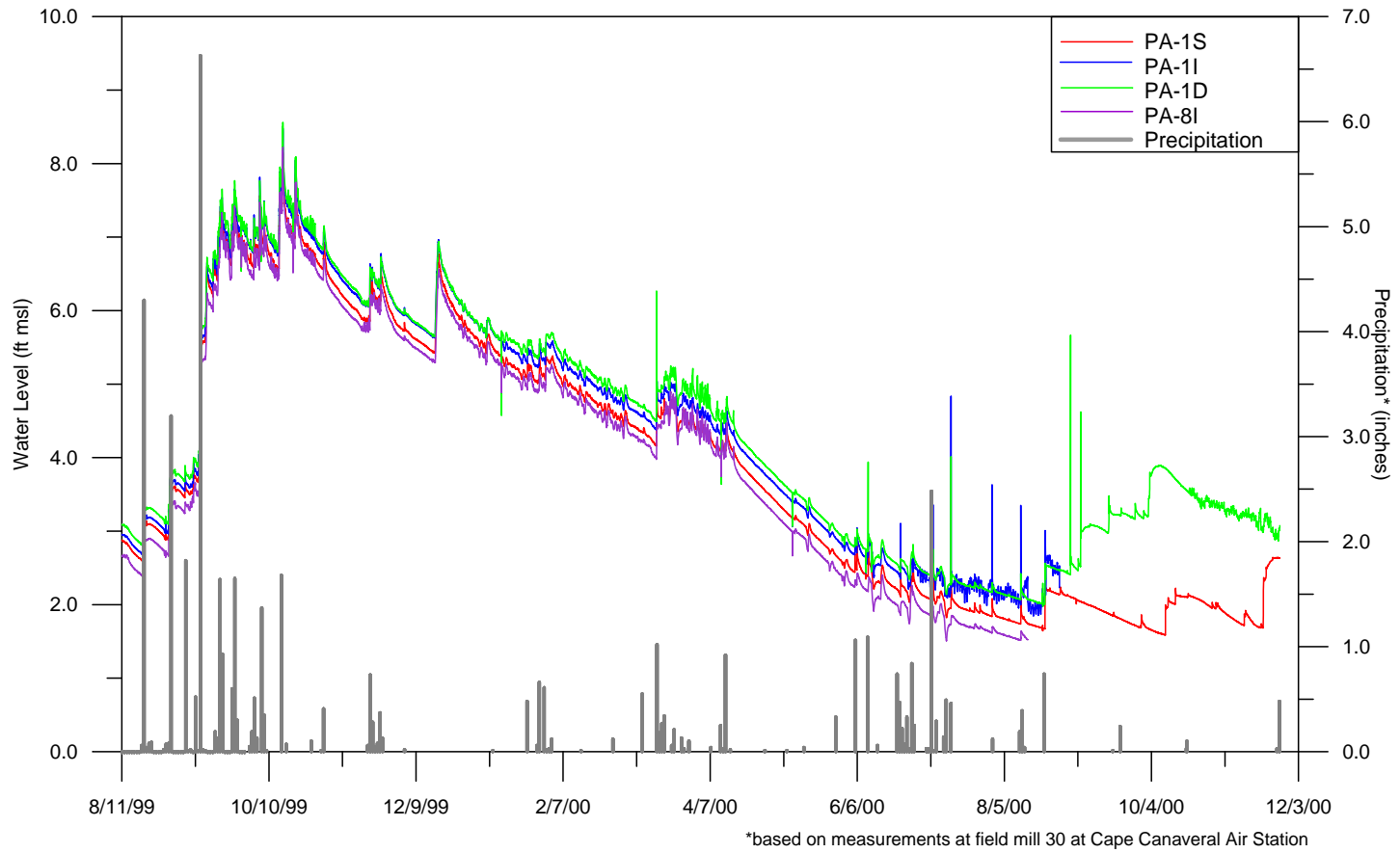


Post-demonstration Slug Test Results: Well PA-14D.

Well PA-14D: Replicate B



Post-demonstration Slug Test Results: Well PA-14D.

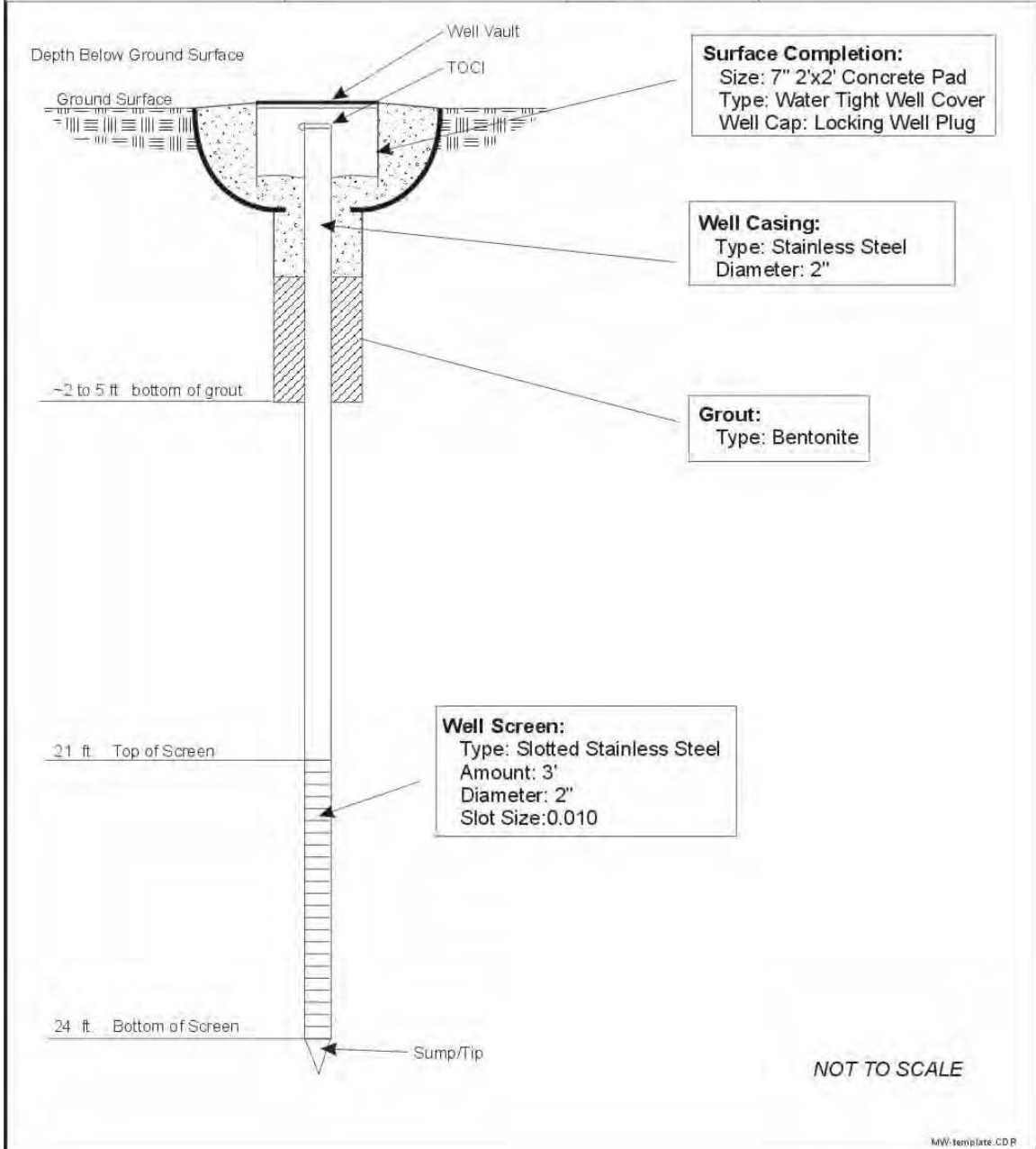


B.2 Site Assessment Well Completion Diagrams for Shallow, Intermediate, and Deep Wells



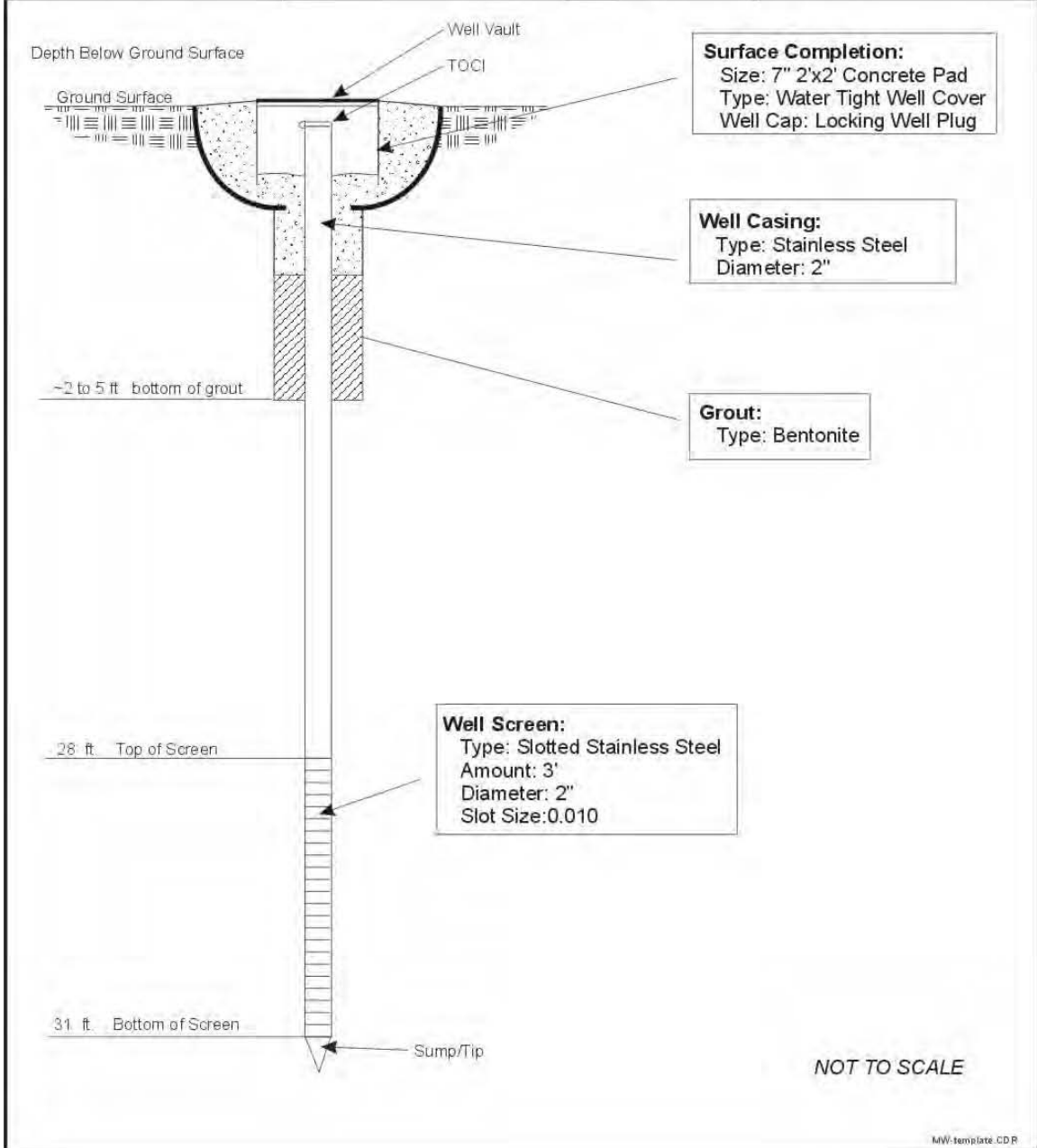
WELL COMPLETION DIAGRAM

Project #: G004065	Site: LC34, CCAS	Well #: Shallow	Northing (NAD 83):
Drilling Contractor:	Rig Type and Drilling Method: Direct Push	Date: 1998-2001	Easting (NAD 83):
Reviewed by: JRS	Driller:	Hydrogeologist: JRS	Surface Elevation (NAVD 88):



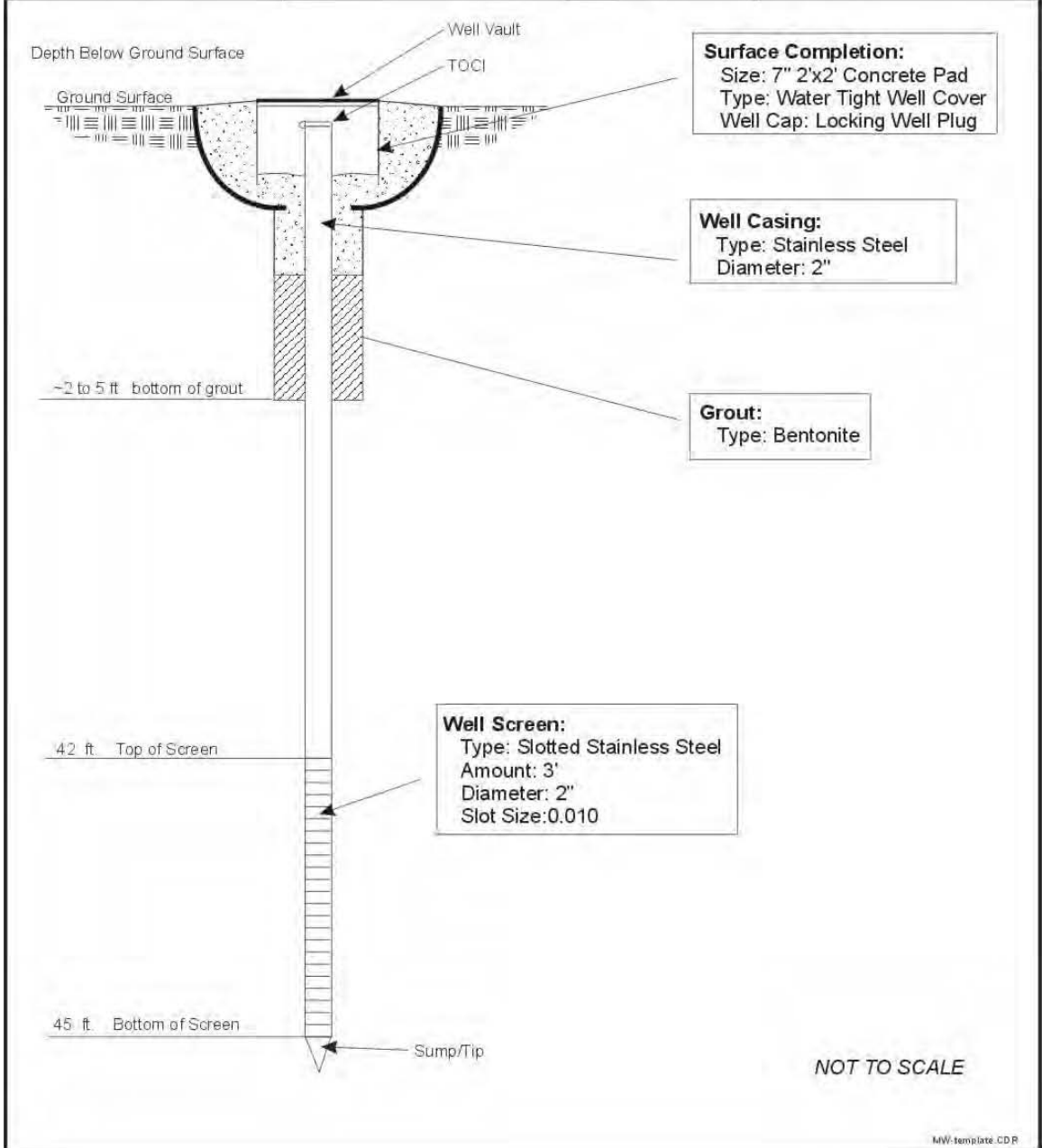
WELL COMPLETION DIAGRAM

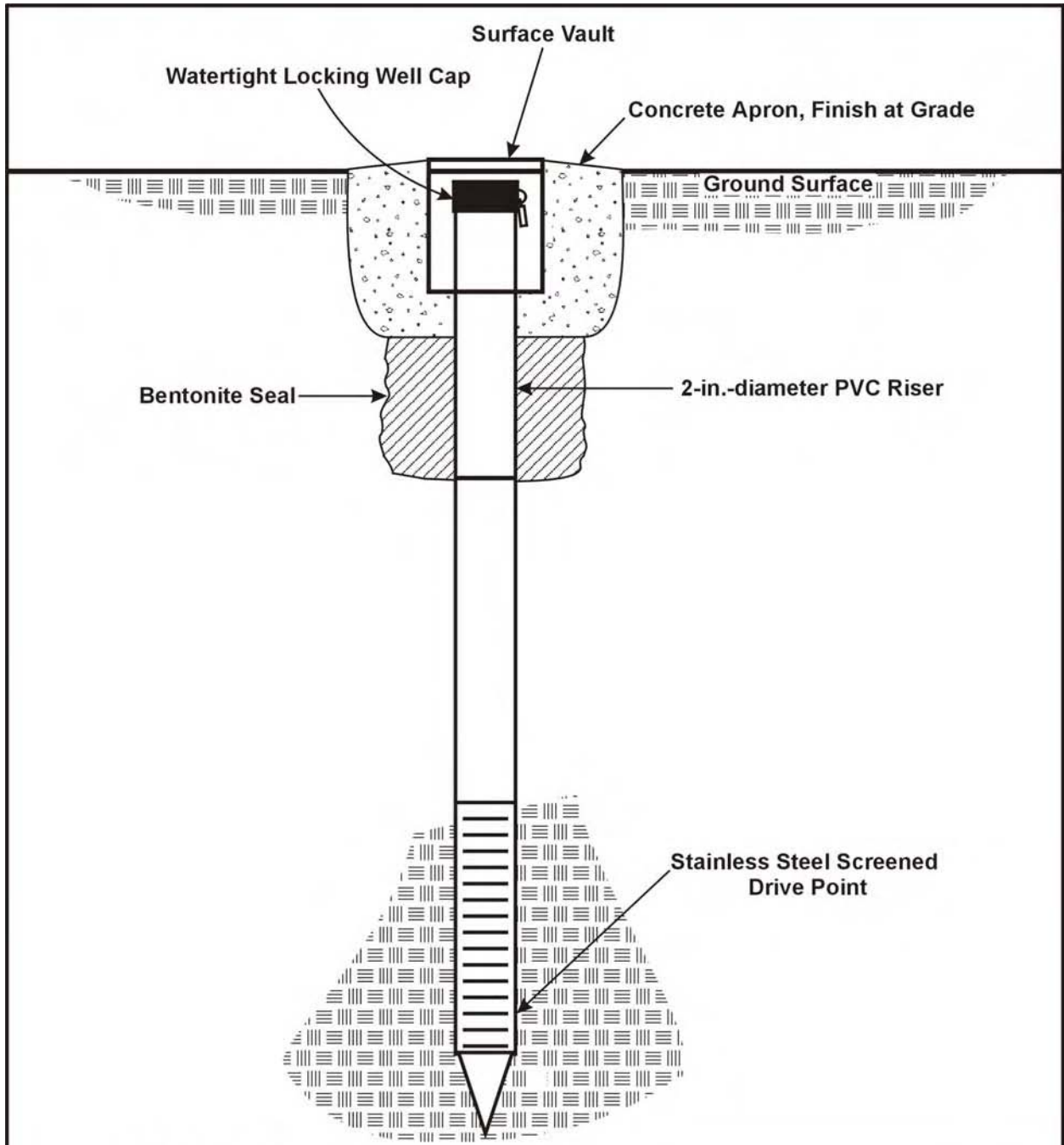
Project #: G004065	Site: LC34, CCAS	Well #: Intermediate	Northing (NAD 83):
Drilling Contractor:	Rig Type and Drilling Method: Direct Push	Date: 1998-2001	Easting (NAD 83):
Reviewed by: JRS	Driller:	Hydrogeologist: JRS	Surface Elevation (NAVD 88):



WELL COMPLETION DIAGRAM

Project #: G004065	Site: LC34, CCAS	Well #: Deep	Northing (NAD 83):
Drilling Contractor:	Rig Type and Drilling Method: Direct Push	Date: 1998-2001	Easting (NAD 83):
Reviewed by: JRS	Driller:	Hydrogeologist: JRS	Surface Elevation (NAVD 88):

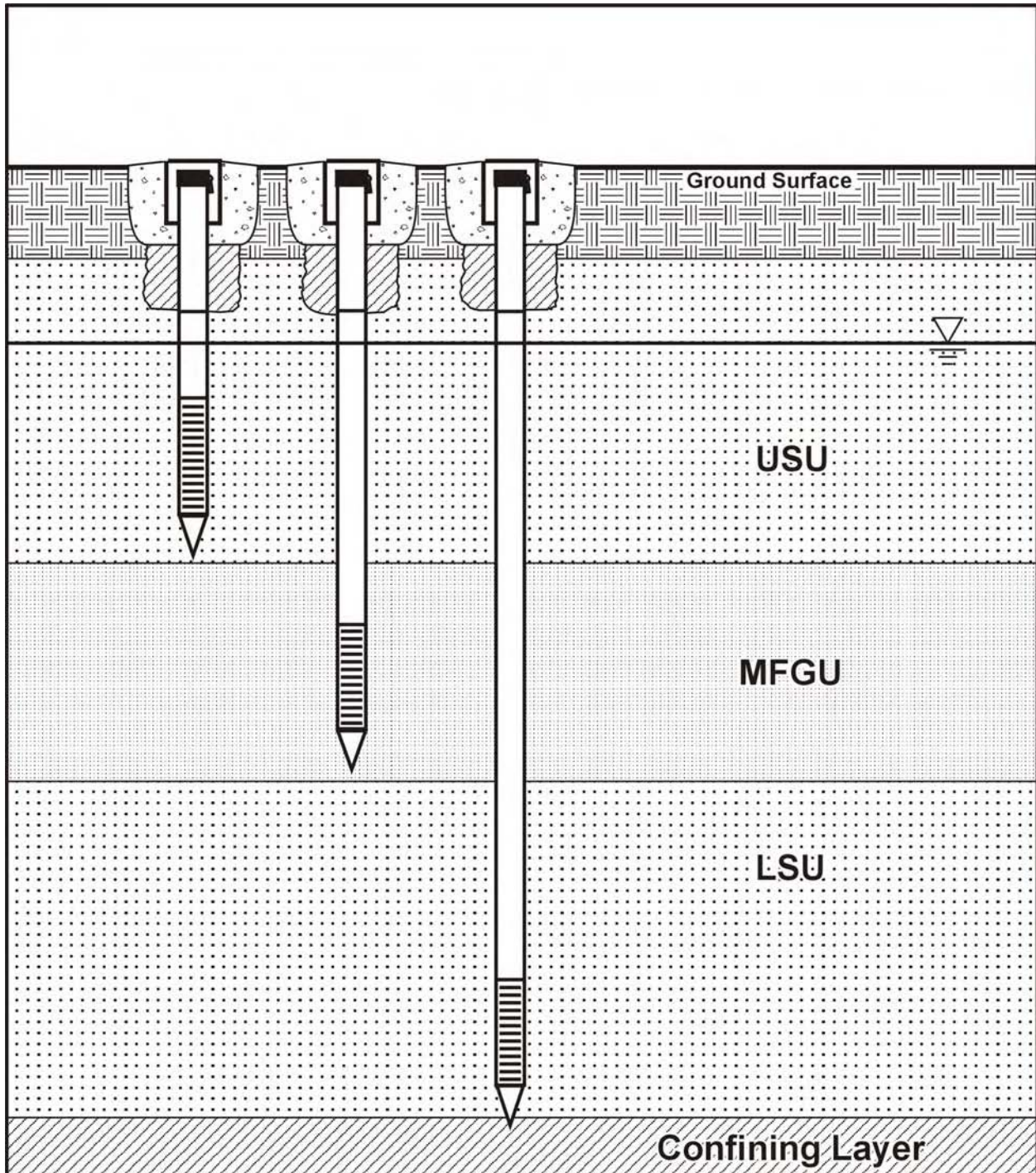




NOT TO SCALE

		DESIGNED BY JS
Figure 3-4. PASC Groundwater Monitoring Well Construction Diagram		DRAWN BY VS
CAPE CANAVERAL AIR STATION – FLORIDA		CHECKED BY TL
PROJECT	G331505-11	DATE 12/98

DSGWMCAPE_C01.CDR



NOT TO SCALE



DESIGNED BY
JS

Figure 3-5.
PASC Monitoring Well Cluster Diagram

DRAWN BY
VS

CAPE CANAVERAL AIR STATION – FLORIDA

CHECKED BY
TL

D:\CLUSTER2\CAPE\C01.CDR

PROJECT G331505-11 DATE 12/98

B.3 LC34 IDC Coring Logsheets for Site Assessment Wells

LC34 IDC Coring Logsheet

Boring ID PA-1S

Date 2/17/99

Location LC34 E. of ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>26.1</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush vault w/ concrete pad</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>21.7</u> to <u>24.4</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
Post hole loose tan sands	0-5	---	---		PVC riser
No sampling, direct push.	5-26.1	---	---		

Logged by: J Sminchak

Completion Date: 2/17/99

Construction Notes: Completion depths based on previous borings in the area (LC34-B13).



LC34 IDC Coring Logsheet

Boring ID PA-11

Date 2/19/99

Location LC34 E. of ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>31</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush vault w/ concrete pad</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>26.6</u> to <u>29.3</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
Post hole loose tan sands	0-4	---	---		PVC riser
No sampling, direct push.	4-31	---	---		

Logged by: J Sminchak

Completion Date: 2/19/99

Construction Notes: Completion depths based on previous borings in the area (LC34-B13).



LC34 IDC Coring Logsheet

Boring ID PA-1D

Date 2/18/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>46.5</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush vault w/ concrete pad</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>43.3</u> to <u>45.9</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
post hole to 4 ft bgs soil, loose tan sands	0-4	---	---		PVC riser
direct push, no sampling	4-25	---	---		
gray fine sand, some silt <30%	25-26.5	PA-1D-26.5	SM		
direct push, no sampling	26.5-35	---	---		
gray fine sand, some silt <30%	35-36	PA-1D-36.5	SM		
gray med to fine sand, shells 40%, some silts	36-36.5	PA-1D-36.5	SW		
gray fine to medium sand, 40-50%, some silts	37-38.5	PA-1D-38.5	SW		
gray med to fine sand, shells < 10%, some silts	39.5-39.8	PA-1D-40.5	SW		
gray med to fine sand, shells 40-50%, some silts	39.8-40.5	PA-1D-40.5	SW		
gray med to fine sand grading into more shell content >50% w/ some silts	41-42.5	PA-1D-42.5	SW		

Logged by: J Sminchak

Completion Date: 2/19/99

Construction Notes: soil sampling 2/18, left tip in hole overnight and completed 2/19/99



LC34 IDC Coring Logsheet

Boring ID PA-2S

Date 2/22/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>21</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush vault w/ concrete pad</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>17.7</u> to <u>20.3</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
Post hole loose tan sands	0-4	---	---		PVC riser
No sampling, direct push.	4-21	---	---		

Logged by: J Sminchak

Completion Date: 2/22/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-21

Date 2/22/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>27</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mounted vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>23.7</u> to <u>26.3</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
post hole soil, loose tan sands	0-4	---	---		PVC riser
direct push, no sampling	4-27	---	---		

Logged by: J Sminchak

Completion Date: 2/22/99

Construction Notes: Two pilot hole pushes and
a well push



LC34 IDC Coring Logsheet

Boring ID PA-2D

Date 2/19/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>45</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush vault w/ concrete pad</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>41.7</u> to <u>44.3</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
post hole to 4 ft bgs soil, loose tan sands	0-4	---	---		PVC riser
direct push, no sampling	4-15	---	---		
medium to fine sand, gray, trace of shell material, wet	15-15.5	PA-2D-16.6	SP		
gray fine sand and silt, trace of shell material	15.5-16.6	PA-2D-16.6	SP		
no recovery	16.6-17	PA-2D-16.6			
gray fine sand and silt, trace shell material	17-17.25	PA-2D-18.5	SP		
gray fine to medium sand, 20-30% shells, 10-20% silts	17.25-18.5	PA-2D-18.5	SP		
no recovery	18.5-19				
gray silty fine sand, trace of shells	19-20	PA-2D-20.5	SP		
gray med to fine to med sand, 50-70% shells, some silts	20-20.5	PA-2D-20.5	SP		

Logged by: J Sminchak

Completion Date: 2/19/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-2D

Date 2/20/99

Location LC34 ESB

Lithologic Description	Depth	Sample	USCS	Well	Water Level	Other
gray medium to fine sands with abundant shell material >70%	21-21.5	PA-2D-22.5	SW	<div style="border: 1px solid black; width: 100%; height: 100%;"></div>		
gray silty fine sand, little shell material	21.5-22.5	PA-2D-22.5	SP			
gray silty fine sand, little shell material 10-20%	23-24.5	PA-2D-24.5	SP			
grayly clayey fine sand	25-26.5	PA-2D-26.5	SM			
gray clayey fine sand, shells <10%	27-28.2	PA-2D-28.5	SM			
gray fine to medium sand, shells <20%	28.2-28.5	PA-2D-28.5	SP			
gray fine silty sand, little % of shells	29-29.5	PA-2D-30.5	SM			
gray fine to medium sand, some silts	29.5-30	PA-2D-30.5	SP			
mostly shells and gray fine sand with trace of silt <10%	30-30.5	PA-2D-30.5	SW			
no recovery (piston on sampler jammed)	31-32.5	PA-2D-30.5				
fine to med. gray sands, 30-40% shells	33.3-34.1	PA-2D-34.5	SW-GM			
silty fine sand to med. sand, some shells	34.1-34.5	PA-2D-34.5	SP			
silty fine sand, little shells	35-35.3	PA-2D-36.5	SM			
clay, medium plasticity	35.3-35.4	PA-2D-36.5	CL			
medium to fine sand, mostly >75% gravel sized shell material	35.4-36.5	PA-2D-36.5	SW			
gray silty fine sand, trace of shell material	37-38.5	PA-2D-38.5	SM			
gray fine silty sand, trace of shell material	39-39.3	PA-2D-40.5	SM			
fine sand, mostly shell frags, trace of silt	39.3-40.5	PA-2D-40.5	SP			

LC34 IDC Coring Logsheet

Boring ID PA-3S

Date 2/24/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>24</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>19.6</u> to <u>22.3</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description

Lithologic Description	Depth	Sample	USCS	Well	Other
Post hole loose tan sands	0-4	---	---		PVC riser
No sampling, direct push.	4-24	---	---		

Logged by: J Sminchak

Completion Date: 2/24/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-3I

Date 2/24/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>30.3</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mounted vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>26.1</u> to <u>28.7</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
post hole soil, loose tan sands	0-4	---	---		PVC riser
direct push, no sampling	4-30.3	---	---		

Logged by: J Sminchak

Completion Date: 2/24/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-3D

Date 2/23/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>46.5</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>42.2</u> to <u>44.8</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
post hole soil, loose tan sands	0-4	---	---		PVC riser
direct push, no sampling	4-15	---	---		
fine silty sand, gray, 10% shells	15-16.2	PA-2D-16.6	SP		
abundant shells and medium to fine gray sands	16.2-16.5	PA-2D-16.6	SP		
fine gray silty sand, trace shells	17-18.5	PA-2D-16.6	SP		
fine to medium gray sand, 20% shell fragments	19-20.5	PA-2D-18.5	SP		
fine gray sand, some silts <10% and shells <10%	21-22.5	PA-2D-18.5	SP		
fine gray sand, some silts 10-20% and shell material <10%	23-24.5	PA-2D-18.5	SP		
fine gray sand, some silts and shell and shell material	25-26.5	PA-2D-20.5	SP		
fine gray sand, little silt, 20-30% shell (wet)	27-28.2	PA-2D-20.5	SP		

Logged by: J Sminchak

Completion Date: 2/23/99

Construction Notes: _____




LC34 IDC Coring Logsheet

Boring ID PA-3D

Date 2/23/99

Location LC34 ESB

Lithologic Description	Depth	Sample	USCS	Well	Water Level	Other	
shelly layer, mostly shells and fine sand and silts (wet)	28.2-28.5	PA-3D-28.5	SP				
shelly layer, mostly shells and fine sand and silts (wet)	29-29.2	PA-3D-30.5	SP				
fine silty/clayey sand, trace of shells	29.2-30.5	PA-3D-30.5	SM				
abundant shells and fine gray sands and silts 20-30%	31-32.1	PA-3D-32.5	SP-GM				
fine silty sand and 20-30% shells	32.1-32.5	PA-3D-32.5	SM				
fine silty sand and 20-30% shells	33.2-33.6	PA-3D-34.5	SM				
mostly shells and gray fine sand (20%)	33.6-34.5	PA-3D-34.5	SP-GM				
mostly shells and gray fine sand (20%)	35.3-36.3	PA-3D-36.5	SP-GM				
clayey fine sand, med-low plasticity	36.3-36.5	PA-3D-36.5	SC				
abundant shells, fine sands and silts 20-30%, loose wet	37-38.5	PA-3D-38.5	SP-GM				
abundant shells, fine sands and silts 20-30%, loose wet	39-40.5	PA-3D-40.5	SP-GM				
abundant shells, fine sands and silts 20-30%, loose wet	41-42.5	PA-3D-42.5	SP-GM				
fine silty sand and small amount of shells 10%	43.2-43.5	PA-3D-44.5	SM				
fine sand and shell frag 20% wet and loose	43.5-44.5	PA-3D-44.5	SP				2 2/3 ft screen
gray clay with some silt and fine sand, med-low plasticity	45-46.5	PA-3D-46.5	CL				6 7/8 in. tip

LC34 IDC Coring Logsheet

Boring ID PA-4S

Date 2/26/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>22</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>17.7</u> to <u>20.4</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
Post hole soil and loose tan sands	0-4	---	---		PVC riser
No sampling, direct push.	4-22	---	---		

Logged by: J Sminchak

Completion Date: 2/26/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-4I

Date 2/26/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>28</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>23.7</u> to <u>26.4</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
post hole soil and loose tan sands	0-4	---	---		PVC riser
direct push, no sampling	4-28	---	---		

Logged by: J Sminchak

Completion Date: 2/26/99

Construction Notes: _____



LC34 IDC Coring LogsheetBoring ID PA-4DDate 2/25/99Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>47.5</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>43.2</u> to <u>45.9</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
post hole soil, loose tan sands	0-4	---	---		PVC riser
direct push, no sampling	4-15	---	---		
silty fine gray sand with 10-20% shells	15-15.3	PA-4D-16.5	SP		
abundant shell frags, some silty fine sand	15.3-16	PA-4D-16.5	SP		
silty fine to medium gray sand, 20-30% shells	16-16.5	PA-4D-16.5	SP		
fine gray sand, with little silt and shells <5%	17-18.5	PA-4D-18.5	SP		
fine gray sand with more silt 10-20%	19-20.5	PA-4D-20.5	SP		
fine gray sand, with silt 10% and some shell material (well sorted)	21-22.5	PA-4D-22.5	SP		
fine gray sand, with silt 10% and some shell material (well sorted)	23-24.5	PA-4D-24.5	SP		
fine gray sand with 5% silt and shells, well sorted	25-26.5	PA-4D-26.5	SP		

Logged by: J SminchakCompletion Date: 2/25/99

Construction Notes: _____




LC34 IDC Coring Logsheet

Boring ID PA-4D

Date 2/23/99

Location LC34 ESB

Lithologic Description	Depth	Sample	USCS	Well	Water Level	Other
fine gray sand and 40% shells with some silts	27-27.4	PA-4D-28.5	SP			
silty fine gray sand, some clay	27.4-28.5	PA-4D-28.5	SM			
fine to med sand with abundant shell material	29-29.4	PA-4D-30.5	SP			
gray silty sand	29.4-30.0	PA-4D-30.5	SM			
wet silty fine sand with 20% shells	30.0-30.5	PA-4D-30.5	SP			
wet silty fine sand with 10-20% shells	31-32	PA-4D-32.5	SP-GM			
abundant shells with gray fine silty sand (10%)	32-32.5	PA-4D-32.5	SP-GM			
abundant shells with gray fine silty sand (10%), wet	33-34.5	PA-4D-34.5	SP-GM			
abundant shells with gray fine silty sand (10%), wet	35-36	PA-4D-36.5	SP			
silty gray sand, some shells	36-36.5	PA-4D-36.5	---			
no recovery	37-38.5	PA-4D-36.5	SP-GM			
abundant shells with gray silty sand	38.5-38.8	PA-4D-40	SP-GM			
fine silty gray sand with 40-50% shells	38.8-39.7	PA-4D-40	SP-GM			
sandy clay with some shells med-low plasticity	39.7-40	PA-4D-40	SC			
abundant shells with fine gray silty sand 30-40%	40.5-42	PA-4D-42	SP-GM			
abundant shells with fine gray silty sand 30%	42.5-44	PA-4D-44	SP-GM			
silty gray fine sand	44.5-46	PA-4D-46	SP			
clayey sand and silt, some shells	46.5-46.8	PA-4D-47.5	SC			
sandy clay, some shell material	46.8-47.5	PA-4D-47.5	CL			

2 2/3 ft screen

1 ft sump
6 7/8 in. tip

LC34 IDC Coring Logsheet

Boring ID PA-5S

Date 3/1/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>17</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>13.7</u> to <u>16.3</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
Post hole loose tan sands	0-5	---	---		PVC riser
No sampling, direct push.	5-17	---	---		
					2 2/3 ft screen
					6 7/8 in. tip

Logged by: J Sminchak

Completion Date: 3/1/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-5I

Date 3/1/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>22</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>17.8</u> to <u>20.4</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
post hole soil and loose tan sands	0-4	---	---		PVC riser
direct push, no sampling	4-22	---	---		

Logged by: J Sminchak

Completion Date: 3/1/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-5D

Date 2/26/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>45.6</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>42.2</u> to <u>44.9</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description

	Depth	Sample	USCS	Well	Other
post hole soil, loose tan sands	0-5	---	---		PVC riser
direct push, no sampling	5-15	---	---		
fine gray sand with 20-30% shell material	15-15.7	PA-5D-16.5	SP		
mostly shell frags with 20-30% fine gray sand	15.7-16.5	PA-5D-16.5	SP		
well graded yellowish-orange fine sand with dark brown mottling (no shells gray plug)	17-18.5	PA-5D-18.5	SP		
gray silty fine sand, well sorted, trace of shell frags	19-20.5	PA-5D-20.5	SP		
well graded yellowish-orange fine sand with dark brown mottling	21-22.3	PA-5D-20.5	SP		
gray silty fine sand in plug of sampler	22.3-22.5	PA-5D-22.5	SP		
gray silty fine sand, trace of shell fragments	23-24.5	PA-5D-24.5	SP		
gray silty fine sand, trace of shell fragments	25-26.5	PA-5D-26.5	SP		

Logged by: J Sminchak

Completion Date: 2/27/99

Construction Notes: _____




LC34 IDC Coring Logsheet

Boring ID PA-5D

Date 2/27/99

Location LC34 ESB

Lithologic Description	Depth	Sample	USCS	Well	Water Level	Other
silty fine gray sand, trace of shell fragments	27-28.1	PA-5D-28.5	SM			
silty fine gray sand, 10% shells	28.1-28.5	PA-5D-28.5	SM			
yellowish-orange fine to medium sand w/ abundant shells (sluff?)	29-30	PA-5D-30.5	SP			
silty fine gray sand, trace of shell fragments	30-30.5	PA-5D-30.5	SM			
abundant shell fragments and fine gray sand, trace silt	31-32.5	PA5-D-32.5	SP-GM			
yellowish orange fine to med. sand w/ abundant shells	33.5-34	PA-5D-34.5	SP			
silty fine gray sand, trace shell frags	34-34.2	PA-5D-34.5	SM			
abundant shells frags. and gray fine sand, trace silt	34.2-34.5	PA-5D-34.5	SP-GM			
silty fine gray sand, trace of clay and shell frags	35-35.4	PA-5D-36.5	SM			
silty gray clay low plasticity, trace sand	35.4-35.9	PA-5D-36.5	CL			
abundant shells, trace of fine silty sand (10%)	35.9-36.5	PA-5D-36.5	SP-GM			
silty gray clay, trace shells med-low plasticity, (1-2" stiff gray plug)	37 - 37.6	PA-5D-38.5	CL-ML			
clayey gray silt, shells 10-20%	37.6-38.5	PA-5D-38.5	SM			
silty gray clay, trace shells med-low plasticity	39-39.3	PA-5D-40.5	CL-ML			
silty-clayey fine sand and shell frags	39.3-39.8	PA-5D-40.5	SP-sM			
silty gray clay, trace shells med-low plasticity	39.8-40.2	PA-5D-40.5	CL-ML			
silty fine sand, mostly shells 60-80%	40.2-40.5	PA-5D-40.5	SP-GM			
sandy silty gray clay with trace of shell frags. (some stiffness)	41.5-42	PA-5D-42.5	CL-ML			
silty sandy gray shell frags and shells (75% shells)	42-42.5	PA-5D-42.5	SP-GM			
gray fine sand, trace of silt and shells but overall well sorted	43-44.5	PA-5D-44.5	SP			
gray sandy clay, trace of shells	45-46.5	PA-5D-46.5	CL			

2 2/3 ft screen

1 ft sump
6 7/8 in. tip

LC34 IDC Coring Logsheet

Boring ID BAT-6S

Date 7/12/99

Location LC34

Boring Diameter	<u>2 1/2</u> in	Total Depth	<u>26.5</u> ft
Casing Outer Diameter	<u>2 1/2</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>2</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite</u>
Screen Type	<u>stainless steel, slotted</u>	Grout Depth	from <u>0</u> to <u>~2</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>23</u> to <u>26</u> ft	Driller	<u>Ruperto Aquilar</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
Direct push- no sampling	0-26.5	--	--	<p>3 ft screen 0.5 ft tip</p>	PVC Riser

Logged by: L. Cumming

Completion Date: 7/12/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-6I

Date 3/2/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>26.8</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>23.5</u> to <u>26.2</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
post hole soil and loose tan sands (tar/rock layer at 2 1/2 ft)	0-5	---	---		PVC riser
direct push, no sampling	4-26.8	---	---		

Logged by: J Sminchak

Completion Date: 3/2/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-6D

Date 3/1/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>46.2</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>42</u> to <u>44.6</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
post hole soil, loose tan sands	0-5	---	---		PVC riser
direct push, no sampling	5-15	---	---		
fine gray sand, well sorted, trace of shell material and silts	15-15.7	PA-6D-16.5	SP		
fine gray sand, well sorted, trace of shell material and silts	15.7-16.5	PA-6D-18.5	SP		
fine gray sand, (30-40%) shell fragments	17-18.5	PA-6D-20.5	SP		
fine gray sand with some silt (<10%) and trace shell frag	19-20.5	PA-6D-20.5	SP		
fine gray sand with some shell frag (10-15%) and trace silt	21-22.3	PA-6D-22.5	SP		
gray silt with fine sand	22.3-22.5	PA-6D-22.5	SM		
no recovery	23-24.5	---	---		
fine gray silty fine sand, trace of shell fragments	25-26.5	PA-6D-26.5	SM		

Logged by: J Sminchak

Completion Date: 3/2/99

Construction Notes: _____




LC34 IDC Coring Logsheet

Boring ID PA-6D

Date 3/2/99

Location LC34 ESB

Lithologic Description	Depth	Sample	USCS	Well	Water Level	Other
silty fine gray sand, trace of shell fragments	27-28	PA-5D-28.5	SM			
gray fine sand with 30-40% shell fragments	28-28.2	PA-5D-28.5	S9			
gray sandy silt, trace of shell fragments	28.2-28.5	PA-5D-30.5	SM			
gray sandy silt, trace of shell fragments	29-29.7	PA-5D-30.5	SM			
fine gray sand with 30-40% shell frags, trace silt	29.7-30.3	PA5-D-32.5	SP			
gray sandy silt, trace of shell fragments	30.3-30.5	PA-5D-34.5	SM			
gray sandy silt, trace of shell fragments	31-31.4	PA-5D-34.5	SM			
abundant shells frags. and gray fine silty sand	31.4-32.5	PA-5D-34.5	SP-GM			
abundant shells frags. and gray fine silty sand	33.5-34.5	PA-5D-36.5	SP-GM			
silty fine gray sand, trace shell frags	35-35.3	PA-5D-36.5	SP			
silty sandy clay, low plast.	35.3-35.6	PA-5D-36.5	SC			
clayey, silty sand w/ shell material 20%	35.6 - 36.5	PA-5D-38.5	SM			
abundant shells w/ silty-fine sands	37-38.5	PA-5D-38.5	SP-SM			
silty clayey fine sand w/ 10-20% shell frags	39.5-39.7	PA-5D-40.5	SP-SM			
abundant large shells + frags in a silty clayey matirix	39.3-40.5	PA-5D-40.5	SP-SM			
clayey silt and fine sand with 20-30% shell frags	41.5-42.5	PA-6D-42.5	SM			
silty fine gray sand with 10-20% shell frags	43-44.5	PA-6D-44.5	SP			
sandy clay with trace of shell ftags.	45-46.2	PA-6D-46.2	CL			

2 2/3 ft screen
6 7/8 in. tip

LC34 IDC Coring Logsheet

Boring ID PA-7S

Date 3/3/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>23.25</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>19</u> to <u>21.6</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
Post hole loose tan sands	0-4	---	---		PVC riser
No sampling, direct push.	4-17	---	---		
fine gray sand, some shell fragments + silts	15-16.5	PA-7D(s)-18.5	SP		
fine gray sand, well sorted, trace shells	17-18.5	PA-7D(s)-18.5	SP		
shell fragments and fine to medium gray sands	19-20.5	PA-7D(s)-20.5	SP-GM		
abundant shell fragments and fine to coarse gray sands	21-22.5	PA-7D(s)-22.5	SP-GM		
					2 2/3 ft screen
				1ft sump	
				6 7/8 in. tip	

Logged by: J Sminchak

Completion Date: 3/3/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-71

Date 3/8/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>26.8</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>23.6</u> to <u>26.2</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
saw 2" asphalt, post hole loose tan sands	0-6	---	---		PVC riser
direct push, no sampling	6-26.8	---	---		

Logged by: J Sminchak

Completion Date: 3/8/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-7D

Date 3/5/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>45.5</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>41.3</u> to <u>43.9</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
saw 2 " asphalt, post hole soil, loose tan sands	0-5	---	---		PVC riser
direct push, no sampling, continue from PA-7S	5-23	---	---		
fine gray sand, w/ some silts and trace of shell material	23-23.7	PA-6D-16.5	SP		
fine gray silty sand 10% shell material	23.7-24.5	PA-6D-18.5	SP		
<u>shelly</u> fine gray sand	25-25.2	PA-6D-20.5	SP		
fine gray sand, trace shell frags, well sorted	25.2-26.1		SP		
sandy gray silt, trace shell frags	26.1-26.3	PA-6D-22.5	SP		
silty fine gray sand, trace shell frags	27-28.5		SM		
fine gray sand, 5% shells, well sorted	29-29.5	---	---		
silty fine gray sand, trace of shell fragments	29.5-30.5	PA-6D-26.5	SM		

Logged by: J Sminchak

Completion Date: 3/5/99

Construction Notes: _____




LC34 IDC Coring Logsheet

Boring ID PA-7D

Date 3/5/99

Location LC34 ESB

Lithologic Description	Depth	Sample	USCS	Well	Water Level	Other
silty fine gray sand, trace of shell fragments	31-31.2	PA-7D-32.5	SM			
abundant shells + fragments with silty gray fine sand	31.2-32.5		GM-SM			
abundant coarse shells + frag with fine sand, some silts	33-33.6	PA-7D-34.5	GM			
silty fine gray sand, trace shell frags	33.6-34.5		SM			
shell frags in silty clay matrix (very slight to no stiffness)	35-35.7	PA7D-36.5	SC			
shell fragments in clayey matrix, low plasticity	35.7-36.5		SC			
light gray fine sand, trace shells	37.5-38.5	PA7D-38.5	SP			
abundant shells (70%) in silty fine gray sand matrix	39-39.8	PA7D-40.5	SP-GM			
gray silty fine sand, trace shells (10-15%)	39.8-40.5		SP-GM			
yellowish brown tan fine sand, trace shells	41-41.7	PA7D-42.5	SP			
gray fine to med sand, trace shells	41.7-42.5		SP			
clayey sand, some stiffness, silty	44 - 44.5	PA7D-45.5	SC			
sandy gray clay, med plasticity	44.5-45.5		CL			

2 2/3 ft screen

1 ft sump
6 7/8 in. tip

LC34 IDC Coring Logsheet

Boring ID PA-8S

Date 3/3/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>20</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>15.8</u> to <u>18.4</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
Post hole loose tan sands	0-6	---	---		PVC riser
No sampling, direct push.	4-20	---	---		

Logged by: J Sminchak

Completion Date: 3/3/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-81

Date 3/8/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>26.8</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>23.6</u> to <u>26.2</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
saw 2" asphalt, post hole loose tan sands	0-6	---	---		PVC riser
direct push, no sampling	6-26.8	---	---		

Logged by: J Sminchak

Completion Date: 3/8/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-8D

Date 3/4/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>46.5</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>42.3</u> to <u>44.9</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
saw 2 " asphalt, post hole soil, loose tan sands	0-6	---	---		PVC riser
direct push, no sampling	6-15	---	---		
fine gray sand, well sorted, trace of shell frags	15-16.5	PA-8D-16.5	SP		
coarse shell fragments (90%) and fine gray sand trace silt	17-18.5	PA-7D-18.5	SP-GM		
fine gray sand, well sorted, 5-10% shell frags.	19-20.5	PA-8D-20.5	SP		
silty fine gray sand, 5-10% shell frags	21-22.5	PA-8D-22.5	SP		
yellowish brown fine sand and shell fragments	23.5-24.3	PA-8D-24.5	SP		
clayey gray silt with some fine sand	24.3-24.5		SM		
silty fine gray sand with 5% shells	25-26.5	PA-8D-26.5	SM		
silty fine gray sand with 5% shells	27-28.3	PA-8D-28.5	SM		

Logged by: J Sminchak

Completion Date: 3/4/99

Construction Notes: _____




LC34 IDC Coring Logsheet

Boring ID PA-8D

Date 3/4/99

Location LC34 ESB

Lithologic Description	Depth	Sample	USCS	Well	Water Level	Other
sandy silty gray clay	28.3-28.5	PA-8D-28.5	SC			
sandy silty gray clay	29-29.3	PA-8D-30.5	SC			
clayey-silty fine sand with some shell frags (5%)	29.3-30.5		SM			
silty fine gray sand	31-31.1	PA-8D-32.5	SM			
abundant shells w/ silty fine gray sand	31.1-31.3		SP-GM			
mostly shells/fragments with in silty fine gray sands (30-40%)	31.3-32.5		SP			
silty fine gray sand with 20% coarse shell frag	33-33.4	PA-8D-34.5	SP-GM			
mostly shells with silty fine gray sand	33.4-33.8		SP			
gray silty fine sand with trace shell frags	33.8-34.5		SP-GM			
silty-clayey fine sand, trace shells	35-35.6	PA-8D-36.5	SP			
silty clayey fine sand wi 10-20% shells +fragments	35.6-36.5		SM			
shells, shell frags in silty clayey matrix	37-38.5	PA-8D-38.5	SM			
fine gray to brown sand, trace of shell fragments	39-39.7	PA-8D-40.5	GM			
silty clayey fine sand w/ 10-20% shells	39.7-40.3		SP			
sandy-silty clay	40.3-40.5		SP-SM			
silty clayey fine sand w/ 30% shells + shell frags	41-42.5	PA-8D-42.5	SC			
gray silty sand with 20-30% shell frags	43-44	PA-8D-44.5	SM			
clayey sitl and fine sand	44-44.5	PA-8D-44.5	SM			
sandy gray clay, med-low plasticity	44.7-45.7	PA-8D-45.7	CL			
						2 2/3 ft screen 1 ft sump 6 7/8 in. tip

LC34 IDC Coring Logsheet

Boring ID PA-9S

Date 3/8/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>22.7</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>18.5</u> to <u>21.1</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
Post hole soil, loose tan sands	0-6	---	---		PVC riser
No sampling, direct push.	6-22.7	---	---		

Logged by: J Sminchak

Completion Date: 3/8/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-9I

Date 3/8/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>26.8</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>23.6</u> to <u>26.2</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
saw 2" asphalt, post hole loose tan sands	0-6	---	---		PVC riser
direct push, no sampling	6-26.8	---	---		

Logged by: J Sminchak

Completion Date: 3/8/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-9D

Date 3/6/99

Location LC34, ESB

Boring Diameter	<u>2 3/8</u> in	Total Depth	<u>45</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>2</u> to <u>3</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>2 2/3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>41.8</u> to <u>44.4</u> ft	Driller	<u>John Hoggatt</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
post hole soil, loose tan sands	0-6	---	---		PVC riser
direct push, no sampling	6-15	---	---		
coarse shell fragments and coarse gray sand	15-16.5	PA-9D-16.5	SP		
fine gray sand, trace shell frags, well sorted	17-18.5	PA-9D-18.5	SP-GM		
fine gray sand, well sorted, trace shell frags.	19-20.5	PA-9D-20.5	SP		
fine gray sand, well sorted, trace shell frags.	21-22.5	PA-9D-22.5	SP		
fine gray sand, well sorted, trace shell frags.	23-24.5	PA-9D-24.5	SP		
light gray fine to med sand and 5-10% shell frags	25-25.4	PA-9D-26.5	SM		
light gray fine to med. sand w/ abundant shells + frags (30-50%)	25.4-25.9		SM		
light gray fine silty sand, trace shell frags	25.9-26.5		SM		

Logged by: J Sminchak

Completion Date: 3/6/99

Construction Notes: _____




LC34 IDC Coring Logsheet

Boring ID PA-9D

Date 3/6/99

Location LC34 ESB

Lithologic Description	Depth	Sample	USCS	Well	Water Level	Other
silty gray fine sand, trace of shells	27-28.5	PA-9D-28.5	SM			
silty gray fine sand, trace of shells	29-30.5	PA-9D-30.5	SM			
silty clayey fine sand w/ 30% shells	31-31.7	PA-9D-32.5	SM			
mostly shells in a silty fine sand matrix	31.7-32.5		GM			
silty fine sand, trace shells	33-33.5	PA-9D-34.5	SM			
abundant shells in silty fine gray sand matrix	33.5-34		SM-GM			
silty clayey fine gray sand with 20-30% shells	34-34.5		SM			
abundant shells (75%) in a silty matrix w/ fine sand	35-36.5	PA-9D-36.5	GM			
gray clay, trace sands	37-37.5	PA-9D-38.5	CL			
gray sandy silt with 10-20% shells	37.5-37.9		SM			
silty fine sand well sorted	37.9-38.5		SP-SM			
silty fine sand well sorted	39-39.8	PA-8D-40.5	SP-SM			
gray silt with shells 30-40%	39.8-40.2		GM-SM			
sandy clay with 10% shells	40.2-40.5		SC-CL			
silty fine sand, trace shells	42-42.9	PA-9D-43.5	SP-SM			
abundant shells + shell frags (70%) w/ silty fine sand	42.9-43.5		GM			
sandy clay, trace shells	44-45	PA-9D-45.5	CL			
shells in silty fine sand matrix	45-45.2		GM			
sandy gray clay, low plasticity	45.2-45.5		SC			

2 2/3 ft screen

1 ft sump
6 7/8 in. tip

LC34 IDC Coring Logsheet

Boring ID PA-10S

Date 3/18/99

Location LC34, ESB

Boring Diameter	<u>3 1/2</u> in	Total Depth	<u>22.5</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>---</u> to <u>---</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>pneumatic hammer</u>
Screen Depth	from <u>18</u> to <u>21</u> ft	Driller	<u>Rob Hancock (PSI)</u>

Lithologic Description

	Depth	Sample	USCS	Well	Other
cement saw 8" concrete, hand-auger loose tan sands	0-6	---	---		PVC riser
No sampling, direct push.	6-22.5	---	---		

Logged by: J Sminchak

Completion Date: 3/18/99

Construction Notes: push sacrificial tip and 3 1/2 diameter sections, insert well in hole and let sands collapse



LC34 IDC Coring Logsheet

Boring ID PA-10I

Date 3/18/99

Location LC34, ESB

Boring Diameter	<u>3 1/2</u> in	Total Depth	<u>28</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>---</u> to <u>---</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>pneumatic hammer</u>
Screen Depth	from <u>23.5</u> to <u>26.5</u> ft	Driller	<u>Rob Hancock (PSI)</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
cement drill 8" concrete, hand-auger loose tan sands	0-6	---	---		PVC riser
No sampling, direct push.	6-28	---	---		

Logged by: J Sminchak

Completion Date: 3/18/99

Construction Notes: push rate increases after 22.5 ft



LC34 IDC Coring Logsheet

Boring ID PA-10D

Date 3/18/99

Location LC34, ESB

Boring Diameter	<u>3 1/2</u> in	Total Depth	<u>45</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>---</u> to <u>---</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>Pneumatic Hammer</u>
Screen Depth	from <u>40.5</u> to <u>43.5</u> ft	Driller	<u>Rob Hancock (PSI)</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
cement drill 8", hand auger loose tan sands	0-6	---	---		PVC riser
direct push, no sampling	6-15	---	---		
no recovery	15-17	---	---		
no recovery	17-18.5	---	---		
silty fine gray sand, trace (5-10%) shell frags.	19-20.5	PA-10D-23.5	SP		
silty fine gray sand, trace (5-10%) shell frags.	21-22.5	PA-10D-25	SP		
silty fine gray sand, trace (5-10%) shell frags.	23-24.5	PA-10D-26.5	SP		
silty fine gray sand, trace (5-10%) shell frags.	25-25.4	PA-10D-28	SP		
skip two ft to prevent sluff from entering sampler	25.4-25.9	---	---		
coarse shell frags (70%) in silty fine gray sand matrix	25.9-26.5	PA-10D-31.5	SP-GM		

Logged by: J Sminchak

Completion Date: 3/25/99

Construction Notes: DI water added to offset heaving sands
during soil sampling, switch to 6' sampling method after 22' bgs

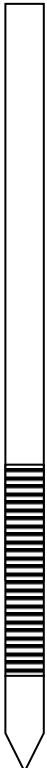


LC34 IDC Coring Logsheet

Boring ID PA-10D

Date 3/18/99

Location LC34 ESB

Lithologic Description	Depth	Sample	USCS	Well	Water Level	Other
abundant whole shells (70%) in silty fine sand matrix	31-32.5	PA-10D-33	SP-GM			
abundant whole shells (70%) in silty fine sand matrix	32.5-34	PA-10D-34.5	SP-GM			
abundant whole shells (70%) in silty fine sand matrix	34-36	PA-10D-36	SP-GM			
---	---	---	---			
skip two ft	---	---	---			
coarse shell frags (75%) in gray silty sand matrix	38-39	PA-10D-38.5	SP-GM			
silty-clayey fine gray sand with 30% shells (slight stiffness)	39-40	PA-10-41	SP-SM			
abundant shells in gray fine sand	40-42.5	PA-10D-42.5	SP-GM			
sampler jammed, no further recovery	---	---	---			

3 ft screen
1.5 ft sump and tip

LC34 IDC Coring Logsheet

Boring ID PA-11S

Date 3/19/99

Location LC34, ESB

Boring Diameter	<u>3 1/2</u> in	Total Depth	<u>22.5</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>---</u> to <u>---</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>pneumatic hammer</u>
Screen Depth	from <u>18</u> to <u>21</u> ft	Driller	<u>Rob Hancock (PSI)</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
cement drill 8" cement, hand-auger loose tan sands	0-6	---	---		PVC riser
No sampling, direct push.	6-22.5	---	---		

Logged by: J Sminchak

Completion Date: 3/19/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-11I

Date 3/19/99

Location LC34, ESB

Boring Diameter	<u>3 1/2</u> in	Total Depth	<u>28</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>---</u> to <u>---</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>pneumatic hammer</u>
Screen Depth	from <u>23.5</u> to <u>26.5</u> ft	Driller	<u>Rob Hancock (PSI)</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
cement saw 8" concrete, hand-auger loose tan sands	0-6	---	---		PVC riser
No sampling, direct push.	6-28	---	---		

Logged by: J Sminchak

Completion Date: 3/19/99

Construction Notes: middle indoor well cluster



LC34 IDC Coring Logsheet

Boring ID PA-11D

Date 3/20/99

Location LC34, ESB

Boring Diameter	<u>3 1/2</u> in	Total Depth	<u>45</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>---</u> to <u>---</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>Pneumatic Hammer</u>
Screen Depth	from <u>41.0</u> to <u>43.5</u> ft	Driller	<u>Rob Hancock (PSI)</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
cement drill 8", hand auger loose tan sands	0-6	---	---		PVC riser
direct push, no sampling	6-15	---	---		
no recovery	15-17.5	---	---		
no recovery	17.5-19.0	PA-11D-19	SP		
silty fine gray sand, trace (5-10%) shell frags.	19.5-22	---	---		
silty fine gray sand, trace (5-10%) shell frags.	22-23.5	PA-11D-23.5	SP		
silty fine gray sand, trace (5-10%) shell frags.	23-24.5	PA-11D-25	SP		
silty fine gray sand, trace (5-10%) shell frags.	24.5-26.5	PA-11D-26.5	SP-SM		
skip two ft to prevent sluff from entering sampler	26.5-28.0	PA-11D-28	SP		
coarse shell frags (70%) in silty fine gray sand matrix	29-30.5	PA-11D-29	SM		

Logged by: J Sminchak

Completion Date: 3/25/99

Construction Notes: DI water added to offset heaving sands
during soil sampling, switch to 6' sampling method after 22' bgs




LC34 IDC Coring Logsheet

Boring ID PA-11D

Date 3/20/99

Location LC34 ESB

Lithologic Description	Depth	Sample	USCS	Well	Water Level	Other
coarse grained shell frags (90%) w/ fine gray sand	30.5-31.2	PA-11D-30.5	GP			
silty fine gray sand, some clay and shell frags	31.2-32.1	PA-11D-32	SM			
abundant shells in silty fine gray sand matrix	32.1-32.6	PA-11D-33.5	SP-GM			
silty fine gray sand, some clay 5% and 10-30% shells	32.6-32.9	PA-11D-35	SM			
abundant shells in silty fine gray sand matrix	32.9-33.5	PA-11D-35	SP			
silty fine gray sand w/ 30-50% shell frags (coarse)	33.5-35	PA-11D-35	SP-GM			
silty fine gray sand, wet, trace shells	35-35.5	PA-11-35.5	SP			
shell hach (5% silty fine gray sand)	35.5-37	PA-11D-37	SP-GM			
sampler jammed, no further recovery	---	---	---			

3 ft screen
1.5 ft sump and tip

LC34 IDC Coring Logsheet

Boring ID PA-12S

Date 3/21/99

Location LC34, ESB

Boring Diameter	<u>3 1/2</u> in	Total Depth	<u>22.5</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>---</u> to <u>---</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>pneumatic hammer</u>
Screen Depth	from <u>18</u> to <u>21</u> ft	Driller	<u>Rob Hancock (PSI)</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
cement drill 8" concrete, hand auger loose tan to brown sands	0-6	---	---		PVC riser
No sampling, direct push.	6-22.5	---	---		
					2 2/3 ft screen
					1.5 ft sump and tip

Logged by: J Sminchak

Completion Date: 3/21/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-12I

Date 3/21/99

Location LC34, ESB

Boring Diameter	<u>3 1/2</u> in	Total Depth	<u>28.5</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>---</u> to <u>---</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>pneumatic hammer</u>
Screen Depth	from <u>24</u> to <u>27</u> ft	Driller	<u>Rob Hancock (PSI)</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
cement drill 8" concrete, hand-auger loose tan sands	0-6	---	---		PVC riser
No sampling, direct push.	6-28.5	---	---		

Logged by: J Sminchak

Completion Date: 3/21/99

Construction Notes: sand heave forces well from
30' to 28.5' during well placement



LC34 IDC Coring Logsheet

Boring ID PA-12D

Date 3/22/99

Location LC34, ESB

Boring Diameter	<u>3 1/2</u> in	Total Depth	<u>45</u> ft
Casing Outer Diameter	<u>2 3/8</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>1 7/8</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite chips</u>
Screen Type	<u>stainless steel</u>	Grout Depth	from <u>---</u> to <u>---</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>Pneumatic Hammer</u>
Screen Depth	from <u>40.5</u> to <u>43.5</u> ft	Driller	<u>Rob Hancock (PSI)</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
cement drill 8", hand auger loose tan sands	0-6	---	---		PVC riser
direct push, no sampling	6-15	---	---		
tan to yellowish brown fine sand well sorted, some gray fine sands	15.5-17	PA-12D-17.5	SP		
fine gray fine sand, 10-15% shells	17.5-18.2	PA-12D-20	SP		
fine to med. gray sand, 10-25% shell frags	18.2-19	PA-12D-20	SP		
fine gray sand well sorted, trace silt and shell frags	19.5-20.5	PA-12D-21	SP		
fine to med. gray sand, 10-25% shell frags	20.5-21	PA-12D-21	SP		
fine to med. gray sand, 10-25% shell frags	21.5-23	PA-12D-23	SP		
fine gray sand, wet, well sorted, trace shells	23.5-25	PA-12D-25	SP		
fine gray silty sand w/ trace of shell frags (<10% silt)	25.5-27	PA-12D-27	SP		

Logged by: J Sminchak

Completion Date: 3/23/99

Construction Notes: start w/ 2 ft pin-point sampler on

3/22 to 31' bgs, swithc to 6 ft core barrel sampler on 3/23




LC34 IDC Coring Logsheet

Boring ID PA-12D

Date 3/22/99

Location LC34 ESB

Lithologic Description	Depth	Sample	USCS	Well	Water Level	Other
silty fine gray sand, trace shells (10-20% silt)	27.5-29	PA-12D-29	SM			
silty fine gray sand, 30-50% shell frags	32-34	PA-12D-33.5	SM			
silty fine gray sand, some shell frags <10%	34-35	PA-12D-35	SM			
abundant shells w/ silty fine sand (10-20%)	35-36.5	PA-12D-36.5	GM			
silty gray fine sand, w/some clay + shells	36.5-38	PA-12D-38	SM			
overpush no sample	---	---	---			
silty fine gray sand, trace shells	41-42	PA-12D-42.5	SP-SM			
ssilty fine gray sand with 20-40% shells	42-44	PA-12D-44	SM			
abundant shells in silty fine gray sand (30-40%)	44-44.5	PA-12D-44.5	GM			

LC34 IDC Coring Logsheet

Boring ID PA-13S

Date 7/13/99

Location LC34

Boring Diameter	<u>2 1/2</u> in	Total Depth	<u>24.5</u> ft
Casing Outer Diameter	<u>2 1/2</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>2</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite</u>
Screen Type	<u>stainless steel, slotted</u>	Grout Depth	from <u>0</u> to <u>2</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>21</u> to <u>24</u> ft	Driller	<u>R. Aguilar</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
No sampling, direct push.	0-24.5	--	--		PVC riser

Logged by: L. Cumming

Completion Date: 7/13/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-13I

Date 7/13/99

Location LC34

Boring Diameter	<u>2 1/2</u> in	Total Depth	<u>28.5</u> ft
Casing Outer Diameter	<u>2 1/2</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>2</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite</u>
Screen Type	<u>stainless steel, slotted</u>	Grout Depth	from <u>0</u> to <u>2</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>25</u> to <u>28</u> ft	Driller	<u>R. Aguilar</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
No sampling, direct push.	0-28.5	---	---	<p>3 ft screen 6 in. tip</p>	PVC riser

Logged by: L. Cumming

Completion Date: 7/13/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-13D

Date 7/12/99

Location LC34

Boring Diameter	<u>2 1/2</u> in	Total Depth	<u>44.5</u> ft
Casing Outer Diameter	<u>2 1/2</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>2</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite</u>
Screen Type	<u>stainless steel, slotted</u>	Grout Depth	from <u>0</u> to <u>2</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>41</u> to <u>44</u> ft	Driller	<u>R. Aguilar</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
No sampling, direct push.	0-44.5	---	---	<p>3 ft screen 6 in. tip</p>	PVC riser

Logged by: L. Cumming

Completion Date: 7/12/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-14S

Date 7/13/99

Location LC34

Boring Diameter	<u>2 1/2</u> in	Total Depth	<u>24.5</u> ft
Casing Outer Diameter	<u>2 1/2</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>2</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite</u>
Screen Type	<u>stainless steel, slotted</u>	Grout Depth	from <u>0</u> to <u>2</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>21</u> to <u>24</u> ft	Driller	<u>R. Aguilar</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
No sampling, direct push.	0-24.5	--	--		PVC riser

Logged by: L. Cumming

Completion Date: 7/13/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-14I

Date 7/13/99

Location LC34

Boring Diameter	<u>2 1/2</u> in	Total Depth	<u>28.5</u> ft
Casing Outer Diameter	<u>2 1/2</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>2</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite</u>
Screen Type	<u>stainless steel, slotted</u>	Grout Depth	from <u>0</u> to <u>2</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>25</u> to <u>28</u> ft	Driller	<u>R. Aguilar</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
No sampling, direct push.	0-28.5	---	---	<p>3 ft screen 6 in. tip</p>	PVC riser

Logged by: L. Cumming

Completion Date: 7/13/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-14D

Date 7/13/99

Location LC34

Boring Diameter 2 1/2 in

Total Depth 44.5 ft

Casing Outer Diameter 2 1/2 in

Sand Pack ---

Casing Inner Diameter 2 in

Sand Pack Depth from --- to --- ft

Casing Material stainless steel

Grout Material bentonite

Screen Type stainless steel, slotted

Grout Depth from 0 to 2 ft

Screen Slot 0.010


Surface Completion flush mount vault

Screen Length 3 ft

Drilling Method CPT

Screen Depth from 41 to 44 ft

Driller R. Aguilar

Lithologic Description	Depth	Sample	USCS	Well	Other
No sampling, direct push.	0-44.5	---	---		PVC riser

Logged by: L. Cumming

Completion Date: 7/13/99

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-16S

Date 5/26/00

Location Steam Plot

Boring Diameter	<u>2 1/2</u> in	Total Depth	<u>24.75</u> ft
Casing Outer Diameter	<u>2 1/2</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>2</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite</u>
Screen Type	<u>stainless steel, slotted</u>	Grout Depth	from <u>0</u> to <u>2</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount pad</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>21</u> to <u>24</u> ft	Driller	<u>Gregg In-Situ</u>

Lithologic Description

Lithologic Description	Depth	Sample	USCS	Well	Other
Topsoil, loose sand	0-8	---	SP		
Direct push	8-24.75	---	---		

Logged by: J. Sminchak

Completion Date: 5/26/00

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-16I

Date 5/26/00

Location Steam Plot

Boring Diameter	<u>2 1/2</u> in	Total Depth	<u>28.75</u> ft
Casing Outer Diameter	<u>2 1/2</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>2</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite</u>
Screen Type	<u>stainless steel, slotted</u>	Grout Depth	from <u>0</u> to <u>2</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount pad</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>25</u> to <u>28</u> ft	Driller	<u>Gregg In-Situ</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
Topsoil, loose sand	0-5	---	SP		
Direct push	5-28.75	---	---		

Logged by: J. Sminchak

Completion Date: 6/2/00

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-16D

Date 5/26/00

Location Steam Plot

Boring Diameter	<u>2 1/2</u> in	Total Depth	<u>45</u> ft
Casing Outer Diameter	<u>2 1/2</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>2</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite</u>
Screen Type	<u>stainless steel, slotted</u>	Grout Depth	from <u>0</u> to <u>2</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount pad</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>41.25</u> to <u>44.25</u> ft	Driller	<u>Gregg In-Situ</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
Topsoil, loose sand	0-5	--	SP		3 ft screen 8 in. tip
Direct push	5-45	---	---		

Logged by: J. Sminchak

Completion Date: 6/2/00

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-17S

Date 5/26/00

Location Steam Plot

Boring Diameter	<u>2 1/2</u> in	Total Depth	<u>21</u> ft
Casing Outer Diameter	<u>2 1/2</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>2</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite</u>
Screen Type	<u>stainless steel, slotted</u>	Grout Depth	from <u>0</u> to <u>2</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount pad</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>18</u> to <u>21</u> ft	Driller	<u>Gregg In-Situ</u>

Lithologic Description

Lithologic Description	Depth	Sample	USCS	Well	Other
Topsoil, loose sand	0-5	---	SP		
Direct push	5-21	---	---		

Logged by: J. Sminchak

Completion Date: 5/26/00 (8/31/01)

Construction Notes: well casing broken during
installation, well not operational, replaced by PSI 8/31/00



LC34 IDC Coring Logsheet

Boring ID PA-17I

Date 6/2/00

Location Steam Plot

Boring Diameter	<u>2 1/2</u> in	Total Depth	<u>28.75</u> ft
Casing Outer Diameter	<u>2 1/2</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>2</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>bentonite</u>
Screen Type	<u>stainless steel, slotted</u>	Grout Depth	from <u>0</u> to <u>2</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount pad</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>CPT</u>
Screen Depth	from <u>25</u> to <u>28</u> ft	Driller	<u>Gregg In-Situ</u>

Lithologic Description

Lithologic Description	Depth	Sample	USCS	Well	Other
Topsoil, loose sand	0-5	---	SP		
Direct push	5-28.75	---	---		

Logged by: J. Sminchak

Completion Date: 6/2/00

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-17D

Date 6/2/00

Location Steam Plot

Boring Diameter 2 1/2 in

Total Depth 45 ft

Casing Outer Diameter 2 1/2 in

Sand Pack ---

Casing Inner Diameter 2 in

Sand Pack Depth from --- to --- ft

Casing Material stainless steel

Grout Material bentonite

Screen Type stainless steel, slotted

Grout Depth from 0 to 2 ft

Screen Slot 0.010

Surface Completion flush mount pad

Screen Length 3 ft

Drilling Method CPT

Screen Depth from 41.25 to 44.25 ft

Driller Gregg In-Situ

Lithologic Description

Lithologic Description	Depth	Sample	USCS	Well	Other
Topsoil, loose sand	0-5	---	SP		
Direct push	5-45	---	---		

Logged by: J. Sminchak

Completion Date: 6/3/00

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-18S

Date 12/11/00

Location ESB

Boring Diameter	<u>4</u> in	Total Depth	<u>24</u> ft
Casing Outer Diameter	<u>2 1/4</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>2</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>cement</u>
Screen Type	<u>stainless steel, slotted</u>	Grout Depth	from <u>0</u> to <u>2</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>Vibra-Core</u>
Screen Depth	from <u>21</u> to <u>24</u> ft	Driller	<u>Precision</u>

Lithologic Description

Lithologic Description	Depth	Sample	USCS	Well	Other
Post-hole, loose tan sand	0-6	---	SP		
Direct push	6-24	---	---		
(pvc riser)					

Logged by: J. Sminchak

Completion Date: 12/11/00

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-18I

Date 12/12/00

Location ESB

Boring Diameter	<u>4</u> in	Total Depth	<u>28</u> ft
Casing Outer Diameter	<u>2 1/4</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>2</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>cement</u>
Screen Type	<u>stainless steel, slotted</u>	Grout Depth	from <u>0</u> to <u>2</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>Vibra-Core</u>
Screen Depth	from <u>25</u> to <u>28</u> ft	Driller	<u>Precision</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
Post-hole, loose tan sand	0-6	--	SP		PVC Riser
Direct push	6-28	---	---		
					3 ft screen

Logged by: J. Sminchak

Completion Date: 12/12/00

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-18D

Date 12/12/00

Location ESB

Boring Diameter	<u>4</u> in	Total Depth	<u>44</u> ft
Casing Outer Diameter	<u>2 1/4</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>2</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>cement</u>
Screen Type	<u>stainless steel, slotted</u>	Grout Depth	from <u>0</u> to <u>2</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush mount</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>Vibra-Core</u>
Screen Depth	from <u>41</u> to <u>44</u> ft	Driller	<u>Precision</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
Post-hole, loose tan sand	0-6	--	SP		PVC Riser
Direct push	6-44	---	---		

Logged by: J. Sminchak

Completion Date: 12/12/00

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-19S

Date 2/28/01

Location LC34

Boring Diameter	<u>4</u> in	Total Depth	<u>23</u> ft
Casing Outer Diameter	<u>2 1/2</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>2</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>cement</u>
Screen Type	<u>stainless steel, slotted</u>	Grout Depth	from <u>0</u> to <u>5</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush vault</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>Direct Push</u>
Screen Depth	from <u>20</u> to <u>23</u> ft	Driller	<u>Precision</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
loose tan sand	0-6	--	SP		3 ft screen
Direct push	6-23	---	---		

Logged by: J. Sminchak

Completion Date: 2/28/01

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-19I

Date 2/28/01

Location LC34

Boring Diameter	<u>4</u> in	Total Depth	<u>28</u> ft
Casing Outer Diameter	<u>2 1/2</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>2</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>cement</u>
Screen Type	<u>stainless steel, slotted</u>	Grout Depth	from <u>0</u> to <u>5</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush vault</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>Direct Push</u>
Screen Depth	from <u>25</u> to <u>28</u> ft	Driller	<u>Precision</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
loose tan sand	0-6	--	SP		
Direct push	6-28	---	---		

Logged by: J. Sminchak

Completion Date: 2/28/01

Construction Notes: _____



LC34 IDC Coring Logsheet

Boring ID PA-19D

Date 2/28/01

Location LC34

Boring Diameter	<u>4</u> in	Total Depth	<u>45</u> ft
Casing Outer Diameter	<u>2 1/2</u> in	Sand Pack	<u>---</u>
Casing Inner Diameter	<u>2</u> in	Sand Pack Depth	from <u>---</u> to <u>---</u> ft
Casing Material	<u>stainless steel</u>	Grout Material	<u>cement</u>
Screen Type	<u>stainless steel, slotted</u>	Grout Depth	from <u>0</u> to <u>45</u> ft
Screen Slot	<u>0.010</u>	Surface Completion	<u>flush vault</u>
Screen Length	<u>3</u> ft	Drilling Method	<u>Direct Push</u>
Screen Depth	from <u>42</u> to <u>45</u> ft	Driller	<u>Precision</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
loose tan sand	0-6	--	SP		
Direct push	6-45	---	---		

Logged by: J. Sminchak

Completion Date: 2/28/01

Construction Notes: _____



B.4 LC34 IDC Coring Logsheets for Semi-Confined Aquifer Wells

LC34 IDC Coring Logsheet

Boring ID PA-20



Date 4/9/01

Location Roadway

Boring Diameter	<u>10 & 5 7/8</u> in	Total Depth	<u>61</u> ft
Casing Outer Diameter	<u>6 & 2</u> in	Sand Pack	<u>20/30</u>
Casing Inner Diameter	_____ in	Sand Pack Depth	from <u>53</u> to <u>61</u> ft
Casing Material	<u>304 SCH 10 Stainless</u>	Grout Material	<u>type G & silica flour</u>
Screen Type	<u>wirewound 304 Sch 10</u>	Grout Depth	from <u>GS</u> to <u>51</u> ft
Screen Slot	<u>0.10</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>5</u> ft	Drilling Method	<u>mud rotary</u>
Screen Depth	from <u>55</u> to <u>60</u> ft	Driller	<u>R. Hutchinson</u>

Lithologic Description	Depth	Sample	USCS	Well	Other	
sand, med gray, silty, rec 1.1 ft, PID 0.0, 12/14/12/13	41-43	SB50-43	SP		Flush Mount	
silt, clayey, med gray, rec 1.0 ft, PID 0.0, 3/2/2/3	43-45	SB50-45	ML		46'	
clay, med plasticity, med. gray, rec. 6", PID 0.0, 3/3	45-46	SB50-46	CL			
clay, plastic, med. gray, wet, rec. 1', PID 15, 8/9/5/5	47.5-48	SB50-48	CH			
sand,some silt and clay, fine grained, rec. 1.5', PID 2.0, 10/12/11/12	48.5-48.9		SM			
sand, med grained with some shells, PID 0.0	48.9-50	SB50-50	SP			
sand, fine-med grained with shell frags, rec 2.0, PID 0.0, 10/13/13/15	50-50.5		SW			
clay, soft, wet, plastic, med. gray , PID 0.0	50.5-51	SB50-52	CH			51' bent. seal (2')
sand, fine-med grained, shelly zones, med. gray, PID 0.0	51-52	SB50-52B	SP			
sand, w coarse shell fragments, PID 0.0, rec 1.7 or 2.0	52-52.3		Sp		53 sand pack (20/30)	
abrupt contact w med grained sand, no shells, silty	52.3-53 53-54	SB50-54	SM SM			

Logged by: C.J. Perry

Completion Date: 4/5/01

Construction Notes: 6-in surface casing set to 46', 2-in casing screen set at 60'

LC34 IDC Coring Logsheet

Boring ID PA-20



Date 4/9/01

Location Roadway

Lithologic Description	Depth	Sample	USCS	Well	Other
sand, shelly cs fragments, med gray, rec 1.4 or 2.0, PID 0.0, 6/7/7/4	54.6-55.2		SP		55
clay, shelly, some silt, soft, wet, med. gray	55.2-56	SB 50-56	CL		2-" SS Screen
sand, very shelly, med. gray, trace silt and clay, Rec 1.9 of 2.0, PID 0.0, 6/7/7/7	56-58	SB 56-58	SM/SC		61' TD
sand, shelly, no fines, med gray, rec. 2.0 of 2.0, PID 0.0, 13/13/15/17	58-60	SB 50-60	SP		
Total Depth (sampled): 60'					
Total Dept (drilled): 61'					
5' x 2" diameter well screen 55-60'					

LC34 IDC Coring Logsheet

Boring ID PA-21



Date 4/9/01

Location ISCO Plot

Boring Diameter	<u>10 & 5 7/8</u> in	Total Depth	<u>61</u> ft
Casing Outer Diameter	<u>6 & 2</u> in	Sand Pack	<u>20/30</u>
Casing Inner Diameter	_____ in	Sand Pack Depth	from <u>53</u> to <u>61</u> ft
Casing Material	<u>304 SCH 10 Stainless</u>	Grout Material	<u>type G & silica flour</u>
Screen Type	<u>wirewound 304 Sch 10</u>	Grout Depth	from <u>GS</u> to <u>51</u> ft
Screen Slot	<u>0.10</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>5</u> ft	Drilling Method	<u>mud rotary</u>
Screen Depth	from <u>55</u> to <u>60</u> ft	Driller	<u>R. Hutchinson</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
sand, brn-gray, some silt, med grnd, rec 1.15 of 2, PID 0.0, 11/13/15/20	40-42	SB51-41	SM		Flush Mount 46'
sand, brn-gray, silty, fine grnd., rec 1.3 of 2', PID 2.0, 6/7/8/6	42-44	SB51.44	SM		
sand, brn, med grnd, grading to silty clay/clay, rec. 2 of 2', PID 2000+, 8/7/4/3	44-44.5	SB51-44B	SM		
silty clay, med. brn gray, wet	44.5-44.75	SB51-45	ML		
clay, med gray, wet, soft	44.75-46	SB51-46	CH		
clay, med gray, wet, soft, rec. 1.1 of 2.0, PID 29, 6/7/9/5	47-47.5		CH		
sand, med grained, med gray, massive, shells, PID 2000+	47.5-48	SB-51-48.8	SP		
sand, clayey, mucky, w/ cs shell frags, rec. 2.0 of 2.0, PID 46, 7/8/8/12	48-48.2	SB51-48B	SC		
clay, soft, plastic, wet, med gray, PID 323	48.2-49		CH		
sand, fine-med grnd, massive, med. gray, PID 96	49-50		SP		
sand, med-cs grnd, some silt, rec 1.9 of 2.0, PID 2.0, 7/7/6/6	50-50.3	SB51-50	SM		

Logged by: C.J. Perry

Completion Date: 4/4/01

Construction Notes: 6-in surface casing set to 46', 2-in casing screen set at 60'

LC34 IDC Coring Logsheet

Boring ID PA-21



Date 4/9/01

Location ISCO Plot

Lithologic Description	Depth	Sample	USCS	Well	Other
sand, silty and clayey, shell frags, med gray	50.3-50.6		SC		Type G Cement
sand, fine grnd, massive, med. gray, PID 2.0	50.6-52	SB 51-52	SP		51 Bentonite Seal
sand, silty and clayey, med. gray, shelly, Rec 2.0 of 2.0', PID 34, 7/8/9/10	52-52.8		SM		53
sand, med grnd, fining downward, some shells	52.8-54	SB 51-54	SP		55
sand, w silt and clay, shelly, med gray, rec 2.0 of 2.0', PID 8.0, 5/5/4/6	54-56	SB51-56	SM		2-in Screen 0.0010
sand, fn-med grnd, massive, med gray, rec 2.0 of 2.0, PID =0.0, 4/4/3/5	56-56.6		SP		
sand, w silt and clay, mucky, shelly	56.6-57.6		SM		
sand, fn grnd, tr. silt and clay	57.6-58	SB51-58	SM		
sand, med grnd, slightly silty, shells, rec 2.0 of 2.0', PID 0.0, 6/8/12/16	59-60		SP		60
clayey interval from 59.1-59.5, PID 0.0		SB51-60	SC		TD 61'
Total Dept (Sampled): 60'					
Total Depth (reamed): 61'					
5' x 2" diameter well screen 55-60'					

LC34 IDC Coring Logsheet

Boring ID PA-22



Date 4/9/01

Location Resistive Heating Plot

Boring Diameter	<u>10 & 5 7/8</u> in	Total Depth	<u>61</u> ft
Casing Outer Diameter	<u>6 & 2</u> in	Sand Pack	<u>20/30</u>
Casing Inner Diameter	_____ in	Sand Pack Depth	from <u>53</u> to <u>61</u> ft
Casing Material	<u>304 SCH 10 Stainless</u>	Grout Material	<u>type G & silica flour</u>
Screen Type	<u>wirewound 304 Sch 10</u>	Grout Depth	from <u>GS</u> to <u>51</u> ft
Screen Slot	<u>0.10</u>	Surface Completion	<u>flush mount vault</u>
Screen Length	<u>5</u> ft	Drilling Method	<u>mud rotary</u>
Screen Depth	from <u>55</u> to <u>60</u> ft	Driller	<u>R. Hutchinson</u>

Lithologic Description	Depth	Sample	USCS	Well	Other
sand, med grnd, shell frags, gray, rec 1.3 of 2, PID 155, 8/10/13/16	40-42	SB52-42	SP		Flush Mount 46'
sand, med-grnd, med. gray, rec 0.75 of 2', PID 44, 6/7/7/8	42-44	SB52-44	SP		
silt, massive, med gray, grading to clay, rec. 1.4 of 2', PID 102, 8/7/6/5	44.6-45.7	SB52-45	ML		
clay, plastic, med. gray, 3" thick, PID 234	45.7-46	SB52-45	CH		
clay, med gray, plastic, 3/3, PID 381	46-46.9	SB52-47	CH		
sand, fine-grnd, med gray, PID 725	46.9-47.2	SB52-47B	SP		
sand, fine grained, silty, shelly, med gray	47.2-.5		SM		
clay, stiff, wet, med gray	47.5-47.7	SB52-47.5	CL		
sand, med-grnd, massive, few shells, med gray	47.7-48	SB52-48	SP		
clay, stiff, mod. wet, shell frags, Rec. 2.0 of 2.0, 6/6/7/8	48-48.9	SB52-49/49B	CL		
sand, fn-med grnd, massive, few shells 1.9 of 2.0	48.9-50	SB52-50	SP		

Logged by: C.J. Perry

Completion Date: 4/5/01

Construction Notes: 6-in surface casing set to 46', 2-in casing screen set at 60'

LC34 IDC Coring Logsheet

Boring ID PA-22



Date 4/9/01

Location Resistive Heating Plot

Lithologic Description	Depth	Sample	USCS	Well	Other
sand, med. grnd, med. gray, some shells, Rec 0.75 of 2.0, PID 20, 7/8/8/9	50-50.75	SB52-51	SP		Type G Cement
sand, med grnd, very shelly, Rec 2.0 of 2.0, PID 20, 6/7/5/8	52-52.9		SP		51 Bentonite Seal
sand, fn-med grnd, silty	52.9-54		SP		53
sand, med grnd, very shelly, loose, wet, PID 80, 7/5/9/9	54-54.2	SB 52-54	SP		55
sand, med. grnd, v. shelly but sandier, PID 1530	54.2-56	SB52-56/56B	SP		2-in Screen 0.0010
sand, med grnd, w/ clay and silt, muckey, shells, 1.7 of 2.0, PID 1200+, 7/7/4/3	56.3-58	SB52-58	SM		
sand, cs grnd, trc silt, v. shelly, loose, rec 2.0 of 2.0, PID 50+, 11/12/14/17	558-58.5		SP		
sand, med grnd, mucky, wet	58.5-59		SP		
sand, med grnd, massive, decreasing shell fragments wit depth	59-60		SP		60
					TD 61'
Total Dept (Sampled): 60'					
Total Depth (reamed): 61'					
5' x 2" diameter well screen 55-60'					