WHITE POND WATER QUALITY STUDIES 1990

prepared for

White Pond Advisory Committee
and
Board of Health
Concord, Massachusetts

by

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This report describes results of groundwater studies conducted around White Pond in 1990. The purpose of the studies was to characterize groundwater flow directions and groundwater nutrient contents in the vicinity of the Pond. This information is potentially useful for determining the importance of onsite sewage disposal systems as sources of nutrients to the Pond. The importance of nutrient input as a factor contributing to algal growth and related pond water quality problems is described in previous reports prepared for the Board of Health and White Pond Advisory Committee (Walker and Ploetz, 1988, 1989, 1990).

On May 2, 1990, sixteen shallow groundwater wells were installed around the pond shoreline by Pine and Swallow, Associates, Inc. of Groton, Massachusetts, using a portable vibrating drill. Well characteristics and locations are summarized in Table 1 and Figure 1, respectively. Detailed logs are given in Appendix A. PVC wells previously installed around the southeastern shoreline by Ralph Tyler (Unisys Corp) were also monitored under this program.

The wells were monitored on three dates in 1990 (April 14, July 26, and September 24). Results are summarized in Table 2. A manometer described by Mitchell et al. (1988) was used to measure water surface elevations inside each well (relative to the pond surface) and to collect samples for chemical analysis. Results of chemical analysis conducted by Arnold Greene Laboratories, Inc. of Natick, Massachusetts are listed in Appendix B. At least 1 liter of water (~3 times the volume of the pipe in and below the screen) was pumped from each well prior to collecting samples for chemical analysis. To remove effects of sediments (sand particles pumped from well, chemical precipitates), all samples were decanted prior to chemical analysis.

The distance from each well to the pond shoreline varied from ~1 to ~18 feet on the date of installation. Because of seasonal increases in the pond water level, well 11B became submerged and could not be sampled after May. Wells 13 and 14 were generally difficult to monitor because of low yields and highly turbid samples. It is possible that these wells are located in isolated zones of low hydraulic conductivity (clay or till), as compared with the other installations (sand). Results from these wells are considered less reliable.

Figure 2 shows measured groundwater elevations for each sampling date and well. Wells are ordered clockwise, starting at the state boat ramp on the eastern shore. A positive elevation indicates that shallow groundwater flows toward the Pond in the vicinity of the sampling well. A negative elevation indicates that groundwater flows away from the Pond.

General patterns in flow direction are summarized in Figure 3. To simplify the presentation, shoreline zones were classified as "inflows" when well water level was more than .5 inches above the pond level (reading >= +.5 inches), "outflows" when the well level was more than .5 inches below the pond level (reading <= -.5 inches), or "stagnant" when the well and pond water levels differed by less than .5 inches (-.5 < reading < +.5 inches). Spatial and temporal variations are discussed below.

Along the northwestern and northern shores, flow was towards the Pond on each sampling date. This includes the White Avenue area, which contains the highest residential lot density. Along the southwestern and southern shores (Sperry/Unisys property, Town Conservation Land), flow was stagnant or away from the Pond on each sampling date. Along the eastern shore (boat ramp, beach), the flow was towards the Pond in May and July and away from the Pond in September.

Results suggest that most of the adjacent watershed was recharging the Pond in May. As the season progressed, the percentage of the pond shoreline functioning as an outlet increased. The clear reversal of well elevations along the eastern and southeastern shore (from +2 inches in May to -2 inches in September) may reflect drawdown of the water table induced by seasonal pumping from the Town water supply well, located ~1200 feet southeast of the Pond. Seasonal aspects of this pumping activity have been described previously (Walker and Ploetz, 1989). Regional groundwater studies indicate that the Town well's cone of influence extends into the Pond (IEP, 1979). It is also possible that groundwater flow directions in the vicinity of the Pond were influenced by well pumping associated with the Sperry/Unisys groundwater restoration project.

Well phosphorus concentrations (Figure 4) were variable from date to date. Highest concentrations were measured in May, when flow direction was primarily towards the Pond. Lowest concentrations were measured in July. The July sampling followed a heavy rainstorm (~3 inches on July 25). Low concentrations may reflect sampling of infiltrated stormwater, as distinct from groundwaters influenced by wastewater effluents.

Several samples collected for chemical analysis were turbid and emitted hydrogen sulfide odors. Precipitates often formed in samples within a few minutes of collection, possibly as a result of iron oxidation and precipitation, a process which can scavenge phosphorus. The laboratory was instructed to decant all samples prior to analysis. In this way, analysis results would reflect total phosphorus in excess of that scavenged by iron precipitation. Since this scavenging would also be expected to occur as shallow groundwaters enter the Pond, analysis of aerobic, decanted samples seems justified for the purpose of identifying local sources of phosphorus which are unchecked by iron coprecipitation.

One potential problem with the survey design is that corrosion of well pipes may have contributed iron to the samples and/or regional groundwaters. To minimize this effect, at least 1 liter of water was pumped from each well prior to collecting samples for chemical analysis. This measure may have been insufficient, however. It is possible that higher phosphorus concentrations measured on May 14 (12 days after installation) reflected less corrosion of the wells on that sampling date, as compared with July and September.

To investigate the potential effects of well composition on sample phosphorus concentrations Wells 2 (steel) and 2-PVC (plastic) were installed adjacent to each other immediately south of the White Pond Association Beach. As summarized in Table 2, phosphorus results from the steel well (.08, < .01, <.01 mg/liter) were consistently below results from the plastic well (.25, .02, and .36 mg/liter, respectively). Total iron concentrations (measured only on September 24) were 6.09 mg/liter in the steel well and 1.86 mg/liter in the plastic well. The steel well also differed from the plastic well with respect to the screen length (5 feet vs. 2 feet), screen depth (1.3-6.3 feet vs. 5.2-7.2), and slot width (.015 inches vs. .020 inches). These differences, plus the lack of replication at other sites, make it impossible to draw firm conclusions regarding the effects of well material on sample phosphorus concentrations. Iron contributed by well corrosion may have caused under-estimation of phosphorus in local groundwaters, however, particularly in the July and September sampling rounds.

Phosphorus influx to the Pond from local groundwaters is related to the product of the elevation gradient, phosphorus concentration, permeability, and thickness. For a given permeability and thickness, the product of water elevation and sample concentration provides a basis for ranking the wells and sampling dates with respect to potential phosphorus influx. The May sampling of Wells 11A and 11B ranked highest in this regard:

Well	Total P mg/l	x Elev inches	= Relative Flux mg/l x inches
11B	4.5	1.50	6.75
11A	2.0	1.75	3.50
Others (Max)	1.7	0.50	0.85

The relatively high flux rates calculated for wells 11A and 11B may reflect the relatively high density of onsite wastewater disposal systems in the White Avenue area. Well 11B should be further prioritized because it was closer to the pond shoreline (~1 foot) than the others. The highest measured phosphorus concentrations (2-4.5 mg/liter) can be compared with typical values for domestic wastewater (4-8 mg/liter).

Because of high spatial and temporal variability, these results provide only preliminary indications of potential source areas and seasonal pond/groundwater interactions. More intensive studies are needed to quantify these factors. Based upon these preliminary results, a cost-effective program for protecting the Pond from the adverse impacts of wastewater discharges is more likely to involve targeting specific sources (reconstruction, relocation, intensive maintenance, separation/reduction in water use, etc.), as distinct from a "global solution" (sewering, etc.).

These studies indicate that groundwater flow direction is generally away from the Pond in the vicinity of the Unisys property (southwest). The flow direction may be reversed, however, during periods of high water table in Spring. It is also possible that groundwater flows in this area may be influenced by pumping from the Sperry/Unisys treatment wells. It is not certain that the Pond will continue to discharge to the Southwest when pumping from the treatment wells is stopped, as will presumably be the case when organic contaminant levels in the groundwater reach acceptable levels.

Transport of nutrients and other water quality contaminants to White Pond via groundwater and/or surface runoff should be considered in evaluating potential water quality impacts of developing the Unisys property. The Pond has no capacity to assimilate additional nutrient loadings without significant adverse water quality impacts (loss of oxygen from bottom waters, occasional algal blooms, decreases in transparency). The need to protect the Town water supply well should also be considered in weighing alternatives for the Unisys property. The proposed purchase of the land by the Town would provide longterm watershed protection for both White Pond and the Town well. Options for public access and use of the parcel need to be explored. Limited recreational use would not necessarily be inconsistent with protecting water quality.

REFERENCES

IEP, Inc., "Concord Water Resources Study", prepared for Town of Concord, 1979.

Mitchell, D.F., K.J. Wagner, C. Asbury, "Direct Measurement of Groundwater Flow and Quality as a Lake Management Tool", Lake and Reservoir Management, Vol. 4, No. 1, pp. 169-178, 1988.

Walker, W.W. and G.P. Ploetz, "White Pond Preliminary Diagnostic Study", prepared for White Pond Advisory Committee and Board of Health, Concord, Massachusetts, January 1988.

Walker, W.W. and G.P. Ploetz, "White Pond Water Quality Studies - 1988", prepared for White Pond Advisory Committee and Board of Health, Concord, Massachusetts, July 1989.

Walker, W.W. and G.P. Ploetz, "White Pond Water Quality Data - 1989", prepared for White Pond Advisory Committee and Board of Health, Concord, Massachusetts, March 1990.

Table 1
White Pond Shoreline Well Descriptions

Well Index:

PS Well	Approximate Location (see Figure 1)
1	south of state boat ramp
2	south of association beach, steel well
2-PVC	south of association beach adjacent to PS-2, pvc well
3	between 2-story cedar house and steps
4	in front of rr ties
5	center of cove - seymour st - camp thoreau
6	in front of rr tie retaining wall, 5 paces east of concrete steps
7	7 paces west of dock with lattice fence
8	west of wooden stairs & dock, house with rounded corners
9	between white cottage & cedar cottage; midway between wooden & concrete stairs
10	white avenue - east of grey house near point
11A	white ave - in front of drain in retaining wall
11B	white ave - in front of cottage with blue tarp roof - in east stone pier
12	at western edge of white ave cottages
13	south of stone root access, north of leaning birch tree
14	east of steps, first house east of conservation land

PS Well Dimensions (Details in Appendix A):

Dimension	Units	Steel Wells	PVC Well
Inside Diameter	inches	0.62	0.50
Total Length	feet	7-8.1	7
Screen Length	feet	5	2
Slot Width	inches	0.015	0.020
Sump Length	feet	1	1
Screen Depth from Ground Surface			
Top	feet	1.3-2.4	5.2
Bottom	feet	6.3-7.4	7.2

Table 2
White Pond Shoreline Well Monitoring Results

Well/ Station	Elev. (inches above pond) 5/14/90	7/26/90	9/24/90	.... Total Phosphorus .... (mg/liter) 5/14/90	7/26/90	9/24/90	Conductivity (umhos) 7/26/90	Iron (mg/l) 9/24/90
1	2.50	1.13	-2.00	<0.01	0.05	0.010	326	
2	2.00	1.50	-2.00	0.08	<0.01	<0.01	50	6.09
2-PVC	2.75	1.50	-1.50	0.25	0.02	0.360	43	1.86
3	2.50	0.38	-1.25	0.17	<0.01	0.050	51	
4	1.50	-0.25	-1.50	*	0.02	0.180	261	
14	0.13	-1.00	-1.50	1.25	<0.01	0.030	44	
T-8	0.13	-1.50	-1.25	0.69	<0.01	0.019	65	
T-5	0.88	-0.50		0.10	<0.01		45	
T-4	0.13		-1.25	0.90		0.040		
T-3		-0.25			<0.01		45	
13	-0.75	2.00	1.50	*	0.32	0.014	103	
12	1.75	1.00	1.50	1.00	<0.01	0.130	91	
11B	1.50	**	**	4.50	**	**	**	
11A	1.75	1.00	1.00	2.00	<0.01	0.040	104	
10	1.75	0.88	0.75	0.08	<0.01	0.045	281	
9	2.75	1.25	0.00	0.08	<0.01	0.040	72	
8	1.75	0.25	0.50	0.38	<0.01	<0.01	168	
5	2.00	1.00	0.50	0.22	<0.01	0.170	86	
6	0.50	-0.25	0.50	1.70	<0.01	0.120	106	
7	1.88	-0.38	0.50	0.17	<0.01	0.040	66	
POND	0.00	0.00	0.00	0.20	<0.01	0.045	47	

Notes:
Well data sorted clockwise around pond starting at boat ramp
Wells installed on 5/2/90 by Pine & Swallow, Assoc., Inc. (details in Appendix A)
T-8, T-5, T-4, T-3 = shoreline wells installed by Ralph Tyler, Unisys Corp.
POND = pond surface, sampled ~100 feet off boat ramp
* well yield too low to sample
** top of well submerged (below pond surface)

Figure 1
Well Map

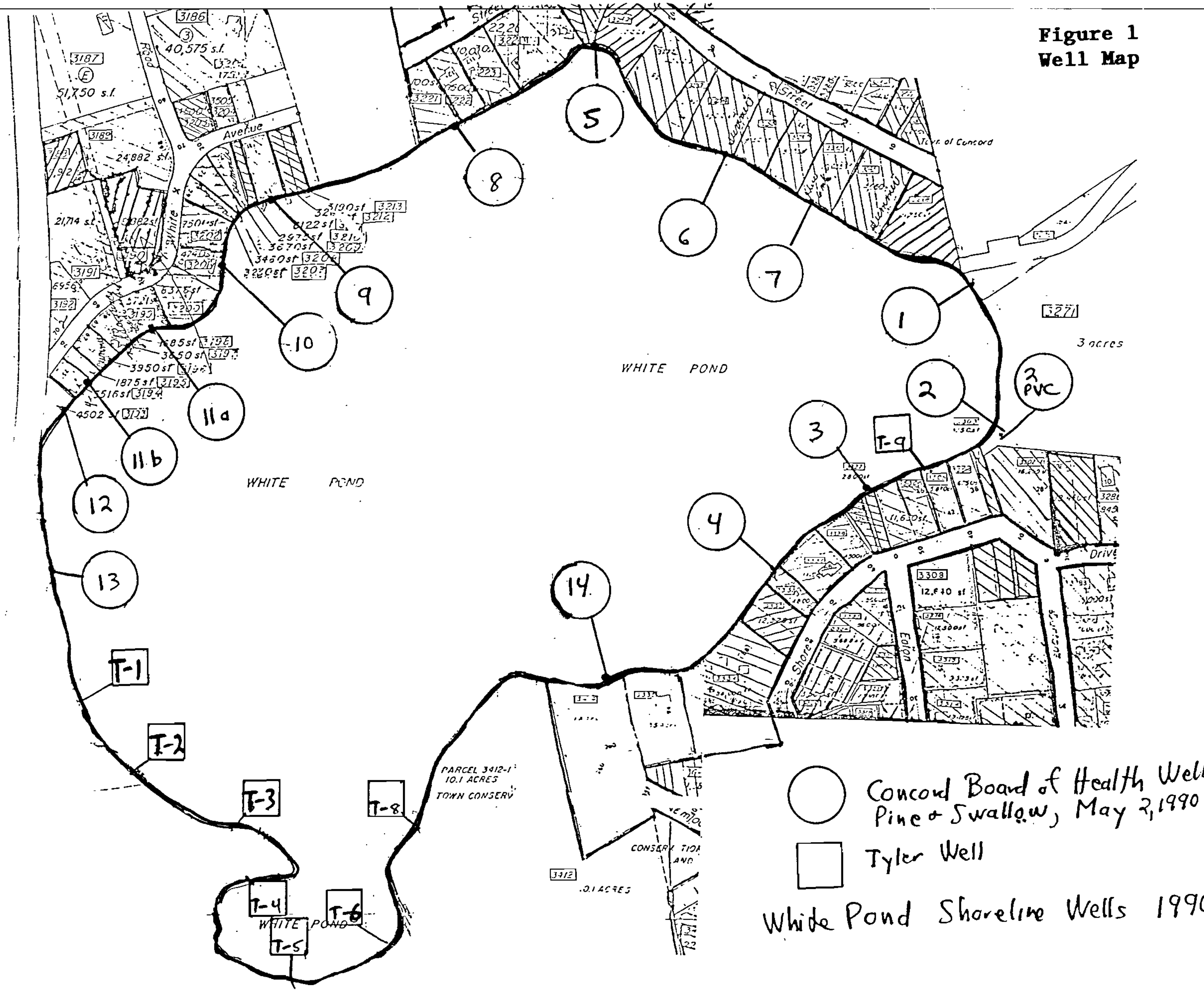
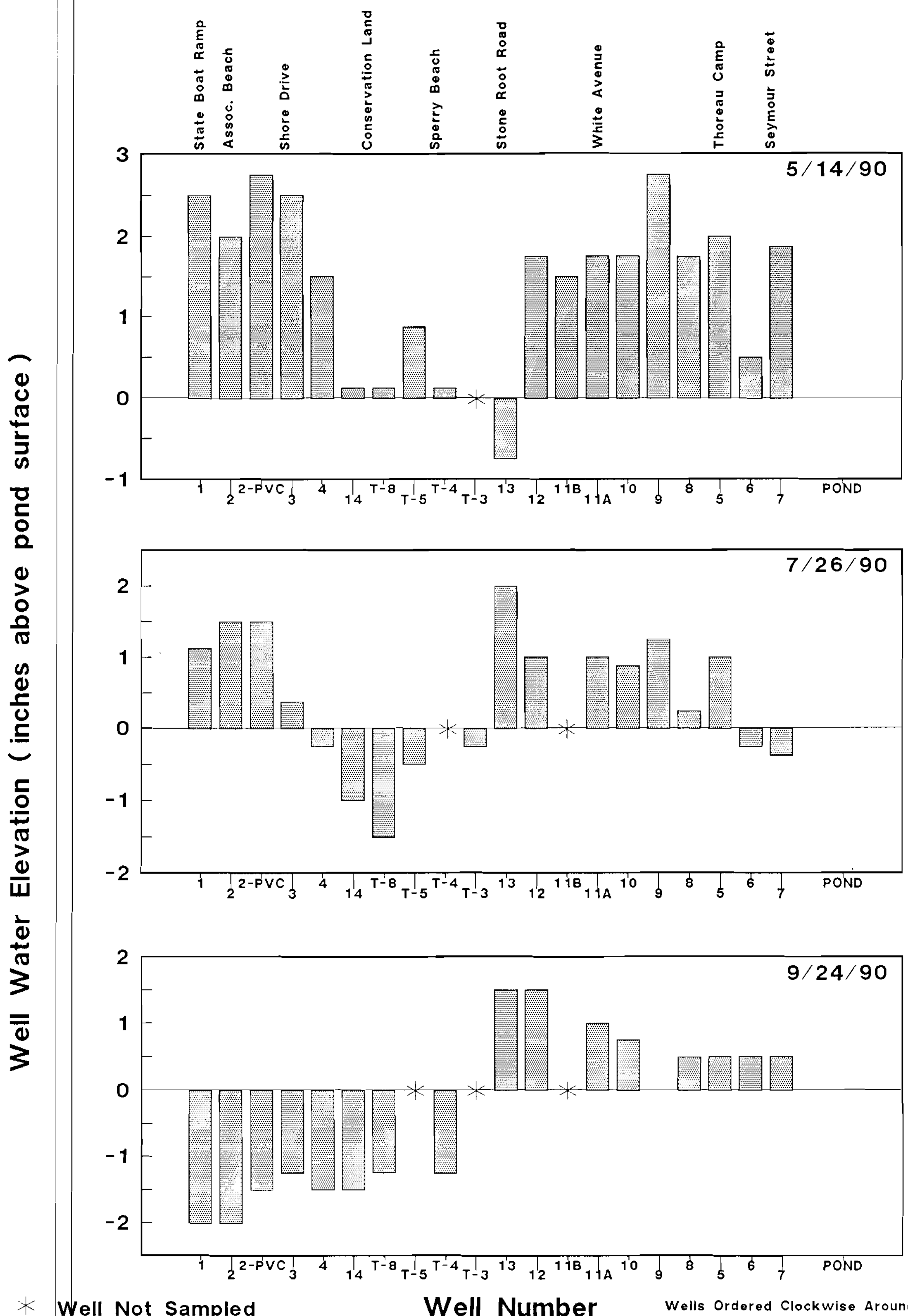


Figure 2
Water Surface Elevations



* Well Not Sampled

Wells Ordered Clockwise Around Pond
Starting at Boat Ramp

Figure 3

Groundwater Flow Directions

White Pond Shoreline Wells

1990

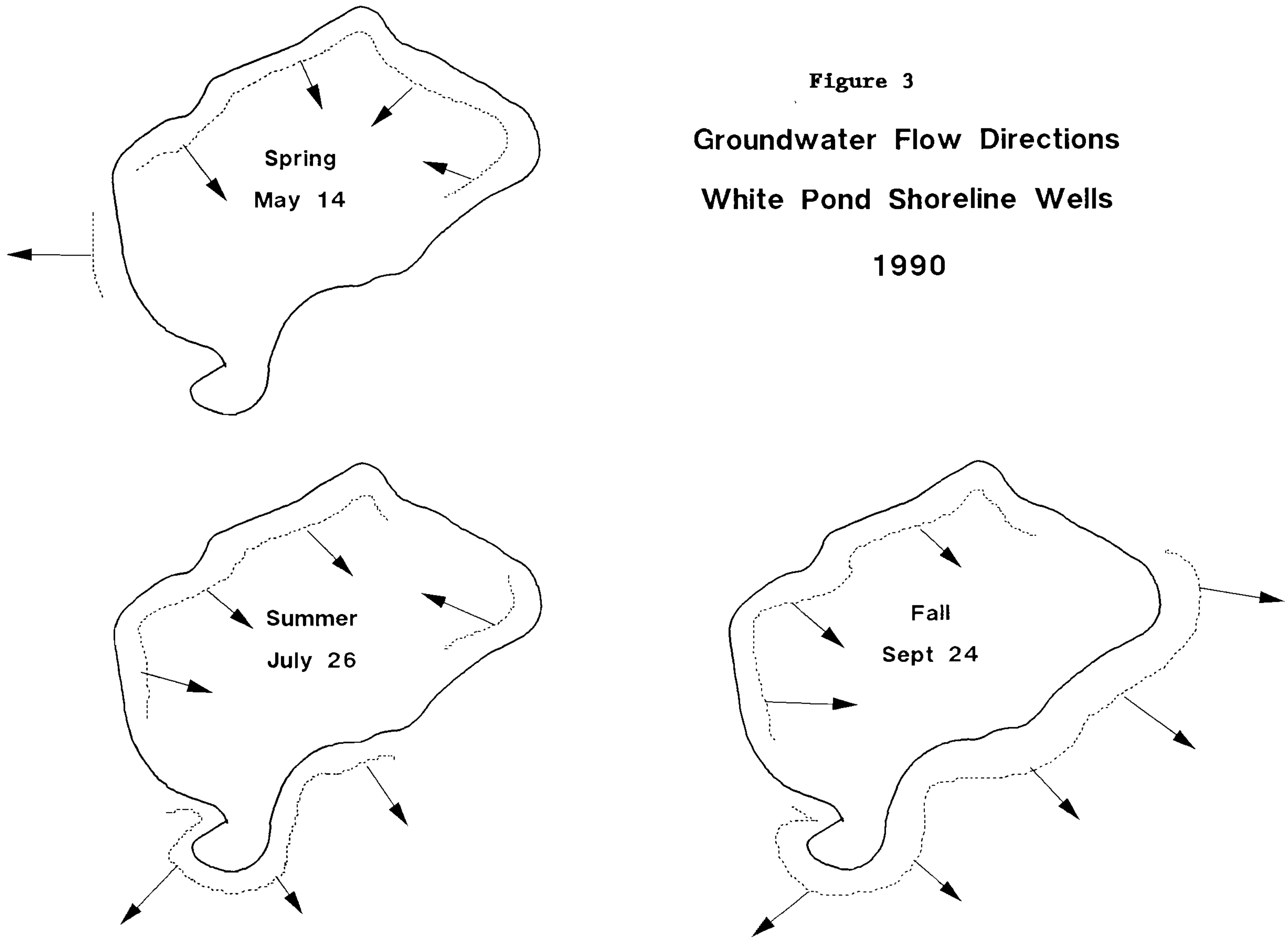
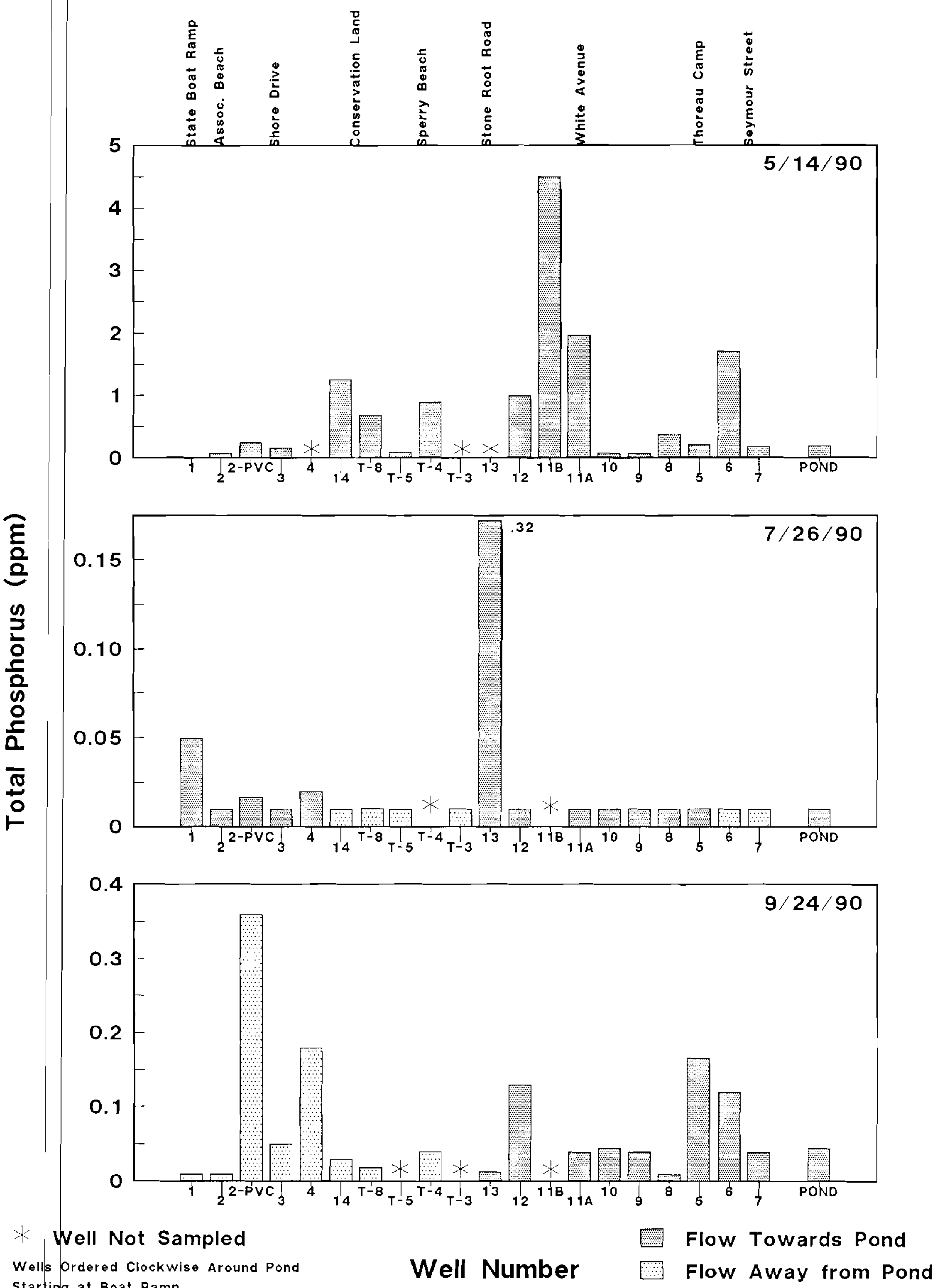


Figure 4
Total Phosphorus Measurements



APPENDIX A

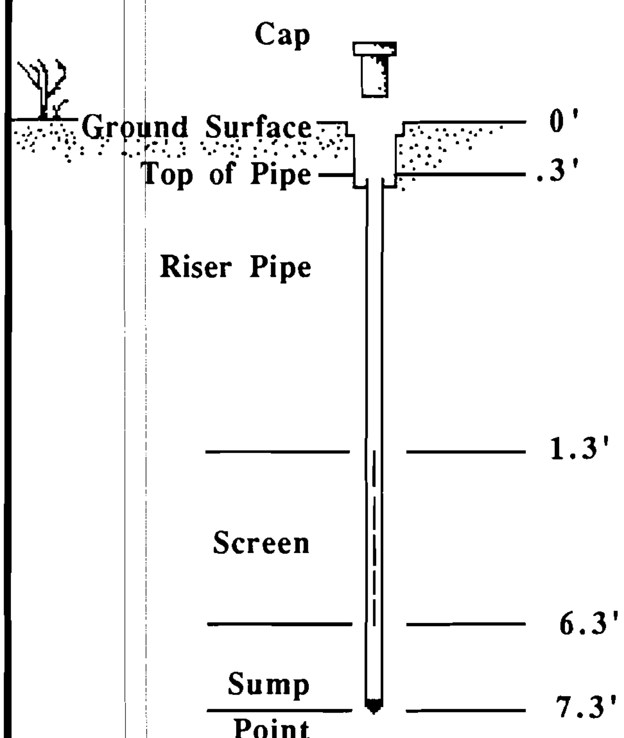
Well Logs

MICRO-WELL INSTALLATION LOGS

PINE & SWALLOW ASSOCIATES, INC. Environmental Scientists and Engineers	Client: William Walker Project: White Pond
Equipment: VibraDrill Personnel: R. Cadwgan, T. Keefe	Pipe ID: 0.62" Screen Slot Width: 0.015" Soil Samples: No

Date: ~~4~~5/2/90

PS-1



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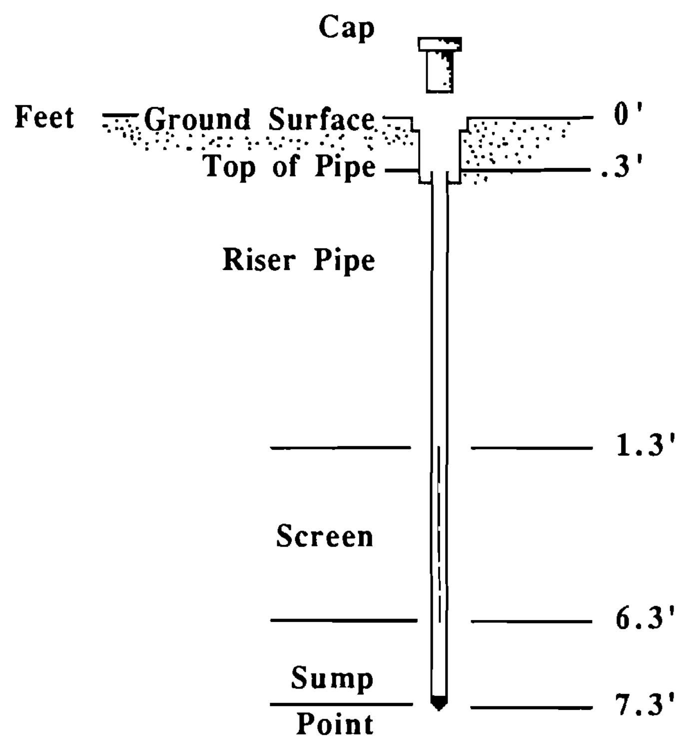
Screen Length • 5'
Slip Cap • 1
Points • 1

Date: ~~4~~5/2/90

PS-2



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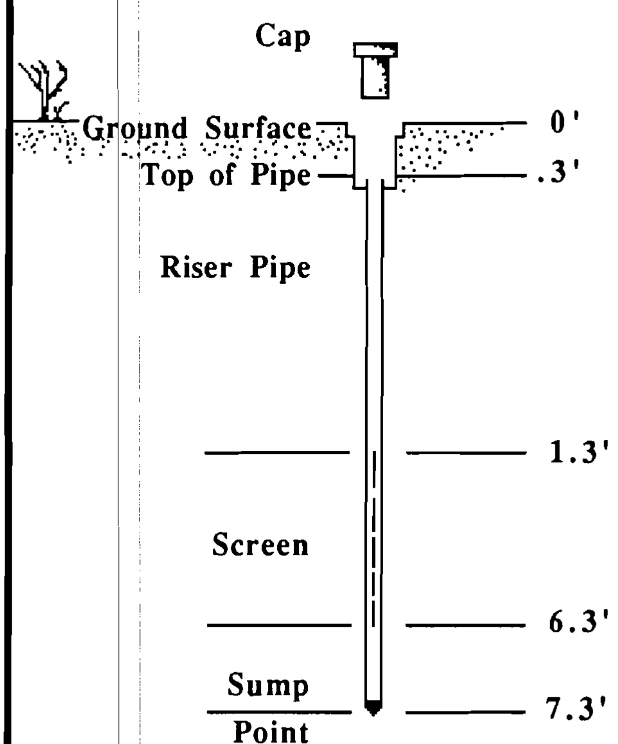
Screen Length • 5'
Slip Cap • 1
Points • 1

MICRO-WELL INSTALLATION LOGS

PINE & SWALLOW ASSOCIATES, INC. Environmental Scientists and Engineers	Client: William Walker Project: White Pond
Equipment: VibraDrill Personnel: R. Cadwgan, T. Keefe	Pipe ID: 0.62" Screen Slot Width: 0.015" Soil Samples: No

Date: ~~4~~5/2/90

PS-3



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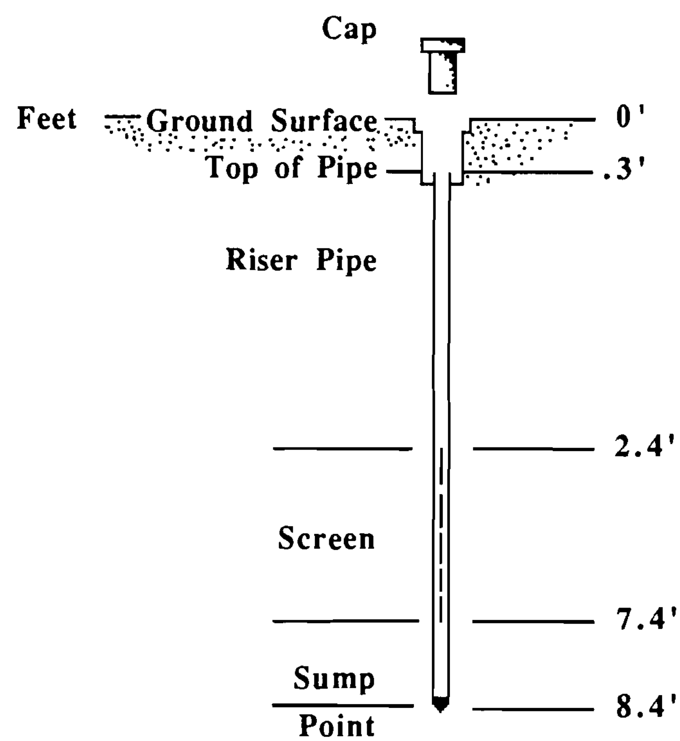
Date: ~~4~~5/2/90

PS-4



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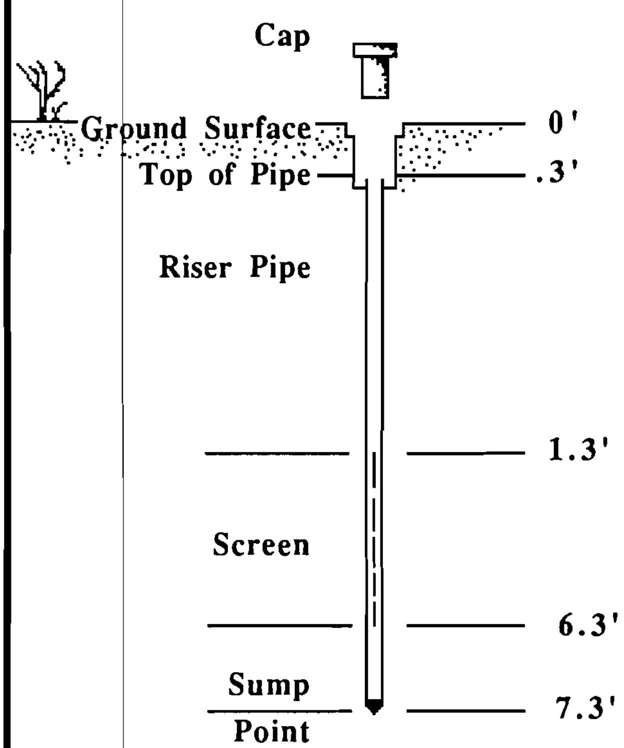
Screen Length • 5'
Slip Cap • 1
Points • 1

MICRO-WELL INSTALLATION LOGS

PINE & SWALLOW ASSOCIATES, INC. Environmental Scientists and Engineers	Client: William Walker Project: White Pond
Equipment: VibraDrill Personnel: R. Cadwgan, T. Keefe	Pipe ID: 0.62" Screen Slot Width: 0.015" Soil Samples: No

Date: ~~4~~ 5/2/90

PS-5



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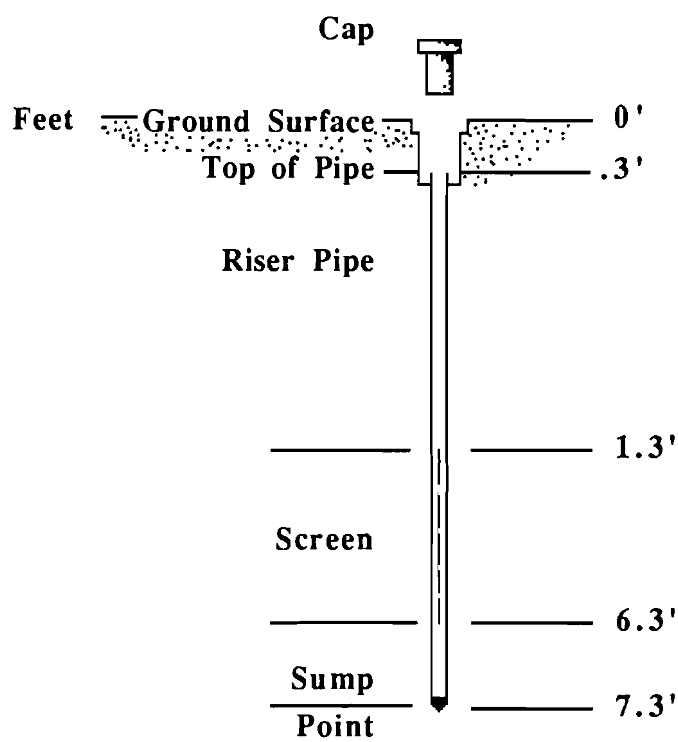
Points • 1

Date: ~~4~~ 5/2/90

PS-6



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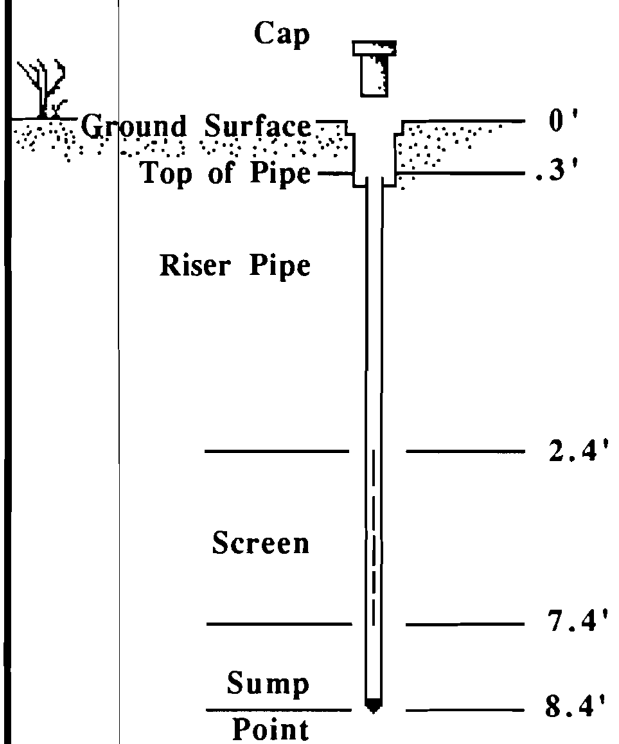
Slip Cap • 1
Points • 1

MICRO-WELL INSTALLATION LOGS

PINE & SWALLOW ASSOCIATES, INC. Environmental Scientists and Engineers	Client: William Walker Project: White Pond
Equipment: VibraDrill Personnel: R. Cadwgan, T. Keefe	Pipe ID: 0.62" Screen Slot Width: 0.015" Soil Samples: No

Date: ~~4~~5/2/90

PS-7



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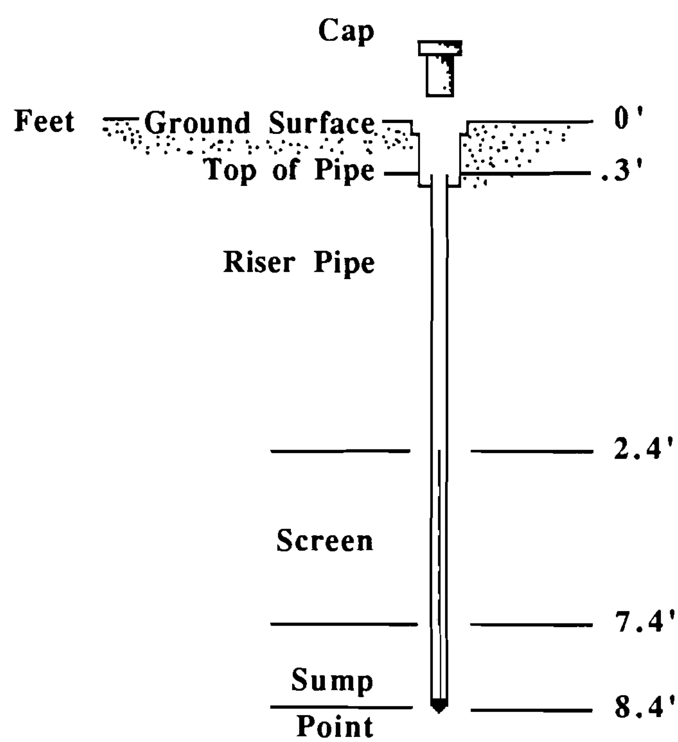
PS-8



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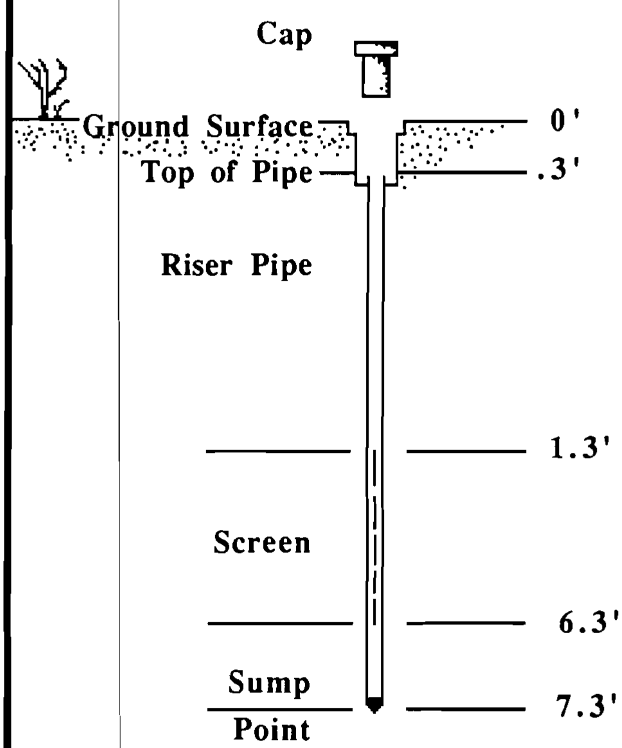
Screen Length • 5'
Slip Cap • 1
Points • 1

MICRO-WELL INSTALLATION LOGS

PINE & SWALLOW ASSOCIATES, INC. Environmental Scientists and Engineers	Client: William Walker Project: White Pond
Equipment: VibraDrill Personnel: R. Cadwgan, T. Keefe	Pipe ID: 0.62" Screen Slot Width: 0.015" Soil Samples: No

Date: ~~4~~ 5/2/90

PS-9



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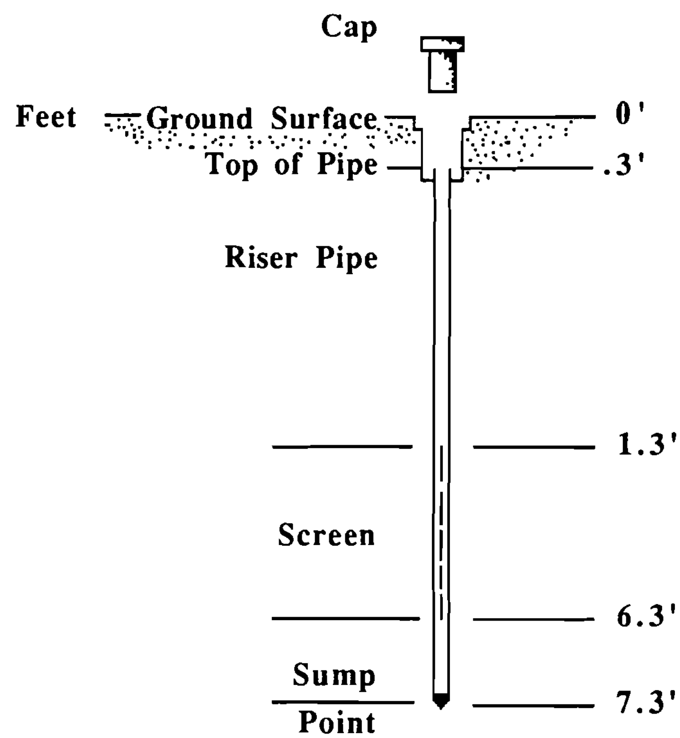
Date: ~~4~~ 5/2/90

PS-10



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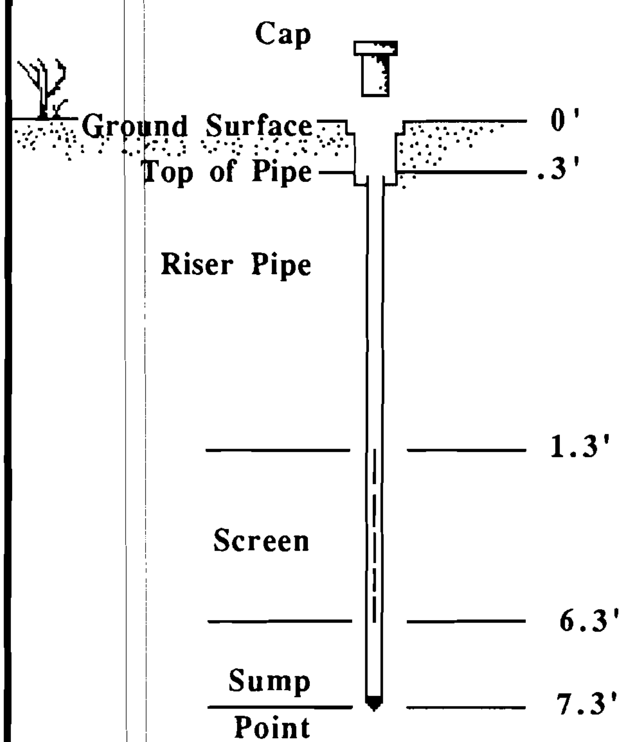
Slip Cap • 1
Points • 1

MICRO-WELL INSTALLATION LOGS

PINE & SWALLOW ASSOCIATES, INC. Environmental Scientists and Engineers	Client: William Walker Project: White Pond
Equipment: VibraDrill Personnel: R. Cadwgan, T. Keefe	Pipe ID: 0.62" Screen Slot Width: 0.015" Soil Samples: No

Date: 5/2/90

PS-11A



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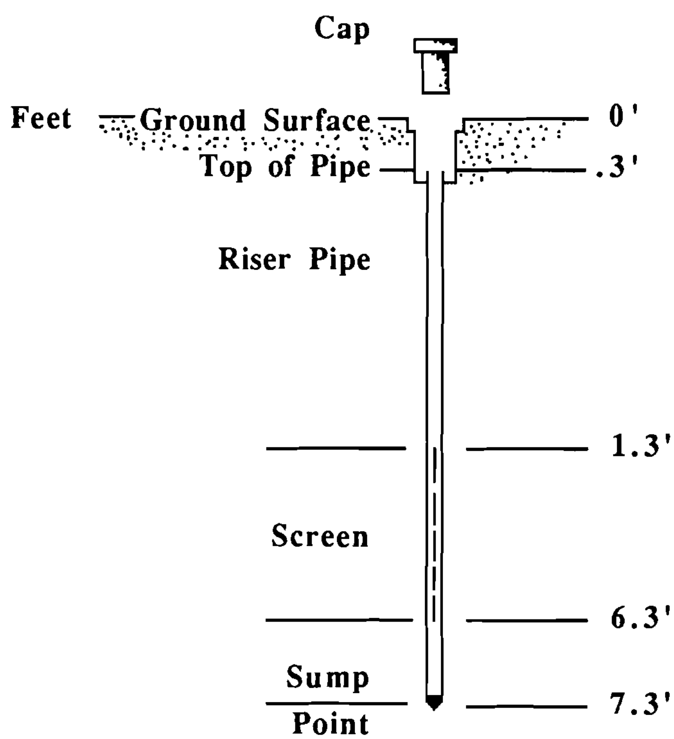
Points • 1

Date: 5/2/90

PS-11B



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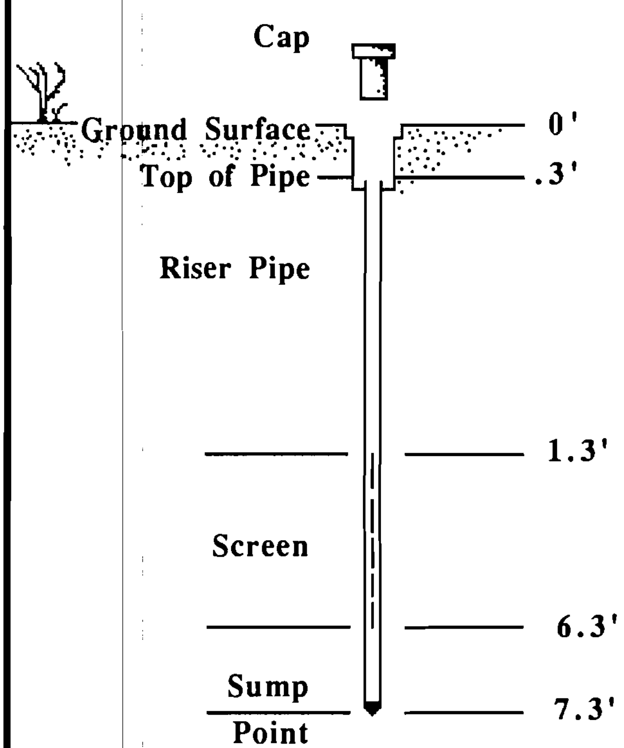
Screen Length • 5'
Slip Cap • 1
Points • 1

MICRO-WELL INSTALLATION LOGS

PINE & SWALLOW ASSOCIATES, INC. Environmental Scientists and Engineers	Client: William Walker Project: White Pond
Equipment: VibraDrill Personnel: R. Cadwgan, T. Keefe	Pipe ID: 0.62" Screen Slot Width: 0.015" Soil Samples: No

Date: ~~4~~ 5/2/90

PS-12



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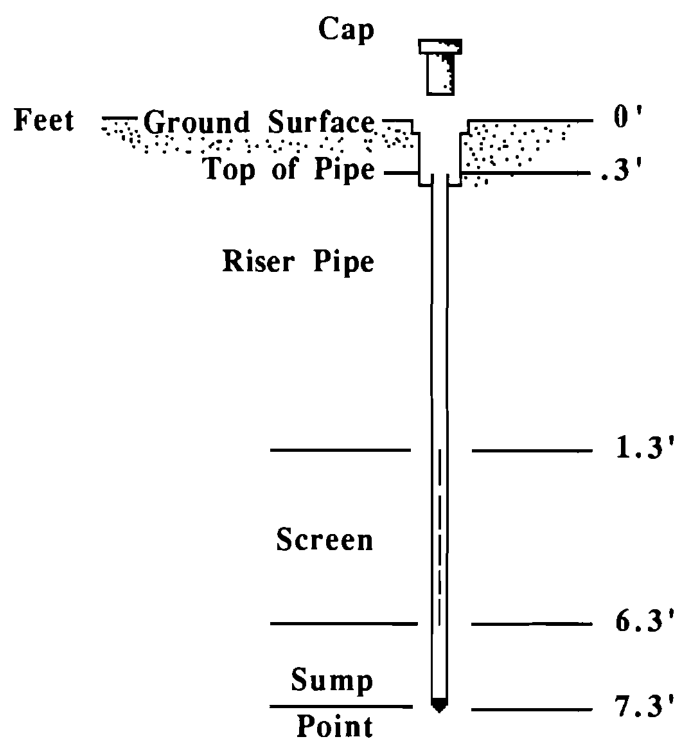
Points • 1

Date: ~~4~~ 5/2/90

PS-13



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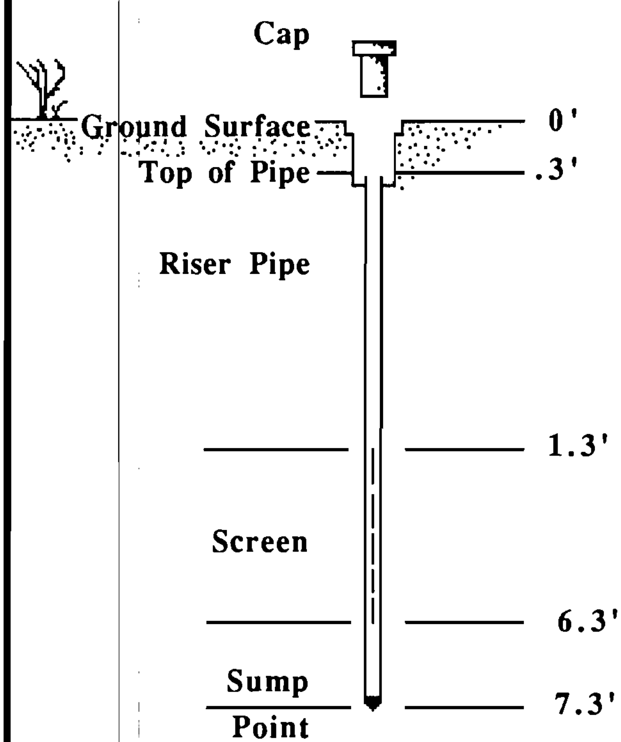
Total Feet of Pipe • 7'
Screen Length • 5'
Slip Cap • 1
Points • 1

MICRO-WELL INSTALLATION LOGS

PINE & SWALLOW ASSOCIATES, INC. Environmental Scientists and Engineers	Client: William Walker Project: White Pond
Equipment: VibraDrill Personnel: R. Cadwgan, T. Keefe	Pipe ID: 0.62" Screen Slot Width: 0.015" PVC: 0.5" PVC: 0.020"

Date: ~~4~~ 5/2/90

PS-14



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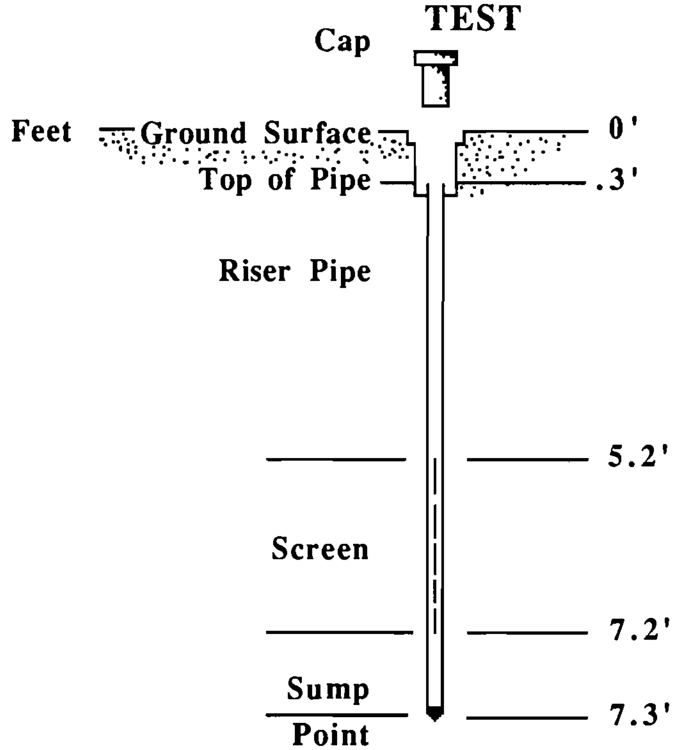
Points • 1

Date: ~~4~~ 5/2/90

PS-PVC TEST



Refusal: No

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Screen Length • 2'
Slip Cap • 1
Points • 1

APPENDIX B

Laboratory Reports

CONAM INSPECTION, INC.
Arnold Greene
Testing Laboratories Division

East Natick Industrial Park
6 Huron Drive • Natick, MA 01760-1383
(617) 235-7330, (508) 653-5950
Fax (508) 651-2974

Nondestructive • Chemical • Pollution • Metallurgical
Inspection • Evaluation • Analysis
Research • Development

Branch Laboratories:
Springfield, MA 01109-2425
(413) 734-6548
FAX (413) 734-2910

Auburn, MA 01501-3204
(508) 832-5500
FAX (508) 832-5557

Texas, Illinois, Pennsylvania, Ohio

To: WILLIAM W. WALKER, JR.,PH.D.
ENVIRONMENETAL ENGINEER
1127 LOWELL ROAD
CONCORD, MA 01742

Date: 5/21/90
Job Number: 36932-1
Lab Number: A90051507
Order No.: NONE
Date received: 5/15/90

Material: WATER
Book Number: 446-15-JB
SPECIFICATIONS:

Sample ID: 18 samples of WATER

	PS-1	PS-2	PS-3	~~PS-5~~ PS-7	PS-6	~~PS-7~~ PS-5	PS-8
Total Phosphate	<0.01	0.08	0.17	0.17	1.70	0.22	0.38
	PS-9	PS-10	PS-11A	PS-11B	PS-12	PS-14	T-4A
Total Phosphate	0.08	0.08	2.0	4.5	1.0	1.25	0.90
	T-5	T-8	PS-PVC	POND			
Total Phosphate	0.10	0.69	0.25	0.20			

Analysis Comments: Results in mg/l.

IN WITNESS WHEREOF, I HAVE HEREUNTO SET MY HAND THIS
21ST DAY OF MAY 1990
ARNOLD GREENE TESTING LABORATORIES
DIVISION OF CONAM INSPECTION

Donald B. Cowan, Manager

CONAM INSPECTION, INC.
Arnold Greene
Testing Laboratories Division

East Natick Industrial Park
6 Huron Drive • Natick, MA 01760-1383
(617) 235-7330, (508) 653-5950
Fax (508) 651-2974

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Auburn, MA 01501-3204
(508) 832-5500
FAX (508) 832-5557

Texas, Illinois, Pennsylvania, Ohio

To: WILLIAM W. WALKER, JR.,PH.D.
ENVIRONMENETAL ENGINEER
1127 LOWELL ROAD
CONCORD, MA 01742
Sample ID: 19 samples of LAKE WATER

Date: 7/31/90
Job Number: 39847-1
Lab Number: A90072707
Order No.: NONE
Date received: 7/27/90

Material: LAKE WATER
Book Number: 453-47-SY
SPECIFICATIONS:
Page: 1

	PS-1	PS-2	PS-2X	PS-3	PS-4	PS-5	PS-6
Specific Conductance umho	326	50	43	51	261	86	106
Total Phosphate	0.05	<0.01	0.02	<0.01	0.02	<0.01	<0.01

	PS-7	PS-8	PS-9	PS-10	PS-11A	PS-12	PS-13
Specific Conductance umho	66	168	72	281	104	91	103
Total Phosphate	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.32

	PS-14	T-3	T-5	T-8	POND
Specific Conductance umho	44	45	45	65	47
Total Phosphate	<0.01	<0.01	<0.01	<0.01	<0.01

Analysis Comments: RESULTS IN MG/L UNLESS OTHERWISE NOTED.

IN WITNESS WHEREOF, I HAVE HEREUNTO SET MY HAND THIS
31ST DAY OF JULY 1990
ARNOLD GREENE TESTING LABORATORIES
DIVISION OF CONAM INSPECTION

Donald B. Cowan, Manager

CONAM INSPECTION, INC.
Arnold Greene
Testing Laboratories Division

East Natick Industrial Park
6 Huron Drive • Natick, MA 01760-1383
(617) 235-7330, (508) 653-5950
Fax (508) 651-2974

Nondestructive • Chemical • Pollution • Metallurgical
Inspection • Evaluation • Analysis
Research • Development

Branch Laboratories:
Springfield, MA 01109-2425
(413) 734-6548
FAX (413) 734-2810

Auburn, MA 01501-3204
(508) 832-5500
FAX (508) 832-5557

Texas, Illinois, Pennsylvania, Ohio

To: WALKER, WILLIAM W.
1127 LOWELL ROAD
CONCORD, MA 01742

Date: 9/26/90
Job Number: 41906-1
Lab Number: A90092501
Order No.: NONE

Material: WATER
Book Number: 463-1-JB
SPECIFICATIONS:

Sample ID: 18 samples of WATER

Date received: 9/25/90

Page: 1

Special Request: *** Sample ID - White Pond 9/24/1990 ***

	1	2	2X (PVC)	3	4	5	6
Iron	--	6.09	1.86	--	--	--	--
Total Phosphate	0.01	<0.01	0.36	0.05	0.18	0.17	0.12

Special Request: *** Sample ID - White Pond 9/24/1990 ***

	7	8	9	10	11	12	13
Iron	--	--	--	--	--	--	--
Total Phosphate	0.04	<0.01	0.04	0.045	0.040	0.13	0.014

Special Request: *** Sample ID - White Pond 9/24/1990 ***

	14	P	T4	T8
Iron	--	--	--	--
Total Phosphate	0.03	0.045	0.04	0.019

Analysis Comments: Results in mg/l.

IN WITNESS WHEREOF, I HAVE HEREUNTO SET MY HAND THIS
26TH DAY OF SEPTEMBER 1990
ARNOLD GREENE TESTING LABORATORIES
DIVISION OF CONAM INSPECTION

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Testing Laboratories Division

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Texas, Illinois, Pennsylvania, Ohio

To: WILLIAM W. WALKER, JR., PH.D.
ENVIRONMENETAL ENGINEER
1127 LOWELL ROAD
CONCORD, MA 01742

Sample ID: 18 samples of WATER

Date: 5/21/90
Job Number: 36932-1
Lab Number: A90051507
Order No.: NONE
Date received: 5/15/90

Material: WATER
Book Number: 446-15-JB
SPECIFICATIONS:
Page: 1

	PS-1	PS-2	PS-3	~~PS-5~~ PS-7	PS-6	~~PS-7~~ PS-5	PS-8
Total Phosphate	<0.01	0.08	0.17	0.17	1.70	0.22	0.38
	PS-9	PS-10	PS-11A	PS-11B	PS-12	PS-14	T-4A
Total Phosphate	0.08	0.08	2.0	4.5	1.0	1.25	0.90
	T-5	T-8	PS-PVC	POND			
Total Phosphate	0.10	0.69	0.25	0.20			

Analysis Comments: Results in mg/l.

IN WITNESS WHEREOF, I HAVE HEREUNTO SET MY HAND THIS
21ST DAY OF MAY 1990
ARNOLD GREENE TESTING LABORATORIES
DIVISION OF CONAM INSPECTION

Donald B. Cowan, Manager

CONAM INSPECTION, INC.

Arnold Greene
Testing Laboratories Division

Branch Laboratories

East Natick Industrial Park
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To: WILLIAM W. WALKER, JR.,PH.D.
ENVIRONMENETAL ENGINEER
1127 LOWELL ROAD
CONCORD, MA 01742
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Date: 7/31/90
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Lab Number: A90072707
Order No.: NONE
Date received: 7/27/90

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Job Number: 41906-1
Lab Number: A90092501
Order No.: NONE
Date received: 9/25/90

Material: WATER
Book Number: 463-1-JB
SPECIFICATIONS:

Page: 1

Sample ID: 18 samples of WATER

Special Request: *** Sample ID - White Pond 9/24/1990 ***

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Analysis Comments: Results in mg/l.

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