

# REPORT OF BENTOMAT FREEZE/THAW TEST RESULTS

24 February 1993

## INTRODUCTION

The purpose of this testing program was to determine the permeability of Bentomat in response to multiple freeze/thaw cycles. Although existing data consistently indicates that geosynthetic clay liners comprised of natural sodium bentonite are not adversely affected by these phenomena, it was requested that additional testing be conducted under somewhat different conditions. Accordingly, Robert L. Nelson & Associates, Inc. has supervised a test program whose purpose was to satisfy the requirements of the Copenhagen Gasworks project such that Bentomat will be deemed an acceptable component of the cover system to be installed over contaminated soil at the site.

Two different freeze/thaw tests were performed. In Test 1, several Bentomat test specimens were progressively frozen and thawed, and each specimen was tested for permeability only once, in order to minimize the possibility that the act of permeability testing could cause consolidation of the bentonite, that would not ordinarily happen in the field. In Test 2, only one specimen of Bentomat was used, and it was tested for permeability an equal number of times. The results of these two tests indicate that Bentomat is not susceptible to increases in permeability, regardless of the test procedure used.

## TEST 1

### Procedures

Six circular pieces of Bentomat (approximately 4 inches in diameter) were placed in a shallow tub of tap water and were weighted with a flat porous stone in order to provide a nominal confining stress. The confining stress on the hydrating Bentomat was approximately 0.25 psi, which roughly corresponds to the confining stress that would be applied by 4 inches of soil cover whose average bulk density is 100 pcf.

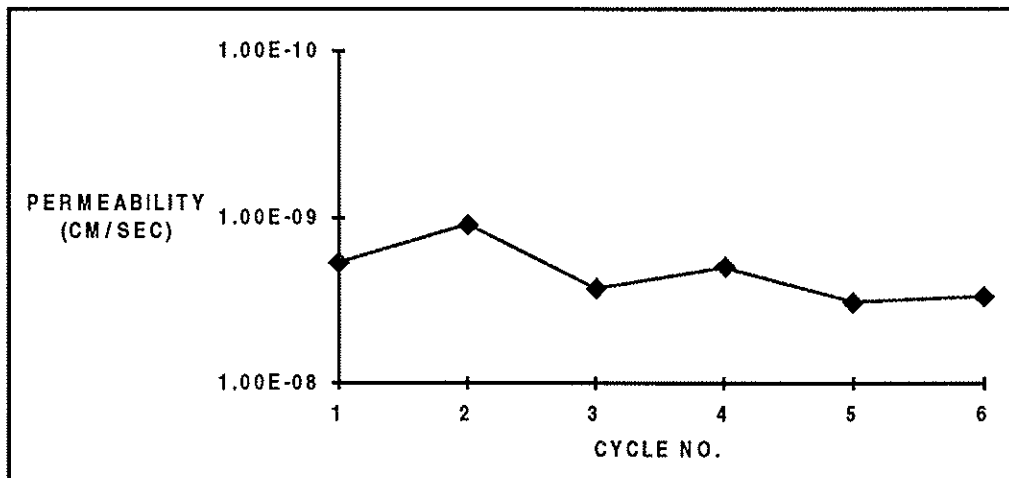
The level of water in the tub was maintained above the top of the Bentomat during a 7-day hydration period. At the end of 7 days, the tub was drained of free water and placed in a freezer whose temperature was approximately -20 degrees Celsius. After freezing for 48 hours, the tub was removed from the freezer, and the samples of Bentomat were allowed to thaw for an additional 48 hours. Confining stress in the form of the porous plate was maintained at all times.

At the conclusion of the 48-hour thawing period, one of the samples was removed from the tub and was placed in a flexible wall triaxial permeameter. Permeability testing was then initiated in accordance with the methods and procedures of ASTM D 5084. The maximum effective confining stress for the test was 5 psi, with a hydraulic gradient of 3 psi.

The tub containing the remaining Bentomat samples was replaced into the freezer, and the above procedures were repeated with these other samples such that permeability behavior after several freeze/thaw cycles can be determined. Performing the tests in this fashion ensured that there will be no potentially beneficial reconsolidation of the Bentomat that could otherwise occur if one individual specimen was frozen and thawed several times while remaining mounted in the permeameter.

## Results

Six freeze/thaw cycles were completed, and the permeability values after each cycle is reported graphically below:



Attachment A presents the detailed results of the freeze/thaw permeability testing conducted to date. It should be noted that, in the interest of providing timely test data, steady-state permeability values were not always achieved. The data indicates a consistently *decreasing* permeability with time, but some of the testing was suspended before the decreasing trend was completed in order to expedite the overall testing process.

## TEST 2

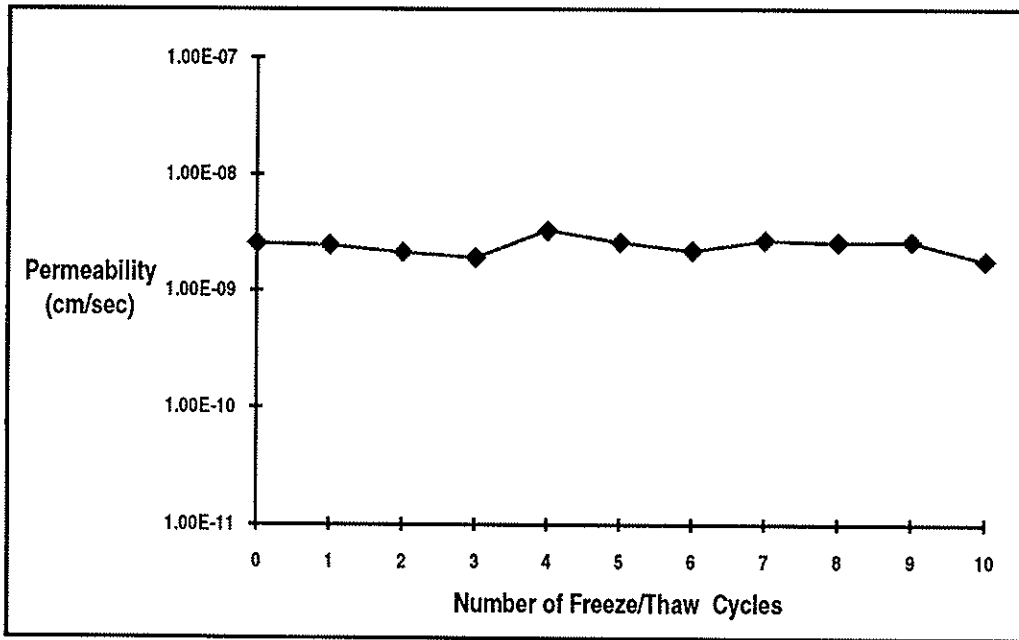
### Procedures

In this test, a single sample of Bentomat was repeatedly frozen, thawed, and tested for permeability. In order to minimize the potential for damage to the sample due to excessive handling, the Bentomat was left in the flexible-wall permeameter for duration of the test. Therefore, after each round of permeability testing, the permeameter cell was detached from the pressure supply panel. The cell was then drained and placed in a freezer. After at least 48 hours,

the cell (still containing the original Bentomat sample) was re-connected to the pressure supply system, and permeating was initiated. The maximum effective confining stress was 5 psi over the first ten freeze/thaw cycles, but permeation during the subsequent ten cycles will be conducted at a confining stress of 2 psi.

## Results

To date, ten freeze/thaw cycles have been completed, and the steady-state permeability of the Bentomat sample after each cycle is plotted below:



## CONCLUSIONS

The data from the two tests presented above indicates that the performance of Bentomat was not adversely affected after being subjected to multiple freeze/thaw cycles.

**ATTACHMENT A**  
**TEST 1 RESULTS**

Sample: Bentomat

Permeability equation :  $((0.879 \times \text{Thickness}) / (2 \times \pi \times r^2 \times \text{Time})) \times \ln(\text{Change in Head})$

Project # : 353 - Freeze/ Thaw Testing

Flux equation :  $(\text{Inflow} + \text{Outflow}) / 2 / \pi \times r^2 / \text{Time}$

Seal Thickness : 1.800 cm. Hydration : 100% (Initial)

Permeant : De-aired Tap Water

Test Position : 1 Initial Head : 3psi Analyst : PBD Date Printed : 2/16/93 12:01 PM

Cell Size : 4 in. Confining Stress : 5psi Requested by : BT Date Begun : 10/8/92

Conversions : 1 psi = 2.307 feet of head 1 foot of head = 30.48 cm 1 psi = 70.32 cm Leakage Rate = Flux \* 2.8999E+08

Date	Time	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
10/8/92	11:20 AM	1.6	23.4	18.8	6.2	17.2	210.95	228.15						
	11:57 AM	1.5	23.5	18.2	6.8	16.7	210.95	227.65	9.64E-09	1.39E-06	7.47E-09	1.07E-06	311	4:47:00
	2:37 PM	1.4	23.6	16.5	8.5	15.1	210.95	226.05	7.17E-09	1.03E-06				
	4:07 PM	1.5	23.5	15.9	9.1	14.4	210.95	225.35	5.60E-09	7.99E-07				
10/9/92	1:28 PM	2.5	22.5	21.0	4.0	18.5	210.95	229.45						
	2:38 PM	2.6	22.4	20.8	4.2	18.2	210.95	229.15	3.04E-09	4.41E-07	3.37E-09	4.88E-07	141	2:46:00
	4:14 PM	2.8	22.2	20.5	4.5	17.7	210.95	228.65	3.70E-09	5.35E-07				
10/12/92	10:09 AM	3.3	21.7	19.9	5.1	16.6	210.95	227.55						
	11:25 AM	3.0	22.0	19.0	6.0	16.0	210.95	226.95	5.65E-09	8.11E-07	3.81E-09	5.46E-07	158	6:18:00
	3:17 PM	2.8	22.2	17.6	7.4	14.8	210.95	225.75	3.72E-09	5.32E-07				
	4:27 PM	2.8	22.2	17.4	7.6	14.6	210.95	225.55	2.06E-09	2.94E-07				
10/14/92	10:12 AM	3.4	21.6	17.3	7.7	13.9	210.95	224.85						
	11:05 AM	3.4	21.6	17.1	7.9	13.7	210.95	224.65	2.73E-09	3.88E-07	1.87E-09	2.65E-07	77	5:58:00
	2:23 PM	3.5	21.5	16.6	8.4	13.1	210.95	224.05	2.20E-09	3.11E-07				
	4:10 PM	3.5	21.5	16.5	8.5	13.0	210.95	223.95	6.79E-10	9.61E-08				
10/23/92	11:00 AM	3.9	21.1	22.0	3.0	18.1	210.95	229.05						
	1:10 PM	3.9	21.1	21.2	3.8	17.3	210.95	228.25	4.38E-09	6.33E-07	3.82E-09	5.51E-07	160	5:27:00
	4:27 PM	4.1	20.9	20.5	4.5	16.4	210.95	227.35	3.26E-09	4.70E-07				
10/26/92	12:00 PM	4.3	20.7	20.3	4.7	16.0	210.95	226.95						
	1:14 PM	4.4	20.6	20.0	5.0	15.6	210.95	226.55	3.88E-09	5.56E-07	2.97E-09	4.33E-07	126	6:45:00

CYCLE #2

## Laboratory Computation Sheet : Flexible Wall Permeability Testing

Date	Time	Reading		Reading		X-Y	Y	X	Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
		In	Out	In	Out												
10/27/92	3:24 PM	4.6	20.4	19.8	5.2	15.2	5.2	210.95	226.15	2.21E-09	3.16E-07						
	4:36 PM	4.7	20.3	19.6	5.4	14.9	5.4	210.95	225.85	3.00E-09	4.28E-07						
	6:45 PM	4.9	20.1	19.3	5.7	14.4	5.7	210.95	225.35	2.79E-09	3.98E-07						
10/27/92	9:00 AM	5.0	20.0	19.1	5.9	14.1	5.9	210.95	225.05								
	10:01 AM	5.2	19.8	19.0	6.0	13.8	6.0	210.95	224.75	3.56E-09	5.06E-07	2.17E-09	3.28E-07	95		6:08:00	
	11:17 AM	5.3	19.7	18.9	6.1	13.6	6.1	210.95	224.55	1.91E-09	2.70E-07						
10/28/92	1:46 PM	5.5	19.5	18.8	6.2	13.3	6.2	210.95	224.25	1.46E-09	2.07E-07						
	3:08 PM	5.6	19.4	18.7	6.3	13.1	6.3	210.95	224.05	1.77E-09	2.51E-07						
	9:37 AM	5.8	19.2	18.5	6.5	12.7	6.5	210.95	223.65								
10/28/92	10:42 AM	5.9	19.1	18.4	6.6	12.5	6.6	210.95	223.45	2.24E-09	3.16E-07	1.81E-09	2.55E-07	74		7:01:00	
	3:01 PM	6.2	18.8	18.1	6.9	11.9	6.9	210.95	222.85	1.69E-09	2.38E-07						
	4:38 PM	6.3	18.7	18.0	7.0	11.7	7.0	210.95	222.65	1.51E-09	2.12E-07						
11/3/92	9:54 AM	0.7	24.3	22.7	2.3	22.0	2.3	210.95	232.95								
	11:07 AM	0.8	24.2	22.6	2.4	21.8	2.4	210.95	232.75	1.91E-09	2.82E-07	1.10E-09	1.62E-07	47		6:07:00	
	1:43 PM	0.9	24.1	22.6	2.4	21.7	2.4	210.95	232.65	4.48E-10	6.59E-08						
11/12/92	2:47 PM	0.9	24.1	22.5	2.5	21.6	2.5	210.95	232.55	1.09E-09	1.61E-07						
	4:01 PM	1.0	24.0	22.5	2.5	21.5	2.5	210.95	232.45	9.45E-10	1.39E-07						
	10:35 AM	3.1	21.9	20.8	4.2	17.7	4.2	210.95	228.65								
11/12/92	11:50 AM	3.0	22.0	20.3	4.7	17.3	4.7	210.95	228.25	3.80E-09	5.48E-07	3.50E-09	5.03E-07	146		10:12:00	
	4:10 PM	3.2	21.8	19.1	5.9	15.9	5.9	210.95	226.85	3.85E-09	5.53E-07						
	8:47 PM	3.5	21.5	18.3	6.7	14.8	6.7	210.95	225.75	2.85E-09	4.08E-07						
11/13/92	10:47 AM	4.0	21.0	17.7	7.3	13.7	7.3	210.95	224.65								
	11:48 AM	4.1	20.9	17.5	7.5	13.4	7.5	210.95	224.35	3.56E-09	5.06E-07	3.08E-09	4.36E-07	127		5:53:00	
	1:21 PM	4.3	20.7	17.3	7.7	13.0	7.7	210.95	223.95	3.12E-09	4.42E-07						
11/16/92	4:40 PM	4.6	20.4	16.9	8.1	12.3	8.1	210.95	223.25	2.56E-09	3.62E-07						
	3:15 PM	4.6	20.4	16.4	8.6	11.8	8.6	210.95	222.75								
	4:10 PM	4.7	20.3	16.1	8.9	11.4	8.9	210.95	222.35	5.31E-09	7.48E-07	3.51E-09	4.93E-07	143		6:07:00	
11/17/92	5:15 PM	4.8	20.2	16.0	9.0	11.2	9.0	210.95	222.15	2.25E-09	3.16E-07						
	9:22 PM	5.1	19.9	15.3	9.7	10.2	9.7	210.95	221.15	2.97E-09	4.16E-07						
	11:29 AM	5.2	19.8	15.0	10.0	9.8	10.0	210.95	220.75								

CYCLE #3

Final Results

Page 2

Laboratory Completion Sheet : Flexible Wall Permeability Testing

Date	Time	Reading			Reading			X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
		In	X	Out	Y	Out	Y									
11/18/92	1:36 PM	5.4	19.6	14.6	10.4	9.2	210.95	220.15	3.49E-09	4.86E-07	3.19E-09	4.44E-07	129	5:07:00		
	2:38 PM	5.5	19.5	14.4	10.6	8.9	210.95	219.85	3.58E-09	4.97E-07	2.68E-09	3.69E-07			107	6:14:00
	4:36 PM	5.7	19.3	14.2	10.8	8.5	210.95	219.45	2.51E-09	3.48E-07						
9:53 AM	5.9	19.1	13.8	11.2	7.9	210.95	218.85	2.69E-09	3.72E-07							
12/1/92	11:16 AM	6.0	19.0	13.6	11.4	7.6	210.95	218.55	2.69E-09	3.72E-07	3.82E-09	5.12E-07	148	6:14:00		
	2:21 PM	6.4	18.6	13.2	11.8	6.8	210.95	217.75	3.22E-09	4.44E-07						
	4:07 PM	6.5	18.5	13.0	12.0	6.5	210.95	217.45	2.12E-09	2.91E-07						
12/2/92	9:16 AM	10.5	14.5	12.4	12.6	1.9	210.95	212.85	5.27E-09	7.09E-07	2.86E-09	4.19E-07	121	8:26:00		
	10:14 AM	10.5	14.5	12.0	13.0	1.5	210.95	212.45	3.96E-09	5.32E-07						
	11:12 AM	10.5	14.5	11.7	13.3	1.2	210.95	212.15	2.68E-09	3.59E-07						
12/3/92	1:35 PM	10.6	14.4	11.3	13.7	0.7	210.95	211.65	3.34E-09	4.47E-07	2.78E-09	4.04E-07	117	6:36:00		
	3:30 PM	10.7	14.3	10.9	14.1	0.2	210.95	211.15	3.34E-09	4.47E-07						
	10:00 AM	0.9	24.1	20.3	4.7	19.4	210.95	230.35	3.21E-09	4.67E-07						
12/9/92	11:02 AM	1.0	24.0	19.8	5.2	18.8	210.95	229.75	3.42E-09	4.97E-07	2.01E-09	2.89E-07	84	6:25:00		
	12:15 PM	1.1	23.9	19.6	5.4	18.5	210.95	229.45	2.91E-09	4.22E-07						
	3:00 PM	1.3	23.7	19.2	5.8	17.9	210.95	228.85	2.58E-09	3.74E-07						
1/14/92	4:36 PM	1.4	23.6	19.0	6.0	17.6	210.95	228.55	2.22E-09	3.21E-07	3.22E-09	4.43E-07	129	7:21:00		
	10:25 AM	1.4	23.6	18.4	6.6	17.0	210.95	227.95	1.57E-09	2.26E-07						
	11:56 AM	1.4	23.6	18.2	6.8	16.8	210.95	227.75	1.57E-09	2.26E-07						
1/14/92	1:53 PM	1.5	23.5	17.9	7.1	16.4	210.95	227.35	2.44E-09	3.51E-07	4.81E-09	6.63E-07	129	7:21:00		
	4:50 PM	1.6	23.4	17.5	7.5	15.9	210.95	226.85	2.02E-09	2.90E-07						
	9:40 AM	8.2	16.8	15.7	9.3	7.5	210.95	218.45	4.81E-09	6.63E-07						
10:42 AM	8.3	16.7	15.4	9.6	7.1	210.95	218.05	4.81E-09	6.63E-07	3.22E-09	4.43E-07	129	7:21:00			
11:47 AM	8.4	16.6	15.3	9.7	6.9	210.95	217.85	2.30E-09	3.16E-07							

CYCLE #4

CYCLE #5

Laboratory Computation Sheet : Flexible Wall Permeability Testing

Date	Time	Reading In	Reading X	Reading Out	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
1/18/92	1:55 PM	8.4	16.6	15.0	10.0	6.6	210.95	217.55	1.75E-09	2.41E-07				
	5:01 PM	8.9	16.1	14.5	10.5	5.6	210.95	216.55	4.03E-09	5.53E-07				
	11:15 AM	9.2	15.8	13.7	11.3	4.5	210.95	215.45					150	5:03:00
	2:01 PM	9.5	15.5	13.2	11.8	3.7	210.95	214.65	3.64E-09	4.95E-07	3.82E-09	5.18E-07		
	3:07 PM	9.6	15.4	12.9	12.1	3.3	210.95	214.25	4.60E-09	6.23E-07				
1/19/92	4:18 PM	9.7	15.3	12.7	12.3	3.0	210.95	213.95	3.21E-09	4.34E-07				
	9:33 AM	0.6	24.4	21.2	3.8	20.6	210.95	231.55					158	6:38:00
	10:48 AM	0.8	24.2	20.8	4.2	20.0	210.95	230.95	5.63E-09	8.22E-07	3.75E-09	5.47E-07		
	11:43 AM	0.9	24.1	20.6	4.4	19.7	210.95	230.65	3.84E-09	5.61E-07				
	1:32 PM	1.1	23.9	20.4	4.6	19.3	210.95	230.25	2.59E-09	3.77E-07				
1/25/92	3:06 PM	1.3	23.7	20.0	5.0	18.7	210.95	229.65	4.51E-09	6.56E-07				
	4:11 PM	1.4	23.6	19.9	5.1	18.5	210.95	229.45	2.18E-09	3.16E-07				
	10:36 AM	1.7	23.3	19.3	5.7	17.6	210.95	228.55					141	5:20:00
	11:43 AM	1.8	23.2	19.0	6.0	17.2	210.95	228.15	4.25E-09	6.14E-07	3.38E-09	4.86E-07		
	2:21 PM	2.0	23.0	18.4	6.6	16.4	210.95	227.35	3.62E-09	5.20E-07				
1/26/92	3:56 PM	2.1	22.9	18.2	6.8	16.1	210.95	227.05	2.26E-09	3.25E-07				
	10:08 AM	2.4	22.6	17.4	7.6	15.0	210.95	225.95					133	6:08:00
	11:31 AM	2.6	22.4	17.1	7.9	14.5	210.95	225.45	4.34E-09	6.19E-07	3.23E-09	4.59E-07		
	1:36 PM	2.8	22.2	16.8	8.2	14.0	210.95	224.95	2.89E-09	4.11E-07				
	2:39 PM	2.9	22.1	16.6	8.4	13.7	210.95	224.65	3.44E-09	4.89E-07				
2/4/93	4:16 PM	3.0	22.0	16.4	8.6	13.4	210.95	224.35	2.24E-09	3.18E-07				
	9:32 AM	6.0	19.0	20.1	4.9	14.1	210.95	225.05					166	6:45:00
	11:17 AM	5.5	19.5	18.5	6.5	13.0	210.95	223.95	7.59E-09	1.08E-06	4.05E-09	5.73E-07		
	1:07 PM	5.0	20.0	17.5	7.5	12.5	210.95	223.45	3.30E-09	4.67E-07				
	2:27 PM	4.9	20.1	16.8	8.2	11.9	210.95	222.85	5.47E-09	7.71E-07				
2/5/93	3:37 PM	4.6	20.4	16.3	8.7	11.7	210.95	222.65	2.09E-09	2.94E-07				
	4:17 PM	4.5	20.5	16.1	8.9	11.6	210.95	222.55	1.83E-09	2.57E-07				
	9:22 AM	5.1	19.9	15.5	9.5	10.4	210.95	221.35					144	6:34:00
	10:22 AM	5.3	19.7	15.3	9.7	10.0	210.95	220.95	4.90E-09	6.85E-07	3.56E-09	4.96E-07		
	11:12 AM	5.4	19.6	15.2	9.8	9.8	210.95	220.75	2.95E-09	4.11E-07				
1:36 PM	5.8	19.2	14.9	10.1	9.1	210.95	220.05	3.59E-09	5.00E-07					

CYCLE #6



Laboratory Completion Sheet : Flexible Wall Permeability Testing

Date	Time	Reading In	Reading X	Reading Out	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
2/8/93	2:49 PM	5.9	19.1	14.7	10.3	8.8	210.95	219.75	3.04E-09	4.22E-07				
	3:56 PM	6.1	18.9	14.6	10.4	8.5	210.95	219.45	3.32E-09	4.60E-07				
	8:42 AM	6.2	18.8	13.9	11.1	7.7	210.95	218.65						
	9:42 AM	6.2	18.8	13.8	11.2	7.6	210.95	218.55	1.24E-09	1.71E-07	2.52E-09	3.48E-07	101	6:51:00
	10:48 AM	6.3	18.7	13.4	11.6	7.1	210.95	218.05	5.64E-09	7.79E-07				
	11:45 AM	6.3	18.7	13.3	11.7	7.0	210.95	217.95	1.31E-09	1.80E-07				
	1:07 PM	6.3	18.7	13.1	11.9	6.8	210.95	217.75	1.82E-09	2.51E-07				
	2:21 PM	6.3	18.7	12.9	12.1	6.6	210.95	217.55	2.02E-09	2.78E-07				
	3:33 PM	6.4	18.6	12.7	12.3	6.3	210.95	217.25	3.12E-09	4.28E-07				
	8:37 AM	7.0	18.0	12.3	12.7	5.3	210.95	216.25						
2/9/93	9:32 AM	7.1	17.9	12.1	12.9	5.0	210.95	215.95	4.10E-09	5.61E-07	2.77E-09	3.78E-07	110	5:55:00
	10:35 AM	7.2	17.8	12.0	13.0	4.8	210.95	215.75	2.39E-09	3.26E-07				
	11:39 AM	7.2	17.8	11.9	13.1	4.7	210.95	215.65	1.18E-09	1.61E-07				
	1:00 PM	7.3	17.7	11.6	13.4	4.3	210.95	215.25	3.73E-09	5.08E-07				
	2:32 PM	7.4	17.6	11.4	13.6	4.0	210.95	214.95	2.47E-09	3.35E-07				
	8:46 AM	7.6	17.4	10.9	14.1	3.3	210.95	214.25						
	9:50 AM	7.8	17.2	10.7	14.3	2.9	210.95	213.85	4.75E-09	6.42E-07	2.98E-09	4.03E-07	117	7:36:00
	11:03 AM	7.8	17.2	10.5	14.5	2.7	210.95	213.65	2.08E-09	2.82E-07				
	11:52 AM	7.9	17.1	10.4	14.6	2.5	210.95	213.45	3.11E-09	4.20E-07				
	4:22 PM	8.2	16.8	10.0	15.0	1.8	210.95	212.75	1.98E-09	2.66E-07				
2/11/93	8:58 AM	8.1	16.9	10.1	14.9	2.0	210.95	212.95						
	10:15 AM	8.2	16.8	10.0	15.0	1.8	210.95	212.75	1.98E-09	2.67E-07	3.97E-10	5.34E-08	15	7:19:00
	11:45 AM	8.2	16.8	10.0	15.0	1.8	210.95	212.75	0.00E+00	0.00E+00				
	1:15 PM	8.2	16.8	10.0	15.0	1.8	210.95	212.75	0.00E+00	0.00E+00				
	2:28 PM	8.2	16.8	10.0	15.0	1.8	210.95	212.75	0.00E+00	0.00E+00				
	4:17 PM	8.2	16.8	10.0	15.0	1.8	210.95	212.75	0.00E+00	0.00E+00				

**ATTACHMENT B**  
**TEST 2 RESULTS**

Sample: Freeze Thaw

Permeability equation :  $((0.879 * \text{Thickness}) / (2 * \text{Pi} * r^2 * \text{Time})) * \ln(\text{Change in Head})$

Project #: 394

Flux equation :  $((\text{Inflow} + \text{Outflow}) / 2) / \text{Pi} * r^2 / \text{Time}$

Seal Thickness : 1.600 cm. Hydration : 135% ( Initial )

Permeant : De-aired Tap Water

Test Position : 3 Initial Head : 3psi

Analyst : PBD Date Printed : 8/17/93

Cell Size : 4 in. Confining Stress : 5psi

Requested by : BT Date Begun : 7/30/92

Conversions : 1 psi = 2.307 feet of head 1 foot of head = 30.48 cm 1 psi = 70.32 cm Leakage Rate = Flux \* 2.8999E+08

Date	Time	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
7/30/92	10:19 AM	0.8	24.2	23.7	1.3	22.9	210.95	233.85						
	11:53 AM	0.9	24.1	23.7	1.3	22.8	210.95	233.75	6.58E-10	1.09E-07	1.57E-09	2.61E-07	76	6:10:00
	1:03 PM	1.1	23.9	23.6	1.4	22.5	210.95	233.45	2.65E-09	4.41E-07				
	2:22 PM	1.2	23.8	23.5	1.5	22.3	210.95	233.25	1.57E-09	2.60E-07				
	3:29 PM	1.3	23.7	23.5	1.5	22.2	210.95	233.15	9.25E-10	1.53E-07				
4:29 PM	1.4	23.6	23.4	1.6	22.0	210.95	232.95	2.07E-09	3.43E-07					
7/31/92	9:27 AM	1.5	23.5	23.2	1.8	21.7	210.95	232.65						
	11:57 AM	1.7	23.3	23.1	1.9	21.4	210.95	232.35	1.24E-09	2.06E-07	1.28E-09	2.12E-07	62	6:38:00
	1:46 PM	1.9	23.1	23.0	2.0	21.1	210.95	232.05	1.71E-09	2.83E-07				
	4:05 PM	2.0	23.0	22.9	2.1	20.9	210.95	231.85	8.97E-10	1.48E-07				
8/4/92	9:35 AM	2.2	22.8	22.6	2.4	20.4	210.95	231.35						
	11:02 AM	2.3	22.7	22.5	2.5	20.2	210.95	231.15	1.44E-09	2.36E-07	1.70E-09	2.79E-07	81	6:21:00
	1:43 PM	2.5	22.5	22.3	2.7	19.8	210.95	230.75	1.56E-09	2.55E-07				
8/6/92	2:42 PM	2.6	22.4	22.2	2.8	19.6	210.95	230.55	2.12E-09	3.48E-07				
	3:56 PM	2.7	22.3	22.1	2.9	19.4	210.95	230.35	1.70E-09	2.78E-07				
	10:43 AM	2.8	22.2	21.9	3.1	19.1	210.95	230.05						
	12:06 PM	2.9	22.1	21.7	3.3	18.8	210.95	229.75	2.27E-09	3.72E-07	1.84E-09	3.00E-07	87	5:10:00
	1:41 PM	3.0	22.0	21.6	3.4	18.6	210.95	229.55	1.33E-09	2.16E-07				
8/7/92	3:53 PM	3.2	21.8	21.4	3.6	18.2	210.95	229.15	1.91E-09	3.11E-07				
	9:11 AM	3.5	21.5	21.2	3.8	17.7	210.95	228.65						
	10:59 AM	3.6	21.4	21.0	4.0	17.4	210.95	228.35	1.76E-09	2.86E-07	1.49E-09	2.42E-07	70	6:57:00
	12:16 PM	3.6	21.4	20.9	4.1	17.3	210.95	228.25	8.22E-10	1.33E-07				
	1:52 PM	3.8	21.2	20.8	4.2	17.0	210.95	227.95	1.98E-09	3.21E-07				

ROBERT L. NELSON & ASSOCIATES, INC. Laboratory Computation Sheet : Flexible Wall Permeability Testing

Date	Time	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
8/10/92	4:08 PM	3.9	21.1	20.6	4.4	16.7	210.95	227.65	1.40E-09	2.27E-07				
	1:36 PM	4.1	20.9	20.1	4.9	16.0	210.95	226.95						
	3:32 PM	4.3	20.7	20.0	5.0	15.7	210.95	226.65	1.65E-09	2.66E-07	1.79E-09	2.89E-07	84	3:02:00
	4:38 PM	4.4	20.6	19.9	5.1	15.5	210.95	226.45	1.93E-09	3.11E-07				
8/11/92	10:21 AM	4.5	20.5	19.6	5.4	15.1	210.95	226.05						
	1:37 PM	4.7	20.3	19.4	5.6	14.7	210.95	225.65	1.31E-09	2.10E-07	1.71E-09	2.75E-07	80	6:02:00
	2:56 PM	4.8	20.2	19.3	5.7	14.5	210.95	225.45	1.62E-09	2.60E-07				
	4:23 PM	4.9	20.1	19.1	5.9	14.2	210.95	225.15	2.21E-09	3.54E-07				
8/13/92	10:58 AM	5.0	20.0	18.8	6.2	13.8	210.95	224.75						
	12:04 PM	5.2	19.8	18.7	6.3	13.5	210.95	224.45	2.93E-09	4.67E-07	2.46E-09	3.93E-07	114	5:34:00
	3:24 PM	5.4	19.6	18.4	6.6	13.0	210.95	223.95	1.61E-09	2.57E-07				
	4:32 PM	5.5	19.5	18.2	6.8	12.7	210.95	223.65	2.85E-09	4.53E-07				
8/17/92	11:48 AM	1.3	23.7	22.5	2.5	21.2	210.95	232.15						
	1:59 PM	1.4	23.6	22.2	2.8	20.8	210.95	231.75	1.90E-09	3.14E-07	1.77E-09	2.92E-07	85	4:43:00
	4:31 PM	1.6	23.4	22.0	3.0	20.4	210.95	231.35	1.64E-09	2.70E-07				
8/26/92	10:48 AM	1.3	23.7	21.9	3.1	20.6	210.95	231.55						
	11:59 AM	1.4	23.6	21.6	3.4	20.2	210.95	231.15	3.52E-09	5.79E-07	2.80E-09	4.59E-07	133	5:34:00
	2:14 PM	1.6	23.4	21.2	3.8	19.6	210.95	230.55	2.78E-09	4.57E-07				
	3:19 PM	1.7	23.3	21.0	4.0	19.3	210.95	230.25	2.90E-09	4.74E-07				
	4:22 PM	1.8	23.2	20.9	4.1	19.1	210.95	230.05	1.99E-09	3.26E-07				
8/27/92	10:05 AM	1.9	23.1	20.6	4.4	18.7	210.95	229.65						
	11:23 AM	2.0	23.0	20.4	4.6	18.4	210.95	229.35	2.42E-09	3.95E-07	2.16E-09	3.51E-07	102	6:21:00
	1:12 PM	2.2	22.8	20.2	4.8	18.0	210.95	228.95	2.32E-09	3.77E-07				
	3:26 PM	2.5	22.5	19.9	5.1	17.4	210.95	228.35	2.83E-09	4.60E-07				
	4:26 PM	2.5	22.5	19.8	5.2	17.3	210.95	228.25	1.06E-09	1.71E-07				
8/31/92	10:53 AM	2.6	22.4	19.6	5.4	17.0	210.95	227.95						
	12:01 PM	2.7	22.3	19.5	5.5	16.8	210.95	227.75	1.87E-09	3.02E-07	2.34E-09	3.79E-07	110	5:34:00
	2:29 PM	2.9	22.1	19.2	5.8	16.3	210.95	227.25	2.15E-09	3.47E-07				
	3:37 PM	3.0	22.0	19.0	6.0	16.0	210.95	226.95	2.81E-09	4.53E-07				
	4:27 PM	3.1	21.9	18.9	6.1	15.8	210.95	226.75	2.55E-09	4.11E-07				

Date	Time	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
	12:08 PM	3.4	21.6	18.7	6.3	15.3	210.95	226.25	1.91E-09	3.07E-07	1.79E-09	2.89E-07	84	3:01:00
	2:02 PM	3.5	21.5	18.5	6.5	15.0	210.95	225.95	1.68E-09	2.70E-07				
9/8/92	10:08 AM	4.1	20.9	17.8	7.2	13.7	210.95	224.65						
	11:13 AM	4.2	20.8	17.6	7.4	13.4	210.95	224.35	2.97E-09	4.74E-07	2.41E-09	3.83E-07	111	6:20:00
	2:17 PM	4.5	20.5	17.4	7.6	12.9	210.95	223.85	1.75E-09	2.79E-07				
	3:33 PM	4.6	20.4	17.2	7.8	12.6	210.95	223.55	2.55E-09	4.06E-07				
	4:28 PM	4.7	20.3	17.1	7.9	12.4	210.95	223.35	2.35E-09	3.74E-07				
CYCLE #2														
10/8/92	10:52 AM	0.8	24.2	22.9	2.1	22.1	210.95	233.05						
	11:58 AM	0.9	24.1	22.9	2.1	22.0	210.95	232.95	9.40E-10	1.56E-07	2.89E-09	4.77E-07	138	5:16:00
	2:36 PM	1.0	24.0	21.9	3.1	20.9	210.95	231.85	4.33E-09	7.16E-07				
	4:08 PM	1.2	23.8	21.6	3.4	20.4	210.95	231.35	3.39E-09	5.59E-07				
10/9/92	1:29 PM	1.5	23.5	20.9	4.1	19.4	210.95	230.35						
	2:39 PM	1.6	23.4	20.7	4.3	19.1	210.95	230.05	2.69E-09	4.41E-07	2.35E-09	3.84E-07	111	2:44:00
	4:13 PM	1.7	23.3	20.5	4.5	18.8	210.95	229.75	2.01E-09	3.28E-07				
10/12/92	10:08 AM	1.9	23.1	20.4	4.6	18.5	210.95	229.45						
	11:24 AM	2.0	23.0	20.2	4.8	18.2	210.95	229.15	2.49E-09	4.06E-07	2.25E-09	3.66E-07	106	6:18:00
	3:16 PM	2.4	22.6	19.7	5.3	17.3	210.95	228.25	2.45E-09	3.99E-07				
	4:26 PM	2.5	22.5	19.6	5.4	17.1	210.95	228.05	1.81E-09	2.94E-07				
10/14/92	10:11 AM	2.6	22.4	19.4	5.6	16.8	210.95	227.75						
	11:06 AM	2.8	22.2	19.3	5.7	16.5	210.95	227.45	3.46E-09	5.61E-07	2.20E-09	3.56E-07	103	5:58:00
	2:26 PM	3.1	21.9	19.0	6.0	15.9	210.95	226.85	1.91E-09	3.08E-07				
	4:09 PM	3.2	21.8	18.9	6.1	15.7	210.95	226.65	1.24E-09	2.00E-07				
10/15/92	1:43 PM	3.7	21.3	18.4	6.6	14.7	210.95	225.65						
	2:35 PM	3.8	21.2	18.3	6.7	14.5	210.95	225.45	2.47E-09	3.95E-07	2.60E-09	4.17E-07	121	2:49:00
	4:32 PM	4.0	21.0	18.0	7.0	14.0	210.95	224.95	2.74E-09	4.39E-07				
10/19/92	10:49 AM	4.2	20.8	17.9	7.1	13.7	210.95	224.65						
	11:49 AM	4.3	20.7	17.8	7.2	13.5	210.95	224.45	2.15E-09	3.43E-07	1.82E-09	2.90E-07	84	5:55:00
	2:40 PM	4.6	20.4	17.5	7.5	12.9	210.95	223.85	2.26E-09	3.61E-07				
	4:44 PM	4.7	20.3	17.4	7.6	12.7	210.95	223.65	1.04E-09	1.66E-07				

Date	Time	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
10/20/92	12:04 PM	1.6	23.4	23.5	1.5	21.9	210.95	232.85	2.35E-09	3.89E-07	2.19E-09	3.62E-07	105	4:15:00
	2:16 PM	1.8	23.2	23.2	1.8	21.4	210.95	232.35	2.03E-09	3.34E-07				
	4:19 PM	2.0	23.0	23.0	2.0	21.0	210.95	231.95	2.10E-09	3.45E-07				
10/21/92	9:56 AM	2.2	22.8	22.9	2.1	20.7	210.95	231.65	1.62E-09	2.67E-07	2.12E-09	3.48E-07	101	6:33:00
	11:13 AM	2.3	22.7	22.8	2.2	20.5	210.95	231.45	2.62E-09	4.31E-07				
	2:00 PM	2.6	22.4	22.4	2.6	19.8	210.95	230.75	2.10E-09	3.45E-07				
	4:29 PM	2.9	22.1	22.2	2.8	19.3	210.95	230.25						
10/23/92	11:01 AM	3.1	21.9	22.1	2.9	19.0	210.95	229.95	1.94E-09	3.16E-07	2.10E-09	3.43E-07	99	5:25:00
	1:11 PM	3.3	21.7	21.9	3.1	18.6	210.95	229.55	2.26E-09	3.69E-07				
	4:26 PM	3.6	21.4	21.5	3.5	17.9	210.95	228.85						
CYCLE #3														
11/6/92	9:29 AM	0.8	24.2	21.9	3.1	21.1	210.95	232.05	2.79E-09	4.60E-07	2.10E-09	3.46E-07	100	6:44:00
	10:36 AM	0.9	24.1	21.7	3.3	20.8	210.95	231.75	1.49E-09	2.45E-07				
	12:00 PM	1.0	24.0	21.6	3.4	20.6	210.95	231.55	2.50E-09	4.11E-07				
	1:40 PM	1.2	23.8	21.4	3.6	20.2	210.95	231.15	1.64E-09	2.69E-07				
	4:13 PM	1.4	23.6	21.2	3.8	19.8	210.95	230.75						
11/9/92	9:46 AM	1.5	23.5	21.1	3.9	19.6	210.95	230.55	2.21E-09	3.63E-07	2.00E-09	3.27E-07	95	6:51:00
	11:11 AM	1.7	23.3	21.0	4.0	19.3	210.95	230.25	2.51E-09	4.11E-07				
	12:01 PM	1.8	23.2	20.9	4.1	19.1	210.95	230.05	1.72E-09	2.82E-07				
	1:14 PM	1.9	23.1	20.8	4.2	18.9	210.95	229.85	1.55E-09	2.53E-07				
	4:37 PM	2.1	22.9	20.5	4.5	18.4	210.95	229.35						
11/12/92	10:36 AM	2.3	22.7	20.4	4.6	18.1	210.95	229.05	1.68E-09	2.74E-07	1.70E-09	2.76E-07	80	5:33:00
	11:51 AM	2.4	22.6	20.3	4.7	17.9	210.95	228.85	1.72E-09	2.79E-07				
	4:09 PM	2.8	22.2	20.0	5.0	17.2	210.95	228.15						
11/17/92	11:30 AM	3.9	21.1	19.1	5.9	15.2	210.95	226.15	2.02E-09	3.24E-07	1.74E-09	2.79E-07	81	5:07:00
	1:37 PM	4.2	20.8	19.0	6.0	14.8	210.95	225.75	1.03E-09	1.66E-07				
	2:39 PM	4.2	20.8	18.9	6.1	14.7	210.95	225.65	2.17E-09	3.48E-07				
	4:37 PM	4.4	20.6	18.7	6.3	14.3	210.95	225.25						
11/18/92	9:54 AM	4.5	20.5	18.6	6.4	14.1	210.95	225.05	1.55E-09	2.48E-07	1.78E-09	2.84E-07	82	6:14:00
	11:17 AM	4.6	20.4	18.5	6.5	13.9	210.95	224.85	1.41E-09	2.25E-07				
	2:20 PM	4.8	20.2	18.3	6.7	13.5	210.95	224.45						

Date	Time	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
	4:08 PM	5.0	20.0	18.1	6.9	13.1	210.95	224.05	2.39E-09	3.81E-07				
11/19/92	10:13 AM	5.1	19.9	18.0	7.0	12.9	210.95	223.85						
	11:22 AM	5.2	19.8	17.9	7.1	12.7	210.95	223.65	1.87E-09	2.98E-07	1.77E-09	2.80E-07	81	6:24:00
	1:32 PM	5.3	19.7	17.8	7.2	12.5	210.95	223.45	9.95E-10	1.58E-07				
	3:05 PM	5.5	19.5	17.6	7.4	12.1	210.95	223.05	2.79E-09	4.42E-07				
	4:37 PM	5.6	19.4	17.5	7.5	11.9	210.95	222.85	1.41E-09	2.23E-07				
11/20/92	9:57 AM	5.7	19.3	17.4	7.6	11.7	210.95	222.65						
	11:10 AM	5.8	19.2	17.3	7.7	11.5	210.95	222.45	1.78E-09	2.82E-07	1.89E-09	2.98E-07	87	5:33:00
	2:10 PM	6.0	19.0	17.1	7.9	11.1	210.95	222.05	1.45E-09	2.28E-07				
	3:30 PM	6.2	18.8	17.0	8.0	10.8	210.95	221.75	2.44E-09	3.85E-07				
CYCLE #4														
1/8/93	10:35 AM	2.2	22.8	22.4	2.6	20.2	210.95	231.15						
	11:34 AM	2.3	22.7	22.1	2.9	19.8	210.95	230.75	4.24E-09	6.97E-07	3.28E-09	5.37E-07	156	6:02:00
	2:48 PM	2.5	22.5	21.7	3.3	19.2	210.95	230.15	1.94E-09	3.18E-07				
	3:43 PM	2.6	22.4	21.5	3.5	18.9	210.95	229.85	3.43E-09	5.61E-07				
	4:37 PM	2.8	22.2	21.4	3.6	18.6	210.95	229.55	3.50E-09	5.71E-07				
1/11/93	9:30 AM	3.6	21.4	20.9	4.1	17.3	210.95	228.25						
	11:25 AM	3.6	21.4	20.5	4.5	16.9	210.95	227.85	2.20E-09	3.58E-07	2.22E-09	3.59E-07	104	6:45:00
	1:26 PM	3.7	21.3	20.1	4.9	16.4	210.95	227.35	2.62E-09	4.25E-07				
	3:09 PM	3.9	21.1	19.8	5.2	15.9	210.95	226.85	3.09E-09	4.99E-07				
	4:15 PM	3.9	21.1	19.7	5.3	15.8	210.95	226.75	9.66E-10	1.56E-07				
1/12/93	11:38 AM	4.0	21.0	19.8	5.2	15.8	210.95	226.75						
	1:56 PM	4.2	20.8	19.0	6.0	14.8	210.95	225.75	4.63E-09	7.45E-07	2.70E-09	4.33E-07	126	4:51:00
	3:08 PM	4.3	20.7	18.8	6.2	14.5	210.95	225.45	2.67E-09	4.28E-07				
	4:29 PM	4.3	20.7	18.7	6.3	14.4	210.95	225.35	7.92E-10	1.27E-07				
1/13/93	9:45 AM	4.4	20.6	18.3	6.7	13.9	210.95	224.85						
	11:08 AM	4.5	20.5	18.1	6.9	13.6	210.95	224.55	2.33E-09	3.72E-07	2.24E-09	3.57E-07	104	6:44:00
	1:47 PM	4.8	20.2	17.8	7.2	13.0	210.95	223.95	2.43E-09	3.88E-07				
	2:55 PM	4.8	20.2	17.7	7.3	12.9	210.95	223.85	9.49E-10	1.51E-07				
	3:40 PM	4.9	20.1	17.6	7.4	12.7	210.95	223.65	2.87E-09	4.57E-07				
	4:29 PM	5.0	20.0	17.5	7.5	12.5	210.95	223.45	2.64E-09	4.20E-07				

ROBERT L. NELSON & ASSOCIATES, INC. Laboratory Computation Sheet : Flexible Wall Permeability Testing

Date	Time	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
1/14/93	9:39 AM	5.2	19.8	17.1	7.9	11.9	210.95	222.85						
	10:41 AM	5.2	19.8	17.0	8.0	11.8	210.95	222.75	1.05E-09	1.66E-07	1.63E-09	2.57E-07	75	7:21:00
	11:46 AM	5.3	19.7	16.9	8.1	11.6	210.95	222.55	2.00E-09	3.16E-07				
	1:54 PM	5.3	19.7	16.7	8.3	11.4	210.95	222.35	1.02E-09	1.61E-07				
	5:00 PM	5.7	19.3	16.4	8.6	10.7	210.95	221.65	2.45E-09	3.87E-07				
1/18/93	11:16 AM	5.8	19.2	15.6	9.4	9.8	210.95	220.75						
	2:00 PM	5.8	19.2	15.4	9.6	9.6	210.95	220.55	7.99E-10	1.25E-07	2.16E-09	3.38E-07	98	5:03:00
	3:08 PM	5.9	19.1	15.2	9.8	9.3	210.95	220.25	2.89E-09	4.53E-07				
	4:19 PM	6.0	19.0	15.0	10.0	9.0	210.95	219.95	2.78E-09	4.34E-07				
1/19/93	9:32 AM	0.6	24.4	21.9	3.1	21.3	210.95	232.25						
	10:46 AM	0.7	24.3	21.7	3.3	21.0	210.95	231.95	2.52E-09	4.17E-07	2.19E-09	3.61E-07	105	6:38:00
	11:44 AM	0.7	24.3	21.5	3.5	20.8	210.95	231.75	2.15E-09	3.54E-07				
	1:33 PM	0.9	24.1	21.3	3.7	20.4	210.95	231.35	2.29E-09	3.77E-07				
	3:07 PM	1.0	24.0	21.1	3.9	20.1	210.95	231.05	2.00E-09	3.28E-07				
	4:10 PM	1.1	23.9	21.0	4.0	19.9	210.95	230.85	1.99E-09	3.26E-07				
1/25/93	10:35 AM	1.3	23.7	20.8	4.2	19.5	210.95	230.45						
	11:42 AM	1.3	23.7	20.1	4.9	18.8	210.95	229.75	6.56E-09	1.07E-06	3.25E-09	5.31E-07	154	5:20:00
	2:20 PM	1.4	23.6	19.9	5.1	18.5	210.95	229.45	1.20E-09	1.95E-07				
	3:55 PM	1.4	23.6	19.6	5.4	18.2	210.95	229.15	1.99E-09	3.25E-07				
CYCLE #5														
2/3/93	10:43 AM	5.1	19.9	21.6	3.4	16.5	210.95	227.45						
	11:36 AM	5.1	19.9	21.6	3.4	16.5	210.95	227.45	0.00E+00	0.00E+00	3.25E-10	5.26E-08	15	5:15:00
	1:35 PM	5.2	19.8	21.6	3.4	16.4	210.95	227.35	5.34E-10	8.64E-08				
	2:58 PM	5.3	19.7	21.6	3.4	16.3	210.95	227.25	7.66E-10	1.24E-07				
	3:58 PM	5.3	19.7	21.6	3.4	16.3	210.95	227.25	0.00E+00	0.00E+00				
2/4/93	9:31 AM	5.5	19.5	21.6	3.4	16.1	210.95	227.05						
	11:16 AM	5.4	19.6	21.6	3.4	16.2	210.95	227.15	-6.06E-10	-9.79E-08	3.79E-11	6.12E-09	2	6:45:00
	1:06 PM	5.4	19.6	21.6	3.4	16.2	210.95	227.15	0.00E+00	0.00E+00				
	2:26 PM	5.5	19.5	21.6	3.4	16.1	210.95	227.05	7.96E-10	1.28E-07				
	3:36 PM	5.5	19.5	21.6	3.4	16.1	210.95	227.05	0.00E+00	0.00E+00				
	4:16 PM	5.5	19.5	21.6	3.4	16.1	210.95	227.05	0.00E+00	0.00E+00				
2/5/93	9:21 AM	5.6	19.4	21.6	3.4	16.0	210.95	226.95						



Date	Time	Reading In	Reading X	Reading Out	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
	10:21 AM	5.6	19.4	21.6	3.4	16.0	210.95	226.95	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	6:34:00
	11:11 AM	5.6	19.4	21.6	3.4	16.0	210.95	226.95	0.00E+00	0.00E+00				
	1:35 PM	5.6	19.4	21.6	3.4	16.0	210.95	226.95	0.00E+00	0.00E+00				
	2:50 PM	5.6	19.4	21.6	3.4	16.0	210.95	226.95	0.00E+00	0.00E+00				
	3:55 PM	5.6	19.4	21.6	3.4	16.0	210.95	226.95	0.00E+00	0.00E+00				
2/8/93	8:41 AM	6.2	18.8	21.6	3.4	15.4	210.95	226.35	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	6:49:00
	9:41 AM	6.2	18.8	21.6	3.4	15.4	210.95	226.35	0.00E+00	0.00E+00				
	10:47 AM	6.2	18.8	21.6	3.4	15.4	210.95	226.35	0.00E+00	0.00E+00				
	11:44 AM	6.2	18.8	21.6	3.4	15.4	210.95	226.35	0.00E+00	0.00E+00				
	1:06 PM	6.2	18.8	21.6	3.4	15.4	210.95	226.35	0.00E+00	0.00E+00				
	2:20 PM	6.2	18.8	21.6	3.4	15.4	210.95	226.35	0.00E+00	0.00E+00				
	3:30 PM	6.2	18.8	21.6	3.4	15.4	210.95	226.35	0.00E+00	0.00E+00				
2/9/93	8:36 AM	7.3	17.7	21.5	3.5	14.2	210.95	225.15	-2.33E-09	-3.74E-07	-9.88E-10	-1.58E-07	-46	5:55:00
	9:31 AM	7.2	17.8	21.6	3.4	14.4	210.95	225.35	0.00E+00	1.45E-21				
	10:34 AM	7.1	17.9	21.5	3.5	14.4	210.95	225.35	-2.00E-09	-3.21E-07				
	11:38 AM	7.0	18.0	21.6	3.4	14.6	210.95	225.55	7.91E-10	1.27E-07				
	12:59 PM	7.0	18.0	21.5	3.5	14.5	210.95	225.45	-1.39E-09	-2.23E-07				
	2:31 PM	6.9	18.1	21.6	3.4	14.7	210.95	225.65						
2/10/93	8:45 AM	6.8	18.2	21.5	3.5	14.7	210.95	225.65	0.00E+00	0.00E+00	1.18E-10	1.89E-08	5	7:38:00
	9:49 AM	6.8	18.2	21.5	3.5	14.7	210.95	225.65	0.00E+00	0.00E+00				
	11:02 AM	6.8	18.2	21.5	3.5	14.7	210.95	225.65	0.00E+00	0.00E+00				
	11:51 AM	6.8	18.2	21.5	3.5	14.7	210.95	225.65	0.00E+00	0.00E+00				
	4:23 PM	6.9	18.1	21.4	3.6	14.5	210.95	225.45	4.71E-10	7.56E-08				
2/11/93	8:57 AM	6.8	18.2	21.5	3.5	14.7	210.95	225.65	0.00E+00	0.00E+00	2.57E-10	4.12E-08	12	7:19:00
	10:14 AM	6.8	18.2	21.5	3.5	14.7	210.95	225.65	0.00E+00	1.12E-07				
	11:46 AM	6.9	18.1	21.5	3.5	14.6	210.95	225.55	6.96E-10	0.00E+00				
	1:14 PM	6.9	18.1	21.5	3.5	14.6	210.95	225.55	0.00E+00	0.00E+00				
	2:27 PM	6.9	18.1	21.5	3.5	14.6	210.95	225.55	0.00E+00	0.00E+00				
	4:16 PM	6.9	18.1	21.4	3.6	14.5	210.95	225.45	5.88E-10	9.43E-08				
CYCLE #6														
2/23/93	9:56 AM	1.3	23.7	22.7	2.3	21.4	210.95	232.35	3.24E-09	5.35E-07	2.22E-09	3.65E-07	106	5:56:00
	11:32 AM	1.5	23.5	22.4	2.6	20.9	210.95	231.85	2.45E-09	4.03E-07				
	1:14 PM	1.7	23.3	22.2	2.8	20.5	210.95	231.45						

ROBERT L. NELSON & ASSOCIATES, INC. Laboratory Computation Sheet : Flexible Wall Permeability Testing

Date	Time	Reading In	Reading Out	X	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
2/24/93	2:30 PM	1.8	23.2	23.1	2.9	20.3	210.95	231.25	1.64E-09	2.70E-07				
	3:52 PM	1.9	23.1	22.0	3.0	20.1	210.95	231.05	1.53E-09	2.51E-07				
	9:37 AM	2.2	22.8	21.9	3.1	19.7	210.95	230.65	4.83E-09	7.91E-07	2.77E-09	4.52E-07	131	6:09:00
	10:29 AM	2.3	22.7	21.6	3.4	19.3	210.95	230.25	1.92E-09	3.13E-07				
	1:13 PM	2.6	22.4	21.4	3.6	18.8	210.95	229.75	1.85E-09	3.02E-07				
2/25/93	2:55 PM	2.7	22.3	21.2	3.8	18.5	210.95	229.45	2.47E-09	4.03E-07				
	3:46 PM	2.8	22.2	21.1	3.9	18.3	210.95	229.25						
	8:57 AM	3.1	21.9	20.9	4.1	17.8	210.95	228.75	2.14E-09	3.48E-07	2.15E-09	3.48E-07	101	6:26:00
	10:55 AM	3.3	21.7	20.7	4.3	17.4	210.95	228.35	2.04E-09	3.32E-07				
	1:30 PM	3.6	21.4	20.5	4.5	16.9	210.95	227.85	2.25E-09	3.64E-07				
2/26/93	3:23 PM	3.8	21.2	20.3	4.7	16.5	210.95	227.45						
	10:03 AM	4.1	20.9	20.0	5.0	15.9	210.95	226.85	1.77E-09	2.86E-07	1.75E-09	2.82E-07	82	5:45:00
	11:51 AM	4.3	20.7	19.9	5.1	15.6	210.95	226.55	2.23E-09	3.59E-07				
	1:17 PM	4.4	20.6	19.7	5.3	15.3	210.95	226.25	3.01E-09	4.84E-07				
	2:42 PM	4.6	20.4	19.5	5.5	14.9	210.95	225.85	0.00E+00	0.00E+00				
3/1/93	3:48 PM	4.6	20.4	19.5	5.5	14.9	210.95	225.85						
	10:10 AM	5.2	19.8	19.3	5.7	14.1	210.95	225.05	2.41E-09	3.85E-07	2.12E-09	3.38E-07	98	6:21:00
	1:17 PM	5.5	19.5	18.9	6.1	13.4	210.95	224.35	1.92E-09	3.07E-07				
	2:24 PM	5.6	19.4	18.8	6.2	13.2	210.95	224.15	2.03E-09	3.24E-07				
	4:31 PM	5.8	19.2	18.6	6.4	12.8	210.95	223.75						
3/2/93	10:02 AM	6.7	18.3	18.4	6.6	11.7	210.95	222.65	2.87E-09	4.53E-07	1.74E-09	2.75E-07	80	5:03:00
	11:10 AM	6.8	18.2	18.2	6.8	11.4	210.95	222.35	1.25E-09	1.98E-07				
	12:02 PM	6.8	18.2	18.1	6.9	11.3	210.95	222.25	2.83E-09	4.47E-07				
	1:11 PM	6.9	18.1	17.9	7.1	11.0	210.95	221.95	0.00E+00	0.00E+00				
	3:05 PM	6.9	18.1	17.9	7.1	11.0	210.95	221.95						
3/3/93	10:50 AM	2.9	22.1	21.3	3.7	18.4	210.95	229.35	1.05E-08	1.71E-06	4.79E-09	7.80E-07	226	4:35:00
	11:02 AM	3.0	22.0	21.2	3.8	18.2	210.95	229.15	1.88E-09	3.07E-07				
	1:16 PM	3.2	21.8	21.0	4.0	17.8	210.95	228.75	1.96E-09	3.19E-07				
	3:25 PM	3.4	21.6	20.8	4.2	17.4	210.95	228.35						
	10:08 AM	3.8	21.2	20.3	4.7	16.5	210.95	227.45	1.30E-09	2.10E-07	2.07E-09	3.35E-07	97	4:28:00
3/4/93	10:57 AM	3.9	21.1	20.3	4.7	16.4	210.95	227.35	1.89E-09	3.05E-07				
	1:12 PM	4.1	20.9	20.1	4.9	16.0	210.95	226.95						
														Preliminary Results

Date	Time	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
	2:36 PM	4.3	20.7	19.9	5.1	15.6	210.95	226.55	3.04E-09	4.89E-07				
3/5/93	11:43 AM	4.7	20.3	19.5	5.5	14.8	210.95	225.75						
	1:34 PM	4.9	20.1	19.3	5.7	14.4	210.95	225.35	2.31E-09	3.70E-07	2.18E-09	3.49E-07	101	4:02:00
	3:18 PM	5.1	19.9	19.2	5.8	14.1	210.95	225.05	1.85E-09	2.97E-07				
	3:45 PM	5.1	19.9	19.1	5.9	14.0	210.95	224.95	2.38E-09	3.81E-07				
CYCLE #7														
3/9/93	9:00 AM	5.9	19.1	19.7	5.3	13.8	210.95	224.75						
	9:58 AM	6.0	19.0	19.6	5.4	13.6	210.95	224.55	2.22E-09	3.54E-07	2.17E-09	3.47E-07	101	4:03:00
	11:24 AM	6.1	18.9	19.3	5.7	13.2	210.95	224.15	3.00E-09	4.78E-07				
	1:03 PM	6.1	18.9	19.1	5.9	13.0	210.95	223.95	1.30E-09	2.08E-07				
3/10/93	8:53 AM	3.5	21.5	18.4	20.7	0.8	210.95	211.75						
	10:15 AM	3.6	21.4	18.2	20.5	0.9	210.95	211.85	-8.32E-10	3.76E-07	-1.38E-10	2.40E-07	69	-5:48:00
	11:40 AM	3.8	21.2	18.1	20.4	0.8	210.95	211.75	8.03E-10	3.63E-07				
	1:51 PM	3.9	21.1	17.9	20.2	0.9	210.95	211.85	-5.21E-10	2.35E-07				
	3:05 AM	4.0	21.0	17.9	20.1	0.9	210.95	211.85	0.00E+00	-1.59E-08				
3/11/93	10:17 AM	4.4	20.6	19.7	5.3	15.3	210.95	226.25						
	11:30 AM	4.5	20.5	19.6	5.4	15.1	210.95	226.05	1.75E-09	2.82E-07	1.78E-09	2.86E-07	83	4:44:00
	1:10 PM	4.6	20.4	19.5	5.5	14.9	210.95	225.85	1.28E-09	2.06E-07				
	3:01 PM	4.8	20.2	19.3	5.7	14.5	210.95	225.45	2.31E-09	3.70E-07				
3/12/93	9:13 AM	5.1	19.9	19.0	6.0	13.9	210.95	224.85						
	10:19 AM	5.2	19.8	19.0	6.0	13.8	210.95	224.75	9.74E-10	1.56E-07	1.68E-09	2.69E-07	78	5:37:00
	11:40 AM	5.4	19.6	18.9	6.1	13.5	210.95	224.45	2.38E-09	3.81E-07				
	2:50 PM	5.6	19.4	18.6	6.4	13.0	210.95	223.95	1.70E-09	2.70E-07				
3/15/93	10:58 AM	6.1	18.9	18.3	6.7	12.2	210.95	223.15						
	12:02 PM	6.2	18.8	18.1	6.9	11.9	210.95	222.85	3.04E-09	4.82E-07	2.11E-09	3.35E-07	97	4:20:00
	1:37 PM	6.3	18.7	18.0	7.0	11.7	210.95	222.65	1.37E-09	2.16E-07				
	3:18 PM	6.5	18.5	17.9	7.1	11.4	210.95	222.35	1.93E-09	3.05E-07				
3/16/93	9:29 AM	6.7	18.3	17.6	7.4	10.9	210.95	221.85						
	10:15 AM	6.8	18.2	17.6	7.4	10.8	210.95	221.75	1.42E-09	2.23E-07	1.60E-09	2.51E-07	73	6:37:00

ROBERT L. NELSON & ASSOCIATES, INC. Laboratory Computation Sheet : Flexible Wall Permeability Testing

Date	Time	Reading In	Reading X	Reading Out	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
3/17/93	2:22 PM	7.2	17.8	17.2	7.8	10.0	210.95	220.95	2.12E-09	3.33E-07				
	4:06 PM	7.3	17.7	17.1	7.9	9.8	210.95	220.75	1.26E-09	1.98E-07				
3/17/93	9:31 AM	7.3	17.7	17.1	7.9	9.8	210.95	220.75			0.00E+00	0.00E+00	0	6:09:00
	11:15 AM	7.3	17.7	17.1	7.9	9.8	210.95	220.75	0.00E+00	0.00E+00				
	1:19 PM	7.3	17.7	17.1	7.9	9.8	210.95	220.75	0.00E+00	0.00E+00				
	3:40 PM	7.3	17.7	17.1	7.9	9.8	210.95	220.75	0.00E+00	0.00E+00				
3/18/93	1:15 PM	10.1	14.9	18.6	6.4	8.5	210.95	219.45			2.14E-09	3.33E-07	97	2:57:00
	2:30 PM	10.1	14.9	18.3	6.7	8.2	210.95	219.15	2.64E-09	4.11E-07				
	3:27 PM	10.1	14.9	18.1	6.9	8.0	210.95	218.95	2.32E-09	3.61E-07				
	4:12 PM	10.1	14.9	18.0	7.0	7.9	210.95	218.85	1.47E-09	2.28E-07				
3/19/93	9:30 AM	2.1	22.9	19.8	5.2	17.7	210.95	228.65			2.66E-09	4.32E-07	125	6:20:00
	10:16 AM	2.2	22.8	19.6	5.4	17.4	210.95	228.35	4.13E-09	6.70E-07				
	2:15 PM	2.4	22.6	19.1	5.9	16.7	210.95	227.65	1.86E-09	3.01E-07				
	3:50 PM	2.5	22.5	18.9	6.1	16.4	210.95	227.35	2.01E-09	3.25E-07				
3/23/93	10:54 AM	3.6	21.4	24.6	0.4	21.0	210.95	231.95			1.32E-08	2.16E-06	625	6:01:00
	11:55 AM	4.2	20.8	22.1	2.9	17.9	210.95	228.85	3.19E-08	5.22E-06				
	2:39 PM	5.6	19.4	22.0	3.0	16.4	210.95	227.35	5.80E-09	9.40E-07				
	4:55 PM	6.0	19.0	22.0	3.0	16.0	210.95	226.95	1.87E-09	3.02E-07				
3/24/93	10:34 AM	7.6	17.4	22.8	2.2	15.2	210.95	226.15			7.89E-09	1.26E-06	367	4:06:00
	11:16 AM	7.7	17.3	21.7	3.3	14.0	210.95	224.95	1.83E-08	2.94E-06				
	1:45 PM	8.1	16.9	21.4	3.6	13.3	210.95	224.25	3.02E-09	4.83E-07				
	2:40 PM	8.2	16.8	21.3	3.7	13.1	210.95	224.05	2.35E-09	3.74E-07				
3/25/93	10:40 AM	9.1	15.9	20.9	4.1	11.8	210.95	222.75			4.48E-10	7.09E-08	21	-1:50:00
	1:05 PM	7.3	17.7	19.0	6.0	11.7	210.95	222.65	4.48E-10	7.09E-08				
3/26/93	8:50 AM	2.0	23.0	21.1	20.7	2.3	210.95	213.25						
	9:52 AM	2.0	23.0	20.6	20.5	2.5	210.95	213.45	-2.19E-09	8.29E-07				
	11:25 AM	2.0	23.0	20.3	20.4	2.6	210.95	213.55	-7.28E-10	3.32E-07				
	2:22 PM	2.2	22.8	19.9	20.2	2.6	210.95	213.55	0.00E+00	3.48E-07				
	3:30 PM	2.2	22.8	19.8	20.1	2.7	210.95	213.65	-9.95E-10	1.51E-07				

Date	Time	Reading In	Reading Out	X	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
3/29/93	10:50 AM	2.4	22.6	19.4	20.7	1.9	210.95	212.85						
	11:45 AM	2.5	22.5	19.2	20.5	2.0	210.95	212.95	-1.23E-09	5.61E-07	-5.04E-10	3.48E-07	101	5:16:00
	1:20 PM	2.6	22.4	19.1	20.4	2.0	210.95	212.95	0.00E+00	2.16E-07				
	2:47 PM	2.7	22.3	18.9	20.2	2.1	210.95	213.05	-7.80E-10	3.54E-07				
	4:06 PM	2.8	22.2	18.8	20.1	2.1	210.95	213.05	0.00E+00	2.60E-07				
3/30/93	9:10 AM	2.9	22.1	18.6	6.4	15.7	210.95	226.65						
	9:58 AM	3.0	22.0	18.5	6.5	15.5	210.95	226.45	2.66E-09	4.28E-07	2.02E-09	3.24E-07	94	6:35:00
	11:28 AM	3.1	21.9	18.4	6.6	15.3	210.95	226.25	1.42E-09	2.28E-07				
	1:14 PM	3.3	21.7	18.3	6.7	15.0	210.95	225.95	1.81E-09	2.91E-07				
	2:39 PM	3.4	21.6	18.1	6.9	14.7	210.95	225.65	2.26E-09	3.63E-07				
3:45 PM	3.5	21.5	18.0	7.0	14.5	210.95	225.45	1.94E-09	3.11E-07					
3/31/93	10:42 AM	3.7	21.3	17.7	20.7	0.6	210.95	211.55						
	12:10 PM	3.8	21.2	17.6	20.5	0.7	210.95	211.65	-7.76E-10	2.34E-07	-6.37E-10	2.71E-07	79	4:58:00
	1:48 PM	4.0	21.0	17.5	20.4	0.6	210.95	211.55	6.97E-10	3.15E-07				
	2:50 PM	4.1	20.9	17.4	20.2	0.7	210.95	211.65	-1.10E-09	3.32E-07				
	3:40 PM	4.1	20.9	17.3	20.1	0.8	210.95	211.75	-1.37E-09	2.06E-07				
4/1/93	2:21 PM	4.8	20.2	20.7	20.7	-0.5	210.95	210.45						
	2:50 PM	4.8	20.2	20.6	20.5	-0.3	210.95	210.65	-4.74E-09	3.54E-07	-4.74E-09	3.54E-07	103	0:29:00
4/2/93	9:07 AM	5.0	20.0	20.5	4.5	15.5	210.95	226.45						
	10:13 AM	5.1	19.9	20.3	4.7	15.2	210.95	226.15	2.90E-09	4.67E-07	2.02E-09	3.25E-07	94	4:27:00
	11:38 AM	5.2	19.8	20.2	4.8	15.0	210.95	225.95	1.50E-09	2.42E-07				
	1:34 PM	5.4	19.6	20.1	4.9	14.7	210.95	225.65	1.66E-09	2.66E-07				
	8:05 AM	5.8	19.2	19.8	5.2	14.0	210.95	224.95						
4/5/93	8:48 AM	5.9	19.1	19.6	5.4	13.7	210.95	224.65	4.49E-09	7.17E-07	2.26E-09	3.62E-07	105	6:24:00
	1:13 PM	6.2	18.8	19.3	5.7	13.1	210.95	224.05	1.46E-09	2.33E-07				
	2:29 PM	6.3	18.7	19.3	5.7	13.0	210.95	223.95	8.49E-10	1.35E-07				
	9:45 AM	6.3	18.7	19.3	5.7	13.0	210.95	223.95						
	10:55 AM	6.4	18.6	19.2	5.8	12.8	210.95	223.75	1.85E-09	2.94E-07	1.45E-09	2.31E-07	67	4:37:00
4/7/93	1:05 PM	6.4	18.6	19.2	5.8	12.8	210.95	223.75	0.00E+00	0.00E+00				
	2:22 PM	6.5	18.5	19.0	6.0	12.5	210.95	223.45	2.52E-09	4.00E-07				
	10:40 AM	3.9	21.1	21.8	3.2	17.9	210.95	228.85						

ROBERT L. NELSON & ASSOCIATES, INC. Laboratory Computation Sheet : Flexible Wall Permeability Testing

Date	Time	Reading In	Reading X	Reading Out	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
4/12/93	11:42 AM	4.0	21.0	21.7	3.3	17.7	210.95	228.65	2.04E-09	3.32E-07	2.09E-09	3.40E-07	99	4:30:00
	1:30 PM	4.2	20.8	21.5	3.5	17.3	210.95	228.25	2.34E-09	3.81E-07				
	3:10 PM	4.3	20.7	21.3	3.7	17.0	210.95	227.95	1.90E-09	3.08E-07				
4/12/93	8:44 AM	3.3	21.7	20.2	4.8	16.9	210.95	227.85			1.94E-09	3.13E-07	91	7:12:00
	9:32 AM	3.4	21.6	20.1	4.9	16.7	210.95	227.65	2.64E-09	4.28E-07				
	10:40 AM	3.5	21.5	19.9	5.1	16.4	210.95	227.35	2.80E-09	4.53E-07				
	11:48 AM	3.5	21.5	19.8	5.2	16.3	210.95	227.25	9.35E-10	1.51E-07				
	1:11 PM	3.7	21.3	19.7	5.3	16.0	210.95	226.95	2.30E-09	3.72E-07				
	3:05 PM	3.9	21.1	19.6	5.4	15.7	210.95	226.65	1.68E-09	2.70E-07				
4/13/93	8:53 AM	4.2	20.8	19.4	5.6	15.2	210.95	226.15			1.91E-09	3.07E-07	89	6:50:00
	10:23 AM	4.3	20.7	19.3	5.7	15.0	210.95	225.95	1.42E-09	2.28E-07				
	11:32 AM	4.5	20.5	19.2	5.8	14.7	210.95	225.65	2.78E-09	4.47E-07				
	3:43 PM	4.8	20.2	18.9	6.1	14.1	210.95	225.05	1.53E-09	2.46E-07				
4/14/93	10:18 AM	1.8	23.2	21.9	3.1	20.1	210.95	231.05			2.34E-09	3.84E-07	111	5:38:00
	10:52 AM	1.9	23.1	21.8	3.2	19.9	210.95	230.85	3.68E-09	6.05E-07				
	1:06 PM	2.1	22.9	21.5	3.5	19.4	210.95	230.35	2.34E-09	3.84E-07				
	2:16 PM	2.3	22.7	21.4	3.6	19.1	210.95	230.05	2.69E-09	4.41E-07				
	3:14 PM	2.3	22.7	21.4	3.6	19.1	210.95	230.05	0.00E+00	0.00E+00				
	3:56 PM	2.4	22.6	21.3	3.7	18.9	210.95	229.85	2.99E-09	4.89E-07				
4/15/93	10:38 AM	1.3	23.7	21.7	20.7	3.0	210.95	213.95			-6.07E-11	7.65E-06	2218	5:48:00
	12:05 PM	1.5	23.5	21.5	20.5	3.0	210.95	213.95	0.00E+00	4.73E-07				
	1:35 PM	1.7	23.3	21.4	20.4	2.9	210.95	213.85	7.51E-10	3.43E-07				
	2:43 PM	1.8	23.2	1.8	20.2	3.0	210.95	213.95	-9.94E-10	2.98E-05				
	4:26 PM	1.9	23.1	1.9	20.1	3.0	210.95	213.95	0.00E+00	0.00E+00				
4/16/93	10:34 AM	1.9	23.1	21.3	3.7	19.4	210.95	230.35			2.13E-09	3.47E-07	101	4:47:00
	12:29 PM	2.2	22.8	21.1	3.9	18.9	210.95	229.85	2.73E-09	4.47E-07				
	1:57 PM	2.4	22.6	21.0	4.0	18.6	210.95	229.55	2.15E-09	3.50E-07				
4/19/93	10:47 AM	2.8	22.2	20.6	4.4	17.8	210.95	228.75			2.43E-09	3.94E-07	114	4:29:00
	11:35 AM	2.9	22.1	20.5	4.5	17.6	210.95	228.55	2.63E-09	4.28E-07				
	1:58 PM	3.2	21.8	20.3	4.7	17.1	210.95	228.05	2.21E-09	3.59E-07				
	3:16 PM	3.3	21.7	20.1	4.9	16.8	210.95	227.75	2.44E-09	3.95E-07				

Date	Time	Reading In	Reading X	Reading Out	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
4/20/93	8:36 AM	3.5	21.5	19.9	20.7	0.8	210.95	211.75						
	11:40 AM	3.8	21.2	19.6	20.5	0.7	210.95	211.65	3.71E-10	3.35E-07	2.97E-10	3.28E-07	95	7:17:00
	1:43 PM	4.0	21.0	19.4	20.4	0.6	210.95	211.55	5.55E-10	3.34E-07				
	2:56 PM	4.1	20.9	19.3	20.2	0.7	210.95	211.65	-9.36E-10	2.82E-07				
	3:53 PM	4.3	20.7	19.3	20.1	0.6	210.95	211.55	1.20E-09	3.61E-07				
4/21/93	9:24 AM	4.4	20.6	19.1	5.9	14.7	210.95	225.65						
	10:37 AM	4.5	20.5	19.0	6.0	14.5	210.95	225.45	1.76E-09	2.82E-07	1.96E-09	3.14E-07	91	3:58:00
	11:46 AM	4.7	20.3	18.9	6.1	14.2	210.95	225.15	2.79E-09	4.47E-07				
	1:22 PM	4.8	20.2	18.8	6.2	14.0	210.95	224.95	1.34E-09	2.14E-07				
	9:10 AM	5.3	19.7	18.3	6.7	13.0	210.95	223.95						
4/22/93	10:16 AM	5.4	19.6	18.2	6.8	12.8	210.95	223.75	1.96E-09	3.11E-07	1.70E-09	2.71E-07	79	7:05:00
	1:45 PM	5.7	19.3	17.9	7.1	12.2	210.95	223.15	1.86E-09	2.95E-07				
	4:15 PM	5.9	19.1	17.8	7.2	11.9	210.95	222.85	1.30E-09	2.06E-07				
	9:27 AM	6.0	19.0	17.7	7.3	11.7	210.95	222.65						
	11:06 AM	6.2	18.8	17.5	7.5	11.3	210.95	222.25	2.63E-09	4.15E-07	2.14E-09	3.37E-07	98	6:50:00
4/27/93	1:45 PM	6.5	18.5	17.4	7.6	10.9	210.95	221.85	1.64E-09	2.59E-07				
	4:17 PM	6.7	18.3	17.1	7.9	10.4	210.95	221.35	2.15E-09	3.38E-07				
	10:04 AM	6.8	18.2	20.7	4.3	13.9	210.95	224.85						
	2:20 PM	7.3	17.7	20.3	4.7	13.0	210.95	223.95	2.26E-09	3.61E-07	2.26E-09	3.61E-07	105	4:16:00
	1:00 PM	7.8	17.2	19.9	5.1	12.1	210.95	223.05						
4/28/93	2:10 PM	7.8	17.2	19.9	5.1	12.1	210.95	223.05	0.00E+00	0.00E+00	2.56E-09	4.04E-07	117	3:06:00
	3:30 PM	8.0	17.0	19.6	5.4	11.6	210.95	222.55	4.06E-09	6.42E-07				
	4:06 PM	8.1	16.9	19.5	5.5	11.4	210.95	222.35	3.61E-09	5.71E-07				
	9:32 AM	7.0	18.0	21.3	3.7	14.3	210.95	225.25						
	10:15 AM	6.5	18.5	20.1	4.9	13.6	210.95	224.55	1.05E-08	1.67E-06	5.58E-09	8.90E-07	258	5:10:00
5/5/93	1:26 PM	5.8	19.2	18.3	6.7	12.5	210.95	223.45	3.72E-09	5.92E-07				
	2:42 PM	5.7	19.3	17.9	7.1	12.2	210.95	223.15	2.56E-09	4.06E-07				
	9:00 AM	5.9	19.1	21.5	3.5	15.6	210.95	226.55						

CYCLE # 9

ROBERT L. NELSON & ASSOCIATES, INC. Laboratory Computation Sheet : Flexible Wall Permeability Testing

Date	Time	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
	10:23 AM	6.0	19.0	21.2	3.8	15.2	210.95	226.15	3.08E-09	4.95E-07	3.06E-09	4.91E-07	142	5:25:00
	11:21 AM	6.1	18.9	21.0	4.0	14.9	210.95	225.85	3.31E-09	5.32E-07				
	2:25 PM	6.4	18.6	20.5	4.5	14.1	210.95	225.05	2.79E-09	4.47E-07				
5/7/93	9:01 AM	6.7	18.3	20.0	5.0	13.3	210.95	224.25	3.58E-09	5.71E-07	2.67E-09	4.24E-07	123	6:50:00
	10:13 AM	6.9	18.1	19.8	5.2	12.9	210.95	223.85	2.59E-09	4.11E-07				
	11:53 AM	7.1	17.9	19.6	5.4	12.5	210.95	223.45	3.64E-09	5.77E-07				
	1:22 PM	7.3	17.7	19.3	5.7	12.0	210.95	222.95	1.54E-09	2.45E-07				
	2:46 PM	7.4	17.6	19.2	5.8	11.8	210.95	222.75	2.00E-09	3.16E-07				
	3:51 PM	7.5	17.5	19.1	5.9	11.6	210.95	222.55	3.00E-09	4.84E-07	2.97E-09	4.77E-07	138	5:52:00
5/10/93	9:04 AM	3.5	21.5	19.3	5.7	15.8	210.95	226.75	3.42E-09	5.51E-07				
	10:29 AM	3.7	21.3	19.1	5.9	15.4	210.95	226.35	2.86E-09	4.59E-07				
	11:25 AM	3.8	21.2	18.9	6.1	15.1	210.95	226.05	2.59E-09	4.15E-07				
	1:17 PM	4.1	20.9	18.7	6.3	14.6	210.95	225.55	3.00E-09	4.84E-07	2.52E-09	4.00E-07	116	7:23:00
	2:56 PM	4.3	20.7	18.5	6.5	14.2	210.95	225.15	2.69E-09	4.28E-07				
5/11/93	8:56 AM	4.6	20.4	18.1	6.9	13.5	210.95	224.45	2.30E-09	3.65E-07				
	11:02 AM	4.9	20.1	17.9	7.1	13.0	210.95	223.95	2.95E-09	4.74E-07	2.82E-09	4.53E-07	131	6:18:00
	1:02 PM	5.1	19.9	17.6	7.4	12.5	210.95	223.45	3.31E-09	5.32E-07				
	4:19 PM	5.5	19.5	17.3	7.7	11.8	210.95	222.75	2.52E-09	4.05E-07				
5/12/93	9:22 AM	5.7	19.3	21.2	3.8	15.5	210.95	226.45	2.51E-09	4.02E-07				
	10:27 AM	5.8	19.2	21.0	4.0	15.2	210.95	226.15	2.37E-09	3.76E-07	2.74E-09	4.35E-07	126	2:51:00
	11:25 AM	6.0	19.0	20.9	4.1	14.9	210.95	225.85	2.70E-09	4.28E-07				
	1:32 PM	6.2	18.8	20.6	4.4	14.4	210.95	225.35	3.16E-09	5.01E-07				
	3:40 PM	6.4	18.6	20.3	4.7	13.9	210.95	224.85	1.41E-09	2.22E-07	2.18E-09	3.43E-07	100	4:11:00
5/13/93	1:20 PM	7.1	17.9	19.6	5.4	12.5	210.95	223.45	2.95E-09	4.65E-07				
	2:42 PM	7.3	17.7	19.5	5.5	12.2	210.95	223.15	1.93E-09	3.11E-07	2.52E-09	4.07E-07	118	4:10:00
	3:30 PM	7.4	17.6	19.4	5.6	12.0	210.95	222.95	2.95E-09	4.65E-07				
	4:11 PM	7.5	17.5	19.3	5.7	11.8	210.95	222.75	1.93E-09	3.11E-07				
5/14/93	9:07 AM	7.7	17.3	19.1	5.9	11.4	210.95	222.31	2.95E-09	4.65E-07				
	10:21 AM	7.8	17.2	19.0	6.0	11.2	210.95	222.15	1.41E-09	2.22E-07	2.18E-09	3.43E-07	100	4:11:00
	1:18 PM	8.2	16.8	18.6	6.4	10.4	210.95	221.35	2.95E-09	4.65E-07				
5/17/93	9:30 AM	3.7	21.3	20.0	5.0	16.3	210.95	227.25	1.93E-09	3.11E-07	2.52E-09	4.07E-07	118	4:10:00
	10:36 AM	3.8	21.2	19.9	5.1	16.1	210.95	227.05	1.93E-09	3.11E-07				



Date	Time	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
5/18/93	1:40 PM	4.2	20.8	19.4	5.6	15.2	210.95	226.15	3.12E-09	5.03E-07				
	9:02 AM	4.8	20.2	18.9	6.1	14.1	210.95	225.05						
	10:13 AM	4.9	20.1	18.8	6.2	13.9	210.95	224.85	1.81E-09	2.90E-07	2.38E-09	3.80E-07	110	6:24:00
	1:22 PM	5.3	19.7	18.4	6.6	13.1	210.95	224.05	2.73E-09	4.35E-07				
	3:26 PM	5.6	19.4	18.2	6.8	12.6	210.95	223.55	2.60E-09	4.14E-07				
5/19/93	9:34 AM	5.9	19.1	17.9	7.1	12.0	210.95	222.95						
	10:24 AM	6.0	19.0	17.7	7.3	11.7	210.95	222.65	3.89E-09	6.17E-07	3.09E-09	4.88E-07	141	7:12:00
	3:38 PM	6.6	18.4	17.1	7.9	10.5	210.95	221.45	2.49E-09	3.93E-07				
	4:46 PM	6.8	18.2	17.0	8.0	10.2	210.95	221.15	2.88E-09	4.53E-07				
5/20/93	10:46 AM	6.9	18.1	20.9	4.1	14.0	210.95	224.95						
	1:33 PM	7.3	17.7	20.5	4.5	13.2	210.95	224.15	3.08E-09	4.92E-07	2.49E-09	3.97E-07	115	3:55:00
	2:41 PM	7.4	17.6	20.4	4.6	13.0	210.95	223.95	1.90E-09	3.02E-07				
5/21/93	8:54 AM	7.7	17.3	20.1	4.9	12.4	210.95	223.35						
	10:10 AM	7.9	17.1	19.9	5.1	12.0	210.95	222.95	3.41E-09	5.41E-07	2.91E-09	4.61E-07	134	6:40:00
	3:34 PM	8.5	16.5	19.3	5.7	10.8	210.95	221.75	2.41E-09	3.81E-07				
5/24/93	8:52 AM	8.8	16.2	19.0	6.0	10.2	210.95	221.15						
	10:11 AM	9.0	16.0	18.8	6.2	9.8	210.95	220.75	3.31E-09	5.20E-07	2.67E-09	4.19E-07	121	8:18:00
	1:40 PM	9.4	15.6	18.4	6.6	9.0	210.95	219.95	2.51E-09	3.93E-07				
	5:10 PM	9.8	15.2	18.1	6.9	8.3	210.95	219.25	2.19E-09	3.43E-07				
5/25/93	9:11 AM	4.0	21.0	21.5	3.5	17.5	210.95	228.45						
	10:40 AM	4.3	20.7	21.3	3.7	17.0	210.95	227.95	3.56E-09	5.77E-07	2.75E-09	4.45E-07	129	6:05:00
	1:16 PM	4.5	20.5	21.0	4.0	16.5	210.95	227.45	2.03E-09	3.29E-07				
	3:16 PM	4.8	20.2	20.8	4.2	16.0	210.95	226.95	2.65E-09	4.28E-07				
5/26/93	9:16 AM	4.9	20.1	20.6	4.4	15.7	210.95	226.65						
	11:19 AM	5.2	19.8	20.4	4.6	15.2	210.95	226.15	2.60E-09	4.18E-07	2.58E-09	4.15E-07	120	7:04:00
	1:18 PM	5.4	19.6	20.1	4.9	14.7	210.95	225.65	2.69E-09	4.32E-07				
	4:20 PM	5.8	19.2	19.8	5.2	14.0	210.95	224.95	2.47E-09	3.95E-07				
5/28/93	10:34 AM	6.0	19.0	19.5	5.5	13.5	210.95	224.45						
	11:57 AM	6.3	18.7	19.4	5.6	13.1	210.95	224.05	3.11E-09	4.95E-07	2.74E-09	4.36E-07	127	3:12:00
	1:46 PM	6.5	18.5	19.2	5.8	12.7	210.95	223.65	2.37E-09	3.77E-07				

ROBERT L. NELSON & ASSOCIATES, INC. Laboratory Computation Sheet : Flexible Wall Permeability Testing

Date	Time	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
6/1/93	9:21 AM	6.8	18.2	21.3	3.7	14.5	210.95	225.45	2.58E-09	4.13E-07	2.58E-09	4.13E-07	120	4:34:00
	1:55 PM	7.4	17.6	20.8	4.2	13.4	210.95	224.35	2.58E-09	3.82E-07	2.41E-09	3.82E-07	111	3:35:00
6/2/93	9:55 AM	7.9	17.1	20.2	4.8	12.3	210.95	223.25	2.68E-09	4.21E-07	2.41E-09	3.78E-07	109	4:54:00
	1:30 PM	8.3	16.7	19.8	5.2	11.5	210.95	222.45	2.13E-09	3.34E-07	2.41E-09	3.34E-07	109	4:54:00
	3:23 PM	9.5	15.5	18.8	6.2	9.3	210.95	220.25	2.13E-09	3.34E-07	2.41E-09	3.34E-07	109	4:54:00
6/7/93	10:10 AM	9.9	15.1	21.4	3.6	11.5	210.95	222.45	1.26E-09	2.00E-07	2.37E-09	3.74E-07	108	5:08:00
	11:53 AM	10.0	15.0	21.3	3.7	11.3	210.95	222.25	1.26E-09	2.00E-07	2.37E-09	3.74E-07	108	5:08:00
	1:14 PM	10.2	14.8	21.1	3.9	10.9	210.95	221.85	3.21E-09	5.08E-07	2.37E-09	3.74E-07	108	5:08:00
	3:18 PM	10.5	14.5	20.9	4.1	10.4	210.95	221.35	2.63E-09	4.14E-07	2.37E-09	3.74E-07	108	5:08:00
6/8/93	9:45 AM	10.8	14.2	20.6	20.7	-6.5	210.95	204.45	-1.06E-09	4.60E-07	8.36E-11	3.97E-07	115	6:09:00
	10:52 AM	10.9	14.1	20.4	20.5	-6.4	210.95	204.55	-1.06E-09	4.60E-07	8.36E-11	3.97E-07	115	6:09:00
	12:05 PM	11.1	13.9	20.3	20.4	-6.5	210.95	204.45	9.68E-10	4.22E-07	8.36E-11	3.97E-07	115	6:09:00
	2:53 PM	11.4	13.6	20.0	20.2	-6.6	210.95	204.35	4.21E-10	3.67E-07	8.36E-11	3.97E-07	115	6:09:00
	3:54 PM	11.5	13.5	19.9	20.1	-6.6	210.95	204.35	0.00E+00	3.37E-07	8.36E-11	3.97E-07	115	6:09:00
6/9/93	9:27 AM	4.6	20.4	19.6	5.4	15.0	210.95	225.95	1.75E-09	2.82E-07	2.19E-09	3.50E-07	102	5:39:00
	10:40 AM	4.7	20.3	19.5	5.5	14.8	210.95	225.75	1.75E-09	2.82E-07	2.19E-09	3.50E-07	102	5:39:00
	1:16 PM	5.0	20.0	19.2	5.8	14.2	210.95	225.15	2.47E-09	3.95E-07	2.19E-09	3.50E-07	102	5:39:00
	3:06 PM	5.2	19.8	19.0	6.0	13.8	210.95	224.75	2.34E-09	3.74E-07	2.19E-09	3.50E-07	102	5:39:00
6/10/93	8:59 AM	5.5	19.5	18.7	6.3	13.2	210.95	224.15	2.19E-09	3.48E-07	2.59E-09	4.11E-07	119	5:35:00
	10:57 AM	5.7	19.3	18.5	6.5	12.8	210.95	223.75	2.19E-09	3.48E-07	2.59E-09	4.11E-07	119	5:35:00
	2:34 PM	6.2	18.8	18.0	7.0	11.8	210.95	222.75	2.98E-09	4.74E-07	2.59E-09	4.11E-07	119	5:35:00
6/11/93	10:40 AM	6.2	18.8	21.7	3.3	15.5	210.95	226.45	1.92E-09	3.09E-07	1.92E-09	3.09E-07	90	4:26:00
	3:06 PM	6.6	18.4	21.3	3.7	14.7	210.95	225.65	1.92E-09	3.09E-07	1.92E-09	3.09E-07	90	4:26:00
6/14/93	9:40 AM	6.9	18.1	21.0	4.0	14.1	210.95	225.05	3.84E-09	6.14E-07	3.30E-09	5.28E-07	153	3:50:00
	10:47 AM	7.1	17.9	20.8	4.2	13.7	210.95	224.65	3.84E-09	6.14E-07	3.30E-09	5.28E-07	153	3:50:00
	1:30 PM	7.4	17.6	20.4	4.6	13.0	210.95	223.95	2.77E-09	4.41E-07	3.30E-09	5.28E-07	153	3:50:00
6/17/93	10:18 AM	9.5	15.5	18.5	6.5	9.0	210.95	219.95	2.70E-09	4.22E-07	2.55E-09	3.98E-07	115	5:38:00
	11:31 AM	9.6	15.4	18.3	6.7	8.7	210.95	219.65	2.70E-09	4.22E-07	2.55E-09	3.98E-07	115	5:38:00

Date	Time	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)																																																																																																																																																																																																																																																																																																												
6/18/93	1:48 PM	9.9	15.1	18.0	7.0	8.1	210.95	219.05	2.89E-09	4.50E-07	2.51E-09	4.06E-07	118	3:48:00																																																																																																																																																																																																																																																																																																												
	3:56 PM	10.1	14.9	17.8	7.2	7.7	210.95	218.65	2.06E-09	3.21E-07					6/21/93	10:25 AM	3.9	21.1	20.9	4.1	17.0	210.95	227.95	2.51E-09	4.06E-07	2.66E-09	4.28E-07	124	5:11:00	2:13 PM	4.4	20.6	20.5	4.5	16.1	210.95	227.05	2.51E-09	4.06E-07	10:51 AM	4.6	20.4	20.2	4.8	15.6	210.95	226.55	2.70E-09	4.34E-07	12:02 PM	4.8	20.2	20.1	4.9	15.3	210.95	226.25	2.82E-09	4.53E-07	6/22/93	9:07 AM	5.4	19.6	19.5	5.5	14.1	210.95	225.05	2.47E-09	3.95E-07	2.63E-09	4.19E-07	122	7:12:00	10:45 AM	5.6	19.4	19.2	5.8	13.6	210.95	224.55	3.28E-09	5.24E-07	1:20 PM	5.9	19.1	19.0	6.0	13.1	210.95	224.05	2.08E-09	3.32E-07	4:19 PM	6.2	18.8	18.6	6.4	12.4	210.95	223.35	2.53E-09	4.02E-07	6/23/93	9:19 AM	6.4	18.6	21.7	3.3	15.3	210.95	226.25	2.12E-09	3.41E-07	2.08E-09	3.34E-07	97	5:04:00	1:20 PM	6.8	18.2	21.3	3.7	14.5	210.95	225.45	2.12E-09	3.41E-07	2:23 PM	6.9	18.1	21.2	3.8	14.3	210.95	225.25	2.04E-09	3.26E-07	6/28/93	11:50 AM	8.5	16.5	19.4	5.6	10.9	210.95	221.85	2.30E-09	3.62E-07	2.36E-09	3.71E-07	108	4:10:00	2:12 PM	8.8	16.2	19.2	5.8	10.4	210.95	221.35	2.30E-09	3.62E-07	4:00 PM	9.0	16.0	19.0	6.0	10.0	210.95	220.95	2.42E-09	3.81E-07	9:47 AM	9.1	15.9	18.9	6.1	9.8	210.95	220.75	2.91E-09	4.57E-07	6/30/93	11:17 AM	9.3	15.7	18.7	6.3	9.4	210.95	220.35	2.05E-09	3.21E-07	2.39E-09	3.74E-07	108	5:40:00	1:57 PM	9.5	15.5	18.4	6.6	8.9	210.95	219.85	2.05E-09	3.21E-07	3:27 PM	9.7	15.3	18.3	6.7	8.6	210.95	219.55	2.19E-09	3.43E-07	8:42 AM	9.9	15.1	20.6	4.4	10.7	210.95	221.65	3.20E-09	5.04E-07	7/1/93	10:24 AM	10.2	14.8	20.4	4.6	10.2	210.95	221.15	3.20E-09	5.04E-07	2.59E-09	4.07E-07	118	6:57:00	12:56 PM	10.4	14.6	20.1	4.9	9.7	210.95	220.65	2.15E-09	3.38E-07	3:39 PM	10.8	14.2	19.9	5.1	9.1	210.95	220.05	2.41E-09	3.78E-07	10:07 AM	11.8	13.2	20.7	4.3	8.9	210.95	219.85	1.81E-09	2.83E-07	7/6/93	1:45 PM	12.9	12.1	21.2	3.8	8.3	210.95	219.25	2.72E-09	4.24E-07	2.27E-09	3.53E-07	102	5:15:00	3:22 PM	13.3	11.7	21.2	3.8	7.9	210.95	218.85	2.72E-09	4.24E-07	CYCLE #10														
6/21/93	10:25 AM	3.9	21.1	20.9	4.1	17.0	210.95	227.95	2.51E-09	4.06E-07	2.66E-09	4.28E-07	124	5:11:00																																																																																																																																																																																																																																																																																																												
	2:13 PM	4.4	20.6	20.5	4.5	16.1	210.95	227.05	2.51E-09	4.06E-07						10:51 AM	4.6	20.4	20.2	4.8	15.6	210.95	226.55	2.70E-09	4.34E-07					12:02 PM	4.8	20.2	20.1	4.9	15.3	210.95	226.25	2.82E-09	4.53E-07	6/22/93	9:07 AM	5.4	19.6	19.5	5.5	14.1	210.95	225.05	2.47E-09	3.95E-07	2.63E-09	4.19E-07	122	7:12:00	10:45 AM	5.6	19.4	19.2	5.8		13.6	210.95	224.55	3.28E-09	5.24E-07	1:20 PM	5.9	19.1	19.0	6.0					13.1	210.95	224.05	2.08E-09	3.32E-07	4:19 PM	6.2	18.8	18.6	6.4	12.4	210.95	223.35	2.53E-09	4.02E-07	6/23/93	9:19 AM	6.4	18.6	21.7	3.3	15.3	210.95	226.25	2.12E-09	3.41E-07	2.08E-09	3.34E-07	97	5:04:00		1:20 PM	6.8	18.2	21.3	3.7	14.5	210.95	225.45	2.12E-09	3.41E-07					2:23 PM	6.9	18.1	21.2	3.8	14.3	210.95	225.25	2.04E-09	3.26E-07	6/28/93	11:50 AM	8.5	16.5	19.4	5.6	10.9	210.95	221.85	2.30E-09		3.62E-07	2.36E-09	3.71E-07	108	4:10:00	2:12 PM	8.8	16.2	19.2	5.8					10.4	210.95	221.35	2.30E-09	3.62E-07	4:00 PM	9.0	16.0	19.0	6.0	10.0	210.95	220.95	2.42E-09	3.81E-07	9:47 AM	9.1	15.9	18.9	6.1	9.8	210.95	220.75	2.91E-09	4.57E-07	6/30/93	11:17 AM	9.3	15.7	18.7		6.3	9.4	210.95	220.35	2.05E-09	3.21E-07	2.39E-09	3.74E-07	108	5:40:00					1:57 PM	9.5	15.5	18.4	6.6	8.9	210.95	219.85	2.05E-09	3.21E-07	3:27 PM	9.7	15.3	18.3	6.7	8.6	210.95	219.55	2.19E-09	3.43E-07	8:42 AM	9.9	15.1	20.6	4.4	10.7	210.95	221.65	3.20E-09	5.04E-07		7/1/93	10:24 AM	10.2	14.8	20.4	4.6	10.2	210.95	221.15	3.20E-09					5.04E-07	2.59E-09	4.07E-07	118	6:57:00	12:56 PM	10.4	14.6	20.1	4.9	9.7	210.95	220.65	2.15E-09	3.38E-07	3:39 PM	10.8	14.2	19.9	5.1	9.1	210.95	220.05	2.41E-09	3.78E-07	10:07 AM	11.8	13.2	20.7	4.3		8.9	210.95	219.85	1.81E-09	2.83E-07	7/6/93	1:45 PM	12.9	12.1	21.2					3.8	8.3	210.95	219.25	2.72E-09	4.24E-07	2.27E-09	3.53E-07	102	5:15:00	3:22 PM	13.3	11.7	21.2	3.8	7.9	210.95	218.85	2.72E-09	4.24E-07	CYCLE #10				
	10:51 AM	4.6	20.4	20.2	4.8	15.6	210.95	226.55	2.70E-09	4.34E-07						12:02 PM	4.8	20.2	20.1	4.9	15.3	210.95	226.25	2.82E-09	4.53E-07					6/22/93	9:07 AM	5.4	19.6	19.5	5.5	14.1	210.95	225.05	2.47E-09		3.95E-07	2.63E-09	4.19E-07	122	7:12:00	10:45 AM	5.6	19.4	19.2	5.8					13.6	210.95	224.55	3.28E-09	5.24E-07		1:20 PM	5.9	19.1	19.0	6.0	13.1	210.95	224.05	2.08E-09	3.32E-07					4:19 PM	6.2	18.8	18.6	6.4	12.4	210.95	223.35	2.53E-09	4.02E-07	6/23/93	9:19 AM	6.4	18.6	21.7		3.3	15.3	210.95	226.25	2.12E-09	3.41E-07	2.08E-09	3.34E-07	97	5:04:00					1:20 PM	6.8	18.2	21.3	3.7	14.5	210.95	225.45	2.12E-09	3.41E-07	2:23 PM	6.9	18.1	21.2	3.8	14.3	210.95	225.25	2.04E-09	3.26E-07	6/28/93	11:50 AM	8.5	16.5	19.4		5.6	10.9	210.95	221.85	2.30E-09	3.62E-07	2.36E-09	3.71E-07	108		4:10:00					2:12 PM	8.8	16.2	19.2	5.8					10.4	210.95	221.35	2.30E-09	3.62E-07	4:00 PM	9.0	16.0	19.0	6.0	10.0	210.95	220.95	2.42E-09	3.81E-07	9:47 AM	9.1	15.9	18.9	6.1	9.8	210.95	220.75	2.91E-09	4.57E-07		6/30/93	11:17 AM	9.3	15.7		18.7	6.3	9.4	210.95	220.35	2.05E-09									3.21E-07	2.39E-09	3.74E-07	108	5:40:00	1:57 PM	9.5	15.5	18.4	6.6	8.9	210.95	219.85	2.05E-09	3.21E-07	3:27 PM	9.7	15.3	18.3	6.7	8.6	210.95	219.55	2.19E-09	3.43E-07	8:42 AM	9.9	15.1	20.6	4.4			10.7	210.95	221.65	3.20E-09	5.04E-07	7/1/93	10:24 AM	10.2	14.8					20.4					4.6	10.2	210.95	221.15	3.20E-09	5.04E-07	2.59E-09	4.07E-07	118	6:57:00	12:56 PM	10.4	14.6	20.1	4.9	9.7	210.95	220.65	2.15E-09	3.38E-07	3:39 PM	10.8	14.2	19.9	5.1	9.1	210.95	220.05	2.41E-09	3.78E-07	10:07 AM		11.8	13.2	20.7	4.3	8.9	210.95	219.85	1.81E-09	2.83E-07	7/6/93	1:45 PM	12.9	12.1	21.2					3.8	8.3	210.95	219.25	2.72E-09	4.24E-07	2.27E-09	3.53E-07	102	5:15:00	3:22 PM	13.3	11.7	21.2	3.8
	12:02 PM	4.8	20.2	20.1	4.9	15.3	210.95	226.25	2.82E-09	4.53E-07					6/22/93	9:07 AM	5.4	19.6	19.5	5.5	14.1	210.95	225.05	2.47E-09	3.95E-07	2.63E-09	4.19E-07	122	7:12:00		10:45 AM	5.6	19.4	19.2	5.8	13.6	210.95	224.55	3.28E-09		5.24E-07					1:20 PM	5.9	19.1	19.0	6.0					13.1	210.95	224.05	2.08E-09	3.32E-07	4:19 PM	6.2	18.8	18.6	6.4	12.4	210.95	223.35	2.53E-09	4.02E-07	6/23/93	9:19 AM	6.4	18.6	21.7	3.3	15.3	210.95	226.25	2.12E-09	3.41E-07	2.08E-09	3.34E-07	97	5:04:00		1:20 PM	6.8	18.2	21.3		3.7	14.5	210.95	225.45	2.12E-09	3.41E-07									2:23 PM	6.9	18.1	21.2	3.8	14.3	210.95	225.25	2.04E-09	3.26E-07	6/28/93	11:50 AM	8.5	16.5	19.4	5.6	10.9	210.95	221.85	2.30E-09		3.62E-07	2.36E-09	3.71E-07	108		4:10:00	2:12 PM	8.8	16.2	19.2	5.8				10.4						210.95	221.35	2.30E-09	3.62E-07	4:00 PM	9.0	16.0	19.0	6.0	10.0	210.95	220.95	2.42E-09	3.81E-07	9:47 AM	9.1	15.9	18.9	6.1	9.8	210.95	220.75	2.91E-09	4.57E-07	6/30/93	11:17 AM	9.3	15.7	18.7	6.3	9.4	210.95	220.35	2.05E-09			3.21E-07	2.39E-09	3.74E-07	108	5:40:00	1:57 PM	9.5	15.5	18.4	6.6					8.9	210.95	219.85	2.05E-09	3.21E-07					3:27 PM	9.7	15.3	18.3	6.7	8.6	210.95	219.55	2.19E-09	3.43E-07	8:42 AM	9.9	15.1	20.6	4.4	10.7	210.95	221.65	3.20E-09	5.04E-07	7/1/93	10:24 AM	10.2	14.8	20.4	4.6		10.2	210.95	221.15	3.20E-09	5.04E-07		2.59E-09	4.07E-07	118	6:57:00	12:56 PM	10.4	14.6	20.1					4.9	9.7	210.95	220.65	2.15E-09	3.38E-07					3:39 PM	10.8	14.2	19.9	5.1	9.1	210.95	220.05	2.41E-09	3.78E-07	10:07 AM	11.8	13.2	20.7	4.3	8.9	210.95	219.85	1.81E-09	2.83E-07	7/6/93		1:45 PM	12.9	12.1	21.2	3.8	8.3	210.95	219.25	2.72E-09		4.24E-07	2.27E-09	3.53E-07	102					5:15:00	3:22 PM	13.3	11.7	21.2	3.8					7.9	210.95	218.85	2.72E-09	4.24E-07
6/22/93	9:07 AM	5.4	19.6	19.5	5.5	14.1	210.95	225.05	2.47E-09	3.95E-07	2.63E-09	4.19E-07	122	7:12:00																																																																																																																																																																																																																																																																																																												
	10:45 AM	5.6	19.4	19.2	5.8	13.6	210.95	224.55	3.28E-09	5.24E-07						1:20 PM	5.9	19.1	19.0	6.0	13.1	210.95	224.05	2.08E-09	3.32E-07						4:19 PM	6.2	18.8	18.6	6.4	12.4	210.95	223.35	2.53E-09	4.02E-07	6/23/93					9:19 AM	6.4	18.6	21.7	3.3	15.3	210.95	226.25	2.12E-09	3.41E-07	2.08E-09	3.34E-07	97	5:04:00	1:20 PM	6.8	18.2	21.3	3.7	14.5	210.95	225.45	2.12E-09	3.41E-07		2:23 PM	6.9	18.1	21.2	3.8	14.3	210.95	225.25	2.04E-09	3.26E-07					6/28/93	11:50 AM	8.5	16.5	19.4	5.6	10.9	210.95	221.85	2.30E-09	3.62E-07	2.36E-09	3.71E-07	108	4:10:00	2:12 PM	8.8	16.2	19.2	5.8	10.4	210.95	221.35	2.30E-09	3.62E-07	4:00 PM	9.0	16.0	19.0	6.0		10.0	210.95	220.95	2.42E-09	3.81E-07	9:47 AM	9.1	15.9	18.9		6.1				9.8		210.95	220.75	2.91E-09	4.57E-07	6/30/93				11:17 AM		9.3	15.7	18.7	6.3	9.4	210.95	220.35	2.05E-09	3.21E-07	2.39E-09	3.74E-07	108	5:40:00	1:57 PM	9.5	15.5	18.4	6.6	8.9	210.95	219.85	2.05E-09	3.21E-07	3:27 PM	9.7	15.3	18.3	6.7		8.6	210.95	219.55	2.19E-09	3.43E-07	8:42 AM	9.9	15.1	20.6	4.4		10.7					210.95	221.65	3.20E-09	5.04E-07	7/1/93	10:24 AM	10.2	14.8	20.4	4.6	10.2	210.95	221.15	3.20E-09					5.04E-07	2.59E-09	4.07E-07	118	6:57:00	12:56 PM	10.4	14.6	20.1	4.9	9.7	210.95	220.65	2.15E-09	3.38E-07	3:39 PM	10.8	14.2	19.9	5.1		9.1	210.95	220.05	2.41E-09	3.78E-07	10:07 AM	11.8	13.2	20.7	4.3	8.9						210.95	219.85	1.81E-09	2.83E-07	7/6/93	1:45 PM	12.9	12.1	21.2	3.8	8.3	210.95	219.25	2.72E-09					4.24E-07	2.27E-09	3.53E-07	102	5:15:00	3:22 PM	13.3	11.7	21.2	3.8	7.9	210.95	218.85	2.72E-09	4.24E-07	CYCLE #10																																							
	1:20 PM	5.9	19.1	19.0	6.0	13.1	210.95	224.05	2.08E-09	3.32E-07						4:19 PM	6.2	18.8	18.6	6.4	12.4	210.95	223.35	2.53E-09	4.02E-07					6/23/93	9:19 AM	6.4	18.6	21.7	3.3	15.3	210.95	226.25	2.12E-09	3.41E-07		2.08E-09	3.34E-07	97	5:04:00	1:20 PM	6.8	18.2	21.3	3.7	14.5	210.95	225.45	2.12E-09	3.41E-07					2:23 PM	6.9	18.1	21.2	3.8	14.3	210.95	225.25	2.04E-09	3.26E-07	6/28/93	11:50 AM	8.5	16.5	19.4	5.6	10.9	210.95	221.85	2.30E-09	3.62E-07	2.36E-09	3.71E-07	108	4:10:00		2:12 PM	8.8	16.2	19.2	5.8	10.4	210.95	221.35	2.30E-09	3.62E-07					4:00 PM	9.0	16.0	19.0	6.0	10.0	210.95	220.95	2.42E-09	3.81E-07	9:47 AM	9.1	15.9	18.9	6.1		9.8	210.95	220.75	2.91E-09	4.57E-07	6/30/93	11:17 AM	9.3	15.7	18.7	6.3				9.4		210.95	220.35	2.05E-09	3.21E-07		2.39E-09	3.74E-07	108	5:40:00	1:57 PM	9.5	15.5	18.4	6.6	8.9	210.95	219.85	2.05E-09	3.21E-07					3:27 PM	9.7	15.3	18.3	6.7	8.6	210.95	219.55	2.19E-09	3.43E-07	8:42 AM	9.9	15.1	20.6	4.4		10.7	210.95	221.65	3.20E-09	5.04E-07	7/1/93	10:24 AM	10.2	14.8	20.4	4.6	10.2					210.95	221.15	3.20E-09	5.04E-07		2.59E-09	4.07E-07	118	6:57:00	12:56 PM	10.4	14.6	20.1	4.9	9.7	210.95	220.65	2.15E-09	3.38E-07					3:39 PM	10.8	14.2	19.9	5.1	9.1	210.95	220.05	2.41E-09	3.78E-07	10:07 AM	11.8	13.2	20.7	4.3		8.9	210.95	219.85	1.81E-09	2.83E-07	7/6/93	1:45 PM	12.9	12.1	21.2	3.8	8.3					210.95	219.25	2.72E-09	4.24E-07		2.27E-09	3.53E-07	102	5:15:00	3:22 PM	13.3	11.7	21.2	3.8	7.9	210.95	218.85	2.72E-09	4.24E-07					CYCLE #10																																																	
	4:19 PM	6.2	18.8	18.6	6.4	12.4	210.95	223.35	2.53E-09	4.02E-07					6/23/93	9:19 AM	6.4	18.6	21.7	3.3	15.3	210.95	226.25	2.12E-09	3.41E-07	2.08E-09	3.34E-07	97	5:04:00		1:20 PM	6.8	18.2	21.3	3.7	14.5	210.95	225.45	2.12E-09	3.41E-07						2:23 PM	6.9	18.1	21.2	3.8	14.3	210.95	225.25	2.04E-09	3.26E-07					6/28/93	11:50 AM	8.5	16.5	19.4	5.6	10.9	210.95	221.85	2.30E-09		3.62E-07	2.36E-09	3.71E-07	108	4:10:00	2:12 PM	8.8	16.2	19.2	5.8						10.4	210.95	221.35	2.30E-09	3.62E-07	4:00 PM	9.0	16.0	19.0	6.0					10.0	210.95	220.95	2.42E-09	3.81E-07	9:47 AM	9.1	15.9	18.9	6.1	9.8	210.95	220.75	2.91E-09	4.57E-07	6/30/93	11:17 AM	9.3	15.7	18.7	6.3		9.4	210.95	220.35	2.05E-09	3.21E-07	2.39E-09	3.74E-07	108	5:40:00	1:57 PM	9.5	15.5	18.4	6.6						8.9	210.95	219.85	2.05E-09	3.21E-07	3:27 PM	9.7	15.3	18.3	6.7					8.6	210.95	219.55	2.19E-09	3.43E-07	8:42 AM	9.9	15.1	20.6	4.4	10.7	210.95	221.65	3.20E-09	5.04E-07	7/1/93	10:24 AM	10.2	14.8	20.4	4.6		10.2	210.95	221.15	3.20E-09	5.04E-07	2.59E-09	4.07E-07	118	6:57:00	12:56 PM	10.4	14.6	20.1	4.9						9.7	210.95	220.65	2.15E-09	3.38E-07	3:39 PM	10.8	14.2	19.9	5.1					9.1	210.95	220.05	2.41E-09	3.78E-07	10:07 AM	11.8	13.2	20.7	4.3	8.9	210.95	219.85	1.81E-09	2.83E-07	7/6/93	1:45 PM	12.9	12.1	21.2	3.8		8.3	210.95	219.25	2.72E-09	4.24E-07	2.27E-09	3.53E-07	102	5:15:00	3:22 PM	13.3	11.7	21.2	3.8						7.9	210.95	218.85	2.72E-09	4.24E-07	CYCLE #10																																																										
6/23/93	9:19 AM	6.4	18.6	21.7	3.3	15.3	210.95	226.25	2.12E-09	3.41E-07	2.08E-09	3.34E-07	97	5:04:00																																																																																																																																																																																																																																																																																																												
	1:20 PM	6.8	18.2	21.3	3.7	14.5	210.95	225.45	2.12E-09	3.41E-07						2:23 PM	6.9	18.1	21.2	3.8	14.3	210.95	225.25	2.04E-09	3.26E-07					6/28/93	11:50 AM	8.5	16.5	19.4	5.6	10.9	210.95	221.85	2.30E-09	3.62E-07	2.36E-09	3.71E-07	108	4:10:00	2:12 PM	8.8	16.2	19.2	5.8	10.4	210.95	221.35	2.30E-09	3.62E-07	4:00 PM	9.0	16.0	19.0	6.0		10.0	210.95	220.95	2.42E-09	3.81E-07	9:47 AM	9.1	15.9	18.9		6.1					9.8	210.95	220.75	2.91E-09	4.57E-07					6/30/93	11:17 AM	9.3	15.7	18.7	6.3	9.4	210.95	220.35	2.05E-09	3.21E-07	2.39E-09	3.74E-07	108	5:40:00	1:57 PM	9.5	15.5	18.4	6.6	8.9	210.95	219.85	2.05E-09	3.21E-07	3:27 PM	9.7	15.3	18.3	6.7		8.6	210.95	219.55	2.19E-09	3.43E-07		8:42 AM	9.9	15.1	20.6	4.4					10.7	210.95	221.65	3.20E-09	5.04E-07	7/1/93					10:24 AM	10.2	14.8	20.4	4.6	10.2	210.95	221.15	3.20E-09	5.04E-07	2.59E-09	4.07E-07	118	6:57:00	12:56 PM	10.4	14.6	20.1	4.9	9.7	210.95	220.65	2.15E-09	3.38E-07	3:39 PM	10.8	14.2	19.9	5.1		9.1	210.95	220.05	2.41E-09	3.78E-07		10:07 AM	11.8	13.2	20.7	4.3					8.9	210.95	219.85	1.81E-09	2.83E-07	7/6/93					1:45 PM	12.9	12.1	21.2	3.8	8.3	210.95	219.25	2.72E-09	4.24E-07	2.27E-09	3.53E-07	102	5:15:00	3:22 PM	13.3	11.7	21.2	3.8	7.9	210.95	218.85	2.72E-09	4.24E-07	CYCLE #10																																																																																														
	2:23 PM	6.9	18.1	21.2	3.8	14.3	210.95	225.25	2.04E-09	3.26E-07					6/28/93	11:50 AM	8.5	16.5	19.4	5.6	10.9	210.95	221.85	2.30E-09	3.62E-07	2.36E-09	3.71E-07	108	4:10:00		2:12 PM	8.8	16.2	19.2	5.8	10.4	210.95	221.35	2.30E-09	3.62E-07					4:00 PM	9.0	16.0	19.0	6.0	10.0	210.95	220.95	2.42E-09	3.81E-07	9:47 AM	9.1	15.9	18.9	6.1		9.8	210.95	220.75	2.91E-09	4.57E-07	6/30/93	11:17 AM	9.3	15.7	18.7	6.3					9.4	210.95	220.35	2.05E-09	3.21E-07	2.39E-09	3.74E-07	108	5:40:00		1:57 PM	9.5	15.5	18.4	6.6	8.9	210.95	219.85	2.05E-09	3.21E-07					3:27 PM	9.7	15.3	18.3	6.7	8.6	210.95	219.55	2.19E-09	3.43E-07	8:42 AM	9.9	15.1	20.6	4.4		10.7	210.95	221.65	3.20E-09	5.04E-07	7/1/93	10:24 AM	10.2	14.8	20.4	4.6					10.2	210.95	221.15	3.20E-09	5.04E-07		2.59E-09	4.07E-07	118	6:57:00	12:56 PM	10.4	14.6	20.1	4.9	9.7	210.95	220.65	2.15E-09	3.38E-07					3:39 PM	10.8	14.2	19.9	5.1	9.1	210.95	220.05	2.41E-09	3.78E-07	10:07 AM	11.8	13.2	20.7	4.3		8.9	210.95	219.85	1.81E-09	2.83E-07	7/6/93	1:45 PM	12.9	12.1	21.2	3.8					8.3	210.95	219.25	2.72E-09	4.24E-07		2.27E-09	3.53E-07	102	5:15:00	3:22 PM	13.3	11.7	21.2	3.8	7.9	210.95	218.85	2.72E-09	4.24E-07					CYCLE #10																																																																																																								
6/28/93	11:50 AM	8.5	16.5	19.4	5.6	10.9	210.95	221.85	2.30E-09	3.62E-07	2.36E-09	3.71E-07	108	4:10:00																																																																																																																																																																																																																																																																																																												
	2:12 PM	8.8	16.2	19.2	5.8	10.4	210.95	221.35	2.30E-09	3.62E-07						4:00 PM	9.0	16.0	19.0	6.0	10.0	210.95	220.95	2.42E-09	3.81E-07						9:47 AM	9.1	15.9	18.9	6.1	9.8	210.95	220.75	2.91E-09	4.57E-07					6/30/93	11:17 AM	9.3	15.7	18.7	6.3	9.4	210.95	220.35	2.05E-09	3.21E-07	2.39E-09	3.74E-07	108	5:40:00	1:57 PM	9.5	15.5	18.4	6.6	8.9		210.95	219.85	2.05E-09	3.21E-07	3:27 PM	9.7	15.3	18.3	6.7	8.6	210.95	219.55	2.19E-09	3.43E-07						8:42 AM	9.9	15.1	20.6	4.4	10.7	210.95	221.65	3.20E-09	5.04E-07					7/1/93	10:24 AM	10.2	14.8	20.4	4.6	10.2	210.95	221.15	3.20E-09	5.04E-07	2.59E-09	4.07E-07	118	6:57:00	12:56 PM	10.4	14.6	20.1	4.9	9.7		210.95	220.65	2.15E-09	3.38E-07	3:39 PM	10.8	14.2	19.9	5.1	9.1	210.95	220.05	2.41E-09	3.78E-07						10:07 AM	11.8	13.2	20.7	4.3	8.9	210.95	219.85	1.81E-09	2.83E-07					7/6/93	1:45 PM	12.9	12.1	21.2	3.8	8.3	210.95	219.25	2.72E-09	4.24E-07	2.27E-09	3.53E-07	102	5:15:00	3:22 PM	13.3	11.7	21.2	3.8	7.9		210.95	218.85	2.72E-09	4.24E-07	CYCLE #10																																																																																																																																					
	4:00 PM	9.0	16.0	19.0	6.0	10.0	210.95	220.95	2.42E-09	3.81E-07						9:47 AM	9.1	15.9	18.9	6.1	9.8	210.95	220.75	2.91E-09	4.57E-07					6/30/93	11:17 AM	9.3	15.7	18.7	6.3	9.4	210.95	220.35	2.05E-09	3.21E-07	2.39E-09	3.74E-07	108	5:40:00		1:57 PM	9.5	15.5	18.4	6.6	8.9	210.95	219.85	2.05E-09	3.21E-07					3:27 PM	9.7	15.3	18.3	6.7	8.6		210.95	219.55	2.19E-09	3.43E-07	8:42 AM	9.9	15.1	20.6	4.4	10.7	210.95	221.65	3.20E-09	5.04E-07					7/1/93	10:24 AM	10.2	14.8	20.4	4.6	10.2	210.95	221.15	3.20E-09	5.04E-07	2.59E-09	4.07E-07	118	6:57:00		12:56 PM	10.4	14.6	20.1	4.9	9.7	210.95	220.65	2.15E-09	3.38E-07					3:39 PM	10.8	14.2	19.9	5.1	9.1		210.95	220.05	2.41E-09	3.78E-07	10:07 AM	11.8	13.2	20.7	4.3	8.9	210.95	219.85	1.81E-09	2.83E-07	7/6/93					1:45 PM	12.9	12.1	21.2	3.8	8.3	210.95	219.25	2.72E-09	4.24E-07	2.27E-09	3.53E-07	102	5:15:00		3:22 PM	13.3	11.7	21.2	3.8	7.9	210.95	218.85	2.72E-09	4.24E-07					CYCLE #10																																																																																																																																																
	9:47 AM	9.1	15.9	18.9	6.1	9.8	210.95	220.75	2.91E-09	4.57E-07					6/30/93	11:17 AM	9.3	15.7	18.7	6.3	9.4	210.95	220.35	2.05E-09	3.21E-07	2.39E-09	3.74E-07	108	5:40:00		1:57 PM	9.5	15.5	18.4	6.6	8.9	210.95	219.85	2.05E-09	3.21E-07						3:27 PM	9.7	15.3	18.3	6.7	8.6	210.95	219.55	2.19E-09	3.43E-07					8:42 AM	9.9	15.1	20.6	4.4	10.7	210.95	221.65	3.20E-09	5.04E-07	7/1/93	10:24 AM	10.2	14.8	20.4	4.6	10.2	210.95	221.15	3.20E-09	5.04E-07	2.59E-09	4.07E-07	118	6:57:00		12:56 PM	10.4	14.6	20.1	4.9	9.7	210.95	220.65	2.15E-09	3.38E-07						3:39 PM	10.8	14.2	19.9	5.1	9.1	210.95	220.05	2.41E-09	3.78E-07					10:07 AM	11.8	13.2	20.7	4.3	8.9	210.95	219.85	1.81E-09	2.83E-07	7/6/93	1:45 PM	12.9	12.1	21.2	3.8	8.3	210.95	219.25	2.72E-09	4.24E-07		2.27E-09	3.53E-07	102	5:15:00	3:22 PM	13.3	11.7	21.2	3.8	7.9	210.95	218.85	2.72E-09	4.24E-07						CYCLE #10																																																																																																																																																														
6/30/93	11:17 AM	9.3	15.7	18.7	6.3	9.4	210.95	220.35	2.05E-09	3.21E-07	2.39E-09	3.74E-07	108	5:40:00																																																																																																																																																																																																																																																																																																												
	1:57 PM	9.5	15.5	18.4	6.6	8.9	210.95	219.85	2.05E-09	3.21E-07						3:27 PM	9.7	15.3	18.3	6.7	8.6	210.95	219.55	2.19E-09	3.43E-07						8:42 AM	9.9	15.1	20.6	4.4	10.7	210.95	221.65	3.20E-09	5.04E-07					7/1/93	10:24 AM	10.2	14.8	20.4	4.6	10.2	210.95	221.15	3.20E-09	5.04E-07	2.59E-09	4.07E-07	118	6:57:00	12:56 PM	10.4	14.6	20.1	4.9	9.7	210.95	220.65	2.15E-09	3.38E-07		3:39 PM	10.8	14.2	19.9	5.1	9.1	210.95	220.05	2.41E-09	3.78E-07						10:07 AM	11.8	13.2	20.7	4.3	8.9	210.95	219.85	1.81E-09	2.83E-07					7/6/93	1:45 PM	12.9	12.1	21.2	3.8	8.3	210.95	219.25	2.72E-09	4.24E-07	2.27E-09	3.53E-07	102	5:15:00	3:22 PM	13.3	11.7	21.2	3.8	7.9	210.95	218.85	2.72E-09	4.24E-07		CYCLE #10																																																																																																																																																																																												
	3:27 PM	9.7	15.3	18.3	6.7	8.6	210.95	219.55	2.19E-09	3.43E-07						8:42 AM	9.9	15.1	20.6	4.4	10.7	210.95	221.65	3.20E-09	5.04E-07					7/1/93	10:24 AM	10.2	14.8	20.4	4.6	10.2	210.95	221.15	3.20E-09	5.04E-07	2.59E-09	4.07E-07	118	6:57:00		12:56 PM	10.4	14.6	20.1	4.9	9.7	210.95	220.65	2.15E-09	3.38E-07					3:39 PM	10.8	14.2	19.9	5.1	9.1	210.95	220.05	2.41E-09	3.78E-07		10:07 AM	11.8	13.2	20.7	4.3	8.9	210.95	219.85	1.81E-09	2.83E-07					7/6/93	1:45 PM	12.9	12.1	21.2	3.8	8.3	210.95	219.25	2.72E-09	4.24E-07	2.27E-09	3.53E-07	102	5:15:00		3:22 PM	13.3	11.7	21.2	3.8	7.9	210.95	218.85	2.72E-09	4.24E-07					CYCLE #10																																																																																																																																																																																																							
	8:42 AM	9.9	15.1	20.6	4.4	10.7	210.95	221.65	3.20E-09	5.04E-07					7/1/93	10:24 AM	10.2	14.8	20.4	4.6	10.2	210.95	221.15	3.20E-09	5.04E-07	2.59E-09	4.07E-07	118	6:57:00		12:56 PM	10.4	14.6	20.1	4.9	9.7	210.95	220.65	2.15E-09	3.38E-07						3:39 PM	10.8	14.2	19.9	5.1	9.1	210.95	220.05	2.41E-09	3.78E-07					10:07 AM	11.8	13.2	20.7	4.3	8.9	210.95	219.85	1.81E-09	2.83E-07	7/6/93	1:45 PM	12.9	12.1	21.2	3.8	8.3	210.95	219.25	2.72E-09	4.24E-07	2.27E-09	3.53E-07	102	5:15:00		3:22 PM	13.3	11.7	21.2	3.8	7.9	210.95	218.85	2.72E-09	4.24E-07						CYCLE #10																																																																																																																																																																																																																					
7/1/93	10:24 AM	10.2	14.8	20.4	4.6	10.2	210.95	221.15	3.20E-09	5.04E-07	2.59E-09	4.07E-07	118	6:57:00																																																																																																																																																																																																																																																																																																												
	12:56 PM	10.4	14.6	20.1	4.9	9.7	210.95	220.65	2.15E-09	3.38E-07						3:39 PM	10.8	14.2	19.9	5.1	9.1	210.95	220.05	2.41E-09	3.78E-07						10:07 AM	11.8	13.2	20.7	4.3	8.9	210.95	219.85	1.81E-09	2.83E-07					7/6/93	1:45 PM	12.9	12.1	21.2	3.8	8.3	210.95	219.25	2.72E-09	4.24E-07	2.27E-09	3.53E-07	102	5:15:00	3:22 PM	13.3	11.7	21.2	3.8	7.9	210.95	218.85	2.72E-09	4.24E-07		CYCLE #10																																																																																																																																																																																																																																																			
	3:39 PM	10.8	14.2	19.9	5.1	9.1	210.95	220.05	2.41E-09	3.78E-07						10:07 AM	11.8	13.2	20.7	4.3	8.9	210.95	219.85	1.81E-09	2.83E-07					7/6/93	1:45 PM	12.9	12.1	21.2	3.8	8.3	210.95	219.25	2.72E-09	4.24E-07	2.27E-09	3.53E-07	102	5:15:00		3:22 PM	13.3	11.7	21.2	3.8	7.9	210.95	218.85	2.72E-09	4.24E-07					CYCLE #10																																																																																																																																																																																																																																																														
	10:07 AM	11.8	13.2	20.7	4.3	8.9	210.95	219.85	1.81E-09	2.83E-07					7/6/93	1:45 PM	12.9	12.1	21.2	3.8	8.3	210.95	219.25	2.72E-09	4.24E-07	2.27E-09	3.53E-07	102	5:15:00		3:22 PM	13.3	11.7	21.2	3.8	7.9	210.95	218.85	2.72E-09	4.24E-07						CYCLE #10																																																																																																																																																																																																																																																																												
7/6/93	1:45 PM	12.9	12.1	21.2	3.8	8.3	210.95	219.25	2.72E-09	4.24E-07	2.27E-09	3.53E-07	102	5:15:00																																																																																																																																																																																																																																																																																																												
	3:22 PM	13.3	11.7	21.2	3.8	7.9	210.95	218.85	2.72E-09	4.24E-07						CYCLE #10																																																																																																																																																																																																																																																																																																										
	CYCLE #10																																																																																																																																																																																																																																																																																																																									

ROBERT L. NELSON & ASSOCIATES, INC. Laboratory Computation Sheet : Flexible Wall Permeability Testing

Date	Time	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gall/Acre/Day	Test Duration (hr/min/ss)
7/8/93	1:46 PM	14.0	11.0	21.3	3.7	7.3	210.95	218.25	1.98E-09	3.07E-07	1.43E-09	2.21E-07	64	2:23:00
	2:53 PM	14.1	10.9	21.2	3.8	7.1	210.95	218.05	8.73E-10	1.35E-07				
	4:09 PM	14.2	10.8	21.2	3.8	7.0	210.95	217.95	7.23E-10	1.18E-07	9.18E-10	1.50E-07	43	4:28:00
7/12/93	10:50 AM	3.3	21.7	22.1	2.9	18.8	210.95	229.75	1.22E-09	2.00E-07				
	12:17 PM	3.5	21.5	22.2	2.8	18.7	210.95	229.65	8.08E-10	1.32E-07				
	2:00 PM	3.7	21.3	22.2	2.8	18.5	210.95	229.45	7.62E-10	4.62E-07	2.19E-11	2.63E-07	76	5:47:00
	3:18 PM	3.8	21.2	22.2	2.8	18.4	210.95	229.35	-2.20E-22	1.41E-07				
	9:17 AM	2.0	23.0	22.0	20.7	2.3	210.95	213.25	-1.43E-09	1.08E-07				
7/13/93	10:46 AM	2.3	22.7	21.9	20.5	2.2	210.95	213.15	7.53E-10	3.43E-07				
	11:59 AM	2.4	22.6	21.9	20.4	2.2	210.95	213.15	5.71E-09	9.22E-07	3.15E-09	5.07E-07	147	4:15:00
	1:34 PM	2.4	22.6	21.8	20.2	2.4	210.95	213.35	5.81E-10	9.34E-08				
	3:04 PM	2.6	22.4	21.7	20.1	2.3	210.95	213.25	-7.21E-10	2.19E-07	-1.02E-10	1.89E-07	55	7:43:00
7/14/93	12:29 PM	4.3	20.7	20.8	4.2	16.5	210.95	227.45	0.00E+00	9.43E-08				
	2:54 PM	4.5	20.5	19.7	5.3	15.2	210.95	226.15	0.00E+00	-9.98E-08				
	4:44 PM	4.5	20.5	19.6	5.4	15.1	210.95	226.05	-7.70E-10	5.84E-07				
	8:58 AM	2.0	23.0	20.7	20.7	2.3	210.95	213.25	9.82E-10	1.49E-07				
	10:32 AM	2.1	22.9	20.6	20.5	2.4	210.95	213.35	4.21E-09	1.82E-07	8.65E-10	1.75E-07	51	7:57:00
	12:21 PM	2.2	22.8	20.6	20.4	2.4	210.95	213.35	0.00E+00	2.78E-07				
7/15/93	2:04 PM	2.4	22.6	20.9	20.2	2.4	210.95	213.35	-7.47E-10	1.13E-07				
	3:32 PM	2.4	22.6	20.4	20.1	2.5	210.95	213.45	0.00E+00	1.27E-07				
	4:41 PM	2.5	22.5	20.4	20.1	2.4	210.95	213.35	2.69E-09	4.17E-07	2.27E-09	3.51E-07	102	3:02:00
7/16/93	9:22 AM	2.8	23.0	22.2	20.7	2.3	210.95	213.25	1.85E-09	2.86E-07				
	11:15 AM	2.9	22.1	22.1	20.5	1.6	210.95	212.55	2.94E-09	4.76E-07	2.94E-09	4.76E-07	138	5:02:00
	1:06 PM	3.0	22.0	21.9	20.4	1.6	210.95	212.55	2.94E-09	4.76E-07				
	2:37 PM	3.1	21.9	21.9	20.2	1.7	210.95	212.65	1.85E-09	2.86E-07				
	5:19 PM	3.2	21.8	21.8	20.1	1.7	210.95	212.65	2.94E-09	4.76E-07				
7/21/93	10:38 AM	12.6	12.4	19.3	5.7	6.7	210.95	217.65						
	11:52 AM	12.9	12.1	19.3	5.7	6.4	210.95	217.35						
	1:40 PM	13.1	11.9	19.2	5.8	6.1	210.95	217.05						
8/10/93	9:38 AM	3.9	21.1	21.7	3.3	17.8	210.95	228.75						
	2:40 PM	4.4	20.6	20.8	4.2	16.4	210.95	227.35						

Date	Time	Reading In	Reading X	Reading Out	Y	X-Y	Head (cm)	H (cm)	K (cm/ss)	Flux (cc/ss)	Avg K (cm/ss)	Avg Flux (cc/ss)	Leakage Gal/Acre/Day	Test Duration (hr/min/ss)
8/11/93	8:10 AM	6.0	19.0	18.7	6.3	12.7	210.95	223.65	2.21E-09	3.50E-07	2.21E-09	3.50E-07	102	2:56:00
	11:06 AM	6.3	18.7	18.4	6.6	12.1	210.95	223.05						
8/12/93	1:18 PM	8.4	16.6	22.1	2.9	13.7	210.95	224.65	2.04E-09	3.26E-07	2.04E-09	3.26E-07	95	1:03:00
	2:21 PM	8.5	16.5	22.0	3.0	13.5	210.95	224.45						
8/16/93	8:54 AM	1.2	23.8	22.0	3.0	20.8	210.95	231.75	1.92E-09	3.16E-07	1.78E-09	2.93E-07	85	4:42:00
	11:04 AM	1.3	23.7	21.7	3.3	20.4	210.95	231.35						
	1:36 PM	1.6	23.4	21.6	3.4	20.0	210.95	230.95						

