

Appendix B – Filter Media Sieve Analysis Results

Sieve Analysis of Fine and Coarse Aggregates



S&ME Project #:

1053-06-278

Report Date:

6/20/06

Project Name:

Nags Head Fresh Pond Water Treatment Plant

Test Date(s):

6/16 - 6/20/06

Client Name:

The Wooten Company

Client Address:

120 North Boylan Avenue, Raleigh, NC 27603

Boring #:	Cell #1	Sample #:	1	Sample Date:	6/15/06
Location:	Project Site	2200		Elevation:	NA

Sample Description: And	thracite Media
-------------------------	----------------

Sieve Size (mm)	Sieve Size	% Retained Total Sample	% Retained Between Sieves	Percent Passing Total Sample	Specifications
19.00	3/4"	0.0%	0.0%	100.0%	
12.50	1/2"	0.0%	0.0%	100.0%	
9.50	3/8"	0.0%	0.0%	100.0%	
4.75	#4	0.0%	0.0%	100.0%	
2.80	#7	0.0%	0.0%	100.0%	
2.36	#8	0.2%	0.2%	99.8%	
1.18	#16	41.7%	41.5%	58.3%	
0.600	#30	76.7%	35.0%	23.3%	
0.425	#40	93.4%	16.7%	6.6%	
0.300	#50	99.4%	6.0%	0.6%	
0.150	#100	99.8%	0.4%	0.2%	
0.075	#200	100.0%	0.2%	0.0%	Annual Contract of the Contrac

Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size

#7

Coarse Sand

41.5%

Fine Sand

6.6%

Gravel

Liquid Limit

0.2%

Medium Sand

51.7%

Silt & Clay

0.0%

ND

Plastic Limit

ND

Plastic Index

ND

Relative Density SSD

ND

ND=Not Determined

Fineness Modulus

ND

Cu: 2.9 Cc: 0.7

References: ASTM C 136: Sieve Analysis of Fine and Coarse Aggregates 2117: Material Finer than the #200 Sieve in Mineral Aggregates by Washing ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D75: Practice for Sampling Aggregates ASTM C702: Practice for Reducing Samples of Aggregate to Testing Size

Technical Responsibility:

S&ME,INC.

Mal Krajan

Signatúre

aboratory Supervosor

3109 Spring Forest Road, Raleigh, NC. 27616

Cell #1 Anthracite



ASTM C 136

`&ME Project #:

1053-06-278

Report Date:

6/20/06

roject Name:

Nags Head Fresh Pond Water Treatment Plant

Test Date(s):

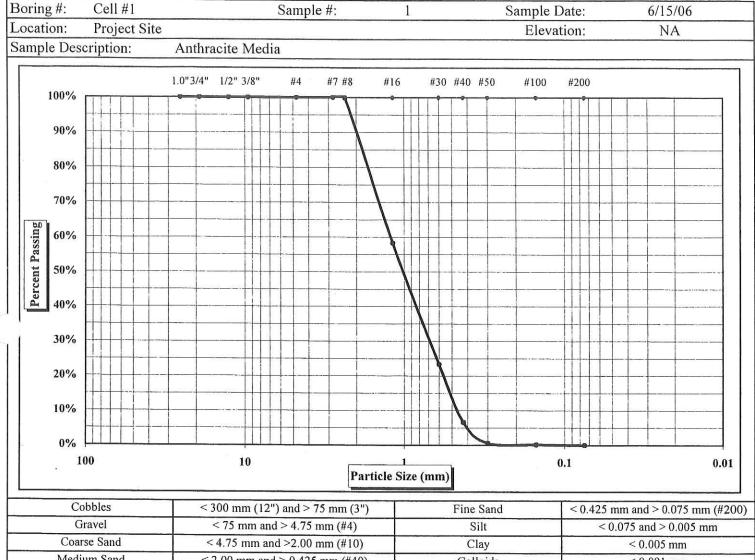
6/16 - 6/20/06

Client Name:

The Wooten Company

Client Address:

120 North Boylan Avenue, Raleigh, NC 27603



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size

#7

Coarse Sand

41.5%

Fine Sand

6.6%

Liquid Limit

ND

0.2%

Medium Sand 51.7% Silt & Clay

0.0%

ND

Plastic Limit

Relative Density SSD

ND

ND

Plastic Index

ND

ND=Not Determined

Gravel

Cc: 0.7

References: ASTM C 136: Sieve Analysis of Fine and Coarse Aggregates ASTM D75: Practice for Sampling Aggregates

117: Material Finer than the #200 Sieve in Mineral Aggregates by Washing ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM C702: Practice for Reducing Samples of Aggregate to Testing Size

Mal Krajan

Cu:

2.9

Signature

Laboratory Supervosor

Position

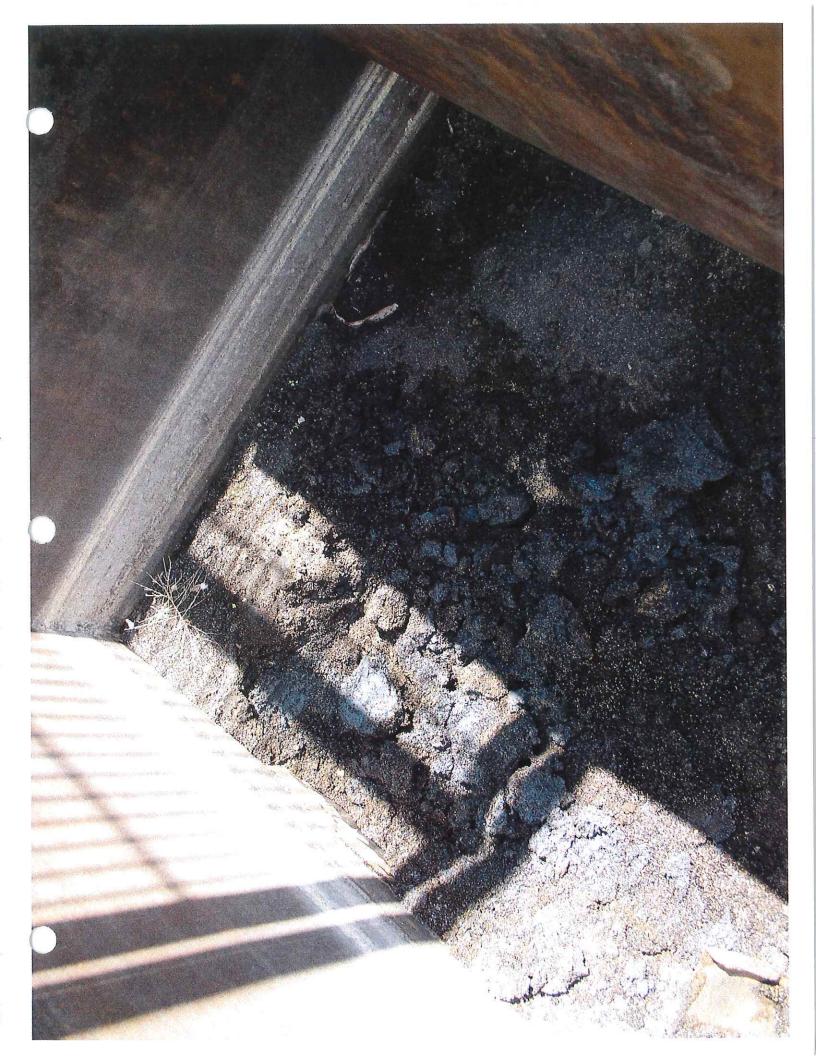
Cell #1 Anthracite

S&ME,INC.

Technical Responsibility:

Fineness Modulus

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&ME Project #:

1053-06-278

Report Date:

6/20/06

. roject Name:

Nags Head Fresh Pond Water Treatment Plant

Test Date(s):

6/16 - 6/20/06

Client Name:

The Wooten Company

Client Address:

120 North Boylan Avenue, Raleigh, NC 27603

Boring #:	Cell #2	Sample #:	2	Sample Date:	6/15/06	
Location:	Project Site			Elevation:	NA	

Sample Description: Anthracite Media

Sieve Size (mm)	Sieve Size	% Retained Total Sample	% Retained Between Sieves	Percent Passing Total Sample	Specifications
19.00	3/4"	0.0%	0.0%	100.0%	
12.50	1/2"	0.0%	0.0%	100.0%	
9.50	3/8"	0.0%	0.0%	100.0%	
4.75	#4	0.0%	0.0%	100.0%	
2.80	#7	0.0%	0.0%	100.0%	
2.36	#8	0.1%	0.1%	99.9%	
1.18	#16	51.1%	51.0%	48.9%	
0.600	#30	85.9%	34.8%	14.1%	
0.425	#40	92.2%	6.3%	7.8%	
0.300	#50	99.6%	7.4%	0.4%	
0.150	#100	99.9%	0.3%	0.1%	
0.075	#200	100.0%	0.1%	0.0%	

Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size

#7

Coarse Sand

51.0%

Fine Sand

7.8%

Gravel Liquid Limit 0.1% ND Medium Sand

41.1%

Silt & Clay

0.0%

Relative Density SSD

ND

Plastic Limit ND

D

Plastic Index

ND

ND=Not Determined

Fineness Modulus ND

Cu: 3.0

Cc: 1.0

References: ASTM C 136: Sieve Analysis of Fine and Coarse Aggregates 117: Material Finer than the #200 Sieve in Mineral Aggregates by Washing

ASTM D75: Practice for Sampling Aggregates
ASTM C702: Practice for Reducing Samples of Aggregate to Testing Size

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Technical Responsibility:

Mal Krajan

Signature

Laboratory Supervosor

Position

Cell #2 Anthracite

S&ME,INC.

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ASTM C 136

%ME Project #:

1053-06-278

Report Date:

6/20/06

oject Name:

Nags Head Fresh Pond Water Treatment Plant

Test Date(s):

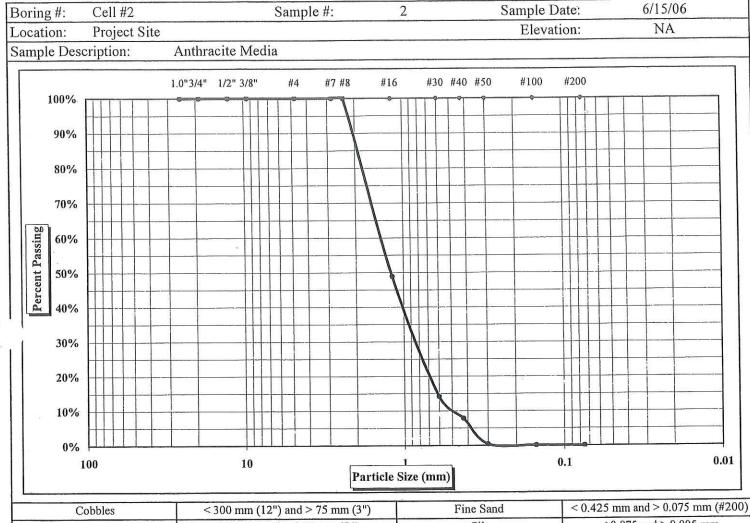
6/16 - 6/20/06

Client Name:

The Wooten Company

Client Address:

120 North Boylan Avenue, Raleigh, NC 27603



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size

#7

Coarse Sand

51.0%

Fine Sand

7.8%

Gravel

0.1%

Medium Sand

Liquid Limit

ND

Plastic Limit

41.1% ND

Silt & Clay

0.0%

Relative Density SSD

ND

Plastic Index

ND

Fineness Modulus

ND

Cu: 3.0 Cc: 1.0

References: ASTM C 136: Sieve Analysis of Fine and Coarse Aggregates

ASTM D75: Practice for Sampling Aggregates ASTM C702: Practice for Reducing Samples of Aggregate to Testing Size

. 117: Material Finer than the #200 Sieve in Mineral Aggregates by Washing

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan

Laboratory Supervosor

Position

Cell #2 Anthracite

Technical Responsibility:

3109 Spring Forest Road, Raleigh, NC. 27616

S&ME,INC.



%ME Project #:

1053-06-278

Report Date:

Test Date(s):

Nags Head Fresh Pond Water Treatment Plant

6/20/06 6/16 - 6/20/06

Client Name: Client Address:

Boring #:

. roject Name:

The Wooten Company

120 North Boylan Avenue, Raleigh, NC 27603

Sample #: Sample Date: 6/15/06

Project Site Location:

Cell #1

Elevation: NA

Sample Description: Sand

Sieve Size (mm)	Sieve Size	% Retained Total Sample	% Retained Between Sieves	Percent Passing Total Sample	Specifications
19.00	3/4"	0.0%	0.0%	100.0%	
12.50	1/2"	0.0%	0.0%	100.0%	
9.50	3/8"	0.0%	0.0%	100.0%	
4.75	#4	0.0%	0.0%	100.0%	
2.80	#7	0.1%	0.1%	99.9%	
2.36	#8	0.3%	0.2%	99.7%	
1.18	#16	32.6%	32.3%	67.4%	
0.600	#30	92.1%	59.5%	7.9%	
0.425	#40	99.0%	6.9%	1.0%	
0.300	#50	99.7%	0.7%	0.3%	
0.150	#100	99.9%	0.2%	0.1%	
0.075	#200	99.9%	0.0%	0.1%	

Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size #4 Coarse Sand

Fine Sand

Plastic Index

0.9%

Gravel 0.3% Liquid Limit ND

Medium Sand 66.4% Plastic Limit ND

Silt & Clay

0.1% ND

Relative Density SSD

ND

ND=Not Determined

Fineness Modulus ND

Cc: 0.9

32.3%

ASTM C 136: Sieve Analysis of Fine and Coarse Aggregates 117: Material Finer than the #200 Sieve in Mineral Aggregates by Washing ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D75: Practice for Sampling Aggregates ASTM C702: Practice for Reducing Samples of Aggregate to Testing Size

Technical Responsibility:

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3109 Spring Forest Road, Raleigh, NC. 27616

Cell #1 Sand





ASTM C 136

* &ME Project #:

1053-06-278

Report Date:

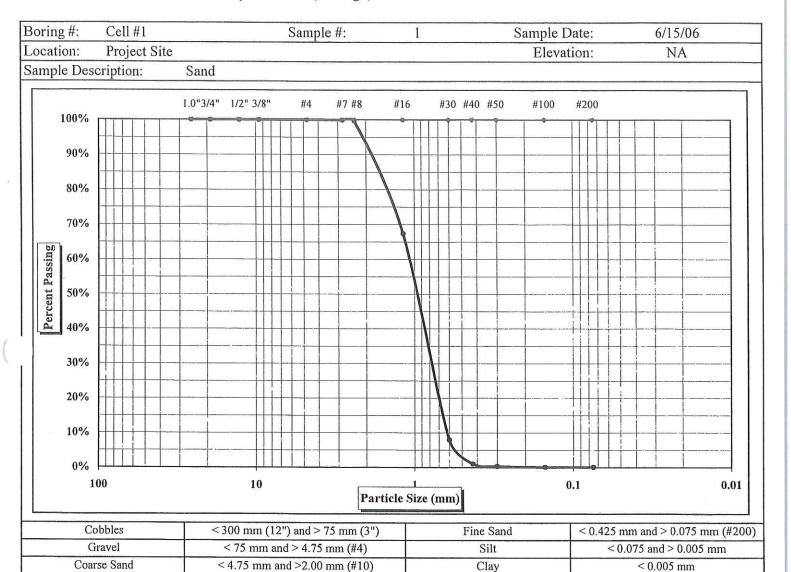
6/20/06

roject Name: Client Name:

Client Address:

120 North Boylan Avenue, Raleigh, NC 27603

Nags Head Fresh Pond Water Treatment Plant Test Date(s): 6/16 - 6/20/06 The Wooten Company



Medium Sand	< 2.00 mm and > 0.425 mm	(#40) Collo	ids	< 0.001 mn	1
Maximum Particle S	Size #4	Coarse Sand	32.3%	Fine Sand	0.9%
Gra	avel 0.3%	Medium Sand	66.4%	Silt & Clay	0.1%
Liquid L	imit ND	Plastic Limit	ND	Plastic Index	ND
Relative Density S	SSD ND				

ND=Not Determined

ND Fineness Modulus Cu: 1.8 Cc: 0.9

References: ASTM C 136: Sieve Analysis of Fine and Coarse Aggregates. 117: Material Finer than the #200 Sieve in Mineral Aggregates by Washing

ASTM D75: Practice for Sampling Aggregates ASTM C702: Practice for Reducing Samples of Aggregate to Testing Size

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Technical Responsibility:

S&ME,INC.

Mal Krajan

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Laboratory Supervosor

Cell #1 Sand



Laboratory Worksheet Version 4.2

Sieve Analysis of Fine and Coarse Aggregates

%ME Project #:

. roject Name:

1053-06-278

Report Date:

Nags Head Fresh Pond Water Treatment Plant

Test Date(s):

Client Name:

The Wooten Company

Client Address: 120 North Boylan Avenue, Raleigh, NC 27603

Boring #:	Cell #2		Sample #:	2	Sample Date:	6/15/06
Location:	Project Site				Elevation:	NA
Sample De	scription:	Sand		**************************************		

Sieve Size (mm)	Sieve Size	% Retained Total Sample	% Retained Between Sieves	Percent Passing Total Sample	Specifications
19.00	3/4"	0.0%	0.0%	100.0%	
12.50	1/2"	0.0%	0.0%	100.0%	
9.50	3/8"	0.0%	0.0%	100.0%	
4.75	#4	0.0%	0.0%	100.0%	
2.80	#7	1.0%	1.0%	99.0%	
2.36	#8	1.3%	0.3%	98.7%	
1.18	#16	29.0%	27.7%	71.0%	
0.600	#30	77.3%	48.3%	22.7%	
0.425	#40	97.8%	20.5%	2.2%	
0.300	#50	99.6%	1.8%	0.4%	¥3
0.150	#100	99.9%	0.3%	0.1%	
0.075	#200	100.0%	0.1%	0.0%	

Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

#4 Maximum Particle Size Coarse Sand 27.7% Gravel 1.3% Medium Sand 68.8% Liquid Limit NDPlastic Limit ND Relative Density SSD ND

ND=Not Determined

Fineness Modulus ND References: ASTM C 136: Sieve Analysis of Fine and Coarse Aggregates

Cc: 0.9 ASTM D75: Practice for

ASTM C702: Practice for Reducing Samp

'117: Material Finer than the #200 Sieve in Mineral Aggregates by Washing ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Technical Responsibility:

S&ME,INC.

Mal Krajan

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6/20/06		
6/16 - 6/20/06	5	
6/15/06		
NA		
Specifications		
25 mm and > 0.075 mm	n (#200)	
< 0.075 and > 0.005 m	ım	
< 0.005 mm		
< 0.001 mm		
Fine Sand 2.	2%	
Silt & Clay 0.		
	ND	
idstic fidex 1	ND	
Sampling Aggregates oles of Aggregate to Testir	ng Size	
poratory Supervoso	<u>r</u>	
Cell #2 Sa	nd	

Laboratory Worksheet Version 4.2

Sieve Analysis of Fine and Coarse Aggregates



ASTM C 136

¬&ME Project #:

1053-06-278

Report Date:

6/20/06

roject Name: Client Name:

Client Address:

120 North Boylan Avenue, Raleigh, NC 27603

Nags Head Fresh Pond Water Treatment Plant Test Date(s): 6/16 - 6/20/06 The Wooten Company

Boring #:	Cell #2			Samp	le #:	2		S	ample I	Date:		6/15/06	
Location:	Project Site								Eleva	tion:		NA	
Sample Des	cription:	Sand											
100%		1.0"3/4"	1/2" 3/8"	#4	#7 #8	#16	#30 #40	#50	#100	#200	1 1		
90%													
80%													
70%													
ssing 60%													
Percent Passing %09													
40%							+++						
30%													
20%													
10%									4 7 1				
0%	ШШ												
1	00		10		Parti	cle Size	(mm)	8	(0.1			0.01
Cobbles		< 300 mm (12") and > 75 mm (3")				Fine Sand		< 0.425 mm and > 0.075 mm (#200)					
Gravel Coarse Sand			< 75 mm and > 4.75 mm (#4)				Silt			< 0.075 and > 0.005 mm			
Medium Sand		< 4.75 mm and >2.00 mm (#10) < 2.00 mm and > 0.425 mm (#40)			+-	Clay Colloids		< 0.005 mm < 0.001 mm					

				9,007,111		_
Maximum Particle Size	#4	Coarse Sand	27.7%	Fine Sand	2.2%	
Gravel	1.3%	Medium Sand	68.8%	Silt & Clay	0.0%	
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND	
Relative Density SSD	ND					
ND=Not Determined						

Fineness Modulus ND Cc: 0.9

References: ASTM C 136: Sieve Analysis of Fine and Coarse Aggregates 117: Material Finer than the #200 Sieve in Mineral Aggregates by Washing ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

ASTM D75: Practice for Sampling Aggregates ASTM C702: Practice for Reducing Samples of Aggregate to Testing Size

Technical Responsibility:

S&ME,INC.

Mal Krajan

3109 Spring Forest Road, Raleigh, NC. 27616

Laboratory Supervosor

Cell #2 Sand

Appendix C – Preliminary Recommendations

Page 1 of 2

Vance Brooks

From: Vance Brooks [vbrooks@thewootencompany.com]

Sent: Friday, June 16, 2006 5:29 PM

To: 'Nancy Carawan'

Cc: 'Chris Thomson'; 'Fred hill'; 'David Tawes'

Subject: Nags Head Fresh Pond WTP - Filter Assessment - TWC # 2977-A

Nancy

We enjoyed meeting with you yesterday. As discussed, following below are some preliminary observations from our field investigation.

- Before placing the plant in service:
 - o Remove trash, particularly roof gravel, from the filter troughs.
 - Remove mud balls from anthracite along the west side of Filter Cell No. 1. Do not disturb the filter sand.
 - o Remove mud balls from anthracite along the south side of Filter Cell No. 2. Do not disturb the filter sand.
 - o It is estimated that no more than 110 CF of anthracite will have to be removed. Actually, much less than this should end up being taken out.
 - o Re-level the filter surface.
 - Disinfect the filters.
- During the plant field trials to be conducted prior to placing the plant on-line:
 - Check the proper operation of the filter surface sweeps.
 - Are they spinning properly?
 - What is the flow rate?
 - Are water and air coming from all of the nozzles, especially the end nozzles?
 - What is the filter backwash rate? It should be on the order of 15-20 gpm/sf. This translates to 2,160 to 2,880 gpm per filter.
- As soon as it can be obtained, replace the anthracite removed above. The anthracite, based on the old MGA specification for this project, should have the following characteristics: effective size of 1.0 mm and uniformity coefficient of about 1.4. Note that the lead time on purchasing anthracite is six months or more. We are in the process of making calls now to see if any is available for immediate delivery. We will be back in touch when we have more information.

The above procedures were discussed with you in the field yesterday. Mr. David Tawes with N. C. Public Water Supply was present and concurred. Also, the above was discussed in detail with Mr. Fred Hill of N. C. Public Water Supply today. He also concurred. Should you have any questions concerning this, please do not hesitate to contact our office and/or N. C. Public Water Supply for further confirmation.

We will provide you with a full, final report on our filter assessment once we receive the sieve analyses on the filter media samples taken. This full report will include the preliminary recommendations noted above.

Also, Chris Thomson with our office will be at your plant for jar testing assistance on June 28 and 29, per our discussion. We believe that Mr. Tawes also plans to be present.

Thanks,

C. V. Brooks, IV, PE, PLS (Vance Brooks)

6/16/2006

Water Resources Manager The Wooten Company Raleigh, North Carolina (919)828-0531

PRELIMINARY - DO NOT USE FOR CONSTRUCTION