MVA SCIENTIFIC CONSULTANTS

3300 Breckinridge Boulevard
Suite 400
Duluth, GA 30096

770-662-8509
FAX 770-662-8532
www.mvainc.com

28 April 2006

Ms. Patti Carswell
Severn Trent
5815 Middlebrook Pike
Knoxville, TN 37921

Dear Ms. Carswell,

Enclosed is our report of results for the particle size analysis of eight samples, STL Project No. 142541. If you have any questions, please do not hesitate to contact me.

Thank you for your continued trust in MVA Scientific Consultants. Your samples will be retained for thirty (30) days prior to disposal.

Sincerely,

Tim B. Vander Wood, Ph.D.
Executive Director

Bryan R. Bandli
Research Microscopist

Enclosure

6655execsum042806

SERVICES:

Investigative Analysis

Consultative Support

Expert Reports & Imaging

APPLICATIONS:

Environmental Issues

QA/QC Challenges

Laboratory Support

Litigation Support

Subject Matter Expertise

CAPABILITIES:

Particle Sizing & Identification

Dust Analysis

Nanoparticles

Contaminant Identification

Source Determination

Materials Characterization

Surface Metrology

ISO/IEC 17025-1999

cGMP Compliant

Focused on the Science of Small Things

Report of Results: MVA6655

Particle Sizing
STL Project Number 142541

Prepared for:

Severn Trent
5815 Middlebrook Pike
Knoxville, TN 37921

Respectfully Submitted by:

Tim B. Vander Wood, Ph.D.
Executive Director

Bryan R. Bandli
Research Microscopist

MVA Scientific Consultants
3300 Breckinridge Boulevard
Suite 400
Duluth, GA 30096

28 April 2006

MVA SCIENTIFIC CONSULTANTS

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Report of Results: MVA6655

Particle Sizing: STL Project Number 142541

INTRODUCTION

This report includes the results of particle size analysis of eight particulate samples delivered to MVA Scientific Consultants on 18 April 2006. The samples were assigned MVA sample numbers as follows:

MVA#	Description
R0612	G-2949-R1-Particle Size Distribution Filter
R0613	G-2950-R1-Particle Size Distribution Acetone Probe Rinse
R0614	G-2951-R1-Particle Size Distribution Filter RB
R0615	G-2952-R1-Particle Size Distribution Acetone Probe Rinse RB
R0616	G-3055-R2-Particle Size Distribution Filter
R0617	G-3056-R2-Particle Size Distribution Acetone Probe Rinse
R0618	G-3139-R3-Particle Size Distribution Filter
R0619	G-3140-R3-Particle Size Distribution Acetone Probe Rinse

Analyses were performed at MVA Scientific Consultants during the period 18 April through 28 April 2006.

METHODS

The analyses were performed using a JEOL JSM-6500F field emission scanning electron microscope operating in automated mode under the control of a Noran Vantage x-ray analysis system, utilizing MVA SOP 317. The loading on the samples was variable and at least several hundred particles from each sample were individually sized and classified according to six client-requested size categories: 0.1-0.5, 0.5-1.0, 1.0-5.0, 5.0-10.0, 10.0-100.0, and >100.0 µm. The blank samples and two of the particle size distribution samples were very lightly loaded and fewer than one hundred particles from each were sized. The particle size data are presented in terms of particle number and in terms of estimated mass. The assumption has been made that the particles are all of similar density and therefore the particle volume distribution is equivalent to the particle mass distribution.

DISCUSSION AND RESULTS

The size distributions of the particles down to 0.1 micrometers are shown in Tables 1 and 2.

Table 1. MVA 6655. STL Project Number 142541
Percentages of Particles in Various Diameter Ranges by
Number of Particles

MVA#	R0612	R0613	R0614	R0615	R0616	R0617	R0618	R0619
Client ID	G-2949-R1	G-2950-R1	G-2951-R1	G-2952-R1	G-3055-R2	G-3056-R2	G-3139-R3	G-3140-R3
Diameter Range (µm)								
0.1-0.5	99.8	74.5	85.0	93.0	79.2	74.0	87.4	97.2
0.5-1.0	0.2	13.8	5.0	3.1	2.1	16.1	8.1	2.8
1.0-5.0	0.1	11.0	10.0	3.9	16.7	9.6	3.6	0.0
5.0-10.0	0.0	0.5	0.0	0.0	2.1	0.3	0.5	0.0
10.0-100.0	0.0	0.2	0.0	0.0	0.0	0.0	0.5	0.0
>100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Particles	2000	1999	20	129	48	1192	222	36

Table 2. MVA 6655. STL Project Number 142541
Percentages of Particles in Various Diameter Ranges by
Estimated Mass of Particles

MVA#	R0612	R0613	R0614	R0615	R0616	R0617	R0618	R0619
Client ID	G-2949-R1	G-2950-R1	G-2951-R1	G-2952-R1	G-3055-R2	G-3056-R2	G-3139-R3	G-3140-R3
Diameter Range (µm)								
0.1-0.5	14.2	0.1	2.4	13.3	0.3	1.4	0.2	85.9
0.5-1.0	1.1	0.4	1.5	12.3	0.0	4.4	0.3	14.1
1.0-5.0	84.7	9.2	96.1	74.3	39.2	50.3	9.1	0.0
5.0-10.0	0.0	8.2	0.0	0.0	60.5	43.8	6.0	0.0
10.0-100.0	0.0	82.1	0.0	0.0	0.0	0.0	84.5	0.0
>100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

STATE OF LOUISIANA
DEPARTMENT OF ENVIRONMENTAL QUALITY

Is hereby granting a Louisiana Environmental Laboratory Accreditation to:

MVA Scientific Consultants
3300 Breckinridge Blvd. Suite 400
Duluth, GA 30096

Agency Interest No. 116776

According to the Louisiana Administrative Code, Title 33, Part I, Subpart 3, LABORATORY ACCREDITATION, the State of Louisiana formally recognizes that this laboratory is technically competent to perform the environmental analyses listed on the scope of accreditation detailed in the attachment.

The laboratory agrees to perform all analyses listed on this scope of accreditation according to the Part I, Subpart 3 requirements and acknowledges that continued accreditation is dependent on successful ongoing compliance with the applicable requirements of Part I. Please contact the Department of Environmental Quality, Louisiana Environmental Laboratory Accreditation Program (LELAP) to verify the laboratory's scope of accreditation and accreditation status. Accreditation by the State of Louisiana is not an endorsement or a guarantee of validity of the data generated by the laboratory, and does not constitute an endorsement of the suitability of the listed methods for any specific application.

To be accredited initially and maintain accreditation, the laboratory agrees to participate in two single-blind, single-concentration PT studies, where available, per year for each field of testing for which it seeks accreditation or maintains accreditation as required in LAC 33:I.4711.

Melvin C. Mitchell Sr., Accreditation Officer
Louisiana Environmental Laboratory Accreditation Program

Certificate Number: 04096
Expiration Date: June 30, 2006
Issued On: July 1, 2005

Louisiana Environmental Laboratory

LELAP

Accreditation Program

Laboratory Scope of Accreditation

Organization

04096 **7706628509**

MVA Scientific Consultants
5500 Oakbrook Parkway
Suite 200
Norcross, GA 30093

Louisiana Stack Testing Program Certification

Method Code	Method Ref	Analyte	Status	Date Effective	Type	AA
2036	MVA SOP #308	Particle Size Distribution	Accredited	12/30/2003	STATE	LA
2037	MVA SOP#313	Particle Size Distribution	Accredited	12/30/2003	STATE	LA
2089	MVA SOP 315	Particle Size Analysis using JOEL 6500 SEM and Noran Voyager	Accredited	2/19/2004	STATE	LA
2090	MVA SOP 316	Particle Size Analysis using JOEL 6500 SEM and Noran Voyager	Accredited	2/19/2004	STATE	LA
2091	MVA SOP 318	Manual Feature Sizing in Digital Images using NIH Image, Scion Image, Image SXM or Image J	Accredited	2/19/2004	STATE	LA

Print Date 6/20/2005 9:07:39 AM

Issue Date: July 1, 2005
Expiration Date: June 30, 2006

MVA Scientific Consultants
Quarterly SEM Calibration Record
Microscope: JEOL 6500F

	Microscope				Noran									
Date	Agar A877, horizontal (µm)	Pass? Y/N	Agar A877, vertical (µm)	Pass? Y/N	Agar A877, horizontal (µm)	Pass? Y/N	Agar A877, vertical (µm)	Pass? Y/N	Cu K_{alpha} peak energy	Pass? Y/N	Cu L_{alpha} peak energy	Pass? Y/N	Analyst Initals	QC Check
120505	9.75	Y	9.88	Y	10.0	Y	10.0	Y	8.04	Y	0.94	Y	BSB	[illegible] 12/05
3/1/06	9.75	Y	9.88	Y	~~[illegible]~~ 9.7 3/1/06	Y	10.0	Y	8.05	Y	0.94	Y	BSB	[illegible] 3/1/06

Comments:

Agar A877 test specimen obtained from Agar Scientific Ltd. Test criterion: Square periodicity = 10.0 +/- 0.5 µm.
Copper used for EDS calibration is NIST SRM 457. Test Criteria: Cu K_{alpha} = 8.04 +/- 0.01 keV, Cu L_{alpha} = 0.93 +/- 0.01 keV.

Store calibration data on the file server in folder: mva_data\mva_files\SEM_Files\SEM_Calibration_Data\SEM6500

6655

Request for Analysis/Chain-of-Custody – RFA/COC #021 [Particle Size Distribution]
Focus/US Filter Westates Carbon
Comprehensive Performance Test at Parker, Arizona

STL Knoxville Lot Number: _____
STL Knoxville Project Number: 142541

NOTE: After Log-In, please send a copy of the completed RFA/COC to STL Knoxville c/o Patti Carswell.

Project Identification:	**Westates Carbon CPT**
STL Knoxville Project Number:	142541
STL Contact:	Ms. Patti Carswell (865) 291-3010
STL - ACS Project Manager:	Dr. William C. Anderson (865) 291-3080

Laboratory Deliverable Turnaround Requirements:	
Analytical Due Date: (Review-Released Data)	21 Days from Lab Receipt
Data Package Due Date:	21 Days from Lab Receipt
Laboratory Destination:	MVA, Inc. ATTN: Mr. Tim Vanderwood 5500 Oakbrook Parkway - #200 Norcross, GA 30093 (770) 662-8509
Courier:	FedEx

Analytical Testing QC Requirements:
The Legend for Project-Specific Quality Control Testing is designated in the "QC" column as follows:
"MS" = Matrix Spike, "MSD" = Matrix Spike Duplicate,
"DUP" = Duplicate, and "PDS" = Post Digestion Spike

Project Deliverables:
Report analytical results in a data package. Include "Field Number", "Sample Type", and "Run Number" on all Reports.

Holding Time Requirements:
N/A

Field Sample No./ Sample Coding ID	**Sample Collection Date**	**Project QC Require-ments**	**Sample Bottle/ Container**	**Sample Type/Analysis**	**Analytical Specifications**
G-2949-R1-Particle Size Distribution Filter	3-28-06		Petri Dish	**Particle Size Distribution Filter, Run #1** M5 Train (Method 0050) Particle Size Distribution	Analyze for Particle Size Distribution by Scanning Electron Microscopy (SEM). Report the following particle size ranges: < 0.1 µm 0.1 – 0.5 µm 0.5 - 1.0 µm 1 – 5 µm 5 – 10 µm 10 – 100 µm > 100 µm Report the results in a data package.
G-2950-R1-Particle Size Distribution Acetone Probe Rinse	3-28-06		250 mL Amber Boston Round	**Acetone Probe Rinse Run #1** M5 Train (Method 0050) Particle Size Distribution	Analyze for Particle Size Distribution by Scanning Electron Microscopy (SEM). Report the following particle size ranges: < 0.1 µm 0.1 – 0.5 µm 0.5 - 1.0 µm 1 – 5 µm 5 – 10 µm 10 – 100 µm > 100 µm Report the results in a data package.

Request for Analysis/Chain-of-Custody – RFA/COC #021 [Particle Size Distribution]
Focus/US Filter Westates Carbon
Comprehensive Performance Test at Parker, Arizona

Field Sample No./ Sample Coding ID	Sample Collection Date	Project QC Requirements	Sample Bottle/ Container	Sample Type/Analysis	Analytical Specifications
G-2951-R1-Particle Size Distribution Filter RB	3-28-06	**Reagent Blank**	Petri Dish	**Particle Size Distribution Filter Reagent Blank Run #1** M5 Train (Method 0050) Particle Size Distribution	Analyze for Particle Size Distribution by Scanning Electron Microscopy (SEM). Report the following particle size ranges: < 0.1 µm 0.1 – 0.5 µm 0.5 - 1.0 µm 1 – 5 µm 5 – 10 µm 10 – 100 µm > 100 µm Report the results in a data package.
G-2952-R1-Particle Size Distribution Acetone Probe Rinse RB	3-28-06	**Reagent Blank**	250 mL Amber Boston Round	**Acetone Probe Rinse Reagent Blank Run #1** M5 Train (Method 0050) Particle Size Distribution	Analyze for Particle Size Distribution by Scanning Electron Microscopy (SEM). Report the following particle size ranges: < 0.1 µm 0.1 – 0.5 µm 0.5 - 1.0 µm 1 – 5 µm 5 – 10 µm 10 – 100 µm > 100 µm Report the results in a data package.
G-3055-R2-Particle Size Distribution Filter	3-29-06		Petri Dish	**Particle Size Distribution Filter, Run #2** M5 Train (Method 0050) Particle Size Distribution	Analyze for Particle Size Distribution by Scanning Electron Microscopy (SEM). Report the following particle size ranges: < 0.1 µm 0.1 – 0.5 µm 0.5 - 1.0 µm 1 – 5 µm 5 – 10 µm 10 – 100 µm > 100 µm Report the results in a data package.

6655

Request for Analysis/Chain-of-Custody – RFA/COC #021 [Particle Size Distribution]
Focus/US Filter Westates Carbon
Comprehensive Performance Test at Parker, Arizona

Field Sample No./ Sample Coding ID	Sample Collection Date	Project QC Requirements	Sample Bottle/ Container	Sample Type/Analysis	Analytical Specifications
G-3056-R2-Particle Size Distribution Acetone Probe Rinse	3-29-06		250 mL Amber Boston Round	**Acetone Probe Rinse Run #2** M5 Train (Method 0050) Particle Size Distribution	Analyze for Particle Size Distribution by Scanning Electron Microscopy (SEM). Report the following particle size ranges: < 0.1 µm 0.1 – 0.5 µm 0.5 - 1.0 µm 1 – 5 µm 5 – 10 µm 10 – 100 µm > 100 µm Report the results in a data package.
G-3139-R3-Particle Size Distribution Filter	3-30-06		Petri Dish	**Particle Size Distribution Filter, Run #3** M5 Train (Method 0050) Particle Size Distribution	Analyze for Particle Size Distribution by Scanning Electron Microscopy (SEM). Report the following particle size ranges: < 0.1 µm 0.1 – 0.5 µm 0.5 - 1.0 µm 1 – 5 µm 5 – 10 µm 10 – 100 µm > 100 µm Report the results in a data package.
G-3140-R3-Particle Size Distribution Acetone Probe Rinse	3-30-06		250 mL Amber Boston Round	**Acetone Probe Rinse Run #3** M5 Train (Method 0050) Particle Size Distribution	Analyze for Particle Size Distribution by Scanning Electron Microscopy (SEM). Report the following particle size ranges: < 0.1 µm 0.1 – 0.5 µm 0.5 - 1.0 µm 1 – 5 µm 5 – 10 µm 10 – 100 µm > 100 µm Report the results in a data package.

Request for Analysis/Chain-of-Custody – RFA/COC #021 [Particle Size Distribution]
Focus/US Filter Westates Carbon
Comprehensive Performance Test at Parker, Arizona

Sample Receipt Log and Condition of the Samples Upon Receipt:

Please fill in the following information:		Comments (Please write "NONE" if no comment applicable)
(1) Record the identities of any samples that were listed on the RFA but were not found in the sample shipment.	N/A	N/A
(2) Record the sample shipping cooler temperature of all coolers transporting samples listed on this RFA:	5.0°C	ambient
(3) Record any apparent sample loss/breakage.	N/A	none
(4) Record any unidentified samples transported with this shipment of samples:	N/A	none
(5) Indicate if all samples were received according to the project's required specifications (i.e. no nonconformances):	N/A	no nonconformances

Custody Transfer:

hand delivered

	Name	Company	Date/Time
Relinquished By:			
Accepted By:	[illegible]	STL-Knoxville	4/2/06 1625
Relinquished By:	[illegible]	STL-Knoxville	4/4/06 1600
Accepted By:	[illegible]	MVA Scientific Cons.	4/18/06 0915
Relinquished By:			
Accepted By:			
Relinquished By:			
Accepted By:			