

1 One
Source
Environmental
Testing Services

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OSETS Project #060508

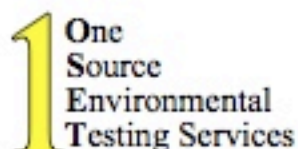
**UVM DELEHANTY GEOLOGY LAB
AIR-HANDLER PERFORMANCE TESTING
FINAL REPORT**



Certification #CR149



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**OSETS PROJECT #060508 - UVM DELEHANTY GEOLOGY LAB
AIR-HANDLER PERFORMANCE TESTING
FINAL REPORT**

CLEANROOM CERTIFICATION REPORT

Conducted by:
One Source Environmental Testing Services
PO Box 64941
Burlington, Vermont 05406-4941

DATA CONTAINED WITHIN THIS REPORT REPRESENTS A PRECISE ACCOUNT OF CLEANROOM PERFORMANCE. THE RESULTS AND INFORMATION PRESENTED ARE CERTIFIED TO BE ACCURATE, AND COMPLETE TO THE EXTENT POSSIBLE BASED ON EQUIPMENT AND PROCEDURES USED DURING PERFORMANCE TESTING.

CLEANROOM EVALUATION WAS CONDUCTED IN COMPLETE ACCORDANCE WITH NEBB PROCEDURAL STANDARDS, IEST PROCEDURAL STANDARDS AND ISO 14644-1 & 2.

ONE SOURCE ENVIRONMENTAL TESTING SERVICES WARRANTS THAT THE CLEANROOM EVALUATED DURING THIS CERTIFICATION PROCESS WAS OPERATING AT THE LEVELS DOCUMENTED WITHIN THIS REPORT, AT AND ONLY AT THE TIME OF DATA ACQUISITION. WE MAKE NO OTHER WARRANTIES, STATED OR IMPLIED, CONCERNING THE CONTINUED PERFORMANCE OR SAFE OPERATION OF THE CLEANROOM DESCRIBED HEREIN.

Customer:
University of Vermont
Facilities Design & Construction
Marsh Hall Suite 10
31 Spear Street
Burlington, VT 05405

Project: #060508
UVM Delehanty Geology Lab
Air-Handler Performance Testing
Final Report
Report Date: July 03, 2008
Project Manager/NEBB CPT Supervisor:
Jeffrey J. Jimmo



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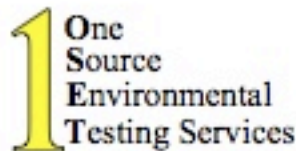
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July 3, 2008

University of Vermont
Facilities Design & Construction
Marsh Hall Suite 10
31 Spear Street
Burlington, VT 05405

Attention: Mr. Mike Stevens
Project Manager

Reference: **OSETS PROJECT #060508 - UVM DELEHANTY GEOLOGY
LAB AIR-HANDLER PERFORMANCE TESTING FINAL
REPORT**

Dear Mr. Stevens:

We are pleased to submit to you our Final Report associated with the project listed above at the UVM Delehanty Geology Lab located in Burlington Vermont. One Source Environmental Testing Services (OSETS) performed Air-Handler Particle Removal Efficiency Performance Testing. All of the tests were conducted during an "At Rest" Facility operating mode.

OSETS was tasked with testing the filter efficiency within the Air Handling system located at the UVM Trinity Campus Delehanty Hall facility. We did this by sampling the incoming air at the Air Handler Intake and then sampling the Air supply exiting the ducts at the two Diffusers within the lab area proper. This raw data accompanied with our efficiency calculations are presented herein. Note: A 100/1 diluter (calibrated orifice) was used to prevent over concentration of the laser particle counter used to acquire the samples. Because of the relatively small populations at the larger particle sizes, combined with the dilution factor, resultant efficiency percentages for the 1.0 and 5.0 micrometer particle sizes appear skewed.

Larger particle sizes skewed
Outside conditions were windy which affected particle populations

Roof Top AHU Location #1 (Left side of intake)

Sample	Date	Time	Particle Sizes Micrometers							
			0.1	0.15	0.2	0.25	0.3	0.5	1	5
1	6/19/2008	8:10:23	120668	90756	51647	16224	10148	504	62	8
2	6/19/2008	8:11:37	120439	90412	51262	16093	10226	456	61	1
3	6/19/2008	8:12:53	118663	87159	48424	14888	9436	470	64	0
4	6/19/2008	8:14:07	117649	85037	46856	13982	8955	414	52	1
5	6/19/2008	8:15:20	117300	84336	46224	13982	8806	429	43	0
6	6/19/2008	8:16:33	115246	82941	45907	13800	8710	396	47	2
Average Count			118328	86774	48387	14828	9380	445	55	2
Normalized 100:1 dilution count			11832750	8677350	4838667	1482817	938017	44483	5483	200

Roof Top AHU Location #2 (Right side of intake)

Sample	Date	Time	Particle Sizes Micrometers							
			0.1	0.15	0.2	0.25	0.3	0.5	1	5
1	6/19/2008	8:18:12	114187	81749	44958	13414	8569	392	53	1
2	6/19/2008	8:19:51	113982	81026	44296	13002	8146	339	33	0
3	6/19/2008	8:21:02	112811	79411	43180	12420	7691	321	35	0
4	6/19/2008	8:22:13	110568	77582	42305	12434	7903	375	50	0
5	6/19/2008	8:23:27	110087	77042	41963	12364	7722	309	29	0
6	6/19/2008	8:24:43	109001	78151	44077	13653	8587	388	78	0
Average Count			111773	79160	38463	12881	8103	354	46	0
Normalized 100:1 dilution count			11177267	7916017	3846317	1288117	810300	35400	4633	17
Average Normalized 100:1 dilution count			11505008	8296683	4342492	1385467	874158	39942	5058	108

Lab#1 Supply outlet diffuser

Sample	Date	Time	Particle Sizes Micrometers							
			0.1	0.15	0.2	0.25	0.3	0.5	1	5
1	6/19/2008	8:41:07	33176	16275	7179	1590	919	65	25	2
2	6/19/2008	8:42:19	33690	17104	7462	1693	968	44	13	1
3	6/19/2008	8:43:32	33628	17009	7567	1632	947	32	9	0
4	6/19/2008	8:45:10	34178	17345	7603	1689	1009	44	8	1
5	6/19/2008	8:46:39	34281	17401	7556	1661	945	22	3	1
6	6/19/2008	8:47:54	34167	17399	7623	1674	1001	34	7	2
Average Count			33853	17089	7498	1657	965	40	11	1
Normalized 100:1 dilution count			3385333	1708883	749833	165650	96483	4017	1083	117
Removal Efficiency			70.6%	79.4%	82.7%	88.0%	89.0%	89.9%	78.6%	-7.7%

Lab/Office#2 Supply outlet diffuser

Sample	Date	Time	Particle Sizes Micrometers							
			0.1	0.15	0.2	0.25	0.3	0.5	1	5
1	6/19/2008	8:54:33	37821	20510	9712	2369	1409	68	22	1
2	6/19/2008	8:56:06	37615	20904	10045	2540	1509	139	66	2
3	6/19/2008	8:57:19	37620	20777	9954	2516	1553	139	56	6
4	6/19/2008	8:58:32	38168	21290	10329	2641	1648	172	93	6
5	6/19/2008	8:59:46	38180	21144	10308	2759	1721	209	100	7
6	6/19/2008	9:01:03	38280	21164	10495	2853	1767	220	114	7
Average Count			37947	20965	10141	2613	1601	158	75	5
Normalized 100:1 dilution count			3794733	2096483	1014050	261300	160117	15783	7517	483
Removal Efficiency			67.0%	74.7%	76.6%	81.1%	81.7%	60.5%	-48.6%	-346.2%

SUMMARY

We have enjoyed this opportunity to be of service and look forward to future opportunities to support the UVM Delehanty Geology Lab in Burlington, Vermont. It is our sincere hope that the data contained within this report is informative and useful in assessing overall equipment performance. Comments included in this report regarding test blanking plates, etc. are intended to help facilitate future testing. Should you have specific questions regarding any of the test results discussed in this report or if we may be of further assistance please don't hesitate to contact us.

Sincerely,

A. One Source Environmental Testing Services

Jeffrey J. Jimmo
NEBB CPT Supervisor

JJJ:tfc
060508

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Section 2.

OSETS Project #060508 – UVM DELEHANTY GEOLOGY LAB

Process Filter Drawings

- Particle Count Locations
- Particle Count Locations

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Roof Top "CleanPaK"
Air Handler



Roof Top AHU
Location #2 (right
side of intake)



Roof Top AHU
Location #1 (Left
side of intake)



View of probe on tripod,
diluter and Laser Particle
Counter used during data
acquisition



Lab "airlock" supply diffuser outlet test location #1



Close up of location #1



Lab "write up area" supply diffuser outlet test location #2



Close up of location #2

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Calibration Certificates

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Manufacturer's Calibration Certificate

REPORT OF CALIBRATION

Model : Solair 1100+
Sensor ID : Bench 452
Serial Number : 071105003

Calibration has been accomplished by comparison with standards maintained by LIGHTHOUSE WORLDWIDE SOLUTIONS. The accuracy and stability of standards maintained by LIGHTHOUSE WORLDWIDE SOLUTIONS are traceable to the National Institute of Standards and Technology, or have been derived from acceptable values of natural physical constants. A record of all work performed is maintained by LIGHTHOUSE WORLDWIDE SOLUTIONS, INC.

Calibration has been accomplished by size calibration as defined by ASTM F328-98 and applicable sections of JIS B 9921

Test Equipment:

Flow Meter s/n: 101501 Calibration Due: January 24, 2008
DMM s/n: 91110178 Calibration Due: April 11, 2008

Calibration was performed under the following controlled conditions:

Temperature: 74.1°F Relative Humidity: 31.1% Flow Rate: 1.002 CFM

This certifies the above named instrument conforms to the original specifications in effect at time of manufacture.

Final Test Date: November 12, 2007

DAC Values

Table with 4 columns: Channel, Particle Size, DAC Value. Rows for Channel 0 to Channel 7 with corresponding particle sizes (0.10 to 5.00) and DAC values (110 to 28).

Table with 2 columns: Particle (um), Lot. Rows for particle sizes 0.102 to 1.000 with corresponding lot numbers (27769 to 30516).

Signature: [Handwritten Signature] Quality Assurance

Certification Date: November 12, 2007

Next calibration on this instrument is due: November 12, 2008

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