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IUCB
INDUSTRY/UNIVERSITY
COOPERATIVE RESEARCH CENTER
FOR BIOSURFACES

Dear Mr. Andersson:

Thank you for your inquiry about the progress of our final report preparation for the environmental quality control project we have performed at the request of NIEQRI, Inc. This letter is in response to your request for an interim review of the results of changes you implemented in the PURE Allergy Friendly Room treatment protocol as a consequence of our earlier findings. Data are included for PURE Room #808, treated by the original protocol, and for Room #817, treated with the expanded protocol and new air-handling unit chemistry.

Our final report will include comparisons of the outdoor air quality and the indoor conditions among many hotel rooms treated by varying equipment and techniques. I comment here only on the significant improvements seen in PURE Room quality following implementation of your expanded HEPA contact vacuum cleaning procedure and conversion to a new chemistry for cleaning/treatment of the Room air-handling units. The enclosed data tables provide details and specific values from the 15 relevant analyses performed on samples taken and handled in accord with FDA Good Laboratory Practice Guidelines and American Conference of Governmental Industrial Hygienists (ACGIH) Bioaerosol Guidelines. I am a Member of ACGIH; the analyses were performed at AeroTech Laboratories, formally accredited by the American Industrial Hygiene Association and the American Association for Laboratory Accreditation. The sampling program was organized, supervised, and reported by Dr. Anne Meyer, Principal Investigator for the NIEQRI project. I performed the on-site, real-time measurements using a MetOne Particle Concentration Meter (PCM), for respirable particulates in the size range from 0.3 to 10 micrometers.

All of the measured variables showed changes toward improved environmental quality in Room #817, including greater reductions in the air viable fungi, coil viable fungi and viable bacteria, and carpet viable bacteria counts than in the Room #808 samples. In both Rooms, the PURE process substantially improved indoor conditions that persisted for more than 3 months and all were further improved as a result of the applied 90-day maintenance procedures. The PCM (particle) and bioaerosol (fungi, bacteria in the air) counts dramatically reflect the continuously improved atmospheric quality in the PURE Rooms, compared to outdoor air conditions. For example, it is noteworthy that the pre-conversion respirable particulate concentrations in Room #817 exceeded those for the outdoor air, while the post-conversion Room #817 concentrations were much reduced and maintained even though the outdoor air quality deteriorated to greater than 10,000,000 particles per cubic foot. It is in such conditions of degraded air quality that the PURE Rooms can most benefit Room guests, by minimizing the concentrations of fine particulate matter that might trigger respiratory distress.

I look forward to reviewing these data with you in further detail. Dr. Anne Meyer and I are now working toward completion of the final report on the entire project performed over the past year. Thank you for your interest and commitment to continuously improving indoor air quality!

Sincerely,

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Professor and Director

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IUCB/NIEQRI Project – 2006 Chronological Data Summary for Room #808 [PURE/healthway]

	Sample Type	**May 31**	**June 02**	**Sept 05** *96 days after conversion*	**Sept 06**
		Pre-conversion	**Post-conversion**	**Pre-maintenance**	**Post-maintenance**
TEST					
		per m^3			
Air/Total Fungi	*air*	153 *[outside: 3027]*	67 *[outside: 5273]*	80 *[outside: 23,940]*	27 *[outside: 22,413]*
Air/Viable Fungi	*air*	82 *[outside: 424]*	141 *[outside: 707]*	94 *[outside: 318]*	59 *[outside: 577]*
Air/Viable Bact.	*air*	59 *[outside: 47]*	<12 *[outside: <12]*	35 *[outside: 82]*	<12 *[outside: 71]*
		per ft^2 (area sampled in ft^2)			
Mattress/allergens Der p 1 Der f 1	*vacuum cassette*	 <0.15 µg (1) <0.15 µg (1)	 <0.15 µg (1) <0.15 µg (1)	 <0.01 (28) <0.01 (28)	 [no sample] [no sample]
Carpet/allergens Der p 1 Der f 1	*vacuum cassette*	 <0.15 µg (1) <0.15 µg (1)	 <0.15 µg (1) <0.15 µg (1)	 <0.10 µg (15) Detected but below quantifiable limits (15)	 <0.10 µg (15) 0.11 (15)
		per ft^2 (area sampled in ft^2)			
Carpet/Tot. Fungi	*vacuum cassette*	4 (1)	4 (1)	[no sample]	[no sample]
Carpet/Via. Fungi	*swab*	[no sample]	[no sample]	129 near bathroom (1) 8380 near couch (1)	<18 near bathroom (1) <18 near couch (1)
Carpet/Via. Bact	*swab*	5128 near bthrm (.05)	<335 near bthrm (.05)	42,300 near bthrm (1) 5630 near couch (1)	18 near bathroom (1) 37 near couch (1)
		per cm^2 (area sampled in cm^2)			
Drip Pan/Tot.Fngi	*swab*	<2 (36)	32 (30)	[no sample]	[no sample]
Drip Pan/Via.Fngi	*swab*	[no sample]	[no sample]	1 (25)	15 (25)
Drip Pan/Via.Bact	*swab*	32,220 (36)	144,300 (30)	264,000 (25)	130,000 (25)
		per cm^2 (area sampled in cm^2)			
Coil/Via. Fungi	*swab*	Bulk sample/total fungi: 15.53 x 10^6 per gram	Bulk sample/total fungi: 0.15 x 10^6 per gram	1790 (100)	6350 (100)
Coil/Via. Bacteria	*swab*	[no sample]	[no sample]	3300 (100)	1000 (100)
		LEFT in each box = time of sample; RIGHT = # particles x 10^6 per ft^3			
PCM readings	*air*	1105 5.66	0811 0.35	0910 0.33	0811 0.39
		1301 5.86	1151 0.52	0912 0.30	
		1413 6.64	1315 0.42	1230 3.53	
			1423 1.98	1534 0.30	
			1655 0.41		
		Air impactor: room sample taken 0923 to 1023	*Air impactor: room sample taken 1343 to 1448*	*Air impactor: room sample taken 1130 to 1230*	
PCM on ROOF	*air*	*0901 8.56*	*0820 3.71*	*0820 7.77* (parking lot)	*0725 7.65* (parking lot)
		1900 1.38 (parking lot)	*0832 2.72*	*1059 5.26*	*0745 7.45*
			0840 3.54	*1306 4.56* (parking lot)	*0800 7.42*
			1020 2.12		*0840 7.92*
			1200 1.98 (parking lot)		

IUCB/NIEQRI Project – 2006/07 Chronological Data Summary for Room #817 [PURE/healthway]

	Sample Type	**August 17**	**August 19**	**January 11** *145 days after conversion*	**January 12**
		Pre-conversion	**Post-conversion**	**Pre-maintenance**	**Post-maintenance**
TEST					
		per m^3			
Air/Total Fungi	*air*	300 *[outside: 4213]*	100 *[outside: 2053]*	93 *[outside: 147]*	20 *[outside: 460]*
Air/Viable Fungi	*air*	283 *[outside: 424]*	35 *[outside: 306]*	59 *[outside: 718]*	24 *[outside: 24]*
Air/Viable Bact.	*air*	448 *[outside: 24]*	24 *[outside: 24]*	82 *[outside: 224]*	24 *[outside: 12]*
		per ft^2 (area sampled in ft^2)			
Mattress/allergens Der p 1 Der f 1	*vacuum cassette*	 <0.01 µg (36) <0.01 µg (36)	 <0.01 µg (36) <0.01 µg (36)	 [no sample] [no sample]	 [no sample] [no sample]
Carpet/allergens Der p 1 Der f 1	*vacuum cassette*	 <0.01 µg (15) 0.25 µg (15)	 <0.10 µg (15) <0.10 µg (15)	 <0.10 µg (15) 0.16 µg (15)	 <0.10 µg (15) Detected but below quantifiable limits (15)
		per ft^2 (area sampled in ft^2)			
Carpet/Tot. Fungi	*vacuum cassette*	4 near bathroom (2) 4 near foot of bed (2)	3 near bathroom (2) 2 near foot of bed (2)	[no sample]	[no sample]
Carpet/Via. Fungi	*swab*	92 near bathroom (1) 166 near foot of bed (1)	<18 near bathroom (1) <18 near foot of bed (1)	18 near bathroom (1) <18 near couch (1)	18; <18 nr bthrm (1) <18; <18 nr bed (1) <18; <18 nr cch (1)
Carpet/Via. Bact	*swab*	93,800 near bthrm (1) 84,500 nr ft of bed (1)	74 near bathroom (1) 18 near foot of bed (1)	166 near bathroom (1) 13,100 near couch (1)	37; 55 near bthrm (1) <18; <18 nr bed (1) 55; 18 nr cch (1)
		per cm^2 (area sampled in cm^2)			
Drip Pan/Tot.Fngi	*swab*	12 (25)	18 (25)	[no sample]	[no sample]
Drip Pan/Via.Fngi	*swab*	[no sample]	[no sample]	15 (25)	10 (25)
Drip Pan/Via.Bact	*swab*	324,000 (25)	1 (25)	6000 (25)	916 (25)
		per cm^2 (area sampled in cm^2)			
Coil/Via. Fungi	*swab*	1880 (100)	502 (100)	44,800 (100)	<1 (100)
Coil/Via. Bacteria	*swab*	16,700 (100)	1 (100)	15,600 (100)	<1 (100)
		LEFT in each box = time of sample; RIGHT = # particles x 10^6 per ft^3			
PCM readings	*air*	1100 1.01	0843 2.81	0809 0.41	1030 0.35
		1219 4.14	0905 1.26	09xx 0.16	1056 0.70
		1237 4.46	0906 1.34	1054 0.82 pump on for carpet sample	1104 0.90
		1310 2.84	1009 3.21	1152 0.32	1233 0.99
		1353 1.97	1016 2.43 1025 2.44	1342 1.05 remediation team arrived	1430 0.33, 0.55
			1055 0.77 1056 0.66		
* door to hallway opened while taking reading near door			1105 0.70 1115 5.10*		
		Air impactor: room sample taken 1135 to 1235	*Air impactor: room sample taken 0911 to 1011*	*Air impactor: room sample taken 1211 to 1311*	*Air impactor: room sample taken 1104 to 1204*
PCM on ROOF **reading taken in parking lot*	*air*	1040** 1.25 1137 1.04 1145 1.07 1150 0.90 1152 0.88 1306** 0.97	0830** 9.99+ 0925 9.99+ 0935 9.99+ 0950 9.99+	0750** 4.90 1153 0.94	1047** 3.43 1140** 4.77 1210** 4.79