



MEMORANDUM

DATE: March 8, 2011

TO: Ms. Patricia Liegey
Safety and Occupational Health Manager
Office of Administration, U.S. Nuclear Regulatory Commission (NRC)

FROM: CAPT Jeff Church, REHS, CSP, CIH
Senior Program Manager
Federal Occupational Health, U.S. Public Health Service

SUBJECT: NRC Two White Flint North Indoor Air Quality Report

CC: Mr. George Bearer, CIH (FOH)

INTRODUCTION

At the request of the U.S. Nuclear Regulatory Commission (NRC) Safety and Occupational Health Manager, the U.S. Public Health Service (USPHS), Federal Occupational Health (FOH) conducted an on-site indoor air quality (IAQ) survey at the Two White Flint North building, located at 11555 Rockville Pike, Rockville, MD. The initial activities included a building walk-through and informal interviews with building and office management. Air monitoring and sampling activities were conducted on February 23, 2011. The purpose of this survey was to monitor, sample, and evaluate the IAQ in two office work areas. One area is where an employee currently works and the other a possible future worksite for that employee in the same building. FOH representative CAPT Jeff Church conducted the survey.

BACKGROUND

A NRC employee working in cubicle T-2E37 located in the library on the 2nd floor expressed concerns about IAQ at a proposed new worksite, cubicle T-5F28 on the 5th floor, and requested a survey. Management relayed the employee's report of experiencing respiratory symptoms when checking out the work area near cubicle T-5F28. Reportedly the employee relates some of the IAQ concern to old boxes of records from the warehouse, which are occasionally opened in that area. Management requested an IAQ survey that would include an evaluation of airborne dust concentrations and provided a previous IAQ survey report that was conducted for the library in 2005 after the employee reported health symptoms during office renovation.¹ The sampling plan for this survey was designed to monitor environmental conditions and sample indoor air constituents, similar to those in the 2005 survey with the addition of mold spores, at the concerned employee's current and future proposed work space.

The Two White Flint North building is a leased facility that contains 10 stories and 5 parking decks beneath the building. Building management staff reported the building was built around 1992. The heating ventilation and air conditioning system is designed to draw outside air from the roof and supply air handling units in mechanical rooms on each floor. The roof outside air is pulled in through a 12 feet by 16 feet metal louvered intake vent. The exterior of the air intake structure is painted cinderblock which is surrounded by an approximately 15 feet high concrete barrier with a 2 feet air gap at the bottom. Cooling tower units are inside the barrier and near the intake. The roof is covered with smooth stone. The interior walls of the roof air intake structure appear to be covered with a painted insulating material. The mechanical rooms on each floor act as a mixing plenum for the fresh outdoor air and the return air from the office areas served. Those mechanical rooms have carbon dioxide (CO₂) sensors that monitor the return air,

although they are reported as not controlling operation of the fresh air supply to the mechanical rooms. Each floor has two mechanical rooms and air handling units to cover the north and south ends of the building. The air handling units contain ultraviolet light sources to reduce microbiological growth and improve condensate pan drainage. Units are equipped with Magnehelic gauges to measure the pressure drop across filters to determine change-out. The 8-foot high ceilings are composed of 2 feet by 2 feet acoustical tiles suspended below the ceiling/floor structure. The space above the suspended ceiling is used as a return air plenum and contains the supply air ducts leading to slotted vents near the windows and square vents in the other areas. The supply air temperature is controlled by wall-mounted thermostats that provide heat through the slotted vents and operate variable air volume supply air control boxes throughout the rest of the work area.

The 2nd floor library is approximately 6,000 square feet, with cubicles along the windows. The 5th floor work area that was surveyed is designed with a row of cubicles along the exterior thermopane windows and along an interior wall with an aisle-way between the two rows of cubicles. The cubicles surveyed on the 2nd and 5th floors cover an approximately 8 feet by 8 feet area and have 5.5 feet high fabric-covered metal partition walls. Both cubicles are next to windows with slatted blinds and have carpeted floors. The 5th floor cubicle is near an open area containing two laser printers, a fax-microfiche scanner and viewer, and computer equipment.

SURVEY METHODOLOGY

Building Walk-through

The employee who expressed concern about the IAQ was not present at the time of the survey. Office management led the initial walk-through of the survey areas, and building management staff provided access to the roof and mechanical spaces and answered questions about the ventilation and building operations. The Safety and Occupational Health Manager was present for the duration of the IAQ survey.

IAQ Monitoring

Two Quest Technologies, Inc., EVM7 environmental monitoring instruments were used to monitor and data log measurements of temperature, relative humidity, dew point, CO₂ and carbon monoxide (CO), total suspended particulates, and volatile organic compounds (VOCs). Results were logged every 5 minutes for almost 9 hours during the workday. Both instruments were factory-calibrated within the last year and were user-calibrated for particulates, gases, and VOCs within three days of the survey. Ten minutes of outdoor background air monitoring was conducted outside the front entrance of the Two White Flint North building prior to beginning the survey. The instruments were time-synchronized and started at the same time and were placed on the desks at cubicle T-2E37 and T-5F28.

Formaldehyde Sampling

Assay Technology's diffusive ChemDisk Aldehyde Monitors (Lot# 571AT3H10, expiration 3/31/11) were placed with each EVM7 monitor. The sampling devices were shipped overnight to the FOH Industrial Hygiene and Environmental Laboratory in Chicago, Illinois, for analysis by National Institutes of Occupational Safety and Health (NIOSH) Method 2016.

Microbiological Sampling

Air samples were collected for non-viable microbials from cubicle T-2E37, cubicle T-5F28, and outside near the roof air intake three times throughout the workday. Temperature, relative humidity, CO₂, and CO measurements were recorded with a hand-held, direct read-out Q-Trak (TSI Model 7565-X – manufacturer calibrated in December 2010) at each location during microbial sampling. Non-viable air samples were collected using a Zefon Bio-pump sampler (Model ZBP-100, Serial Number 2104, manufacturer calibrated on February 23, 2011), calibrated by the user at 15 liters/minute on the date of sampling, onto Air-O-Cell cassettes. Each sample was collected for 10 minutes. EMLab

P&K in San Bruno, CA, performed direct microscopic examination of the spore samples. The laboratory characterized, counted, and recorded fungal spores and/or structures on each slide and reported the results as spores per cubic meter (spores/m³) of air sampled.

FINDINGS AND SAMPLING RESULTS

Building Walk-through

Office areas were neat and orderly, with no visible indication of water intrusion or mold growth. The carpets are reported to be shampooed every 6 months, with the last shampoo cleaning 4.5 months ago. No new painting or office renovation has occurred recently in the surveyed areas, although construction for a hearing room on the other end of the 2nd floor was reported. Dust accumulation on the ceiling tiles around the supply air vents was present.

The mechanical spaces inspected on the 2nd and 5th floors contained some dust and debris, but air handling unit filters were in place, clean, and appeared to be well maintained. There were no chemicals or other materials that would be expected to adversely affect air quality in the mechanical spaces and no noticeable odors. There were no drain pan leaks and no visible mold growth in the spaces. The exterior of the outdoor air duct in the mechanical space for the 5th floor, north, air handling unit showed deformed paint that may indicate some previous water intrusion. The outside air supply vents were closed in all of the mechanical spaces, except for the 5th floor north mechanical space during the time of inspection. The cubicles and areas being surveyed are reportedly served by air handling units in the 2nd floor north and the 5th floor south mechanical spaces.

The roof air intake structure contained some dust, but air handling unit filters were in place, clean, and appeared to be well maintained. There were no chemicals or other materials that would be expected to adversely affect air quality in the mechanical spaces and no noticeable odors. The floor of the space near the intake vent for outside air showed what appeared to be water stains, although it was dry at the time and there was no visible mold growth. The air intake screen and louvers were clean. On the roof, outside the air intake structure, there were no exhaust systems or vents nearby that would be expected to impact air quality. The nearby cooling tower, labeled TC-09-2-M, had ice formation and water leaking from an access plate. In the area below and near the leak there was some moss growth on the ground among the stones covering the roof. The cooling towers near the air intake were not producing any noticeable water mist.

Formaldehyde Results

Formaldehyde was not detected in the air while sampled for almost 9 hours with a detection limit of 0.05 parts per million (ppm). Those detection limits are below the 8-hour Time-Weighted Average (TWA) Permissible Exposure Limit (PEL) established by regulation under the Occupational Safety and Health Administration (OSHA). The OSHA PEL 0.75 ppm and the American Conference of Governmental Industrial Hygienists (ACGIH) guidance limit is 0.3 ppm.² A media blank was non-detect for formaldehyde. Laboratory analytical results for formaldehyde are in Appendix A.

IAQ Monitoring Results

Thermal Environmental Conditions for Human Occupancy recommends normal comfort temperature ranges as 73-79°F for summer and 68-74°F for winter, when clothing is typically heavy slacks and long-sleeve shirt or sweater, work is sedentary and there are no drafts. The ideal relative humidity range is 30 to 50%.³ Average temperatures were within the acceptable range. Relative humidity was below optimal levels.

The 8-hr TWA OSHA PEL for inhalable dust is 15 milligrams/cubic meter (mg/m³) and respirable dust is 5 mg/m³.² Because ACGIH believes that evidence to evaluate the health effects of airborne particulates not otherwise specified is insufficient to establish a Threshold Limit Value (TLV), they have established guidelines, which for inhalable dust is

10 mg/m³ and for respirable dust is 3 mg/m³, based on an 8-hr TWA.⁴ The monitored office dust levels are 3-4 orders of magnitude below occupational exposure limits.

CO₂ is measured in indoor air quality investigations as an indicator of proper outdoor air delivery and dilution ventilation. Consensus guidelines indicate that CO₂ levels indoors should remain below the sum of 700 ppm and the outside CO₂ concentration in ppm for acceptable dilution and occupant comfort.⁵ Based on that guidance and initial local background readings, acceptable levels were maintained for most of each workday.

CO is a tasteless, colorless, and odorless gas that forms as a by-product of incomplete combustion. The OSHA 8-hour TWA PEL for CO is 35 ppm and ACGIH's TLV 8-hour TWA TLV is 25 ppm.² Monitored concentrations were well below regulatory and guidance levels.

In IAQ surveys, total VOCs are measured as a screening method to identify possible significant sources. Concentrations greater than 1 to 2 ppm, total VOCs, above outdoor background levels may indicate an indoor source that warrants further investigation.^{6,7} Monitored VOC readings did not exceed 0.5 ppm and averaged less than 0.1 ppm.

The IAQ monitoring results are summarized below. Initial background monitoring data, detailed monitoring summaries and data logging results are in Appendix B.

Cubicle T-2E37

Temperatures ranged from 70.9 °F to 75.7 °F with an average of 73.9 °F.

Relative humidity ranged from 20.1% to 23.8% with an average of 21.0%.

Total dust ranged from 0.0 micrograms/cubic meter (µg/m³) to 26 µg/m³ with an 8-hour TWA of 2 µg/m³.

CO₂ ranged from 172 ppm to 853 ppm with an average of 560 ppm.

CO ranged from 0.0 ppm to 1.0 ppm with an average of <0 ppm.

VOCs ranged from 0.0 ppm to 0.5 ppm with an average of 0.1 ppm.

Cubicle T-5F28

Temperatures ranged from 63.1 °F to 76.1 °F with an average of 72.7 °F.

Relative humidity ranged from 22.8% to 28.6% with an average of 24.3%.

Total dust ranged from 0.0 micrograms/cubic meter (µg/m³) to 28 µg/m³ with an 8-hour TWA of 4 µg/m³.

CO₂ ranged from 635 ppm to 1051 ppm with an average of 877 ppm.

CO ranged from 0.0 ppm to 0.0 ppm with an average of <0.0 ppm.

VOCs ranged from 0.0 ppm to 0.0 ppm with an average of <0.0 ppm.

Microbiological Results

Currently, there are no governmental regulations for acceptable indoor airborne fungal or spore levels. Typically, indoor airborne fungal levels are compared to those of outdoors. In addition, airborne fungal levels in areas of concern are compared to reference areas. Both quantitative (concentrations) and qualitative (fungal taxa) information

are important in interpretation of the results. In general, indoor airborne fungal levels in a mechanically ventilated building, where no fungal proliferation occurs, are lower than those of outdoors. Moreover, fungal species found indoors are representative of those found outdoors. Fungal genera such as: Cladosporium, Alternaria, Epicoccum, and Basidiomycetes are examples of fungi frequently detected in outdoor air samples on a seasonal basis. In a mechanically ventilated building with air filtration, the apparent concentrations of these genera should be less than those of outdoors at the air intake. There was partial snow cover on the ground, particularly in shady areas during the survey. For this sampling event, non-viable fungi were less than the outdoor levels and the partial snow cover likely reduced the level of spores captured in the outdoor samples. The results are summarized below and in Table 1.

The outdoor airborne non-viable fungal spore counts ranged from 150 to 230 spores per cubic meter (spores/m³), with Basidiospores, Ascospores, and Penicillium/Aspergillus being the dominant types. Indoor airborne non-viable fungal spore counts ranged from 27 to 67 spores/m³ at cubicle T-2E37 and 27 to 53 at cubicle T-5F28, with Basidiospores being the dominate type which showed identical cumulative counts for each cubicle. Media blank was non-detect for non-viable fungi. Laboratory results for non-viable fungi are in Appendix C.

Table 1. Summary of Microbiological Sampling and Environmental Conditions at Time of Sampling on 2/23/2011

Location	Time	Temp (°F)	%RH	CO	CO ²	Non-viable (spores/m ³)
2 nd Floor – cubicle T-2E37 desk	0931	73.0	17.8	0.0	727	67
Roof – 15' from outside air intake	1003	32.8	33.4	0.0	408	230
5 th Floor – cubicle T-5F28 desk	1022	71.8	21.6	0.0	781	53
5 th Floor – cubicle T-5F28 desk	1219	72.6	20.5	0.0	900	53
Roof – 15' from outside air intake	1250	40.8	41.3	0.0	395	150
2 nd Floor – cubicle T-2E37 desk	1308	72.0	18.4	0.0	796	27
2 nd Floor – cubicle T-2E37 desk	1500	73.6	17.4	0.0	840	33
Roof – 15' from outside air intake	1524	44.4	27.4	0.0	379	210
5 th Floor – cubicle T-5F28 desk	1543	70.7	22.4	0.0	908	27

DISCUSSION

Indoor air quality sampling and monitoring results represent only what is present at the time of the survey. This survey was designed to capture data for a number of IAQ parameters over a workday. Based on this survey and the parameters sampled or monitored, the indoor air quality at cubicle T-2E37 and T-5F28 is similar and meets established regulatory requirements.

Indoor airborne total particulate monitoring measured similar concentrations on the 2nd and 5th floors which were at or below the low microgram levels, well below occupational exposure levels and below outdoor background concentrations. No boxes of records were observed being opened during this survey, but it does not appear that there is a substantial increase in airborne dust loads which might be available for resuspension in the air near cubicle T-5F28 from residual dust off of boxes of records or nearby electronic equipment.

Air temperature averages for the workday were within the wintertime indoor optimal temperature range. Temperature can be a factor in occupant comfort, but it alone does not lead to symptoms related to indoor air quality. Thermal comfort encompasses a number of factors beyond air temperature alone, including relative humidity, air movement, personal activity level, and clothing.

Relative humidity on both the 2nd and 5th floors averaged around 21% and 24%, respectively, below the optimal comfort range. It is believed that low relative humidity (<30%) can cause dryness of the mucous membranes, resulting in eye and throat irritations which may also lead to increased susceptibility to infectious diseases and

irritation from other contaminants. However, those relationships have generally not been supported in studies, other than at extremely low relative humidity (<5%).^{8,9,10}

Although average and maximum CO₂ concentrations were higher on the 5th floor, they averaged below 1,000 ppm and individual measurements were below 1,000 ppm for a large majority of the workday. Indoor CO₂ levels below 1,000 ppm are generally regarded as an indication that adequate ventilation is provided. As CO₂ levels rise, other contaminants also rise and associated symptoms and health complaints sometimes increase. The vents that provide outside air to several of the mechanical rooms were not open at the time they were inspected and may not be operating properly. Increased outside air into the mechanical room air handling unit that services cubicle T-5F28 will likely further reduce the CO₂ concentrations on the 5th floor area monitored during this survey.

Formaldehyde concentrations were not detected at a detection limit of 0.05 ppm on either the 2nd or 5th floors, and that detection limit is below OSHA and ACGIH occupational exposure limits. Formaldehyde can cause nasal, eye, and upper respiratory irritation and increase risk of asthma and/or allergies, typically at concentrations above 0.1 ppm, and is known to off-gas from new building products.^{8,9} Although formaldehyde is a sensitizer and a suspected human carcinogen, it is produced naturally in our bodies at very low levels, which causes no apparent harm. Humans are exposed to formaldehyde in the environment through the air they breathe at home and at work, their food, and some products used on the skin. Some examples of items containing, releasing, or producing formaldehyde include: auto exhaust, gas cookers, fireplaces, cheeses, dried foods, fish, antiseptics, medicines, cosmetics, dish-washing liquids, fabric softeners, shoe-care agents, carpet cleaners, glues and adhesives, lacquers, paper, plastics, paints, and some types of wood products.¹¹

Non-viable fungal spore concentrations detected on the 2nd and 5th floors were similar. Indoor levels were lower than outdoor levels, and no visible or suspected fungal growth was identified during the walk-through. The presence and types of microbials detected indoors are not suggestive of fungal growth and amplification inside the building. In a mechanically ventilated building, outside air, which contains fungal spores, is brought in through filters, mixed with the returned air, conditioned either by heating or cooling in the air handling units, and then delivered to the occupied space through ducts and supply vents/diffusers. Fungal spores can enter buildings through openings around entrance doors, windows, and cracks in the building envelope. Spores can also be carried into the building on occupants' apparel and shoes. Fungal spores that enter the occupied space will either return to the ventilation system through return ducts or plenum and eventually settle primarily on horizontal surfaces, such as desks, counters, workstations, bookshelves, and floor/carpeting. Provided with a proper environment, indoor fungal spores can germinate and proliferate in or on such surfaces. Thus, routine cleaning of those surfaces plays an important role in reducing microbiological burden inside the building.

CO was not detected on the 5th floor, and while concentrations were detected on the 2nd floor, they averaged less than 1ppm, well below regulatory and guidance limits. CO is a chemical asphyxiant that can cause fatigue, headache, nausea, dizziness, and even death. However, no symptoms or adverse health effects are expected from exposures to CO concentrations below 10 ppm.^{9,12}

VOCs were not detected on the 5th floor, and the total VOC concentrations on the 2nd floor averaged less than 0.1 ppm. VOCs are chemicals classified with boiling points that range roughly between 120 and 500 °F and are widespread in the environment as they are emitted from many man-made products, including office furnishings, building materials, and electronic equipment. Indoor environments generally have greater VOC concentrations than outdoors. Health effects and symptoms can vary widely among individual compounds, but most are not acutely toxic and only a few have established regulatory exposure limits. The sensor used in the instrument for this survey detects VOCs down to 0.0 ppm. The photoionization detector was equipped with a 10.6 electron volt lamp which can detect over 300 different VOCs, including a majority of those most commonly detected in air. The concentration of total VOCs detected during this survey does not trigger further investigation for specific sources of VOCs.^{6,7}

CONCLUSIONS

1. Based on the sampling and monitoring conducted, indoor air quality at cubicle T-2E37 and T-5F28 is similar and meets established regulatory requirements.
2. Relative humidity at cubicle T-2E37 and T-5F28 is below wintertime indoor optimal levels.
3. Average air temperatures were within wintertime indoor optimal levels.
4. Formaldehyde concentrations were not detected.
5. CO and total suspended particulate concentrations were below occupational exposure limits, and particulates and indoor airborne fungal spore concentrations were less than those detected in outside air.
6. Total VOC concentrations monitored in indoor air were below 1 ppm.

RECOMMENDATIONS

1. Improve relative humidity to between 30-50% humidity for optimum occupant comfort.
2. Inspect outside air vents in the air handling unit mechanical rooms to ensure proper operation. Increased outside air may further reduce buildup of indoor air contaminants and improve occupant comfort.
3. Ensure there is no ongoing water intrusion at the roof air intake vents or at the outside air duct supplying the 5th floor north air handling unit mechanical room.
4. Inspect the cooling tower, labeled TC-09-2-M, to prevent water leakage near the outside air intake.

REFERENCES

1. Amy, Jeffery L. and O'Konski, David P. Report from Applied Environmental, Inc., entitled "Indoor Air Quality Survey – 11555 Rockville Pike, Rockville, Maryland" to Dr. August K. Spector, U.S. Nuclear Regulatory Commission dated September 29, 2005.
2. American Conference of Governmental Industrial Hygienists. Guide to Occupational Exposure Values - 2010. ACGIH: Cincinnati, OH, 2010.
3. ASHRAE Standard 55-2010, Thermal Environmental Conditions for Human Occupancy. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 2010.
4. American Conference of Governmental Industrial Hygienists. TLVs® and BEIs: Threshold Limit Values for Chemical Substances and Physical Agents. Cincinnati: ACGIH, 2010.
5. ASHRAE Standard 62.1-2010, Ventilation for Acceptable Indoor Air Quality. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 2010.
6. O'Reilly, James T.; Hagan, Phillip; Gots, Ronald; and Hedge, Alan. Keeping Buildings Healthy. New York: John Wiley and Sons, Inc., 1998.
7. Samet, Jonathan M. and Spengler, John D. Indoor Air Pollution: A Health Perspective. Baltimore: The Johns Hopkins University Press, 1991.
8. Burge, Harriet A. and Hoyer, Marion E. Indoor Air Quality. In: DiNardi, Salvatore R.: The Occupational Environment – Its Evaluation and Control. Fairfax, VA: American Industrial Hygiene Association, 1997.
9. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Formaldehyde. Atlanta: ATSDR, July 1999, and Addendum to the Toxicological Profile for Formaldehyde. Atlanta: ATSDR, October 2010.
10. Costa, Daniel L. and Amdur, Mary O. Casarett and Doull's Toxicology: The Science of Poisons, 5th Edition; Chapter 28, Air Pollution. McGraw-Hill: San Francisco, CA. 1995.
11. Burton, Jeff D. IAQ and HVAC Workbook, 3rd Edition; Bountiful, UT: IVE, Inc., 1997.
12. ANSI/AIHA Z9 Committee. Recommendations for the Management, Operation, Testing and Maintenance of HVAC Systems: Maintaining Acceptable IAQ in Non-Industrial Employee Occupancies Through Dilution Ventilation. Fairfax, VA: American Industrial Hygiene Association, 2004

APPENDIX A

FORMALDEHYDE ANALYSIS LABORATORY RESULTS



FOH ENVIRONMENTAL LABORATORY

536 S. CLARK STREET CHICAGO, IL 60605 PHONE: (312) 886-0413 FAX: (312) 886-0434

ANALYTICAL REPORT

Submitted To: USPHS/Federal Occupational Health
4550 Montgomery Avenue, Suite 950
Bethesda, MD

Attention: CAPT Jeff Church, REHS, CSP, CIH

Submitted By: Ms. Michelle C. Stemmons

Reference Data: Formaldehyde
Sampling Site: NRC: Rockville, MD
Sample Type: Air/Assay Technology badge(s)
Method Reference: Modified NIOSH 2016
Project ID: Project O-1336
DFOH Lab Nos.: O-11-7153 through O-11-7155
Date Received: 02/25/11
Date Analyzed: 03/01/11
Date Issued: 03/02/11

The formaldehyde samples were prepared by extraction with acetonitrile. The analysis was performed using a Hewlett Packard Series II 1090 Liquid Chromatograph with a diode-array detector and a C-18 column.

General Lab Comments:

All quality control criteria have been met.

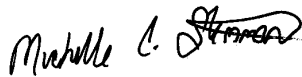
* All samples received in condition acceptable for analysis unless otherwise noted.

** Sample results have not been corrected for contamination based on the field blank or other analytical blank unless otherwise noted.

The formaldehyde results are not covered under the AIHA accreditation.

Analytical results are given in the enclosed table. Results relate only to items tested. If you have any questions about these results, feel free to phone the Laboratory at (312) 886-0413.


Ms. Edna A. Bautista
Technical Manager


Ms. Michelle C. Stemmons
Laboratory Director



FOH ENVIRONMENTAL LABORATORY

536 S. CLARK STREET CHICAGO, IL 60605 PHONE: (312) 886-0413 FAX: (312) 886-0434

FORMALDEHYDE in AIR RESULTS

SAMPLE NUMBER*	LABORATORY NUMBER	TIME (min.)	CONCENTRATION (μg)	CONCENTRATION (ppm)
3H10-HD3042	O-11-7153	526	<0.04	<0.05
3H10-HD3513	O-11-7154	524	<0.04	<0.05
3H10-HD3832**	O-11-7155		<0.04	None Detected

ANALYTE	Agency Standard (ppm)	Method Detection Limit (ppm)	Reporting Limit (ppm)	Sampling Rate (ml's/min)	Method
Formaldehyde – Assay Technology Badge	0.75 (OSHA PEL) 2 (OSHA STEL) 0.1 (NIOSH Ceiling) 0.3 (ACGIH Ceiling)	0.08 @ 15 min sample 0.003 @ 480 min sample	0.17 @ 15 min sample 0.005 @ 480 min sample	13.1	Modified NIOSH #2016


Ms. Edna A. Bautista
Technical Manager

APPENDIX B

INDOOR AIR QUALITY MONITORING RESULTS

Background Monitoring Data (SN030029)

Information Panel

Comments	10-minute Background of outside air for Two White Flint IAQ monitoring of 2nd Floor, Rm T-2E37 (SN030029)
Location	11555 Rockville Pike, Rockville, MD
Name	NRC Two White Flint IAQ - Outside Background Data
Parent Session	EVM0157
Start Time	Wednesday, February 23, 2011 08:07:57
Stop Time	Wednesday, February 23, 2011 08:18:06
User Name	FOH

General Data Panel

<u>Description</u>	<u>Meter</u>	<u>Value</u>	<u>Description</u>	<u>Meter</u>	<u>Value</u>
Humidity Max	1	26.2 %	Humidity Avg	1	23.4 %
Humidity Min	1	21.4 %	Humidity Max Time	1	2/23/2011
8:18:05 AM					
Humidity Min Time	1	2/23/2011 8:09:31 AM	Dust Average	1	65 ug/m ³
Dust Minimum	1	40 ug/m ³	Dust Maximum	1	110 ug/m ³
CO2 Average	1	50 PPM	CO2 Minimum	1	27 PPM
CO2 Maximum	1	81 PPM	CO Average	1	0 PPM
CO Minimum	1	0 PPM	CO Maximum	1	0 PPM
PID Average	1	0 PPM	PID Minimum	1	0 PPM
PID Maximum	1	0.3 PPM	Temp Avg	1	47.3 °F
Temp Min	1	42.1 °F	Temp Max	1	53.1 °F
Dust Min Time	1	2/23/2011 8:10:08 AM	Dust Max Time	1	2/23/2011
8:11:55 AM					
CO2 Min Time	1	2/23/2011 8:17:13 AM	CO2 Max Time	1	2/23/2011
8:08:03 AM					
CO Min Time	1	2/23/2011 8:16:51 AM	CO Max Time	1	2/23/2011
8:08:30 AM					
PID Min Time	1	2/23/2011 8:10:20 AM	PID Max Time	1	2/23/2011
8:08:20 AM					
Temp Min Time	1	2/23/2011 8:18:04 AM	Temp Max Time	1	2/23/2011
8:07:56 AM					
Dew Point Minimum	1	32 °F	Dew Point Maximum	1	32 °F
Dew Point Average	1	32 °F	Dew Point Min Time	1	2/23/2011
8:07:56 AM					
Dew Point Max Time	1	2/23/2011 8:07:56 AM			

Background Monitoring Data (SN030030)

Information Panel

Comments	10-minute Background of outside air for Two White Flint IAQ monitoring of 5th Floor, Rm T-5F28 (SN030030)
Location	11555 Rockville Pike, Rockville, MD
Name	NRC Two White Flint IAQ - Outside Background Data
Parent Session	EVM0414
Start Time	Wednesday, February 23, 2011 08:07:58
Stop Time	Wednesday, February 23, 2011 08:18:07
User Name	FOH

General Data Panel

<u>Description</u>	<u>Meter</u>	<u>Value</u>	<u>Description</u>	<u>Meter</u>	<u>Value</u>
Humidity Max	1	29.2 %	Humidity Avg	1	27.1 %
Humidity Min	1	24.4 %	Humidity Max Time	1	2/23/2011
8:18:06 AM					
Humidity Min Time	1	2/23/2011 8:07:57 AM	Dust Average	1	41 ug/m ³
Dust Minimum	1	28 ug/m ³	Dust Maximum	1	56 ug/m ³
CO2 Average	1	428 PPM	CO2 Minimum	1	358 PPM
CO2 Maximum	1	497 PPM	CO Average	1	0 PPM
CO Minimum	1	0 PPM	CO Maximum	1	0 PPM
PID Average	1	0 PPM	PID Minimum	1	0 PPM
PID Maximum	1	0 PPM	Temp Avg	1	44.2 °F
Temp Min	1	40.1 °F	Temp Max	1	50.2 °F
Dust Min Time	1	2/23/2011 8:12:04 AM	Dust Max Time	1	2/23/2011
8:11:45 AM					
CO2 Min Time	1	2/23/2011 8:08:54 AM	CO2 Max Time	1	2/23/2011
8:16:51 AM					
CO Min Time	1	2/23/2011 8:07:57 AM	CO Max Time	1	2/23/2011
8:07:57 AM					
PID Min Time	1	2/23/2011 8:07:57 AM	PID Max Time	1	2/23/2011
8:07:57 AM					
Temp Min Time	1	2/23/2011 8:18:05 AM	Temp Max Time	1	2/23/2011
8:07:57 AM					
Dew Point Minimum	1	32 °F	Dew Point Maximum	1	32 °F
Dew Point Average	1	32 °F	Dew Point Min Time	1	2/23/2011
8:07:57 AM					
Dew Point Max Time	1	2/23/2011 8:07:57 AM			

IAQ Summary Monitoring Data, 2nd Floor, SN030029

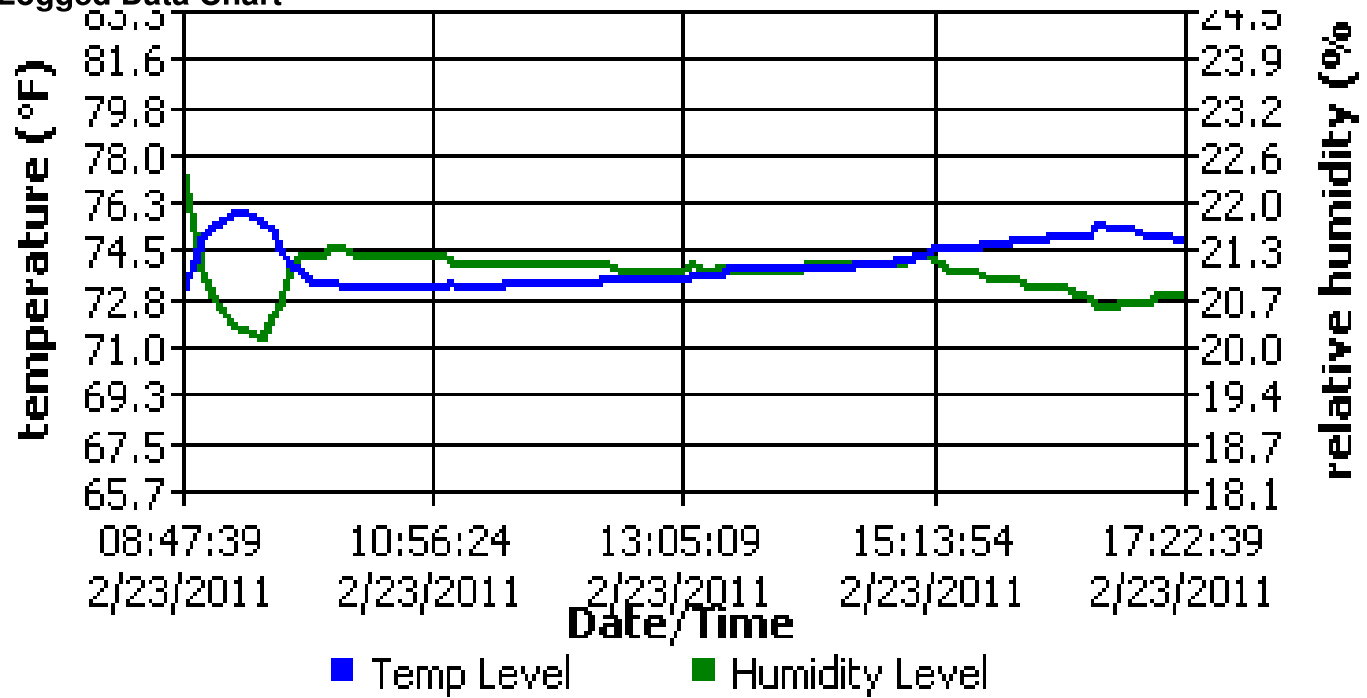
Information Panel

Comments (SN030029) Summary Monitoring Data for Two White Flint IAQ, 2nd Floor, Rm T-2E37
Location 11555 Rockville Pike, Rockville, MD
Name NRC Two White Flint IAQ - 2nd Floor Summary Data
Parent Session EVM0158
Start Time Wednesday, February 23, 2011 08:42:39
Stop Time Wednesday, February 23, 2011 17:27:17
User Name FOH

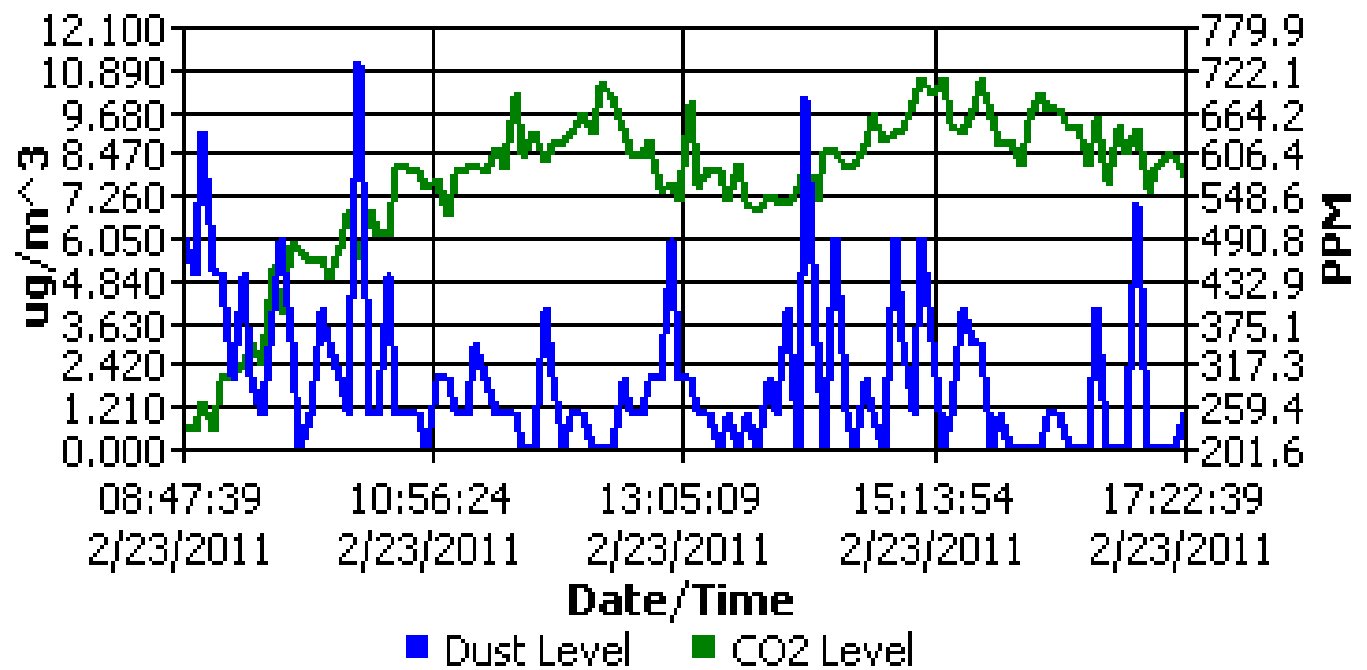
General Data Panel

<u>Description</u>	<u>Meter</u>	<u>Value</u>	<u>Description</u>	<u>Meter</u>	<u>Value</u>
Humidity Max	1	23.8 %	Humidity Avg	1	21 %
Humidity Min	1	20.1 %	Humidity Max Time	1	2/23/2011
8:43:07 AM					
Humidity Min Time	1	2/23/2011 9:27:20 AM	Dust Average	1	2 ug/m ³
Dust Minimum	1	0 ug/m ³	Dust Maximum	1	26 ug/m ³
Dust Max STEL	1	9 ug/m ³	Dust TWA	1	2 ug/m ³
CO2 Average	1	560 PPM	CO2 Minimum	1	172 PPM
CO2 Maximum	1	853 PPM	CO2 Max STEL	1	709 PPM
CO2 TWA	1	613 PPM	CO Average	1	0 PPM
CO Minimum	1	0 PPM	CO Maximum	1	1 PPM
CO Max STEL	1	1 PPM	CO TWA	1	1 PPM
PID Average	1	0.1 PPM	PID Minimum	1	0 PPM
PID Maximum	1	0.5 PPM	PID Max STEL	1	0.2 PPM
PID TWA	1	0.1 PPM	Temp Avg	1	73.9 °F
Temp Min	1	70.9 °F	Temp Max	1	75.7 °F
Dust Min Time	1	2/23/2011 11:17:04 AM	Dust Max Time	1	2/23/2011
8:55:04 AM					
Dust Max STEL Time	1	2/23/2011 8:57:39 AM	CO2 Min Time	1	2/23/2011
8:46:00 AM					
CO2 Max Time	1	2/23/2011 3:10:31 PM	CO2 Max STEL Time	1	2/23/2011
3:14:18 PM					
CO Min Time	1	2/23/2011 5:27:13 PM	CO Max Time	1	2/23/2011
10:32:07 AM					
CO Max STEL Time	1	2/23/2011 10:36:49 AM	PID Min Time	1	2/23/2011
3:35:19 PM					
PID Max Time	1	2/23/2011 8:42:48 AM	PID STEL Time	1	2/23/2011
8:57:39 AM					
Temp Min Time	1	2/23/2011 8:42:37 AM	Temp Max Time	1	2/23/2011
9:18:41 AM					
Dew Point Minimum	1	32 °F	Dew Point Maximum	1	32.5 °F
Dew Point Average	1	32 °F	Dew Point Min Time	1	2/23/2011
9:26:52 AM					
Dew Point Max Time	1	2/23/2011 8:54:56 AM			

Logged Data Chart



Logged Data Chart



IAQ Summary Monitoring Data, 5th Floor, SN030030

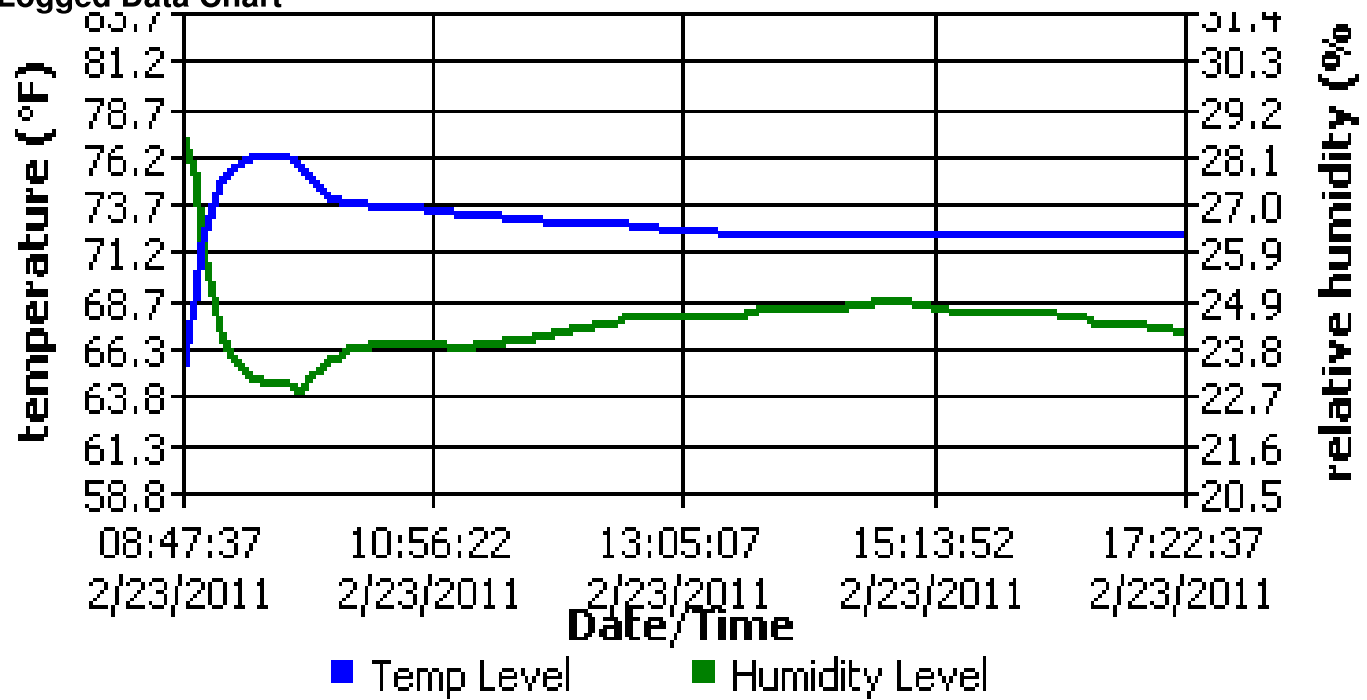
Information Panel

Comments (SN030030) Summary Monitoring Data for Two White Flint IAQ, 5th Floor, Rm T-5F28
Location 11555 Rockville Pike, Rockville, MD
Name NRC Two White Flint IAQ - 5th Floor Summary Data
Parent Session EVM0415
Start Time Wednesday, February 23, 2011 08:42:37
Stop Time Wednesday, February 23, 2011 17:25:02
User Name FOH

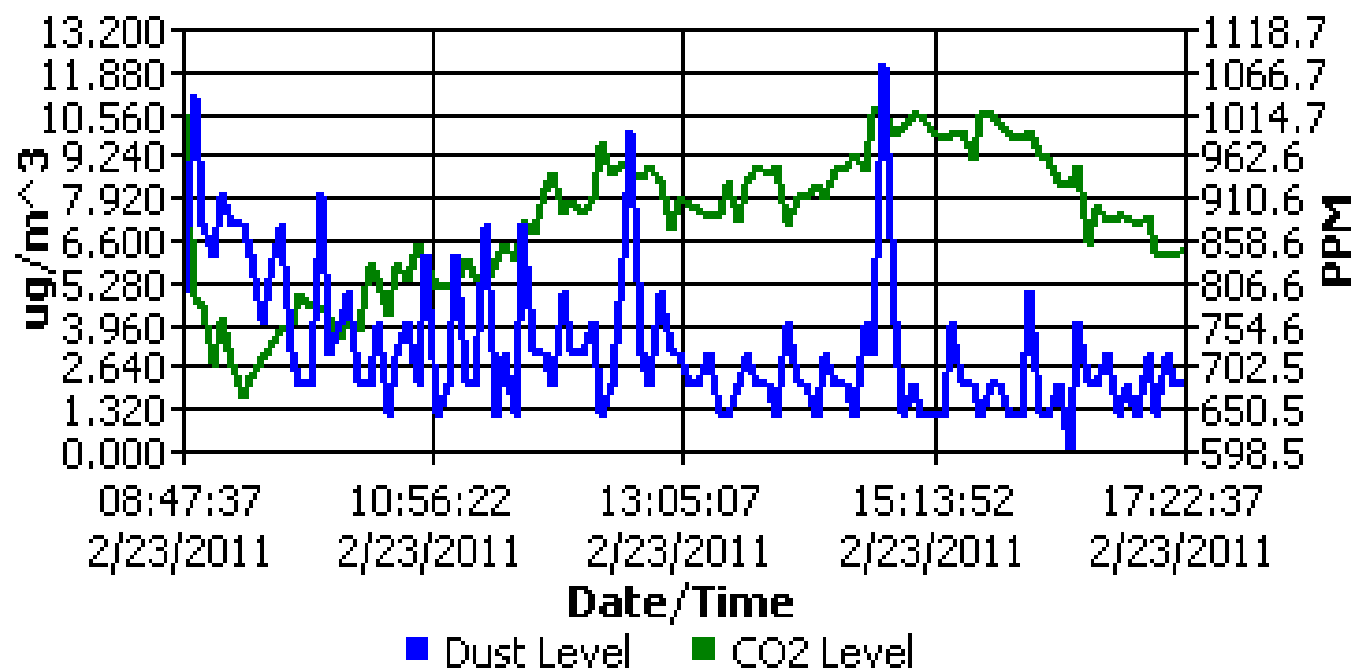
General Data Panel

<u>Description</u>	<u>Meter</u>	<u>Value</u>	<u>Description</u>	<u>Meter</u>	<u>Value</u>
Humidity Max	1	28.6 %	Humidity Avg	1	24.3 %
Humidity Min	1	22.8 %	Humidity Max Time	1	2/23/2011
8:48:34 AM					
Humidity Min Time	1	2/23/2011 9:47:51 AM	Dust Average	1	3 ug/m ³
Dust Minimum	1	0 ug/m ³	Dust Maximum	1	28 ug/m ³
Dust Max STEL	1	8 ug/m ³	Dust TWA	1	4 ug/m ³
CO2 Average	1	877 PPM	CO2 Minimum	1	635 PPM
CO2 Maximum	1	1051 PPM	CO2 Max STEL	1	1014 PPM
CO2 TWA	1	955 PPM	CO Average	1	0 PPM
CO Minimum	1	0 PPM	CO Maximum	1	0 PPM
CO Max STEL	1	0 PPM	CO TWA	1	0 PPM
PID Average	1	0 PPM	PID Minimum	1	0 PPM
PID Maximum	1	0 PPM	PID Max STEL	1	0 PPM
PID TWA	1	0 PPM	Temp Avg	1	72.7 °F
Temp Min	1	63.1 °F	Temp Max	1	76.1 °F
Dust Min Time	1	2/23/2011 4:36:46 PM	Dust Max Time	1	2/23/2011
8:44:09 AM					
Dust Max STEL Time	1	2/23/2011 8:57:37 AM	CO2 Min Time	1	2/23/2011
9:17:17 AM					
CO2 Max Time	1	2/23/2011 3:01:11 PM	CO2 Max STEL Time	1	2/23/2011
3:02:14 PM					
CO Min Time	1	2/23/2011 8:42:35 AM	CO Max Time	1	2/23/2011
10:27:08 AM					
CO Max STEL Time	1	2/23/2011 10:34:47 AM	PID Min Time	1	2/23/2011
8:42:35 AM					
PID Max Time	1	2/23/2011 8:42:35 AM	PID STEL Time	1	2/23/2011
8:57:37 AM					
Temp Min Time	1	2/23/2011 8:42:35 AM	Temp Max Time	1	2/23/2011
9:34:43 AM					
Dew Point Minimum	1	32 °F	Dew Point Maximum	1	35.8 °F
Dew Point Average	1	34.2 °F	Dew Point Min Time	1	2/23/2011
8:42:35 AM					
Dew Point Max Time	1	2/23/2011 9:10:14 AM			

Logged Data Chart



Logged Data Chart



IAQ Logged Monitoring Data, 2nd Floor, SN030029

Information Panel

Comments Logged Monitoring Data for Two White Flint IAQ, 2nd Floor, Rm T-2E37
(SN030029) - Dust units ug/m3, Temp & Dew pt degrees F
Location 11555 Rockville Pike, Rockville, MD
Name NRC Two White Flint IAQ - 2nd Floor Logged Data
Parent Session EVM0158
Start Time Wednesday, February 23, 2011 08:42:39
Stop Time Wednesday, February 23, 2011 17:27:17
User Name FOH

Timestamp	Dust Level ug/	Temp Level	Humidity Level	CO2 Level	CO Level	PPMPID Level	Dew Point
		temperature (°	relative	PPM		PPM	Level
		humidity (%)	humidity (%)				temperature (°
2/23/2011 8:47:39 AM	6.0	73.0	22.3	231.0	0.0	0.2	32.4
2/23/2011 8:52:39 AM	5.0	74.1	21.5	224.0	0.0	0.1	32.4
2/23/2011 8:57:39 AM	9.0	75.0	21.0	262.0	0.0	0.1	32.4
2/23/2011 9:02:39 AM	5.0	75.4	20.7	228.0	1.0	0.1	32.4
2/23/2011 9:07:39 AM	5.0	75.6	20.5	296.0	0.0	0.1	32.4
2/23/2011 9:12:39 AM	2.0	75.7	20.3	300.0	0.0	0.1	32.2
2/23/2011 9:17:39 AM	5.0	75.7	20.2	317.0	1.0	0.1	32.2
2/23/2011 9:22:39 AM	2.0	75.7	20.2	341.0	0.0	0.1	32.0
2/23/2011 9:27:39 AM	1.0	75.6	20.1	315.0	1.0	0.1	32.0
2/23/2011 9:32:39 AM	4.0	75.2	20.4	453.0	0.0	0.1	32.0
2/23/2011 9:37:39 AM	6.0	74.5	20.6	389.0	1.0	0.1	32.0
2/23/2011 9:42:39 AM	3.0	73.9	21.1	483.0	1.0	0.1	32.0
2/23/2011 9:47:39 AM	0.0	73.8	21.2	472.0	1.0	0.1	32.0
2/23/2011 9:52:39 AM	1.0	73.4	21.2	455.0	1.0	0.1	32.0
2/23/2011 9:57:39 AM	4.0	73.2	21.2	463.0	1.0	0.1	32.0
2/23/2011 10:02:39 AM	3.0	73.2	21.3	433.0	1.0	0.1	32.0
2/23/2011 10:07:39 AM	2.0	73.2	21.3	476.0	1.0	0.1	32.0
2/23/2011 10:12:39 AM	1.0	73.0	21.3	527.0	0.0	0.1	32.0
2/23/2011 10:17:39 AM	11.0	73.0	21.2	463.0	0.0	0.1	32.0
2/23/2011 10:22:39 AM	1.0	73.0	21.2	524.0	1.0	0.1	32.0
2/23/2011 10:27:39 AM	1.0	73.0	21.2	492.0	0.0	0.1	32.0
2/23/2011 10:32:39 AM	5.0	73.0	21.2	494.0	1.0	0.1	32.0
2/23/2011 10:37:39 AM	1.0	73.0	21.2	588.0	0.0	0.1	32.0
2/23/2011 10:42:39 AM	1.0	73.0	21.2	583.0	1.0	0.1	32.0
2/23/2011 10:47:39 AM	1.0	73.0	21.2	579.0	1.0	0.1	32.0
2/23/2011 10:52:39 AM	0.0	73.0	21.2	559.0	1.0	0.1	32.0
2/23/2011 10:57:39 AM	2.0	73.0	21.2	568.0	1.0	0.1	32.0
2/23/2011 11:02:39 AM	2.0	73.2	21.2	520.0	0.0	0.1	32.0
2/23/2011 11:07:39 AM	1.0	73.2	21.1	577.0	1.0	0.1	32.0
2/23/2011 11:12:39 AM	1.0	73.0	21.1	584.0	1.0	0.1	32.0
2/23/2011 11:17:39 AM	3.0	73.0	21.1	588.0	1.0	0.1	32.0
2/23/2011 11:22:39 AM	2.0	73.0	21.1	579.0	1.0	0.1	32.0
2/23/2011 11:27:39 AM	1.0	73.0	21.1	609.0	1.0	0.1	32.0
2/23/2011 11:32:39 AM	1.0	73.2	21.1	585.0	1.0	0.1	32.0
2/23/2011 11:37:39 AM	1.0	73.2	21.1	688.0	0.0	0.1	32.0
2/23/2011 11:42:39 AM	0.0	73.2	21.1	598.0	1.0	0.1	32.0
2/23/2011 11:47:39 AM	0.0	73.2	21.1	630.0	0.0	0.1	32.0
2/23/2011 11:52:39 AM	4.0	73.2	21.1	594.0	1.0	0.1	32.0
2/23/2011 11:57:39 AM	2.0	73.2	21.1	617.0	1.0	0.1	32.0
2/23/2011 12:02:39 PM	0.0	73.2	21.1	622.0	0.0	0.1	32.0
2/23/2011 12:07:39 PM	1.0	73.2	21.1	630.0	0.0	0.1	32.0
2/23/2011 12:12:39 PM	1.0	73.2	21.1	658.0	1.0	0.1	32.0
2/23/2011 12:17:39 PM	0.0	73.2	21.1	630.0	0.0	0.1	32.0
2/23/2011 12:22:39 PM	0.0	73.4	21.1	700.0	0.0	0.1	32.0
2/23/2011 12:27:39 PM	0.0	73.4	21.1	681.0	1.0	0.1	32.0
2/23/2011 12:32:39 PM	2.0	73.4	21.0	639.0	0.0	0.1	32.0
2/23/2011 12:37:39 PM	1.0	73.4	21.0	604.0	1.0	0.1	32.0
2/23/2011 12:42:39 PM	1.0	73.4	21.0	600.0	0.0	0.1	32.0
2/23/2011 12:47:39 PM	2.0	73.4	21.0	621.0	0.0	0.1	32.0
2/23/2011 12:52:39 PM	2.0	73.4	21.0	551.0	0.0	0.1	32.0
2/23/2011 12:57:39 PM	6.0	73.6	21.0	563.0	1.0	0.1	32.0
2/23/2011 1:02:39 PM	2.0	73.4	21.0	541.0	0.0	0.1	32.0
2/23/2011 1:07:39 PM	2.0	73.6	21.1	677.0	1.0	0.1	32.0
2/23/2011 1:12:39 PM	1.0	73.6	21.1	557.0	0.0	0.1	32.0
2/23/2011 1:17:39 PM	1.0	73.6	21.0	587.0	1.0	0.1	32.0
2/23/2011 1:22:39 PM	0.0	73.6	21.1	579.0	0.0	0.1	32.0
2/23/2011 1:27:39 PM	1.0	73.8	21.0	544.0	1.0	0.1	32.0
2/23/2011 1:32:39 PM	0.0	73.8	21.0	590.0	0.0	0.1	32.0
2/23/2011 1:37:39 PM	1.0	73.8	21.0	534.0	1.0	0.1	32.0
2/23/2011 1:42:39 PM	0.0	73.8	21.0	527.0	0.0	0.2	32.0
2/23/2011 1:47:39 PM	2.0	73.8	21.0	548.0	0.0	0.1	32.0

Timestamp	Dust Level ug/	Temp Level	Humidity Level	CO2 Level	CO Level	PPM	PPM	Dew Point
		temperature (°	relative	PPM				Level
		humidity (%)	humidity (%)					temperature (°
2/23/2011 1:52:39 PM	1.0	73.8	21.0	543.0	0.0	0.2		32.0
2/23/2011 1:57:39 PM	4.0	73.8	21.0	538.0	1.0	0.1		32.0
2/23/2011 2:02:39 PM	0.0	73.8	21.0	556.0	0.0	0.1		32.0
2/23/2011 2:07:39 PM	10.0	73.8	21.1	594.0	1.0	0.1		32.0
2/23/2011 2:12:39 PM	3.0	73.8	21.1	542.0	0.0	0.1		32.0
2/23/2011 2:17:39 PM	0.0	73.8	21.1	609.0	0.0	0.1		32.0
2/23/2011 2:22:39 PM	6.0	73.8	21.1	607.0	1.0	0.1		32.0
2/23/2011 2:27:39 PM	1.0	73.8	21.1	585.0	0.0	0.1		32.0
2/23/2011 2:32:39 PM	0.0	73.9	21.1	588.0	1.0	0.1		32.0
2/23/2011 2:37:39 PM	2.0	73.9	21.1	616.0	0.0	0.1		32.0
2/23/2011 2:42:39 PM	1.0	73.9	21.1	659.0	0.0	0.1		32.0
2/23/2011 2:47:39 PM	0.0	73.9	21.1	622.0	0.0	0.1		32.0
2/23/2011 2:52:39 PM	6.0	74.1	21.1	630.0	0.0	0.1		32.0
2/23/2011 2:57:39 PM	3.0	74.1	21.1	640.0	1.0	0.1		32.0
2/23/2011 3:02:39 PM	1.0	74.3	21.2	678.0	0.0	0.1		32.0
2/23/2011 3:07:39 PM	6.0	74.3	21.2	709.0	1.0	0.1		32.0
2/23/2011 3:12:39 PM	3.0	74.5	21.2	686.0	0.0	0.1		32.2
2/23/2011 3:17:39 PM	0.0	74.5	21.1	709.0	0.0	0.1		32.0
2/23/2011 3:22:39 PM	1.0	74.5	21.0	641.0	0.0	0.0		32.0
2/23/2011 3:27:39 PM	4.0	74.5	21.0	635.0	0.0	0.0		32.0
2/23/2011 3:32:39 PM	3.0	74.5	21.0	664.0	0.0	0.0		32.0
2/23/2011 3:37:39 PM	3.0	74.7	21.0	705.0	0.0	0.0		32.0
2/23/2011 3:42:39 PM	0.0	74.7	20.9	652.0	0.0	0.1		32.0
2/23/2011 3:47:39 PM	1.0	74.7	20.9	615.0	0.0	0.0		32.2
2/23/2011 3:52:39 PM	0.0	74.8	20.9	624.0	0.0	0.0		32.0
2/23/2011 3:57:39 PM	0.0	74.8	20.9	592.0	0.0	0.1		32.2
2/23/2011 4:02:39 PM	0.0	74.8	20.8	656.0	0.0	0.1		32.2
2/23/2011 4:07:39 PM	0.0	74.8	20.8	687.0	0.0	0.1		32.2
2/23/2011 4:12:39 PM	1.0	75.0	20.8	663.0	0.0	0.1		32.2
2/23/2011 4:17:39 PM	1.0	75.0	20.8	664.0	0.0	0.1		32.2
2/23/2011 4:22:39 PM	0.0	75.0	20.8	640.0	0.0	0.1		32.2
2/23/2011 4:27:39 PM	0.0	75.0	20.7	643.0	0.0	0.1		32.2
2/23/2011 4:32:39 PM	0.0	75.0	20.7	592.0	0.0	0.1		32.2
2/23/2011 4:37:39 PM	4.0	75.4	20.6	653.0	0.0	0.1		32.2
2/23/2011 4:42:39 PM	0.0	75.4	20.5	564.0	0.0	0.1		32.2
2/23/2011 4:47:39 PM	0.0	75.2	20.6	644.0	0.0	0.0		32.2
2/23/2011 4:52:39 PM	0.0	75.2	20.6	607.0	0.0	0.1		32.0
2/23/2011 4:57:39 PM	7.0	75.2	20.6	638.0	0.0	0.1		32.0
2/23/2011 5:02:39 PM	0.0	75.0	20.6	552.0	0.0	0.1		32.0
2/23/2011 5:07:39 PM	0.0	75.0	20.7	587.0	0.0	0.1		32.0
2/23/2011 5:12:39 PM	0.0	75.0	20.7	601.0	0.0	0.1		32.0
2/23/2011 5:17:39 PM	0.0	75.0	20.7	603.0	0.0	0.1		32.0
2/23/2011 5:22:39 PM	1.0	74.8	20.7	576.0	0.0	0.0		32.0

IAQ Logged Monitoring Data, 5th Floor, SN030030

Information Panel

Comments Logged Monitoring Data for Two White Flint IAQ, 5th Floor, Rm T-5F28
 (SN030030) - Dust units ug/m3, Temp & Dew pt degrees F
Location 11555 Rockville Pike, Rockville, MD
Name NRC Two White Flint IAQ - 5th Floor Logged Data
Parent Session EVM0415
Start Time Wednesday, February 23, 2011 08:42:37
Stop Time Wednesday, February 23, 2011 17:25:02
User Name FOH

Timestamp	Dust Level ug/	Temp Level	Humidity Level	CO2 Level	CO Level	PPMPID Level	Dew Point
		temperature (°	relative	PPM		PPM	Level
		humidity (%)	humidity (%)				temperature (°
2/23/2011 8:47:37 AM	5.0	65.3	28.5	1012.0	0.0	0.0	32.0
2/23/2011 8:52:37 AM	11.0	68.9	27.7	786.0	0.0	0.0	34.2
2/23/2011 8:57:37 AM	7.0	71.8	26.1	776.0	0.0	0.0	35.2
2/23/2011 9:02:37 AM	6.0	73.8	24.9	701.0	0.0	0.0	35.6
2/23/2011 9:07:37 AM	8.0	74.8	24.1	761.0	0.0	0.0	35.8
2/23/2011 9:12:37 AM	7.0	75.6	23.6	702.0	0.0	0.0	35.8
2/23/2011 9:17:37 AM	7.0	75.9	23.3	665.0	0.0	0.0	35.6
2/23/2011 9:22:37 AM	6.0	76.1	23.1	688.0	0.0	0.0	35.6
2/23/2011 9:27:37 AM	4.0	76.1	23.0	711.0	0.0	0.0	35.6
2/23/2011 9:32:37 AM	6.0	76.1	22.9	730.0	0.0	0.0	35.6
2/23/2011 9:37:37 AM	7.0	76.1	22.9	744.0	0.0	0.0	35.6
2/23/2011 9:42:37 AM	3.0	76.1	22.9	754.0	0.0	0.0	35.4
2/23/2011 9:47:37 AM	2.0	75.7	22.8	790.0	0.0	0.0	35.2
2/23/2011 9:52:37 AM	2.0	75.0	23.1	775.0	0.0	0.0	34.9
2/23/2011 9:57:37 AM	8.0	74.5	23.3	776.0	0.0	0.0	34.5
2/23/2011 10:02:37 AM	3.0	74.1	23.5	758.0	0.0	0.0	34.5
2/23/2011 10:07:37 AM	4.0	73.9	23.6	738.0	0.0	0.0	34.5
2/23/2011 10:12:37 AM	5.0	73.8	23.7	764.0	0.0	0.0	34.3
2/23/2011 10:17:37 AM	2.0	73.6	23.7	745.0	0.0	0.0	34.3
2/23/2011 10:22:37 AM	2.0	73.6	23.8	827.0	0.0	0.0	34.3
2/23/2011 10:27:37 AM	4.0	73.4	23.8	806.0	0.0	0.0	34.3
2/23/2011 10:32:37 AM	1.0	73.4	23.8	767.0	0.0	0.0	34.3
2/23/2011 10:37:37 AM	3.0	73.4	23.9	826.0	0.0	0.0	34.3
2/23/2011 10:42:37 AM	4.0	73.4	23.8	808.0	0.0	0.0	34.3
2/23/2011 10:47:37 AM	2.0	73.4	23.8	852.0	0.0	0.0	34.2
2/23/2011 10:52:37 AM	6.0	73.4	23.8	826.0	0.0	0.0	34.2
2/23/2011 10:57:37 AM	1.0	73.2	23.8	799.0	0.0	0.0	34.2
2/23/2011 11:02:37 AM	2.0	73.2	23.8	796.0	0.0	0.0	34.0
2/23/2011 11:07:37 AM	6.0	73.2	23.7	805.0	0.0	0.0	34.0
2/23/2011 11:12:37 AM	2.0	73.0	23.7	830.0	0.0	0.0	34.0
2/23/2011 11:17:37 AM	2.0	73.0	23.8	814.0	0.0	0.0	34.0
2/23/2011 11:22:37 AM	7.0	73.0	23.8	800.0	0.0	0.0	33.8
2/23/2011 11:27:37 AM	1.0	73.0	23.8	832.0	0.0	0.0	34.0
2/23/2011 11:32:37 AM	3.0	73.0	23.9	849.0	0.0	0.0	34.0
2/23/2011 11:37:37 AM	1.0	72.9	23.9	834.0	0.0	0.0	34.0
2/23/2011 11:42:37 AM	7.0	72.9	23.9	880.0	0.0	0.0	34.0
2/23/2011 11:47:37 AM	3.0	72.9	24.0	865.0	0.0	0.0	34.0
2/23/2011 11:52:37 AM	3.0	72.9	24.0	919.0	0.0	0.0	34.0
2/23/2011 11:57:37 AM	2.0	72.7	24.1	939.0	0.0	0.0	34.0
2/23/2011 12:02:37 PM	5.0	72.7	24.1	890.0	0.0	0.0	34.0
2/23/2011 12:07:37 PM	3.0	72.7	24.2	903.0	0.0	0.0	34.0
2/23/2011 12:12:37 PM	3.0	72.7	24.2	891.0	0.0	0.0	34.0
2/23/2011 12:17:37 PM	4.0	72.7	24.3	907.0	0.0	0.0	34.0
2/23/2011 12:22:37 PM	1.0	72.7	24.3	979.0	0.0	0.0	34.2
2/23/2011 12:27:37 PM	2.0	72.7	24.3	936.0	0.0	0.0	34.0
2/23/2011 12:32:37 PM	6.0	72.7	24.4	953.0	0.0	0.0	34.2
2/23/2011 12:37:37 PM	10.0	72.7	24.4	940.0	0.0	0.0	34.2
2/23/2011 12:42:37 PM	3.0	72.5	24.4	932.0	0.0	0.0	34.2
2/23/2011 12:47:37 PM	2.0	72.5	24.4	946.0	0.0	0.0	34.2
2/23/2011 12:52:37 PM	5.0	72.5	24.4	929.0	0.0	0.0	34.0
2/23/2011 12:57:37 PM	3.0	72.3	24.4	869.0	0.0	0.0	34.0
2/23/2011 1:02:37 PM	3.0	72.3	24.4	911.0	0.0	0.0	34.0
2/23/2011 1:07:37 PM	2.0	72.3	24.4	899.0	0.0	0.0	34.0
2/23/2011 1:12:37 PM	2.0	72.3	24.4	897.0	0.0	0.0	33.8
2/23/2011 1:17:37 PM	3.0	72.3	24.4	887.0	0.0	0.0	33.8
2/23/2011 1:22:37 PM	1.0	72.3	24.4	892.0	0.0	0.0	33.8
2/23/2011 1:27:37 PM	1.0	72.1	24.4	929.0	0.0	0.0	33.8
2/23/2011 1:32:37 PM	2.0	72.1	24.4	881.0	0.0	0.0	33.8
2/23/2011 1:37:37 PM	3.0	72.1	24.5	929.0	0.0	0.0	33.8
2/23/2011 1:42:37 PM	2.0	72.1	24.6	949.0	0.0	0.0	34.0
2/23/2011 1:47:37 PM	2.0	72.1	24.6	938.0	0.0	0.0	34.0

Timestamp	Dust Level ug/	Temp Level	Humidity Level	CO2 Level	CO Level	PPM	PID Level	Dew Point
	temperature (°	relative	humidity (%)	PPM	PPM	PPM	PPM	Level
	temperature (°	humidity (%)	humidity (%)	PPM	PPM	PPM	PPM	temperature (°
2/23/2011 1:52:37 PM	1.0	72.1	24.6	948.0	0.0	0.0	0.0	34.0
2/23/2011 1:57:37 PM	4.0	72.1	24.6	876.0	0.0	0.0	0.0	34.0
2/23/2011 2:02:37 PM	2.0	72.1	24.6	908.0	0.0	0.0	0.0	34.0
2/23/2011 2:07:37 PM	2.0	72.1	24.6	911.0	0.0	0.0	0.0	34.0
2/23/2011 2:12:37 PM	1.0	72.1	24.6	926.0	0.0	0.0	0.0	34.0
2/23/2011 2:17:37 PM	3.0	72.1	24.6	910.0	0.0	0.0	0.0	34.0
2/23/2011 2:22:37 PM	2.0	72.1	24.6	943.0	0.0	0.0	0.0	34.0
2/23/2011 2:27:37 PM	2.0	72.1	24.7	947.0	0.0	0.0	0.0	34.0
2/23/2011 2:32:37 PM	1.0	72.1	24.7	960.0	0.0	0.0	0.0	34.0
2/23/2011 2:37:37 PM	4.0	72.1	24.7	943.0	0.0	0.0	0.0	34.2
2/23/2011 2:42:37 PM	3.0	72.1	24.8	1015.0	0.0	0.0	0.0	34.2
2/23/2011 2:47:37 PM	12.0	72.1	24.8	1017.0	0.0	0.0	0.0	34.2
2/23/2011 2:52:37 PM	4.0	72.1	24.8	985.0	0.0	0.0	0.0	34.2
2/23/2011 2:57:37 PM	1.0	72.1	24.8	998.0	0.0	0.0	0.0	34.2
2/23/2011 3:02:37 PM	2.0	72.1	24.8	1011.0	0.0	0.0	0.0	34.2
2/23/2011 3:07:37 PM	1.0	72.1	24.7	1010.0	0.0	0.0	0.0	34.2
2/23/2011 3:12:37 PM	1.0	72.1	24.7	992.0	0.0	0.0	0.0	34.2
2/23/2011 3:17:37 PM	1.0	72.1	24.6	983.0	0.0	0.0	0.0	34.0
2/23/2011 3:22:37 PM	4.0	72.1	24.6	984.0	0.0	0.0	0.0	34.0
2/23/2011 3:27:37 PM	2.0	72.1	24.5	992.0	0.0	0.0	0.0	34.0
2/23/2011 3:32:37 PM	2.0	72.1	24.5	956.0	0.0	0.0	0.0	34.0
2/23/2011 3:37:37 PM	1.0	72.1	24.5	1013.0	0.0	0.0	0.0	34.0
2/23/2011 3:42:37 PM	2.0	72.1	24.5	1008.0	0.0	0.0	0.0	34.0
2/23/2011 3:47:37 PM	2.0	72.1	24.5	1001.0	0.0	0.0	0.0	34.0
2/23/2011 3:52:37 PM	1.0	72.1	24.5	988.0	0.0	0.0	0.0	34.0
2/23/2011 3:57:37 PM	1.0	72.1	24.5	982.0	0.0	0.0	0.0	34.0
2/23/2011 4:02:37 PM	5.0	72.1	24.5	991.0	0.0	0.0	0.0	34.0
2/23/2011 4:07:37 PM	1.0	72.1	24.5	960.0	0.0	0.0	0.0	34.0
2/23/2011 4:12:37 PM	1.0	72.1	24.5	957.0	0.0	0.0	0.0	33.8
2/23/2011 4:17:37 PM	2.0	72.1	24.5	928.0	0.0	0.0	0.0	33.8
2/23/2011 4:22:37 PM	0.0	72.1	24.4	922.0	0.0	0.0	0.0	33.8
2/23/2011 4:27:37 PM	4.0	72.1	24.4	948.0	0.0	0.0	0.0	33.8
2/23/2011 4:32:37 PM	2.0	72.1	24.4	853.0	0.0	0.0	0.0	33.8
2/23/2011 4:37:37 PM	2.0	72.1	24.3	899.0	0.0	0.0	0.0	33.6
2/23/2011 4:42:37 PM	3.0	72.1	24.3	878.0	0.0	0.0	0.0	33.6
2/23/2011 4:47:37 PM	1.0	72.0	24.3	885.0	0.0	0.0	0.0	33.6
2/23/2011 4:52:37 PM	2.0	72.0	24.3	884.0	0.0	0.0	0.0	33.6
2/23/2011 4:57:37 PM	1.0	72.0	24.3	875.0	0.0	0.0	0.0	33.6
2/23/2011 5:02:37 PM	3.0	72.0	24.3	883.0	0.0	0.0	0.0	33.4
2/23/2011 5:07:37 PM	1.0	72.0	24.2	839.0	0.0	0.0	0.0	33.4
2/23/2011 5:12:37 PM	3.0	72.0	24.2	836.0	0.0	0.0	0.0	33.4
2/23/2011 5:17:37 PM	2.0	72.0	24.2	839.0	0.0	0.0	0.0	33.4
2/23/2011 5:22:37 PM	2.0	72.1	24.1	846.0	0.0	0.0	0.0	33.4

APPENDIX C

MICROBIOLOGICAL ANALYSIS LABORATORY RESULTS



Report for:

Dr. Ling-Ling Hung
U.S. Public Health Service
150 S. Independence Mall West
Suite 368
Philadelphia, PA 19106

Regarding: Project: A113837/S152286/P158031
EML ID: 756756

Approved by:

Lab Manager
Dr. Kamashwaran Ramanathan

Dates of Analysis:
Spore trap analysis: 03-01-2011

Service SOPs: Spore trap analysis (1038)

For clarity, we report the number of significant digits as calculated; but, due to the nature of this type of biological data, the number of significant digits that is used for interpretation should generally be one or two. All samples were received in acceptable condition unless noted in the Report Comments portion in the body of the report. Due to the nature of the analyses performed, field blank correction of results is not applied. The results relate only to the items tested.

EMLab P&K ("the Company") shall have no liability to the client or the client's customer with respect to decisions or recommendations made, actions taken or courses of conduct implemented by either the client or the client's customer as a result of or based upon the Test Results. In no event shall the Company be liable to the client with respect to the Test Results except for the Company's own willful misconduct or gross negligence nor shall the Company be liable for incidental or consequential damages or lost profits or revenues to the fullest extent such liability may be disclaimed by law, even if the Company has been advised of the possibility of such damages, lost profits or lost revenues. In no event shall the Company's liability with respect to the Test Results exceed the amount paid to the Company by the client therefor.

Document Number: 200091 - Revision Number: 5

Client: U.S. Public Health Service
C/O: Dr. Ling-Ling Hung
Re: A113837/S152286/P158031

Date of Sampling: 02-23-2011
Date of Receipt: 02-25-2011
Date of Report: 03-01-2011

SPORE TRAP REPORT: NON-VIABLE METHODOLOGY

Location:	NV-1: 2nd floor-room T-2E37			NV-2: Roof-15' from air intake			NV-3: 5th floor-room T5F28			NV-4: 5th floor-room T5F28		
Comments (see below)	None			None			None			None		
Lab ID-Version‡:	3347623-1			3347624-1			3347625-1			3347626-1		
	raw ct.	% read	spores/m3	raw ct.	% read	spores/m3	raw ct.	% read	spores/m3	raw ct.	% read	spores/m3
Alternaria												
Arthrinium												
Ascospores*				1	25	27						
Aureobasidium												
Basidiospores*	2	25	53	5	25	130	1	25	27	1	25	27
Bipolaris/Drechslera group												
Botrytis												
Chaetomium												
Cladosporium				1	25	27	1	25	27	1	25	27
Curvularia												
Epicoccum												
Fusarium												
Myrothecium												
Nigrospora												
Other brown	2	100	13	1	100	7						
Other colorless												
Penicillium/Aspergillus types†				1	25	27						
Pithomyces												
Rusts*												
Smuts*, Periconia, Myxomycetes*				1	100	7						
Stachybotrys												
Stemphylium												
Torula												
Ulocladium												
Zygomycetes												
Background debris (1-4+)††	3+			3+			3+			3+		
Sample volume (liters)	150			150			150			150		
§ TOTAL SPORES/m3			67			230			53			53

Comments:

Spore types listed without a count or data entry were not detected during the course of the analysis for the respective sample.
 * Most of these spore types are not seen with culturable methods (Andersen sampling), although some may appear as non-sporulating fungi. Most of the basidiospores are "mushroom" spores while the rusts and smuts are plant pathogens.
 † The spores of *Aspergillus* and *Penicillium* (and others such as *Acremonium*, *Paecilomyces*) are small and round with very few distinguishing characteristics. They cannot be differentiated by non-viable sampling methods. Also, some species with very small spores are easily missed, and may be undercounted.
 †† Background debris indicates the amount of non-biological particulate matter present on the trace (dust in the air) and the resulting visibility for the analyst. It is rated from 1+ (low) to 4+ (high). Counts from areas with 4+ background debris should be regarded as minimal counts and may be higher than reported. It is important to account for samples volumes when evaluating dust levels.
 The Limit of Detection is the product of a raw count of 1 and 100 divided by the percent read. The analytical sensitivity (counts/m3) is the product of the Limit of Detection and 1000 divided by the sample volume.
 For more information regarding analytical sensitivity, please contact QA by calling the laboratory.
 ‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".
 § Total Spores/m3 has been rounded to two significant figures to reflect analytical precision.

Client: U.S. Public Health Service
C/O: Dr. Ling-Ling Hung
Re: A113837/S152286/P158031

Date of Sampling: 02-23-2011
Date of Receipt: 02-25-2011
Date of Report: 03-01-2011

SPORE TRAP REPORT: NON-VIABLE METHODOLOGY

Location:	NV-5: Roof-15' from air intake			NV-6: 2nd floor-room T-2E37			NV-7: 2nd floor-room T-2E37		
Comments (see below)	None			None			None		
Lab ID-Version‡:	3347627-1			3347628-1			3347629-1		
	raw ct.	% read	spores/m3	raw ct.	% read	spores/m3	raw ct.	% read	spores/m3
Alternaria									
Arthrinium									
Ascospores*	2	25	53						
Aureobasidium									
Basidiospores*	1	25	27	1	25	27	1	25	27
Bipolaris/Drechslera group									
Botrytis									
Chaetomium									
Cladosporium	1	25	27						
Curvularia									
Epicoccum									
Fusarium									
Myrothecium									
Nigrospora									
Other brown	2	100	13				1	100	7
Other colorless									
Penicillium/Aspergillus types†	1	25	27						
Pithomyces									
Rusts*									
Smuts*, Periconia, Myxomycetes*									
Stachybotrys									
Stemphylium									
Torula									
Ulocladium									
Zygomycetes									
Background debris (1-4+)††	3+			2+			3+		
Sample volume (liters)	150			150			150		
§ TOTAL SPORES/m3			150			27			33

Comments:

Spore types listed without a count or data entry were not detected during the course of the analysis for the respective sample.
 * Most of these spore types are not seen with culturable methods (Andersen sampling), although some may appear as non-sporulating fungi. Most of the basidiospores are "mushroom" spores while the rusts and smuts are plant pathogens.
 † The spores of *Aspergillus* and *Penicillium* (and others such as *Acremonium*, *Paecilomyces*) are small and round with very few distinguishing characteristics. They cannot be differentiated by non-viable sampling methods. Also, some species with very small spores are easily missed, and may be undercounted.
 †† Background debris indicates the amount of non-biological particulate matter present on the trace (dust in the air) and the resulting visibility for the analyst. It is rated from 1+ (low) to 4+ (high). Counts from areas with 4+ background debris should be regarded as minimal counts and may be higher than reported. It is important to account for samples volumes when evaluating dust levels.
 The Limit of Detection is the product of a raw count of 1 and 100 divided by the percent read. The analytical sensitivity (counts/m3) is the product of the Limit of Detection and 1000 divided by the sample volume.
 For more information regarding analytical sensitivity, please contact QA by calling the laboratory.
 ‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".
 § Total Spores/m3 has been rounded to two significant figures to reflect analytical precision.

Client: U.S. Public Health Service
C/O: Dr. Ling-Ling Hung
Re: A113837/S152286/P158031

Date of Sampling: 02-23-2011
Date of Receipt: 02-25-2011
Date of Report: 03-01-2011

SPORE TRAP REPORT: NON-VIABLE METHODOLOGY

Location:	NV-8: Roof-15' from air intake			NV-9: 5th floor-room T5F28			NV-10: Media blank		
Comments (see below)	None			None			None		
Lab ID-Version‡:	3347630-1			3347631-1			3347632-1		
	raw ct.	% read	spores/m3	raw ct.	% read	spores/m3	raw ct.	% read	spores/m3
Alternaria									
Arthrinium									
Ascospores*	3	25	80						
Aureobasidium									
Basidiospores*	3	25	80	1	25	27			
Bipolaris/Drechslera group									
Botrytis									
Chaetomium									
Cladosporium									
Curvularia									
Epicoccum									
Fusarium									
Myrothecium									
Nigrospora									
Other brown									
Other colorless									
Penicillium/Aspergillus types†	2	25	53						
Pithomyces									
Rusts*									
Smuts*, Periconia, Myxomycetes*									
Stachybotrys									
Stemphylium									
Torula									
Ulocladium									
Zygomycetes									
Background debris (1-4+)††	3+			2+			None		
Sample volume (liters)	150			150			0		
§ TOTAL SPORES/m3			210			27			N/A

Comments:

Spore types listed without a count or data entry were not detected during the course of the analysis for the respective sample.
 * Most of these spore types are not seen with culturable methods (Andersen sampling), although some may appear as non-sporulating fungi. Most of the basidiospores are "mushroom" spores while the rusts and smuts are plant pathogens.
 † The spores of *Aspergillus* and *Penicillium* (and others such as *Acremonium*, *Paecilomyces*) are small and round with very few distinguishing characteristics. They cannot be differentiated by non-viable sampling methods. Also, some species with very small spores are easily missed, and may be undercounted.
 †† Background debris indicates the amount of non-biological particulate matter present on the trace (dust in the air) and the resulting visibility for the analyst. It is rated from 1+ (low) to 4+ (high). Counts from areas with 4+ background debris should be regarded as minimal counts and may be higher than reported. It is important to account for samples volumes when evaluating dust levels.
 The Limit of Detection is the product of a raw count of 1 and 100 divided by the percent read. The analytical sensitivity (counts/m3) is the product of the Limit of Detection and 1000 divided by the sample volume.
 For more information regarding analytical sensitivity, please contact QA by calling the laboratory.
 ‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".
 § Total Spores/m3 has been rounded to two significant figures to reflect analytical precision.