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AGENDA
August 12, 2003

Department of Revenue Services
25 Sigourney Street
Room 2A/B 5th Floor

1. Introductions – Dr. Mary Lou Fleissner, CT DPH
2. Background of Building Concerns – Dr. Jean Cox-Ganser, NIOSH
3. Introduction to Testing Program of EH&E – Dr. John McCarthy

Preliminary Analysis of Fungal Measurements at the Sigourney Street Building
Dr. Brenda Barry, EH&E
4. 17th Floor Carpet Sampling – Dr. Carol Rao and Dr. Ju-Hyeang Park
5. Medical Survey of 2002 – Dr. Jean Cox-Ganser, NIOSH
6. Agency and consultant updates
 - DPW
 - JCONN
 - EH&E
 - DPH
 - DOL
 - EnviroMed
7. Next steps – Dr. Jean Cox-Ganser, NIOSH

Preliminary Analysis of Fungal Measurements at the Sigourney Street Building

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Today's Objective

- Describe the results of fungal measurements collected by EH&E at 25 Sigourney Street building
- Provide preliminary answers to the following questions:
 - Is there evidence for active fungal growth in the building currently?
 - Is there evidence of historical fungal growth in the building?



Project Background

- Measurements for fungal spores were one component of a comprehensive sampling plan to evaluate indoor environmental conditions as possible causes for the building-related health concerns
- Areas of emphasis
 - Allergens and irritants in the air and on surfaces
 - Mechanical systems operations and performance
 - Building design and construction



Timeline of Selected Investigation Events

- Sept. 2001 Initial health survey - NIOSH
- June 2002 Medical evaluation and second health survey - NIOSH and EH&E
- July 2002 Wall sampling for fungi - EH&E
- March 2003 Environmental sampling - EH&E

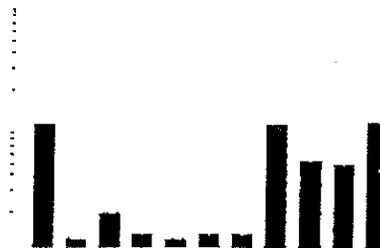


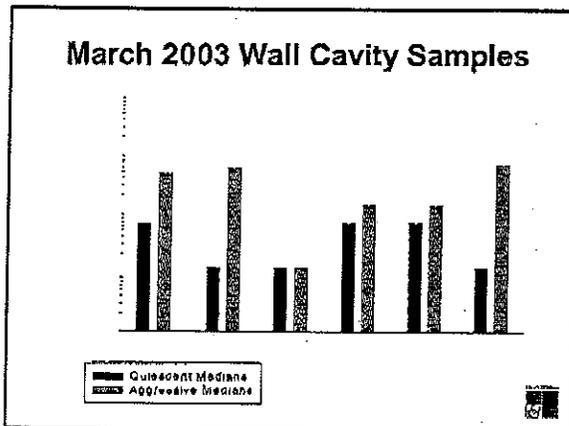
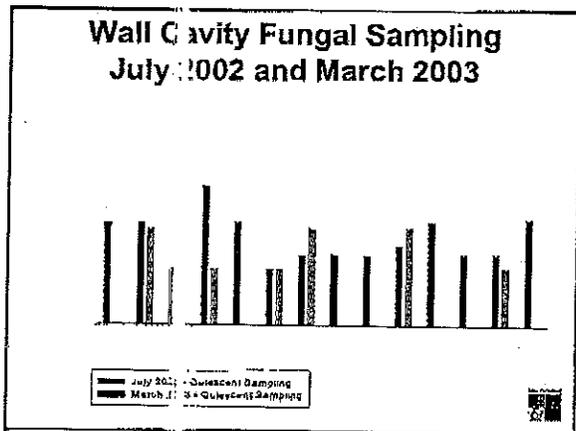
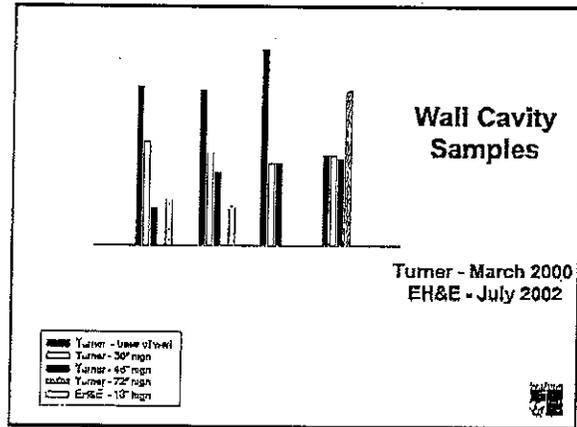
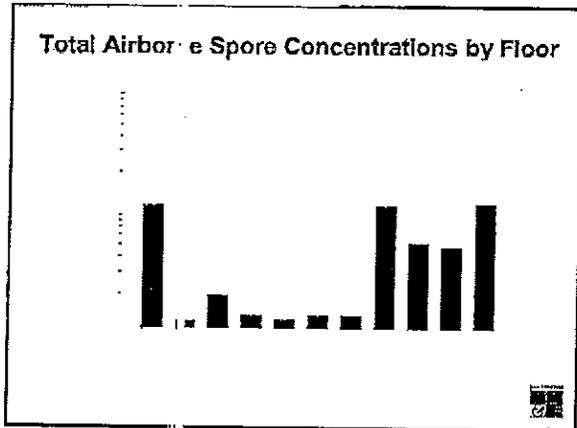
Environmental Measurements

- July 2002
 - Fungal spores in exterior wall cavities
 - Visual inspection for mold growth and water damage
- March 2003
 - Fungal spores in exterior wall cavities - Quiescent and perturbation sampling
 - Airborne fungal spores
 - Airborne particles
 - Fungal spores and dust components on surfaces
 - Temperature, relative humidity, carbon dioxide
 - Ventilation systems inspection



Total Airborne Spore Concentrations by Floor





Results

Fungal Spores on Surfaces

- Surface samples collected from occupant spaces
 - 160 samples collected - Only one sample contained fungal spores
- Surface samples collected from mechanical rooms
 - 128 samples collected - Nine samples contained fungal spores

Carbon Dioxide Levels (ppm) by Floor

Floor	6	8	10	11	15	18	19
Mean	604	559	599	586	745	586	523
Max	978	830	972	909	1294	947	833

Average of carbon dioxide measurements collected between 9am and 5pm from March 10 to 14, 2003

Preliminary Conclusions

- Results of March 2003 sampling did not indicate elevated levels of fungal spores in the air or on surfaces in the occupant spaces
- Wall cavity samples provided some evidence of previous fungal growth on the 5th, 8th, 17th, 18th, and 19th floors



Next Steps

- Combine historical information about building with current environmental data to understand possible causes for health concerns
- Evaluate possible associations between health survey data and environmental data



Background

- NIOSH administered short health questionnaire to all DRS and DSS employees in September 2001.
- The purpose of the questionnaire was to evaluate health concerns of all employees in relation to the building environment.
- Results from this screening questionnaire led NIOSH to believe that further study of the building was important.

17th Floor Carpet History

- Historical reports of water incursion
- Carpet around perimeter removed
- Carpet HEPA cleaned early Dec 2001
- NIOSH samples old carpet mid-Dec 2001
- Carpet replaced late December 2001
- NIOSH samples new carpet April 2002

How did NIOSH choose sampling locations?

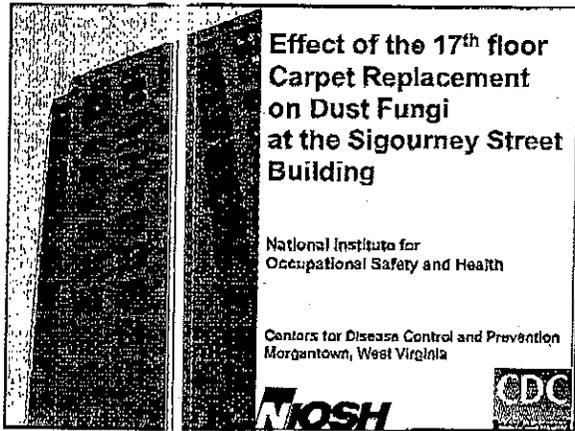
- Locations were chosen based on the participant results from the September 2001 health questionnaire.
- Participants were selected based on a range of symptoms, from none to several.
- Reported physician-diagnosis of respiratory conditions was also taken into consideration.

Environmental survey

- Total air samples taken = 447
 - 67 samples in December 2001 on 17th floor
 - 380 samples in April 2002
- Total chair vacuum samples taken in April 2002 = 333
- Total floor vacuum samples taken = 401
 - 61 samples in December 2001 on 17th floor
 - 340 samples in April 2002

Fungi terminology

- Spore count vs colony-forming units
- Air sampling vs dust sampling
- Surrogate exposure measurements
- Dust measurements in relation to health not well studied

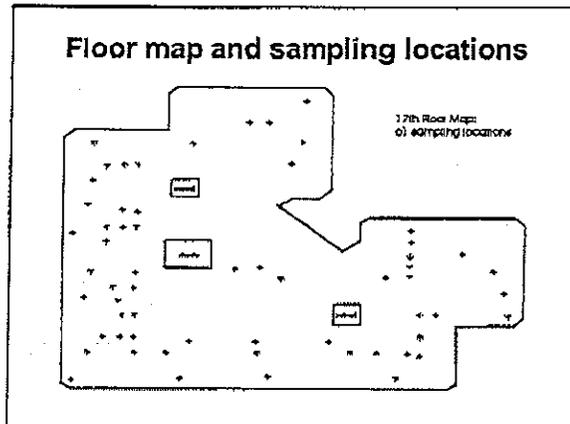


The purpose of data analysis

- To determine if the levels of culturable fungi and fungi types in floor dust on the 17th floor changed after the carpet was replaced

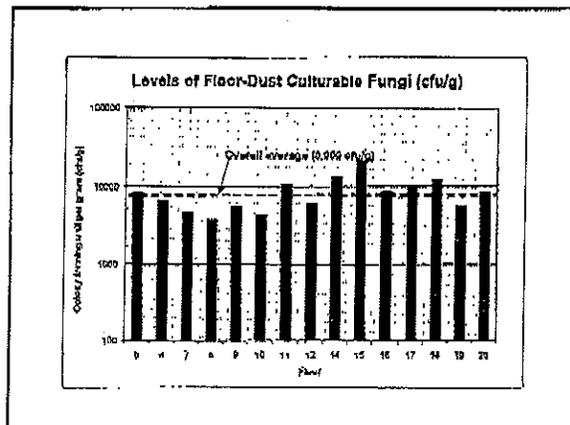
Environmental survey

- Sampling period
 - December 17-20, 2001 at 61 locations
 - Carpet replaced late December 2001
 - April 2-11, 2002 at 61 locations
- Sampling locations
 - Based on participant's response to the health questionnaire in 2001
 - Vacuumed floor area around desks and chairs



Levels of culturable fungi

Date of sampling	Number of Samples	Average or Median	Range
Average fungal level per gram dust: CFU/g			
Jan 2001	8	21,000	6,000 - 410,000
Dec 2001: before replacement	61	15,000	3,000 - 81,000
Apr 2002: after replacement	55	10,000	800 - 1,000,000
Median fungal level per square meter: CFU/m ²			
Dec 2001: before replacement	61	2,000	300 - 18,000
Apr 2002: after replacement	55	2,000	50 - 230,000
Harvard Study 2002	192	12,000	300 - 1,600,000



- Carpet replacement did not substantially decrease fungi levels in floor dust from December 2001 to April 2002.
- Levels of floor dust fungi were generally lower than levels in other buildings reported by Harvard Study.

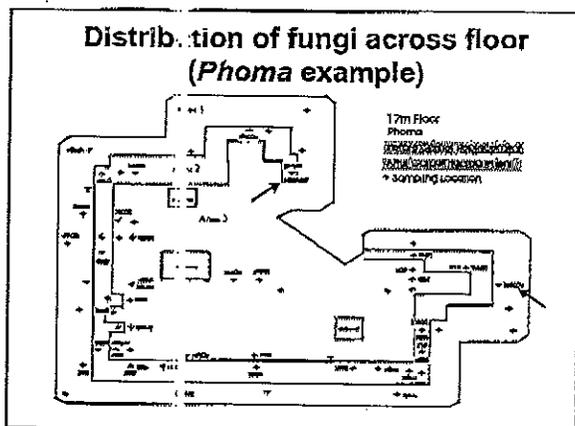
Percent of samples with specific fungi types

Before replacement (out of 61 samples)		After replacement (out of 55 samples)	
<i>Cladosporium</i>	97%	yeasts	71%
yeasts	93%	<i>Penicillium</i>	61%
<i>Epilcoccum</i>	85%	<i>Aureobasidium</i>	56%
<i>Alternaria</i>	86%		
<i>Aureobasidium</i>	64%		
<i>Penicillium</i>	64%		

Average composition of fungi type in samples

Before replacement (% of total fungi level)		After replacement (% of total fungi level)	
<i>Phoma</i>	35%	<i>Phoma</i>	43%
<i>Cladosporium</i>	28%	yeasts	41%
<i>Chaetomium</i>	27%	<i>Aspergillus</i>	25%
yeasts	26%	<i>Penicillium</i>	22%

- *Phoma* and yeasts were predominant in floor dust samples before and after the carpet was replaced.
- The significance of these hydrophilic fungi in dust samples is not well understood.



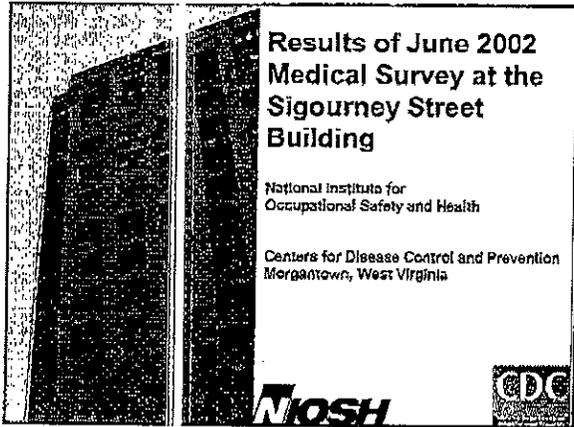
- All types of fungi were distributed over the entire 17th floor area.
- Higher fungi levels were not found closer to walls and windows.

Limitations

- The old carpets were deep-cleaned before the Dec. 2001 sampling.
- Sampling strategy?
 - Timing
 - Locations

Conclusions

- No substantial changes in the levels of fungi and fungal type after carpet replacement
- No apparent clustering of high fungal levels across 17th floor



Survey Methods June 2002

- Medical testing & questionnaire offered to 356 DRS & DSS employees
- 2 groups from September 2001:
 - Symptomatic or
 - Asymptomatic

Presentation Topics

1. Were test results associated with symptoms?
2. Were there newly effected employees in 2002?
3. Were there differences between floors?
4. What were the results of the allergen skin tests?

Participation and Demographics from September 2001

	Symptomatic	Asymptomatic	Volunteers
Participation	142/202 70%	91/154 59%	15 N/A
Women	71%	49%	60%
Age	47	47	52
Occupancy Years	7	7	7
Current Smoker	16%	11%	0
Former Smoker	23%	22%	20%

Medical Tests: June 2002 Medical Survey

- Questionnaire
- Spirometry
- Twitchy Airways
(Methacholine/Bronchodilator)
- Allergen Skin Tests

Breathing Test Results

	Symptoms	No Symptoms
Obstructed/Mixed	12%	7%
Restricted	8%	0%
Twitchy airways	19%	6%
Any abnormal test	36%	11%

Never Smokers Breathing Test Results

	Symptoms	No Symptoms
Obstructed/Mixed	9%	7%
Restricted	5%	0%
Twitchy Airways	21%	8%
Any abnormal test	31%	12%

Medication Usage

	Symptoms	No Symptoms
Oral Steroids	17%	2%
Inhaled Steroids	14%	0%
Bronchodilator	20%	0%
Any Breathing Medication	36%	2%
Medication or Abnormal Tests	58%	11%

Never Smokers Medication Usage

	Symptoms	No Symptoms
Oral Steroids	15%	0%
Inhaled Steroids	12%	0%
Bronchodilator	21%	0%
Any Breathing Medication	38%	0%
Medication or Abnormal Tests	57%	12%

- ### Presentation Topics
1. Were test results were associated with symptoms? Yes.
 2. Were there newly effected employees in 2002?
 3. Were there differences between floors?
 4. What were the results of the allergen skin tests?

Symptoms in Newly Affected Employees in 2002

	Many Symptoms (15/91)	Some Symptoms (35/91)
Cough	73%	63%
Wheezing	33%	3%
Shortness of breath	47%	8%
Chest tightness	20%	9%
Fever or chills	27%	3%
Flu-like symptoms	87%	29%

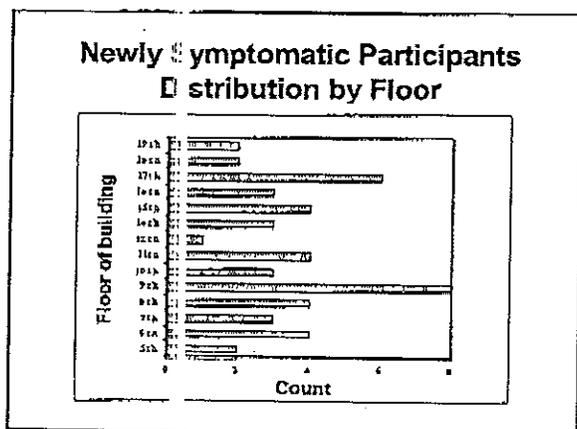
Breathing Test Results for Newly Symptomatic Participants

	Many Symptoms	Some Symptoms
Obstructed/Mixed	7%	6%
Restricted	13%	3%
Twitchy Airways	9%	7%
Any abnormal test	25%	17%

Medication Usage Newly Symptomatic Participants

	Many Symptoms	Some Symptoms
Oral Steroids	7%	6%
Inhaled Steroids	7%	0%
Bronchodilator	20%	0%
Any breathing medication	20%	6%
Medication or normal tests	42%	24%

- ### Presentation Topics
- Were there newly effected employees in 2002? Yes.
 - Were there differences between floors?
 - What were the results of the allergen skin tests?



Floors with Higher 2002 Medical Survey Positive Results in the Symptomatic Participants

	Rank				
	1	2	3	4	5
Work-related respiratory symptoms	19 th	14 th	18 th	10 th	16 th
Symptom score	19 th	14 th	18 th	6 th	10 th
Medication score	19 th	14 th	10 th	6 th	17 th
Obstruction/Mixed	12 th	14 th	9 th	5 th	15 th
Restriction	19 th	14 th	10 th	6 th	17 th
Twichy airways	10 th	11 th	9 th	14 th	12 th

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Medication score	19 th	14 th	10 th	8 th	17 th
Obstruction/Mixed	12 th	14 th	9 th	5 th	15 th
Restriction	19 th	14 th	10 th	6 th	17 th
Twitchy airways	19 th	11 th	9 th	14 th	12 th

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Obstruction/Mixed	12 th	14 th	9 th	5 th	15 th
Restriction	19 th	14 th	10 th	6 th	17 th
Twitchy airways	19 th	11 th	9 th	14 th	12 th

Presentation Topics

3. Were there differences between floors?
 Although there is evidence for some floors to have more people with health effects, all floors should be considered in remediation.

4. What were the results of the allergen skin tests?

Allergen Skin Test Results

	Symptoms	No Symptoms
Allergic to molds	18%	13%
Allergic to one or more of 7 common allergens	57%	50%

What We Found

- Breathing test abnormalities are consistent with symptom reports.
- Medication use is consistent with symptom reports
- There were participants on all floors who had onset of respiratory symptoms in 2002.

- Floors 14, 19, 10, and 6 ranked high for symptoms and abnormal tests in June 2002
- Allergen skin tests were similar for symptomatic and asymptomatic participants

Recommendation for Follow-up

Determine if building remediation improved employee health:

Repeat the questionnaire and medical survey in 2004.