



NIOSH HEALTH HAZARD EVALUATION REPORT

HETA # 2005-0167-2983

Indian River Memorial Hospital

Center for Emotional and Behavioral Health

Vero Beach, Florida

September 2005

Richard Kanwal, M.D., M.P.H.

Terri Pearce, Ph.D.

**DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health**



PREFACE

The Respiratory Disease Hazard Evaluations and Technical Assistance Program (RDHETAP) of the National Institute for Occupational Safety and Health (NIOSH) conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health (OSH) Act of 1970, 29 U.S.C. 669(a)(6), or Section 501(a)(11) of the Federal Mine Safety and Health Act of 1977, 30 U.S.C. 951(a)(11), which authorizes the Secretary of Health and Human Services, following a written request from any employers or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

RDHETAP also provides, upon request, technical and consultative assistance to federal, state, and local agencies; labor; industry; and other groups or individuals to control occupational health hazards and to prevent related trauma and disease. Mention of company names or products does not constitute endorsement by NIOSH.

ACKNOWLEDGMENTS AND AVAILABILITY OF REPORT

This report was prepared by Richard Kanwal, MD, MPH, and Terri Pearce, PhD of the RDHETAP, Division of Respiratory Disease Studies (DRDS). Desktop publishing was performed by Amber Harton.

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HIGHLIGHTS OF THE NIOSH HEALTH HAZARD EVALUATION AT Indian River Memorial Hospital Center for Emotional and Behavioral Health (CEBH) Vero Beach, Florida

On April 26th and 27th, 2005, The National Institute for Occupational Safety and Health (NIOSH) conducted a walkthrough site visit at the CEBH facility, after receiving a request for a health hazard evaluation from Teamsters Local Union 769 on behalf of its members who work at CEBH. This request concerned worker reports of respiratory symptoms and illnesses, including asthma, that workers felt could be related to possible mold contamination in the building.

What NIOSH Did

- Walked through all sections of the facility.
- Looked at the space above the ceilings in many rooms and hallways.
- Looked at the inside of ventilation ducts in two locations.
- Looked at the roof and the inside of two roof-top ventilation units.
- Measured temperature, relative humidity, and carbon dioxide air concentration in many areas of the facility.

What NIOSH Found

- In the areas that NIOSH looked at, the space above the ceiling appeared dry and did not show evidence of moisture-damaged materials or mold growth.
- Relative humidity levels in some areas were above recommended limits; all temperature and carbon dioxide readings were within recommended limits.
- Lining material inside of the ventilation ducts appeared to be deteriorating and releasing debris.
- Fire-proofing material underneath the roof deck had come loose in some areas and was lying on top of ceiling tiles.

What Managers Can Do

- Remove the ventilation duct lining material and clean the ducts (or replace the existing ducts).
- Ensure that the ventilation system properly cools and dehumidifies the occupied spaces.
- Replace the fire-proofing material that has loosened from the underside of the roof deck.
- Remediate, under appropriate containment, any moisture-damaged or mold-contaminated building materials, including damaged walls that were previously covered with paint or other material.
- Re-grade the ground in areas of the courtyard where it slopes towards the building wall.
- Implement an indoor air quality maintenance program and committee, and include worker representatives.

What Employees Can Do

- Report immediately to maintenance staff any roof or other leaks, any wet walls, rugs, or ceiling tiles, and any musty or moldy odors.
- See your physician if you experience persistent respiratory symptoms.



What To Do For More Information:

We encourage you to read the full report. If you would like a copy, either ask your health and safety representative to make you a copy or call 1-513-841-4252 and ask for HETA Report #2005-0167-2983.



**Health Hazard Evaluation Report
HETA #2005-0167-2983
Indian River Memorial Hospital
Center for Emotional and Behavioral Health
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SUMMARY

On April 26 and 27, 2005, the National Institute for Occupational Safety and Health (NIOSH) conducted a site visit at the Indian River Memorial Hospital's Center for Emotional and Behavioral Health (CEBH). This visit was conducted as part of a health hazard evaluation requested by Teamsters Local Union 769 on behalf of its members who work at CEBH. This was the second request for an evaluation since February 2004. The first request concerned respiratory symptoms and illnesses, including asthma, that workers felt could be related to possible mold contamination in the ventilation system, ceilings, walls, and rugs due to roof leaks. In April 2004, NIOSH provided management with written recommendations and best practice guidelines for addressing and preventing indoor environmental quality problems due to water incursion (See Appendix). Teamsters Local Union 769 made a second request for a NIOSH evaluation of CEBH in March 2005 due to continued worker reports of building-related respiratory symptoms and asthma, and concerns that areas of potential mold contamination in the building had not been adequately addressed. While the roof was replaced in the spring of 2004, two hurricanes during the summer of 2004 led to additional water incursion into the building. The April 2005 site visit by NIOSH staff involved all sections of the building and included several offices, staff lounges, patient rooms, patient lounges, the gymnasium, and the cafeteria. A Q-trak™ indoor air quality monitor (TSI, Inc., Shoreview, MN) was used to measure temperature, relative humidity, and carbon dioxide (CO₂) levels at several locations. The ceiling plenum space (i.e. area above the ceiling tiles) was examined at several locations in hallways, offices, lounges, and the cafeteria. The ceilings in patient rooms did not have removable ceiling tiles. The walkthrough also included the roof deck, where the inside of two heating, ventilation, and air conditioning (HVAC) units (one original to the building, one a newer unit) was examined, as well as the exterior of the building and grounds. Overall the CEBH facility appeared to be clean and well maintained. Carbon dioxide concentration and temperature measurements throughout the facility were within the limits recommended by the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE). At several locations, relative humidity exceeded the upper limit of 60% recommended by ASHRAE. NIOSH staff did not detect any odors that might indicate water-damaged materials and/or mold growth. In the areas of the building that NIOSH staff inspected, there was no visible evidence of moisture-damaged building materials or mold growth. However, no wall finishes were removed as part of this evaluation and no invasive examinations of wall cavities were performed. Limited inspection of the ventilation ducts revealed a lining material that appeared to be breaking down. This may be responsible for the dirty appearance of ventilation supply diffusers and returns that workers have reported in the past.

The CEBH building has a history of water incursion from roof leaks over many months in 2003 and 2004 as well as through hall windows and the ventilation system attributed to damage from hurricanes in the summer of 2004. During and after this time period, workers reported experiencing eye, nose, and throat irritation, headaches, and the onset of asthma (or exacerbation of preexisting asthma). An inspection of the facility by NIOSH staff found the building to be predominantly clean and well maintained. Issues identified that should be addressed in order to minimize potential effects on health include: (1) deteriorating ventilation duct lining, and (2) moisture-damaged walls that have been painted and/or covered with another material such as fiberglass reinforced panels. CEBH management should follow the recommendations in this report in order to address these and other issues that could impact indoor air quality and potentially lead to health effects in workers.

Keywords: SIC Code 8062, NAICS 622110 (General Medical and Surgical Hospitals), indoor air, mold, asthma, IAQ, IEQ

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INTRODUCTION

On April 26 and 27, 2005, the National Institute for Occupational Safety and Health (NIOSH) conducted a walkthrough site visit at Indian River Memorial Hospital's Center for Emotional and Behavioral Health (CEBH). The visit was conducted as part of a health hazard evaluation (HHE) requested by Teamsters Local Union 769 on behalf of its members who work at CEBH. This was the second request for an evaluation by the Union since February 2004. NIOSH responded to the first request by providing management with written recommendations. The second request indicated that employees continued to report respiratory symptoms and illnesses, including asthma, that workers felt could be related to the presence of mold in the ventilation system, ceilings, walls, and rugs. This report provides a summary of observations and recommendations resulting from the NIOSH evaluation.

BACKGROUND

In February 2004, NIOSH received the first HHE request from Teamsters Local Union 769 regarding CEBH. The request listed several health effects: headaches, sinus infections, coughing, sneezing, watery eyes, and trouble breathing. At the time of the 2004 request, the roof of CEBH reportedly had leaked for much of the previous year. Workers claimed that mold had grown on some walls due to persistent wetness and that maintenance staff subsequently covered these walls with additional sheetrock and vinyl material without removing the mold. Workers also stated that they thought that dirty ceilings and vent covers indicated mold within the ventilation ducts. Several workers reported that their symptoms improved when away from the building. One worker reported developing asthma since starting work at CEBH and two others reported a worsening of pre-existing asthma. NIOSH staff held phone conversations with CEBH management to obtain information on the building's structural and maintenance history. NIOSH provided management with written recommendations and best practice

guidelines for addressing and preventing indoor environmental quality problems due to water incursion. (See Appendix) Guidance materials enclosed with this information included the Environmental Protection Agency (EPA) publications, *Mold Remediation in Schools and Commercial Buildings* and *Indoor Air Quality Tools for Schools*^{1,2}. Also included was the New York City Department of Health and Mental Hygiene (NYCDOHMH) *Guidelines on Assessment and Remediation of Fungi in Indoor Environments*.³

In March 2005, Teamsters Local Union 769 made a second request for a NIOSH HHE at CEBH due to continued worker reports of building-related respiratory symptoms and asthma, and concerns that mold contamination in the building had not been adequately addressed. Although the roof was replaced in the spring of 2004, two hurricanes during the summer of 2004 led to additional water incursion into the building. According to workers, some hallway carpeting was water soaked and had a persistent odor after being dried. Management reported that during one of the hurricanes, water entered through windows in the hallway located adjacent to the lobby, and a panel on one of the roof-top HVAC units came off allowing water to enter through ventilation ducts and into the ceiling plenum. Management reported that the entire wall (including all windows) of the section of hallway adjacent to the lobby were replaced after the hurricanes. Management also reported that re-caulking and waterproofing of all exterior building walls were performed after the hurricanes.

METHODS

The walkthrough of the CEBH facility was performed by an industrial hygienist and a medical officer from NIOSH's Division of Respiratory Disease Studies. We visited all sections of the building and entered several offices, staff lounges, patient rooms, patient lounges, the gymnasium, and the cafeteria. We used a direct-reading Q-trak™ indoor air quality monitor to measure temperature, relative humidity, and carbon dioxide (CO₂) levels at

several locations. We visualized the ceiling plenum space (i.e. area above the ceiling tiles) at several locations in hallways, offices, lounges, and the cafeteria. We accessed the roof deck and examined the inside of two heating, ventilation, and air conditioning (HVAC) units located on the roof (one original to the building, one a newer unit), and also examined the exterior of the building and grounds.

RESULTS

Building Exterior

1. Roof and HVAC units
 - a. The roof was in good repair and appeared to be appropriately constructed to allow drainage of rainwater into rooftop drains; the drains emptied into subsurface piping to transport the water to catchment basins on the building grounds. Roof construction was described as a metal decking layer with insulation applied between the decking and the exterior roof membrane. A layer of gravel covered the rubber membrane surface.
 - b. The 15 rooftop HVAC units were in good repair; four units were original to the building and the rest were installed over the last 3-4 years. Two units (an original unit and a newer one) were opened by maintenance staff to allow visual examination of the interior surfaces including the condensing coils and filters. The newer unit was fitted with pleated filters. Inspection of the cooling coils and drain pan revealed them to be clean, and the condensate from the coils was draining properly. The filter in the original unit was cut-to-fit batting, a less efficient material than the pleated filters.

Condensate from the unit appeared to be draining properly but it was not possible to view the condensate coils or pan due to the configuration of the unit. The fresh air intake was not at the proper setting for summer operation of the unit. This was noted by the maintenance person for later correction.

2. Exterior walls
 - a. The exterior walls had a stucco finish; wall construction appeared to consist of an exterior wall/stucco panel applied over interior metal studs with fiberglass bat insulation between the exterior and interior walls.
3. Courtyard and perimeter of building:
 - a. The ground in some areas of the inner courtyard sloped toward the building. Standing water and erosion were observed around roof downspouts in two areas.
 - b. The ground near the exterior of the building appeared to be graded appropriately to direct surface drainage and water from roof downspouts away from the building and toward catchment basins located on the grounds east and west of the building.

Building Interior

1. Ceiling plenum space
 - a. All plenum areas inspected appeared dry. Rust was not evident on metal structural elements. The visible areas of sheetrock did not appear to be water damaged and did not have discoloration suggesting mold growth. There were no odors suggesting mold- or moisture-damaged materials. Spray-on fireproofing material was present on the upper interior walls above the ceiling and on

the underside of the roof. In several areas, this material had come loose and fallen onto the ceiling tiles. This was most evident in the cafeteria plenum space. Lifting the ceiling tiles in the cafeteria in order to inspect the plenum area allowed some of this material to fall to the floor.

- b. Ventilation ducts: The interior of ventilation ducts was examined via access doors at two locations in the hallway outside the cafeteria. The ducts were lined with an insulating material that appeared to be deteriorating, as debris and loosened fiberglass were observed. Some interior fasteners had rusted but there were no odors or obvious mold growth inside the ducts.
2. Floors, walls, and ceilings
- a. Floors: Vinyl flooring was used in hallways and many patient rooms. Carpeting was present in some patient rooms and in most patient lounges/common areas and offices. Carpeting in some patient lounges showed signs of wear as well as stains that appeared to have resulted from food and beverage spills.
 - b. Walls: There was no apparent visual evidence of water damage or mold. However, no paint or other wall finishes were removed and no invasive assessments of wall cavities were performed. Some walls in patient rooms were covered with fiberglass reinforced panels (FRP). Management reported that these were areas where the sheetrock had been forcibly damaged by agitated patients. FRP was also present under the windows in the hallway adjacent to the cafeteria. Management reported that the

sheetrock in this location had been covered because it was water damaged. Management reported that this area was scheduled for remediation in the future.

- c. Ceilings: The vast majority of ceiling tiles appeared clean and did not show signs of water stains. Most supply air diffusers and returns were clean with the exception of the returns in the cafeteria which were found to be very dirty.
3. Interior temperature, relative humidity, and CO₂ levels (See Table 1)
- a. Interior temperatures were within the range recommended by the American Society for Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Standard 55-2004.⁴
 - b. Most indoor relative humidity measurements exceeded the ASHRAE Standard 55-2004 recommended limit of 60%.⁴
 - c. All CO₂ measurements met the adequate ventilation criteria established in ASHRAE Standard 62-2004 (indoor concentrations should not be more than 700 parts per million greater than the concentration measured outdoors).⁵ Some measurements were near the recommended maximum.

DISCUSSION

It is well known that some workers experience headaches and eye, nose, and throat irritation in damp or moisture-damaged buildings.^{6,7} The actual exposures that are responsible for these symptoms are still unknown, and research is ongoing in this area. Occasionally workers will experience exacerbation of pre-existing asthma or become newly asthmatic in such buildings.^{8,9} Development of hypersensitivity pneumonitis, an allergic-type lung disease, has also been linked to damp or moisture-damaged

buildings.^{8,9} While building-related symptoms such as headache and eye, nose, and throat irritation generally resolve after the affected individual leaves the building and usually do not pose any long-term health risk, asthma and hypersensitivity pneumonitis can lead to decreased lung function if exposure to the triggering agent is allowed to continue. To prevent potential effects on the health of workers, NIOSH recommends following the guidelines established by EPA and NYDOHMH when remediating moisture-damaged building materials (i.e. perform remediation under appropriate containment to minimize exposures of individuals occupying the facility while such work is in progress).^{1,3}

Overall the CEBH facility appeared to be clean and well maintained. Temperature and CO₂ levels were within ASHRAE recommended limits in all areas of the building. Relative humidity was above the ASHRAE recommended limit of 60% in several areas. This may have been due to HVAC units not cycling on as often in these areas due to mild outdoor temperatures leading to a lower cooling requirement to maintain the indoor temperatures, or to over-sizing of the air conditioners in relation to the volume of air space to be conditioned and the usual number of building occupants. NIOSH staff did not detect any odors that might indicate water-damaged materials and/or mold growth and did not see any visible evidence of moisture-damaged building materials or mold growth. However, as noted previously, no wall finishes were removed during this evaluation and no invasive examinations of wall cavities were performed.

Limited inspection of the ventilation ducts revealed a lining material that appeared to be breaking down. This may be responsible for the dirty appearance of air supply diffusers and returns that workers have reported in the past.

Other conditions noted during the walkthrough inspection that should be addressed include (1) re-grading the area around the downspouts in the courtyard to prevent pooling of water which could infiltrate into the building, and (2)

replacing the fireproofing material that has fallen off from the underside of the roof deck.

Management provided NIOSH with a copy of its policy titled "Suspected or Detected Mold Management Plan" (Policy #1095; dated 12/1/04). Suggested revisions are noted below in the recommendations section of this report.

CONCLUSIONS

The CEBH building has a history of water incursion from roof leaks over many months in 2003 and 2004 as well as through hall windows and the ventilation system from hurricanes in the summer of 2004. During and after this time, workers reported experiencing eye, nose, and throat irritation, headaches, and the onset of asthma (or exacerbation of preexisting asthma). A walkthrough of the facility by NIOSH staff revealed the building to be predominantly clean and well maintained. Issues identified that should be addressed in order to minimize potential health effects include: 1) deteriorating ventilation duct lining, 2) moisture-damaged walls that have been painted and/or covered with another material such as fiberglass reinforced panels, 3) relative humidity above the ASHRAE-recommended levels, 4) fireproofing material that was no longer attached to wall or roofing surfaces and 5) exterior grading that may direct storm water runoff toward the building. CEBH management should follow the recommendations listed below in order to address these and other issues that could impact indoor air quality and potentially lead to health effects in workers.

RECOMMENDATIONS

If the following interventions have not been performed or implemented to date, CEBH management should:

1. Remediate any building materials that have known moisture damage or mold contamination while utilizing appropriate containment to prevent staff and patient exposures

- to airborne dust or other contaminants.
2. Have all ventilation-duct lining material removed or replaced and have the ducts cleaned. If this cannot be accomplished in the existing ductwork, then the ducts themselves should be replaced.
 3. Ensure that HVAC units are properly sized and maintained to provide for temperature and relative humidity control within the ASHRAE recommended limits for all heating and cooling seasons.
 4. Repair or replace any fireproofing material that has come loose from the underside of the roof deck.
 5. Implement a program to maintain indoor air quality. The essential features of such a program are outlined in the Environmental Protection Agency's guidance materials for maintaining indoor air quality in schools.²
 6. Instruct all CEBH staff to report immediately to maintenance staff any roof or other leaks, any wet walls, rugs, or ceiling tiles, and any musty or moldy odors. These problems should be immediately investigated by maintenance staff, with leaks repaired as soon as possible and wet materials dried within 24 hours. Materials with evidence of mold growth should be replaced as noted above.
 7. Revise your "*Suspected or Detected Mold Management Plan, Policy #1095*" as follows: In the section titled "Facilities response to moisture incident report", there is reference to "10 percent of the area of the wall..." as the criterion for level of response. Revise this to "10 square feet of wall" as recommended in the NYCDOHMH *Guidelines on Assessment and Remediation of Fungi in Indoor Environments*. (Later sections of Policy #1095 do use the "10 square foot" criterion.) Include a

requirement for skin and eye protection for workers using bleach solutions during cleanups. Clearly indicate the mechanism for employee reporting of leaks or other building moisture issues.

8. In the courtyard, re-grade any areas where the ground is sloped toward the building, or where water is noted to pool next to the building walls when it rains.
9. Workers should see their personal physicians for any persistent respiratory symptoms.

REFERENCES

1. Environmental Protection Agency [2001]. Mold remediation in schools and commercial buildings. EPA 402-K-01-001.
2. Environmental Protection Agency [2000]. Indoor air quality tools for schools. EPA 402-K-95-001 (Second Edition).
3. New York City Department of Health. Guidelines on Assessment and Remediation of Fungi in Indoor Environments. <http://www.nyc.gov/html/doh/html/epi/moldrpt1.shtml>. Accessed September 21, 2005.
4. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. ANSI/ASHRAE Standard 62.1-2004 – Ventilation for acceptable indoor air quality. Atlanta, GA. 2004.
5. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. ANSI/ASHRAE Standard 55-2004 – Thermal Environmental Conditions for Human Occupancy. Atlanta, GA. 2004.
6. Institute of Medicine [2004]. Executive summary. In: Damp indoor spaces and health. Washington, DC: National Academy Press, pp. 1-16.
7. Kreiss K [1989]. The epidemiology of building-related complaints and illness.

Occupational Medicine: State of the Art Reviews. 4(4):575-592.

8. Cox-Ganser J, White S, Jones R, et al. [2005]. Respiratory morbidity in office workers in a water-damaged office building. Environ Health Perspect 113:485-490.
9. Hoffman RE, Wood RC, Kreiss K [1993]. Building-related asthma in Denver office workers. Am J Public Health 83:89-93.

Table 1. Temperature, relative humidity and carbon dioxide concentration at various locations within the CEBH building*

Area/Room	Occupants Present	Temperature (°F)	Relative Humidity (%)	CO₂ Concentration (ppm)
Room 181	0	76	39.8	836
Hallway outside room 173	0	76.1	47.8	940
Room 173	6	75.4	48.0	925
Room 174	0	74.5	59.0	775
Room 167	4	73.9	62.2	829
Room 168	2	74	63.7	862
B-wing hallway	0	73.8	56.5	905
Room 147	1	73.7	59.6	783
Room 138	0	73.4	62.7	881
Room 136	0	73.9	62.6	785
G-unit hallway	1	74.1	64.2	1015
Room 128	0	74	64.4	810
Multipurpose room	0	73.7	60.6	830
Room 125	0	74.1	61.7	725
Group room	0	73	66.1	736
Hall outside cafeteria	0	73	55.6	653
Cafeteria	0	73.5	65.5	507
Courtyard	N/A	80.5	78.50	442

* All measurements were made between 8:00 a.m. and 12:00 p.m., April 26, 2005

APPENDIX



DEPARTMENT OF HEALTH & HUMAN SERVICES

Phone: (304) 285-5751
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Public Health Service

Centers for Disease Control
and Prevention (CDC)
National Institute for Occupational
Safety and Health (NIOSH)
1095 Willowdale Road
Morgantown, WV 26505-2888

April 15, 2004
HETA 2004-0148

Mr. Cliff Schroder, CHFM
Director, Facility Services
Indian River Memorial Hospital
1000 36th Street
Vero Beach, Florida 32960

Dear Mr. Schroder:

This letter is in response to a confidential request for the National Institute for Occupational Safety and Health (NIOSH) to conduct a health hazard evaluation (HHE) at the Indian River Memorial Hospital in Vero Beach, Florida. In the request, the primary health concerns include headaches, sinus infections, coughing, sneezing, watery eyes, and breathing problems. The building concerns and exposures were attributed to roof leaks that had caused mold growth within the building.

We called the requester, union representative Mr. Steve Myers, to confirm the information in the request and to obtain additional information about the building-related concerns. Mr. Myers informed us that he was making the request on behalf of approximately 50 nurses who work in the Center for Emotional and Behavioral Health (CEBH) located next to the hospital. This facility began having roof leaks around a year ago. The roof had not been repaired due to budget constraints. Mr. Myers stated that the building has a musty smell and described the areas of concern as having what appears to be mold growth on the walls behind wall paper. For further information regarding the building, Mr. Myers referred us to both you and Human Resource Director, Mr. Bob Zomock.

Bob Zomock stated that the roof is in need of repair and that approval had recently been given to hire a contractor to replace it. He told me that the hospital has an American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) certified technician who has been involved in addressing building-related problems. He also mentioned that you had recently gone to the facility and reported that there were no problems with the air quality and suggested that we contact you.

In our discussions, you reported that a contract had already been awarded for replacing the roof, and that work was set to begin in the upcoming weeks. You said that the roof would be replaced first, and then any interior problems would be addressed after that. You also stated that the ASHRAE technician looked at the HVAC system and found that it was clean and well maintained, and that he did not observe any mold in the building. You stated that the technician

had prepared an assessment report and that you would send it to me electronically. We received the report shortly after. It consisted of an email correspondence between you and Mr. Chad Lane, HVAC technician.

In the email, Mr. Lane said that he had investigated two medical rooms where workers had expressed concerns about mold and found no visual indication of mold in either room. He noted that the adolescent medical room needed cleaning and that he was told by the housekeeper that access to the rooms was difficult because staff were still working in them during cleaning times. Mr. Lane also said that humidity levels in the rooms sometimes exceeded the recommended levels and that if this were not corrected, it could facilitate mold growth. He made changes in the ventilation control system to minimize the spikes in humidity. Carbon dioxide levels were measured and the results indicated that the two rooms appeared to have sufficient ventilation.

NIOSH Physician, Dr. Richard Kanwal, spoke with several nurses about their health problems. During the discussions, the nurses reported headaches, eye irritation, nasal stuffiness, and sinus problems. Most symptoms were reported to improve when the affected individuals are away from the hospital. Two nurses reported that their asthma symptoms had worsened over the past several months, while one reported that his/her asthma developed after starting to work in the building. One nurse also mentioned that patients had complained of cough, congestion, and sore throat. Dr. Kanwal was informed by the nurses that the building roof has leaked repeatedly for much of the past year. The nurses discussed seeing several walls with mold growth. In one area, they stated that a repair to a moldy wall included covering the affected area with sheetrock, and then covering the extra sheetrock with vinyl when mold grew on the second sheetrock layer. The nurses stated that there is mold on carpets in the lounge areas and in the fabric creases of upholstered furniture. They mentioned two instances where "mushrooms" were found at the base of a wall, and that mold growth was found on a book in the "children's medication room". They said that air conditioning vents were dirty, and would become dirty again very soon after being cleaned. A staff bathroom reportedly has a "sewer smell" and the entire building was reported to have a musty smell.

During one of our discussions, you requested that we review a proposal from an environmental contractor and give recommendations regarding the appropriateness of the recommended actions. We have reviewed the indoor air quality investigation and sampling proposal prepared for your facility by Jack Tracy of Indoor Environmental Consultants, and contacted you to discuss our recommendations. As we discussed with you over the telephone, there are no recognized or regulatory limits for allowable levels of mold in indoor air. Therefore, NIOSH usually recommends thorough visual inspection of a building to determine whether potential sources of mold are present prior to any decisions about air sampling. Any areas with visible water damage or moldy odors should be thoroughly examined for mold growth including inspection of wall cavities or ceiling plenums. In the areas where there are no obvious signs of mold growth but employees have concerns about mold due to smells or symptoms, limited air sampling might be useful to determine if the possibility exists for a hidden reservoir. If the results of the sampling indicate that these areas have concentrations or types of fungi present that are not similar to outdoors, then more invasive investigation would be warranted.

In relation to the air sampling proposed for monitoring the volatile chemicals that might enter the building during the roof repair, a more proactive approach would be to establish procedures that

would prevent entrainment of odors into the building. You have stated that you have chosen a roofing system that will have lower emissions. Working with your contractor to develop good site control and proper work practices should minimize any entrainment of odors into the building. If these procedures are implemented, it is unlikely that any chemicals that enter the building would be present at levels above the allowable workplace limits.

After reviewing the information provided, it appears that you are moving forward to address employee health concerns in relation to your work facility. We recommend that you have the roof repaired as soon as possible. Immediately after the roof repair, it is recommended that you engage the services of a qualified professional to identify all water-damaged and/or moldy building materials and the appropriate procedures for removal. We have included two documents with this letter: the Environmental Protection Agency publication *Mold Remediation in Schools and Commercial Buildings* and the New York City Department of Health and Mental Hygiene *Guidelines on Assessment and Remediation of Fungi in Indoor Environments*. These documents are considered to contain the current best practice for removing mold should it be found in your building and will be of use to you in determining the appropriate actions for your building.

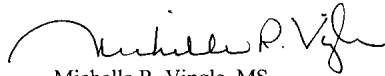
IAQ exposures and outcomes like yours are reported frequently in buildings. NIOSH has evaluated buildings with similar characteristics and has found that mold and indoor air quality problems can be corrected using remediation methods that are fairly standardized. The potential exposures from mold and moisture-damaged building materials can pose a risk to the health of workers and patients. This means that it will be important to consider employee health before and during repairs. We recommend that any workers with asthma who experience a worsening of their symptoms should consult with their physician to determine if they should avoid working in the building until all remediation work is complete. Any workers that experience shortness of breath, fever, or extreme fatigue should also seek medical attention. These symptoms may indicate hypersensitivity pneumonitis, an allergic-type lung disease which can lead to lead to persistent, severe symptoms if it is not identified early and the affected individuals are not removed from further exposure in the building.

Maintaining acceptable IAQ must be a continuing process integrating a sound and effective maintenance program with available resources and methods to identify any possible causative factors for environmental concerns. The enclosed safety and health information bulletin, *A Brief Guide to Mold in the Workplace*, contains practical advice regarding the prevention, evaluation, and correction of indoor air quality problems. Also enclosed are documents on *Mold in Indoor Workplaces*, and *Ventilation and Air Quality in Offices*. The enclosed *Indoor Air Quality Tools for Schools* package provides guidelines on how to implement an indoor air quality program in a school setting. The information can be used a model to implement a similar IAQ programs in your facility. NIOSH encourages building management to use the IAQ Tools for Schools model to establish an IAQ team consisting of a coordinator, representatives of the building employees, employers, and building management who would oversee implementation of the program.

We hope that this information will help you to better understand the possible health risks in mold and moisture damaged buildings, and how to avoid them. Copies of this letter are being sent to Mr. Bob Zomok, Director of Human Resources and Mr. Steve Myers, Representative, Teamsters

Local Union No. 769. This letter serves to close out this request. All parties should feel free to contact us at 304-285-5734 if additional questions arise, or if building conditions do not improve. **In accordance with the Code of Federal Regulations, Title 42, Part 85, copies of this letter must be posted by management in a prominent place accessible to the employees for a period of 30 calendar days.**

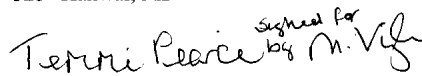
Sincerely,



Michelle R. Vingle, MS



Rich Kanwal, MD



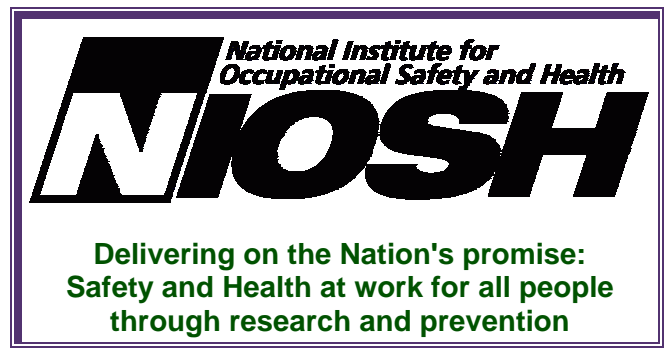
Terri Pearce, Ph.D.
Respiratory Disease Hazard Evaluation and
Technical Assistance Program
Field Studies Branch
Division of Respiratory Disease Studies

Enclosures

cc:
Mr. Bob Zomock, Director of Human Resources
Indian River Memorial Hospital, Inc.
Mr. Steve Myers, Union Representative
Teamsters Local Union No. 769
OSHA, Region 4
Richard Hartle (HETAB)
Close-out file (2004-0148)

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