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NIOSH INVESTIGATORS:
John A. Decker, M.S.
Ruth A. Shults, R.N., M.P.H.

SUMMARY

In June 1992, the National Institute for Occupational Safety and Health (NIOSH) received a request for a Health Hazard Evaluation (HHE) from a group of employees at the District of Columbia Board of Parole. The request indicated that employees were potentially exposed to parolees with active tuberculosis. In response to this request, NIOSH representatives conducted site visits on August 24-25, 1992, and
November 19, 1992.

The ventilation system in the parole office was evaluated to assess air distribution, outside air intake, and dilution. Outside airflow and carbon dioxide (CO_2) concentrations, a surrogate indicator of outside airflow into a building, were measured. Outside air intake on the first floor (and possibly the third floor) did not meet the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) ventilation recommendations for office space (ASHRAE Standard 62-1989, 20 cubic feet per minute per person). Afternoon carbon dioxide concentrations reached 1300, 875, and 1000 parts per million (ppm) on the first, second, and third floors, respectively. Concentrations over 1000 ppm suggest inadequate outside airflow into a building. ASHRAE standard 62-1989 is designed to provide acceptable indoor air quality, but not to prevent transmission of infectious respiratory diseases. There are no ventilation criteria that specifically address infectious disease transmission in office buildings.

Thirty-four of the 51 (67%) D.C. Board of Parole employees completed a self-administered questionnaire. All questionnaire respondents recalled having at least one tuberculin skin test prior to November 1992. Thirty respondents reported that their last test result was negative, one reported that his last test was positive, and three did not answer the question. Another respondent, who reported that her last skin test was negative, had taken preventive drug therapy for a positive skin test when she was a child. None of the thirty-four respondents had been diagnosed with active tuberculosis.

The D.C. Board of Parole did not require pre-employment tuberculin skin testing or yearly retesting of employees. In November 1992, 27 of the 51 (53%) Board of Parole employees were tuberculin skin tested by the D.C. Bureau of Tuberculosis Control.
Two employees, whose previous skin tests had been negative, had positive tuberculin reactions. One of the employees denied contact with any known tuberculosis cases, and the other did not provide information on possible exposures. It could not be determined if the two individuals became infected while at work. Both individuals received a follow-up medical evaluation.

D.C. Board of Parole employees may have an added risk of tuberculous infection because:
(1) parolees are at increased risk for developing active tuberculosis (all have been incarcerated, some are medically underserved, and some are homeless); and
(2) the building's ventilation system recirculates most of the air in the facility, thereby permitting any infectious droplet nuclei in the air to spread throughout the facility.
Recommendations for an employee tuberculosis screening program and improvements to the ventilation system are provided.

KEYWORDS: SIC 8322 (Individual and Family Social Services, Parole Office)
Mycobacterium tuberculosis, tuberculosis, TB

INTRODUCTION

In June 1992, the National Institute for Occupational Safety and Health (NIOSH) received a request for a Health Hazard Evaluation (HHE) from a group of employees at the District of Columbia Board of Parole (1339 Green Court, N.W., Washington, D.C.). The request indicated that parole officers and other employees in the building were potentially exposed to parolees with active tuberculosis. In response to this request, NIOSH representatives conducted site visits on
August 24-25, 1992, and November 19, 1992. An interim report was distributed in October 1992.

BACKGROUND

Facility

Since late 1987, the Board of Parole has occupied the first three floors of a four-story brick building constructed in the late 1920s. Each floor has about 5000 square feet of open work area, some of which is sectioned into office cubicles. The building is occupied by Board of Parole employees and clients on weekdays between 7:00 a.m. and 6:00 p.m.

In August 1992, 54 Board of Parole employees supervised about 4200 parolees from this office. By November 1992, there were 51 employees. Each parole officer had approximately 225 parolee visits per month; frequency of parolees' visits ranged from about weekly to every two months. Frequently, many parolees reported to the office on the same day, creating overcrowding in the waiting areas. Waiting time ranged from around 10 minutes to an hour or more.

Ninety percent of the Board of Parole clients were paroled from the Washington, D.C. Department of Corrections, which did not routinely do tuberculin skin tests on inmates before paroling them.

Heating, Ventilating, and Air-Conditioning (HVAC) System

The heating, ventilating, and air-conditioning (HVAC) systems for the first three floors of the building consist of nine 3-ton Trane heat pumps (Model BPCB 5020-A). Three heat pumps, serve each floor; each heat pump is controlled by a single thermostat that is located near the center of area it serves. The system has no provision for humidification in the winter. All heat pumps are operated in the "automatic" mode (i.e., the ventilation system shuts off when heating or cooling

requirements are satisfied). Each floor has a 12-inch tubular duct that supplies outside air to the three heat pumps. Except for the bathroom exhausts, there is no provision for exhausting air from the building.

Supply air from the HVAC units is distributed to the work area through metal tubular ducts that feed into numerous circular diffusers (19 supply diffusers on the third floor). Each HVAC unit has one return air vent located near the air handler. Return air and outside air mix in a common plenum prior to distribution.

EVALUATION CRITERIA

Tuberculosis

Over 25,000 cases of active tuberculosis are reported annually in the United States.[1] The transmission of tuberculosis is a recognized risk in prisons, homeless shelters, and health care institutions.[2,3,4,5,6] Recent outbreaks in hospitals and a New York state correctional facility have raised concerns over the possibility of further spread among the general population.[7] Several recent outbreaks of tuberculosis involving multidrug-resistant strains of *M. tuberculosis* have heightened concern about transmission of the disease. In addition, active tuberculosis is increasing among persons infected with the human immunodeficiency virus (HIV). Because HIV weakens the immune system, persons with HIV infection are at high risk of developing active tuberculosis if infected.[3]

Certain groups are at increased risk for developing tuberculosis. These groups include medically underserved low-income populations, including racial or ethnic minorities (African Americans, Hispanics, and Asians/Pacific Islanders, Native Americans/Alaskan Natives); residents of long-term care facilities, correctional institutions, mental institutions, nursing homes, and other long-term residential facilities; persons living under crowded conditions; alcoholics and intravenous drug users; the homeless; the elderly; foreign-born persons from areas of the world with a high prevalence of tuberculosis; and persons living in the same household as members of these high risk groups.[7,8,9] Workers who have close contact with individuals with unsuspected tuberculosis may have a substantial risk for acquiring tuberculosis infection, but the extent of the risk is unknown for most work settings.[3,4]

M. tuberculosis, a rod-shaped bacterium, is transmitted by airborne droplets generated when persons with pulmonary or laryngeal tuberculosis sneeze, cough, or speak.[3,10] The droplet nuclei are so small (1-5 microns in diameter) that normal air currents keep them airborne and can spread them throughout a room or building. When a

susceptible person inhales droplet nuclei, the organisms lodge in the alveoli of the lungs and spread throughout the body, causing infection. The dose required to initiate infection is unknown. Two to ten weeks after the initial infection, the body's immune response usually limits further multiplication and spread of the organisms. However, in approximately 1% of newly infected persons, the initial infection rapidly progresses to active tuberculosis. Another 5 - 10% of those infected will develop active tuberculosis over a period of months, years, or decades. The risk of progression to active disease is markedly increased for persons with HIV infection.[3,11]

Infection with *M. tuberculosis* usually can be identified through tuberculin skin testing. The Mantoux technique, the preferred test, involves intradermal injection of 0.1 milliliters of purified protein derivative [PPD] containing 5 tuberculin units.[3,12] If an individual has been infected with *M. tuberculosis*, treatment with the drug isoniazid can greatly reduce the chance of later developing active tuberculosis. Questions about the effectiveness and reliability of the tuberculosis vaccine (Bacillus of Calmette and Guerin [BCG] vaccine) have limited its use in the United States.[13]

Ventilation Criteria

Criteria for evaluating the risk of tuberculosis transmission in office buildings do not exist. Additionally, effective and practical control techniques for reducing risk or preventing exposures to tuberculosis have not been determined or thoroughly evaluated. Because the control measures discussed below were developed primarily for hospitals, they may not all readily apply to other workplaces. However, a discussion of these measures is useful in understanding the range of options available to control tuberculosis transmission.

The following basic approaches can be used to greatly reduce the risk of *M. tuberculosis* transmission: (1) prevent infectious particles from entering the air by identifying and treating persons with active tuberculosis, (2) reduce the number of infectious particles entering the air by containing them at their source, (3) use appropriate respiratory protection, and (4) use tuberculin skin test screening to identify infected personnel and provide preventive treatment. When inadequate attention is given to any of these approaches, the probability of tuberculosis transmission is increased.[3]

When infectious particles cannot be controlled at their source and they enter room air, ventilation, both local and general, can reduce the concentration of particles. Local exhaust ventilation captures and removes the infectious agent from the air

before it comes in contact with susceptible individuals. It is most effective when the infection source is at a fixed location (such as a in a laboratory or area where respiratory treatment booths can be used). General ventilation, which provides air flow to larger areas, reduces the concentration of infectious agent and/or moves the infectious agent away from susceptible individuals. Both local and general ventilation can be supplemented by adding high-efficiency particulate air [HEPA] filters to the ventilation system.

For many years, ventilation has been the primary environmental control method for tuberculosis. Ancillary control measures have included ultraviolet radiation and the wearing of personal respirators. However, ultraviolet radiation is controversial because of concerns about over-exposures to ultraviolet radiation and limited evidence of efficacy.[3] All of the control measures discussed above may reduce exposure to tuberculosis; however, there is no reliable method for measuring the reduction achieved by each control measure. None of the control methods used alone or in combination can completely eliminate the risk of tuberculosis transmission.[3]

Ventilation in Office Buildings

The probability of tuberculosis transmission is affected by the number and infectiousness of persons with active tuberculosis, the susceptibility and proximity of uninfected persons, and building ventilation. Ventilation recommendations exist for minimum outside air intake and temperature control in office buildings.[14,15] The American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE) standard 62-1989, "Ventilation for Acceptable Indoor Air Quality," recommends outdoor air supply rates of 20 cubic feet per minute per person (CFM/person) for office spaces and conference rooms, 15 CFM/person for reception areas, and 60 CFM/person for smoking lounges.[14,16] These guidelines, however, do not address disease transmission. This is of concern in control of tuberculosis transmission because even the most dilute airborne concentration of the infectious agent may present some risk of infection.[17,18]

Carbon dioxide (CO_2) is a normal constituent of exhaled breath and, if monitored, can be used as a screening technique to evaluate whether adequate quantities of outside air are being introduced into an occupied office space. Indoor CO_2 concentrations are normally higher than the generally constant ambient CO_2 concentrations (range 300-400 ppm). When indoor CO_2 concentrations exceed 1000 ppm in areas where the only known source is exhaled breath, inadequate ventilation is suspected.[19] Elevated CO_2 concentrations suggest that other indoor contaminants may also be increased.

Ventilation in Health Care Settings and Homeless Shelters

ASHRAE and the American Institute of Architects (AIA) have published other ventilation guidelines for health care facilities.[20,21] These guidelines, which do not apply to office buildings, are presented for perspective. The guidelines specify proper pressure relationships to adjacent areas, minimum outdoor air and total air changes, proper exhaust location, and air recirculation restrictions. In these guidelines, ventilation rates are expressed in terms of air changes per hour (ACH); an ACH is defined by the theoretical number of times that the air volume of a given space will be replaced in a one-hour period. However, the terminology is misleading because the entering air is constantly mixed with existing air in the room; air is not completely "changed" even if there is perfect mixing. According to these guidelines, hospital isolation rooms, which are intended to reduce the airborne spread of disease in a hospital, should provide a minimum of 6 ACH (2 ACH of outside air) with all air exhausted directly to the outside. Isolation rooms should be under negative (lower) air pressure with respect to adjacent areas. Negative pressure is attained by exhausting more air from the area than is being supplied. Waiting areas in hospital emergency rooms should provide a minimum of 10 ACH, with all air exhausted directly to the outside. The Advisory Council for the Elimination of Tuberculosis (ACET) recommends that homeless shelters be provided with a minimum of
25 CFM/person outside air.[6]

Currently, there is no health-based information which can validate the ASHRAE, AIA, or ACET airflow criteria. Engineering judgement suggests that higher general ventilation rates than published by ASHRAE or AIA would improve dilution and removal and could thus further reduce the probability of exposure. Therefore, health-care facilities should be designed to achieve the best possible general ventilation air flows substantially greater than 6 ACH in those areas where confirmed or potentially infectious TB patients are present (e.g., isolation and treatment rooms).

METHODS - ENVIRONMENTAL

Visual HVAC System Inspection

A walk-through survey of the first three floors of the building and an inspection of the ventilation system was conducted on August 25, 1992. The outside air intakes on the side of the building and the HVAC compressors on the roof were also inspected. The air handlers for the first floor were inaccessible and were not inspected. The air handlers and outside air intakes for the second and third floors of the building were visually inspected for microbiological growth and water drainage.

HVAC Measurements

Outside air supply rates to the HVAC units on the second and third floor were measured with a VelociCalc TSI Plus velometer Model 8360. The instrument utilizes a hot wire; the cooling effect due to airflow is proportional to the air velocity (accuracy +/- 2.5% of reading). Five cross-sectional velocity measurements were made in the supply duct, and the volumetric outside airflow rate was calculated by multiplying the average air velocity by the cross-sectional duct area.

Air flow rates from the supply diffusers on the third floor were estimated by measuring the air velocity at five points inside the diffuser and multiplying the average air velocity by the area inside the diffuser. Velocity measurements of this type (close to the diffuser) have limited accuracy and should be considered rough estimates.

Carbon Dioxide Concentrations

Real-time carbon dioxide (CO_2) concentrations were measured using a Gastech Model RI-R11A meter. This portable, battery-operated instrument monitors CO_2 by non-dispersive infrared absorption with a sensitivity of 25 parts per million (ppm). Instrument zeroing and calibration were performed before use with zero air and
800 ppm CO_2 span gas. Four sets of measurements at two locations on each floor were taken throughout the day, starting before the building was occupied.

METHODS - MEDICAL

At the suggestion of NIOSH representatives, the Board of Parole arranged for free Mantoux tuberculin skin testing at the worksite. NIOSH mailed each employee a letter explaining the importance of the skin testing and encouraging each employee to participate. The Washington, D.C. Bureau of Tuberculosis Control gave tuberculin skin tests to 28 of the 51 (57%) Board of Parole employees on November 17, 1992, and read the results of 27 of the skin tests on November 19, 1992. During the November 19th visit, all Board of Parole employees were asked to complete a self-administered questionnaire regarding their past tuberculin skin test results, any history of medical treatment for active tuberculosis or preventive treatment for a positive skin test, and about personal and occupational risk factors for tuberculosis.

RESULTS AND DISCUSSION - ENVIRONMENTAL

Visual HVAC Inspection

The outside air dampers for the air handlers on the 2nd and 3rd floors were completely closed, resulting in no outside air supply to the building, except by infiltration. The filters reportedly had been changed about two weeks prior to the NIOSH visit. Air was by-passing all of the filters that were inspected because of imprecise fit of filters in the air handlers. No obstructions, biological growth, or sources of pollutants were near the outside air intakes. The air handlers and outside air intakes for the second and third floors were free of water accumulation, biological growth, or debris. The air handler for the first floor was not inspected because it was inaccessible.

HVAC Measurements

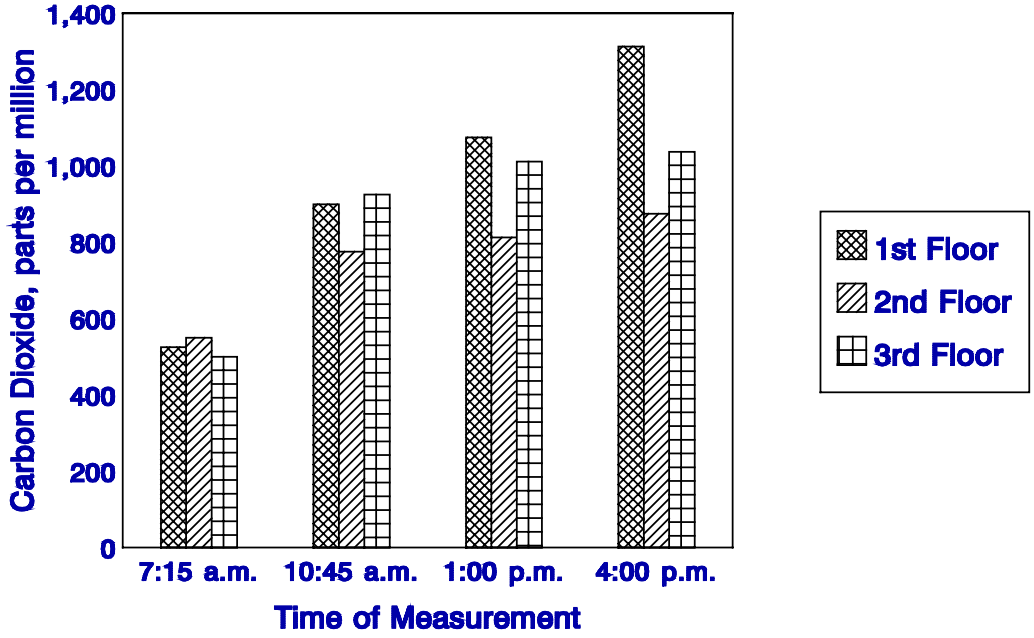
The outside air dampers on the second and third floors were opened during the inspection. The outside air flow rate for the third floor was 397 CFM with the outside air damper completely opened. Based on the ASHRAE office space ventilation recommendations, a maximum of twenty people could be accommodated on the third floor, assuming proper distribution of outside air to occupied spaces. The outside air flow rate for the second floor was 585 CFM with the outside air dampers completely opened. Based this ventilation rate, a maximum of about twenty-nine people could be accommodated on the floor. According to a building engineer, when the outside air dampers were completely opened, the HVAC units could not adequately heat and cool the building, so the dampers were kept fully or partially closed. ASHRAE recommends 20 CFM/person of outside air intake for office buildings. This criterion would not be met when the outside air dampers were closed.

Based on the number of employees and parolee visits per day, over 90 people could be occupying the first three floors at any one time. When this occurs, outside air flow into the building may not meet ASHRAE ventilation requirements (especially the third floor). On the day of the NIOSH survey (Tuesday), relatively few parolee visits were scheduled. Based on actual counts of the numbers of people on each floor during our survey, the amount of outside air intake on the second and third floors was sufficient only when the outside air dampers were completely opened.

Airflow rates from the 19 diffusers on the third floor ranged from 48 to 520 CFM. Four diffusers were covered or blocked because some employees were uncomfortable with drafts. The total air flow from all open diffusers was approximately 4000 CFM. Therefore, when the outside air dampers were completely open, about 10% of the total supply air was outside air.

Carbon Dioxide Concentrations

Figure 1
D.C. Board of Parole
Carbon Dioxide Concentrations



CO_2 measurements were taken throughout the day on the first, second, and third floors of the building (see Figure 1 below). The two measurements taken at each time point on the respective floor were averaged. As discussed previously, concentrations over 1000 ppm suggest insufficient outside air into the space. On the first floor, CO_2 concentrations increased steadily to over 1300 ppm by 4:00 p.m., suggesting insufficient outside air intake to this floor. The actual flow rate of outside air provided to the first floor could not be determined because the outside air intakes and air handlers were not accessible. On the second and third floors, the outside air intakes were opened during the visual inspection at

about 10:00 a.m. CO_2

concentrations leveled off on the second and third floors at approximately 800-875 ppm and 1000 ppm, respectively. Opening of the outside air intakes may have helped hold CO_2 concentrations lower on these floors. Outside CO_2 concentrations were approximately 350 ppm throughout the day.

RESULTS AND DISCUSSION - MEDICAL

Questionnaire Results

Thirty-four of the 51 (69%) Board of Parole employees (21 males and 13 females) completed the self-administered questionnaire; 22 (65%) were parole officers, six (18%) were parole supervisors, five (17%) were parole assistants, and one (3%) was a laboratory technician. Their ages ranged from 27 to 55 years, with an average age of 41 years. Duration of employment at the Green Court location ranged from less than one year to six years, with an average duration of four years and three months.

All 34 respondents recalled having at least one tuberculin skin test before November 1992; 17 (50%) recalled the year of their last test. Of those seventeen, eight (47%) were tested last in 1992, three (18%) were tested last in 1990 or 1991, five (30%) were tested during the 1980s, and one (6%) was tested in the 1970s. Thirty respondents (88%) reported that their last test (before November 1992) was negative. One respondent reported that his last skin test, which was given before he began working at the Board of Parole, was positive. He reported that he did not take preventive therapy, but that he receives a chest x-ray during routine medical checkups to insure that he does not have active tuberculosis. Another respondent, who reported that her last tuberculin skin test was negative, had completed a course of preventive drug therapy for a positive tuberculin skin test when she was a child. Three additional respondents did not answer the question; two of the three participated in the work site skin testing, and both had negative results. None of the 34 respondents had been diagnosed with active tuberculosis.

Both respondents who reported histories of a positive tuberculin skin test were informed that, once a person has been exposed to tuberculosis, he/she is likely to react positively to a tuberculin skin test for the rest of his/she life, even if he/she takes drugs to prevent active tuberculosis from developing. Therefore, because these two employees have had positive tuberculin skin tests in the past, they should not take skin tests in the future.

Three respondents reported that a coworker at the 1339 Green Court location had been diagnosed with active tuberculosis. On the basis of interviews and discussions with Parole Board and D.C. Bureau of Tuberculosis Control, however, NIOSH

investigators did not identify any current employees with diagnosed active tuberculosis. It is possible that the respondents were misinformed. No one reported having a friend or family member diagnosed with tuberculosis since the employee began work at the Green Court location. Five respondents reported that at least
one of their clients had been diagnosed with active tuberculosis since January 1992; four respondents reported that one client, and one respondent reported that three clients had active disease. NIOSH did not confirm the tuberculosis diagnoses among parolees.

Ten of the thirty-four employees who completed questionnaires did not get skin tested at the work site. Of these ten employees, four reported having received a tuberculin skin test in 1992, one in 1991, and one in 1989. The remaining
four employees could not recall the year of their last skin test.

Tuberculin Skin Testing Results

On November 17, 1992, the D.C. Bureau of Tuberculosis Control gave tuberculin skin tests to 28 employees at the Board of Parole. The standard Mantoux test (intradermal injection of 0.1 milliliters of purified protein derivative tuberculin containing 5 tuberculin units) was used. On November 19, 1992, the Bureau of Tuberculosis Control returned to read the results of the skin tests; 27 of the 28 skin tests were read. Two employees, whose past skin tests had been negative, had positive tuberculin reactions of 10 millimeters or greater; one employee denied contact with any known tuberculosis cases, and the other did not complete the questionnaire. Both received a follow-up medical evaluation.

CONCLUSIONS

Thirty-one of the 51 (61%) Board of Parole employees received tuberculin skin tests either at the work site or elsewhere during 1992. Two employees, whose previous skin tests had been negative, had positive reactions in 1992, and two additional employees reported that they had positive skin tests before 1992. Therefore, four of the 33 (12%) employees for whom current tuberculin skin test status was known had been exposed to tuberculosis; at least two of four employees were exposed to tuberculosis before they began working at the Board of Parole. We were unable to determine if the other two employees became infected while working at the Board of Parole.

Board of Parole employees may have an added risk of tuberculous infection because their clients, the parolees, are at increased risk for active tuberculosis (all previously incarcerated, some medically underserved, and some homeless). Also, the building's

ventilation system, which may not meet ASHRAE office ventilation recommendations, recirculates most of the air in the facility. This recirculation of air increases the likelihood that infectious particles such as droplet nuclei will spread throughout the facility.

RECOMMENDATIONS

Early identification and treatment of persons with tuberculosis remains the most effective method of stopping transmission. However, these medical functions are beyond the control of the Board of Parole. In the future, it may be possible for the Board of Parole to require tuberculin skin testing of prisoners as a condition of parole.

The following recommendations were adapted from those published by the Centers for Disease Control and Prevention for employees in health-care settings and correctional institutions.[3,4] Two assumptions were necessarily made in formulating these recommendations: (1) a Board of Parole employee's risk of exposure to *M. tuberculosis* may be similar to that of health care workers in an outpatient setting; and, (2) the rate of active tuberculosis in the D.C. parolee population may be similar to the rate in homeless populations of around 1% to near 7%.[6]

1. At the time of employment, Washington, D.C. Board of Parole employees who will work in the building where parolee make their visits should receive a Mantoux tuberculin skin test unless: (1) a previously positive reaction is documented; or (2) completion of preventive drug therapy is documented; or
   (3) therapy for active disease is documented.[3,12] Individuals who have a history of BCG vaccination should receive a tuberculin skin test, even though interpretation of a reaction is more difficult. Employees with a positive tuberculin skin test should be evaluated for active tuberculosis.

2. The Board of Parole, in consultation with qualified medical or public health personnel, should establish a tuberculosis screening policy for employees. The policy should require that all tuberculin skin test-negative employees be retested yearly and that the results be maintained in a central confidential file. Data on skin-test conversions should be reviewed periodically so that the risk of acquiring new infection may be estimated. On the basis of this analysis, the frequency of retesting may be altered accordingly.

3. Board of Parole employees who have contact with parolees should be aware of the potential risk for tuberculosis infection. The Board of Parole, in consultation with qualified medical or public health personnel, should provide in-service education to employees about tuberculosis.

4. Parolees who are frequently coughing should spend a minimum of time in common waiting areas. Disposable tissues should be available, and parolees should be encouraged to cover their mouths and noses when coughing or sneezing. Parolees who report unexplained, persistent cough, persistent fever, or unexplained weight loss should be referred for immediate medical evaluation. The Board of Parole may want to consult with the Washington, D.C. Tuberculosis Bureau about the feasibility of monitoring the compliance of parolees being treated for active tuberculosis during their routine visits to the Board of Parole.

5. At a minimum, the building ventilation system should be upgraded to meet the ASHRAE Standard 62-1989 "Ventilation for Acceptable Indoor Air Quality," for general offices. A minimum of 20 CFM/person of outside air should be provided to all occupied areas. When the outside air dampers are fully open, the second floor of the building may meet this recommendation. The first and third floors probably do not meet this criterion even with outside air dampers open. The outside air intake damper and air handling units that serve the first floor could not be inspected during the NIOSH investigation. The Board of Parole should have their HVAC contractor inspect these units.

   Ideally, the ventilation system should provide 100% outside air into the building with no recirculation. If some air must be recirculated, it may be filtered through high efficiency particulate air (HEPA) filters. HEPA filters, which can remove 99.7% of particles greater than 0.3 microns in diameter, could filter out droplet nuclei (1-5 microns in diameter).[4] However, HEPA filtration systems require proper installation, leak testing, and meticulous maintenance.

   Implementation of these ventilation recommendations may reduce, but will not eliminate, the potential for transmission of *M. tuberculosis* infection, since transmission is more likely to occur as a result of "face-to-face" proximity than through the ventilation system.

6. Until the Board of Parole offices are moved from the 1339 Green Court location or until the ventilation system is upgraded, the outside air dampers for all HVAC units should remain fully opened to allow as much outside air as possible to enter the building. The HVAC thermostatic controls should be set to the "FAN ON"

position rather to the "AUTO" position while the building is occupied. When the HVAC units are operated in the "AUTO" position, the HVAC units will shut-down completely when the heating or cooling requirements are satisfied. When this occurs, no outside air enters the building.

7. Diffuser airflow in the building should be evaluated and the ventilation system balanced. A balanced ventilation system will provide an even distribution of air and temperature throughout the work area. Correctly-fitting filters should be installed in the HVAC units so that air does not bypass the filters.

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AUTHORSHIP AND ACKNOWLEDGMENTS

Evaluation Conducted and Report Prepared By:	John A. Decker, M.S. Industrial Hygienist Atlanta Regional Office Ruth A. Shults, M.P.H., R.N. Epidemiologist
Originating Office:	NIOSH Hazard Evaluations and Technical Assistance Branch Division of Surveillance, Hazard Evaluations, and Field Studies NIOSH Cincinnati, Ohio

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2. Requester
3. D.C. Bureau of Tuberculosis Control
4. OSHA Region III Office

For the purpose of informing affected employees, copies of this report should be posted by the employer in a prominent place accessible to the employees for a period of 30 calendar days.

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