Laboratory and Hospital Safety Policy

Summary

BT installs and services various equipment, controls, and devices that maintain pressure differentials in laboratories or critical-care areas with specific ventilation requirements (i.e., operating rooms, airborne infection isolation rooms, etc.).

The BT Room Pressurization Controller (RPC) provides Direct Digital Control technology for space pressurization and temperature control. Typical applications include hospital isolation rooms, surgical suites, critical care and ancillary areas, labs with constant volume two-position fume hoods, areas surrounding laboratories, or wherever positive or negative air pressurization of the room environment is critical.

These areas may contain hazardous chemicals, or airborne or blood-borne pathogens. Therefore, each BT field office will be required to provide safety training prior to the installation, servicing, or maintenance of any HVAC equipment, controls, or fume hoods in these environments. Upon completion of training, the BT office will retain a copy of the class attendance roster complete with signatures of those employees in attendance.

The training program has been designed utilizing various OSHA standards and the December 30, 2005, Centers for Disease Control (CDC) Guidelines for Preventing the Transmission of Mycobacterium Tuberculosis (TB) in

Health Care Settings. This policy is available to all Branch Safety Coordinators to use for training of potentially exposed employees, primarily fitters and specialists.

The risk for contracting TB within a health care setting varies by occupational group, prevalence of TB within the community, patient population, and effectiveness of TB infection control measures taken by the health care facility. The CDC recommends that persons who install, maintain, or replace environmental controls in areas in which people with TB disease are encountered should be included in a TB screening program. This means that BT employees who work in health care settings must receive a baseline TB screening prior to working in a health care setting where they may be exposed to TB. BT employees must take a two-step Tuberculin Skin Test (TST) prior to working on the job site, and should receive TB screening annually by their physician.

1.1 BT Laboratory and Hospital Safety Guidelines

BT employees must be aware of the specific hazards and safety procedures within a laboratory, hospital, or health care facility before installing or servicing any components such as these: 1) Laboratory Room Controllers (LRC), which are typically located in facilities with hazardous environments; 2) Fume Hood Controllers, which modulate exhaust air in systems that may contain biological hazards, toxic chemicals, or radioactive materials; and 3) Differential Pressure Monitors, which measure pressure in

infectious or protective isolation rooms, animal labs, and pharmaceutical rooms.

Laboratories and hospitals are required by OSHA to provide safety guidelines and ensure that they are carried out. BT will not contract with employers who do not comply with OSHA guidelines. The title of the "safety person" may vary from site to site, but BT personnel must contact a representative of the safety office on every site visited to install or service any components in a laboratory, hospital, or other health care facility. **If such a safety officer is NOT identified by the facility, the BT employee must immediately notify their BT supervisor and evacuate the area until further direction is given by BT EH&S Management.**

A laboratory is defined by OSHA as a workplace where relatively small quantities of a variety of hazardous chemicals are used on a non-production basis. OSHA requires that all laboratories establish a Chemical Hygiene Plan to explain how the facility will minimize personnel exposure to hazardous chemicals. The Chemical Hygiene Plan must designate a Chemical Hygiene Officer whose primary responsibility is the safety of laboratory personnel. BT personnel should introduce themselves to the Chemical Hygiene Officer at every laboratory site visited. They are charged with lab personnel protection and are required by law to inform these personnel of the hazards in the laboratory.

Any site that handles radioactive materials is required to have a Radiation Safety Officer (RSO). The RSO ensures

compliance with the Nuclear Regulatory Commission guidelines and Title 10 of the Code of Federal Regulations, Part 20 (10 CFR Part 20), for storage and labeling of radioactive materials and monitoring of personnel exposure. See http://www.nrc.gov/reading-rm/doc-collections/cfr/part020/.

Hospitals will have an administrator in charge of overall occupational safety who may or may not be the Chemical Hygiene Officer. Any facility with a TB isolation ward will have an Infection Control Officer. Larger sites will have several staff members dedicated to occupational safety. **BT employees are NOT allowed to be in a TB isolation room when a patient is occupying the room.**

For simplicity, all these job titles will be referred to as the Safety Officer. The single most productive way for BT personnel to protect themselves in a laboratory or hospital is to find the Safety Officer and ask questions about the hazards and established safety procedure for each laboratory, hospital, or other health care site visited.

TB is caused by the bacterium *Mycobacterium Tuberculosis* and is spread by airborne droplets generated when a person infected with a TB bacteria coughs, speaks, sings, sneezes, etc. Infection occurs when a susceptible person inhales droplet nuclei containing the bacteria, which then become established in the body.

An additional hazard is now present because of multiple drug-resistant (MDR) TB. MDR organisms are resistant to the drugs that are normally used to treat TB, such as Isoniazid and Rifampin. The course of treatment when

treating MDR TB increases from 6 months to 18-24 months, and the cure rate decreases from nearly 100% to less than 60%. Mortality among patients with MDR TB can be high.

The following guidelines are based on recommendations from various OSHA standards, the CDC Guidelines for Preventing the Transmission of Tuberculosis, and past experience in labs and hospitals. These should be considered minimum standards and are not intended to cover all situations that may be encountered. Local safety procedures and the recommendations of the site Safety Officer supersede these recommendations.

1. **On the first visit to a laboratory, BT personnel should introduce themselves to the Safety Officer and locate the Safety Data Sheets, Chemical Hygiene Plan, and other safety information.** Ask specific questions, such as "What type of biological research is being conducted onsite?" and "Do you handle radioactive materials?" This not only establishes credibility, it prompts the Safety Officer to provide more than the standard lecture on how safe the site is. Make sure site safety training and/or written safety procedures are received before work is begun. Most laboratories and hospitals have established controls and procedures to maintain safety. Following these guidelines enhances Siemens' value as a service provider.
2. **Every time when entering a hospital or research laboratory, BT personnel should check in with the**

onsite supervisor. Tell them what you will be doing and ask what work is in progress. Before beginning work, know the hazards that are present, required protective equipment, waste disposal procedures, and locations of safety equipment and emergency evacuation routes. For example, the perchlorate salts that form in the ductwork from a perchloric acid hood are explosive. Never remove potentially contaminated materials from a fume hood exhaust system or bio-safety cabinet. Always ask lab personnel for assistance.

3. **Read warning labels on containers and access doors.** If exposed to a chemical in the air or on your skin, know what hazards are present, required protective equipment, waste disposal procedures, and locations of safety equipment and emergency evacuation routes. Methyl sulfate, a poisonous liquid that is absorbed through the skin, is found in many laboratories. Never touch containers of toxic chemicals or potentially contaminated materials from a hood or bio-safety cabinet with unprotected skin. Always ask lab personnel for assistance.

4. **Wear appropriate personal protective equipment.** When working in laboratories, this includes surgical gloves, safety glasses, and a lab smock which in total serve as a minimum. These should be available onsite. Disposable items must be placed in appropriate containers (biological waste, chemical waste, etc.). Wash your hands thoroughly before leaving the lab. If work on potentially contaminated

areas such as inside fume hoods or air handlers must be performed, make sure they are decontaminated and approved by the supervisor or site Safety Officer. Full face respirators may be required to work inside contaminated ductwork, and there must be training on proper fit and use of respirators before using them on the job. Respirator training is available from Industrial Health, Inc., and through Grainger, who supplies Siemens' personal protective equipment.

5. **Before entering the roof area of a laboratory or a hospital, find out what operations are in progress and what is being exhausted.** Stay upwind of exhaust stacks under 7 feet high. Never place your head in the air stream from a laboratory exhaust fan. Do not perform maintenance on a laboratory exhaust fan or ductwork without knowing what hazardous materials have been exhausted and what protective equipment is required.
6. **Vent isolation room air to the outdoors away from intake vents and employees.** If the air from these areas cannot be vented to the outside, filter air through a HEPA filter before re-circulating it back into other areas of the facility.
7. **If installing or servicing equipment in a laboratory, ask the Branch Safety Coordinator to provide laboratory safety training.** This seminar is taught by National Service Operations initially, and then by the Branch Safety Coordinator.

8. **If installing or servicing Room Pressurization Controllers, or working in a hospital or prison, study the tuberculosis prevention video and pamphlet.** Get a Tuberculin Skin Test (TST) prior to exposure and as recommended by a physician thereafter while being occupationally exposed. Chest X-rays are not recommended unless a skin test shows positive. A positive skin test shows the presence of TB germs in the body. Only about ten percent of people with positive tests develop active TB. The Branch must pay for all personal protective equipment and required preventive medical expenses. Never enter an infectious or protective isolation room when the patient is present. For vacant rooms, if required to enter a potentially infectious area, a P-100 respirator must be worn. Surgical masks and dust/mist/fume respirators provide no protection against TB. Exhaust system maintenance must be performed in accordance with the site safety plan.

9. **The BT employee is the primary factor in creating a safe work environment.** While BT assumes liability for its employee's actions, as contractors, we are required to follow all safety regulations pertaining to the customer's site. If the BT employee feels they are in an unsafe situation, they must leave the area immediately and speak to the site Safety Officer. If not satisfied with the results, speak to the BT supervisor and Branch Safety Coordinator. Before returning to an area they feel is hazardous, the BT employee should request air samples and analysis,

radiation surveys, inspection by a safety representative, or similar positive actions to ensure their safety. Any BT employee who refuses to work in hazardous locations will be reassigned to other work when possible, and will not receive disciplinary action. One's life and health are more important than any job or task.

1.2 OSHA and CDC Guidelines

1.2.1 OSHA National Research Council Recommendations Concerning Chemical Hygiene in Laboratories (Non-Mandatory) – 29 CFR 1910.1450 Appendix A

Under the 1910.1450 Appendix A section, a Chemical Hygiene Officer is described as, "...an employee who is designated... to provide technical guidance in the development and implementation of the Chemical Hygiene Plan." A Chemical Hygiene Plan is "…a written program developed and implemented by the employer which sets forth procedures, equipment, personal protective equipment, and work practices..." to protect the workers from over-exposure to toxic chemicals, to ensure that they are trained on workplace hazards, and to ensure they are provided with free medical treatment if over-exposed.

The non-mandatory Appendix A., paragraph C.4 (b) recommends that "each hood should have a continuous monitoring device to allow convenient confirmation of adequate hood performance before use." Paragraph C.4 (h) recommends that "Quality and quantity of ventilation

should be evaluated on installation, regularly monitored (at least every 3 months), and re-evaluated whenever a change in local ventilation devices is made."

OSHA guidance not only sets forth specific rights for employees, it also reinforces the need for lab control and monitoring equipment.

1.2.2 CDC Guidelines for Prevention of Transmission of Mycobacterium Tuberculosis in Health Care Settings, 2005

According to the introduction, "The purpose of this document is to make recommendations for reducing the risk for transmitting Mycobacterium Tuberculosis to a Health Care Worker (HCW), patients, volunteers, visitors, and other persons in these settings." It describes different risk groups and how the disease is spread. Hospitals and senior care facilities as well as prisons are areas where workers are most likely to come in contact with TB airborne droplet nuclei.

TB warning symptoms are:

- a productive cough
- coughing up blood
- weight loss
- loss of appetite
- lethargy/weakness
- night sweats and/or fever

Engineering controls required for TB isolation rooms are shown below. For detailed information, see the BT Technology Report: Healthcare Isolation Rooms.

- Patient room should be 0.01 in. WC negative (-2.5 Pa) pressure with respect to corridor.
- Newly constructed and renovated isolation infection rooms should receive a minimum of 12 air changes per hour (ACH), and existing rooms should have a minimum of 6 ACH.
- Room exhaust air from isolation rooms should discharge to the outside of building.
- Visual indication of direction of airflow is required at the entry to patient room.