INDOOR AIR QUALITY

A. Introduction:

1. The Indoor Air Quality (IAQ) program at UNE was created to make certain that all occupants of all buildings on both campuses are able to breathe clean, healthy air that is not harmful to their health or safety in an acute or chronic way. Good IAQ should include comfortable temperature and humidity, adequate supply of fresh outdoor air, and control of pollutants from inside and outside of the building. This program was developed to respond to any indoor air quality concerns that building occupants report to EHS and put a process and procedure in place for reporting, investigation, and air monitoring that may be necessary.

Per OSHA, "The right ventilation and building care can prevent and fix IAQ problems. Although OSHA does not have IAQ standards, it does have standards about ventilation and standards on some of the air contaminants that can be involved in IAQ problems. OSHA responds to questions about standards with letters of interpretation". OSHA also says "Employers are required to follow the General Duty Clause of the OSHA Act, which requires them to provide workers with a safe workplace that does not have any known hazards that cause or are likely to cause death or serious injury".

Per the EPA, "A healthy indoor environment is one in which the surroundings contribute to productivity, comfort, and a sense of health and well-being. The indoor air is free from significant levels of odors, dust and contaminants and circulates to prevent stuffiness without creating drafts. Temperature and humidity are appropriate to the season and to the clothing and activity of the building occupants. There is enough light to illuminate work surfaces without creating glare and noise levels do not interfere with activities. Sanitation, drinking water, fire protection, and other factors affecting health and safety are well planned and properly managed".

B. Responsibilities:

1. Environmental Health and Safety Department:

a. Respond to any calls from University building campuses at either site in a prompt manner to investigate the issue and see what the best course of action is.

b. Conduct any investigations, interviews, and air monitoring that needs to be done in response to an IAQ complaint and hire outside contractors when necessary to assist in the investigation and monitoring process.

c. Execute a solution to the IAQ complaint and follow up with building occupants to ensure all necessary improvements and corrections have been made and are effective.

d. Work with the Facilities and HVAC staff to effectively manage the IAQ problem.

e. Report all results to Management in an organized fashion and involve management in all major planning and decision making processes.

2. Facilities Department:

a. Assist EHS and outside contractors with IAQ investigations and resolutions when needed.

b. Provide information that may be pertinent to the building's operations and HVAC systems.

c. Report any air quality issues to the EHS department.

d. Assure all building systems are operating as intended. This includes ventilation, plumbing, and electrical systems, as well as the building envelope.

e. Carefully select products and processes used on jobs. This includes selecting products with low VOC's, alternative products with less hazardous chemicals, and products without added fragrance when possible.

f. Use products and chemicals only as intended and follow directions on the label. When products having volatile chemicals or strong odors are used, provide as much ventilation as feasible and schedule work when the building is minimally occupied. Notify building occupants when odor-creating work will occur.

3. Employees/Staff/Faculty/Students:

a. Report any indoor air quality issues that are encountered to the EHS department.

b. Provide detailed information on the IAQ issue such as dates, times, odors, symptoms, etc., when interviewed.

c. Employees, Staff, Faculty, and students should make themselves accessible for questions and interactions throughout the air quality investigation.

d. Clean work areas regularly. Remove excess papers, food crumbs and dust. If food or drink is spilled, clean it up immediately.

e. Rotting food frequently causes foul odors so check desk drawers and old brown paper bags. Clean any cups, plates or other utensils used to prepare or consume food daily. Clean out microwaves and refrigerators (including the drip pan) at least once a month.

f. Keep all ventilation grills and ducts clear. Don't place furniture, boxes, posters, or other items in locations where they will block airflow.

g. Keep all exhaust ports and air inlets to electrical equipment clear. Overheating electronic equipment can produce irritating odors.

h. Assure plants are well maintained and not overwatered. Overwatering can promote the growth of mold in the soil and on the plant or container (and drown the plant). Remove dead foliage regularly. Carefully follow directions on labels for fertilizers.

i. Use all cleaning and office products only as recommended on the label. Be aware that products with a citrus odor can be irritating to some people, so avoid their use if possible. Whenever possible use cleaning products without added fragrances.

j. Use perfumes, colognes, and scented lotions sparingly.

k. If you notice an odor, check with occupants in adjacent rooms and floors to determine if the problem is throughout the building or specific to your workspace. Ask if they are conducting any activities or know of any activities that might create a similar odor.

C. Possible Causes of Indoor Air Quality Issues.

There are several factors or causes that can produce Indoor Air Quality issues that include but are not limited to:

1. Sources Outside the Building: These sources include contaminated outdoor air, pollen, dust, fungal spores, industrial pollutants, general vehicle exhaust, emissions from nearby sources, exhaust from vehicles on nearby roads or in parking lots, or garages loading docks, odors from dumpsters, re-entrained (drawn back into the building) exhaust from the building itself or from neighboring buildings, unsanitary debris near the outdoor air intake, soil gas radon leakage from underground fuel tanks, contaminants from previous uses of the site (e.g., landfills), pesticides, moisture or standing water promoting excess microbial growth, rooftops after rainfall, and crawlspaces.

2. Equipment: HVAC system dust or dirt in ductwork or other components microbiological growth in drip pans, humidifiers, ductwork, coils, improper use of biocides, sealants, and/or cleaning compounds, improper venting of combustion products refrigerant leakage, emissions from office equipment (volatile organic compounds, ozone), supplies (solvents, toners, ammonia) emissions from shops, labs, cleaning processes, elevator motors and other mechanical systems.

3. Human Activities: Smoking, cooking, body odor, cosmetic odors.

4. Housekeeping Activities: Cleaning materials and procedures, emissions from stored supplies or trash, use of deodorizers and fragrances, airborne dust or dirt (e.g., circulated by sweeping and vacuuming).

5. Maintenance activities: Microorganisms in mist from improperly maintained cooling towers, airborne dust or dirt, volatile organic compounds from use of paint, caulk, adhesives, and other products, pesticides from pest control activities, emissions from stored supplies.

6. Unsanitary conditions: Water damage that causes: microbiological growth on or in soiled or water-damaged furnishings, microbiological growth in areas of surface condensation, standing water from clogged or poorly designed drains, dry traps that allow the passage of sewer gas.

7. Chemicals released from building components or furnishings: Volatile organic compounds or inorganic compounds.

8. Accidental events: Spills of water or other liquids, microbiological growth due to flooding, leaks from piping, and fire damage (soot, PCBs from electrical equipment, odors).

9. Special use areas and mixed use buildings: Laboratories, print shops, art rooms exercise rooms, and food preparation areas.

10. Building Redecorating/remodeling/repair: Emissions from new furnishings, dust and fibers from demolition, odors and volatile organic and inorganic compounds from paint, caulk, adhesives, and micro biologicals released from demolition or remodeling activities.

D. Signs and symptoms of Air Quality issues

The effects of IAQ problems are often nonspecific symptoms rather than clearly defined illnesses. Symptoms commonly attributed to IAQ problems include: headache, fatigue, shortness of breath, sinus congestion, cough, sneezing, eye, nose, and throat irritation, skin irritation, dizziness, and nausea.

1. Sick Building Syndrome (SBS) is sometimes used to describe cases in which building occupants experience acute health and comfort effects that are apparently linked to the time they spend in the building, but in which no specific illness or cause can be identified. The complaints may be localized in a particular room or zone or may be widespread throughout the building. Many different symptoms have been associated with SBS, including respiratory complaints, irritation, and fatigue. Analysis of air samples often fails to detect high concentrations of specific contaminants. The problem may be caused by any or all of the following: the combined effects of multiple pollutants at low concentrations, environmental stressors such as overheating, poor lighting, and noise,

ergonomic stressors, job-related psychosocial stressors such as overcrowding and labor-management problems, or unknown factors.

2. Building-related illness (BRI) is a term referring to illness brought on by exposure to the building air, where symptoms of diagnosable illness are identified (certain allergies or infections) and can be directly attributed to environmental agents in the air. Legionnaire's disease and hypersensitivity pneumonitis are examples of BRI that can have serious, even life- threatening consequences.

3. Multiple Chemical Sensitivity (MCS): A small percentage of the population may be sensitive to a number of chemicals in indoor air, each of which may occur at very low concentrations.

E. Policies, Procedures, and Practices:

1. Procedures for Reporting an Indoor Air Quality Issue:

a. Please have the following information ready before calling to report an Indoor Air Quality Issue:

i. Your name, location, and a phone number where you can be reached.

ii. The location of the air quality problem (building, room, area within the room).

iii. Describe any odors that may be present and dates and times they occur.

iv. How many people have been affected by the problem (please provide their names and numbers as well).

v. List any symptoms associated with the problem such as headaches, dizziness, etc.

vi. Report any chemicals or agents used in the area that may affect the investigation.

b. Call the Environmental Health and Safety office. If it is off hours or it is an emergency, call UNE Campus Security. Circumstances requiring immediate response include but are not limited to:

i. There have been complaints of headaches, nausea, and combustion odors. (As this could be a sign of a carbon monoxide or gas leak).

ii. One or more occupants of your building have been diagnosed as having Legionnaire's disease.

iii. Staff report that water from a roof leak has flooded a portion of the carpeting.

iv. The building occupant feels the threat is dangerous to life or health (evacuation will be necessary in this circumstance).

c. Once you have reported the issue, an investigation will begin through EHS or Security, whoever is notified. If there is no immediate danger, an investigation may take several days or weeks depending on how many parties will need to be involved and what action may need to be taken. All complaints will be investigated in a prompt manner and the EHS department will update the person reporting the problem as information becomes available. The following are considered high priority investigations, but not emergencies:

i. Inspection of the humidification system reveals an accumulation of mold.

ii. A group of occupants has discovered that they share common symptoms of headaches, eye irritation, and respiratory complaints and decided that their problems are due to conditions in the building.

iii. Immediately after delivery of new furnishings (furniture or carpeting), occupants complain of odors and discomfort.

iv. Immediately after heavy cleaning has been done in the occupants work area.

v. Local news articles suggest that some buildings in the area have high indoor radon levels.

vi. There is a suspicion of asbestos exposure.

vii. Renovations are causing irritant dusts of concern to occupants.

d. Indoor Air Quality Investigations: After an IAQ is reported to the appropriate party, an Indoor Air Quality investigation will begin immediately to ensure there is no immediate danger to life or health. Investigations include but are not limited to:

i. Surveying the area reported by looking for strange odors or causes of ventilation issues.

ii. Looking at equipment and processes used in the area.

iii. Interviewing occupants of the area to obtain more specific information.

iv. Communicating with building users and Facilities/HVAC staff on possible issues.

v. Conducting air monitoring using several different methods and devices.

vi. Calling in contractors if necessary to do more in depth air sampling or survey the ventilation systems.

vii. Creating a report with detailed information on testing results.

viii. Notification to all building occupants involved and all affected parties with the results of the testing.

e. Post-Investigation Procedures: Once the problem has been identified, action will be taken by the appropriate parties to remediate the issue by correcting the problem. This could include but is not limited to:

i. Correcting ventilation system issues

ii. Installing new equipment (ex- dehumidifiers, fume hoods, etc.)

iii. Improving/revising policies and procedures in the area to include more stringent engineering or administrative controls.

iv. Purchasing and utilizing additional PPE.

All parties involved in the investigation will be notified and follow up information will be provided as it becomes available.

If no cause can be found for the issue and there are no measurements that indicate a hazardous exposure, the persons that filed the complaint shall keep a log of dates/times the issue occurs if it continues to be a problem and call EHS as necessary.

If corrective action has been taken, follow up evaluations will be conducted to make sure the actions were effective and the problem has been mitigated.

F. Prevention for Poor Indoor Air Quality:

1. The following steps will be taken to attempt to prevent poor indoor air quality in all facilities:

a. Review of older records of indoor air quality complaints

b. Ensure up-to-date manufacturers' operating instructions and maintenance records for HVAC system components have been reviewed and filed.

2. Make sure up-to-date schedules and procedures for facility operations and maintenance have been reviewed and filed.

3. Guarantee HVAC “as built” blueprints have been updated to indicate current HVAC configuration and filed.

4. Drawings of tenant build-out and interior building renovations should be updated and information on major space use changes (e.g., office space to kitchen or laboratory, significant increases or decreases in occupant density) have been updated and filed.

5. Ensuring the HVAC system was designed to deliver a specific CFM of outside air which translates into the appropriate CFM of outside air per occupant.

6. A review of occupant thermal comfort complaints and indoor temperature and relative humidity readings indicates that current peak heating and cooling loads do not exceed HVAC system capacity.

7. Information on pressure relationships between areas and/or zones within the building have been examined, updated, and filed.

8. Safety Data Sheets (SDS) for products used in the building are requested from suppliers and kept on file.

9. A building walkthrough inspection has been conducted, including both occupied areas and mechanical rooms.

10. During the walkthrough, a pollutant/source inventory has been completed and the IAQ problem indicators have been checked for and noted on a floor plan or comparable drawing, including:

a. Odors

b. Dirty or unsanitary conditions

c. Visible fungal growth or moldy odors

d. Evident moisture in inappropriate locations (e.g., moisture on walls, floors, etc)

e. Staining or discoloration of building material(s) or "Smoke damage"

f. Presence of hazardous substances

g. Potential for soil gas entry (e.g., cracks or holes in building surfaces)

h. Unusual noises from light fixtures or equipment

i. Poorly-maintained filters

j. Uneven temperatures

k. Overcrowding

l. Personal air cleaners (e.g., ozone generators, portable filtration units) or fans

m. Inadequate ventilation

n. Inadequate exhaust air flow

o. Blocked vents

p. Other conditions that could impact IAQ, especially risk factors that need regular inspection to prevent IAQ problems from occurring (e.g., drain pans that do not fully drain).

12. The condition and operations of the HVAC system have been inspected, including:

a. Components that need to be repaired, adjusted, cleaned, or replaced have been and work orders prepared.

b. Actual control settings and operating schedules for each air handling unit have been recorded and filed, and checked against the design intent.

c. Areas with significant sources of contaminants (e.g., copy rooms, food service areas, printing/photographic areas) are provided with adequate exhaust. Other sources are moved as close to exhaust as possible.

d. Operating schedules for HVAC equipment, ensuring that the HVAC system is operating during significant occupancy periods, have been written and are updated as needed.

e. The HVAC operating schedule provides for an adequate flush of the building, with as much outside air as is feasible, prior to occupants' arrival.

13. HVAC Preventative Maintenance:

a. A preventive maintenance plan that includes equipment maintenance schedules has been written or computerized and is followed and updated as needed.

b. A preventive maintenance plan or contract includes at least the following maintenance:

i. Outside air intakes (inspected for nearby sources of contaminants)

ii. Air distribution dampers (cleared of obstruction and operating properly)

iii. Air filters (pressure drops monitored, replacement or cleaning performed

iv. Drain pans (inspected and cleaned to ensure proper drainage)

v. Heating and cooling coils (inspected and cleaned)

vi. Interior of air handling units (inspected and cleaned, as warranted)

vii. Fan motor and belts (inspected)

viii. Air humidification and controls (inspected and regularly cleaned)

xiv. Cooling tower (inspected, cleaned, and water treated according to schedule)

x. Air distribution pathways and VAV boxes (inspected and cleaned as needed).

xi. The preventive maintenance plan and operations manuals are updated when equipment is added, removed, or replaced.

14. Housekeeping:

a. All housekeeping equipment and products used in the building are known to EHS.

b. The products used in this building that may produce strong odors, are potential irritants, or may have other IAQ impacts have been determined and, where possible, have been replaced by products without such impacts.

c. Housekeeping procedures that detail proper use, storage, and purchase of cleaning materials have been written and are updated as needed.

d. The housekeeping staff or contractors have been educated about the IAQ implications, appropriate use, and application of the following to improve IAQ:

i. Proper cleaning methods

ii. Cleaning schedules

iii. Purchasing low irritant chemicals

iv. Proper materials storage and use of chemicals.

v. Proper trash disposal.

15. Procedures for unscheduled maintenance events (e.g., equipment failure) have been written and communicated to building staff. They include:

a. Building maintenance personnel immediately tell EHS that a maintenance event has occurred.

b. Notification to occupants/tenants is provided in a timely manner, addressing how quality is being protected and necessary remedial action is taken.

c. When new products are purchased, information on potential indoor air contaminant emissions is requested from product suppliers.

d. When the services of architects, engineers, contractors, and other professionals are used, IAQ concerns, such as special exhaust needs, are discussed.

16. Remodeling and Renovation: Special procedures to minimize the generation and migration of contaminants or odors to occupied areas of the building are used (or required of contractors). The special procedures used in this building are:

a. The EHS Director reviews designs and construction activities for all proposed remodeling and renovation activities prior to their initiation

b. Work is scheduled during periods of minimum occupancy

c. Ventilation is provided in order to isolate work areas

d. Lower-emitting work processes are used (e.g., wet-sanding dry wall)

e. Specialized cleaning procedures are used (e.g., use of HEPA vacuums)

f. Filters are changed more frequently, especially after work is completed

g. Emissions from new furnishings are minimized (e.g., buying lower-emitting products, airing out furnishings before installation, increased amount and duration of after installation)

h. Ventilation and distribution equipment are protected.

i. When painting, occupants' exposure to paint vapors is minimized by using low-emitting products, scheduling work during periods of minimum occupancy, or increasing ventilation.

j. Tenants or occupants are notified in advance of major renovation, remodeling, maintenance or pest control activities.

17. Pest Control: Integrated Pest Management procedures are used to the extent possible:

a. The pest control products being used in the building are known.

b. Either by written procedures or contract language, it is ensured that all people who use pest control products read and follow all label directions for proper use, mixing, storage and disposal.

c. Non-chemical pest control strategies are used where possible.

d. The safest available pest control products that meet the building's needs are reviewed with pest control contractor.

18. Shipping or Receiving: Vehicle exhaust has been prevented from entering the building (including through air intakes and building openings) by installing barriers to airflow from loading dock areas (e.g., doors, curtains, etc.) and using pressurization.

19. Smoking: A. Smoking is prohibited in all campus buildings, including tenant occupied space. Smoking areas with disposal buckets are available around the campus. Tenants or occupants are routinely informed about building conditions and policies that may impact IAQ (e.g., smoking policy clarifications).

G. Mold

Dampness results from water incursion either from internal sources such as leaking pipes or external sources such as rainwater. Dampness becomes a problem when various materials in buildings like rugs, walls and ceiling tile become wet for extended periods of time. Excessive moisture in the air, such as high relative humidity that is not properly controlled with air conditioning, can also lead to excessive dampness. Dampness provides the moisture that supports the growth of bacteria, fungi, mold, and insects. In the presence of damp building materials, the source of water incursion is often obvious when there is physical evidence of leaks in the roof or windows or a pipe that has burst. Dampness problems can also be less obvious when the affected materials and water source are hidden from view such as wet insulation within a ceiling or wall. Excess moisture is generally the cause of indoor mold growth. Molds reproduce by releasing tiny spores that float through the air until landing in other locations. When they settle on wet or moist surfaces, the spores can form new mold colonies. Moderate temperatures and available nutrient sources make most office buildings ideal for mold growth.

1. Testing for Mold: The CDC does not recommend routine sampling for molds. Generally, it is not necessary to identify the species of mold growing in a building. Measurements of mold in air are not reliable or representative. If mold is observed or smelled, there is a potential health risk; therefore, no matter what type of mold is present, you should arrange for its removal. Furthermore, sampling for mold can be expensive, and standards for judging

what is or what is not an acceptable or tolerable quantity of mold is have not been established.

2. Possible medical issues with mold:

a. Allergies: Allergic responses like those to pollen or animal dander are the most common types of health problems related to mold. Typical symptoms include sneezing; irritation of the nose, mouth, or throat; nasal stuffiness and runny nose; and red, itchy or watery eyes. Inhaling or touching mold or mold spores can cause a person who was not previously allergic to mold to become allergic to mold. For people with known allergies, molds can trigger asthma symptoms such as shortness of breath, wheezing, or cough. Irritation can also occur in non-allergenic (non-sensitized) people.

b. Hypersensitivity pneumonitis: (HP) is a kind of lung inflammation that occurs in persons who develop immune system sensitization (similar to an allergy) to inhaled organic dust. It can be mistaken for pneumonia, but it does not get better with antibiotics for infection. Symptoms of HP can vary. Some persons have shortness of breath, cough, muscle aches, chills, fever, night sweats, and profound fatigue. These symptoms usually first appear 2 to 9 hours after exposure and last for 1 to 3 days. Other affected persons have progressive shortness of breath and cough, as well as weight loss. Work-relatedness may only become apparent over long holidays if symptoms resolve and then recur on return to work. With continued exposure, the persistent lung inflammation of both kinds of symptoms can lead to scarring and permanent damage. The slow progression of symptoms and the persistence of symptoms away from work may result in delayed recognition of work-related lung disease by both workers and physicians.

c. Asthma: is a form of lung disease in which the airways develop inflammation and bronchospasm (reversible narrowing) in response to sensitizing or irritating exposure. Affected individuals can experience episodes of shortness of breath, cough, chest tightness, and wheezing. These symptoms occur after exposure to nonspecific irritating substances in the air or after exposure to substances to which an individual is allergic. Early diagnosis and removal from the impacted damp office environment can cure asthma caused by workplace exposures.

3. Procedures for reporting a suspected mold problem:

a. Report concerns immediately to your direct supervisor and the EHS department.

b. If you are high risk for mold sensitivity issues, see your doctor for proper diagnosis and treatment.

c. Ask your doctor whether you should be medically restricted from the affected environment.

4. Employer's procedures for after a mold complaint is filed:

a. Evaluate the work area for evidence of mold and dampness.

b. Repair leaks and remediate water damaged materials.

c. Communicate with workers about areas of the building with evidence of mold or moisture damage and provide the status of remediation plans.

d. Arrange for relocation of workers whose doctors restrict them from the implicated work environments.

e. Advise all employees with mold sensitivities or health issues to seek a medical evaluation.

5. Preventing Mold:

The UNE Facilities department will try to locate any mold issues as soon as possible, but the building occupants will usually be the first ones to identify the problem since they inhabit the building daily. UNE employees and building occupants should notify Facilities and EHS immediately if they have dampness, moisture, leaks, or signs of water damage in their area. The following will be done to ensure a mold incident does not occur or is less likely to occur:

a. Fix leaky plumbing and leaks in the building envelope as soon as possible.

b. Watch for condensation and wet spots. Fix source(s) of moisture problem(s) as soon as possible.

c. Prevent moisture due to condensation by increasing surface temperature or reducing the moisture level in air (humidity). To increase surface temperature, insulate or increase air circulation. To reduce the moisture level in air, repair leaks, increase ventilation (if outside air is cold and dry), or dehumidify (if outdoor air is warm and humid).

d. Keep heating, ventilation, and air conditioning (HVAC) drip pans clean, flowing properly, and unobstructed.

e. Vent moisture-generating appliances, such as dryers, to the outside where possible.

f. Maintain low indoor humidity, below 60% relative humidity (RH), ideally 30 – 50%, if possible.

g. Perform regular building/HVAC inspections and maintenance as scheduled.

h. Clean and dry wet or damp spots within 48 hours.

i. Don't let foundations stay wet. Provide drainage and slope the ground away from the foundation.

6. Mold Remediation:

UNE will contact an outside contractor for all mold remediation activities so that no employee will be subjected to the mold exposure after it is reported. The following will be completed by the contractor before occupants can return to the space:

a. Fix the water or humidity problem. Complete and carry out repair plan if appropriate.

b. Revise and/or carry out maintenance plan if necessary.

c. Revise remediation plan, as necessary, if more damage is discovered during remediation.

d. Continue to communicate with Facilities, EHS, and building occupants, as appropriate to the situation. Be sure to address all concerns.

e. Completely clean up mold and dry water-damaged areas. Select appropriate cleaning and drying methods for damaged/contaminated materials.

f. Carefully contain and remove moldy building materials. Use appropriate Personal Protective Equipment (PPE).

H. Training: There is no required training for IAQ issues. Employees should be made aware of the existence of this program and how to report an IAQ problem upon hire.