360-INDOOR AIR QUALITY PROGRAM

Central New Mexico Community College

360.1 PURPOSE

A. To help ensure employees and students at Central New Mexico Community College (CNM) are provided a workplace free of recognized indoor air quality hazards.

360.2 SCOPE

A. CNM recognizes the impact that indoor air quality has in the workplace. In an effort to provide the CNM with the optimum level of indoor air quality, has developed a program for responding to indoor air quality concerns, to help protect employees and students.

360.3 RESPONSIBILITIES

A. Manager/Supervisor/Instructor

(1) Ensuring that all employees who have an indoor air quality concern are supported.

(2) Working with all parties and ensuring safety recommendations are followed.

B. Employees

(1) Initially bringing the concern with their supervisor, facility coordinator, and/or safety office. If the concern is an emergency or deemed extremely dangerous, immediately call 911.

(2) Working with CNM Safety, facility personnel and other university representatives during the review.

(3) Following recommendations as outlined by CNM Safety.

C. Safety Director/Designee

(1) Developing and maintaining the Indoor Air Quality Program, annually reviewing it.

(2) Following up with evaluations of indoor air quality issues and using equipment to help determine problems/solutions.

360.4 PROCEDURES

A. All CNM Buildings are designed, built and maintained to provide a comfortable and safe work environment free from environmental and other contamination that may result in diminished indoor air quality. Indoor air quality concerns shall be reported and reviewed following these procedures:

B. IAQ concerns that pose an immediate threat to personal health or safety shall be reported by calling 911.

C. Initial Symptoms/Factors

(1) PPD should be contacted initially to investigate concerns relating to:

(a) Temperature or humidity problems

(b) Air movement/drafts from diffusers

(c) Stale air

(d) Particulates or dirt coming from air handling systems

D. Potential Health & Safety-Related Factors

(1) The Safety Director/Designee should be contacted to investigate concerns such as:

(a) Chemical, gas, exhaust or unusual odors,

(b) Sickness associated with building occupancy which may include: headaches, nausea, dizziness, upper respiratory irritation, fever, chills and fatigue.

(c) Areas of mold contamination, including any contamination on any component of an air handing system.

360.5 EVALUATIONS

A. CNM Safety will perform an IAQ evaluation using the following elements:

(1) Discussion and Inspection

(a) Initial assessments may include discussing conditions with occupants, and performing a walk-through inspection (if necessary) of the building or area of concern.

(b) During the site walk-through, building ventilation systems may be evaluated and potential sources of contamination identified. If the immediate cause or source cannot be found, testing and further evaluation may be required.

(2) Testing and Evaluation

(a) Common indoor air quality parameters including temperature, relative humidity (RH), and carbon dioxide (CO2) levels are measured. Additional testing may include other environmental contaminants such as carbon monoxide, or specific agents if other potential sources are anticipated or known.

(b) The most commonly cited indoor air quality standards are those established by the American Society of Heating and Air Conditioning Engineers (ASHRAE), and particularly those presented in the standard: Ventilation for Acceptable Indoor Air Quality (ASHRAE 62.1-2010) or current version. The ASHRAE 62.1 standard serves as an industry standard of practice supporting acceptable indoor air quality.

(c) Additional air contaminant standards may be referenced, such as those established by the Occupational Safety and Health Administration (Permissible Exposure Limits), the American Conference of Governmental Industrial Hygienists (Threshold Limit Values), or by the U.S. Environmental Protection Agency. The OSHA and ACGIH standards pertain to air contaminants associated with workplace sources. These may or may not pertain to indoor air quality, depending on whether the sources affect other building occupants. The U.S. EPA National Ambient Air Quality Standards (NAAQS) pertain to allowable outdoor contaminant levels associated with many types of industrial sources; however, these standards represent long-term exposure levels, and may serve as a benchmark for indoor air quality.

(d) All building-related factors, equipment, and occupant or maintenance practices that may impact indoor air quality will be considered and/or reviewed and assessed.

(3) Recommendations/Report - All sampling results and data are reviewed and analyzed. All findings and recommendations are brought forward and any additional reviews and improvements are discussed. CNM Safety will issue documentation of the review and/or a detailed IAQ report to affected parties.

360.6 INDOOR AIR QUALITY CONTAMINANT SOURCES AND FACTORS

A. The following contaminant sources and factors may contribute to indoor air quality or indoor environmental quality.

(1) Building Materials (Newly Installed Components or Finishes)

(a) Building components may be treated with, or formulated with a variety of chemicals and preservatives. These may become a source of indoor air quality problems, particularly if inadequate building ventilation is established. Glues/ adhesives, new carpeting, upholstery,

particleboard, furniture, and finishes may off-gas volatile organic compounds (VOC's) such as formaldehyde or other air contaminants, and contribute to odors, sensory irritation, headaches or other health and comfort-related symptoms to occupants in the indoor environment.

(2) Carbon Dioxide (CO2)

(a) Carbon dioxide is a primary component of human respiration, and can be monitored as a surrogate contaminant, reflecting the adequacy of air exchange or ventilation in the building. CO2 in outside air may commonly range between 300 – 500 parts per million (ppm), as influenced by outdoor CO2 sources such as local vehicular exhaust, fuel combustion, or other industrial sources. The American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) has determined that indoor CO2 levels should not exceed 700 ppm greater than outdoor levels (300 – 500 ppm), to maintain biological (human) odors at agreeable levels for most occupants.

(3) Carbon Monoxide (CO)

(a) Carbon monoxide (CO) in the indoor environment may be associated sources such as:

(i) Improperly vented appliances with natural gas or other hydrocarbon fuel sources.

(ii) Outdoor vehicular hydrocarbon emissions.

(iii)Boilers, heating systems, or other industrial sources.

(b) CO may therefore build-up or accumulate within buildings, where there is inadequate ventilation or fresh-air exchange. With respect to outdoor concentrations, the U.S. Environmental Protection Agency has determined that CO levels should typically not exceed 9 ppm in an 8-hour period, more than once per year, or 35ppm in any 1-hour period more than once per year (National Ambient Air Quality Standards).

(4) Other Indoor Contaminant Sources may include:

(a) Cleaning agents

(b) Sewer gas from dry floor or sink drain traps

(c) Appliances not properly maintained or exhausted

(d) Cosmetics

(e) Humidification devices not properly maintained

(f) Smoke or soot from inadequately vented appliances

(g) Painting supplies, or other source materials or agents

(h) Odors

(i) Odorants may not be toxic, per se, but may cause anxiety or the perception of poor indoor air quality. They are a major cause for complaints in indoor environments. Odors may also indicate contaminated air being circulated either from outdoors or generated within the building and distributed throughout the building. Many building maintenance activities are potential sources of volatile organic compounds (VOC's). The emissions from sources such as waxed floors generally recede with time, but may continue for days after a single application. Consumer products may also contribute to indoor VOC concentrations and include potpourri, perfumes and air fresheners.

(5) Outdoor contaminant sources may also include:

(a) Exhaust from motor vehicles
(b) Fumes from construction or renovation activities
(c) Odors from landscaping materials, pesticides, etc.
(d) Smoke

(6) Inadequate ventilation: Occurs when an insufficient amount of fresh outside air is supplied to the interior environment.

(7) Microbial Contamination- May occur in buildings that are impacted by water leaks, build-up of humidity, and other sources of moisture. Contaminants can also be introduced into buildings from stagnant water in HVAC distribution systems and cooling towers. Prevention of microbiological contamination is accomplished by eliminating standing water and other sources of moisture, and by the proper use of biocides.

(8) Temperature and Relative Humidity (%RH)

(a) Relative humidity levels can affect the release rate of many indoor contaminants, their concentrations in the air, and can influence the growth of microbial organisms. Relative Humidity can also have a direct effect on worker comfort. An optimal range for relative humidity is 20 to 60%, depending on season. Relative humidity levels routinely less than 20% may contribute to skin, eye and mucous membrane drying, and levels routinely exceeding 60% may contribute to mold growth.

(b) Temperature and relative humidity levels may have a direct impact on occupant comfort, the release of other contaminants and/or microbial growth, and subsequent occupant symptoms, complaints or visibly deteriorating building materials. The Occupational Safety and Health Administration (OSHA) has reported that ideal indoor temperature for office occupancies may range between 68 – 76F, and that ideal relative humidity levels should range between 20 – 60%. ASHRAE and other standard-setting agencies currently address thermal comfort in terms of these and other factors including: air movement/speed, clothing and temperature differential.

(c) Indoor temperature and humidity share an integral relationship. In general, more moisture may be retained in air at lower temperatures and constant barometric pressure. Below these “dew point” temperatures, water may condense on cold or cool surfaces within the room or building. This condition may contribute to the collection and build-up of airborne dusts and debris that contain fungal spores onto the wetted surfaces, with subsequent mold growth.

(d) Relative humidity levels less than 20% have generally been associated with occupant discomfort associated with drying of eyes, nose, throat, mucous membranes and skin, thus certain minimal level of relative humidity should be maintained. Many agencies have historically recommended that relative humidity levels be maintained indoors to less than 60% to reduce condensation or equilibrium moisture vapor pressure at surfaces, and to prevent microbial growth. ASHRAE has recently recommended that RH should not exceed 65% when buildings are properly operating at design conditions with respect to dehumidification.

(9) Respirable/Ultra-Fine Particulates

(a) Airborne respirable and ultra-fine particulates, associated with copier toners, inks, and paper products are anticipated with high production copying. Depending on the copier manufacturer's internal controls or products associated with the copier equipment, low level respirable particulate exposures may occur; however, these exposures are substantially less than the corresponding occupational exposure criteria such as the OSHA Permissible Exposure Limit, eight-hour time-weighted average (TWA) of 5 mg/m3, or, the ACGIH Threshold Limit Value-TWA of 3 mg/m3 inhalable mass for carbon particulate (inhalable mass).

(b) Inks and toners may also have very small quantities of metals and/or resinous components; however, these components are anticipated to be at airborne exposure levels significantly less than applicable occupational exposure criteria, and may be associated with individual response (irritant or allergic), at levels less than occupational exposure criteria.

(10)Ozone (O3) or Related Oxygen Free Radical Compounds

(a) Ozone is produced via operation of office machines, copiers and electrostatic appliances. Both occupational and public health exposure criteria have been established for ozone. Ozone is attributable to exacerbations of asthma, and to irritant effects on eyes, nose, throat, lung and mucous membrane tissues. Ozone may also accelerate aging of lung tissue and contribute to the degradation of property due to its oxidizing effects.

(b) OSHA has established a PEL-TWA for ozone of 0.1 ppm. The ACGIH has established TLV-TWA criteria based on the level of work activity encountered during exposure, ranging from 0.05 ppm during heavy work to 0.2 ppm during light work. The USEPA NAAQS for ozone is 0.12 ppm as a 1-hour exposure not to be exceeded during a year, and otherwise 0.08 ppm as the fourth highest 8-hour daily maximum exposure when averaged over a 3-year period. ASHRAE has listed a 100 ug/m3 (0.1 mg/m3) Concentration of Interest for ozone (a level at which physical and health-related symptoms or effects may occur in the indoor environment).

360.7 MAINTAINING ACCEPTABLE INDOOR AIR QUALITY

A. Maintaining acceptable indoor air quality is accomplished by:

(1) Monitoring and maintaining the operation of HVAC equipment, and repairing and adjusting equipment as required to maintain proper air flow within occupied spaces. Adequate Ventilation is defined by the American Society for Heating, Refrigeration, Air Conditioning Engineers (ASHRAE) as 20 cubic feet per minute (CFM) per person, per the ASHRAE Ventilation for Acceptable Indoor Air Quality guidelines.

(2) Routine maintenance of equipment including scheduled filter changes to keep the equipment running and providing clean air. The Office of Physical Plant performs regularly scheduled maintenance of HVAC equipment.

(3) Identification of external intake air contamination and relocation of equipment/source so that it will not impact the IAQ. For example, a hot asphalt roofing 'kettle' located near a building air intake.

(4) Identification of internal sources of air contamination and elimination of the source or substitution of materials that do not generate problems. Contaminant sources such as copier effluents may build-up in office environments, if the exhaust flow is inadequate.
(5) Good housekeeping in general will help maintain indoor air quality by controlling odors and dust within the occupied space.
(6) Use of cleaning and maintenance materials that do not emit objectionable odors or vapor into the indoor environment.
(7) Use of low emission building materials, carpeting and furniture will help maintain low levels of VOCs, supporting acceptable air quality.
(8) Isolating areas during construction/ renovation activities, and providing enhanced ventilation to prevent dust and odors from impacting occupants within the building.

CNM Safety & Environmental Health Department

Air Sampling SOP

Pre-Testing

1) Assess the need for an air sample test.
    a. Meet with instructors.
    b. Identify and determine "what" type of testing is to take place based on the materials/process being used/performed in the class; (welding rod type, material being welded, etc.)
    c. Determine the person with the most exposure.
    d. Contact the vendor to find out what method they use to analyze the contaminate.
    e. Order medium cassettes/supplies from vendor if needed.
    f. Schedule the time and date of the air sample test.
2) Access NIOSH/OSHA analytical method of testing online.
    a. Determine flow rate and minimum / maximum total volume needed for testing.
    b. Determine specific testing medium cassettes used for testing; (PVC, MCE, Cyclone, etc.)
3) Calibrate personal air sampler with a "bubble film flow test".
4) Ensure that the Sensidyne Pump (personal air sampler) is fully charged
5) Obtain chain of custody form.
    a. Pre-fill appropriate information; addresses, additional contact information, flow rate, testing medium.
6) Apply labels to testing medium cassettes for identification.

Testing

1) Gather equipment.
    a. Sensidyne personal air sampler pump
    b. Rotameter
    c. Duct tape
    d. Testing medium and blank cassettes
    e. Screwdriver or tool
2) Meet instructional staff and person who will be wearing air sampler.
3) Ensure pump tubing is connected to the outlet of the cassette ensuring inlet of cassette is exposed to ambient air.
4) Conduct a field flow test calibration with rotameter.
5) Instruct the person wearing the sampler on equipment operation:
    a. Placement of the personal air sampler pump
    b. Placement of the intake medium attachment / appropriate collar location (As close as possible to the breathing zone).
    c. No obstruction of inlet
    d. No smoking during testing
    e. Removal and re-application of device for breaks etc.
    f. Listen for pump running, look that the green light is on and there is no red light on fault to ensure it is properly functioning

g. Do not attempt to turn the personal air sampler off.

6) Turn personal air sampler on and ensure flow, apply switch cover plate and screw into place.
7) Advise staff and person wearing pump of the duration of the testing and estimated time of personal air sampler retrieval.
8) Place the "blank medium cassettes" somewhere within the classroom, but not directly in the flow or path of a possible fume. Remove the red and blue caps from the blank. The blank medium should be resting on its side.
9) Observation
    a. Every hour, check on the person wearing sampler and ensure;
        i. Medium is being exposed and is still in employees breathing zone.
        ii. Personal air sampler is still working and running properly (no red light).
        iii. Participant is still wearing the sampler properly.

Post Testing

1) Retrieve air sampler and obtain total minutes from LCD readout and document on the chain of custody form. Then turn the personal air sampler off.
2) Document minutes and calculate volume in liters based on flow rate. This information will be added to the chain of custody form.
3) Take the testing medium and blank, recap them and place them in a clear zip lock bag. (These bags are usually included with the medium packaging)
4) Take the chain of custody form, the cassettes and a chain of custody witness (instructor or student) to the mailroom at PPD.
5) Mailing the paperwork and cassettes:
    a. Use Fed Ex.
    b. Provide cost account number to the mail room.
    c. Ask for a copy of the Fed Ex mailing form.
    d. Sign and have the chain of custody witness sign on the bottom of the chain of custody form, under "Sample Relinquished By".
6) Email lab vendor advising them of the test and send them a scanned copy of the completed chain of custody form.

Follow Up

1) Expect an email report back from lab vendor in 1 to 3 weeks.
2) Upon receiving the results of the test, apply these results to the "Air Sampling" template.
3) Discuss with the Safety department the results of the testing.
4) Email the CNM Air Sampling report to the individual instructors involved in the testing.