



Indoor Air Quality Program

I. Policy

California State University, Fullerton has adopted a policy to protect employees and the public from unsafe indoor air quality (IAQ). The overall safety of faculty, staff, students, and general public is the main focus of the program; to not subject them to avoidable and unreasonable risks and/or accidental injury or illness. To accomplish this, Environmental Health and Safety (EHS) will coordinate appropriate and practical proactive, investigative, and corrective measures concerning IAQ matters with specific departments.

The impetus behind this policy rests with CSUF's Injury and Illness Prevention Program (IIPP). The IIPP outlines the campus's responsibility for providing and maintaining a safe work environment for all employees. The IAQ program incorporates key elements of the IIPP to achieve the stated objectives. These elements shall be enforced by the University President and are but not limited to: inspection, communication, and correction.

II. Authority

California Code of Regulations, Title 8 sections 332.2, 332.3, 3203, 3362, 5141 through 5143, 5155, and 14301.

III. Scope

The scope of this program is extended to the entire campus community. This program shall include all campus structures, including leased structures, and apply to all campus employees. Response to and improvement of this program rests with EHS, Capitol Programs and Facility Management. However, it is the responsibility of all employees to report IAQ deficiencies and complaints to their supervisor or EHS.

IV. Definitions

Mitigation - Identifying, avoiding, and if necessary, addressing risks.

Off-Gassing - Off-gassing occurs when volatile organic compounds volatilize and become gasses at room temperature. This situation can cause eye, nose, and throat irritation and possibly other adverse health effects.

VOC - Volatile organic compounds are chemicals that emitted as gases, often have short and long term adverse health effects, and are found in many building products.

V. Accountability

A. Environmental Health and Safety

1. Develop and maintain the IAQ Program. Make the program available to affected departments.
2. Provide assistance to individual departments concerning implementation of the program. Provide public information and guidance for product substitution or replacement.
3. Respond to complaints concerning the IAQ. Conduct analytical testing and monitoring of IAQ if warranted by conditions.
4. Review construction plans with regard to proposed Heating Ventilation and Air Conditioning (HVAC) system use and design as well as other safety considerations. Assist with HVAC system inspections when necessary.
5. Maintain records of employee/occupant complaints related to IAQ.
6. Coordinate mitigation efforts which apply to conditions which may impact IAQ.

B. Facilities Management

1. Maintain and operate HVAC system.
2. Conduct routine inspections and maintenance of HVAC system. Retain record of such activity.
3. Provide response to IAQ complaints in conjunction with EHS. Assist with any remedial action if necessary.
4. Maintain records of HVAC testing, balancing, and adjusting documents and water treatment logs.
5. Coordinate plan review with EHS concerning the design of new and retrofitted HVAC systems.
6. Provide 100% outside air in the event of indoor fumigation, carpet installation, or material release.
7. Coordinate painting and/or remodeling projects and pesticide applications to minimize impact on IAQ.
8. Post locations where pesticides are applied.

C. Capitol Programs

1. Coordinate plan review with EHS concerning the design of new and retrofitted HVAC systems.
2. Ensure all new and remodeled locations are provided with adequate ventilation based on Uniform Building Code requirements. Reviewed on case by case basis.
3. Identify and inform the specific campus areas of projects which may impact IAQ.
4. Mitigate the entrainment of construction related gases, fumes, and odors into the HVAC system of building under remodel or into the buildings proximal to the construction site.

VI. Program

A. Chemical Agents

1. Sources

Chemical agents are chiefly responsible for contaminating indoor air. These chemicals may be introduced into the indoor environment by a variety of ways. Some examples are: VOCs found in newer office furniture and carpet, entrapment of an outdoor source via the HVAC system, and an indoor chemical release. With the exception of chemical spills, exposures in office settings are far below enforceable concentration limits set forth by the Occupational Safety and Health Administration (OSHA). However, small concentrations may provoke reactions in hypersensitive individuals. Refer to Table 1 for information regarding indoor air contaminants and sources.

2. Source Mitigation

Mitigation of chemical agents may include substitution, source removal, and accelerated off-gassing. Common office products may be substituted for water based or low emission products which generate VOCs. For instance, interior paints used on campus are now water based or emit very low VOCs. Source removal may contribute to the improvement of IAQ. Source removal is required in the event of a spill or release where practical. Office furnishings and carpet should be off-gassed out-of-doors prior to installation and placement to reduce the concentration of off-gassed products after installation. Off-gas time is dependent on the size and type of furnishing. Once carpet is installed, 100% or maximum feasible outside air supplied by the affected building's HVAC system should be used to remove remaining VOCs.

B. Biological Agents

1. Sources

Biological agents can create a complex mixture of indoor air pollutants. Sources range from human sneezes, which send droplet nuclei laden with infectious material into the air, to spores generated from active fungal colonies. The scope of biological agents includes: viruses, bacteria, fungi, protozoa, arthropods, and mammals. Common indoor biological agents are known to cause four types of human disease: infections, where living organisms penetrate and grow in human tissue (e.g., Legionnaires' disease); allergic or hypersensitivity diseases (e.g., hay fever, asthma); toxicosis (e.g., endotoxins) and irritant effects from compounds released from biological growth.

2. Source Mitigation

Humid environments and condensation support the growth of biological agents. Therefore, materials subjected to floods or leaks shall be removed or disinfected as soon as possible. The air handlers will be inspected for biological growth by Physical Plant annually or changes in condition or regulation occur.

C. Physical Agents

1. Sources

Physical agents such as humidity, noise, vibration and temperature play small but important roles in IAQ. For example, dry environments exacerbate respiratory ailments and cause eye irritation, nosebleeds and dry throat. Exposure to mechanical vibration will lead to headaches and fatigue. While rare in office environments, excessive noise exposures are related to hearing loss, headache and mental fatigue.

2. Source Mitigation

Mitigating these sources is perhaps the easiest of IAQ issues. Since these issues are rooted in the building's mechanical system and sensory perception determines the extent of these exposures, identification and correction of the problems are straightforward. In the case of mechanical vibration and noise, mitigation may consist of removal from the location or isolation of the source.

D. Odors and Acute Complaints

1. Odors

Odors are caused by a source significant enough to briefly overwhelm a building's HVAC system. In some cases, odors are related to maintenance or construction activities. Once a foreign odor is noticed, it should be reported immediately to EHS for response and logging. A representative from EHS will respond to the location and conduct an evaluation which includes canvassing

the area to determine the source of the odor. Since the sources vary and are seldom persistent, the main focus of an EHS investigation will be on unusual events or new sources that have been introduced into the building.

Odors are commonly associated to singular events and require the exhausting capabilities of the HVAC system to perform properly. In most cases, the normal exhaust capability of the HVAC system has dissipated the odor before an investigation could be performed by EHS. However, this actuality will not prevent EHS from conducting investigations. Once a source is determined, several departments may be called upon to remove the source.

2. Acute Unsatisfactory Conditions

Acute unsatisfactory conditions usually diminish over a short period of time and may stem from sources such as new office furniture, new carpets, or other recently manufactured equipment introduced into a structure. Materials used to manufacture these products may contain numerous VOC's that produce the effects listed in Table 1 upon mild exposure. These complaints should be forwarded to EHS.

E. Chronic Unsatisfactory Conditions

Chronic unsatisfactory conditions are caused by a persistent source present in the building which doesn't diminish over time. In most cases, chronic unsatisfactory conditions are biologically related since concentration thresholds are caused by bio-amplification.

1. Sources

Sources which cause chronic mild symptoms related to the occupancy of a building are far more difficult to assess and require a complex investigative approach. EHS's response to complaints of this nature will include a thorough inspection of the building and HVAC system. If this inspection does not yield obvious sources, EHS will distribute a questionnaire to better assess symptoms and event similarities. If trends are observed, a systematic evaluation of the indoor environment will be undertaken.

This evaluation will consist of collecting indoor air samples for biological or chemical analyses. Biological analyses are more effective when an allergic profile has been established from affected individuals prior to sample collection. If the profiles are uniform throughout a selected pool of occupants with respect to the causative agent(s), air samples will be collected for the specific agents to determine their presence, prevalence, and amplification source. As of the date of this draft, OSHA nor the EPA has developed standards which describe acceptable levels of airborne bio aerosols. In lieu of this deficiency, CSUF considers environments in which indoor biological levels greater than outdoor levels as unhealthy.

Chemical analysis of IAQ requires a less invasive approach. Through real-time monitoring or OSHA/NIOSH sampling techniques, the identification and concentration of contaminants are determined. If sampling or monitoring results indicate contaminant concentrations exceed their respective ACGIH TLV or OSHA action limit, the contaminant source shall be removed from the affected area if possible and decontaminated by various means. If the source cannot be removed, efforts to contain or isolate the source will be undertaken.

In addition to biological and chemical assessments, physical assessments will also be conducted. Monitoring of temperature and humidity will round out the systemic approach to solving an IAQ issue. The American Society of Heating Refrigeration and Air-conditioning Engineers (ASHRAE) suggests that relative humidity between 30% - 60% be maintained throughout the course of the workday. This range is dependent on dew point temperature and season. Dry or humid air may respectively lead to upper respiratory irritation and microbiological growth. HVAC systems at CSUF have been designed to Uniform Building Code specifications which refer to ASHRAE recommendations.

F. Preventative Maintenance and Inspections

Preventative maintenance and inspections for conditions which contribute to poor IAQ will be performed by Facilities Maintenance in conjunction with EHS. As indicated in the routine maintenance plan, Facilities Maintenance identifies and makes repairs to HVAC and associated equipment operating beyond the range of specification.

G. Notification

Public awareness of IAQ issues shall be presented through the EHS newsletter. Topics will include: simple methods for improving IAQ for the occupant, campus HVAC modification projects, technical information concerning impacts to IAQ in an office setting and action EHS is taking to alleviate these potential problem areas and successes in combating poor IAQ. The newsletter also presents safety related topics useful for home and office settings.

IAQ complaints should be forwarded to EHS. Since EHS investigative process involves an employee interview, complaints cannot be lodged anonymously. Under OSHA regulations, employees lodging workplace complaints are protected against discrimination and retaliation.

H. Individual Programs

Under CSUF's IIPP, several programs which address areas that impact IAQ are in place. These programs are: Asbestos Management, Building Plan Review, Public Health and Sanitation, and Pesticide Management. These programs contain elements designed to maintain satisfactory IAQ and improve it in problem areas.

Depending on regulatory necessity or prudent policy making, incorporation of additional programs which affect IAQ into the IIPP shall occur.

1. Asbestos Control - an annually updated list distributed throughout campus of asbestos locations. In relation to IAQ, this list serves as a resource for renovation/retrofit projects and outlines areas which must undergo proper containment if they are to be disturbed.
2. Building Plan Review - is to assure that the buildings will comply with applicable health and safety standards and the buildings and its facilities will be adequate for the proposed purpose.
3. Public Health and Sanitation - this program safeguards against improper house-keeping practices that may burden IAQ.
4. Pesticide Management - safe indoor application of pesticides and related procedures are outlined in his program. Normally, combinations of administrative and engineering controls are implemented to minimize exposure to occupants and remove residual odors.

I. Response Procedures for Complaints

1. Odor Complaints
 - a. Have the complainant describe the odor.
 - b. Visit the area. Equipment is usually unnecessary, however in the case of natural gas leakage or unusual chemical/solvent odor, using detection equipment may help locate the source.
 - c. Interview the complainant upon arrival using the following questions.
 - i. When did they first notice the odor?
 - ii. Was this the first occurrence?
 - iii. If not, when was the last occurrence?
 - iv. If a recurring problem, is it sporadic or consistent? When, if consistent.
 - d. Visit neighboring areas to determine if the odor is isolated or wide-spread.
 - e. Locate the source, if possible. Check supply inlets and air handler rooms for possible sources.
 - f. Call Central Plant for 100% outside air supply, even if source cannot be located.

- g. If source is located, remove and isolate.
 - h. Inform occupants of your findings and make sure they report back to EHS if odor re- occurs.
2. Chronic IAQ Problems (In depth analysis)
- a. Distribute indoor air quality questionnaire throughout suspect building.
 - b. Interview individuals who returned the questionnaire by reviewing their responses and obtain additional information.
 - c. Compare consistencies from other responses. Look for symptomatic and location similarities. Additionally, all similarities are helpful in developing a purposeful investigation by narrowing the field of suspect agents and sources. Conduct additional research of symptomatic responses to narrow the field of likely agents.
 - d. Conduct a building investigation which primarily addresses the HVAC system.
 - i. Inspect for biomagnification sources such as slime in drip pans, water damage, mold, off-gassing sources (i.e., new office equipment, mechanical sources), excessive dusts, fungus, and mold odors.
 - ii. Sampling is purely optional and should be conducted to locate the source and determine the concentration of the contaminant. If the contaminant source can be removed permanently, sampling is necessary for baseline exposure development.
 - iii. Sampling methods vary depending on the nature of symptoms and complaints. If sampling reveals excessive levels of the agent, abatement of the source shall be completed immediately.
 - e. Suggest allergen screening to be completed by a medical professional. Results from this screening should reveal similarities between complainants, therefore conduct air sampling specific for the common agent.

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Table 1: Indoor Air Contaminants and Sources

Contaminant	Health Effects	Example of Sources
Carbon Monoxide	Nausea, headaches, visual disturbances, brain damage, angina	Automobile exhaust, improperly vented stoves, hot water heaters, and furnaces
Formaldehyde	Mucous membrane irritation, fatigue, skin rash, cancer	Particle board, plywood, adhesives in office furnishings and carpets, tobacco smoke
Ozone	Upper respiratory irritation, dry eyes	Copiers, laser printers, air ionizers
Organic Vapors	Upper respiratory irritation, fatigue, nausea, liver and kidney damage	Paints, solvents, disinfectants, plastics
Asbestos	Asbestosis, mesothelioma, lung cancer	Insulation, ceiling and floor tiles
Dust	Upper respiratory irritation, dry throat, rhinitis	Various
Biological Agents (fungi, bacteria, viruses, protozoa)	Hypersensitivity pneumonitis, chronic rhinitis, common respiratory ailments	Various
Carbon Dioxide	Fatigue and malaise, shortness of breath	Bioeffluents, poor HVAC operation.