**RESIDENTIAL AND INSTITUTIONAL ENVIRONMENT**

**Facts**

* Every family and individual has a basic right to a decent home and a suitable living environment.

Realization of a decent home in a suitable living environment requires:

* + Clean air
  + Pure water and food
  + Adequate shelter
  + Unpolluted land
  + Freedom from excessive noise and odors
  + Adequate recreational and neighborhood facilities
  + Convenient community services in an environment that provides safety, comfort, and privacy
* APHA (American Public Health Association) appraisal method for measuring housing quality was developed by the Committee on the Hygiene of Housing between 1944 and 1950.

APHA appraisal method:

* + Attempts to minimize/eliminate individual opinion to arrive at numerical value
  + May be compared with results in other cities
  + Grouped under Facilities, Maintenance, and Occupancy
  + Rating is based on a penalty system
  + Theoretical maximum score is 600
  + Score of zero indicates a perfect score
  + **Score of 200 or greater indicates unfit conditions**

Conditions constituting basic deficiency include:

* + Over 1.5 persons per room
  + Number of occupants equals or exceeds 2 times the number of sleeping rooms plus 2
  + **Less than 40 square feet of sleeping area per person (crowding)**
  + Installed bath lacking, shared with other dwelling unit, or outside structure
  + Water supply outside dwelling unit
  + Outside window lacking in any room unit
  + No installed electric lighting
* **A trained Sanitarian can inspect about 10 dwelling units per day. For every 4 inspectors, there should be one trained field supervisor, three office clerks, and one office supervisor.**

Environmental sanitation and hygiene indices:

* + Cost estimates for rehabilitation of selected buildings and foot survey **(re‑inspect)** should be made to confirm administrative judgment and decisions **before any major action is taken**

NEEDS (Neighborhood Environmental Evaluation and Decision System)

* + 5 stages
  + Provides rapid and reliable measure of neighborhood quality

Basic health principles of housing and its environment:

* + Living unit and structure
    - Human factors
    - Sanitation and maintenance
    - Safety and injury prevention
  + Residential environment
    - Community of individual facilities
    - Quality of the environment
    - Environmental control programs

Outline of a housing program:

* + Establishment of a committee(s)
  + Identification of the problem
  + Informing the community
  + Designation of a board or commission
  + Appropriation of adequate funds
  + Appraisal and designation of areas
  + Preparation and adoption of an enforceable housing code and other regulations
  + Institution of a systematic and planned code enforcement program
  + Concurrent provision and upgrading
  + Provision of new and rehabilitated housing units
  + Aid in securing financial and technical assistance
  + Evaluation of progress made and continual adjustment

Enforcement procedure:

* + Education and persuasion
    - New releases and informational bulletins
    - Inspection
    - Notification
    - Re-inspection
    - Second notification
    - Third notification
  + Legal action as last resort
    - Informational hearings
    - Administrative hearings
    - Pre-trial hearings
    - Summonses

Structural safety:

* + **Building must be able to support two and half to four times the loads and stresses to which it is or may be subjected**
  + Water-repellent floor with sanitary cove base or its equivalent is necessary
  + Must have window or skylight not less than 10% of the floor area, with at least 45% “openable” providing adequate light and ventilation
  + Ventilation system may be approved in lieu of a window or skylight
* **Every room occupied for sleeping purposes shall contain at least 70 square feet of floor space for one person and 50 square feet for each additional person.**
* For backflow prevention, terminate the water supply inlet or faucet with **air gap of twice the diameter of the pip**e above the flood-level rim of the fixture.
* Indirect waste piping should discharge to an open-water supplies sink or receptacle so that the end of the waste pipe terminates **at least 2 inches above the rim** of the sink or receptacle, which is directly connected to the drainage system.
* Most urban dwellers spend as much as 80–90% of their time indoors, including transportation vehicles.

Primary types in indoor air quality problems are:

* + Inadequate ventilation (52%)
  + Contamination from inside the building (17%)
  + Contamination from outside the building (11%)
  + Microbiological contamination (5%)
  + Contamination from building fabrics (3%)
  + Unknown (12%)

Sick building syndrome:

* + Eliminate VOCs
  + Up HVAC air exchange
  + Eliminate allergens and mold
* **A study showed a 45% increase in respiratory infection in energy-efficient buildings.**
* Young children, the elderly, and people suffering from respiratory diseases will be the first to show signs of discomfort from indoor air contamination.

Radon (and its alpha-emitting decay products):

* + Major portion of the biologically-significant dose associated with natural background radiation
  + Hazard association with radon is related to concentration and time of exposure
  + **Should not exceed 2–5 pCi/l indoors**
  + Contamination in existing dwelling can be reduced by preventing entry or removing
  + Can be reduced by
    - **Closing and caulking all cracks, joints, and openings of the structure in the basement or in contact with the ground or in the flooring above the crawl space**
    - Tightly covering open drains and sumps

Formaldehyde:

* + Colorless gas
  + May cause extreme discomfort and contact dermatitis indoors
  + Odor can be detected at less than 1 ppm
  + Sources are
    - Resins and glues to bond particle board and plywood
    - Urea-formaldehyde foam insulation
    - Permanent press fabric
    - Embalming fluid
    - Drugs
    - Disinfectants
    - Cosmetics
    - Chemicals used in pathology and anatomy laboratories
    - Chemicals used in the manufacture of automobiles
    - Furniture
    - Paper
    - Electrical equipment
    - Beauty products in a cosmetology salon (hair treatments, etc…)
    - Materials used in mobile homes and prefabricated housing
  + **Minimum ventilation of 5 air changes per hour required**

Thermal and moisture requirements:

* + EPA recommends relative humidity of 30–50% for homes
  + **Indoor relative humidity of 60% or higher would cause excessive condensation and greater mildew, corrosion, and decay**
  + Humidity above 70% promote germination and growth of fungal spores

Venting of heating units:

* + The **high moisture in vent gases condenses inside a chimney forming sulfuric acid**, which attacks lime in the mortar, leaching it out, and creating leaks and destruction of the chimney
  + Flue/vent extended at least 3 ft above flat roofs or 2 ft above the highest part of the wall parapets and peaked roof ridges will be reasonably free from downdrafts
  + An opening of 100–200 square inches will usually provide sufficient fresh air under ordinary household conditions
  + Connection between the furnace or stove and chimney should be tight fitting and slope up to the chimney at least ¼ in/ft

Mobile home parks:

* + Mobile homes are “transportable, single-family dwelling units”
  + “Manufactured relocatable living unit”
  + **Minimum spacing of 10 feet required**

Institutions:

* + Communities unto themselves
  + Possibilities for transmission of illnesses associated with air, water, food, and contact are increased
  + Provide ideal environment for spread of communicable diseases
  + **Schools should allow 25–30 square feet per student classroom space**
  + **If a school suspects radon, ground-level classrooms should be monitored**

Hospitals:

* + **Nosocomial infection = hospital-acquired infection**
    - Urinary tract is most frequent site of infection
    - Contributing factors are
      * Older patients with chronic disease
      * Increase in high‑risk patients and surgical procedures such as organ transplants and open‑heart surgery
      * Innovations in diagnostic and therapeutic procedures
      * Inadequate disinfection or sterilization of respiratory therapy and other equipment
    - Prevention measures include
      * Hygienic medical, nursing, and staff practices (e.g., hand washing)
      * Equipment sterilization
      * Food, water, plumbing, air, laundering, linen handling, and housekeeping sanitation
      * Prevention of overcrowding
      * Minimization of movement of patients and hospital personnel from point to point
      * Avoidance of antibiotic use when possible
      * Establishment of a representative infection control committee
  + **Hospital laundry wash-water temperatures must be a minimum of 160 to 167◦F for 25 minutes**

Hospital wastes:

* + Vacuum cleaners are problematic…cause particulates in air
  + Only about 15% of all hospital wastes are infectious
  + **Infectious and pathological wastes (e.g., disposable needles, syringes, scalpels) are best disposed of via incineration and autoclaving followed by compaction or shredding**
    - Recommendations to equal or exceed air quality standards include temperature of 2,000◦F with 2 seconds residence time and secondary chamber temperature of 1,800◦F
  + Chemotherapy and pathological wastes are incinerated
  + Autoclaved wastes are disposed of in a landfill or incinerator
  + General hospital and kitchen wastes can usually be disposed of through the community waste collection system
  + Liquid infectious wastes may be carefully poured to a drain connected to a sanitary sewer
  + **The usual method for the disposal of *low-level* radioactive solid waste is by storage until decayed, followed by disposal with the general waste**

Prisons:

* + Known causes of prison unrest and illness include
    - Food poisoning
    - Poor and insufficient food
    - Vermin infestation
    - Inadequate work and recreational programs
    - Overcrowding
  + **Should allow for 60 square feet per person**
  + **Prisoners required to shower twice per week**
  + **Prisoners required to change clothes twice per week**
  + **Prisoners should be fed twice per day**
  + A prison is a **complete community**
  + Prisoners **should be guaranteed adequate recreation and work**
  + **Max water temp for hand washing in jail is 120 F**

Day care centers:

* + Enteric and respiratory disease transmission via the fecal-oral route and by intimate contact is more common among children in a day-care center
  + Multiple pathogen infection is not uncommon
  + Diarrhea in day cares can be prevented by hygiene, hand washing, food sanitation, separation of ill children, education of staff and management in disease transmission and prevention