**Section 370.570 Laboratory**

a) All treatment works shall include a laboratory for making the necessary analytical determinations and operating control tests, except for those plants utilizing only processes not requiring laboratory testing for plant control and satisfactory off-site laboratory provisions are made to meet the permit monitoring requirements. For plants where a fully equipped laboratory is not required, the requirements for utilities and equipment such as fume hoods may be reduced or omitted.

b) The laboratory shall have sufficient size, bench space, equipment and supplies to perform all self-monitoring analytical work required by discharge permits, and to perform the process control tests necessary for good management of each treatment process included in the design.

c) The facilities and supplies necessary to perform analytical work to support industrial waste control programs will normally be included in the same laboratory. The laboratory size and arrangement must be sufficiently flexible and adaptable to accomplish these assignments. The layout should consider future needs for expansion in the event that more analytical work is needed.

d) Location and Space

1) The laboratory should be located on ground level, easily accessible to all sampling points, with environmental control as an important consideration. It shall be located in a separate room or building away from vibrating machinery or equipment which might have adverse effects on the performance of laboratory instruments or the analyst, or shall be designed to prevent structural transmission of machine vibration. The floor and wall construction shall be designed to keep out machine noise (blowers, pumps, etc.). The following minimum conditions shall be met:

A) Blowers, pumps, etc., must be located on a separate floor pad.

B) Common walls between machinery rooms must be double-walled with sound insulation between the walls. Connecting doors or windows to machinery rooms are not acceptable.

C) Common attic space shall be blocked off and effective sound proof material provided in the ceiling.

2) A minimum of 400 square feet of floor space should be allocated for the laboratory. Less space may be allowed if the sampling and analysis program, approved by the Agency, does not require a full-time laboratory chemist. If more than two persons normally will be working in the laboratory at any given time, 100 square feet of additional space should be provided for each additional person. Bench-top working surface should occupy at least 35 percent of the total floor space.

3) Minimum ceiling height should be 8 feet 6 inches. If possible, this height should be increased to provide for the installation of wall-mounted water stills, distillation racks, and other equipment with extended height requirements.

4) Additional floor and bench space should be provided to facilitate performance of analysis of industrial wastes, as required by the discharge permit and the utilities industrial waste pretreatment program. The above minimum space does not provide office or administration space.

e) Materials

1) Ceilings

Acoustical tile should be used for ceilings except in high humidity areas where they should be constructed of cement plaster. Materials containing asbestos shall not be used.

2) Walls

For ease of maintenance and a pleasant working environment, light-colored ceramic tile should be used from floor to ceiling for all interior walls.

3) Floors

Floor surface materials shall be fire resistant and highly resistant to acids, alkalies, solvents, and salts.

4) Doors

A) Two exit doors should be located to permit a straight egress from the laboratory, preferably at least one to outside the building. Panic hardware should be used. They should have large glass windows for easy visibility of approaching or departing personnel.

B) Automatic door closers should be installed; swinging doors should not be used.

C) Flush hardware should be provided on doors if cart traffic is anticipated. Kick plates are also recommended.

f) Cabinets and Bench Tops

1) Cabinets

A) Wall-hung cabinets are useful for dust-free storage of instruments and glassware.

B) Units with sliding glass doors are preferable. They should be hung so the top shelf is easily accessible to the analyst. Thirty inches from the bench top is recommended.

C) One or more cupboard-style base cabinets should be provided for storing large items; however, drawer units are preferred for the remaining cabinets. Drawers should slide out so that entire contents are easily visible. They should be provided with rubber bumpers and with stops which prevent accidental removal. Drawers should be supported on ball bearings or nylon rollers which pull easily in adjustable steel channels. All metal drawer fronts should be double-wall construction. All cabinet shelving should be acid resistant and adjustable from inside the cabinet.

2) Bench Tops

Generally, bench-top height should be 36 inches. However, areas to be used exclusively for sit-down type operations should be 30 inches high and include kneehole space. One-inch overhangs and drip grooves should be provided to keep liquid spills from running along the face of the cabinet. Tops should be furnished in large sections, 1¼ inches thick. They should be field joined into a continuous surface with acid, alkali, and solvent-resistant cements which are at least as strong as the material of which the top is made.

3) Utility Accessories

Water, gas, air, and vacuum service fixtures; traps, strainers, overflows, plugs and tailpieces; and all electrical service fixtures shall be supplied with the laboratory furniture.

g) Hoods

Fume hoods to promote safety and canopy hoods over heat-releasing equipment shall be installed.

1) Fume Hoods

A) Location

i) Fume hoods should be located where air disturbance at the face of the hood is minimal. Air disturbance may be created by persons walking past the hood; by heating, ventilating or air-conditioning systems; by drafts from opening or closing a door; etc.

ii) Safety factors should be considered in locating a hood. If a hood is situated near a doorway, a secondary means of egress must be provided. Bench surfaces should be available next to the hood so that chemicals need not be carried long distances.

B) Design and Materials

i) The selection of fume hoods, their design and materials of construction, must be made by considering the variety of analytical work to be performed and the characteristics of the fumes, chemicals, gases, or vapors that will or may be released. Special design and construction is necessary if perchloric acid use is anticipated. Consideration should be given for providing more than one fume hood to minimize potential hazardous conditions throughout the laboratory.

ii) Fume hoods are not appropriate for operation of heat-releasing equipment that does not contribute to hazards, unless they are provided in addition to those needed to perform hazardous tasks.

C) Fixtures

i) One cup sink should be provided inside each fume hood.

ii) All switches, electrical outlets, and utility and baffle adjustment handles should be located outside the hood. Light fixtures should be explosion-proof.

D) Exhaust

Continuous duty exhaust capability should be provided. Exhaust fans should be explosion-proof. Exhaust velocities should be checked when fume hoods are installed.

E) Alarms

A buzzer for indicating exhaust fan failure and a static pressure gauge should be placed in the exhaust duct. A high temperature sensing device located inside the hood should be connected to the buzzer.

2) Canopy Hoods

Canopy hoods should be installed over the bench-top areas where hot plate, steam bath, or other heating equipment or heat-releasing instruments are used. The canopy should be constructed of steel, plastic, or equivalent material, and finished with enamel to blend with other laboratory furnishings.

h) Sinks

1) The laboratory should have a minimum of 3 sinks (not including cup sinks). At least 2 of them should be double-well with drainboards. Additional sinks should be provided in separate work areas as needed, and identified for the use intended.

2) Waste openings should be located toward the back so that a standing overflow will not interfere. All water fixtures on which hoses may be used should be provided with reduced zone pressure backflow preventers to prevent contamination of water lines.

3) The sinks should be constructed of material highly resistant to acids, alkalies, solvents, and salts, and should be abrasion and heat resistant, non-absorbent, light in weight and have all appropriate characteristics for laboratory applications. Traps should be made of glass, plastic, or lead and easily accessible for cleaning.

i) Ventilation and Lighting

1) Laboratories shall be separately air conditioned and dehumidification shall be provided where laboratory control tests procedures will be affected by high humidity conditions. Separate exhaust ventilation outlet locations (fume and heat hoods, room air, etc.) shall be provided remote from ventilation intakes.

2) Adequate lighting, free from shadows, shall be provided to permit reading of laboratory instrument dials, glassware calibrations, etc.

j) Gas and Vacuum

1) Natural or bottled gas should be supplied to the laboratory. Digester gas should not be used.

2) An adequately-sized line source of vacuum should be provided with outlets available throughout the laboratory.

k) Balance and Table

An analytical balance of the automatic, digital readout, single pan, 0.1 milligram sensitivity type shall be provided. A heavy special-design balance table which will minimize vibration of the balance shall be provided. It shall be located as far as practical from windows, doors, or other sources of drafts or air movements, so as to minimize undesirable impacts from these sources upon the balance.

l) Equipment, Supplies and Reagents

The laboratory shall be provided with all of the equipment, supplies, and reagents that are needed to carry out all of the facility's analytical testing requirements. Discharge permit, process control, and industrial waste monitoring requirements must be considered when specifying equipment needs. References such as Standard Methods and the USEPA Analytical Procedures Manual should be consulted prior to specifying equipment items.

m) Power Supply Regulation

1) To eliminate voltage fluctuation, electrical lines supplying the laboratory should be controlled with a constant voltage, harmonic neutralized type of transformer. This transformer should contain less than 3% total root mean square (rms) harmonic content in the output, should regulate to +¿1% for an input range of +¿15% of nominal voltage, with an output of 118 volts. For higher voltage requirements, the 240-volt lines should be similarly regulated.

2) Electrical devices in the laboratory not requiring a regulated supply (i.e., ordinary resistance heating devices) that are non-portable may be wired to an unregulated supply.

n) Laboratory Grade Water Source

A laboratory grade water source, with at least one gallon per hour capacity, shall be installed complete with all utility connections. The type of treatment used to produce laboratory grade water shall be based on the quality of water required for the tests to be performed at the plant. Laboratory water treatment devices shall be constructed of materials that are compatible with the water to be treated and produced.

o) Laboratory Safety Equipment

Laboratory safety equipment shall be provided in accordance with the requirements of Section 370.560(a)(3), (a)(9), (b)(3) and (b)(6).

(Source: Amended at 21 Ill. Reg. 12444, effective August 28, 1997)