CHAPTER 40
SEWAGE TREATMENT WORKS

41. PLANT LOCATION

___ The following items shall be considered when selecting a plant site:

a. Proximity of residential areas;

b. Direction of prevailing winds;

c. Vehicular access by all weather roads;

d. Area available for expansion;

e. Local zoning requirements;

f. Requirement for a 150-foot buffer zone;

g. Local soil characteristics, geology, hydrology, and topography available to minimize pumping;

h. Access to receiving stream;

i. Classification, vulnerability, and downstream uses of the receiving streams; and

j. Compatibility of treatment process with the present and planned future land use, including noise, potential odors, air quality, and sludge handling and disposal;

k. Existence of nearby wetlands, flood plains, threatened or endangered species, scenic rivers, or areas of archaeological or cultural importance.

___ Where a site must be used which is critical with respect to these items, appropriate measures shall be taken to minimize adverse impacts.

41.1 Flood Protection

___ For new construction and major modifications at existing facilities, structures, electrical and mechanical equipment shall remain fully operational and accessible and shall be protected from physical damage by the 100-year flood (excepting hurricane flood surges). Design consideration shall be given to groundwater elevations and the risk of floating dry wells or empty wet wells or other below grade units.

42. QUALITY OF EFFLUENT

___ The required degree of wastewater treatment shall be based on the effluent requirements and water quality standards. Only treatment processes that are known, demonstrated, or reasonably expected to be capable of consistently meeting such standards under normal operating conditions may be approved.

43. DESIGN

43.1 Type of Treatment

___ Minimally, the following items shall be considered in the selection of the type of treatment:

a. Present and future effluent requirements, including the status and vulnerability of the receiving stream;

b. Location of and local topography of the plant site;

c. Space available for future plant construction;

d. The effect on industrial wastes likely to be encountered;

e. Ultimate disposal of sludge;

f. System capital costs;

g. System operating and maintenance costs, including basic energy requirements;

h. Process complexity governing operating personnel requirements; and

i. Environmental impact on the receiving stream and on present and future adjacent land use.

43.2 Required Engineering Data for New Process Evaluation

The policy of the Department is to encourage rather than obstruct the development of any methods or equipment for treatment of wastewaters. The lack of inclusion in these standards of some types of wastewater treatment processes or equipment should not be construed as precluding their use. The Department may approve other types of wastewater treatment processes and equipment under the condition that the operational reliability and effectiveness of the process or device shall have been demonstrated with a suitably-sized unit operating at similar design load and effluent conditions, to the extent required.

43.2.1 Test Data

The Department may require the following:

a. Monitoring observations, including test results and engineering evaluations, demonstrating the efficiency of such processes.

b. Detailed description of the test methods.

c. Testing, including appropriately-composited samples, under various ranges of strength and flow rates (including diurnal variations) and waste temperatures over a sufficient length of time to demonstrate performance under climatic and other conditions which may be encountered in the area of the proposed installations.

d. Other appropriate information.

The Department may require that appropriate testing be conducted and evaluations be made under the supervision of a competent process engineer other than those employed by the manufacturer or developer.

43.2.2 Design by Analogy

Data from similar municipalities may be utilized in the case of new systems; however, thorough investigation that is adequately documented shall be provided to the reviewing authority to establish the reliability and applicability of such data.

43.3 Design Loads

43.3.1 Hydraulic Design

43.3.1.1 New Systems

a. Undeveloped Areas

The design for sewage treatment plants to serve new sewer systems being built in currently undeveloped areas shall be based on an average per capita flow of 70 to 120 gpd, as described in Section 23.1.

b. Existing Developed Areas

Consideration shall be given in the design for a sewage treatment plant to serve a new sewerage system for a municipality or sewer district for higher flow rates if the existence of a large percentage of older building is likely to contribute significant infiltration/inflow to the new sanitary sewer system.

43.3.1.2 Existing Systems

Where there is an existing system, the volume and strength of existing flows shall be determined. The determination shall include both dry-weather and wet-weather conditions for at least a one-year period. Samples shall be taken and composited so as to be accurately representative of the strength of the wastewater. At least one year's flow data should be taken as the basis for the preparation of hydrographs for analysis to determine the following types of flow conditions of the systems:

a. the annual average daily flow - as determined by averaging flows over one year, exclusive of inflow due to rainfall;

b. the minimum daily flow - as determined by observing twenty-four hour flows during dry weather (low rainfall period) when infiltration/inflow are at a minimum;

c. wet-weather peak flows - as determined by observing twenty-four hour flows during a period of one year when infiltration/inflow are at a maximum;

d. wet-weather flows of 7-day duration, as determined by observing for a period of one year the daily flows during the immediate 7-day period following rainfall sufficient to cause ground surface runoff;

e. peak hourly flows - as determined by observing the maximum hydraulic load to the plant; and

f. industrial waste flows - as determined by flow data, including water use records, for each of industries tributary to sewer system.

___ The plant design flow selected shall meet the appropriate effluent and water quality standards that are set forth in the discharge permit.

43.3.2 Organic Design

43.3.2.1 New System Minimum Design

___ Domestic waste treatment design shall be on the basis of at least 0.17 pounds (0.08 kg) of BOD_5 per capita per day and 0.20 pounds (0.09 kg) of suspended solids per capita per day, unless information is submitted to justify alternate designs.

___ Where garbage grinders are widely used in areas tributary to a domestic treatment plant, the design basis should be increased to 0.22 pounds (0.10 kg) of BOD_5 per capita per day and 0.25 pounds (0.11 kg) of suspended solids per capita per day.

___ Domestic waste treatment plants that will receive industrial wastewater flows shall be designed to include these industrial waste loads.

43.3.2.2 Existing Systems

When an existing treatment works is to be upgraded or expanded, the organic design shall be based upon the actual strength of the wastewater as determined from the measurements taken in accordance with paragraph 43.3.1.2 above, or upon the basis in paragraph 43.3.2.1 above, whichever is higher, with an appropriate increment for growth.

43.3.3 Shock Effects

___ The shock effects of high concentrations and diurnal peaks for short periods of time on the treatment process, particularly for small treatment plants, shall be considered.

43.4 Conduits

___ All piping and channels should be designed to carry the maximum expected flows. The incoming sewer should be designed for unrestricted flow. Bottom corners of the channels must be filleted. Conduits shall be designed to avoid creation of pockets and corners where solids can accumulate. Suitable gates should be placed in channels to seal off unused sections that might accumulate solids. The use of shear gates or stop planks is permitted where they can be used in place of gate valves or sluice gates. Non-corrodible materials shall be used for these control gates.

43.5 Arrangement of Units

___ Component parts of the plant should be arranged for greatest operating and maintenance convenience, flexibility, economy, continuity of maximum effluent quality, and ease of installation of future units. Unless otherwise noted, all process unit drains, backwash, overflow, supernatant drawoff, waste sludge, etc. shall be properly disposed of, or routed to an appropriate point in the treatment process, or to the head of the plant. In no case shall any such waste be discharged, through the effluent line or otherwise, to the environment.

43.6 Flow Division Control

___ Flow division control facilities shall be provided as necessary to insure organic and hydraulic loading control of plant process units and shall be designed for easy operator access, change, observation, and maintenance. Appropriate flow measurement shall be incorporated in the flow division control design.

44. PLANT DETAILS

44.1 Installation of Mechanical Equipment

___ The specifications should be so written that the installation and initial operation of major items of mechanical equipment will be performed in accordance with the recommendations of the manufacturer and supervised by a representative of the manufacturer.

44.2 Unit Bypasses

___ Properly located and arranged bypass structures and piping shall be provided so that each unit of the plant can be removed from service independently without causing a violation of the permit. The bypass design shall facilitate plant operation during unit maintenance and emergency repair so as to minimize deterioration of effluent quality and insure rapid process recovery upon return to normal operational mode. Dual or multiple unit processes are strongly recommended to facilitate adequate treatment during such repairs, and may be required to protect sensitive receiving waters.

44.2.1 Unit Bypass During Construction

___ Final plan documents shall include construction requirements in accordance with Section 15, as deemed necessary by the Department to avoid unacceptable temporary water quality degradation.

44.3 Drains

___ Means shall be provided to dewater each unit to an appropriate process point. In no case shall any untreated or partially treated water be discharged, through the effluent line or otherwise, to the environment. Consideration shall be given to the possible need for hydrostatic pressure relief devices to prevent flotation of structures. Pipes subject to clogging shall be provided with means or access for mechanical cleaning or flushing.

44.4 Construction Materials

___ Due consideration should be given to the selection of materials which are to be used in sewage treatment works because of the possible presence of hydrogen sulfide and other corrosive gases, greases, oils, and similar constituents frequently present in sewage. This is particularly important in the selection of metals and paints. Contact between dissimilar metals should be avoided to minimize galvanic action.

___ All earthen basins receiving wastewater or sludge shall comply with the following Sections: 101 and all subsections, 102 and all subsections, 103, 103.6, 104.1.1-104. 1.5, 104.1.7 and all subsections, 104.2 and all subsections, 104.3.1, 104.3.2, 104.3.4, 104.3.6, 104.4.2 105.1-105.3, and 105.5.

___ All electrical equipment shall comply with Section 32.3.5.

44.5 Painting

___ The use of paints containing lead or mercury should be avoided. In order to facilitate identification of piping, particularly in large plants, it is suggested that the different lines be color-coded. The following color scheme is recommended for purposes of standardization. Items with a □ are required colors.

Raw sludge line - brown with black bands
Sludge recirculation suction line - brown with yellow bands
Sludge draw off line - brown with orange bands
Sludge recirculation discharge line - brown
□Sludge gas line - orange (or red)
□Natural gas line - orange (or red) with black bands
Nonpotable water line - blue with black bands
□Potable water line - blue
□Chlorine line - yellow
□Sulfur Dioxide - yellow with red bands
Sewage (wastewater) line - gray
Compressed air line - green
Water lines for heating digesters or building - blue with a 6-inch (152 mm) red band spaced 30 inches (762 mm) apart
□The contents shall be stenciled on the piping in a contrasting color.

A direction of flow stencil is also recommended.

44.6 Operating Equipment

___ A complete outfit of tools, accessories, and spare parts necessary for the plant operator's use should be provided. Readily-accessible storage space and workbench facilities should be provided, and consideration be given to provision of a garage for a large equipment storage, maintenance, and repair.

44.7 Erosion Control During Construction

___ Effective site erosion control shall be provided during construction.

44.8 Grading and Landscaping

___ Upon completion of the plant, the ground should be graded and grassed. All-weather walkways should be provided for access to all units. Where possible, steep slopes should be avoided to prevent erosion and accidents. Surface water shall not be permitted to drain into any unit. Particular care shall be taken to protect trickling filter beds, sludge beds, and intermittent sand filters from stormwater runoff. Provision should be made for landscaping, particularly when a plant must be located near residential areas.

45. PLANT OUTFALLS

45.1 Entrance Impact Control

___ The outfall sewer shall be designed to discharge to the receiving stream in a manner acceptable to the Department and COE and any other appropriate authority. Consideration should be given in each case to the following:

a. Preference for free fall or submerged discharge at the site selected;
b. Utilization of cascade aeration of effluent discharge to increase dissolved oxygen;
c. Limited or complete across stream dispersion as needed to protect aquatic life movement and growth in the immediate reaches of the receiving stream; and
d. Appropriate effluent sampling in accordance with Section 45.3.

45.2 Protection and Maintenance

___ The outfall sewer shall be so constructed and protected against the effects of floodwater, tide, ice, erosion, or other hazards as to reasonably insure its structural stability and freedom from stoppage. A manhole should be provided at the shore end of all gravity sewers extending into the receiving waters. Hazards to navigation shall be considered in designing outfall sewers.

45.3 Sampling Provisions

___ All outfalls shall be designed so that a sample of the effluent can be obtained at a point after the final treatment process and before discharge to or mixing with the receiving waters.

46. ESSENTIAL FACILITIES

46.1 Power Supply and Electrical Equipment

___ The requirements of Section 32.3.5 shall apply.

46.1.1 Emergency Power Facilities - General

___ All plants shall be provided with an alternative source of electric power to allow continuity of operation during power failures, except as noted below. Methods of providing alternate sources include:

a. The connection of at least 2 independent public utility sources such as substations - a power line from each substation is recommended, and will be required unless documentation is received and approved by the Department verifying that a duplicate line is not necessary to minimize water quality violations;

b. Portable or in-place internal combustion engine equipment which will generate sufficient electrical or mechanical energy; and

c. Portable pumping or aeration equipment when only emergency pumping or aeration is required.

Power-providing equipment shall conform to Section 36.2, as applicable.

46.1.2 Power for Aeration

___ Standby generating capacity normally is not required for aeration equipment used in the activated sludge process. In cases where long-term (4 hours or more) power outages (such as hurricanes and ice storms) have occurred, auxiliary power for minimum aeration of the activated sludge will be required. Full power generating capacity may be required by the Department on certain critical stream segments.

46.1.3 Power for Disinfection

___ Continuous disinfection, where required, shall be provided during all power outages.

46.2 Water Supply

46.2.1 General

___ An adequate supply of potable water under pressure shall be provided for use in the laboratory and for general cleanliness around the plant. No piping or other connections shall exist in any part of the treatment works that, under any conditions, might cause the contamination of potable water supply. The chemical quality should be checked for suitability for its intended uses such as in heat exchangers, chlorinators, etc.

46.2.2 Direct Connections

___ Only potable water from a municipal or separate supply may be used directly at points above grade for the following hot and cold supplies:

a. Lavatory;
b. Water closet;
c. Laboratory sink (with vacuum breaker);
d. Shower;
e. Drinking fountain;
f. Eye wash fountain; and
g. Safety shower.

___ Hot water for any of the above units shall not be taken directly from a boiler used for supplying hot water to a sludge heat exchanger or digester heating unit.

46.2.3 Indirect Connections

___ Where a potable water supply is to be used for any purpose in a plant other than those listed in Section 46.2.2, a backflow preventer or a break tank, pressure pump, and pressure tank shall be provided. Water shall be discharged to the break tank through an air gap at least 6 inches (15.2 cm) above the maximum flood line or the spill line of the tank, whichever is higher.

___ A sign shall be permanently posted at every hose bib, faucet, hydrant, or sill cock located on the water system beyond the backflow preventer or break tank to indicate that the water is not safe for drinking. Hoses used at such outlets should be restricted to non-potable uses and should be color coded to not be confused with potable water hoses.

46.2.4 Separate Non-Potable Water Supply

___ Where a separate non-potable water supply is to be provided, a backflow preventer or break tank will not be necessary, but all system outlets shall be posted with a permanent sign indicating the water is not safe for drinking. Hoses used at such outlets should be restricted to non-potable uses and should be color coded to not be confused with potable water hoses.

46.3 Sanitary Facilities

___ Toilet, shower, lavatory, and locker facilities should be provided in sufficient numbers and convenient locations to serve the expected plant personnel.

46.4 Floor Slope

___ Floor surfaces should be sloped adequately to a point of drainage, except where materials containment is necessary.

46.5 Stairways

___ Stairways should be installed wherever possible in lieu of ladders. A flight of stairs should consist of not more than a 12 foot (3.7 m) continuous rise without a platform.

46.6 Flow Measurement

___ Effluent flow measurement facilities shall be provided at all plants. Indicating, totalizing, and recording flow measurement devices shall be provided for all mechanical plants and for all HCR systems or when required by permit conditions. Flow measurement facilities for lagoon systems shall not be less than pump-calibration time clocks or calibrated flume or weir.

___ Influent flow measurement facilities are recommended.

47. SAFETY

___ Applicable regulations of the Occupational Safety and Health Administration (OSHA) should be considered in the design, construction, and operation of the wastewater facilities. If any of the following items conflict with OSHA regulations, the OSHA regulations shall prevail.

Adequate provision shall be made to effectively protect the operator and visitor from hazards. The following shall be provided as necessary to fulfill the particular needs of each plant:

___ a. Enclosure of the plant site with a fence designed to discourage the entrance of unauthorized persons and animals;

___ b. Hand rails and guards around and/or grating over tanks, trenches, pits, stairwells, and other hazardous structures;

___ c. First aid equipment;

___ d. "No Smoking" signs in hazardous areas;

___ e. Protective clothing and equipment, such as air pacs, goggles, full face shields, gloves, hard hats, safety harnesses, fire extinguishers, chemical spill kits, etc.;

___ f. Portable blower and sufficient hose;

___ g. Portable lighting equipment, complying with the NEC requirements, and;

___ h. Appropriately-placed warning signs for slippery areas, non-potable water fixtures, low head clearance areas, open service manhole, hazardous chemical storage areas, flammable fuel storage areas, etc.

___ i. A positive means of locking out each mechanical device.

47.1 Hazardous Chemical Handling

___ The materials utilized for storage, piping, valves, pumping, metering, splash guards, etc., shall be specially selected considering the physical and chemical characteristics of each hazardous or corrosive chemical.

47.1.2 Secondary Containment

___ Chemical storage areas shall be enclosed in dikes or curbs which will contain the stored volume until it can be safely transferred to alternate storage or released to the wastewater at controlled rates which will not damage facilities, inhibit the treatment processes, or contribute to stream pollution. Liquid polymer should be similarly contained to reduce areas with slippery floors, especially to protect travelways. Non-slip floor surfaces are desirable in polymer-handling areas.

47.1.3 Eye-Wash Fountains and Safety Showers

___ Eye-wash fountains and safety showers utilizing potable water shall be provided in the laboratory and on each floor level or work location involving hazardous or corrosive chemical storage, mixing (or slaking), pumping, metering, or unloading. These facilities

are to be as close as practicable and shall be no more than 25 feet (7.6 m) from points of hazardous chemical exposure and are to be fully useful during all weather conditions.

47.1.4 Splash Guards

___ All pumps or feeders for hazardous or corrosive chemicals shall have guards that will effectively prevent spray of chemicals into space occupied by personnel. The splash guards are in addition to guards to prevent injury from moving or rotating machinery parts.

47.1.5 Piping, Labeling, Coupling Guards, Location

___ All piping containing or transporting corrosive or hazardous chemicals shall be identified with labels every ten feet and with at least two labels in each room, closet, or pipe chase. Color-coding as detailed in Section 44.5 shall also be used, but is not an adequate substitute for labeling. All connections (flanged or other type), except those adjacent to storage or feeder areas, shall have guards which will direct any leakage away from space normally occupied by personnel. Pipes containing hazardous or corrosive chemicals should not be located above shoulder level except where continuous drip collection trays and coupling guards will eliminate chemical spray or dripping onto personnel.

47.1.6 Protective Equipment

___ Other safety or protective clothing and equipment, such as chlorine repair kits and respirators, should be provided as appropriate.

47.1.7 Warning System and Signs

___ Facilities shall be provided for automatic shutdown of pumps and sounding of alarms when failure occurs in pressurized chemical discharge line.

___ Warning signs requiring use of goggles shall be located near chemical unloading stations, pumps, and other points of frequent hazard.

47.1.8 Dust Collection

___ Dust collection equipment shall be provided where necessary to protect personnel from dusts injurious to the lungs or skin and to prevent polymer dust from settling on walkways.

48. LABORATORY

Note: Section 48 has been extracted and modified from the Michigan Water Pollution Association publication entitled: "Recommended Guidelines for Wastewater Treatment Plant Laboratory Facilities, 1970".

___ All Class IV and mechanical Class III treatment works shall include a laboratory for making the necessary analytical determinations and operating control tests, except in

individual situations where the omission of a laboratory is approved by the Department. 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.

48.1 Location

___ 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 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 adverse effects from vibration.

48.2 Materials

48.2.1 Floors

___ Floor surfaces should be fire resistant, highly resistant to acids, alkalies, solvents, and salts, and not be slippery when wet. Floor drains should be installed as appropriate, and shall connect to the sanitary sewer.

48.2.2 Doors

___ 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.

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

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

48.3 Cabinets and Bench Tops

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

___ Strong, stable cabinets and bench tops should be provided. The top material should be resistant to attacks from normally used laboratory reagents. Overhangs and drip grooves should be provided.

___ Separate storage cabinets for acids and solvents should be provided.

___ The solvent storage cabinets should be vented top and bottom.

48.4 Hoods

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

48.4.1 Fume Hoods

48.4.1.1 Location

___ 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.

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

48.4.1.2 Design and Materials

___ The selection of fume hoods, their design and materials of construction, shall be appropriate to the variety of analytical work to be performed and the characteristics of the fumes, chemicals, gases, or vapors that will or may be released by the activities therein.

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

48.4.1.3 Fixtures

___ One cup sink should be provided inside each fume hood.

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

48.4.1.4 Exhaust

___ 24-hour continuous exhaust capability should be provided. Exhaust fans should be explosion-proof. Exhaust velocities should be checked when fume hoods are installed.

48.4.1.5 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.

48.4.2 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 heat and corrosion resistant material.

48.5 Sinks

___ The laboratory should have a minimum of three appropriately designed sinks (not including cup sinks). At least two of them should be double-well with drainboards. The sinks should be constructed of material highly resistant to acids, alkalies, solvents, and salts, and should be abrasion and heat resistant, non-absorbent, and light in weight. Traps should be made of glass or plastic and easily accessible for cleaning.

48.6 Ventilation and Lighting

___ Laboratories should be separately air conditioned, with external air supply for 100% makeup volume. In addition, separate exhaust ventilation should be provided. Ventilation outlet locations should be remote from ventilation inlets. Dehumidifiers should be considered.

___ Good lighting, free from shadows, shall be provided.

48.7 Gas and Vacuum

___ Natural gas should be supplied to the laboratory. Digester gas should not be used.

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

48.8 Balance and Table

___ An appropriate analytical balance and table should be provided and appropriately located.

48.9 Equipment, Supplies, and Reagents

___ The laboratory should be provided with all of the equipment, supplies, and reagents that are needed to carry out all of the facility's analytical testing requirements. Permit, process control, and industrial waste monitoring requirements shall be considered when specifying equipment needs. References such as Standard Methods, the U.S.E.P.A. Analytical Procedures Manual and 40 CFR Part 136 should be consulted prior to specifying equipment items.

48.10 Power Supply Regulation

___ To eliminate voltage fluctuation in sensitive equipment, electrical lines supplying the laboratory should be controlled with a constant voltage, harmonic neutralized type of transformer.

48.11 Water Still

___ An all-glass still, with at least one gallon (3.79 1) per hour capacity, should be installed complete with all utility connections. A deionization unit capable of producing 1 gph (3.79 lph) of CAP/ASTM Type I water may be used instead of a still.

48.12 Handicapped Access

Applicable requirements of the Americans with Disabilities Act of 1990 (ADA) must be considered in the design, construction, and operation of the wastewater facilities.

___ **The design engineer shall state or confirm in writing that the facility's design conforms with the ADA.**

49. FIRE PROTECTION

___ Treatment facilities should have adequate fire protection. A reference is NFPA 820, Recommended Practice for Fire Protection in Wastewater Treatment Plants, by the National Fire Protection Association (NFPA), Quincy, MA, phone 1-800/344-3555.