

North Carolina Department of Human Resources  
Eastern Regional Office • 404 Saint Andrews Drive • Greenville, N. C. 27834

James G. Martin, Governor

Phillip J. Kirk, Jr., Secretary

January 26, 1987

Commanding General  
USMC Base  
Camp Lejeune, NC 28542

RE: USMC Base Water System  
Onslow County

Dear Sir:

We have experienced an excellent relationship with the Base water supply personnel both from an administrative and technical respect. In an effort to maintain and improve this, your attention is directed to the North Carolina "Rules Governing Public Water Supplies" (NCAC 10, 10, 10D .0900), which require the owner of any public water system intending to alter, construct, or expand the system to provide written notice, including plans and specifications, to our office in Raleigh. Please note this is required prior to contracts being awarded and/or construction begun.

While not intending to interfere with routine operations and maintenance, we are concerned with any significant developments at the water treatment facilities within the State.

Thanks for your continued cooperation and interest.

Sincerely,

A handwritten signature in cursive script, appearing to read "J. Fred Hill".

J. Fred Hill  
Water Plant Consultant  
Public Water Supply Branch  
Environmental Health Section

bgb

Enclosure

cc: W. E. Venrick  
M. P. Bell

1/26/87

T6280

6280  
FAC  
FEB 19 1987

**From:** Commanding General, Marine Corps Base, Camp Lejeune, North Carolina  
**To:** Commander, Atlantic Division, Naval Facilities Engineering Command, Norfolk, Virginia 23511-6287 (Code 40)

**Subj:** NORTH CAROLINA RULES GOVERNING PUBLIC WATER SUPPLIES

**Encl:** (1) NC Dept of Human Resources ltr dtd 26 Jan 87 w/encl

1. The enclosure provides subject rules and required notification prior to alteration, construction, expansion, etc. Request you review and provide comments if unable to comply. Point of contact at this office is Mr. R. E. Alexander, Autovon 484-3034/3035.

T. J. DALZELL  
By direction

Blind copy to:  
PWO  
EnvEngr

A  
2/18

Writer: Mr. Alexander, EnvEngr, FAC, X3034  
Typist: M. Ballentine, 18 Feb 87

Doc No: CLEJ-00561-  
12.03-01/26/87

July 1, 1986

To the Users of the "Rules Governing Public Water Supplies":

Please be advised that any reference to "Water Supply Branch" or "Engineering Planning Branch" within these rules should be read as "Public Water Supply Branch" for both.

Changes in the text of these rules will be formally changed as soon as all steps for approval have been completed. During the interim time, we respectfully request your understanding and patience.

RULES  
GOVERNING PUBLIC WATER SUPPLIES  
SECTION .0600 THROUGH .2600  
OF THE  
NORTH CAROLINA ADMINISTRATIVE CODE  
TITLE 10  
DEPARTMENT OF HUMAN RESOURCES  
CHAPTER 10  
HEALTH SERVICES: ENVIRONMENTAL HEALTH  
SUBCHAPTER 10D  
WATER SUPPLIES

NORTH CAROLINA  
DEPARTMENT OF HUMAN RESOURCES  
DIVISION OF HEALTH SERVICES  
ENVIRONMENTAL HEALTH SECTION  
EFFECTIVE  
JANUARY 1, 1977  
AMENDED SEPTEMBER 1, 1979  
AMENDED EFFECTIVE SEPTEMBER 30, 1980  
AMENDED EFFECTIVE MARCH 31, 1981  
AMENDED EFFECTIVE FEBRUARY 27, 1982  
AMENDED EFFECTIVE APRIL 1, 1982  
AMENDED EFFECTIVE OCTOBER 1, 1982  
AMENDED EFFECTIVE APRIL 1, 1983  
AMENDED EFFECTIVE OCTOBER 1, 1983  
AMENDED EFFECTIVE OCTOBER 1, 1984  
AMENDED EFFECTIVE OCTOBER 1, 1985  
AMENDED EFFECTIVE JANUARY 1, 1986

TABLE OF CONTENTS

	<u>Page Number</u>
SECTION .0600 - FLUORIDATION OF PUBLIC WATER SUPPLIES	
.0601 POLICY	1
.0602 FORMAL APPLICATION	1
.0603 RESOLUTION	1
.0604 FEEDING EQUIPMENT	1
.0605 PROTECTION OF OPERATORS	2
.0606 CONTROL OF TREATMENT PROCESS	2
.0607 APPROVAL MAY BE RESCINDED	3
.0608 SEVERABILITY	3
.0609 REFERENCE RULES	3
SECTION .0700 - PROTECTION OF PUBLIC WATER SUPPLIES	
.0701 PURPOSE AND SCOPE	5
.0702 DEFINITIONS	5
SECTION .0800 - LOCATION OF SOURCES OF PUBLIC WATER SUPPLIES	
.0801 SURFACE SUPPLIES FOR COMMUNITY WATER SYSTEMS	9
.0802 REMOVAL OF DISSOLVED MATTER AND SUSPENDED MATTER	9
.0803 PUBLIC WELL WATER SUPPLIES	9
SECTION .0900 - SUBMISSION OF PLANS, SPECIFICATIONS, AND REPORTS	
.0901 APPLICABILITY; PRIOR NOTICE	11
.0902 PLANS	11
.0903 ENGINEER TO PREPARE PLANS AND SPECIFICATIONS	11
.0904 APPLICATION FOR APPROVAL; BY WHOM MADE	12
.0905 APPROVAL OF PLANS NECESSARY BEFORE CONTRACTING	12
.0906 CHANGES IN PLANS OR SPECIFICATIONS AFTER APPROVAL	13
.0907 ENGINEER'S REPORT	13
.0908 TYPE AND FORM OF EXHIBITS	13
SECTION .1000 - WATER SUPPLY DESIGN CRITERIA	
.1001 MINIMUM REQUIREMENTS	16
.1002 WATER SUPPLY WELLS	16
.1003 SURFACE WATER FACILITIES	17
.1004 WATER TREATMENT FACILITIES	18
.1005 STORAGE OF FINISHED WATER	19
.1006 DISTRIBUTION SYSTEMS	22
.1007 ELECTRICAL SYSTEMS	23

.1615	MAXIMUM CONTAMINANT LEVELS FOR ORGANIC CHEMICALS	39
.1616	MAXIMUM CONTAMINANT LEVELS FOR INORGANIC CHEMICALS	40
.1617	MAXIMUM CONTAMINANT LEVELS FOR RADIUM	41
.1618	MAXIMUM CONTAMINANT LEVELS FOR MAN-MADE RADIONUCLIDES	41
.1619	CONCENTRATION OF IRON	41
.1620	CONCENTRATION OF MANGANESE	42
.1621	CORROSION CONTROL: MONITORING CORROSIVITY CHARACTERISTICS	42
.1622	MICROBIOLOGICAL CONTAMINANT SAMPLING AND ANALYSIS	43
.1623	TURBIDITY SAMPLING AND ANALYSIS	47
.1624	ORGANIC CHEMICALS OTHER THAN TTHM, SAMPLING AND ANALYSIS	48
.1625	INORGANIC CHEMICAL SAMPLING AND ANALYSIS	49
.1626	ANALYTICAL METHODS FOR RADIOACTIVITY	50
.1627	MONITORING FREQUENCY FOR RADIOACTIVITY	52
.1628	MONITORING OF CONSECUTIVE PUBLIC WATER SYSTEMS	55
.1629	CERTIFIED LABORATORIES	55
.1630	ALTERNATIVE ANALYTICAL TECHNIQUES	56
.1631	REPORTING REQUIREMENTS	56
.1632	RECORD MAINTENANCE	57
.1633	PUBLIC NOTIFICATION REQUIREMENTS	57
.1634	VARIANCES AND EXEMPTIONS	59
.1635	TOTAL TRIHALOMETHANES SAMPLING AND ANALYSIS	59
.1636	SPECIAL MONITORING FOR SODIUM	63
.1637	TREATMENT TECHNIQUES FOR TOTAL TRIHALOMETHANES	63
SECTION .1700 - WATER SUPPLY DESIGN GUIDELINES		
.1701	PURPOSE	66
.1702	DESIGN GUIDELINES	66
SECTION .1800 - RAW SURFACE WATER FACILITIES		
.1801	IMPOUNDMENT; PRE-SETTLING RESERVOIRS	67
.1802	RAW WATER INTAKES	67
.1803	INTAKE CONDUITS	67
.1804	PUMPS; POWER FACILITIES	67
SECTION .1900 - SURFACE WATER TREATMENT FACILITIES		
.1901	FLASH OR RAPID MIXING FACILITY	69
.1902	AIR MIXING	69
.1903	MECHANICAL FLOCCULATION	69
.1904	BAFFLED MIXING AND FLOCCULATION BASINS	69
.1905	CONDUITS; PIPES AND FLUMES; GATES AND VALVES	70
.1906	SEDIMENTATION BASIN	70
.1907	SOLIDS CONTACT OR UP-FLOW UNITS	70
.1908	GRAVITY FILTERS	71
.1909	PREVENTION OF BACKFLOW AND BACK-SIPHONAGE	72

.2504	DISPOSITION OF A VARIANCE REQUEST	86
.2505	PUBLIC HEARINGS ON VARIANCES AND SCHEDULES	88
.2506	REQUIREMENTS FOR AN EXEMPTION	89
.2507	EXEMPTION REQUEST	89
.2508	CONSIDERATION OF AN EXEMPTION REQUEST	89
.2509	DISPOSITION OF AN EXEMPTION REQUEST	90
.2510	PUBLIC HEARINGS ON EXEMPTION SCHEDULES	90
.2511	FINAL SCHEDULE	91

SECTION .2600 - LOCAL PLAN APPROVAL PROGRAM

.2601	LOCAL APPROVAL PROGRAM	93
.2602	APPLICATION FOR CERTIFICATION	93
.2603	CERTIFICATION	93
.2604	NOTICE	93
.2605	DEPARTMENTAL ENFORCEMENT	94

APPENDIX

FIGURE 1 (a)	ALKALINITY VS PH
FIGURE 1 (b)	ALKALINITY VS TOTAL FREE CARBON DIOXIDE
FIGURE 2	INSTANTANEOUS DEMAND FOR RESIDENTIAL COMMUNITY WATER SYSTEMS
FIGURE 3	TYPICAL WELL HEAD DETAILS
FIGURE 4	PEAK DEMAND FOR MHP WATER SYSTEMS
FIGURE 5	PRESSURE AND VOLUME DIFFERENTIALS FOR HYDROPNEUMATIC TANKS
FIGURE 6	VOLUME OF HYDROPNEUMATIC TANKS
TABLE 1	APPROVED METHODOLOGY FOR MICROBIOLOGICAL CONTAMINANTS
TABLE 2	APPROVED METHODOLOGY FOR INORGANIC CONTAMINANTS
TABLE 3	APPROVED METHODOLOGY FOR ORGANIC CONTAMINANTS
	APPROVED METHODOLOGY FOR THM

SECTION .0600 - FLUORIDATION OF PUBLIC WATER SUPPLIES

.0601 POLICY

Upon receipt of an application from a community water system to fluoridate its water supply, the Department of Human Resources will approve the application provided the rules for fluoridation pursuant to this Section are followed.

History Note: Statutory Authority G.S. 130A-316;  
Eff. February 1, 1976;  
Readopted Eff. December 5, 1977;  
Amended Eff. September 1, 1979.

.0602 FORMAL APPLICATION

(a) Fluoride shall not be added to a community water system until a formal application has been submitted to and written approval is granted by the Secretary of the Department of Human Resources.

(b) Such approval will be considered upon written application and after adequate investigation has been made to determine if the policy adopted by the division of health services has been satisfied and the facilities, their accuracy and the proposed method of control are satisfactory and meet the requirements hereafter stated.

History Note: Statutory Authority G.S. 130A-316;  
Eff. February 1, 1976;  
Readopted Eff. December 5, 1977;  
Amended Eff. September 1, 1979.

.0603 RESOLUTION

The application requesting authorization to add fluoride to the water supply shall be accomplished by a certified copy of a resolution legally adopted by the municipal board, or governing body, stating that the approval of the appropriate local board of health has been received and setting forth full information regarding the proposed procedure to be followed in applying the fluoride, the type of equipment to be used and the control measures to be employed in its application.

History Note: Statutory Authority G.S. 130A-316;  
Eff. February 1, 1976;  
Readopted Eff. December 5, 1977.

.0604 FEEDING EQUIPMENT

Accurate feeding equipment must be provided for applying fluoride. Either gravimetric or volumetric dry-feed equipment or positive displacement liquid-feed equipment with accuracy within five percent is required.

History Note: Statutory Authority G.S. 130A-316;  
Eff. February 1, 1976;  
Readopted Eff. December 5, 1977.



the fluoride compound and applied to the water so as to add 1.0 mg/liter of fluoride (F), shall not in any way be toxic or detrimental to health and shall not in any way affect the quality of the water in respect to the requirements of 10 NCAC 10D .1616. The kind of coloring material used for coloring the fluoride shall be identified by the manufacturer in his proposal. Where tinted or colored fluoride chemicals are not available, white fluoride may be used, provided every necessary precaution is taken to insure its proper handling and use.

History Note: Statutory Authority G.S. 130A-316;  
Eff. February 1, 1976;  
Readopted Eff. December 5, 1977;  
Amended Eff. December 17, 1979.

.0607 APPROVAL MAY BE RESCINDED

Failure to thoroughly and effectively carry out the requirements governing the application of fluoride, or for other justifiable reasons, shall be considered sufficient cause to rescind the approval of the Department of Human Resources and to withdraw the authorization granted for the permission to add fluoride to a community water system.

History Note: Statutory Authority G.S. 130A-316;  
Eff. February 1, 1976;  
Readopted Eff. December 5, 1977;  
Amended Eff. September 1, 1979.

.0608 SEVERABILITY

If any provision of this Section, or the application thereof to any person or circumstance, is held invalid, the remainder of these rules, or the application of such provision to other persons or circumstances, shall not be affected thereby.

History Note: Statutory Authority G.S. 130A-316;  
Eff. February 1, 1976;  
Readopted Eff. December 5, 1977.

.0609 REFERENCE RULES

The following codes and standards mentioned in this Section are adopted by reference and can be inspected at the principal address of the division of health services:

- (1) "Pharmacopoeia of the United States," 18th revision, may be purchased from Mack Publishing Company, Easton, Pennsylvania, 18042. The cost is seventeen dollars and fifty cents (\$17.50);
- (2) "Standard Methods for the Examination of Water and Wastewater," 14th edition may be purchased from the American Public Health Association, Inc., 1790 Broadway, New York, New York 10010; The cost of the 14th edition is thirty-five dollars (\$35.00).

History Note: Statutory Authority G.S. 130A-316;  
Eff. February 1, 1976;

SECTION .0700 - PROTECTION OF PUBLIC WATER SUPPLIES

.0701 PURPOSE AND SCOPE

(a) For the protection of the public health, and pursuant to authority granted by Article 10 of Chapter 130A of the General Statutes of North Carolina, the commission for health services hereby adopts the following rules (10 NCAC 10D .0700 through .2500) governing the location of sources of supply for public water systems, the design and construction of public water system facilities, the operation of public water systems, and the protection of public water systems.

(b) The provisions of this Subchapter shall apply to each public water system in the state, unless the public water system meets all of the following conditions:

- (1) consists only of distribution and storage facilities and does not have any collection and treatment facilities;
- (2) obtains all of its water from, but is not owned or operated by, a public water system to which such regulations apply;
- (3) does not sell water to any person; and
- (4) is not a carrier which conveys passengers in interstate commerce.

(c) Any provision of any charter granted to a public water system in conflict with the rules of this Subchapter is hereby repealed.

History Note: Authority G.S. 130A-315;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. October 1, 1984; September 1, 1979;  
January 1, 1978.

.0702 DEFINITIONS

As used in this Subchapter, the term:

- (1) "Act" means the North Carolina Drinking Water Act.
- (2) "Administrator" means the Administrator of the United States Environmental Protection Agency or an authorized representative.
- (3) "Certified Laboratory" shall mean any facility for performing bacteriological, chemical or other analyses on water which has received interim or final certification by either the Environmental Protection Agency or the division of health services laboratory section certification program.
- (4) "Class I reservoir" shall mean a reservoir from which water flows by gravity or is pumped directly to a treatment plant or to a small intervening storage basin and thence to a treatment plant.
- (5) "Class II reservoir" shall mean a reservoir from which the water flows by gravity or is pumped to a Class I reservoir prior to final entrance to a water treatment plant.
- (6) "Class III reservoir" is a large impoundment used for electric power generation, flood control, and similar purposes,

- Occupational Exposure," NBS HANDBOOK 69, except the daughter products of thorium 232, uranium 235 and uranium 238.
- (20) "Maximum contaminant level" means the maximum permissible level of a contaminant in water which is delivered to the free flowing outlet of the ultimate user of a public water system, except in the case of turbidity where the maximum permissible level is measured at the point of entry to the distribution system. Contaminants added to the water under circumstances controlled by the user, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from this definition.
- (21) "Maximum Total Trihalomethane Potential (MTP)" means the maximum concentration of total trihalomethanes produced in a given water containing a disinfectant residual after 7 days at a temperature of 25 C or above.
- (22) "National Primary Drinking Water Regulations" means primary drinking water regulations promulgated by the administrator pursuant to the federal act.
- (23) "Non-potable water supply" shall mean waters not approved for drinking or other household uses.
- (24) "Person" means an individual, corporation, company, association, partnership, unit of local government, state agency, federal agency, or other legal entity.
- (25) "Picocurie (pCi)" means that quantity of radioactive material producing 2.22 nuclear transformations per minute.
- (26) "Potable water supply" shall mean water which is approved for drinking or other household uses.
- (27) "Public water system"
- (a) "Public Water System" means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year. Such term includes:
- (i) any collection, treatment, storage, and distribution facility under control of the operator of such system and used primarily in connection with such system; and
- (ii) any collection or pre-treatment storage facility not under such control which is used primarily in connection with such system.
- (b) A public water system is either a "community water system" or a "non-community water system":
- (i) "Community Water System" means a public water system which serves at least 15 service connections or regularly serves at least 25 year-round residents.
- (ii) "Non-Community Water System" means a public water system which is not a community water system.
- (28) "Raw water" shall mean surface water or ground water which because of bacteriological quality, chemical quality, turbidity, color, or mineral content makes it unsatisfactory

SECTION .0800 - LOCATION OF SOURCES OF PUBLIC WATER SUPPLIES

.0801 SURFACE SUPPLIES FOR COMMUNITY WATER SYSTEMS

(a) A surface supply may be used for a community water system with disinfection if it complies with the provisions of this Section.

(b) Such water supply shall be derived from uninhabited wooded areas.

(c) The entire watershed shall be either owned or controlled by the person supplying the water or be under the control of the federal or state government; however, no such new water supply shall be created except where the water system owner shall own in its entirety the watershed from which the water will be obtained.

(d) The water after disinfection shall be of potable quality as determined by bacteriological and chemical tests performed by a certified laboratory. The presence of contaminants shall not exceed the limits set forth in Section .1600 of this Subchapter.

(e) The water source shall have an A-I classification as established by the Environmental Management Commission and shall meet the quality standards for that classification.

History Note: Statutory Authority G.S. 130A-315;  
130A-318; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. September 1, 1979.

.0802 REMOVAL OF DISSOLVED MATTER AND SUSPENDED MATTER

Any surface water which is to receive treatment for removal of dissolved matter and/or suspended matter in order to be used for a community water system shall be obtained from a source which meets the A-I or A-II stream classification standards established by the Environmental Management Commission and shall be properly protected from objectionable sources of pollution as determined by a sanitary survey of the watershed made by an authorized representative of the department. The source supply shall be sufficient in capacity to satisfy the anticipated needs of the users for the period of design.

History Note: Statutory Authority G.S. 130A-315;  
130A-318; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. September 1, 1979.

.0803 PUBLIC WELL WATER SUPPLIES

Any site or sites for any water supply well to be used as a community water system shall be investigated by an authorized representative of the division of health services. Approval by the division of health services is required in addition to any approval or permit issued by any other state agency. The site shall meet the following requirements for approval:

SECTION .0900 - SUBMISSION OF PLANS, SPECIFICATIONS, AND REPORTS

.0901 APPLICABILITY; PRIOR NOTICE

(a) All persons including units of local government intending to construct, alter, or expand a community water system shall give written notice thereof, including submission of applicable plans, specifications and engineering reports, to the environmental health section, division of health services as required by the rules of this Section.

(b) All reports, plans and specifications shall be submitted to the division of health services at least 30 days prior to the date upon which action by the division is desired.

(c) If revisions to the plans or specifications are necessary, the engineer who prepared them will be notified. Revised plans and specifications will constitute a resubmittal and additional time will be required for review.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. June 30, 1980; September 1, 1979.

.0902 PLANS

(a) Procedure Applicable to all Projects, Extensions, or Changes. All plans, specifications or other data intended for submission to the environmental health section, division of health services, in compliance with the statutes covering community water systems, shall be submitted in triplicate for review by the Environmental Health Section, Division of Health Services, P.O. Box 2091, Raleigh, North Carolina, 27602.

(b) Plans for Community Water Systems. Plans should consist of legible prints having black, blue, or brown lines on a white background suitable for microfilming. The plans should not be more than 36 inches wide and 48 inches long.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. June 30, 1980; September 1, 1979.

.0903 ENGINEER TO PREPARE PLANS AND SPECIFICATIONS

Detailed plans and specifications for community water system facilities shall be prepared by a professional engineer licensed to practice in the State of North Carolina. The plans shall bear an imprint of the registration seal of the engineer.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. September 1, 1979.

01/26/87

submitted for review and approval by the division of health services.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. September 1, 1979.

.0906 CHANGES IN PLANS OR SPECIFICATIONS AFTER APPROVAL

No deviation from the approved plans or specifications shall be made unless amended plans showing such proposed changes shall have been submitted to and approved by the Department of Human Resources. Failure to comply with this requirement shall invalidate any previous approval of plans and specifications.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.

.0907 ENGINEER'S REPORT

(a) The owner, when required, shall submit to the environmental health section, division of health services, an engineering report in duplicate covering the basic factors and principles considered in planning of the project.

(b) Such engineering reports shall be required for projects involving new community water systems, modification of existing community water system, development or modification of surface water sources and other community water system projects requiring significant engineering.

(c) Before preparation of the engineering report, the consulting engineer may wish to consult with the office or field staff of the division of health services concerning the proposed source of supply, treatment methods, and alternatives.

History Note: Statutory authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. June 30, 1980; September 1, 1979.

.0908 TYPE AND FORM OF EXHIBITS

(a) Engineer's Report. The engineer's report (including any preliminary plans) shall contain the following information where applicable:

- (1) description of any existing water system related to the project;
- (2) identification of the municipality, community, or area to be served by the proposed water system;
- (3) the name and address of the owner;
- (4) a description of the nature of the establishments and of the area to be served by the proposed water system;

01/26/87

(6) the north point.

(c) Specifications. Complete detailed specifications for materials, equipment, workmanship, test procedures and specified test results shall accompany the plans. The specifications shall include, where applicable:

- (1) the design and number of chemical feeders, mixing devices, flocculators, pumps, motors, pipes, valves, filter media, filter controls, laboratory facilities and equipment, and water quality control equipment and devices;
- (2) provision for continuing with minimum interruption the operation of existing water supply facilities during construction of additional facilities;
- (3) safety devices and equipment; and
- (4) procedure for disinfection of tanks, basins, filters, wells and pipes.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.

01/26/87

- (5) A community water system using well water as its source of supply and designed to serve 50 or more residences or connections shall provide at least two wells. In lieu of a second well, another approved water supply source may be accepted.
- (6) A totalizing meter shall be installed in the piping system from each well.
- (7) The well or wells serving a mobile home park shall be capable of supplying an average daily demand of 250 gallons per day per connection. The well or wells serving residences shall be capable of supplying an average daily demand of 400 gallons per day per connection.

(g) Initial Disinfection of Water Supply Well. All new wells, and wells that have been repaired or reconditioned shall be cleaned of foreign substances such as soil, grease, and oil, and then shall be disinfected. A representative sample or samples of the water (free of chlorine) shall be collected and submitted to an approved laboratory for bacteriological analyses. After disinfection the water supply shall not be placed into service until bacteriological test results of representative water samples analyzed in an approved laboratory are found to be satisfactory.

(h) Initial Chemical Analyses. A representative sample of water from every new water supply well shall be collected and submitted for chemical analyses to the laboratory section, division of health services or to a laboratory approved by the division of health services. The results of the analysis must be satisfactory before the well is placed into service.

(i) Continuous Disinfection. Equipment designed for continuous application of chlorine or hypochlorite solution or some other approved and equally efficient disinfectant shall be provided for all well water supplies introduced on or after January 1, 1972. Equipment for determining residual chlorine concentration in the water shall be specified.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. January 1, 1986; March 31, 1980;  
September 1, 1979.

#### .1003 SURFACE WATER FACILITIES

(a) Unimpounded Stream. Both the minimum daily flow of record of the stream and the estimated minimum flow calculated from rainfall and run-off shall exceed the maximum daily draft for which the water treatment plant is designed with due consideration given to requirements for future expansion of the treatment plant.

(b) Pre-settling Reservoirs. Construction of a pre-settling or pre-treatment reservoir shall be required where excessive bacterial concentrations or wide and rapid variations in turbidity and/or chemical qualities occur.

(c) Impoundments. Raw water storage capacity shall be sufficient to reasonably satisfy the designed water supply demand



other approved, equally efficient disinfectant shall be provided. Stand-by units shall be provided. The plans and specifications shall describe the equipment in detail.

- (2) Chlorinators shall be installed in tightly constructed, above ground rooms with adequate mechanical ventilation to the outside air. The capacity of exhaust fans shall be sufficient to discharge all air in the rooms every 30 seconds to 1 minute. The fans or their suction ducts shall be located not more than eight inches above floor level. Provisions for entrance of fresh air shall be made. The point of discharge shall be so located as not to contaminate the air in any building or inhabited areas. Electrical switches for operation of fans shall be located outside the chlorinator rooms. Rooms used for storage of chlorine cylinders shall be designed as described above.

(d) Safety Breathing Apparatus. Emergency breathing equipment for operators shall be stored outside rooms where chlorine is used or stored.

(e) Meters and Gauges. Meters and gauges, including raw and finished water meters, shall be installed to indicate and record water flow entering the treatment plant and water pumped or conducted to the distribution system.

(f) Prevention of Backflow and Back-Siphonage. Submerged inlets and interconnections whereby non-potable water, or water of questionable quality, or other liquids may be siphoned or forced into or otherwise allowed to enter the finished water supply shall not be permitted.

(g) Chemical Storage. Separate space for storing at least 30 days supply of chemicals shall be provided. A separate room or partitioned space shall be provided for storage of dry fluoride chemicals or liquid fluoride chemicals in portable containers.

(h) Laboratory. Adequate space, equipment, and supplies shall be provided for daily, routine chemical and bacteriological tests. A layout of laboratory furniture and equipment shall be included in the plans.

(i) Toilet Facilities. Adequate toilet facilities shall be provided for the plant personnel.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.

#### .1005 STORAGE OF FINISHED WATER

##### (a) Ground Level Storage

- (1) Water Ground Storage Tank. Finished water ground storage tanks shall be provided with a light-proof and insect-proof cover of concrete, steel or other material approved by the division of health services. The construction joints between side walls and the covers of concrete tanks or reservoirs shall be above ground

tanks may be used to control pumps, stabilize pressures and provide a minimum of storage. Pressure tanks shall not be considered acceptable for meeting total storage requirements for water systems of over 300 connections, except as provided in .1005(d) of this Section.

- (2) Corrosion Control. Pressure tanks shall be galvanized after fabrication, provided with an approved liner or coated in accordance with AWWA Standard D 102-64 (adopted in 1964) of the American Water Works Association, Inc., or approved equal standard. Copies of AWWA standards are available from the American Water Works Association, 6666 W. Quincy Avenue, Denver, Colorado 80235, at a cost of one hundred forty dollars (\$140.00) per complete set for nonmembers or seventy dollars (\$70.00) for members. Copies are available for public inspection at the principal address of the environmental health section, division of health services.
  - (3) Required Parts. Pressure tanks shall have access man-holes, bottom drains, pressure gauges, and properly sized safety and vacuum relief valves.
  - (4) Controls. Automatic pressure, start-stop controls for operation of pumps shall be provided.
- (d) High Yield Aquifers
- (1) Equipment. In lieu of providing elevated storage for systems over 300 connections in areas where aquifers are known to produce high yields, i.e., 400-500 gpm from an eight-inch well, a system of extra well pumping capacity, auxiliary power generating equipment, hydro-pneumatic tanks, controls, alarms and monitoring systems may be provided. The design and installation of such system shall assure that reliable, continuous service is provided.
  - (2) Auxiliary Power. Such a system shall have an adequate number of wells equipped with sufficient pumping capacity so that the required flow rate can be maintained with the single largest capacity well and pump out of operation. Auxiliary power generating equipment shall be provided for each well sufficient to operate the pump, lights, controls, chemical feeders, alarms and other electrical equipment as may be necessary.
  - (3) Pump Control. Hydropneumatic tanks designed in accordance with (c) of this Rule and Section .2000 of this Subchapter shall be provided to maintain pressure and control the pump operation.
  - (4) Alarm System. An alarm system shall be provided which will send a visual or audible signal to a constantly monitored location so that the water system operator will be advised of a primary power failure.

History Note: Authority G.S. 130A-315; 130A-317;  
P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;

- (B) When the elevated tank or ground storage reservoir is filled entirely by water from a public water supply:
- (i) If a covered ground reservoir or covered elevated storage tank is used, an approved reduced pressure back-flow preventor or an approved double check valve assembly may be used. The back-flow prevention device shall be installed in such a manner as to afford adequate protection and shall be easily accessible and shall include all necessary pressure gauges and drains for testing. Gate valves shall be installed in the line at both ends of the back-flow prevention device.
  - (ii) If an uncovered ground reservoir or uncovered elevated storage tank is used, a complete physical break shall be provided between the reservoir or elevated tank and the public supply. The physical break between the inlet pipe and the top or overflow rim of the reservoir shall be at least twice the diameter of the inlet pipe.
- (4) All cross-connections between potable water supplies and non-potable or unprotected supplies which are not specifically covered in the categories in this Paragraph will be considered as special problems and the protective devices required will be determined by the Department of Human Resources on the basis of the degree of health hazard involved.
- (5) Persons desiring to install non-potable water supplies in conjunction with a public water supply shall submit to the environmental health section, division of health services, detailed plans and specifications in triplicate showing the non-potable water supply and its relation to the potable water supply.
- (6) Any such interconnection to a potable water system is subject to the approval of the water supplier and shall not be made until authorized by the water supplier in addition to the Department of Human Resources

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. June 30, 1980.

#### .1007 ELECTRICAL SYSTEMS

Electrical wiring and equipment shall comply with applicable provisions of the national, state, and local electrical codes.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.

Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. June 30, 1980; September 1, 1979.

.1103 OPERATION OF COMMUNITY WATER SYSTEM WELLS

(a) Operator in Charge. The operator of a community water system well shall be capable of computing chlorine dosages and other chemical dosages which are applied to the water when such treatment is required. The operator shall be familiar with the entire water system, including pipelines, pumps, chlorinators, and other appurtenances pertaining to the operation of the entire water system. The operator shall hold a valid certificate issued by the North Carolina Water Treatment Facility Operators Certification Board.

(b) Tests; Forms. When application of chlorine and other chemicals are required, the operator shall make required residual chlorine tests and other tests at least daily and shall report his results to the water supply branch, division of health services in a monthly report which shall include pertinent information required by the division of health services. Copies of this report form indicating the required information may be obtained from the water supply branch, division of health services. A copy of each monthly report shall be submitted by the 10th day of the following month to the Water Supply Branch, Division of Health Services, P.O. Box 2091, Raleigh, North Carolina, 27602.

History Note: Statutory Authority G.S. 130A-315;  
90A-29; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. June 30, 1980; September 1, 1979.

Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. September 1, 1979.

.1205 PROHIBITED CONDUCT ON WATERSHED

No timbering, lumbering, construction, or reforestation operations shall be permitted on the watershed of an unfiltered community water system, except by the special permission of the Department of Human Resources. Written application for such permission shall be made by the owner of the water supply to the Director of the Division of Health Services. The applicant shall submit a project plan describing the nature and scope of the project and precautions for protection of the water supply. If approved, special rules and regulations governing the conduct of such work will be prescribed in order to provide for the sanitary and physical protection of the water supply during such operations.

History Note: Statutory Authority G.S. 130A-315;  
130A-320; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. September 1, 1979.

.1206 INSPECTION OF WATERSHEDS

The person or company supplying water from the watershed of an unfiltered source shall employ an adequate number of responsible inspectors and cause satisfactory inspection of the watershed to be made at least at quarterly intervals to assure that the watershed area is at all times maintained in a manner that will promote and insure the sanitary and physical protection of the supply. A copy of the watershed inspection report shall be submitted to the water supply branch, division of health services within 10 days after completion of the inspection.

History Note: Statutory Authority G.S. 130A-315;  
130A-320; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.

.1207 WATERSHED BOUNDARY SIGNS

Signs advising the public of the watershed boundaries and prohibiting trespassing by all unauthorized persons shall be posted at the water works intake and along the boundaries and at entrances and accesses throughout the watershed area of an unfiltered community water system. It shall be the duty of the watershed inspectors and other water supply officials to see that these signs are posted, replaced, and renewed when necessary.

History Note: Statutory Authority G.S. 130A-315;  
130A-320; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. September 1, 1979.

SECTION .1300 - PROTECTION OF FILTERED WATER SUPPLIES

.1301 RECREATIONAL ACTIVITIES

(a) No recreational activities shall be permitted on a class I or class II reservoir without a resolution by the Commission or without approval by the Department. The Department may approve recreational events on a class I or class II reservoir which last one day or less upon a showing that the recreational event will not adversely affect the quality of the water to the point of rendering it unsatisfactory as a source for a community water system. All other recreational activities on a class I or class II reservoir shall be permitted only upon a resolution by the Commission authorizing the activity.

(b) Upon request for such a resolution, the division of health services shall make or cause to be made a thorough investigation of the quality of the water to determine the extent to which the proposed recreational activities would adversely affect the quality of the water. If, after such investigation, the Commission for Health Services is of the opinion that the proposed recreational activities will not adversely affect the quality of the water to the point of rendering it unsatisfactory as a source of community water system, the Commission for Health Services may adopt a resolution authorizing the proposed recreational activities.

(c) Only those recreational activities specifically authorized in the resolution will be allowed. No recreational activities shall be permitted within 50 yards of any community water system intake.

History Note: Statutory Authority G.S. 130A-315;  
130A-320; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. October 1, 1985; September 1, 1979.

.1302 MAINTENANCE OF PARKS

Parks or other places of resort for the use and entertainment of the public which may be established and maintained on a watershed shall be provided with sanitary facilities for the collection of garbage and disposal of sewage. Such facilities must, in the opinion of the division of health services, not cause deterioration of water quality and must meet requirements for approval by the division of health services. Persons in charge of such facilities must maintain strict compliance with the Commission for Health Services' sanitation requirements at all times in order to prevent the pollution of the community water system.

History Note: Statutory Authority G.S. 130A-315;  
130A-320; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. September 1, 1979.

be buried by the owner or person in charge of the animal or the person owning or in charge of the land upon which the animal dies with a covering of a least three feet of earth or the carcass shall be burned or removed from the watershed and buried as required by G.S. 106-403. In no case shall dead animals be placed in the reservoir.

History Note: Statutory Authority G.S. 130A-315;  
130A-320, P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.

.1308 BURIAL GROUND

No burial ground shall be established on any watershed within 1,500 feet upstream from a public water supply intake on an unpounded stream or within 300 feet of any class I or class II reservoir.

History Note: Statutory Authority G.S. 130A-315;  
130A-320; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.

.1309 SEWAGE DISPOSAL

Any residence, place of business or public assembly, located on a watershed shall be provided with a sanitary means of sewage disposal.

History Note: Statutory Authority G.S. 130A-315; 130A-320;  
P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.

.1310 DISPOSAL OF ANY SUBSTANCE

Disposal of or storage of any substance on a watershed of a public water supply that may, in the opinion of the division of health services, have a deleterious effect on the quality of the raw water shall be prohibited. The owner of the water supply shall be responsible for maintaining surveillance of the reservoirs and watersheds to insure protection of the water quality.

History Note: Statutory Authority G.S. 130A-315;  
130A-320; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.

.1311 PROTECTION OF WATER QUALITY

The issuance of a resolution by the Commission for Health Services for recreational activities on public water supply reservoirs shall be contingent upon the governing authority establishing provisions for adequate sanitation facilities, supervision and police control to insure the protection of the water quality.

SECTION .1400 - PROTECTION OF BOTTLED WATER SUPPLIES

- .1401 BOTTLING OR PACKAGING WATER
- .1402 DISINFECTION
- .1403 WATER SAMPLES

History Note: Statutory Authority G.S. 130-157 through 130-159;  
Eff. January 1, 1977;  
Amended Eff. January 24, 1977;  
Readopted Eff. December 5, 1977;  
Repealed Eff. December 17, 1979.



SECTION .1600 - WATER QUALITY STANDARDS

- .1601 PURPOSE OF STANDARDS
- .1602 MAXIMUM CONTAMINANT LEVELS OF INORGANIC CHEMICALS
- .1603 FLUORIDATION
- .1604 MAXIMUM CONTAMINANT LEVELS FOR COLIFORM BACTERIA
- .1605 RECOMMENDED LIMITS FOR OTHER CHEMICAL SUBSTANCES
- .1606 LIMIT FOR TURBIDITY
- .1607 LIMIT FOR COLOR

History Note: Statutory Authority G.S. 130A-315; 130A-317;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. January 1, 1978;  
Repealed Eff. September 1, 1979.

- .1608 LIMIT FOR IRON AND MANGANESE
- .1609 CORROSION CONTROL

History Note: Statutory Authority G.S. 130A-315; 130A-317;  
Eff. January 1, 1978;  
Repealed Eff. September 1, 1979.

.1610 PURPOSE

The purpose of this Section is to implement the provisions of the North Carolina Drinking Water Act.

History Note: Authority G.S. 130A-315;  
P.L. 93-523; 40 C.F.R. 141;  
Eff. September 1, 1979.

.1611 CONSTRUCTION

This Section shall be construed as enabling the State of North Carolina to undertake primary responsibility for the enforcement of the federal act.

History Note: Statutory Authority G.S. 130A-315;  
P.L. 93-523; 40 C.F.R. 141;  
Eff. September 1, 1979.

.1612 SITING REQUIREMENTS

(a) Any person constructing or modifying a public water system shall to the extent practicable, avoid locating all or part of a new or expanded facility at a site which:

- (1) is subject to a significant risk from earthquakes, floods, fires or other disasters which could cause a breakdown of the public water system or a portion thereof; or
- (2) except for intake structures, is within the floodplain of a 100-year flood or is lower than any recorded high tide where appropriate records exist.

(b) Additional requirements concerning the siting of raw water intakes shall be found in 10 NCAC 10D .1802.

01/26/87

- the samples when 20 or more are examined per month.
- (2) When the fermentation tube method and 10 milliliter standard portions pursuant to .1622(a) of this Section are used, coliform bacteria shall not be present in any of the following:
- (a) more than 10 percent of the portions (tubes) in any one month pursuant to .1622(b) or (c) of this Section except at the Department's discretion, systems required to take 10 or fewer samples per month may be authorized to exclude one positive routine sample resulting in one or more positive tubes per month from the monthly calculation if:
    - (i) as approved on a case-by-case basis the Department determines and states in writing to the public water system that no unreasonable risk to health existed under the conditions of this modification. This determination should be based upon a number of factors not limited to the following:
      - (A) the system provided and had maintained an active disinfectant residual in the distribution system,
      - (B) the potential for contamination as indicated by a sanitary survey, and
      - (C) the history of the water quality at the public water system (e.g. MCL or monitoring violations);
    - (ii) the supplier initiates a check sample on each of two consecutive days from the sampling point within 24 hours after notification that the routine sample is positive, and each of these check samples is negative; and
    - (iii) the original positive routine sample is reported and recorded by the supplier pursuant to .1631(a) and .1632(1) of this Section. The supplier shall report to the Department its compliance with the conditions specified in this paragraph and report the action taken to resolve the prior positive sample result. If a positive routine sample is not used for the monthly calculation, another routine sample must be analyzed for compliance purposes. This provision may be used only once during two consecutive compliance periods.
  - (b) three or more portions in more than one sample when less than 20 samples are examined per month; or
  - (c) three or more portions in more than five percent of the samples when 20 or more samples are examined per month.
- (3) When the fermentation tube method and 100 milliliter standard portions pursuant to .1622(a) of this Section are used, coliform bacteria shall not be present in any of the following:
- (a) more than 60 percent of the portions (tubes) in any month pursuant to .1622(b) or (c) of this Section,

01/26/87

surface water sources in whole or in part. The maximum contaminant levels for turbidity in drinking water, measured at a representative entry point(s) to the distribution system, are:

- (1) One turbidity unit (TU), as determined by a monthly average pursuant to .1623 of this Section except that five or fewer turbidity units may be allowed if the supplier of water can demonstrate to the department that the higher turbidity does not do any of the following:
  - (a) interfere with disinfection,
  - (b) prevent maintenance of an effective disinfectant agent throughout the distribution system, or
  - (c) interfere with microbiological determinations.
- (2) Five turbidity units based on an average for two consecutive days pursuant to .1623 of this Section.

History Note: Authority G.S. 130A-315;  
P.L. 93-523; 40 C.F.R. 141;  
Eff. September 1, 1979.

#### .1615 MAXIMUM CONTAMINANT LEVELS FOR ORGANIC CHEMICALS

The following are the maximum contaminant levels for organic chemicals. They apply only to community water systems. Compliance with maximum contaminant levels for organic chemicals is calculated pursuant to .1624 of this Section:

	<u>Level, milligrams per liter</u>
(1) Chlorinated hydrocarbons:	
<u>Endrin</u> (1,2,3,4,10, 10-hexachloro 6,7,-epoxy-1,4,4a,5,6,7,8,8a-octa- hydro-1,4-endo, endo-5,8 - dimethano naphthalene).	0.0002
<u>Lindane</u> (1,2,3,4,5,6-hexachloro- cyclohexane, gamma isomer).	0.004
<u>Methoxychlor</u> (1,1,1-Trichloro-2,2 - bis (p-methoxyphenyl) ethane).	0.1
<u>Toxaphene</u> [C(10)H(10)Cl(8) Technical chlorinated camphene, 67-69 percent chlorine].	0.005
(2) Chlorophenoxy:	
<u>2,4,D</u> , (2,4-Dichlorophenoxyacetic acid).	0.1
<u>2,4,5-TP Silvex</u> (2,4,5-Trichloro phenoxypropionic acid).	0.01
(3) Total trihalomethanes (the sum of the concentrations of bromodichloromethane, dibromochloromethane, tribromomethane (bromoform) and trichloromethane (chloroform)).	0.10

History Note: Authority G.S. 130A-315;  
P.L. 93-523; 40 C.F.R. 141;  
Eff. September 1, 1979;  
Amended Eff. September 30, 1980.

.1617 MAXIMUM CONTAMINANT LEVELS FOR RADIUM

The following are the maximum contaminant levels for radium-226, radium-228, and gross alpha particle radioactivity in community water systems:

- (1) combined radium-226 and radium-228--5 pCi/l;
- (2) gross alpha particle activity (including radium-226 but excluding radon and uranium)--15 pCi/l.

History Note: Authority G.S. 130A-315;  
P.L. 93-523; 40 C.F.R. 141;  
Eff. September 1, 1979.

.1618 MAXIMUM CONTAMINANT LEVELS FOR MAN-MADE RADIONUCLIDES

(a) The average annual concentration of beta particle and photon radioactivity from man-made radionuclides in community water systems shall not produce an annual dose equivalent to the total body or any internal organ greater than four millirem/year.

(b) Except for the radionuclides listed in Table A, the concentration of man-made radionuclides causing four mrem total body or organ dose equivalents shall be calculated on the basis of a two liter per day drinking water intake using the 168 hour data listed in "Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure" NBS HANDBOOK 69 as amended August 1963, U.S. Department of Commerce. If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed 4 millirem/year:

TABLE A

Average annual concentrations assumed to produce  
a total body or organ dose of 4 mrem/yr.

<u>Radionuclide</u>	<u>Critical Organ</u>	<u>pCi per liter</u>
Tritium	Total Body	20,000
Strontium-90	Bone Marrow	8

History Note: Authority G.S. 130A-315;  
P.L. 93-523; 40 C.F.R. 141;  
Eff. September 1, 1979.

.1619 CONCENTRATION OF IRON

The requirements of this Rule apply only to community water systems. A community water system which has an iron concentration in excess of 0.30 mg/l shall provide approved treatment to control the water quality. Analysis of samples shall be made on an as needed basis determined by the department. Such need basis shall include, but not be limited to, addition of a new well or other raw water source, approval of a new community water system, approval of an existing system not previously approved, or problems and complaints of water quality normally associated with iron concentration.

01/26/87

more frequent monitoring as appropriate, and may require monitoring for additional parameters which indicate corrosivity characteristics, such as sulfates and chlorides. In certain cases, the Aggressive Index, as described in Paragraph (d), can be used instead of the Langelier Index; the supplier shall request in writing to the Department which will make this determination.

(c) The supplier of water shall report to the Department the results of the analyses for the corrosivity characteristics within the first 10 days of the month following the month in which the sample results were received. If more frequent sampling is required by the Department, the supplier can accumulate the data and shall report each value within 10 days of the month following the month in which the analytical results of the last sample was received.

(d) Analyses conducted to determine compliance with this Rule shall be made in accordance with methods adopted by the United States Environmental Protection Agency and codified as 40 C.F.R. 141.42(c)(1) through (9) which are hereby adopted by reference as amended through March 12, 1982. A list of these methods is available from the Water Supply Branch, Environmental Health Section, Division of Health Services, P. O. Box 2091, Raleigh, North Carolina 27602.

(e) Community water supply systems shall identify whether the following construction materials are present in their distribution system and report to the Department:

- (1) Lead from piping, solder, caulking, interior lining of distribution mains, alloys and home plumbing;
- (2) Copper from piping and alloys, service lines, and home plumbing;
- (3) Galvanized piping, service lines, and home plumbing;
- (4) Ferrous piping materials such as cast iron and steel;
- (5) Asbestos cement pipe;
- (6) Vinyl lined asbestos cement pipe;
- (7) Coal tar lined pipes and tanks.

(f) Community water systems in operation on the effective date of this Rule shall comply with the requirements of (b) and (e) within one year of the effective date. Community water systems which begin operation after the effective date shall comply with the requirements of (b) and (e) within one year of the date operation begins.

History Note: Authority G.S. 130A-315;  
P.L. 93-523; 40 C.F.R. 141;  
Eff. September 1, 1979;  
Amended Eff. October 1, 1982; February 27, 1982.

#### .1622 MICROBIOLOGICAL CONTAMINANT SAMPLING AND ANALYSIS

(a) Suppliers of water for community and non-community water systems shall analyze or use the services of a certified laboratory for coliform bacteria to determine compliance with .1613 of this section. Analyses shall be conducted in accordance

24,901 to 25,000	29
25,001 to 28,000	30
28,001 to 33,000	35
33,001 to 37,000	40
37,001 to 41,000	45
41,001 to 46,000	50
46,00 to 50,000	55
50,001 to 54,000	60
54,001 to 59,000	65
59,001 to 64,000	70
64,001 to 70,000	75
70,001 to 76,000	80
76,001 to 83,000	85
83,001 to 90,000	90
90,001 to 96,000	95
96,001 to 111,000	100
111,001 to 130,000	110
130,001 to 160,000	120
160,001 to 190,000	130
190,001 to 220,000	140
220,001 to 250,000	150
250,001 to 290,000	160
290,001 to 320,000	170
320,001 to 360,000	180
360,001 to 410,000	190
410,001 to 450,000	200
450,001 to 500,000	210
500,001 to 550,000	220
550,001 to 600,000	230
600,001 to 660,000	240
660,001 to 720,000	250
720,001 to 780,000	260
780,001 to 840,000	270
840,001 to 910,000	280
910,001 to 970,000	290
970,001 to 1,050,000	300
1,050,001 to 1,140,000	310
1,140,001 to 1,230,000	320
1,230,001 to 1,320,000	330
1,320,001 to 1,420,000	340
1,420,001 to 1,520,000	350
1,520,001 to 1,630,000	360
1,630,001 to 1,730,000	370
1,730,001 to 1,850,000	380
1,850,001 to 1,970,000	390
1,970,001 to 2,060,000	400
2,060,001 to 2,270,000	410
2,270,001 to 2,510,000	420
2,510,001 to 2,750,000	430
2,750,001 to 3,020,000	440
3,020,001 to 3,320,000	450
3,320,001 to 3,620,000	460
3,620,001 to 3,960,000	470

a particular sampling point has been confirmed by any check samples examined as directed in (d)(1), (2), or (3) of this Rule, the supplier of water shall report to the department within 48 hours.

(g) When a maximum contaminant level set forth in (1), (2) or (3) of .1613 of this Section is exceeded, the supplier of water shall report to the department and notify the public as prescribed in .1631 and .1633 of this Section.

(h) Special purpose samples, such as those taken to determine whether disinfection practices following pipe placement, replacement, or repair have been sufficient, shall not be used to determine compliance with .1613 or .1622(b) or (c) of this Section.

(i) The Department has the authority to determine compliance or initiate enforcement action based upon analytical results or other information compiled by their sanctioned representatives and agencies.

History Note: Authority G.S. 130A-315; P.L. 93-523;  
40 C.F.R. 141;  
Eff. September 1, 1980;  
Amended Eff. March 31, 1981; December 19, 1979.

#### .1623 TURBIDITY SAMPLING AND ANALYSIS

(a) The requirements of this Rule shall apply only to public water systems which use water obtained in whole or in part from surface sources.

(b) Samples shall be taken by suppliers of water for both community and non-community water systems at a representative entry point(s) to the water distribution system at least once per day, for the purpose of making turbidity measurements to determine compliance with .1614 of this Section. If the Department determines that a reduced sampling frequency in a non-community system will not pose a risk to public health, it can reduce the required sampling frequency. The option of reducing the turbidity frequency shall be permitted only in those public water systems that practice disinfection and which maintain an active residual disinfectant in the distribution system, and in those cases where the Department has indicated in writing that no unreasonable risk to health existed under the circumstances of this option. The turbidity measurements shall be made by the Nephelometric Method in accordance with the recommendations set forth in "Standard Methods for Examination of Water and Wastewater," American Public Health Association, 14th Edition, pp. 132-134; or Method 180.1, 1-Nephelometric Method.

(c) If the result of a turbidity analysis indicates that the maximum allowable limit has been exceeded, the sampling and measurement shall be confirmed by resampling as soon as practicable and preferably within one hour. If the repeat sample confirms that the maximum allowable limit has been exceeded, the supplier of water shall report to the department within 48 hours. The repeat sample shall be the sample used for the purpose of calculating the monthly average. If the monthly average of the daily samples exceeds the maximum allowable limit, or if the average of two samples taken on consecutive days exceeds five TU, the

of this Section shall be made in accordance with methods adopted by the United States Environmental Protection Agency and codified as 40 C.F.R. 141.24(e) and (f) which are hereby adopted by reference as amended through March 12, 1982. A list of these methods is available from the water supply branch, Environmental Health Section, Division of Health Services, P.O. Box 2091, Raleigh, NC 27602.

History Note: Authority G.S. 130A-315; P.L. 93-523;  
40 C.F.R. 141;  
Eff. September 1, 1979;  
Amended Eff. October 1, 1982; March 31, 1981;  
September 30, 1980; December 19, 1979.

.1625 INORGANIC CHEMICAL SAMPLING AND ANALYSIS

(a) Analyses for the purpose of determining compliance with Rule .1616 of this Section are required as follows:

- (1) Analyses for all community water systems utilizing surface water sources shall be completed within one year following the effective date of the National Primary Drinking Water Regulations (40 C.F.R. 141.23, eff. June 24, 1977). These analyses shall be repeated at yearly intervals.
- (2) Analyses for all community water systems utilizing only ground water sources shall be completed within two years following the effective date of the National Primary Drinking Water Regulations (40 C.F.R. 141.23, eff. June 24, 1977). These analyses shall be repeated at three year intervals.
- (3) For non-community water systems, whether supplied by surface or ground sources, analyses for nitrate shall be completed by July 1, 1980. These analyses shall be repeated at intervals determined by the Department.
- (4) The Department has the authority to determine compliance or initiate enforcement action based upon analytical results and other information compiled by its authorized representatives and agencies.

(b) If the result of an analysis made pursuant to (a) of this Rule indicates that the level of any contaminant listed in .1616 of this Section exceeds the maximum contaminant level, the supplier of water shall report to the department within seven days and initiate three additional analyses at the same sampling point within one month.

(c) When the average of four analyses made pursuant to (b) of this Rule, rounded to the same number of significant figures as the maximum contaminant level for the substance in question, exceeds the maximum contaminant level, the supplier of water shall notify the Department pursuant to .1631 of this Section and give notice to the public pursuant to .1633 of this Section. Monitoring after public notification shall be at a frequency designated by the secretary and shall continue until the maximum contaminant level has not been exceeded in two successive samples or until a monitoring schedule as a condition to a variance,



N.Y., 1975;

- (6) Cesium-134-ASTM D-2459 "Gamma Spectrometry in Water," 1975 ANNUAL BOOK OF ASTM STANDARDS, WATER AND ATMOSPHERIC ANALYSIS, Part 31, American Society for Testing and Materials, Philadelphia, PA (1975);
- (7) Uranium-ASTM D-2907 "Micro-quantities of Uranium in Water by Fluorometry," STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, 14th Edition, American Public Health Association, New York, N.Y., 1975.

(b) When the identification and measurement of radionuclides other than those listed in (a) of this Rule is required, the following references are to be used, except in cases where alternative methods have been approved in accordance with .1630 of this Section.

- (1) PROCEDURES FOR RADIOCHEMICAL ANALYSIS OF NUCLEAR REACTOR AQUEOUS SOLUTIONS, H.L. Krieger and S. Godd, EPA-R4-73-014; USEPA, Cincinnati, Ohio, May 1973;
- (2) HASL PROCEDURE MANUAL, Edited by John H. Harley, HASL 300, ERDA Health and Safety Laboratory, New York, N.Y. 1973.

(c) For the purpose of monitoring radioactivity concentrations in drinking water, the required sensitivity of the radioanalysis is defined in terms of a detection limit. The detection limit shall be that concentration which can be counted with a precision of plus or minus 100 percent at the 95 percent confidence level ( $1.96*$  where  $*$  is the standard deviation of the net counting rate of the sample):

- (1) To determine compliance with .1617(1) of this Section the detection limit shall not exceed 1 pCi/l. To determine compliance with .1617(2) of this Section the detection limit shall not exceed 3 pCi/l.
- (2) To determine compliance with .1618 of this Section the detection limits shall not exceed the concentrations listed in Table B:

TABLE B  
DETECTION LIMITS FOR MAN-MADE BETA  
PARTICLE AND PHOTON EMITTERS

Radionuclide	Detection Limit
Tritium-----	1,000 pCi/l
Strontium-89-----	10 pCi/l
Strontium-90-----	2 pCi/l
Iodine-131-----	1 pCi/l
Cesium-134-----	10 pCi/l
Gross Beta-----	4 pCi/l
Other radionuclides-----	1/10 of the applicable limit

(d) To judge compliance with the maximum contaminant levels listed in .1617 and .1618 of this Section, averages of data shall be used and shall be rounded to the same number of significant figures as the maximum contaminant level for the substance in question.

(e) The Department has the authority to determine compliance or initiate enforcement action based upon analytical results or other

- (B) A supplier of water shall monitor in conformance with (a)(1) of the Rule within one year of the introduction of a new water source for a community water system. More frequent monitoring shall be conducted when ordered by the department in the event of possible contamination or when changes in the distribution system or treatment processing occur which may increase the concentration of radioactivity in finished water;
  - (C) A community water system using two or more sources having different concentrations of radioactivity shall monitor source water, in addition to water from a free-flowing tap, when ordered by the department;
  - (D) Monitoring for compliance with .1617 of this Section after the initial period need not include radium-228 except when required by the department, provided that the average annual concentration of radium-228 has been assayed at least once using the quarterly sampling procedure required by (a)(1) of this Rule;
  - (E) Suppliers of water shall conduct annual monitoring of any community water system in which the radium-226 concentration exceeds 3 pCi/l, when ordered by the secretary.
- (3) If the average annual maximum contaminant level for gross alpha particle activity or total radium as set forth in .1617 of this Section is exceeded, the supplier of a community water system shall give notice to the department pursuant to .1631 of this Section and notify the public as required by .1633 of this Section. Monitoring at quarterly intervals shall be continued until the annual average concentration no longer exceeds the maximum contaminant level or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

(b) Monitoring requirements for man-made radioactivity in community water systems:

- (1) Within two years of the effective date of the National Primary Drinking Water Regulations (40 C.F.R. 141.26, eff June 24, 1977), systems using surface water sources and serving more than 100,000 persons and such other community water systems as are designated by the secretary shall be monitored for compliance with .1618 of this Section by analysis of a composite of four consecutive quarterly samples or analysis of four quarterly samples. Compliance with .1618 of this Section may be assumed without further analysis if the average annual concentration of gross beta particle activity is less than 50 pCi/l and if the average annual concentrations of tritium and strontium-90 are less than those listed in Table A in .1618 of this Section provided that if both radionuclides are present the sum of their annual

with a nuclear facility for direct monitoring of a man-made radioactivity by the supplier of water where the secretary determines such data is applicable to a particular community water system.

- (4) If the average annual maximum contaminant level for man-made radioactivity set forth in .1618 of this Section is exceeded, the operator of a community water system shall give notice to the department pursuant to .1631 of this Section and to the public as required by .1633 of this Section. Monitoring at monthly intervals shall be continued until the concentration no longer exceeds the maximum contaminant level or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

History Note: Authority G.S. 130A-315;  
 P.L. 93-523; 40 C.F.R. 141;  
 Eff. September 1, 1979;  
 Amended Eff. September 1, 1980;  
 December 19, 1979.

.1628 MONITORING OF CONSECUTIVE PUBLIC WATER SYSTEMS

(a) When a public water system supplies water to one or more other public water systems the department may modify the monitoring requirements imposed by this Section to the extent that the interconnection of the systems justifies treating them as a single system for monitoring purposes. Any modified monitoring shall be conducted pursuant to a schedule specified by the department and concurred in by the Administrator of the U.S. Environmental Protection Agency.

(b) All public water systems which purchase water for resale and which do not provide any treatment except booster chlorination will be required to perform bacteriological monitoring in accordance with .1622 of this Section.

History Note: Authority G.S. 130A-315;  
 P.L. 93-523; 40 C.F.R. 141;  
 Eff. September 1, 1979.

.1629 CERTIFIED LABORATORIES

(a) For the purpose of determining compliance with the requirements of this Section, samples may be considered only if they have been analyzed by a laboratory certified by the Environmental Protection Agency or the Division of Health Services laboratory certification unit except that measurements for turbidity, free chlorine residual, temperature and pH may be performed by any person acceptable to the Department.

(b) Nothing in this Section shall be construed to preclude the Department or any duly designated representative from taking samples or from using the results from such samples to determine compliance by a supplier of water with the applicable requirements of this Section.

taken by the system to correct any problem and the results of any additional sampling.

(e) Notices required by this Rule may be given by the secretary on behalf of the supplier of water.

(f) The requirements of this Rule shall not apply to .1619, .1620, and .1621(a) of this Section.

(g) In any instance in which notification by mail is required by (b)(1) of this Rule but notification by newspaper or to radio or television stations is not required by (b)(2) of this Rule, the secretary may order the supplier of water to provide notification by newspaper and to radio and television stations when circumstances make more immediate or broader notice appropriate to protect the public health.

History Note: Authority G.S. 130A-315; P.L. 93-523;  
40 C.F.R. 141;  
Eff. September 1, 1979;  
Amended Eff. March 31, 1981;  
December 19, 1979.

#### .1634 VARIANCES AND EXEMPTIONS

Variations and exemptions from a maximum contaminant level or required treatment technique may be requested by a public water system and may be granted by the secretary in accordance with 10 NCAC 10D .2501 through .2511.

History Note: Authority G.S. 130A-315;  
P.L. 93-523; 40 C.F.R. 141;  
Eff. September 1, 1979.

#### .1635 TOTAL TRIHALOMETHANES SAMPLING AND ANALYSIS

(a) Community water systems which serve a population of 10,000 or more individuals and which add a disinfectant (oxidant) to the water in any part of the drinking water treatment process shall analyze for total trihalomethanes (TTHMs) in accordance with this Rule. For systems serving 75,000 or more individuals, sampling and analyses shall begin not later than November 29, 1980. For systems serving 10,000 to 74,999 individuals, sampling and analyses shall begin not later than November 29, 1982. For the purpose of this Rule, the minimum number of samples required to be taken by the system shall be based on the number of treatment plants used by the system, except that multiple wells drawing raw water from a single aquifer may, with Department approval, be considered one treatment plant for determining the minimum number of samples. All samples taken within an established frequency shall be collected within a 24-hour period.

(b) For all community water systems utilizing surface water sources in whole or in part, and for all community water systems utilizing only ground water sources that have not been determined by the Department to qualify for the monitoring requirements of (c) of this Rule, analyses for TTHMs shall be made as follows:

(1) Analyses shall be performed at quarterly intervals on at least four water samples for each treatment plant

12.03 - 01/26/87

reflecting the maximum residence time of the water in the system. The system's monitoring frequency may only be reduced upon a written determination by the Department that, based upon the data submitted by the system, the system has a maximum TTHM potential of less than 0.10 mg/l and that, based upon an assessment of the local conditions of the system, the system is not likely to approach or exceed the maximum contaminant level for total TTHMs. The results of all analyses shall be re-ported to the Department within 30 days of the system's receipt of such results. All samples collected shall be used for determining whether the system must comply with the monitoring requirements of (b) of this Rule, unless the analytical results are invalidated for technical reasons. Sampling and analyses shall be conducted in accordance with the methods listed in (e) of this Rule.

- (2) If at any time during which the reduced monitoring frequency prescribed under (c)(1) of this Rule applies, the results from any analysis taken by the system for maximum TTHM potential are equal to or greater than 0.10 mg/l, and such results are confirmed by at least one check sample taken promptly after such results are received, the system shall immediately begin monitoring in accordance with the requirements of (b) of this Rule and such monitoring shall continue for at least one year before the frequency may be reduced again. In the event of any significant change to the system's raw water or treatment program, the system shall immediately analyze an additional sample for maximum TTHM potential taken at a point in the distribution system reflecting maximum residence time of the water in the system for the purpose of determining whether the system must comply with the monitoring requirements of (b) of this Rule. At the option of the Department, monitoring frequencies may and should be increased above the minimum in those cases where this is necessary to detect variation of TTHM levels within the distribution system.

(d) Compliance with 10 NCAC 10D .1615(3) shall be determined based on a running annual average of quarterly samples collected by the system as prescribed in (b)(1) or (2) of this Rule. If the average of samples covering any 12 month period exceeds the maximum contaminant level, the supplier of water shall report to the Department pursuant to 10 NCAC 10D .1631 and notify the public pursuant to 10 NCAC 10D .1633. Monitoring after public notification shall be at a frequency designated by the Department and shall continue until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

(e) Sampling and analyses made pursuant to this section shall be conducted by one of the following EPA approved methods:

- (1) "The Analysis of Trihalomethanes in Drinking Waters by the Purge and Trap Method," Method 501.1, Environmental

12.03-01/26/87

C  
13

community water systems serving 75,000 or more individuals, and November 29, 1983 for community water systems serving 10,000 to 74,999 individuals.

History Note: Authority G.S. 130A-315;  
P.L. 93-523; 40 C.F.R. 141;  
Effective September 30, 1980;  
Amended Eff. April 1, 1983.

#### .1636 SPECIAL MONITORING FOR SODIUM

(a) Suppliers of water for community water systems shall collect and analyze one sample per plant at the entry point of the distribution system for the determination of sodium concentration levels. Samples must be collected and analyzed annually for systems utilizing surface water sources in whole or in part, and at least every three years for systems utilizing solely ground water sources. The minimum number of samples required to be taken by the system shall be based on the number of treatment plants used by the system, except that multiple wells drawing raw water from a single aquifer may, with Department approval, be considered one treatment plant for determining the minimum number of samples. The supplier of water may be required by the Department to collect and analyze water samples for sodium more frequently in locations where the sodium content is variable.

(b) The supplier of water shall report to the Department the results of the analyses for sodium within the first 10 days of the month following the month in which the sample results were received or within the first 10 days following the end of the required monitoring period as stipulated by the Department, whichever is first. If more than annual sampling is required the supplier shall report the average sodium concentration within 10 days of the month following the month in which the analytical results of the last sample used for the annual average was received.

(c) The Department shall notify appropriate local health officials of the sodium levels found in community water systems.

(d) Analyses conducted to determine compliance with this Rule shall be made in accordance with methods adopted by the United States Environmental Protection Agency and codified as 40 C.F.R. 141.41(d) which is hereby adopted by reference as amended through August 27, 1980. A list of these methods is available from the Water Supply Branch, Environmental Health Section, Division of Health Services, P. O. Box 2091, Raleigh, North Carolina 27602.

History Note: Authority G.S. 130A-315;  
P.L. 93-523; 40 C.F.R. 141;  
Eff. February 27, 1982.

#### .1637 TREATMENT TECHNIQUES FOR TOTAL TRIHALOMETHANES

(a) The following have been identified as the best technology, treatment techniques or other means generally available for achieving compliance with 10 NCAC 10D .1615(3):

- (1) Use of chloramines as an alternate or supplemental disinfectant or oxidant;

SECTION .1800 - RAW SURFACE WATER FACILITIES

.1801 IMPOUNDMENT; PRE-SETTLING RESERVOIRS

Where impoundment of the water supply stream does not or will not provide a raw water of acceptable quality, a pre-settling or pre-treatment reservoir located outside the watershed or catchment area may be required.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.

.1802 RAW WATER INTAKES

(a) Stream Intakes. The intake structure for unimpounded streams shall be constructed so that it will not be affected by flood water or damaged by floating debris. It shall be located and designed to minimize entrance of sand, silt, fish and debris. A bar screen or grating shall be provided, with the area of the openings designed to restrict the entrance velocity to 30 feet per minute or less.

(b) Reservoir Intakes. Where water quality variations affecting the treatment process will occur at different depths of a reservoir, the intake structure shall be constructed with multiple inlets that can be readily opened and closed for selection of the optimum water quality level. A bar screen or grating shall be provided, with the area of the openings designed to restrict the entrance velocity to 50 feet per minute or less.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.

.1803 INTAKE CONDUITS

The pipes, tunnels or flumes used for intake conduits shall be designed to conduct water at self-cleaning velocities of at least two feet per second. A screen, accessible for cleaning, shall be provided to protect the pumps.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.

.1804 PUMPS; POWER FACILITIES

At least two pumping units with necessary check valves, gate valves, piping and appurtenances shall be provided for both raw water and finished water. Auxiliary facilities shall be provided

SECTION .1900 - SURFACE WATER TREATMENT FACILITIES

.1901 FLASH OR RAPID MIXING FACILITY

Mixing shall be adequate to obtain rapid and thorough dispersal of the chemicals in the raw water before it enters the flocculation basins. The design of the flash mix facilities shall provide sufficient and efficient transfer of energy to the water to effect thorough mixing.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.

.1902 AIR MIXING

Diffused air mixing may be used only in conjunction with mechanical or baffled mixers.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.

.1903 MECHANICAL FLOCCULATION

(a) Basin Inlet and Outlet. The design of inlets and outlets of flocculation basins shall prevent short circuiting of the water and destruction or deterioration of the floc.

(b) Detention Period. The flocculation basins should have a theoretical detention period of not less than 20 minutes.

(c) Agitator Control. The agitators of flocculation basins shall be equipped with variable speed controls.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.

.1904 BAFFLED MIXING AND FLOCCULATION BASINS

(a) Detention Period. The theoretical detention period of baffled mixing and flocculation shall be at least 25 minutes.

(b) Velocities

(1) The velocity of the water between the baffles shall be as follows:

- (A) first third of basin -- 1.5 feet per second;
- (B) second third of basin -- 0.75 feet per second; and
- (C) last third of basin -- 0.4 to 0.5 feet per second.

(2) The velocity of the water under and over the baffles shall not exceed the velocity between the baffles.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.



(e) Sludge Withdrawal. Sludge withdrawal equipment shall include an intermittent sludge removal mechanism controlled by an adjustable automatic timer.

(f) Basin Drain. The basin should be provided with a bottom drain that is of sufficient size to empty the basin in two hours or less.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.

#### .1908 GRAVITY FILTERS

(a) Filtration Rates. The standard rate of filtration for a single media filter shall be two gallons per minute per square foot. Higher filtration rates up to four gallons per minute per square foot may be approved for dual media or multi-media filters.

(b) Wash Water Rate. The backwash rate of flow shall be designed to theoretically expand the filter media 50 percent.

(c) Rate Control Devices. Rate control equipment shall be provided to control or regulate the filtration rate and the backwash rate.

(d) Surface Washers. Filter beds shall be equipped with a revolving or fixed system of nozzles designed for uniform waterjet agitation of the entire beds.

(e) Gauges and Flow Indicators. Gauges or meters shall be installed to indicate the rate of filtration, the loss of head, and backwash rate for every filter.

(f) Filter Sand. Filter sand shall be clean silica sand having:

- (1) an effective size of 0.35 mm to 0.55 mm,
- (2) a uniformity coefficient of not more than 1.70,
- (3) a dust content (passing 150 mesh tyler) less than 0.5 percent, and
- (4) a depth of a least 24 inches and generally not more than 30 inches.

(g) Anthracite Filter Media. If anthracite coal is used as a single filter media, it shall have an effective size of 0.35 mm to 0.55 mm and a uniformity coefficient of 1.70 or less. Minimum depth of the media shall be 24 inches.

(h) Dual Media or Multi-media Filters. Dual media and mixed media filter beds may have a wider range of gradation than single media beds. Particle sizes may range from 0.15 mm to 1.2 mm within the beds. Influent water quality shall be considered in specifying particle sizes of mixed media beds. The minimum depth of the filter media should be 24 inches.

(i) Supporting Media and Underdrain System. The underdrain system and layers of gravel or other media supporting the filter media shall be designed to provide uniform filtration and uniform backwash throughout the filter media.

(j) Wash Water Troughs Elevation. The elevation of the bottom of the wash water troughs for new installations shall be above the maximum level of the expanded media during washing at the normal

SECTION .2000 - HYDROPNEUMATIC STORAGE TANKS

.2001 CAPACITIES; DETERMINING MINIMUM EFFECTIVE VOLUME

The minimum effective volume of pressure tanks, in gallons, shall equal the peak demand, in gallons per minute, minus the pumping capacity (gpm), multiplied by 20.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.

.2002 CAPACITIES; DETERMINING PEAK DEMAND

There are charts available from the water supply branch, environmental health section, division of health services, which shall be used to determine the peak demand for residential communities and mobile home parks.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. June 30, 1980.

.2003 CAPACITIES; DETERMINING TOTAL VOLUME

The total volume of the pressure tank shall be calculated by using the principle of Boyle's Law or by using the curves indicating air-water volume relationships available from the water supply branch, environmental health section, division of health services. The total volume (gallons) shall be not less than 25 times the number of connections or 500 gallons, whichever is greater for a mobile home park. In the case of a residential community (community water system) the total volume shall not be less than 40 times the number of connections or 500 gallons, whichever is greater.

History Note: Authority G.S. 130A-315; 130A-317;  
P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. March 31, 1980.

.2004 CAPACITIES; GROUND STORAGE PLUS HYDROPNEUMATIC TANKS

When ground level storage tanks and high-service pumps are to be used, hydropneumatic tanks shall be sized in relation to peak demand and the high-service pump capacity in accordance with the procedures outlined in .2001 to .2003 of this Section.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.

SECTION .2100 - DISTRIBUTION SYSTEMS

.2101 SIZE OF THE WATER MAINS

Water distribution mains shall be sized to provide a minimum pressure at all points within the distribution system of not less than 20 pounds per square inch (gauge) during periods of peak demand (fire flow); but in any case water mains shall not be less than two-inch standard nominal diameter. Fire hydrants shall not be installed on water mains of less than six inches diameter or on water mains or water systems not designed to carry fire protection flows. Systems not designed for fire flows shall have the capacity to maintain a pressure of at least 30 pounds per square inch (gauge) throughout the system during periods of peak flow.

History Note: Authority G.S. 130A-315; 130A-317;  
P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. March 31, 1980.

.2102 NUMBER OF RESIDENCES ON A WATER MAIN

(a) No more than 20, or the equivalent of 20 residences shall be connected to a two-inch diameter water line, unless the main is looped or otherwise supplied from two connections with mains of adequate capacities.

(b) A looped two-inch main shall serve no more than 40 residences, or the equivalent water demand of 40 residences. A two-inch diameter main shall not exceed 1000 feet in length.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. January 1, 1978.

.2103 DEAD-END WATER MAINS

Where installation of dead-end water mains cannot be avoided, a hydrant or a valve of adequate size for flushing shall be installed at the terminal end of the line. The flush valves shall have an above-ground discharge and shall be protected from contamination.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.

.2104 PIPE LAYING

Trenching, pipe laying, and backfilling shall be accomplished in a manner to prevent damage and misalignment of the pipe. Water mains shall be buried to a depth below the frostline or to a depth sufficient to provide a minimum of 30 inches cover, whichever is greater.

- (1) three valves at x (crosses),
- (2) two valves at T's (tees), and
- (3) one valve on single hydrant branch.

(b) All valves installed in water distribution systems should meet the appropriate AWWA Standards C 500-71 (adopted in 1971) C 504-74 (adopted in 1974) and C 507-73 (adopted in 1973) of the American Water Works Association, Inc., or approved equal standards. Copies of AWWA standards are available from the American Water Works Association, 6666 W. Quincy Avenue, Denver, Colorado 80235, at a cost of one hundred forty dollars (\$140.00) per complete set for non-members or seventy dollars (\$70.00) for members. Copies are available for public inspection at the principal address of the environmental health section, division of health services. Further, all valves must be installed in such a manner as to be readily accessible, preferably, the use of an appropriate valve box and cover.

History Note: Authority G.S. 130A-315, 130A-317;  
P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. March 31, 1980.

(d) In unusual situations where large volume tanks are involved and where there is not sufficient water available to fill the tank or there is not available a suitable drainage area for the chlorinated water, an alternate disinfection procedure for tanks may be proposed. Such proposal must be submitted in writing completely describing the proposed disinfection procedure and substantiating the need for an alternate procedure in the particular circumstance. Such alternate procedure must be approved before being implemented. The conclusion of the department shall be final.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977;  
Amended Eff. January 1, 1978.

#### .2204 DISINFECTION OF FILTERS

(a) After filters have been thoroughly backwashed to remove dust, silt and other foreign matter the entire filter (including filter media, supporting material and underdrain system) shall be disinfected by application of a chlorine solution having a concentration of at least 50 milligrams per liter (or ppm).

(b) The solution shall be dispersed throughout the filter bed and remain in contact for a period of at least 24 hours.

History Note: Statutory Authority G.S. 130A-315;  
130A-317; P.L. 93-523;  
Eff. January 1, 1977;  
Readopted Eff. December 5, 1977.

Amended Eff. October 1, 1984.

.2406 CONSIDERATIONS IN ASSESSING ADMINISTRATIVE PENALTIES

In determining the amount of the assessment the department or its delegates shall consider the following criteria and shall cite which provisions are applicable:

- (1) nature of the violation and the degree and extent of the harm, including but not limited to the following:
  - (a) for a violation of the North Carolina Drinking Water Act, Article 10 of Chapter 130A, and the rules adopted thereunder:
    - (i) type of violation,
    - (ii) type of contaminant involved,
    - (iii) duration,
    - (iv) cause (whether resulting from a negligent, reckless or intentional act or omission),
    - (v) potential effect on public health and the environment,
    - (vi) effectiveness of responsive measures taken by the violator,
    - (vii) damage to private property,
    - (viii) size of the water system and population exposed;
  - (b) for a violation of an order issued under the North Carolina Drinking Water Act, Article 10 of Chapter 130A:
    - (i) subject matter of order;
    - (ii) duration;
    - (iii) cause (whether resulting from a negligent, reckless or intentional act or omission);
    - (iv) type of violation, if any;
    - (v) potential effect on public health and the environment;
    - (vi) effectiveness of responsive measures taken by violator;
  - (c) for refusing to allow an authorized representative of the commission for health services, any local board of health, or the Department of Human Resources a right of entry as provided for in G.S. 130A-17;
    - (i) type of other violation, if any,
    - (ii) duration of refusal,
    - (iii) potential effect on public health and the environment;
  - (d) for failure to give adequate public notice as required by G.S. 130A-324:
    - (i) inadequacy of type of notice,
    - (ii) misleading in nature,
    - (iii) delay in providing notice,
    - (iv) potential effect on public health from failure to give adequate notice;
- (2) cost of rectifying any damage;
- (3) the violator's previous record in complying or not complying with the North Carolina Drinking Water Act, Article 10 of Chapter 130A and the regulations adopted thereunder.

(e) The department will acknowledge the receipt of all payments.

History Note: Statutory Authority G.S. 130A-22(f);  
Eff. September 1, 1979.

.2410 STAY OF PENALTY ASSESSMENT

When an administrative hearing is requested for a purpose other than remission or mitigation of the penalty assessed, the penalty will be stayed as of the date of said request until service of the final decision in accordance with Rule .0200, Subchapter 1B of this Title or other settlement of the matter.

History Note: Statutory Authority G.S. 130A-22(f);  
Eff. September 1, 1979.

.2411 CONTINUANCE; WAIVER OF ADMINISTRATIVE HEARING

(a) Notwithstanding Rule .0207, Subchapter 1B of this Title, the respondent may for good cause request a continuance of the hearing. Such request must be made in writing and be received by the hearing officer at least five days before the scheduled hearing. The hearing officer will determine if such a continuance should be granted or denied and shall so inform the respondent of its decision at least one day prior to the scheduled hearing.

(b) A respondent waives his right to a hearing when he:

- (1) submits a written waiver to the department or its delegates of his right to an administrative hearing,
- (2) fails to request a hearing within 30 days of receipt of notice of penalty assessment as provided for in Rule .0126 of this Subchapter, or
- (3) fails to attend a scheduled administrative hearing.

History Note: Statutory Authority G.S. 130A-22(f);  
Eff. September 1, 1979.

.2412 REFERRAL

If any administrative penalty as finally assessed is not paid within 60 days after receipt of notice of penalty assessment where no administrative hearing was requested or within 60 days after service of a written copy of the decision as provided for in G.S. 150A-36 where an administrative hearing was requested, the secretary shall request the Attorney General to commence an action to recover the amount of the assessment.

History Note: Statutory Authority G.S. 130A-22(f);  
Eff. September 1, 1979.

.2413 RIGHT OF ENTRY AND INSPECTION

(a) Any supplier of water or other person subject to drinking water regulations shall, at any time, allow the secretary, or a designated representative, upon presenting appropriate credentials and a written notice of inspection, to enter any establishment, facility or other property of such supplier or other person to

SECTION .2500 - VARIANCES AND EXEMPTIONS

.2501 REQUIREMENTS FOR A VARIANCE

(a) The secretary may grant one or more variances to any public water system within the state from any requirement respecting a maximum contaminant level of an applicable rule of 10 NCAC 10D .1610 through .1634 upon a finding that:

- (1) Because of characteristics of the raw water sources which are reasonably available to the system, the system cannot meet the requirements respecting the maximum contaminant levels of such drinking water regulations despite application of the best technology, treatment techniques, or other means, which the secretary, with the concurrence of the administrator, finds are generally available (taking costs into consideration); and
- (2) The granting of a variance will not result in an unreasonable risk to the health of persons served by the system.

(b) The secretary may grant one or more variances to any public water system within the state from any requirement of a specified treatment technique of an applicable rule of 10 NCAC 10D .1610 through .1634 upon a finding that the public water system applying for the variance has demonstrated that such treatment technique is not necessary to protect the health of persons because of the nature of the raw water source of such systems.

History Note: Authority G.S. 130A-315; 130A-321;  
P.L. 93-523; 40 C.F.R. 142;  
Eff. September 1, 1979;  
Amended Eff. December 19, 1979.

.2502 VARIANCE REQUEST

A supplier of water may request a variance for a public water system by submitting a written request to the secretary. Suppliers of water may submit a joint request for variances when they seek similar variances under similar circumstances. A request for a variance or variances shall include the following information:

- (1) the nature and duration of variance requested;
- (2) relevant analytical results of water quality sampling of the system, including results of relevant tests conducted pursuant to the rules of 10 NCAC 10D .1610 through .1634;
- (3) for any request made under .2501(a) of this Section:
  - (a) explanation in full and evidence of the best available treatment technology and techniques;
  - (b) economic and legal factors relevant to ability to comply;
  - (c) analytical results of raw water quality relevant to ability to comply;
  - (d) a proposed compliance schedule, including the date each step toward compliance will be achieved; such schedule shall include as a minimum the following dates:
    - (i) date by which arrangement for alternative raw water source or improvement of existing raw water



proposed denial. Within 30 days after the receipt of such notice, the applicant may request a hearing for the purpose of contesting the proposed denial. Such hearing shall be conducted in the manner set forth in G.S. 150A-23 through 150A-52. If no hearing is requested by the applicant within the 30 day period, the application shall be denied.

(b) If the secretary proposes to grant a variance request submitted pursuant to .2502 of this Section, the applicant shall be notified of the decision in writing. Such notice shall identify the variance, the facility covered, and shall specify the period of time for which the variance will be effective:

- (1) For the type of variance specified in .2501(a) of this Section, such notice shall provide that the variance will be terminated when the system comes into compliance with the applicable regulation, and may be terminated upon a finding by the secretary that the system has failed to comply with any requirements of a final schedule issued pursuant to .2505 of this Section.
- (2) For the type of variance specified in .2501(b) of this Section, such notice shall provide that the variance may be terminated at any time upon a finding that the nature of the raw water source is such that the specified treatment technique for which the variance was granted is necessary to protect the health of persons or upon a finding that the public water system has failed to comply with monitoring and other requirements prescribed by the secretary as a condition to the granting of the variance.

(c) For a variance specified in .2501(a)(1) of this Section, the department shall propose a schedule for:

- (1) compliance (including increments of progress) by the public water system with each contaminant level requirement covered by the variance, and
- (2) implementation by the public water system of such control measures as the department may require for each contaminant covered by the variance.

(d) The proposed schedule for compliance shall specify dates by which steps towards compliance are to be taken, including at the minimum, where applicable:

- (1) date by which arrangement for an alternative raw water source or improvement of existing raw water source will be completed,
- (2) date of initiation of the connection for the alternative raw water source or improvement of the existing raw water source,
- (3) date by which final compliance is to be achieved.

(e) The proposed schedule may, if the public water system has no access to an alternative raw water source, and can effect or anticipate no adequate improvement of the existing raw water source, specify an indefinite time period for compliance until new and effective treatment technology is developed at which time a new compliance schedule shall be prescribed by the secretary.

(f) The proposed schedule for implementation of interim control

conducted in the manner set forth in G.S. 150A-23 through 150A-52.

History Note: Authority G.S. 130A-315; 130A-321;  
P.L. 93-523; 40 C.F.R. 142;  
Eff. September 1, 1979.

#### .2506 REQUIREMENTS FOR AN EXEMPTION

The secretary may exempt any public water system in the state from any requirement respecting a maximum contaminant level or any treatment technique requirement, or from both, of an applicable rule of 10 NCAC 10D .1610 through .1634 upon a finding that:

- (1) Due to compelling factors (which may include economic factors), the public water system is unable to comply with such contaminant level or treatment technique requirement;
- (2) The public water system was in operation on the effective date of federal promulgation of such contaminant level or treatment technique requirement; and
- (3) The granting of the exemption will not result in an unreasonable risk to health.

History Note: Authority G.S. 130A-315; 130A-321;  
P.L. 93-523; 40 C.F.R. 142;  
Eff. September 1, 1979;  
Amended Eff. December 19, 1979.

#### .2507 EXEMPTION REQUEST

A supplier of water may request an exemption for a public water system by submitting a written request to the secretary. Suppliers of water may submit a joint request for exemptions when they seek similar exemptions under similar circumstances. Any request for an exemption or exemptions shall include the following information:

- (1) the nature and duration of exemption requested;
- (2) relevant analytical results of water quality sampling of the system, including results of relevant tests conducted pursuant to the requirements of the drinking water regulations;
- (3) explanation of the compelling factors such as time or economic factors which prevent such system from achieving compliance;
- (4) other information if any, believed by the applicant to be pertinent to the application;
- (5) a proposed compliance schedule, including the date when each step toward compliance will be achieved;
- (6) such other information as the secretary may require.

History Note: Authority G.S. 130A-315; 130A-321;  
P.L. 93-523; 40 C.F.R. 142;  
Eff. September 1, 1979.

#### .2508 CONSIDERATION OF AN EXEMPTION REQUEST

(a) The secretary shall act on any exemption request submitted pursuant to .2507 of this Section within 90 days of receipt of the

.2509 of this Section may take effect, the secretary shall provide notice and opportunity for public hearing on the schedule. Such notice may cover the proposal of more than one such schedule and a hearing held pursuant to such notice shall include each of the schedules covered by the notice.

(b) Public notice of an opportunity for hearing on an exemption schedule shall be circulated in a manner designed to inform interested and potentially interested persons of the proposed schedule, and shall include at least the following:

- (1) Posting of a notice in the principal post office of each municipality or area served by the public water system, and publishing a notice in the newspaper or newspapers of general circulation in the area served by the public water system;
- (2) Mailing of a notice to the water supply branch, division of health services and to other appropriate state or local agencies at the secretary's discretion;
- (3) Such notices shall include a summary of the proposed schedule and shall inform interested persons that they may request a public hearing on the proposed schedule.

(c) Requests for hearing may be submitted by any interested person. Frivolous or insubstantial requests for hearing may be denied by the secretary. Requests must be submitted to the secretary within 30 days after issuance of the public notices provided for in (b) of this Rule. Such requests shall include the following information:

- (1) the name, address and telephone number of the individual, organization or other entity requesting a hearing;
- (2) a brief statement of the interest of the person making the request in the proposed schedule and of information that the requesting person intends to submit at such hearing; and
- (3) the signature of the individual making the request, or, if the request is made on behalf of an organization or other entity, the signature of a responsible official of the organization or other entity.

(d) Any hearing held pursuant to a request submitted by an interested person or on the secretary's own motion shall be conducted in the manner set forth in G.S. 150A-23 through 150A-52.

History Note: Authority G.S. 130A-315; 130A-321;  
P.L. 93-523; 40 C.F.R. 142;  
Eff. September 1, 1979.

#### .2511 FINAL SCHEDULE

(a) Within a reasonable time after the termination of a hearing conducted in the manner set forth in G.S. 150A-23 through 150A-52, the secretary shall, based upon consideration of the hearing record as a whole, revise the proposed schedule as necessary and prescribe the final schedule for compliance and interim measures for the public water system granted an exemption under .2509 of

SECTION .2600 - LOCAL PLAN APPROVAL PROGRAM

.2601 LOCAL APPROVAL PROGRAM

This section implements G.S. 130A-317(d) which authorizes the certification of local programs for approval of the construction or alteration of the distribution system of a community water system. For purposes of this section, distribution system means the network of pipes, valves, hydrants and related appertenances but does not include pumps, storage tanks, treatment devices, wells or other facilities.

History Note: Statutory Authority G.S. 130A-317;  
1985 S.L., Ch. 697, Sec. 3;  
Eff. January 1, 1986.

.2602 APPLICATION FOR CERTIFICATION

Application for certification shall be made to the Environmental Health Section, Division of Health Services, P.O. Box 2091, Raleigh, North Carolina, 27602. Application shall be submitted in triplicate and shall designate the office or agency which will administer the program.

History Note: Statutory Authority G.S. 130A-317;  
1985 S.L., Ch. 697, Sec. 3;  
Eff. January 1, 1986.

.2603 CERTIFICATION

The Department shall certify a local approval program which satisfies the requirements of G.S. 130A-317(d). The requirements of G.S. 130A-317(d)(4) are satisfied when a local approval program provides by ordinance or local law for enforcement provisions equivalent to G.S. 130A-18 and G.S. 130A-25. The requirements of G.S. 130A-317 (d)(5) are satisfied when a local approval program has a minimum staff and other resources of: a designer who is a professional engineer registered in this State and who will devote full time to local approval program duties; a technical staff, budget, equipment and facilities sufficient to support a design engineering office; and an organizational structure sufficient to carry out this purpose.

History Note: Statutory Authority G.S. 130A-317;  
1985 S.L., Ch. 697, Sec. 3;  
Eff. January 1, 1986.

.2604 NOTICE

(a) A local approval program shall submit notice to the Department of each approval of the construction or alternation of the distribution system of a community water system. The notice shall consist of one copy of the application with construction plans, any revisions made to the plans and the final approval letter.

(b) The local approval program shall provide notice to the Department within 10 days of any change in staff, budget or other resources which may affect the ability to effectively carry out

Doc NO: CLEJ - 00561-  
12.03- 01/26/87

APPENDIX

FIGURE 1 (a) ALKALINITY VS pH \*

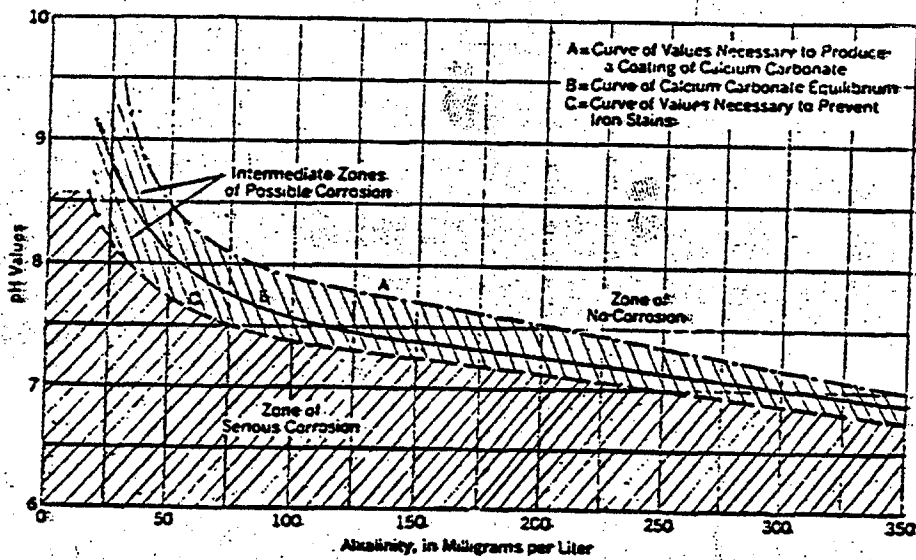


FIGURE 1 (b) ALKALINITY VS TOTAL FREE CARBON DIOXIDE \*

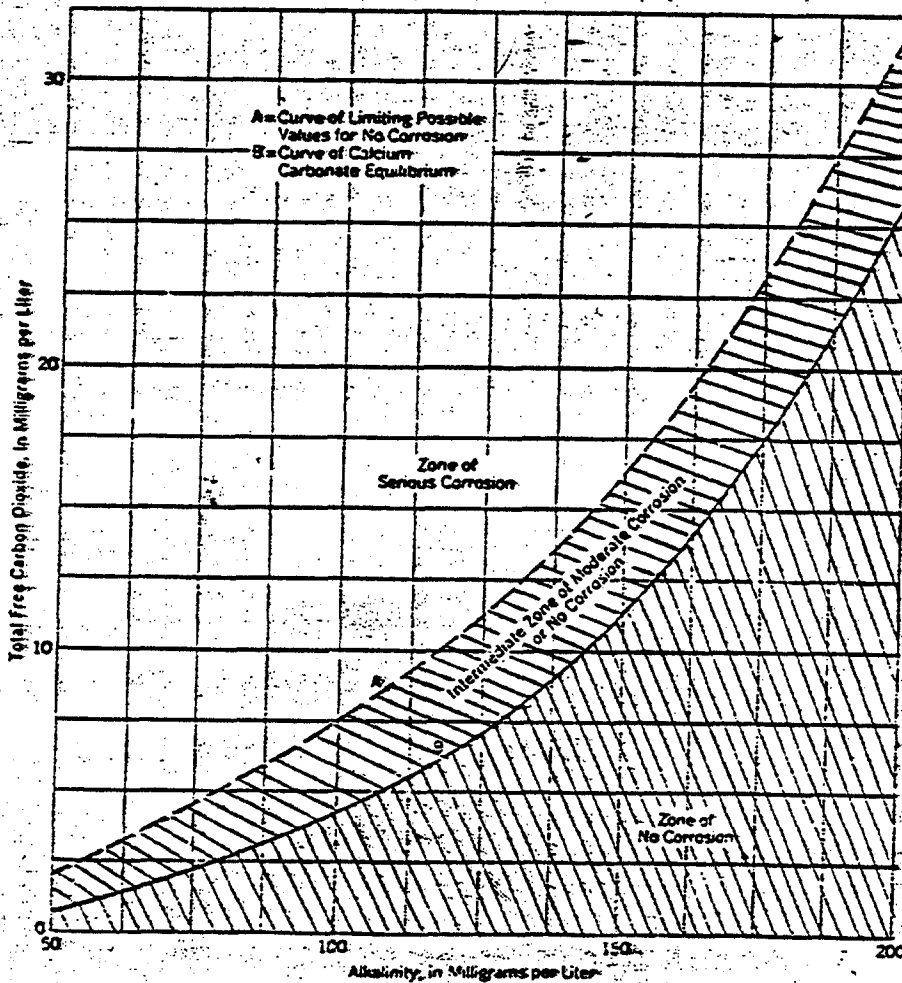
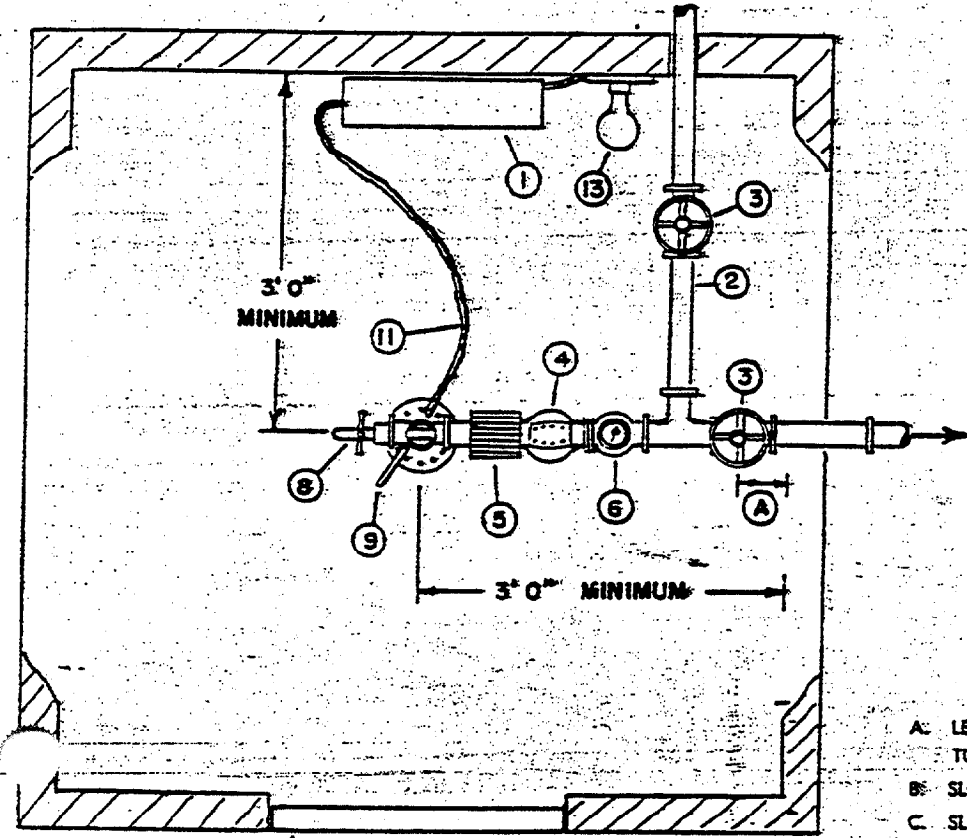


FIGURE 3

TYPICAL WELL HEAD DETAILS

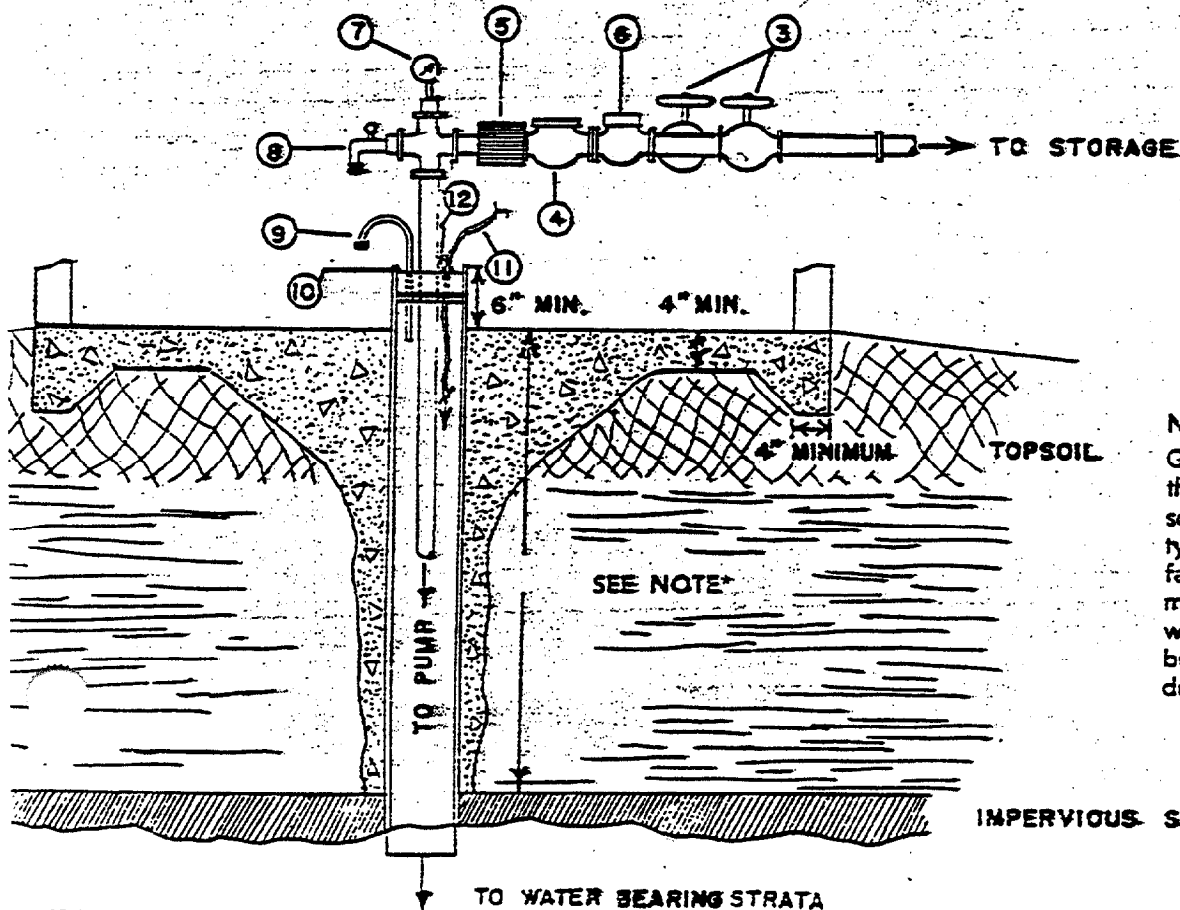


LEGEND:

- 1. CONTROL BOX
- 2. BLOW OFF LINE
- 3. GATE VALVE
- 4. CHECK VALVE
- 5. DRESSER COUPLING (OR UNION)
- 6. METER
- 7. PRESSURE GAUGE (W/NEEDLE VALVE)
- 8. SAMPLE FAUCET (W/THREADED HOSE RIB)
- 9. SCREENED VENT
- 10. SANITARY WELL SEAL
- 11. ELECTRICAL CONDUIT
- 12. ELECTRICAL CABLE SEAL
- 13. ELECTRICAL LIGHTING

NOTES

- A: LEAVE CLEARANCE BETWEEN WALL AND VALVE FOR TURNING VALVE
- B: SLOPE GROUND SURFACE AWAY FROM SLAB
- C: SLOPE FLOOR TO DRAIN
- D: PROVIDE HATCH IN ROOF ABOVE WELL CASING



Note\*

Grout the annular space between the casing and the surrounding soil to a distance of at least twenty (20) feet below ground surface, provided that this distance may be reduced when available water is found at a lesser depth, but in no case shall the grouting depth be less than ten (10) feet.

**PRESSURE AND VOLUME DIFFERENTIALS  
FOR HYDRO-PNEUMATIC TANKS**

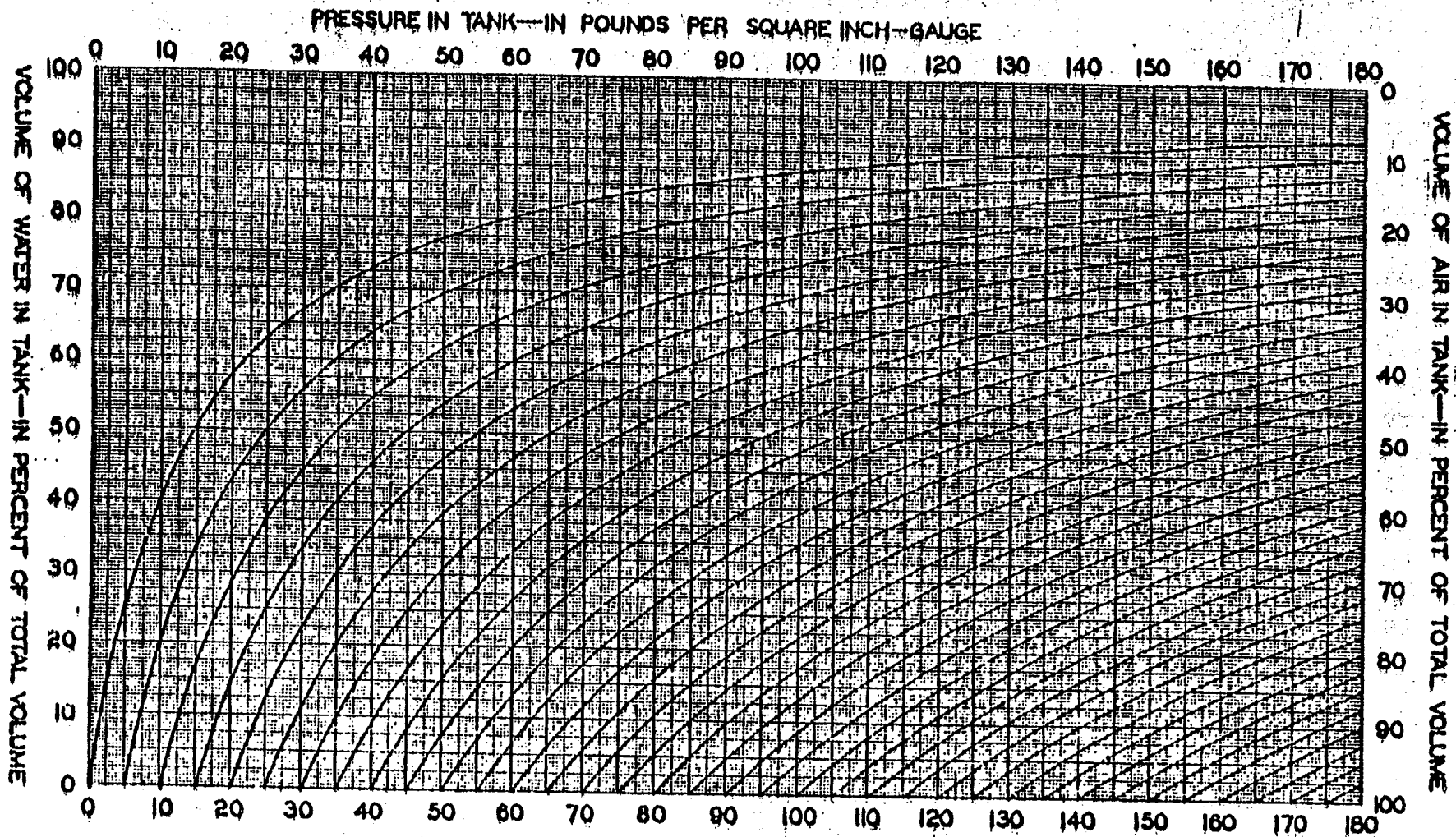


FIGURE 5

Doc No: OESJ-00561-  
12.03-01/26/87



FIGURE 6

VOLUME OF HYDROPNEUMATIC TANKS

The following examples are offered in further explanation of the requirements for proper sizing of hydropneumatic tanks. As previously indicated, it is required to supply the indicated peak demand for a period of twenty minutes, and it is assumed that a combination of hydropneumatic storage and pumping will be utilized. The Effective Volume of the tank is considered to be the volume of water discharged between the high and low pressure setting.

$$\text{Required Effective Volume} = (\text{Peak Demand} - \text{Pumping Capacity}) \times 20 \text{ Minutes}$$

For example, a mobile home system to serve 50 spaces and having a pumping capacity of 30 gpm would require an effective volume of:

$$\begin{aligned} \text{Req'd. Eff. Vol.} &= (\text{Peak Demand} - \text{Pump. Cap.}) \times 20 \text{ Min.} \\ &= (60 - 30) \times 20 \quad (\text{See Figure 4.}) \\ &= 600 \text{ gallons} \end{aligned}$$

The actual tank size required to furnish the 600 gallons effective volume depends upon the pressure settings, air-water volume controls, etc. A system without controls would require the largest tank, whereas a system with air charging device and automatic air-water volume controls would require a much smaller tank.

The curves indicating air-water volume relationships shown in Figure 5 may be utilized to determine required tank sizes.

Continuing the above example, assume further that it is necessary to operate the tank on a 60-40 psi pressure cycle, and assume that the tank has no air-water volume controls and was not pre-charged. These conditions are indicated by the top curve in Figure 5 since this curve passes through the zero % water - 100% air point.

At 60 psi, water volume \_\_\_\_\_ 80%  
At 40 psi, water volume \_\_\_\_\_ 73%

Therefore, the percent water volume discharged during the 60-40 psi cycle is 80 - 73 = 7% of the total tank volume. The total volume of a tank necessary to produce the required effective volume of 600 gallons:

$$\text{Total Volume} = \frac{600}{0.07} = 8570 \text{ gallons}$$

The tank size can also be determined by direct calculation rather than by using Figure 5. By using the principle of Boyle's Law and assuming the effects of temperature to be negligible, the tank is sized accordingly.

Continuing the above example and converting the pressures to Absolute (gauge + 14.7 psi), the volume is calculated as follows:

If there is no water (100% air) in the tank originally and it is filled with water until a pressure of 60 psi gauge is reached, the volume of air at that point is:

$$P_1 V_1 = P_2 V_2$$

$$\text{Vol.}_2 = \frac{P_1 V_1}{P_2} = \frac{(0 + 14.7 \text{ psi}) \times (100)}{(60 + 14.7 \text{ psi})} = 19.7\% \text{ (air)}$$

On a 60-40 psi cycle, the tank would discharge to a pressure of 40 psi, and the air volume would be:

$$\text{Vol.}_3 = \frac{P_2 V_2}{P_3} = \frac{(60 + 14.7 \text{ psi}) \times (19.7\%)}{(40 + 14.7 \text{ psi})} = 26.9\% \text{ (air)}$$

APPROVED METHODOLOGY FOR MICROBIOLOGICAL CONTAMINANTS

Contaminant	Methodology	Reference (Method Numbers)		
		EPA <sup>1</sup>	SM <sup>2</sup>	Other
Coliforms	Multiple Tube Technique Membrane Filter Technique	pp. 114-119 pp. 108-114	908A & 908D 909A	- -

<sup>1</sup>"Microbiological Methods for Monitoring the Environment, Water and Waste", EPA 600/8-78-017, U.S. EPA, EMSL, Cincinnati, Ohio 45268.

<sup>2</sup>"Standard Methods for the Examination of Water and Wastewater", 14th Edition, American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1975.

TABLE 1

\*Addendum to Table 2.

Contaminant	Methodology	EPA <sup>1</sup>	SM <sup>2</sup>
Iron	Atomic absorption; direct aspiration	236.1	301A-II
	Atomic absorption; furnace technique	236.2	-
Manganese	Atomic absorption; direct aspiration	243.1	301A-II
	Atomic absorption; furnace technique	243.2	-

Doc No: CLEJ-00561-  
12.03-01/24/87

## VOLUME OF HYDROPNEUMATIC TANKS

The following examples are offered in further explanation of the requirements for proper sizing of hydropneumatic tanks. As previously indicated, it is required to supply the indicated peak demand for a period of twenty minutes, and it is assumed that a combination of hydropneumatic storage and pumping will be utilized. The Effective Volume of the tank is considered to be the volume of water discharged between the high and low pressure setting.

$$\text{Required Effective Volume} = (\text{Peak Demand} - \text{Pumping Capacity}) \times 20 \text{ Minutes}$$

For example, a mobile home system to serve 50 spaces and having a pumping capacity of 30 gpm would require an effective volume of:

$$\begin{aligned} \text{Req'd. Eff. Vol.} &= (\text{Peak Demand} - \text{Pump. Cap.}) \times 20 \text{ Min.} \\ &= (60 - 30) \times 20 \quad (\text{See Figure 4.}) \\ &= 600 \text{ gallons} \end{aligned}$$

The actual tank size required to furnish the 600 gallons effective volume depends upon the pressure settings, air-water volume controls, etc. A system without controls would require the largest tank, whereas a system with air charging device and automatic air-water volume controls would require a much smaller tank.

The curves indicating air-water volume relationships shown in Figure 5 may be utilized to determine required tank sizes.

Continuing the above example, assume further that it is necessary to operate the tank on a 60-40 psi pressure cycle, and assume that the tank has no air-water volume controls and was not pre-charged. These conditions are indicated by the top curve in Figure 5 since this curve passes through the zero % water - 100% air point.

$$\begin{aligned} \text{At 60 psi, water volume} & \text{ --- } 80\% \\ \text{At 40 psi, water volume} & \text{ --- } 73\% \end{aligned}$$

Therefore, the percent water volume discharged during the 60-40 psi cycle is  $80 - 73 = 7\%$  of the total tank volume. The total volume of a tank necessary to produce the required effective volume of 600 gallons:

$$\text{Total Volume} = \frac{600}{0.07} = 8570 \text{ gallons}$$

The tank size can also be determined by direct calculation rather than by using Figure 5. By using the principle of Boyle's Law and assuming the effects of temperature to be negligible, the tank is sized accordingly.

Continuing the above example and converting the pressures to Absolute (gauge + 14.7 psi), the volume is calculated as follows:

If there is no water (100% air) in the tank originally and it is filled with water until a pressure of 60 psi gauge is reached, the volume of air at that point is:

$$P_1 V_1 = P_2 V_2$$

$$\text{Vol.}_2 = \frac{P_1 V_1}{P_2} = \frac{(0 + 14.7 \text{ psi}) \times (100)}{(60 + 14.7 \text{ psi})} = 19.7\% \text{ (air)}$$

On a 60-40 psi cycle, the tank would discharge to a pressure of 40 psi, and the air volume would be:

$$\text{Vol.}_3 = \frac{P_2 V_2}{P_3} = \frac{(60 + 14.7 \text{ psi}) \times (19.7\%)}{(40 + 14.7 \text{ psi})} = 26.9\% \text{ (air)}$$

The percent volume of water discharged during the 60-40 cycle is:

$$\text{Percent volume} = 26.9 - 19.7 = 7.2\%$$

The total tank volume necessary to produce the required effective volume of 600 gallons is:

$$\text{Tank Volume} = \frac{600 \text{ gal.}}{0.072} = 8330 \text{ gallons}$$

By utilizing an air charging system with automatic air-water volume controls, it is possible to discharge up to 25% of the tank volume during a 60-40 psi pressure cycle. The total tank volume necessary to furnish the required effective volume in this case would be:

$$\text{Total Tank Volume} = \frac{\text{Required Effective Volume (gallons)}}{0.25}$$

APPROVED METHODOLOGY FOR MICROBIOLOGICAL CONTAMINANTS

Contaminant	Methodology	Reference (Method Numbers)		
		EPA <sup>1</sup>	SM <sup>2</sup>	Other
Coliforms	Multiple Tube Technique	pp. 114-119	908A & 908D	-
	Membrane Filter Technique	pp. 108-114	909A	-

<sup>1</sup>"Microbiological Methods for Monitoring the Environment, Water and Waste", EPA 600/8-78-017, U.S. EPA, EMSL, Cincinnati, Ohio 45268.

<sup>2</sup>"Standard Methods for the Examination of Water and Wastewater", 14th Edition, American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1975,

TABLE 1

\*Addendum to Table 2.

Contaminant	Methodology	EPA <sup>1</sup>	SM <sup>2</sup>
Iron	Atomic absorption; direct aspiration	236.1	301A-II
	Atomic absorption; furnace technique	236.2	-
Manganese	Atomic absorption; direct aspiration	243.1	301A-II
	Atomic absorption; furnace technique	243.2	-

Doc No: CLEJ-00561-  
12.03-6/24/87

TABLE 2

Contaminant	Methodology		ASTM <sup>2</sup>	SH <sup>3</sup>	Other
Alkalinity	Methyl orange titrimetric or Potentiometric	300	D1067-70B	403	-
Arsenic	Atomic absorption; furnace technique	206.2	-	-	-
	Atomic absorption; gaseous hydride	206.3	D2972-78B	301A-VII	I-1062-78 <sup>4</sup>
	Spectrophotometric, silver diethyldithiocarbamate	206.4	D2972-78A	404A & 404B(4a)	-
Barium	Atomic absorption; direct aspiration	208.1	-	301A-IV	-
	Atomic absorption; furnace technique	208.2	-	-	-
Cadmium	Atomic absorption; direct aspiration	213.1	D3557-78A or B	301A-II or III	-
	Atomic absorption; furnace technique	213.2	-	-	-
Calcium Hardness	EPTA titrimetric	-	D1126-27	306C	-
	Atomic absorption; direct aspiration	215.1	-	301A-II & 309	-
Chloride	Potentiometric	-	-	408C	-
Chromium	Atomic absorption; direct aspiration	218.1	D1687-77D	301A-II or III	-
	Atomic absorption; furnace technique	218.2	-	-	-
Corrosivity	Langelier index	-	-	203	-
	Aggressive index	-	-	-	C400-77 <sup>5</sup>
Fluoride	Colorimetric SPADNS; with distillation	340.1	D1179-72A	414 A and C	-
	Potentiometric ion selective electrode	340.2	D1179-72B	414B	- <sup>6</sup>
	Automated Alizarin fluoride blue; with distillation	-	-	603	129-71W
	Automated ion selective electrode Zirconium eriochrome cyanine R; with distillation	-	-	-	380-75WE <sup>7</sup> I-3325-78
Free chlorine residual	Colorimetric DPD	-	-	409F	-
Lead	Atomic absorption; direct aspiration	239.1	D3559-78A or B	301A-II or III	-
	Atomic absorption; furnace technique	239.2	-	-	-
Mercury	Manual cold vapor technique	245.1	D3223-79	301A-VI	-
	Automated cold vapor technique	245.2	-	-	-
Nitrate	Colorimetric brycine	352.1	D992-71	419D	-
	Spectrometric; cadmium reduction	353.3	D3867-79B	419C	-
	Automated hydrazine reduction	353.1	-	-	-
	Automated cadmium reduction	353.2	D3867-79A	605	-
	Potentiometric, Ion Selective Electrode	-	-	-	Orion Res. Inc.

APPROVED METHODOLOGY FOR INORGANIC CONTAMINANTS

Reference (Method Number)

Contaminant	Methodology	EPA <sup>1</sup>	ASTM <sup>2</sup>	SM <sup>3</sup>	Other
pH	Potentiometric	150.1	D1293-78A or B	424	-
Selenium	Atomic absorption; furnace technique	270.2	-	-	-
	Atomic absorption; gaseous hydride	270.3	D3859-79	301A-VII	I-1667-78 <sup>4</sup>
Silver	Atomic absorption; direct aspiration	272.1	-	301A-II	-
	Atomic absorption; furnace technique	272.2	-	-	-
Sodium	Atomic absorption; direct aspiration	273.1	D1428-64A	320A	-
	Atomic absorption; furnace technique	273.2	-	-	-
Sulfate	Turbidimetric	375.4	-	427C	-
Temperature	Thermometer	-	-	212	-
Total filterable residue	Gravimetric	160.1	-	208B	-
Turbidity	Nephelometric	180.1	-	214A	-

TABLE 2

<sup>1</sup>"Methods of Chemical Analysis of Water and Wastes," EPA Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268 (EPA-600/4-79-Q20), March 1979. Available from ORD Publications, CERL, EPA, Cincinnati, Ohio 45268. For approved analytical procedures for metals, the technique applicable to total metals must be used.

<sup>2</sup>Annual Book of ASTM Standards, Part 31 Water, American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

<sup>3</sup>"Standard Methods for the Examination of Water and Wastewater," 14th Edition, American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1975.

<sup>4</sup>Techniques of Water-Resources Investigation of the United States Geological Survey, Chapter A-1, "Methods for Determination of Inorganic Substances in Water and Fluvial Sediments," Book 5 (1979, Stock #024-001-03177-9. Available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

<sup>5</sup>AWWA Standard for Asbestos - Cement Pipe, 4 in. through 24 in. for Water and Other Liquids," AWWA C400-77, Revision of C400-75, AWWA, Denver, Colorado.

<sup>6</sup>"Fluoride in Water and Wastewater. Industrial Method #129-71 W." Technicon Industrial Systems, Tarrytown, New York 10591, December 1972.

<sup>7</sup>"Fluoride in Water and Wastewater," Technicon Industrial Systems, Tarrytown, New York 10591, February 1976.

Doc No: CUEJ-00561-  
12.03-01/20/87