NEEDS TO KNOW GUIDE
FOR
SURFACE WATER SYSTEM OPERATORS

Presented by
NORTH CAROLINA WATERWORKS OPERATORS ASSOCIATION
BOARD OF EXAMINERS

2015

PART I
NEED TO KNOW GUIDE - WATER TREATMENT PLANT OPERATION, VOLUME I
Sections Listed are from 6th Edition

Guide for Water Treatment Plant Operation, Volume I, A Field Study Training Program Prepared by California State University, Sacramento, School of Engineering, Applied Research and Design Center in Cooperation with the National Environmental Training Association.

PART II
NEED TO KNOW GUIDE - WATER TREATMENT PLANT OPERATION, VOLUME II
Sections Listed are from 6th Edition

Guide for Water Treatment Plant Operation, Volume II, A Field Study Training Program Prepared by California State University, Sacramento, School of Engineering, Applied Research and Design Center in Cooperation with the National Environmental Training Association.

PART III
NEED TO KNOW GUIDE - RULES GOVERNING PUBLIC WATER SYSTEMS
Sections Listed are from July 2010 Edition

Guide for "Rules Governing Public Water Systems", Section .0100 through .2100, Title 15A, Subchapter 18C of the North Carolina Administrative Code, Department of Environment, Health and Natural Resources, Division of Environmental Health.

PART IV
NEED TO KNOW GUIDE - RULES GOVERNING WATER TREATMENT FACILITY OPERATORS
Sections Listed are from December 1, 2008 Edition

Guide for "Rules Governing Water Treatment Facility Operators", Section .0100 through Section .2105, Title 15A, Subchapter 18D of the North Carolina Administrative Code, Department of Environment, Health and Natural Resources, Division of Environmental Health.

WATER TREATMENT PLANT OPERATION VOLUME I

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1.	**THE WATER TREATMENT PLANT OPERATOR**			
1.0	NEED FOR WATER PLANT OPERATORS	X	X	X
1.10	Conventional Surface Water Treatment Plant	X	X	X
1.11	Softening	X	X	X
1.12	Iron and Manganese Control	X	X	X
1.20	Operation and Maintenance	X	X	X
1.21	Supervision and Administration	X	X	X
1.22	Public Relations	X	X	X
1.23	Safety	X	X	X
1.30	JOB OPORTUNITIES - Staffing Needs	X	X	X
1.31	Who Hires Water Treatment Plant Operators?	X	X	X
1.32	Where Do Water Treatment Plant Operators Work?	X	X	X
1.33	What Pay Can A Water Treatment Operator Expect?	X	X	X
1.34	What Does It Take To Be A Treatment Plant Operator?	X	X	X
1.40	Your Qualifications	X	X	X
1.41	Your Personal Training Program	X	X	X
1.42	Certification	X	X	X
2.	**WORDS: WATER SOURCES AND TREATMENT**	X	X	X
2.0	IMPORTANCE OF WATER	X	X	X
2.10	SOURCES OF WATER - The Water (Hydrologic) Cycle	X	X	X
2.11	Rights To The Use of Water	X	X	X
2.12	The Ocean	X	X	X
2.130	Surface Water - Direct Runoff	X	X	X
2.131	Rivers and Streams	X	X	X
2.132	Lakes and Reservoirs	X	X	X
2.140	Groundwater - Sources	X	X	X
2.141	Wells	X	X	X
2.142	Springs	X	X	X
2.15	Reclaimed Water	X	X	X
2.20	Sanitary Survey	X	X	X
2.21	Precipitation	X	X	X
2.22	Physical Characteristics	X	X	X
2.23	Chemical Characteristics	X	X	X
2.24	Biological Factors	X	X	X
2.25	Radiological Factors	X	X	X
2.3	THE SAFE DRINKING WATER ACT	X	X	X
2.4	WATER TREATMENT	X	X	X
3.	**WORDS: IMPORTANCE OF RESERVOIR WATER QUALITY MANAGEMENT**	X	X	X
3.00	Use Of Surface Reservoirs (Impoundments) As Domestic Water Supplies	X	X	X
3.01	Factors Affecting Water Quality	X	X	X
3.10	CAUSES OF WATER QUALITY PROBLEMS - Nutrients	X	X	X
3.11	Algal Blooms	X	X	X
3.12	Tastes and Odors	X	X	X
3.13	Shortened Filter Runs	X	X	X
3.14	Increased pH	X	X	X
3.15	Dissolved Oxygen Depletion	X	X	X
3.16	Organic Loading	X	X	X
3.17	Thermal Stratification	X	X	X
3.18	Anaerobic Conditions	X	X	X
3.19	Watershed Conditions	X	X	X
3.20	PURPOSE OF RESERVOIR MANAGEMENT PROGRAMSImprovement and Maintenance of Water Quality		X	X
3.21	Reduction of Water Treatment Costs		X	X

WATER TREATMENT PLANT OPERATION VOLUME I

SECTION	TOPIC	C	B	A
3.22	Improvement and Maintenance of Fishery, Recreational and Property Values		X	X
3.30	Removal of Trees and Brush From Areas To Be Flooded		X	X
3.31	Watershed Management		X	X
3.31	Need for Watershed Management		X	X
3.311	Wastewater		X	X
3.312	Fertilization		X	X
3.313	Industrial Discharge		X	X
3.314	Soil Grading and Farming Practices		X	X
3.315	Livestock Grazing		X	X
3.316	Pesticides and Herbicides		X	X
3.317	Wildfires		X	X
3.318	Control of Land Use		X	X
3.319	Highway Storm Water Runoff		X	X
3.320	Algae Control - Purpose of Chemical Methods		X	X
3.321	Chemicals Available		X	X
3.322	Chemical Doses		X	X
3.323	Methods of Chemical Application		X	X
3.324	Monitoring		X	X
3.325	Record Keeping		X	X
3.326	Safety		X	X
3.327	Alternatives to Copper Sulfate		X	X
3.330	Terminology			X
3.331	Purpose of Reaeration – Destratification Programs			X
3.332	Methods of Reaeration			X
3.333	Destratification			X
3.334	Mechanical or Hydraulic Mixing			X
3.335	Development of Reaeration-Destratification Program			X
3.34	Managing Frozen Reservoirs			X
3.340	Physical Effects of Ice Formation			X
3.3400	Water Level			X
3.3401	Lake Level Measurement			X
3.3402	Intake Screens			X
3.3403	Intakes			X
3.3404	Silt Survey			X
3.3405	Recreational Use of Reservoir Ice Surfaces			X
3.341	Effects On Raw Water Quality			X
3.35	Dam and Reservoir Maintenance			X
3.350	Dam Inspection and Maintenance			X
3.351	Reservoir Maintenance			X
3.40	LABORATORY AND MONITORING PROGRAMS - Purpose			X
3.41	Procedures			X
3.42	Record Keeping			X
3.43	Safety			X
3.50	Purpose of Intake Structures			X
3.51	Types of Intake-Outlet Structures			X
3.52	Types of Intake Gates			X
3.53	Intake Screens and Trash Racks			X
3.54	Operation and Maintenance Programs			X
3.55	Records			X
3.56	Safety			X
4.	**WORDS: COAGULATION AND FLOCCULATION**	X	X	X
4.0	NATURE OF PARTICULATE IMPURITIES IN WATER	X	X	X
4.1	NEED FOR COAGULATION AND FLOCCULATION	X	X	X
4.20	COAGULATION - Process Description	X	X	X

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SECTION	TOPIC	C	B	A
4.21	Coagulants	X	X	X
4.22	Basic Coagulant Chemistry	X	X	X
4.230	Methods of Mixing	X	X	X
4.231	Types of Mixers	X	X	X
4.232	Coagulation Basins	X	X	X
4.30	FLOCCULATION - Process Description	X	X	X
4.31	Floc Formation	X	X	X
4.32	Process Performance Considerations	X	X	X
4.320	Detention Time	X	X	X
4.321	Types of Flocculators (Stirrers)	X	X	X
4.322	Flocculation Basins	X	X	X
4.4	INTERACTION WITH OTHER TREATMENT PROCESSES	X	X	X
4.5	PROCESS CONTROL	X	X	X
4.60	Indicators of Normal Operating Conditions	X	X	X
4.61	Process Actions	X	X	X
4.620	Need for Experimentation	X	X	X
4.621	Physical Facilities	X	X	X
4.622	Detention Time	X	X	X
4.623	The Jar Test	X	X	X
4.623 #1	Preparation for Test	X	X	X
4.623 #2	Establish Range of Dosages	X	X	X
4.623 #3	Establish Test Sequence	X	X	X
4.623 #4	Perform Tests	X	X	X
4.623 #5	Evaluation of Test Results	X	X	X
4.623 #6	Frequency of Performing Tests	X	X	X
4.624	Evaluation of Plant Performance	X	X	X
4.625	Streaming Current Meters	X	X	X
4.630	Calculating Amount of Chemical Required	X	X	X
4.631	Chemical Feeding	X	X	X
4.632	Preparation of Chemical Solutions	X	X	X
4.64	Record Keeping	X	X	X
4.65	Safety Considerations	X	X	X
4.66	Communications	X	X	X
4.70	Indicators of Abnormal Conditions	X	X	X
4.71	Process Actions		X	X
4.72	Record Keeping		X	X
4.73	Communications		X	X
4.8	ENHANCED COAGULATION		X	X
4.80	Chemical Reactions		X	X
4.81	Process Control		X	X
4.82	Process Actions Under Varying Conditions		X	X
4.90	Conditions Requiring Implementation of Startup/Shutdown Procedures		X	X
4.91	Implementation of Startup/Shutdown Procedures		X	X
4.910	Startup Procedures		X	X
4.911	Shutdown Procedures		X	X
4.92	Record Keeping	X	X	X
4.93	Safety Considerations		X	X
4.100	Laboratory Tests - Process Control Water Quality Indicators		X	X
4.101	Sampling Procedures		X	X
4.102	Sample Analysis		X	X
4.103	Safety Considerations	X	X	X
4.104	Record Keeping	X	X	X
4.30	FLOCCULATION			
4.110	Types of Equipment			X
4.111	Equipment Operation			X

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SECTION	TOPIC	C	B	A
4.112	Safety Considerations	X	X	X
4.113	Preventative Maintenance Procedures			X
5.	**WORDS: SEDIMENTATION**	X	X	X
5.00	Process Definition	X	X	X
5.01	Presedimentation	X	X	X
5.10	Factors Affecting Sedimentation	X	X	X
5.11	Nature of Particulate Impurities	X	X	X
5.12	Water Temperature	X	X	X
5.13	Currents	X	X	X
5.14	Particle Interactions	X	X	X
5.20	Sedimentation Basin Zones		X	X
5.200	Inlet Zone	X	X	X
5.201	Settling Zone	X	X	X
5.202	Sludge Zone	X	X	X
5.203	Outlet Zone	X	X	X
5.210	Selection of Basin Type		X	X
5.211	Rectangular Basins		X	X
5.212	Double-Deck Basins		X	X
5.213	Circular and Square Basins		X	X
5.214	High-Rate Settlers		X	X
5.215	Solids-Contact Units		X	X
5.22	Basin Layout		X	X
5.23	Detention Time		X	X
5.24	Solids-Contact Clarification			X
5.240	Process Description		X	X
5.241	Fundamentals of Operation		X	X
5.242	Maintenance		X	X
5.243	Arithmetic for Solids-Contact Clarification			X
5.250	Sludge Characteristics		X	X
5.251	Sludge Removal Systems		X	X
5.252	Operation of Sludge Removal Equipment		X	X
5.3	INTERACTION WITH OTHER TREATMENT PROCESSES			X
5.4	PROCESS CONTROL			X
5.50	Indicators of Normal Operating Conditions	X	X	X
5.51	Process Actions	X	X	X
5.52	Record Keeping	X	X	X
5.60	Indicators of Abnormal Conditions		X	X
5.61	Process Actions		X	X
5.70	Conditions Requiring Implementation of Startup and Shutdown Procedures		X	X
5.71	Implementation of Startup/Shutdown Procedures		X	X
5.710	Startup Procedures		X	X
5.711	Shutdown Procedures		X	X
5.80	LABORATORY TESTS - Process Control Water Quality Indicators		X	X
5.81	Sampling Procedures		X	X
5.82	Sample Analysis		X	X
5.90	Types of Equipment		X	X
5.91	Equipment Operation		X	X
5.92	Safety Consideration		X	X
5.93	Corrosion Control		X	X
5.94	Preventative Maintenance Procedures		X	X
5.7	STARTUP and SHUTDOWN PROCEDURES			
6.	**WORDS: FILTRATION**	X	X	X
6.0	PROCESS DESCRIPTION	X	X	X
6.1	FILTRATION MECHANISMS	X	X	X
6.2	TYPES OF FILTERS	X	X	X

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6.20	Gravity Filtration	X	X	X
6.21	Pressure Filtration	X	X	X
6.22	Diatomaceous Earth Filtration			X
6.23	Slow Sand Filtration			X
6.30	Filter Media		X	X
6.310	Operational Criteria - Filter Layout		X	X
6.311	Filter Production and Filter Rate		X	X
6.312	Filtration Efficiency		X	X
6.320	Filter Operation - Filtration Mode	X	X	X
6.321	Backwashing	X	X	X
6.322	Surface Wash	X	X	X
6.33	Filter Control Systems			X
6.4	ACTIVATED CARBON FILTERS			X
6.50	Importance of Pretreatment		X	X
6.51	In-Line Filtration		X	X
6.52	Conventional Filtration (Treatment)		X	X
6.53	Direct Filtration		X	X
6.6	PROCESS CONTROL	X	X	X
6.70	Indicators of Normal Operating Conditions	X	X	X
6.71	Process Actions		X	X
6.72	Process Calculations		X	X
6.720	Filter Efficiency		X	X
6.721	Filtration Rate		X	X
6.722	Backwash Rate		X	X
6.73	Record Keeping		X	X
6.74	Filter Monitoring Instrumentation		X	X
6.80	Indicators of Abnormal Conditions	X	X	X
6.81	Process Actions		X	X
6.82	Air Binding	X	X	X
6.83	Excessive Head Loss		X	X
6.90	Conditions Requiring Implementation of Startup and Shutdown Procedures	X	X	X
6.91	Implementation of Startup/Shutdown Procedures	X	X	X
6.910	Filter Checkout Procedures	X	X	X
6.911	Backwash Procedures	X	X	X
6.912	Filter Startup Procedures	X	X	X
6.913	Filter Shutdown Procedures	X	X	X
6.100	Types of Equipment		X	X
6.101	Equipment Operation		X	X
6.102	Preventative Maintenance Procedures		X	X
6.103	Safety Considerations	X	X	X
6.11	Surface Water Treatment Rule (SWTR)	X	X	X
6.110	Description of The SWTR	X	X	X
6.111	Filtration Technologies	X	X	X
6.112	Turbidity Requirements	X	X	X
6.120	Need for Particle Counters			X
6.121	Grab Vs. On-Line Particle Counters			X
6.122	Filter Performance Monitoring			X
6.1220	Filter Ripening			X
6.1221	Filter Flow Rate			X
6.1222	Filter Run Time			X
6.1223	Filter Media Selection			X
6.1224	Polymer Application			X
6.1225	Other Uses of Particle Counters			X
6.123	How Particle Counters Work			X

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SECTION	TOPIC	C	B	A
6.124	Comparison of Particle Counters With Turbidimeters			X
6.125	Operation and Maintenance			X
6.126	Actual Plant O&M			X
6.127	Actual Plant Data			X
7.	**WORDS: DISINFECTION**	X	X	X
7.00	Making Water Safe for Consumption	X	X	X
7.01	Safe Drinking Water Laws	X	X	X
7.10	pH	X	X	X
7.11	Temperature	X	X	X
7.12	Turbidity	X	X	X
7.120	Organic Matter	X	X	X
7.121	Inorganic Matter	X	X	X
7.13	Reducing Agents	X	X	X
7.140	Number and Types of Microorganisms	X	X	X
7.141	Removal Processes	X	X	X
7.20	Purpose of Process	X	X	X
7.210	Agents of Disinfection -Physical Means of Disinfection		X	X
7.211	Chemical Disinfectants (Other Than Chlorine)		X	X
7.220	Properties of Chlorine	X	X	X
7.221	Chlorine Disinfection Action	X	X	X
7.222	Reaction With Water	X	X	X
7.223	Reaction With Impurities in Water		X	X
7.230	Reactions With Water		X	X
7.231	Differences Between Chlorine Gas and Hypochlorite Reactions		X	X
7.232	On-Site Chlorine Generation			X
7.240	Reactions in Water			X
7.241	Reactions With Impurities in Water			X
7.25	Breakpoint Chlorination		X	X
7.26	Chloramination			
7.260	Use of Chloramines	X	X	X
7.261	Methods for Producing Chloramines			X
7.262	Chlorine To Ammonia-Nitrogen Ratios			X
7.263	Special Water Users			X
7.264	Blending Chloraminated Waters			X
7.265	Chloramine Residuals			X
7.266	Nitrification			X
7.267	Nitrification Prevention and Control			X
7.270	Importance	X	X	X
7.271	Chlorine Residual Curve	X	X	X
7.272	Critical Factor		X	X
7.28	CT Values		X	X
7.29	Process Calculation		X	X
7.30	Prechlorination	X	X	X
7.31	Postchlorination	X	X	X
7.32	Rechlorination	X	X	X
7.33	Wells	X	X	X
7.34	Mains	X	X	X
7.35	Tanks and Reservoirs	X	X	X
7.36	Water Supply Systems		X	X
7.40	Hypochlorinators		X	X
7.41	Chlorinators	X	X	X
7.420	Plastic	X	X	X
7.421	Steel Cylinders	X	X	X
7.422	Ton Tanks	X	X	X
7.43	Removing Chlorine From Containers	X	X	X

WATER TREATMENT PLANT OPERATION VOLUME I

SECTION	TOPIC	C	B	A
7.430	Connections	X	X	X
7.431	Valves	X	X	X
7.432	Ton Tanks	X	X	X
7.44	Performance of Chlorination Units	X	X	X
7.440	Hypochlorinators		X	X
7.441	Chlorinators		X	X
7.45	Normal and Abnormal Operation	X	X	X
7.450	Container Storage Area	X	X	X
7.451	Evaporators	X	X	X
7.452	Chlorinators, Including Injectors	X	X	X
7.453	Summary, Daily Operation	X	X	X
7.454	Laboratory Tests	X	X	X
7.46	Troubleshooting Gas Chlorinator Systems	X	X	X
7.47	Disinfection Troubleshooting	X	X	X
7.48	Chlorination System Failure	X	X	X
7.5	MAINTENANCE	X	X	X
7.50	Hypochlorinators		X	X
7.51	Chlorinators	X	X	X
7.52	Chlorine Leaks	X	X	X
7.53	Installation		X	X
7.60	Use of Chlorine Dioxide	X	X	X
7.61	Safe Handling of Chemicals	X	X	X
7.620	Pre-Start Procedures		X	X
7.621	Start-Up		X	X
7.622	Shutdown		X	X
7.63	Maintenance		X	X
7.64	Troubleshooting		X	X
7.70	Methods of Measuring Chlorine Residual	X	X	X
7.71	Amperometric Titration for Free Residual Chlorine		X	X
7.72	DPD Colorimetric Method for Free Residual Chlorine	X	X	X
7.73	ORP Probes	X	X	X
7.8	CHLORINE SAFETY PROGRAM	X	X	X
7.80	Chlorine Hazards	X	X	X
7.81	Why Chlorine Must Be Handled With Care	X	X	X
7.82	Protect Yourself From Chlorine	X	X	X
7.83	First Aid Measures	X	X	X
7.84	Hypochlorite Safety	X	X	X
7.85	Chlorine Dioxide Safety	X	X	X
7.86	Operator Safety Training		X	X
7.87	CHEMTREC (800)424-9300	X	X	X
7.90	UV Technology	X	X	X
7.901	Types of UV Lamps			X
7.902	Types of UV Systems			X
7.91	Safety			X
7.920	Operator Tasks			X
7.921	UV Light Intensity Effectiveness			X
7.922	Minimum UV Dose Management			X
7.923	Routine Operations Task			X
7.924	Wiping System			X
7.925	Equipment Shutdown/Start-Up Preliminary Steps			X
7.926	Shutdown Sequence			X
7.927	Start-Up Sequence			X
7.928	Monitoring Lamp Output Intensity			X
7.929	Monitoring Influent & Effluent Characteristics			X
7.93	Emergency Alarms			X

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SECTION	TOPIC	C	B	A
7.940	Routine Maintenance			X
7.941	Quartz Sleve Fouling			X
7.942	Sleeve Cleaning			X
7.943	Lamp Maintenance			X
7.944	Disposal of Used Lamps			X
7.95	Troubleshooting			X
7.950	System Hydraulics			X
7.951	Biofilms on UV Channel Walls & Equipment			X
7.952	Particles Sheilding Bacteria			X
7.10	DISINFECTION USING OZONE SYSTEMS	X	X	X
7.100	Ozone - Equipment	X	X	X
7.101	Gas Preparation		X	X
7.102	Electrical Supply Unit		X	X
7.103	Ozone Generator		X	X
7.104	Ozone Contactor		X	X
7.105	Ozone Residuals		X	X
7.106	Safety	X	X	X
7.107	Maintenance			X
7.108	Applications of Ozone			X
7.109	Advantages and Limitations of Ozone			X
7.11	MIXED OXIDENTS (MIOX) SYSTEM			X
7.120	Chlorinators		X	X
7.101	Hypochlorinators		X	X
8.	**WORDS: CORROSION CONTROL**	X	X	X
8.0	ADVERSE EFFECTS OF CORROSION	X	X	X
8.10	Definition of Corrosion	X	X	X
8.11	Electrochemical Corrosion: The Galvanic Cell		X	X
8.2	FACTORS INFLUENCING CORROSION		X	X
8.20	Physical Factors		X	X
8.200	System Construction		X	X
8.201	System Pressure		X	X
8.202	Soil Moisture		X	X
8.203	Stray Electric Current		X	X
8.204	Temperature		X	X
8.205	Flow Velocity		X	X
8.21	Chemical Factors		X	X
8.210	Alkalinity		X	X
8.211	pH		X	X
8.212	Dissolved Oxygen		X	X
8.213	Dissolved Solids		X	X
8.214	Hardness		X	X
8.215	Chloride and Sulfate		X	X
8.216	Phosphate and Silicate		X	X
8.217	Trace Metals		X	X
8.22	Biological Factors		X	X
8.220	Iron Bacteria		X	X
8.221	Sulfate-Reducing Bacteria		X	X
8.23	Oxygen Concentration Cell			X
8.3	HOW TO DETERMINE IF CORROSION PROBLEMS EXIST	X	X	X
8.30	Examine Materials Removed From Distribution System	X	X	X
8.31	Flow Tests			X
8.320	Dissolved Oxygen		X	X
8.321	Toxic Heavy Metals		X	X
8.322	Calcium Carbonate Saturation		X	X
8.33	Complaints	X	X	X

WATER TREATMENT PLANT OPERATION VOLUME I

SECTION	TOPIC	C	B	A
8.40	Calcium Carbonate Saturation	X	X	X
8.41	Selection of Corrosion-Control Chemicals		X	X
8.42	Determination of Chemical Dose		X	X
8.43	Determination of Chemical Feeder Setting		X	X
8.44	Zinc, Silica, and Polyphosphate Compounds		X	X
8.450	Need for Cathodic Protection		X	X
8.451	How The Protection System Works		X	X
8.452	Equipment			X
8.453	Protection of Flocculators, Clarifiers, and Filters			X
8.454	Maintenance			X
8.46	Removal of Oxygen			X
8.470	Soil Corrosion			X
8.471	Corrosion of Steel Imbedded In Concrete			X
8.472	Stray Electric Currents			X
8.50	Internal Pipe Corrosion			X
8.51	External Pipe Corrosion			X
8.60	Lead & Copper Rule - Health Concerns	X	X	X
8.61	Regulations	X	X	X
8.62	Monitoring Requirements		X	X
8.620	Monitoring Frequency		X	X
8.621	Sampling Procedure		X	X
8.622	Maximum Contaminant Level Goals (MCLGs)		X	X
8.623	Monitoring Deadlines		X	X
8.624	Other Water Quality Monitoring		X	X
8.625	Analytical Methods and Certification Requirements			X
8.630	Corrosion Treatment Studies			X
8.631	Source Water Treatment			X
8.632	Lead Service Line Replacement			X
8.633	Treatment for Control of Lead and Copper			X
8.640	Public Education			X
8.641	Reporting and Record Keeping Requirements			X
9.	**WORDS: TASTE AND ODOR**	X	X	X
9.0	IMPORTANCE OF TASTE AND ODOR CONTROL	X	X	X
9.10	CAUSES OF TASTES AND ODORS -Specific Taste & Odor Compounds	X	X	X
9.11	Types of Causes	X	X	X
9.12	Natural Causes		X	X
9.120	Biological Growths		X	X
9.121	Environmental Conditions		X	X
9.130	Human Causes of Tastes and Odors - Types of Sources	X	X	X
9.131	Municipal Wastewaters		X	X
9.132	Industrial Wastes		X	X
9.133	Chemical Spills		X	X
9.134	Urban Runoff		X	X
9.135	Agricultural Wastes		X	X
9.136	Treatment Plant and Distribution Housekeeping		X	X
9.137	Household Plumbing		X	X
9.20	Potential Sources	X	X	X
9.21	Raw Water Sources		X	X
9.22	Treatment Plant		X	X
9.23	Distribution System	X	X	X
9.30	Need for Prevention and the Development of a Taste and Odor Monitoring Program	X	X	X
9.31	Raw Water Management		X	X
9.32	Plant Maintenance		X	X

WATER TREATMENT PLANT OPERATION VOLUME I

SECTION	TOPIC	C	B	A
9.33	Distribution System Maintenance		X	X
9.40	Methods of Treatment	X	X	X
9.41	Improved Coagulation/Flocculation/Sediment		X	X
9.420	Description of Processes	X	X	X
9.421	Air Blowers		X	X
9.422	Cascades and Spray Aerators		X	X
9.423	Air Stripping		X	X
9.430	Oxidative Processes - Types of Processes	X	X	X
9.431	Chlorine		X	X
9.432	Potassium Permanganate	X	X	X
9.433	Handling of Potassium Permanganate		X	X
9.434	Ozone		X	X
9.435	Chlorine Dioxide		X	X
9.440	Adsorption Processes - Types of Processes	X	X	X
9.4410	Powdered Activated Carbon - Description of Process		X	X
9.4411	Powdered Activated Carbon Feed Systems			X
9.4412	Powdered Activated Carbon Dose Determination		X	X
9.4413	Filtration Consideration With Powdered Activated Carbon			X
9.4414	Powdered Activated Carbon Handling	X	X	X
9.442	Granular Activated Carbon			X
9.5	IDENTIFYING A TASTE AND ODOR PROBLEM	X	X	X
9.6	DEVELOPING A TASTE AND ODOR CONTROL STRATEGY		X	X
10.	**WORDS: PLANT OPERATION**	X	X	X
10.0	GOALS OF PLANT OPERATION	X	X	X
10.10	Drinking Water Regulations	X	X	X
10.11	Monitoring Program	X	X	X
10.12	Turbidity Removal	X	X	X
10.20	Prepare A List for Your Plant		X	X
10.21	Daily Tasks		X	X
10.22	Tasks To Be Done During The Day		X	X
10.23	At The End of The Day		X	X
10.30	Monitored Functions		X	X
10.310	Methods Available		X	X
10.311	Mechanical		X	X
10.312	Pneumatic		X	X
10.313	Hydraulic		X	X
10.314	Electronic		X	X
10.315	Electrical		X	X
10.32	Control Methods		X	X
10.33	Computers		X	X
10.40	Need for Flow Regulation	X	X	X
10.41	Clear Wells	X	X	X
10.42	Treatment Process Changes	X	X	X
10.50	Need for Chemicals	X	X	X
10.51	Types of Chemicals	X	X	X
10.52	Storage of Chemicals	X	X	X
10.53	Safe Handling of Chemicals	X	X	X
10.54	First Aid Procedures	X	X	X
10.60	Written Documents	X	X	X
10.61	Oral Communications	X	X	X
10.70	Maintenance Program	X	X	X
10.700	Planning and Scheduling	X	X	X
10.701	Records Management			X
10.702	Spare Parts Management			X
10.703	Cost and Budget Control			X

SECTION	TOPIC	C	B	A
10.704	Emergency Repair Procedures			X
10.705	Training Programs			X
10.80	Safety Considerations	X	X	X
10.81	Security Considerations	X	X	X
10.90	Emergency Conditions	X	X	X
10.910	Changes In Raw Water Quality	X	X	X
10.911	Operator Error	X	X	X
10.92	Process Equipment Failures	X	X	X
10.93	Power Failures	X	X	X
10.94	Fires	X	X	X
10.95	Natural Disasters	X	X	X
10.96	Communications	X	X	X
10.100	Discharge Standards		X	X
10.101	Sludge Sources		X	X
10.102	Sludge Processing and Disposal		X	X
10.110	Guidelines for Handling Complaints	X	X	X
10.111	Investigating Complaints	X	X	X
10.120	Energy Considerations		X	X
10.121	Energy Conservation Procedures		X	X
10.122	Power Management		X	X
10.123	Power Cost Analysis		X	X
11.	**WORDS: LABORATORY PROCEDURES**	X	X	X
11.00	Importance of Laboratory Procedures	X	X	X
11.01	Metric System	X	X	X
11.02	Chemical Names and Formulas	X	X	X
11.03	Helpful References	X	X	X
11.10	Water Laboratory Equipment	X	X	X
11.11	Use of Laboratory Glassware	X	X	X
11.12	Chemical Solutions	X	X	X
11.13	Titrations	X	X	X
11.14	Data Recording and Record Keeping	X	X	X
11.15	Laboratory Quality Control	X	X	X
11.16	Laboratory Safety	X	X	X
11.160	Laboratory Hazards	X	X	X
11.161	Personal Safety and Hygiene	X	X	X
11.162	Prevention of Laboratory Accidents	X	X	X
11.1620	Chemical Storage	X	X	X
11.1621	Movement of Chemicals	X	X	X
11.1622	Proper Laboratory Techniques	X	X	X
11.1623	Accident Prevention	X	X	X
11.20	Importance of Sampling	X	X	X
11.210	Importance of Representative Sampling	X	X	X
11.211	Source Water Sampling	X	X	X
11.212	In-Plant Sampling	X	X	X
11.213	Distribution System Sampling	X	X	X
11.22	Types of Sampling	X	X	X
11.220	Grab Samples	X	X	X
11.221	Composite Samples	X	X	X
11.23	Sampling Devices	X	X	X
11.240	Surface Sampling	X	X	X
11.241	Depth Sampling	X	X	X
11.242	Water Tap Sampling	X	X	X
11.243	First Draw Samples	X	X	X
11.25	Sampling Containers and Preservation of Samples	X	X	X
11.26	Reporting	X	X	X

WATER TREATMENT PLANT OPERATION VOLUME I

SECTION	TOPIC	C	B	A
11.3 #1	Alkalinity	X	X	X
11.3 #2	Chlorine Residual	X	X	X
11.3 #3	Chlorine Demand	X	X	X
11.3 #4	Coliform Bacteria	X	X	X
11.3 #5	Hardness	X	X	X
11.3 #6	Jar Test	X	X	X
11.3 #7	pH	X	X	X
11.3 #8	Temperature	X	X	X
11.3 #9	Turbidity	X	X	X
	APPENDIX: HOW TO SOLVE WTP ARITHMETIC PROBLEMS			
A.0	HOW TO STUDY ARITHMETIC APPENDIX	X	X	X
A.1	BASIC ARITHMETIC	X	X	X
A.10	Addition	X	X	X
A.11	Subtraction	X	X	X
A.12	Multiplication	X	X	X
A.13	Division	X	X	X
A.14	Rules for Solving Equations	X	X	X
A.15	Example Problems	X	X	X
A.20	AREAS - Units	X	X	X
A.21	Rectangle	X	X	X
A.23	Circle	X	X	X
A.24	Cylinder	X	X	X
A.30	VOLUME - Rectangular	X	X	X
A.32	Cylinder	X	X	X
A.44	Milligrams Per Liter	X	X	X
A.45	Example Problems	X	X	X
A.5	WEIGHT-VOLUME RELATIONS	X	X	X
A.6	FORCE, PRESSURE AND HEAD		X	X
A.70	Velocity		X	X
A.71	Flow Rate		X	X
A.80	PUMPS - Pressure		X	X
A.81	Work		X	X
A.82	Power		X	X
A.83	Horsepower		X	X
A.84	Head		X	X
A.85	Pump Characteristics			X
A.86	Evaluation of Pump Performance		X	X
A.87	Pump Speed-Performance Relationship			X
A.88	Friction or Energy Losses			X
A.90	STEPS IN SOLVING PROBLEMS - Identification of Problems	X	X	X
A.91	Selection of Formula	X	X	X
A.92	Arrangement of Formula	X	X	X
A.93	Unit Conversions	X	X	X
A.94	Calculations	X	X	X
A.95	Significant Figures	X	X	X
A.96	Check Your Results	X	X	X
A.10	Basic Conversion Factors - ENGLISH	X	X	X
A.11	BASIC FORMULAS			
A.11	BASIC FORMULAS			
A.11	Flows	X	X	X
A.11	Chemical Doses	X	X	X
A.11	Coagulation and Flocculation	X	X	X
A.11	Sedimentation	X	X	X
A.11	Filtration		X	X
A.11	Disinfection	X	X	X

WATER TREATMENT PLANT OPERATION VOLUME I

SECTION	TOPIC	C	B	A
A.11	Corrosion Control			X
A.11	Plant Operation	X	X	X
A.11	Laboratory Procedures		X	X
A.12	HOW TO USE BASIC FORMULAS	X	X	X
A.13	TYPICAL WTP PROBLEMS (ENGLISH SYSTEM)			
A.130	Flows - Example 1	X	X	X
A.131	Chemical Doses			
A.131	Examples 2,	X	X	X
A.131	Examples 3 thru 8		X	X
A.132	Reservoir Management and Intake Structure			X
A.132	Examples 9 thru 13	X	X	X
A.133	Coagulation and Flocculation			
A.133	Examples 14, 16, 17		X	X
A.133	Example 15	X	X	X
A.134	Sedimentation			
A.134	Example 18	X	X	X
A.134	Example 20		X	X
A.134	Examples 19, 21			X
A.135	Filtration			
A.135	Examples 22 thru 31		X	X
A.135	Examples 32	X	X	X
A.136	Disinfection			
A.136	Examples 33, 34, 35	X	X	X
A.136	Examples 36, 37, 38		X	X
A.137	Corrosion Control			
A.137	Examples 39, 40			X
A.138	Plant Operation			
A.138	Example 41	X	X	X
A.138	Example 42		X	X
A.139	Laboratory Procedures			
A.139	Examples 43 & 44	X	X	X
A.139	Examples 45 & 46		X	X

WATER TREATMENT PLANT OPERATION VOLUME II

SECTION	TOPIC	C	B	A
12.	**WORDS: IRON AND MANGANESE CONTROL**	X	X	X
12.0	NEED TO CONTROL IRON AND MANGANESE	X	X	X
12.10	Occurrence Of Iron And Manganese	X	X	X
12.11	Collection Of Iron And Manganese Samples	X	X	X
12.12	Analysis For Iron And Manganese		X	X
12.20	Alternate Source	X	X	X
12.21	Phosphate Treatment	X	X	X
12.22	Removal By Ion Exchange		X	X
12.23	Oxidation By Aeration		X	X
12.24	Oxidation With Chlorine		X	X
12.25	Oxidation With Permanganate		X	X
12.26	Operation Of Filters		X	X
12.27	Proprietary Process			X
12.28	Monitoring Of Treated Water	X	X	X
12.29	Summary			X
12.3	OPERATION OF AN IRON AND MANGANESE REMOVAL PLANT		X	X
12.30	Description Of Equipment And Process		X	X
12.31	Regeneration Of Manganese Greensand		X	X
12.32	Troubleshooting		X	X
12.4	MAINTENANCE OF A CHEMICAL FEEDER		X	X
12.5	TROUBLESHOOTING RED WATER PROBLEMS	X	X	X
13.	**WORDS: FLUORIDATION**	X	X	X
13.0	IMPORTANCE OF FLUORIDATION	X	X	X
13.1	FLUORIDATION PROGRAMS		X	X
13.2	COMPOUNDS USED TO FURNISH FLUORIDE ION	X	X	X
13.3	FLUORIDATION SYSTEMS		X	X
13.30	Chemical Feeders		X	X
13.31	Saturators		X	X
13.32	Downflow Saturators			X
13.33	Upflow Saturators			X
13.34	Large Hydrofluosilicic Acid Systems		X	X
13.4	FINAL CHECK-UP OF EQUIPMENT		X	X
13.40	Avoid Overfeeding	X	X	X
13.41	Review Of Designs And Specifications		X	X
13.5	CHEMICAL FEEDER START-UP		X	X
13.6	CHEMICAL FEEDER OPERATION		X	X
13.60	Fine Tuning		X	X
13.61	Preparation Of Fluoride Solution		X	X
13.62	Fluoridation Log Sheets		X	X
13.620	Hydrofluosilicic Acid		X	X
13.621	Sodium Silicofluoride		X	X
13.63	Equipment Check Procedures		X	X
13.7	PREVENTION OF OVERFEEDING	X	X	X
13.8	UNDERFEEDING	X	X	X
13.9	SHUTTING DOWN CHEMICAL SYSTEMS	X	X	X
13.10	MAINTENANCE	X	X	X
13.11	SAFETY IN HANDLING FLUORIDE COMPOUNDS	X	X	X
13.110	Avoid Overexposure	X	X	X
13.111	Symptoms Of Fluoride Poisoning	X	X	X
13.112	Basic First Aid	X	X	X
13.113	Protecting Yourself And Your Family	X	X	X
13.114	Training	X	X	X
13.12	CALCULATING FLUORIDE DOSAGES		X	X

SECTION	TOPIC	C	B	A
15.	**WORDS: SPECIALIZED TREATMENT PROCESSES**	X	X	X
15.0	THE TRIHALOMETHANES (THM) PROBLEM		X	X
15.1	FEASIBILITY ANALYSIS PROCESS		X	X
15.2	PROBLEM DEFINITION			X
15.20	Sampling			X
15.21	THM Calculations		X	X
15.22	Chemistry of THM Formation			X
15.3	CONTROL STRATEGIES			X
15.4	EXISTING TREATMENT PROCESSES			X
15.5	TREATMENT PROCESS RESEARCH STUDY RESULTS			X
15.50	Consider Options			X
15.51	Remove THM's After They Are Formed			X
15.52	Remove THM Precursors			X
15.53	Alternative Disinfectants			X
15.6	SELECTION AND IMPLEMENTATION OF A COST-EFFECTIVE ALTERNATIVES			X
15.7	REGULATORY UPDATE		X	X
15.8	SUMMARY AND CONCLUSIONS			X
15.100	Why Are We Concerned About Arsenic?	X	X	X
15.101	What Are the Sources of Arsenic?	X	X	X
15.102	Chemistry of Arsenic		X	X
15.110	New Source Alternative to Treatment		X	X
15.111	Summary of Arsenic Treatment Options	X	X	X
15.112	Engineered Blending		X	X
15.113	Ion Exchange (IX)		X	X
15.114	Active Alumina (AA)			X
15.115	Oxidation-Filtration & Iron Based Adsorption			X
15.116	Point of Use (POU) & Point of Entry (POE) Devices		X	X
15.117	Proprietary Media		X	X
15.12	TYPICAL ARSENIC TREATMENT PLANT	X	X	X
15.120	Plant Start-Up & Shutdown		X	X
15.121	Operation		X	X
15.122	Maintenance		X	X
15.123	Troubleshooting			X
15.124	Safety & Security Issues	X	X	X
15.125	Review of Plans & Specifications			X
15.13	WASTEWATER AND RESIDUALS		X	X
15.140	MONITORING - Analysis of Arsenic	X	X	X
15.141	Types of Arsenic Sampling/Monitoring		X	X
15.142	Monitoring for Compliance		X	X
15.143	Monitoring for Process Control		X	X
15.15	RECORDKEEPING AND REPORTING		X	X
15.150	Records	X	X	X
15.151	Reporting		X	X
17.	**WORDS: HANDLING AND DISPOSAL OF PROCESS WASTES**		X	X
17.0	NEED FOR HANDLING AND DISPOSAL OF PROCESS WASTES		X	X
17.1	SOURCES OF TREATMENT PROCESS WASTES			X
17.2	PROCESS SLUDGE VOLUMES			X
17.3	METHODS OF HANDLING AND DISPOSING OF PROCESS WASTES			X
17.4	DRAINING AND CLEANING TANKS			X
17.5	BACKWASH RECOVERY PONDS (SOLAR LAGOONS)			X
17.6	SLUDGE DEWATERING PROCESSES			X
17.60	Solar Drying Lagoons			X
17.61	Sand Drying Beds			X
17.62	Belt Filter Presses			X

SECTION	TOPIC	C	B	A
17.63	Centrifuges			X
17.64	Filter Presses			X
17.65	Vacuum Filters			X
17.7	DISCHARGE INTO COLLECTION SYSTEMS (SEWERS)			X
17.8	DISPOSAL OF SLUDGE			X
17.9	EQUIPMENT			X
17.90	Vacuum Trucks			X
17.91	Sludge Pumps			X
17.10	PLANT DRAINAGE WATERS			X
17.11	MONITORING AND REPORTING			X
18.	**WORDS: MAINTENANCE**	X	X	X
18.0	TREATMENT PLANT MAINTENANCE - GENERAL PROGRAM	X	X	X
18.00	Preventive Maintenance Records	X		X
18.01	Library of Manufacturers' Operation and Parts Manuals	X		X
18.02	Emergencies			X
18.03	Lockout/Tagout Procedures	X	X	X
18.10	Beware of Electricity	X		X
18.100	Recognize Your Limitations	X	X	X
18.11	Understanding Electricity	X	X	X
18.110	Volts	X	X	X
18.111	Direct Current (D.C.)	X	X	X
18.112	Alternating Current (A.C.)	X	X	X
18.113	Amps	X	X	X
18.114	Watts	X	X	X
18.115	Power Requirements	X	X	X
18.116	Conductors and Insulators		X	X
18.12	Tools, Meters and Testers		X	X
18.120	Voltage Testing		X	X
18.121	Ammeter		X	X
18.122	Megger		X	X
18.123	Ohmmeters		X	X
18.13	Switch Gear		X	X
18.130	Equipment Protective Devices	X	X	X
18.131	Fuses	X	X	X
18.132	Circuit Breakers	X	X	X
18.133	Overload Relays	X	X	X
18.134	Motor Starters		X	X
18.140	Electric Motors - Classifications		X	X
18.1410	Troubleshooting - Step-By-Step Procedures		X	X
18.1411	Troubleshooting Guide for Electric Motors	X	X	X
18.1412	Troubleshooting Guide for Magnetic Starters	X	X	X
18.1413	Trouble/Remedy Procedures for Induction Motors	X	X	X
18.142	Record Keeping		X	X
18.150	Auxilary Electric Power - Safety First	X	X	X
18.151	Standby Power Generation	X		X
18.152	Emergency Lighting	X	X	X
18.153	Batteries	X	X	X
18.160	High Voltage - Transmission			X
18.161	Switch Gear			X
18.162	Power Distribution Transformers			X
18.17	Electrical Safety Checklist	X	X	X
18.2	MECHANICAL EQUIPMENT	X	X	X
18.20	Repair Shop	X	X	X
18.21	Pumps	X	X	X

SECTION	TOPIC	C	B	A
18.210	Centrifugal Pumps	X	X	X
18.211	Let's Build a Pump	X	X	X
18.212	Vertical Centrifugal Pumps	X	X	X
18.213	Horizontal Centrifugal Pumps	X	X	X
18.214	Reciprocating or Piston Pumps	X	X	X
18.215	Progressive Cavity (Screw-Flow) Pumps	X	X	X
18.216	Chemical Metering Pumps	X	X	X
18.220	Purpose of Lubrication	X	X	X
18.221	Properties of Lubrication	X	X	X
18.222	Lubrication Schedule	X	X	X
18.223	Precautions	X	X	X
18.224	Pump Lubrication	X	X	X
18.225	Equipment Lubrication	X	X	X
18.230	Pump Maintenance - Section Format	X	X	X
18.231	Preventative Maintenance	X	X	X
18.231 #1	Pumps, General	X	X	X
18.231 #2	Reciprocating Pumps, General	X	X	X
18.231 #3	Propeller Pumps, General	X	X	X
18.231 #4	Progressive Cavity Pumps, General	X	X	X
18.231 #5	Pump Controls	X	X	X
18.231 #6	Electric Motors	X	X	X
18.231 #7	Belt Drives	X	X	X
18.231 #8	Chain Drives	X	X	X
18.231 #9	Variable Speed Belt Drives	X	X	X
18.231 #10	Couplings	X	X	X
18.231 #11	Shear Pins	X	X	X
18.240	Starting a New Pump	X	X	X
18.241	Pump Shutdown	X	X	X
18.242	Pump-Driving Equipment	X	X	X
18.243	Electrical Controls	X	X	X
18.244	Operating Troubles	X	X	X
18.245	Starting and Stopping Pumps	X	X	X
18.2450	Centrifugal Pumps	X	X	X
18.2451	Positive Displacement Pumps	X	X	X
18.25	Compressors	X	X	X
18.26	Valves	X	X	X
18.260	Uses of Valves	X	X	X
18.261	Gate Valves	X	X	X
18.262	Maintenance of Gate Valves	X	X	X
18.262 #12	Gate Valves	X	X	X
18.263	Globe Valves		X	X
18.264	Eccentric Valves		X	X
18.265	Butterfly Valves		X	X
18.266	Check Valves	X	X	X
18.267	Maintenance of Check Valves	X	X	X
18.267 #13	Check Valves	X	X	X
18.268	Automatic Valves		X	X
18.30	Gasoline Engines	X	X	X
18.300	Need to Maintain Gasoline Engines	X	X	X
18.301	Maintenance	X	X	X
18.302	Starting Problems		X	X
18.303	Running Problems		X	X
18.304	How to Start a Gasoline Engine		X	X
18.3040	Small Engines		X	X

SECTION	TOPIC	C	B	A
18.3041	Large Engines		X	X
18.31	Diesel Engines		X	X
18.310	How Diesel Engines Work	X	X	X
18.311	Operation		X	X
18.312	Fuel System		X	X
18.313	Water-Cooled Diesel Engines		X	X
18.314	Air-Cooled Diesel Engines		X	X
18.315	How to Start Diesel Engines		X	X
18.316	Maintenance and Troubleshooting		X	X
18.32	Cooling Systems		X	X
18.330	Fuel Storage - Code Requirements	X	X	X
18.331	Diesel	X	X	X
18.332	Gasoline	X	X	X
18.333	Liquid Petroleum Gas (LPG)		X	X
18.334	Natural Gas		X	X
18.34	Standby Engines	X	X	X
18.40	Chemical Storage	X	X	X
18.41	Drainage from Chemical Storage and Feeders	X	X	X
18.42	Use of Feeder Manufacturer's Manual	X	X	X
18.43	Solid Feeders	X	X	X
18.44	Liquid Feeders	X	X	X
18.45	Gas Feeders		X	X
18.46	Calibration of Chemical Feeders		X	X
18.460	Large-Volume Metering Pumps		X	X
18.461	Small-Volume Metering Pumps		X	X
18.462	Dry Chemical Systems			X
18.47	Chlorinators	X	X	X
18.5	TANKS AND RESERVOIRS			X
18.50	Scheduling Inspections	X	X	X
18.51	Steel Tanks			X
18.52	Cathodic Protection			X
18.53	Concrete Tanks			X
18.6	BUILDING MAINTENANCE	X	X	X
19.	**WORDS: INSTRUMENTATION**	X	X	X
19.00	Importance & Nature of Instrumentation & Control Systems		X	X
19.01	Importance to the Water TreatmentOperator		X	X
19.02	Nature of the Measurement Process		X	X
19.03	Explanation of Control Systems		X	X
19.030	Modulating Control Systems		X	X
19.031	Motor Control Stations		X	X
19.10	General Precautions		X	X
19.11	Electrical Hazards		X	X
19.12	Mechanical & Pneumatic Hazards		X	X
19.13	Confined Spaces		X	X
19.14	Oxygen Deficiency or Enrichment		X	X
19.15	Explosice Gas Mixtures		X	X
19.16	Falls & Associated Hazards		X	X
19.20	General Principles of Sensors		X	X
19.21	Pressure Measurements		X	X
19.22	Level Measurements		X	X
19.23	Flow (Rate of Flow and Total Flow)		X	X
19.24	Chemical Feed Rate		X	X
19.25	Process Instrumentation		X	X
19.26	Signal Transmitters/Transducers		X	X

SECTION	TOPIC	C	B	A
19.30	Primary Elements		X	X
19.31	Panel Instruments		X	X
19.310	Indicators		X	X
19.311	Recorders		X	X
19.312	Totalizers		X	X
19.313	Alarms		X	X
19.32	Automatic Controller			X
19.33	Pump Controllers			X
19.34	Air Supply Systems			X
19.35	Laboratory Instruments			X
19.36	Test and Calibration Equipment			X
19.370	Computer Control Systems		X	X
19.371	Typical Computer Control System Functions		X	X
19.40	Proper Care of Instruments		X	X
19.41	Indications of Proper Function		X	X
19.42	Start-up/Shutdown Considerations		X	X
19.43	Preventative Maintenance		X	X
19.44	Operational Checks		X	X
19.45	Preventive Maintenance		X	X
20.	**WORDS: SAFETY**	X	X	X
20.00	What is Safety?	X	X	X
20.01	Causes of Accidents	X	X	X
20.02	Steps to Avoid Accidents	X	X	X
20.10	Safe Handling of Chemicals	X	X	X
20.11	Acids	X	X	X
20.110	Acetic Acid (Glacial)	X	X	X
20.111	Hydrofluosilic Acid	X	X	X
20.112	Hydrogen Fluoride	X	X	X
20.113	Hydrochloric Acid	X	X	X
20.114	Nitric Acid	X	X	X
20.115	Sulfuric Acid	X	X	X
20.12	Bases	X	X	X
20.120	Ammonia	X	X	X
20.121	Calcium Hydroxide	X	X	X
20.122	Sodium Hydroxide	X	X	X
20.123	Sodium Silicate	X	X	X
20.124	Hypochlorite	X	X	X
20.125	Sodium Carbonate	X	X	X
20.13	Gases	X	X	X
20.130	Chlorine	X	X	X
20.131	Carbon Dioxide			X
20.132	Sulfur Dioxide			X
20.14	Salts	X	X	X
20.140	Aluminum Sulfate (Alum)	X	X	X
20.141	Ferric Chloride	X	X	X
20.142	Ferric Sulfate	X	X	X
20.143	Ferrous Sulfate	X	X	X
20.144	Sodium Aluminate	X	X	X
20.145	Fluoride Compounds	X	X	X
20.15	Powders	X	X	X
20.150	Potassium Permanganate	X	X	X
20.151	Powdered Activated Carbon	X	X	X
20.152	Other Powders	X	X	X
20.16	Labeling of Chemical Containers	X	X	X

SECTION	TOPIC	C	B	A
20.17	Chemical Storage Drains	X	X	X
20.20	Fire Prevention	X	X	X
20.21	Classification of Fires and Extinguishers	X	X	X
20.22	Fire Extinguisher Operation and Maintenance	X	X	X
20.23	Fire Hoses	X	X	X
20.24	Storage of Flammables	X	X	X
20.25	Exits	X	X	X
20.30	Maintenance Hazards	X	X	X
20.31	Cleaning	X	X	X
20.32	Painting	X	X	X
20.33	Cranes	X	X	X
20.34	Confined Spaces	X	X	X
20.35	Manholes	X	X	X
20.36	Power Tools	X	X	X
20.37	Welding	X	X	X
20.38	Safety Valves	X	X	X
20.40	Types of Vehicles	X	X	X
20.41	Maintenance	X	X	X
20.42	Seat Belts	X	X	X
20.43	Accident Prevention	X	X	X
20.44	Forklifts	X	X	X
20.50	Electrical Safety	X	X	X
20.51	Current - Voltage	X	X	X
20.52	Transformers	X	X	X
20.53	Electric Starters	X	X	X
20.54	Electric Motors	X	X	X
20.55	Instrumentation	X	X	X
20.56	Control Panels	X	X	X
20.57	Lockout/Tagout Procedure	X	X	X
20.60	Laboratory Hazards		X	X
20.61	Glassware		X	X
20.62	Chemicals		X	X
20.63	Biological Considerations		X	X
20.64	Radioactivity		X	X
20.65	Laboratory Equipment		X	X
20.650	Hot Plates		X	X
20.651	Water Stills		X	X
20.652	Sterilizers		X	X
20.653	Pipet Washers		X	X
20.70	Operator Safety	X	X	X
20.71	Respiratory Protection	X	X	X
20.72	Safety Equipment	X	X	X
20.73	Eye Protection	X	X	X
20.74	Foot Protection	X	X	X
20.75	Hand Protection	X	X	X
20.76	Head Protection	X	X	X
20.77	Water Safety	X	X	X
20.8	PREPARATION FOR EMERGENCIES	X	X	X
21.	**ADVANCED LABORATORY PROCEDURES**			
21.0	USE OF A SPECTROPHOTOMETER	X	X	X
21. #1	Algae Counts		X	X
21. #2	Calcium		X	X
21. #3	Chloride		X	X
21. #4	Color	X	X	X

SECTION	TOPIC	C	B	A
21. #5	Dissolved Oxygen	X	X	X
21. #6	Fluoride		X	X
21. #7	Iron (Total)	X	X	X
21. #8	Manganese	X	X	X
21. #9	Marble Test (Calcium Carbonate Saturation Test)			X
21. #10	Metals		X	X
21. #11	Nitrate			X
21. #12	pH	X	X	X
21. #13	Specific Conductance (Conductivity)	X	X	X
21. #14	Sulfate			X
21. #15	Taste and Odor	X	X	X
21. #16	Trihalomethanes	X	X	X
21. #17	Total Dissolved Solids		X	X
22.	**WORDS: DRINKING WATER REGULATIONS**		X	X
22.0	HISTORY OF DRINKING WATER LAWS AND STANDARDS		X	X
22.1	HOW EPA DEVELOPS DRINKING WATER STANDARDS		X	X
22.10	Types of Contaminants		X	X
22.11	Identifying Contaminants To Be Regulated		X	X
22.12	Unregulated Contaminants		X	X
22.13	Newer & Proposed Regulations		X	X
22.130	Arsenic Rule	X	X	X
22.131	Lead & Copper Rule	X	X	X
22.132	Total Coliform Rule (TCR)	X	X	X
22.133	Surface Water Treatment Rules	X	X	X
22.134	Filter Backwash Recycling Rule (FBRR)	X	X	X
22.135	Disinfectants & Disinfection By-Products	X	X	X
22.136	Ground Water Rule (GWR)		X	X
22.137	Radionuclides Rule		X	X
22.138	Regulation of Microbial Contaminents in Drinking Water		X	X
22.139	Standardized Monitoring Framework (SMF)		X	X
22.139	Consumer Confidence Report (CCR) Rule		X	X
22.14	Setting Standards		X	X
22.15	Types of Water Systems		X	X
22.2	PRIMARY DRINKING WATER STANDARDS		X	X
22.20	Inorganic Chemical Standards		X	X
22.200	Antimony		X	X
22.201	Arsenic		X	X
22.202	Asbestos		X	X
22.203	Barium		X	X
22.204	Beryllium		X	X
22.205	Bromate		X	X
22.206	Cadmium		X	X
22.207	Chlorite		X	X
22.208	Chromium		X	X
22.209	Copper		X	X
22.2010	Cyanide		X	X
22.2011	Fluoride		X	X
22.2012	Lead and Copper		X	X
22.2013	Mercury		X	X
22.2014	Nitrate		X	X
22.2015	Nitrite		X	X
22.2016	Selenium		X	X
22.2017	Thallium		X	X
22.21	Organic Chemical Standards		X	X

SECTION	TOPIC	C	B	A
22.210	Trichloroethylene		X	X
22.211	1,1-Dichloroethylene		X	X
22.212	Vinyl Chloride		X	X
22.213	1,1,1-Trichloroethane		X	X
22.214	1,2-Dichloroethane		X	X
22.215	Carbon Tetrachloride		X	X
22.216	Benzene		X	X
22.217	Para-Dichlorobenzene (p-Dichlorobenzene)		X	X
22.22	Microbial Standards		X	X
22.220	Total Coliform Rule		X	X
22.221	2012 Revised Total Coliform Rule (RTCR)		X	X
22.2200	Sanitary Survey		X	X
22.2201	Sampling Plan		X	X
22.2202	Laboratory Procedures		X	X
22.2203	Monitoring Frequency		X	X
22.2204	Determining Compliance		X	X
22.2205	Reporting and Notification Requirements		X	X
22.221	Surface Water Treatment Rule		X	X
22.2210	Criteria for Avoiding Filtration		X	X
22.2211	Requirements for Filtered Water Systems		X	X
22.2212	Chlorine Residual Substitutions		X	X
22.2213	Turbidity Requirements		X	X
22.2214	Monitoring Requirements		X	X
22.2215	CT Values		X	X
22.2216	Interim Enhanced Surface Water Treatment Rule (IESWTR)		X	X
22.2217	Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR)		X	X
22.2218	Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)		X	X
22.23	Disinfectants and Disinfection By-Products (D/DBPs)		X	X
22.24	Radiological Standards		X	X
22.30	Enforcement of Regulations		X	X
22.31	Secondary Maximum Contaminant Levels		X	X
22.32	Monitoring		X	X
22.33	Secondary Contaminants		X	X
22.330	Aluminum		X	X
22.331	Chloride		X	X
22.332	Color		X	X
22.333	Copper		X	X
22.334	Corrosivity		X	X
22.335	Fluoride		X	X
22.336	Foaming Agents		X	X
22.337	Iron and Manganese		X	X
22.338	Iron		X	X
22.339	Manganese		X	X
22.3310	Odor		X	X
22.3311	pH		X	X
22.3312	Silver		X	X
22.3313	Sulfate		X	X
22.3314	Total Dissolved Solids (TDS)		X	X
22.3315	Zinc		X	X
22.4	SAMPLING PROCEDURES		X	X
22.40	Safe Drinking Water Regulations		X	X
22.41	Overview of Sampling		X	X
22.42	General Guidelines for Water Sampling		X	X
22.43	Selecting Sampling Locations		X	X

SECTION	TOPIC	C	B	A
22.44	Use of Dedicated SamplingStations		X	X
22.45	Sampling Points		X	X
22.46	Sampling Point Selection		X	X
22.47	Sampling Schedule			
22.48	Sampling Routine		X	X
22.49	Sample Collection		X	X
22.410	Frequency of Sampling		X	X
22.411	Chain-of-Custody Procedures		X	X
22.5	REPORTING PROCEDURES		X	X
22.6	NOTIFICATION REQUIREMENTS		X	X
22.7	RECORDKEEPING		X	X
22.8	CONSUMER CONFIDENCE REPORT (CCRs)		X	X
23	**WORDS: ADMINISTRATION**		X	X
23.0	NEED FOR UTILITY MANAGEMENT			X
23.1	FUNCTIONS OF A MANAGER			X
23.2	PLANNING			X
23.3	ORGANIZING			X
23.40	STAFFING - The Utility Manager's Responsibilities			X
23.41	How Many Employees Are Needed			X
23.42	Qualifications Profile			X
23.430	Advertising the Position			X
23.431	Paper Screening			X
23.432	Interviewing Applicants			X
23.433	Selecting the Most Qualified Candidate			X
23.44	New Employee Orientation			X
23.450	Probationary Period			X
23.451	Compensation			X
23.452	Training and Certification			X
23.453	Performance Evaluation			X
23.454	Dealing with Disciplinary Problems			X
23.455	Example Policy: Harassment			X
23.456	Labor Laws Governing Employer/Employee Relations			X
23.457	Personnel Records			X
23.50	Oral Communication			X
23.51	Written Communication			X
23.6	CONDUCTING MEETINGS			X
23.70	Establish Objectives			X
23.71	Utility Operations			X
23.72	The Mass Media			X
23.73	Being Interviewed			X
23.74	Public Speaking			X
23.75	Telephone Contacts			X
23.76	Consumer Inquiries			X
23.77	Plant Tours			X
23.8	FINANCIAL MANAGEMENT			X
23.80	Financial Stability			X
23.81	Budgeting			X
23.82	Equipment Repair/Replacement Funds			X
23.83	Water Rates			X
23.84	Capital Improvements and Funding in the Future			X
23.85	Financial Assistance			X
23.90	The Manager's Responsibilities			X
23.91	Purpose of O & M Programs			X
23.92	Types of Maintenance			X

SECTION	TOPIC	C	B	A
23.93	Benefits of Managing Maintenance			X
23.94	Computer Control Systems			X
23.940	Description of SCADA Systems			X
23.941	Typical Water Treatment and Distribution SCADA Systems			X
23.95	Cross Connection Control Program			X
23.950	Importance of Cross Connection Control		X	X
23.951	Program Responsibilities			X
23.952	Water Supplier Program			X
23.953	Types of Backflow Prevention Devices			X
23.954	Devices Required for Various Types of Situations			X
23.96	Geographic Information System (GIS)			X
23.100	Planning for Emergency Response			X
23.101	Homeland Defense			X
23.1020	Handling the Threat of Contaminated Water Supplies - Importance			X
23.1021	Toxicity			X
23.1022	Emergency Contaminent Limits			X
23.1023	Protective Measures			X
23.1024	Emergency Countermeasures			X
23.1025	In Case of Contamination			X
23.1026	Cryptosporidium			X
23.1100	Everyone is Responsible for Safety		X	X
23.1101	Regulatory Agencies		X	X
23.1102	Managers			X
23.1103	Supervisors			X
23.1104	Operators			X
23.111	First Aid		X	X
23.112	Hazard Communication Program and Worker Right-To-Know (RTK) Laws			X
23.113	Confined Spaces Entry Procedures			X
23.114	Reporting			X
23.115	Training			X
23.116	Measuring			X
23.117	Human Factors			X
23.120	Purpose of Records		X	X
23.121	Types of Records		X	X
23.122	Types of Plant Operations Data			X
23.123	Maintenance Records		X	X
23.124	Procurement Records			X
23.125	Inventory Records			X
23.126	Equipment Records		X	X
23.127	Computer Record Keeping Systems			X
23.128	Disposition of Plant Records			X
23.130	Need for Conservation	X	X	X
23.131	What Is Water Conservation?	X	X	X
23.132	Elements of Water Conservation Program		X	X
23.1320	Residential Water Surveys		X	X
23.1321	Residential Plumbing Retrofits		X	X
23.1322	System Water Audits, Leak Detection, and Repair		X	X
23.1323	Meeting with Commodity Rates			X
23.1324	Large Landscape Conservation Programs			X
23.1325	High-Efficiency Clothes Washers			X
23.1326	Public Information Programs			X
23.1327	School Education Programs			X
23.1328	Conservation Programs for Commercial, Industrial & Institutional (CII) Sectors			X

SECTION	TOPIC	C	B	A
23.1329	Wholesale Agency Assistance Programs			X
23.13210	Conservation Pricing			X
23.13211	Conservation Coordinator			X
23.13212	Water Wast Prohibition			X
23.13213	Residential ULFT Replacement Programs			X
23.13214	Potential Best Management Practices			X
23.133	EPA's WaterSense: Efficiency Made Easy			X
A	**HOW TO SOLVE WATER TREATMENT PLANT ARITHMETIC PROBLEMS**			
A.1	BASIC CONVERSION FACTORS (ENGLISH SYSTEM)		X	X
A.2	BASIC FORMULAS		X	X
A.30	Iron and Manganese Control - Examples 1 - 4		X	X
A.31	Fluoridation - Examples 5 - 10		X	X
A.33	Specialized Treatment Process - Example 24		X	X
A.34	Membrane Treatment Process - Examples 27-29			X
A.35	Maintenance - Examples 30 - 33		X	X
A.36	Advanced Laboratory Procedures - Example 34		X	X
A.37	Regulations - Example 38		X	X
A.38	Administration, Safety - Examples 39 - 40		X	X
A.4	BASIC CONVERSION FACTORS (METRIC SYSTEM)		X	X

RULES GOVERNING PUBLIC WATER SYSTEMS

SECTION	TOPIC	C	B	A
.0102	DEFINITIONS	X	X	X
.0201	SURFACE WATER SUPPLIES FOR PUBLIC WATER SYSTEMS	X	X	X
.0202	REMOVAL OF DISSOLVED MATTER & SUSPENDED MATTER		X	X
.0301	APPLICABILITY: PRIOR NOTICE	X	X	X
.0303	SUBMISSIONS REQUIRED BY ENGINEER AND APPLICANT	X	X	X
.0304	APPLICATION FOR APPROVAL: BY WHOM MADE	X	X	X
.0305	APPROVALS NECESSARY BEFORE CONTRACTING OR CONSTRUCTION	X	X	X
.0306	CHANGES IN ENGINEERING PLANS OR SPECIFICATIONS AFTER APPROVAL	X	X	X
.0307	ENGINEER'S REPORT, WATER SYSTEM MANAGEMENT PLAN AND OTHER PLANS			X
.0308	ENGINEERING PLANS AND SPECIFICATIONS			X
.0309	FINAL APPROVAL			X
.0403	SURFACE WATER FACILITIES			X
.0404	WATER TREATMENT FACILITIES	X	X	X
.0405	STORAGE OF FINISHED WATER	X	X	X
.0406	DISTRIBUTION SYSTEMS	X	X	X
.0407	ELECTRICAL SYSTEMS	X	X	X
.0408	LEAD FREE CONSTRUCTION	X	X	X
.0409	SERVICE CONNECTIONS	X	X	X
.0501	PURPOSE			X
.0502	DESIGN CRITERIA			X
.0601	IMPOUNDMENTS: PRE-SETTLING RESERVOIRS			X
.0602	RAW WATER INTAKES			X
.0603	INTAKE CONDUITS			X
.0604	PUMPS: POWER FACILITIES			X
.0701	FLASH OR RAPID MIXING FACILITY			X
.0702	AIR MIXING			X
.0703	MECHANICAL FLOCCULATION			X
.0704	BAFFLED MIXING AND FLOCCULATION BASINS			X
.0705	CONDUITS: PIPES AND FLUMES: GATES AND VALVES			X
.0706	SEDIMENTATION BASIN			X
.0707	SOLIDS CONTACT OR UP-FLOW UNITS			X
.0708	GRAVITY FILTERS			X
.0709	PREVENTION OF BACKFLOW AND BACK-SIPHONAGE		X	X
.0710	OTHER WATER TREATMENT PLANTS			X
.0711	ALTERNATIVE FILTRATION TREATMENT TECHNOLOGIES			X
.0712	DIRECT FILTRATION			X
.0713	PRESSURE FILTERS			X
.0714	PILOT PLAN STUDIES			X
.0715	OTHER DESIGN STANDARDS			X
.0805	CAPACITIES: ELEVATED STORAGE			X
.0901	SIZE OF WATER MAINS	X	X	X
.0902	NUMBER OF RESIDENCES ON A WATER MAIN	X	X	X
.0903	DEAD END WATER MAINS	X	X	X
.0904	PIPE LAYING	X	X	X
.0905	TESTING NEW WATER MAINS	X	X	X
.0906	RELATION OF WATER MAINS TO SEWERS	X	X	X
.0907	VALVES		X	X
.1001	DISINFECTION OF NEW SYSTEM	X	X	X
.1003	DISINFECTION OF STORAGE TANKS & DISTRIBUTION SYSTEMS	X	X	X
.1201	RECREATIONAL ACTIVITIES			X
.1202	PROTECTION OF WATER QUALITY			X
.1203	MAINTENANCE OF PARKS			X
.1204	FISHING			X

RULES GOVERNING PUBLIC WATER SYSTEMS

SECTION	TOPIC	C	B	A
.1207	ANIMALS IN RESERVOIR			X
.1208	CONTROLLING THE DRAINAGE OF WASTES			X
.1209	UNTREATED DOMESTIC SEWAGE OR INDUSTRIAL WASTES			X
.1210	SEWAGE DISPOSAL			X
.1211	GROUND ABSORPTION SEWAGE COLLECTION: TREATMENT/DISP SYSTEMS			X
.1212	BURIAL OF CARCASSES			X
.1213	BURIAL GROUND			X
.1214	DISPOSAL OF ANY SUBSTANCE			X
.1301	OPERATION OF PUBLIC WATER SUPPLY - GENERAL REQUIREMENTS	X	X	X
.1302	TEST, FORMS & REPORTING	X	X	X
.1303	FACILITY OVERSIGHT	X	X	X
.1304	WATER SYSTEM OPERATION AND MAINTENANCE			X
.1401	POLICY- FLUORIDATION		X	X
.1402	FORMAL APPLICATION		X	X
.1404	FEEDING EQUIPMENT		X	X
.1405	PROTECTION OF OPERATORS	X	X	X
.1406	CONTROL OF TREATMENT PROCESS		X	X
.1407	APPROVAL MAY BE RESCINDED		X	X
.1502	MONITORING OF CONSECUTIVE PUBLIC WATER SYSTEMS		X	X
.1505	TURBIDITY SAMPLING AND ANALYSIS	X	X	X
.1506	MAXIMUM CONTAMINANT LEVELS FOR TURBIDITY	X	X	X
.1507	CORROSION CONTROL AND LEAD AND COPPER MONITORING	X	X	X
.1508	INORGANIC CHEMICAL SAMPLING AND ANALYSIS	X	X	X
.1509	SPECIAL MONITORING FOR SODIUM		X	X
.1510	MAXIMUM CONTAMINANT LEVEL FOR INORGANIC CHEMICALS	X	X	X
.1511	CONCENTRATION OF IRON	X	X	X
.1512	CONCENTRATION OF MANGANESE	X	X	X
.1513	TOTAL TRIHALOMETHANES SAMPLING AND ANALYSIS: 10,000 OR MORE		X	X
.1514	TREATMENT TECHNIQUES FOR TOTAL TRIHALOMETHANES		X	X
.1515	ORGANIC CHEMICALS OTHER THAN TTHM, SAMPLING AND ANALYSIS	X	X	X
.1516	SPECIAL MONITORING FOR ORGANIC CHEMICALS	X	X	X
.1517	MAXIMUM CONTAMINANT LEVEL FOR ORGANIC CHEMICALS		X	X
.1518	MAXIMUM CONTAMINANT LEVEL FOR ORGANIC CONTAMINANTS	X	X	X
.1519	MONITORING FREQUENCY FOR RADIOACTIVITY	X	X	X
.1520	MAXIMUM CONTAMINANT LEVELS FOR RADIUM	X	X	X
.1521	MAXIMUM CONTAMINANT LEVEL GOALS FOR RADIONUCLIDES			X
.1522	ANALYTICAL METHODS FOR RADIOACTIVITY			X
.1523	PUBLIC NOTICE	X	X	X
	Subpart Q - Public Notification of Drinking Water Violations	X	X	X
.1524	REPORTING FOR ORGANIC CHEMICALS	X	X	X
.1525	REPORTING REQUIREMENTS	X	X	X
.1526	RECORD MAINTENANCE	X	X	X
.1527	CERTIFIED LABORATORIES			X
.1528	ALTERNATE ANALYTICAL TECHNIQUES			X
.1529	POINT-OF-ENTRY AND OTHER TREATMENT DEVICES			X
.1531	SITING REQUIREMENTS			X
.1532	VARIANCES AND EXEMPTIONS			X
.1534	COLIFORM SAMPLING	X	X	X
.1535	MAXIMUM CONTAMINANT LEVELS FOR COLIFORM BACTERIA	X	X	X
.1536	TREATMENT TECHNIQUES		X	X
.1537	DRINKING WATER ADDITIVES		X	X
.1538	CONSUMER CONFIDENCE REPORT		X	X
.1601	REQUIREMENTS FOR A VARIANCE		X	X

RULES GOVERNING PUBLIC WATER SYSTEMS

SECTION	TOPIC	C	B	A
.1602	VARIANCE REQUEST			X
.1603	CONSIDERATION OF A VARIANCE REQUEST			X
.1604	DISPOSITION OF A VARIANCE REQUEST			X
.1605	PUBLIC HEARING OF VARIANCES AND SCHEDULES			X
.1606	VARIANCES FOR FLUORIDE			X
.1607	VARIANCES AND EXEMPTIONS FOR CHEMICALS, LEAD AND COPPER, AND RADIO-NUCLIDES			X
.1608	REQUIREMENTS FOR AN EXEMPTION			X
.1609	EXEMPTION REQUEST			X
.1610	CONSIDERATION OF AN EXEMPTION REQUEST			X
.1611	DISPOSITION OF AN EXEMPTION REQUEST			X
.1612	PUBLIC HEARINGS ON EXEMPTION SCHEDULES			X
.1613	FINAL SCHEDULE			X
.1614	BOTTLED WATER AND POINT-OF-USE DEVICES			X
.1904	WHEN PENALTIES MAY BE ASSESSED	X	X	X
.1905	AMOUNT OF PENALTY ASSESSMENT	X	X	X
.1913	RIGHT OF ENTRY AND INSPECTION	X	X	X
.2001	GENERAL REQUIREMENTS (FILTRATION AND DISINFECTION)	X	X	X
.2002	DISINFECTION	X	X	X
.2003	FILTER BACKWASH RECYCLING RULE		X	X
.2004	ANALYTICAL AND MONITORING REQUIREMENTS		X	X
.2005	CRITERIA FOR AVOIDING FILTRATION		X	X
.2006	REPORTING AND RECORD KEEPING RULES		X	X
.2007	SUBPART P - ENHANCED FILTRATION AND DISINFECTION (Systems serving 10,000 or more people)			X
.2007	SUBPART T - ENHANCED FILTRATION AND DISINFECTION (Systems serving fewer than 10,000 people)		X	X
.2008	DISINFECTANTS AND DISINFECTION BYPRODUCTS		X	X
.2101	PERMITS	X	X	X
.2102	APPLICATION FOR PERMITS	X	X	X
.2103	INITIAL PERMIT PERIOD	X	X	X
.2104	RENEWAL FEES	X	X	X
.2105	REVOCATION	X	X	X
	APPENDIX B - FIGURE 2 - NORTH CAROLINA GUIDELINES CROSS CONNE	X	X	X

PART IV

RULES GOVERNING WATER TREATMENT FACILITY OPERATORS

SECTION	TOPIC	C	B	A
0.0100	GENERAL POLICIES	X	X	X
.0105	Definitions	X	X	X
.0200	QUALIFICATIONS OF APPLICANTS AND CLASSIFICATION OF FACILITIES	X	X	X
.0201	Grades of Certification	X	X	X
.0202	Examinations	X	X	X
.0205	Classification of Water Treatment Facility	X	X	X
.0206	Certified Operator Required	X	X	X
.0300	APPLICATIONS AND FEES	X	X	X
.0301	Application for Exam	X	X	X
.0302	Application for Reciprocity	X	X	X
.0303	Application for Temporary Certificate	X	X	X
.0304	Fee Schedule	X	X	X
.0307	Revocation of Certificate	X	X	X
.0308	Continuing Education	X	X	X
.0309	Certification Reinstatement	X	X	X
.0400	ISSUANCE OF CERTIFICATE	X	X	X
.0401	Notification of Classification	X	X	X
.0403	Issuance of Grade Certificate	X	X	X
.0404	Temporary Certificate	X	X	X
.0501	Petitions	X	X	X
.0508	Declaratory Rules	X	X	X
.0601	Opportunity for Licensee or Applicant to Have Hearing	X	X	X
.0701	Operator in Responsible Charge	X	X	X