

MONTANA WATER CENTER OPERATOR BASICS TRAINING SERIES 2005 OUTLINE FOR SURFACE AND GROUND WATER SYSTEMS COURSE

1 - The Basics

- 1.1 - What Is a Public Water Supply System?**
 - 1.1.1 - Purpose of Public Water Supply Systems
 - 1.1.2 - Types of Public Water Supply Systems
- 1.2 - Operator Certification Program**
 - 1.2.1 - Operator Certification Requirements
 - 1.2.2 - Operator Need for Continuing Education

2 - Sources

- 2.1 - Surface Water As a Source**
 - 2.1.1 - The Hydrologic Cycle
 - 2.1.2 - The Watershed
 - 2.1.3 - Characteristics of Surface Waters
 - 2.1.4 - Streams and Rivers
 - 2.1.5 - Lakes and Reservoirs
 - 2.1.6 - Raw Water Transmission, Storage and Measurement
- 2.2 - Ground Water Aquifers**
 - 2.2.1 - Aquifer Characteristics
 - 2.2.2 - Well Pumping
 - 2.2.3 - Recharge of Aquifers
- 2.3 - Ground Water Collection**
 - 2.3.1 - What Is GWUDISW?
- 2.4 - Water Characteristics and Contamination**
 - 2.4.1 - Contamination of Water
 - 2.4.2 - Biological Contaminants
 - 2.4.3 - Chemical Properties and Contaminants
 - 2.4.4 - Physical Properties and Contaminants
 - 2.4.5 - Radiological Contaminants
- 2.5 - Source Water Protection**
 - 2.5.1 - The Multiple Barrier Concept
 - 2.5.2 - Why Protect Source Water?
 - 2.5.3 - The Source Water Assessment
 - 2.5.4 - The Source Water Protection Plan

3 - Treatment

- 3.1 - Conventional Treatment Process**
 - 3.1.1 - Coagulation, Flocculation and Sedimentation
 - 3.1.2 - Filtration
 - 3.1.3 - Backwash
 - 3.1.4 - Point-of-Use Treatment
 - 3.1.5 - Sand and Sediment Removal
 - 3.1.6 - Other Removal Processes
- 3.2 - Process Monitoring and Controls**
 - 3.2.1 - Lab Instruments
 - 3.2.2 - Jar Tests
 - 3.2.3 - Plant Automation

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3.3 - Disinfection

3.3.1 - Chlorine

3.3.2 - Forms of Chlorine

3.3.3 - Full-Time Chlorination

3.3.4 - Periodic or Emergency Chlorination

3.3.5 - Substituting Hypochlorite for Gas Chlorine

3.3.6 - Chlorine Gas

3.3.7 - Ultraviolet Light (UV)

3.3.8 - Other Disinfectants

4 - Distribution and Storage

4.1 - System Components

4.1.1 - Piping

4.1.2 - Valves

4.1.3 - Fire Hydrants

4.1.4 - Storage Reservoirs

4.1.5 - Booster Stations

4.2 - System Pressure and Basic Hydraulics

4.2.1 - System Pressure

4.2.2 - Hydraulics

4.3 - Construction and Repair

4.3.1 - Minimum Separation Distances

4.3.2 - Looped Systems and Dead End Mains

4.3.3 - Preventing Contamination

4.3.4 - System Repairs

4.3.5 - Record Keeping

4.4 - Cross-Connections and Backflow Defined

4.4.1 - Public Health Significance

4.4.2 - Types of Cross-Connection Control

4.5 - Backflow Preventers

4.5.1 - Air Gap

4.5.2 - Atmospheric / Hose Bibb Vacuum Breaker

4.5.3 - Pressure Vacuum Breaker Assembly

4.5.4 - Double Check Valve Assembly

4.5.5 - Reduced Pressure Principle Assembly

4.5.6 - Installation and Servicing

4.6 - Cross-Connection Control Plans

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- 5 - Pumps, Facilities and Controls
 - 5.1 - Well Construction
 - 5.1.1 - Water Rights and Well Log Reports
 - 5.1.2 - Well Construction Methods
 - 5.1.3 - Casing Type and Size
 - 5.1.4 - Perforated Interval and Screens
 - 5.1.5 - Grouting and Sealing
 - 5.1.6 - Test Pumping
 - 5.1.7 - Adapters, Caps, Seals and Vents
 - 5.2 - Site Considerations
 - 5.2.1 - Drainage Around the Wellhead
 - 5.2.2 - Well Pits
 - 5.2.3 - Pump Power Cable Installation
 - 5.2.4 - Yard Hydrants and Sample Taps
 - 5.2.5 - Artesian Wells
 - 5.2.6 - Well Abandonment
 - 5.3 - Well Pumps and Components
 - 5.3.1 - Plumbing a Pump Station
 - 5.3.2 - Electrical Safety
 - 5.3.3 - Pressure Tanks
 - 5.4 - Well and Pump Maintenance
 - 5.4.1 - Routine Maintenance
 - 5.4.2 - Troubleshooting Declining Yield

- 6 - Regulations and Monitoring
 - 6.1 - Laws and Regulations
 - 6.2 - Types of Drinking Water Regulations
 - 6.3 - Plan / Specification Review and Approval
 - 6.4 - Monitoring and Reporting
 - 6.4.1 - Microbiological Quality
 - 6.4.2 - The Filtration Process
 - 6.4.3 - Chemical Contaminants
 - 6.4.4 - Disinfectant Residual
 - 6.4.5 - Disinfection Byproducts
 - 6.4.6 - Fluoridation
 - 6.4.7 - Lead and Copper / Corrosion Control
 - 6.4.8 - Secondary Contaminants and Concerns
 - 6.4.9 - Professional Water Haulers for Cisterns
 - 6.5 - The Sanitary Survey
 - 6.6 - Public Notification
 - 6.7 - Future Regulations

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- 7 - Operation and Management
 - 7.1 - Elements of a Safety Program
 - 7.1.1 - Electrical Safety
 - 7.1.2 - Chemical Safety
 - 7.1.3 - Chemical Storage Issues
 - 7.1.4 - Chlorine Safety
 - 7.1.5 - Traffic Control Clothing
 - 7.1.6 - Shoring and Trenching
 - 7.1.7 - Confined Spaces
 - 7.1.8 - Fire Safety
 - 7.1.9 - First Aid
 - 7.1.10 - Personal Hygiene and Protective Clothing
 - 7.2 - Identification of Possible Disruption Threats
 - 7.2.1 - System Protection and Security
 - 7.2.2 - Designation of An Emergency Coordinator
 - 7.2.3 - Available Resources
 - 7.2.4 - Well Shutdown Procedures
 - 7.2.5 - Communicating During an Emergency
 - 7.2.6 - Resumption of Water
 - 7.3 - Records Maintenance
 - 7.3.1 - Planning for the Future
 - 7.3.2 - Effective Communication
 - 7.3.3 - Consumer Confidence Reports
 - 7.3.4 - Public Notification
 - 7.3.5 - Relief Operator
 - 7.3.6 - Contacts for the Small Water System Operator