

MONTANA WATER CENTER OPERATOR BASICS TRAINING SERIES 2005 OUTLINE FOR 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 - The Hydrologic Cycle
- 2.2 - Types of Aquifers
- 2.3 - Ground Water Movement
 - 2.3.1 - Well Pumping
 - 2.3.2 - Recharge of Aquifers
- 2.4 - Brief Chemistry of Water
- 2.5 - Types of Ground Water Sources
 - 2.5.1 - What Is GWUDISW?
- 2.6 - Ground Water Contamination
 - 2.6.1 - Biological Contaminants
 - 2.6.2 - Chemical Contaminants
 - 2.6.3 - Radiological Contaminants
- 2.7 - Source Water Protection

3 - Treatment

- 3.1 - Overview of Disinfection
- 3.2 - Chlorination
 - 3.2.1 - Forms of Chlorine
 - 3.2.2 - Full-Time Chlorination
 - 3.2.3 - Periodic or Emergency Chlorination
 - 3.2.4 - Substituting Hypochlorite for Gas Chlorine
 - 3.2.5 - Gas Chlorine
- 3.3 - Ultra Violet Light (UV)
- 3.4 - Other Disinfectants
 - 3.4.1 - Ozone
 - 3.4.2 - Mixed Oxidants
 - 3.4.3 - Chlorine Dioxide
- 3.5 - Treatment for Chemical/Physical Contaminants
 - 3.5.1 - Nitrate and Nitrite
 - 3.5.2 - Iron and Manganese
 - 3.5.3 - Taste and Odor
 - 3.5.4 - Sulfate and Sulfide
 - 3.5.5 - Fluoride
 - 3.5.6 - Sand and Sediment
 - 3.5.7 - Corrosivity
 - 3.5.8 - Hardness

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- 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 - Distribution System Recordkeeping
 - 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 Breakers
 - 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 - Water Rights and Well Log Reports
 - 5.2 - Well Construction
 - 5.2.1 - Well Construction Methods
 - 5.2.2 - Casing Type and Size
 - 5.2.3 - Perforated Interval and Screens
 - 5.2.4 - Grouting and Sealing
 - 5.2.5 - Test Pumping
 - 5.2.6 - Adapters, Caps, Seals and Vents
 - 5.3 - Site Considerations
 - 5.3.1 - Drainage Around the Wellhead
 - 5.3.2 - Well Pits
 - 5.3.3 - Pump Power Cable Installation
 - 5.3.4 - Yard Hydrants and Sample Taps
 - 5.3.5 - Artesian Wells
 - 5.3.6 - Well Abandonment
 - 5.4 - Well Pumps and Components
 - 5.4.1 - Plumbing a Pump Station
 - 5.4.2 - Electrical Safety
 - 5.4.3 - Pressure Tanks
 - 5.5 - Well and Pump Maintenance
 - 5.5.1 - Routine Maintenance
 - 5.5.2 - 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 - Chemical Contaminants
 - 6.4.3 - Disinfectants and Disinfection Byproducts
 - 6.4.4 - Fluoridation
 - 6.4.5 - Lead and Copper / Corrosion Control
 - 6.4.6 - Secondary Contaminants and Concerns
 - 6.4.7 - 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