

Grade 3 Water Treatment Operator Need-To-Know Criteria (Subject Areas)

The following list of categories suggests topics of information that are important to know in order to be a successful and proficient Grade 3 Water Treatment Operator. The list may not be all-inclusive, and knowledge of additional topics may be of benefit to the operator.

Category of Information: Processes

Pre-Treatment

- Screens (Wells; Intake)
- Bar screens (Hand-cleaned; mechanically cleaned)

Aeration

- Slat tray
- Cascade
- Draft Aerators
 - Induced draft
 - Positive draft

Coagulation/Flocculation

- Mixers-in-line
- Mechanical
- Baffles
- Polymers
- Coagulants
 - Alum
 - Ferric Chloride and Sulfate
 - Polyaluminum Chloride

Clarification

- Pre-sedimentation
- Sedimentation Basins
- Upflow Solids Clarifiers
- Tube settlers

Filtration

- Rapid Sand
- Mixed Media
- Pressure
- Slow Sand
- Membrane
- Oxidation
 - Potassium Permanganate
 - Sodium Permanganate
- Point of entry cartridge filter
- Bag

Disinfection

- Gas Chlorinators
- Hypochlorinators
- Ozonators
- Chlorine Dioxide
- Mixed Oxidants
- Ultra-violet

Fluoridation

- Fluorosilicic Acid
- Sodium fluoride
- Sodium Fluorosilicate

Taste/Odor Control

- Aeration
- Powdered Activated Carbon
- GAC Contactors
- Oxidation
 - Potassium Permanganate
 - Sodium Permanganate
 - Chlorine
 - Peroxide

Softening

- Chemical Precipitation
- Ion Exchange

Corrosion Control

- Calcium Carbonate Equilibrium
- Corrosion Inhibitors
- Aeration

Iron/Manganese Removal

- Chemical Oxidation Precipitation
 - Potassium Permanganate
 - Sodium Permanganate
 - Chlorine Dioxide
- Aeration
- Filters
- Green Sand

Storage

- Ground Storage
- Elevated Tanks
- Standpipes
- Hydropneumatic Tanks

Recirculation

- Water Systems
- Sludge Systems

Sludge Disposal

- Drying Beds
- Filter Press
- Land Disposal
- Belt Press
- Landfill Solids
- Land Application of Solids

Cross Connections

- Air Gap
- Vacuum Breakers
- Backflow
- Backpressure
- Backsiphonage
- Cross Connection

Category of Information: Support Systems

Motors

- Single Phase
- Three Phase
- Variable Speed

Drives

- Coupled
- Direct

Pumps

- Air Lift
- Centrifugal
- Positive Displacement (Piston Plunger; Cavity; Diaphragm)
- Turbine
- Metering

Blowers and Compressors

- Centrifugal
- Positive Displacement

Generators

- AC & DC

Engines

- Gasoline & Diesel

Pipes

- Ductile Iron
- PVC
- Asbestos Cement

Joints

- Flanged
- Compression/Dresser
- Threaded

Valves

- Ball
- Check
- Globe
- Gate
- Plug
- Pressure Control
- Vacuum Relief
- Mud
- Butterfly
- Multiport
- Sluice Gate
- Air Release
- Foot
- Altitude
- RBPB
- Double Check

Fittings

- Coupling
- Union
- Plug/Caps
- Corporation
- Curb Stop

Cathodic Protection Devices

- Anode Rod/Bags
- Cathode Rod/Bags
- Rectifiers

- Dissimilar metals – Galvanic Corrosion
- ### Measuring/Control

- Signal Generators
 - Magnetic Flowmeter
 - Parshall Flume
 - Proportional Weir
 - Rectangular Weir
 - Venturi
 - Propeller Meter
 - Ultrasonic
 - Pitot tube
- Signal Transmitters
 - Electric
 - Pneumatic
 - Hydraulic
 - Mechanical
 - Telemetry
- Signal Receivers
 - Counters
 - Indicators
 - Log Scale Indicators
 - Totalizers
 - Recorders
- Meters
 - Hydraulic/Rotameters
 - Electrical – Amp
 - Electrical – Watt
 - Electrical - Multi – VOM
 - Electrical - Multi - MA
- Alarms
- Controls
 - Pneumatic
 - Float
 - Hydraulic
 - Electrical
 - Telemetry
 - Timers

Chemical Feeders

- Solids
- Liquids
- Evaporators
- Gas
- Slurry

Rolling Stock

- Service Vehicles
- Trucks
- Portable Pumps
- Generators

Safety

- Personal Protection Equipment
- Self Contained Breathing Apparatus
- Confined Space
- MSDS Information
- Traffic Control (Warning Devices; Barricades)
- Hazard Detection
- First Aid/Hygiene

Security

- Attack
 - Prevention
 - Detection
 - Recovery

Category of Information: Lab Tests

Lab Tests

- Alkalinity
- Calcium
- Disinfectant residual
- Disinfectant demand
- Fluoride
- Iron
- Jar Test
 - Maximum Gradient
 - Velocity Gradient
 - Viscosity of Water
- Manganese
- Orthophosphate
- pH
- Specific Conductance
- Temperature
- Threshold Odor Number
- Total Coliform
- Total Hardness
- Turbidity (NTU)
- CO₂
- Specific Gravity
- THM
- HAA5

Category of Information: General Information

Units of Expression

- Definition
- Conversion

Sources and Characteristics

- Characterization
- Quality/quantity
- Physical/chemical/biological characteristics

Electrical Concepts (Basic)

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Hydraulic Concepts (Basic)

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Maps/Plans