

Grade 4 Wastewater Treatment Operator Need-To-Know Criteria (Subject Areas)

The following list of categories suggests topics of information which are important to know in order to be a successful and proficient Grade 4 Wastewater 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

Collection Systems

- Types
- Inflow, Infiltration, Exfiltration
- Pre-treatment
- Sources of wastewater
- Pump stations

Flow

- Measurement
- Flow equalization

Screening

- Bar screens (hand-cleaned)
- Bar screens (mechanically cleaned)
- Static screen
- Microscreen

Grinding

- Grinders
- Comminutors
- Barminutors

Grit Removal

- Hand-cleaned grit chambers
- Mechanically-cleaned grit chambers
- Aerated grit chambers
- Vortex

Clarification

- Primary (Rectangular; Circular)
- Secondary
- SBR Clarification

Attached Growth/Fixed Film

- Trickling Filters
 - Standard Rate
 - High Rate
 - Roughing
- Rotating Biological Contactor (RBC)
- Activated Biofilter (ABF)

Lagoons

- Aerobic
- Facultative
- Anaerobic
- Aerated
- Discharging

Activated Sludge

- Conventional
- Step Feed
- Contact Stabilization
- Extended aeration
- Tapered aeration
- Complete mix
- Pure oxygen
- Oxidation ditch
- Types of aeration
- Sequencing Batch Reactor (SBR)
- Membrane Biological Reactor (MBR)

Solids handling

- Sludge conditioning
- Sludge thickening
- Anaerobic digesters
- Aerobic digesters
- Dewatering
- Incineration
- Drying beds
- Land application
- Composting
- 503 Regulations

Disinfection/ Use of Chlorine

- Chlorination
- Dechlorination
- UV
- Other methods

Advanced Treatment

- Filtration
- Nitrogen removal
- Phosphorus removal
- Biological

Effluent Disposal

- Discharge
- Direct Use
- Irrigation
- Underground Disposal
- NPDES Permit

Cross- Connection

- Prevention

- Types of devices

Category of Information: Support Systems

Motors

- Single Phase
- Poly Phase
- Variable Speed

Drives

- Coupled
- Direct (Shaft; Gear)
- Speed Reducer (Fixed; Variable)
- Right Angle

Pumps

- Air Lift
- Centrifugal
- Positive Displacement
 - Piston Plunger
 - Progressive Cavity
 - Diaphragm
- Screw
- Turbine
- Metering
- Ejector

Blowers and Compressors

- Centrifugal
- Positive Displacement (Rotary; Piston)

Generators – AC & DC

Engines – Gasoline, Diesel & Gas

Joints

- Flanged
- Compression
- Dresser
- Victualic
- Fused
- Threaded

Valves

- Ball
- Check
- Globe
- Gate
- Plug
- Petcock
- Pressure Control
- Vacuum Relief
- Mud
- Butterfly
- Multiport
- Telescoping
- Sluice Gate
- Air Release
- Foot

- Altitude

Fittings

- Coupling
- Union
- Plug/Caps
- Corporation (Ferrell; Cock)
- Curb Stop
- Special

Cathodic Protection Devices

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

Measuring/ Control

- Signal Generators
 - Kennison Nozzle
 - 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
 - Combination Recorders
- Meters
 - Hydraulic – Rotameter
 - Electrical – Amp
 - Electrical – Watt
 - Electrical – Watt – Hour
 - Electrical – Multi.
 - Electrical – VOM
 - Electrical – Megger
 - Mechanical – RPM
- Alarms
- Controls
 - Pneumatic
 - Float
 - Hydraulic
 - Electrical
 - Telemetry
 - Timers

Category of Information: Support Systems (continued)

Chemical Feeders

- Solids
- Liquids
- Evaporators
- Gas
- Slurry

Odor Control

- Biofilters
- Chemical Additives
- Scrubbers

Rolling Stock

- Service Vehicles
- Fork Lifts
- Trucks
- Tractors
- Trailers
- Lawn Mowers
- Loaders
- Portable Pumps

- Generators
- ### HVAC

- Heat Exchangers
- Dehumidifiers
- Fans
- Compressors
- Condensers
- Boilers

Safety Equipment

- Personal Protection Gear
- Traffic Control (Warning Devices; Barricades)
- Hazard Detectors
- First Aid/Hygiene

Category of Information: Lab Tests

Routine Tests

- B.O.D.
- Ammonia
- Chlorine Residual
- Coliform (Fecal)
- E. coli
- Dissolved oxygen
- Total Kjeldahl nitrogen
- pH

- Phosphorus
- Solids
 - Settleable
 - Suspended
 - Total dissolved
 - Total
 - Volatile

Control Tests

- Centrifuge
- Alkalinity
- C.O.D.
- Color
- Conductance
- Nutrients
- Micro exam
- Nitrate - nitrite

- Oil and Grease
- Surfactants
- Temperature
- Total organic carbon
- Turbidity
- Volatile acids
- Settleability
- Specific Oxygen Uptake Rate (SOUR)

Special Tests:

- Metals
- Chlorinated organics
- Cyanide

- Phenol
- Sulfate - sulfide
- Biomonitoring

Category of Information: General Information

Units of expression

- Define units
- Convert units

Electrical (Basic)

Hydraulics (Basic)

Sources and characteristics

- Characterize
- Quality/quantity
- Physical/chemical/biological
- Effects
- Pre-aeration
- Chemical pre-treatment
- Grease control

Maps/plans – Interpretation and use

WWT Processes

- Sketch sequence
- Describe processes
- Explain why treated
- Goals of WWT (protect public; protect environment)