

# Grade 3 Wastewater Treatment Operator Need-To-Know Criteria

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 digestors
- Aerobic digestors
- 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
- 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)

Maps/plans – Interpretation and use

### Sources and characteristics

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

### WWT Processes

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