1. Basic and applied math
   - Perform addition, subtraction, multiplication and division of whole numbers and decimals
   - Square and cube whole numbers, fractions, mixed numbers and decimals
   - Using conventional formulas, solve for
     - Diameter and Radius
     - Circumference
     - Perimeter
     - Area: Surface area, cross-sectional area, and sidewall area for circles, rectangles, and triangles
     - Volume: Circular tanks, pipes, and rectangular tanks
     - Dosages: lbs and lbs/day
     - Solutions: Weight of solutions, dilution (gal of concentrated solution), dosage (mg/L), and % strength (available)
     - Hydraulics: Total head (suction & pressure), velocity, and average velocity
     - Pumps: Water HP, Brake HP, and efficiency
     - Blowers: Blower size (cfm)
     - Population Equivalent (PE): Design flow and population equivalent
     - Lift Stations: Detention time, filling time, pumping time, emptying time
     - Construction: Slope (ft/ft) and slope (%)
   - Convert fractions to percentage and vice-versa
   - Read tables
   - Develop tables
   - Using conversion references, convert from English to metric and vice-versa
   - Calculate percent removal for I/I

2. Basic and applied science
   - Identify and describe chemicals used in wastewater
   - Define and describe the significance of basic concepts in wastewater chemistry

3. Safety
   - Identify basic categories of safety hazards
   - Identify basic safety procedures
   - Describe personal safety procedures
   - Describe basic fire safety procedures
   - Describe chemical safety procedures
   - Describe confined space safety procedures
   - Identify chemical placards
   - Identify and describe use of safety equipment
4. Units of expression
   - Defining and measuring units of expression, such as ppm, mg/L, lbs/mg, etc.
   - Perform necessary calculations
   - Convert from one unit to another using appropriate references or formulas
     ⇒ Time: Days, hours, minutes, and seconds
     ⇒ Distance: Tenths, inches, feet, yards, and miles
     ⇒ Area: Square inches, square feet, square yards, and acres
     ⇒ Volume
       ♦ Cubic feet, cubic yards, and gallons
       ♦ Gallons, milliliters, and liters
     ⇒ Weight
       ♦ Cubic feet, gallons, ounces, tons and pounds
       ♦ Milligrams, grams, kilograms, and pounds
     ⇒ Flow: mgd, gpd, gpm, and cfs
     ⇒ Head: psi and feet
     ⇒ Dosage: mg/L, ppm, and %

5. Electrical concepts
   - Define basic concepts
   - Terminology

6. Hydraulic concepts
   - Define basic concepts

7. Maps and plans
   - Interpret and use maps and plans
   - Perform necessary calculations
   - Update system maps as needed

8. Sources and characteristics
   - Identify sources
   - Describe source quality and quantity
   - Identify physical, chemical, and biological characteristics
   - Describe effects of the physical, chemical, and biological characteristics
   - Define pollution prevention concepts and terminology
   - Describe pollution prevention practices

9. Public health principles
10. System types: Sanitary, storm, and combined
11. Gravity collection systems
    - Building sewers (service lines)
    - Lateral sewers
    - Branch sewers
    - Main sewers
    - Trunk sewers
    - Intercepting sewers
    - Outfall sewers
12. Low pressure collection systems
13. Vacuum collection systems
14. Lift stations
   - General purpose
   - Wet wells
   - Dry wells
   - Drives: Coupled, direct (shaft & gear), speed reducer (fixed and variable), right angle, and universal
   - Pumps
     ⇒ Centrifugal: Submersible, flooded suction, and self-priming
     ⇒ Positive displacement: Diaphragm, piston plunger, and progressive cavity
     ⇒ Screw
     ⇒ Turbine
     ⇒ Metering
     ⇒ Pneumatic ejector
     ⇒ Pump testing
     ⇒ Components for each pump
     ⇒ Maintenance
   - Blowers & compressors: Centrifugal and positive displacement (rotary and piston)
   - Series/parallel
   - Generators
   - Engines: Gasoline, diesel, and LP/Natural gas
   - Valves
   - Screening devices
   - Emergency response
   - Dehumidifiers

15. System components
   - Pipes: ACP, CIP, concrete, VCP, DIP, steel, thermoplastic, and thermoset plastic
   - Pipe joints: Gasketed, flanged, cement mortar, solvent cement, compression, welded, heat fusion, bituminous, elastomeric sealing compound, mastic, dresser, victaulic, fused, and threaded
   - Valves: Ball, check, globe, gate, plug, petcock, pressure control, vacuum relief, mud, butterfly, multiport, telescoping, sluice gate, air release, and foot
   - Fittings: Coupling, union, plugs/caps, and special
   - Manholes
   - Pressure sewers
   - Force mains
   - Backflow prevention devices
   - Cleanouts
   - Inverted siphons
15. System components cont’d
   - Diversion structures
   - Catch basins
   - Hydrants

16. Cleaning and maintenance
   - Stoppages
   - Hydraulic
   - Mechanical
   - Sewer lines and system components
   - Operation and maintenance
   - Combination cleaner

17. Inspection and testing
   - Sewer lines and system components
   - Closed-circuit television
   - Flow monitoring
   - Ground water gauging
   - Smoke
   - Dye
   - Lift station
   - Lamping
   - Air and water
   - Vacuum
   - Mandrel

18. Construction, repair, and replacement
   - Damage
   - Excavation
     ⇒ Equipment
     ⇒ Location of utilities
   - Shoring/shielding/sloping/benching
   - Sewers
   - Manholes
   - Inspection
   - Testing

19. Sewer rehabilitation
   - Corrosion
   - Grouting and sealing
   - Trenchless technology
   - Manhole rehabilitation
   - Service line rehabilitation
   - Inspection
   - Testing
20. Infiltration/inflow/exfiltration detection
   - SSES
   - Infiltration/exfiltration
   - Inflow

21. Flow measurement
   - Manual
   - Flow meters

22. Chemical addition
   - Roots
   - Grease
   - Corrosion
   - Rodents and insects
   - Disinfection
   - Application: Flooding, spraying, and foaming
   - Testing

23. Odor control
   - Chlorine
   - Hydrogen peroxide
   - Oxygenation
   - Lime
   - Sodium hydroxide
   - Iron salts
   - Masking agents
   - Other chemicals
   - Testing

24. Right of ways/easement
   - Maintenance and equipment: Mechanical and chemical

25. Information management systems
   - Manual
   - CMMS: GIS, GPS, and databases

26. Administration
   - Personnel
   - Information and record keeping
   - Emergency response – O & M
   - Public relations
     ⇒ PR interactions
   - Security
     ⇒ Site
   - Laws, regulations, and compliance issues
South Carolina “B” Operator Study Guide

For more study information, please contact

- Office of Water Programs, California State University Sacramento, 6000 J St, Sacramento, CA 95819-6025, call 916-278-6142, fax 916-278-5959, email wateroffice@owp.csus.edu, www.owp.csus.edu
  ⇒ Volume I of the *Operation and Maintenance of Wastewater Collection Systems*
  ⇒ Volume II of the *Operation and Maintenance of Wastewater Collection Systems*
  ⇒ *Collection System Operation and Maintenance Training Videos*
  ⇒ *WEF/ABC Collection System Operators’ Guide to Preparing for the Certification Examination*
  ⇒ *WEF Wastewater Collection System Operator Certification Studybook*

Disclaimer: Please note that this study guide is being provided to help you prepare for your exam. It was created from the “Needs-to-Know” validated by the South Carolina Voluntary Certification Committee, but it is NOT the “Need-to-Know”. To obtain a copy of the validated “Needs-to-Know”, please contact our office: SCAWWA / WEASC, 200-C Rich Lex Dr., Lexington, SC 9072-9274, 803-939-9574.