CORE COMPETENCIES

• LEARNING OBJECTIVES
  o TASKS

22.75 Available hours for training with 3.0 hours for Exam.

MATERIALS, TOOLS AND LUBRICATION (5.0 HOURS TRAINING)

• To provide a basic overview of tools, materials and lubrication required for basic plant maintenance technologist.
  o REQUIRED MATERIAL SELECTION – Adhesives, Anti-seize compounds, Coatings/Paints, Epoxy, Fastening Devices, Gaskets, Locking Compounds, Metals, O-rings, Plastics, Sealants, Shims, Solvents
  o REQUIRED KNOWLEDGE OF MATERIALS – Application Procedures, Corrosion Control, Material Compatibility, Material Safety Data Sheets, Storage Procedures
  o REQUIRED USE OF PRECISION TOOLS – Alignment, Caliper, Dial Indicator, Laser, Micrometer
  o REQUIRED KNOWLEDGE OF TOOLS – Accuracy, Non Sparking, Precision, Sharpening, Tool Storage
  o REQUIRED USE OF LUBRICANTS – Grease, Oil, Water
  o REQUIRED KNOWLEDGE OF LUBRICATION – Food Grade Lubricants, Grades of Lubricants, Load, Lubrication Systems, Manufacturer Requirements, Petroleum Based Lubricants, Product Compatibility, Sampling, Scheduling, Synthetic Based Lubricants, Temperature
  o REQUIRED PREDICTIVE MAINTENANCE – Flow Monitoring, Hour Readings, Oil Analysis, Pressure Recording, Temperature Monitoring, Vibration Analysis

PUMPS (3.0 HOURS TRAINING)

• To provide a basic knowledge of pumps, types, operation and components
  o REQUIRED KNOWLEDGE OF PUMP OPERATIONS – Air Binding, Cavitation, Operating Against A Closed Valve, Pump Curve, Pump Efficiency, Pump Head/Hydraulics, Reverse Rotation, Water Hammer (Surge)
  o REQUIRED KNOWLEDGE OF PUMP COMPONENTS – Impeller, Lantern Ring, Mechanical Seals, Packing, Packing Gland, Shaft Sleeve, Slinger Ring, Stuffing Box, Suction/Discharge Valves, Volute, Wear Plate, Wear Rings
ROTATING COMPONENTS (2.0 HOURS TRAINING)

- To provide a basic knowledge of bearings, shafts and seals
  - **INSPECT BEARINGS** – Ball, Needle, Radial, Roller, Spherical, Tapered, Thrust
  - **INSPECT BUSHINGS** – Babbitt, Sleeve
  - **REQUIRED KNOWLEDGE OF BEARINGS AND BUSHINGS** – Cleaning Procedures, Dismounting Procedures, Lubrication Methods, Mounting Procedures, Seals, Shields, Wear Pattern Analysis
  - **INSPECT SHAFTS**
  - **REQUIRED KNOWLEDGE OF SHAFTS** – Axial Alignment, Bearing Fit, Coupling Techniques, Dismounting Procedures, Endplay, Lubrication Methods, Mounting Procedures, Out-of-Roundness, Plumb, Run out, Storage, Vibration Analysis, Wear Pattern, Wear Sleeves

MOTORS AND DRIVES (1.0 HOUR TRAINING)

- To provide a basic knowledge of electric, internal combustion engines and drives
  - **INSPECT DRIVE EQUIPMENT** – Actuators, Belts, Brakes, Chains, Clutches, Drive Coupling, Drive Shafts, Gearbox, Gears, Universal Joints, Variable Speed Belt Drive
  - **REQUIRED KNOWLEDGE OF DRIVE EQUIPMENT** – Alignment, Anti-reverse Ratchets, Carrier Bearings, Gear Lash, Gear Ratios, Guards, Harmonic Imbalance, Lock Nuts, Shear Pin, Torque Overload

PIPES AND VALVES (1.75 HOURS TRAINING)

- To provide a basic knowledge of valves, valve controls and hydraulics
  - **REQUIRED KNOWLEDGE OF VALVE APPLICATION** – Actuators, Air release, Air Vacuum, Backflow Prevention, Isolation, Level Control, Pressure Control, Throttling
  - **REQUIRED KNOWLEDGE OF PIPING** – Hydraulic Concepts, Wrap

SAFETY PRACTICES (2.75 HOURS TRAINING)

- Overview of general industrial safety standards
  - **REQUIRED KNOWLEDGE OF HEAVY EQUIPMENT** – Commercial Driver License (CDL), Equipment Operator Certification, Safety Procedures
  - **INSPECT TANKS**
  - **REQUIRED KNOWLEDGE OF TANKS** – Application, Cathodic Protection, Coatings, Materials, Overflow/Drain Lines, Tank Access, Ventilation, Wash Down Procedure
  - **REQUIRED TO FOLLOW SAFETY PROCEDURES** – Chemical Handling, Confined Space Entry, Cross Connection Control, Electrical Hazards, Explosion Proof Lighting, Extension Cords, Fire Safety,
Laboratory Safety, Lock-out/Tag-out, Traffic Control/Work Zone Safety, Trenching and Shoring Required


**PRESSURE VESSELS AND BLOWERS (1.5 HOURS TRAINING)**

- To provide a basic knowledge of compressors, blowers, boilers and associated devices
  - **REQUIRED KNOWLEDGE OF BOILERS** – Air Release Valve, Chemical Feed, Corrosion Control, Low Water Cutoff, Pressure Relief Valve, Water Chemical Analysis
  - **REQUIRED KNOWLEDGE OF COMPRESSORS/BLOWERS** – Air Dryers, Constant Speed Control Systems, Filters, Mufflers, On-Off Control Systems, Pressure Relief, Unloader Control Systems

**ELECTRICAL DEVICES AND CONCEPTS (0.75 HOUR TRAINING)**

- To provide a basic knowledge of electrical theory, electrical apparatus types, devices and operation
  - **REQUIRED KNOWLEDGE OF ELECTRICAL DEVICES** – Ammeter, Conduit, Ground Fault Circuit Interrupters (GFCI), Internal Motor Heating Coils, Leak Detection (Insulation), Magnetic Starters, Motor Control, Phase Protection Monitoring, Vibration Monitoring, Voltmeter, Watt Hour Meter
  - **REQUIRED KNOWLEDGE OF ELECTRICAL CONCEPTS** – Amperage, Grounding, Load Demand, Resistance, Voltage, Wattage, Wire Sizing

**INSTRUMENTATION (0.75 HOURS TRAINING)**

- The identification of process control instrumentation, electrical and electronic monitoring
  - **IDENTIFY INSTRUMENTS** – Air Velocity, Chart Recorder, Chlorine, Conductivity, Dissolved Oxygen (DO), Gas Monitors, Oxidation Reduction Potential (ORP), Particle Counters, pH, Power Supply, Recorders, Streaming Current, Temperature, Totalizer
  - **IDENTIFY ELECTRONIC EQUIPMENT** – Auto dialers, On/Off Control, Programmable Logic Controllers (PLC), Radio/SCADA Systems
REQUIRED KNOWLEDGE OF INSTRUMENTATION AND ELECTRONIC EQUIPMENT – Alarm Set-Points, Analog, Diaphragms, Digital, Oil Fill, Programming, Troubleshooting Techniques

IDENTIFY LEVEL/FLOW DEVICES – Bubblers, Conductivity, Doppler, Electrode, Float, Magnetic, Manometer, Palmer-Bowlsus Flume, Parshall Flume, Pressure Differential (Venturi), Pressure Transducers, Propeller, Ultrasonic, V-notch Weir, Other Closed Pipe, Other Open-Channel

REQUIRED KNOWLEDGE OF LEVEL/FLOW DEVICES – Application Procedures, Methods of Measuring Drawdown, Troubleshooting Techniques

MATH (1.5 HOURS TRAINING)
- To provide a basic knowledge of industrial and shop math
  - REQUIRED TO PERFORM CALCULATIONS – Addition and Subtraction, Division and Multiplication, Basic Algebra, Basic Geometry, Exponents, Graphing

DRAWINGS (0.5 HOUR TRAINING)
- To provide a basic understanding of maps, prints, drawings, illustrations and symbols
  - INTERPRET DRAWINGS – Operation and Maintenance Manuals, Standard Operation Procedures, System Maps
  - REQUIRED KNOWLEDGE OF DRAWINGS – Geographic Information System (GIS), Graphing, Sketching Techniques

MAINTENANCE MANAGEMENT (2.25 HOURS TRAINING)
- The components of an infrastructure maintenance program
  - REQUIRED ADMINISTRATIVE/MAINTENANCE MANAGEMENT – Predictive Maintenance, Preventive Maintenance, Record Keeping, Work Order
  - MAINTAIN SYSTEM SECURITY – Fences, Lighting and Locks, Chemical Delivery, Surveillance
  - PROTECT SYSTEM SECURITY – Data Security, Vehicle Security
  - RESTRICT SYSTEM SECURITY – Computer Access, System Access
  - REQUIRED KNOWLEDGE OF SYSTEM SECURITY – Communication Systems, Homeland Security, Security Awareness
NC AWWA-WEA  
Voluntary Plant Maintenance Technologist Class I Certification  
Core Competencies for Class I  
May 18th, 2009

- **REQUIRED REGULATIONS AND STANDARDS** – Comply with Requirements, Implement Requirements, Record Requirements, Report Requirements

- **REQUIRED KNOWLEDGE OF REGULATIONS AND STANDARDS**
  - CHEMTREC, Department of Homeland Security, Department of Transportation, Environmental Protection Agency 40 CFR, National Incident Management System, National Sanitation Foundation, Occupational Safety & Health Administration, Office of Hazardous Materials Safety, State/Provincial Regulations