CORE COMPETENCIES

• LEARNING OBJECTIVES
  o TASKS – Changes from Class 1

23.00 Available hours for training with 3.0 hours for Exam.

MATERIALS, TOOLS AND LUBRICATION (3.75 HOURS TRAINING)
• To provide intermediate overview of tools, materials and lubrication required for Class 2 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 PREDICTIVE MAINTENANCE – Amperage, Flow Monitoring, Hour Readings, Oil Analysis, Pressure Recording, Temperature Monitoring, Vibration Analysis

PUMPS (2.25 HOURS TRAINING)
• To provide intermediate 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)
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 intermediate knowledge of bearings, shafts and seals.
  - MAINTAIN BEARINGS - Ball, Needle, Radial, Roller, Spherical, Tapered, Thrust
  - MAINTAIN BUSHINGS - Babbitt, Sleeve
  - REQUIRED KNOWLEDGE OF BEARINGS AND BUSHINGS - Cleaning Procedures, Dismounting Procedures, Lubrication Methods, Mounting Procedures, Seals, Shields, Wear Pattern Analysis
  - MAINTAIN 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 (1.75 HOUR TRAINING)
- To provide intermediate knowledge of electric, internal combustion engines and drives.
  - REQUIRED KNOWLEDGE OF MOTORS - Brake Horsepower, Capacitors, Enclosures, Hollow Shaft, Motor Brushes, Motor Efficiency, Motor Windings, Mounting, Rotation, Service factor
  - MAINTAIN 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 (2.25 HOURS TRAINING)
- To provide intermediate 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, BFP
  - MAINTAIN TANKS
REQUIRED KNOWLEDGE OF TANKS - Application, Cathodic Protection, Coatings, Materials, Overflow/Drain Lines, Tank Access, Ventilation, Wash Down Procedures

SAFETY PRACTICES (2.00 HOURS TRAINING)
- Intermediate overview of industrial safety standards.
  - REQUIRED KNOWLEDGE OF HEAVY EQUIPMENT - Commercial Driver License (CDL), Equipment Operator Certification, Safety Procedures
  - 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 intermediate 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 (1.0 HOUR TRAINING)
- To provide intermediate 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
  - IDENTIFY ELECTRICAL DEVICES - Soft Start (reduced voltage starter), Variable Frequency Drives
  - REQUIRED KNOWLEDGE OF ELECTRICAL CONCEPTS - Amperage, Grounding, Load Demand, Resistance, Voltage, Wattage, Wire Sizing, Electrical Line Diagrams, Electrical Math
REQUIRED KNOWLEDGE OF REGULATIONS / STANDARDS - National Fire Protection Association

INSTRUMENTATION (1.0 HOURS TRAINING)
- To provide intermediate knowledge of process control instrumentation, electrical and electronic monitoring.
  - **MAINTAIN INSTRUMENTATION CONTROL** - Electronic Equipment, Instrumentation, Level / Flow Devices
  - **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
  - **MAINTAIN / REPLACE LEVEL/FLOW DEVICES** - Bubblers, Conductivity, Doppler, Electode, Float, Magnetic, Manometer, Palmer-Bowlus 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 (2.5 HOURS TRAINING)
- To provide intermediate knowledge of industrial and shop math.
  - **REQUIRED TO PERFORM CALCULATIONS** - Addition and Subtraction, Division and Multiplication, Basic Algebra, Basic Geometry, Exponents, as used to solve practical Maintenance Applications

DRAWINGS (0.75 HOUR TRAINING)
- To provide intermediate understanding of maps, prints, drawings, illustrations and symbols.
  - **INTERPRET DRAWINGS** - As-Built Drawings / Blueprints, Charts, Process and Instrumentation Diagrams, Schematics, 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 intermediate components of an infrastructure maintenance program.
  - **REQUIRED ADMINISTRATIVE / MAINTENANCE MANAGEMENT** - Corrective Maintenance, Employee Training,
Predictive Maintenance, Preventive Maintenance, Record Keeping, Work Order, Writing Reports


- **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 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