SECTION 15186
WATER TREATMENT

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements, apply to work specified in this Section.

B. Requirements of Section 15050, "Basic Mechanical Materials and Methods," apply to work specified in this section.

1.02 SUMMARY

A. Provide water treatment contractor to make a chemical analysis of water supply, to furnish water treatment equipment and to provide water treatment service for a period of one year from the date of start up.

B. Provide equipment, chemicals, controls, and service for a complete water treatment program. Water treatment program to service the following systems:
1. Energy recovery system
2. Hot water heating
3. Chilled water
4. Steam system with 100 percent make-up water for humidification and Lab equipment..
5. Make-up water

C. Chemical cleaning of new systems.

1.03 REFERANCE STANDARDS

A. Department of Agriculture requirements for boiler water treatment chemicals.

1.04 SUBMITTALS

A. Product data including chemical properties, rated capacities of selected model, weights (shipping, installed, and operating), furnished specialties, and accessories; and installation and startup instructions.

B. Shop drawings detailing fabrication and installation of equipment assemblies. Indicate dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.

C. Wiring diagrams detailing power and control wiring and differentiating clearly between manufacturer-installed wiring and field-installed wiring.

1.05 OPERATION AND MAINTENANCE MANUALS

A. The manuals shall include a table of contents, specifications, drawings, and description of equipment; chemicals, installation instructions; operating instructions; Maintenance instructions; parts lists; and test data and performance curves. The table of contents shall be marked with the Owner's name, project name, equipment name, and the Owner's purchase order number.

B. Where applicable, the information contained in the manual shall include a list of recommended spare parts and a schedule of required lubricants, as recommended by the Manufacturer. The data shall also include all nameplate information and shop order numbers for each item of equipment and component part thereof.

C. Six copies of complete and final operation and maintenance manuals, including one set, suitable for reproduction.

1.06 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of water treatment equipment, of types and capacities required, whose products have been in satisfactory use in similar service for not less than 10 years.

B. Installer's Qualifications: Firm with at least 10 years of successful installation experience on projects with treating and service of boilers, cooling towers, and closed loop piping systems, similar to those indicated for this Project and that have a record of successful in-service programs.

C. Coordination: The Contractor to coordinate layout and installation of water treatment systems with related work.
   1. Furnish copy of manufacturer's wiring diagram submittal to electrical Installer.
   2. Coordinate size and location of equipment.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers and Installers: Subject to compliance with requirements, furnish product by one of the following manufacturers:
   1. Barclay Water Management
   2. Betz Entec Inc.
   3. Malco Co.

2.02 GENERAL

A. Provide all chemical feed pump, solution tanks, solenoid valves, controls, timers, meters, feeders, propylene glycol, etc., required.

2.03 CHEMICAL CLEANING OF PIPING

A. Supervise the flush out cleaning of all water systems to be treated. The flush out procedure shall be as follows:

1. Cleaning chemical shall be Barclay Liquid Flush out or equal for closed loop systems and Prekleen 50 for steam boilers. Systems shall be circulated for at least 24 hours with chemical and then thoroughly flushed. Remaining total alkalinity shall not exceed 200 ppm and maximum dissolved solids level shall not exceed 200 ppm. Cleaning solution shall not remain in systems longer than 48 hours.

2.04 CLOSED LOOP WATER SYSTEMS (HOT, CHILLED, AND ENERGY RECOVERY)

A. Five (5) gallon capacity filter/by-pass shot feeder shall be furnished and installed for the closed water loop. Barclay model FTF-5 or equal.

B. Two station corrosion coupon rack.

C. A single liquid corrosion inhibitor shall be provided. Product shall be nitrite-borate based blend. Control limits shall be 800-1,200 parts per million sodium nitrite. Treatment shall be Barclay Inhibitor N-101 or equal.

D. Forty percent propylene glycol by volume shall be furnished and installed for freeze and corrosion protection for the closed water loop systems. The fluid must conform to the following:

1. Freezing point equal to -5°F and burst point equal to -21°F.

2. Fuild conforms to ASTM D1384

3. Fluid is dyed yellow to facilitate leak detection.

4. Alkalinity of the fluid must be at least 15 mL.

2.05 STEAM BOILER

A. Furnish Chemical Feed Pump and Tank. LMI pump model A151-19lS, 0-24GPD at 110 psi. Chemical tank to be LMI 26350-1, 50 gallon with cover Pump to be wired into boiler feed water pump circuit for semi-automatic operation.

B. Only liquid boiler treatments shall be provided. Products shall contain scale and deposit inhibitors. alkalinity boosters and oxygen scavengers. Treatment shall be Barclay Bar Kem 404 and Oxotrol or equal.

C. Furnish Sodium Zeolite Water Softener System for softening of a continuous make-up water supply.

D. Volatile neutralizing amine is not allowed.

E. An automatic blow down for steam boiler high level blowoff/ skimmer connection. Provide control valve, sensors and associated controls.

PART 3 - EXECUTION

3.01 WATER ANALYSIS

A. Water Treatment contractor shall obtain water sample, make a chemical analysis of same for pH, total alkalinity, hardness, total solids, chloride and silica and select chemicals which will be used to treat system. Chromates shall not be used in Water Treatment System.

3.02 COMPLETE WATER TREATMENT SERVICE

A. For complete water treatment service, Water Treatment contractor shall:
   1. Make service visits every two weeks monthly on open systems and bimonthly visits to closed, recalculating systems to adjust feeding equipment, apply chemicals, obtain and analyze samples and regulate bleed-off, in order to maintain conditions as specified below.
   2. Furnish all necessary labor, chemicals and feeding equipment required for the specified treatment.
   3. Make monthly tests on open systems for Legionellae pneumophila.
   4. Obtain a signed service card after each visit and leave a report indicating which systems were serviced.
   5. Maintain complete records of treatment program for each system, such records to be made available, upon request, to interested parties.
   6. Instruct Contractor in field on installation, piping and wiring of chemical feeding equipment.
   7. Maintain chemical feeding equipment in proper working condition for term of contract.
   8. Maintain specified conditions in each system.
   9. Submit service reports as specified hereinafter.

B. Propylene Glycol

   1. Clean new systems with a 1% to 2% solution of trisodium phosphate in water prior to the installation of industrially inhibited forty percent propylene glycol fluid.

   2. Use only good quality water in solution with the propylene glycol fluid. Use water with low levels (less than 25 ppm) of chloride and sulfate, and less than 50 ppm of hard water ions (Ca++, Mg++). Distilled water is recommended. If good quality water is unavailable, purchase pre-diluted solutions of industrially inhibited propylene glycol fluid from the fluid manufacturer.

C. Submit reports to Owner for each service call.
   1. Include the following information as a minimum:
      a. pH before and after treatment.
      b. Dissolved solids excluding water treatment compounds.
      c. Methyl-orange alkalinity before and after treatment.
      d. Calcium hardness and total hardness.

e. Conductivity before and after treatment.
f. Concentration of each water treatment material before and after treatment.
g. Amount of makeup water used between visits, where water meter is provided in the system
h. Legionellae bacteria count per milliter and the results from the previous test.

3.03 SUPERVISED WATER TREATMENT SERVICE

A. For supervised water treatment service, Water Treatment contractor shall:
1. Provide complete written instructions to Owner for chemical feeding, bleed-off, blowdown control and testing procedures.
2. Demonstrate to Owner's personnel proper application of written instructions.
3. Provide all chemicals required during contract period.
4. Provide all required test kits.
5. Obtain samples from all systems, at least once per month, analyze such samples and furnish written reports and recommendations to Owner.
6. Furnish chemical feeding equipment and instruct Contractor in field on installation, piping and wiring of chemical feeding equipment.

END OF SECTION 15186