EXHIBIT A

UNIVERSITY OF NEVADA - LAS VEGAS WATER TREATMENT "BEST PRACTICES"

This document is designed to guide the UNIVERSITY OF NEVADA - LAS VEGAS HVAC systems through the difficult task of managing the water treatment programs at the facility level.

UNIVERSITY OF NEVADA - LAS VEGAS is looking for a comprehensive, service-oriented water treatment program for their cooling and closed loop chilled and hot water systems. This includes chemicals, automated chemical feed equipment and routine services. The intent of the program is to preserve the HVAC equipment assets, while optimizing water and energy efficiency through proper scale, corrosion and biological fouling control.

The primary goals, in no order of preference, of the service-oriented water treatment program are as follows:

- Minimize or eliminate safety hazards and chemical handling by PLANT personnel.

- Provide professional, knowledgeable and involved water treatment service personnel.

- Accurately monitor the program results and communicate appropriate recommendations with quantifiable, business-oriented justifications. Service reports shall provide the required water treatment test data to indicate the PLANT's compliance with the water treatment specifications.

- Reduce the overall energy/utility consumption through improved heat transfer efficiency and water quality. This is accomplished by improving the make-up quality, reducing system contamination and minimizing scale, corrosion, fouling and microbiological growth, which create deposits on heat transfer surfaces.

- Minimize the water usage rates by operating with maximum cycles of concentration levels, the elimination of leaks and evaluating alternative water sources as the make-up for the cooling systems.

- Minimize the repair and maintenance costs associated with the replacement and cleaning of equipment due to scale, corrosion, fouling or microbiological activity.

TOWER WATER SYSTEMS TREATMENT

Chemical Inhibitor:

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The chemical inhibitor chosen should either be based on the ability to control scale formation while running with the highest cycles of concentration levels, or have the ability to use alternative water sources. It is desired to run and maintain three cycles of concentration to minimize the water, sewage and chemical usage rates.

The inhibitor should be a phosphonate program (PBTC/azole/polymer). PBTC is the most resistant inhibitor to oxidizing biocides and holding time in cooling towers. The phosphonate levels should be maintained at a minimum of 1.06 PPM (3 PPM as PBTC) using the HACH method. The inhibitor should be fed based on water meter usage or by direct control method.

The only chemical protecting copper in your system is azole. These are tolytriazole (TT), benzotriazole (BZT), or HRA (halogen-resistant azole). The most common are TT and BZT. You must maintain some level of free and available azole, or you have no copper corrosion inhibition. With the use of enhanced tubes, the importance of controlling copper corrosion is critical. The minimum free and available azole level should be 1 PPM (tested by the HACH method).

The program should be maintained in such a manner to prevent scale formation and achieve corrosion rates no greater than 1 mil/yr (MPY) for mild steel and 0.1 MPY for copper by the use of coupon studies conducted a minimum of every 90 days.

The use of molybdate as a part of the program, or a trace testing method should be evaluated for discharge limits prior to use. In many municipalities, molybdate is not allowed to be discharged.

Given the very high levels of calcium and m-alkalinity in the potable make-up water source, soft water make-up applications or the use of acid to control tower water pH should be considered if there is financial justification for such use. If used, it is desired to stay with an alkaline-based program as described above and adjust the cycles of concentration levels to achieve an LSI (Langelier Stability Index) above 2. If the corrosion rates cannot be maintained with the program outlined, then inform UNIVERSITY OF NEVADA - LAS VEGAS management.

The use of acid should be the last resort as part of the water treatment program due to safety concerns. Any use of acid needs to be reviewed by UNIVERSITY OF NEVADA - LAS VEGAS.

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Dual Biocide Program:

The most important component of the treatment of cooling towers is the biocide program. Over 90% of failures in cooling systems are due to microbiologically-influenced underdeposit corrosion. In addition, the lack of control of this aspect of the program can lead to the growth of the dangerous *Legionella* bacteria. This program must be controlled to keep total aerobic counts below 10,000 cells/ml and total anaerobic counts below 50 cells/ml at all times. The biocide program must be a dual, alternating program where two biocides are employed. For bulk water sterilization, a halogen-type biocide is used, while a non-oxidizing biocide is used to control anaerobic and slime-forming type bacteria. Please remember that "biocide" means "kills life". These products need to be respected from a safety stand-point.

Oxidizing Biocide – Primary Biocide:

The oxidizing biocide of choice is a liquid, stabilized bromine-based product. A pellet, hydantoin-based bromine biocide is acceptable if there is business justification to use and properly feed this product. Bromine should be fed a minimum of two to three times per week and achieve a 1-PPM free halogen residual. In some locations, continuous halogenations may be required to control the bacteria counts. If continuous halogenation is used, the control levels should be within the range of 0.2-0.4 PPM as free halogen. Halogens are oxidizing agents, so if you over-feed them they will become corrosive towards the system. If your bacteria counts are consistently zero cells/ml, you may be over-feeding the halogen. All liquid halogen products must have a degasification head on the chemical feed pump. All erosion feeders must have a pressure release valve.

Non-Oxidizing Biocide – Secondary Biocide:

A non-oxidizing biocide needs to be fed at a minimum of once per week for the control of underdeposit bacteria and biological slime. This is not fed to control bulk water bacteria. Bulk water bacteria are controlled by halogen. If your biological counts always increase dramatically after the addition of these products, you may already have a large population of slime-forming bacteria in the system. The biocide of choice is either glutaraldehyde fed at a level of 120 PPM of the 45% solution, or isothiazoline fed at a level of 100 PPM once per operating week.

NOTE – Every heat exchanger should see every biocide feed weekly. If you have "idle chillers", you must change the water in the condenser immediately following the feed of the biocides. Failure to do so can result in biologically-induced underdeposit corrosion conditions of the condenser tubes that could lead to tube failure.

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CHILLED WATER SYSTEMS TREATMENT

The inhibitor should be a molybdate or molybdate/silica/azole/polymer program. Where nitrite is already used, this program can continue and be maintained at levels within the following ranges:

- Molybdenum 100-120 PPM (for a molybdate-based program)
- Molybdenum 40-60 PPM (for a molybdate/silica-based program)
- Silica 30-40 PPM (for a molybdate/silica-based program)
- Sodium Nitrite ($NaNO_2$) 800-1000 PPM
- Free and available azole 5-10 PPM
- pH 8.0-10.2
- Conductivity <4,000 MMHS
- Iron <1 PPM
- Copper <0.5 PPM

If the iron and copper levels are both above their ranges, then filtration should be considered in order to remove iron, copper, and suspended solids. In many cases, a simple cartridge filter or cartridge filter/pot feeder combination is all that is needed.

The chill water loop needs to be checked by a laboratory for biological activity. If the biological counts are above 1,000 cells/ml, you need to shock the system with a non-oxidizing-type biocide. Two proactive additions of a non-oxidizer (preferably copper-free isothiazoline and glutaraldehyde) should be performed at least once per year per product to the loops. Most bacteria in closed loops are anaerobic and do not show up on dip slides.

It is recommended that all chill water make-up lines be equipped with a water meter to determine the amount of water loss. Closed loop systems should have a water loss of less than 1% of the system volume per year.

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HOT WATER SYSTEMS TREATMENT

The inhibitor should be a nitrite/silica/azole/polymer program maintained at minimum levels within the following ranges:

- Sodium Nitrite ($NaNO_2$) 1000-1200 PPM
- Free and available azole 5-10 PPM
- pH 8.0-10.2
- Conductivity <4,000 MMHS
- Iron <1 PPM
- Copper <0.5 PPM
- Silica <50 PPM

If the iron and copper levels are both above their ranges, then filtration should be considered to remove iron, copper and suspended solids.

The chill water loop needs to be checked by a laboratory for biological activity. If the biological counts are above 1,000 cells/ml, you need to shock the system with a non-oxidizing-type biocide. Two proactive additions of a non-oxidizer (preferably copper-free isothiazoline and glutaraldehyde) should be performed at least once per year per product to the loops. Most bacteria in closed loops are anaerobic, and do not show up on dip slides.

Given the high levels of hardness present in the make-up water source, the use of water softeners should be considered to provide soft water to the hot water systems. This will minimize scale formation.

It is recommended that all hot water make-up lines be equipped with a water meter to determine the amount of water loss. Closed loop systems should have a water loss of less than 1% of the system volume per year.

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MONTHLY WATER TREATMENT TESTING REQUIREMENTS

Each system should be tested a minimum of once per month by a qualified water treatment supplier. The testing should be followed up with an electronic, written service report that describes the current status of the water treatment program and recommendations to improve the program. The tests, at a minimum, should include the following:

- Make-up tower water
  - pH
  - Conductivity
  - M-alkalinity
  - Total hardness
  - Turbidity
  - Iron (if using non-city water as the make-up)
  - Copper (if using non-city water as the make-up)
- Cooling tower water
  - pH
  - Conductivity
  - M-alkalinity
  - Total hardness
  - Molybdenum (if used for tracing)
  - Phosphonate
  - Turbidity
  - Azole
  - Free halogen
  - Iron
  - Copper
  - Biological count (by strip method inoculated 48 hours prior by PLANT personnel and incubated at a temperature of 35° C)
- Chill/hot water
  - pH
  - Conductivity
  - Nitrite/molybdate (depending on the treatment type)
  - Copper
  - Iron
  - Azole (chilled water only)
  - Turbidity

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If a water treatment provider is used for services, it is expected that the supplier provide the UNIVERSITY OF NEVADA - LAS VEGAS with enough hours based on chemical spend to manage the water treatment program. The minimum expectation is a $300.00 chemical spend per one hour of service. For example, if the UNIVERSITY OF NEVADA - LAS VEGAS spends $100,000.00 annually, it is expected the supplier provide 300 hours of service annually, which equates to 25 hours per month.

Corrosion coupon testing shall be conducted during each quarter for all cooling tower and closed loop systems and include the following metallurgies:

- Mild steel
- Copper

UNIVERSITY OF NEVADA - LAS VEGAS requires that one set of laboratory tests be performed for each system once every six months for the cooling tower and closed loop systems to validate that the field tests are providing proper test results.

UNIVERSITY OF NEVADA - LAS VEGAS would like to take advantage of other services if there is a business justification to include, but not be limited to, the following: particle size distribution studies, biological profiles, system volume/leak tests, system audits, borescoping, deposit analyses, corrosion studies, etc. Please inform UNIVERSITY OF NEVADA - LAS VEGAS of the advantages of these tests and how they can improve the water treatment results or reduce the energy and water usage rates.

All water-side equipment must be inspected and photographed when available for inspection. All inspection reports will be submitted to UNIVERSITY OF NEVADA - LAS VEGAS within 30 days of each inspection.

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OPERATOR TRAINING

The UNIVERSITY OF NEVADA - LAS VEGAS is requesting a comprehensive operator training program. The UNIVERSITY OF NEVADA - LAS VEGAS will help with the routing weekly operation and control of the water treatment program. This is to include, but not limited to, the following:

- Inspect equipment, including chemical feed station, chillers and cooling towers
- Run conductivity test and calibrate controller
- Run inhibitor test and adjust pumps if needed
- Run bi-monthly bacteria dip slides on each tower system
- Run closed loop inhibitor levels and manually adjust monthly or as needed
- Deliver water treatment chemicals to point-of-use chemical feed locations

Contractor shall eliminate chemical handling and safety hazards to UNLV personnel
*All chemicals, including delivery to the individual pre-designated chemical treatment sites.
*Contractor will provide a real time inventory of the chemicals that are delivered to campus and used at the individual sites.

Due to the large amount of foot traffic on campus, the use of large gas powered vehicles is prohibited. The contractor will provide its own means of transportation. Electric powered carts are to be used. The cart can be staged near the Facilities Maintenance yard. The cart must meet with UNLV and DOT regulations

The vendor must agree to provide and keep updated four complete water treatment manuals for the UNIVERSITY OF NEVADA - LAS VEGAS at the designed locations that includes the following sections:

- Program overview and description and SDS of each product used
- System control charts and daily log sheets
- Service reports
- Corrective action flow charts to assist operators in recognizing water-related problems and their associated corrective actions
- Telephone, beeper, voicemail numbers, etc. of the primary treatment representative, supervisor and emergency hot lines

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CHEMICAL FEED EQUIPMENT

The most important aspect of a well-run chemical program is the level of automation. Given the minimal man-power available, UNIVERSITY OF NEVADA - LAS VEGAS wants, as a minimum, the following chemical feed equipment for the cooling, chilled and hot water systems. UNIVERSITY OF NEVADA - LAS VEGAS will evaluate new equipment technologies if there is business justification to do so.

Cooling Towers:

- Containment systems for all chemicals must be a minimum of 10% greater than the volume of chemicals.

- Make-up (MU) and/or blowdown (BD) water meters must be compatible to send a pulse signal(s) to a controller to feed the scale/corrosion inhibitor based on the water usage rate. It is always preferred to have a water meter with an actuating pulse on the make-up water source.

- Blowdown solenoid for automatic blowdown control

- Chemical feed controller:

    - Internet ready (desired on larger tower systems)
    - Tower conductivity probe
    - Support water meter inputs for inhibitor feed
    - pH probe for acid feed (only used if acid is needed as a part of the program)
    - Biocide lock-out
    - Dual biocide timer to automatically feed two biocides based on a timer.

- Four-position corrosion coupon racks with rotameters; the goal is to have a three to five feet-per-second flow rate at all times.

- Pumps:

    - To feed scale and corrosion inhibitor
    - To feed a liquid bromine product, the pump must have a degasifying head to prevent priming problems or use a peristaltic pump. If a solid bromine product is used, an erosion feeder equipped with a solenoid valve and pressure relief valve is needed instead of a chemical pump. The solenoid valve should be activated based on the controller biocide timer.
    - To feed a non-oxidizing biocide pump capable of delivering the required dose in one hour

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Closed Hot and Chilled Loops:

- Make-up water meter(s) to monitor water usage.
- Four-position corrosion coupon racks with rotameters; the goal is to have a three to five feet-per-second flow rate at all times.
- Pot feeders
- Cartridge filter/pot feeder that can withstand the temperatures (optional, yet recommended)