8.0 MAINTENANCE & SERVICE & WARRANTY

8.1 General Considerations & Definitions

No pool complex will operate reliably unless all items of equipment are adequately maintained. Maintenance is commonly defined as the work and repairs that are necessary to maintain individual items of plant in a suitable working condition consistent with their expected service life.

Fundamental maintenance requirements are as follows:-

(a) Keep all work areas in a neat and orderly fashion.
(b) Follow a systematic plan for the execution of the daily operations that are outlined within this Manual. Routinely maintain the plant and its finishes.
(c) Establish a routine schedule, whereby individual work areas or plant rooms are vigorously inspected. If problems are discovered make timely decisions.
(d) Maintain meaningful records on all major items of plant. Apart from logging any repairs, record any unusual incidents or faulty operating conditions.
(e) Observe all common sense safety measures - do not tamper with equipment unless suitably trained & qualified.
(f) At the end of each month review all log sheets and test results and compile a summary of events.

Whilst Trisley's are responsible for the correction of defects that become apparent during the first twelve months of operation, the Pool Operator is required to operate and maintain the plant in a safe and efficient condition. Apart from maintaining accurate records, it is important for the Operator to appreciate that:-

(a) The plant must be operated in strict accordance with the instructions and or recommendations given on start-up and or detailed within this Manual. Warranty and or free service does allow for mis-use, abuse, water damage, negligence, and or accident. The golden rule is "IF IN DOUBT ASK"

(b) All pool water must be maintained and balanced in accordance with the Langelier Saturation Index whereby chemical concentrations are as recommended by the NT Health Department.

If a defect becomes apparent in the first twelve months of operation, its significance could vary quite substantially. Be this as it may, Trisley's must be advised of the potential problem when it first becomes apparent.

8.2 The Concept of Preventative Maintenance

For a facility to operate successfully on a year round basis, most Operators prefer to adopt a program of preventative maintenance. Under this arrangement any part or item that starts to show signs of wear is automatically repaired or replaced. This work is normally undertaken during a yearly close down period but with proper planning it can often be done, periodically throughout the year at times that are covenant to the Operator.

Rather than respond to random breakdowns, preventative maintenance is undertaken prior to the product's failure. Items that cannot be readily inspected (eg.., pump bearings, mechanical seals etc.,) should be replaced after a nominated number of running hours irrespective of their condition.

To manage an effective maintenance program, it is essential that all repairs and or replacements be accurately logged so that over time, the service life of the component or product can be established under actual operating conditions. With an accurate and meaningful service history parts (or items of plant) can be confidently reconditioned, repaired, or replaced at times that are convenient to the Operator. Refer to **Section 8.11** for a sample maintenance log sheet.

Whilst the Pool Operator may have the staff and the skill to undertake some routine maintenance, it is strongly recommended that after the twelve months defects period, service and maintenance arrangements is established for the more specialised items of plant.

8.3 Spare Parts & Consumables

Some spare parts and consumables should be maintained on site. Given that the Centre is new, the Operator will need to build up a stock of consumables and spare parts according to historic use .

8.4 Simple Do’s and Dont’s List

8.4.1 Don’t do this:-

Don’t operate a pump without first understanding its intended function.
Don’t operate any item of plant without first reading the manufacturer's instructions
Don’t run a pump without checking that all suction valves are fully open.
Don’t use valves on the suction side of the pump for flow throttling.
Don’t start a pump without first checking that there is an adequate water supply.
Don’t run a pump longer than one minute with the pump discharge valve fully closed
Don’t change any equipment settings indiscriminately
Don’t let untrained staff operate the plant and equipment
Don’t use flocculants (PAC) on the UFF filters.
Don’t wash the pool surrounds into the pool gutters.

8.4.2 These things must be done;

Please read these Instructions & feel free to ask questions and get more details
Do backwash filters according to an established timetable and log all details
Check all gauge and flow readings on a DAILY basis.
Get the pool water biologically tested every three months.
Use Log Sheets to manage day to day activities & record meaningful information.
Regularly check the performance of the backwash pump out system
Use a face mask when handling dry powder filter aids
Check and monitor the progressive build-up of TDS
Ensure adequate stocks of chemicals and consumables are on hand.
No matter how small the apparent problem, feel free to talk to Trisley's

8.5 Common Maintenance Problems

8.5.1 Introduction

Although the maintenance requirements for commercially available items such as pumps, valves, flow switches, etc., are provided in Part B of this manual, the following notes are intended to assist the pool Operator with some common maintenance issues. This information should be read in conjunction with all other information provided by Trisley Hydraulic Services.

8.5.2 Precoat Filtration

With regard to the maintenance of the UFF filters it is important to understand that this form of filtration has a very fine particle selectivity. When first filling a pool it is important that all construction work around the pool has been fully completed and that any construction debris has been removed from the pool system (ie.., pool gutters, balance tanks, etc.,). Initially the pool should be overfilled and superchlorinated. The pool should be allowed to settled for up to 48 hours then vacuumed cleaned to waste.

When first starting a precoat (UFF) plant monitor the pressure gauges carefully. Given the particle selectivity of precoat filtration, it is not uncommon that frequent backwashing may be initially required.

At least once a year, it is required to lift the filter head and conduct a manual clean-out of the filter vessel. During this time, the cloth covered candles should be inspected. Under high organic loads, the cloth covered filter candles may become clogged and require an acid wash. Grease and body oils can also be removed by washing the cloth filter bags in a strong detergent. The service life of the cloth filter bags will vary from one to three years depending upon conditions. Filter bags should be periodically replaced on a need basis. This type of service work should be undertaken by an approved and authorised service Agent.

It is important to note that failure to use new filter media after each and very filter cycle will cause major binding problems that will necessitate the supply of new filter bags that are not covered by warranty. The prescribed amount of filter media must be added after each and every backwash.

PAC IS NOT TO BE USED UNDER ANY CIRCUMSTANCES. The use of PAC in conjunction with precoat filters will cause significant damage to the internal elements. As well as voiding the filter’s warranty, the ability of the filters to maintain water clarity will be diminished.

Daily Requirements:
Filter pressures to be logged. Backwashing carried out as per procedure manuals.

Yearly Requirements:
After the filters have been in service for 9,000 hours a major service on the internal filter elements should be carried out by an Authorised Agent. This will require the following;

- Removal of filter elements and acid cleaning of the cloth fabric. This removes the build up of calcium deposits that accumulates over a period of time.
- Visual examination of cloth covered filter candles & O Ring seals
- Visual examination of coated tube/pressure plates
- Maintenance on ancillary plant including lubrication of valve gearbox, tank mixer service, visual inspection and clean out of solids separation tank, spa bag filter,

8.5.3 Chemical Dosing

In their concentrated form most pool chemicals are corrosive and caustic. Most chemicals will attack metals and in time they will affect rubber and elastomeric parts. A planned replacement of seals, check valves, and diaphragms will ensure long term trouble free performance. Checkvalves on positive displacement pumps are important. Whilst they must close tightly to produce accurate output; they also must close to prevent siphoning when the pump is switched off.

Make sure that suction screens are in place and that they remain clean. If a positive displacement pump fails to pump even though the motor is running, the first thing to inspect is dirty valves. Whilst maintenance intervals should be dictated by the actual operating conditions, the Manufacturer recommends that:-

- the Dosing Diaphragm, valves, o rings, valve ball, and valve seat be replaced either after 2000 hours of operation or annually. Note these replacement parts should be considered to be consumables.
- the Gear Head be greased after a maximum of 8,000 operating hours or in continuous operation, after one year.

Daily
- Physical check that chemical levels are correct, pumps are working with no leaks. General visual check that the chemical system is working and that there are no leaks either from the pumps, feed lines or from the day tanks or bulk tanks.

Weekly
- Calibration checks on the probes should be carried out every week. This will need to be done by an authorised Prominent service agent if there are no pool staff available with the necessary experience.

Monthly
- Probes require manual cleaning every month for pools. The Chlorine injector requires cleaning every month. To do this the filtration system need not be turned off. Turn off the chemical supply pump and remove the injector and wash off any chlorine. Then immerse the injector in a weak solution of acid and water (7:1). Once all the calcium buildup has been removed,

replace the injector. Check all dosing pump suction valves.

- The chlorine probes installed at the Centre are of the free chlorine type and have a membrane fitted. The membrane is protected by a gel substance, which dissipates with time. This gel needs to be replaced usually every 6 months. Failure to do this can lead to failure of the entire probe which is an expensive piece of equipment. We recommend that the gel be topped up every 6 months to avoid costly probe replacements.

Three Monthly
- A microbiological test should be carried out every three months.

Yearly
- Dosing pumps should be stripped down yearly and checked with a view to replacing the diaphragm and wet end parts.

Salt Chlorinators
The units installed are relatively maintenance free except for the acid cleaning of the salt cells. The operator will need to refer to the manufacturers manual for more detailed instructions on maintenance / service intervals.

Dry Chlorine Feeders
The units installed are relatively maintenance free as they are self cleaning units. The operator will need to refer to the manufacturers manual for more detailed instructions on maintenance / service intervals.

8.5.4 Pumps & Motors, Generally

Although detailed maintenance instructions are provided within other Volumes of this manual, the following Manufacturers recommendations for key items of plant should be noted.

Bearings with lubrication points should be greased every 1000 to 2000 operating hours depending on the severity of service. For pumps operating continuously 24 hours per day this would be every 6 to 12 weeks. For pumps operating eight hours per day for five days, this would be every 6 to 12 months. For pumps used infrequently the bearings should have grease added at 12 month intervals.

Daily
A “walk through” to check for leaks, abnormal noise and operating pressures. Any problems should be logged and then attended to by maintenance staff.

Yearly
All pumps should be inspected yearly for wear to mechanical seals, erosion of back plates and impeller wear. A program of seal replacement should be carried out after the pumps have been in service for 15,000 hours.

8.6 FAULT FINDING

High vacuum gauge reading	Suction valve inadvertently restricted, pre-pump strainer is dirty.
Pump won't start	Probable cause will be electrical
	Check for burnt windings in pump, Pump won't work if insufficient flow. Check flow switch for broken paddle or loose connection. Also check for electrical overloads in control board.
Incorrect probe readings	Probes either dirty or out of calibration
	Remove probes and clean as per manual. If clean check calibration. Probe may be at end of life (2 years approx), replace if necessary. Check water balance.
Chemical pumps not pumping	Probable cause is flow
	Check that there are no air locks in suction line. Check for blocked injector points. Check for broken pump diaphragm.
Water is cloudy	Probable cause is chemical.
	Check water balance and adjust as necessary. Check that plant is fully operational. Bather load to be reduced until water clarity returns. Check that the system may need a backwash or check the backwash procedure.
D.E Filter powder in pool	Break or tear in filter element
	The filter should be isolated and the broken element cloth replaced.
Pool Water Milky	Could be dissolved gases in solution. Could be heavily aerated water. Could be filter media leaching back to pool.

8.7 Warranty

All items of mechanical equipment employed on this project are subject to Manufacturers warranty which is conditional upon:-

- Adherence to all operating requirements,
- that "fair wear and tear" be accepted, and,
- that a set claim procedure be followed.

Notwithstanding, Trisley's Hydraulics Services warrants the plant installation (limited by his scope of works) for a period of twelve months from the date of practical completion. Refer to Part B for specific warranty terms and conditions

8.8 Service Contact Details

Trisley's Hydraulic Services may be contacted during normal business hours by phone,

PHONE 02 8566 3666.

Out of hours messages may be lodged by

Fax on 02 8566 3667

or email to **service@trisley.com.au**

Emergency out of hours messages can be directed to:-

Greg Flood	**(0418) 443 143**
Stuart Crane	**(0408) 292 272**

Trisley's Hydraulic Services has an agreement in place with a local contractor who in our absence will undertake any warranty work if required. However, all requests for post contract support must initially be directed to THS.

Attendance to issues other than those required by Contract will attract a service charge at the current commercial rates.

8.9 Summary of Equipment Suppliers

UFF Filters	Atlas Australia Pty Ltd.
Filter Valves are by SH	Trisley's Hydraulic Services.
Strainers	Fulham Fabrications Pty Ltd.
Main Re-circulating Pumps	Total Pump Solutions Pty Ltd
Chemical Controllers	Prominent Pty Ltd
Dosing Pumps	Prominent Pty Ltd.
Salt Chlorinators	Prominent Pty Ltd
Dry Chlorine Feeders	International Quadratics Pty Ltd
Pressure Gauges	Burkett Pty Ltd.
Binder Gauge Connections	Binder Engineering Pty Ltd.
Chemical Dosing Tubing	Prominent.
Electrical Control Board	CVP Electrical Pty Ltd
Flow Switches	Kelco Engineering Pty Ltd
Bulk Air Releases	Amiad Pty Ltd
Air Blowers	Esam Pty Ltd
Wet Deck Grating	Hydrocare Pty Ltd
Wave Machine	Murphy Waves Pty Ltd

8.10 Maintenance Records

The foundation of any good maintenance system is an equipment record system that makes all necessary equipment maintenance information readily accessible to maintenance personnel. The equipment record system should ensure that various sources of information are brought together, consolidated, and cross referenced, so that personnel can easily find information on proper procedures, and can schedule necessary maintenance.

Regardless of who undertakes any service and or maintenance work, the Pool Operator is totally responsible for maintaining proper maintenance records. Refer to the sample Maintenance Log Sheet in **Section 8.11** for the minimum requirements that apply to all major items of plant.

8.11 Example of a Typical Plant Maintenance Log:

DARWIN CITY WATERFRONT POOL EQUIPMENT MAINTENANCE LOG

Equipment Code :

Product Description :

Manufacturer Details :

Serial Number : Model Number :

Rated Conditions :

Construction Materials :

Special Notes:

DETAILS OF INSPECTION & REPAIRS

Date	Work Undertaken	Done By	Remarks	Cost
……..				
……..				
……..				
……..				
……..				
……..				
……..				

8.12 Example of a water chemistry log sheet

Date	Time	Digital	Act	Digital	Act	Total	C/Hard	Temp	Sat	Chemicals	Comments	
		Cl2	Cl2	pH	pH	Alk			Index	Added		

The above information will provide the operator with sufficient information to ensure that the pools' water chemistry parameters are in line with safe bathing requirements.