NATURE FLOW® MK II STP

OPERATION & MAINTENANCE MANUAL

The system should be serviced annually or as per your maintenance agreement by qualified service personnel as advised by the supplier/installer of the equipment.

The Nature Flow® Mk II, 10-20 Person On-site Sewerage Treatment Plant was approved for use in Queensland by Type Specification Approval No 514 dated 17 November 2000.

A copy of the entire specification approval document may be found at www.natureflow.com.au, or by request from your installer. Alternatively this document is also available from the Department of Infrastructure and Planning at www.dip.qld.gov.au or by telephoning 07 3237 0368.

The Nature Flow® Mk II On-site Sewerage Treatment Plant meets the requirements of the Queensland Plumbing & Wastewater Code dated 21/04/2010.

FOR FURTHER INFORMATION:

1. Contact your installer.
2. Contact Nature Flow Systems on 07 4128 8019 or via email at info@natureflow.com.au.

In the event that a problem occurs with the plant within the first year from date of commissioning please contact your installer.

In the event that a problem occurs with the plant and the plant is older than one year please contact your service agent.

We have a 24hr assistance mobile number 0448 099 900 if there is no answer leave a message LEAVE YOUR NUMBER and someone will call you back.

CONTENTS

REFERENCES

We recommend that service agents keep a working file containing at minimum the following documents in addition to this manual.

Full copy of Specifications & Drawings for Nature Flow® MkII STP

Material Safety Data Sheet – Chlorine Tablets

Material Safety Data Sheet – Ultra Violet Lamps

Submersible Pump (Pump Well 1) Owners Manual

Submersible Pump (Pump Well 2) Owners Manual

Chlorine Contactor Owners Manual

UV Disinfection Unit Owners Manual

Material Safety Data Sheet – Cleaning Solution for Quartz Sleeve

PLEASE READ THROUGH THIS SECTION FIRST.

Precautions

Maintain the highest regard for your personal safety at all times.

Servicing by service agent is recommended and may be mandatory by State/Local Authority.

Refer to MSDS attached to this manual for chlorine tablets and/or ultra violet lamps.

Refer to owners manual for submersible pumps attached to this manual.

Refer to owners manual for chlorine contactor and/or UV disinfection unit attached to this manual.

Disclaimer

This information booklet is provided as a guide only.

While every effort has been made to ensure that the information contained in this guide is accurate and complete, no liability can be accepted for any errors or omissions. Nature Flow Systems Pty Ltd reserves the right to change the specifications of the products and procedures described herein at any time without notice.

Nature Flow Systems Pty Ltd makes no warranties for damages resulting from use of this guide. Nature Flow Systems Pty Ltd accepts no liability for damages of any nature resulting from use of this guide.

MAINTENANCE SCHEDULE – BASIC

Primary Chambers 1 and 2	Clean suspended solids filters on outlet. Hose any matter off the filters back into the primary chamber of the tank.
Pump Well 1 (MF)	Check operation of alarm by pressurising clear alarm tube connected to control box. Check pump & high level alarm operation.
Media Filter(s)	Check for ponding. Check drainback to pump chamber. Check air venturi – ensure carbon filter in good condition. Advise owner on general state of maintenance around treatment plant (i.e. mowing, weed control, fencing, signage etc).
Pump Well 2 (Disposal)	Check operation of pump & high level alarm.
UV Disinfection Unit	Check unit operation. Service every 12 months at minimum. Refer to manufacturer's recommendations (owner's manual etc). Replace cleaning felts and o'rings. Replace UV lamps as required (intermittent operation). Replace UV thimble as required.
Chlorine Disinfection Unit	Check unit operation. Check chlorine tablet level and replenish if required. Service every 12 months. Check condition of o'ring (if applicable) that seals the lid to the chlorinator. Take care when screwing lid onto unit that the o'ring is correctly located.
Disposal Field	Check and service rotary valves (if applicable). Check for ponding. Advise owner on general state of maintenance around disposal field (i.e. mowing, weed control, fencing, signage etc). Check sprinklers for blockage. Clean inline filters, flush out lines.
Diversion/retention mounds	Check condition of mounds and advise owner of any maintenance requirements.

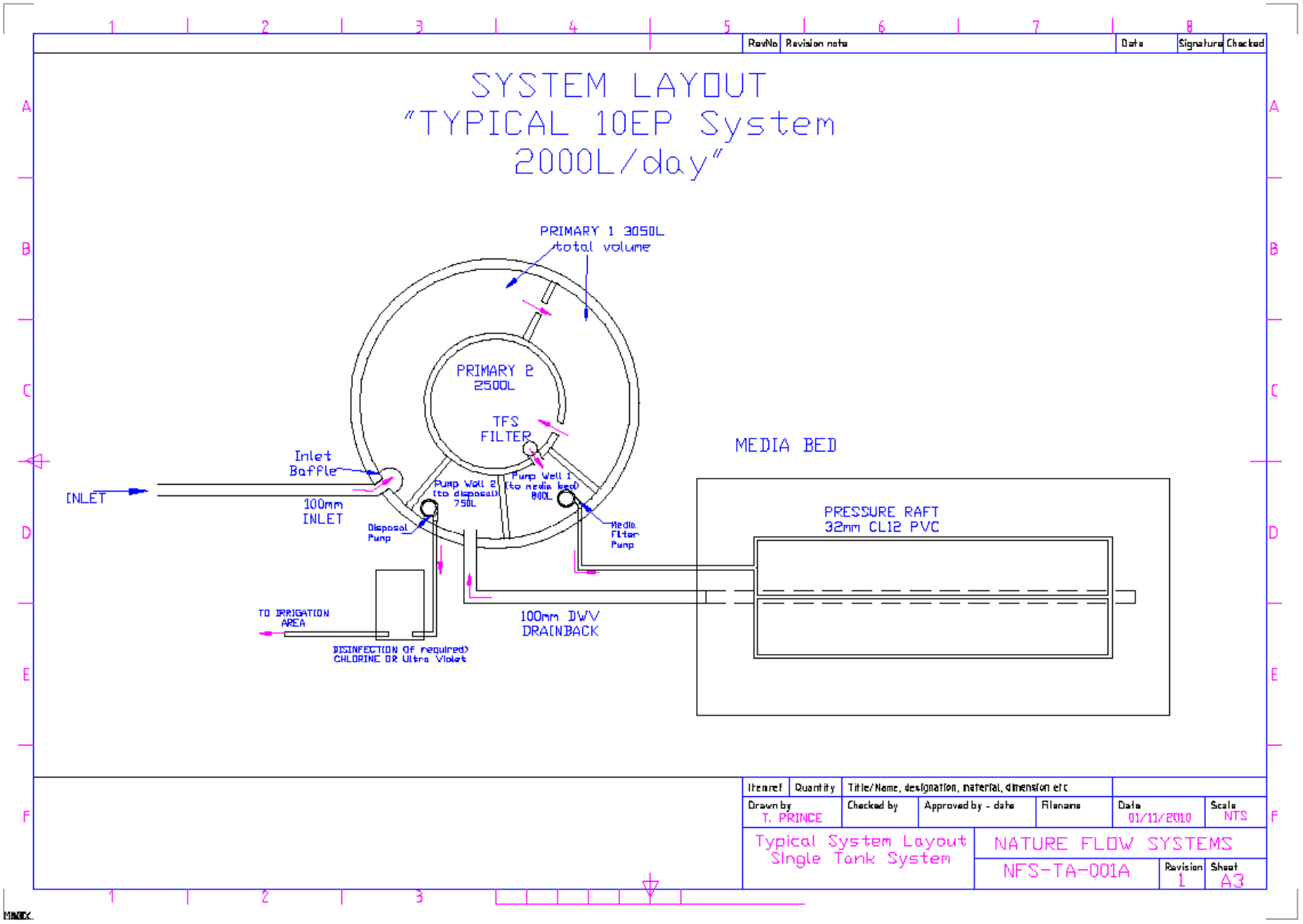
Reference Documents

Due to the geographical coverage of the Nature Flow® Mk II STP components may be sourced from various manufacturers.

Reference should be made to the applicable manufacturer's manuals in regards to specific maintenance and/or operation of any ancillary components such as submersible pumps, UV unit, Chlorine contactor, Zabel or equivalent filter etc.

Refer also to "Service Contract" in this manual.

Ensure MSDS's are held on file and updated as required.



SERVICE PROCEDURE & SITE SAMPLING

1 Ensure correct name and address for your service report.

2 Knock on the door and identify yourself to the home owner.

3 Visually inspect the sewerage plant, check for any odours, check the landscaping, sprinklers and lines.

4 Remove all concrete lids.

5 Check sludge level & scum layer in Primary 1 & Primary 2.

6 Remove and clean suspended solids filter (between Primary 2 and Pump Well 1). To clean filter, withdraw filter and if required hose off into open primary chamber and when clean refit.

7 Check pump and high level alarm operation in Pump Well 1. On system with float switch fitted, raise the float switch to check the high water alarm.

8 Check drainback from media filter to pump chamber 2 is running freely. Check Air Venturi for operation.

9 Check media filter vents checked for damage and mosquito proofing.

10 Visual inspection for ponding above filter.

11 Check pump and high level alarm operation in Pump Well 2. On system with float switch fitted, raise the float switch to check the high water alarm.

12 Start pump by raising its float switch if necessary (wait for 2 minute pump delay in UV models) and check sprinklers and lines. Check irrigation area for pooling. When stopped look at walls below pump. Any turbulence noticed while pumping would indicate leak in PVC pipe or damage to pump. If needed put a sludge pump into bottom of chamber and pump and hose out.

UV Model Only. Check UV unit operation. Check 2 minute delay from UV lamp on to pump operation. Refer to manufacturer's instructions (owner's manual – UV unit). Replace cleaning felts and o'rings (if applicable). Check lamp fail alarm (sensor operation). Replace UV lamps as required (intermittent operation). Replace UV thimble as required. Refer detailed procedure in this manual.

13 **Chlorine Model Only.**

Inline Chlorinator: Check dial up residual and bypass valve is set correctly. Check the chlorine tablet dispenser and refill if necessary. Refer detailed procedure in this manual.

Intank Chlorinator: Remove chlorine dispenser from pump chamber and observe if tube needs cleaning. If this is required, remove any remaining chlorine tablets, clean base of chlorine dispenser by hosing off base into pump chamber and recharge dispenser with the whole remaining tablets first, topping up with new tablets. If tube is clean, top up remaining tablets with new supply as required. Adjust dispenser to ensure correct minimum/maximum residual chlorine is available.

14 Collect a sample from inside the Pump Well 2 or at the first sprinkler head if the sprinkler is operative and carry out the test for:

Clarity
Residual Chlorine (Chlorine Model Only.)
pH
Dissolved Oxygen
Temperature

15 UV Disinfection Only. Dose Pump Well 2 with chlorine to provide an annual chlorine flush to the plumbing downstream of the UV unit. Do not contaminate primary chambers or pump well 1 with chlorine.

16 Replace all covers correctly.

17 Fill in service report sheet accurately. Leave one copy of the report with the home owner. Distribute remaining copies, one for the Council, one for your own records.

NOTES: Some systems with subsurface irrigation may have 1 or 2 in-line filters. These must be removed and cleaned at every service. The homeowner should be advised where they are located in case the homeowner needs to clean them between services.

INSTRUCTIONS FOR CHECKING AND REPLENISHING CHLORINE TABLETS.

Exercise extreme caution when opening or servicing your feeder. Always switch off power supply before opening. Do not inhale any fumes from any chemical feeder or container. Protect your eyes, skin and clothing from chemicals at all times. Refer to Materials Safety Data Sheet for chlorine tablets for further information.

The chlorine tablets used in the system are slow-dissolve Trichloro-S-Triazinetrione (Tri -Chlor). (Chlorine tablets are all different and the tablets used within this system are of a specific composition.) **Never add liquid chlorine or chlorine tablets of a different composition to your system. No other type of chemical should ever be used in your chlorine feeder.**

Step 1: Read and understand MSDS – handling, storage and first aid procedures for chlorine tablets.

Step 2: Turn HSTP off at power point and unplug.

Step 3: Remove lid on poly cabinet (screws on side of lid).

Step 4: Unscrew lid on canister anti-clockwise.

DO NOT INHALE ANY FUMES FROM ANY CHEMICAL FEEDER OR CONTAINER.

Release lock tab to allow lid to unscrew. Take care not to cross thread the lid when unscrewing from the canister. An O'Ring is used to seal the lid – ensure that care is taken when the lid is removed not to damage this O'Ring.

Step 5: Check level of remaining chlorine tablets. If less than 5 full tablets remain then canister requires refilling. (A packet of 5 chlorine tablets lasts approx 3 months for a standard household of 4 people.)

Step 6: Wear gloves & eye protection**. Replenish chlorine tablets if required. NB**: **When adding the chlorine tablets do not touch the tablets**. Hold the middle of the packet. Carefully split the bottom of the packet while holding it over the chlorinator container and allow the tablets to gently fall into the unit.

Avoid chemical contact

Do not drop the tablets into the unit.

Step 7: Grease O'Ring with a non petroleum based lubricant (rubber grease or similar) before replacing lid on canister. (Regular lubrication is necessary to allow for easy cover removal.) Ensure O'Ring is placed correctly into groove. Replace the lid on the canister. Screw clockwise to tighten. Take care not to cross thread. **DO NOT OVERTIGHTEN!** The lid has a lock tab mechanism – do not overtighten past this point.

NB:If O'Ring is stretched (ie sits loose in the groove) then it must replaced. See your service agent or installer.

Step 8: Replace lid on poly cabinet.

Step 9: Plug leads back into power points and turn on.

While this is undertaken at annual service you should also remind the householder of their responsibilities in this regard. Checking the level of chlorine tablets (and replenishing if required) should be carried out every three (3) months by the householder.

UV UNIT

NOTES

UV Disinfection Units are to be maintained as per manufacturer's recommendations. UV units may vary between installations and geographic areas.

The TYPICAL unit is a proprietary Nature Flow® UV Disinfection Unit – unit size/style to suit individual application. It is anticipated that the standard size be a 40 watt unit with the standard style being tank mounted.

UV units from alternative manufacturers may be used subject to adherence to that manufacturer's servicing and operation maintenance. All alternative units require approval from Nature Flow Systems Pty Ltd prior to their inclusion in any Nature Flow Mk II STP.

Procedures detailed below are directly applicable to the typical unit however will have some commonality with similar alternative UV units. Where alternative UV units are utilised servicing must be done in conjunction with the applicable manufacturer's recommendations/manual.

Maintenance – UV Unit
Maintenance for the UV unit only is detailed below. Additional maintenance may be required for those systems including pre-filtration and/or other options. Refer to your supplier/installer.

ALWAYS ENSURE THAT ALL POWER TO THE TREATMENT PLANT IS SWITCHED OFF PRIOR TO SERVCING THE UV UNIT. UNPLUG AT POWERPOINTS AND TAG.

1. UV lamp is to be replaced after 9 000 hours of continuous use (one year) or after 2 years of intermittent use whichever is the sooner. After this time the lamp will photochemically change and no longer allow sufficient 254-nm shortwave UV, the germicidal ray of the lamp, through the glass to effectively disinfect. (Mercury vapour lamps rarely burn out completely but suffer from lumen depreciation. The lamp produces less light over time, to the point of becoming ineffective while still drawing the same amount of power it drew when it was new. This comes about because the emitter is deposited as a film darkening the arctube wall and reducing light output.) IE: Even if the lamp is still "ON" it may not still be emitting light at 254nm and as such may not be providing germicidal effect –change lamp at recommended intervals regardless.
2. The turbine cleaner (if applicable) requires annual servicing at which time, the cleaning felts and o'rings shall be replaced.
3. The UV thimble should be replaced as required. Intermittent operations should be checked for cracks, crazing and general degradation on annual inspection and replaced as required. Where a sleeve cleaning device is not utilised the quartz sleeve should be checked regularly (approx every three months subject to water quality) and cleaned should evidence of substance build-up be evident. Use a piece of cloth soaked in vinegar or citric to gently wipe the sleeve clean. Avoid touching the glassware with your bare fingers as this will leave marks on the sleeve/lamp and reduce its effectiveness.
4. O'Rings are to be replaced on annual service. When installing glassware (whether a replacement or reinstall) ensure the O'Rings are greased with food grade lubricant.
5. We recommend light sensors are replaced as required. At the time of replacement older units with the hardwired light sensor must be upgraded to the new "push-in" plug type light sensor (upgrade kits available – a licensed electrician is required for this). The "push in" type sensors do not require a licensed electrician and may be replaced by suitable competent person.

WARNINGS & PRECAUTIONS – UV UNIT

FAILURE TO FOLLOW THESE PRECAUTIONS CAN CAUSE SERIOUS PERSONAL INJURY OR DAMAGE TO THE SYSTEM.

1 The lamp(s) in this system emit ultraviolet light. Exposure to ultraviolet light can cause serious burns to unprotected eyes and skin. Never view ultraviolet directly with the naked eye. Always view ultraviolet light through a properly rated viewing port or through properly rated protective eyewear. Always wear protective clothing when exposed to ultraviolet light. Ensure all lamps are properly secured within the chamber before turning the system on. Turn the system off before servicing.
2 To prevent electrical shock, turn the system off before removing any of the covers on the chamber or opening the control panel.
3 Ultraviolet lamps become hot during operation. Hot lamps can cause serious burns. Allow the lamps to cool before servicing.
4 The ultraviolet lamps, and the sleeves/thimbles they are housed in, are constructed of quartz tubing. Quartz tubing is very fragile and easily fractured. Do not strike, bend or apply pressure to this material or it will break. Broken lamps or sleeves can cause serious cuts.
5 Lamp connections and end plate surfaces can be come hot during normal operation. Do not touch while the unit is operating.
6 Acids used to clean the lamps and sleeves can cause burns. Wear protective clothing and eyewear when handling these materials. Rinse the components thoroughly in distilled water after cleaning. Always follow the safety precautions provided by the manufacturer of the cleaning solution.
7 This system uses ultraviolet light to reduce the concentration of pathogens to non-infectious levels. Failure to follow the maintenance instructions or respond to alarms will reduce the effectiveness of the system.
8 This system has been designed to be effective under operating conditions described by the customer. Any changes in these conditions can reduce the effectiveness of the system to disinfect. Some of the factors affecting operation include source water quality, flow rate and temperature.
9 This system is meant to treat liquids water only.
10 Intermittent operation of the system requires a minimum flow to be circulated through the system in order to remove heat from the lamps. Never operate the unit empty or without flow for extended periods of time.
11 Do not operate the system unless the chamber is completely filled with flowing water.
12 If your piping system is subject to impulse pressure (i.e. water hammer), a surge tank or other means of removing this condition must be provided.
13 The ultraviolet output of these lamps decreases with time. The ultraviolet lamps in this system must be replaced every 12 months of continuous use or every 24 months of intermittent use to ensure proper operation.
14 Periodic evaluation of the system performance through standard methods is recommended. Sampling before system and immediately after system should be taken and reduction calculated.
15 Installation and maintenance to be performed by qualified persons only.
16 All repairs to be performed by Nature Flow Systems Pty Ltd service technicians or qualified personnel.
17 As an ultraviolet treatment unit does not introduce any chemical residue within the water it is strongly recommended that a periodic chlorine flush of the pipework and fittings downstream of the UV unit is undertaken.

Pictorial Depiction of Components – Nature Flow® UV Unit

Refer to Figure 1 and pictorial depiction of components
Servicing by service agent is recommended.

HOW TO REPLACE UV LAMP

1. Switch off power and unplug from powerpoint.
2. Lift top cap.
3. Disconnect 4-pin fitting from UV lamp. Care should be taken when handling UV lamp, **hold by white ceramic ends only**.
4. Gently pull UV lamp upwards and remove from thimble.
5. Carefully lower replacement UV lamp GENTLY into the thimble with pins at the top **- hold by white ceramic ends only**. Do not touch the clear parts of the UV lamp as it will become contaminated. Remove any marks from the UV lamp with a cloth soaked in methylated spirit. Any deposit on the UV lamp, such as fingerprints can affect the output and rated life of the UV lamp. **DO NOT DROP UV LAMP INTO UNIT AS THIS WILL RESULT IN DAMAGE**. Make sure the 4-pin plug is attached to the lamp before completely lowering the UV lamp into the unit. As the lamp is lowered into the unit ensure that the UV sensor is also inserted into thimble just below ceramic end of lamp with metal circuit facing towards the lamp.
6. Replace o'ring at top of thimbleholder, ensuring it is lubricated prior to placement. Push top cap back into place on thimbleholder.
7. Plug leads back into powerpoint and switch on.
8. For a new lamp allow 5-10 minutes for the UV lamp to establish germicidal output. Note that system utilises a 2 minute time delay. Dispersal pump will not activate until 2 minutes after UV lamp operation.

HOW TO TEST LIGHT SENSOR AND ALARMS

1. Follow steps 1-4 above.
2. Replace top cap on cylinder pressing down firmly. (This will ensure that the 4-pin plug and light sensor is lowered into the cylinder without the UV lamp attached).
3. Connect 3-pin supply plug to powerpoint.
4. Turn unit on.
5. Listen for audible buzzer and watch for blue strobe. If light sensor is operating correctly both alarms should activate.
6. Turn off unit. Disconnect from power supply and follow steps 5-8 above to reinstall lamp.
7. Once lamp has been installed and the system is again operational there should be no active alarms.
8. If alarms are active then disconnect power and check lamp connection and placement of light sensor (light sensor should be facing lamp). If lamp and sensor installation is confirmed correct then assume light sensor requires replacement.

HOW TO REPLACE LIGHT SENSOR

1. Follow steps 1-4 in "How to replace UV Lamp".
2. Identify type of lamp sensor – hardwired Type A or plug-in Type B. Type A will require installation by a licensed electrician. Type B may be replaced by a suitably competent person. We recommend that those installations with Type A sensors be upgraded at time of replacement with the new Type B sensors. These are available in kit form from Nature Flow Systems.

Type A Sensor

- **a** Cut old sensor wires from lamp loom leaving as much length as possible.
- **b** Place 5mm heat shrink over both sensor wires.
- **c** Place 3mm heat shrink over individual sensor wires.
- **d** Solder new sensor leads to sensor wires (Core 5 & 6).
- **e** Shrink 3mm heat shrink in place over soldered joints and 5 mm heat shrink over both joints to provide further protection.

Type B Sensor

a Unplug old sensor from lamp lead. Take care not to force connection.
b Press release latch on plug to facilitate disconnection.
c Connect new sensor ensuring plug and socket mate firmly together.
d If plug and socket do not go together easily check orientation of plug and socket.

3 Follow steps 5-8 in "How to replace UV Lamp".

HOW TO REPLACE QUARTZ THIMBLE

1 Switch off power and disconnect from GPO.
2 Remove top cap.
3 Disconnect UV lamp from 4-pin fitting. Place UV lamp carefully to one side on a clean surface.
4 Loosen hexagon nut at bottom of cylinder to allow water to drain. Do not remove nut entirely.
5 Unscrew black thimble holder.
6 Gently lift thimble holder up. Thimble should remain attached to holder.
7 Grasp thimble and support as thimble holder is raised to allow for removal.
8 Remove the thimble holder from the thimble.
9 Completely remove hexagon nut and thimble seat from bottom of cylinder. Clean thimble seat, replace o'ring (lubricate first) and reinstall thimble seat and hexagon nut.
10 Place replacement thimble (6) gently into the top of the stainless steel cylinder ensuring to locate centre of turbine and thimble seat.
11 Next lubricate the O'Ring in the Thimble Holder using a food grade grease eg Vineleo WT90, then screw the thimble holder (2) onto the cylinder firmly. **DO NOT OVERTIGHTEN**!
12 Switch on power at GPO.
13 Perform leak checks on the system.
14 Once leak checks have been performed, switch off power and disconnect from GPO.
15 Replace Ultraviolet lamp (follow steps 5-8 in "How to replace UV Lamp").

NOTE: When withdrawing thimble take care not to let the end drop into the stainless steel cylinder as it could break.

HOW TO CLEAN THE QUARTZ SLEEVE/THIMBLE

1 Remove the quartz sleeve(s) as directed above.
2 Using a non-abrasive cloth soaked in an appropriate cleaning solution and wiped along the length of the quartz sleeve.
3 After cleaning, rinse the acid solution thoroughly from the sleeves with distilled water. Inspect the interior of the sleeve before installation to make sure they are clean and dry. Clean the interior of the sleeves with alcohol if they have been exposed to water or acid solutions.
4 Reinstall the quartz sleeve(s) as per above.

Sleeve Cleaning Solutions

The following sleeve cleaning solutions are recommended for removal of scale build-up and coatings from the quartz sleeves. Mild acid solutions are recommended. Acid solutions can be bought commercially or diluted form industrial strength acids. (Cleaners such as "Lima-A-Way" and "CLR" may be used.)

- 15% Phosphoric Acid
- 5% Nitric Avid
- 10% Citric Acid*

*Citric acid solutions cannot be reused. All other types can be stored indefinitely and reused until they no longer have the strength to effectively clean the sleeves. Refer to MSDS from manufacturer of cleaning solution for further information on storage and handling.

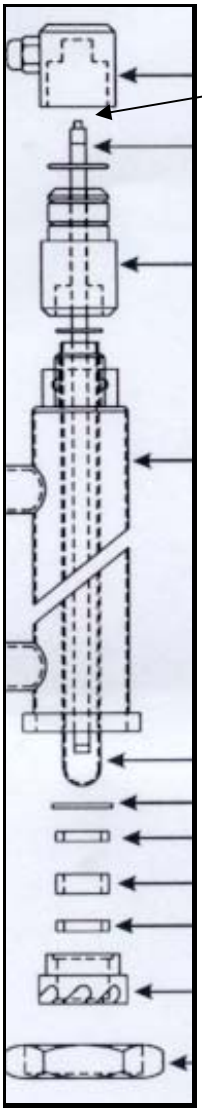
HOW TO SERVICE TURBINE CLEANER

1. Switch off power and disconnect from GPO.
2. Loosen hexagon nut at bottom of UV cylinder to allow water to drain.
3. When drained completely remove hexagonal nut at bottom of UV cylinder.
4. Thimble seat will drop from cylinder. Move to one side until reassembly required.
5. Turbine cleaner will also drop down from UV cylinder. If turbine cleaner does not drop out see instructions for dislodging.
6. Remove used felts (2).
7. Snap out locking ring by laying turbine on its side, pulling spacer away from locking ring, place screwdriver through centre hole of turbine and tap gently to remove locking ring.
8. Remove spacer.
9. Wet new felts. Insert first felt. Replace spacer. Insert second felt.
10. Replace locking ring.
11. Remove and replace thimble seat o'ring. This is located in recess at bottom of cylinder (on cylinder end). Lubricate o'ring with valve lubricant prior to placement.
12. Re -insert cleaning turbine into UV cylinder with locking ring to the top.
13. Clean thimble seat and re-insert - hold in place.
14. Screw hexagonal nut back into place at bottom of UV cylinder.
15. Plug leads into powerpoint and turn system on.
16. Check pipework for leaks.
17. If leaking check where leak is coming from – check o'ring seal and check tension on hexagonal nut.

IF TURBINE CLEANER BECOMES LODGED IN UV CYLINDER AND WILL NOT DROP OUT

1. Switch off power and disconnect from GPO.
2. Loosen hexagon nut at bottom of cylinder to allow water to drain. Do not remove nut entirely.
3. Remove top cap.
4. Disconnect UV lamp from 4-pin fitting. Place UV lamp carefully to one side on a clean surface.
5. Unscrew black thimble holder.
6. Gently lift thimble holder up. Thimble should remain attached to holder.
7. Grasp thimble and support as thimble holder is raised to allow for removal. Place thimble and holder to one side.
8. Continue as per Steps 2-14 of "How to service the turbine cleaner".
9. After completing all steps in "How to service the turbine cleaner", carefully and gently replace thimble and screw on black thimble holder.
10. Perform leak checks on the system.
11. Once leak checks have been performed, switch off power and disconnect from GPO.
12. Replace Ultraviolet lamp (see instructions steps 5-8).

FIGURE 1 SCHEMATIC OF UV CYLINDER ASSEMBLY



STANDARD REPLACEMENT PARTS UV UNIT

UV lamp size may vary between individual installations. Please check with your supplier/installer to confirm the size lamp in your system.

Ultra Violet Lamp 20 watt
Ultra Violet Lamp 30 watt
Ultra Violet Lamp 40 watt
Ultra Violet Lamp 58 watt
Ultra Violet Lamp 75 watt
Quartz Thimble 20 watt
Quartz Thimble 30/58 watt
Quartz Thimble 40/75 watt
Food Grade Lubricant 20mL tube
Service kit (o'rings & cleaning felts only)
Light Sensor Type A (hardwire type upgrade kit)
Light Sensor Type B (plug-in type)

STANDARD TESTS TO BE UNDERTAKEN AT ANNUAL SERVICE

Clarity

To measure turbidity/clarity, using a suitable dipper, immediately scoop a little more than a litre of effluent from pump well 2/test point and pour it into the Imhoff Cone and set the cone and sample aside for approx 20-30 minutes. Observe and record Suspended Solids (SS) reading from Imhoff Cone sample. Observe colour of settled sludge and clarity of top of sample. On completion, pour sample back into primary chamber and replace lid.

Obtain effluent sample for clarity test from pump well 2/test point, pour into clarity measurement vessel, raise and lower centre tube focussing on cross on bottom of cylinder, read and record. (Or can also use marked dip stick with marked disc at end, noting depth till disk cannot be seen.)

Dissolved Oxygen
This test is performed by testing a sample of the effluent with a dissolved oxygen test kit. The results are expressed as parts per million of dissolved oxygen. A normal operating plant should have a dissolved oxygen content of at least 1.0 PPM in the final effluent.

To measure the Dissolved Oxygen level take sample of effluent from pump well 2 or sprinkler. Place the Dissolved Oxygen probe into the sample and measure the DO in Parts Per Million and record.

Temperature
Leaving the DO probe in place, read the temperature of the effluent, using the temperature function on the Dissolved Oxygen meter and record. Remove probe.

pH
Basically, the pH test is one which measures the acidity or alkalinity (causticity) of the liquid in the aeration chamber. The pH range is from one to fourteen; a pH of one indicating completely acidic conditions and a pH of fourteen indicating completely alkaline conditions.

The pH is measured by using a colour comparator with 7 indicating a neutral condition.

A normally operating domestic sewage treatment plant should have a pH of between 6.5 and 8.0. The bacteria responsible for the digestion of sewage cannot normally live and grow if the pH is not in this range. A pH reading outside this range indicates either (1) that the plant is septic; this can be corrected by the methods listed in the first section of the manual or (2) acidic or caustic wastes are being emptied into the plant; these must be stopped before they enter the plant.

To determine pH of system take sample of effluent from pump well 2 or sprinkler. Place pH meter into effluent sample and read the pH level and record.

Residual Chlorine
The principal reason for chlorination of sewage effluent is for disinfection. Sewage treatment may not completely remove the pathogenic (disease-causing) bacteria which can be present. The chlorine residual is measured by using a colour comparator, generally part of the same instrument used to measure pH.

When effluents are discharged to bodies of water which are, or may be used as a source of public water supply, or for recreational purposes, chlorination to kill harmful bacteria will require a chlorine residual of greater than 0.5 PPM. This residual must be the minimum maintained in the effluent. If the test results show less than this, increase the rate of chlorine feed. A dose of 8ppm free chlorine should produce a chlorine residual of 0.5 PPM or more in a normally operating plant.

To determine free chlorine in final effluent, take sample of effluent from pump well 2 or sprinkler, using chlorine comparator indicator kit. Drip indicator chemicals into sample and observe and record result.

Sludge Level in Primary Chambers
To measure the accumulated sludge level in the primary tank use “sludge judge”. Clear a hole in sludge, place sludge judge in the primary at the wall. If over 750mm tank needs a pump-out. Advise client to have primary chambers 1 and 2 pumped out. System should be filled back to operating level with clear water to prevent any damage to chambers. Refer to *Sludge Removal* section of this manual.

SLUDGE REMOVAL

Periodic removal of accumulated sludge from the treatment tank (primary chambers 1 and 2) will be required.

Sludge build-up by volume has been calculated on the basis of 80 litres per person per year. Thus it will be calculated that desludging of the plant on full 20EP loading would be on a 3 to 4 year cycle.

A standard 10 EP (10 person) plant will require sludge removal approx every 6-8 years.

Sludge should be removed by an authorised septic pump out contractor. After desludging and cleaning out by pumping, the tank should not be disinfected or washed. All that needs to be done is to fill the tank with water (fill primary chamber 1 and allow to flow through to primary chamber 2) to reproduce the bacterial action and keep odours to a minimum. Do not contaminate Pump Well 2 (disposal chamber).

RECOMMENDED METHODS FOR COLLECTING EFFLUENT SAMPLES

Refer to "SITE SAMPLING" procedure in this manual.

Testing – Chlorine Disinfection.
Samples are to be taken from the first sprinkler head (if sprinklers are operational) or from pump well 2. Where available use test tap if installed. Ensure correct sampling procedures are followed (flush test tap/sprinkler head prior to taking sample).

Testing – UV Disinfection Only.
Samples are to be taken from the line after disinfection and as close to the point of disinfection as possible. Where available use test tap if installed. Ensure correct sampling procedures are followed (flush test tap prior to taking sample).

Toggle Switch located on control box. Note: Some models may not have this function. When switched to "on" position (facing the box switch to left) this switch will activate the UV lamp. Following a 2 minute time delay the dispersal pump will also activate. May be used to take a test sample or to check UV lamp operation.

EFFLUENT PRODUCER STATEMENT

It is expected that treated effluent produced by an operational Nature Flow® Mk II STP meet secondary quality standards.

Secondary quality effluent has these compliance characteristics:

- 90% of the samples taken over the test period shall have a BOD5 less than or equal to 20g/m^3 with no sample greater than 30g/m^3.
- 90% of the samples taken over the test period shall have total suspended solids less than or equal to 30g/m^3 with no sample greater than 45 g/m^3.
- where disinfection is provided, 90% of the samples taken over the test period shall have thermotolerant coliform count (determined by either the most probably number of membrane filter technique) not exceeding 200 organisms per 100ml with no sample exceeding 1000 organisms per 100ml.
- where chlorination is the disinfection process, the total chlorine concentration shall be greater than or equal to 0.5g.m^3 and less than 2.0g/m^3 in four out of five samples taken.

Nature Flow® Sewerage Treatment Plant
SERVICE CONTRACT

This Agreement is made between (Owner/Occupier) _____

of (Address) _____

_____

and Nature Flow Systems P/L or their duly appointed agent.

The duration of the Agreement is for a period of twelve calendar months.

Nature Flow Systems P/L or their agent, upon payment of **$_____ per year plus travel & consumeables (where applicable)** and the signature of the afore-named person at the place indicated below, and upon acceptance of this application by a duly authorised employee of Nature Flow Systems P/L, agrees, for the period indicated to the following:

1 Annual field service inspection will be made by a trained employee at approximately one year from the date this Agreement is signed (or if the first service after installation then approx one year after the date of commissioning). Inspections include the following checks:

a) Efficiency of chlorinator. Check dial up residual and Bypass Valve is set correctly.
b) Level of chlorine tablets (Cost of replenishing chlorine tablets is **NOT** included in maintenance fee.)
c) Check irrigation and recirculating pumps are operational
d) Amount of sludge accumulation in the septic chamber
e) Zabel filter/or equivalent
f) Media filter vents checked for damage and mosquito proofing
g) Drainback to final effluent chamber is running freely
h) Visual inspection for ponding above filter
i) Condition of all hoses and irrigation sprays
j) Condition of irrigation area

Inspection includes the following tests:

a) pH level of effluent
b) Level of dissolved oxygen
c) Temperature of effluent
d) High water level alarms
e) Clarity of water
f) Free residual chlorine level

2 This maintenance agreement does *NOT* include the maintenance of the irrigation area or repairs to any part of the treatment system, chlorinator unit or pumps. The cost of replenishing chlorine tablets is *NOT* included in this maintenance agreement.

3 Both labour and materials will be charged for any emergency service call outside the annual service call specified above.

4 All repairs are strictly on a COD basis.

5 This Agreement does not bind Nature Flow Systems P/L or its duly appointed agent to be responsible for the quality of the effluent. However, it will at all times wherever possible, recommend how the effluent quality can be maintained at its maximum and alter and adjust the system during annual service to obtain the best possible effluent standards.

In applying for this Agreement, the undersigned acknowledges that this Agreement is binding while they are the owner/occupier of the premises. Nature Flow Systems P/L will transfer the unexpired portion of this contract to any new owner/occupier to comply with the relevant health legislation.

I hereby apply for the above Agreement and agree to the annual service fee payable of $_____ plus travel & consumeables (where applicable).

_____
(Owner/Occupier's signature)

Accepted the _____ day of _____, 20_____.

By: _____