Weekly Discharge Monitoring Record

Wellman International Limited

Table 1 – To be completed on a weekly basis

Parameter		Influent (Ex Balance tank)		Biotower		Treated effluent (SW1)	
pH							
COD conc(mg/l)							
COD load (kg)							
SS of *standard* (mg/l)							
SS (mg/l)							
SS load (kg)							
CBOD$_5$ Determination							
V1 (mg/l)	V2 (mg/l)						
VD1 (mg/l)	VD2 (mg/l)						
ϕ = V1 ï V2							
ϕ D = VD1 ï VD2							
Dilution factor							
CBOD$_5$ (mg/l) = (ϕï ϕD) x dilution factor							
CBOD$_5$ load (kg)							

Table 2 Visual checks to be completed on a weekly basis. All other parameters must be conducted at least once per month. Indicate 'insufficient flow' or 'N/A' (if testing had been done earlier in the month) on the table.

Parameter		M/037/S	M/123/S	M/014/S	M/235/S	M/000/S
Visual check						
pH						
Conductivity						
Temperature (^{0}C)						
COD Conc (mg/l)						
CBOD$_5$ Determination						
V1 (mg/l)	V2 (mg/l)					
VD1 (mg/l)	VD2 (mg/l)					
ϕ = V1 ï V2						
ϕ D = VD1 ï VD2						
Dilution factor						
CBOD$_5$ (mg/l) = (ϕï ϕD) x dilution factor						
CBOD$_5$ load (kg)						

WEEKLY FLOW METER RECORDING –REVIEWED ☐ **MONTHLY RECORDS STORED** ☐

Note: V1 = Initial DO of test sample V2 = Final DO of test sample
DV1 = Initial DO of control sample (dilution water) DV2 = Final DO of control sample (dilution water)

COMMENTS:

SIGNED: _____ **DATE:** _____

Daily Discharge Monitoring Record

Wellman International Limited

Standardisation of equipment (Required prior to use of DO or pH meter)

Portable DO meter recording	pH meter recording (Slope mV)

Water usage (Required Monday-Friday during normal operations)

Time:	Reading at river (m^3)	Daily water intake ($m^{3)}$

Visual checks (Required Monday-Friday during normal operations)

DO Recorder	pH Recorder

Treated effluent (SW1) (**Daily flow** required everyday day including Sundays, Bank holidays and factory shut downs, all other parameters required Monday-Friday during normal operations)

pH	
Daily flow (m^3) *(*meter reading)	
Depth of weir (mm) *(ruler reading)*	
Depth of weir (mm) *(meter reading)*	

COD Conc. of standard (mg/l)	
COD Conc. of sample (mg/l)	
COD load (kg) = *(COD conc x flowrate)/1000*	

Influent & Biotower (Required Monday-Friday during normal operations)

	Influent (Ex Balance tank)	Ex Biotower
pH		
COD Conc. of standard (mg/l)		
COD Conc (mg/l)		
COD load (kg)		

Aeration Basin (Required every day including Sundays, Bank holidays and factory shut downs)

Weight of filter (W1) (g)	
Weight of filter + residue (W2) (g)	
MLSS/SS (mg/l) = (W2 ï W1) x 10000	
SS of standard (mg/l)	
Sludge settlement volume (ml/l) *(Cone test)*	
SVI (ml/g) = (sludge settlement vol/MLSS) x 1000	

Comments: _____

_____

_____

SIGNED: _____ **DATE:** _____

WASTE WATER TREATMENT PROCESS

Purpose

- To ensure that the liquid effluent discharge from the factory complies with requirements of the IPPC Licence (Condition 6).
- To ensure the health and safety of those working within the effluent treatment plant, at the drainage system and down at the river, and those that may come in contact with liquid effluent.

Scope

- Covers the running operation and monitoring of the Waste Water Treatment Plant (WWTP) during normal periods of operation and during periods of shut down.
- Covers visits to the river and sample taking at the manholes to the site drainage system.

Responsibility

Development Technician
Laboratory Manager
Laboratory Technician
HSE Officer
HSE Manager

Related Documents

Dewatered Sludge Disposal Record	EC20a
Monthly Discharge Licence Record	EC14
Weekly Discharge Monitoring Record	EC14a
Daily Discharge Monitoring Record	EC14b
Emissions to water, SW1 Emission Limit Values	EC14f
Waste Water Treatment Plant Checks	EC 14g
Procedure for activation of firewater retention ponds	EP 31
Plant and Equipment Maintenance Sheet	EC 57
Procedure for Disposal/Recovery of Non-hazardous waste	EP 34
Procedure to Monitor Sludge Settlement	EP 23.11
Procedure to Measure Suspended Solids	EP 23.5

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Safety Measures

Follow all plant safety rules including the Common Hazards and Control Measures procedure GE/094.

Hazards	Control Measures
Access/Egress	• Access to the effluent treatment plant is restricted to authorised personnel only (and sign at perimeter fencing to indicate no unauthorised access). • The perimeter of the effluent treatment plant is fenced to prevent inadvertent access of personnel. • Follow the general guidelines set out in SOP GE/032, Use of Ladders, Steps and Stairs, when ascending and descending stairs and fixed vertical ladders.
Lone Working	• Adhere to the controls outlined in SOP GE/023 ñLone Worker Alarm TelePROTECT Systemò This alarm should be worn at all times when working alone.

Hazards	Control Measures
Falling from Heights/Slips,Trips,Falls/Risk of Drowning (open effluent tanks in waste water treatment plant, plant drainage system, river)	• Adhere to the controls outlined in this procedure. • Sampling points at ground level are provided for the open effluent tanks. • Platforms with adequate handrails and mid-rails are provided on all open effluent tanks. • A guard is in place for access to the monotank effluent screens. • The river bank is adequately guarded with handrails and railings. • Industrial steps with handrails are provided to gain access to the underneath of the river bridge. • A lifebuoy is provided at all open effluent tanks and at the river.
Exposure to effluent could result in a number of illnesses. These include: • Gastroenteritis, characterised by cramping stomach pains, diarrhoea and vomiting. • Occupational asthma produced by the inhalation of living or dead organisms. • Hepatitis, characterised by inflammation of the liver • Weil's disease, a flu-like illness with persistent and severe headache, transmitted by rats urine. • Infections to skin and eyes. • Rarely, allergic alveolitis (inflammation of the lung).	• Adhere to the controls outlined in this procedure. • Warning notice indicating potential biological hazard exposure risk is displayed at all access points to the effluent treatment plant. • Hepatitis B vaccinations are offered to all employees who work at the effluent system and others who may come into contact with equipment contamination with effluent. • A pest control monitoring and maintenance service is provided by an outside contractor. • An effluent testing laboratory and its own supplies is provided at the effluent treatment plant to minimise numbers of persons exposed to potential sources of effluent through accidental exposure or contaminated laboratory equipment. • No eating and drinking allowed within the effluent testing laboratory (warning sign erected to indicate this point). • Hand/face washing facilities are provided within the effluent treatment laboratory. • A PPE storage facility is provided in the effluent testing laboratory (and separate clean/dirty facility).

Hazards	Control Measures
Manual Handling (manhole covers)	• Use the manhole lifter to move manhole covers away from position (Ref. SOP GE/081 ñManhole Cover Lifter - General Useò). • Manual handling training provided to operators.
Confined Space Entry (plant drainage system)	• Entry into confined spaces is not permitted without the completion of a permit, in accordance with SOP GE/072 ñWorking in Confined Spacesò

1. Personal protective equipment (PPE)

The following PPE must be used in the effluent treatment plant:

a. Safety glasses and safety footwear.
b. Where contact with effluent is likely, assess the need for the following additional personal protective equipment:
   - Waterproof gloves.
   - Splash resistant overalls.
   - Safety wellington boots.
   - Full-face visor.
   - Respiratory protection (3M 6000 and A1 organic gas and vapour filter fitted) is required when entering/working in the dewatering press and the sump pump house for extended periods.

2. Access to the effluent treatment plant

Access to the effluent treatment plant is restricted to authorised persons. Authorised persons are those who are instructed by management to enter the area and those who must enter the area as part of their normal duties. A list of authorised persons who may enter and work in the effluent treatment plant should be maintained by the Laboratory Manager.

3. Personal Hygiene

a. Avoid becoming contaminated with effluent.
b. Do not breathe in effluent dust or spray.
c. Do not touch your face, smoke, eat or drink, unless you have washed your hands thoroughly with soap and water.
d. Report all wounds however small to first aider for cleaning and covering with a sterile waterproof dressing.
e. Change out of contaminated clothing before eating, drinking or smoking.
f. People who suffer from skin problems should seek medical advice before working with effluent.
g. Contaminated clothing must not be taken home by employees.
h. Store contaminated laboratory coats and disposable overalls in the designated storage areas.

4. Weil's disease

a. Do not touch rats with unprotected hands.
b. Cover all cuts and broken skin with a waterproof plaster.
c. Wear the protective clothing as listed above.
d. Wash contaminated hands before eating drinking or smoking.
e. A Weilõs disease card is issued to all employees who work in the effluent treatment plant.
f. Employees who work in the effluent treatment plant should tell their doctor about their work and show them the card when ill, as the symptoms are the same as flu.

5. Vaccinations

a. On the recommendation of the Company Medical Officer Wellman International Limited offer the Hepatitis B vaccination to all employees who work at the effluent system.

The effluent treatment process

1. Water

The water used in the process is taken from the Borora River, with an average of 250m^3 per day used. A small quantity is taken from our own well for drinking purposes. All water from the site is returned to the river.

2. Drains

There are two distinct separate series of drains within the factory.

One, the storm drains, picks up surface water from the roof, car parks, loading docks etc, and also any non-contact cooling water.
This non-contaminated water flows to the river without treatment.

The second series, the foul drains, picks up all the trade effluent i.e. toilets, tower, finishing and lab. This effluent collects in the Underground Sump at the entry to the Waste Water Treatment Plant (WWTP).

Of the 250m^3 of water taken from the river each day, approximately 150m^3 is collected in the foul drain system for treatment in the WWTP.

3. River Discharge

The treated effluent from the WWTP and the flow from the storm drains combine at manhole M001S before leaving the site. The effluent is piped underground to discharge into the Borora river via a single outflow in the centre of the River weir upstream of the Bridge.

Fire Water retention ponds can be used to interrupt this flow if there is any contamination. Control of these ponds is documented in EP 31 ñProcedure for activation of firewater retention pondsò

4. Waste finish collection system

Waste finishes from Spinning and from the Manual Finish Mixing area in Finishing are pumped to the 12,000 gallon tank for controlled disposal. The waste from the AFM is metered directly to the treatment plant via the foul drains.

5. Why Treat?

In a normal healthy river oxygen is dissolved in the water and is available for uptake by fish, plants, micro organisms etc. This oxygen is also used by the micro organisms to rot down organic debris in the river.
The oxygen is continuously replenished by solution from the atmosphere.

If we were to discharge our effluent directly into the river without treatment the organic chemicals in the domestic sewage, the finishes, monomer, etc would degrade in the river, using up the valuable oxygen faster than it can be replenished. This oxygen would therefore no longer be available for fish and plant life - the river would ñdieò

To eliminate this problem the effluent treatment plant accelerates this degrading process by using bacteria and freely available oxygen. Then, when the effluent reaches the river, only a very small amount of the riverôs oxygen is required to finally break down any small amount of organic matter remaining.

6. B.O.D./S.S.

A measure of the amount of oxygen that would be required from the river to finally break down the small amount of organic matter remaining is given by the Biochemical Oxygen Demand (B.O.D.). This is a measure of the amount of oxygen absorbed by the effluent over a five day period. B.O.D. is recorded as the concentration in mg/ litre or p.p.m.

The amount of solid material suspended in the effluent is also an indication of its purity. Suspended Solids (S.S.) are recorded as the concentration in mg/ litre or p.p.m.

7. B.O.D. or S.S. “Load”

The river has a natural ability to accept a certain quantity of contaminants in our effluent on a continuous basis without adverse effects.
This quantity is called the effluent ñloadò and we calculate the load that we are putting into the River by multiplying the volume of the effluent flow by the B.O.D. (B.O.D. load) or S.S. concentration (S.S.load).
The maximum load that we can discharge is specified in our IPPC licence.

8. Discharge Licence

We have been granted an IPPC Licence by the Environmental Protection Agency (EPA) in order to discharge effluent to the Borora River.

The main conditions of the WIL license are:-

A maximum daily	580m^3	
Volume:		
Average B.O.D.:	18 mg/litre -	10.44 kgs/day
Average S.S.	18 mg/litre -	10.44 kgs/day
Temperature:	less than 20^{o}C	
Oil, Fats, Grease:	10mg/litre ï	5.80 kgs/day
pH:	6 ï 8.5	
Ammonia:	8 mg/litreï	4.64 kgs/day
Detergent:	4 mg/litreï	2.32 kgs/day
O/Phosphates as P	2 mg/litre ï	1.16 kgs/day
Nitrates & Nitrite as N	15 mg/litre ï	8.7 kgs/day

Of the many conditions in our licence the most significant relating to the treatment of liquid effluent are:-

- Maximum daily Volume
- Maximum B.O.D load.
- Maximum S.S. load

9. The treatment plant

The WWTP provides oxygen to bacteria and other micro-organisms to break down the contaminants in the effluent. In doing so solid sludges are generated which are separated from the water and disposed of separately.

The effluent plant has been constructed in various stages throughout the life of the site and has grown in accordance with the company's needs.

a) Underground Sump –

a. The effluent in the underground sump is pumped to a Balance Tank by one of two Sarlin submersible pumps, using a stand-by system, and controlled by float switches in the sump.

b) Balance Tank (Green Tank)

a. This is the latest addition to the treatment plant and will replace the Mono Tank. The capacity of the tank is 38 m^3 .Compressed air is pumped to diffusers in the bottom of the tank from compressors located in the pump house. This keeps the effluent aerated. The effluent is then pumped to the biotower

c) Mono Tank ï

a. The mono tank has a capacity of approx. 188 m^3 and a surface area of 50 m^2 and allows solids to settle and float. This tank is no longer typically used on a regular basis. The tank is only used to bypass the balance tank straight to the biotower in the event of the balance tank failing.
b. Occasionally the floating sludge is skimmed from the tank and disposed of by a contractor.

d) Biotower

a. From the balance tank the liquor flows by gravity to one of three rectangular holding tanks below the Biotower.

b. From the first tank the liquor is pumped by two KSB pumps up to the top of the Tower and allowed to percolate back down through the high surface area medium. Bacterial growth on this medium breaks down the effluent using the upward flow atmospheric oxygen.

c. The effluent collects in the reservoir at the bottom of the Tower and flows to the second rectangular tank. This tank is connected to the third larger settlement tank and also to the first tank which supplies the Biotower pumps. In effect the liquor sees several passes through the Biotower before it enters the third settlement tank from where it is gravity fed to the aeration basin.

d. Under equilibrium conditions a sludge continuously falls off the medium and settles in the third settlement tank. Biotower Sludge is regularly taken from the bottom of this tank for dewatering and disposal.

e. The partially treated effluent then flows, again under gravity, to the aeration basin.

e) Aeration Basin

a. The aeration basin is a 680m^3 tank stirred with a 25HP motor and impeller which adds oxygen to the effluent. The oxygen level in the basin is continuously monitored with a dissolved oxygen (DO) meter. The BSK aerator (type Gigant 1600) rotates at 56 rpm when required by the DO meter.

b. An activated sludge is produced in the aeration basin. This contains the bacteria and other organisms for the breakdown of the effluent. The sludge is present as a dispersion in the basin and will settle out if allowed to stand.

c. A standby floating Aerator is also in place in the Aeration Basin.

f) Settlement Tank

a. The activated sludge from the aeration basin flows to the final settlement tank. This has a conical shaped bottom and has a volume of 107 m^3. The activated sludge settles to the base of the cone and clear effluent from the aeration basin flows to the liquor surface.

b. The sludge is transferred back to the aeration basin using an air lift pump and Blower.

c. The effluent is picked up in a weir and is gravity fed to the clarifier.

d. Excess Settlement Tank sludge is removed for dewatering and disposal.

g) Clarifier

a. The clarifier is intended as a coarse filter to remove any residual sludge from the effluent. The liquid passes into a trough and flows upwards through a stainless steel wedge wire medium which acts as a filter. The filtered effluent flows to the V Notch weir.

b. The screen is backwashed weekly and any solids are returned to the underground sump.

h) V Notch Weir

a. The effluent then flows to a rectangular concrete tank of approx. 4 m^3 which houses a 90° V notch weir arrangement, automatic sampler and flow meter Information from the flowmeter is passed on to a sampler, which takes a sample from every m^3 of effluent. This is collected as a 24 hour composite sample.

b. A series of baffles across the surface of the tank act as a final floating sludge trap and a floating pump is used to return any floating sludge to the underground sump.

c. The treated effluent flows over the V notch weir and joins the non-contaminated water at manhole number M001S.

i) Sludge Dewatering and Removal

a. As the effluent is treated organic sludges build up in the tanks.

b. Aerobic (with oxygen) sludge is brown with little or no smell.

c. Anaerobic (without oxygen) sludge is black with an unpleasant smell.

d. Sludge from the Mono tank and Biotower are anaerobic and the Settlement Tank sludge is aerobic. These sludges are removed from time to time and dewatered to allow more cost effective disposal.

e. In order to control the concentration of sludge in the aeration basin the mixed liquor suspended solids (M.L.S.S.) content of the aeration is checked daily as per EP23.5.

f. The sludges are piped by gravity to the hydropress/dewatering cabin. A metering pump mixes controlled quantities of the sludge with polyelectrolyte which causes the sludge to flocculate. The flocculated sludge is passed onto a belt filter press. The filtered liquor passes back to the effluent collection sump.

g. The filtered sludge is augured out of the press into a sludge collection skip.

h. When the skip is full it is disposed of by a contractor as per EP 34 "Procedure for disposal/recovery of non-hazardous waste"

i. The operation of the hydropress is detailed later.

j) Electrical Control Room

a. This is situated behind the Underground Sump and contains all the main electrical control panels, the Alarm PLC and the DO meter.

k) Standby Equipment

Spares are kept for critical equipment in the locations outlined below

Stand-by equipment	**Storage location**
Standby sump pump and spare sump pump	Sump house
Spare aerator gearbox and motor	Ground level in motor store
Standby sludge return blower	WWTP
Emergency power supply from a diesel generator	WWTP
Back-up aerator (floating aerator)	In aeration tank

l) Minimum plant requirement

a. In the event of the generator being required the minimum plant that must run is:-
   i. Aerator No 1
   ii. Sump Pumps No 1 and No 2
   iii. Biotower Pump No 1 OR No 2 (Valve off pump not in use)
   iv. Sludge Pump Roots Blower
   v. DO meter, Flowmeter, and pH meter.

10. Original Design Parameters

The effluent treatment plant design parameters are (ref. Tender for supplementary effluent treatment works by Purification Systems Int. Ltd. May 1979):

- Crude influent flow
  a. Hours / Day = 24
  b. Days / Week = 7
  c. Total Daily Volume = 641 m^3

- Bio-Loading 548 kg/day
- Final Standard = 15 : 10 BOD/SS
- Overall BOD Reduction

	- BOD Inlet	- BOD Outlet
- Settlement Tank	- 855	- 641
- Biotower	- 641	- 217
- Aeration / Settlement	- 217	- 20
- Clarifier	- 20	- 15

11. Visual Monitoring of the Effluent Treatment Plant

From Monday to Friday the Laboratory Technician undertakes visual monitoring of the treatment plant:

a. Sump - To ensure that the duty pump and the float switches are functioning correctly, a visual check is carried out on the liquid level in the sump. A visual check of the control panels highlights any electrical malfunction. A visual check of the dissolved oxygen level can be made.
b. Biotower Pumps - These are checked for function and leaks.
c. Aeration / Settlement Tanks - The level in the tanks, the correct functioning of the aerator and the quality of the settled effluent are checked visually.
d. Weir - The quality of the final treated effluent is checked visually as it leaves the plant at the V notch weir.
e. River - Visual checks on the Borora river give an indication of river flow, upstream quality, downstream quality and the presence of oil downstream. A general assessment of the condition of the river ecosystem can also be made.
f. In the event of a change in sludge behaviour a microscopic examination of the sludge is carried out to check for filamentous organisms and the general shape and size of the flocs. Action can be taken to adjust conditions throughout the treatment plant if unusual conditions are seen.

Electrical maintenance checks are conducted on equipment in the wastewater treatment plant on Friday of each week. Refer to PM721. Details are recorded on EC57 ôPlant & Equipment Maintenance Sheet- Electricalô

12. Analytical Control of Effluent Treatment Plant.

The functioning of the effluent treatment within the limits of the IPPC Licence is covered by procedures in the ISO 14001 system

Safety Measures when Taking Samples:

The following control measures should be adhered to when taking samples for analysis:

1. Effluent Tanks - use the sample taps provided at ground level.
2. Weir ï use the long-handled holder for the sample container used to collect the sample from this sampling point.
3. Manholes ï use the manhole lifter to lift manhole covers away from position. Exercise due care and attention when collecting samples from open manholes. All manhole covers should be replaced immediately after the sample has been taken. Do not leave open manholes unattended unless it is securely cordoned off.
4. River ï use the controlled sample holder and sampling point (ie. metal beaker tied to a string) to take river water samples. Wear the lone worker alarm when down at the river.
5. Boilerhouse ï wear a full face shield and gauntlet type gloves when taking a sample from this sampling point. Use a sample container with a wide opening to collect the sample from this point.

13. What can go wrong?

Alarms

In the event of a fault occurring an ñEffluent Treatment Plant Alarmò sounds on the Services Alarm Panel. This can be silenced locally but the light remains on and can only be reset from the PLC in the Electrical room at the rear of the Sump house. A light also remains lit on the side of the PLC panel.

If the alarm activates the cause of the alarm(s) will be registered on the screen of the PLC

1. Determine the cause of the Alarm from the PLC screen. (If the screen is ñoffò press F14)
2. Press the ñACKòpad (On the right of the PLC)
3. Press the red ñRESETòbutton on the panel (Below right of the PLC screen.) This resets the alarm lights on the Services Alarm Panel and on the PLC panel. If this is NOT done the alarm light will remain on and will not alert for the next alarm!

4. Fix the problem.

5. (If a blue flashing triangle is seen on the top right hand corner of the screen the fault still remains.)

6. The alarms should be shown on the screen but to check which alarms are still active press the ñK2òpad (Top right pad below the screen). This will list all uncorrected alarms.

7. (For a history of the alarms press K2 a second time. The up/down arrows scroll through the alarms)

8. ñESCòreturns to the main screen

Note
In extreme cases failure of the WWTP can result in untreated or partially treated effluent or effluent sludge flowing directly to the River. If this happens the South East Fire Water Retention Pond (Car Park) must be closed immediately (Ref EP 31) and the HS&E Dept advised.

a. Extra High level in the Sump

The pumps can cut out or get blocked or fibrous material can hang onto the float switches, the flow can exceed the capacity of the pumps or solids floating on the surface in the sump can stop the floats functioning correctly.
If this were to happen the sump would overflow and untreated effluent would flow directly to the river via the road drains.

There are four float switches in the Sump
1. Low level to switch off the pumps
2. Medium level to switch on the duty pump
3. High level to switch on the standby pump (and leave the duty pump on also).
4. Extra High level to activate the alarm on the Services panel.

If the alarm activates, either the pump/s have failed or the flow into the Sump has exceeded the capability of the pumps or the solids on the surface is preventing the floats from functioning.

Action
- *If the sump overflows activate the south east retention ponds as above.*
- *Check that there is flow from the pumps*
- *Check pumps/floats electrically*
- *Change to standby pump.*
- *Clean float switches*
- *To remove the solids lift all floats and rest on their side. Switch pumps to manual and allow sump to empty, hosing down to break up the mat of solids. When sump is empty replace floats and turn pumps to automatic.*

b. Extra High level in the balance tank

The discharge pumps have failed or the float switches are clogged or have failed.

Action
- *Check that there is flow from the pumps*
- *Check pumps/floats electrically*
- *Change to standby pump.*
- *Clean float switches*
- *If the tank overflows it flows back into the Sump and will activate the high level alarm in the Sump. If the Sump overflows close the South East retention ponds as above*

c. High level in the mono tank

The transfer pipe to the Bio Tower can block, especially at the valve W10 on the outlet pipes.

Action

- *Activate the valve W10 to clear.*
- *Clear by rods etc.*
- *If the tank overflows it is held in the bunded area but then flows back into the Sump and will activate the high level alarm in the Sump. If the Sump overflows close the South East retention ponds as above*

d. High level in any of the Bio Tower tanks

The outlet pipe from the Bio Tower is blocked.

Action

- *Advise a Contact Person (See list on page 18)*
- *Bypass the Bio tower entirely by directing the influent directly from the Balance Tank (or Mono tank if in use) into the Aeration Basin –Close valve W10 and open valve W11.*

The outlet from the reservoir at the bottom of the Tower can block and the reservoir overflows. Effluent seeps into the gravel and does not go into the drain system.

Action

- *Advise a Contact Person (See list on page 18)*
- *Bypass the Biotower entirely by directing the influent directly from the Mono tank into the Aeration Basin – Open valve W11 and close valve W10.*
- *Turn off the Biotower pumps and allow level to drop*
- *Remove the blockage and return the flow to normal.*

The treated effluent in the Biotower can foam and overflow the Biotower holding tanks. The overflow soaks into the gravel.

Action

- *Turn down the finish discharge from the 12000gal tank*
- *Clean the jets on the top of the Biotower*

Water can drip from the side of the Biotower caused by jets being partially blocked and spraying onto the cladding. The overflow soaks into the gravel

Action

- *Clean the jets on the top of the Biotower*

The Biotower settlement tank can overflow. The overflow soaks into the gravel

Action

- *Turn off the Sump pumps*
- *Divert the flow directly to the Aeration basin. As per Note above*
- *Rod the transfer pipe*

e. Bio Tower Circulation Pumps

These are under the tower. Both are running. If one cuts out or is turned off it backstreams from the running pump. A low flow results in the tower drying out and the bacteria dying off.

Action

- *Check electrically for overload cut out and reset*
- *Valve off the failed pump W36, W37, W38, W39.*
- *Note :- Check reset after a Power failure.*

f. High level in Aeration Basin

The level in the Basin is normally about 50 cms from the top. The alarm is activated by an air operated probe on the catwalk.

Action

Note: Clearing any blockage which has resulted in a high level alarm may result in poor sludge settlement. Be prepared to activate the South East Retention Pond

- *The probe may be blocked. Remove and clean.*
- *The probe may have slipped – raise it about 2-3 cms and monitor. If it activates within 30 mins the water level is rising and further action is required..*
- *Check if there is flow from the Settlement tank.*
- *Check that the valve between the two tanks is open. If closed open it SLOWLY.*
- *Advise a Contact Person (See list on page 18)*
- *Rod the pipe. If the blockage clears throttle off the valve to prevent sludge overflow and monitor until equilibrated*
- *Clear out the stillage tube in the centre of the Settlement tank. If the blockage clears throttle off the valve to prevent sludge overflow and monitor until equilibrated.*

g. Low Current on either of the two aerators

This alarm will suggest that the Impellor has fallen off.

Action

- *Check status*
- *Switch on the Standby Aerator*
- *Advise a Contact Person (See list on page 18)*

Note: The Aerator is controlled by an oxygen meter located in the Electrical room at the rear of the Sump house. Aerator should be running when the oxygen meter recording is below Set Point 2 (SP 2).
If the Aerator is not running when on ñautomaticò and the DO meter reads below SP2.:-

Action

- *Check the status with the Lab*
- *Check that it works on "Hand"*
- *Check electrically*
- *Switch on Stand By Aerator*
- *Advise a Contact Person (See list on page 18)*

Note:- There is no alarm for this scenario.

h. No Flow for sludge return

The sludge is returned from the base of the settlement tank using an airlift pump. Failure of the blower will cause the flow of sludge to stop.
If this stops the pipe at the base of the Settlement Tank can block and is a major problem to unblock. Also, because sludge is not being returned it builds up in the settlement basin and eventually flows to the river. **This is an extremely serious problem.**
A No Flow Detector is located in the pipe where the sludge is transferred from the settlement tank back into the aeration tank. The alarm will activate if the sludge stops coming across or if the sensor has failed or is dirty.

Action

- *If sludge is flowing to the river activate the South East retention pond as above.*
- *Advise a Contact Person (See list on page 18)*
- *Check that there is a flow from the transfer pipe. (To check out the sensor. Remove and clean if necessary.).*
- *Reset air lift pump or change to standby pump.*
- *Apply compressed air to top of down pipe*

i. Sludge level in settlement tank

From time to time the sludge may ñbulkòi.e. instead of settling, it floats to the surface and flows to the river. A sludge level alarm identifies if the interface between the settling sludge and the clear liquor in the settlement tank is rising to a dangerous level.

Action

- *Check settlement tank to see if sludge is bulking.*
- *If not --- lift the sensor and clean the two lenses. These can become coated with algae during normal running conditions.*
- *If Bulking ---*
    - *Turn off aerator*
    - *Close the valve between the Aeration Basin and the Settlement Tank*
    - *Advise a Contact Person (See list on page 18)*
    - *When sludge settles in the Aeration Basin **slowly** open the valve and monitor the effluent*
    - *If this fails and sludge flows to the river activate the South East retention pond*

j. High level alarm Nylon Sludge Tank –

The Nylon Sludge Tank is fed from finish mixing on Take Up. When finish reaches the high level probe a solenoid closes preventing finish reaching the tank. If this fails the alarm activates.

Action

- *Switch off the pump*
- *Advise a Contact Person (See list on page 18)*
- *Remove some finish from the tank*

k. Compressor trip.

This alarm indicates that the compressor in the pump house has tripped. Therefore there is no aeration in the new balance tank (green tank)

Action

- *Contact electrician*
- *If the compressor continues to trip .Plug in spare compressor and change valves*

Other problems

Power loss

In the event of a power outage the plant should be monitored closely. If there is a total power failure there will be ***no alarms*** so the Sump may overflow. The generator should be turned on.

The biological treatment can withstand a short power outage .
If this exceeds ***one hour*** the generator should be switched on.

In the event of restoration of power after a power loss check all motors. **The Biotower pumps and the Blower do not restart automatically.**

Oil - The treatment plant will only handle small quantities of oil. These collect with solids at the top of the Balance tank and can be removed. Larger quantities flow into the system and become mixed, as small globules, with the sludge. This sludge/oil mixture floats, passing oil and sludge to the river.

Action

- *Prevent oil leaks reaching the drains i.e. Can Traverse, Finishing Lines, Guillotines.*
- *In the event of a known oil spill monitor the effluent. If Oil is visible place an oil boom in the weir.*
- *Advise a Contact Person (See list on page 18)*

Storm Drain Contamination - Fluff, fibre, chip, oil, etc can accumulate on roadways, loading ramps, roofs etc. This can get washed into the river.

Action

- *Good Housekeeping*

l. *Awareness of the problem*

12000 Gallon Tank – Level switches prevent excessive quantities of finish from being pumped out.

List of Contact Persons

Peader Farrelly	042 96 68036	087 7559600
Danny Lynch	049 85 44661	
Cecil Conaty	046 92 40735	087 230 4386

14. Procedure to clean the Wedge Wire Clarifiers

Purpose
To ensure the efficient operation of the clarifiers

Frequency
Weekly

Responsibility
Grounds person

Safety Measures
- Before removing the grids, ensure that the water level is emptied to a safe level.

Procedure
a. The clarifiers filter out sludge from the treated effluent. This must be removed regularly to ensure the efficient operation of the clarifiers:
b. The flow is diverted to bypass the clarifiers.
c. The three outlet valves at the base of the clarifier are opened to drain the contents back to the collection sump.(W27, W28, W25)
d. The wedge wire is hosed until clean.
e. When all the water has drained to the sump the valves are closed and the flow is diverted back to the clarifiers.

15. Procedure to Run the Effluent Treatment Plant in the Event of a Production Shut Down

Scope
Covers the running of the Effluent Treatment Plant
Covers the monitoring of the Effluent Treatment Plant

Procedure

a) The effluent plant continues to run at all times.
b) In order to maintain a consistent feed to the effluent plant a supply of mixed finish is metered at a reduced rate into the collection sump. This is discussed at the plant shut down meeting.
c) In order to ensure an adequate hydraulic flow through the plant one of the desludging valves from the clarifier may be opened one turn.
d) The plant is monitored visually and the effluent tested to conform with the effluent discharge requirements of the IPPC licence

16. Procedure to run the Dewatering Press

Purpose
Sludges are removed from the WWTP to maintain the efficiency of the process. Typically the Biotower is desludged at least once per week until a clear liquid flows. The Mono Tank is also desludged whenever required.
The Settlement Tank is dewatered to maintain a MLSS level in the Aeration Basin of 2500 to 6000mg/L.

The purpose of this procedure is to remove water from the waste sludge to reduce disposal costs.

Responsibility
Laboratory Technician

Procedure
Sludges originate in the Bio Tower (anaerobic) and the Settlement tank (aerobic). When in use, sludge can also originate in the Mono Tank (anaerobic).
These are piped to a manifold with a single outlet to the dewatering press

1. **Make up of the Polyelectrolyte**.
   - Bio Tower and Mono Tank (when in use)
     Add approx 5 litres of polyelcetrolyte to approx half a tank of water with constant mixing. Dilute as required. Keep mixing continuously and do not run the press until all the lumps have gone.
   - Settlement Tank
     Add approx 5 litres of polyelectrolyte to approx a tank of water with constant mixing. Dilute as required. Keep mixing continuously and do not run the press until all the lumps have gone.

2. Desludgeing the Mono Tank

Setting up and dewatering the sludge

a) Ensure there is space in the sludge skip.
b) Turn on the scraper in the electrical control panel.
c) Turn on water supply to the hose (Valve on the wall)
d) Open valve at the base of the Mono Tank (W8, W9)
e) Open the Mono Tank valve W12 on the manifold and close any other valves on the manifold (W13, W14, W15)
f) Remove, hose down and replace the filter for the water going into the press (on the floor below the press)
g) Turn on water supply for cleaning the belt (Open the valve W24 at the pump under the clarifiers)
h) Turn on main power isolator switch
i) Switch on all except the ñWash water pumpò
j) Select ñForòfor the sludge pump
k) Turn sludge pump to ñ20òby turning the wheel adjuster on the pump.
l) Set the Poly pump to get a good floc. If too much poly the liquid will have a whitish appearance and the sludge will slide on the belt. To little and there will be no separation of the sludge and water.
m) Check that the dewatered sludge is going into the skip.

Shutting down

n) Turn off scraper
o) Turn off the sludge pump and the poly pump
p) Close valves at base of the Mono tank (W8,W9)
q) Close manifold valve W12 and open the drain valve W15 on the manifold
r) Put sludge pump into reverse to empty the flocculation tank
s) When the belt is clear hose down the press and the cabin
t) Turn off individual switches and the main isolator
u) Turn off the water supply at the clarifiers (W24)
v) Turn off the hose supply

3. **Desludging the Bio Tower**

Setting up and dewatering the sludge

a) Ensure there is space in the sludge skip.
b) Turn on water supply to the hose (Valve on the wall)
c) Open valve W18 at the base of the Bio Tower
d) Open the Bio Tower valve W14 on the manifold and close any other valves on the manifold (W12, W13, W15)
e) Remove, hose down and replace the filter for the water going into the press (on the floor below the press)
f) Turn on water supply for cleaning the belt (Open the valve W24 at the pump under the clarifiers)
g) Turn on main power isolator switch
h) Switch on all except the ñWash water pumpò
i) Select ñForòfor the sludge pump
j) Turn sludge pump to ñ20òby turning the wheel adjuster on the pump.
k) Set the Poly pump to get a good floc. If too much poly the liquid will have a whitish appearance and the sludge will slide on the

belt. To little and there will be no separation of the sludge and water.

l) Check that the dewatered sludge is going into the skip.

Shutting down

m) Turn off the sludge pump and the poly pump
n) Close valve W18 at base of the Bio Tower
o) Close manifold valve W14 and open the drain valve W15 on the manifold
p) Put sludge pump into reverse to empty the flocculation tank
q) When the belt is clear hose down the press and the cabin
r) Turn off individual switches and the main isolator
s) Turn off the water supply at the clarifiers W24
t) Turn off the hose supply

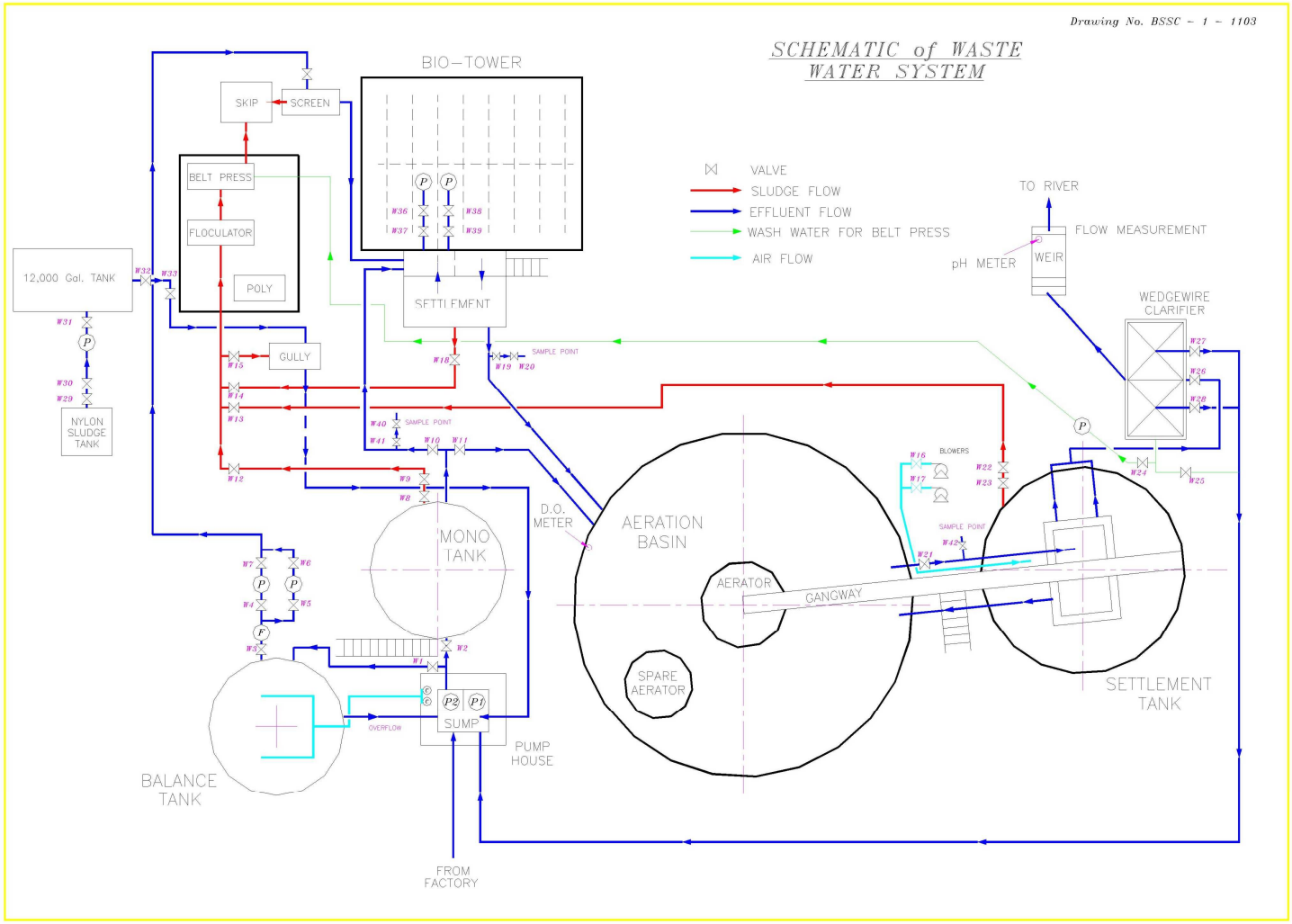
4. **Desludging the Settlement tank**

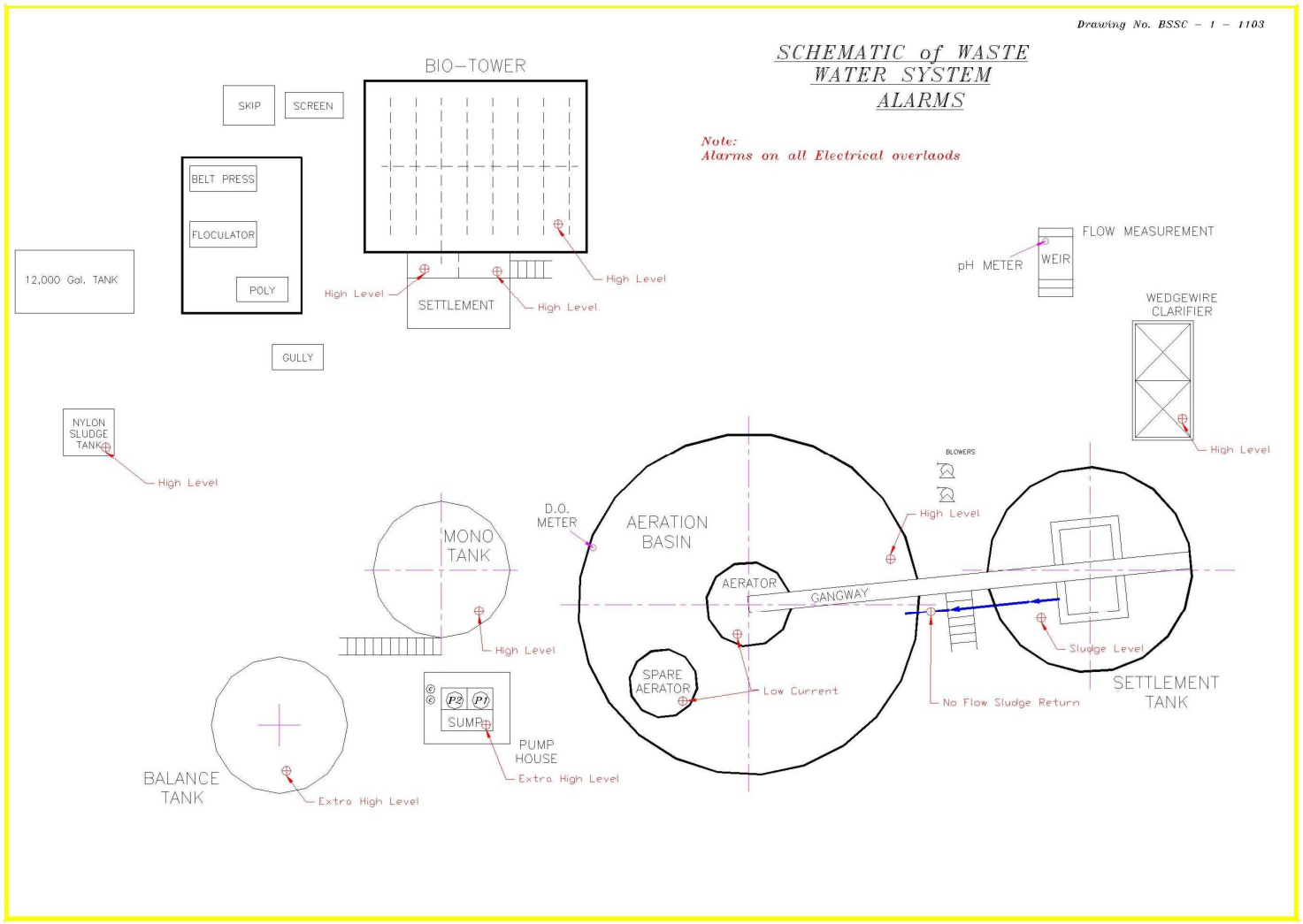
Setting up and dewatering the sludge

a) Ensure there is space in the sludge skip.
b) Turn on water supply to the hose (Valve on the wall)
c) Open valves at the side of the Settlement Tank.(W22, W23)
d) Open the Settlement Tank valve W13 on the manifold and close any other valves on the manifold. (W12, W14, W15)
e) Remove, hose down and replace the filter for the water going into the press (on the floor below the press)
f) Turn on water supply for cleaning the belt (Open the valve W24 at the pump under the clarifiers)
g) Turn on main power isolator switch
h) Switch on all except the ñWash water pumpò
i) Select ñForòfor the sludge pump
j) Turn sludge pump to ñ30òby turning the wheel adjuster on the pump.
k) Set the Poly pump to get a good floc. If too much poly the liquid will have a whitish appearance and the sludge will slide on the belt. To little and there will be no separation of the sludge and water.
l) Check that the dewatered sludge is going into the skip.

Shutting down

m) Turn off the sludge pump and the poly pump
n) Close valves at the side of the Settlement Tank (W22, W23)
o) Close manifold valve W13 and open the drain valve W15 on the manifold
p) Put sludge pump into reverse to empty the flocculation tank
q) When the belt is clear hose down the press and the cabin
r) Turn off individual switches and the main isolator
s) Turn off the water supply at the clarifiers
t) Turn off the hose supply


Drawing No. BSSC – 1 – 1103
SCHEMATIC of WASTE WATER SYSTEM
BIO–TOWER
SKIP
SCREEN
BELT PRESS
FLOCULATOR
POLY
12,000 Gal. TANK
NYLON SLUDGE TANK
GULLY
SETTLEMENT
SAMPLE POINT
VALVE
SLUDGE FLOW
EFFLUENT FLOW
WASH WATER FOR BELT PRESS
AIR FLOW
TO RIVER
FLOW MEASUREMENT
pH METER
WEIR
WEDGEWIRE CLARIFIER
BLOWERS
D.O. METER
AERATION BASIN
AERATOR
GANGWAY
SPARE AERATOR
SETTLEMENT TANK
MONO TANK
SUMP
OVERFLOW
PUMP HOUSE
BALANCE TANK
FROM FACTORY


Drawing No. BSSC – 1 – 1103
SCHEMATIC of WASTE WATER SYSTEM ALARMS
Note:
Alarms on all Electrical overlaods
BIO–TOWER
SKIP
SCREEN
BELT PRESS
FLOCULATOR
POLY
12,000 Gal. TANK
GULLY
High Level
SETTLEMENT
High Level
High Level
FLOW MEASUREMENT
pH METER
WEIR
WEDGEWIRE CLARIFIER
High Level
NYLON SLUDGE TANK
High Level
BLOWERS
High Level
D.O. METER
AERATION BASIN
MONO TANK
AERATOR
GANGWAY
High Level
SPARE AERATOR
Low Current
No Flow Sludge Return
Sludge Level
SETTLEMENT TANK
P2
P1
SUMP
PUMP HOUSE
Extra High Level
BALANCE TANK
Extra High Level

Revision History

Revision Number	Revision Date	Summary of Change(s)
03	18/06/03	• New procedure
04	01/12/04	• Procedure updated to include health and safety measures and to cover sample taking. • Withdraw SOP LB/402/01 ï all information in this SOP is now detailed here in this SOP.
05	13/10/05	• Procedure updated to include new balance tank and alarm for compressor trip
06	15/02/08	• Role of the mono tank updated to reflect that tanks is no longer in regular use • IPC licence changed to IPPC licence • Zeetag 7867 has now been replaced with Dryfloc 733 ï changed to simply state ñpolyelectrolyteò
6.2	22/12/09	• Microscopic examination of sludge is only done if there is a change in sludge characteristics • Location of spare parts included in the procedure • Reference to PM 721 included
6.3	08/07/10	• Included EP34, EP23.11 &EP23.5 in related documents section. • EP 35.1 referenced in text, up-dated to EP34 • MLSS limits are 2500-6000mg/L as per EP23.5. Procedure up-dated accordingly. • Mono tank is only occasionally skimmed of sludge ï procedure up-dated accordingly. • Procedure incorrect in relation to desludgeing balance tank ï this is not done and is not required to be done, procedure up-dated accordingly.

Appendix 1: Guidelines for sludge dewatering

- Check that the skip has the capacity for the dewatered sludge
- Mixing Polyelectrolyte - Add approx. 5 litres of Dryfloc 733 into the mixing tank, using the graduated bucket, fill with water and agitate.
- Connect flexi pipe from the sludge source to the manifold outside the press room and open the appropriate valves.
- Switch on the hydro press (all the switches on ñautoò the sludge pump on ñRevò)
- The sludge pump and the polyelectrolyte dosing pumps must be adjusted to obtain optimum flocculation and filter press throughput depending on the sludge source.

Aeration basin sludge
Sludge pump at max. - min. polyelectrolyte

Biotower and monotank sludge
Sludge pump min. - max polyelectrolyte

These settings must be trimmed for individual requirements.

- Ensure that the sludge is augered to the collection skip
- To cease dewatering disconnect the sludge source divert the flexi pipe to the drain, switch the sludge pump to forward and pump out the flocculation tank
- Hose down the press and the portacabin
- Note this area is a biohazard area. Use the protective clothing provided and observe the personal hygiene guidelines.