

BOONAH SHIRE COUNCIL



TERTIARY WASTEWATER TREATMENT PLANT

PROJECT No: W2395 OPERATIONS MANUAL VOLUME 1 SECTIONS 1 - 15



ENVIRONMENTAL GROUP

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2. INTELLECTUAL PROPERTY STATEMENT

The Water Division of Environmental Group Operations Pty Ltd has over the years developed and acquired a significant base of wastewater treatment technology from extensive in-house research and engineering activities.

The development of this technical manual requires proprietary technology and know how, including chemical regimes, to be disclosed to our customers. We accept that disclosure is necessary to enable our customers to better understand the technology they have purchased.

The information presented in this manual ¹ is considered proprietary and confidential by Environmental Systems and the recipients of this manual are asked to maintain this information as confidential and not to disclose or publish the information contained herein without the express written consent of Environmental Systems Pty. Ltd

¹ We shall supply up to 3 copies of the manual free of charge. There should be no need to photocopy the manual in whole or part.



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4. INTRODUCTION

4.1 CONTENTS OF THE MANUAL

Environmental Group Waste Water Treatment Manual comprises of several sections. The sections are listed below:

Sections 1 - 12: Environmental Group Operations Manual.

Sections 13-14: Equipment & Spare Parts Listing

Section 15: Material Safety Data Sheets

Section 16 - 33: Equipment Technical Specifications

Section 34: Drawings

4.2 DESIGN PHILOSOPHY

Environmental Group waste water treatment plants have been proven to be a reliable and cost effective means of meeting the Environmental Protection Authorities water discharge licence requirements. Given the operating parameters and client specifications, our team of engineers and chemists have provided waste water treatment plants that will best suit our client's requirements. Where possible, various options for the re-use of treated water will be considered. Possible areas for re-use include plant area cleaning or irrigation.

Our aim is to produce, for the client, a plant, which not only achieves the required discharge conditions but also is simple in operation while requiring minimal operator attention. Careful attention is given to the final plant layout to ensure that each component is readily accessible and that there are no hazardous obstructions where injuries can occur.

Environmental Group has an extensive network of suppliers and manufacturers. Members of the network have proven themselves to offer the highest standards of workmanship and service. The majority of components used in our designs are Australian made allowing for rapid replacement should a component fail. As most components are readily available it is unnecessary to hold a large inventory of spare parts in store.



5. SCOPE OF PROJECT

5.1 PROJECT OVERVIEW

Environmental Group has developed a flotation process capable of removing precipitated phosphorus and algae from wastewater effluents. The development of this technology is the culmination of two years of research and on-site trials in the Hunter Valley and other inland sites in NSW. Suspended solids were reduced by 90-95% while phosphorus levels were reduced to less than 0.3 mg/L. The technology provides an innovative and cost effective alternative to improving the performance of wastewater treatment plants that have difficulty meeting current and future licence requirements.

Numerous plants incorporating this technology have been constructed to enable water authorities to meet its effluent discharge specifications and over the operating life to conduct tests to determine the effect on the process to changes in the influent parameters and chemical dosing schemes to continuously optimise plant performance.

This waste water treatment plant has been designed to treat up to 0.864 ML/day (10 L/s) of raw water. The floated contaminants (i.e. sludge) are returned to two sludge drying beds operating in tandem while the cleaned effluent is sent to the discharge point.

5.2 PLANT COMPONENTS

The Effluent Treatment Plant supply comprises the following main items:

- Jameson cell rated to 0.864 ML/day (10 L/s)
- Powder polymer storage tank, make-up and dosing system.
- Surfactant storage tank (500 L) and dosing system

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6. PRINCIPLES OF THE PROCESS

Environmental Systems Wastewater Treatment Plant consists of three main components:

- Feed delivery
- Chemical Conditioning
- Flotation

6.1 FEED DELIVERY.

Boonah STP's existing treatment process works by raw sewage passing through fine screens into two (2) primary grit channels, prior to treatment in two (2) Imhoff tanks. Sludge from the Imhoff tanks is periodically drawn off and discharged to drying beds. Secondary effluent from the Imhoff tanks is discharged into two (2) oxidation lagoons arranged in series. Final effluent discharge is through v-notch weir into a vegetated drain prior to discharge into Teviot Brook.

Feed into the tertiary treatment plant is via the Soft start variable speed drive submersible centrifugal feed pumps from the second oxidation lagoon discharge point.

6.2 CHEMICAL CONDITIONING.

The effectiveness of the flotation step depends very much on the correct chemical conditioning of the wastewater before the flotation step. The wastewater from the lagoons undergoes a number of steps in the treatment process that could be termed chemical conditioning.

A coagulant is added to the wastewater at the discharge of the submersible pumps prior to entering the IAF. The turbulence within the pipeline is sufficient to promote mixing and coagulation of the suspended solids. A surfactant is a foaming agent that allows the creation of millions of bubbles as well as promoting the coagulated particles to readily float to the surface as a sludge. When air saturated water enters the downcomer from the saturator, a plume of air bubbles is introduced to the raw feed water.

Flocculation is a further step in the chemical conditioning of the wastewater. Polymer is introduced just prior to the downcomer of the Jameson Cell. The polymer attaches itself to the fine particles, growing them to a sufficient size for flotation. The polymer

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binds and strengthens flocs into larger agglomerates of flocs, and also imparts hydrophobicity to the flocs, which allows the flocs to be collected by the bubbles induced in the downcomer. The hydrophobic nature of the flocs ensures good bubble-particle attachment in the flotation step.

6.3 FLOTATION.

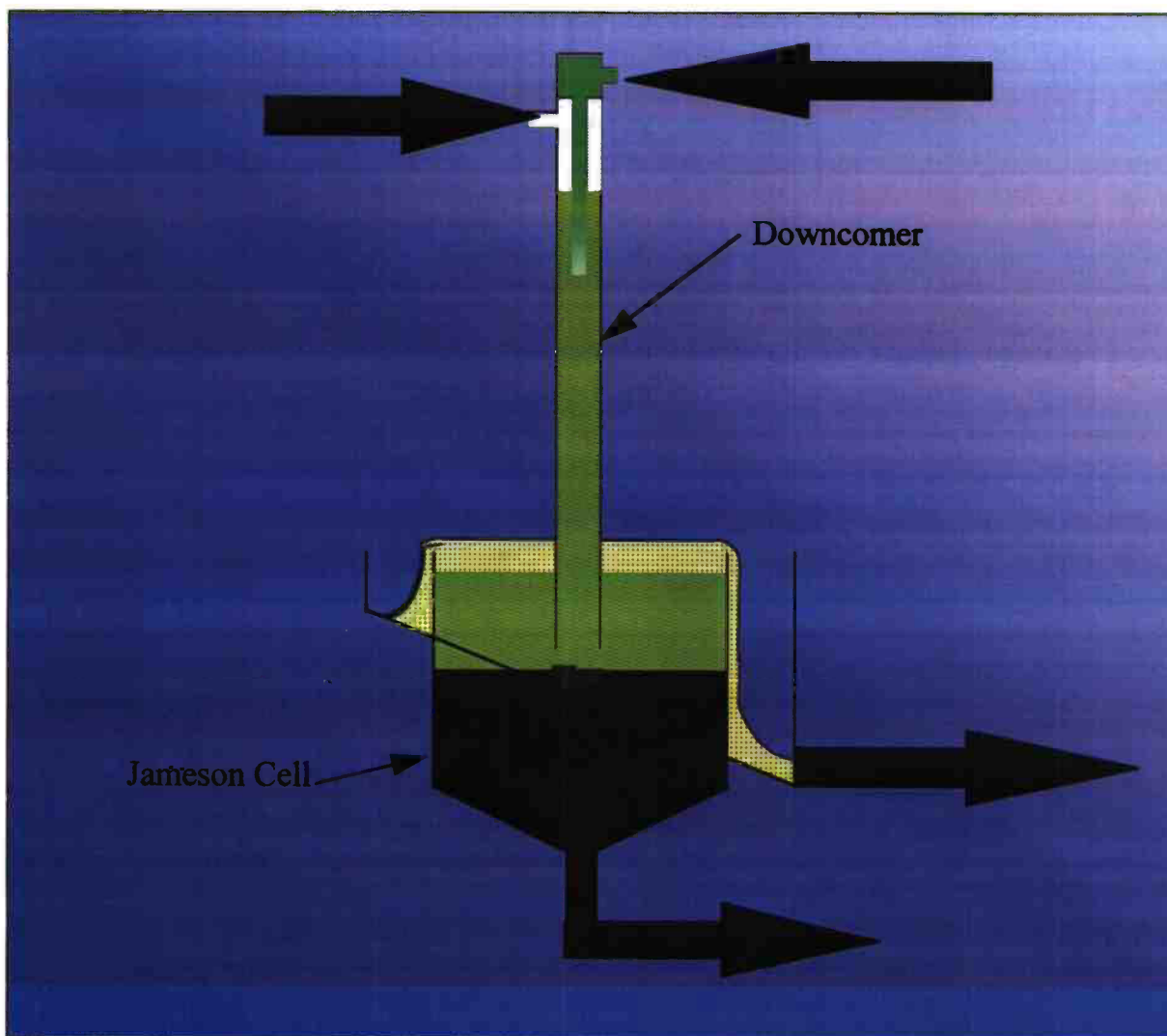
Flotation is an extremely effective means of removing fine particles from liquid wastewater streams. The use of flotation for the removal of oil and grease, solids and organic material is standard practice in a wide variety of industries. A number of flotation devices have been adapted from the mineral processing industry to applications for the treatment of wastewater. Dissolved air flotation (DAF) units have been used in wastewater treatment with varying degrees of success.

The dissolved air is transferred to the Jameson Cell via an air saturator vessel, where water (potable or recycled effluent) is treated under pressure with compressed air, resulting in tiny bubbles which attach to the flocs and draws them to the surface.

6.3.1 The Jameson Cell

The heart of Environmental Group's flotation technology used in this wastewater treatment plant is the Jameson Cell. Environmental Group have the exclusive worldwide license for use of Jameson cell technology in wastewater treatment.

Compared with other flotation technologies, the Jameson cell technology offers a very rapid throughput in an extremely compact and efficient system. The only requirement is for a pump to deliver the wastewater to the unit.



6.3.2 Principles of Operation of the Jameson cell

In the Jameson Cell, conditioned wastewater is pumped to the mixing head at the top of the *downcomer*, where it exits through a nozzle and forms a liquid jet. Saturated air from the saturator vessel is injected into the downcomer.

The saturated air enters in the vicinity of the flowing jet of wastewater, where the velocity of the liquid jet shears and disperses the air into bubbles. This forms a somewhat turbulent region called the *mixing zone* where the floc particles in the water are contacted with the air bubbles, where upon a proportion of the flocs contact and adhere to the surface of the bubbles.

The water and floc/bubbles travel downward in the downcomer, which is essentially, a vertical pipe. The downward velocity of the bubble/liquid mixture is chosen such that all bubbles have to descend in the downcomer and emerge at the bottom.

As a consequence, the bubbles rise upward within the down flowing liquid, due to the density difference, so the bubbles crowd together to give very high bubble

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concentration in the downcomer. A particle of flocculated feed material does not have to go far before it comes into contact with the bubbles, resulting in rapid collection of the particles in the downcomer. The bubble/liquid mixture subsequently emerges into a reservoir or *cell* at the bottom. This is necessary for the bubbles to disengage from the liquid, after which they rise to the surface carrying the flocculated solids with them. The separated sludge overflows the weir into the launder, while the cleaned effluent passes to the effluent discharge point.

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7. PROCESS DESCRIPTION

7.1 PROCESS & INSTRUMENTATION DIAGRAMS (P & ID).

The Process & Instrumentation Diagram provides a detailed overview of the process components of the wastewater treatment plant (drawing W2395-100). The process can be split into several main sections;

- 7.1.1 Feed System
- 7.1.2 Chemical Conditioning
- 7.1.3 Jameson Cell Flotation
- 7.1.4 Sludge Management
- 7.1.5 Polymer Storage and Batching
- 7.1.6 Chemical Storage

7.1.1 Feed system

The Wastewater Treatment Plant's influent is to be pumped at a rate not exceeding approximately 10 litres per second using duty and standby variable speed submersible pumps PP1 & PP2.

7.1.2 Chemical Conditioning

There are three stages of chemical conditioning in the feed.

- 7.1.2.1 Coagulant Addition
- 7.1.2.2 Polymer Addition
- 7.1.2.3 Surfactant Addition

7.1.2.1 Coagulant (Alum) Addition

A coagulant (Alum) is added to the wastewater directly at the discharge of the main submersible feed pumps. The addition rate of the coagulant can be altered by adjusting the stroke length of the dosing pump DP3 and by making adjustments to the pH set-point. A measuring cylinder can be used to calculate the volumetric flowrate and from this flowrate the dosing concentration can be calculated.



7.1.2.2 Polymer Addition

The helical rotor pumps CP1 & CP2 supply dissolved polymer from the batching tank directly to the Jameson Cell downcomer. Polymer will be delivered to site in a powdered form. The polymer will be made up automatically as required using a batch sequencing process from the PLC.

7.1.2.3 Surfactant Addition

A surfactant is added to the wastewater directly upstream of the recycle pumps. The addition rate of the surfactant can be altered by adjusting the stroke length of the dosing pumps DP1 & DP2 and by making adjustments to the PLC. A measuring cylinder can be used to calculate the volumetric flowrate and from this flowrate the dosing concentration can be calculated.

7.1.3 Jameson Cell Flotation

The energy for mixing and air entrainment in the cell comes from a proportion (approx. 10%) of the effluent, which is recycled via multistage centrifugal pumps PP3 & PP4. The recycle water passes through the saturator vessel, then into the downcomer where it is dispersed via nozzles. The saturator vessel entrains air into the recycled effluent using compressors CC1 & CC2. The level of entrained air is controlled via level switches on the saturator vessel.

The pressure of the recycle system (400kPa – 500kPa) can be altered by adjusting the diaphragm valves located on the side of the downcomer.

In the cell section, after passing through the downcomer, the flocs float with the air bubbles to the surface leaving clarified water to flow through internal piping within the cell body then out over the weir into the discharge box. The weir height can be adjusted manually to control the height of liquid in the cell. By adjusting the weir height the moisture in the removed sludge can be altered.

7.1.4 Sludge Management

The sludge is scraped and overflows from the lip of the Jameson Cell into a launder located in the end of the cell. The sludge gravity feeds from the launder into the suction side of the diaphragm pumps SP1 & SP2. The sludge is then pumped to the drying beds.



7.1.5 Polymer Storage and Batching

The polymer is delivered as a powder and must be made up to a dilute solution for dosing. Polymer storage (for the solution) consists of a batching tank, which houses the polymer wetting head and the batch mixer. The batched polymer must be aged for three hours before use, hence tank capacity must be sufficient to provide this.

The batching process automatically combines the required amount of polymer powder (from DF1) with water (via SV1) to produce a solution of the desired concentration. The water and powder are blended and mixed by mixer M1 in such a way to ensure consistency of the resultant solution.

7.1.6 Chemical Storage

7.1.6.1 Surfactant Storage

The surfactant will be supplied and stored as 100% w/w Sodium Laurel Sulphate dry flakes. The made up surfactant solution (1%) will be stored in a 500L poly tank, incorporating a low level switch.

7.1.6.2 Polymer Storage

Polymer is stored in a stainless steel silo. The polymer silo is fitted with a low -level alarm switch to initiate reorder of polymer.

7.1.6.3 Coagulant Storage

The coagulant (Alum) will be supplied and stored as 46% w/w Aluminium Sulphate solution.

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8. PROCESS CONTROL

The Wastewater Treatment Plant is PLC controlled to sequence stop/start the equipment and alarm any fault conditions. Operator interface is a panel-view system.

8.1 FEED SOURCE.

The plant operates by taking feed from the second oxidation lagoon via PP1 & PP2 feed pumps.

8.2 PLANT FLOWRATE CONTROL.

The Process Feed Pumps PP1 & PP2 operate on VSD to provide the required flow (measured by FM001) in accordance with the plant flowrate set point. The set point is set using a potentiometer found on the control panel. Control is via a PID loop within the PLC.

8.3 PLANT STARTUP.

Plant startup can be fully automated either using timer based operation or continuous operation. In timer mode, the plant stops and starts according to time set points programmed into the PLC. In continuous mode, the plant starts and stops according to the start / stop buttons. This means the plant will run only at particular times during the day.

A 10 second delay occurs between starting each drive.

Check feed source. Level switches LS004 and LS005 determine the low and high lagoon levels which initiate the auto plant start up or auto plant shutdown.

Start feed pump PP1 (or PP2 standby).

Start coagulant dosing pump (DP3).

Start surfactant dosing pump DP1 (or DP2 standby).

Start polymer dosing pump CP1 (or CP2 standby).

Start recycle pump PP3 (or PP4 standby)

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Start sludge scraper, SC1.

After 1 minute, start sludge pump SP1 (or SP2 standby).

Additionally, the following control sequence is required while the plant is operational.

LS008 – Saturator high level switch

Open SV3 compressed air delivery solenoid valve.

LS009 – Saturator low level switch

Close SV3 compressed air delivery solenoid valve.

Surfactant Mixer M2 switches on each 12 hours for 5 minutes. In addition, when started by operator input (in auto) the mixer runs for 45 min.

8.4 CONTINUALLY OPERATING DEVICES.

The following equipment will be operational, regardless of whether the effluent treatment plant is running:

Polymer heat trace, HE1 runs continually unless the emergency stop button is pressed

The Compressors that provide compressed air to the saturator vessel, start when the plant starts. The plant is delayed by 5 minutes to allow the compressors to build pressure.

8.5 SYSTEM ALARMS

| Instrument Tag | Description | Indication | Action |
|--------------------------------|--|--|---|
| FS001 (only while SV1 is open) | Polymer batching no water flow | Orange fault light, as per description | Stop batching equipment, plant shutdown. [Critical] |
| FS002 | Polymer dosing no flow duty pump (CP1 / CP2) | Drive orange fault light | Start standby pump [Non Critical] |
| After 10 sec if still active | Polymer dosing no flow standby pump (CP1 / CP2) | Drive orange fault light | Plant shutdown [Critical] |
| FS003 | Surfactant dosing no flow duty pump (DP1 / DP2) | Drive orange fault light | Start standby pump [Non Critical] |
| After 10 sec if still active | Surfactant dosing no flow standby pump (DP1 / DP2) | Drive orange fault light | Plant shutdown [Critical] |

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| FS004 | Recycle no flow duty pump (PP3 / PP4) | Drive orange fault light | Start standby pump [Non Critical] |
| After 5 sec if still active | Recycle no flow standby pump (PP3 / PP4) | Drive orange fault light | Plant shutdown [Critical] |
| PS001 | Compressed air receiver low pressure duty compressor (CC1 / CC2) failure | Drive orange fault light | Start standby compressor [Non Critical] |
| After 5 sec if still active | Compressed air receiver low pressure standby compressor (CC1 / CC2) failure | Drive orange fault light | Plant shutdown [Critical] |
| LS003 | Polymer dose tank low level | Orange fault light, sign per description | Plant shutdown [Critical] |
| LS006 | Surfactant dose tank low level | Orange fault light, sign per description | Plant shutdown [Critical] |
| LS007 | Polymer hopper low level – polymer batch fault | Orange fault light, sign per description | Stop batching equipment, plant shutdown |
| LS010 | Sludge hopper high level duty pump (SP1 / SP2) failure | Drive orange fault light | Start standby pump [Non Critical] |
| After 5 sec if still active | Sludge hopper high level standby pump (SP1 / SP2) failure | Drive orange fault light | Plant shutdown [Critical] |
| LS011 (not active until startup sequence complete) | Saturator low low level | Orange fault light, per description | Plant Shutdown [Critical] |
| LS012 | Jameson Cell low level | Orange fault light, per description | Plant shutdown [Critical] |
| FM001 (Only switches when set flowrate is not reached @ 100% VSD | Effluent feed no flow duty pump (PP1 / PP2) | Orange drive fault light | Start standby pump [Non Critical] |
| After 35 sec if still active | Feed standby pump failure (PP1 / PP2) | Orange drive fault light | Plant shutdown [Critical] |

Note that in the event of feed pump failure causing plant shutdown, this does not cause the polymer batch sequence to stop if it is mid sequence, unless there is a polymer batch fault. Also note that the entire plant shuts down when a polymer batch fault occurs.

8.6 POLYMER BATCHING.

Drives need to be in auto, otherwise indicate polymer batch fault

LS002 trips – Polymer batch tank low level switch to start sequence.

Start BL1 – Polymer blower.

Open SV1 – Service water into wetting head.

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Start M1 – Start batch tank mixer.

Start DF1 – After 30 sec, start the polymer feeder (runs for T1 sec).

LS001 trips – Batch tank high level switch to stop polymer batch sequence.

Stop BL1 – After T seconds (60 sec) stop the blower.

Close SV1 – After T sec, close wetting head service water valve.

At the start of a batch process, start a timer (for about 20 minutes). If timer times out and LS001 is not reached, illuminate the polymer batch fault light (FS001) to initiate plant shutdown.

8.7 PLANT SHUTDOWN

Plant shutdown can be initiated by the operator, the lagoon low level switch (LS005) or process fault as noted previously. The shutdown sequence is:

Stop feed pump PP1 (or PP2 standby).

Stop coagulant dosing pump (DP3).

Stop Surfactant dosing pump DP1 (or DP2 standby).

Stop recycle pump PP3 (or PP4 standby).

Stop scraper SC1.

Stop sludge pump SP1 (or SP2 standby).

Close saturator vessel compressed air inlet valve SV3.

Stop compressor CC1 (or CC2 standby).

8.8 DRIVE FAULTS

If a motor or drive fault occurs, start standby device; drive fault light illuminates.

8.9 DUTY / STANDBY

Duty / standby switching should occur each time the plant restarts.



8.10 OPERATOR CHANGEABLE PARAMETERS.

The feed delivery into the plant can be adjusted using the Plant Flow Set Point dial on the control panel. This varies the speed of the feed pumps, allowing more specific control of the plant, and help optimise plant performance. Weir height will need to be adjusted to optimise sludge capture if plant flow is altered.

Polymer dose rate will be adjusted by a potentiometer on the control panel. The potentiometer will be used to manipulate the analogue output (AO) of both dose pumps within the PLC, hence only one potentiometer is required. The potentiometer will be set using the following parameters:

Polymer batch concentration can be adjusted by reprogramming the PLC (changing feeder run time).

8.11 EMERGENCY STOP.

An emergency stop lanyard will be located around the flotation cell and when activated will immediately stop SC1, then the remainder of the plant.

When the emergency stop lanyard is pulled, resetting the lanyard switch will not reactivate the plant. The MCC mounted reset needs to be depressed.

8.12 REMOTE EQUIPMENT.

As PP1 and PP2 feed pumps are located away from the switchboard, they will have field mounted isolators which will act on the drive contactors in the MCC.

8.13 CONTROL LOOPS

8.13.1 Plant Feed

The plant feed rate is controlled to an operator flow set point. Control is by a PID control loop adjusting the speed at which PP1 & PP2 operate.



9. STANDARD OPERATING PROCEDURES

9.1 GENERAL PLANT OPERATION

The following conditions are required before plant operation:

9.1.1 Power

The MCC must be switched to ON and all of the pump control switches must be in *Auto*.

9.1.2 Water Supply

Town water supply (clean potable water) is required for polymer make-up.

9.1.3 Chemical Supply

Adequate supplies of coagulant, surfactant and polymer are required for the efficient removal of solids.

9.2 SYSTEM START-UP AND SHUTDOWN

The system has been designed to start-up and shutdown in a sequence mode using the PLC located in the MCC. To start the plant at the MCC:

1. Ensure all manual valves are set in the correct position.
2. Select all the drives into AUTO.
3. Select the "Plant Start" button.
4. Select the "Plant Flow Set Point" button (i.e. F2) and adjust the speed (in %) for pump PP1 or PP2 to achieve the desired flowrate (in L/min).
5. Set up the Operating Parameters. Refer to Section 7.3

To shutdown the plant select the "Plant Shutdown" button.



9.3 SETTING UP OPERATING PARAMETERS

The Wastewater Treatment Plant will be set-up and optimized during the commissioning period. The main operating variables that will be set during this period are as follows;

- The discharge weir height is adjusted manually to set the cell liquid level and sludge flow into the launder.
- The saturated air recycle rate to provide sufficient air for floc flotation.
- The polymer concentration and dose rate to control the flocculation of particles.
- The surfactant dose rate to improve the flotation characteristics of the particles.
- The coagulant dose rate to improve the coagulation characteristics of the particles.

It is likely that once optimized the cell should perform efficiently until the feed conditions change substantially. Long-term pump wear will also necessitate changes to the variable speed settings.

9.3.1 Changes to the Weir Height.

The liquid level in the cell (and thus the sludge recovery rate) is dependent on the weir height in the effluent discharge box. Weir height needs to be adjusted if the plant is to be operated at lower flowrates to ensure sludge produced is scraped to the launder. The weir height is adjusted a hand wheel, accessible by ladder.

9.3.2 Changes to the Recycle Rate.

The diaphragm valve on the side of the downcomer may adjust the recycle rate to the downcomer. As the valve is opened the recycle rate increases. The optimum pressure for the recycle rate will be within the range of 450kPa to 550 kPa. Generally, this should not need regular adjustment after commissioning.

9.3.3 Changes to Polymer Dose Rate.



Adjust the potentiometer on the control panel to change the polymer dose rate. This controls the polymer dose pump flow rate via the PLC manipulating the dose pump AO.

To change the polymer dose concentration, adjust the polymer feeder DF1 run time. For greater concentration, increase the feeder run time and for lower concentrations, decrease the feeder run time.

9.3.4 Measurement of Polymer Dose Rates.

The actual dose rate of the polymer pumps should be checked periodically as, over time, the stator of the dosing pumps will wear, resulting in a reduction in pump performance. The procedure for checking the pump performance is as follows:

Procedure:

Fill the measuring cylinder by **partially and slowly** opening the cylinder isolation valve until the level starts to rise. When the cylinder is full **close** the isolation valve.

WARNING: If you open the isolation valve too quickly the tank head may cause the cylinder to overflow.

At the same time **close** the Polymer dosing tank isolation valve leading to CP1 & CP2's suction and **open** the cylinder isolation valve fully. This will cause the pump to draw from the cylinder and not the tank.

Measure the volume drawn from the measuring cylinder in one minute.

Immediately after timing, **close** the measuring cylinder isolation valve and **open** the tank isolation valve (i.e. **simultaneously**). This should cause the pump to draw from the tank and not the cylinder.

WARNING: The switching of valves has to be done quickly otherwise damage to the pump will occur if it runs dry. Never leave the area while this process is being performed.

Check the pump calibration curve contained in Section 17 to confirm that the measured flow is as per the pump curve.

If the measured value is significantly lower than that from the curve it indicates the need to replace the pump stator. As an immediate measure the polymer dose rate may be increased to compensate (if flotation performance is not acceptable).



9.3.5 Changing Surfactant Dose Rate.

Note: 1. The pump must be running when adjusting stroke length.

It is not recommended to operate the pump below 30% stroke length.

9.3.6 Measurement of Surfactant Dose Rates.

The actual dose rate of the surfactant pump should be checked periodically to confirm the pump is operating to specification. To check the flowrate perform the following whilst the plant is running:

Procedure

Fill the measuring cylinder by **partially and slowly** opening the cylinder isolation valve until the level starts to rise. **WARNING: If you open the isolation valve too quickly the tank head may cause the cylinder to overflow.**

At the same time **close** the coagulant tank isolation valve leading to the dosing pump suction and **open** the cylinder isolation valve fully. This will cause the pump to draw from the cylinder and not the tank.

Measure the volume drawn from the measuring cylinder over one or more minutes.

After timing is completed let the pump drain the contents from the cylinder (to prevent solidification in the cylinder) and **close** the measuring cylinder isolation valve and **open** the tank isolation valve (**i.e. simultaneously**). This should cause the pump to draw from the tank and not the cylinder.

WARNING: The switching of valves has to be done quickly otherwise damage to the pump will occur if it runs dry. Never leave the area while this process is being performed.

The stroke rate and stroke length of the test should be recorded.

9.3.7 Filling Polymer Silo.

The polymer is delivered in powdered form. It is transferred to the silo by manual handling. The polymer is to be stored in the adjacent shed to the skid.



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Note that the powder polymer is hydroscopic (absorbs water readily) and as such it is important that hands and any equipment used is dry. Polymer is not a dangerous substance, although gloves are recommended as contact may cause dermatitis. Safety glasses and a dust mask are also recommended to prevent discomfort that may result from dusts.



10. PLANT MAINTENANCE SCHEDULES

Maintenance schedule checklists have been prepared to summarize the following and are contained in Section 9.

10.1 DUTIES TO BE PERFORMED WHEN THE PLANT IS SHUTDOWN FOR AN EXTENDED PERIOD.

When the plant is to be shutdown for an extended period (ie: more than a week), the following tasks should be performed:

1. Drain polymer dosing and batching tanks and then flush polymer line with water.
2. Drain and wash down the Jameson cell.
3. Drain and wash down the sludge launder.
4. For shutdown periods greater than a month, remove dry polymer to an air tight container and shut off polymer Heat Trace HE1.

10.2 DUTIES TO BE PERFORMED DAILY.

Check the operator control panel for any alarms. If any alarms present, check equipment, fix and reset alarm.

1. Inspect the levels in chemical storage tanks, powder polymer silo (low-level switch). Re-order if necessary.
2. Optimize performance of the flotation cell if required. Consult Troubleshooting guide. This should not be done too soon prior to a plant start-up (allow approximately 15 minutes). If the separation does not appear to be satisfactory refer to the troubleshooting guide.

Check that the sludge is being transferred to the sludge lagoon. If the sludge is not flowing refer to the troubleshooting guide.

3. Hose down the Jameson cell walls, launder and paddles.
4. Check polymer flowrate and consistency, consult Troubleshooting Guide if a problem occurs.



10.3 WEEKLY MAINTENANCE & OPERATION DUTIES

Clean Jameson Cell sludge lauder thoroughly.

1. Check pumps and mixer for leaks.
2. Check for any build-up on the polymer cone. Check polymer-wetting head to ensure there is no blockages or polymer build-up.
3. Check that surfactant is sufficiently heated to prevent freezing.

10.4 MONTHLY (OR AS REQUIRED) MAINTENANCE DUTIES.

1. Perform monthly maintenance on all pumps. Refer to the manufacturers' manual.
2. Check and grease nipples on all equipment as required.
3. Check polymer eductor and pipework to wetting head for blockages.
4. Perform maintenance on top entry mixer.
5. Clean and perform maintenance on the Jameson cell scraper.
6. Every month to six weeks empty and clean Jameson Cell.

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11. PLANT MAINTENANCE PROCEDURES.

The following procedures are guidelines to the maintenance procedures for the equipment in the plant. These procedures should be followed in conjunction with the manufacturers technical information (provided with this manual). If there are any queries, consult the preferred suppliers for advice.

11.1 PRECAUTIONS

11.1.1 General Precaution When Performing Maintenance

When performing maintenance on any piece of equipment, ensure that the item and any other related pieces of equipment are properly isolated, at the MCC and any manual isolation points such as power isolation and valves. Open the circuit breaker and tag out the item where possible and place the appropriate tag on the isolation point.

11.1.2 Entry to Enclosed Vessels & Tanks

When performing maintenance on the Jameson cell or any storage or mixing tanks, consider them as confined spaces and adopt appropriate safety procedures for entry etc. The following procedure should be followed in addition to company safety procedures:

1. Isolate pumps and incoming (and outgoing) valving as appropriate.
2. Isolate mixers as appropriate.
3. NOTE: There is a possibility of the presence of gases in the vapour space of all process tanks. Accordingly, the tanks should be considered as confined spaces and treated as such when entry for maintenance purposes or otherwise is required.
4. Perform appropriate maintenance.
5. Return mixers, pumps and valving to the appropriate state.

11.2 JAMESON CELL MAINTENANCE

11.2.1 Draining the Jameson Cell

The following procedure should be carried out when the Jameson Cell is to be drained for cleaning or inspection.

Procedure:

1. Shutdown the system and select all the drives to OFF.

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2. Partially open the Jameson cell drain valve to allow the cell contents to discharge.

11.2.2 Cleaning The Jameson cell

The following procedure should be carried out when the launder and/or Jameson Cell is cleaned:

Safety Equipment:

Chemical goggles or Face mask
Rubber gloves

Equipment and Tools:

Scrubbing Brushes & Brooms
Washdown hose
Detergent (phosphate free)

Procedure:

1. Cleaning can only be performed while the wastewater plant is not operating.
2. Select plant shutdown at the MCC.
3. Drain cell.
4. Tag out all pumps to prevent the plant from accidental starting up (open circuit breakers).
5. Tag out paddle SC1 to ensure it may not be manually started.
6. Ensure safety equipment is available to be utilized.
7. Isolate paddle motor at local isolator as an added precaution.
8. Clean surfaces of cell and launders with detergent and water as per manufacturers recommendations.
9. Rinse off detergent with water.
10. Remove Tags, isolations and return valving to original positions.

11.2.3 Filling the Jameson Cell



This procedure is to be performed whenever level has been taken from the cell. Starting the plant up before filling the tank may result in damage to the sludge pumps SP1 & SP2 if they should run dry.

Procedure

1. Ensure any electrical isolations have been removed and that the valves are set correctly.
2. Select PP1 or PP2 to manual and start the pump.
3. When the level in the cell nears the level of the overflow weir stop the pump.
4. Return PP1 or PP2 to auto. The system is ready to be sequence started.



11.2.4 Jameson Cell Paddle Drive (SC1).

Procedure

1. Check oil level on gear drive each 3000 hours or as per the manufacturers' recommendation.
2. Replace oil each 3 years.

11.3 TANKS AND STORAGE VESSELS.

1. Check all valves are functioning normally.
2. Check tanks for leaks etc.

11.4 PUMPS

When performing any maintenance on any pump, ensure it has been isolated properly. This includes power, MCC and any valve isolation (on both the suction and displacement sides of the pump).

11.4.1 Chemical Dosing Pumps (DP1, DP2 & DP3).

1. Flush the pumps with water prior to dismantling. Note: If no flushing points are present, isolate the tank outlet valve and flush via the calibration cylinder.
2. Pressure on the discharge side of the pumps can be relieved by opening the air breather valve located on the discharge of each pump.
3. Dismantle suction and discharge valves. Replace any worn ball checks and valve seats.
4. Reassemble ensuring all gaskets, ball checks and ball stops are in the correct position. NOTE failure to fit ball stops can result in severe pump damage.
5. Check Diaphragm for damage or wear. Replace if necessary as per technical information.
6. Check pump for abnormal vibrations, leaks etc. Consult technical specifications for troubleshooting if required.



11.4.2 Sludge Discharge Pumps (SP1 & SP2) and Polymer Dosing Pumps (CP1 & CP2).

1. Flush the pumps with water prior to dismantling. Note: If no flushing points are present, isolate the tank outlet valve and flush via the calibration cylinder.
2. Pressure on the discharge side of the pumps can be relieved by opening the air breather valve located on the discharge of each pump.
3. Dismantle suction and discharge valves. Replace any worn ball checks and valve seats.
4. Reassemble ensuring all gaskets, ball checks and ball stops are in the correct position. NOTE failure to fit ball stops can result in severe pump damage.
5. Check Diaphragm for damage or wear. Replace if necessary as per technical information.
6. Check pump for abnormal vibrations, leaks etc. Consult technical specifications for troubleshooting if required.
7. Check oil level in sight glass before start up. Recommended lubricant is Shell Omala 320 or Castrol Alpha SP320

11.4.3 Centrifugal Pumps (PP1 & PP2).

1. Check pumps for leaks etc.
2. Grease bearings at manufacturer's recommended intervals.

11.5 MIXER

11.5.1 Top Entry Mixers (M1).

1. Grease shaft support bearing every 1000 hours with "NeverSeize" or comparable grease.
2. Check gearbox oil each 6 months and replace each 3 years.
3. The oil should be replaced each 3 years using or equivalent.



11.6 POLYMER MAKE-UP SYSTEM

11.6.1 Cleaning of Polymer Wetting Head

The polymer wetting head is designed to prevent the powder from caking to the tube however should long term build-up occur the following can be done to clean the head.

1. Ensure the blower (BL001) and make-up water line are both isolated.
2. Dismantle the wetting head by unbolting the blower and water connections and the top flange to the wetting head.
3. Clean all surfaces of any polymer buildup. NOTE: wetted polymer is extremely slippery. Care should be taken to avoid getting polymer onto the walkway.
4. Reassemble mixing head and remove any isolation.

11.6.2 Clearing of Powder Blockages

If a blockage occurs in the powder transfer system, the following procedure should be undertaken to rectify the problem:

1. Ensure the blower (BL001) and powder feeder (DF1) are isolated
2. If the blockage is in the screw feeder:

Close the powder isolation valve

Remove the conical section by disconnecting the eductor 'T' piece and the support brackets

Place a blanket under the feeder to catch any spillage. Remove the screw feeder flange and clear blockage.

Reassemble.

3. If the blockage is in the venturi:

Ensure that the blower and feeder are isolated.

Remove the venturi by disconnecting the three ends from the cone and pipework.

Clear the blockage. It is important to clear the bulk of the polymer in the dry state. If the eductor is wet, it should be thoroughly dried.

Reassemble.



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4. If the blockage is in the delivery line:

Disconnect the delivery line from the venturi.

Remove the main pipe section by disconnecting from the wetting head.

Locate the blockage and clear. The use of water for cleaning should be avoided because of the difficulty in ensuring the pipework is dry on completion.

Reassemble.

5. Clean up any powder spillage using a dustpan and brush. Do **not use a hose to clean up any spillage, as this will create a slippery surface.**

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12. TROUBLE SHOOTING GUIDE

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12.1 CHEMICAL DOSING

| PROBLEM | POSSIBLE CAUSE | ACTION |
|--|---|--|
| 1.1: No flocs forming in Jameson Cell | | |
| 1.1.1 No polymer being dosed | <p>Pump not operating</p> <p>Blocked dosing line</p> <p>Pump stator worn</p> <p>Valve on bottom of storage tank closed</p> <p>No polymer in make-up tank</p> | <p>Check pump is turned on and in AUTO</p> <p>Flush line with water</p> <p>Replace stator</p> <p>Check and open valve</p> <p>Prepare a fresh batch of polymer</p> |
| 1.1.2 Polymer dosage not effective | <p>Dose rate too low / high</p> <p>Polymer gone off due to age / dilution</p> <p>Polymer solution too weak</p> | <p>Increase / decrease dosing rate</p> <p>Check polymer viscosity, drain tank prepare fresh polymer</p> <p>Check the mass of polymer being added</p> |
| 1.1.3 No surfactant being dosed | <p>Pump not operating</p> <p>Blocked dosing line</p> <p>Pump diaphragm damaged</p> <p>Valve on bottom of tank closed</p> <p>No chemical in storage tank</p> <p>Surfactant has solidified, will not flow</p> | <p>Check pump is turned on and in AUTO</p> <p>Flush line with water</p> <p>Replace diaphragm</p> <p>Check operation of valve</p> <p>Order urgent delivery</p> <p>Check heating circuit, flush line</p> |

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| PROBLEM | POSSIBLE CAUSE | ACTION |
|--------------------------------|---|--|
| 1.1.4 No coagulant being dosed | <p>Pump not operating.</p> <p>Blocked dosing line.</p> <p>Pump not primed.</p> <p>Isolation valve on tank closed.</p> <p>Pump isolation valve closed.</p> <p>No coagulant in storage tanks.</p> | <p>Check pump is turned on at isolator, MCC not tripped and in AUTO.</p> <p>Back flush line with water.</p> <p>Check and prime pump.</p> <p>Check and open valve.</p> <p>Check and open valve.</p> <p>Check level on sight gauge arrange delivery.</p> |

12.2 MECHANICAL DIFFICULTIES

| PROBLEM | POSSIBLE CAUSE | ACTION |
|--|--|--|
| 2.1: Jameson Cell | | |
| 2.1.1 Water carry over into sludge launder | Weir too high | Lower weir |
| 2.1.2 Recycle Pressure:- Partially blocked valve (recycle line) | <p>Blockage in the orifice</p> <p>Inlet blockage on PP3</p> <p>Seals and gaskets worn allowing air into suction side of the pump</p> | <p>Remove injection valve and clear orifice</p> <p>Check inlet to PP3 and clean if necessary</p> <p>Remove and replace seals and gaskets</p> |
| 2.1.3 Blockages | Floc build up on the inside of the downcomer | Flush with water by removing nozzle from top |
| 2.1.4 Leaks - low downcomer suction | <p>Seals and gaskets leaking</p> <p>Recirculation nozzles</p> | <p>Remove and replace</p> <p>Remove and replace</p> |

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| PROBLEM | POSSIBLE CAUSE | ACTION |
|---|--|--|
| 2.2 Pumps | | |
| 2.2.1 Blockages:- Pump not delivering required flow | Pump suction blocked Check valve seized closed Pump partially isolated Seals or gaskets leaking Rotor or stator worn | Clean around pump suction Inspect and repair. Check isolation valves Remove and replace Inspect and replace if necessary |
| 2.2.2 Pump will not operate | Pump isolated Overload tripped Locked rotor trips overload Pump relay faulty | Check isolator, main switch Check overload current setting, full motor current, reset alarms. Clear blockage as above. Reset overload and alarm. Check and replace relay. |

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13. EQUIPMENT LISTING

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| Environmental Group (Operations) | | | | Equipment Schedule | | | |
|----------------------------------|---------|----------------------|-----------|-----------------------------------|----------------------------|---|---|
| Pty Ltd | | | | Form No: 1.4.1 108 Version: 01 | | | |
| Division: Projects | | ▼ | | Boonah Tertiary Treatment Plant | | | |
| Project Number | | W2395 | | Project Title | | | |
| Contract Number | | 745/0110 | | Order Number | | | |
| Item No. | Tag No. | Description | Make | Model | Size | Supplier | Contact |
| 1 | PP1 | Feed Pump No 1 | ABS | AS0830DS22/4D | 2.2 kW, VSD | Brian Clulow Industrial Pumping (Brian) | 19 Aruma PI Cardiff NSW 2285 Ph:02 4954 2020 |
| 2 | PP2 | Feed Pump No 2 | ABS | AS0830DS22/4D | 2.2 kW, VSD | Brian Clulow Industrial Pumping (Brian) | 19 Aruma PI Cardiff NSW 2285 Ph:02 4954 2020 |
| 3 | PP3 | Recycle Pump No 1 | Grundfos | CR3-17 | 1.5 kW | Brian Clulow Industrial Pumping (Brian) | 19 Aruma PI Cardiff NSW 2285 Ph:02 4954 2020 |
| 4 | PP4 | Recycle Pump No 2 | Grundfos | CR3-17 | 1.5 kW | Brian Clulow Industrial Pumping (Brian) | 19 Aruma PI Cardiff NSW 2285 Ph:02 4954 2020 |
| 5 | SP1 | Sludge Pump No 1 | Mono | DT50 | 1.1 kW | Westvic Pump Sales (Ben) | 39 Coghians Rd Wamambool VIC 2282 Ph: 03 5561 1400 |
| 6 | SP2 | Sludge Pump No 2 | Mono | DT50 | 1.1 kW | Westvic Pump Sales (Ben) | 39 Coghians Rd Wamambool VIC 2282 Ph: 03 5561 1400 |
| 7 | DP1 | Surfactant Pump No 1 | Pulsatron | LMB4-T2 | 240V AC | International Chemicals Engineering (Maria Young) | P.O. Box 611 Hurstville NSW 1481 Ph: 02 9586 2111 |
| 8 | DP2 | Surfactant Pump No 2 | Pulsatron | LMB4-T2 | 240V AC | International Chemicals Engineering (Maria Young) | P.O. Box 611 Hurstville NSW 1481 Ph: 02 9586 2111 |
| 9 | CP1 | Polymer Pump No 1 | Mono | PLF 102 | 0.55 kW VSD, 75-600 ml/min | Brian Clulow Industrial Pumping (Brian) | 19 Aruma PI Cardiff NSW 2285 Ph:02 4954 2020 |
| 10 | CP2 | Polymer Pump No 2 | Mono | PLF 102 | 0.55 kW VSD, 75-600 ml/min | Brian Clulow Industrial Pumping (Brian) | 19 Aruma PI Cardiff NSW 2285 Ph:02 4954 2020 |

| | |
|-------------------|------------|
| Prepared By:..... | Date:..... |
| Verified By:..... | |

| Environmental Group (Operations) Pty Ltd | | | | Equipment Schedule | | | |
|---|-------|----------|--|-----------------------------------|--|--------------|------------|
| Division: | | Projects | | Form No: 1.4.1 108 Version: 01 | | | |
| Project Number | | W2395 | | Boonah Tertiary Treatment Plant | | | |
| Contract Number | | 745/0110 | | Project Title | | | |
| Item No. | | Tag No. | | Description | | Order Number | |
| | | | | | | Make | |
| | | | | | | Model | |
| | | | | | | Size | |
| | | | | | | Supplier | |
| | | | | | | Contact | |
| 11 | CC1 | | | Compressor No 1 | | Pilot | K11 |
| | | | | | | | |
| 12 | CC2 | | | Compressor No 2 | | Pilot | K11 |
| | | | | | | | |
| 13 | SC1 | | | Sludge Scraper drive | | SEW | |
| | | | | | | | |
| 14 | M1 | | | Polymer Mixer | | FSA | GDFT-0.37 |
| | | | | | | | |
| 15 | M2 | | | Surfactant mixer | | FSA | GDPP-0.37 |
| | | | | | | | |
| 16 | DF1 | | | Polymer Powder feeder | | UES | |
| | | | | | | | |
| 17 | BL1 | | | Polymer Blower | | PDA | RB022A |
| | | | | | | | |
| 18 | HE1 | | | Polymer heating element | | Hotco | |
| | | | | | | | |
| 19 | FM001 | | | Inlet magnetic flow meter | | ABB | Mag Master |
| | | | | | | | |
| 20 | LS001 | | | Polymer batching levels | | Electrosonda | DB |
| | | | | | | | |
| | | | | Prepared By:..... | | | |
| | | | | Verified By:..... | | | |
| | | | | Date:..... | | | |

| Environmental Group (Operations) Pty Ltd | | | | Equipment Schedule | | | |
|---|---------|-----------------------------------|--------------|---------------------------------|----------------|--------------------------------------|--|
| Division: Projects | | Form No: 1.4.1 108 Version: 01 | | | | | |
| Project Number | | W2395 | | Boonah Tertiary Treatment Plant | | | |
| Contract Number | | 745/0110 | | | | | |
| Item No. | Tag No. | Description | Make | Model | Size | Supplier | Contact |
| 21 | LS002 | Polymer batching levels | Electrosonda | DB | 24 V | Midstream Instruments (Andrew Begas) | 1/729 Elizabeth St Waterloo NSW 2017 Ph: 02 9699 4208 |
| 22 | LS003 | Polymer batching levels | Electrosonda | DB | 24 V | Midstream Instruments (Andrew Begas) | 1/729 Elizabeth St Waterloo NSW 2017 Ph: 02 9699 4208 |
| 23 | LS004 | Lagoon high level (float) | Kelco | Q series | 240 V | Kelco Engineering (Kerry Field) | P.O. Box 496 Brookvale NSW 2100 Ph: 02 9905 6425 |
| 24 | LS005 | Lagoon low level (float) | Kelco | Q series | 240 V | Kelco Engineering (Kerry Field) | P.O. Box 496 Brookvale NSW 2100 Ph: 02 9905 6425 |
| 25 | LS006 | Surfactant tank low level | Kelco | D30 | 24 v DC SPDT | Kelco Engineering (Kerry Field) | P.O. Box 496 Brookvale NSW 2100 Ph: 02 9905 6425 |
| 26 | LS007 | Polymer hopper low level | IFM | KN5100 | 24 V DC 4 wire | IFM Efector (Bruce Vokes) | Unit 2/318 Auburn Rd Hawthorn VIC 3122 Ph: 1300 365 088 |
| 27 | LS008 | Saturator tank high level | IFM | KN5100 | 24 V DC 4 wire | IFM Efector (Bruce Vokes) | Unit 2/318 Auburn Rd Hawthorn VIC 3122 Ph: 1300 365 088 |
| 28 | LS009 | Saturator tank low level | IFM | KN5100 | 24 V DC 4 wire | IFM Efector (Bruce Vokes) | Unit 2/318 Auburn Rd Hawthorn VIC 3122 Ph: 1300 365 088 |
| 29 | LS010 | Sludge Hopper high level | Kelco | D30 | 24 v DC SPDT | Kelco Engineering (Kerry Field) | P.O. Box 496 Brookvale NSW 2100 Ph: 02 9905 6425 |
| 30 | LS011 | Saturator tank low low level | IFM | KN5100 | 24 V DC 4 wire | IFM Efector (Bruce Vokes) | Unit 2/318 Auburn Rd Hawthorn VIC 3122 Ph: 1300 365 088 |

| | |
|-------------------|------------|
| Prepared By:..... | Date:..... |
| Verified By:..... | |

| Environmental Group (Operations) | | | | Equipment Schedule | | | |
|---|---------|-----------------------------------|----------|---------------------------------|-------------------------|-----------------------------------|---|
| Division: Projects | | Form No: 1.4.1 108 Version: 01 | | Boonah Tertiary Treatment Plant | | | |
| Project Number | | W2395 | | Project Title | | | |
| Contract Number | | 745/0110 | | Order Number | | | |
| Item No. | Tag No. | Description | Make | Model | Size | Supplier | Contact |
| 31 | LS012 | Jameson Cell low level | Kelco | D30 | 24 V DC SPDT | Kelco Engineering (Kerry Field) | P.O. Box 496 Brookvale NSW 2100 Ph: 02 9905 6425 |
| 32 | FS001 | Polymer batching flow switch | Kelco | F25 - C | 24 V DC SPDT | Kelco Engineering (Kerry Field) | P.O. Box 496 Brookvale NSW 2100 Ph: 02 9905 6425 |
| 33 | FS002 | Polymer dosing flow switch | Kelco | P20 - C | 24 V DC SPDT | Kelco Engineering (Kerry Field) | P.O. Box 496 Brookvale NSW 2100 Ph: 02 9905 6425 |
| 34 | FS003 | Surfactant dosing flow switch | Kelco | P20 - C | 24 V DC SPDT | Kelco Engineering (Kerry Field) | P.O. Box 496 Brookvale NSW 2100 Ph: 02 9905 6425 |
| 35 | FS004 | Recycle flow switch | Kelco | F25 - C | 24 V DC SPDT | Kelco Engineering (Kerry Field) | P.O. Box 496 Brookvale NSW 2100 Ph: 02 9905 6425 |
| 36 | PS001 | Compressor Pressure Switch | PDI | PDA | 24 V DC 3 wire | Air & Hydraulics (Michael Hanley) | P.O. Box 419 Brookvale NSW 2100 Ph: 02 9451 7427 |
| 37 | SV1 | Polymer batching solenoid valve | | | 24 V DC normally closed | Air & Hydraulics (Michael Hanley) | P.O. Box 419 Brookvale NSW 2100 Ph: 02 9451 7427 |
| 39 | SV3 | Saturator air solenoid valve | | | 24 V DC normally closed | Air & Hydraulics (Michael Hanley) | P.O. Box 419 Brookvale NSW 2100 Ph: 02 9451 7427 |
| 40 | FL1 | Compressed air rotameter | Honsberg | Koniflux UKV-020GM-L0005 | 0.4 - 5 NL/min | Pipeline Dynamics (Peter Mizi) | P.O. Box 69 Avondale Heights Vic 3034 |

Prepared By:
 Verified By: Date:

| Environmental Group (Operations) Pty Ltd | | | | Equipment Schedule | | | |
|---|------------------|--|--------------|-----------------------------------|------------|---|---|
| Division: | | Projects | | Form No: 1.4.1 108 Version: 01 | | | |
| Project Number | | W2395 | | Boonah Tertiary Treatment Plant | | | |
| Contract Number | | 745/0110 | | | | | |
| Item No. | Tag No. | Description | Order Number | Model | Size | Supplier | Contact |
| 41 | PI | Saturator pressure vessel pressure gauge | | 63 'o' Face bourdon tube | 0-1000 kPa | Air & Hydraulics (Michael Hanley) | P.O. Box 419 Brookvale NSW 2100 Ph: 02 9451 7427 |
| 42 | FG1 | Surfactant dosing calibration tube | | DDC 250-S | 250 ml | International Chemicals Engineering (Maria Young) | P.O. Box 611 Hurstville NSW 1481 Ph: 02 9586 2111 |
| 43 | FG2 | Polymer dosing calibration tube | | DDC 2000-S | 2000 ml | International Chemicals Engineering (Maria Young) | P.O. Box 611 Hurstville NSW 1481 Ph: 02 9586 2111 |
| 44 | | | | | | | |
| 45 | Saturator Vessel | | | | 0.5 cu.m | Unique Engineering Services (Daryl) | Unit 2 Block 2, 337 Hillsborough Rd Warners Bay NSW 2282 4954 2168 |
| 46 | Jameson Cell | | | | | Unique Engineering Services (Daryl) | Unit 2 Block 2, 337 Hillsborough Rd Warners Bay NSW 2282 4954 2168 |
| 47 | Surfactant Tank | MDPE chemical tank black | | | 500 L | Bushman Tanks (Alun Jones) | 8 Cooper St Dalby QLD 4405 Ph: 07 4662 1286 |
| 48 | | | | | | | |
| 49 | | | | | | | |
| 50 | | | | | | | |
| Prepared By:..... | | | | Date:..... | | | |
| Verified By:..... | | | | | | | |

14



14. SPARE PARTS LISTING

- **Feed Pumps - ABS - AS0830DS22/4D**

Mechanical seal
Wear Ring
Gaskets and seals

- **Recycle Pumps - Grundfos CR3-17**

Shaft seal kit
Gasket Kit
Coupling guard kit
Wear parts kit

- **Polymer Dosing Pumps - Mono PLF 102**

Rotor & Stator
Drive Shaft-Packed gland

Chemical Dosing Pumps - Pulsatron

Diaphragm replacement kit
O-ring, seals kits
Valve replacement kit

- **Sludge Pumps – ASM DT50 Diaphragm**

Diaphragm kit
O-ring and gasket kit

15



EGL

**ENVIRONMENTAL GROUP Pty Ltd
BOONAH TERTIARY TREATMENT PLANT
OPERATIONS MANUAL**

15. MATERIAL SAFETY DATA SHEETS

REVISION: 1

DATE: 2nd NOVEMBER 2004

ENVIRONMENTAL GROUP

15-1



EGL

**ENVIRONMENTAL GROUP Pty Ltd
BOONAH TERTIARY TREATMENT PLANT
OPERATIONS MANUAL**

15.1 MSDS SURFACTANT

REVISION: 1

DATE: 2nd NOVEMBER 2004

ENVIRONMENTAL GROUP

15-2

MATERIAL SAFETY DATA SHEET

Generic MSDS

For reference purposes only

Not classified as hazardous according to criteria of Worksafe Australia.

I IDENTIFICATION

Product Name: Sodium Lauryl Sulphate

Other Names: Sodium lauryl sulfate

Dangerous Goods Class: None allocated.

Sub Risk Class: No Subsidiary Risk.

Packaging Group: None allocated.

EPG: None allocated.

Poison Schedule: Not Scheduled.

Product Type: Organic solid.

Chemical Family: Sodium salt of alkyl sulfate.

Uses: Ingredient in detergent products.

Physical appearance & Properties:

Appearance & Odour: Fine white needles. No odour.

Melting/softening point: No data. Solid at normal temperatures.

Boiling point and vapour pressure: Decomposes.

Volatile materials: Nil.

Flashpoint: Not flammable.

Specific gravity: Bulk (packing) density approx 0.5

Solubility in water: Approx 300g/L at 25°C

Corrosiveness: Not corrosive.

Ingredients:

| Chemical entity | CAS No | Proportion % | Worksafe Exposure Limits | |
|---------------------------------|------------|-----------------|--------------------------|---------------------------|
| | | | TWA mg/m ³ | STEL mg/m ³ |
| Sodium lauryl sulfate | 68585-47-7 | 93 | not set | not set |
| Sodium sulfate | 7757-82-6 | 2 | not set | not set |
| Minor non hazardous ingredients | various | to 100 | not set | not set |

This is a commercial product, and the exact ratio of components may vary. Some impurities are also likely.

II HEALTH HAZARD DATA

Health Effects:

No specific data is available for the product for chronic exposure symptoms. This product is not listed as carcinogenic in Worksafe's document "Exposure Standards for Atmospheric Contaminants in the Occupational Environment" (May 1995).

Acute Effects:

Swallowed: Data suggests that the product should be considered to be irritating by ingestion because of its alkaline and detergent properties.

Eye: Data suggests that this product should be classified as irritating to the eyes. May cause problems including corneal damage or transient blindness if contact is not treated promptly.

Skin: Data suggests that the product should be classified as irritating on prolonged exposure to the skin.

Inhalation: Data suggests that dusts should be considered to be irritating by inhalation. Inhalation may cause coughing and chest discomfort.

Primary route of exposure is inhalation and skin and eye contact.

LD₅₀ Oral (Rat) = 1200-2400mg/kg for equivalent products.

Product Sodium Lauryl Sulphate

Page 1 of 3

For reference purposes only

Generic MSDS

Issued: August 1999

MATERIAL SAFETY DATA SHEET

First Aid:

If swallowed, do NOT induce vomiting. Give a glass of water. Seek medical attention.

Eye: If this product comes into contact with eyes, hold open and wash with running water for at least 15 minutes. Ensure irrigation under eyelids by occasionally lifting them. Do not try to remove contact lenses unless trained.

Skin: If this product comes into contact with skin, wash skin for at least 15 minutes with soap and water. Remove contaminated clothing and footwear. Ensure contaminated clothing is thoroughly washed before using again.

Inhalation: If mists, dusts or combustion products are inhaled, remove to fresh air. Lay victim down & keep warm and rested. If breathing is shallow, or has stopped, ensure clear airway and apply resuscitation or oxygen if available. Transport to hospital or doctor immediately.

Eye wash stations or baths and if possible, deluge showers should be available where product is being used.

Advice to doctor: Treat symptomatically. Note the nature of this product.

III PRECAUTIONS FOR USE

Exposure Standards:

A time weighted average (TWA) concentration for an 8 hour day, and 5 day week has not been established by Worksafe Australia for any of the ingredients in this product. There is a blanket recommendation of 10mg/m³ for inspirable dusts or mists when limits have not otherwise been established. The nature of this product makes it unlikely that this level will be approached in normal use. See ingredients section on page 1 of this data sheet.

Engineering Controls:

In industrial situations, concentration values below the TWA value should be maintained. Values may be reduced by process modification, use of local exhaust ventilation, capturing substances at the source, or other methods. If you believe air borne concentrations of mists, dusts or vapours are high, you are advised to modify the process or environment to reduce the problem.

Personal Protection:

Respiratory Protection: A face mask or respirator is essential when this material is being used. For help in selecting suitable equipment consult AS/NZS 1715.

Protective Gloves: Rubber, PVC or other protective gloves should be used other than for brief use. Failure to use gloves may result in skin irritation and symptoms ranging from redness and itching to blisters and even burns. For help in selecting suitable gloves consult AS 2161.

Eye Protection: Goggles or full face shield must be used when using this product. Failure to do so may result in eye damage if an accident occurs. Consult AS 1336 and AS/NZS 1337 for information about eye protection.

Clothing: Clean overalls should be worn, preferably with an apron. All skin areas must be covered. Consult AS 2919 for advice on Industrial Clothing.

Safety Boots: Wearing safety boots would be advisory. Consult AS/NZS 2210 for advice on Occupational Protective Footwear.

Flammability Limits: Not flammable.

Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storing or re-using.

IV SAFE HANDLING INFORMATION

Storage & Transport:

No special requirements storage and transport requirements. This material has no UN Classification.

Not a Scheduled Poison. Containers should be kept closed in order to minimise contamination. Keep from extreme heat and open flames, and make sure the material does not come into contact with water or acids.

Spills and disposals:

In event of a major spill, prevent spillage from entering drains or water courses. Call Fire Brigade or emergency services. Wear full protective clothing including self contained breathing apparatus. Stop leak if safe to do so, and contain spill. Sweep up and shovel or collect recoverable product into labelled containers for recycling or salvage. Recycle containers wherever possible. After spills, wash area, preventing runoff from entering drains. If material enters drains, advise emergency services. This material may be suitable for approved landfill. Dispose of only in compliance with local, state and federal regulations. Launder all contaminated clothing before re-use.

MATERIAL SAFETY DATA SHEET

Fire/Explosion Hazard:

There is no explosion hazard from this material under normal circumstances.

Flashpoint: Not flammable.

Extinguishing Media: Use media suited to burning material.

Special Fire fighting procedures: Wear full protective clothing including self contained breathing apparatus.

Unusual fire & Explosion hazards: Decomposition products are toxic and corrosive. There is little or no chance of an explosion from this product if involved in a fire.

Stability: Stable.

Polymerisation: Will not polymerise.

Decomposition Products: carbon dioxide, carbon monoxide, oxides of sulfur, water.

Materials to avoid: water, strong acids, strong bases, strong oxidising agents.

V OTHER INFORMATION

This MSDS is prepared in accord with the Worksafe Australia document "National Code of Practice for the Preparation of Material Safety Data Sheets", 1994.

Contact Points:

Police and Fire Brigade:

Dial

AUSTRALIA

000

If ineffective:

Dial

1100 (Exchange)

National Poisons Information Centre:

Dial

13 1126 (from anywhere in Australia)

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Note that this MSDS is in Worksafe format, but is for reference purposes only. Since MSDS.COM does not supply this product, it cannot be held responsible for the provision of information that by law must be provided by the supplier of the product.

If you want your supplier to place his MSDSs on this system, tell him about our service.

Please read all labels carefully before using product.



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**ENVIRONMENTAL GROUP Pty Ltd
BOONAH TERTIARY TREATMENT PLANT
OPERATIONS MANUAL**

15.2 MSDS JETFLOC HP3 CATIONIC POWDER FLOCULTANT

REVISION: 1

DATE: 2nd NOVEMBER 2004

ENVIRONMENTAL GROUP

15-3

MATERIAL SAFETY DATA SHEET

JETFLOC POWDER CATIONIC FLOCCULANTS

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

JETFLOC HP3 CATIONIC POWDER FLOCCULANT

SUPPLIER: Environmental Group (Operations) Pty Ltd – Water Division

67 Pendlebury Rd

Cardiff 2285

Ph: +61 2 4954 5889

Fax: +61 2 4954 9910

2. COMPOSITION/INFORMATION ON INGREDIENTS

Cationic water-soluble polymer

3. HAZARDS INFORMATION

Aqueous solutions or powders that become wet render surfaces extremely slippery.

4. FIRST AID MEASURES

Inhalation : No hazards which require special first aid measures. Move to fresh air.

Skin Contact : No hazards which require special first aid measures. Wash with water and soap as a precaution. In case of persistent skin irritation, consult a physician.

Eye Contact : Rinse thoroughly with plenty of water, also under the eyelids. In case of persistent eye irritation, consult a physician.

Ingestion : No hazards which require special first aid measures. The product is not considered toxic based on studies on laboratory animals.

Issued: 07/04/2000

Product: Jetfloc HP3

5. FIRE-FIGHTING MEASURES

- Suitable Extinguishing Media** : Water, water spray, foam, carbon dioxide (CO₂), dry powder.
- Special Fire-fighting Precautions** : Aqueous solutions or powders that become wet render surfaces extremely slippery.
- Special Protective Equipment for Fire-fighters** : No special protective equipment required.

6. ACCIDENTAL RELEASE MEASURES

- Personal Precautions** : No special precautions required.
- Environmental Precautions** : DO NOT contaminate water.
- Methods for cleaning up** : Do not flush with water. Clean up promptly by scoop or vacuum. Keep in suitable and closed containers for disposal. After cleaning flush away traces with water

7. HANDLING AND STORAGE

- Handling** : Avoid contact with skin and eyes. Avoid dust formation. Do not breathe dust. Wash hands before breaks and at the end of workday
- Storage** : Keep in a dry, cool place (0 - 35°C)

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

- Engineering Measures to Reduce Exposure** : Use local exhaust if dusting occurs. Natural ventilation is adequate in absence of dusts.

Personal Protection Equipment

- **Respiratory Protection** : Dust safety masks are recommended where concentration of total dust is more than 10mg/m³.
- **Hand Protection** : Rubber gloves.
- **Eye Protection** : Safety glasses with side-shields. Do not wear contact lenses.

Issued: 07/04/2000

Product: Jetfloc HP3

- **Skin & Body Protection** : Chemical resistant apron or protective suit if splashing or repeated contact with solution is likely.
- Hygiene Measures** : Wash hands before breaks and at the end of workday. Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---------------------------------------|------------------|
| Form | : Granular solid |
| Colour | : White |
| Odour | : None |
| pH | : 2.5-4.5 @ 5g/l |
| Melting point (degrees C) | : Not applicable |
| Flash point (degrees C) | : Not applicable |
| Auto ignition temperature (degrees C) | : Not applicable |
| Vapour pressure (mm Hg) | : Not applicable |
| Approximate Bulk density | : 0.85 |

10. STABILITY AND REACTIVITY

- Stability** : Product is stable, no hazardous polymerisation will occur.
- Materials to avoid** : Oxidising agents may cause exothermic reactions.
- Hazardous Decomposition Products** : Thermal decomposition may produce : hydrogen chloride gas, nitrogen oxides (NO_x), carbon oxides.

Issued: 07/04/2000

Product: Jetfloc HP3

11. TOXICOLOGICAL INFORMATION

Acute Toxicity -

- **Oral** : LD50/oral/rat > 5000 mg/kg
- **Dermal** : The results of testing on rabbits showed this material to be non-toxic even at high dose levels.
- **Inhalation** : The product is not expected to be toxic by inhalation.

Irritation -

- **Skin** : The results of testing on rabbits showed this material to be non-irritating to the skin.
- **Eyes** : Testing conducted according to the Draize technique showed the material produces no corneal or iridial effects and only slight transitory conjunctival effects similar to those which all granular materials have on conjunctivae.

Sensitisation : The results of testing on guinea pigs showed this material to be non-sensitising.

Chronic Toxicity : A two-year feeding study on rats did not reveal adverse health effects. A one-year feeding study on dogs did not reveal adverse health effects.

12. ECOLOGICAL INFORMATION

Ecotoxicity:

The aquatic toxicity is highly mitigated by the presence of dissolved organic carbon in the water. Results obtained using the US EPA "Dirty Water" test show that irreversible adsorption onto suspended matter and dissolved organics (such as humic and other organic acids) present in natural waters, reduces the toxicity to aquatic organisms by a factor of over 10.

Environmental Fate:

The product is rapidly eliminated from the aquatic medium through irreversible adsorption onto suspended matter and dissolved organics.

Bioaccumulation : The product is not expected to bioaccumulate.

Persistence/degradability : No data available.

13. DISPOSAL CONSIDERATIONS

14. TRANSPORT INFORMATION

15. REGULATORY INFORMATION

16. OTHER INFORMATION

[illegible]

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EGL

**ENVIRONMENTAL GROUP Pty Ltd
BOONAH TERTIARY TREATMENT PLANT
OPERATIONS MANUAL**

15.3 MSDS COAGULANT

REVISION: 1

DATE: 2nd NOVEMBER 2004

ENVIRONMENTAL GROUP

15-4

MATERIAL SAFETY DATA SHEET

Generic MSDS

For reference purposes only

Not classified as hazardous according to criteria of Worksafe Australia.

I IDENTIFICATION

Product Name: Aluminium sulfate

Other Names: None

UN No: None allocated.

Hazchem Code: None allocated.

Dangerous Goods Class: None allocated.

Sub Risk Class: No Subsidiary Risk.

Packaging Group: None allocated.

EPG: None allocated.

Poison Schedule: Not Scheduled.

Product Type: Inorganic solid.

Chemical Family: Aluminium salt of mineral acid.

Uses: Chemical intermediate.

Physical appearance & Properties:

Appearance & Odour: White crystalline solid (powder, lumps or granules). No odour.

Melting/softening point: No data.

Boiling point and vapour pressure: No data.

Volatile materials: No data.

Flashpoint: Does not burn.

Specific gravity: 1.7

Solubility in water: 600g/L at 20°C

Corrosiveness: Not corrosive.

Ingredients:

| Chemical entity | CAS No | Proportion % | Worksafe Exposure Limits | |
|-------------------|------------|-----------------|--------------------------|---------------------------|
| | | | TWA mg/m ³ | STEL mg/m ³ |
| Aluminium sulfate | 10043-01-3 | pure * | not set | not set |

* Commercially pure.

This is a commercial product, and the exact ratio of components may vary. Trace quantities of impurities are also likely.

II HEALTH HAZARD DATA

Health Effects:

No specific data is available for the product for chronic exposure symptoms. The ingredients are not listed as carcinogenic in Worksafe's document "Exposure Standards for Atmospheric Contaminants in the Occupational Environment" (May 1995).

Acute Effects:

Swallowed: Data suggests that the product should be considered to be irritating by ingestion. May cause problems if treatment is not sought.

Eye: Data suggests that this product should be classified as irritating to the eyes. May cause transient blindness if contact is not treated promptly.

Skin: Data suggests that the product should be classified as irritating in contact with the skin. May cause symptoms ranging from itching to redness and blisters if not treated promptly.

Inhalation: Data suggests that the product should be considered to be non irritating and non toxic by inhalation.

Primary route of exposure is inhalation and skin and eye contact.

LD₅₀ Oral (Rat) = 6200mg/kg

First Aid:

If poisoning occurs, contact a Doctor or Poisons Information Centre.

Product Aluminium sulfate

Page 1 of 3

For reference purposes only

Generic MSDS

Issued: August 1999

MATERIAL SAFETY DATA SHEET

If swallowed, do NOT induce vomiting. Give a glass of water.

Eye: If this product comes into contact with eyes, hold open and wash with running water for at least 15 minutes. Ensure irrigation under eyelids by occasionally lifting them. Do not try to remove contact lenses unless trained.

Skin: If this product comes into contact with skin, wash skin for at least 15 minutes with soap and water. Remove contaminated clothing and footwear. Ensure contaminated clothing is thoroughly washed before using again.

Inhalation: If mists, dusts or combustion products are inhaled, remove to fresh air. Lay victim down & keep warm and rested. If breathing is shallow, or has stopped, ensure clear airway and apply resuscitation or oxygen if available.

Transport to hospital or doctor immediately.

Eye wash stations or baths and deluge showers should be available where product is being used.

Advice to doctor: Treat symptomatically. Note the nature of this product.

III PRECAUTIONS FOR USE

Exposure Standards:

A time weighted average (TWA) concentration for an 8 hour day, and 5 day week has not been established by Worksafe Australia for any of the ingredients in this product. There is a blanket recommendation of 10mg/m³ for inspirable dusts or mists when limits have not otherwise been established. The nature of this product makes it unlikely that this level will be approached in normal use. See ingredients section on page 1 of this data sheet.

Engineering Controls:

In industrial situations, concentration values below the TWA value should be maintained. Values may be reduced by process modification, use of local exhaust ventilation, capturing substances at the source, or other methods. If you believe air borne concentrations of mists, dusts or vapours are high, you are advised to modify the process or environment to reduce the problem.

Personal Protection:

Respiratory Protection: A face mask or respirator may be used when the product is being used in dusty or confined areas. Otherwise it is usually safe to not use respiratory protection. However, there may be other circumstances where use of a mask or other device is preferred. Use judgement. For help in selecting suitable equipment consult AS/NZS 1715.

Protective Gloves: Rubber, PVC or other protective gloves should be used, even if product is being used infrequently or for brief periods. The product may be absorbed by the skin, resulting in poisoning. For help in selecting suitable gloves consult AS 2161.

Eye Protection: Goggles or full face shield must be used when using this product. Failure to do so may result in permanent eye damage if an accident occurs. Consult AS 1336 and AS/NZS 1337 for information about eye protection.

Clothing: Clean overalls should be worn, preferably with an apron. All skin areas should be covered. Consult AS 2919 for advice on Industrial Clothing.

Safety Boots: Wearing safety boots would be advisory. Consult AS/NZS 2210 for advice on Occupational Protective Footwear.

Flammability Limits: Does not burn.

Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storing or re-using.

IV SAFE HANDLING INFORMATION

Storage & Transport:

No special requirements storage and transport requirements. This material has no UN Classification.

Not a Scheduled Poison. Containers should be kept closed in order to minimise contamination. Keep from extreme heat and open flames, and make sure the material does not come into contact with water or acids.

Spills and disposals:

In event of a major spill, prevent spillage from entering drains or water courses. Wear full protective clothing including face mask, face shield and gauntlets. Stop leak if safe to do so, and contain spill.

Sweep up and shovel or collect recoverable product into labelled containers for recycling or salvage.

After spills, wash area, preventing runoff from entering drains. If material enters drains, advise emergency services. This material may be suitable for approved landfill. Dispose of only in compliance with local, state and federal regulations.

Launder all contaminated clothing before re-use.

Fire/Explosion Hazard:

There is no explosion hazard from this material under normal circumstances.

Product Aluminium sulfate

Page 2 of 3

For reference purposes only

Generic MSDS

Issued: August 1999

MATERIAL SAFETY DATA SHEET

Flashpoint: Does not burn.

Extinguishing Media: Use media suited to burning material.

Special Fire fighting procedures: Wear full protective clothing including face mask, face shield and gauntlets.

Unusual fire & Explosion hazards: Heat does not produce any known decomposition products. There is little or no chance of an explosion from this product if involved in a fire.

Stability: Stable.

Polymerisation: Will not polymerise.

Decomposition Products: No known decomposition products.

Materials to avoid: Strong acids, strong alkalis, strong oxidising agents.

V OTHER INFORMATION

This MSDS is prepared in accord with the Worksafe Australia document "National Code of Practice for the Preparation of Material Safety Data Sheets", 1994.

Contact Points:

Police and Fire Brigade:

Dial

AUSTRALIA

000

If ineffective:

Dial

1100 (Exchange)

National Poisons Information Centre:

Dial

13 1126 (from anywhere in Australia)

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If you want your supplier to place his MSDSs on this system, tell him about our service.

Please read all labels carefully before using product.