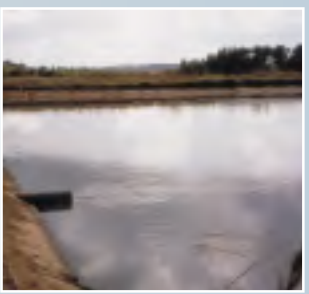
An Illustrated Guide to Basic Sewage Purification Operations









Department of Water Affairs and Forestry
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PREFACE

Water services include water supply as well as appropriate sanitation. Services refers to the provision of infrastructure as well as the sustainable operation and maintenance of the associated systems. The Department of Water Affairs and Forestry has an obligation to support municipalities with their constitutional role to provide water services to all citizens. One way in which the Department can assist is by developing the skills of municipal staff. In this regard, the Department has identified the need to train on-site staff for the proper operation and maintenance of sewage works - essential components of many sanitation systems - and therefore developed this guide.

The first edition of this guide is aimed at entry grade attendants who operate smaller waste water treatment facilities. Particular attention has been given to the needs of those who have limited literacy skills. Important concepts and correct operational procedures have been explained in simple terms and in a humorous manner by using cartoon illustrations. This guide emphasises the importance of the operator's job and providing services to communities.

This guide is part of a comprehensive support package to municipalities and fits into government's endeavour to systematically build capacity at local government level, providing well-structured and accredited training. It is intended as a reference for the personnel employed at a waste water treatment facility but can also be used by the facility manager for training purposes.

The participation of various persons in the development of this guide, their time and knowledge sharing - is much appreciated.

Let's all continue to work together to improve services to our communities.

Department of Water Affairs and Forestry

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GLOSSARIES

INTRODUCTION

The purpose of this guide is to provide persons involved in conducting routine maintenance tasks and checks on sewage treatment works with a better understanding of basic sewage treatment operational activities.

The guide has been developed in an illustrated colour format to aid a wide spectrum of users in the understanding of the underlying fundamental concepts to basic sewage treatment works.

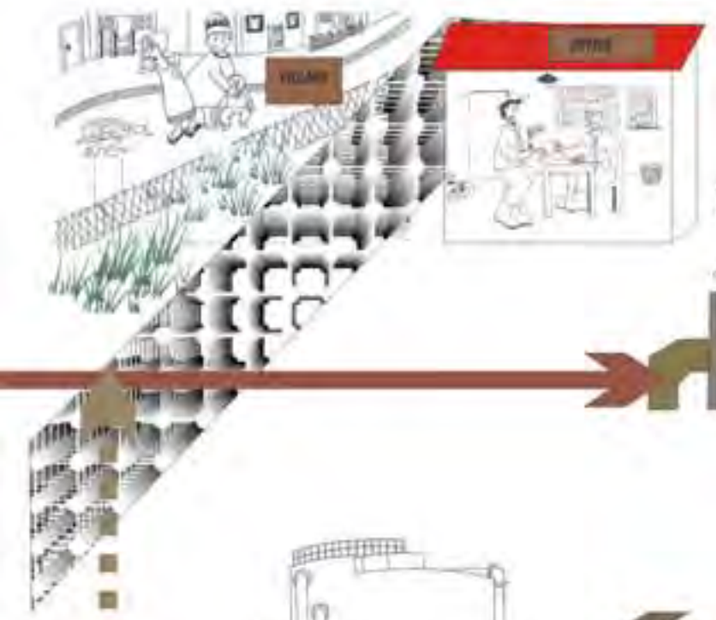
The guide is intended for use by:

Water care operators and attendants - to apply the basic operating activities related to a sewage treatment works effectively and to develop an understanding why these tasks are important in the overall functioning of the works.

Water care managers - to provide guidance in basic sewage treatment operations to staff.

Educators - to develop an understanding of routine operation and maintenance activities of a sewage treatment works.

OVERVIEW OF SEWAGE WORKS



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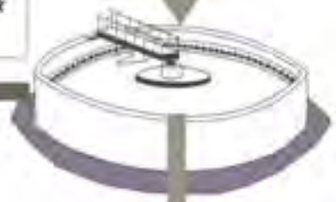
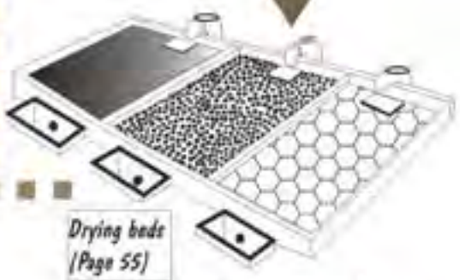
SLUDGE





Drying beds
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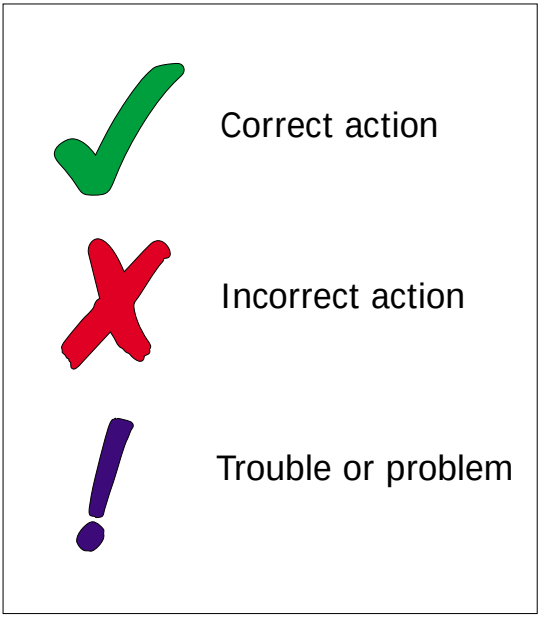
You will see the following symbols in the manual:



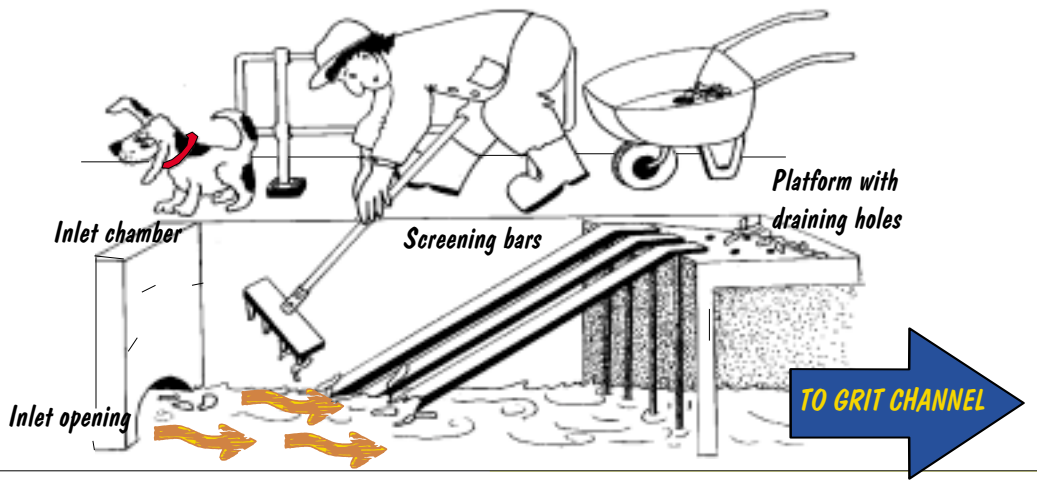
Manual Operated Inlet Screen 1

Isisefo lapho kusetsenziswa khona I harika yesandla
Isefo esentjenziswa iharika yesandla
Sisefo lapho kusetshentiswa iharika yesandla
Sefo eo ho sebedisoang haraka ea letsoho
Sefo e e dirisang haraka ya seatla
Sefo e e somiswago ka haraka ya seatla
I sefo leyi yi tirisiwaka ihareka hi mavoko
Sefo ine ha shumiswa haraga ya tshanda
Inlaatwerke handrooster

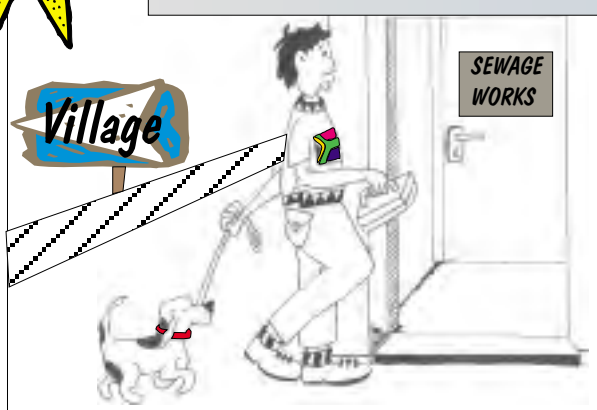
The Purpose of the manual operated inlet screen

Screening of the incoming raw waste water is part of the preliminary treatment phase and is applied to remove non-biodegradable floating objects. The purpose is to protect mechanical equipment in downstream process units and to reduce blockages in pipes, channels and sumps. In addition, floating material can encourage the development of odours and fly breeding.

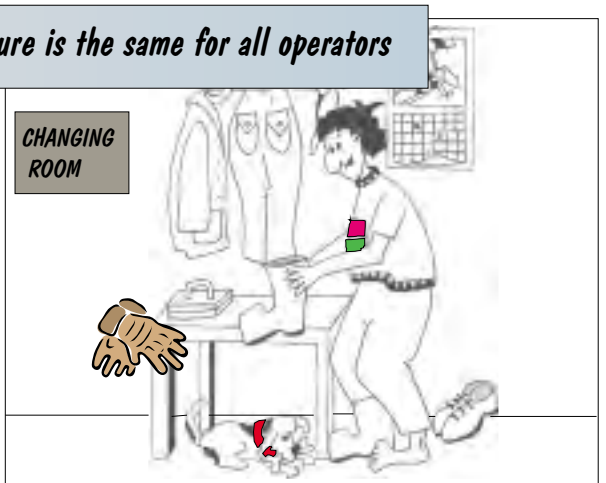
The Manual Operated Inlet Screen Unit



Operator arrives at work - this procedure is the same for all operators



START OF THE DAY SHIFT The operator arrives at work wearing his own clothes and shoes



The operator changes into the correct work clothes and shoes

Correct clothing

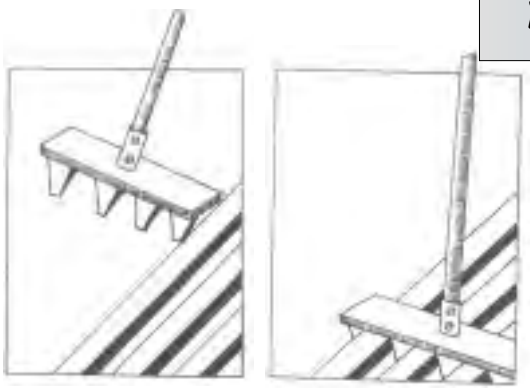
No pets are allowed at the works - the INLET DOG is included to get your attention

The operator with the correct work clothing, gloves and boots

Tools

The operator with the correct tools and equipment

The rake



The operator must use the correct rake with tines that fit snugly between the bars

The operator can use a wire hook to remove material which is stuck between the bars

Example of a rake that is not suitable for the work, the tines do not fit between the bars

Notes.....

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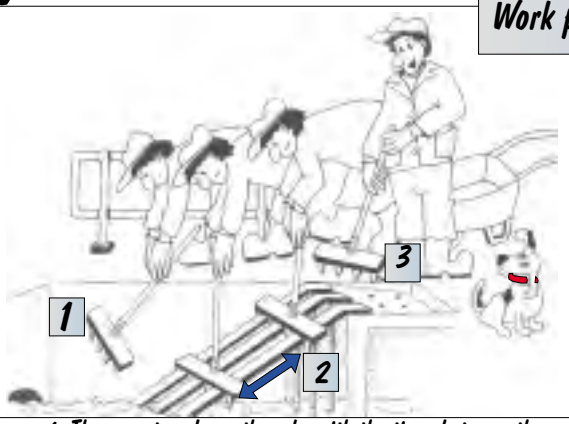
Manual Operated Inlet Screen 1

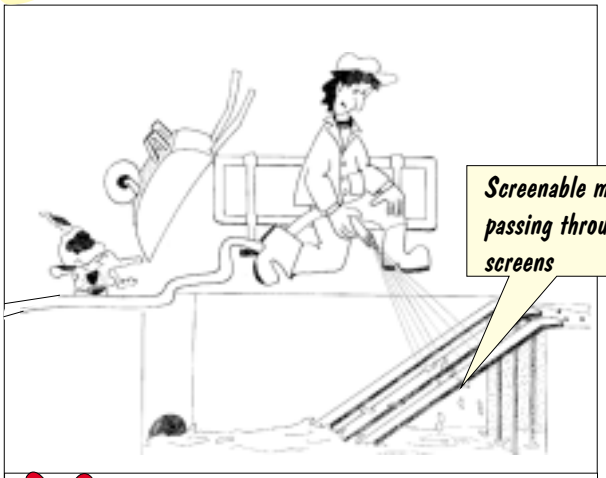
Work procedure



1. The operator places the rake with the tines between the bars. 2. He rakes with continuous up and down movement from the bottom to the top of the bars. 3. The collected material is then moved to the top, on the platform to drain and dry

The operator sprinkles lime on the drying screened material to discourage flies

Do not pull the screenable material over into the grit channel



Do not wash screenings off with a water jet, it forces the residue through the bars into the downstream units

Notes .....

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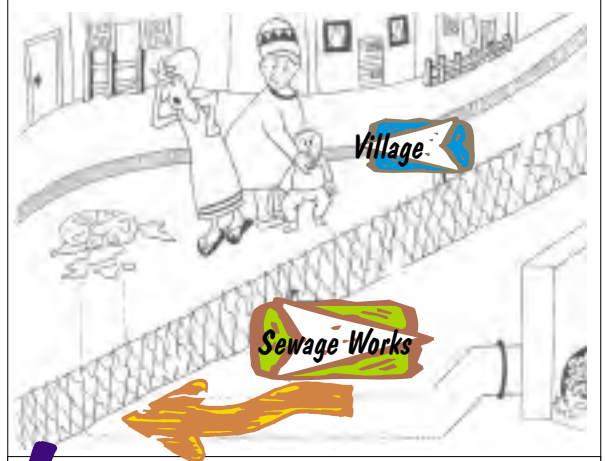
The operator must not allow screenable material to build up in the inlet chamber

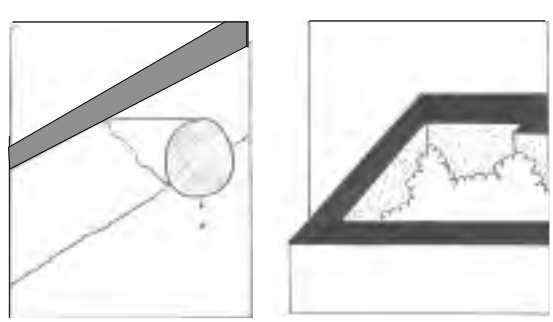


Screenable material has been allowed to build up and forces sewage back through the pipes into the manholes in the community

A build-up of material at the screens

Build-up of screenable material forces sewage back into the manholes in the community and forces material through the bars and into the downstream units

Problems caused by screenable material accumulation at the inlet works include unpleasant odours and possible health problems in the community and at the works

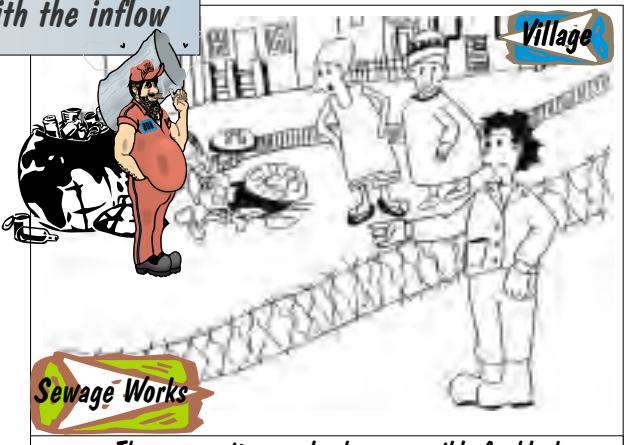


Other problems at the plant include pipe blockages, scum formation and screenable material will occupy process volume in downstream units

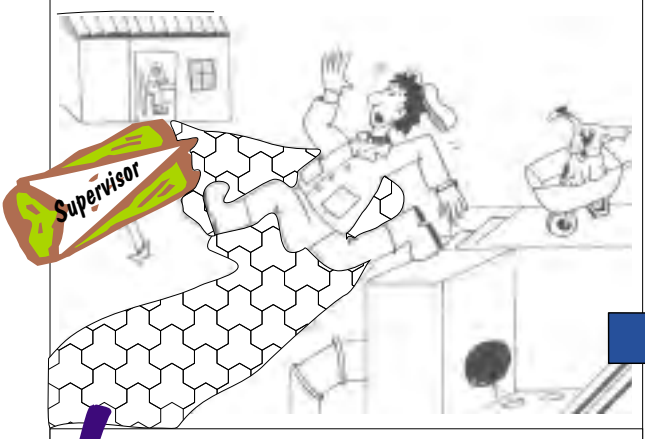
Manual Operated Inlet Screens 1

Problems with the inflow

The community should not dump anything in the manhole. It leads to problems in the community and at the sewage works



The community can also be responsible for blockages and no inflow into the sewage works by dumping garbage and other materials in the manholes. The lid must always be on the manhole



The operator checks to see that there is inflow into the inlet chamber

The operator calls the supervisor if there is no inflow

The operator checks the colour of the inflow

The operator calls the supervisor if the inflow is not the usual colour

Notes .....

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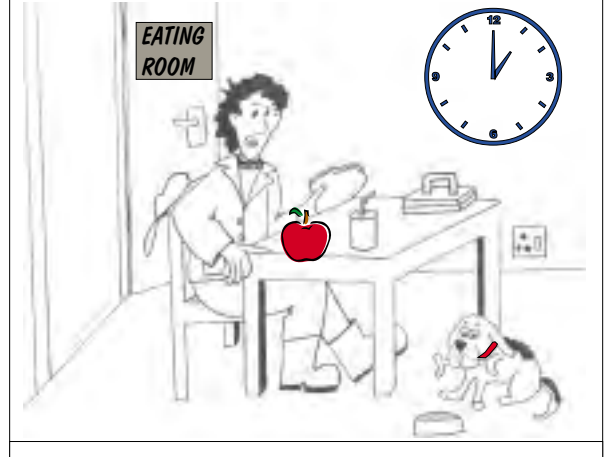
Safety tip - do not eat near the inlet works

The operator should not eat or drink near the inlet works

Unhygienic practices can lead to illness

Before eating or drinking and after each cleaning cycle, the operator should wash hands with soap and water



The operator must eat and drink in designated areas

Manual Operated Inlet Screens 1

Disposal of screenings in designated area

✓ Once dried the operator disposes of the screening material in an excavated trench. He then covers the disposed screening material with a layer of soil

The operator sprinkles lime on the screening material before burying in the trench to discourage flies

The operator calls the supervisor when the trench reaches full capacity

✗ The operator must not dump the screening material in undesignated areas

OR

The operator can also dispose of the screening material in an incinerator, if available

! The operator must call the supervisor when the incinerator is not working

Notes.....

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The operator is also responsible for the general upkeep around the inlet works

End of shift- the procedure is the same for all operators

TIME TO GO HOME The operator takes a shower or washes before going home

The operator changes back into his own clothes and shoes before going home. Dirty clothes are taken home and washed

START OF NIGHT SHIFT The day shift operator goes home and the night shift operator starts his shift

Screenable material draining on the platform at the inlet

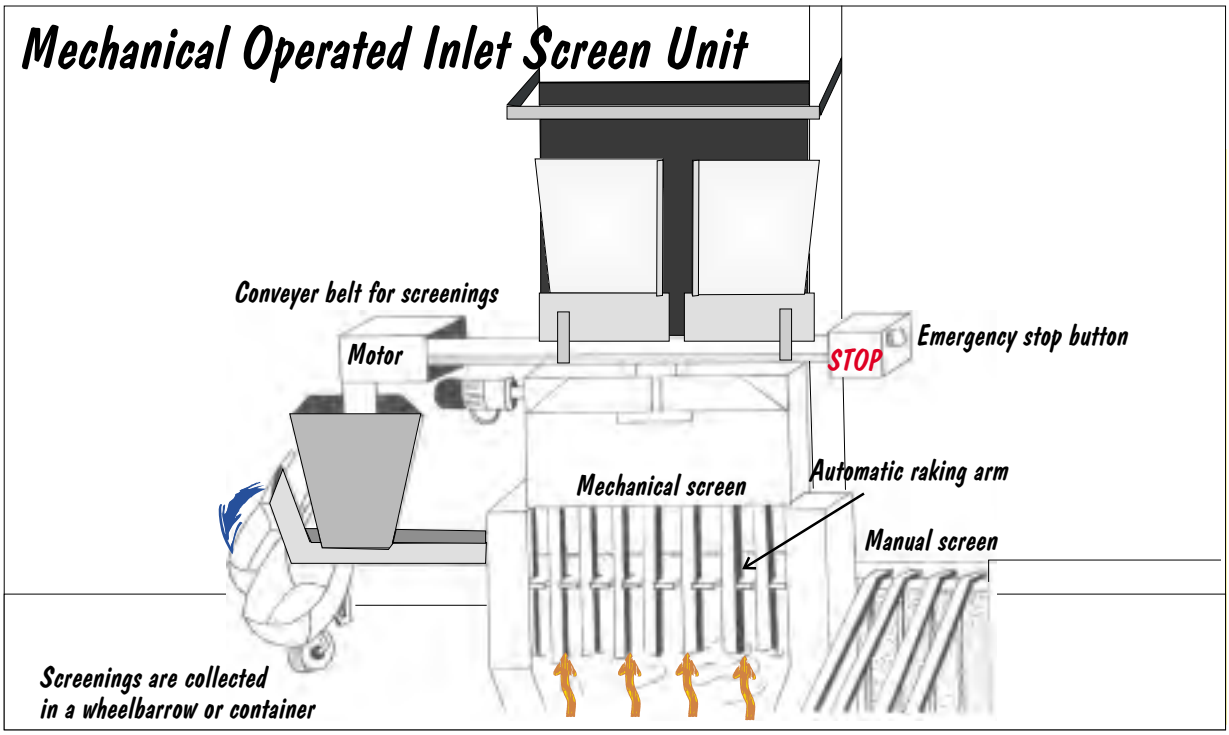
Mechanical Operated Inlet Screens 2

Esefo ezilawolayo
Isefo ezisebenzisayo
Sisefo lesitilawulako
Sefo eo e itaolang
Sefo e e itaolang
Sefo yeo e itaolaga
Sefo leyi yi tilawulaka
Sefo ine ya di laula
Inlaatwerke meganieserooster

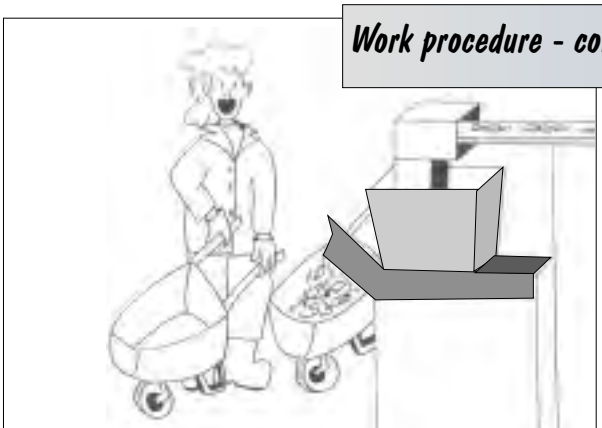
The Purpose of the Mechanical Operated Inlet Screen

Screening of the incoming raw waste water is part of the preliminary treatment phase and is applied to remove non-biodegradable floating objects. The purpose is to protect the mechanical equipment in downstream process units, as well as to reduce blockages in pipes, channels and sumps. In addition, floating material can encourage the development of odours and fly breeding.

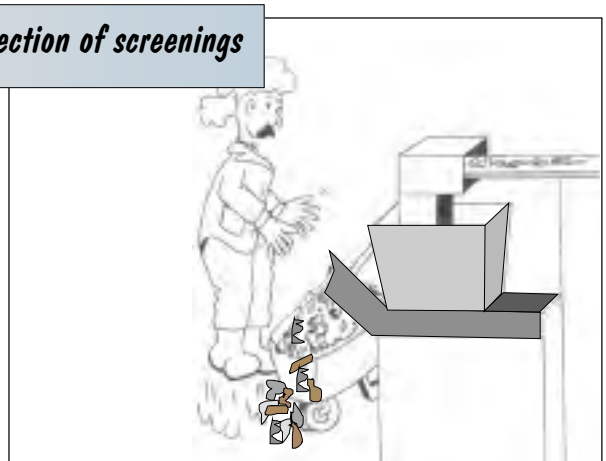
Mechanical Operated Inlet Screen Unit



Work procedure - collection of screenings

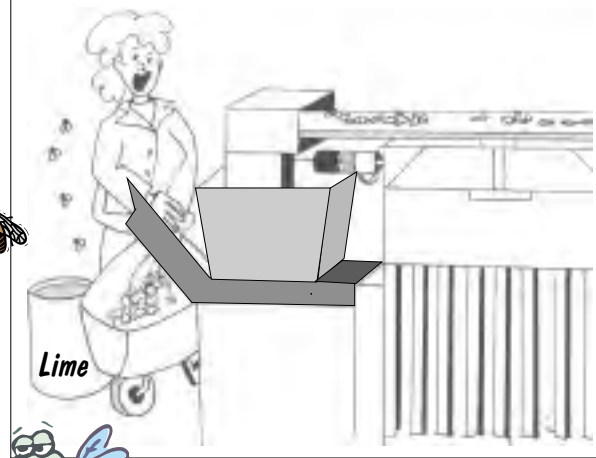


The operator collects the screening material in the wheelbarrow/container. When the first wheelbarrow or container is full, it is removed and replaced with a second clean wheelbarrow or container



The operator must not allow the wheelbarrow or container in which the screening material is collected to overflow

Mechanical Operated Inlet Screens 2



The operator sprinkles lime on the screening material to discourage flies

Notes.....

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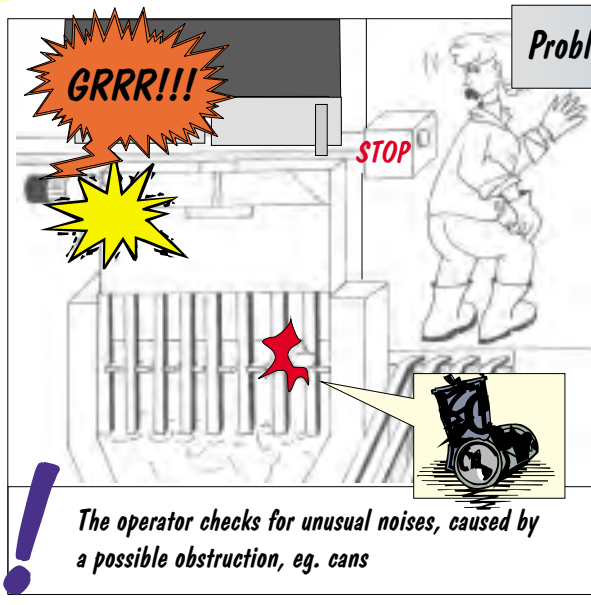
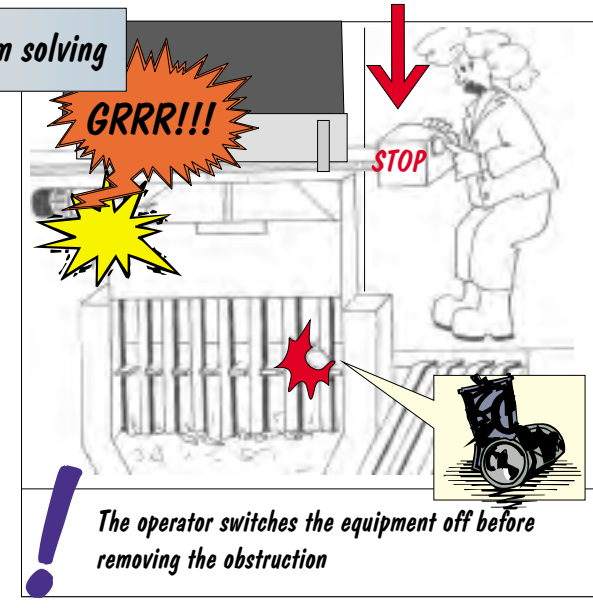
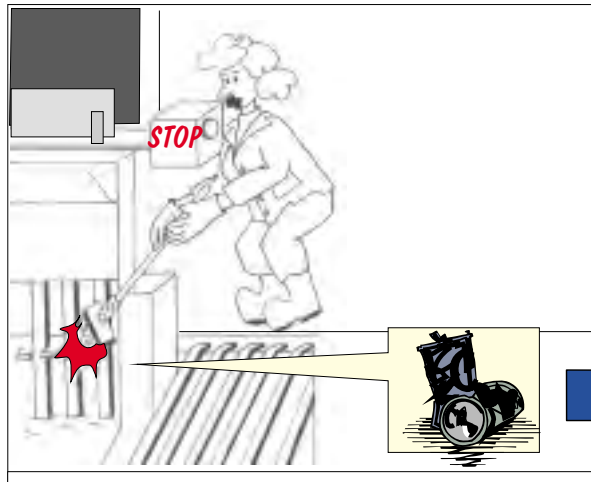
Problem solving



The operator checks for unusual noises, caused by a possible obstruction, eg. cans



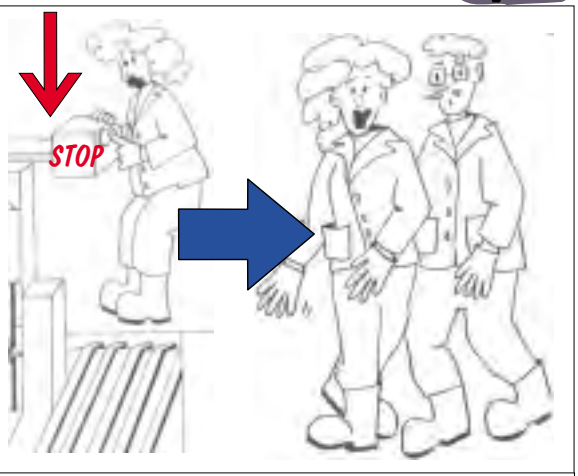
The operator switches the equipment off before removing the obstruction



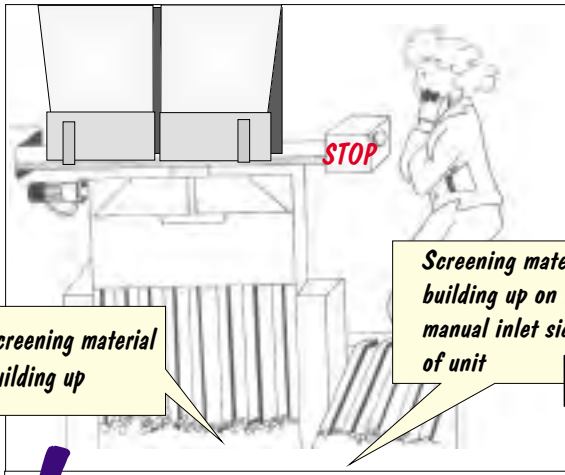
The operator removes the obstruction

The operator reports any irregularities to the supervisor

The operator checks to see if the motor is operational. Overheating and unusual noises should be reported



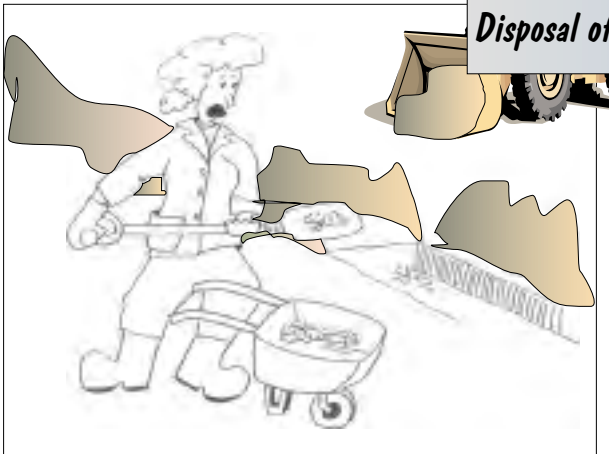
The operator switches the machine off and then calls the supervisor



The operator regularly checks to see if there is power supply to the unit

The operator calls the supervisor if there is no power to the unit

Disposal of screenings



The operator buries the screenings in an excavated trench (see page 8)

OR

The operator places the screening material in the incinerator (see page 8)

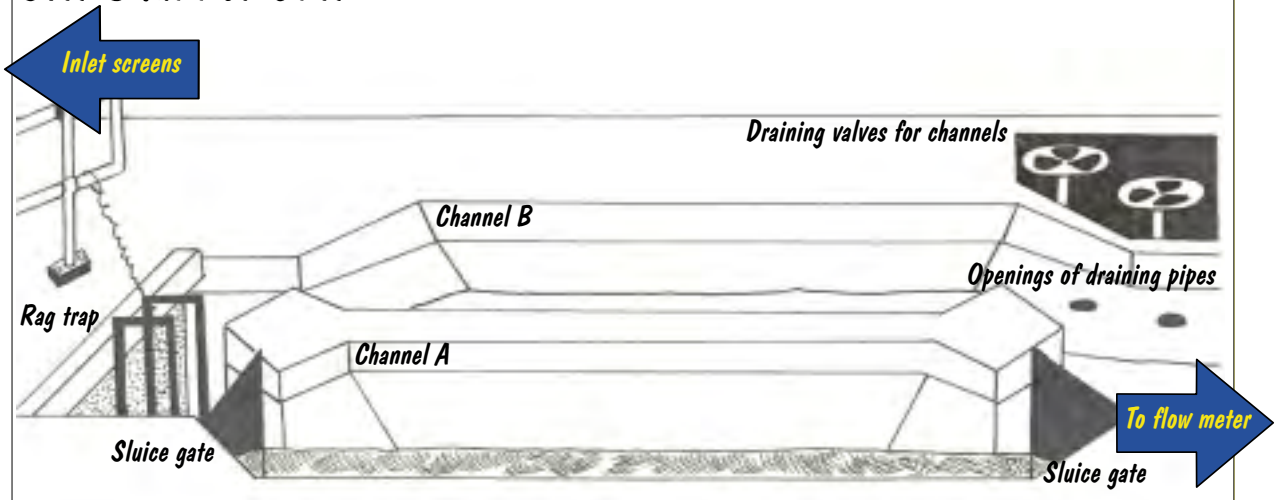
Grit Channel 3

Umsele wesanti
Izekhewu zokuhluza ukungcola
Umsele wesihlabatsi
Mosele wa lekhoarana
Mosela wa lekgwarana
Mosela wa lekgwarana
Ndlela ya rikhwara
Mugero wa madi a no tshimbila na mutavha
Grint kanale

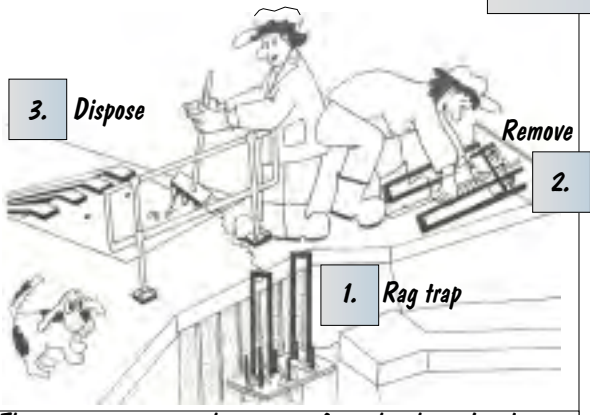
The Purpose of the Grit Channels

Grit removal takes place downstream of the inlet and forms part of the preliminary treatment phase. It is applied to remove inorganic material, or ditritus, from the suspended organic material in the raw waste water. The purpose is to protect mechanical equipment located in downstream process units, particularly pumps, from excessive wear and tear. Inorganic material that is allowed to pass through the preliminary treatment phase will also unnecessarily occupy process volume. Various mechanical grit removal operations are also available, which includes pista grit traps, vortex degritters and automatically driven suction devices.

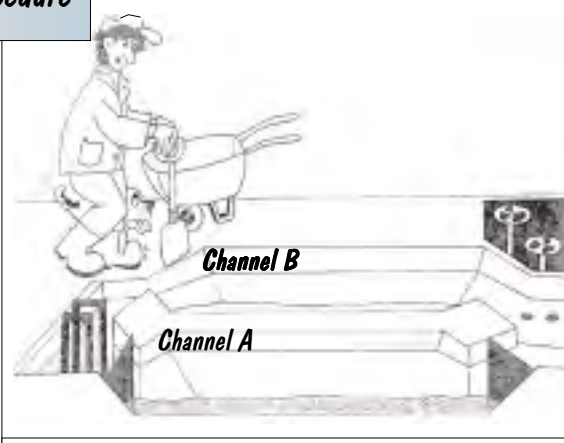
Grit Channel Unit



Work procedure



The operator removes the rag trap from the channel and removes any screenable material that passes from the inlet screen

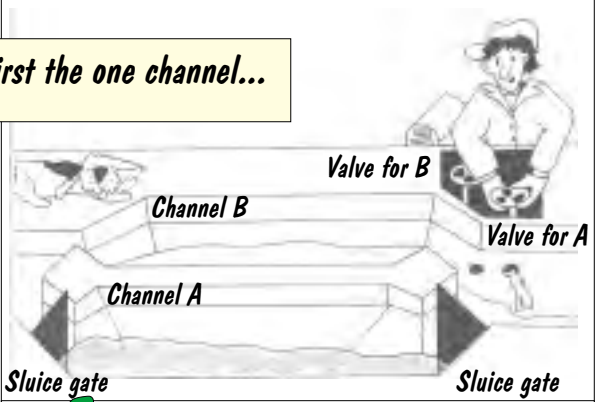


The operator diverts the inflow from the channel (A) to be cleaned by installing sluice gates, allowing the waste water to pass through a clean channel (B)

Grit Channel 3

Draining of channels

First the one channel...



The operator opens the valve slowly to drain the water in the isolated channel (A)

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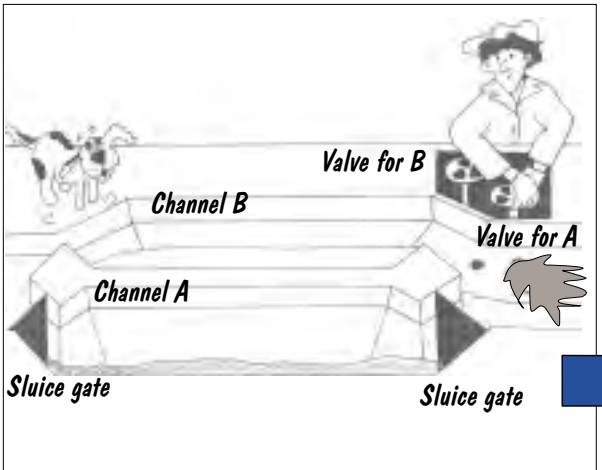
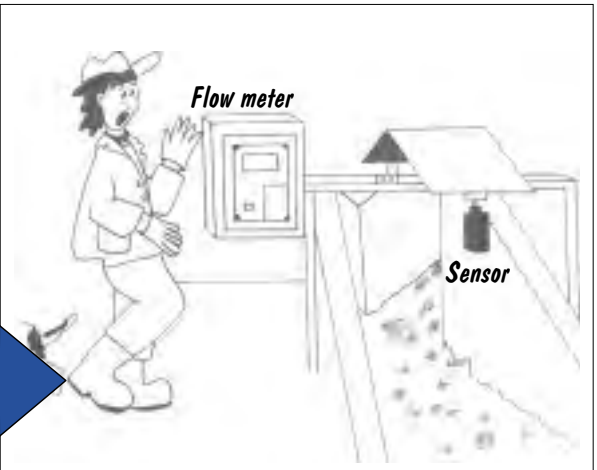
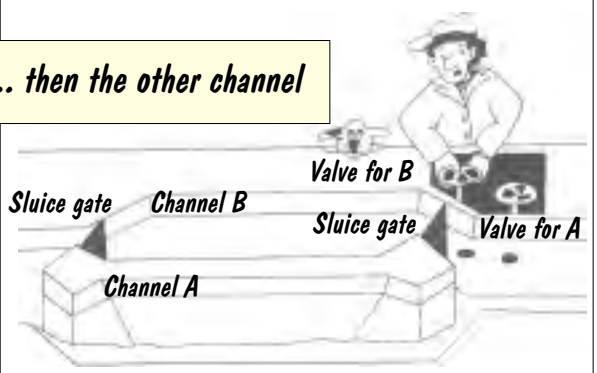


The operator must take care not to open the valve too quickly, as the grit will be washed out



Inadequate removal of grit will create grit accumulation in channels and may cause incorrect flow meter readings

... then the other channel

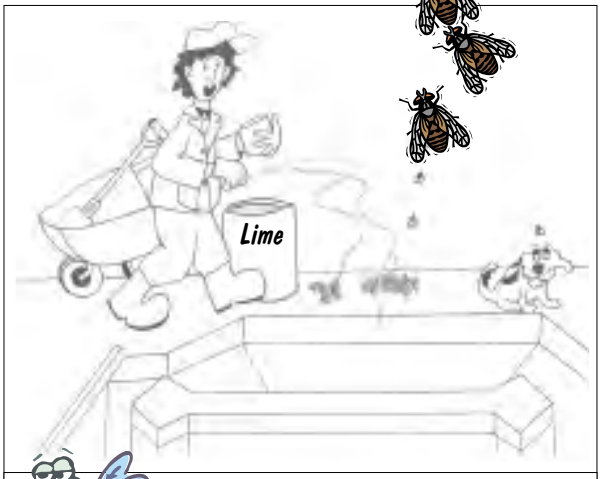


The operator drains and cleans alternative channels on a regular basis, averaging between daily to weekly intervals

Cleaning of channels

After the channel has been drained, the operator removes the settled grit from the bottom of the channel

The operator places the grit on the area adjacent to the channel, to allow the grit to dry and the water to drain back into the channel



The operator sprinkles lime on the drying grit to discourage flies

The operator must not brush the settled grit along the channel into the down stream units

Settled grit washed along the channel into the downstream units may cause incorrect flow meter readings

Grit Channel 3

The operator must not hose the settled grit along the channel into the down stream units

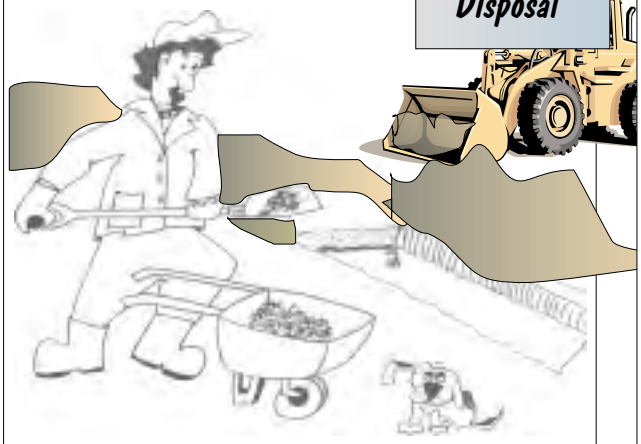
Turbulence due to the grit being washed along the channel into the down stream units may cause incorrect flow meter readings

The operator must not hose the dry grit back into the channel into the down stream units

Turbulence due to the dry grit being washed back into the channel and into the downstream units may cause incorrect flow meter readings

Notes.....

Disposal



The operator buries the dried grit in an excavated trench (see page 8)

OR

The operator can also place the dried grit in an incinerator, if available (see page 8)

The operator is responsible for the general upkeep around the grit channel unit

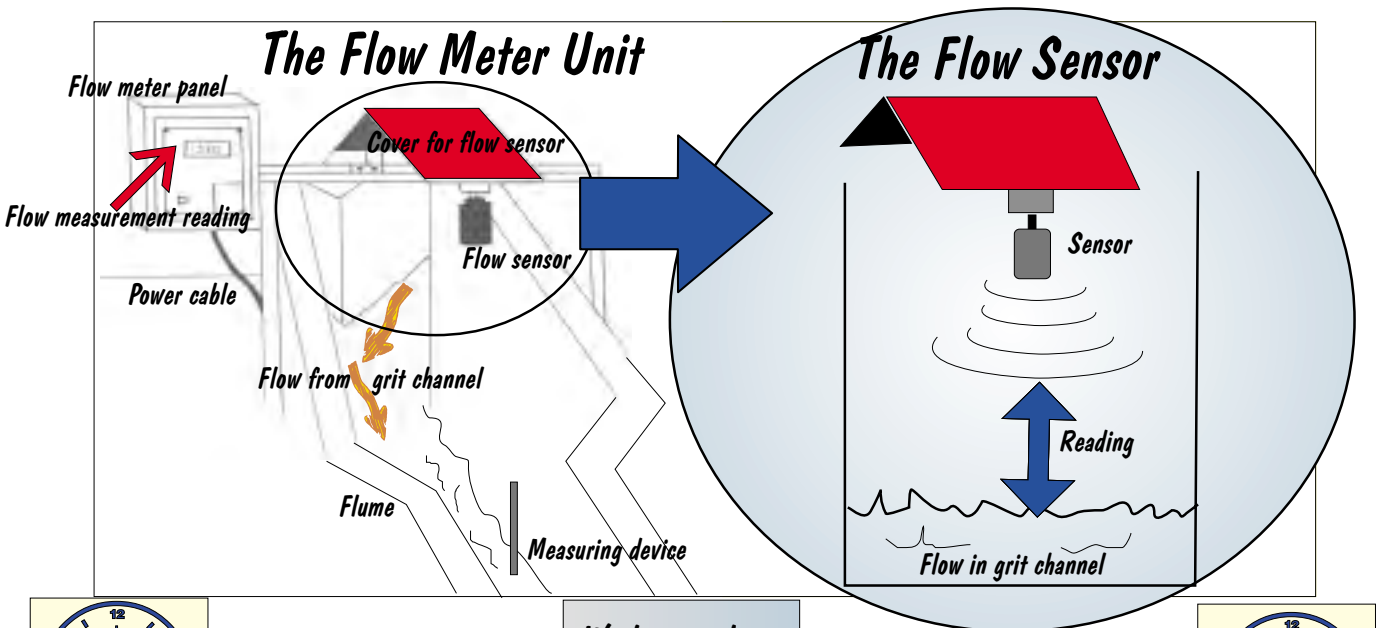
Notes .....

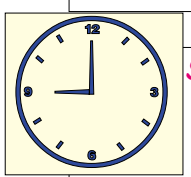
Flow Measurement 4

Iwashi elibonisa ukugeleza kwamanzi
Umatshini okhangela indlela amanzi ahamba gayo
Liwashi lelibonisa kuhamba kwemanti
Sesupa kelelo ea metsi
Sesupa kelelo ya metsi
Sesupa kelelo ya meetse
Nchumu/iwatch lowu wu kombaka nkhuluko wa mati
Watshi yo no sumbedza u tshimbila ha madi
Vloeimeting

The Purpose of the Flow Measuring Unit

Regular measuring of the flow is required to determine the hydraulic and organic loadings imposed on the works. In addition, regular flow recordings can provide warnings on blockages or pump failure in sewer reticulation. Peak flow factors can also be determined from flow recordings.



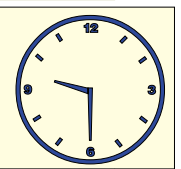


SAME TIME EVERY DAY

Monday 09:00
Tuesday 09:00
Wednesday 09:00
Thursday 09:00
Friday 09:00
Saturday 09:00
Sunday 09:00

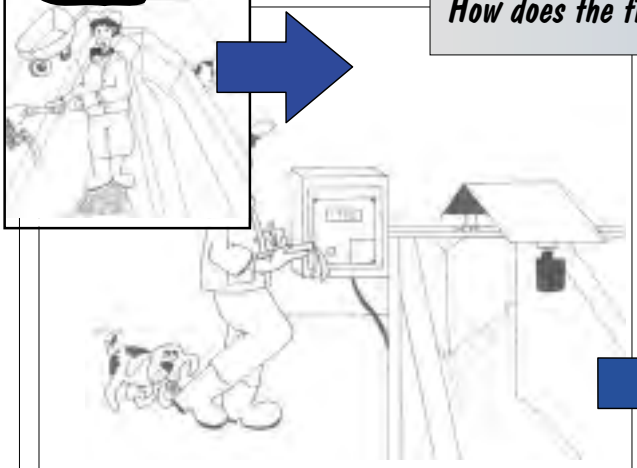
Work procedure

The operator takes flow meter readings every day at the same time

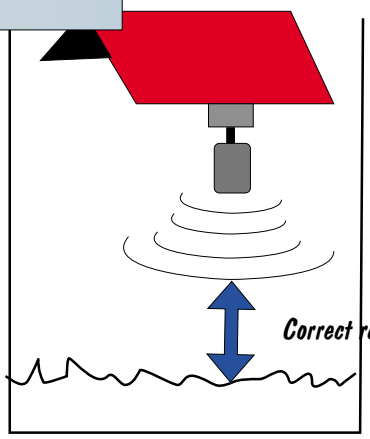


The operator gives these readings to the supervisor for inclusion in the works operating records

Flow Measurement 4

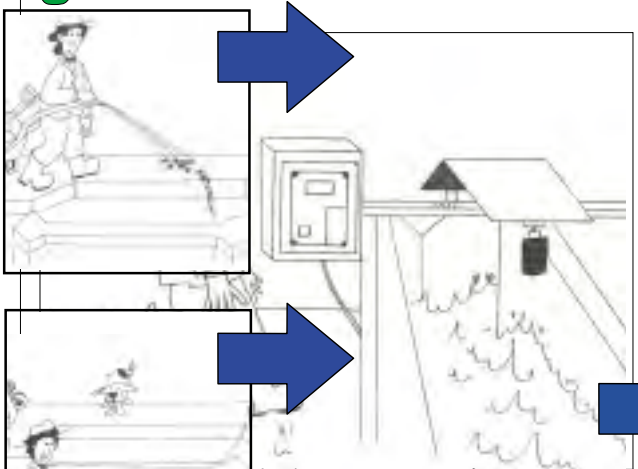


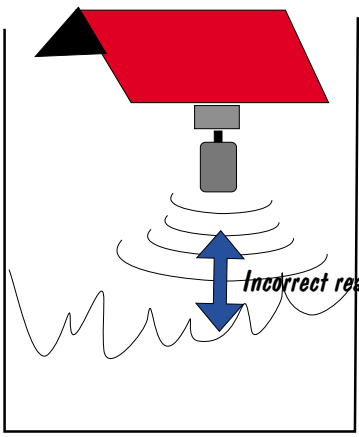
How does the flow sensor work?



The operator maintains the correct work procedures and the correct flow meter readings are recorded (see page 17)

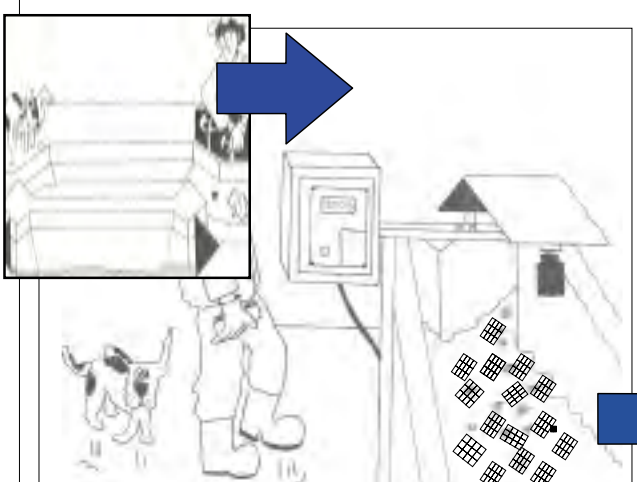
Normal flow

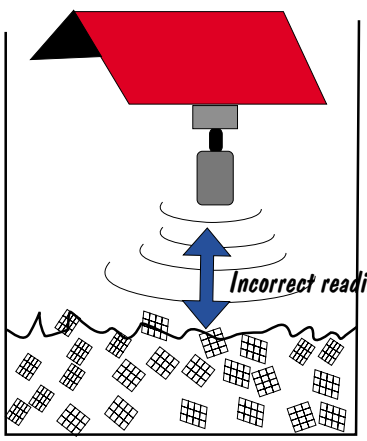




Inadequate grit removal or incorrect work procedure leads to turbulence and incorrect flow meter readings (see page 17 and 18)

Turbulent flow





Inadequate grit removal or incorrect work procedure leads to washed out grit and incorrect flow meter readings (see page 17 and 18)

Washed out grit

Notes .....

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The operator checks on the flow regularly. Turbulence causes incorrect readings

The operator reports any turbulence to the supervisor

Grit that has been washed out or not removed from the grit channels may cause incorrect flow meter readings

The operator reports any washed out grit that causes incorrect readings to the supervisor

Flow Measurement 4

If there is no power supply to the unit, the operator calls the supervisor

If there is no power due to cable damage, the operator calls the supervisor

The operator is responsible for general maintenance around the unit. Grass, weeds and spider webs around the sensor, can cause incorrect readings

Notes .....

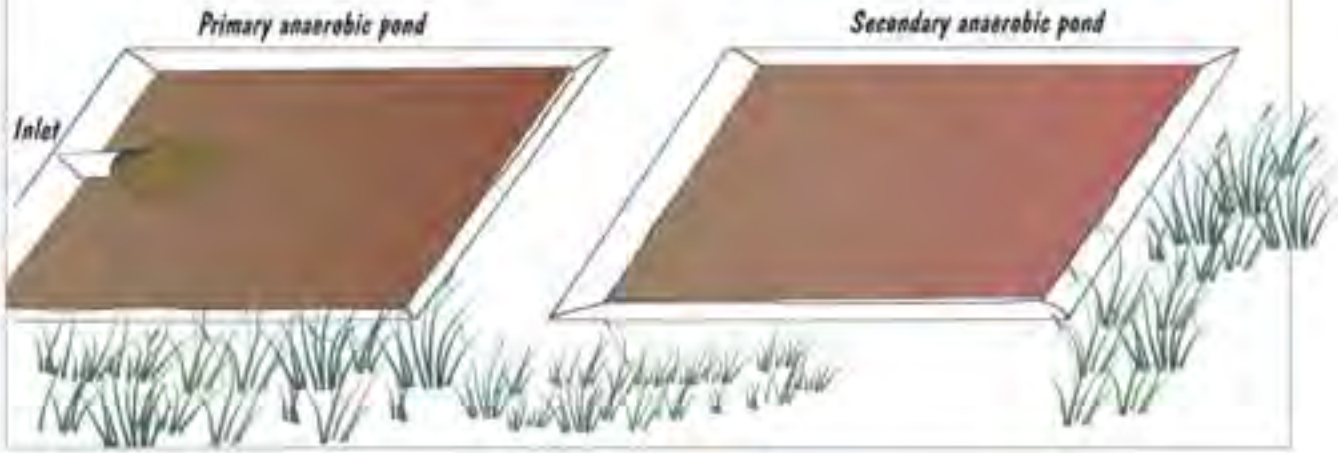
Anaerobic Ponds 5

Amadamo ahlanza amanzi aqolile, angasebenzisi umoya ahlanzekile
Amadanyana acoca umsele ngokusebenzisa umoya
Emadamu ageza emanti ngaphandle kwemoya lohlobile
Matangwana a ho hloekisa metsi, a ho sebedisa moea o o hloekilene
Matangwana a go phepafatsa metsi, ao a dirisang moya o phepa
Ditanka/matangwana a go hlwekisa meetse a go šomiša moya o hlwekileng
Madamu lama ya tirhisaka moya lowo twnga ku tengisa mati
Madamu a no shumisa muya wa kunaho kha u tanzwa madi
Anaërobiese damme

The purpose of the anaerobic ponds

Anaerobic ponds are one of the primary phase separation methods that can be applied to the screened and degritted waste water. Primary phase separation is applied for a set duration to allow a portion of the suspended solids in the waste water to settle out at the bottom of the ponds. The settled material is broken down by anaerobic bacteria. This process is slower than the rate that the organic material will settle out, resulting in the need to desludge the anaerobic ponds from time to time.

Anaerobic ponds



Work procedure

The operator wets the surface regularly to prevent a crust from forming

A crust attracts flies and causes odour problems

The operator removes floating debris from the surface

The operator disposes of the debris together with the screenings removed at the inlet works. It is allowed to drain before disposal in an excavated trench (see page 8)

Notes .....

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Desludging

The operator opens the desludge valve when excessive rising bubbles are observed in the waste water in the ponds

OR

If there are no desludging valves, the pond is decommissioned and the sludge is allowed to dry. The operator can now remove the sludge with a spade and wheelbarrow

OR

The operator can also remove the dried sludge with a front loader, if available

Anaerobic Ponds 5

The operator keeps the embankments and inlet free from vegetation

Notes

Settling Tanks 6

Itanki elahlukanisa amanzi nodaka
Itanki eyahlula amanzi edakeni
Lithanki lelihlukanisa nemanti neludzaka
Tanka ya ho arohanya metsi le seretse
Tanka e e arolang metsi le seretse
Ditanka tse di arolago meetse le leraga
Mathangi lama ya hambanisaka mati na ridaka
Thannga ya u fhambanyisa madi na matope
Besinktenks

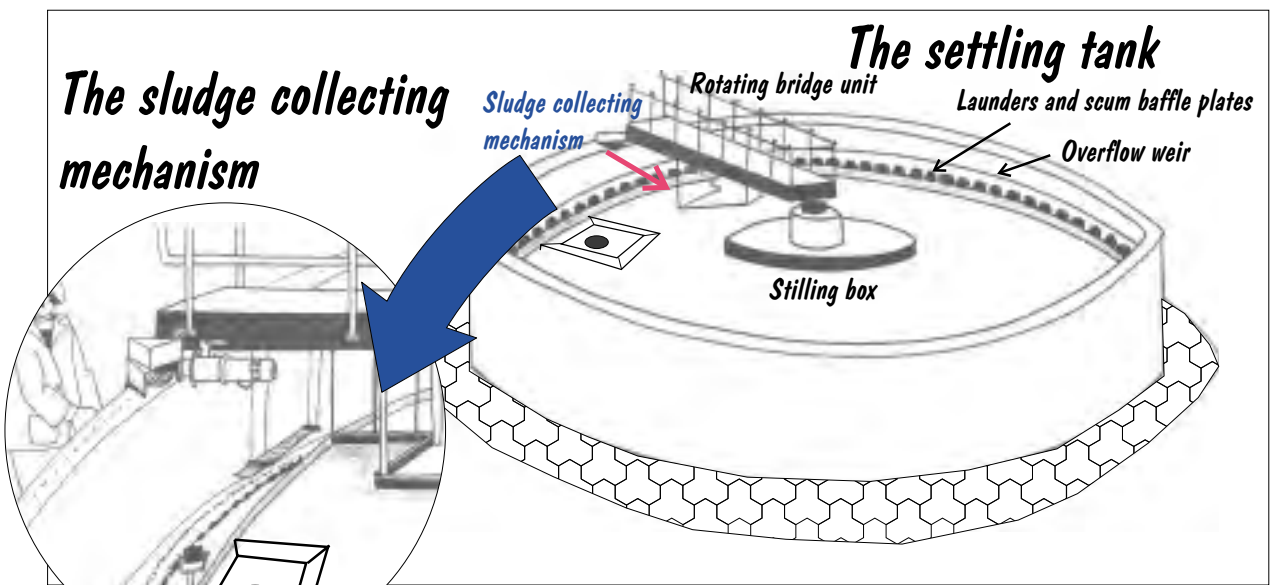
The purpose of settling tanks

Settling tanks are used to separate the solid particles from the water. The specially designed tanks let the water flow slowly so that the solid particles have time to sink to the bottom of the tank. The particles collect at the bottom to form sludge. The water, which is now clearer, leaves from the top of the tank. From time to time the sludge is removed from the bottom of the tank for further treatment.

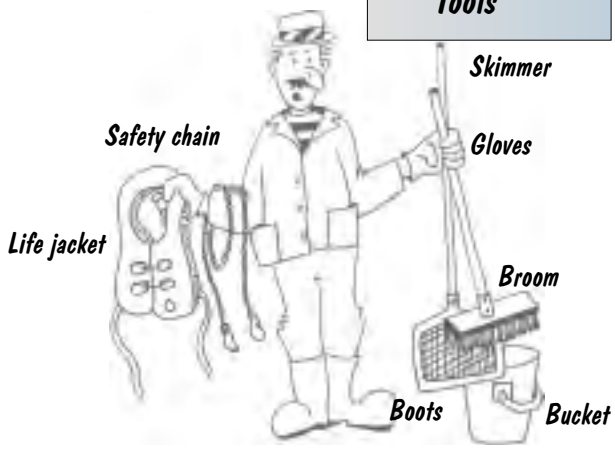
"Primary settling" or the "first" settling separates most of the solid waste - organic matter such as faeces and paper - from the water. The sludge from this tank is called primary sludge or raw sludge.

"Secondary settling" takes place after the water from the primary settling tank has been treated biologically. For example, the effluent leaving the biological filters (section 7, page 35) contains humus that is removed by settling. Humus is organic matter that has left the fixed media in the filter. The humus is mixed with the raw sludge and then treated.

Settling is also used as part of the activated sludge process. Sludge, which contains active bacteria, is separated from the water and returned to a reactor to maintain a constant concentration.

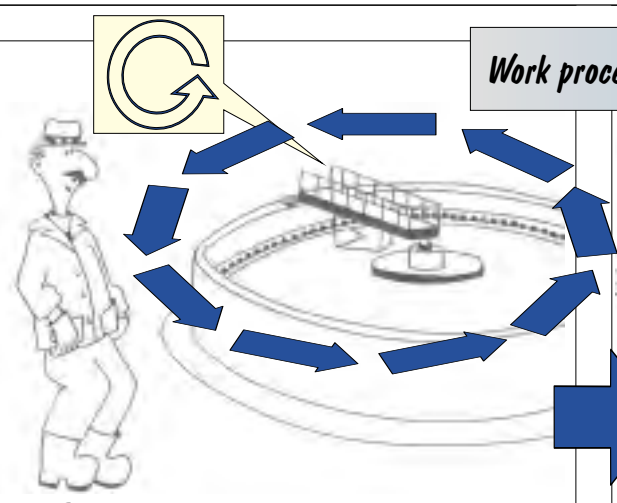


Tools

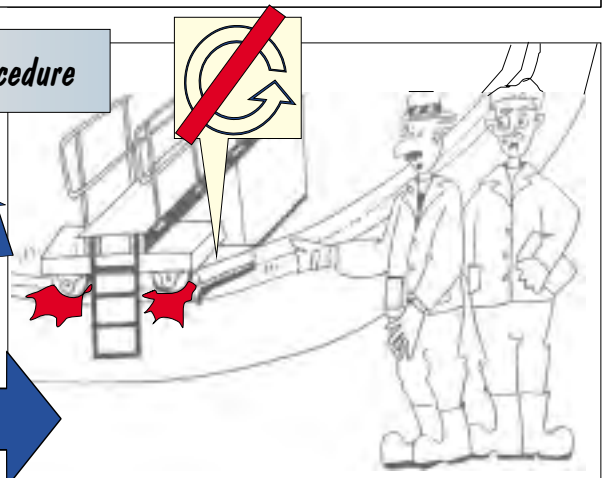


The operator working at the settling tank has to take extra safety precautions, eg. safety chains and life jackets

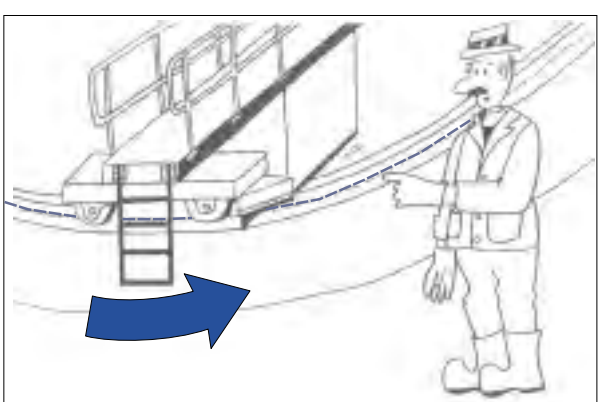
Work procedure



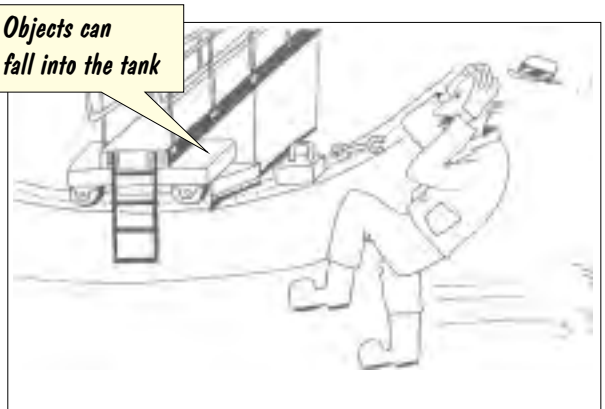
The operator checks that the bridge unit is rotating



The operator calls the supervisor if the bridge unit fails to rotate

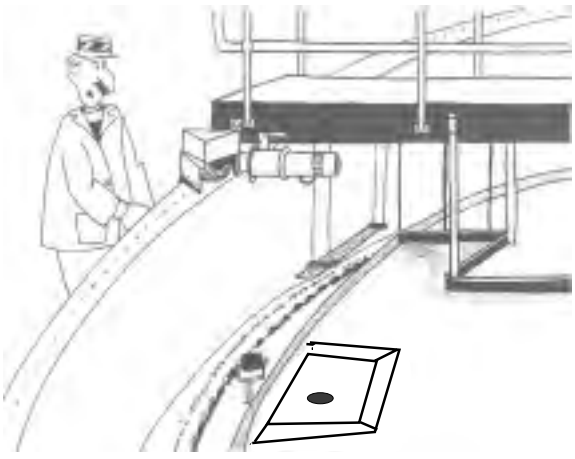


The operator checks to see that the wheel alignment is in the centre of the running surface. The operator calls the supervisor when there are any problems



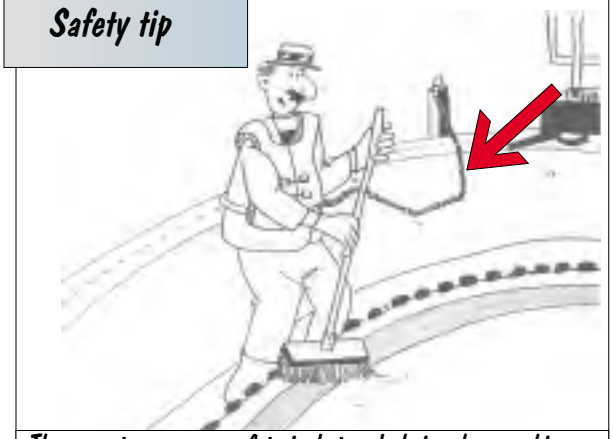
The operator must be sure not to leave anything on the side of the tank. It can fall in and cause damage to the tanks

Settling Tanks 6

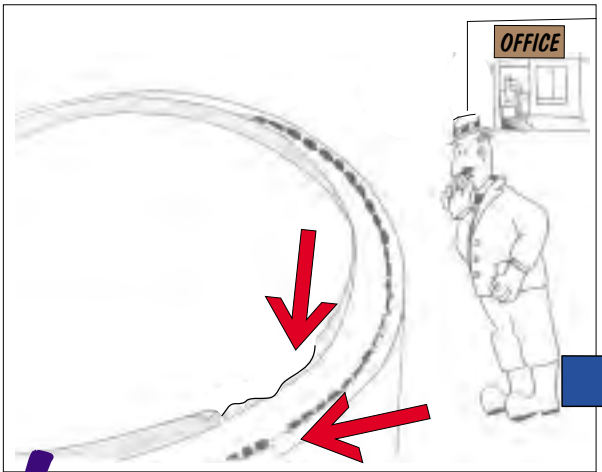


The operator makes sure that the surface skimming mechanism is in working order

Safety tip



The operator wears a safety jacket and chain when working in the tank. He brushes the effluent launders, scum baffle plates and overflow weir plates regularly to remove organic solids accumulation



The operator checks regularly that there are no loose plates in the settling tank

The operator reports any missing, damaged or loose plates to the supervisor

The operator skims floating debris from the surface of the tank

Notes .....

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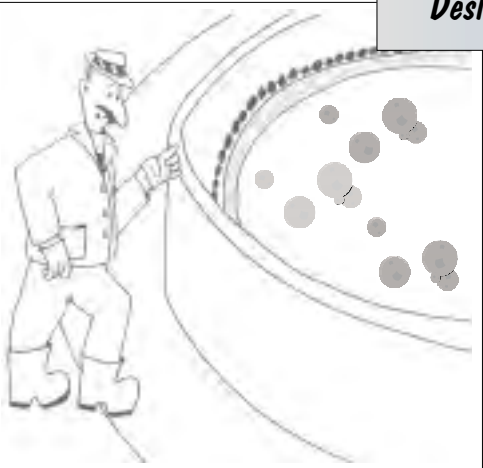
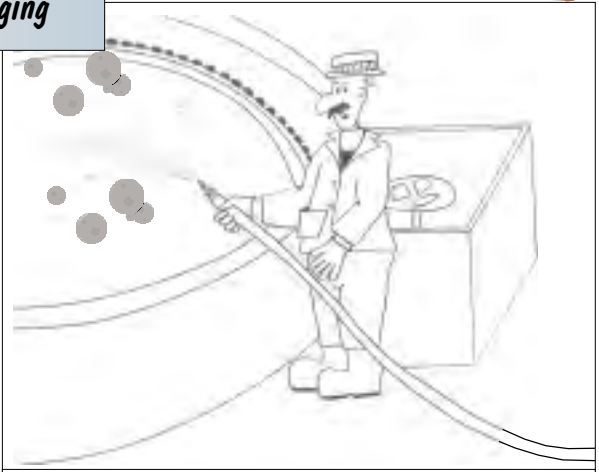
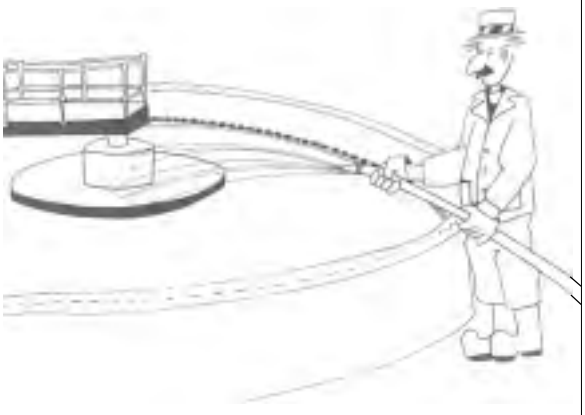
Desludging



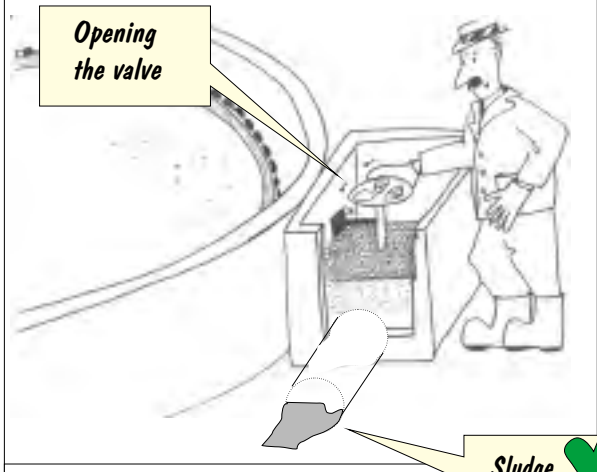
The operator checks to see if there are bubbles on the surface of the tanks. This is an indication that he should withdraw sludge (desludge)



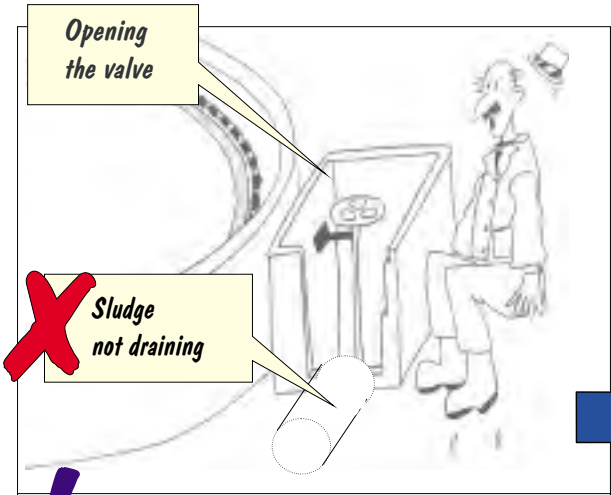
The operator hoses the surface before desludging to settle floating sludge particles



The operator hoses the stilling box areas to reduce scum accumulation



The operator opens the desludge valve slowly



The operator makes sure that there is outflow from the desludge pipe after opening the desludge valve

The operator calls the supervisor if there is no flow from the desludge pipe after opening the desludge valve

The operator disposes of the debris at the inlet with the screening material. It is allowed to drain, before disposal in an excavated trench (see page 8)

The operator is responsible for the upkeep and maintenance around the settling tank

Notes .....

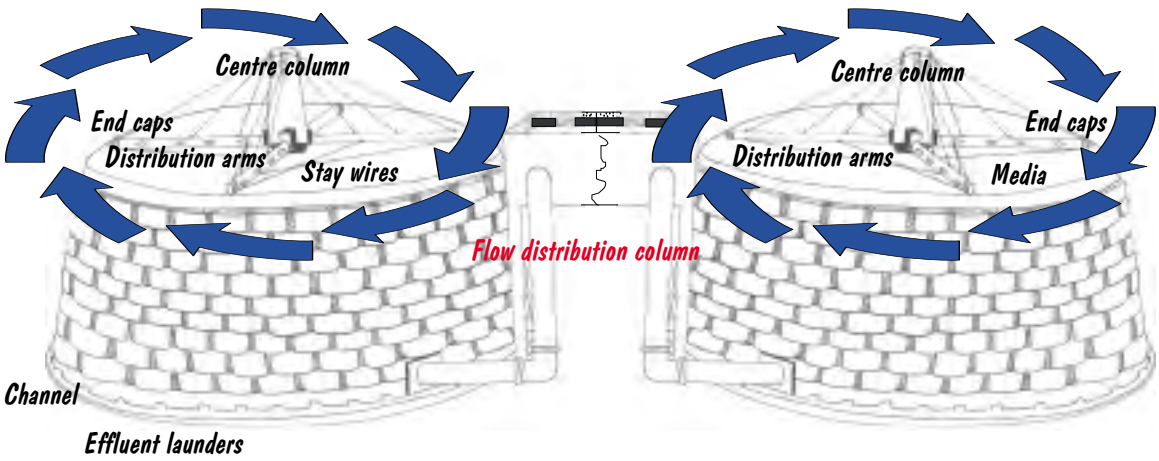
Biological Filtration 7

Indawo lapho amagciwane ehlelikhona
Indawo enentsholongwane e nqeda ecoceni kwa-manzi
Indzawo lenemagciwane
Tulo e tletseng dikokoanahloko tse thusang ho hloekisa metsi a dihoerehoere
Karolo ya go hlwekisa maswe fao megare e funanwago tulo e lengwe
Karolo fao ditwatse di lego felo gotee
Maendlelo/ndhawu laha switsongwa-tsongwana switshunguriwaka swiri ndhawu yinwe
Fhethu ho dalaho zwitshili
Biologiese filtrasie

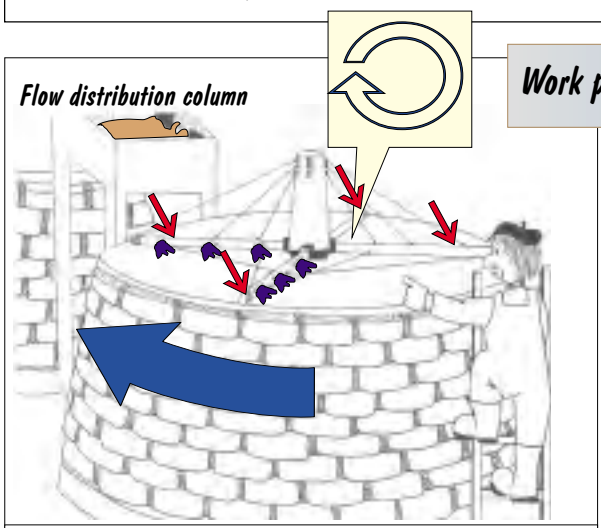
The purpose of the biological filtration unit

A biological filtration process entails the oxidation of carbon and ammonia nitrogen fractions in the waste water. This is achieved by passing the waste water over or through fixed surface media to which bacteria attach themselves. The presence of adequate available oxygen is necessary to ensure ammonia oxidation to nitrates.

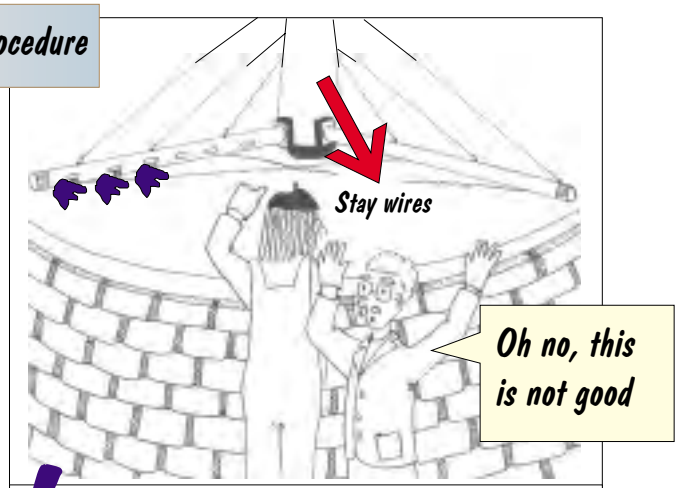
Biological filtration unit



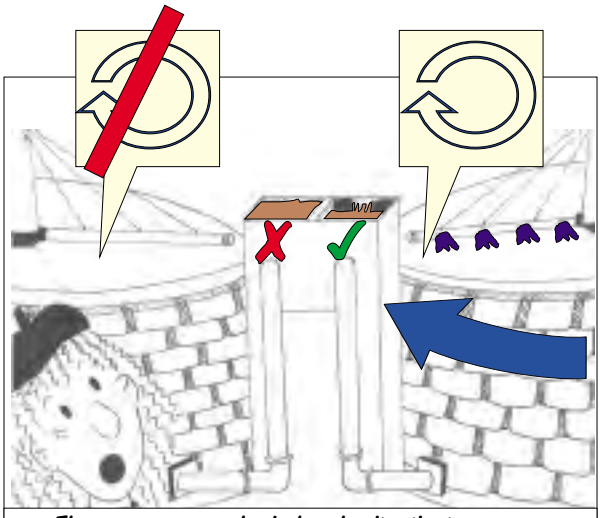
Work procedure



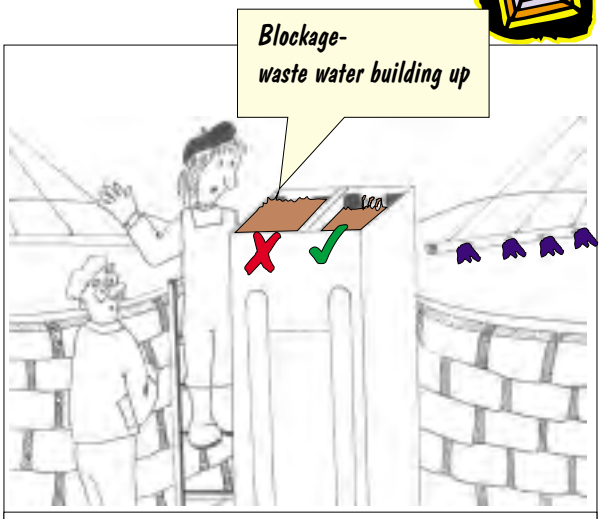
The operator checks that the distribution arms rotate evenly and that all the end caps are fitted



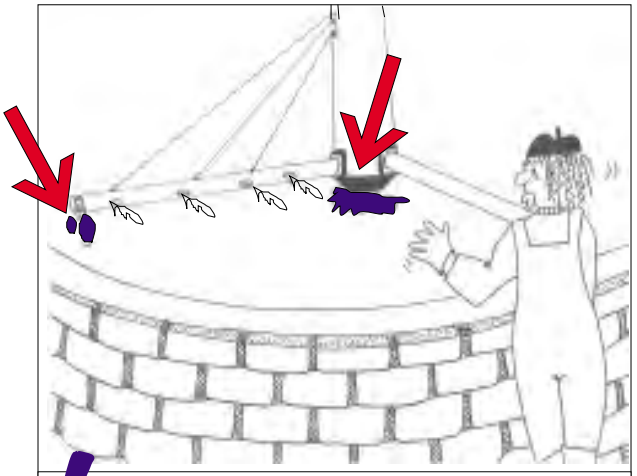
The operator makes sure that all the stay wires are in place. If the wires are not in place, it will cause uneven flow. The operator reports this to the supervisor



The operator must check that the distribution arms of both units rotate similarly. If the rotation speed is not equal, there may be a blockage in the flow distribution column



The operator and the supervisor inspect the flow distribution column to see if there is a blockage



The operator checks to see if there are any leaks. Leaks are reported to the supervisor

Notes .....

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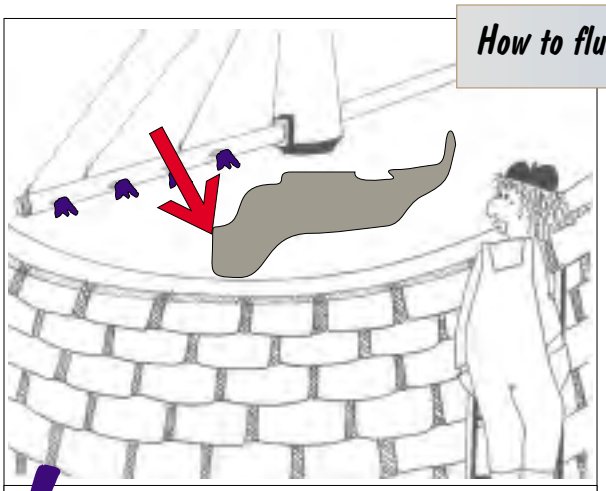
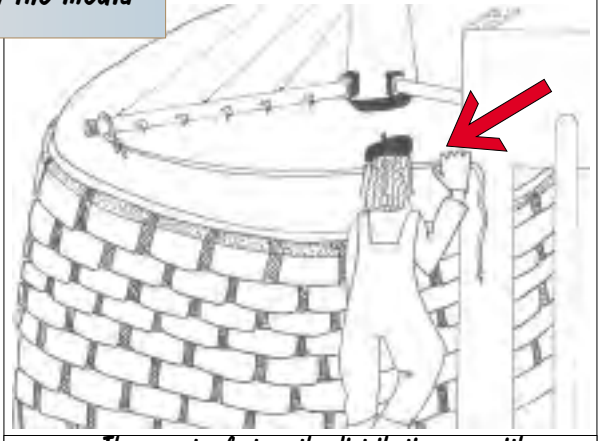
How to flush the media

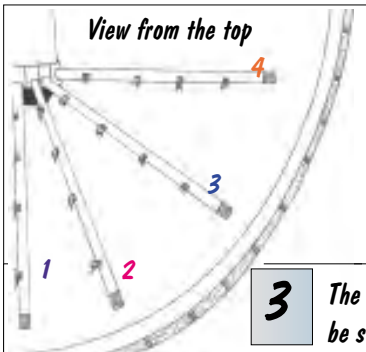


The operator checks for ponding on the surface of the media which he then reports to the supervisor. The media should be flushed



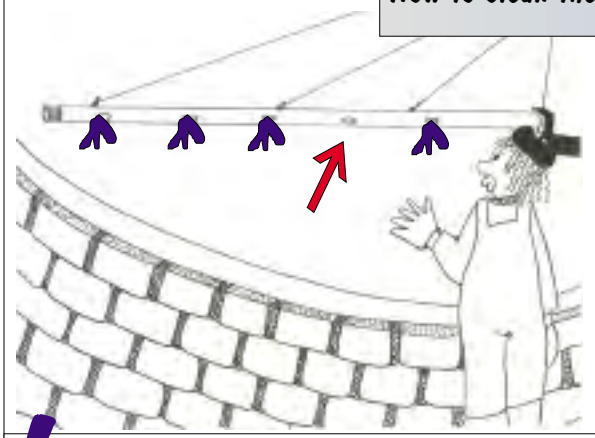
1 The operator fastens the distribution arm with a rope to a secure location. The arm should be stationary during the flushing

2 The operator loosens the media as much as possible with a fork or crowbar

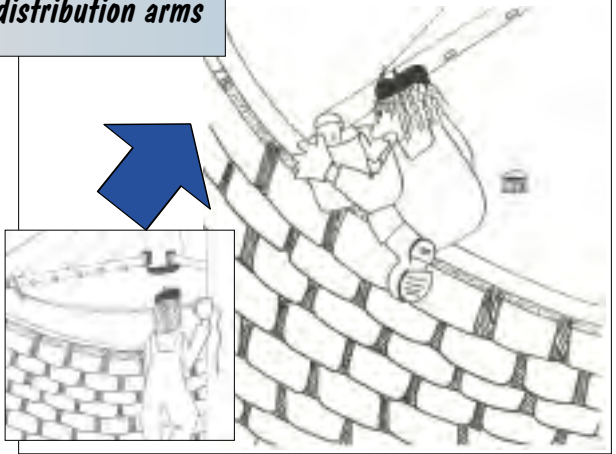


3 The distribution arm should be stationary while receiving flow for 5 min in a specific area (1) to flush the media. He then re-positions(2) the arm and flushes the media for another 5 min. On completion of a quarter of the circle with one distribution arm, the media should be adequately flushed to allow the free flow of waste water through the media bed

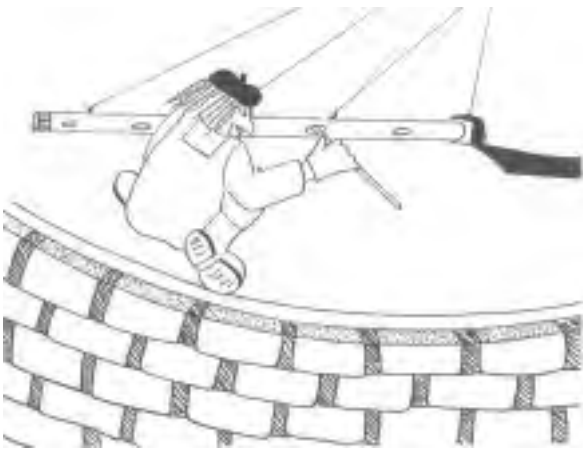
How to clean the distribution arms



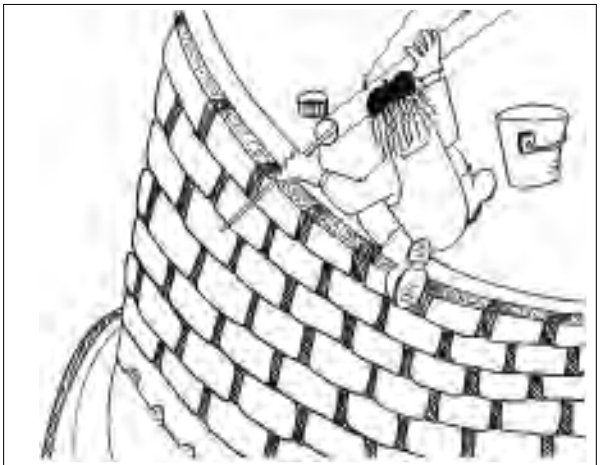
The operator checks that all the ports in the distribution arms are discharging waste water freely



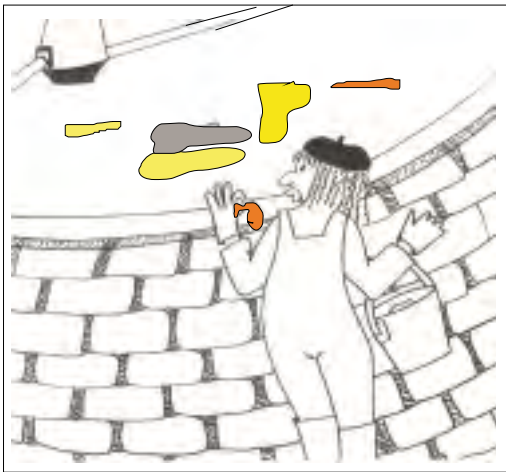
The operator stops the rotation of the distribution arms and removes the end caps so that the solids can be washed out of the distribution arm



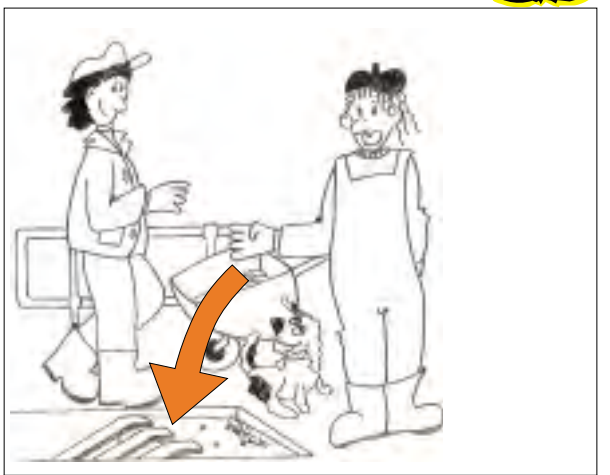
The operator rods the port holes to remove trapped solids



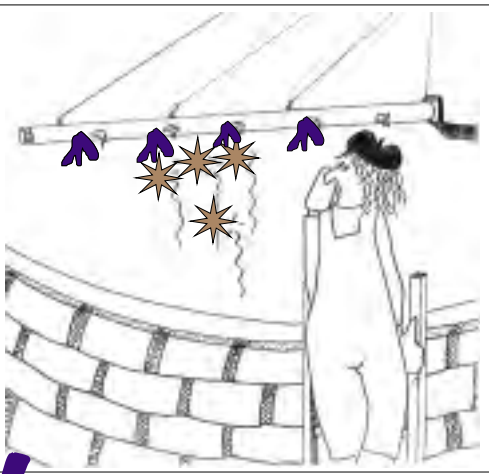
The operator also rods the distribution arm to remove any accumulation



The operator removes solids/debris from the media



The operator disposes of the debris at the inlet with the screenable material. It is allowed to drain and then disposed of in an excavated trench (see page 8)



The operator checks to see if there are any unpleasant odours coming from the media and reports this to the supervisor

Notes .....

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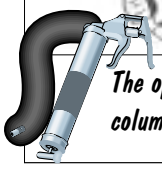


The operator and supervisor lubricate the centre column at all the designated grease points

The operator cleans and brushes the effluent launders surrounding the unit

The operator is responsible for removing any vegetative growth around the unit

Notes.....

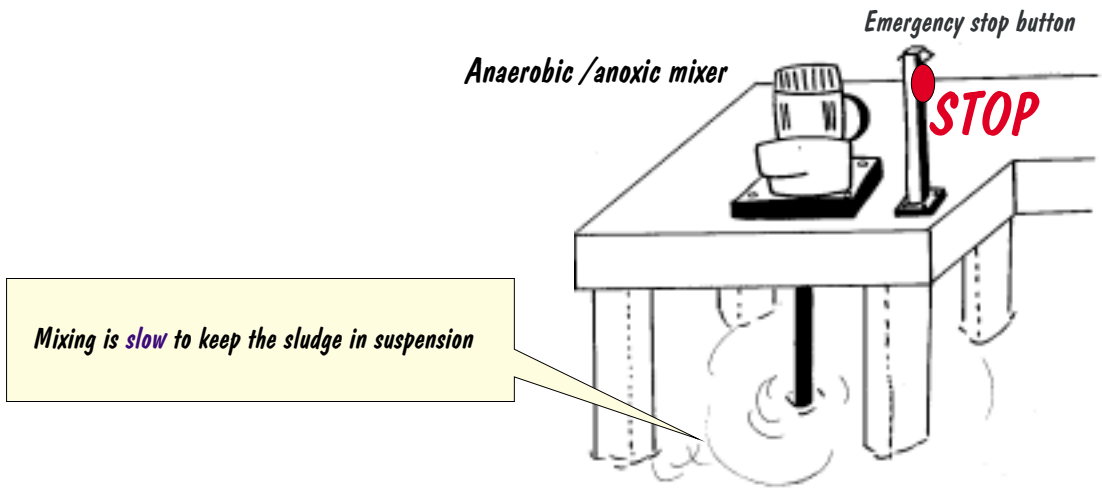
Activated Sludge Treatment 8

Indawo lapha amanzi a colile ahlanganiswa namaqiwane
Indlela yokucoca indle
Indawo lapho emagciwane ahlanganiswa khona nemanti langcolile
Tula fao dikokoanahloko di kopantshoang le metsi a dihoerehoere
Karola ya hlwekiso fao megare e kopantshwang le metsi a maswe
Karolo ya hlwekišo fao ditwatše di hlakantshwago le meetse a ditshila
Indhawu laha switsongwa-tsongwana swi hlanganisiwaka na mati
lama ya nga tangangiki
Fhethu hu no tanganyiswa madi a tshika na zwitshili
Geaktiveerde slykproses

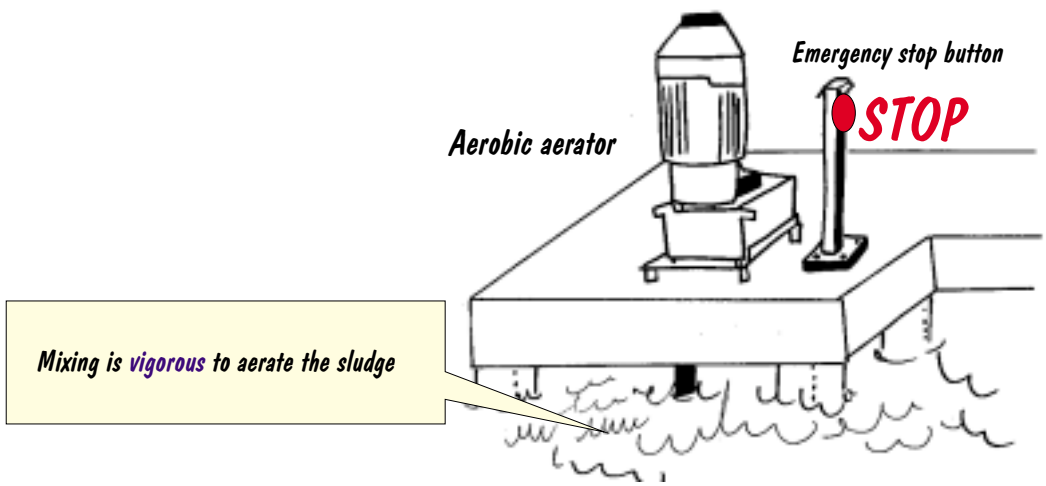
The purpose of the activated sludge unit

An activated sludge process refers to the oxidation of the carbon, nitrogen and phosphorous concentrations in the waste water, depending on the process configuration. The incoming waste water is mixed with sludge that is kept in suspension in a reactor. Oxygen is introduced into the process through surface mounted aerators or by diffused air.

The anaerobic/anoxic reactor - the first part of the activated sludge unit

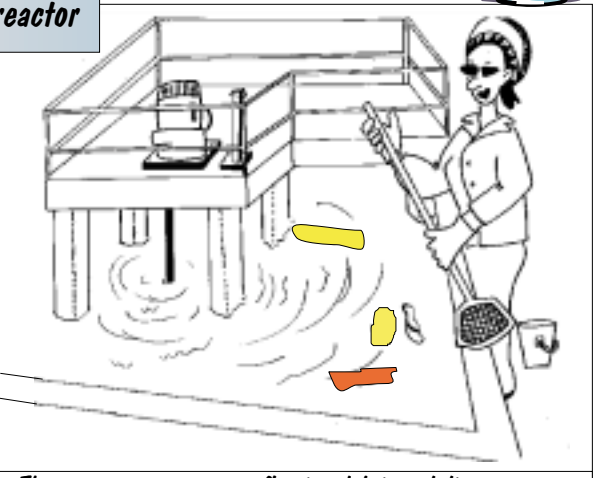


The aerobic reactor - the second part of the activated sludge unit

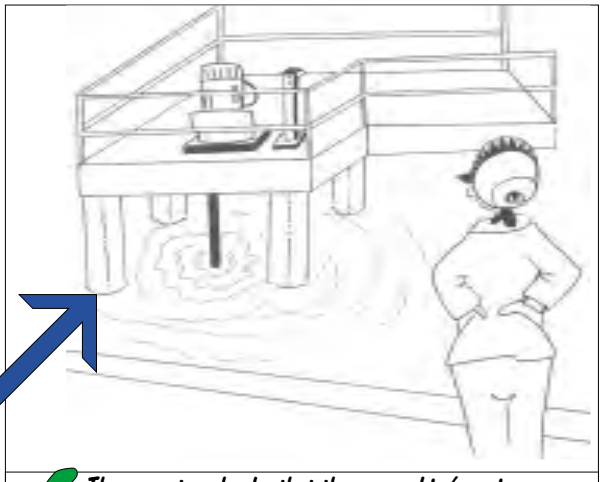


Anaerobic reactor

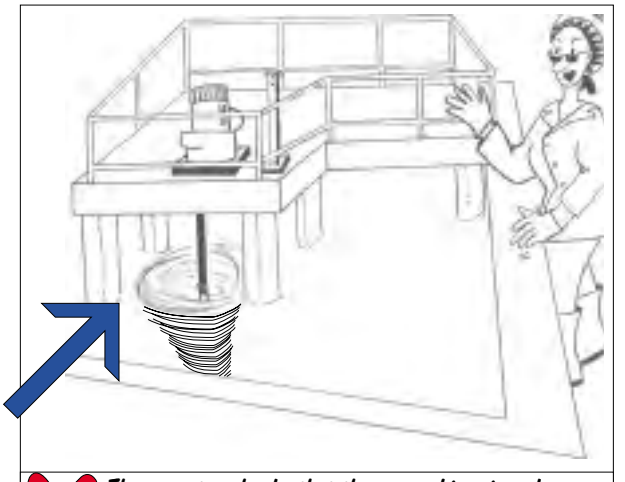
The operator checks and removes any restrictions from the inlet and outlet weirs



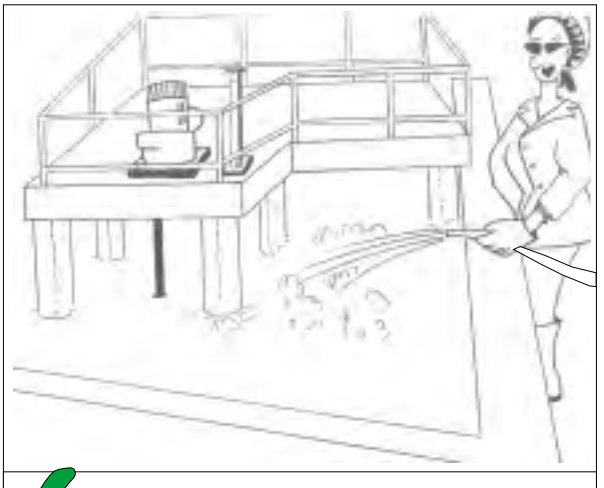
The operator removes any floating debris and disposes of the debris with the screenable material at the inlet (see page 8)



The operator checks that the anaerobic/anoxic reactor mixers are in continuous operation and reports any problems to the supervisor



The operator checks that the anaerobic mixer does not form a vortex in the sludge during the mixing process. Report to the supervisor

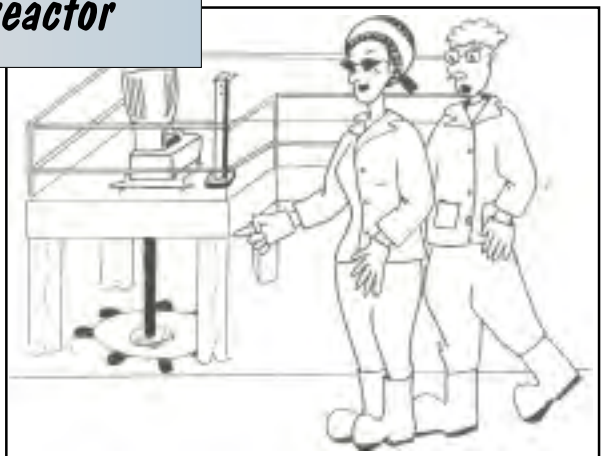


The operator hoses down any scum formation

Scum formations will generate unpleasant odours and encourage fly breeding

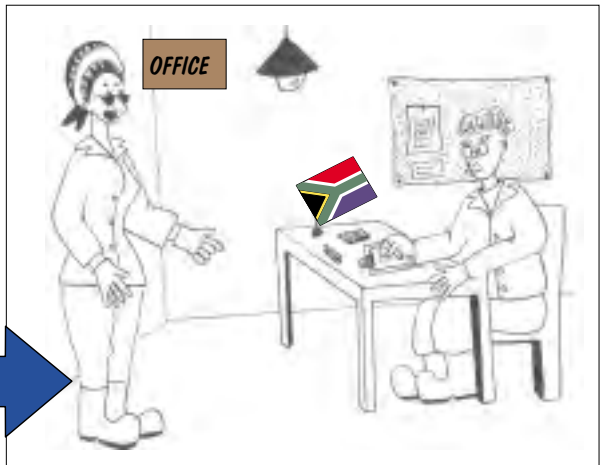
Aerobic reactor

The operator visually checks that the aerobic aerators are functioning properly and that the sludge is stirred effectively



The operator reports malfunctioning aerobic aerators to the supervisor

Malfunctioning aerators could cause excessive scum formation



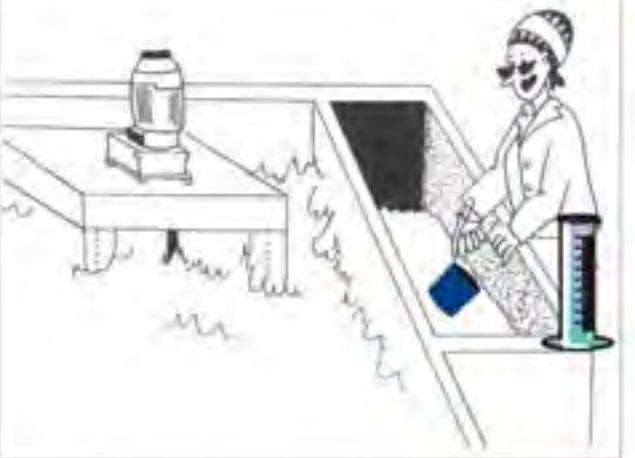
The operator reports excessive scum production to the supervisor

The operator reports all unusual noises and oil leaks from the motors and gearboxes to the supervisor

Aerobic reactor

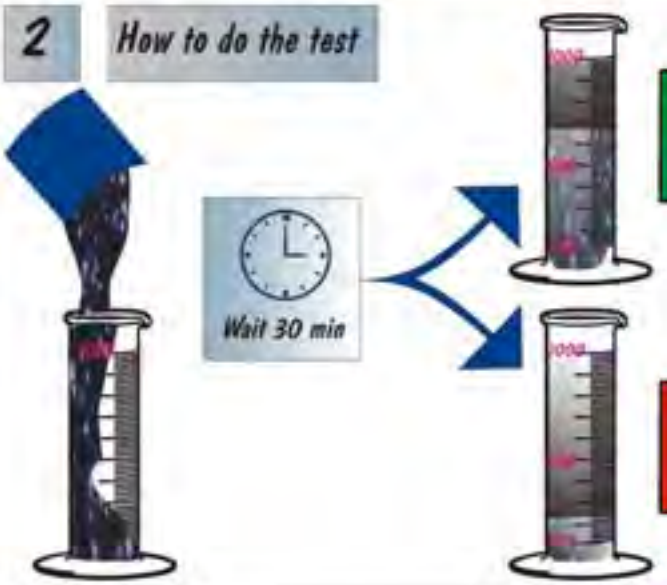
The sludge test

The sludge test is done to determine if sludge should be withdrawn from the process or allowed to accumulate in the process. The test should not be conducted in direct sunlight



1 The operator takes a sample of the overflow from the aerobic reactor for the sludge test

2 How to do the test



3 The operator discusses the results with the supervisor. The supervisor decides whether to waste or accumulate the sludge

Notes .....

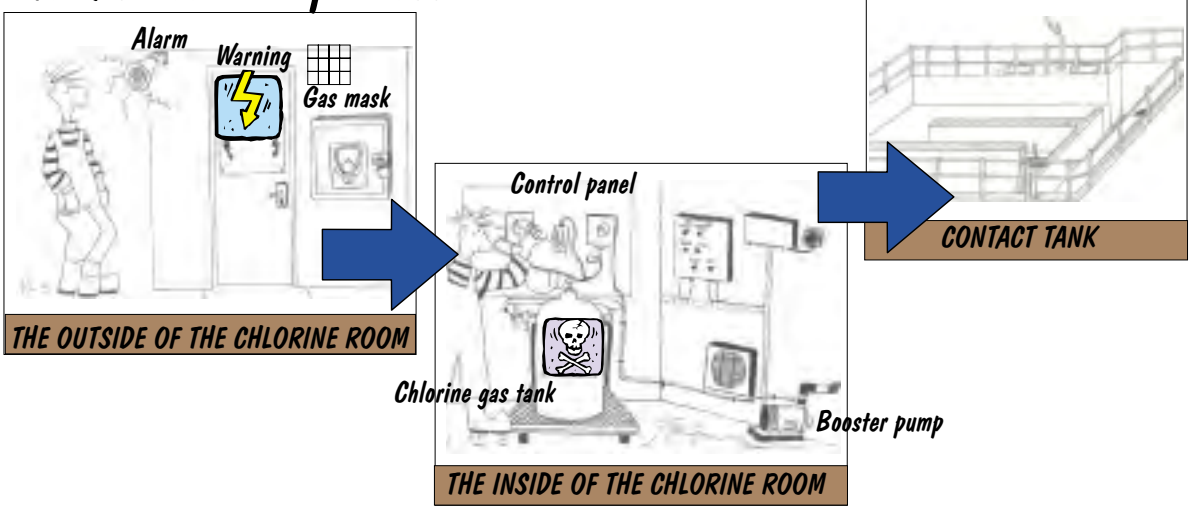
Disinfection 9

Ukubulala amagciwane
Ukubulala intsholongwane
Kukubulala emagciwane
Polao ea peo tsa mafu
Polao ya megare
Polao ya ditwatse
Ku dlayiwa ka switsongwa-tsongwana
U vhulaya zwitshili
Ontsmetting

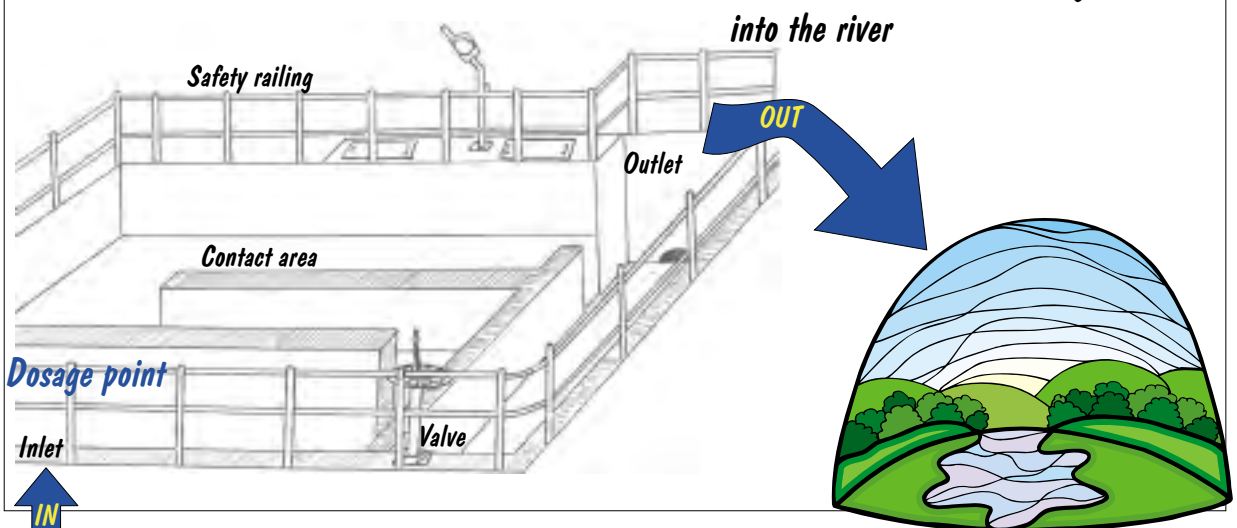
The purpose of disinfection

So far, the treated effluent from the process, usually the overflow from the secondary separation phase, still contains pathogenic (harmful) bacteria. To destroy the pathogenic bacteria, the effluent needs to be disinfected. Disinfection is usually done in the form of an applied chlorine gas dosage. Other forms of disinfection include the application of calcium hypochlorite (HTH), ozone and ultraviolet radiation. Chlorine gas is the most common application and is shown below.

The disinfection process



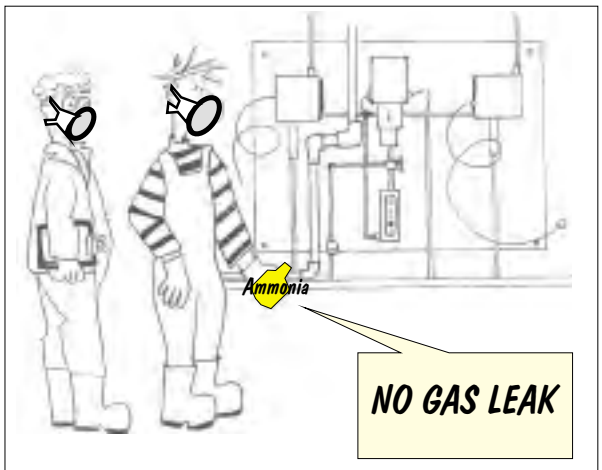
The chlorine contact tank



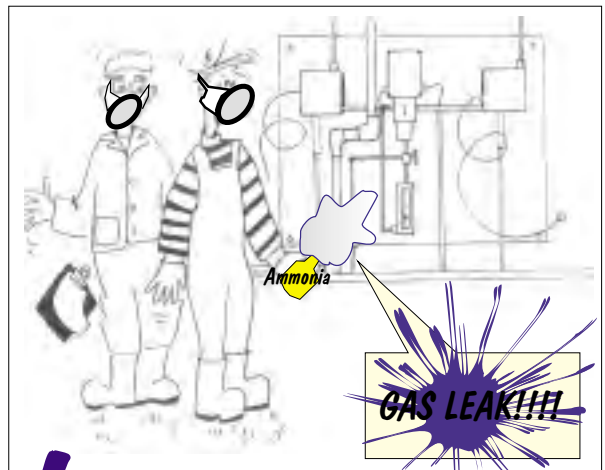
Disinfection 9

The operator notices the gas leak alarm is sounding

The operator reports the emergency to the supervisor



The supervisor uses ammonia vapour from an open bottle to detect possible gas leaks



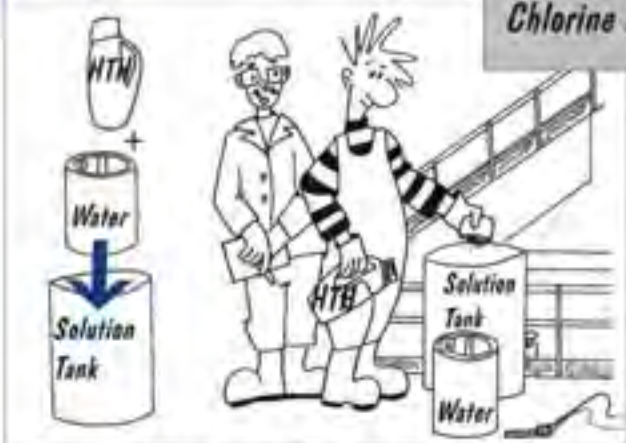
There is a gas leak if a little vapour cloud is noticed at any point

Before entering the room, the operator and supervisor must put on masks. The supervisor is responsible for making any adjustments. Everyone entering the room should wear a mask

The operator makes sure that the booster pump is operational and that there are no leaks or irregular noises

The operator reports all irregularities to the supervisor

Chlorine contact tank



If there is no chlorine gas available, the operator mixes under the supervision of the supervisor, the correct amounts of granular chlorine and water in the solution tank. This is then dosed in the chlorine contact tank

The operator can also use chlorine tablets for the disinfection process

The operator removes any floating debris from the contact tank and disposes of the debris at the inlet with the screenable material (see page 8)

Notes .....

The operator judges the amount of sludge accumulation at the bottom of the tank by using a long stick

To clean the chlorine contact tank, the operator opens the bypass valve and isolates the chlorine contact tank, so that he can remove the sludge from the contact tank

The operator brushes the sides of the chlorine contact tank to remove any built-up solids or algae growth

The operator is responsible for the general upkeep around the chlorine contact tank

Notes .....

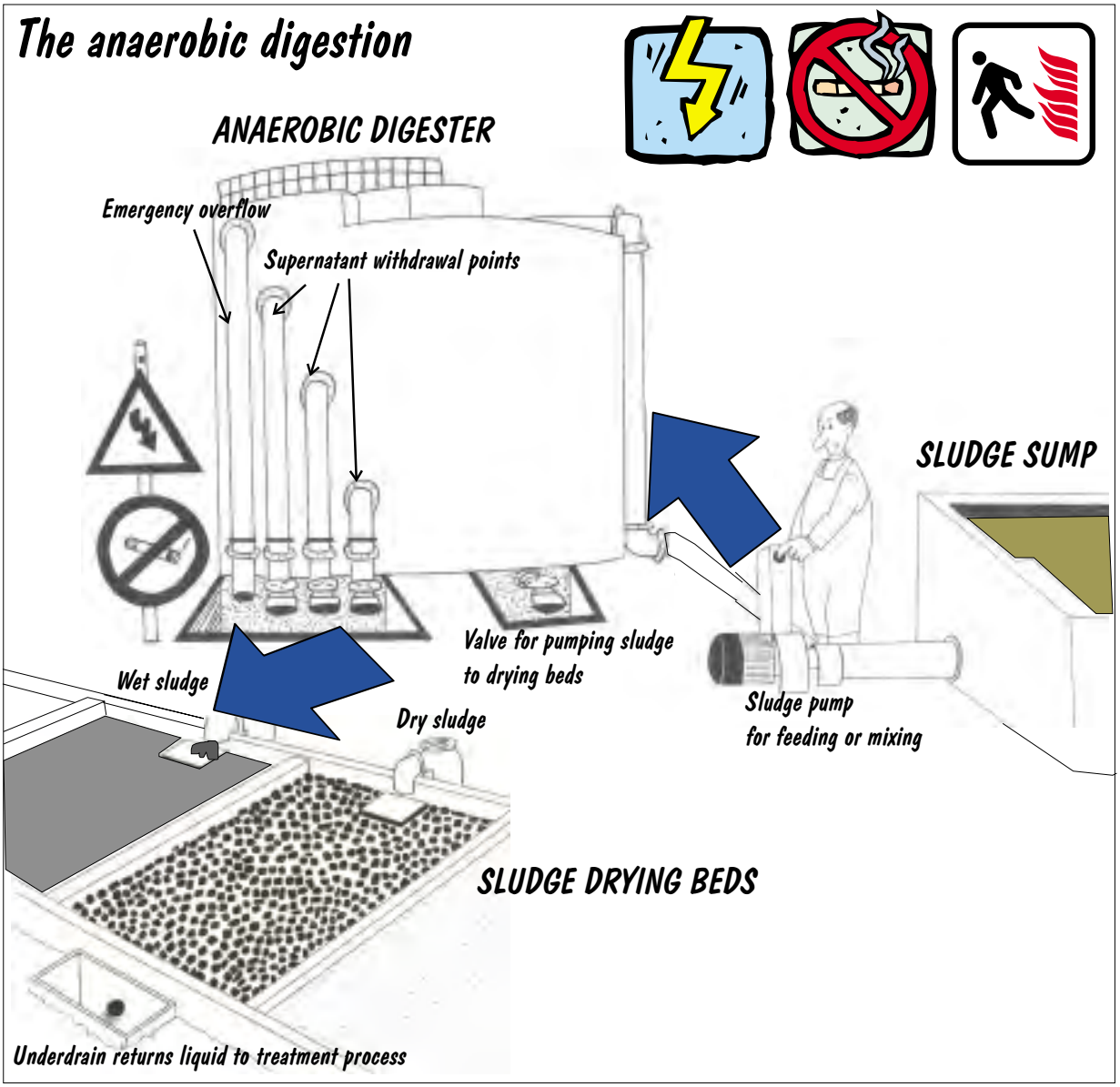
Anaerobic Sludge Digestion 10

Inqubekho yoku phula udaka ngaphandle kwe moya oqoqekile
Indlela yokwahlukanisa udaka kwindayo engena moya ococekileyo
Indlela yekuphula ludzaka ngaphandle kwemoya lohlantekile
Ketsahalo ea ho fokotsa seretse ntle le tshebediso ya moea o o hloekileng
Tiro ya go thubaganya seretse kwa ntle ga moya o phepa
Phetogo ya go fokotša leraga ntle ga moya o hlwekilego
Maendlelo ya ku hunguta/ku faya ndzhope ku ngari na ku nghenelela ka moya lowo tenga
Mushumo wo u fhungudza matope hu si na u shumisa muya wo kunaho
Anäerobiese slykvertering

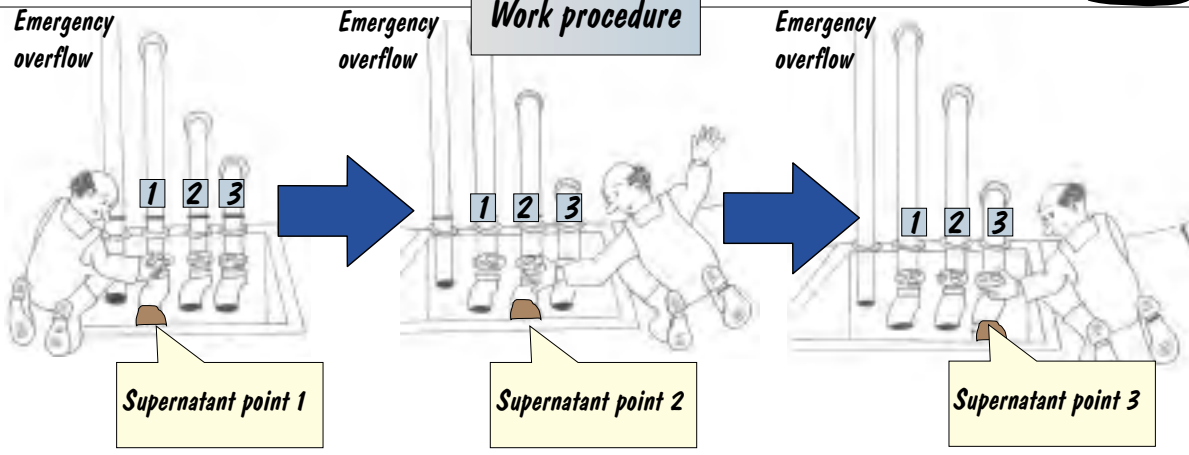
The purpose of the anaerobic sludge digestion

The anaerobic digestion of sludge is a tertiary treatment stage that stabilises surplus solids - the sludge that is generated through the sewage treatment process. The surplus sludge is retained in anaerobic digesters for a certain time period during which the sludge particles are anaerobically digested.

The anaerobic digestion

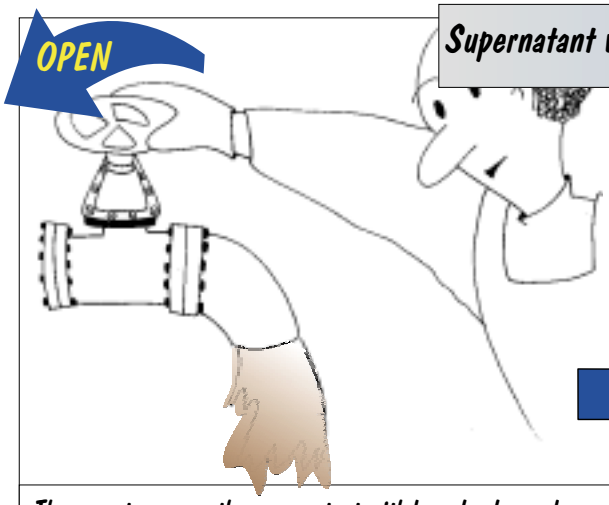


Work procedure

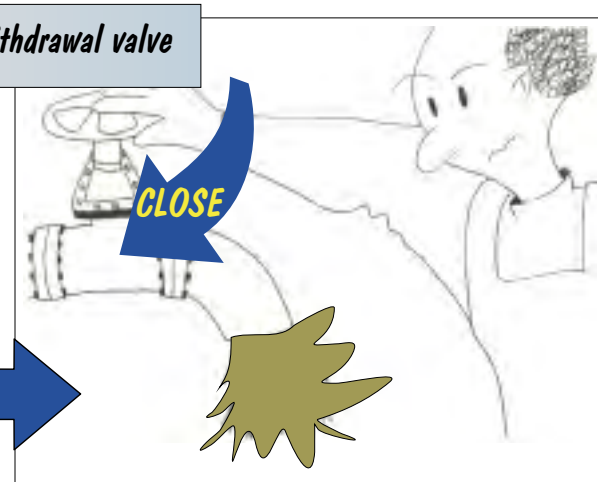


The operator checks for supernatant at all the supernatant withdrawal points

Supernatant withdrawal valve

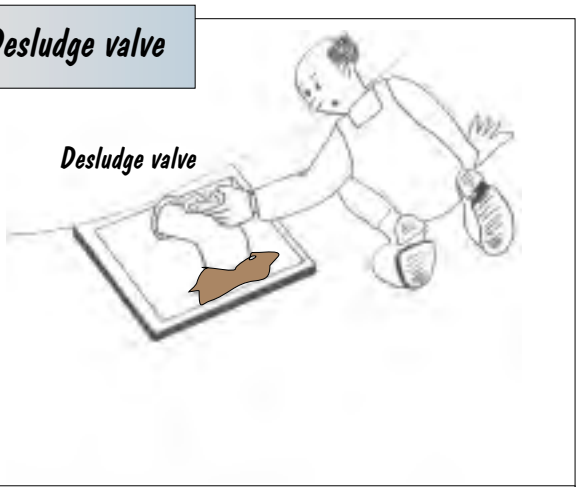


The operator opens the supernatant withdrawal valve and keeps it open while there is a flow of clear liquid

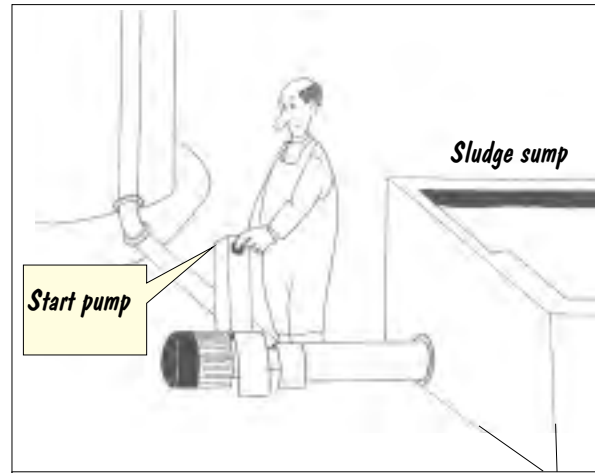


The operator closes the supernatant withdrawal valve when the discharging liquid is not clear

Desludge valve



The operator opens the desludge valve to waste sludge to the sludge drying beds when required. The operator consults with the supervisor before wasting sludge



The operator mixes the sludge daily by operating the mixing mechanism installed on site and pumps sludge from the sludge sump whenever there is room in the digester

SAFETY TIP The operator should not smoke near the anaerobic sludge digesters

Flammable methane gas is produced in the process. Smoking near the digesters may cause explosions

The operator is responsible for the general upkeep around the digester

Notes .....

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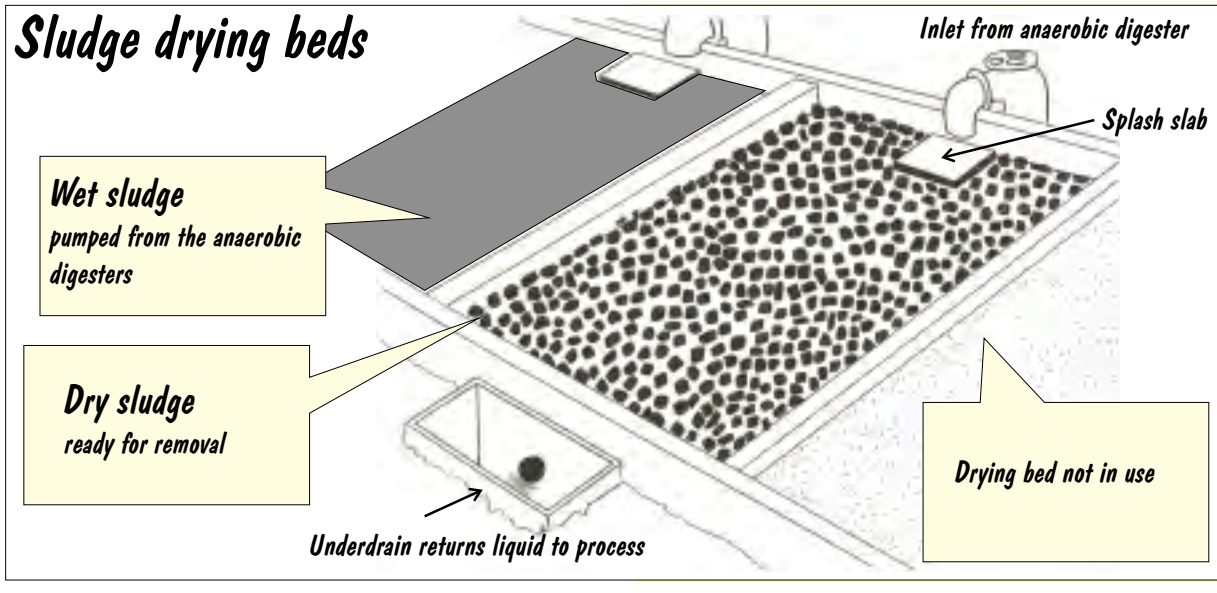
Sludge Drying Beds 11

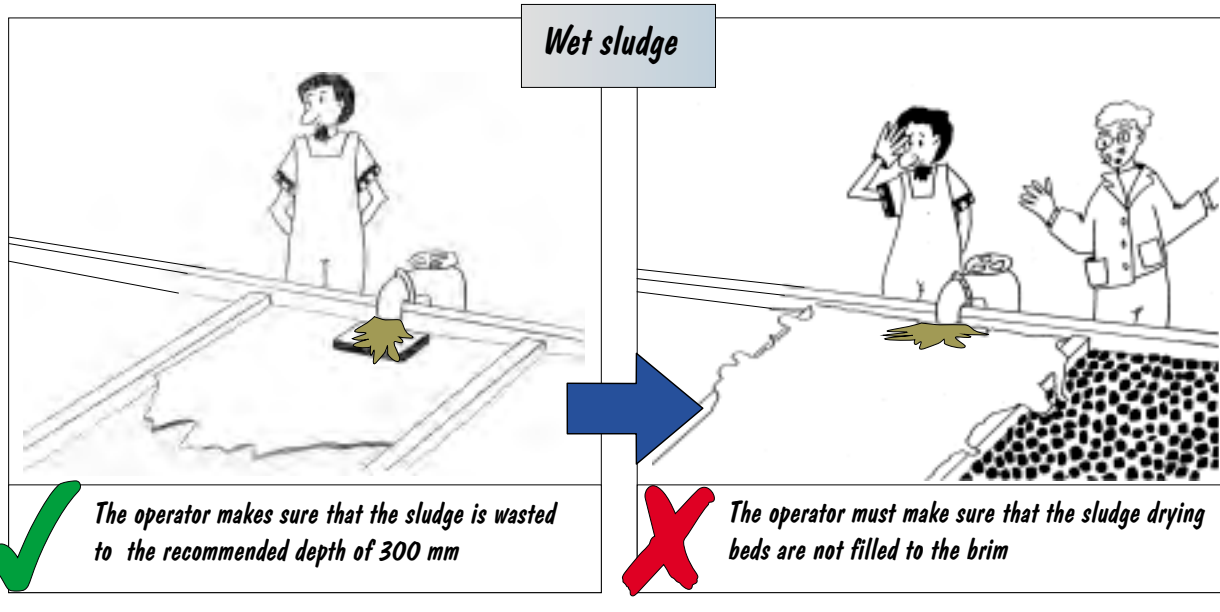
Indawo lapho komiswa khona udaka
Indawu yokomisa udaka
Indzawo lapho kumiswa khona ludzaka
Matamo a o omisa seretse
Tula ya go omisa seretse
Tulo tsa so omisa leraga
Ndhawu laha ku omisiwaka ndzhope
Fhethu ha u omisa matope
Slykdroogbeddings

The purpose of the sludge drying beds

Sludge drying beds are provided to allow surplus sludge that is withdrawn from the process to dry for easier handling. Sludge drying relies on an underground drainage system as well as sunshine. Liquid from the underdrains should be returned to the sewage treatment process for further treatment.

Sludge drying beds





The operator checks that splash slabs are in place to ensure that the underdrain filter media is not disturbed

The operator sprinkles lime on the wet sludge to discourage flies

Flow from the underdrainage system

The operator checks that the media is filtering clear liquid, by inspecting the flow from the underdrainage system

The operator reports to the supervisor if the flow from the underdrainage system is not clear

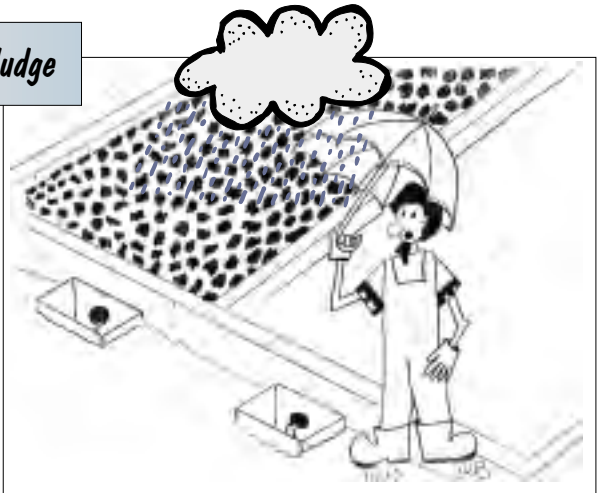
The operator reports to the supervisor if there is no flow from the underdrainage system from a wet sludge drying bed

Notes .....

Sludge Drying Beds 11

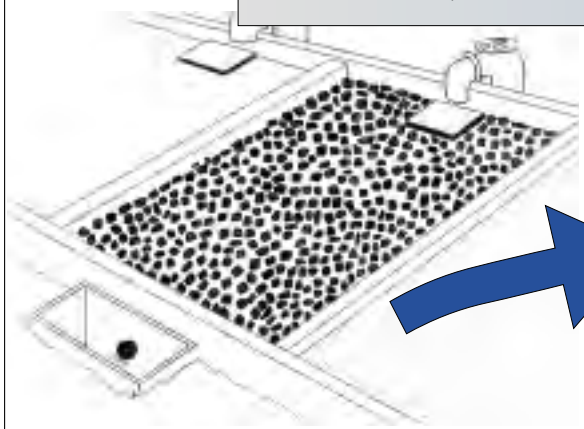
Dried sludge

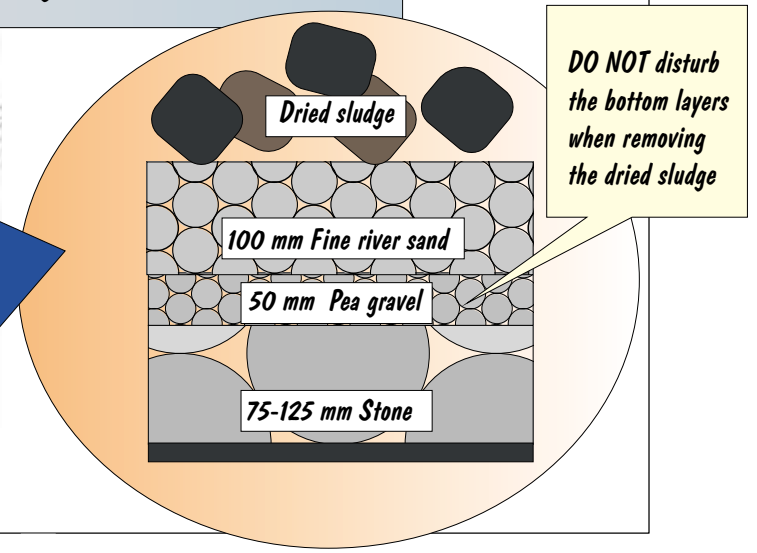
The operator should remove the dried sludge from the drying beds to make space for wasting sludge from the anaerobic digester

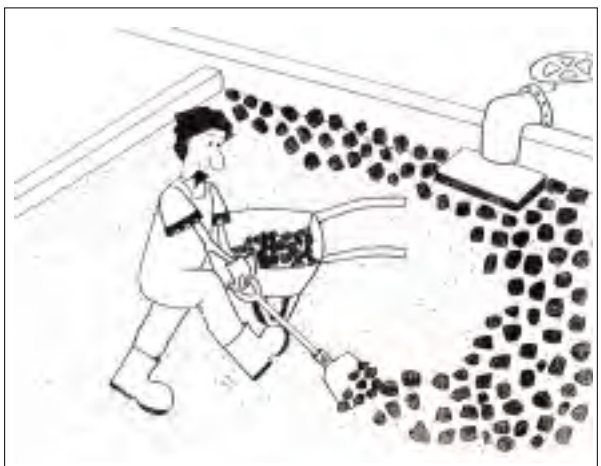


If the dry sludge in the drying beds gets wet again, there might be no beds to waste sludge from the anaerobic digester

The different layers of sand, gravel and stone in the bed

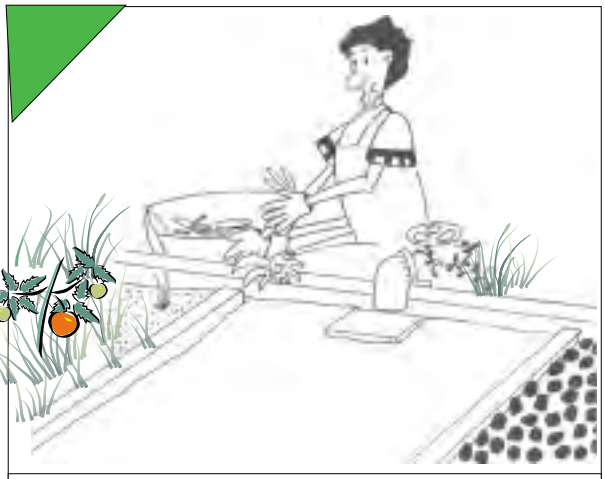






The operator removes the dried sludge, taking care not to disturb the top sand layer on the drying bed

The operator calls the supervisor in case the top media layers has been disturbed



The operator is responsible for the general upkeep around the sludge drying beds

Notes .....
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Disposal of the dried sludge

The operator dispose of the dried sludge in an excavated trench. The sludge is then covered with a layer of soil (see page 8)

OR

The operator can also dispose of the dried sludge in an incinerator

OR

The operator puts the dried sludge in a designated area for composting

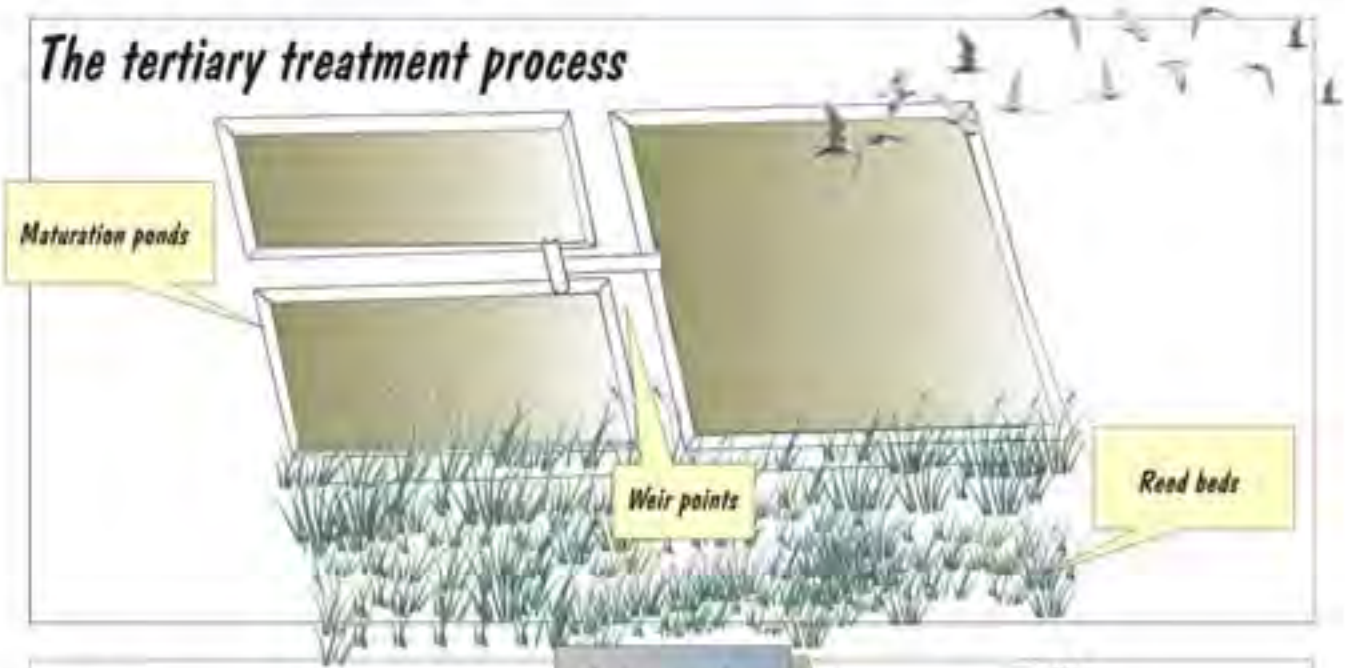
Tertiary Treatment 12

Indawo yoku hlwengisa ephezulu
Indawu yokucoca ephakamileyo
Indzawo lephezulu yekuhlobisa
Tulo ea ho hloekisa metsi e e hodingoana
Tulo ya go phepafatsa e godingwana
Karolo ya go hlwekiša e godingwana
Xiphemu xa ku tengisa xa xiyimo xa lehenhla
Fhethu ha ntha hu no tanziwa hone madi
Tersiêre behandeling

The purpose of the tertiary treatment process

Usually tertiary treatment at a sewage works involves a series of ponds, wetlands or reed beds that are installed to provide a degree of "polishing" of the treated effluent discharged from the mechanical treatment process. This is particularly important in the event of mechanical failure in the upstream process or during extended power failures.

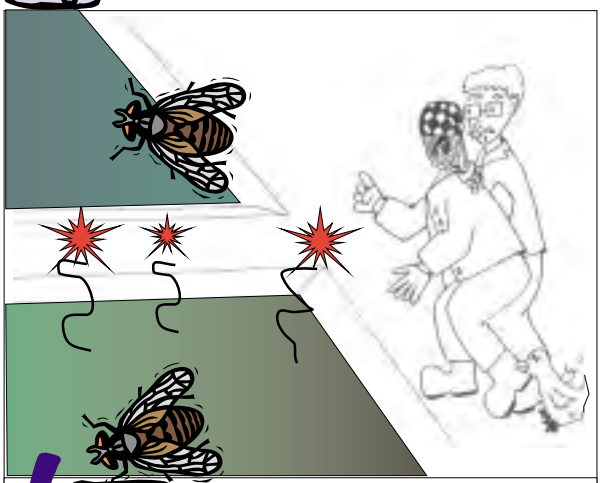
The tertiary treatment process



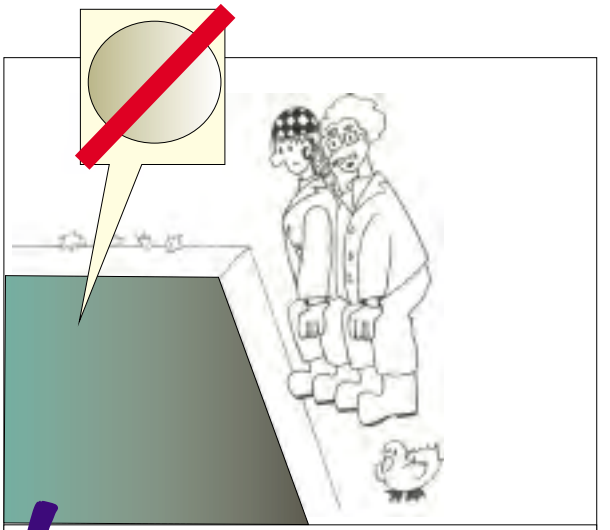
Work procedure

The operator must check that there is a minimum of 500 mm freeboard (space between the embankment and the water level)

The operator removes any vegetation, plastic bags or dead birds from the inlet and outlet weir points. Dead animals and birds should be reported to the supervisor



The operator observes unusual odours and reports to the supervisor



The operator checks the colour of the water, and if not greenish in appearance, reports to the supervisor

The operator removes any floating debris from the surface and disposes of the debris at the inlet with the screenings (see page 8)

Notes.....

Pump Stations, Electrical Boards, Store Room 13

Indawo yamapompo, indawo lapha kulawulwa khona ugezi & indawo lapho kubekwa khona imphahla

Isitishi sokupompa amanzi, ulawulondawo yombane & indlu yokugcina

Indzawo yemhpompi, indzawo lapho kulawulwa khona gezi & indzawo yekubeka timphahla

Tulo eo dipompo, tulo ho laoloang motlakase & ntlo ya ho bolokela

Tulo ya dipompo, tulo fa go laolwang motlakase & tulo ya polokelo

Tulo ya dipompo, taolong ya motlakatse & ntlo ya bobolokelo

Xitixi laha ku pomperiwaka kona, laha ku lawuriwaka kona ghezi & yindlu ya vuhlayiselo

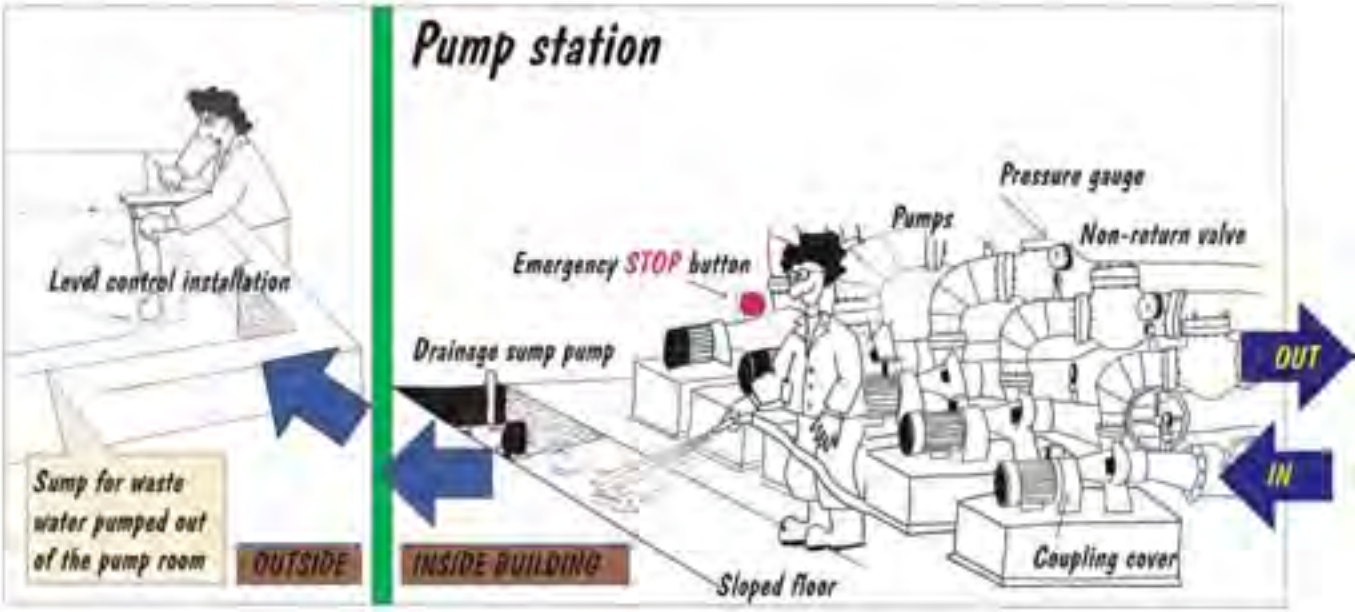
Ho no dzula bommbo, ho no langulwa mudagasi & fhethu ha u vhulungela

Pompstasies, elektriese verspreidingsborde, stoorkamer

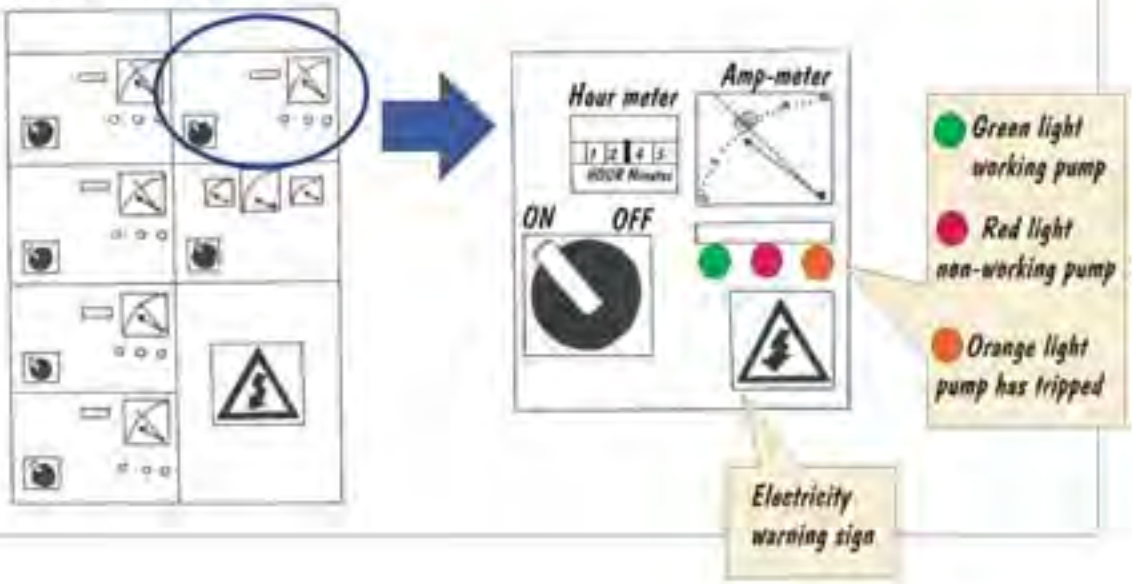
The purpose of the pump stations and electrical boards

Pump stations are provided in situations where the flow of waste water into and out of a sewage works under gravity (unassisted natural flow) is not possible

Electrical control boards are necessary to ensure that the correct power is supplied to each mechanical item and to protect equipment from damage by lightning. Electrical control panels also provide information on the operation of mechanical equipment.

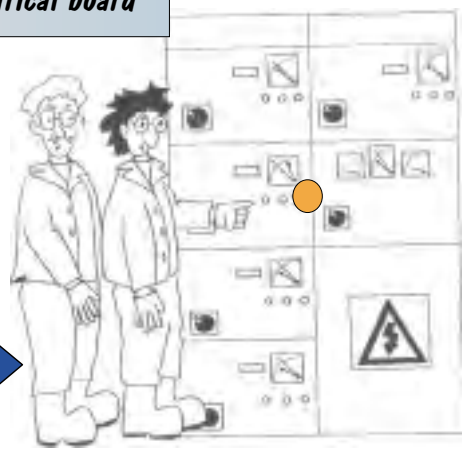


The electrical board

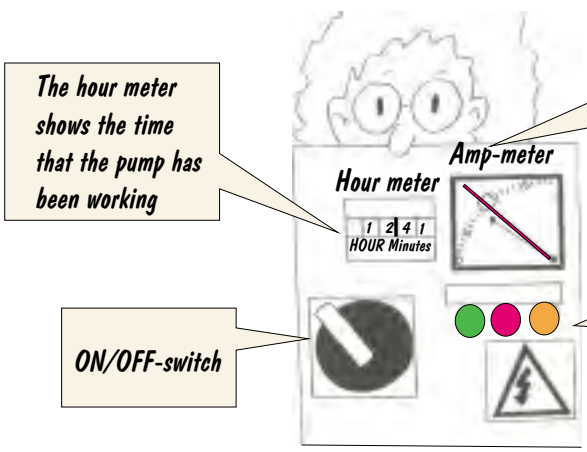


How to read the electrical board

The operator takes regular readings



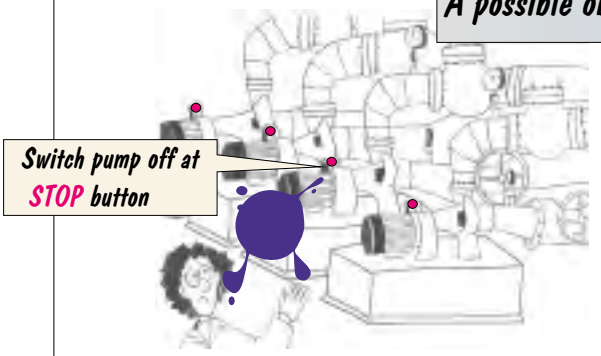
The operator calls the supervisor when there is a flashing orange light on the board. This is an indication that a pump has tripped



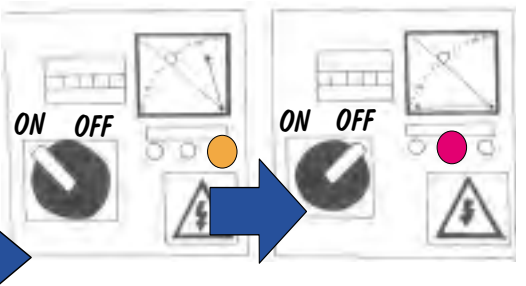
The operator records the various readings on the board

Notes .....

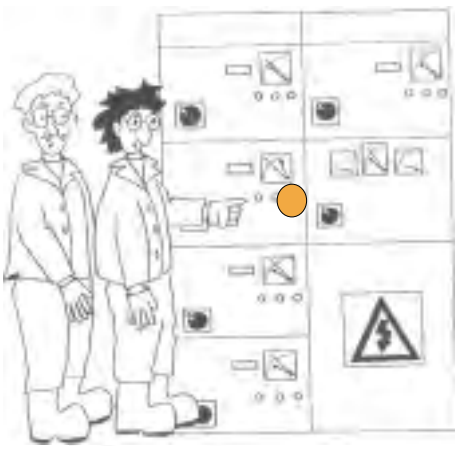
A possible obstruction in the pump



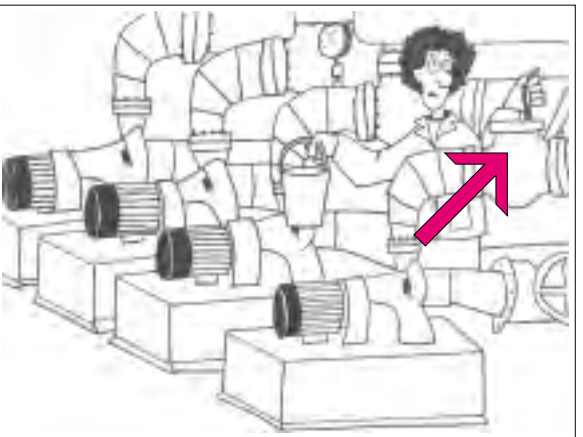
The operator notes that all the pumps are switched on, but that one of the pumps switches on/off at irregular intervals. This might be an indication that there is an obstruction in the pump. He switches the pump off at the emergency button and then goes to the electrical board



The operator switches the pump off at the appropriate switch



The operator reports this to the supervisor



The operator removes any obstruction from the non-return valve or a pipe bend

Notes .....

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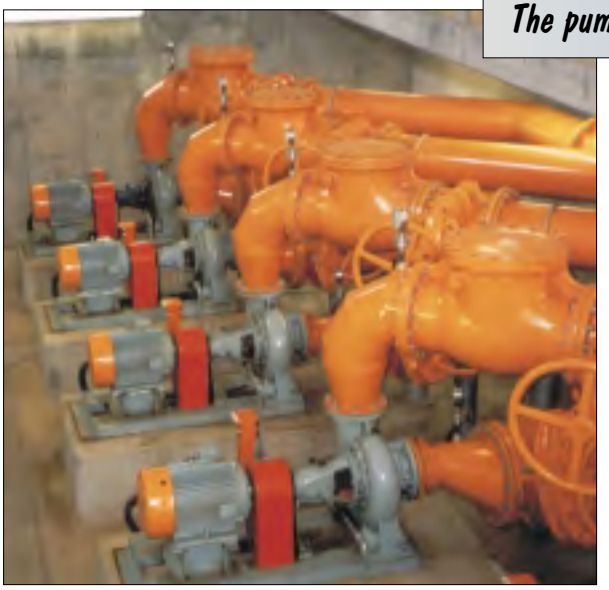
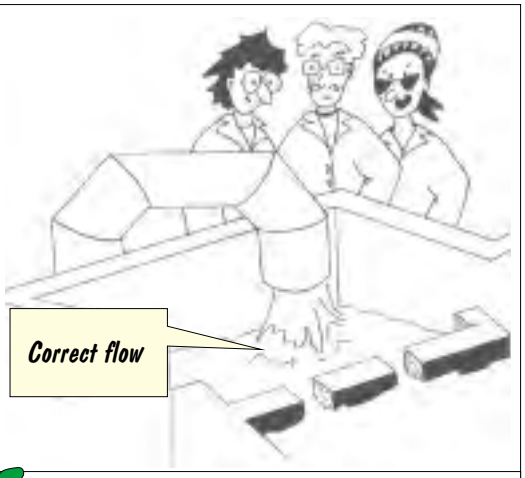
The pump station

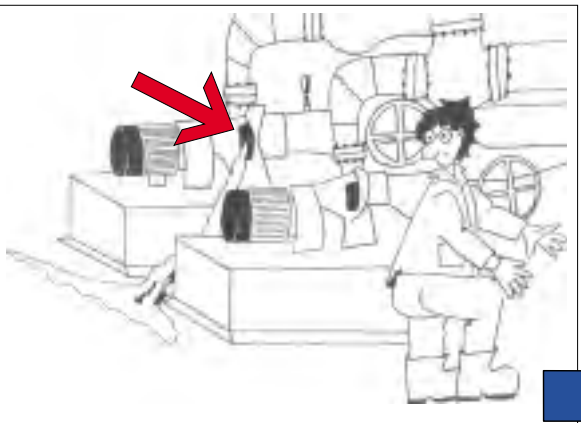


The operator notes that the pump is overheating and making a noise. He calls the supervisor



The operator and supervisor make sure that there is flow at the inlet and discharge at the outlet

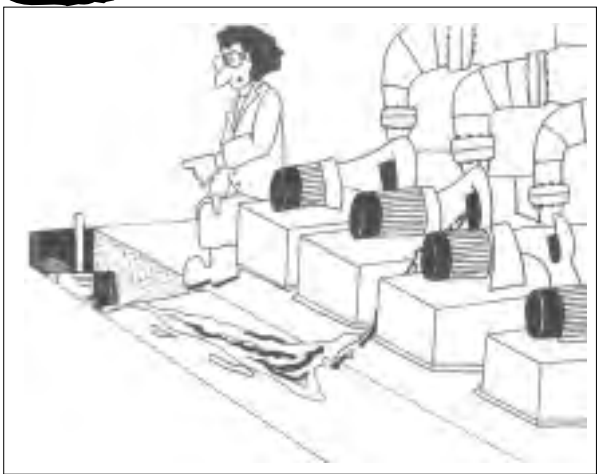
If there is no flow, it is usually an indication of a blockage



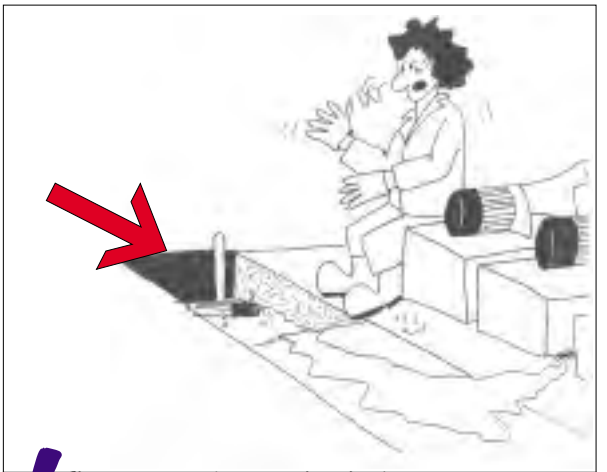
The operator notes that there is excessive water leaking from the gland or pipe connections (not the normal slow drip from the gland)

The operator reports all leaks to the supervisor

Pump Stations, Electrical Boards, Store Room 13



The operator checks that the water from the leaks runs down the sloped floor towards the drainage sump. The drainage sump pump removes the water to avoid flooding inside



The operator makes sure that the drainage sump pump is operational. If it is not operational the drainage sump pump and the entire pump station can be flooded

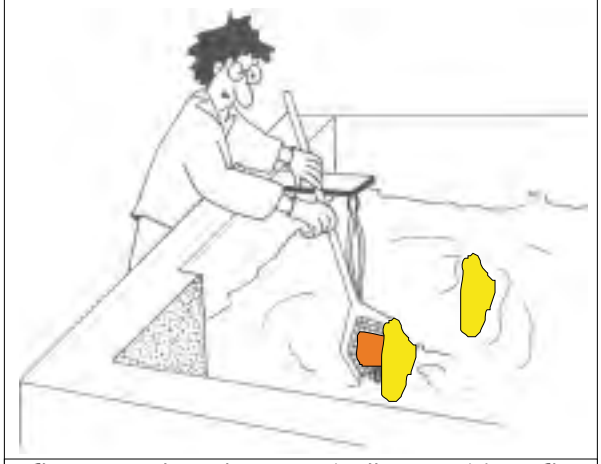
Call the supervisor in case of any emergency

The operator cleans the floor with clean water

The sump

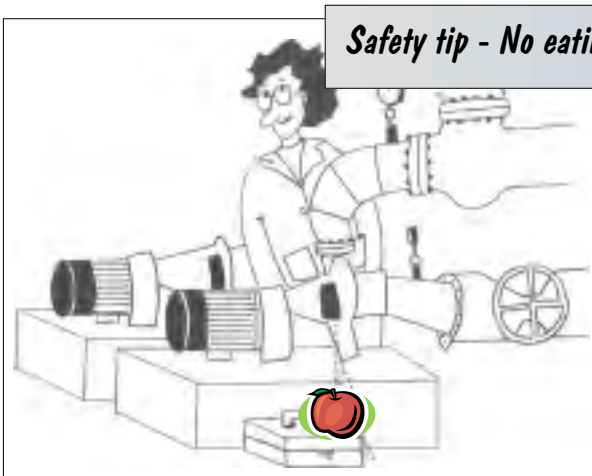
Waste water is usually collected in a sump. The operator checks that the sump does not overflow and checks the level control installation

The operator hoses and cleans the level control installation

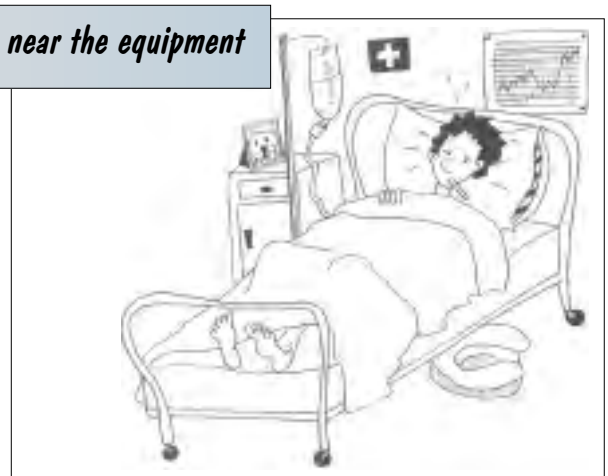


The operator cleans the sump and collects any debris. The debris is disposed of with the screenable material at the inlet (see page 8)

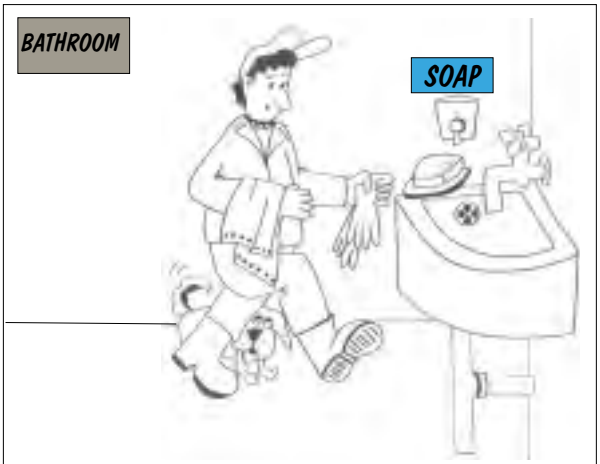
Safety tip - No eating near the equipment



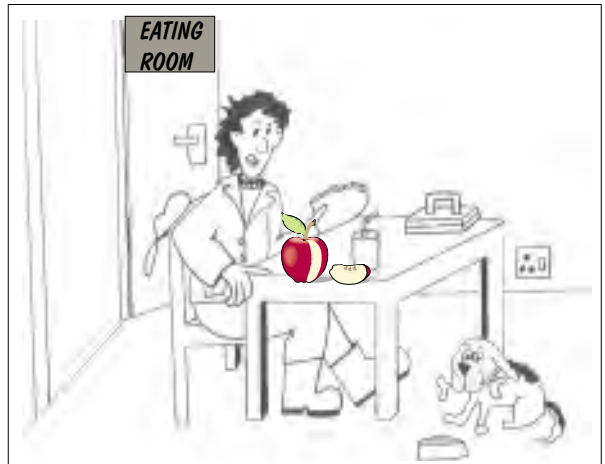
Do not leave any food stuffs in the pump station room



Contaminated food can lead to illness



The operator washes before eating

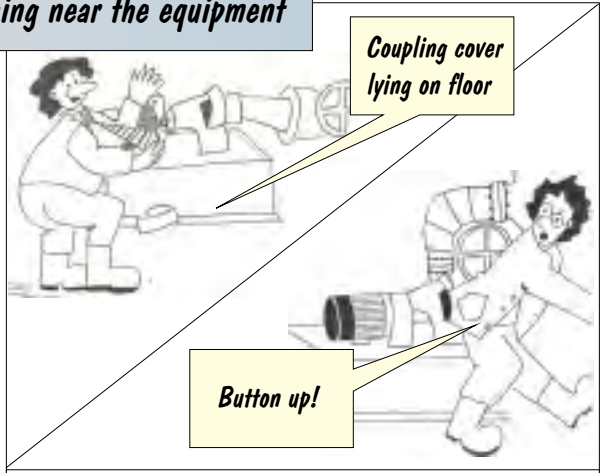


The operator eats in the designated area

Pump Stations, Electrical Boards, Store Room 13

Safety tip - No loose clothing near the equipment

The operator must not wear any loose clothing near the pumps. Operators must button up any loose clothing near mechanical equipment



Accidents might happen and injuries might occur

Safety tip - Store room

Always keep the store room neat and tidy

An untidy store room can lead to injury

Notes .....

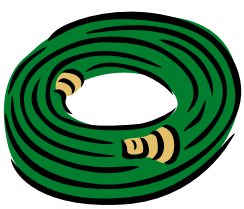
GLOSSARY 1 ENGLISH – ZULU

Activated Sludge Process A sewage treatment process where bacteria are mixed with waste water and the mixture is aerated
Indawo lapha amanzi a colile ahlanganiswa namaqiwane
Aerobic In the presence of oxygen
Ephila ngomoya ohlanzekile
Ammonia Vapour A cloud that consists of the chemical ammonia
Intuthu ene chemical ye amonia
Anaerobic Ponds
Amadamo ahlanza amanzi aqolile, angasebenzisi umoya ohlanzekile
Anaerobic Sludge Digestion The process of breaking down sludge in the absence of oxygen
Inqubekho yoku phula udaka ngaphandle kwe moya oqoqekile
Anaerobic A condition without oxygen
Isikhathi kungane moya oqoqekile
Anoxic A reaction that takes place without the presence of free oxygen
Isenzo lapho kungana khona umoya oqoqekile
Bacteria Microscopic living animals
Izibungu eziphilayo, ezibonakalayo ngaphansi komshini okhulisayo
Biological Filtration Process A sewage treatment process where bacteria attaches to a fixed surface
Indawo lapho amagciwane ehlelikhona
Blockage Obstruction
Ukuvaleka
Center Column Conical tower in center of biological filter
Umnyango wophoshongo wongaphakathi nendawo ena matshe
Contaminated Infected with dirt, polluted
Eqolile
Debris Scattered fragments afloat
Ezitantayo / Eziphaphamele
Desludging Removal of surplus sludge
Ukususwa kwedaka elisele
Detritus Sand and grit
Umhlabathi
Disinfection Killing of germs
Ukubulala amagciwane
Distribution Arm Rotating pipes with openings on a biological filter
Amaphayiphi anemibhobo azungezwayo phezu kwendawo ena amatshe
Effluent The discharge (outflow) from a sewage works
Amanzi a gelezelayo abuya endaweni lakhona kungezwa amanzi aqolile
Electrical Boards
Indawo lapha kulawulwa khona ugezi
Excavate To dig up
Ukugubha
Flow Instrument An instrument which measures the flow of water
Iwashi elibonisa ukugeleza kwamanzi
Glossary
Amagama okungena nenqazelo
Granular Chlorine A white, coarse powder chemical
E chemical emhlophe enamagwargwar
Grit
Umhlabathi
Grit Channel
Umsele wesanti
Incinerator A structure in which objects can be burned
Indawo lapho kushiselwa khona

Inorganic
Eya vuthuluga
Launders Channel like structures in which effluent flows
Umsele lapho kugelezela khona amanzi anqolile
Macerator A machine that can chop up material into small pieces
Umshini onga gawula izinto cezu-cezu
Manual Operated Inlet Screen A hand raked screen
Isisefo lapho kusetsenziswa khona I harika yesandla
Mechanical Operated Inlet Screen
Esefo ezilawolayo
Media Uniformed shaped stones or plastic wheels
Amatse alinganayo noma amavili we plasitiki
Methane Gas A highly flammable and dangerous gas
E gas eyengozi evutha masinyane
Non-Biodegradable Cannot be broken down biologically
Enga kwazi ukuphungulwa
Operator
Umlawuli woku hambisa
Organic
Ayi vuthulugi
Overview
Amaqampunqampu
Oxidation A reaction that uses oxygen
Indawo esebenzisa umoya ohlanzekile
Ozone Type of chemical used for disinfection
Umhlobo we chemical osetsenziswayo ukuthi kuhlanzeke
Pathogenic Bacteria Potential disease forming germs
Amagciwane anamandla abanga ukugula
Phase Separation Separating solids from liquids
Ehlukanisa amanzi na loku okuqinile
Primary First
Ukucala
Pump Station
Indawo yamapompo
Safety
Ukuphepha
Secondary Second
Yesibili
Settling Tanks
Itanki elahlukanisa amanzi nodaka
Sludge Drying Beds
Indawo lapho komiswa khona udaka
Store Room
Indawo lapho kubekwa khona imphahla
Supernatant
Amanzi aphuma ekuhlohlweni kodaka
Supervisor
Umholi
Tertiary Treatment
Indawo yoku hlwengisa ephezulu
Vortex Degritter
Umshini woku khipha umhlabathi

GLOSSARY 2 ENGLISH – XHOSA

Activated Sludge Process A sewage treatment process where bacteria are mixed with waste water and the mixture aerated
Indlela yokucoca indle
Aerobic In the presence of oxygen
Iphila apho kukhoyo umoya ococekileyo
Ammonia Vapour A cloud that consists of the chemical ammonia
Umophu we amonia
Anaerobic A condition without oxygen
Indawu engena moya ococekileyo
Anaerobic Ponds
Amadanyana acoca umsele ngokusebenzisa umoya
Anaerobic Sludge Digestion The process of breaking down sludge in the absence of oxygen
Indlela yokwahlukanisa udaka kwindayo engena moya ococekileyo
Anoxic A reaction that takes place without the presence of free oxygen
Isimo sokungabiko kwe moya ococekile
Bacteria Microscopic living animals
Intsholongwane ezibonakala kuphela ngendlela yokukhulisiwa
Biological Filtration Process A sewage treatment process where bacteria attaches to a fixed surface
Indawo enentsholongwane e nqeda ecoceni kwa-manzi
Blockage Obstruction
Ukuvaleka
Center Column Conical tower in center of biological filter
Isimiselo esime maphakathi nendau egcwaleswe nga matye
Contaminated Infected with dirt, polluted
Ukungcola
Debris Scattered fragments afloat
Ubumdaka phezulu kwamanzi
Desludging Removal of surplus sludge
Ukukupha udaka aluqgithileyo
Detritus Sand and grit
Inhlabathi
Disinfection Killing of germs
Ukubulala intsholongwane
Distribution Arm Rotating pipes with openings on a biological filter
Imibhobho ejikeleli e ne ngxuma
Effluent The discharge (outflow) from a sewage works
Amanzi a setshenzwayo a kalungelwayo akuselwa
Electrical Boards
Ulawulondawo yombane
Excavate To dig up
Ukumba
Flow Instrument An instrument which measures the flow of water
Umatshini okhangela indlela amanzi ahamba gayo
Glossary
Isihlomelo
Granular Chlorine A white, coarse powder chemical
E chemical emhlophe
Grit
Inhlabati
Grit Channel
Izikhewu zokuhluza ukungcola
Incinerator A structure in which objects can be burned
Indawu yokutshisela



Inorganic
Utho olu ngavuthuleki
Launders Channel like structures in which effluent flows
Umsela apho kuphumeza khona amanzi
Macerator A machine that can chop up material into small pieces
Umatshini ocanda izinto zibe ncinci
Manual Operated Inlet Screen A hand raked screen
Isefo esentjenziswa iharika yesandla
Mechanical Operated Inlet Screen
Isefo ezisebenzisayo
Media Uniformed shaped stones or plastic wheels
Amatye alinganayo afanayo noma amavili wepolasitiki
Methane Gas A highly flammable and dangerous gas
Igesi enobungozi evutha msinya
Non-Biodegradable Cannot be broken down biologically
Engena kuphungulwa
Operator
Umlawuli ngqubo
Organic
Utho olu ngakwazi ukuvuthuleka
Overview
Umbono
Oxidation A reaction that uses oxygen
Inguquko esebenzisa umoya
Ozone Type of chemical used for disinfection
Umhlobo lwe khemikhale yokucoca
Pathogenic Bacteria Potential disease forming germs
Intsholongwane ebangela isifo
Phase Separation Separating solids from liquids
Ukwahlula amanzi kumqa
Primary First
Sokuqala
Pump Station
Isitishi sokupompa amanzi
Safety
Ukhuseleko
Secondary Second
Isahlulo sesibini
Settling Tanks
Itanki eyahlula amanzi edakeni
Sludge Drying Beds
Indawu yokomisa udaka
Store Room
Indlu yokugcina
Supernatant
Amanzi acocekileyo aphuma eludakeni
Supervisor
Umlawuli
Tertiary Treatment
Indawu yokucoca ephakamileyo
Vortex Degritter
Umachini woku khupha isihlabathi

GLOSSARY 3 ENGLISH – SWAZI

Activated Sludge Process A sewage treatment process where bacteria are mixed with waste water and the mixture aerated
Indawo lapho emagciwane ahlanganiswa khona nemanti langcolile
Aerobic In the presence of oxygen
Lephilako ngaphansi kwemoya lohlantekile
Ammonia Vapour A cloud that consists of the chemical ammonia
Intuthu lene chemical ye amonia
Anaerobic Ponds
Emadamu ageza emanti ngaphandle kwemoya lohlobile
Anaerobic Sludge Digestion The process of breaking down sludge in the absence of oxygen
Indlela yekuphula ludzaka ngaphandle kwemoya lohlantekile
Anaerobic A condition without oxygen
Indzawo lengenawo umoya lohlantekile
Anoxic A reaction that takes place without the presence of free oxygen
Loku lokwentekako ngaphandle kwemoya lohlantekile
Bacteria Microscopic living animals
Tilwane letiphilako letibonakala ngaphansi kwesibonisakhulu
Biological Filtration Process A sewage treatment process where bacteria attaches to a fixed surface
Indzawo lenemagciwane
Blockage Obstruction
Ukuvimbana
Center Column Conical tower in center of biological filter
Umakhiwo lophakatsi kwendzawo yematje
Contaminated Infected with dirt, polluted
Lengcolile
Debris Scattered fragments afloat
Letintantako
Desludging Removal of surplus sludge
Ukusula ludzaka lelisele
Detritus Sand and grit
Umhlabatsi
Disinfection Killing of germs
Kukubulala emagciwane
Distribution Arm Rotating pipes with openings on a biological filter
Emaphayiphi anetimbhobo ayijikeleza phezu kwendzawo enematje
Effluent The discharge (outflow) from a sewage works
Ngemanti laphuma lapho kugezwa khona langcolile
Electrical Boards
Indzawo lapho kulawulwa khona gezi
Excavate To dig up
Ukugubha
Flow Instrument An instrument which measures the flow of water
Liwashi lelibonisa kuhamba kwemanti
Glossary
Kwatiswa kwemagama nencazelo
Granular Chlorine A white, coarse powder chemical
E chemicali lemhlophe
Grit
Umhlabatsi
Grit Channel
Umsele wesihlabatsi

Incinerator A structure in which objects can be burned
Indawo lapho kushiselwa khona
Inorganic
Iya vutfuluka
Launders Channel like structures in which effluent flows
Umsele lapho emanti ageletela khona
Macerator A machine that can chop up material into small pieces
Umshini logawula tintfo tibe macetucetu
Manual Operated Inlet Screen A hand raked screen
Sisefo lapho kusetshentiswa iharika yesandla
Mechanical Operated Inlet Screen
Sisefo lesitilawulako
Media Uniformed shaped stones or plastic wheels
Matshe lalinganako nobe ngemavili epulasitiki
Methane Gas A highly flammable and dangerous gas
I gas iyingoti ivutsa masinyane
Non-Biodegradable Cannot be broken down biologically
Lowungeke uwuphungule
Operator
Umkhombisi wemsebenti
Overview
Sihloko sendzaba
Organic
Ayi vutfuluki
Oxidation A reaction that uses oxygen
Kusebentisa kwemoya lohlantekile
Ozone Type of chemical used for disinfection
Luhlobo lwe chemical lokuhlobisa
Pathogenic Bacteria Potential disease forming germs
Magciwane lanemandla abanga tifo
Phase Separation Separating solids from liquids
Kuhlukanisa emanti nalo ku cinele
Primary First
Sekucala
Pump Station
Indzawo yempompi
Safety
Ukugcineka
Secondary Second
Yesibili
Settling Tanks
Lithanki lelihlukanisa nemanti neludzaka
Sludge Drying Beds
Indzawo lapho kumiswa khona ludzaka
Store Room
Indzawo yekubeka timphahla
Supernatant
Emanti laphuma lapho kuhlohlwa khona ludzaka
Supervisor
Indvuna
Tertiary Treatment
Indzawo lephezulu yekuhlobisa
Vortex Degritter
Umshini lokhipha umhlabatsi

GLOSSARY 4 ENGLISH – SOTHO

Activated Sludge Process A sewage treatment process where bacteria are mixed with waste water and the mixture aerated
Tula fao dikokoanahloko di kopantshoang le metsi a dihoerehoere
Aerobic In the presence of oxygen
Mo boemong ba moea o hloekileng
Ammonia Vapour A cloud that consists of the chemical ammonia
Musi o nang le khemikhale ea amonia
Anaerobic Ponds
Matangwana a ho hloekisa metsi, a ho sebedisa moea o o hloekilene
Anaerobic Sludge Digestion The process of breaking down sludge in the absence of oxygen
Ketsahalo ea ho fokotsa seretse ntle le tshebediso ea moea o o hloekileng
Anaerobic A condition without oxygen
Tulo e senang moea o hloekileng
Anoxic A reaction that takes place without the presence of free oxygen
Ketsahalo e e etsahalang ntle le moea o o hloekileng
Bacteria Microscopic living animals
Dikokoana tse phelang, tse bonalang ka tlase ga mochene oa ho hodisa
Biological Filtration Process A sewage treatment process where bacteria attaches to a fixed surface
Tulo e tletseng dikokoanahloko tse thusang ho hloekisa metsi a dihoerehoere
Blockage Obstruction
Ho thibana
Center Column Conical tower in center of biological filter
Karolo e e mo hare ha boalo ba majwe
Contaminated Infected with dirt, polluted
E e ditshila
Debris Scattered fragments afloat
Tse phaphametseng
Desludging Removal of surplus sludge
O tlosa seretse se se oketsehileng
Detritus Sand and grit
Lekhoarana
Disinfection Killing of germs
Polao ea peo tsa mafu
Distribution Arm Rotating pipes with openings on a biological filter
Dipeipi tse potologang tse nang le masoba holimo ha boalo ba majwe
Effluent The discharge (outflow) from a sewage works
Metsi a dihoerehoere a hlahang tulong ea ho hloekisa
Electrical Boards
Tulo ho laoloang motlakase
Excavate To dig up
Ho tsheka
Flow Instrument An instrument which measures the flow of water
Sesupa kelelo ea metsi
Glossary
Mantsoe a ho gala a a hlalosang
Granular Chlorine A white, coarse powder chemical
Khemikhale e tshoeu e lekhoarana
Grit
Lekhoarana
Grit Channel
Mosele wa lekhoarana

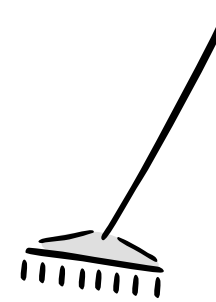
Incinerator A structure in which objects can be burned
Moaho o ho tshiselwang teng
Inorganic
E fokotsehang
Launders Channel like structures in which effluent flows
Mesela ea ho elela ha metsi
Macerator A machine that can chop up material into small pieces
Motshene oa ho ripaganya disebediswa ho ba dikarolo tse nnyane
Manual Operated Inlet Screen A hand raked screen
Sefo eo ho sebedisoang haraka ea letsoho
Mechanical Operated Inlet Screen
Sefo eo e itaolang
Media Uniformed shaped stones or plastic wheels
Majwe a a lekalekanang kapa mabile a polasetiki
Methane Gas A highly flammable and dangerous gas
Gase e e kotsi e e tukang hanghang
Non-Biodegradable Cannot be broken down biologically
E e kekeng ea fokotsoa
Operator
Molaola mosebetsi / Molaodi
Overview
Matseno a a akaretsang
Organic
E sa fokotseheng
Oxidation A reaction that uses oxygen
Ketsahalo e e sebedisang moea o o hloekileng
Ozone Type of chemical used for disinfection
Mofuta oa khemikhale o o sebedisoang ho hloekisa
Pathogenic Bacteria Potential disease forming germs
Dikokoanyana tse matla tse bakang mafu
Phase Separation Separating solids from liquids
Ea ho arohanya metsi le tse thata
Primary First
Ea ho qala
Pump Station
Tulo ea dipompo
Safety
Ho sireletseha
Secondary Second
Ya bobedi
Settling Tanks
Tanka ya ho arohanya metsi le seretse
Sludge Drying Beds
Matamo a o omisa seretse
Store Room
Ntlo ya ho bolokela
Supernatant
Metsi a a hlahang mo tlhotlhong ya seretse
Supervisor
Molaodi
Tertiary Treatment
Tulo ea ho hloekisa metsi e e hodingoana
Vortex Degritter
Motshini o ntshang lekgoarana

GLOSSARY 5 ENGLISH – TSWANA

Activated Sludge Process A sewage treatment process where bacteria is mixed with waste water and the mixture aerated
Karolo ya hlwekiso fao megare e kopantshwang le metsi a maswe
Aerobic In the presence of oxygen
Tse phelang ka moya o phepa
Ammonia Vapour A cloud that consists of the chemical ammonia
Mosi o nang le khemikhale ya amonia
Anaerobic Ponds
Matangwana a go phepafatsa metsi, ao a dirisang moya o phepa
Anaerobic Sludge Digestion The process of breaking down sludge in the absence of oxygen
Tiro ya go thubaganya seretse kwa ntle ga moya o phepa
Anaerobic A condition without oxygen
Maemo a se nang moya o phepa
Anoxic A reaction that takes place without the presence of free oxygen
Phetogo e e tswelang pele ntle le moya o phepa
Bacteria Microscopic living animals
Megare e phelang e bonagalang ka tlase ga segodiso
Biological Filtration Process A sewage treatment process where bacteria attaches to a fixed surface
Karolo ya go hlwekisa maswe fao megare e funanwago tulo e lengwe
Blockage Obstruction
Go thibana
Center Column Conical tower in center of biological filter
Karolo ya mogare e godimo ga boalo ba matlapa
Contaminated Infected with dirt, polluted
E e maswe
Debris Scattered fragments afloat
Diphaphamadi godimo ga metsi
Desludging Removal of surplus sludge
Tloso ya seretse se se okeditsweng
Detritus Sand and grit
Lekgwarana
Disinfection Killing of germs
Polao ya megare
Distribution Arm Rotating pipes with openings on a biological filter
Dipeipi tse di potologang tse nang le masoba di leng godimo ga boalo ba matlapa
Effluent The discharge (outflow) from a sewage works
Metsi a a tswang mo tulong ya go phepafatsa metsi
Electrical Boards
Tulo fa go laolwang motlakase
Excavate To dig up
Go epa
Flow Instrument An instrument which measures the flow of water
Sesupa kelelo ya metsi
Glossary
Mantswe a matseno a hlaloso
Granular Chlorine A white, coarse powder chemical
Khemikhale e sweu e lekgwarana
Grit
Lekgwarana
Grit Channel
Mosela wa lekgwarana
Incinerator A structure in which objects can be burned
Tulo fao go fisetswang teng

Inorganic
E foforegang
Launders Channel like structures in which effluent flows
Dikago tsa mesela fao metsi a elelang teng
Macerator A machine that can chop up material into small pieces
Motshene wa go ripaganya didiriswa go ba tse nnye
Manual Operated Inlet Screen A hand raked screen
Sefo e e dirisang haraka ya seatla
Mechanical Operated Inlet Screen
Sefo e e itaolang
Media Uniformed shaped stones or plastic wheels
Matlapa a a leka-lekanang gotsa mabili a polasitiki
Methane Gas A highly flammable and dangerous gas
Gase e kotsi e e tukang bonolo
Non-Biodegradable Cannot be broken down biologically
E e ka sekeng ya kgona go fokotswa
Operator
Molaola tsamaiso / Molaodi
Organic
E sa foforegeng
Overview
Matseno a a akaretsang
Oxidation A reaction that uses oxygen
Phetoso e e dirisang moya o phepa
Ozone Type of chemical used for disinfection
Mofuta wa khemikhale o o diriswang go phepafatsa
Pathogenic Bacteria Potential disease forming germs
Megare e matla e e bakang malwetse
Phase Separation Separating solids from liquids
E e aroganyang metsi le tse thata
Primary First
Ya pele
Pump Station
Tulo ya dipompo
Safety
Tshireletso
Secondary Second
Ya bobedi
Settling Tanks
Tanka e e arolang metsi le seretse
Sludge Drying Beds
Tulo ya go omisa seretse
Store Room
Tulo ya polokelo
Supernatant
Metse a tlhagang mohlohlong ya seretse
Supervisor
Molaodi
Tertiary Treatment
Tulo ya go phepafatsa e godingwana
Vortex Degritter
Motshini o ntshang mohlaba

Activated Sludge Process A sewage treatment process where bacteria is mixed with waste water and the mixture aerated
Karolo ya hlwekišo fao ditwatši di hlakantshwago le meetse a ditshila
Aerobic In the presence of oxygen
Tse di phelago tlase ga moya o hlwekilego
Ammonia Vapour A cloud that consists of the chemical ammonia
Muši wo o nago le khemikhale ya amonia
Anaerobic Ponds
Ditanka / matangwana a go hlwekisa meetse a go šomiša moya o hlwekileng
Anaerobic Sludge Digestion The process of breaking down sludge in the absence of oxygen
Phetogo ya go fokotša leraga ntle ga moya o hlwekilego
Anaerobic A condition without oxygen
Tulo fao go se nago moya o o hlwekileng
Anoxic A reaction that takes place without the presence of free oxygen
Phetogo yeo e tšwelang pele ntle le moya o hlwekileng
Bacteria Microscopic living animals
Ditwatše tse phelang, tse bonagalang ka fase ga motshene wa go godiša
Biological Filtration Process A sewage treatment process where bacteria attaches to a fixed surface
Karolo fao ditwatši di lego felo gotee
Blockage Obstruction
Go thibana
Center Column Conical tower in center of biological filter
Moago wa mo gare, o godimo ga boalo bja maswika
Contaminated Infected with dirt, polluted
E e ditshila
Debris Scattered fragments afloat
Diphaphamalo godimo ga meetse
Desludging Removal of surplus sludge
Go tlosa leraga la koketšo
Detritus Sand and grit
Lekgwarana
Disinfection Killing of germs
Polao ya ditwatši
Distribution Arm Rotating pipes with openings on a biological filter
Dipeipi tse mašoba tse thethago godimo ga boalo bja maswika
Effluent The discharge (outflow) from a sewage works
Meetse ao a tšwago tulong ya go hlwekiša meetse
Electrical Boards
Taolong ya motlakatse
Excavate To dig up
Go epa
Flow Instrument An instrument which measures the flow of water
Sesupa kelelo ya meetse
Glossary
Mantšu-matseno a hlaloso
Granular Chlorine A white, coarse powder chemical
Khemikhale e šweu ya lekgwarana
Grit
Lekgwarana / Mohlaba
Grit Channel
Mosela wa lekgwarana
Incinerator A structure in which objects can be burned
Tulo fao go fisetšwago gona



Inorganic
E foforegago
Launders Channel like structures in which effluent flows
Meago ya meselana fao go elelago meetse a go tšwa hlwekišong
Macerator A machine that can chop up material into small pieces
Motshini wa go ripantsha dišomišwa go ba tse nnyane
Manual Operated Inlet Screen A hand raked screen
Sefo e e šomišwago ka haraka ya seatla
Mechanical Operated Inlet Screen
Sefo yeo e itaolaga
Media Uniformed shaped stones or plastic wheels
Maswika a go leka-lekana goba mabili a polasetiki
Methane Gas A highly flammable and dangerous gas
Gase e kotsi ya go tuka ka pela
Non-Biodegradable Cannot be broken down biologically
Yeo e sa kgonego go fokotšwa
Operator
Molaola tshepetso
Organic
E sa foforegego
Overview
Matseno-kakaretšo
Oxidation A reaction that uses oxygen
Phetogo yeo e šomišago moya
Ozone Type of chemical used for disinfection
Mohuta wa khemikhale o o šomišwago go hlwekisa
Pathogenic Bacteria Potential disease forming germs
Ditwatši tše maatla tse bakago malwetši
Phase Separation Separating solids from liquids
Yeo e aroganyang meetse le tse thata
Primary First
Ya pele
Pump Station
Tulo ya dipompo
Safety
Tshireletšo
Secondary Second
Karolo ya bobedi
Settling Tanks
Ditanka tse di arolago meetse le leraga
Sludge Drying Beds
Tulo tša go omisa leraga
Store Room
Ntlo ya bobolokelo
Supernatant
Meetse a hlohlilwego a tšwago ka gare ga tshilo ya leraga
Supervisor
Molaodi
Tertiary Treatment
Karolo ya go hlwekiša e godingwana
Vortex Degritter
Motshini wa go ntsha lekgwarana

GLOSSARY 7 ENGLISH – TSONGA

Activated Sludge Process A sewage treatment process where bacteria are mixed with waste water and the mixture aerated
Indhawu laha switsongwa-tsongwana swi hlanganisiwaka na mati lama ya nga tangangiki
Aerobic In the presence of oxygen
Yi hanya laha ku nga na moya lowo tenga
Ammonia Vapour A cloud that consists of the chemical ammonia
Musi lowu nga na khemikhali ya amonia
Anaerobic Ponds
Madamu lama ya tirhisaka moya lowo tenga ku tengisa mati
Anaerobic Sludge Digestion The process of breaking down sludge in the absence of oxygen
Maendlelo ya ku hunguta / ku faya ndzhope ku ngari na ku nghenelela ka moya lowo tenga
Anaerobic A condition without oxygen
Ndhawu laha ku nga riki na moya lowo tenga
Anoxic A reaction that takes place without the presence of free oxygen
Maendlelo lama ya ka emahlweni ya humelela e handle ka ku nghenelela ka moya lowo tenga
Bacteria Microscopic living animals
Switsongwa-tsongwana leswi swivoniwaka ntsena hi michini ya ku kurisa
Biological Filtration Process A sewage treatment process where bacteria attaches to a fixed surface
Maendlelo / ndhawu laha switsongwa-tsongwana switshunguriwaka swiri ndhawu yinwe
Blockage Obstruction
Ku-pfaleka
Center Column Conical tower in center of biological filter
Xiphemu xa le ndzeni ka byiandlalo bya maribye
Contaminated Infected with dirt, polluted
Leyi yinga na thyaka
Debris Scattered fragments afloat
Leswi swinga papamala ehenhla ka mati
Desludging Removal of surplus sludge
Ku susiwa ka ndzhope lowu nga ngeteleleka
Detritus Sand and grit
Rikhwarha
Disinfection Killing of germs
Ku dlayiwa ka switsongwa-tsongwana
Distribution Arm Rotating pipes with openings on a biological filter
Tiphayiphi leti ti nga na mimbhovo laha byi andlaleni bya maribye
Effluent The discharge (outflow) from a sewage works
Masalela lama ya salaka loko ku heta ku hlantswiwa mati
Electrical Boards
Laha ku lawuriwaka kona ghezi
Excavate To dig up
Ku cela
Flow Instrument An instrument which measures the flow of water
Nchumu / iwatch lowu wu kombaka nkhuluko wa mati
Glossary
Marito ya manghenelo
Granular Chlorine A white, coarse powder chemical
Khemikhali yo basa ya tikhwarha
Grit
Rikhwarha
Grit Channel
Ndlela ya rikhwarha
Incinerator A structure in which objects can be burned
Ndhawu laha ku hisiwaka kona

Inorganic
Swo hlanhleka
Launders Channel like structures in which effluent flows
Ndhawu laha ku nga na mati lama ya ngatengisiwa
Macerator A machine that can chop up material into small pieces
Muchini lowu nga kotaka ku ghaya switirhisiwa swiva leswi ntsongo
Manual Operated Inlet Screen A hand raked screen
I sefo leyi yi tirisiwaka harika ya mavoko
Mechanical Operated Inlet Screen
Sefo leyi yi tilawulaka
Media Uniformed shaped stones or plastic wheels
Maribye lama ya ringanaka yatlhela ya fana
Methane Gas A highly flammable and dangerous gas
Ximoko xa nghozi lexi xipfurhaka hiku hatlisa
Non-Biodegradable Cannot be broken down biologically
Lowu wu nga hungutekiki
Operator
Mulawuri wa vufambisi
Organic
Swo ka swi nga hlankeki
Overview
Manghenelo hi ku angarheta
Oxidation A reaction that uses oxygen
Ku hundzuka lo ku kutirhisaka moya
Ozone Type of chemical used for disinfection
Makhuva / muxaka wa khemikhale lowu wu tirhisiwaka ku tengisa
Pathogenic Bacteria Potential disease forming germs
Switsongwa-tsongwana swa matimba leswi va nga ka mavabyi
Phase Separation Separating solids from liquids
Ku hambanisiwa ka mati na leswi swi nga kotiki ku n'oka
Primary First
Xo sungula
Pump Station
Xitixi laha ku pomperiwaka kona
Safety
Vuhlayiseki
Secondary Second
Xiphemu xa vumbirhi
Settling Tanks
Mathangi lama ya hambanisaka mati na ridaka
Sludge Drying Beds
Ndhawu laha ku omisiwaka ndzhope
Store Room
Yindlu ya vuhlayiselo
Supernatant
Mati lama ya nga hlutlwa lama ya humaka eridakeni
Supervisor
Mufambisi
Tertiary Treatment
Xiphemu xa ku tengisa xa xiyimo xa lehenhla
Vortex Degritter
Mutshini lowu wu humesaka rikhwarha

GLOSSARY 8 ENGLISH – VENDA

Activated Sludge Process A sewage treatment process where bacteria is mixed with waste water and the mixture aerated
Fhethu hu no tanganyiswa madi a tshika na zwitshili
Aerobic In the presence of oxygen
Zwi tshilaho nga muya wo kunaho
Ammonia Vapour A cloud that consists of the chemical ammonia
Mutsi une wavha na mushonga wa ammonia
Anaerobic A condition without oxygen
Fhethu hu si na muya wo kunaho
Anaerobic Ponds
Madamu a no shumisa muya wa kunaho kha u tanzwa madi
Anaerobic Sludge Digestion The process of breaking down sludge in the absence of oxygen
Mushumo wa u fhungudza matope hu si na u shumisa muya wo kunaho
Anoxic A reaction that takes place without the presence of free oxygen
Tshanduko yo bvelelaho hu so ngo shumiswa muya wo kunaho
Bacteria Microscopic living animals
Zwitshili zwi tshilaho zwi kona u vhonwa nga mutshini wa u hulisa
Biological Filtration Process A sewage treatment process where bacteria attaches to a fixed surface
Fhethu ho dalaho zwitshili
Blockage Obstruction
Yo valea
Center Column Conical tower in center of biological filter
Tshifhato tshi re nga ngomu hu re na matombo
Contaminated Infected with dirt, polluted
Ina tshika
Debris Scattered fragments afloat
Zwo papamalaho
Desludging Removal of surplus sludge
U bviswa matope o dalesaho
Detritus Sand and grit
Mutavha
Disinfection Killing of germs
U vhulaya zwitshili
Distribution Arm Rotating pipes with openings on a biological filter
Phaiphi ine ya vha na mabuli ine ya shuma u fafadzela fhasi hu re na matombo
Effluent The discharge (outflow) from a sewage works
Madi a no bva fhethu hu tanziwaho madi
Electrical Boards
Ho no langulwa mudagasi
Excavate To dig up
U gwa
Flow Instrument An instrument which measures the flow of water
Watshi yo no sumbedza u tshimbila ha madi
Glossary
Maipfi a mathomo a u talusa
Granular Chlorine A white, coarse powder chemical
Mushonga mutshena wa madzhoro
Grit
Muthava
Grit Channel
Mugero wa madi a no tshimbila na mutavha
Incinerator A structure in which objects can be burned
Fhethu hune ra fhisela hone zwithu zwa tshika

Inorganic
I fhufhurea nga utavhanya
Launders Channel like structures in which effluent flows
Mugero wa u tshimbidza madi
Macerator A machine that can chop up material into small pieces
Mutshini u vundekanyaho zwithu u ri zwi vhe zwi tuku-tuku
Manual Operated Inlet Screen A hand raked screen
Sefo ine ha shumiswa haraga ya tshanda
Mechanical Operated Inlet Screen
Sefo ine ya di laula
Media Uniformed shaped stones or plastic wheels
Matombo a linganaho / mavhili a pulasitiki
Methane Gas A highly flammable and dangerous gas
Xasi ine ya vha vhuhali ine ya duga nga u tavhanya
Non-Biodegradable Cannot be broken down biologically
Tshine tsha so kone u fhungudzea
Operator
Mulanguli wa mushumo
Organic
I sa fhufhurei
Overview
Ho no dzheniwa hone nga u angaredza
Oxidation A reaction that uses oxygen
Tshanduko yo bvelelalo ho shumiswa muyo wo kunaho
Ozone Type of chemical used for disinfection
Mofuda wa mushonga u no shumiswa u kulumaga
Pathogenic Bacteria Potential disease forming germs
Zwitshili zwa maanda zwine zwa ita malwadze
Phase Separation Separating solids from liquids
Tshi fhambanyisa madi na zwithu zwi no konda
Primary First
Ya mathomo
Pump Station
Ho no dzula bommbo
Safety
Ho tsireledzeaho
Secondary Second
Lwa vhuvhili
Settling Tanks
Thannga ya u fhambanyisa madi na matope
Sludge Drying Beds
Fhethu ha u omisa matope
Store Room
Fhethu ha u vhulungela
Supernatant
Madi a nobva fhethu hune ha vha na matope
Supervisor
Mulanguli
Tertiary Treatment
Fhethu ha ntha hu no tanziwa hone madi
Vortex Degritter
Mutshini wa u ntsha mutavha

GLOSSARY 9 ENGLISH – AFRIKAANS

Activated Sludge Process A sewage treatment process where bacteria is mixed with waste water and the mixture aerated
Geaktiveerde slykproses ‘n Rioolsuiweringsproses bestaande onder meer uit anaërobiese, anoksiese en aërobiese aktiwiteite en waarin bakterieë en belugting met suurstof ‘n belangrike rol speel
Aerobic In the presence of oxygen
Aërobies ‘n Proses waar suurstof aanwesig is
Ammonia Vapour A cloud that consists of the chemical ammonia
Ammoniak damp Ammoniak wat in die teenwoordigheid van chloor as ‘n witterige damp sigbaar is
Anaerobic A condition without oxygen
Anaërobies ‘n Proses waarin suurstof nie aanwesig is nie
Anaerobic Ponds
Anaërobiese damme Damme waarin organiese materiaal afgebreek word in die afwesigheid van suurstof
Anaerobic Sludge Digestion The process of breaking down sludge in the absence of oxygen
Anaërobiese slykvertering ‘n Proses waarin slyk afgebreek word in die afwesigheid van suurstof
Anoxic A reaction that takes place without the presence of free oxygen
Anoksies ‘n Gedeelte van die geaktiveerde slykproses wat plaasvind sonder die teenwoordigheid van vrye suurstof
Bacteria Microscopic living animals
Bakterieë Mikroskopiese eensellige organismes
Biological Filtration Process A sewage treatment process where bacteria attaches to a fixed surface
Biologiese filtrasie proses ‘n Rioolsuiweringsproses bestaande uit media waaroor riool oor ‘n sypelbed gefiltreer word en die bakterieë wat op die media groei met die suiweringsproses help
Blockage Obstruction
Verstopping Obstruksie veroorsaak deur materiaal wat saampak
Center Column Conical tower in center of biological filter
Middelste roterende verspreidingskolom Kolom in die middel van ‘n biologiese sypelbed waardeur die riool na die verspreidingsarms gevoer word
Contaminated Infected with dirt, polluted
Gekontamineerd Besoedelde water
Debris Scattered fragments afloat
Opdrifsel Opdrifsel of skuim wat bo-op die water dryf
Desludging Removal of surplus sludge
Ontslyking Onttrekking van oortollige slyk en skuim
Detritus Sand and grit
Detritus Gruis en growwe materiaal
Disinfection Killing of germs
Ontsmetting Uitwissing van kieme deur onder andere chloor
Distribution Arm Rotating pipes with openings on a biological filter
Roterende verspreidingsarm Roterende pype met openinge wat riool oor ‘n biologiese sypelbed versprei
Effluent The discharge (outflow) from a sewage works
Uitvloeisel Die vloei vanuit ‘n rioolsuiweringsaanleg nadat dit gesuiwer is
Electrical Boards
Elektriese verspreidingsborde Verspreidingsborde waarin die skakeltuig vir die verskillende toerusting geïnstalleer is
Excavate To dig up
Opgrawing Om uit te grawe
Flow Instrument An instrument which measures the flow of water
Vloei-instument ‘n Instrument wat die vloei van water meet
Glossary
Verklarende woordelys
Granular Chlorine A white, coarse powder chemical
Korrelrige chloor Chloor in ‘n wit korrelrige poeier vorm
Grit
Grint Growwe materiaal wat teen ‘n lae vloeisnelheid uitsak
Grit Channel
Grint kanale Kanale waarin die vloeisnelheid verlaag word sodat grint en growwe materiaal kan uitsak

Incinerator A structure in which objects can be burned
Verbrandingsoond ‘n Oond waarin lappe en ander vuilgoed verbrand word
Inorganic
Anorganiese materiaal
Launders Channel like structures in which effluent flows
Kanale Kanale waarin uitvloeisel oorloop en weggelei word
Macerator A machine that can chop up material into small pieces
Masereerder Toerusting waardeur growwe materiaal in die riool fyngemaak word
Manual Operated Inlet Screen A hand raked screen
Hand inlaatrooster ‘n Rooster by die inlaatwerke wat met die hand gehark word
Mechanical Operated Inlet Screen
Meganiese inlaatrooster ‘n Meganiese rooster by die inlaatwerke wat outomaties die riool sif
Media Uniformed shaped stones or plastic wheels
Media Uniforme materiaal wat in biologiese sypelbeddings geplaas word
Methane Gas A highly flammable and dangerous gas
Metaangas ‘n Gevaarlike, hoogs vlambare gas
Non-Biodegradable Cannot be broken down biologically
Nie-biodegradeerbaar Materiaal wat nie biologies afbreekbaar is nie
Operator
Operateur Persoon wat die aanleg begryf
Organic
Organiese materiaal
Overview
Oorsig van aanleg
Oxidation A reaction that uses oxygen
Oksidasie ‘n Proses waarin suurstof gebruik word
Ozone Type of chemical used for disinfection
Osoon ‘n Tipe chemikalie wat gebruik word vir ontsmetting
Pathogenic Bacteria Potential disease forming germs
Patogene bakterieë Bakterieë wat die potensiaal het om siekte te veroorsaak
Phase Separation Separating solids from liquids
Vloeistof skeiding Skeiding van growwe materiaal en vloeistowwe
Primary First
Primêre Eerste
Pump Station
Pompstasie
Safety
Veiligheid
Secondary Second
Sekondêre Tweede
Settling Tanks
Besinktenks Tenks waarin die besinking van slyk plaasvind
Sludge Drying Beds
Slykdroogbeddings Beddings waarin slyk gedroog word
Store Room
Stoorkamer Kamer vir die stoor van toerusting en benodighede
Supernatant
Bowater
Supervisor
Toesighouer
Tertiary Treatment
Tersiêre behandeling
Vortex Degritter
Draaikolk ontgrinter Tipe ontgrinter waardeur growwe materiaal en grint deur besinking uit riool verwyder word

Congratulations !!

YOU HAVE COMPLETED THIS WORK BOOK

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