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OFFICIAL JOURNAL OF THE WATER INDUSTRY OPERATORS ASSOCIATION

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WATERWORKS

OFFICIAL JOURNAL OF THE WATER INDUSTRY OPERATORS ASSOCIATION

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IMPLEMENTATION - THE MISSING LINK IN WATER QUALITY

Guidelines and Regulations, HACCP Plans and Risk Management Plans are all relatively new initiatives to try to ensure that safe, aesthetically pleasing water is delivered to consumers at all times. All too often they remain simply that, Guidelines, Regulations and Plans.

Peter Mosse

How many I wonder can put their hand up and say they have read the *Australian Drinking Water Guidelines, Framework for the Management of Drinking Water Quality* from cover to cover? How many managers can say that their utility has truly embraced

the ADWG and Framework as their guiding document and management system and taken the steps to ensure that all the good words and intentions are actually realised on the ground, in the treatment plants, disinfection sites, depots and work teams? How many operators have started to use the concepts promoted in the Framework to modify the way they operate and monitor their plants?

The reality on the ground is often quite far removed from the intentions of the plans and regulations and guidelines. While some Utilities are making a genuine effort, many do not appear to do so. Operators are often not fully or adequately trained. Training

Continued over page

Our Cover: Goulburn Valley Water operator Sarah Angel carries out a solids test at the Actiflo wastewater plant in Shepparton, Victoria. The plant operates during the winter period to remove phosphorus from effluent for return to the Goulburn River. During summer months the effluent from the lagoons is irrigated to trees, crops and pasture.



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Continued from previous page

courses perhaps don't emphasise the new level of operation necessary in this country to bring about the changes required by governments and expected by consumers. Treatment plants are run by operators who haven't completed basic water treatment training courses available at many sites around Australia. Field crews often don't have any training in water quality and distribution system management for water quality. Operators running disinfection plants often lack training in disinfection. Of course, many operators have undergone thorough training in these areas but often fail to implement many of the key points of that training.

An example is relevant, I wonder how many treatment plant operators know their filtration and backwash rates and know that their filters undergo adequate bed expansion for backwashing? All too often the assumption is made that if the backwash water runs clear the backwash is adequate. This is only the case if bed expansion is adequate. At a recent plant audit, a filter was found to be retaining

relatively large amounts of sludge in the media even when the backwash water was clear. How often is the filter media inspected at WTPs around our country? Without such inspection the suitability or otherwise of the backwash cannot be assessed.

Then of course there is disinfection. How many utilities base their disinfection on Ct requirements and check that this actually occurs? How many operators are comfortable dealing with Ct? How many contact "structures" actually ensure that ALL water is disinfected to the same Ct all the time?

Professor Don Bursill once voiced his frustration to me that the industry wasn't striving to get the best out of their systems and was settling for second best when the work of the CRC and other research groups clearly showed the way forward.

We need to fill the gap in the jigsaw. We need to make sure that operators are trained to the level necessary to fulfil the operational requirements of the current decade. We need to make sure that operation of the plant is elevated to the highest priority. Too often, conflicting

requirements on operators time means that the higher level operational requirements are not attended to. OH&S, ESC and other reporting, budgeting and supervising contractors regularly compromise plant operations. We need to ensure that training courses are relevant and up to date and teach people what is required but more importantly to give them the confidence in their training to implement the activities taught. Utilities need to nurture operators through the difficult initial period as they start to try to implement more advanced plant operations. Mentors need to be provided to facilitate this. Simply attending a training course does not translate into implementation in the field. HR managers and operations managers need to ensure that the training actually brings altered levels of operation into the Utility. CEOs need to be sure that what is said to be done is actually being done.

Implementation is required. Operators cannot do it alone but need training, support, mentoring and feedback. Let's make the commitment to implementation at the field level and all ensure that it is happening. In the wisdom of the ADWG Framework for the Management of Drinking Water Quality, Element 1 was identified as Management Commitment. What was inherent in this element and in Elements 11 and 12 encompassing Audit of drinking water quality management and Senior Executive Review, was to ensure that the continuous improvement steps and management framework were actually implemented at the work place; and in operations that means, plants, depots, disinfection sites and the distribution system.

Peter Mosse Ph.D.

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FROM THE EXECUTIVE OFFICER'S DESK

As with all Associations, communication with our Members is very important. Some of the visions, processes and reasons for the resultant actions implemented by the Committee may not be quite so clear to all our Members. This is particularly true for an organisation like WIOA which has experienced a rapid growth in Membership recently. In writing this, I want to take a brief step back in time, and then talk a bit about the future in the hope of providing a more complete picture of where the Committee sees WIOA going. Some of this might appear a bit "Victorian" centric but keep in mind things are changing rapidly and we only expanded Nationally very recently.

The Association has undergone an amazing transformation from where it first started as a small Victorian (wastewater only) group in 1973. It has progressively evolved into the broad based and vibrant entity that it is today. It is also notable that the water industry, the technology, the staff and the expectations of the stakeholders and regulators that we all answer to, have also all changed at a rapid pace.

When the Association started off back in the "stone" age of the water industry, there were no formal training programs and all the necessary process knowledge was passed down the line through on-the-job experience. Recording of data was paper based (if at all), there were no computers, no detailed operational manuals, little if any direct assistance from management, no networking opportunities, no resources and certainly little or no recognition of the important role of the "Operator". Little by little, the work of our Association founders, followed by that of subsequent Committee's, has played a part in helping the industry to change all this.

The early Association work was mostly behind the scenes with the formation of the Water Training Centre in Werribee a direct result of consistent lobbying. In terms of benefits, Members received an infrequent newsletter, generally only 2 or 3 pages long, and not a lot else. In 1989 the then AWWOA Committee took on the role of organising and running the annual Victorian Water Industry Engineers and Operators Conference. This was a major step due to the time and commitment involved, but it was also a defining moment in the development of the Association. In 1989 there were something like 100 delegates and for the first time a "Trade Exhibition" with 5 companies



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present. The fact that we have been able to grow the conference to its current size, and run it with a totally voluntary Committee (up until 2005), has been an amazing effort. The success of this event is the envy of many other organisations.

The mid 1990's saw some major issues for AWWOA. Amalgamations in Victoria of around 200 water businesses to leave just 23 led to reductions in staff numbers in many areas and in the main, the people who departed the industry were traditionally the strongest supporters of the Association. At one point in 1994, the Association had less than 90 Members and had less than \$5,000 in the bank. As the new bigger Water Boards continued tightening their financial belts, the prospects for future conferences and events looked grim. A few of the Committee actually met in Lorne and discussed what we would do with the remaining money when the Association folded!

Out of this dire situation came a resolve to move forward in a positive manner and to give our best shot at rebuilding the Association so it not only enjoyed its former status, but was seen to be making a solid contribution to the improvement of operators and the industry in general. Looking back, it was obvious nothing proactive had been implemented to engage the newer people coming into the industry and the reliance on the "same old" products and services was clearly not appropriate. The need to build value into being a Member forced the Committee to become active in areas outside just the

newsletters and the occasional seminar.

A quick check of our records shows that many new initiatives have been added since the late 1990s. Some of these include:

- Publication of our Journal *WaterWorks* within the AWA *Water* magazine twice per year;
- Publication of the Monthly e-news from June 2005;
- Addition of the website, regularly updated and full of papers, training, job ads and other useful info;
- Creation of the distribution and other operator focussed seminars;
- The charity golf day;
- The addition of Operator poster papers and prizes at the conference;
- The Kwatye Prize;
- The IWA Prize of an overseas trip; and
- The distribution of information to allow operators to access external and internal training & other events all designed to better themselves if they wish to participate.

Include with these access to the free weekend seminar, the 4 editions per year of the now 8 page glossy *Operator*, and the annual conference including all the prizes which have eligibility restricted to operators, and we think 2006 Members receive much more than they did compared to say 5 or 6 years ago. There is no doubt that Members receive exceptional value for their \$15 annual fee.

Another recent "defining moment" was the Committee decision to expand the Association Nationally. This was one of many outcomes from a strategic directions workshop held in Bendigo in 2000, to which all Members were invited. We had tried for many years to encourage operators in the other States to develop "Branches" but they could not muster the committed people with the necessary time to get things going. By going National ourselves, we are now setting up and administering operator support groups in all States that clearly would never have happened on their own. We also now have the opportunity to access and collect even more information, tap into more people and share the good work that is being done right around Australia with operators in all States. This will have flow on benefits to operators Australia wide in the longer term.

To safeguard the viability and future of WIOA in this National roll-out, a Heads of Agreement has been developed between

AWA Federally and WIOA which sets out how the two organisations will interact into the future. We see the collaboration of our two organisations as being complimentary to one another and between us, we can now service the entire urban water industry very effectively. We are already working on some shared resource development initiatives and hope to expand this in future.

The growth in Member numbers in the past 4 years has been staggering and we predict it will continue as we become better known on the National front. We currently have more than 530 individual and over 110 Corporate members. Although many of our most recent new Members have come from Interstate, the promotion of the benefits of membership by existing members has been an important factor in this growth. Keeping membership affordable is one of our priority areas. We have been able to keep Membership fees at \$15 when we estimate that the true cost of providing all the listed services to each individual Member is around \$40 per year.

The spin off from all this growth in responsibility and member numbers is the need for more than just a voluntary Committee, hence the appointment of yours truly as Executive Officer. The growth of the Vic conference alone was one of the main reasons for employing an EO - there was simply too much work to be done by volunteers who all have other jobs into the bargain. Add to this the Qld and other operator focussed initiatives in all States and as you can imagine, the workload has become quite substantial. Having an EO has now eased the conference related workload from the Committee providing more time to devote to other operator based issues.

Having said this, we at no stage saw ourselves as just a "conference committee". Apart from all the things listed above, WIOA has a strong interest and involvement in the development and review of the Water Industry Training Package and now has representation on numerous National reference groups working on a variety of directly operator related issues. We have become a strong voice for the grass roots operator in places where operators did not have a say or where our issues were not previously recognised.

So where do we see the Association going in the future? We have many priorities, with number one being to maintain and even expand the existing range and scope of services to our Members, and at an affordable price. In summary our other aims are to continue our collaboration and further strengthen our working relationship with AWA; to maintain a proactive and strong interest in all issues concerning the operational side of the industry; and we intend to foster the further development of the Training Package and in turn the resources available to provide the industry with a trained, highly skilled, competent and committed workforce. The logical next step from here is to determine if there is an industry need (or desire) to implement an operator registration program similar to those in the US, Canada and NZ to ensure the continual improvement program can be maintained in future.

Although the definition of the term "operator" and their needs has changed significantly from the mid 1970's, WIOA has demonstrated an ability and commitment to remain relevant to our Members and has been able to successfully move with the times. This evolutionary process will continue in the future and the services our members require and the way the Association looks in the future may be completely different to now, but at all times we will hold that group we affectionately know as "operators" as our No 1 priority.

The Author

George Wall is Executive Officer of WIOA.

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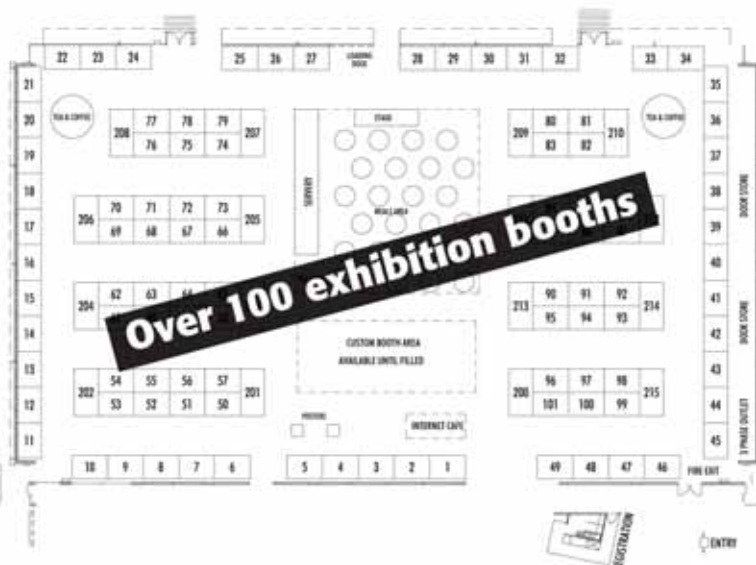
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WATER INDUSTRY TRAINING PACKAGE REVIEW UPDATE – MAY 2006

The first round of national consultations conducted to support the redevelopment and enhancement of the Water Industry Training Package has demonstrated high levels of industry support for the project.

The existing units within the Water Industry Training Package NWP01 form a strong base from which to work. However, there is a need for further enhancement of these existing units to reflect the real and necessary work functions within the industry.

In addition to updating and enhancing existing units of competency, the project team are in the process of developing new units of competency to address some of the identified gap areas in the existing Training Package in areas such as trade waste, hydrography, disinfection, fluoridation, meter reading, responding to emergencies and working effectively in the Water Industry to name just a few.

The first drafts of the enhanced 'existing' units and 'new' units along with a draft of the proposed Qualification Framework for the Training Package will be available for industry comment and feedback by mid May 2006. This process will, however, be ongoing as new and enhanced units will be loaded in batches as they are completed.

For the success of this project, the development team will be relying on industry feedback and comment. This feedback is not restricted to Training Managers and Human Resource Managers but to all operational people in the Water Industry eg: Operators, Technical Officers, Specialist Officers, Engineers – basically anyone who works in or for the Water Industry.

To view the draft material, you are encouraged to regularly visit either the

dedicated NWP01 website (<http://www.groups.edna.edu.au/course/view.php?id=416>) or the Government Skills Australia website (www.gsaisc.net.au) so that you can check on the most recent units that are available for feedback. From these websites, you will be able to easily view all draft material as it becomes available and download a feedback from which you can either email or fax back to the project team. For industry stakeholders who have registered with ALGT as a member of one or more of the Projects Specialist Industry Advisory Groups, advice and links to this material will be forwarded automatically as the material is developed.

For further details or to register as an Industry Advisory Group member, contact Joan Whelan at ALGT on Ph: 03 9349 3911 or email joan@algt.com.au

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WHICH PUMP?

Heath Seuren

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Which Pump provides a technique that simulates a pump's performance as its hydraulic efficiency declines over time. As with any mechanical equipment a pump's performance deteriorates over time due to wear. Calculating power consumption based on a published performance curve without taking into account deterioration will cause an inaccurate, underestimated assessment of power consumption and provide no credible indication of maintenance requirements. The software

offsets maintenance costs to restore the pump's efficiency and determine the most economical balance between power consumption and maintenance costs.

Which Pump software program allows the design engineer to submit a pump's performance curve, service interval, motor & VFD efficiency. This information is used against the client's duty requirements which can be estimated or derived from data recordings at an existing site using a SCADA upload option. As the program is purely mathematical, brand names & supplier relationships are not taken into account. Instead you end up with the most economical solution for your application.

Which Pump has been developed by an independent company and is not aligned with any pump or other equipment manufacturer. Independence allows any supplier's pump, motor & VFD to be accurately compared using the same methodology so you can determine the pumping system that best suits your application.

The *Which Pump* software program is an online service that can be accessed via the web on www.whichpump.com

The Author

Heath Seuren (heath.seuren@whichpump.com) is a director of Which Pump P/L and can be contacted on 1300 558 645 or 0422 689 181.

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PIGGING THE LOBETHAL RISING MAIN

Sue Lefebvre

Judged Best Paper at the Inaugural SA Operators Conference, April 2005

Background

Wastewater from the small town of Lobethal (population 5,000) in South Australia, is collected at one pump station and pumped 7.5 kilometres to a lagoon-based wastewater treatment plant (WWTP). The long rising main often burst at environmentally sensitive points leading to a number of significant environmental events. Approximately seven bursts occurred annually. Although sections of the main were programmed to be replaced, pigging was a short term solution to relieve pressure in the main.

The main is 200 mm cast iron, rubber jointed, laid in 1964.

The diameter increases to 250 mm where it becomes a gravity main some three quarters of the way to the plant. The volume of the main is 238 kL. The design pressure of the pump station is a static head of 74 metres, an operating head of 105 metres and a surge head of 154 metres.

The lowest points of the main are at the creeks and drainage lines traversed by the main, the most significant being the Onkaparinga River, one of Adelaide's major catchment rivers.

The low points are where pipe failures occur. See map on this page.

Diagnosis of the Problem

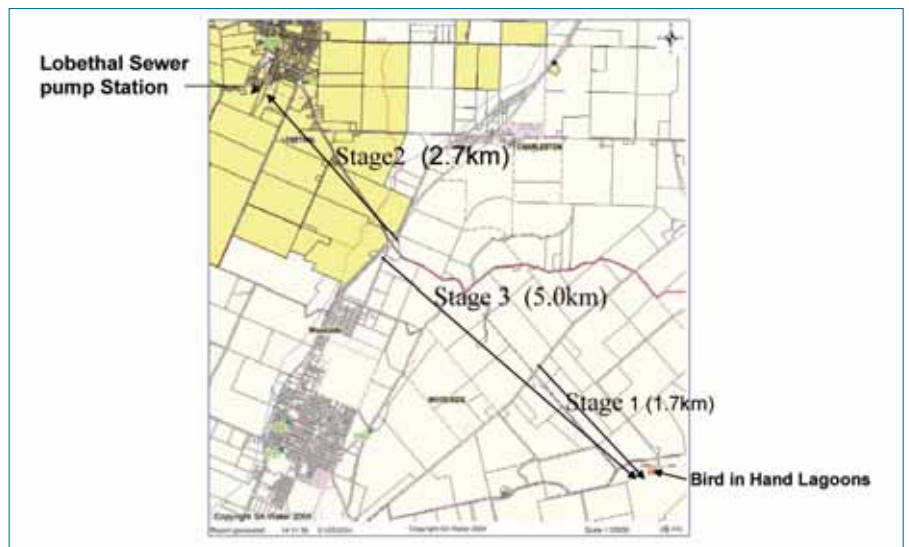
Sections of the pipe removed during repair revealed the internal mortar of the cast/cement lined pipe to be soft and sandy, with no residual alkalinity, and varying from 0 to 6 mm in thickness.

The internal diameter of the pipe was also found to be severely restricted as a result of build up of sludge and corrosion products.

The pipe failures were a result of local external corrosion and pressure surges which caused the pipe to crack longitudinally at its weakest point.

Possible Solutions

An obvious solution to the problem of bursts is the replacement of sections of the main, however due to the sludge build up it was decided to pig the main. In addition the opportunity was taken to fit a pressure sensor so when a burst occurred the drop in



Pigging stages.

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pipe pressure would cause the pump station to shut down thus minimising environmental spillage.

Once the decision was taken to pig the main there were numerous considerations to be taken into account. These included:

- The volume of potable water needed to push the pig/s the entire 7.5 kilometres.
- The need to break the job into sections and do the pigging in 3 stages. We also took the opportunity to install valves where we broke into the main so that the whole rising main did not drain back to the pump station or the location of a burst if a burst did occur.
- Storage of incoming raw wastewater during the pigging exercise. Obviously when the pig was being pushed up the main with potable water (to minimise environmental damage if a burst occurred) incoming raw water from the town needed to be stored. The pump station is a decommissioned WWTP where 5 hours raw sewage could be stored in the 750 kL emergency storage. Part of this volume was used for the storage during the pigging. The entire volume could not be used in case there was a burst during pigging and we had to factor in the time taken to repair a burst in the past.
- Could the WWTP handle the extra sludge loads? SA Water had planned to desludge the lagoons so the extra load of sludge was factored into the planning. Based on the thickness of the coating on the main, an estimated 85 cubic metres of solids would be pushed to the treatment plant.
- All land owners who had the main through their property needed to be notified as did the local Council. Following all the planning, the final details were submitted to the EPA. They were advised of the dates and came to have a look at the job when it was underway

The Pigging

The pigging was carried out by Macro One, an Adelaide based company with considerable pigging experience. The company undertook a risk analysis and developed procedures in conjunction with SA Water.

Since a considerable volume of water was needed to push the pig through, the whole job was broken into stages, starting at the farthest third from the pump station then going back towards the pump station away from the Onkaparinga River.



The pipe before pigging.

Since the available pumps could not supply the pressure to push the pigs through the network a fire truck pump was used to supplement the pressure. In addition since reticulated water was not available for one of the stages a system was developed using a sealed container of water. This method once developed was used for all the stages.

Launch sites were chosen for ease of access and location of stop valves so not too much of the line had to be drained when we broke into it to install a pig launcher.

The job continued over a period of eight days since there had to be a gap between each of the stages when the stored wastewater could be cleared to provide an empty storage for the next stage when the pigs were in the system.

Each stage consisted of two to three piggings whereby we started with soft pigs

then graduated to pigs with a more scouring effect.

A liquid waste removalist was used to dispose of the wastewater and refill the water container. They were placed on-call for the duration of the pigging.

Outcomes

As a result of the pigging, flows through the rising main increased by more than 20% with an associated reduction in operational pressures. There have been no pipe failures due to corrosion and pressure surges in the 14 months since the pigging of main. This translates to no environmental incidents during this period also; a very pleasing outcome for SA Water.

The improved pumping efficiency has also resulted in a reduction in pumping costs and savings in overall operating costs.

The project was partially completed within budget (\$22k for Piggig Contractor) however the SA Water component of \$15 k Labour and materials was over by \$7k due to the amount of time we had between stages and the fact that the pigging went over a weekend.

The Authors

Sue Lefebvre (Sue.Lefebvre@sawater.com.au) is the Service Delivery Manager of Metro Operations for SA Water and **Mario Capasso** (Mario.Capasso@sawater.com.au) is the Area Coordinator Woodside for SA Water.



The "pigs".

EZY LIFT CHLORINE CYLINDER TRAILER

Peter Huggins

Handling and cartage of 70Kg chlorine bottles was identified as an OHS issue at Goulburn Valley Water, and in particular posed manual handling risks.

Traditionally, cylinders had to be laid in a rack on the back of the ute. Full cylinders weigh approx 140 kg and moving them in and out of the ute exposed the staff to unacceptable risk of injury. The need for a safer and more effective system was identified and GVW committed resources to rectify the problem.



The concept for the design of an "Ezy Lift" trailer was developed by Peter Huggins, in consultation with other GVW staff and a local contractor - Trevaskis Engineering from Tatura.

Key Design Issues

The designs and features of existing trailers, both within GVW and at other water Authorities, were reviewed. An amended design was developed by GVW in conjunction with Trevaskis Engineering ensuring that the best features from all units were incorporated.

After completing a preliminary design, estimates of the required materials and construction costs were completed and the concept forwarded to GVW senior management for approval.

The unit was required to achieve the following:

- It had to limit manual handling and allow secure transport of cylinders;
- It had to fit into the frame of a 6' x 4' trailer;
- It had to be suitable for use at a range of different work sites;

- It had to be able to place cylinders on to varying ground levels;
- It had to be able to lift 2 full cylinders to a height of approximately 1.2 metres; and
- It had to be compliant with the Dangerous Goods Regulations.

The design was recognised as providing a significant reduction in OHS risks and budgetary approval to construct a unit was attained.

How it Works

Full cylinders are walked to the edge of the cradle and secured. A single manually operated hydraulic ram with multi function control is used to lift the cradle from the ground.

The cradle is then lowered to the floor of the trailer also using the same hydraulic ram. The ram ensures that the cradle is lowered slowly and safely.



The loaded trailer can then be taken to the various worksites.

Once in the correct position, the trailer can be unloaded using the above steps in reverse, simply by changing the direction of oil flow in the ram.



The unit has the ability to lift the cradle to the height required for the individual worksite.



After unloading, the cradle is then lowered to the floor of the trailer.



The cost to construct the first unit was approx \$6,000 including approx \$2000 for the design. Subsequent units have cost around \$4,000.

There have been no manual handling incidents reported since the introduction of the "Ezy Lift" system. The staff have embraced the new system and Goulburn Valley Water has significantly reduced its OHS risk in this area, providing a more effective and safer workplace.

The Author

Peter Huggins (peterh@gvwater.vic.gov.au) is the Maintenance Coordinator for the South West Region of Goulburn Valley Water.

This article was originally produced as a Poster paper and won 3rd prize at the 2004 Victorian conference. It has been expanded to suit this format.

IMPROVED SOLIDS REMOVAL FROM SEPTIC TANKER DISCHARGE

Tony Heagney & Annmarie Tracey

The Ballarat South Wastewater Treatment Plant (WWTP) is a full Biological Nutrient Removal facility, treating an average of 19ML/d of domestic and industrial wastewaters. The plant also receives deliveries from six septic tank companies working in the Ballarat area. The amount of solid material being delivered by the septic tanker companies from the domestic septic tanks and the Authority's sewer pump stations were causing problems at the inlet works with blocked pipes, odours, large amounts of rag entangling the valves in the tank and further down stream, eventually causing damage to the Archimedeian screw pumps. The plant operators were noticing that the screw pumps were being damaged by the large pieces of grit being lifted by screws. This was increasing the maintenance work required to keep the screw pumps operational and reducing the life of the asset (less than three years old). The odour from the septic waste remaining in the tank for long periods of time, whilst the tank was being unblocked, was also becoming a problem. Unblocking the tank was another cost to Central Highlands Water (CHW) as a large amount of the operator's time was required to help the septic tanker operator manually remove the solids from the pit. The design of the tank also did not make it easy to remove blockages or clean.

Trials

The situation could no longer continue, so the plant operators began to try some different types of screens and analyse the solids entering the plant from the septic tankers, to see if they would make a difference on a limited budget.

Trial 1

In this trial the maintenance crew made a stainless steel bin with a 20 mm spaced grate on the front and connected this to the tank. This was trialled for a couple of weeks and a few hurdles were encountered. This included significant manual handling issues, the bin was working well and was capturing some of

Previous System



New System



the solids but the problem of how to empty the bin which was partially suspended over the tank was difficult. The design of the bin also could not handle the flow from the tankers, creating more mess to be cleaned up and increasing the

amount of time the tanker driver had to spend on site. So armed with the knowledge that the screen needed to be easy to maintain and keep clean, easy to remove the solids, able to handle the high flows from the septic tankers, less operator

intensive and not create more mess, the operators soldiered on to the next idea.

Trial 2

The plant operators went to some local suppliers (Ballarat Industrial Supplies and Innovative Conveying Engineering) and discussed what they wanted. The Operators organized another meeting with these suppliers, as well as the septic tank companies. Everyone agreed we needed some kind of screening device for the tankers to empty into prior to the waste entering the tank and that the screen should be able to handle flows from 8-10,000/litres in the shortest possible time as well having easy to use connection and disconnection points.

The type and size of screen was of great debate between the tanker driver's, operators and suppliers. Screen suggestions ranged from step screens, spiral screen (augers) and the drum screen. The drum screen was more robust and suitable for the amount of solid material to be removed from the septic tankers and was selected for the next stage.

Samples from each tanker were taken for one month to try and determine the amount of rag and the size of solids that was being delivered to plant. This information would then be used to determine the spacing size needed for the screen and the size of the bin to hold the solids captured on the screen.

These results indicated that from most tankers one wheelbarrow full of rag and solids was received, provided the septic tank was being emptied and maintained on a regular cycle. It was also found that if the septic tanks were not maintained correctly there would be two wheelbarrows of rags and solids. From the sewer pump stations that are cleaned yearly, we were receiving large amounts of solids, with varying sizes from half bricks down to quite fine sand.

To try and cater for such a wide range of solid material, Innovative Conveying Engineering trialled different sized screens from 5mm to 20mm. They found the 20mm screen provided the best results. Due to the large amount of rag they also tested different spray bars and sprays to keep the screen clean, optimising its performance. After all the trials were completed there was another meeting with the contractors, tanker drivers and operators, where all results were presented and the way forward determined.

The Way Forward Screen

The design of the screen was a drum type with 20mm screen and 19mm tee jet water sprays with a C.M.G electrical motor and gearbox. The material of construction was 316 stainless steel with 150mm cam lock fittings for the tanker drivers to connect up to the screen. A chute was fitted to the back of the drum screen to remove the solids into a wheelbarrow. A bin for solids collection was also situated at the rear of the screen. The photos show the previous and new septic tank receptacle set-ups.

Operation

Once the tanker driver had reversed up to the screen area and entered in their code, the boom gate would lift and the drum and water sprays would automatically begin. The tanker driver would connect the hose to the outlet of their tanker and the screening process would begin. The rotational speed of the drum was set at 30 rpm and was chain driven to allow the speed to be increased or decreased with a change of sprockets.

The drum screen was installed on the 27th April 2005 and after first use there were some minor issues with sprays, chute and tankers connecting to the drum. The operators and tanker drivers have worked through these issues with the suppliers and the system is now working better than expected.

The total cost of the system was \$26, 000, and an automatic cost and time saving has been realised in the reduced need to continually unblock and clean the septic tank receptacle by the operators. The septic tank operators also spend less time on site.

The Authors

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A clean hygienic approach

PUBLIC HEALTH IS YOUR RESPONSIBILITY

Annette Davison

Editors Note: While this paper emphasises the responsibilities of operational staff involved in the production and delivery of safe drinking water, the very same issues are applicable to operational staff involved in the collection and treatment of wastewater. Instead of public health our responsibility in the waste treatment area is to Environmental Health.

Introduction

The offenders are not being sentenced as the cause of the Walkerton water tragedy. They are being sentenced for their failure to discharge their public duty and thereby endangering the lives, safety, or health of the public.

The importance of all people involved in the water supply chain, particularly operators, has been emphasised in recent years with many outbreaks being ascribed to lack of judgement or care including:

- Miscommunication;
- Falsification of information;
- Misunderstanding of processes; and
- Misunderstanding of legal obligations.

Consequently, utilities need to be aware of their obligations in delivering water as part of their due diligence (Davison and Deere, 2005).

To understand your role as an operator in the delivery of safe drinking water and consequently, in protecting public health, you need to understand something of the law and different types of compliance.

Statutory compliance

Statutory compliance covers the following:

- A duty not to cause damage in conduct of operations
- Liability for any damage or loss as a result of negligent or intentional conduct
- Not engaging in misleading or deceptive conduct
- Compensation for an individual if they suffer loss or damages due to defective goods supplied.

Common law

Liability for negligent acts or failure to act arises under common law and covers the following:

- A reasonable person should reasonably foresee that their act or failure to act may cause harm;
- The person to whom the harm may be caused relies on the person committing the act or failure to act
- The act or failure to act takes place
- Loss or damage results from the act or failure to act.

Standard of duty

In a court case, a water utility might rely on "due diligence" as part of its defence. Due diligence implies that all steps have been taken to comply with obligations as well as the 'reasonableness test' i.e. what a reasonable person would have done in the same situation in the same industry.

As part of due diligence, many utilities, have sought certification to HACCP or ISO even though there is no statutory requirement to do so.

What Is Management Responsible For?

Unless exemptions are granted, utilities must comply with their statutory and legal obligations including:

- Ensuring that staff understands and adheres to obligations;
- Training staff in day to day operations and incident management;
- Ensuring that training and skill levels are appropriate to the position of the staff member; and
- Dissemination of information (such as benchmarking, seminar attendance, literature review) to ensure that emerging issues are appropriately dealt with in the operations of the utility.

What Are Operators Responsible For?

Walkerton is a small town of 4,800 approximately 180 km north of Toronto, Canada. In May 2000, many people

became sick and several died as a result of drinking tap water contaminated with bacteria – primarily *E. coli* O157:H7 & *Campylobacter jejuni*. Poor chlorination plant performance, a storm in the catchment and poor operating practices were found to be contributors to the contamination.

Stan and Frank Koebel were both "operators-in-charge" at the time.

Stan and Frank Koebel were charged with the following as a result of their actions/inactions in the Walkerton Outbreak:

Stan Koebel:

- Public endangerment for operating Well 7 without a chlorinator;
- Public endangerment for failing to monitor, sample and test the well water supplying the town of Walkerton;
- Forgery for falsifying the Daily Operating Sheet for Well 7 for May 2000;
- Using the false Daily Operating Sheet for Well 7 for May 2000 as if it were real;
- Breach of trust;
- Public endangerment for failing to notify the Ministry of the Environment (MOE) of the adverse sample results as reported to him by a lab on May 17, 2000; and
- Public endangerment for failing to notify the Medical Officer of Health (MOH) and the Public Utilities Commission (PUC) of those results.

Frank Koebel:

- Public endangerment for operating Well 7 without a chlorinator;
- Public endangerment for failing to monitor, sample and test the well water supplying the town of Walkerton;
- Forgery for falsifying the Daily Operating Sheet for Well 7 for May 2000;
- Using the false Daily Operating Sheet for Well 7 for May 2000 as if it were real; and
- Breach of trust.

While these charges initially carried a potential jail term of up to 10 years, a negotiated plea bargain in return for guilty pleas from the brothers, reduced the charges to “common nuisance” (risking public safety by failing to monitor and treat the water properly). This lesser charge carried a maximum penalty of a two-year jail term.

Frank Koebel was sentenced to nine months house arrest and Stan Koebel to a year in jail (Anon, 2005) and, as noted by Justice O'Connor, it was the lack of continuous monitoring and the inactions of the Koebels that had exacerbated the tragedy:

It is very likely that daily testing of chlorine residuals would have significantly reduced the scope of the outbreak.

(O'Connor, 2002)

Table 1 details some of the main specific points from the Walkerton case. (O'Connor, 2002 and *R. vs Koebel 2004*).

Although agencies also came under criticism, it is clear that Frank and Stan Koebel should have been aware of their responsibilities as well as the importance of chlorination as a critical control measure for protection against bacterial hazards in particular.

While Australia does not have legislation regarding operator responsibilities, Australian and Canadian legal systems derive from English common law so the Walkerton case is of relevance for Australian operators. As defined in the regulations to the *Ontario Water Resources Act 1990*, Stan and Frank Koebel were both “operators-in-charge”. Because of this designation, they were legally responsible for the following:

- Taking all steps reasonably necessary to operate water supply processes in a safe and efficient manner, in accordance with relevant operational manuals;
- Ensuring the processes were measured, monitored, sampled and tested, in a manner that permitted them to be adjusted;
- Ensuring records were maintained of all adjustments;
- Ensuring that records of equipment operating status were prepared and available at the end of every operating shift;
- Recording any service to equipment or equipment taken out of service during the shift;
- Recording departures from normal operating procedures during a shift; and

Table 1. Main Points from the Walkerton Case.

Area	Comment	Evidence
Training	Formal training was not undertaken	Both Frank and Stan Koebel were 'grandfathered' (on the job) in their training and neither were required to attend a course or examination because of this. <ul style="list-style-type: none"> • The vast majority of both offenders' training and knowledge of the water operation was derived from long standing PUC practices and its former manager.
Agency information	Information was provided & acknowledged but not acted on	All licensed operators of water distribution systems were informed by the MOE about the possible dangers from un-chlorinated water including that disinfection, to kill pathogenic organisms, was the most important step in any treatment process. <p>MOE staff spoke to Stan Koebel about the dangers of unchlorinated water and on at least three occasions, he was sent letters noting the risks.</p> <p>A 1996 MOE inspector's report referred to the bacteriological results for samples collected in 1995, and noted that <i>E. coli</i> bacteria ranging in numbers from 1 to 4 were present in one or more of the samples collected on three occasions. The report provided a minimum chlorine residual level that had to be maintained for all active wells at all times. Stan Koebel acknowledged receipt of the report, and promised compliance.</p>
Notification	Information was not relayed to the appropriate agencies	Where chlorination was required, the MOE and MOH had to be notified immediately if unchlorinated or inadequately chlorinated water was directed to the distribution system.
Sampling/monitoring	Sampling & monitoring were not undertaken in a systematic & honest manner	In 1994, operators were told that the primary purpose of sampling was to determine whether the water was safe for human consumption. <p>On some Monday mornings, the daily operating sheets would not have been filled out for the previous Saturday and Sunday, despite Frank Koebel having been paid for monitoring the wells that weekend.</p> <p>The PUC continuously and historically submitted samples with mislabelled locations.</p> <ul style="list-style-type: none"> • There were numerous examples of water samples taken from locations that did not exist and labelled as having come from addresses where the occupants had no recollection of any samples ever being taken. • A former employee often saw Frank Koebel take up to three samples from the same location, despite their being labelled from another source. <p>Twice in 1995, the District Manager of the MOE, wrote to Stan Koebel reminding him of the importance of an ongoing monitoring program.</p> <p>A 1996 MOE Inspector's report on the water distribution system in Walkerton noting that the Walkerton PUC was not complying with the bacteriological sampling and testing requirements outlined in previously sent documents was sent to Stan Koebel, Dr. McQuigge, Medical Officer of Health, and the MOE.</p>
Risks	Operators were informed of the risks	Frank Koebel attended a 1993 conference which included presentations on chlorination systems maintenance and proper distribution system record keeping. <p>The MOE informed licensed operators about the importance of properly monitoring, sampling, and testing the water. In 1987, they were told chlorination must be performed as frequently as needed, to ensure that an adequate chlorine residual was maintained at all times.</p>

- Recording unusual or abnormal conditions.

At the very least operators have responsibility to ensure that:

- Their actions do not compromise the production of safe drinking water at any time.
- They actively provide feedback to management when they are aware of shortcomings in the treatment sequence that may contribute to the production of unsafe drinking water
- They are alert to changes in the system that they operate within
- They act to produce water that is aesthetically pleasing

Further Reading

- Davison, A. and Deere, D. (2005) Risk Management & Due Diligence In The Water Industry. *Water*, May: 23-26
- O'Connor, D.R. (2002) Report of the Walkerton Inquiry: The Events of May 2000 and Related Issues. Part One: A Summary. Ontario Ministry of the Attorney General. ISBN: 0-7794-2558-8
- R. vs Koebel 2004* CanLII 48879 (ON S.C.)

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RETURN TO HELL ON EARTH, ACEH PROVINCE, INDONESIA

Dave Neru

Visions and memories flood back into my mind as I view photos I took of Aceh Province in the aftermath of the Boxing Day Tsunami. As I sit on a plane bound from Medan to Banda Aceh Airport, I feel excited, nervous and even apprehensive about what I am about to see more than a year on.

Les Collins and I were seconded to Oxfam NZ as Water Specialists, and sent to the devastated Aceh Province on January 3, 2005. We worked in the Province for a month, in water activities, military liaison, air movements' co-ordination, body recovery and any other jobs that needed to be done at the time. It was all hands on deck when there were not many hands to go around. I reflect on the year that has passed. Les and I have been affected by the experience in different ways, both of us both positively and negatively.

For me, I can say now that I value my family more and the time I have with them. I had procrastinated about setting a wedding date with my fiancé Jenni for over 10 years! The day of my returned from Aceh, I told Jenni that a decade long engagement was to long... and that this year, no matter what, we will marry. We did so on October 11, at my grandfather's village in Samoa.

On Boxing Day of 2005 it was made public that Les and I, and others that had assisted in the countries devastated by the tsunami,



Thousands of bodies lay everywhere, wrapped and unwrapped.

were to receive the New Zealand Special Service Medal for the acts. I rang Les and we talked about the experience and how we would like to return to see the progress. With the help of several water industry sponsors (refer list at end of article) and our employers, and the authority of Oxfam NZ, this dream became possible.

As the plane banks for the final approach to Banda Aceh Airport, I feel butterflies in my stomach. 'What is it going to be like?', 'How are the people coping?', 'What help is still required?' And the big one 'Did anything we do help?'.

Stepping off the plane, the first thing I notice is how quiet it is here. When I was last here there were no places to park aircraft. In fact the airport had to frequently close to incoming aircraft as there were no spaces left. Not now. From the chaos of 300 heavy aircraft movements

and about 400 light aircraft movements per day, the airport was down to its normal 5 heavies and half a dozen light movements.

Another thing that struck me was the lack of Military. The airport was the base for Indonesia's Military and all International Militaries that came to help. Now, no sign of any! -including the Indonesian Military, the TNI.

We were here for 10 days to view programmes run by Oxfam throughout the Province. Seeing the airport as it is now, I feel positive that what we were going to see is a country and people that have got on with the job, and life.

The devastated area of Banda Aceh City has now been totally cleared of rubble. This must have been a major feat in its own as I estimate there were thousands of cubic meters of concrete and general rubble. Reclaiming land from the sea is the only activity that has been carried out that you could relate to clearance. Buildings have been and are continually being built to replace the ones lost to the tsunami. It is unbelievable to see this area so clear and clean.

Banda Aceh City has returned to being a busy, thriving centre with most businesses up and running and doing good trade - just like any other typical Asian City. People here are smiling, children are going to schools, normal life continues and the cities infrastructure seems to be running well. There is purpose, excitement and hope for



Banda Aceh City - one week after the tsunami.



Banda Aceh City - clear of rubble and bodies.

the future in the eyes of the people we meet. Meulaboh, a city situated around 300 kilometres down the west coast from Banda Aceh is another city that has risen from the ruins although not as much as Banda Aceh. Development seems to be a bit slower here and I think it is due its isolation and access. However, as with Banda Aceh the shops are open and normal community activities are taking place. Les's package water treatment plant is still operational and supplying safe drinking water to around 2000 people and the same crew that he employed to build and then trained to operate the plant remain.

In between Banda Aceh and Meulaboh is a little village of Lamno. Here the community has come back with vengeance. Probably because of its size, both in population and geographically, it is further ahead than others. Many programmes are in advanced stages with local groups taking over full control and relying on outside assistance less and less. They are truly becoming self sustaining.

Oxfam run a number of humanitarian programmes with communities including providing grants so that individuals or



Lamno - Women working for themselves.

groups can start up businesses to earn income or provide starting capital for growing produce. With the grants, comes technical and facilitation support with the aim always for the community, groups or individuals to become self-sufficient. Most Non Government Organisations (NGOs) have a 3 year programme plan for the Province and I would say that in some areas the work will be completed by this time.

There are many housing projects throughout the Province. Houses are funded by NGOs such as Oxfam with the prospective inhabitants having a part in the design and construction of the dwellings. Grants are given to those who can not afford to buy land.

In general terms the water infrastructure in Aceh is up and running. However, reticulation assets in some villages and cities are still to be repaired. But unlike in Banda Aceh and Meulaboh City disaster areas, where almost everything was destroyed, decisions on the viability of repopulating the areas, and rebuilding, are yet to be made.

It was good to see small water systems using the same principles that I used while here during the relief effort. For example, the local water technicians and engineers continue to use sedimentation facilities at the source water intake structures. I was quite proud to see this. The more you deal with at the source in relation to contamination the easier treatment gets downstream.

The road infrastructure and network has been repaired, even if in some places the

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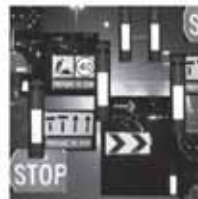
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improvements are still temporary. A road that I thought would never reopen is the West Coast highway from Banda Aceh to Meulaboh. But it is. A lot of this road has been taken over by the sea - in some places, up to 500 meters. In one section of the road you can see a road bridge 200 meters out to sea from the newly positioned road. Solid structural bridges have been replaced by Military Bailey bridges and to travel 120 kilometres it would take 2 hours.

There is however still some sadness. Around 60,000 people around Aceh are still living in Internally Displaced People (IDP) camps or barrack accommodation. They are living on the basics of life provided by NGO's. They are not very nice places and between 700 and 1000 people live in a single camp or barrack facility.

Long drop latrines and water tap stands are the standard water and sanitary systems. Tents that have been up for over a year are showing the signs of abuse from the elements, with up to 10 people cramming into them for shelter. There is no privacy. People want to get out but like all people of Aceh, they are making the best of what they have. Such courage, I have seen only here.

The reason most of these people are in camps or barracks is because these are people who have lost land to the sea or have come from out of the devastated area and do not wish to return. Therefore land has to be found for them and the Indonesian Government has to broker deals with current landowners. As with anything political, in any country, this process takes time.

Meanwhile, Oxfam and other NGOs are continuing to support these people and are standing by to assist them with housing, water and sanitation and income generating activities, when the time comes to move onto their new property.

After the scale of the disaster of the earthquake and tsunami it is incredible to witness how this country and its people have come back. I am in awe of these people and I am proud to have assisted them. What Les, I and other relief workers did is tiny compared to what they have done for themselves. A lot of these people lost everything, family members, possessions, ability to provide an income and more. Yet, they have not given up. They have moved on and started rebuilding their lives, for themselves and in memory of their lost ones.

For a second time, I leave Aceh, humbled after witnessing the courage and humility of these people. The real heroes that have come out of this massive disaster are the people of Aceh and the long term Humanitarian Programme support teams and people of NGO staff, who are out there every day trying to make life better for someone else.

Looking back now, it's not the 18 hour days and seven day weeks or efforts to preserve and sustain life that first enter my mind, it is the memory of witnessing the beginnings of a miracle.

Dave and Les would like to thank the following sponsors for their generosity: Water Systems, Opus International Consultants (NZ), Hynds, Marley and Plastic Systems.

The Authors

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Lamno - Housing Project



Banda Aceh City - still in camps and smiling.



Dave Neru (r) and Les Collins (back left) satisfied with what they have seen.

TRAINING OFFERED ON LINE

Kate Niblett

Since October 2005 a unique pilot program has been taking place in regional Queensland for water industry operators. Wide Bay TAFE, a small regional Institute located close to Fraser Island has been conducting training on-line for over seventy water employees.

Originally the program started with 30 SunWater (A bulkwater supplier in Queensland) employees who were located across the state. But the success of the program meant that it quickly spread to water utilities and regional councils.

The program covers both Certificate II and III in Water Industry Operations and is delivered completely on-line. Students can choose to study bulk water, water supply, waste water or construction and maintenance electives. The core modules cover areas such as OH&S, environmental procedures,

communication, team skills and customer service.

The program provides students with theoretical knowledge delivered in an interesting and engaging manner and provides activities to practice skills acquisition. The program is tailored to each student's individual workplace. Trained assessors are on-line or only a phone call away should students need assistance.

Regional employers have embraced the pilot project because it allows them to train their water operators without the need to send them away. This provides both a cost saving and eliminates the need to backfill staff away on training. Additionally, many employers have taken advantage of Federal Government funding for existing workers and entered them into a traineeship. This further reduces the cost of training.

Students engaged in training have found they only need very basic computer skills and have quickly navigated their way around the learning management system. They have also found a new network where they can compare practices with operators across the state. Many have commented on the advantage of having learning resources available when they have time to study not when it is convenient for a trainer to get a group together.

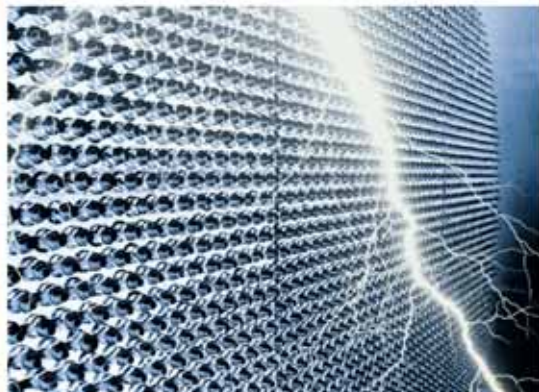
Further information on the training can be obtained from the author. Because the training is on line it can be accessed from anywhere in Australia.

The Author

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TREATMENT PLANT LOCK IN: YOU KNOW YOU SHOULD HAVE STAYED AT HOME IN BED WHEN...

Michelle Colwell

Ever had one of those days when you know from the minute your feet hit the floor that you should never have swung them over the side of the bed? I had one of those days recently.

There had been a power outage at home during the night, and because the backup battery in my alarm clock is next to useless, my alarm did not go off when it was supposed to. Given that I'm rather fond of sleeping, and my body clock doesn't seem to respond to daylight like most people, I was startled to discover my wake up call was from our Service Centre. This phone call was around about an hour after I should have woken up, and it was to advise me that the Water Treatment Plant (WTP) that I was looking after had failed.

Great. What a terrific start to the day. I figured that there was no point in rushing off to the WTP straight away because there should have been enough water already in storage to give me a bit of time up my sleeve. I made sure that I ate a substantial breakfast to ensure that my problem solving abilities were as sharp as they could be, packed my lunch box with lots of goodies to get me through the day, showered and then headed off to fix this broken down WTP.

I don't usually run WTP's full time, but I do get the opportunity for some hands on experience every now and again when the usual operator goes away on leave. This was the situation I was in, and as you can imagine, not being a daily visitor to the plant, I was not intimately aware of how every piece of equipment operated – especially doors.

Now let me just set the scene. Willow Grove WTP, like most of our sites, is in a relatively remote location. It's about 3 km out of town, on a really quiet road that has little if any passing traffic. The site is



The compressor room at Willow Grove WTP.

partially surrounded by bushland, and on this particular day, although bright and sunny, it was blowing a gale. Another pertinent fact is that despite the Government claiming that telecommunication systems have vastly improved in the bush, mobile phone reception at the Willow Grove WTP is notoriously unreliable, and this only gets worse once you're inside the steel shed which is the WTP building.

When I arrived on site, everything was very quiet – which meant that nothing was operating, so whatever had caused the plant to fail was a critical element in the treatment process. The air compressor was the culprit. It had been leaking a little bit of oil, but no more than any other compressor that I'd dealt with. I reset the compressor fault on the PLC touch screen, and the plant went into auto recovery mode (a ten minute time period) to allow the air pressure to build up to the point where the plant could start to operate. Ten minutes went by and the plant started to fire up. It ran for another ten minutes, then the compressor tripped out again and shut the plant down. Bugger!

This time I went into the compressor room. I could smell that the compressor was a bit warm, and there was a bit of oil on the floor, but this was no worse than other plants that I had been at whose compressors were running alright. This time I flicked the switch on the compressor to OFF, and then AUTO, then I went back into the office and repeated the RESET sequence. After 20 minutes, the plant failed again. Now I was starting to get a bit annoyed. If I couldn't get the plant started soon, I would have to call in the mechanical/electrical contractors to assist me, and they were at least an hour's drive away.

Now, being the stubborn independent type, I thought I'd give the compressor one last go before I hollered for help. I reset the fault on the touch screen, and then I went into the compressor room to see what was happening. The compressor was running, and the receiver was starting to build up pressure, when BANG!.....the wind blew the door shut. Now, ordinarily, this wouldn't be a problem. However, when I went to open the door to let myself out, I discovered I had a problem. When I turned the door handle, the snib didn't move, despite some fairly heavy coercion. Now, I probably forgot to mention that the compressor room at Willow Grove WTP is a **tiny little sound proof box** with no windows and with dimensions about 1.5m by 2 m. The room is at the rear of the plant, facing away from the road. It's pretty warm inside because there is little ventilation, and nobody can hear you scream!!!!!!

I did martial arts as a teenager, so I thought I'd try and kick the door open. I must have lost most of my technique over the ensuing years because my size 5 steel

caps weren't up to the job. I also body slammed the door quite a few times with my amply proportioned rear, but I was still unable to free myself. At this point in time I think I said "shit".

It was hot and noisy in the room, so I turned off the compressor at the power point. Now I could hear myself think! I was also sweating a bit after my exertion with the door, and the room wasn't getting any cooler, so I also took off my windcheater. Fat lot of good that did me though, as the place was so greasy and oily I wasn't game to put it down anywhere to sit on it, so I just leant against the wall.

Now – how the hell am I going to get out of here???? I pulled my mobile phone out of my pocket and was surprised to see I had one bar of signal. Unfortunately, that's all the battery I had left too. Now – who can I ring who is relatively close to Willow Grove who won't make a big fuss??

I had spoken to the Tyers WTP operator earlier on that day, so I knew he was at

work (not on an RDO), and he was about as close to Willow Grove as another operator could be (45 minute drive away). I rang Mark's mobile but it went straight through to Message bank. I left the following message "Mark – it's Michelle. It's 9:30am. I'm trapped in the compressor room at Willow Grove WTP. Can you please come and rescue me". As soon as I finished recording the message, my phone started beeping that it had a low battery.

About 5 mins later, Mark rang me back. He sounded really worried about me. "Are you OK? I couldn't hear the entire message. All I got was "trapped, Willow, rescue" – You sounded real upset." I assured Mark that I was OK, but that I couldn't get out of the compressor room. I think I was laughing a bit at the absurdity of the situation I was in when I left the message, and he thought I was hysterical. Mark assured me that he was leaving Tyers right away and would be at Willow Grove in about 40 minutes, so I sat and twiddled my thumbs and waited.

Mark rang again to reassure me that he was coming when he got to Yallourn North. I told him not to ring again as my phone battery was just about to die.

My knight in a silver Falcon ute arrived soon after and we had a cup of tea and a chuckle together about my misfortune. A large piece of bluestone beaching was quickly wedged in the compressor room doorway to prevent the door slamming shut again, and I lodged a maintenance request for the lock to be fixed immediately.

Now – I still had to get this plant running. I ended up calling the mech/elec cavalry, and after a couple of hours, we got the compressor to begrudgingly run again, and the plant started making water. So – after all that – it was just business as usual. All in a day's work!

The Author

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