

# EARLY OPERATOR INVOLVEMENT LEADS TO A SUCCESSFUL PROJECT



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# EARLY OPERATOR INVOLVEMENT LEADS TO A SUCCESSFUL PROJECT

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## ABSTRACT

The Tarago Reservoir was disconnected from Melbourne's network in 1994 because water from its open catchment was not suitable and the city's storages were about 90 per cent full.

In October 2006, with storage levels down to 44%, Melbourne's Water Strategy was released by Premier Steve Bracks, with one of the key projects being the reconnection of Tarago Reservoir to Melbourne's water supply system

In May 2007 with storage levels now down to 29.3% it was announced that land had been obtained for a new treatment plant at Tarago Reservoir in Gippsland.

In November 2007 construction was started on the Tarago Water Treatment Plant by a Joint Venture consisting of Baulderstone, United Group, GHD and Sinclair Knight Merz. Operators were recruited and assigned to the project during the early stages of the design. The Operators undertook extensive training, visited a number of WTPs and worked cooperatively with the Joint Venture to heavily influence the design of the plant.

The result of this early involvement by Operators in the Project, assisted in the treatment plant being completed 6 months ahead of schedule and \$3million under budget.

In June 2009, the day before Tarago Water Treatment Plant was officially opened, storage levels hit an all-time low of 25.6%. Tarago WTP and has been running relatively trouble free since then.

## KEYWORDS

Dissolved Air Flotation and Filtration (DAFF), Operators, Training, Design, Commissioning.

## 1.0 DISCUSSION

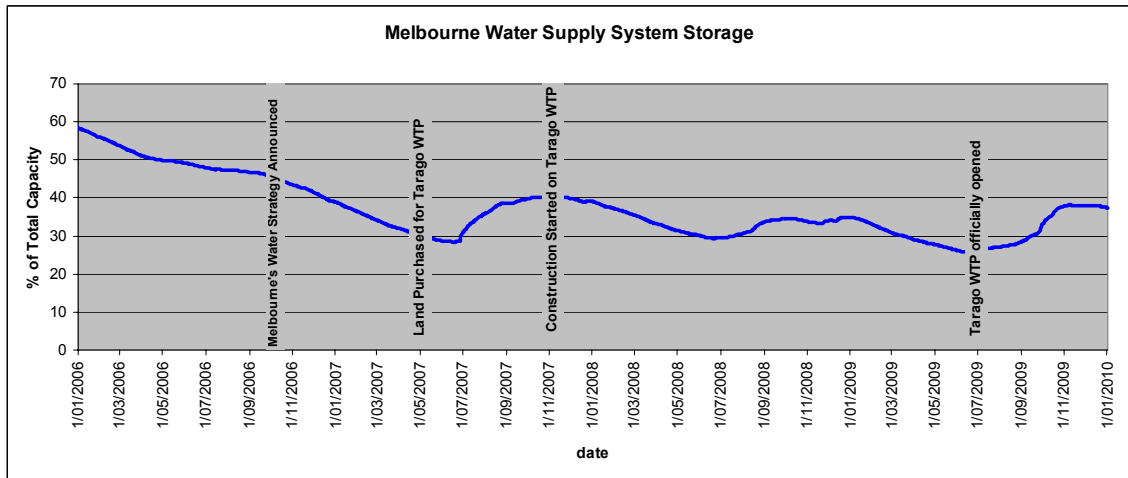
The majority of projects at water utilities with any significant design and construction component to them tend to be contracted out to consultants, due to a lack of available in-house resources. A side effect of the design work being conducted by consultants is that the design team is isolated from the client. Design work requires thousands of decisions to be made on all manner of things from pipe layout to valve types, to valve pit arrangements, and rather than pester the client on every detail the design team makes these decisions on their own based on what they think is best, from past experience, or what they assume their client would prefer.

These days consultation with the client and stake holders is usually built into the project process or written into contract documents, so it is undertaken to some degree. But for 'efficiency' a design is proceeded with, and once in 'draft' form, it is forwarded to the client for review and approval and/or discussion at a meeting. In this instance the client is hit with an overload of information that they have to absorb and respond to in a short period of time, because any time spent reviewing the design is a delay in the project.

On top of this, the Operators and Maintainers out in the field, the ones with the real knowledge, are often too tied up with their day to day duties to be able to take the time to thoroughly go over the design or attend the design meeting.

Melbourne Water has long sought to improve on this model and broke away from it for the Tarago Treatment Plant project. The success of this new project model so noticeable that we felt it was a story worth telling.

In October 2006 with the drought having already been affecting Melbourne for 8 years, with its water storage levels continuing to drop, Melbourne's Water Strategy was released by the Victorian Government. One of the key projects of the Strategy was the reconnection of Tarago Reservoir to Melbourne's water supply system. Unlike most of Melbourne Water's reservoirs, Tarago Reservoir has an open catchment containing agriculture and grazing.



**Figure 1:** *Melbourne Water Storage Levels and Key Project Milestones*

Agriculture in catchments can result in runoff potentially contaminated with nutrients, chemical residues, bacteria and other pathogenic organisms, so a new water treatment plant had to be designed and constructed, and new Operators would be required.

By May 2007 land for the new plant had been purchased, and design and construction could begin in earnest. A Joint Venture consisting of Baulderstone, United Group, GHD and Sinclair Knight Merz was formed to undertake the project. The plant was to be a 70ML/day Dissolved Air Flotation and Filtration (DAFF) plant, and as such would require a dedicated Operations team to run it.

The decision was made to recruit Operators for the new plant during the design phase, rather than wait until the plant was completed. While it was 18 months until the Operators had a plant to run, there was plenty of work for them during the design, construction and commissioning.

To eliminate the usual problem of the design consultant being isolated from their client, the Operators were based in the Joint Venture's office during the design phase. This allowed the designers to ask the Operators their thoughts, views and preferences on all aspects of the design.

Tarago was to be Melbourne Water's first DAFF plant, and only its second media filtration plant, so it was recognised that if Operators were sourced internally they would require training and up skilling. A team of four Operators would be needed to run the plant once it was operational. This team was made up of two existing Melbourne Water Operators that were enthusiastic, but had no filtration or DAFF experience, an externally sourced Operator with DAFF and filtration experience, and a Team Leader that would also help in the day-to-day operations of the plant until a trainee attained Certificate III and was deemed to be competent.

During the design phase the Operators attended the Water Training Centre to learn all about powdered activated carbon, potassium permanganate dosing, chemical coagulation, DAF, filtration, UV, solids thickening, sludge handling and any other processes that they had no previous experience with. This enabled them to complete their Certificate III in Water Industry Operations. Classroom learning isn't everything, so the Operators also visited a number of water treatment plants operated by other water authorities, speaking to the Operators and getting the real story on how to run a DAFF plant, the problems that can occur and the flaws or problems to try and avoid in the design of the new plant.

Construction started in November 2007, so the pressure was now on the design team to stay ahead of construction. A complex of site offices was set up, and the design team, constructors and the Operators moved from their city office, to the site at Drouin West. Personnel numbers on site peaked in excess of 200 during construction, providing a boost to the local economy – particularly the nearby cafes, eateries and hotels.

Whilst the involvement of the Operators was a great help to the design team, being so closely integrated with the designers, and being on site during the construction, the Operators developed an intimate understanding of how the plant was designed, how it was intended to operate, and how it was constructed.

To assist in the fast tracking of the project, a construction program was developed, then the design program was developed to ensure that each component was designed in time for it to be constructed. At times during the project, design was only two or three days ahead of construction, so decisions had to be made quickly and cooperatively. As with any project some compromises had to be made, but by having the Operators integrated into the design team, these adjustments were made with all parties fully informed and aware of the implications, so adjustments were only made where it was acceptable to all parties for them to be made.

This sort of collaborative design process could not have been conducted on such a tight time frame if queries and design drawings had to be emailed or faxed to operators, reviewed when they had time between their usual duties, checked by management and referred back to the designers.

As well as the Operators being heavily involved in the design, the Team Leader that had been assigned to the project had been authorised to make most decisions on the project. A former Operator himself, the Team Leader had extensive 'real' operations knowledge. For a person with 'real' operational knowledge, to also have the authority to make important design decisions on the company's behalf without having to refer back to senior management for every decision was a very powerful tool in keeping the project on its tight timeframe.

One area where the Operators had real input to make the future operation of the plant easier was the design of clear, user friendly SCADA screens. Designers may think they know what Operators want to see on a SCADA screen, but only Operators know what they really want. As well as easily navigable schematics, with ‘hot links’ from one to another, a number of calculations and figures were built into the SCADA system to reduce the number of figures that the Operators had to manually check and record on log-sheets each day.

Other areas where the Operators had great influence were in the fitting out of the lab, store and workshop and in ensuring the control room was large enough to contain SCADA terminals as well as desk space for all the Operators. As with many modern plants CCTV was installed for site security, but at the Operators suggestion, the positioning of cameras was altered to broaden their functionality to enable them to be used to help monitor processes at the plant such as the operation of the filters and the centrifuges and monitor chemical deliveries.



**Figure 2:** *Lead Operator Gary Anderson in the Tarago WTP Control Room*

During the pre-commissioning phase of the new plant, one of Melbourne Water’s contracted instrumentation technicians was also assigned to the project. As with the Operators, the ‘Instro’ was of great assistance to the construction and commissioning team. While developing a comprehensive understanding of how all the instruments were connected and behaved and their various problems, he identified and suggested alterations that could be made to improve their performance and the plant’s operation. The commissioning would have taken a lot longer without the Operators and the Instrument Technician’s input throughout this very important part of the projects phase. Some of the improvements that were recommended and quickly instigated by the Instro included de-bubblers on the turbidity meters, sample pumps on the fluoride analysers, additional filters on the pH analysers and additional sampling points for monitoring and calibration.

All these ‘minor’ improvements to the plant instrumentation dramatically improved the data being collected by the various online analysers, and the information that the plant’s PLC was responding to.



**Figure 3:** *Instrument Technician Scott Dinnage*

Additional stresses on the project were the Black Saturday bushfires on 7<sup>th</sup> February 2009, and DHS changing its Fluoride Code after design of the fluoride plant had already been completed. By Black Saturday many of the civil works had been completed, the frames of buildings had been erected, wiring and insulation had been installed, but the colorbond sheeting had not yet been fitted. With the help and dedication of a couple of hard working fire fighters (one of whom later gained the Operator traineeship at the plant), and some favourable weather changes the fire turned and we sustained no damage to any of the buildings, even though vegetation was burnt out less than 50m from the plant buildings.



**Figure 4:** *Black Saturday Fires Approaching Tarago WTP*

DHS had been reviewing their fluoride code for a number of years, and Tarago was the first new fluoride plant to be built in Victoria since the new code was released. Prior to the new code being released, the design for Tarago's fluoride plant had been submitted for approval by DHS. Construction of the fluoride plant proceeded according to the submitted design, however the new code was released prior to the plant being commissioned and subsequent to a DHS audit, some last minute modifications had to be made.

At the start of the project it was predicted that the Tarago water treatment plant would be finished by December 2009, at a cost of \$100 million. Due to the cooperative working relationship developed between Melbourne Water and the Joint Venture, the plant was officially opened in June 2009, six months ahead of schedule, and was completed for \$97 million - \$3million under budget.

As a result of the efforts and input to this project by our Operators, we've ended up with a very successful, practical, well laid out, and highly functional water treatment plant. Obviously this is a great outcome for Melbourne Water - the decisions made during the design phase will reap benefits for us as an organisation for many years to come. Importantly there is also another great benefit – ownership. The Operators have a strong connection and sense of pride in this plant, and this is reflected as they go about their work and manage the day-to-day operations of this new asset. Their achievements will leave a legacy for newer operators in generations to come – this is something that they can be very proud of.