

THE ALLIANCE PROCESS – AN OPERATORS PERSPECTIVE

John Paulger, *Wastewater Operations Coordinator* Toowoomba City Council

ABSTRACT

The Wetalla Wastewater Reclamation Facility (WWRF) is located at Toowoomba on Old Goombungee Road. The plant serves the entire City of Toowoomba, including a substantial industrial base supplying a large percentage of the biological load. Before the completion of the upgrade the site effectively comprised two separate treatment plants (Stage 3 and Stage 4), Stage 3 being a substantially modified trickling filter and activated sludge plant operated in an Activated Sludge (AS) configuration, and a newer Biological Nutrient Reduction (BNR) plant based on a variation of the Modified UCT configuration. Toowoomba City Council (TCC) identified a need to upgrade the WWRF in order to:

- properly manage increased loads generated within the catchment;
- meet effluent release targets, determined in cooperation with EPA;
- replace the substantially dilapidated Stage 3 facility; and
- establish treatment configurations to support increased effluent reuse.

The two principal drivers, in terms of determining the majority of the scope of the proposed works, were

- To meet the effluent release targets for September 2006; and
- To replace the substantially dilapidated Stage 3 facility.

The augmentation required effectively doubling of the Stage 4 Biological Nutrient Reduction capacity from approximately 120,000 Equivalent (EP) to 240 (EP). Key effluent nutrient requirements were for 5 mg/L Total Nitrogen and 1 mg/L Total Phosphorus. Influent phosphorus concentrations are in the range of 12 to 16 mg/L. Influent nitrogen concentrations are highly variable due to high trade waste component and range from 90 mg/L to 130 mg/L.

INTRODUCTION

In May 2004 TCC determined that a Project Alliance form of contract, including a competitive Target Outturn Cost ('TOC') development phase, would be best suited for the delivery of this project. This model was seen to provide a best value solution for the Council. The strategy adopted by TCC was to operate a single Project Alliance that would deliver a design, construction, commissioning and optimisation scope of work, including subsequent proof of performance testing and an 'extended' "defects liability period".

The main drivers for selecting this method of delivery being:

- The scope of the project was unclear;
- Political pressures were impacting on the project;
- The community and other stakeholder interests had to be met
- Technological changes were impacting on the project; and
- Unclear or changing government requirements had to be met.

What is an Alliance?

- An alliance project is where an organisation forms an alliance with one or more service providers (designer, constructor, supplier, etc) for the purpose of delivering outstanding results on a specific project.
- Alliance projects are different to partnerships, joint ventures, cost-plus contracts and performance incentives.
- The Wetalla Alliance was a “Competitive Alliance” meaning there were several phases to go through before the Alliance could be formed, the steps being:
 - First – Expressions of Interest (EOI) Phase
 - Second – Request for Proposals (RFP) Phase
 - Third – Alliance Phase

The components of the Wetalla Alliance Model were:

- Characterized by the 3 part compensation model:
 1. Direct Project Costs
 2. Project Fee – Corporate overhead and profit
 3. Key Performance Indicators (KPIs)
- Governed by an “Alliance Leadership Group” who had full authority in relation to the project. This group consisted of TCC and Alliance contractor senior representatives
- Day-to-day management of the project was by a streamlined integrated project team called the Alliance Project Management Team made up of TCC and Alliance contractor staff directly involved with the project
- Team members are chosen on a “best for project basis” and were required to make decisions based on the interests of the parties, not the organisation they are employed by.
- The alliance participants developed and committed to work within an agreed Project Charter.
- The project had established processes to ensure the team performs at the highest possible level and strived to achieve “breakthrough” outcomes
- Reimburse to the non-owner participants, 100% open book, subject to verification by audit.

The Alliance is in effect a new “company” comprising designers, contractors and TCC. Participants then work for this “company”.

DISCUSSION

So where does the operator fit into this project? In my case I was involved from the very beginning in mid 2004 when various sections and departments of TCC began meeting to develop a manual or a wish list of equipment, instruments, requirements and processes etc that we would like in the new integrated WWRF. These ideas, requirements and wishes which were put together with the help of an independent facilitator, eventually extended to over 130 pages. This manual was available to all parties that responded to the advertisement for EOI.

After the closing of EOI, three consortia were chosen to do presentations and be interviewed by the TCC selection committee of which I was a member, and this was a new and challenging experience for all of those involved. Once the EOI phase of the process had concluded we then had to select two parties to go on to the next phase, the RFP. The selection process for the two parties to continue to the RFP involved a full day of interviewing and scenario solving. The full team from the contract tenderers were required to be present on their allotted day and different scenarios were presented to different members of the team and they were then asked to select a team from all the people in the room and go

off to find a solution and report back in twenty to thirty minutes time. From these scenarios we made a judgement on how the person leading the scenario team was likely to react in a selection of team and b) solving the problem.

After each day the TCC team and the independent facilitator sat down and scored the individual performances on a scale of 1 to 10. These figures were then recorded in a spreadsheet and different weightings applied to different people according to their position in the team. This selection was played out over three consecutive days and at the completion the TCC members were mentally and physically drained as we were not allowed to guide the discussions at any stage although we actively participated when selected.

Once we had selected two consortia to proceed to the RFP phase the workload became much more intense. Both parties were now beginning to submit both drawings and ideas to the TCC for either endorsement or comment. This was happening on an almost daily basis and the TCC employees overriding concern was that we never at any stage divulged any clues as to what the opposition party was proposing. We could accept or reject their proposals and ask for more details but we couldn't at that stage make suggestions on how we thought things might work better.

One of the issues that we required addressing during the RFP phase was the safe removal of the diffuser racks from the current bioreactor. They were attached to stainless steel wires which were snapping when we lifted the racks for diffuser replacement. We attended a presentation in Toowoomba from one of the consortia where a solid bar lifting system was presented for approval along with several other drawings and ideas. Some days later in Brisbane we were meeting with the other tenderers and they presented the same drawings although with different drafting details. I know that this certainly caused the TCC members some anxious moments as we worried if somehow they had managed to get hold of one of the drawings that we had been issued. We held our nerve and it was not until the successful partners had been chosen that they knew they had both presented the same idea.

Setting Key Performance Indicators (KPIs)

One of the first tasks for TCC and the Alliance management team was to set the KPI targets for the Alliance. These KPI conditions were selected by TCC before the contract was let and there was a pool of \$500,000 to be split between the six KPI conditions. I was involved in the meeting that was conducted to set the measurement, Targets and Limits (\$ values), and this was where I finally became convinced that this Alliance format of contract would be successful.

We were setting the Commissioning Completion target for the project and an early completion date was suggested that was not far removed from the Business As Usual (BAU) completion date. A principal of one of the Alliance parties then got up and spoke about this not being a realistic target and that the idea of the KPIs was to set stretch targets to challenge the team. The eventual outcome for this target was moved out making it a more realistic stretch target rather than rewarding the KPI for a BAU result. The KPI that directly concerned me was the Operator acceptance of reliability and operability. This was discussed among operations staff and our initial decision was that 90% satisfaction was BAU and any less there was no money for the Alliance at all from this KPI. It was eventually changed to 70% BAU with a straight line sliding scale to 45% as the lower limit.

Job Safety and Environmental Assessment (JSEA)

For every activity on the site the personal involved were required to have signed off on a JSEA and only those who had signed off were authorised to participate in that activity. Some of these JSEAs were generic while others involving Operations staff and cut-ins to live sections were very detailed. The first JSEA that I was directly involved with was the fitting of a steel plate on the inside of the chlorine contact tank to allow the laying of pipe to the new clarifiers. I had done a job analysis of all the tasks required for the operation and from that the Site Superintendent and the Site Safety Officer had done up the JSEA.

On the morning of the shutdown for the job all the people involved were assembled and the Site Safety Officer then read out all the items that were on the JSEA. This took almost an hour to do and the shutdown time was only three hours but because the task included a confined space entry it was necessary to have all people involved fully aware of the all the dangers and what measures we had taken to reduce these hazards to an acceptable risk. Eventually we became comfortable with the format of these JSEAs and then came the first hurdle.

The task involved was a complete site power shutdown for eight hours while an interconnection was made between two major switchboards. Notification was given to the Environmental Protection Authority (EPA) that we were having this shutdown and the possible effects on the plant. The shutdown was during the day so there was daylight to work with and involved connecting bus bars into the currently used switchboard. Eight hours was the maximum time chosen because we had previously had a supplier power outage for this duration and the plant had recovered within a week. After about seven hours into the job it became obvious that we were going to run about an hour over. This was when management came along and started to get excited about the time overrun and wanted to see where we had documented our contingency plan. We did not have a documented plan, however we were monitoring progress throughout the day and were comfortable that we could get the job done. This prompted the formation of contingency plans for every JSEA that we did thereafter.

Electrical And SCADA changeovers

A problem that had been identified to the two consortia when they were initially doing the concept design was that the SCADA system we had in operation at the present time (Square D) was no longer being serviced by the manufacturer and that the system would have to be replaced. Of all the concerns I had with the project this was the one that gave me the most worry. The system had degenerated to the stage where if a problem occurred, the fixing of the first problem could generate several more and the entire plant operation relied on information that was generated within and transferred around this network including all the critical Callout Alarms. Thus a failure in the control system would be a disaster.

During the selection phase both parties agreed that it was a concern but with some careful planning the changeover could be done with minimum disruption to control and alarms systems. Once the Alliance contract had been decided one of the first jobs was to sit down with the Electrical Engineer and work out how the changeover of the system would occur and what way we would approach the task. The first task was to remove the active system from its mounting in the switchboard so that the new hardware could be installed, but at the same time the old system was still required to run the plant. We started moving across pieces of equipment that were not currently in use then testing them first for all the alarms to work then that the SCADA controls would also work. One problem that we had throughout the changeover was that the two alarm systems were not compatible so although the equipment was being controlled by the new SCADA system any alarms generated were required to be sent to the old system for transmission to the paging system. This setup continued long after

the changeover of the equipment had finished due to issues with the TCC paging system. This changeover occurred over a period of about four months while the civil work was being done for the new section and due to careful planning and diligent staff there was no disruption to the normal plant operation.

Equipment for the new section and upgrade

The original plant had been in operation for 10 years and all of the design issues that had been causing problems had been identified. In addition TCC had begun to standardize the equipment used throughout the various worksites. The Design Brief developed by the TCC team had a chapter 'Specific Plant and Process Issues' in which there was a section devoted to each part of the plant where we were able to identify any problems or issues that we had and what we had done to rectify the same or other possible solutions.

In the Design Development agreement, drawing and equipment lists were required to be submitted on a regular basis for endorsement thus we were able to review and comment on the type and quality of equipment being proposed by both consortia.

A case in point was where we were increasing the number of lime slurry dosing pumps from one to three and we had just purchased and installed a new unit. The documentation stated that, in general, similar equipment was preferred where additional units were being provided. In this case, it would be advantageous for the two new pumps to be the same as the pump already installed. Instrumentation was handled in the same manner with the TCC documentation identifying possible relocation and reuse options for some equipment that we considered needed upgrading with more accurate equipment.

Operation and Maintenance Manuals and Training

Operation and Maintenance manuals were delivered to operational and technical staff as the equipment was installed then a training program was delivered to all staff after the particular piece of equipment had been commissioned. The training consisted of a theory session in the training room then an on site demonstration of the piece of equipment in action. Some equipment was even disassembled for the technical staff to understand the finer workings of the equipment. The feedback from TCC staff is that the sessions were very worthwhile because in many cases they got to meet the people that they had only ever spoken to on the telephone.

Commissioning and Optimisation

The commissioning of the new and refurbished plant and equipment was, personally, the area of greatest uncertainty. For the commissioning of the new bioreactor, the biomass from the current reactor was pumped across over a 36 hour duration, and at the same time raw sewage was introduced. The physical testing of the equipment had been done previously as the bioreactor had been filled with reclaimed effluent, but it was the side streams such as the scum pump station and blower controls that caused concerns. The aeration blowers would be going on and off and the operator would not know if the commissioning was still in progress or if the aeration blower had failed because of a genuine fault. It was a difficult fortnight while actual control problems were sorted out as the operator was never sure if there was a genuine failure or someone was doing another check.

This uncertainty of responsibility eventually came to a crisis point in the operation and commissioning of the solar drying hall. There were two problems with the operation of the solar sludge drying hall. The first being that although there was a similar structure in South East Queensland our operation was fully automatic and the process manual for such an

operation had yet to be written, the second problem being that we had a backlog of digested sludge in the system that required removal. This was where the value of the Alliance contract became obvious. A workshop was quickly organized with all the parties, from the draftsmen and operators to the project manager and all in between, being involved. From this workshop, we devised a planned approach to how we would address the problem of reducing the sludge build up. At this stage we were operating 24 hours a day, 7 days a week and the staff were starting to become stressed, as it appeared we were getting nowhere. What was also adding to the stress was the fact the plant commissioning was still occurring elsewhere and this was causing the sludge process systems to shut down at unpredictable times. To facilitate this action a person from the Alliance commissioning team was appointed to direct the daily schedule of processing sludge and commissioning actions to minimise both downtime in sludge processing and delays in plant and pump commissioning. It worked very well.

We have now moved on from the commissioning phase to the two year plant optimisation phase and this is progressing smoothly. It commenced with weekly meetings and is now out to monthly meetings as outstanding issues are resolved and the plant operation is approaching optimum performance. An issue that has occurred here is the missed communications between the Process optimisation team and the Operation staff, and it is not because they do not communicate rather that neither asks the correct question. What we have been finding after the fact, is that what the Process optimisation team comes up with is what the operation team was doing previously, but the right question to get the desired answer had not been asked, and this was happening both ways. However we are still learning and striving for the best goals to optimise the Wetalla WWRF.

CONCLUSIONS

A great experience and one that is seldom available for an operator. Being involved from the initial Design Brief development to the delivery of the finished product has definitely given me a strong feeling of ownership, plus the fact that all of the issues that we detailed in the Design Brief were addressed, has removed the option of blaming someone else for process failure. The entire process involved many extra hours outside the normal working hours which were not paid, but the journey was for me also a journey of personal development and, learning the required people skills to be able to interact with all the different team members. This was helped by the regular workshops that were run, where many ideas were raised, some rather radical, but all were considered without losing the focus on the ideas and criticising the person who suggested it.

Another point that was raised was the missed communications, at times, between the different parties, mainly in the commissioning and optimisation phases. As we are now aware of this problem we are focusing on understanding where the questioner is coming from and that the answer might not be as obvious as first thought. A further point is that the operator cannot be separated from his normal daily routine to be specifically involved in the project. His input is most valued as it relates to the daily operation and this knowledge and coordination of activity is necessary when organizing cut-ins and changeovers.

The operational staff have received all that could be reasonably expected from the wish list that was developed in August 2004. It has therefore become obvious to me is that Operational staff should be involved from the very beginning because they can have such a positive impact on the final product, as evidenced at Wetalla.

Finally I have to thank my two assistant operators, Peter Orton and Neil Roberts without whose help I would not have been able to be so actively involved in the whole process.