

## 2009 KVID Focus Issues & Status Report

Periodically we like to communicate what's going on at the utility so that our residents can understand how we are spending your money and what benefit we are providing. This document describes what we've accomplished in the past 9 months.

### Planning

Each year the utility updates its five-year strategic operations plan, 10-year financial plan then creates its annual operations, and capital projects plan. The strategic operations plan is created utilizing several factors including:

- The economic climate,
- The consumer price index change (usually inflationary in nature),
- The 30 year capital equipment replacement plan,
- Infrastructure assessment plan,
- The availability of human and financial resources, and
- Any regulatory/safety requirements set down by the US EPA, Arizona Department of Environmental Quality (ADEQ), Arizona Department of Water Resources (ADWR), OSHA and other regulatory bodies.

This report covers the activities and accomplishments of the first three quarters of the FY '09 year (ending on June 30<sup>th</sup>, 2009).

### Focus Issue #1: Rate Change

Each year for the past four years the utility has reviewed the need for a rate change. Several critical factors enable us to control the utilities costs even in the face of rising costs and inflation, now and that is soon to come. We have found that for the coming year no additional rate increase will be required and if the savings we are planning for 2010-2011 come to fruition we may not require a rate increase the following year.

You might ask what are these critical factors and how we are able to accomplish these results. The answer was produced back in the early 1950's by W. Edwards Deming. At the end of WWII General McArthur invited Deming to assist in the rebuilding of Japan. Through Deming's methods companies such as Toyota emerged. Each year the Deming Prize is awarded to company's that have demonstrated significant advances in quality improvements.

Deming's System of Profound Knowledge helps us to see how complex organizations work. When we understand this we can then figure out what we have to do to get long-term improvements in quality and efficiency. Ultimately, organizations led by people who are guided by the System of Profound

Knowledge are likely to be much more efficient and successful than organizations which continue with the prevailing style of management.

The second critical factor is KVID's ability to extract the very best from its employees. The employees are empowered to make decisions and are openly invited to contribute their efficiency improving ideas and to actually implement those ideas. As a result of these practices KVID has managed to effectively improve efficiencies and to control and reduce costs in many important areas.

## **Focus Issue #2: Employee Retention**

### ***Retention vs. Recruitment Costs***

"All Business", a D&B company, states the following on their web site:

"The average cost of employee turnover is 25% of the employee's annual salary plus 25% of the benefits package offered. For example, if an employee's annual wage is \$35,000, the direct cost of turnover is \$11,375. These costs include administrative time and paper work, training costs, lower productivity, customer/client uncertainty and lower return on investment. High turnover rates adversely affect organizations in other ways, such as loss of institutional memory, diversion of management focus, diversion of peers to train new hires, damage to the organization's image and poor morale among remaining workers."

### ***The Crux of the Problem***

The KVID operators are not your typical certified water/wastewater operators. The typical operators in the industry are trained to manage the operation of utility functions while the heavy maintenance of pumps, blowers, sludge presses, valves, electrical equipment, other system appurtenances, and fabrication are left to specifically trained and skilled electricians, mechanics and millwrights. In the case of KVID both the operations and the maintenance jobs are handled by the same operators. This provides a level of efficiency that is not present in many other utilities. This also makes KVID operators very valuable and very difficult to replace (see Focus Issue #3 below).

### ***Evaluation, Analysis and Mitigation***

With the assistance of Dan Gaither, Public Works Deputy Director, KVID conducted a market survey in 2008 of other utilities in the Flagstaff area to understand the uncertainty of potential employee retention issues. The survey showed that our water operators were at high recruitment risk by other utilities in the area and in particular the southwest region. The retention issue was analyzed, dissected, and alternative solutions considered. With the assistance of the Coconino County Human Resources department and others this risk was mitigated

## **Focus Issue #3: Utility Technician/Operator Hiring**

### ***Job Description Creation***

Again, with the assistance of Mr. Dan Gaither, Public Works Deputy Director, the utility created a written mechanical aptitude test and updated the job description for a Utility Operator position that reflected the true requirements of the operator job. As a result of the Flagstaff market survey (which was extended to include all positions in utility) it became obvious that recruitment of the right person was going to be a long and difficult search.

### ***Finding and Recruiting***

The Coconino County Human Resources group assisted the utility with the redefinition, advertising, and recruiting program. Many, many applications were reviewed, interviews conducted and after a year-long search a very capable individual was inducted into the utilities work force bringing the operations group to full strength.

As stated in Focus Issue #2 finding the right skills was and remains vital to the continued efficient operation of the utility.

## **Focus Area #4: Forest Highlands Reuse Study and Pipeline**

### ***Wetlands Purpose & Construction***

Shortly after the Kachina Village Improvement District was formed the wetlands north of the village were constructed for the purpose of disposing of the reclaimed water generated by processing wastewater from the village residents. The reclaimed water is pumped to the evaporation ponds where it is removed by evaporation and transpiration by the vegetation in the wetlands. The Audubon Society, the Arizona Game and Fish department and KVID met to develop a plan for the maintenance and use of the wetlands by the residents, visitors and wildlife.

### ***The Feasibility Study***

A study, conducted by Brown & Caldwell in 2007, was undertaken to determine the feasibility of selling additional reclaimed water to Forest Highlands for use within their community. The first and most important stipulation was that the wetlands would be maintained for the use and enjoyment of the residents and support of wildlife before any water was sold to Forest Highlands. The results of the study indicated the reclaimed water was of a suitable quality that reuse could be accomplished and the level of water sales was estimated.

### ***The Updated Management Plan***

Forest Highlands, the Audubon Society, Arizona Game and Fish, and KVID met and agreed to create an updated wetlands management plan, which would

support the use of the wetland by the residents and wildlife. This was accomplished and agreed upon by all involved.

### ***The Pipeline***

In support of the increased water sales to Forest Highlands a pipeline will be installed in the south end of the wetlands to transfer reclaimed water to Forest Highlands. This pipeline is being paid for by Forest Highland and will be constructed in May of 2009.

## **Focus Areas #5: Phase 1 SCADA System Completion**

### ***What is SCADA and what is its Value?***

SCADA is an acronym for supervisory control and data acquisition. A SCADA system provides for the monitoring and history tracking of operating parameters and equipment performance within the utility from a central location. The SCADA system is the central repository for collection of the body corporate operating knowledge.

### ***At each site is located a PLC***

A programmable logic controller (PLC) was installed at each major equipment site such as booster stations, well sites, wastewater plant, etc. Each PLC locally controls the operation of the sites pumps and other equipment while providing statistical data to the SCADA system. Unlike the TV show "24" where a single point of failure affected the entire nation's security system the KVID SCADA system was designed to eliminate a single point of failure capable of disrupting the whole system. In the event of a communications failure between any PLC and the host SCADA system the operating location will continue to function autonomously thereby ensuring delivery of potable water and processing of wastewater.

### ***Electrical transients cost money***

During every 15-minute interval of every day the level of electrical usage is monitored by APS and the highest use point recorded. This peak number is used as a multiplier against the overall power usage which has significantly increased electrical charges in the past. Control of electrical transients in the system by the SCADA system effort reduced significantly the APS imposed "peak charges." The combination of process changes accomplished in 2007 and the control of electrical loads have produced a cost savings approaching \$55,000 per year.

### ***Supervisory Control***

The SCADA system also provides information about the water and wastewater treatment processes allowing the utility operators and management to identify

potential saving and to investigate the feasibility of changes and the attendant cost reductions. Collection and analysis of this information has already created FY '09 savings and pointed the way to significant additional cost saving measures to be implemented in FY '10.

### ***Real tangible benefit***

Although the total payback period on the SCADA system will be on the order of three years the cost savings already generated by the system along with other operational measures have negated the necessity for a rate increase during the current fiscal year. Good news for everyone in these tough economic times.

## **Focus Areas #6: Improved Business Management**

### ***GIS***

In FY '08 the utility undertook to map out its assets in a geographic information system (GIS). Data was marshaled from the Coconino County GIS department, KVID as built drawings and records, aerial photography and past maintenance history both documented and individual recollections. This information was loaded into the GIS and provides an invaluable body of knowledge. Analysis of the GIS data provides historical information for generation of future plans and engineering studies. Locations of infrastructure components are now centralized minimizing the time to identify and respond to emergencies.

### ***Infrastructure Condition Study***

During late 2007 and early 2008 the infrastructure study was conducted. The resulting study document and conclusions can be viewed on the utilities' web site at [www.kachinawater.com](http://www.kachinawater.com). Information from the utilities' GIS system played a major role in the generation of this the study results and the final report. The Infrastructure study then provided significant input into the 30 capital replacement and the ten and five year strategic plans.

### ***GASB 34 Inventory Update***

The Government Accounting Standards Board title 34 requires that local and other governments maintain and update their capital inventory on a regular basis. The utility updated its GASB 34 inventory in FY '08, which provided additional information for the five, and ten year strategic plans and the 30 year capital replacement plan.

### ***What's missing?***

Individual and disparate inventory and maintenance records have been historically kept by the utility since its inception. The content of this information is difficult to gather and is costly to capture and maintain. In addition the work order system is a standalone system requiring additional effort to incorporate maintenance history into the inventory.

A computerized maintenance and management system (CMMS) will provide significant value to the maintenance of the utilities' equipment records and will again establish a level of actionable knowledge to the operators and management of the utility. Integration of a CMMS system with the utilities GIS system will enable even greater capacity to understand the overall operation of the system and deliver management planning tools for the continued efficiency improvements that the residents deserve.

## **That's all past history. What are you going to do for us next year?**

### ***SCADA System Upgrades***

The valuable information provided by the SCADA has pointed the way to additional savings. We intend to extend the reach of the SCADA system to include the remote monitoring of the lift stations and to improve the communications reliability of the SCADA system. This will involve the installation of some additional radios, PLCs and antennas to accomplish these goals.

### ***Wastewater Treatment Process Changes***

The data provided by the current SCADA system has indicated that we can increase the efficiency of the wastewater process by utilizing ORP (oxygen reduction potential) and turbidity instrumentation. What this really means is we can better manage the use of blowers and pumps to condition the wastewater. Again, a power savings will result.

### ***Fine Bubble Diffusion & Aeration Blower Replacement***

The wastewater treatment basins are used to sustain a mixed liquor (really, that's what it's called) in which active bacteria feed on the pathogens to neutralize their toxicity and prepare the water for final disinfection. Oxygen is injected into the basins by a blower and is further mixed in the basin with what is called a jet-aeration pump.

Usually only one blower is required to provide sufficient air to the two jet-aeration pumps (one in each basin). Remember back in 2007 and 2008 we changed the operating process to reduce the number of blowers required. The jet-aeration pumps inject air and water into the basins to cause them to mix and to distribute oxygen to the bacteria.

As always the staff is looking for ways to reduce power usage and increase efficiency. The combination of the need to replace the aeration blowers after thirty years of reliable service and after much study and consultation with environmental engineers it was decided that a significant power savings could be generated by the installation of fine bubble diffusers and a new advanced design blower system. As a side note Bill and I drove to Huston, TX to visit a site where the technology is in use and to visit the manufacturing company. It was a long

trip but well worth the effort. The company, HSI, Inc., is a very stable company that utilizes Deming principles of quality management, 24-hour phone support and 24-hour turnaround on parts and service. Bill and I are confident that this technology will work very well for the utility and the residents.

Power savings will result from the following:

- First is the elimination of the jet-aeration pumps (a total of 30 horsepower 24 X 7);
- Second, the greater oxygen flux density (smaller bubble present greater surface area to the bacteria than do larger bubbles) achievable by the use of the fine bubble diffusers requires less blower capacity;
- Third, the replacement of the standard centrifugal blowers with a single turbo blower, which in itself is about 20% more efficient than the existing blowers, and
- Fourth, the turbo blower is controlled by a variable frequency drive (VFD), which greatly reduces electrical line inrush current when it starts which then minimizes the APS bill (see the discussion of electrical transients above).

### ***Power Factor Correction***

Any time an AC motor is utilized it causes perturbation of the voltage and current relationship on the AC line. Unfortunately, but not surprisingly, this results in the delivery of less real power (horsepower) for the actual power delivered to the utility (read higher power bill).

These perturbations cause the power factor (the ratio of real power to power generated by the power utility) to be less than unity (1). Through the judicious application of power correction capacitors and being mindful of possible power line harmonics the power factor can be brought to very near 1. When the power factor is equal to unity (1) the utility will only pay for the actual power being utilized.

The utility operates over twenty five rather large motors. With a relatively small investment in test equipment, capacitors and installation hardware the utilities power bill can be reduced on the order of 10%. The payback time of this project is estimated to be less than two years.

### ***Advanced Automation***

At KVID we never, never, ever implement technology for technology's sake. Using the system of profound knowledge, see the opening paragraphs of this document, and understanding the true operation of the systems under our management, we identify efficiency saving opportunities then apply the proper technology. In the coming year we will be investigating an opportunity to implement advanced meter reading technology, which reads your water meter every hour, integrated computerized maintenance and management system, and service delivery and management systems. As always a cost-benefit analysis

will be performed and only then will the decision be made to implement or disregard such a system.

***Operator Training***

We will continue to provide technical and business training to the employees of the utility. There is a significant return on this investment as our employees learn new and better methods to deliver better service with less cost. All of the efficiency savings that have been implemented thus far are the result of suggestions, planning and implementation efforts, by the staff resulting from the expertise, provided by our employees. In addition the job satisfaction provided keeps our employees happy and employed by the utility, thereby keeping in check recruitment and hiring costs (See Focus Area 2).

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