

# Immediate Results

By Lawrence Green

Oil analysis helps a water plant cut annual maintenance costs by \$25,000

The city of Chandler (Ariz.) Municipal Utilities Department (MUD) employs coagulation, sedimentation, active flow control and filtration to produce 60 million gal per day (mgd) of water at its surface water treatment plant. In addition, the system includes 27 wells and 21 booster stations controlled by SCADA. Water distribution is provided through more than 1,200 miles of water main, in excess of 7,500 fire hydrants and more than 25,500 water valves. The city also has several facilities that treat wastewater, and in some cases, return the purified water into the aquifer through injection wells. The city's state-of-the-art reverse osmosis facility treats a 1.25-mgd wastewater stream produced by local industries.

The water production division runs deep well pumps, vertical turbine booster pumps, flocculators,

flocculant collectors, and other pumps and mixers. The city relies heavily on this equipment to provide Chandler residents and businesses with a sufficient and continuous supply of potable water.

The city of Chandler previously changed oil in all motors, gearboxes and pumps in its water treatment facility twice a year at an approximate annual cost of \$50,000.

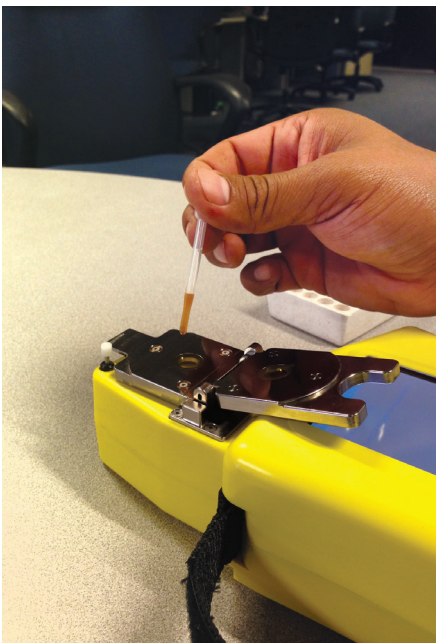
"In order to prevent damage to critical equipment, oil was changed every six months according to the equipment's maintenance instructions," said John Ardans, water systems maintenance superintendent for the city of Chandler MUD.

The maintenance staff recognized that the cost was high, but could not determine which oil changes could be deferred without damaging critical equipment. "We recognized that much of the labor and materials involved were wasted, but at that point we had no way to know when the oil actually needed to be changed," Ardans said. "So we had no choice but to change it."

## Evaluating Alternatives

Hoping to reduce unnecessary expenses, the city initially purchased a multi-parameter oil analyzer—which measures conductivity, resistivity and dielectric loss—and began using it in an effort to more accurately target oil changes.

"Unfortunately, our first oil analyzer provided inconsistent results," Ardans said. "When we checked it by testing the same sample twice, the results were all over the map. So we did not feel confident about relying on these measurements to safeguard our mission-critical equipment. Another weakness of the analyzer was that we



Only one drop of oil is necessary for analysis.



Booster pump

needed to provide a new sample of oil with every sample of oil to be measured, which was inconvenient.”

Management also considered using an outside testing firm to test the oil of the water plant’s equipment. The annual cost of performing quarterly testing was estimated at \$15,488; the annual cost of biannual testing was estimated at \$7,744. Outside testing offered the potential for significant savings, compared with changing oil based strictly on schedule. A limitation of outside testing, however, is that it typically takes about two weeks to receive test results, so the potential for identifying a problem and correcting it immediately is reduced.

### Searching for Solutions

Ardans decided to look for another analyzer. He identified Spectro Scientific’s FluidScan Q1000 portable fluid condition monitor and was impressed by its direct infrared spectroscopy (DIR) approach, which provides a more accurate alternative to conventional total acid number (TAN)/total base number (TBN) analysis. DIR operates without wet chemistry and requires no solvents and only one drop of oil for analysis. This approach provides direct quantitative measurement of a lubricant’s condition. The analyzer immediately detects lubricant contamination, and degradation and cross contamination in mineral and synthetic engines, including gear, hydraulic, turbine and transmission oils, as well as biodiesel and diesel blends. It analyzes for TAN, TBN, oxidation, nitration, sulfation, additive depletion and incorrect (or mixup) lubricant within water content, soot and glycerin in addition to fatty acid methyl esters in biodiesels.

### Justifying the Purchase

Ardans proposed that the treatment plant purchase the FluidScan Q1000 analyzer. To justify the purchase to management, he estimated that the annual costs of internally

testing the water supply equipment would run about \$5,109.28 per quarter for labor and supplies. Assuming that the new analyzer would reduce the oil change frequency to once per year or less provides a savings of \$25,000 per year, ensuring return on investment within a year. Ardans also estimated that the analyzers would save \$10,378.72, compared with quarterly testing using an outside testing service. In addition, the analyzer provides immediate results, compared with the two-week wait for results from an outside testing service.

Management approved the purchase of the FluidScan Q1000 analyzer and city of Chandler MUD personnel began using it to perform quarterly checks on the health of 200-plus pieces of critical equipment.

“We found both the accuracy and repeatability of the instrument to be excellent,” Ardans said. “At this point, it appears that we will be able to increase the average time between oil changes to one year or more for all of our equipment. At the same time, we will be checking oil on a quarterly basis, so we are much more likely to prevent a premature failure than in the past. Simply saving one piece of equipment would more than pay for the analyzer instantly.”

The city also purchased SpectroTrack software, which interfaces with Spectro Scientific instruments and keeps track of asset information relating to service intervals, maintenance actions, locations, status, etc. Users can see a comprehensive, historical view of fluid condition for one piece of equipment, a department or the entire plant. The software provides a single end-to-end view of a sample lifecycle from sample submission and receipt to

results entry. The software also provides all trending, imaging, numerical and textual asset data in one secure location.

### Cost Savings

With the successful rollout of oil analysis in the water supply division, the city is planning to begin analyzing oil samples from an additional 200 pieces of equipment in its wastewater treatment division. The savings in this area are expected to be approximately equal to those achieved on the water supply side. The city of Chandler also is planning to hire a predictive maintenance technician whose responsibilities will include collecting oil samples for both the water supply and wastewater treatment divisions. This person’s responsibilities also will include performing vibration analysis, acoustical analysis and thermography to identify other issues that might put equipment into danger.

“Condition-based predictive maintenance is fast becoming the standard for forward-looking facilities that want to maintain the highest availability of their equipment, while minimizing unnecessary maintenance,” Ardans said. “It is a proven tool to reduce operating costs while preserving the environment. The FluidScan gives us near real-time results at a fraction of the cost of a commercial lab. Changing to a condition-based model should allow us to optimize drain intervals and save enough money to pay for this tool in about a year.” WWD

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