



(clockwise, from left) Geoff Homann, a principal of 03 Wash of Australia, stands beside an ozone-generating machine controlled by two PLCs. The black boxes below the device remove moisture from the air before it's used to create ozone. The small thin tube coming out of the back of the washing machine is used to deliver small quantities ozone into the wash; a frontal view of two washer/extractors in a nursing home on-premise laundry.

Environmental Impact Study— Get into the ‘O-zone’

Advanced technology propels water and energy savings in nursing homes ‘down under’

By Jack J. Reiff

Commercial laundries typically consume large volumes of energy, water and chemicals that are mainly disposed of through publicly owned wastewater treatment systems (POTWs). Finding new ways to reduce each of these components not only serves the laundries, but it also helps to protect the environment. Across a variety of commercial and industrial processes, ozone has been extensively used in the United States and Europe. But in Australia, it has mainly been used for purifying drinking water and for some industrial applications. The need for water and energy conservation prompted the Australian aged care

industry to take a closer look at this revenue-generating and resource-saving technology. With these concerns, ozone is gaining interest among environmentally friendly industries worldwide.

Setting the pace

The Aged Care Association Australia, Australia-NSW (ACAA-NSW [New South Wales]) introduced the “Greening Grey Facilities Program” in an initiative aimed at saving water and energy in aged-care facilities. This project enables aged-care facilities in the area of Sydney, Australia, to get rebates on a variety of water-saving technologies such as ozone laundry systems, water-efficient taps and

showerheads, dual-flush toilets and rainwater tanks. Other program partners included Water Conservation Group Pty, Ltd and Demand Manager Pty Ltd. More information on this program is available at www.greengrey.com.au. With funding from the NSW government's Climate Change Fund, nearly \$1 million is available to aged-care operators for the reduction of water consumption by investing in water-saving technologies. Their goal is to save 1,210 million liters of water through the program.

Propelling change

Wet-Tech, a U.S.-based ozone systems provider, partnered with O3 Wash Pty. Ltd. of Australia after the Worcester, MA, company was selected to introduce Ozone Washing Systems (O3 Wash) to Australia. O3Wash also became a distributor for the Wet-Tech EnviroSaver II Ozone systems. The EnviroSaver II ozone system is a Corona Discharge type that uses an electrical charge passing through clean dry air to create ozone. The Ozone Laundry Systems (Ozone) product is an ecologically friendly alternative to chlorine that readily converts back to oxygen in the atmosphere. Supporters of ozone say it's 3,000 times more effective than bleach at killing bacteria. This enables laundries to reduce the number of wash cycles and save on water, energy, chemicals, labor and linen degradation.

The Aged Care Association (ACAA) says Ozone can save:

- 20-25% on chemical use
- 20-25% on water and sewer charges
- 40-70% on fuel energy costs
- 12 -20% on electrical energy use cost.
- 20-25% in productivity improvements and reduced chemical residue

This agreement between the ACAA and the two vendors noted above set in motion a process in which other agencies established procedures to verify parameters of the process, including reduced wash temperatures, reduced chemical use, reduced wash time, extended linen life and the disinfection aspects of Ozone.

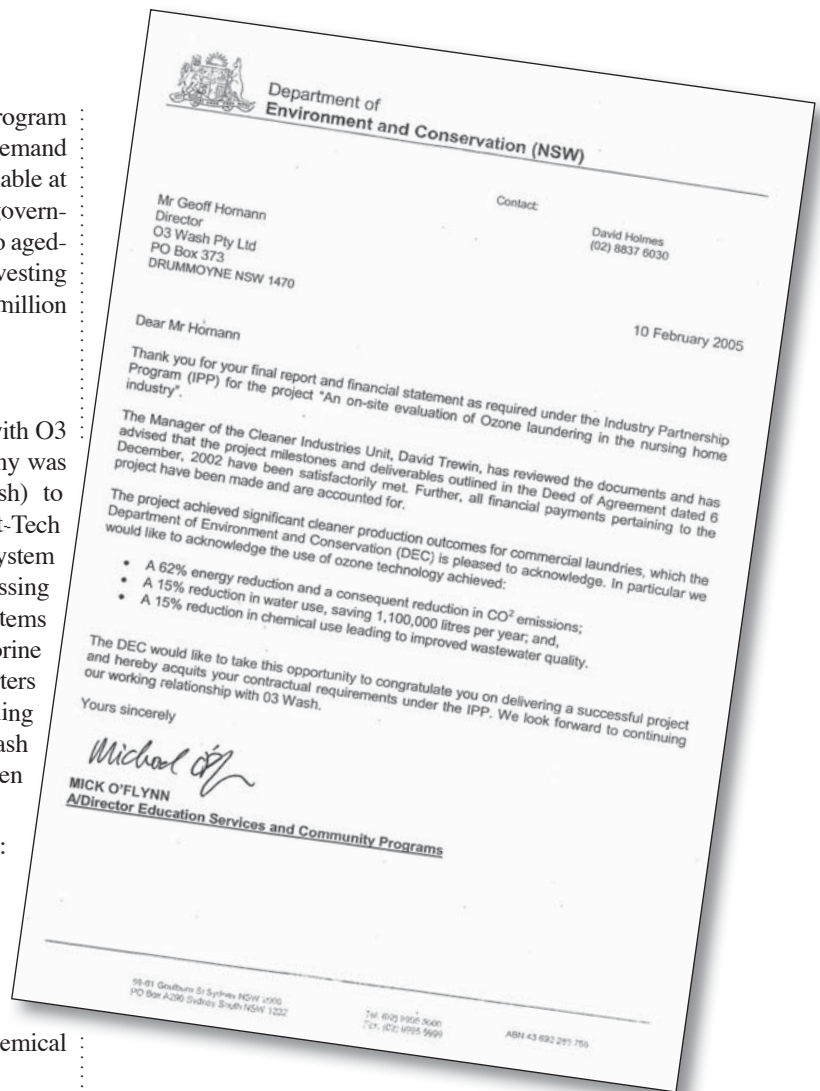
Overcoming obstacles

With a two-year drought in progress and a continuing need to reduce water consumption, O3 Wash approached the government agencies to evaluate the benefits of the Wet-Tech system for water and energy conservation. This was difficult because it represented the introduction of a new technology in a time of need. That prompted other ozone companies to enter the market at low prices, without the guarantees that Wet-Tech provides.

These low introductory prices, in a market where there was no history for the other companies, presented many challenges to Wet-Tech. It's taken four years to show that our original system is still performing well and with little, if any, downtime. This prompted ACAA-NSW to partner with O3Wash Pty Ltd. This partnering has satisfied the needs of their industry while providing the NSW government with a natural resource benefit.

Test case

O3 Wash decided that the best method for introducing the new tech-



Above, a letter from an Australian environmental agency official expresses thanks to Homann for the significant results the ozone program has produced in terms of reduced CO2 emissions, as well as energy and water savings.

nology would be to conduct a trial to verify its suitability for Australian conditions. The site chosen was Our Lady of Consolation (OLOC) Nursing Home in Sydney. This laundry was chosen for a number of reasons, mainly because it was relatively new. It was operating efficiently and had daily records of the weight and type of each load of washing.

Wet-Tech was brought in to set up and commission the system. Because of the system selected by O3 Wash and the method of installation used, the entire system could be tested without any disruption of laundry operations. O3 Wash developed changes to the wash formulas in conjunction with Ecolab Inc. The chemical company reprogrammed the machines with the new reduced formulas.

The ozone system was installed over a period of five days with no production loss to the laundry. In essence, the staff went home one night after using the standard chemical wash and started working with the ozone system the next day—perhaps the only noticeable change was a different-colored program selection sheet. The most resounding feedback from staff was the lack of an odor when removing the wash from the machines. Elimination of chemical irritation to the operator's skin from handling the wet wash was an



(Clockwise, from left) A 2 HP air compressor and a 20-gallon air storage tank used to pump air into the ozone system. Another ozone generating system. This one has the PLCs located to the right, rather than as part of a single unit. Another compressor that provides air for making ozone.

added bonus.

The test site is a four machine operation with the Wet-Tech EnviroSaver II technology dedicating one ozone generator and monitoring PLC to each wash machine. This ensures a continuous ozone supply to each machine on demand. In the event of a wash machine being taken off line for maintenance or malfunction, the other machines continue to operate with ozone. The wash machines also are programmed with a full set of wash formulas in case of an interruption in the ozone supply. This allows the operation to continue with standard formulas, thus avoiding down time.

System components

The ozone system has four main components:

- **Air delivery**—An oil-free air compressor with an air dryer that delivers clean, dry air. This is essential in ensuring that no contaminants are delivered to the ozone generators.
- **Ozone generators**—Four separate ozone generators pass low-pressure air through a high voltage electrical field to create ozone from the oxygen in the air. The four separate generators supply ozone to four washing machines, with a control panel that allows the machines to be isolated for operation and maintenance.

- **Controls**—The controls are integrated with the existing washing machine controls to ensure that ozone is delivered at the correct time and in the correct amount. There are four separate sets of controls to allow easy isolation, so that there's no downtime for the laundry in the event of a failure.

- **Ozone injection**—Ozone is delivered to the washing process via direct injection. There are various methods of ozone injection, depending on the washing machine type and size. For this original installation, a closed-loop pumping system was selected, whereby the water from the machine is drawn out through the loop via an inline strainer to remove lint. The ozone is injected directly into the discharge side of the pump and returned back into the washing machine.

Ozone has a very short life-cycle, so the on-demand, continuous-feed system is considered the safest and most effective method of delivery.

Smooth operations

System maintenance was originally required daily due to the build-up of lint in the closed loop lint strainers. As a result, Wet-Tech specially designed a simpler way to infuse the ozone into the washer with a sintered metal, small bubble diffuser. This diffuser was

installed at the base of the wash machine so that the ozone was always injected into the water and not onto a rotating wash drum. The diffuser application allows for a practically maintenance-free system, controlled by the wash machine programmer.

The Wet-Tech system, using good laundry chemical practices, provides the benefit of retaining temperatures in the wash cycles where stain and chemical reduction is required.

The only two items of general maintenance include: cleaning the washable lint screen at the base of the ozone cabinet for good air flow and checking the automatic drains on the particulate and the coalescing filters in the air dryer system. This new direct-injection system has operated successfully in the United States for the last three years and in Australia for about two years.

Tracking results

O3 Wash installed water meters to record cold water, hot water and water for steam generation, as well as a gas meter. All four meters were read by laundry staff on a daily basis, and electricity data provided records in 15-minute intervals. Ecolab Inc. also provided data

Ozone Environmental Gains

- Energy reduction: 62% (consisting of electrical use, heating fuel, electrical generation, energy transportation)
- Reduction in CO2 emissions: 46.5 tons per year
- Water savings: 15% (1.1 million liters per year)
- Chemical savings: 15% (1,250 liters), leading to improved wastewater quality
- Linen Replacement
- Productivity

This represents a financial payback of about 18 months for a typical system without the inclusion of labor and production savings.

The EnviroSaver II Ozone systems by Wet-Tech are modular in design, so they can be retrofitted to any wash machine of any capacity. The wash and energy benefits are realized in all commercial or institutional wash systems, including tunnel washers.

The benefits are real and the time is now to protect the environment as well as your cash flow.

on the wash formulas for each type of wash load. All of this recorded data, including the wash type and weight, provided a good comparison for the 'before' and 'after' ozone case. In addition to this data collection, the quality of the wash was checked—before the move to ozone and after the ozone was introduced—using the Australian Wool Testing Authority's measures for laundry effectiveness.

Overall, productivity has improved due to the reduced time taken for each load of washing. The trial site has increased its intake of laundry from other nursing homes and has substantially boosted revenue from its laundry operations. In fact, the results proved so successful that the ACAA-NSW is underwriting any members' purchase of the Ozone system (using funding from the Climate Change



The Australian Department of Environmental Conservation (New South Wales) presented the plaque shown above to the nursing home in recognition of its efforts to conserve environmental resources through the use of ozone in its laundry.

Fund) so that they receive a triple benefit—reduced operating costs, improved linen for patients and their help in conserving water and energy.

The trial has proven that using ozone in Australian commercial laundries reduces water, energy and chemical consumption, while saving time and improving linen life. O3 Wash Pty Ltd has shown the nursing home industry that this is the way of the future, and has proposed setting up a system with a large hotel chain. O3 Wash anticipates similar success for other service industries with large commercial laundry systems.

The return on investment (ROI) for this equipment has shown to average about one year, based on sales and installation costs. In rare cases where production requirements are low, investment return can stretch beyond a two-year period. For the average client, an ROI of 15-18 months is expected.

The investment return for the trial site was achieved between 15-22 months. Due to Australian currency differences (trading at \$1.75 to the U.S. dollar) the ROI for the EnviroSaver II Ozone system in Australia has taken slightly longer to recoup. TR



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