



# WATERFREE URINAL STUDY

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## EXECUTIVE SUMMARY

### Waterfree Urinals

The current national standard<sup>1</sup> for new low-consumption urinals specifies a maximum flush volume of 1.0 gallons of water. Innovative technologies led to the development of the Falcon Waterfree Technologies urinals in which no water is required. Waterfree urinals require no water supply and, thus, no flush valve plumbing, thereby saving on the initial costs of purchase and installation, water and sewer expense and reduced maintenance. Furthermore they drain to a standard waste line.

The Falcon Waterfree urinal technology uses a recyclable cartridge that contains a special biodegradable liquid. The special liquid is lighter than other liquids and, therefore, floats on and seals the urine from the room atmosphere. The cartridge has a design duty life of 7,000 uses, at which time the manufacturer recommends replacement.

### The Study

In September 2000, Falcon Waterfree Technologies, LLC. (FWT) arranged with the University of California Los Angeles (UCLA) to install a Falcon Waterfree urinal in a men's restroom in Boelter Hall (classroom building) on campus for the purpose of: (a) measuring usage, (b) comparing bacterial growth rates and odors with traditional flush urinals and (c) performing lifecycle cost analysis modeling of waterfree urinal installation within typical educational institutions. The assignment was performed by the UCLA Department of Civil and Environmental Engineering under the leadership of Professor Birgitte K. Ahring, Ph.D.

### Study Results

#### *Usage*

Measured over a period of six weeks, the Falcon Waterfree urinal averaged 814 uses per week. Based upon the actual urinal usage recorded at UCLA, the urinal has operated properly and without problems. The manufacturer's design duty life of 7000 uses before replacement was actually exceeded both times the cartridge has been replaced. In the original installation, the cartridge lasted over 7300 individual users. The second cartridge has lasted over 7500 individual users and has only required normal maintenance (cleaning and removal of trash, etc.) and has never clogged. (Note: the Falcon Waterfree urinal currently remains in normal service in Boelter Hall.)

<sup>1</sup> ASME A112.19.6-1995

## *Bacterial Counting*

A waterfree urinal differs from a water-flushing urinal in that it does not use water to rinse the porcelain surface of the urinal bowl between each use. The research team sampled and counted organisms from the interior porcelain surfaces of both the Falcon Waterfree urinal and an existing 3.0-gpf water-flushing urinal in the same restroom.<sup>2</sup> The collected data indicated that the cell count per area of measure was lower for the Falcon Waterfree urinal than for the flush urinal. While there were not sufficient data to conclude that the Falcon Waterfree would experience lower microbial growth rates under all conditions, the data did support the conclusion that waterfree urinals will not experience greater bacterial growth rates than a water flush urinal.

## *Ammonia (Odor) Development*

Ammonia, among the most common and offensive odors found in restrooms, is a colorless gas that disperses easily. Yet, its sharp smell makes it a candidate for many beneficial applications as well (smelling salts, household cleaners, and window cleaning products).

The research team measured ammonia concentrations at three locations at each of the two urinals: (a) inside and immediately above the bottom of the urinal (or just above the waterline for the water-flushing urinal), (b) six inches in front of the urinal at the level of the bowl lip, and (c) at ceiling height at the nearest air return vent in the rest room.

Study results indicated that there was no statistically significant difference between the Falcon Waterfree or the water-flushing urinals in the amount of ammonia gas measured inside the urinal bowl or at the bowl lip. No ammonia gas was measured at the return vent for either urinal. Furthermore, none of the sampling data indicated ammonia gas levels that even approached the lower threshold for human detection of 20 parts-per-million. Therefore, odors perceptual to humans were absent from the vicinity of both urinals.

## *Lifecycle Cost Analysis*

Lifecycle Cost Analysis (LCA) modeling is particularly well suited to evaluating whether the higher initial cost of an alternative is economically justified by reductions in future costs when compared to an existing alternative with no initial costs, but which has higher future costs. This is the case when making the decision to replace an existing water-flushing urinal with a waterfree urinal.

The UCLA research team applied LCA to three case studies representing urinal replacement in three typical educational (grades K-12) applications in California. Internal Rates of Return (IRR) for replacement ranged from 37 percent to 61 percent annually; simple payback periods for the three applications ranged from 1.97 to 2.67 years. The variances in IRR and payback were caused by the varying student densities at the three applications. Based upon the LCA, the replacement of existing water-flushing urinals with the Falcon Waterfree urinal is clearly justified.

## **Conclusion**

In all categories of evaluation, the UCLA research team determined that replacement of a standard water-flushing urinal with the waterfree urinal by Falcon Waterfree would yield a competitive rate of return and would not result in any increase in rest room odor or bacterial growth.

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<sup>2</sup> Under most circumstances, human urine is sterile. Certain species microorganisms can, however, utilize nitrogen and are generally responsible for the distinctive "ammonia" odor associated with some restroom facilities.