Study Brief

Overview

Study Purpose: To determine the direct effect of high capacity vacuum induction sodium hypochlorite feed on chloramine development in indoor swimming facilities.

Study Goal: To provide evidence that the high capacity vacuum induction feed process is highly effective in the control of disinfection by-products resulting from incomplete oxidation during the treatment of recreational water with chlorine.

This study consisted of three individual phases with the results documented through each course for final analysis and publication.

Phase I: Current Conditions

> In order to establish a pre-existing chemistry base line for the participating facility, water samples were taken for a period of at least two weeks prior to the installation of the high capacity vacuum induction feed system. These water samples were tested, according to a prescribed testing schedule, both on site by facility personnel via conventional field-testing procedures, as well as off site by the selected certified water quality laboratory. Specific test results from these samples were recorded and analyzed.

Phase II: System Employment

> After the installation and start-up of the high capacity vacuum induction feed system was executed a series of water samples were tested and analyzed according to schedule for a period of ninety days.

Phase III: Appraisal

> After the ninety-day test period was concluded, a period of appraisal was conducted over the following nine months. This consisted of two simple surveys. An immediate post study survey of host facility personnel designed to collect additional pertinent information related to the study. Finally, an annual appraisal was conducted to determine long-term effects, as well as user satisfaction.

Results from the studies performed at host facilities were analyzed and compiled for distribution to those host agencies. It is also intended that they be shared appropriately within the industry through publication in peer journals.

Results

High capacity vacuum induction sodium hypochlorite feed produced the following results when applied as the sole treatment system on the pools studied.

1. “The Solution” provided superior, immediate mixing of the hypochlorous acid (from NaOCl) via venturi, enabling immediate destruction of chloramines.

2. Continuous breakpoint chlorination was maintained throughout the second and third phases of the study (post system employment).

3. The requirement for breakpoint chlorination was eliminated.

4. Chloramine levels were significantly lowered and maintained.

5. A significant savings in chlorine consumption was experienced during the course of the study.

6. The facility water and air quality was improved dramatically over the course of the study.

Measurements

- Measurements at two sites:
  - Montgomery Aquatic Center (MAC) – N. Bethesda, MD
  - Prince Georges Community College (PGCC) – Largo, MD
- 2004 data prior to installation
- 2005 data prior to installation (Phase I) and post installation (Phase II)
- 2005 measurements:
  - 3 months at PGCC (2 months w. venturi)
  - 4 months at MAC (3 months w. venturi)
- Measurements taken during peak usage period
- Measurement of combined chlorine weekly (avg.) during Phase III

Data

2004 PGCC

- Free chlorine and pH measured daily
- Combined chlorine measured twice/week
- Breakpoint chlorination required on average every 2 – 3 weeks
- Average combined chlorine over 4 months period: 0.72 mg/L (ppm)

2005 PGCC

- 3 daily measurements of chlorine, pH and combined chlorine during Phase II of study
- Combined chlorine measured weekly (avg.) during Phase III
- No breakpoint chlorination required
- Average daily combined chlorine during same measurement period:
  - am: 0.24 noon: 0.28 pm: 0.34 mg/L (ppm)
- Overall daily average: 0.29 mg/L (ppm)
- [2004 average: 0.72 mg/L]
- Phase III combined chlorine avg: <.2 mg/L (ppm)

MAC

- MAC data similar to the PGCC data for 2004 and 2005
- 2004: Breakpoint chlorination every 2 weeks
- 2005: No breakpoint chlorination required
- Phase III combined chlorine avg: <.4 mg/L (ppm)