

## Case Study 01

# Potable Water Cooling Module for Alcoa's Emergency eyewash and shower systems.



### OBJECTIVES

- To supply a continuous, clean reliable pressurized water supply.
- To maintain this supply regardless of power failure.
- A compact skid mount unit for simple installation.
- Maintain water temperature within safe and comfortable levels.
- To be environmentally friendly in the use of power and water .
- Be easy to operate and maintain. Using 'off the shelf' components.
- Be intelligent to failures in the system and alert the necessary staff.

### INTRODUCTION

The Potable Water Cooling Module has wide ranging applications. In this instance it was installed as part of Alcoa's safety showers and emergency eyewash system upgrade at their Kwinana refinery.

Safety showers and emergency eyewash stations are widely used in industry where a risk of contact with harmful chemicals is present. Adequate and immediate flushing of the affected area will greatly reduce any damage to the person involved.

Control and Thermal Engineering offered an alternative solution to conventional system designs. CTE were then engaged to consult, design, build, and install a water conditioning and delivery module for Alcoa's emergency eye wash and shower system upgrade.

The system consists of two skid mounted sections for easy transport. The modules were pre-assembled at CTE. The system was commissioned in-house then transported to site for installation into Alcoa's safety shower system.

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## PROBLEMS WITH CURRENT SYSTEMS

**Bacteria growth** - This is a problem with stagnate systems. The CTE system uses a continuously circulating system.

**Heat buildup** – Measured summertime system water temperatures over 50° can cause third degree burns in 5 minutes. The CTE system has thermostatically controlled cooling.

**Contamination** – Many systems are contaminated in time with rust and oil used during construction. This is removed by a continuous flow and filtration provisions on the skid.

**Blockage** – A blockage has dire consequences in an emergency. The CTE system monitors flow constantly and regulates itself to suit demands placed on the system. An alarm is activated if a blockage is detected.

**Water consumption** – Employees often run water onto the ground to flush the system. This is not necessary now as the system only uses what personnel need.

**Pump or power failure** - In the case of pump failure or maintenance, safety is not compromised as the system reverts to mains pressure.

**Large storage vessel** - This is not needed on the CTE system, this greatly reduces the installation area required.

**Doubling up on components** - Many systems rely on doubling up on components to compensate for pump failure for example. The CTE system is cleverly configured to require very little doubling thus reducing costs greatly.

## The Control and Thermal solution

To the best of our knowledge, no system exists in industry today as we have configured, or packaged it.

Upon discussions with CTE, it soon becomes apparent that the CTE solution is based not on intricate concepts and devices, but on existing engineering principals. The system is more about the clever configuration of existing off the shelf items, put together in such a way as to create a reliable, easy to operate system. The system was designed with attention to versatility, economics, existing infrastructure and the safety of those who may one day need to use it.

### Versatility

The client specifies the size of the existing or planned ring system. The CTE potable water module has been configured for great versatility, so changes can be easily made to suit the clients needs. A heat load evaluation may also be carried out by CTE if the client so desires, to more accurately ascertain an existing system's requirements.

### Success

The unit has been a great success since it's installation into a sizable area of Alcoa's Kwinana refinery in 1999. Two more units, were ordered and installed soon after.

A follow up review conducted by Alcoa showed that all design criteria were surpassed. With a reduced risk of eye injury from high temperature water or high pressure, a reduction in maintenance costs and being simple to operate with improved reliability.

Reflecting the success of the unit, the Water Corporation of Western Australia has issued approval for drinking taps to be fitted to the system and to have connection to the main water supply throughout Western Australia.

The 'Potable Water Cooling Module' was a finalist in the **2001 Engineering Excellence Awards**

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