

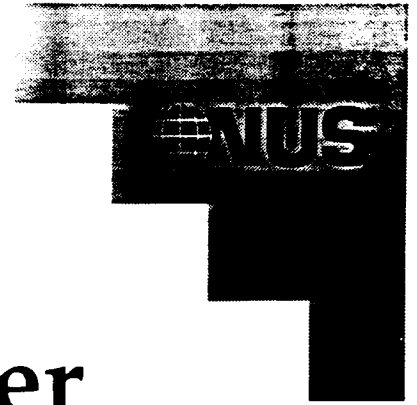
Improving Cooling Tower Performance

Dave Suptic

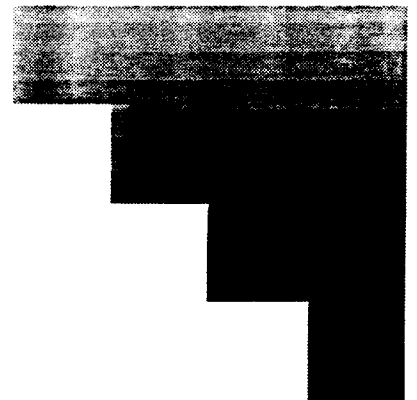
Marley Cooling Tower Company



Improving Cooling Tower Performance



Factors Affecting Cooling Tower Performance



- Non-controllable
- Controllable



Non-controllable Performance Factors

- **Ambient Wet Bulb Temperature**
- **Air Density**
- **Wind Direction & Intensity**



Controllable Performance Factors

- **Hot water temperature**
- **Water flow rate & distribution**
- **Air flow**
- **Water quality**



Controllable Performance Factors

- **Fill design and condition**
- **Drift eliminator design and condition**
- **Fan design and condition**
- **Tower structural condition**



Controllable Performance Factors

Hot water temperature



► Consequences of Excessive Hot Water Temperature

- Melted fill
- Distribution system damage
- Wood structure damage
- Galvanized steel corrosion



► Fill Material Limits

- PVC - 120°F to 140°F limit.
- CPVC - 150°F to 170°F limit.
- Wood Lath Fill - 170°F limit.



▶ **Controllable
Performance Factors**

Water Flow Rate & Distribution



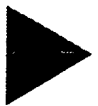
▶ **Improving
Air Flow Rate**

- **More efficient fans**
- **Pitch fan blades for full motor HP**
- **Minimize total tower pressure drop**
- **Velocity recovery stacks**



Controllable Performance Factors

Cooling Water Quality



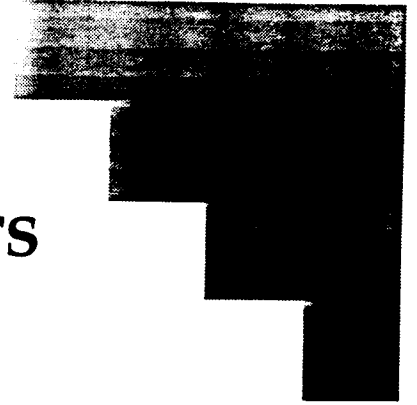
Cooling Water Quality

- **Water quality and fill design**
- **Bio - fouling & new low clog fills**



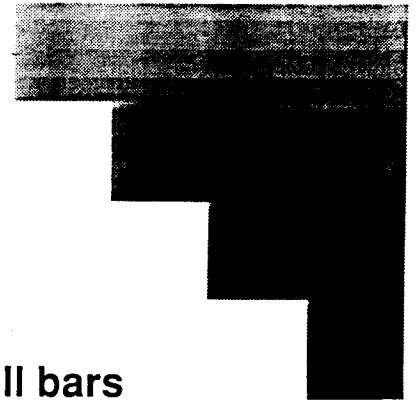
Controllable Performance Factors

Fill design and condition



Splash Fill Upgrades

- **Wood lath to high performance fill bars**
- **Flash fill - Omega bar with MX 75 film fill**





Controllable Performance Factors

Drift eliminator design and condition



Controllable Performance Factors

Fan design and condition



New High Performance Fan Designs

- **HP7 Fiberglass Fans - 10' to 20' diameters**
- **DuraCore Fiberglass fans - 22' to 10 meter diameters**



Controllable Performance Factors

Tower structural condition



Structural Material Alternatives

- **CCA Treated Douglas Fir and Redwood**
- **Pultruded Fiberglass**
- **Galvanized and Stainless Steel**
- **Concrete**



New Tower Design for Improved Performance

Multi-Flow Cooling Tower