

Breakfast with the American Academy of Environmental Engineers (AAEE)

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February 3, 2009

AAEE Competition Background

Started in 1989

Looking for “Excellence in Environmental Engineering”

Provide recognition for environmental engineer’s work

AAEE received 26 submittals in 2008



When is this Competition held?

Annually

Submittals* due by February 1st

Selections announced April or May of each year

*For information on submittal requirements go to the AAEE website (www.aaee.net) and click on Excellence in Environmental Engineering Competition under Programs.

How are the Submittals Evaluated?

- **Independent panel**
 - Distinguished experts
- **Review criteria**
 - Holistic environmental perspective
 - Innovation
 - Proven performance
 - Customer satisfaction
 - Contribution to an improved quality of life & economic efficiency

How are the Submittals Evaluated?

- **Scores tallied**
 - **Overall top scorer: Superior Achievement Award**
 - **Category Top scorer: Grand Prize**
 - **Runner up: Honor Award***

** Scoring within 90% of Grand Prize.*

What Categories are Judged?

Research

Planning

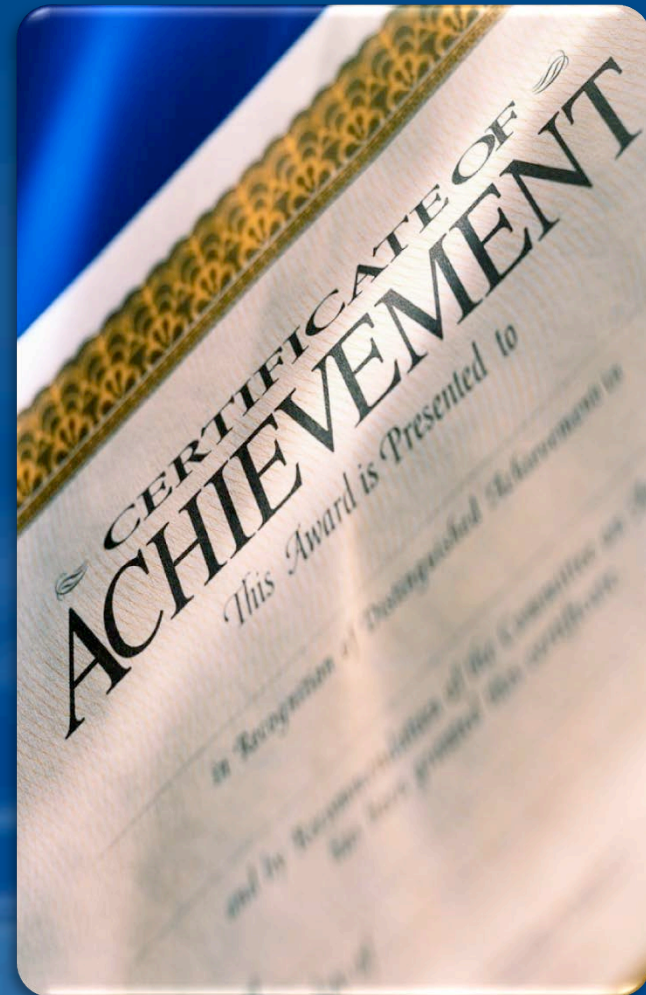
Design

Operations & Management

Small Projects

University Research

Superior Achievement Award



Why Does AAEE Conduct Competitions?

- Identify
- Recognize
- Highlight
- Reward

*Best of today's
environmental
engineering projects*

*Illustrate essential role of
Environmental Engineering
in providing a HEALTHY planet*



Superior Achievement Awarded

Kay Bailey Hutchinson Desalination Facility, El Paso TX
Entering Firm: CDM



CHALLENGES

- **Provide drinking water supply**
 - El Paso and Ft. Bliss
 - In desert
 - Inland
- **Available supplies**
 - Brackish groundwater
- **How to dispose of concentrate**



Superior Achievement Awarded

Kay Bailey Hutchinson Desalination Facility, El Paso TX
Entering Firm: CDM



INNOVATIONS

- **Deep well injection of RO concentrate**
 - 3,500 feet below ground
- **Application of two-stage RO process**
 - Pilot testing (on-site)
- **Integrate limited resources**
 - 30 supply and blend wells
 - 19 miles of collector/transmission pipe
 - 22 miles of concentrate disposal pipe



Superior Achievement Awarded

Kay Bailey Hutchinson Desalination Facility, El Paso TX
Entering Firm: CDM



BENEFITS

- **Largest inland desalination project**
 - 27.5 mgd
- **Partnership between**
 - El Paso Water Utilities
 - US DOD – Ft. Bliss
 - Remained and increased presence
- **Prevent further brackish water intrusion**
- **Included research and learning center**

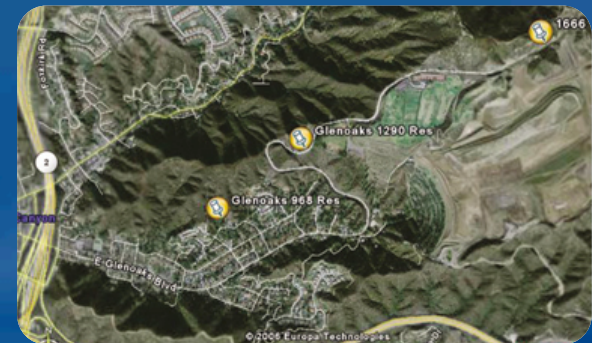


Research Grand Prize

Glendale Demonstration – Scale Evaluation of Chlorite Ion to Control Nitrification in a Distribution System and Reservoirs, Glendale, CA
Entering Firm: Malcolm Pirnie, Inc.

CHALLENGES

- **City of Glendale faces significant water challenges caused by nitrification in water system**
- **Nitrification affect ~30% of US water utilities**
 - Using chloramines as disinfectant
 - Very costly to maintain



Research Grand Prize

Glendale Demonstration – Scale Evaluation of Chlorite Ion to Control Nitrification in a Distribution System and Reservoirs, Glendale CA

Entering Firm: Malcolm Pirnie, Inc.

CHALLENGES

- **Adverse effects of nitrification on water quality**
 - Loss of total chlorine residual
 - Increase in nitrite/nitrate levels
 - Decrease in pH
 - Increase in corrosion rates
 - Increase in microbiological activity



Research Grand Prize

Glendale Demonstration – Scale Evaluation of Chlorite Ion to Control Nitrification in a Distribution System and Reservoirs, Glendale CA
Entering Firm: Malcolm Pirnie, Inc.

INNOVATIONS

- **Nitrification control by chlorite ion addition**
 - Demonstration test on section of distribution system



Research Grand Prize

Glendale Demonstration – Scale Evaluation of Chlorite Ion to Control Nitrification in a Distribution System and Reservoirs, Glendale CA
Entering Firm: Malcolm Pirnie, Inc.

INNOVATIONS

- **Unique analytical method (first time use)**
 - Molecular DNA amplification
 - Track populations of ammonia oxidizing bacteria to promote nitrification
- **Simplified chlorite standard method**
 - More reliable for operators to use



Research Grand Prize

Glendale Demonstration – Scale Evaluation of Chlorite Ion to Control Nitrification in a Distribution System and Reservoirs, Glendale CA
Entering Firm: Malcolm Pirnie, Inc.

BENEFITS

- Provide reliable control of nitrification using chlorite
- Reduced exposure to disinfection byproducts
- Reduced chlorine taste to water
- Lower cost of control
- Reduced health risk/regulatory violations



Planning Grand Prize

Granular Activated Carbon Master Planning Project, Birmingham AL
Entering Firm: Malcolm Pirnie, Inc.

CHALLENGES

- **Comply with upcoming Federal Stage 2 Rule**
 - Removal of disinfection byproducts (DBP)
 - Protecting drinking water supplies
 - Four water treatment facilities
 - Birmingham WaterWorks and Sewer Board (BWWSB)



Planning Grand Prize

Granular Activated Carbon Master Planning Project, Birmingham AL
Entering Firm: Malcolm Pirnie, Inc.

CHALLENGES

- **Develop affordable low-cost strategy**
 - Previous plan – expensive alternative
 - Limited funds available
 - Very limited space
 - Re-evaluate solution



Planning Grand Prize

Granular Activated Carbon Master Planning Project, Birmingham AL
Entering Firm: Malcolm Pirnie, Inc.

CHALLENGES

- **Implement within 5 years**
 - Minimize changes to operations
 - Avoid plant shutdowns/
summer time derating
 - Avoid significant capital and operating costs



Planning Grand Prize

Granular Activated Carbon Master Planning Project, Birmingham AL
Entering Firm: Malcolm Pirnie, Inc.

INNOVATIONS

- **Regulatory compliance with low cost plant upgrades**
- **Modify existing conventional GAC filters**
 - Create GAC biofilters
 - Achieve adsorption and microbial growth
 - Microbes consume organic compounds
 - Ozone pretreatment eliminated



Planning Grand Prize

Granular Activated Carbon Master Planning Project, Birmingham AL
Entering Firm: Malcolm Pirnie, Inc.

INNOVATIONS

- **Bench/Pilot scale demonstrations**
 - **Compliance with Rule**
 - **Removes DBP precursors**
 - **Viable hybrid technology**



Planning Grand Prize

Granular Activated Carbon Master Planning Project, Birmingham AL
Entering Firm: Malcolm Pirnie, Inc.

BENEFITS

- **Water Quality goals achieved**
 - High quality, good-tasting water
 - Meets deadline
- **Minimizes GAC waste/energy**
 - Extends media life 3 – 5 X
 - No ozone generation



Planning Grand Prize

Granular Activated Carbon Master Planning Project, Birmingham AL
Entering Firm: Malcolm Pirnie, Inc.

BENEFITS

- **Avoids water rate increases**
 - Savings of **\$35M** at 1 facility
- **Minor modifications to existing infrastructure**
 - Leveraging existing systems



Design Grand Prize

Orange County Groundwater Replenishment, Fountain Valley CA
Entering Firm: R. Bruce Chalmers, PE

CHALLENGES

- **Address water supply issues**
 - Extended droughts
 - Continued population growth
 - Salt water intrusion
 - Supplying safe drinking water



Design Grand Prize

Orange County Groundwater Replenishment, Fountain Valley CA
Entering Firm: R. Bruce Chalmers, PE

CHALLENGES

- **Implement sustainable water supply solution**
 - Reduce dependence on imported water
 - Northern California or Colorado River
 - Reduce energy demand
- **Minimize land requirement**



Design Grand Prize

Orange County Groundwater Replenishment, Fountain Valley CA
Entering Firm: R. Bruce Chalmers, PE

INNOVATIONS

- **Convert highly treated wastewater**
 - Potable, near distilled, water beyond DW standards
 - Add minerals for stability
- **Apply Microfiltration (pretreatment), Reverse Osmosis (purification), Ultraviolet Light (disinfection)**
 - UV removes: bacteria, emerging contaminants and viruses



Design Grand Prize

Orange County Groundwater Replenishment, Fountain Valley CA
Entering Firm: R. Bruce Chalmers, PE

INNOVATIONS

- **Injected into seawater barrier**
 - Prevents salt water diffusion
 - Reduces TDS in water
- **Percolated into aquifers**
 - Providing new water source



Design Grand Prize

Orange County Groundwater Replenishment, Fountain Valley CA
Entering Firm: R. Bruce Chalmers, PE

BENEFITS

- **Reduces dependence on imported water**
 - Saves water resources, energy, and money
- **Provides new water source**
 - 70 mgd (for 144,000 households)
 - Meets stringent drinking water criteria
- **Stops aquifer salt water intrusion**



Design Grand Prize

Orange County Groundwater Replenishment, Fountain Valley CA
Entering Firm: R. Bruce Chalmers, PE

BENEFITS

- **Makes use of previously wasted resource**
- **Highly automated**
 - Reducing staff required
- **Expandable to 130 mgd**



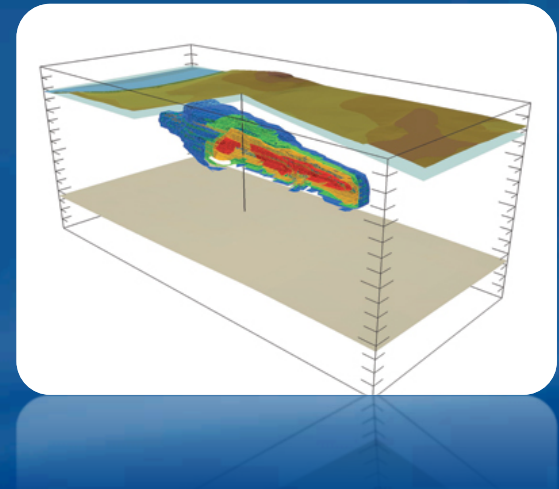
Setting standard for recycled wastewater: water projects

Operations/Management Grand Prize

SPEIM / LTM / O&M Program at MMR, Otis Ang MA
Entering Firm: AFCEE and CH2M Hill

CHALLENGES

- **Effectively treating contaminated groundwater**
 - 16 mgd
 - 8 major extract/treat/re-inject systems
- **Reduce historic impacts**
 - Phosphorus
 - Chlorinated solvents in surface waters
- **Demonstrate local non-impact**
 - Monitor wetlands, cranberry bogs, water bodies
- **Managing data input/data base**



Operations/Management Grand Prize

SPEIM / LTM / O&M Program at MMR, Otis Ang MA
Entering Firm: AFCEE and CH2MHill

INNOVATIONS

- **Reducing energy consumption**
 - Wind turbine (providing 25% of energy)
 - Using VFDs
 - Eliminating pumps/reducing motors
- **Reduce phosphorus impacts:**
 - Install iron geochemical barrier
 - Removes ~67% of phosphorus



Operations/Management Grand Prize

SPEIM / LTM / O&M Program at MMR, Otis Ang MA
Entering Firm: AFCEE and CH2MHill

INNOVATIONS

- **Data management**
 - Simplified web-based data management
 - Auto QC check
 - Easy access

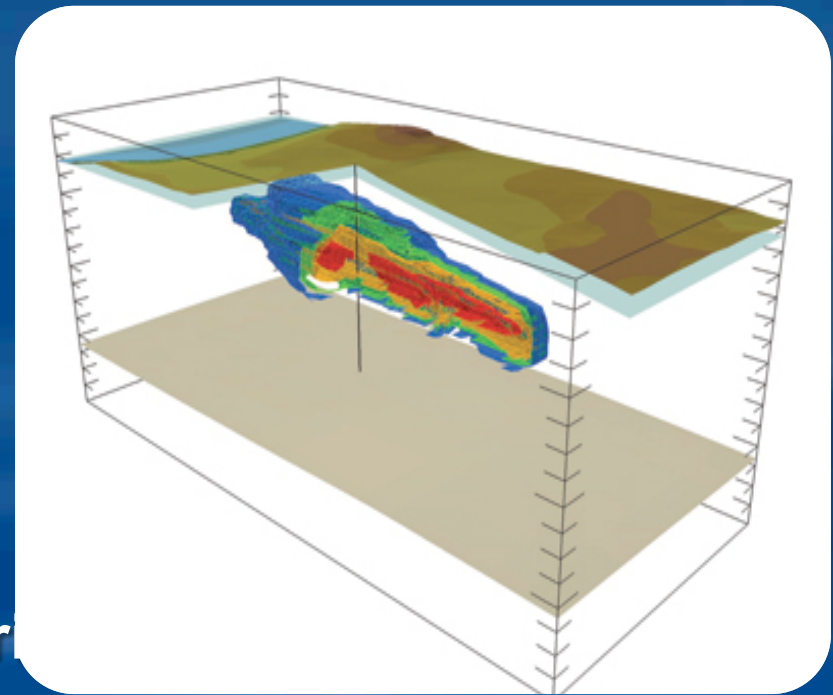


Operations/Management Grand Prize

SPEIM / LTM / O&M Program at MMR, Otis Ang MA
Entering Firm: AFCEE and CH2MHill

BENEFITS

- **Continuous monitoring assures public safety**
- **Reduced cost to treat and monitor waterways**
 - Operate systems (energy)
- **Reducing impacts of historical /existing discharges**



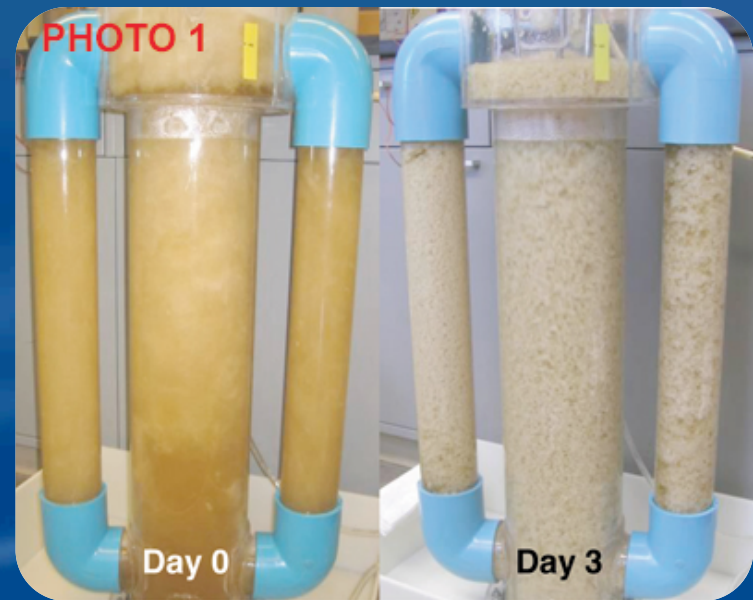
University Research Grand Prize

**Value-Added Products from Dry-Grind Corn Milling Stillage
by Fungal Processing, Ames IA**

Entering Firm: Fungal Research Group Iowa State University

CHALLENGES

- **Convert corn-to-ethanol waste (stillage)**
 - Useful products
 - Reduce energy
 - Economical
- **Recycle water from ethanol production**
 - Eliminate flash evaporation



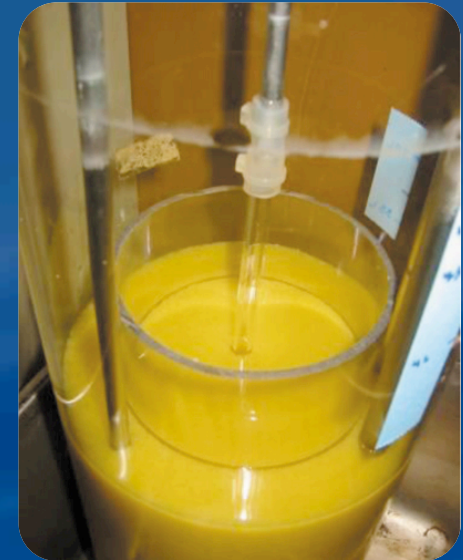
University Research Grand Prize

**Value-Added Products from Dry-Grind Corn Milling Stillage
by Fungal Processing, Ames IA**

Entering Firm: Fungal Research Group Iowa State University

INNOVATIONS

- **Use stillage to feed fungal bioreactors**
- **Stillage contains organic compounds**
 - Micro-nutrients
 - pH of 4.5
 - Ideal for feeding fungal growth
- **Feed fungus to swine/poultry**
 - Replace lost corn stock



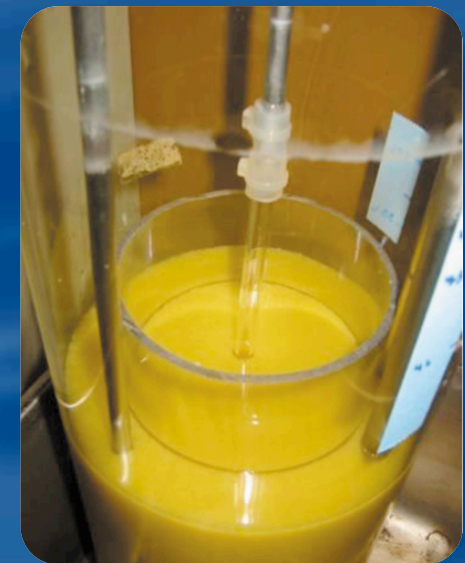
University Research Grand Prize

**Value-Added Products from Dry-Grind Corn Milling Stillage
by Fungal Processing, Ames IA**

Entering Firm: Fungal Research Group Iowa State University

BENEFITS

- **Reduce ethanol production water consumption**
 - Drop 10 bgy
- **Reduce energy consumption**
 - Eliminate flash drying
 - Could save \$800M/yr nationwide
- **Provide viable feedstock**
 - Supplementing corn
 - Reducing need for antibiotics
 - Healthier meat products



Small Projects Grand Prize

Reuse for Industrial, Agricultural, and Landscaping (RIAL), Amman Jordan
Entering Firm: CDM

CHALLENGES

- **Provide water for arid land**
 - Average rainfall: 8 inches
 - 75% of land is desert
 - Demand exceeds supply by 150 bg in 2005
- **Convince stakeholders to reuse wastewater**
 - Goal 100%
- **Develop water reclamation for Industry, Agriculture and Urban Landscaping**



Small Projects Grand Prize

Reuse for Industrial, Agricultural, and Landscaping (RIAL), Amman Jordan
Entering Firm: CDM

INNOVATIONS

- **Underground irrigation process**
 - Bundle water pipes
 - Inside overflow pipes
 - Preventing root blockages
- **Implemented**
 - Nationwide
 - Watershed-based approach with collaboration between Government, Business and Communities



Small Projects Grand Prize

Reuse for Industrial, Agricultural, and Landscaping (RIAL), Amman Jordan
Entering Firm: CDM

BENEFITS

- Increased standard of living
- Farmers saved water
 - Irrigated with reclaimed water
 - Now have multiple seasons
 - Crop yields more than doubled
 - Income tripled
- Urban landscape expansion
 - Citizens enjoyed greenery
 - Expanded landscaped area
 - Use as park



