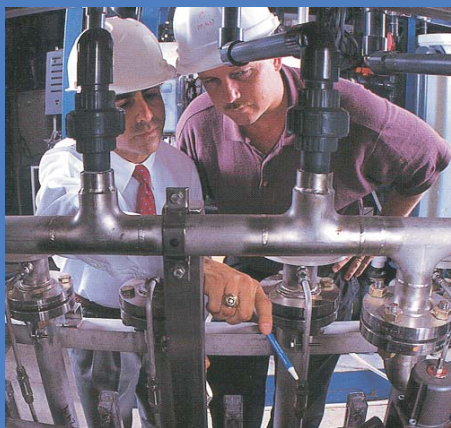


# RECLAMATION

*Managing Water in the West*

## Advanced Water Testing Opportunities



The Water Quality Improvement Center is a National Center for Water Treatment Technology, operated by the U.S. Bureau of Reclamation. It's located in Yuma, AZ, at the site of the 73 million-gallon-a-day Yuma Desalting Plant.

Anyone with an idea to explore or a piece of equipment to test may access the WQIC test facilities. Work can be conducted on a cost-reimbursable basis, or cost-sharing may also be available if a project benefits the government.

The WQIC has on-site engineering, operations and maintenance staff, is fully permitted to conduct test operations, has its own advanced water treatment equipment for use, and space for testing partner-supplied equipment.

## Yuma Area Office

# Water Quality Improvement Center Test Equipment

## Demonstration Scale System (Ps1) 1 million gallons per day



Grit Sedimentation Basin



SCR & Gravity Filters



Hydranautics RO System



Fluid Systems RO System

### General information

600 gpm system, conventional pretreatment (grit basin, intake pumping system, solids contact reactor, dual media gravity filters, clearwell), 8-inch and 12-inch production reverse osmosis systems.

### Pretreatment System

#### **Grit Sedimentation Basin**

Water velocity 600 gallons per minute; Basins 8 foot by 8 foot.

#### **Solids Contact Reactor/Clarifier**

32-foot diameter, rapid-mix, precipitation, flocculation, clarification.

#### **Gravity Filters**

Filters solids 25+ microns; 20 inches of coarse anthracite coal, 10-inch bed of fine sand. 4 cells, 64 ft<sup>2</sup> area each.

### RO Units

#### **Hydranautics System**

6 pressure vessels, 7 8.5-inch membrane elements per vessel. 2:1 array.

#### **Fluid Systems**

6 pressure vessels, 4 12-inch CA membrane elements per vessel. 2:1 array.



# RECLAMATION

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## Water Quality Improvement Center Test Equipment

### Pilot Scale Systems (PS2, PS3) 30-50 gallons per minute

### Membrane Pretreatment Units



Series Continuous Stirred Tank Reactor

#### General Information

2 individual, pilot-scale process trains; 30-50 gallons per minute; 12-24 gpm treated water supplied to 2 membrane evaluation research units per train; MERUs are 2:1 arrays, 2.5-inch spiral-wound NF, RO elements.

#### **Series Continuous Stirred Tank Reactor**

Rapid mix, precipitation, flocculation. Eight cells, liquid volume of 400 gallons.

#### **Gravity Filters**

6 individual filter columns, 30 inches in diameter. Effluent discharges to 2 filter effluent tanks.

#### **Chemical Feed Systems**

Injects chemicals; includes sodium hypochlorite, lime, sulfuric acid, polymer, ferric sulfate, SHMP, ammonium hydroxide.

#### **MERUs 1 & 2 (on PS2) and MERUs 3 & 4 (on PS3)**

4 individual NF/RO systems. 85% recovery; 21 spiral-wound, 2.5" x 40" elements; Operation flows from 3-12 gpm, pressure range from 60 to 500 lb/in<sup>2</sup>.

#### Membrane Pretreatment Units

##### **Memcor Microfiltration**

3 filtration modules. Feed flow 18-20 gpm. 15 m<sup>2</sup> of .2 micron hollow fiber membranes. Flow is outside-in.

##### **YDP Zenon Ultrafiltration**

One 42.7 m<sup>2</sup> chlorine tolerant high pressure membrane with .1 micron nominal size. Flow rate of 18-20 gpm.



Memcor Microfilter



Clarifier



Portable Chemical Feed Systems



Membrane Evaluation Research Units



Zenon Ultrafilter





# RECLAMATION

*Managing Water in the West*

## Water Quality Improvement Center Test Equipment

### Membrane Process Research Units (Bench Scale, Screening, Full Recovery, and Mobile Units)



Swatch Unit

#### Swatch Units 1 & 2

2 independent systems; 3 test cells per system with 3 in<sup>2</sup> of membrane area. Flow range is 1-2 gpm; pressure range is 60-500 lb/in<sup>2</sup>.



Membrane Evaluation Apparatus

#### Membrane Element Apparatus (MEA)

Skid mounted, simultaneously operates 8 membrane vessels; flows to 2 separate water sources for each set of 4 membranes.



Element Screening Unit

#### Membrane Test Apparatus (MTA)

Skid mounted, 1 2.5 by 40-inch long vessel. Includes chiller and interface to SCADA.



Membrane Evaluation Research Unit 5

#### Element Test Apparatus 1, 2, & 3 (ETA)

Skid mounted, 2 2.5-inch-diameter by 40-inch long vessels, and 2 4-inch-diameter by 40-inch-long vessels.



Membrane Test Apparatus

#### Element Screening Unit (ESU)

Skid mounted, 3 2.5-inch-diameter by 40-inch long vessels. Variable flow rates and pressures.



Element Drying Apparatus

#### Membrane Evaluation Research Unit (MU5)

Skid mounted, 2 or 3 stage (for full or high recovery) unit. 4 first-stage, 4 x 40 inch elements; 1 second stage, 4 x 40 inch element; 1 third stage, 2.5 x 40 inch element. Variable flow rates and pressures. SCADA interface on-board.



Element Test Apparatus

#### Element Drying Apparatus (EDA)

3 units, sized for 12"x60", 8 to 8.5"x40", and 2.5"x40" elements.



Mobile Research Facility

#### Mobile Research Facility

Conventional and membrane water pretreatment and treatment. Ancillary chemical systems. Fully portable.



# RECLAMATION

*Managing Water in the West*

## Water Quality Improvement Center Test Equipment

### Chemistry Research Units



Corrosion Test Units

#### Corrosion Test Units

3 independent units. High velocity, variable speed motor control, flow capacity .5 to 1 gpm.

#### Clor-Tec Electrochlorinator

12 lbs/day at .8% concentration. Auto-batching, uses potable water at 30-80 psi.



Clor-Tec Electrochlorinator

#### MIOX Electrochlorinator

4 lbs/day free available chlorine at 06%; complete system.

#### Lamella Clarifier

Integrated flash/flocculation tank; flash section mix volume - 50 gallons; floc tank mix volume - 115 gallons. Design flow - 25 gpm; design rise rate - 0.54 gpm ft<sup>2</sup>.



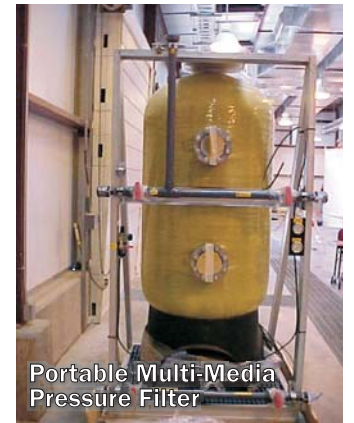
Mixed Oxidant (MIOX)  
Electrochlorinator

#### Portable Multi-Media Pressure Filter

36"-diameter, 7'-5" tall, designed for maximum 30 gpm. Can use multiple media or green sand media. Manually operated.



Lamella Clarifier



Portable Multi-Media  
Pressure Filter

#### Element Check Apparatus (ECA)

Manual operation system; 5 8.5" elements or 4 12-inch elements. Pump range 60-500 lb/in<sup>2</sup>.



Element Check Apparatus





# RECLAMATION

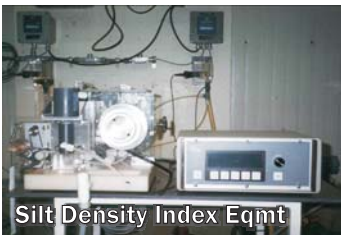
*Managing Water in the West*

## Water Quality Improvement Center Partner-Supplied Test Equipment

### Conventional and membrane systems, equipment, instrumentation



Membrane Pretreatment



Silt Density Index Eqmt



Corrosion Evaluation System

#### Partner-Supplied Technology

Technology Transfer enables Reclamation to partner with you on your research or testing projects. If we don't have equipment that is suitable for your project, you can either supply your own prototype unit, purchase commercially available technology and site it here for your testing, or partner with us to build the equipment you need. We will work with you on a location for the equipment within the WQIC test bays.

Unless other arrangements are negotiated as part of the research agreement, your equipment is removed from the WQIC when the test is done.

#### Arranging Equipment Use

WQIC equipment is available for use either on a cost-reimbursable basis or on a cost-shared basis, depending on the nature of the proposed project. Portable equipment may be transported or shipped to your location and used at your site. Equipment may not be immediately available if it's currently being used for tests.

**To check on the availability of this equipment, please contact:**

Mr. Teh-An (Daniel) Hsu  
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Pilot-scale membrane pretreatment system



High-Recovery Reverse Osmosis System



Brine Crystallization System

