

# RECLAMATION

*Managing Water in the West*

## Feedwater Chemistry

The WQIC can treat waters from a variety of on-site sources, and can replicate many brackish water chemistries. Below is a chemical breakdown of the on-site feedwaters available. For more information, visit <http://www.usbr.gov/lc/yuma/wquality/default.htm>

### On-site Well

Sulfate (SO <sub>4</sub> ) mg/L	290
Sodium (Na) mg/L	145
Potassium (K) mg/L	4.3
Calcium (Ca) mg/L	134
Magnesium (Mg) mg/L	35.5
Barium (Ba) mg/L	0.11
Strontium (Sr) mg/L	1.43
Chloride (Cl) mg/L	196
Nitrate (NO <sub>3</sub> ) mg/L	0.64
Conductivity (Cond.) us/cm	1,600
pH	7.8
Total Alkalinity mg/L as CaCO <sub>3</sub>	220
Total Dissolved Solids (TDS) mg/L	1,090

### Colorado River

Sulfate (SO <sub>4</sub> ) mg/L	272
Sodium (Na) mg/L	113
Potassium (K) mg/L	4.7
Calcium (Ca) mg/L	81.6
Magnesium (Mg) mg/L	27.4
Barium (Ba) mg/L	0.11
Strontium (Sr) mg/L	1.11
Chloride (Cl) mg/L	102
Nitrate (NO <sub>3</sub> ) mg/L	1.3
Conductivity (Cond.) us/cm	1,120
pH	8.3
Total Alkalinity mg/L as CaCO <sub>3</sub>	116
Total Dissolved Solids (TDS) mg/L	780

### Agricultural Drain

Sulfate (SO <sub>4</sub> ) mg/L	787
Sodium (Na) mg/L	613
Potassium (K) mg/L	8.1
Calcium (Ca) mg/L	159
Magnesium (Mg) mg/L	70.2
Barium (Ba) mg/L	0.033
Strontium (Sr) mg/L	2.39
Chloride (Cl) mg/L	665
Nitrate (NO <sub>3</sub> ) mg/L	10.9
Conductivity (Cond.) us/cm	3,930
pH	8.06
Total Alkalinity mg/L as CaCO <sub>3</sub>	289
Total Dissolved Solids (TDS) mg/L	2,940

### Pretreated Feed

Sulfate (SO <sub>4</sub> ) mg/L	804
Sodium (Na) mg/L	599
Potassium (K) mg/L	7.9
Calcium (Ca) mg/L	90.5
Magnesium (Mg) mg/L	50
Barium (Ba) mg/L	0.014
Strontium (Sr) mg/L	1.4
Chloride (Cl) mg/L	660
Nitrate (NO <sub>3</sub> ) mg/L	11.1
Conductivity (Cond.) us/cm	3,610
pH	5.1
Total Alkalinity mg/L as CaCO <sub>3</sub>	3.6
Total Dissolved Solids (TDS) mg/L	2,450

### R.O. Product

Sulfate (SO <sub>4</sub> ) mg/L	4.36
Sodium (Na) mg/L	64.4
Potassium (K) mg/L	0.9
Calcium (Ca) mg/L	0.74
Magnesium (Mg) mg/L	0.43
Barium (Ba) mg/L	<0.001
Strontium (Sr) mg/L	0.011
Chloride (Cl) mg/L	94
Nitrate (NO <sub>3</sub> ) mg/L	6.33
Conductivity (Cond.) us/cm	367
pH	5.72
Total Alkalinity mg/L as CaCO <sub>3</sub>	4.49
Total Dissolved Solids (TDS) mg/L	186

### R.O. Reject

Sulfate (SO <sub>4</sub> ) mg/L	2,730
Sodium (Na) mg/L	1,890
Potassium (K) mg/L	25
Calcium (Ca) mg/L	299
Magnesium (Mg) mg/L	157
Barium (Ba) mg/L	0.046
Strontium (Sr) mg/L	4.68
Chloride (Cl) mg/L	2,090
Nitrate (NO <sub>3</sub> ) mg/L	19.1
Conductivity (Cond.) us/cm	10,100
pH	4.74
Total Alkalinity mg/L as CaCO <sub>3</sub>	2.21
Total Dissolved Solids (TDS) mg/L	7,820

For more information about how you can use the WQIC to test your water treatment processes and/or technology, contact Angela Adams, Yuma Area Office, Bureau of Reclamation, at (520) 343-8114. You can also e-mail her at [aadams@lc.usbr.gov](mailto:aadams@lc.usbr.gov).



NATIONAL  
CENTERS  
*for* Water  
Treatment  
Technologies

# RECLAMATION

*Managing Water in the West*

## On-site Water Lab



*For more information about how to use the WQIC to test your water treatment processes and/or technology, contact Angela Adams, Yuma Area Office, Bureau of Reclamation, at (928) 343-8114. You can also e-mail her at [aadams@lc.usbr.gov](mailto:aadams@lc.usbr.gov).*

Bureau of Reclamation's Water Quality Improvement Center water laboratory is licensed by the Arizona Department of Health Services for drinking water and wastewater inorganic analyses. The lab has a throughput capacity of more than 10,000 samples per year. WQIC's laboratory participates in the U.S. Geological Survey, the U.S. Environmental Protection Agency and Environmental Resource Associates quality control programs.

### Equipment

The laboratory is equipped with the following:

- Lachat-Quik Chem 8000 2 channel flow injection analyzer used for chloride, nitrate, ammonium and orthophosphate analyses.
- Dionex Ion Chromatograph 2120i with AI-450 data system used to analyze F, Br, Cl, PO<sup>4</sup>, NO<sup>2</sup>, NO<sup>3</sup>, and SO<sup>4</sup>. This instrument has the capability of simultaneously determining all of the anions mentioned utilizing less than a milliliter of sample.
- Radiometer titration equipment including ABU 80 Autoburette, TTT85 titrator and SAC80 sample

changer used for pH, alkalinity, specific conductance and fluoride

- Tecan RSP8051 4 channel diluter for diluting water samples.
- Baird ICP 2000 simultaneous inductively coupled plasma emission spectrophotometer used for the following analyses: Silver, aluminum, barium, beryllium, boron, cadmium, calcium, cobalt, chromium, copper, iron, lithium, manganese, magnesium, molybdenum, nickel, potassium, lead, silica as SiO<sup>2</sup>, strontium, sulfur as SO<sup>4</sup>, antimony, tin, thallium, vanadium, and zinc.

Other general laboratory equipment includes equipment required to perform the following tests: chlorine residual, corrosivity, heterotrophic plate count, percent solids or moisture, total dissolved solids and turbidity. This equipment includes a Mettler AE163 analytical balance, Hach Ratio/XR turbidimeter, CEM AVC80 percent solids analyzer and other general laboratory equipment.



NATIONAL  
CENTERS  
for Water  
Treatment  
Technologies

# RECLAMATION

*Managing Water in the West*

*For more information about how to use the WQIC to test your water treatment processes and/or technology, contact Angela Adams, Yuma Area Office, Bureau of Reclamation, at (928) 343-8114. You can also e-mail her at [aadams@lc.usbr.gov](mailto:aadams@lc.usbr.gov).*

## Automated System Controls

### Open PC-Based Supervisory Control and Data Acquisition

PC-based SCADA systems have answered the need on the continuing decline in federal budgets and for Government agencies to make the most out of its research dollars. Government and Industry researchers are moving more and more towards an open based control systems to meet the demanding flexibility and cost effectiveness for controlling and monitoring their water research projects. The performance in personal computers and the variety of user friendly application software has grown almost exponentially in the last 15 years. The WQIC SCADA system has modeled many of these ideas of "Open-System" in the following:

- Cost-effective hardware (personal computers and using off-the-shelf I/O hardware by many different manufacturers).
- Operating system uses Microsoft Windows NT platform.
- Networked based (operator screens and real-time data can be viewed anywhere from the LAN).
- User friendly application software and compatible to variety of window based applications (i.e., spreadsheets, statistical and analytical software, and PID tuning software)

### Reliable Process Instrumentation

With any research project the final conclusion is only as good as the data. This data must come from reliable, repeatable, accurate, and stable

instrumentation. The WQIC instrumentation meets these high demanding performance requirement necessary to gather essential and decisive information about the process being researched.

### On-Site Engineers with Experience in Instrumentation and Controls

The WQIC engineers have many years of experience in various instrumentation and control requires for water treatment and related research projects. This played an important role in the design of the WQIC. Engineers are kept current on today's growing technology in both instrumentation and controls.

### On-Site Computers for Viewing Real Time Data

The WQIC is equipped with Local Area Network computers. This allows researchers locally to view real time data, trends, operating conditions, and manage their research project from their office or WQIC water lab.

### On-Site Staff Available to Analyze Data and Develop Custom Reports

The WQIC has on-site staffing available for analyzing data and develop custom reports based on customer research needs.



NATIONAL  
CENTERS  
*for* Water  
Treatment  
Technologies

# RECLAMATION

*Managing Water in the West*

## Research Facilities

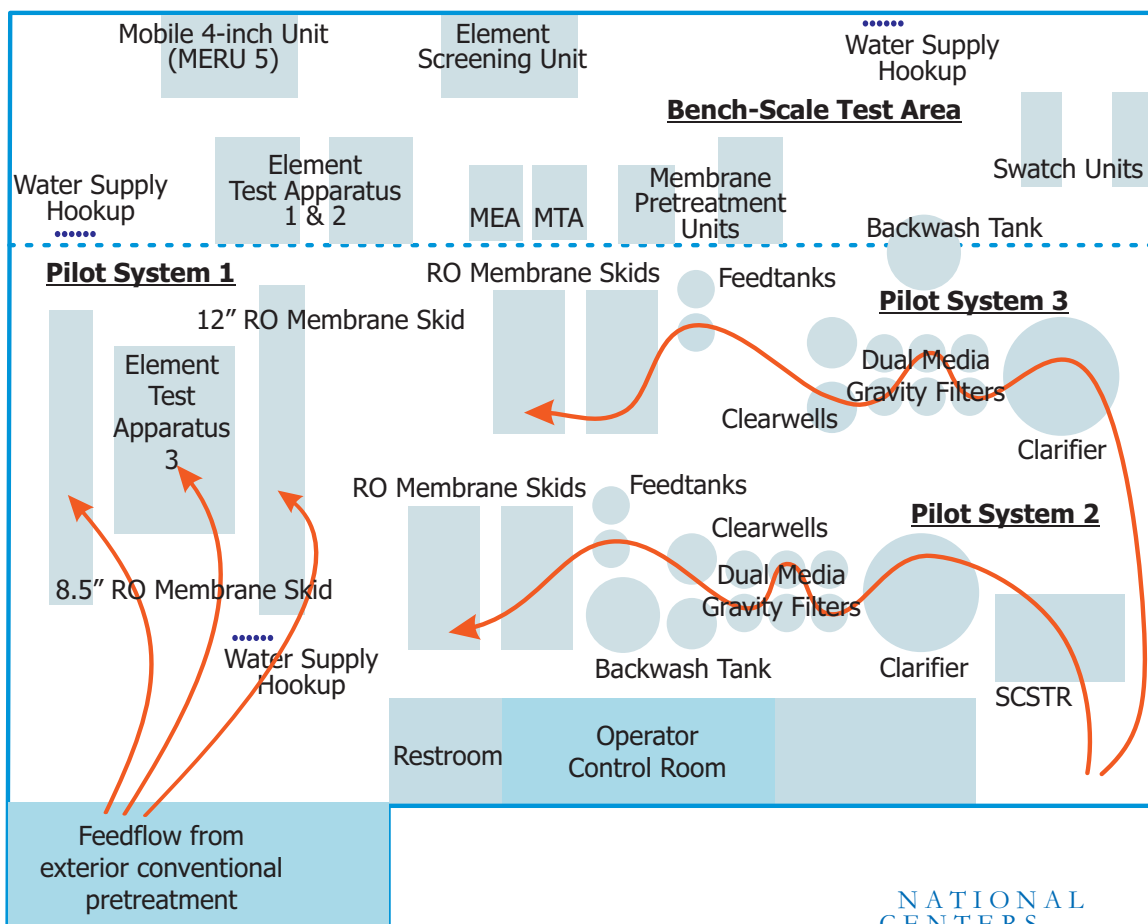
For more information about how to use the WQIC to test your water treatment processes and/or technology, contact Angela Adams, Yuma Area Office, Bureau of Reclamation, at (928) 343-8114. You can also e-mail her at [aadams@lc.usbr.gov](mailto:aadams@lc.usbr.gov).

### WQIC houses the following equipment:

- Two bench-scale swatch units
- One 1-inch membrane testing unit
- Two multi-station 2.5-inch membrane testing units
- One two-station, 4-inch membrane testing unit
- Four 2-inch RO membrane skids
- One 8-inch RO membrane skid
- One 12-inch RO membrane skid
- Membrane pretreatment skids
- Conventional pretreatment facilities

WQIC can tap multiple feedwater sources including:

- Ground water;
- Potable water;
- Brackish agricultural drainage;
- Colorado River;
- Reverse osmosis concentrate;
- Reverse osmosis permeate;
- Flows custom blended to your specifications in our on-site blending tank.



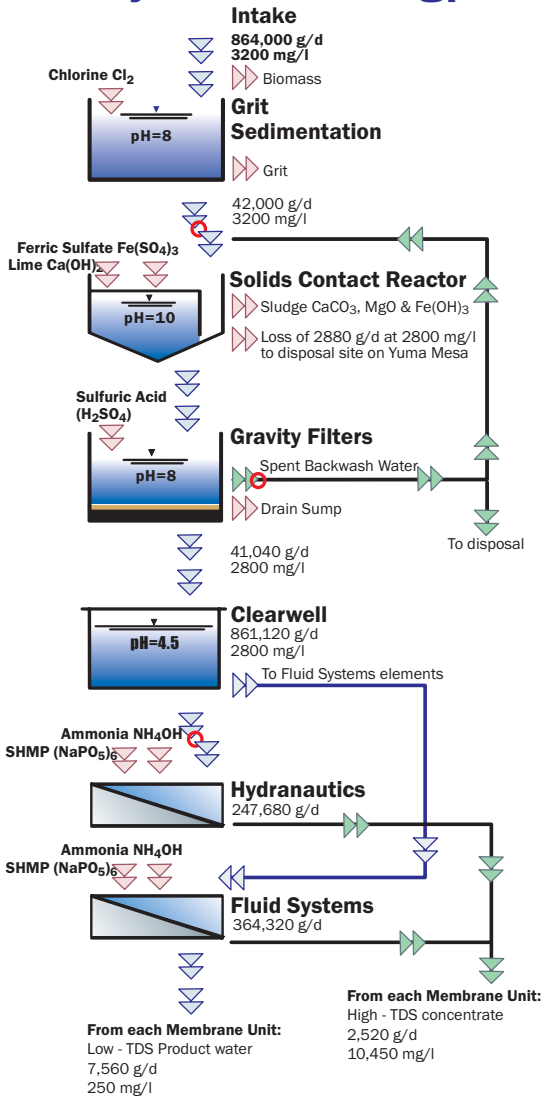
NATIONAL  
CENTERS  
for Water  
Treatment  
Technologies

# RECLAMATION

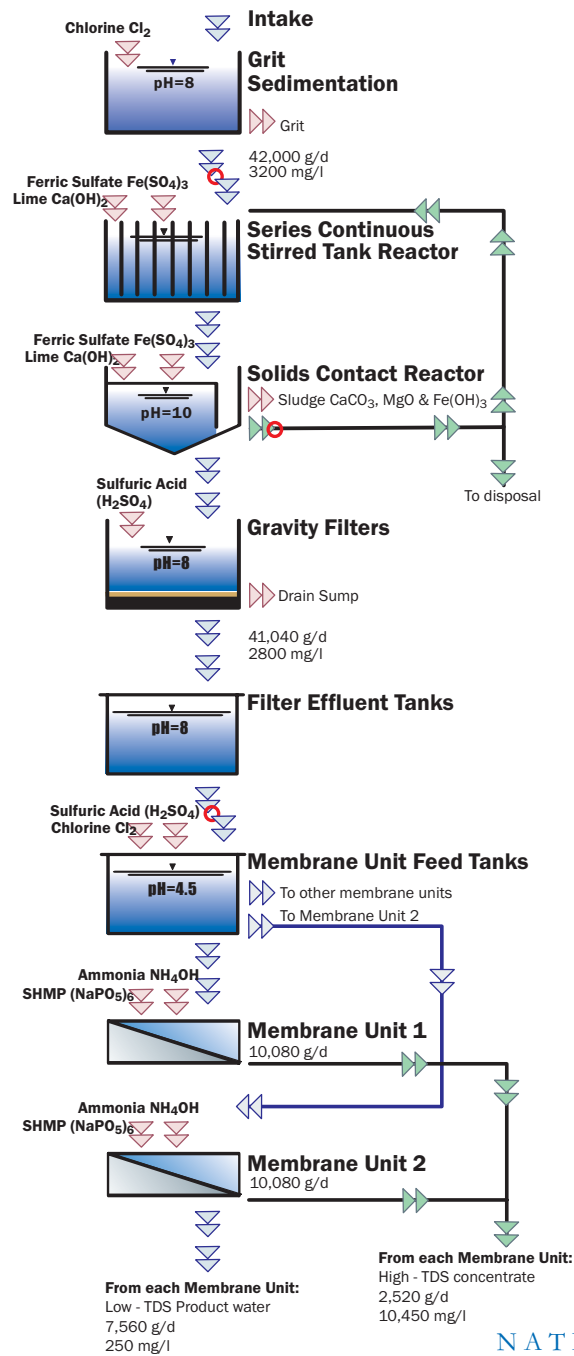
*Managing Water in the West*

## Process Flow Diagram

### Pilot System 1: 600 gpm



### Pilot System 2 & 3: 50 gpm ea.



# RECLAMATION

*Managing Water in the West*

## CRADAs Made Easy

*For more information about how to use the WQIC to test your water treatment processes and/or technology, contact Angela Adams, Yuma Area Office, Bureau of Reclamation, at (928) 343-8114. You can also e-mail her at [aadams@lc.usbr.gov](mailto:aadams@lc.usbr.gov).*

### General Information on CRADAs

The Bureau of Reclamation's Water Quality Improvement Center (WQIC) is designed to serve as a field site for investigation of new and improved water treatment technologies. Cooperative Research and Development Agreements (CRADA) partnerships are open to any non-Federal party with a research project.

Congress authorized CRADAs under the

Federal Technology Transfer Act of 1986 (PL 99-502) to enhance and facilitate collaboration between governmental agencies and commercial firms. The WQIC uses CRADAs as tools to allow water quality research at its facility.

Reclamation operates the WQIC on a cost-shared or cost-reimbursed basis. The CRADA partner may provide funds, facilities, people, or other resources. WQIC provides the CRADA partner with access to unique government facilities,

equipment and expertise; increased exchange of ideas through people-to-people contact; and reduced time between R&D and commercialization. Rights to inventions and other intellectual property are negotiated between the WQIC and participant, and certain proprietary data that are generated may be protected for up to five years.

Establishing a working relationship is usually very quick and easy.

### Steps to a Successful CRADA

- To begin the CRADA process, contact Angela Adams at (928) 343-8114.
- Angela will discuss your research project with you and begin developing a skeleton outline of a statement of work (SOW). The statement of work identifies the tasks involved in the research project, who will perform which tasks, details the financial transactions involved in the project, and expected outcomes of the research project.
- In consultation with the partner, WQIC staff will flesh out the skeleton statement of work, including cost estimates for the project. Staff will then send the SOW to the partner for review. Any changes will be integrated.
- Reclamation will also send a copy of the CRADA standard articles to the partner to review. The WQIC operates according to a standard CRADA legal document that accompanies the SOW. This agreement contains the general provisions of the CRADA, which describe the legal responsibilities of both partners.
- After the prospective CRADA has met the partner's approval, USBR lawyers review the document.
- Once approved by USBR legal staff, the CRADA is signed by both USBR and the partner. The partner then deposits the agreed upon contributions into an assigned account, the agreement is in force, and the project may begin.



NATIONAL  
CENTERS  
*for* Water  
Treatment  
Technologies

# RECLAMATION

*Managing Water in the West*

## Location Map



The Bureau of Reclamation's Water Quality Improvement Center is located in Yuma, Arizona, in the southwestern corner of Arizona. Yuma is 150 miles west of Phoenix, Arizona, 150 miles east of San Diego, California, 75 miles east of Mexicali, Mexico, and 300 miles south of Las Vegas, Nevada.



NATIONAL  
CENTERS  
*for* Water  
Treatment  
Technologies