

# OPTIMIZING SUCCESS OF WATERWELL REHABILITATIONS

FRED ROTHAUGE



2016 NGWA GROUND WATER SUMMIT



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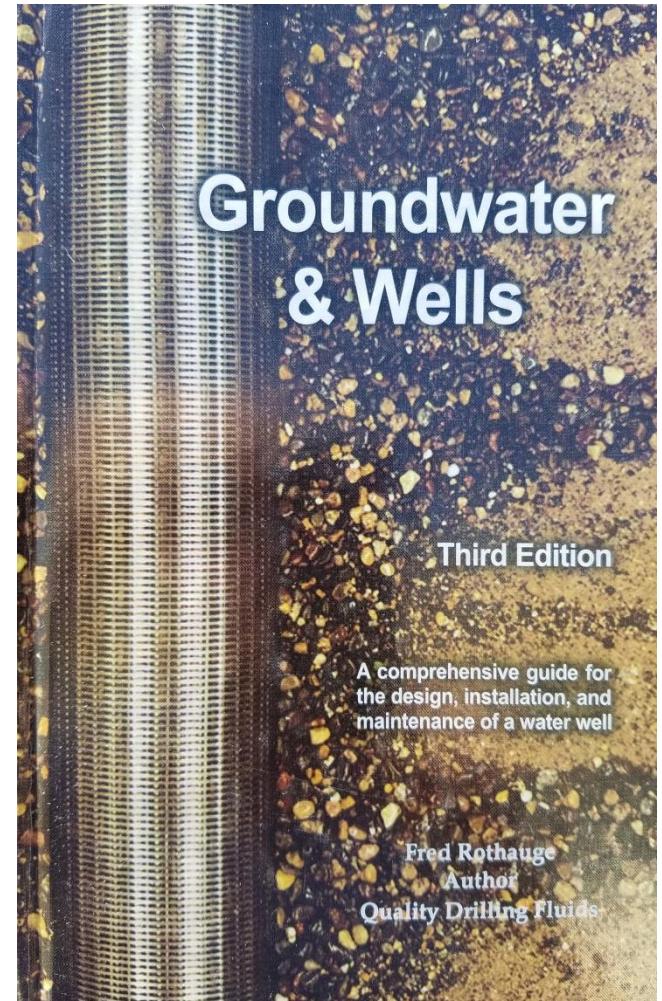
- **WHAT IS WELL REHABILITATION ?**

# Well Rehabilitation

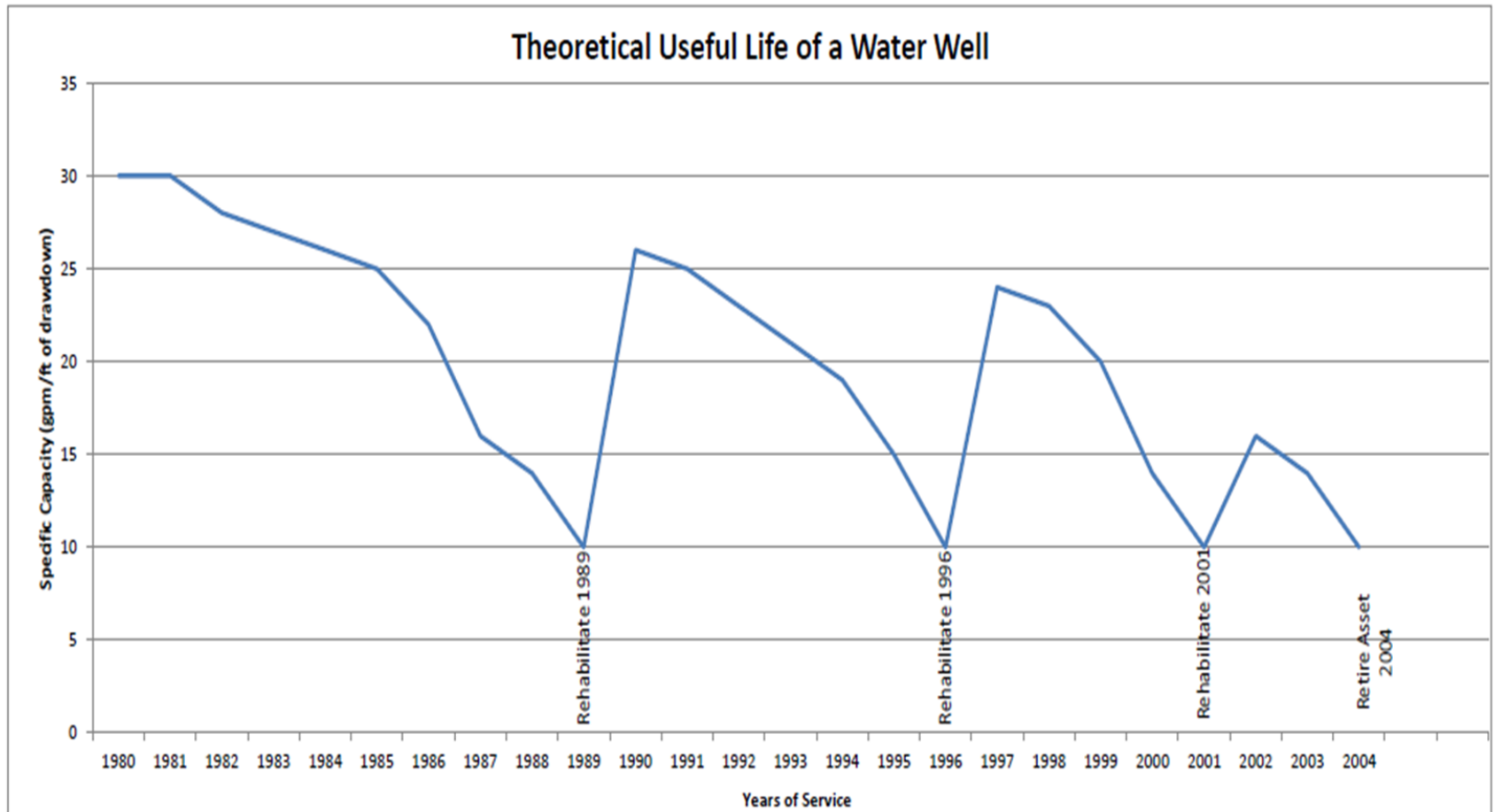
**(GROUNDWATER AND WELLS)**

**WELL REHABILITATION IS:**

**“THE ACT OF RESTORING A WELL  
TO ITS MOST EFFICIENT  
CONDITION BY VARIOUS  
TREATMENTS OR  
RECONSTRUCTION METHODS”**



# CHARACTERISTICS OF WELLS FOLLOWING REHABILITATION



COTEY - Better Wells with Chemicals

# Pumping Cost for City of Phoenix

**Increased cost for a 1,000 gpm well to lift groundwater 100 additional feet would be about \$16,900 every year \*.**



Glofelty, 2012

# Steps for Effective Rehabilitations

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WELL VISIT– Evaluate Symptoms, Determine Diagnosis and Provide Treatment and Record

- Water sample Analysis
- Pre-Rehabilitation Pump Test**
- Pull pumping equipment
- Pre-Rehab Video Inspection
- Wire/Nylon Brushing and Bailing
- Chemical and Physical Treatment
- Re-Development
- Bail or airlift sump
- Post-Rehab Video Inspection
- Re-install pumping equipment
- Post Rehabilitation Pump Test

# Most Well Rehabilitation Failures are contributed to:

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# CHEMICAL TREATMENT CHOICES

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- **CHEMICAL TREATMENT – PRIMARY SUPPLIERS OF:**
  - **JOHNSON CHEMICAL - NU WELL PRODUCTS WATER SYSTEMS TECHNOLOGY – JOHN AND MIKE SCHNEIDERS**
  - **COTEY CHEMICAL**
  - **WELL KLEAN – HCT SCIENCE AND TECHNOLOGY – SAFE ACID HCL AND HYDROGEN PEROXIDE – TODD EDEN**
  - **BAROID WELL CLEANING CHEMISTRY – MIXED BAG**
  - **JET LUBE – DESIGN WATER – DAVE HANSON**
  - **LAYNE – QC-21 - WATER SYSTEMS ENGINEERING – JOHN AND MIKE SCHNEIDERS**
  - **AQUA FREED – INJECTION OF LIQUIFIED GASEOUS CARBON DIOXIDE**



# PHYSICAL TREATMENT OPTIONS

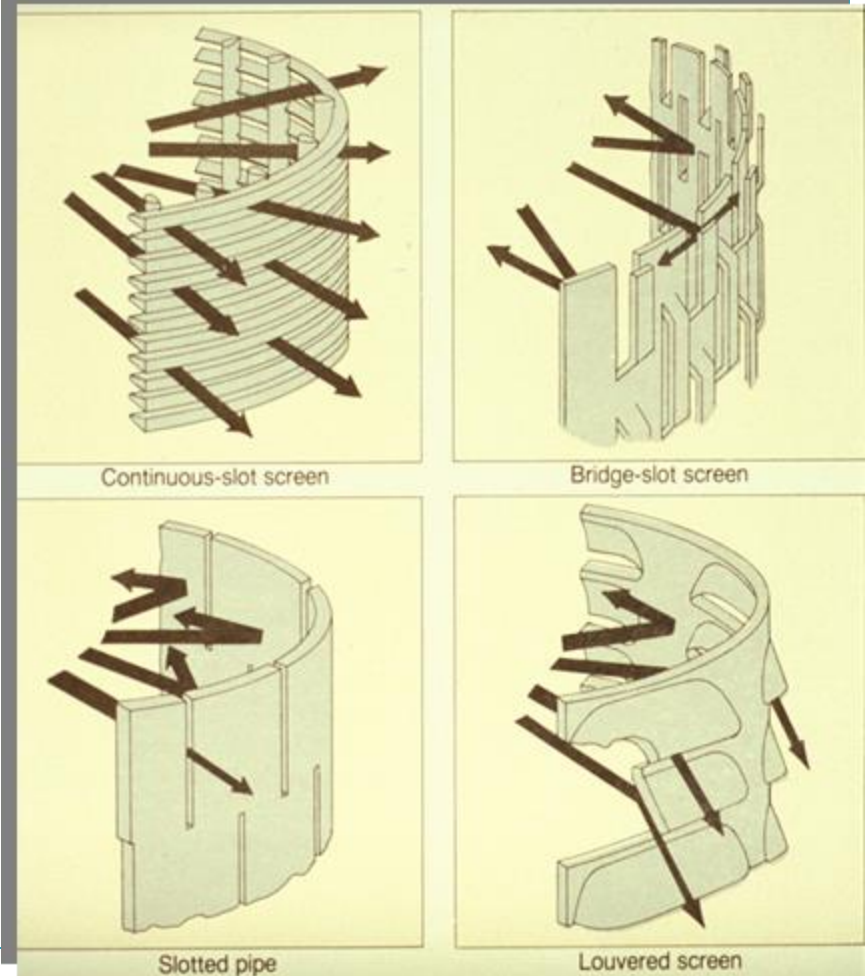
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- **PHYSICAL CLEANING AND RE-DEVELOPMENT**
  - BRUSHING – NYLON – WIRE – ROTATING -
  - BAILING - SAND PUMPING – SOME SURGE AND SWAB ACTION
  - SURGING – PUSHING FLUID OUTWARD
  - SWABING – PULLING FLUID INWARD
  - HIGH PRESSURE JETTING – WATER BLASTING
  - SONAR OR OTHER PULSE TECHNOLOGY – AIR, WATER, NITROGEN, ELECTRONIC, POWDER - HIGH IMPACT ENERGY
  - PUMPING OR AIRLIFTING - EVACUATING FLUID FROM THE WELL

# PHYSICAL TREATMENT METHODS

## CONSTRUCTION DATA:

PRE REHABILITATION VIDEO  
FORMATION  
STATIC WATER LEVEL  
CASING MATERIAL  
SCREEN TYPE AND MATERIAL  
GRAVEL PACK  
DEVELOPMENT METHOD  
INITIAL PUMP TEST

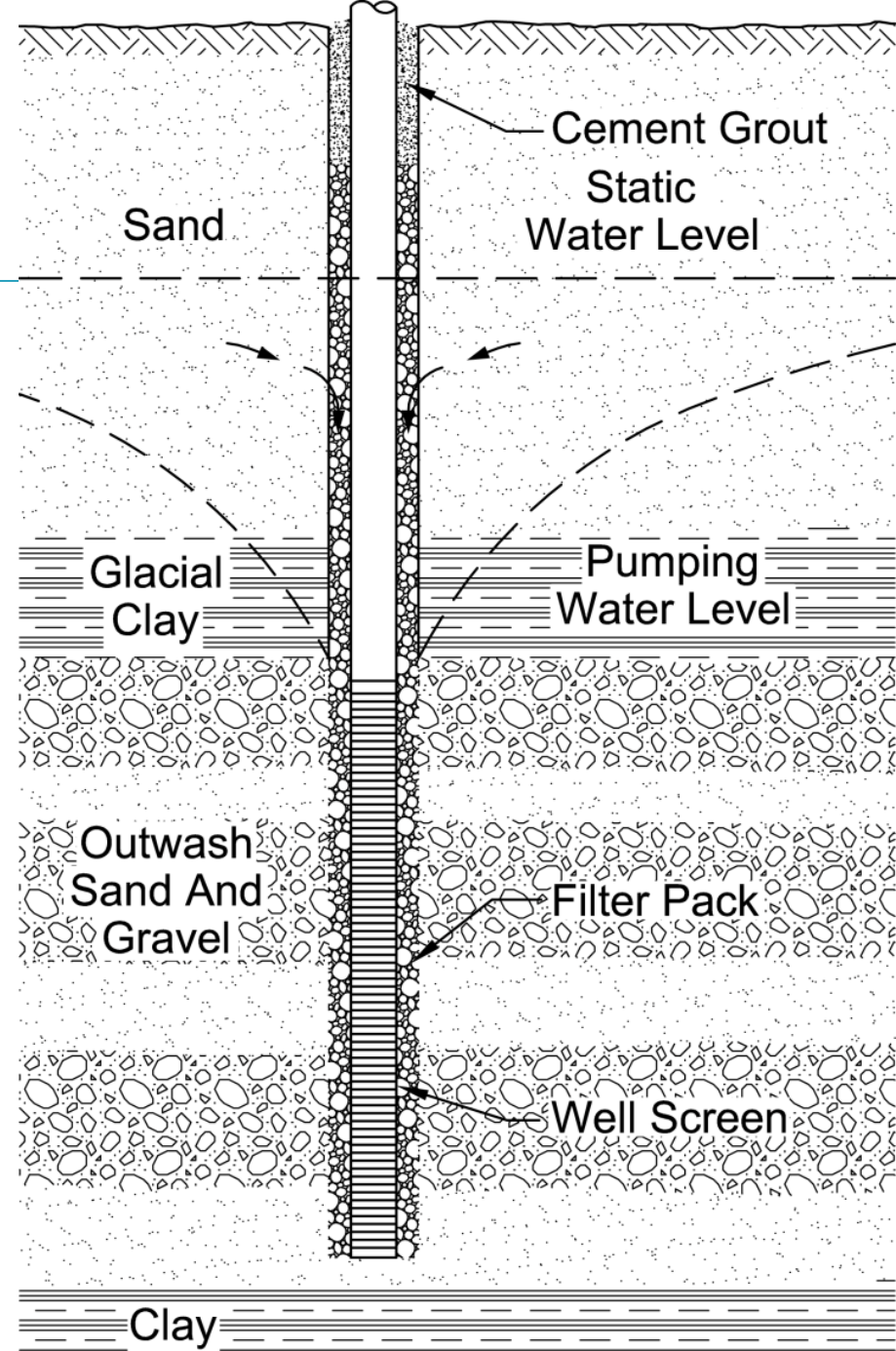


# UNDERSTANDING WELL DYNAMICS

Both, adding chemistry and flushing the Well requires knowledge of the aquifer characteristics and behavior.

As pumping and static levels change so does the wells behavior

Isolating and working smaller intervals will increase potential success.



# PHYSICAL TREATMENT OPTIONS

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# Double Swab Isolation Tool



Concentrates on defined interval

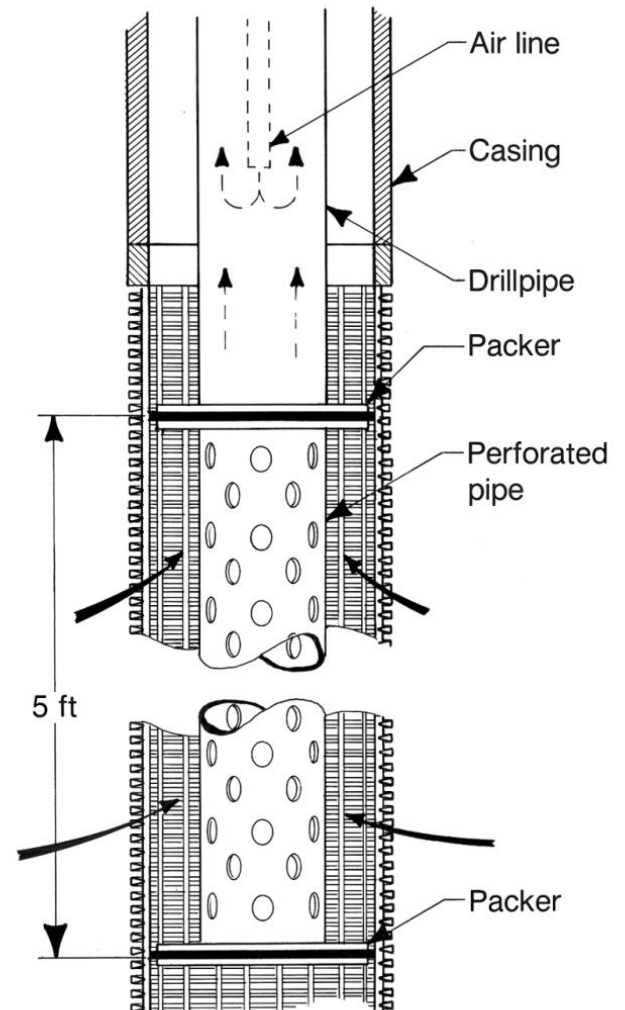
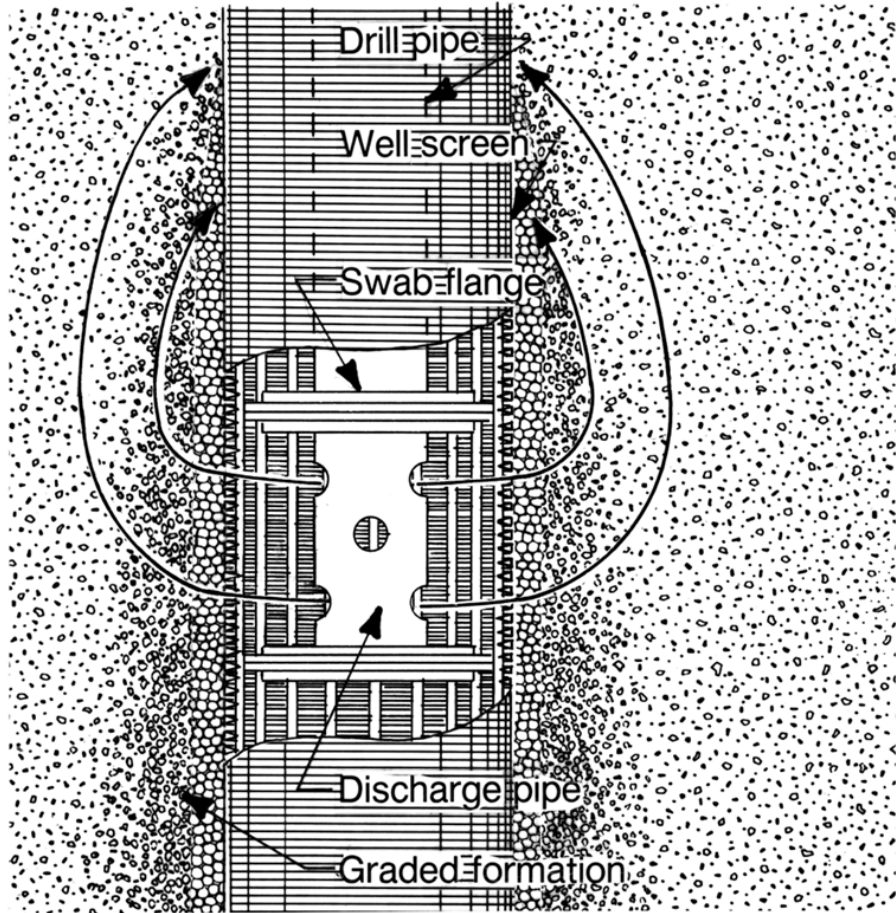
Used to add chemistry

Swab and Surge fluid thru the gravel Pac

Pump or airlift waste water and debris from the well.

Improves the chance for success

# Isolation Tool



# COST

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**Well Maintenance                      20% of a Well Rehab**

**Well Rehab                                20% of a New Well**

**New Well                                  200% of the Old Well**

**This all depends on many variables and assumptions**

## REQUIREMENTS FOR LASTING EFFICIENCY

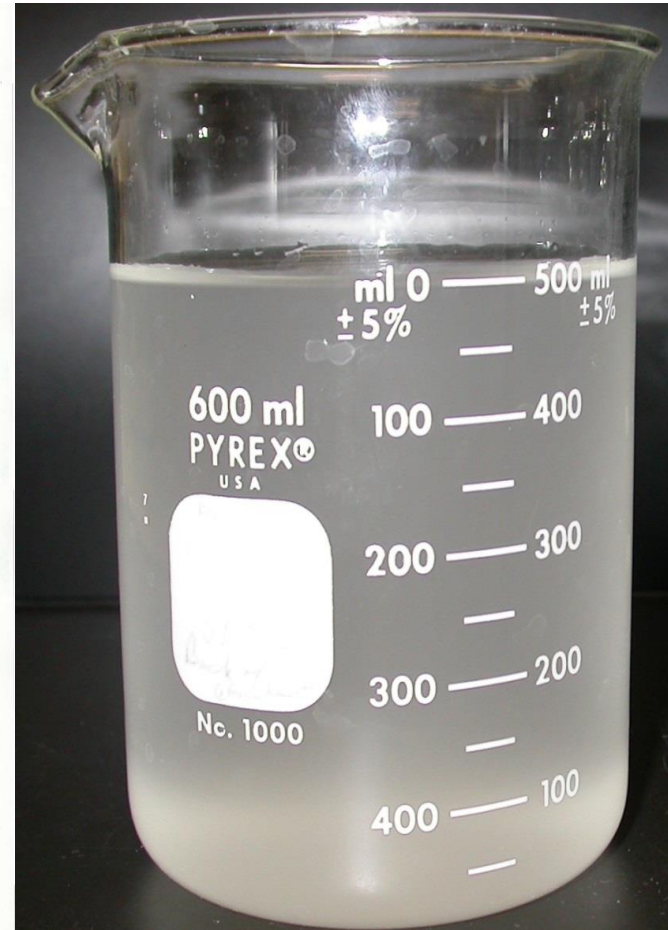
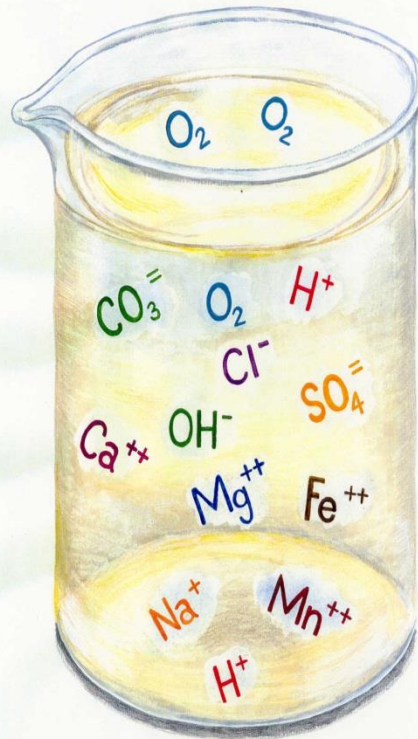
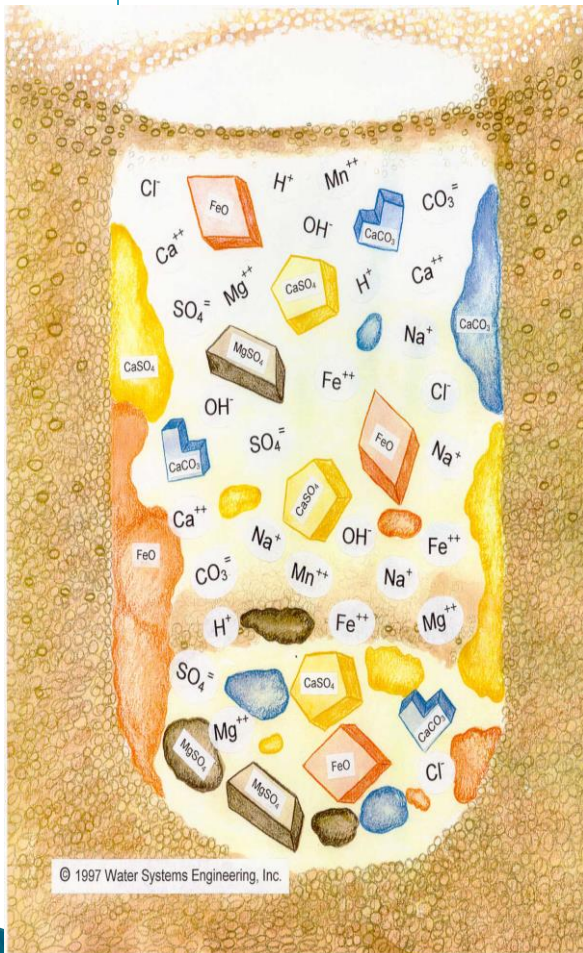
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### **Get the Chemistry and Biology out!**

- ▶ 75 to 80% of chemistry removed in 7 well volumes
- ▶ Normal operations may require 20 well volumes for total removal
- ▶ Evacuation of additional volumes of water may be needed to remove all chemistry from stagnant areas
- ▶ Pumping equipment/completion can influence pumping volumes



# TOTAL DISSOLVED SOLIDS



# AT WHAT POINT ARE WE SATISFIED

- .
- Pumping or airlifting excess TDS waste water and debris from the well improves the chance for lasting success.



# THANK YOU



FRED ROTHAUGE  
970 381-3788



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