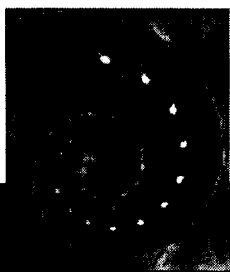


*Overview of  
Koch Membrane Systems  
and its Capabilities*

Presented by:  
Kenneth W. Lam  
Regional Manager, Northeast Asia  
Koch Membrane System, Inc.  
Tel: +852-2482-5242  
Fax: +852-2482-2907  
Email: [kochklam@hkstar.com](mailto:kochklam@hkstar.com)



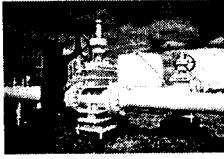

**KOCH**  
MEMBRANE SYSTEMS  
Fluid Systems

*Overview of  
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Email: kochklam@kstar.com

**KOCH**  
MEMBRANE SYSTEMS

- Second largest privately held company in USA

- Seven major business groups

**KOCH**  
MEMBRANE SYSTEMS


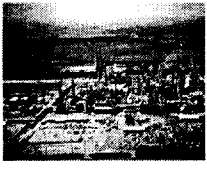
**KOCH**  
MEMBRANE SYSTEMS

- Sales (\$ Million) • 35,000
- Employment • 13,000
- Headquarters • Wichita, Kansas
- Ownership • Privately owned
- Major Business • Oil refining, chemicals, materials, hydrocarbons, pipeline transmission, chemical technology, agriculture, finance (including municipal financing)
- Growth • Strong growth since 1967. Currently we are the second-largest privately held firm in the USA.

**KOCH**  
MEMBRANE SYSTEMS

**KOCH**  
MEMBRANE SYSTEMS

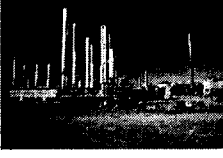

- Refined Products Group
- Refineries (300,000 b/d capacity), product terminals, asphalt plants

**KOCH**  
MEMBRANE SYSTEMS

**KOCH**  
MEMBRANE SYSTEMS




- Hydrocarbon Group
- 150,000 b/d fractionator, gas and gas liquids pipeline systems, and gas processing plants

**KOCH**  
MEMBRANE SYSTEMS

**KOCH**  
MEMBRANE SYSTEMS

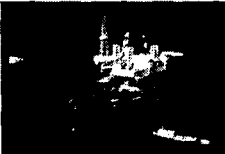

- Crude Oil and Field Services Group
- The largest in the United States

**KOCH**  
MEMBRANE SYSTEMS




**KOCH**

- **Exploration Group**
  - Explores in the Rocky Mountains, offshore Gulf and California coast, Louisiana, Texas, New Mexico, Dakotas, California, and internationally



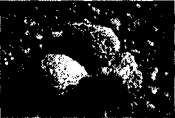

**KOCH**

- **Chemical Group**
  - Produces 200 million gallons of petrochemicals annually and markets over 30 different chemicals worldwide




**KOCH**

- **Carbon Group**
  - Petroleum coke marketing, coal mining, and distribution









**KOCH**


- **Chemical Technology Group**
  - Research & Development, processes, process equipment, membrane separations, and pollution control systems


- **Largest membrane company in the industry**

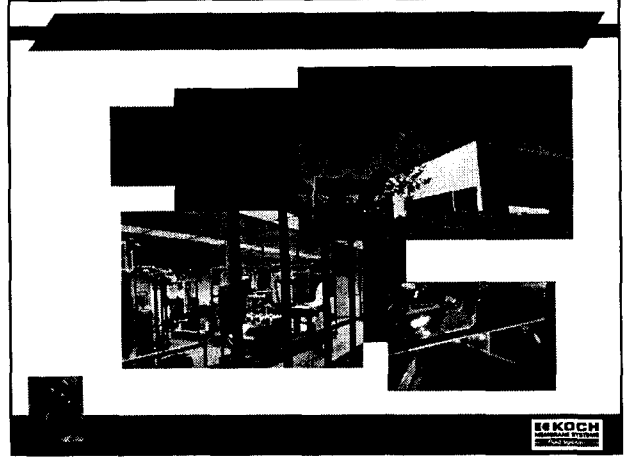
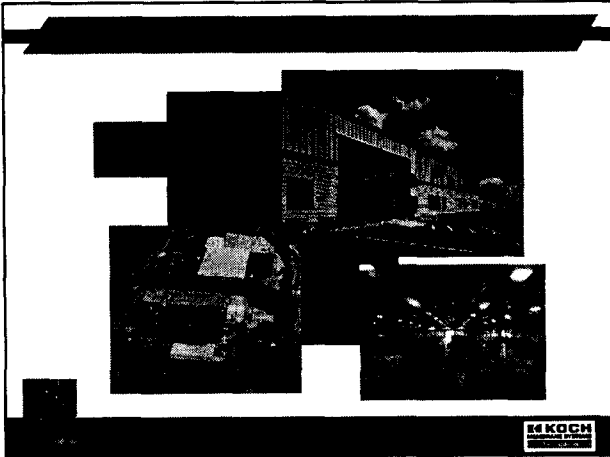




- **Products range from MF/UF/NF to RO in tubular, hollow fiber and spiral formats**

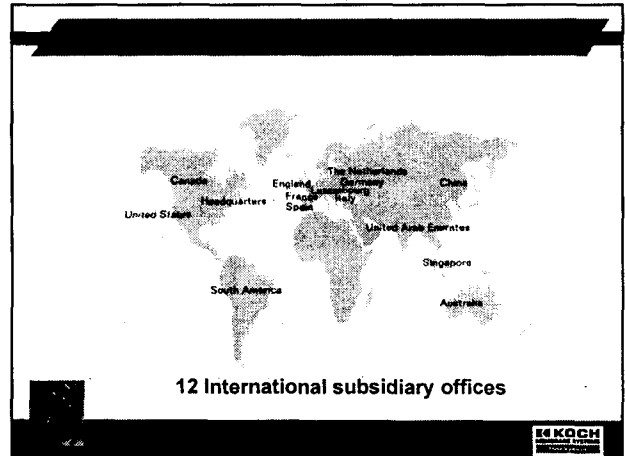


- Sales (\$ Million)
  - 100
- Employment
  - 560
- Headquarters and Manufacturing
  - Koch Membrane Systems, Wilmington, MA
  - Fluid Systems, San Diego, CA
- Growth
  - Merged with Fluid Systems in 1998
  - Currently we are the largest membrane manufacturer in the world
- Experiences
  - Over 30 year in MF/UF
  - Over 30 years in RO





15 North American sales offices



12 International subsidiary offices

**Fluid Systems** TFC<sup>®</sup>

SetRO<sup>®</sup> ROGA<sup>®</sup>

Abcor

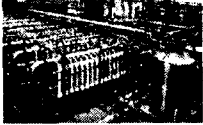
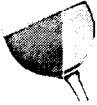

ROMICON<sup>®</sup> CARBO-COR<sup>™</sup>

**Dairy**

- Concentration of whey
- Concentration of milk
- Production of fresh cheese
- Standardization of milk
- Fractionation of proteins
- Filtration of brine

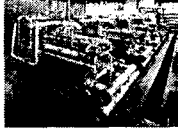


**• Beverages**

- Clarification of apple, pear, and pineapple juices
- Clarification of wine
- Recovery of wine lees
- Upgrading of citrus juices
- Clarification of cranberry and grape juices

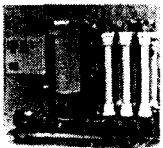

**• Food**

- Clarification of sugar solutions
- Clarification and concentration of gelatin
- Concentration of egg and egg white
- Recovery of starches
- Concentration of blood protein
- Clarification of vinegar

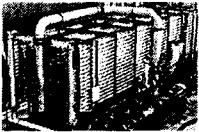


**• Pharmaceutical/Biotech**

- Enzymes
- Cell lysates
- Whole cell broths
- Antibiotics
- Proteins
- Recombinant products
- Organic acids
- Blood products
- Vaccines/ Hormones/ Yeast
- Vitamins




**• Wastewater**

- Metalworking
- Machine tool lubricants
- Food processing
- Textiles
- Paper
- Printing
- Chemicals
- Primary metals
- Transportation
- Leather
- Municipal




**• Electro-coat Paint**

- Automotive
- Appliance
- General Industrial






**• Water**



- Potable water
- Pharmaceutical
- Electronic grade water
- Water for beverage processing
- Industrial process water
- Brackish and Seawater Desalination
- Water Recycle


- Membrane Products
  - Polymeric MF, UF, NF and RO membranes
    - Tubes
    - Hollow Fibers
    - Spirals
  - Flat Sheet RO membranes
  - Carbon Fiber Composite MF tubes
- Membrane Systems
  - Engineered Process Systems



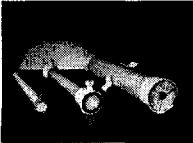
- In-house membrane manufacturing
- Complete selection of module type
- Process and Engineering assistance
- Installation, startup, and training
- Ongoing service and technical support


*Spiral Membranes*



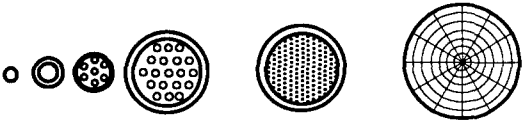
*Tubular Membranes*




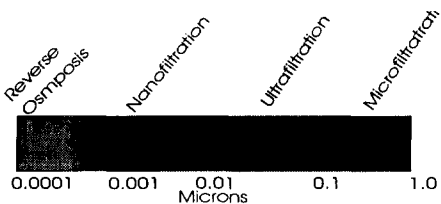
*Hollow Fiber Membranes*




Open, Wide Channel Height ▶ Narrow, Thin



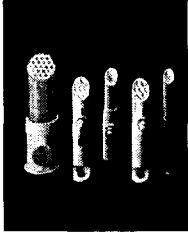


<p><b>Tubular</b> One-Inch FEG ULTRA-COR VII (1/2") SUPER-COR (1/2") CarboCor (3/8")</p>	<p><b>Hollow Fiber</b> Variable Fiber Diameter 20, 30, 35, 43, 60, 75 &amp; 106 mil 3", 5", 6" &amp; 8" sizes</p>	<p><b>Spiral</b> Variable Spacers 4", 6" &amp; 8"</p>
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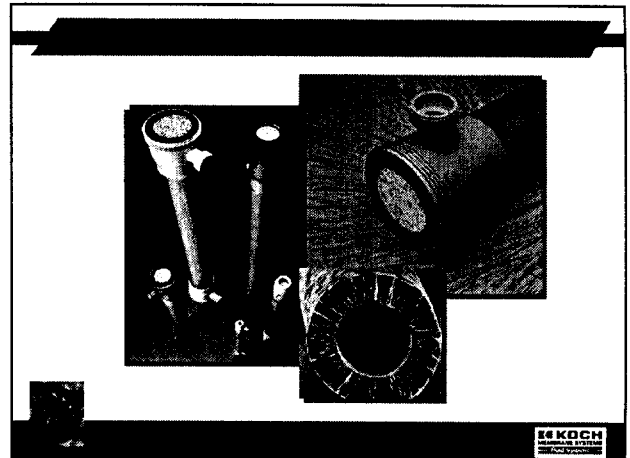
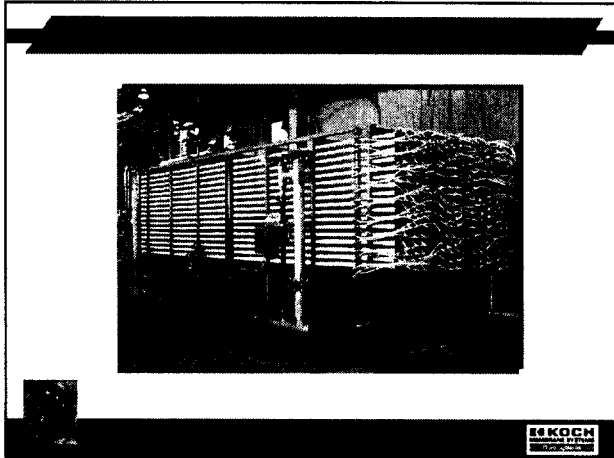



Reverse Osmosis	Nanofiltration	Ultrafiltration	Microfiltration
0.0001	0.001	0.01	0.1 1.0
Microns			
Sea Water Desalination	Divalent Salts	Colloids Suspended Solids Silt Clay Turbidity Some organics Bacteria Viruses Algae	Suspended Solids Particulates
Brackish Water Desalination			




**1" FEG  
7 x 1/2" UltraCor-VII  
and  
19 x 1/2"  
SuperCor Tubes**










**•Final Filtration**  
 -Post RO/DI

 20 mil (0.5 mm)


**•Pretreatment applications**  
 -Surface Waters  
 -Ground Water  
 -City Water

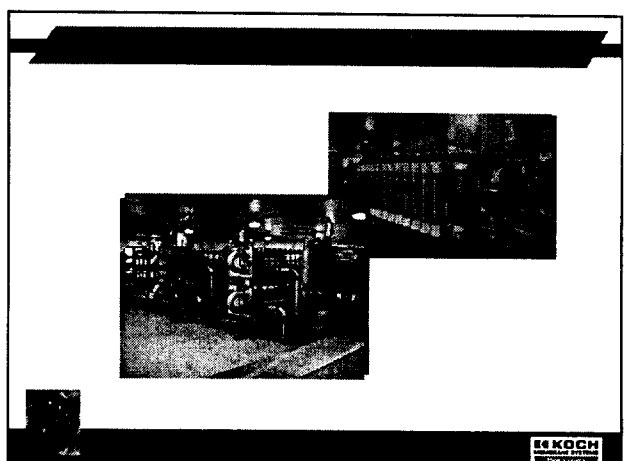
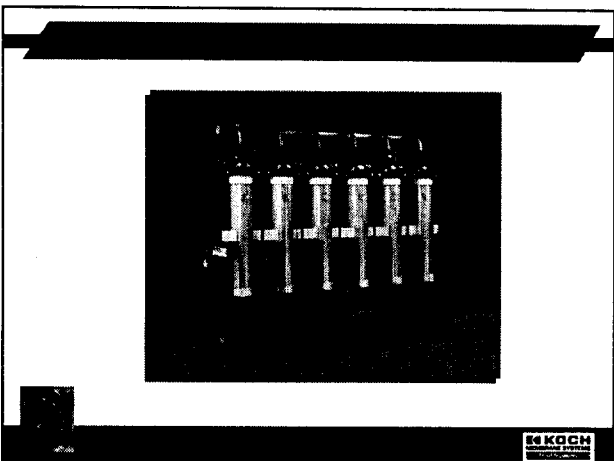
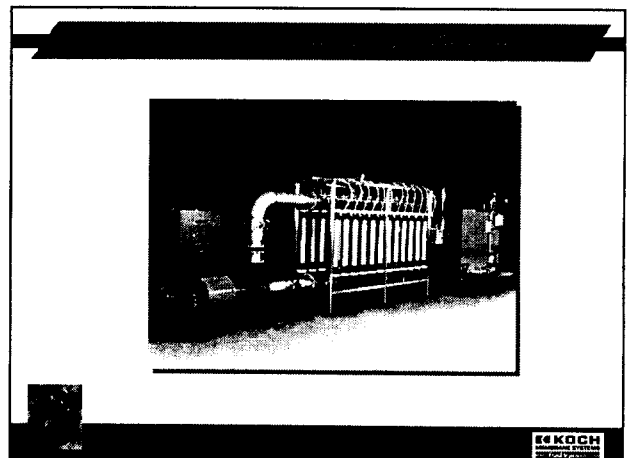
 30 mil (0.7 mm)

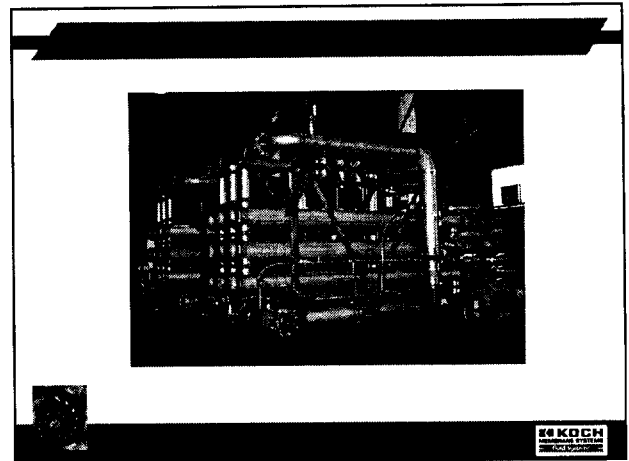
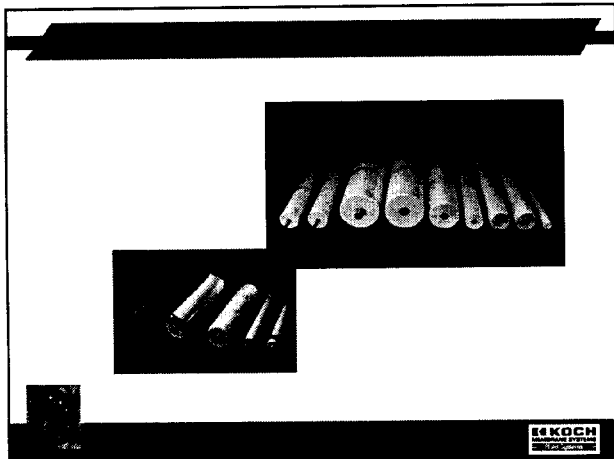
 35 mil (1.0 mm)

 43 mil (1.1 mm)

**•Extremely Dirty Waters**  
 -High Recovery Systems  
 -Bioreactors

 106 mil (2.7 mm)





- NF Membrane
  - pH 0-14, Solvent stable, up to 70 °C
  - Available in tubular and spiral format

*Tubular Module*

*AlkaSave Caustic Recovery System*

- MF/UF Membrane
  - Carbon-graphite composites
  - Any pH up to a temperature of 165°C (329°F).


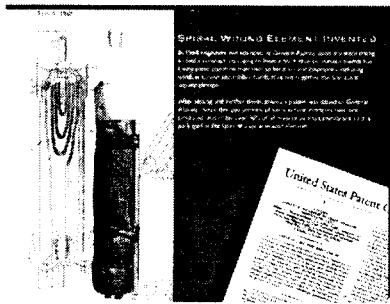
*CarboCor Degreaser Recycling System*

- Brackish Water Desalination
  - Industrial process water
  - Potable water
  - Wastewater
- Seawater Desalination
- Softening/Organic Removal
- Food Separation
- Specialty Process Applications


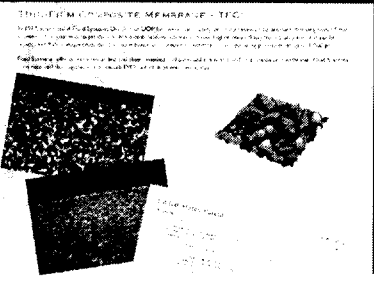
- TFC®
  - Thin Film Composite (polyamide) Membranes
- ROGA®
  - Cellulose Acetate
- Element Sizes
  - 2" and 4" diameter
  - 8" x 40", 8" x 60"
  - 12" x 60"




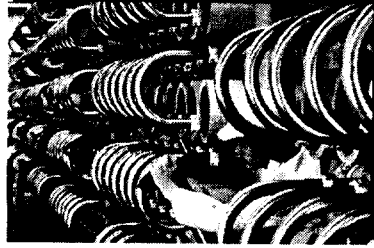
- TFC Highlights
  - Magnum® elements
    - 1.5 meter (60" length)
    - less connectors and higher area
  - ULP® membrane
    - <7 kg/cm2 (100 psi)
  - Premium Products
    - Brackish water, HR Premium: 99.7% minimum salt rejection
    - Sea water, SS Premium: 99.8% minimum salt rejection
  - Heat Sanitizable Product
    - sanitize with 80 °C water


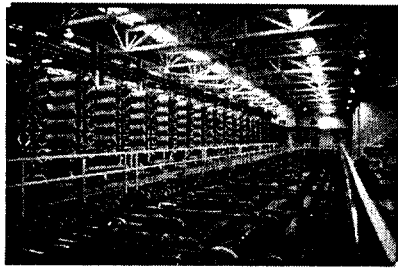
*The 1st Spiral Wound Element - circa 1964*


*The 1st TFC® RO Membrane - circa 1977*

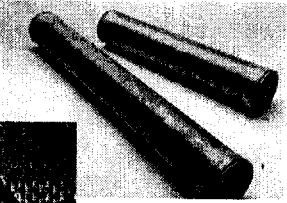

*The 1st Tertiary Wastewater Plant - circa 1977  
Orange County Water Factory 21, 5 MGD*


*The world largest RO Plant, circa 1982  
Yuma Facility, 72 MGD  
using 12" dia. X 60" Magnum® elements*






**Magnum Elements**

*8" diameter x 60" long  
12" diameter x 60" long*



- International company with strong corporate resources
- Complete integration; membranes and systems
- Strong research & development
- ISO 9001 certification since 1995
- Process and engineering support
- Strong customer support
- Installation, start-up and training support
- Over 60 years of combined UF and RO experiences
- Numerous installations worldwide
- Develop long term corporate relationships with our customers



**Thank you very much**

**Kumshahamida**

Please visit our website at [www.kochmembrane.com](http://www.kochmembrane.com)

